MEADOWBANK GOLD PROJECT

2015 Annual Report

Prepared for:
Nunavut Water Board
Nunavut Impact Review Board
Fisheries and Oceans Canada
Indigenous and Northern Affairs Canada
Kivalliq Inuit Association

Prepared by:
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DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Comment
1	2016/03/31	All	All	This has been reviewed by Environmental Staff and will be incorporated into training for all mine staff on behalf of the Mine Manager and Senior Management

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The information in this document has been presented to mine managers and is endorsed and approved by senior management at AEM*.

* AEM is a recent signatory of the Mining Association of Canada- Toward Sustainable Mining. This document presents information related to assessment tools related to: Biodiversity Conservation Management and Tailings Management. Look for the * marked footnotes for TSM related information.

SECTION 1. INTRODUCTION

The Meadowbank Gold Project operated by Agnico Eagle Mines Limited - Meadowbank Division (AEM) is located approximately 70 km north of the Hamlet of Baker Lake, Nunavut. The project components include marshalling facilities in Baker Lake, the 110 km All Weather Access Road (AWAR) between Baker Lake and Meadowbank, the Vault mine site and the Meadowbank mine site.

These various components and activities associated with the project require a number of different authorizations, leases and permits from regulatory agencies including the Nunavut Water Board (NWB), the Environment Canada (EC) Metal Mining Effluent Regulations (MMER); the Department of Fisheries and Oceans Canada (DFO), Indigenous and Northern Affaires (INAC) (formerly Aboriginal Affairs and Northern Development Canada (AANDC)); the Kivalliq Inuit Association (KIA) and the Nunavut Impact Review Board (NIRB).

This report is written to address all of the 2015 annual reporting requirements of the project under these authorizations:

NWB Type A Water License 2AM-MEA1525;
NIRB Project Certificate No. 4;
DFO HADD Authorization NU-03-190 AWAR;
DFO HADD Authorization NU-03-191 Mine Site;
INAC Land Leases 66A/8-71-2 (AWAR) and 66A/8-72-2 (AWAR Quarries); and
KIA Right of Way KVRW06F04.

Reporting requirements for the MMER have been submitted directly to Environment Canada; results are presented herein to comply with the NWB Type A water license.

Table 1.1 outlines each requirement by authorization and report section. Table 1.2 presents the status of each of the sampling stations stipulated in Part I, Schedule 1 of Water License 2AM-MEA1525.

SECTION 2. SUMMARY OF ACTIVITIES

2.1 2015 ACTIVITIES

The primary business objective of Agnico Eagle is to build a high-quality business focused on solid execution that drives growth in cash flow per share. This strategy has been consistent for many years — to minimize financial and political risk while using Agnico's broad range of technical skills and experience to build long-life, manageable operations in recognized mining regions. This strategy has worked well for Agnico and its shareholders over the 59 years the company has been in business.

In 2015, all of Agnico's operations continued to perform well, which allowed the company to exceed production and cost guidance for the fourth consecutive year. Despite a volatile gold price environment, the company doubled exploration spending, continued to advance its pipeline of development projects, and reduced net debt by approximately $190 million. Over the next three years, the company is forecasting stable annual production and costs, which will support continued investment in existing mines, maintain funding levels at key exploration projects and advance development opportunities in Nunavut at a steady and measured pace. The 2015 highlights for Meadowbank include:

- Meadowbank was Agnico Eagle's largest gold producer in 2015, and has 0.9 million ounces of gold in proven and probable reserves* (11 million tonnes at 2.72 g/t).
- The mine is expected to produce 305,000 ounces of gold in 2016, and to average 238,000 ounces gold from 2017 to 2018.
- During 2015, payable gold production totaled 381,804 ounces at a total cash cost per ounce of $613. The mine also produced 221,000 ounces of silver during 2015.
- This was a record year for safety at Meadowbank Mine, with no lost time accidents.
- Meadowbank's recruitment, retention and training of Inuit are showing encouraging outcomes.

In July 2015, the company decided to proceed with the expansion of the Vault pit. This expansion resulted in revised production guidance at Meadowbank for 2016 to 2018. The mine is now expected to close in the third quarter of 2018, which is approximately a year longer than previously forecasted. The expansion of Vault pit includes Phaser pit, which is still in the approval process. Approval from NIRB and the NWB, for this expansion, is anticipated in 2016.

The extension of the Meadowbank life of mine to Q3 2018 is expected to help bridge the production gap between the end of production at Meadowbank and the potential start of production at a satellite pit at Amaruq Exploration Property called Whale Tail Pit (not yet approved for construction). The company is actively exploring the Amaruq deposit, and hopes to ultimately develop the Whale Tail Pit, as a satellite operation to Meadowbank, with the potential to begin production in 2019.

A major challenge is that the gold reserves at Meadowbank will be exhausted by the third quarter of 2018. Should AEM decide to develop the Whale Tail Pit at the Amaruq property, it is anticipated that permitting requirements would not be completed by the Q3 end of production forecast at Meadowbank. Furthermore operations at the potential Whale Tail Pit would not be expected until Q3, 2019. This could cause a gap and may result in Meadowbank going into care and maintenance or closure for a one year period. This could potentially also result in a diminished labour force and contractors for the same one year period.

The Company is actively pursuing ways to close the gap and will seek the support of regulatory agencies to consider more expedient regulatory processes, specifically looking at Amaruq as a satellite deposit feeding an existing mine/mill at Meadowbank rather than a new standalone mine. It is hoped that this can reduce the length of time required to complete the process reducing the potential gap between the end of mining at Meadowbank and the potential start of the Whale Tail Pit at Amaruq

Quarterly progress reports, providing further details of activities throughout the 2015 year, were prepared for the Kivalliq Inuit Association as required by Production Lease KVPL08D280.

AEM infrastructure locations can also be found in Figure 1, 2, 3, 4, and 5.

Figure 1. 2015 Sampling locations around Meadowbank Site.

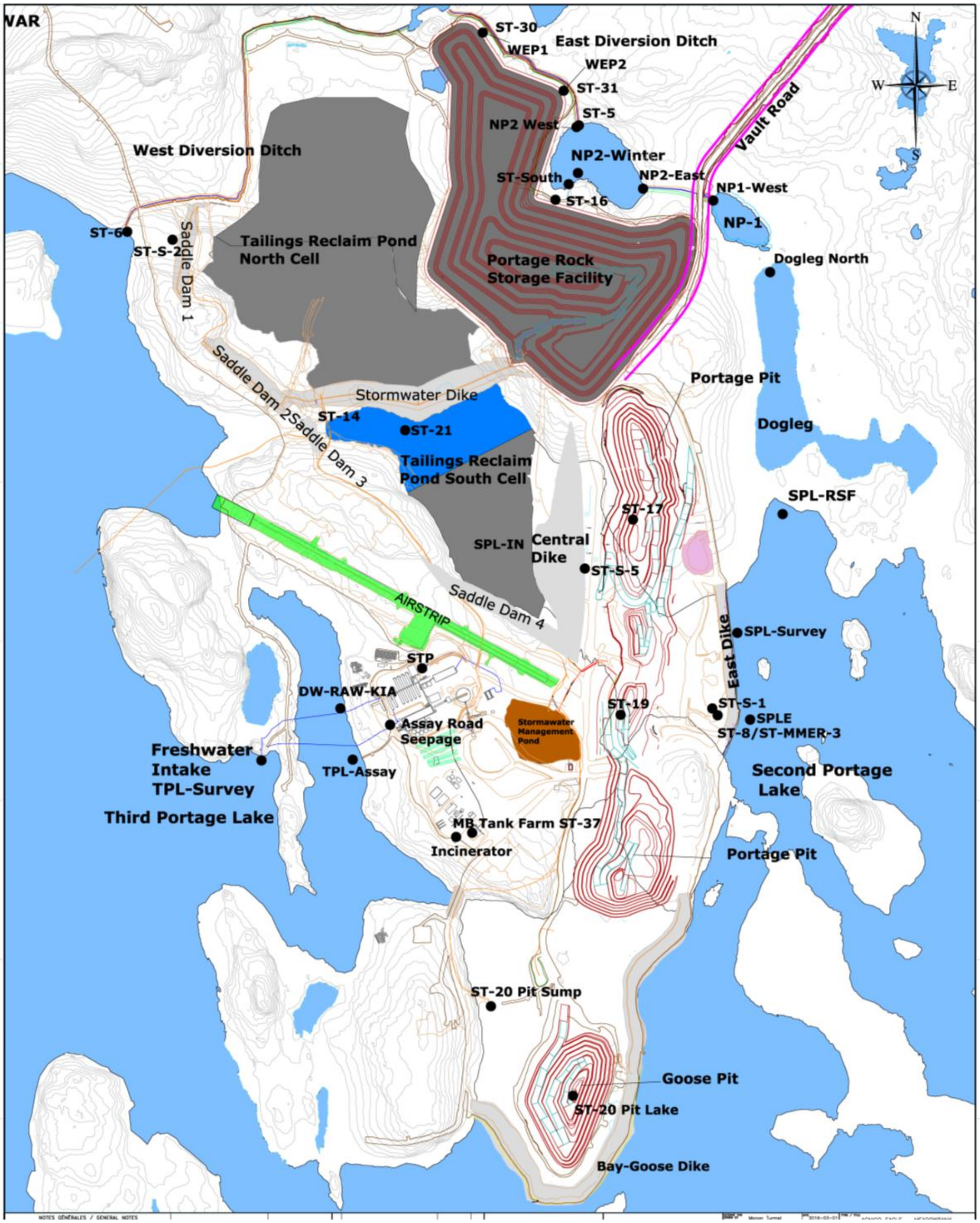


Figure 2. EEM Receiving Environment Sampling Locations

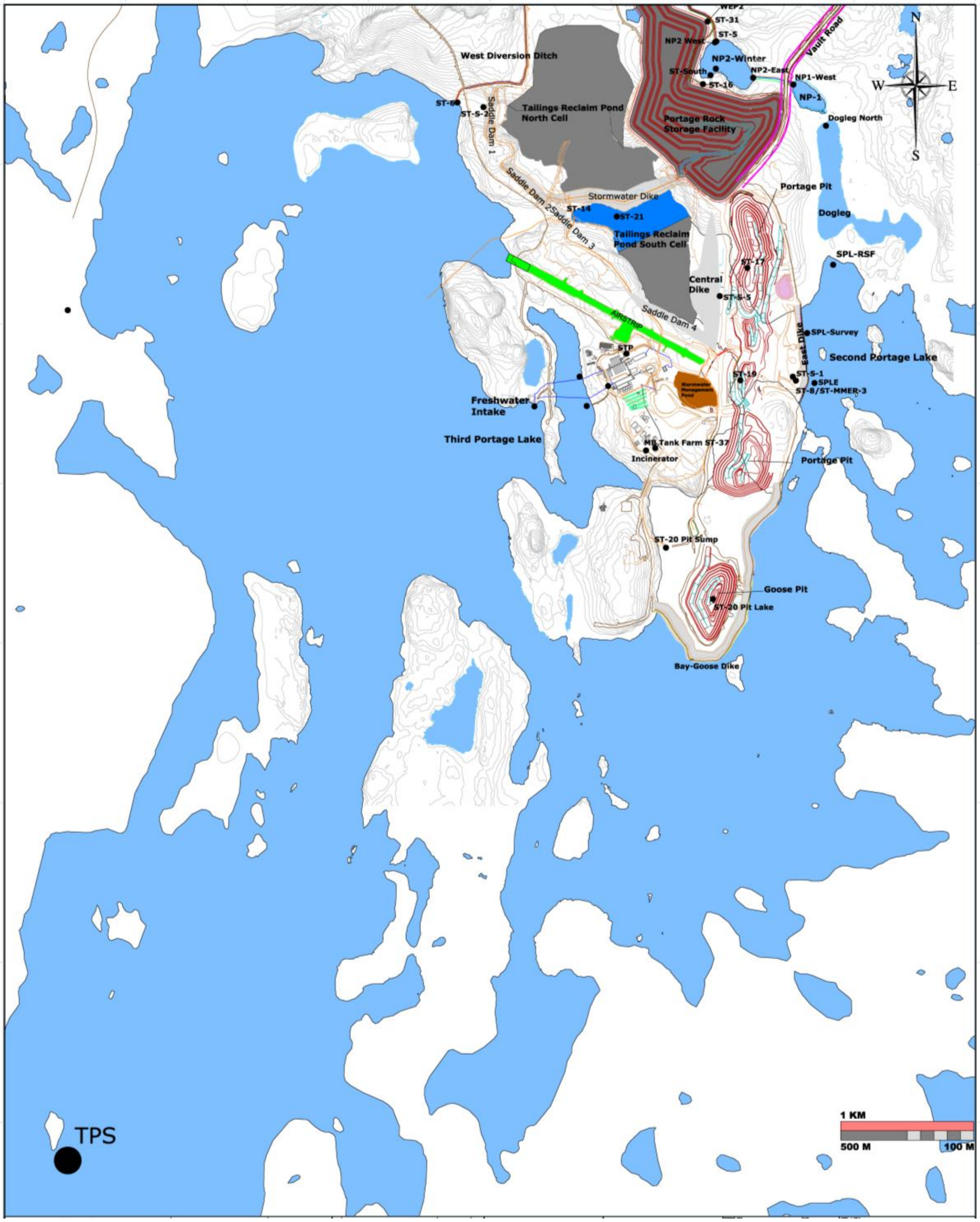


Figure 3. Vault Area Sampling Locations

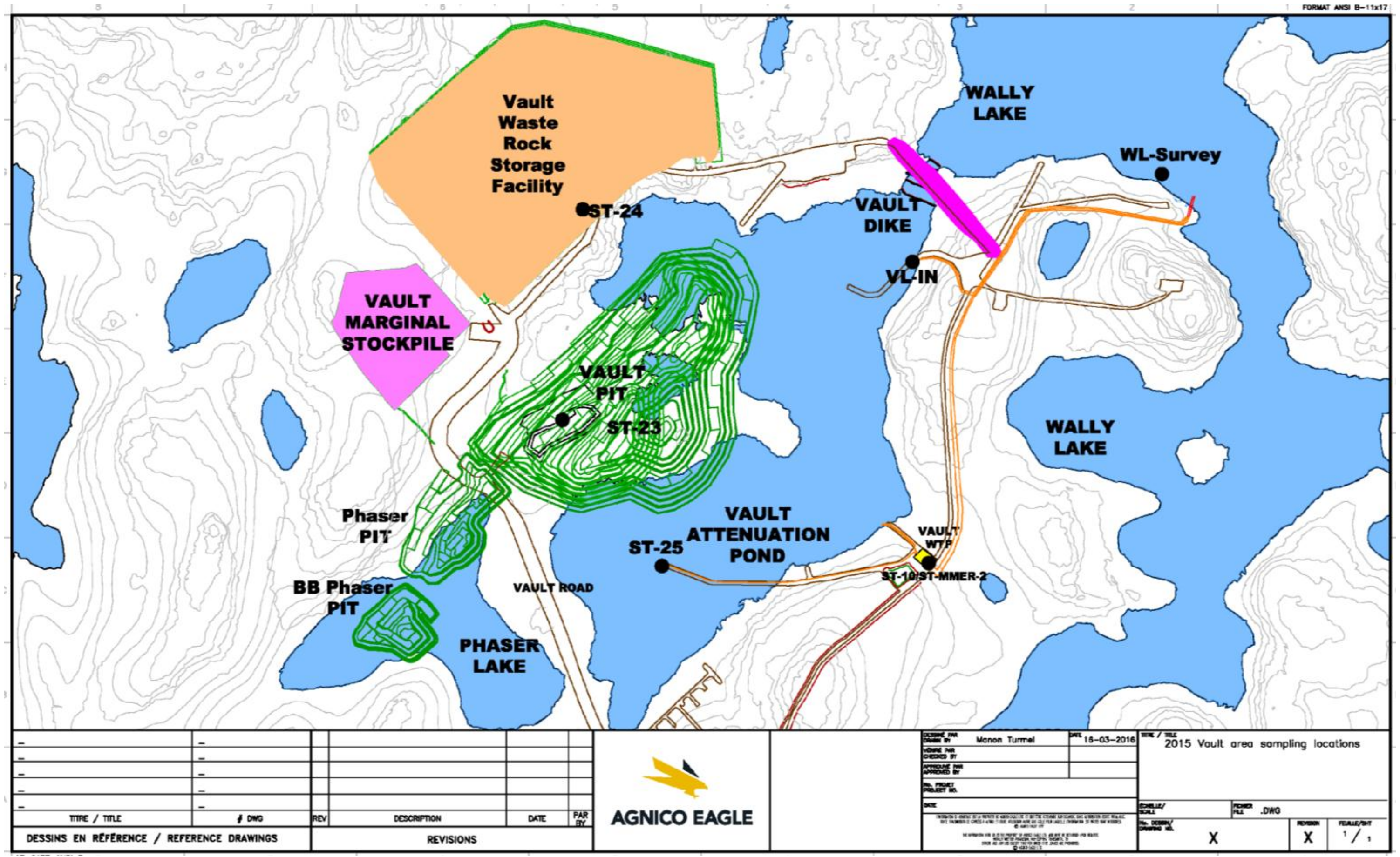


Figure 4. Baker Lake Tankfarm Sampling Locations

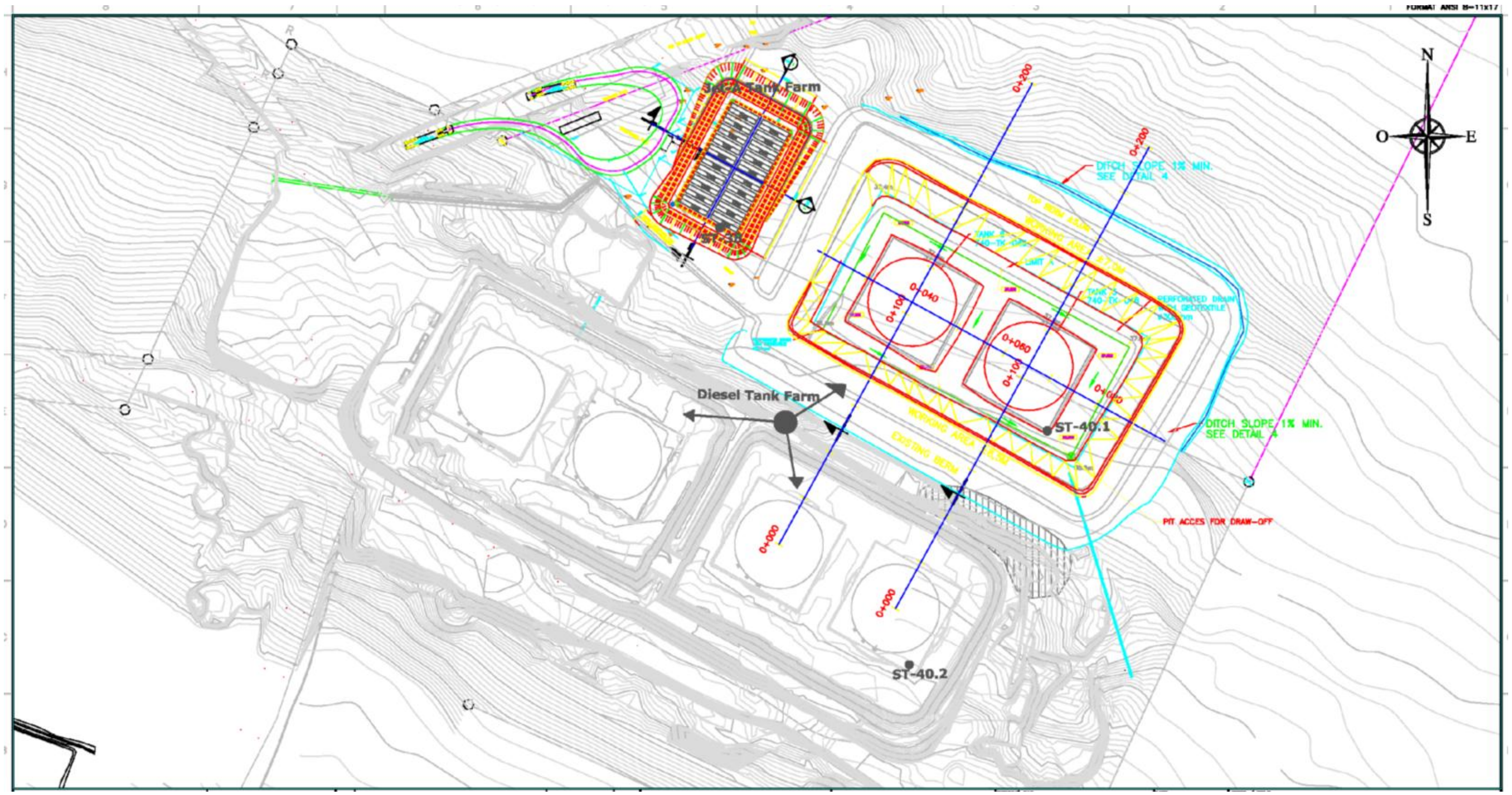
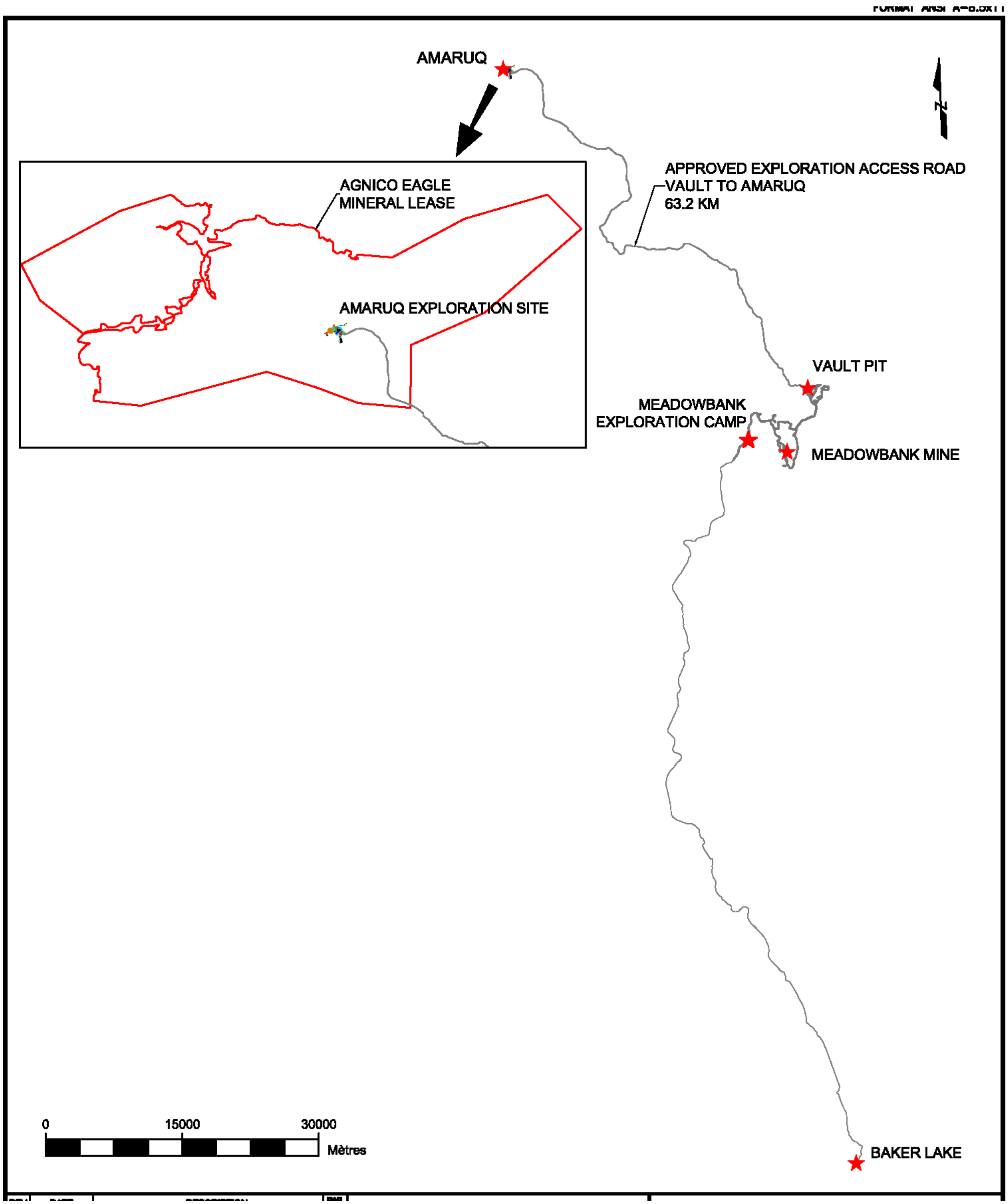


Figure 5. Amaruq Project Plan View



2.2 2016 MINE PLAN

The "*2016 Mine Plan*" for the Meadowbank Gold Project, prepared for the Kivalliq Inuit Association as required by Production Lease KVPL08D280, is attached in Appendix A1. This report was submitted to the KIA on December 18th, 2015, and outlines the activities planned for the project throughout the 2016 year.

The Meadowbank gold mine began the operation phase of the project in February 2010, and thus, is entering its seventh year of operations. In addition to routine activities throughout the 2016 season, a number of secondary construction/modification projects will be undertaken near the main mine site and Vault areas. Construction of the Central Dike Phase 4 and, Saddle Dam 3, 4 and 5 will be completed in 2016.

AEM is currently in the regulatory approval process for receiving authorizations to proceed with the Vault Pit expansion into Phaser Lake. Once the project is approved, AEM plans to begin dewatering Phaser Lake in Q3 of 2016 after completing a fishout. Dewatering is expected to be completed in Q4, 2016 which would allow for active mining in 2017. Dewatering and fish out activity will be completed in less than 3 months (volume of Phaser Lake is estimated at 700,000 m^3). It is proposed that the water from Phaser Lake be transferred into the existing Vault Attenuation Pond and discharged through a diffuser into Wally Lake.

Environmental monitoring (wildlife, aquatic effects, groundwater, noise and air) will continue through 2016 in support of all operational undertakings at the Meadowbank site as required by the NWB Type A Water License 2AM-MEA1525, NIRB Project Certificate No.004, DFO authorizations, and MMER regulations.

In 2016, the AEM mining plan is to operate Portage and Vault pits at the Meadowbank mine site. A total of 33.5 Mt of rock will be mined from these two pits during the year. The mine plan consists of moving 29.5 Mt of waste rock and 4.1 Mt of ore from the open pits. An additional 0.5 Mt of ore from existing stockpiles will also be processed. 5.0 Mt of material will be mined out from Portage pit. Vault pit will accommodate the majority of the mining, totaling 28.5 MT of material. In the first two quarters of 2016, due to a shortage of Pit ore, we will reclaim approximately 0.3 Mt of mostly lower grade ore stockpiles (1.05 g/t)

The Waste Management Plan for 2016 is to maximize waste storage facility (WSF) utilization and minimize haulage cycle times which will, in turn, minimize the greenhouse gas emissions and impact on the environment.

2.3 AMARUQ EXPLORATION ACCESS ROAD

As requested by the NIRB in the screening decision for the Amaruq Exploration Access Road (NIRB File No.11EN010), AEM included within this annual report (Appendix A2), a comprehensive annual report of the activities associated with that project.

SECTION 3. CONSTRUCTION / EARTHWORKS

The following section discusses reporting requirements related to site construction and earthworks activities associated with dikes, dams and quarries.

3.1 DIKES AND DAMS

3.1.1 Performance Evaluation

As required by water license 2AM-MEA1525, Schedule B, Item 1:

a. An overview of methods and frequency used to monitor deformations, seepage and geothermal responses;

The surveillance program consists of several types of inspection and monitoring:

- Daily inspection – carried out daily by a designated qualified engineer or technician;
- Thermistor and piezometer monitoring – carried out generally weekly or bi-weekly by a designated qualified engineer or technician;
- Detailed inspection - carried out, generally, monthly or bi-monthly by a designated qualified engineer or technician; and
- Engineering annual inspection – carried out annually by qualified engineer (consultant), during open water, if possible, to verify that the facilities are functioning as intended.

Table 3.1 describes the routine geotechnical monitoring program. Refer also to the TSF OMS Manual and the Dewatering Dike OMS Manual available in Appendix I1, and the 2015 Annual Geotechnical Inspection, in Appendix B1.

Table 3.1. 2015 Routine Geotechnical Monitoring Program

Instrumentation	Frequency during dewatering	Frequency during operations
Piezometer	Daily/every 3 hours	Daily/every 3 hours
Slope Inclinometer Casings	Monthly	Monthly in winter, bimonthly for the rest of the year
Thermistors	Automatically: Daily/every 3 hours Manually: Every 3 days in summer and weekly in winter	Automatically: Daily/every 3 hours Manually: Every 3 days in summer and weekly in winter
Surface Monuments and Surface Prisms	Not operational	Bi-weekly
Seismographs	During blasting at the Portage Pit / Goose Pit adjacent to the dike	

b. A comparison of measured versus predicted performance;

For the dewatering dikes, i.e. East Dike, Bay Goose Dike, South Camp Dike and Vault Dike; from the analyses of the available geotechnical instrumentation data and as observed by visual inspection, it appears that the structures are performing as expected. No major concerns were identified in 2015. Regular monitoring will continue in 2016 to assess the performance of the structures.

For the Tailing Storage Facilities structures in operation; i.e. Saddle Dam 1, Saddle Dam 2 and Stormwater Dike; from the analyses of the geotechnical instrumentation data available and as observed by visual inspection; the structures are performing as expected. No major concerns were identified for these structures in 2015. Regular monitoring will continue in 2015 to assess the performance of the structures.

For the dewatering dikes and the Tailing Facilities structures, further comparison of the measured performance to the predicted performance will continue in 2016, as additional data becomes available for analysis.

For the Central Dike; from the analyses of the geotechnical instrumentation data available and as observed by visual inspection, the structure is performing as expected structurally. No unexpected settlement, erosion, bulging or sloughing is observed on the structure. From the analyses of the geotechnical instrumentation data available and as observed by visual inspections of the Central Dike, seepage was observed at the downstream toe of the dike during the fall of 2014 (reported in 2014 Annual report). The seepage continued in 2015. Mitigation actions were taken in 2015 in order to control the Central Dike seepage. Refer to Section 3.1.1 c for details on mitigation actions to control the seepage. For additional information about the Central dike seepage, refer to Section c. below and Section 8.3.7.2 of this report. This information is also stated in the 2015 Water Management Report and Plan (Appendix C2).

The monitoring and inspection of the Central Dike will continue in 2016 and throughout the operating life of the dike.

c. A discussion of any unanticipated observations including changes in risk and mitigation measures implemented to reduce risk;

East Dike

The installation of a seepage collection system downstream of East Dike to capture and pump the seepage water started in September 2011 and was completed in 2012. This was reported in previous annual reports and is noted to be an inflow from Second portage Lake. After the system installation, 3 zones of seepage were identified near the downstream toe. The zones at about Sta. 60+247 and Sta. 60+498 each had a collection sump with pump connected to a year round pumping and piping system.

In 2011, the downstream seepage at Sta. 60+498 was stable at a rate of about 864 m^3/day (10L/s), with no visual signs of turbidity. This was consistent with rates recorded during previous years. In 2011, the seepage downstream at Sta.60+247 appeared stable at around 345.6 m^3/day (4L/s) with no visual signs of turbidity noted, which was consistent with previous rates. Since the pumping installation, all unanticipated seepage has been mitigated through the use of the collection system, all seepage is being captured within the sumps and no sign of additional seepage on the ground surface or downstream in the Portage Pit has been observed. The implementation of this system has reduced risks to the mining activities in Portage Pit and to the dike integrity. Flow meters were installed in 2013 at the discharge of each pump. The flow has been generally consistent from 2013 to present and is approximately 1000 m^3/day.

In 2013, AEM applied for a modification to the previous Type A water license (No. 2AM-MEA0815) Part F, Item 4 to discharge East dike seepage water as non-contact water effluent. AEM proposed to discharge seepage water from East Dike collection system through a separate sump collection system and diffuser, back to Second Portage Lake (SPL) prior to contact with mining activity (thus minimizing site contact water and further mitigating the risks to the environment). In April 2013, NWB approved AEM's application to modify the previous Type A water license. The discharge, from the East Dike sump back to SPL, began in January 2014 and is ongoing. This discharge is subject to MMER requirements and monitoring results to date indicate the parameters are within criteria. If water quality shows increased TSS during freshet period and large precipitation events in summer, the seepage water from East Dike is pumped to the mined out areas of the Portage Pit. Once mining of Portage Pit area is completed, the East Dike seepage will remain in the Portage Pit as part of the pit flooding. See Section 8.3.3.5 for more information on the East Dike Seepage.

Bay Goose Dike

Mining activity in the Goose Pit stopped in April, 2015. Four small seepage areas were identified with a total of 9 seepage channels along the dike. No turbidity was observed in the seepage. The overall seepage is less than anticipated and is not presently a concern as no risks have been identified. There is currently no downstream seepage collection and monitoring system as the amount of seepage through the dike is not significant. The area will continue to be monitored to determine increases/decreases of the seepage in these areas, even if mining activities are terminated in Goose Pit. Seepage of the dike will contribute to natural re-flooding of the Goose Pit.

Refer to the Section 2.3 of the 2015 Annual Geotechnical Inspection (Appendix B1) for detailed field observations regarding this dike. No additional seepage collection has been implemented as the seepage is not affecting the mine operation nor the integrity of the dike. The condition of the dike will continually be monitored and if the condition of the dike is judged to be deteriorating then management actions and remediation will be assessed.

Central Dike

Once tailings deposition started in the South Cell (SC) – in November, 2014 – daily inspections of the downstream toe of Central Dike were undertaken as part of the geotechnical inspection program. A small volume of water located against the downstream toe of Central Dike was noticed at that time. This water was contained between the West road and the Central Dike downstream toe. AEM utilized piezometers, thermistors and a ground water well to monitor the dike integrity, the foundation temperatures and the piezometric levels within the structures and its foundation. The seepage was contained at the downstream toe of the Central Dike and did not reach the Portage pit or the environment.

On April 14^{th} 2015, AEM started pumping at the D/S toe of the dike to lower the water level. The water was pumped back to the South Cell TSF. Water quality was closely monitored to foresee any changes from initial conditions in terms of turbidity and clarity. A flowmeter was also installed to monitor the volume of water pumped. By July 7th, pumping was still on going with a larger pump. Daily inspections are conducted by Engineering Department staff.

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

It should be noted that tailings deposition was redirected to the North Cell from June through October in 2015 to complete the filling to design level. During that time water in the North Cell was pumped to the South Cell for use as reclaim water. The South Cell continued as the site reclaim pond during this time although no tailings were deposited in the South Cell. This also allowed for AEM to continue assessment of the seep.

A series of pumping tests were also performed by AEM during the summer 2015 to measure the seepage flow according to the head pressure difference between the South Cell and the Central Dike downstream pond (sampling location ST-S-5) where seepage water is collected and pumping infrastructure redirects this seepage water back to the cell. This information has been used by Golder to review the Central Dike seepage model. In September 2015, mitigation measures were defined with the support of Golder and it was confirmed that the Central Dike could be operated safely under certain conditions. The Meadowbank Dike Review Board (MDRB) also agreed to recommence the operations of the South Cell tailings deposition and that no short term mitigation was required to be implemented. In early November, the downstream pond operational level was to be set at 115masl until summer 2016 following Golder's recommendations (Golder, 2015). At the same time, a permanent and winterized pumping system was put in place to manage and track the water volumes through the winter. The deposition in South Cell TSF restarted on October 28th, 2015. Tailings deposition along the Central Dike to promote a tailings beach along the structure was undertaken. Within two weeks the seepage flow dropped from 800m^3/h to 400m^3/h and has been stable since that time.

For additional detailed information about the Central dike seepage, refer to Section 8.3.7.2 of this report.

d. As-built drawings of all mitigation works undertaken;

The as-built drawing of the permanent and winterized pumping system for the Central Dike seepage described above is available in Appendix B2.

e. Any changes in the design and/or as-built condition and respective consequences of any changes to safety, water balance and water quality;

The 2015 construction season at Meadowbank was conducted from May 2015 to October 2015. It consisted of the construction of Stage 4 for Central Dike, and the construction of Stage 1 for Saddle Dams 3, 4, and 5. Construction was completed in general accordance with the requirements of the Design and Technical Specifications developed by Golder for each structure.

Work carried out during construction of Central Dike Stage 4 and Saddle Dams 3, 4, and 5 included foundation excavation, fill placement, liner placement and liner tie-in key trench work. The design and technical specifications of Central Dike and Saddle Dams 3, 4, and 5 was developed by Golder Associates (Golder) and reviewed by AEM and by the Meadowbank Dike Review Board (MDRB).

The Stage 4 Central Dike embankment crest is El. 137 m and the downstream toe is between El. 109 m and El. 134 m. The cofferdam is included with Central Dike as part of the upstream face. In 2015, Stage 4 of Central Dike has been constructed from station 0+190 to 0+978, for a total length of 788 m.

The Saddle Dam 3 embankment crest is at El. 140 m and the downstream toe is between El. 134 m and El. 140 m. The bottom of the Stage 1 liner tie-in key trench is between El. 132 m and El. 138 m. In 2015, Saddle Dam 3 has been constructed during Stage 1 from station 20+610 to 20+770, for a total length of 160 m. The Saddle Dam 4 embankment crest is at El. 140 m and the downstream toe is between El. 136 m and El. 140 m. The bottom of the Stage 1 liner tie-in key trench is between El. 135 m and El. 138 m. In 2015, Saddle Dam 4 has been constructed during Stage 1 from station 40+130 to 40+390, for a total length of 260 m. The Saddle Dam 5 embankment crest is at El. 137 m and the downstream toe is between El. 133.5 m and El. 134 m. The bottom of the Stage 1 liner tie-in key trench is between El. 134 m and El. 135 m. In 2015, Saddle Dam 5 has been constructed during Stage 1 from station 0+978 to 1+020, for a total length of 42 m.

None of the changes in the design and/or as-built conditions stated above have consequence on safety, water balance and water quality (refer to the 2015 Annual Geotechnical Inspection in Appendix B1). Continuous monitoring will be done to ensure that the conditions remain stable. As-built reports of the construction completed in 2015 was submitted to the Nunavut Water Board on January 21, 2016.

f. Data collected from instrumentation used to monitor earthworks and an interpretation of that data;

Section 4.0 of the 2015 Annual Geotechnical Inspection by Golder, provided in Appendix B1, presents the instrumentation data collected in 2015.

The report, Annual Review of Portage and Goose Pit Slope Performance (2015), which presents the pit wall geotechnical inspection results, is also provided in Appendix B3, for informational purposes.

g. A summary of maintenance work undertaken as a result of settlement or deformation of dikes and dams; and

No major maintenance work on the dewatering or TSF structures was undertaken in 2015.

h. The monthly and annual quantities of seepage from dikes and dams in cubic metres.

See Section 3.1.1 c and 8.3.7.below for a discussion of seepage from East Dike, Bay Goose and Central Dike. Refer also to the 2015 Water Management Report and Plan (Appendix C2).

3.1.2 Meadowbank Dike Review Board

As required by water license 2AM-MEA1525 Part I, Item 12: ***The Licensee shall submit to the Board as part of the Annual Report required under Part B Item 2, all reports and performance evaluations prepared by the Independent Geotechnical Expert Review Panel.***

Two reports (Report 17 and Report 18) were prepared by the Meadowbank Dike Review Board in 2015. These reports and the responses from AEM are included in Appendix B4.

3.2 QUARRIES

The annual reporting requirements listed in the following sections apply only to quarries located along the All Weather Access Road (AWAR).

As required by INAC Land Lease 66A/8 72-2, Condition 8: ***The lessee shall file a report, annually, with the Minister in the manner and format stipulated by the Minister. The report shall include:***
i. Quantity of material removed and location of removal, for the immediately preceding calendar year; and
ii. Such other data as are reasonably required by the Minister from time to time.

And

As required by INAC Land Lease 66A/8 72-2, Condition 25: ***The lessee shall file, annually, a report for the preceding year, outlining the ongoing borrow area operations completed in conformity with the approved Borrow Management Plan, as well as any variations from the Plan.***

And

As required by KIA Right of Way Authorization KVRW06F04, Schedule E, Condition 8: ***The lessee shall file annually a report for the preceding year, outlining the ongoing borrow area operations completed in conformity with the approved Borrow Management Plan, as well as any variations from the Plan.***

In 2015, AEM did not blast from the quarries on INAC or KIA leased lands along the AWAR. The All Weather Access Road (AWAR) and mine site road maintenance utilized crushed NAG material from the mine site.

In 2015, AEM continued the remedial activities in Quarry 22. This quarry was historically used as a temporary storage area for contaminated materials generated as a result of petroleum hydrocarbon (PHC) spill clean-up activities. The contaminated material from these quarries was excavated and removed in 2013 and 2014. The contaminated material was transported to the Meadowbank Landfarm. The Quarry 22 report can be found in Appendix B5 – *Quarry 22 2015 Report*.

Results from the September 2014 fall confirmatory sampling indicated some remnants of contamination when compared to the CCME remediation Criteria for Industrial Use of Coarse Material. Most of the contamination remaining was associated with Fraction 3 hydrocarbons. Therefore AEM proposed to scarify the remaining contaminated areas in Q22 during the summer of 2015 and resample (see Q22 2014 report final – 2014 Annual report).

Taking into consideration the results from 2014, the 2015 workplan included scarifying the surface of Quarry 22 with the back-end of a grader, thus allowing ground surface to be aerated which would increase degradation of PHC. The scarification work started on July 4th and extended throughout warmer months. On average it was done every second week from July to September.

A sampling campaign was planned for the end of September / beginning of October to assess the effectiveness of the remediation. Unfortunately with colder temperatures earlier than expected the ground froze and the sampling could not be completed. A sampling campaign will be conducted in 2016.

Regular inspections of the quarry were also performed during the year to ensure that runoff, if any, would be free of any visible sheen and would not impact the environment. No issues with runoff water inside the quarry were noted in 2015.

SECTION 4. WATER MANAGEMENT ACTIVITIES

The following section addresses reporting requirements related to water management activities.

4.1 FRESH WATER OBTAINED FROM THIRD PORTAGE LAKE

As required by Water License 2AM-MEA1525 Schedule B, Item 2: *Monthly and annual volume of fresh Water obtained from Third Portage Lake*.

On July 23, 2014 AEM submitted an application to the NWB for a Type A Water License Renewal. On July 23rd, 2015 the Minister of Indigenous Affairs and Northern Development Canada conveyed the renewal and amendment of Type A water licence 2AM-MEA1525 for the Meadowbank Gold Project. As per Part E Item 4, *the total volume of freshwater for all uses and from all sources shall not exceed 2,350,000 m^3 per year from the licence approval date to December 31, 2017, followed by a maximum of four million nine hundred thirty five thousand (4,935,000) cubic meters per year, starting in 2018 through to the Expiry of the Licence.*

The total volume of freshwater pumped from the surrounding lakes and used for the Meadowbank Gold Project is listed in Table 4.1. A total volume of 811,807 m^3 of freshwater was used for the project in 2015 which was in compliance with the Water License Freshwater usage amount of 2,350,000 m^3.

The volume of reclaim water used in the mill in 2015 was 2,738,870 m^3. The volume of freshwater that is contained in the ore to the mill in 2015 was 37,844 m^3.

Flow meter calibrations datasheets are presented in Appendix C1.

Table 4.1: Freshwater usage

Water Location	Source Lake	Jan	Feb	Mar	Apr	May	Jun
Camp	Third Portage Lake	3,044	2,647	3,111	3,181	3,118	3,096
Mill (freshwater tank)	Third Portage Lake	86,718	94,718	117,724	100,444	70,474	60,857
Emulsion plant	No-name Lake	171	146	185	212	215	212
Water truck	Third Portage Lake	0	0	0	0	0	0
Total Freshwater Usage (m^3)		**89,933**	**97,511**	**121,020**	**103,837**	**73,807**	**64,165**
Ore Water (m^3)	Ore	4,327	2,473	2,714	2,282	2,679	3,622
Reclaim Water Usage (m^3)	Tailings Pond	231,414	181,712	164,872	185,716	240,272	238,425

Water Location	Source Lake	Jul	Aug	Sep	Oct	Nov	Dec	Total
Camp	Third Portage Lake	3,050	3,264	3,117	3,025	3,073	3,319	**37,045**
Mill (freshwater tank)	Third Portage Lake	45,499	38,240	37,908	37,387	43,831	38,974	**772,775**
Emulsion plant	No-name Lake	173	175	142	172	128	57	**1,987**
Water truck	Third Portage Lake	0	0	0	0	0	0	**0**
Total Freshwater Usage (m^3)		**48,722**	**41,679**	**41,167**	**40,584**	**47,032**	**42,350**	**811,807**
Ore Water (m^3)	Ore	3,210	3,117	2,419	3,765	3,607	3,629	**37,844**
Reclaim Water Usage (m^3)	Tailings Pond	253,692	235,750	249,265	266,026	252,425	239,301	**2,738,870**

4.2 FRESH WATER OBTAINED FROM WALLY LAKE

As required by Water License 2AM-MEA1525 Schedule B, Item 3: *Monthly and annual volume of fresh Water obtained from Wally Lake*.

There was no freshwater obtained from Wally Lake for re-flooding activities in 2015.

4.3 LAKE LEVEL MONITORING

As required by Water License 2AM-MEA1525 Schedule B, Item 4: *Results of lake level monitoring conducted under the protocol developed as per Part D Item 5 (Water Quality Monitoring and Management Plan for Dike Construction and Dewatering)*.

Dewatering of the Vault Lake impoundment area was completed on June 29, 2014. At this point Vault Lake became the Vault Attenuation Pond. Water from the Vault Attenuation Pond (contact water) was discharged from July 8, 2015 to September 10, 2015. This water was discharged into Wally Lake through the diffuser as effluent. No treatment of the water was required prior to discharge as the total suspended solids (TSS) were below the required limit. The Vault discharge is also subject to the MMER and all monitoring results met the appropriate criteria.

The elevation measurement, in metres above sea level (masl), of Wally Lake was conducted on a weekly basis, during open water season and, weather permitting. The location of the lake level survey monitoring station is identified as WL-survey on Figure 3. The lake level monitoring results are presented in Table 4.2; the lake level remained within the range of naturally occurring levels.

Water levels of the Vault Attenuation Pond were also monitored. Table 4.2 presents the elevation monitoring results; the monitoring location is identified as VL-IN on Figure 3. This information is provided for informational purposes only.

As of November 19, 2014 when tailings deposition began in the South Cell, the portage Attenuation pond ceased operation and became the South Cell TSF. There was no discharge from the Portage Attenuation Pond into Third Portage Lake in 2015. The elevation, in metres above sea level (masl), of Third Portage Lake continued to be monitored in 2015 for information purposes only. Surveying activities were conducted on a weekly basis, during open water season and, weather permitting. The location of the lake level survey monitoring is identified as TPL-survey on Figure 1. The lake level monitoring results are presented in Table 4.2; the lake level remained within the range of naturally occurring levels.

Water from the East Dike Seepage was discharged into Second Portage Lake all year with the exception of June 16, 2015 to August 8, 2015. The elevation, in metres above sea level (masl), of Second Portage Lake was monitored on a weekly basis, during open water season and, weather permitting. The location of the lake level survey monitoring is identified as SPL-survey on Figure 1. The lake level monitoring results are presented in Table 4.2; the lake level remained within the range of naturally occurring levels.

Table 4.2: Water level monitoring

	Vault Attenuation Pond (masl)	Wally Lake (masl)	Third Portage Lake (masl)	Second Portage Lake (masl)
Identification Code	VL-IN	WL-survey	TPL-survey	SPL-survey
3/19/2015			133.412	
5/24/2015	134.98			
6/11/2015			133.600	132.890
6/14/2015	135.605			
6/15/2015	135.722			
6/16/2015	135.723			
6/18/2015	135.902			
6/20/2015			133.715	133.222
6/20/2015	136.183	139.755		
6/21/2015	136.32			
6/22/2015	136.503			
6/24/2015	136.603			
6/25/2015	136.78			
6/27/2015	136.798	139.638	133.697	133.739
6/28/2015	136.856			
6/29/2015	136.8			
6/30/2015	136.808			
7/1/2015	136.772			
7/3/2015	136.782			
7/4/2015	136.765	139.692	133.760	133.167
7/4/2015	136.91			
7/5/2015	136.928			
7/6/2015	136.855			
7/6/2015	136.93			
7/7/2015	137.007			
7/8/2015	137.024			
7/9/2015	136.939			
7/10/2015	136.851			
7/12/2015	136.762			
7/13/2015	136.761			
7/14/2015	136.677			
7/15/2015	136.64			
7/17/2015	136.426	139.473	133.779	133.757
7/18/2015	136.396			
7/18/2015	136.387			
7/19/2015	136.411			
7/20/2015	136.187			

7/21/2015	136.436			
7/22/2015	136.464			
7/23/2015	136.435			
7/24/2015	136.382	139.453	133.706	133.794
7/25/2015	136.39			
7/26/2015	136.479			
7/27/2015	136.318			
7/28/2015	136.28			
7/31/2015	136.102			
8/1/2015	136.001			
8/2/2015	135.849			
8/5/2015	135.96			
8/8/2015	135.719			
8/10/2015	135.681			
8/11/2015	135.684	139.454	133.739	132.941
8/14/2015	135.184			
8/16/2015	135.186			
8/16/2015	135.162			
8/17/2015	135.014			
8/18/2015	134.95			
8/20/2015	134.759			
8/20/2015	134.717			
8/22/2015	134.567			
8/22/2015	134.457			
8/23/2015	134.352			
8/25/2015	134.152			
8/25/2015	134.099	139.306	133.603	132.869
8/29/2015	133.872			
8/29/2015	133.793			
9/1/2015	133.88			
9/2/2015	133.769			
9/3/2015	133.743			
9/4/2015	133.768			
9/5/2015	133.806			
9/6/2015	133.801	139.467	133.590	132.852
9/7/2015	133.46			
9/8/2015	133.216			
9/9/2015	132.958			
9/10/2015	132.695			
9/11/2015	132.562			
9/12/2015	132.632	139.309	133.624	132.883
9/13/2015	132.715			
9/13/2015	132.775			
9/18/2015	132.821		133.595	132.851
9/19/2015	132.937			

9/21/2015	132.937			
9/22/2015	132.923			
9/23/2015	132.925			
9/24/2015	132.968			
9/25/2015	132.9	139.286	133.510	132.918
9/26/2015	133.051			
9/27/2015	133.068			
9/28/2015	133.119			
9/29/2015	133.139			
9/30/2015	133.134			
10/1/2015	133.116			
10/2/2015		139.408	133.601	132.870
10/3/2015	133.177			
10/3/2015	133.248			
10/4/2015	133.252			
10/5/2015	133.155			
10/6/2015	133.23			
10/7/2015	133.226			
10/8/2015	133.297	139.377	133.632	132.901
10/10/2015	133.241			
10/26/2015	133.362			

4.4 WATER BALANCE WATER QUALITY MODEL REPORTING SUMMARY

As required by Water License 2AM-MEA1525 Schedule B, Item 5: ***Summary of reporting results for the Water Balance Water Quality model and any calibrations as required in Part E Items 7-9.***

A water balance and water management plan (and report) update for 2015 was completed. The technical report, entitled "*Meadowbank Gold Mine Water Management Report and Plan 2015"*, is included in Appendix C2.

As in 2012, 2013 and 2014, the 2015 water management plan for the Meadowbank mine site update consists of:

- The validation and update of the site hydrology, including the revision of drainage areas and the update of meteorological conditions.

- The update of the short-term and long-term water management plan, taking into account changes to the following elements:
    - Mining schedule;
    - Mill operation rate;
    - Mine pits layout;
    - Rock storage facility extent; and
    - Tailings management facilities filling.

- The development of a water balance model for the entire site and for the complete duration of the mining activities until final site closure.

- A comparison of the predicted and recently remodeled pit water quality (Meadowbank Water Quality Forecasting Update – Based on the 2015 Water Management Plan, SNC, 2016) forecast to assist in water treatment options development for closure planning.

Also, recent updates to the Life of Mine (LOM) have required revision of AEM's water management plan. The major changes observed in the life-of-mine plan affecting the water management include but are not limited to:

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

In 2015, the above mentioned modifications added one year 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 2015-2016 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 as well as a revision of the pits and TSF run off inflows related to their underlying watersheds (performed by SNC, 2013);
- Flooding sequence and volumes update to take into account the updated run off inflows;
- Updating dewatering of Phaser Lake – will occur when approved by regulatory agencies;
- Updating the seepage section;
- Changes in tailings dry density as observed through bathymetric analysis.

Details of the revisions and their effects on the overall water management strategy are discussed in detail in the *2015 Water Management Report and Plan* (Appendix C2).

The necessity of the 2015 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.

As detailed in the *2015 Water Management Report and Plan* the principal additions to this update are:

- The revision of runoff water management strategy that positively impacts the mill freshwater consumption;
- The addition of a year of production related to the new life of mine (LOM);
- The tailings deposition parameters used for the model following the results of the 2015 bathymetries analysis and the new tailings deposition guideline;
- The Central Dike seepage status update;
- The updated planning of the Phaser Lake dewatering (pending approval from the NWB – application has been submitted).

The below summarizes water management activities as presented in the *2015 Water Management Report and Plan*:

- Freshwater pumped from Third Portage Lake was mainly used at the mill (average of 64,801 m^3/month in 2015) and the camp (average of 2,890m^3/month in 2015);
- Freshwater going to the mill is discharged with the tailings as slurry. The water volume is comprised of 40-70% of free reclaim water, 30% is entrapped within void space and 30% is entrapped as ice (varies seasonally). In 2015, annual ice entrapment was reduced due to sub-aqueous deposition. Ice entrapment is forecasted to increase in future years.
- Expected fresh water utilization planned for 2016 to mine closure is 90-200m^3/hr and should drop gradually during closure to 4m^3/hr. Higher freshwater consumptions occur during winter to increase reclaim pond free water volume to reduce the ice entrapment. Ice cover during the winter months on the reclaim pond (up to 55% of the total reclaim water volume compared to the 80% ratio planned in the 2014 Water Management Plan) is the result of the new freshwater flow planned until the end of the mine and to the increase of reclaim water volume in the South Cell TSF at closure.
- Freshwater consumption adjusted following modifications at the mill. Freshwater use limited to pit flooding and camp use after 2018. Increasing freshwater consumption at the mill after 2017 as part of strategy to put less pressure on reclaim system during winter and to avoid having the reclaim barge operating within the tailings.
- Re-flooding volumes and sequence presented. Re-flooding will commence in 2015 with Goose Pit and, subsequently in 2018 for Portage Pit and 2019 for Vault Pit. Re-flooding will be completed in 2025. Contingent that the water quality meets CCME Guidelines for the Protection of Aquatic Life or site specific concentrations, dike breaching will occur in approximately 2029 and will reconnect the Portage and Goose areas to Third Portage Lake and Vault area to Wally Lake.
- The Water Quality Forecast provides water quality modelling with updated parameters to determine the need for potential treatment at closure. The updated water quality forecast model applies to the North and South Cell TSF Reclaim Ponds, the Portage, Goose and Vault Pits. A review of the available water quality data measured in 2015 was undertaken. Treatment may be required for copper, silver, selenium and total nitrogen as the pit water quality may exceed CCME

limits if the water is not treated. For the Vault pit, no treatment is expected when re-flooding the pit.

The following recommendations are presented in the 2015 Water Management Report and Plan 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.
- Validate new tailings parameters with 2016 North and South Cells bathymetries.
- Conduct the water quality modelling analysis on a yearly basis based on updated water quality results and water balance through the life of mine.
- Continue development of the sediment flux model to evaluate erosion of geotechnical structures on site for the closure, primarily for TSS control: diversion ditches, rock storage facilities, capping of the tailings storage facilities, dikes and dams.
- Evaluate opportunities to reduce contaminants concentration in the reclaim pond prior to closure.
- Continue follow up of the Central Dike seepage flow and adjust pumping station capacity in function of the decreasing flow.
- Implement 2015 Meadowbank water quality forecasting (SNC, 2016) recommendations.

4.5 BATHYMETRIC SURVEYS

As required by Water License 2AM-MEA1525 Schedule B, Item 6: *The bathymetric survey(s) conducted prior to each year of shipping at the Baker Lake Marshalling Facility*.

The bathymetric survey in Baker Lake was completed on July 27, 2015 and is included in Appendix C3. The shipping season began on July 21, 2015. Ice on Baker Lake prevented the survey from being conducted prior to the first barge arrival.

4.6 PREDICTED VS MEASURED WATER QUALITY

As required by Water License 2AM-MEA1525 Part E, Item 9: *The Licensee shall, on an annual basis during Operations, compare the predicted water quantity and quality within the pits, to the measured water quantity and quality. Should the difference between the predicted and measured values be 20% or greater, then the cause(s) of the difference(s) shall be identified and the implications of the difference shall be assessed and reported to the Board. The comparison of predicted water quality in reflooded pits also addresses Water License 2AM-MEA1525 Part E, Item 7.*

As per NIRB Comments to 2014 Annual Report "(…) provide comparisons between originally predicted and measured water quantity and quality in 2014. This comparison only uses the current year, but a year over year comparison would help identify trends." In the 2015 Annual Report, the predicted water quantity and quality within the pits will be compared to the measured water quantity and quality. This comparison will use a year over year comparison.

The comparison between the predicted water quantity and quality within the pits will be compared to the measured water quantity and quality done for 2012 to 2015. Because the Portage Pit was not deep enough to collect sufficient data from the sumps in 2011, this comparison used 2012 as a start point.

Appendix C4 provides a comparison between predicted (originally predicted in support of the NWB license) and measured water quantity within Portage, Goose and Vault Pit. The appendix includes the measured data for 2015, and also from 2012 to 2014.

Percent difference was calculated by the following formulas:

% difference = ((A-B) / B)*100;
where: A = measured value and B = predicted

Relative % difference = (A-B) / ((A+B)/2)*100;
where: A = measured value and B = predicted

Water Quantity

As presented in Appendix C4, the % difference between water volume predicted in Golder (2007) and water volume measured in Portage Pit were less than predicted by more the 20% from 2013 to 2015. For 2012, the volume was slightly higher than predicted. This indicates that the seepage and groundwater sources and volumes predicted that collectively make up the water in the pits in 2013 to 2015, are less than what was originally predicted for operations. More specifically for 2015, Portage Pit was -136% less than the predicted value. Before 2014, seepage water from East Dike was pumped to the Portage Pit sump. However, as of January 2014, water from the East Dike Seepage has been pumped back to Second Portage Lake which contributes to significantly decrease the water quantity in Portage Pit between 2012 and 2015.

For Goose Pit, the % difference between water volume predicted in Golder (2007) and water volume measured in Goose Pit were less than predicted by more the 20% from 2012 to 2015. More specifically for 2015, Goose Pit was -105% less than the predicted value. This indicates that since 2012, the seepage and groundwater sources and volumes predicted that collectively make up the water in the Goose pit are less than what was originally predicted for operations. As the mining activity ceased in 2015 in Goose Pit, runoff, groundwater and seepage will contribute to the natural reflooding of the pit.

For Vault Pit, the % difference were higher by 75% in 2014 (commencement of mining operations) and 83% in 2015 between water volume predicted in Golder (2007) and water volume measured. This can be explained by the fact that there was more precipitation including larger freshet and rainfalls in 2015.

Water Quality

According to the original NWB application documents (Golder, 2007- Water Quality Predictions), a Probable scenario and a Possible Poor End scenario for predicted water quality results. These were developed to anticipate a representative range of water quality to allow for management and mitigative decisions. The probable scenario used input values that simulate predicted observed field conditions, and added realistic scaling factors related to explosives management and pit operations. The Possible Poor End scenario input values simulated probable variance on observed field characteristics and selected input parameters to capture possible, conservative variance. The predicted values in the Probable scenario and the Possible Poor End scenario represented the summer average. The measured values for 2012 to 2015 presented are summarized in Appendix C4. The mean and lower 25th centile of all the data available throughout the year at Portage Pit (ST-17 and ST-19), Goose Pit (ST-20) and Vault Pit (ST-23) were compared to the predicted values where data were available.

In 2012 for the Third Portage Pit sump, except for ammonia nitrogen (0%), dissolved barium (14%) and Sulphate (-6%) under Possible Poor End scenario, all the parameters exceeded 20% of difference between the predicted and mean measured values. All parameters exceeded for the Probable Scenario. For the lower 25th centile, all parameters measured exceeded the predicted in the Probable scenario, except dissolved arsenic (4%), dissolved nickel (-14%) and nitrate (14%). All exceeded 20% difference for the Possible Poor Scenario. For Goose Pit, all the parameters exceeded 20% of difference between the predicted (Probable and Possible Poor scenarios) and mean measured values except dissolved manganese (14%). For the lower 25th centile, all parameters measured exceeded the predicted (Probable and Possible Poor scenarios), except dissolved barium (13% for both scenarios) and dissolved manganese (-15% for both scenarios). Although it is difficult to identify the potential cause for these exceedances, it is evident that the models used to predict pit water quality were not conservative. However, they assisted in informing management of water quality and possible implementation of mitigative measures. Furthermore, it is important to note that the water from the pits was monitored extensively and not discharged into the environment, rather Portage Pit and Bay Goose Pit water reported to the former Portage Attenuation Pond. The water accumulated into the Attenuation Pond was treated by the water treatment plant before to be discharged into the receiving environment (Third Portage Lake). No discharge limits were exceeded in 2012 as all the results are below the maximum value required by NWB (Water License 2AM-MEA0815) and Environment Canada (MMER).

In 2013 for the Third Portage Pit sump, except for ammonia nitrogen (-8%), dissolve copper (-4%) and dissolved mercury (14%) under Possible Poor End scenario, all the parameters exceeded 20% of difference between the predicted and mean measured values. All parameters exceed for the Probable Scenario, except pH (19%). For the lower 25th centile, limited data are available, but available parameters measured exceeded the predicted in the Probable scenario and Possible Poor scenario, except for pH (14% and 18% respectively). For Goose Pit, all the parameters exceeded 20% of difference between the predicted (Probable and Possible Poor scenarios) and mean measured values except hardness (2% for both scenarios) and dissolved cadmium (-12% for both scenarios). For the lower 25th centile, all parameters measured exceeded the predicted (Probable and Possible Poor scenarios). Although it is difficult to identify the potential cause for the other exceedances, it is most likely due to the fact that the predicted water volumes were significantly less than what was originally assumed (72 and 121% less than predicted for Portage and Goose Pits). This reflects the fact that seepage, ground water, and local runoff volumes were being managed and less water than what was originally predicted was in these sumps. Furthermore, it is important to note that the water was monitored extensively and not discharged into the environment, rather Portage Pit and Bay Goose Pit water reports to the Attenuation Pond as for 2012. The water accumulated into the Attenuation Pond was sent to Tailings Storage Facility or treated by the water treatment plant before discharge into the receiving environment (Third Portage Lake). No discharge limits were exceeded in 2013 as all the results are below the maximum value required by NWB (Water License 2AM-MEA0815) and Environment Canada (MMER).

In 2014, exceedances of greater than 20% percent difference between predicted (Probable and Possible Poor scenarios) versus the mean of measured values in Vault Pit were found for all of the parameters except for pH (-11% for both scenarios). The mean water quality concentrations measured in the Goose Pit sump exceeded 20% predicted concentrations for all the parameters except for dissolved barium (4% for both scenarios) and dissolved copper (5% for both scenarios). For the lower 25th centile, all available parameters measured exceeded the predicted (probable and possible poor). Although it is difficult to identify the potential cause for the exceedances, for Goose Pit it was again most likely due to the fact that the measured water volumes were significantly less than what was originally assumed (122% less than predicted). This reflects the fact that seepage, ground water, and local runoff volumes were being managed and were less than what was originally predicted in these sumps. For Vault, for most of the parameters the accredited laboratory did not reach a detection limit that allows for a comparison with the predicted values like chloride, fluoride, and most of the dissolved metals such as lead, nickel, iron, zinc, selenium. Therefore the relative % difference is automatically higher than 20%. It should be noted that in 2014 no water from South Portage Pit sump was sampled because the access to the sump presented health and safety issues for the technicians and water was pumped only for 3 months (August to October). All sump water was pumped to the South Cell TSF for use as reclaim water in the mill.

In 2015, exceedances of greater than 20% percent difference between predicted (Probable and Possible Poor scenarios) versus the mean of measured values in Vault Pit were found for all of the parameters except for pH (-11% for both scenarios) and dissolved cadmium (-9%, Possible Poor scenario). The mean water quality concentrations measured in the Goose Pit sump exceeded 20% predicted concentrations for Probable and Possible Poor scenarios for all the parameters except for dissolved molybdenum (16%). For the lower 25th centile, all available parameters measured exceeded the predicted (probable and possible poor), except pH (16% for both scenarios) and dissolved molybdenum (3% for both scenarios). The mean water quality concentrations measured in the Third Portage Pit sump exceeded 20% predicted concentrations for probable and possible poor scenario for all the parameters except for pH (6% and 9% respectively) and the fluoride (13% for possible poor). For the lower 25th, all available parameters measured exceeded the predicted (probable and possible poor), except pH (1% and 4% respectively). The mean water quality concentrations measured in the North Portage Pit sump exceeded 20% predicted concentrations for probable and possible poor scenario for all the parameters except for nitrate (-8% and 19% respectively). For the lower 25th centile, all available parameters measured exceeded the predicted value except pH (18% for Probable scenario) and sulphate (-3%, for Possible Poor scenario). Again, for Portage and Goose Pits, the differences are most likely due to the fact that the measured water volumes were significantly less than what was originally assumed (136% less for Portage, and 105% less for Goose). This reflects the fact that seepage, ground water, and local runoff volumes are being managed and were less than what was originally predicted in these sumps. For Vault, a limited amount of samples were taken and for many of the parameters the accredited laboratory didn't reach a detection limit that allows for a comparison with the predicted values. Therefore the relative % difference is automatically higher than 20%. Furthermore, it is important to note that the water from the pits is monitored extensively and not discharged directly into the environment. Vault Pit water reports to the Vault Attenuation Pond, and Goose and Portage reported to the South Cell Tailings Facility. The water accumulated in the Vault

Attenuation Pond can be treated by the water treatment plant for TSS removal before discharge into the receiving environment (Wally Lake). The results of the Vault discharge can be found in Section 8.3.3.4 under sampling ST-10 (discharge). It should be noted that since the South Tailings Cell was put into operation (November, 2014), no additional water from the former Portage Attenuation Pond has been discharged into the receiving environment during mining operations. Since mining activities are completed in Goose, all water inflows will remain in Goose Pit and form part of the re-flooding volume.

The sample results from Portage, Goose and Vault will continue to be monitored in the future and the results will be considered in the water quality modelling, revised yearly, to assist in informing management of water quality in the pits during closure. All factors including the proportional volume of pit water, and reclaim water in the TSF as well as possible implementation of mitigative measures during operation and closure, will be considered when deciding if water treatment will be required at closure. All of this information including the applicable parameters are integrated into the water quality model and is discussed in the subsequent section.

Water Quality Forecast model - Pit Water Quality

The Water Quality Forecast model is completed yearly with the updated, measured, data from site, as well as the water balance used on site. Review of the water quality predictions for pit reflooding is completed in this forecast. Table 4.2 of the *2015 Meadowbank Water Quality Forecasting Update* found in Appendix C of the *2015 Water Management Report and Plan* (Appendix C2) summarizes the forecasted concentrations of applicable parameters in Portage and Goose Pits (based on measured water quality from the TSF) predicted in the pits after reflooding and compares them to originally predicted concentrations for Goose and Portage. Based on the results of the water quality mass balance presented in section 4.2, treatment may be required for copper, silver, selenium and total nitrogen as the pit water quality may exceed CCME limits, prior to dike breaching at closure, if the water is not treated. For the Vault pit, no treatment would likely be required after the pit has been re-flooded prior to dike breaching. This is largely due to the fact that there is no interaction of contact water with a tailings disposal facility at the Vault site and all parameters are expected to meet the CCME guidelines or other site specific criteria developed during the closure process. Table 5.1 of the *2015 Water Quality Forecast* presents the average concentrations of water quality from samples taken in the Vault area.

With respect to the potential elevated levels of Copper, Selenium, Silver and Total Nitrogen, treatment could be undertaken at the South Cell Reclaim Pond, or in the Portage Pit if the trends shown in the model continue to be noted. A potential treatment option for the removal of copper prior to discharge in Portage Pit is caustic or lime precipitation, while aeration is recommended for total nitrogen reduction via ammonia volatilization. A coagulation-clarification process could be a potential treatment solution for removal of dissolved silver.

Selenium concentration also exceeds the CCME limits in Portage Pit. Consequently, treatment may be required. This parameter still requires close monitoring. For the Vault area, ammonia and nitrate are the parameters of concern identified by Environment Canada, but no actual or forecasted concentration exceeds the Type A Water License discharge requirements for this area.

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

Lake. The dikes will only be breached once the water quality in the pits meets CCME guidelines or site specific criteria developed during the closure plan approval process. This applies also for the Vault area.

4.7 ADDITIONAL INFORMATION

As required by Water License 2AM-MEA1525 Schedule B, Item 25: ***Any other details on Water use or Waste Disposal requested by the Board by November 1st of the year being reported.***

No additional information was requested in 2015.

SECTION 5. WASTE ROCK MANAGEMENT ACTIVITIES

5.1 GEOCHEMICAL MONITORING

As required by NIRB Project Certificate No.004 Condition 15: ***Within two (2) years of commencing operations re-evaluate the characterization of mine waste materials, including the Vault area, for acid generating potential, metal leaching and non-metal constituents to confirm FEIS predictions, and re-evaluate rock disposal practices by conducting systematic sampling of the waste rock and tailings in order to incorporate preventive and control measures into the Waste Management Plan to enhance tailing management during operations and closure; results of the re-evaluations shall be provided to the NWB and NIRB's Monitoring Officer.***

And

In accordance with Water License 2AM-MEA1525 Schedule B, Item 7: ***Geochemical monitoring results including:***

a. Operational acid/base accounting and paste pH test work used for waste rock designation (PAG and NPAG rock);

In 2015, AEM sampled approximately 25% of blast holes and analyzed the percentages of sulphur and carbon. The results from these analyses are used to differentiate Non-Potentially Acid Generating (NPAG) from Potentially Acid Generating (PAG) materials. The Total Sulphur (S) analysis is converted into a Maximum Potential Acidity (MPA) value by multiplying the Total S weight % by 31.25 which yields an MPA value in Kg $CaCO_3$ equivalent. The Total Inorganic Carbon analysis is similarly converted into a Carbonate Neutralization Potential (NP) by multiplying the Total weight % Inorganic Carbon (reported as $\%CO_2$) by 22.7 which yields an NP value in Kg $CaCO_3$ equivalent. The Net Potential Ratio (NPR) for the blast hole drill cutting sample is then calculated as follows: NPR = NP/MPA. See Table 5.1 for a summary of Acid Rock Drainage (ARD) Guidelines used to classify Meadowbank Waste.

Table 5.1. Summary of ARD Guidelines used to classify Meadowbank Waste

Initial Screening Criteria	ARD Potential
NPR< 1	Likely Acid Generating (PAG)
1 < NPR < 2	Uncertain
2 < NPR	Acid Consuming Non Potentially Acid Generating (NPAG)

The mine geology staff uses the derived NPR to characterize the rock in the blast pattern. Mine surveyors use this information to delineate the dig limits within the blasted rock to guide the shovel and loader operators in directing where the rock is to be taken. See Section 5.2 and Table 5.3 for a discussion of the use and location of waste rock.

The results of the NPAG-PAG classification confirmation are logged in the Meadowbank GEMCOM database. Due to the large volume of data, the results are not included in this annual report. These results can be provided upon request.

To validate the method used by AEM, approximately 337 samples (including ultramafic volcanic, intermediate volcanic and iron volcanic rock types) from production drill holes in Portage and Vault Pits were sent to an accredited commercial lab (external lab) for acid base accounting (ABA) analysis using the Modified Sobek Method for determination of NP/AP, metal leaching using the Shake Flask Method, bulk metals analysis and for whole rock analysis. The results from the external laboratory confirmed AEM's methodology and results to differentiate PAG/NPAG rock.

In its recommendations to the 2014 Annual Report, the NIRB requested that AEM *provide a comparison of its results with the FEIS predictions and an explanation of how it re-evaluated rock disposal practices in order to incorporate preventative and control measures into the Waste Management Plan*. These are provided below.

In the FEIS, Vault waste rock was found to be 100% Intermediate Volcanic (IV). AEM's characterization of the Vault waste rock found that it is mostly comprised of IV group rocks, however a small portion is also iron formation. Ultimately, the FEIS was functionally accurate as the IV provides a high buffering capacity, low leachability and is considered NPAG. Data collected for internal control during operations at Vault was compared to the Vault geochemical FEIS (Golder, 2005). The Vault database from AEM included results to date for 18,393 samples analyzed at the on-site laboratory for total sulphur, buffering capacity (NP) , acid potential (AP), the ratio of NP to AP (NRP) and total carbon. Starting at the end of 2014, AEM sent quarterly samples to an accredited laboratory to validate AEM internal determination. The FEIS prediction said that the ARD from Vault rock will be low which was consistent with AEM findings. In the FEIS, it was determined that 14% of the rock will be PAG, 11% uncertain and 75% NPAG. Analysis from AEM's internal determination shows that in 2015, 8% is PAG, 10% uncertain and 82% is NPAG. Ultimately, there is a higher ratio of NPAG versus what was initially predicted. The same results were obtained in 2014. As a mitigative measure any PAG or uncertain waste rock material is placed in the middle of the Vault Waste Rock Storage Facility while NPAG material is placed on the perimeter to encapsulate the PAG material. Runoff or seepage water monitoring analysis will confirm the effectiveness of this abatement measure. To date water monitoring analysis from run off indicates no concerns related to ARD.

Operational data from the Vault deposit (results from onsite lab testing) and NPR from the SGS confirmatory samples and static test database collected during the startup of the project (Golder, 2005) were compared to test the fit of the data sets and to determine the total sulphur content at which material may be considered as potentially acid generating per MEND (2009). The datasets correlate and in general, material with a total sulphur content below 0.2% reports a CaNPR > 2 (carbonate neutralization potential ratio) and thus, is designated as NPAG. This verifies the previously recommended use of S<0.2% as an identifier of NPAG rock (Golder, 2005).

Also, in 2015, the existing NPAG and PAG areas of the Vault waste rock stockpile were sampled in order to confirm the ARD potential of these materials and also to confirm that PAG and NPAG material were segregated appropriately within the Vault RSF. A total of 17 samples were collected in April 2015. In total 11 samples were collected from the NPAG area and six samples were collected from the PAG area with collection focused on spatially representing both materials. At each sample location, sub-samples were selected from within a 10 metre radius, consisting of at least five sub-sample points from which one composite sample was created. Samples were tested at the on-site laboratory for total sulphur and total carbon content; acid potential, CaNP and CaNPR were calculated using these results.

All samples tested show no potential to generate acid except for one sample from the NPAG area, which has an "Uncertain| ARD potential with a CaNPR value of 1.0. This same sample reported the highest sulphur content (0.94%) and the lowest buffering capacity (0.36% total carbon). Total sulphur content ranges from 0.14 to 0.94% while total carbon ranges from 0.36 to 1.0%. In terms of the CaNPR and total sulphur content, the grab samples collected from the piles are representative of the near-average Vault waste rock. The average sulphur content of the grab samples is 0.47%, compared with the overall Vault database average of 0.58% (Golder, 2005). Operational on site testing of the waste material will continue throughout the operations as well as external testing from the accredited laboratory. This will ensure that proper material segregation is completed in Vault RSF.

During the completion of the tailings cover with NAG rock in the North Cell TSF, a total of 121 samples were collected during the construction to ensure that the material coming from Portage Pit was NPAG. Samples were tested at the on-site laboratory for total sulphur and total carbon content; acid potential MPA, NP and NPR were calculated using these results. The minimum NPR value obtained was 2.67 and the maximum value was 312.0. The median value of NPR obtained is 75.2. These results confirm that the material coming from Portage Pit, classified as NPAG by the operational testing on site, and deemed suitable for construction of the tailings cover, is composed of NPAG waste rock.

b. As-built volumes of waste rock used in construction and sent to the Waste Rock Storage Facilities with estimated balance of acid generation to acid neutralization capacity in a given sample as well as metal toxicity;

Refer to the Section 5.2 of this report.

c. All monitoring data with respect to geochemical analyses on site and related to roads, quarries, and the All Weather Access Road;

Unless there are significant changes during reclamation, quarry surface water sampling will not be completed in the future as follow-up water sampling has not provided evidence of geochemical issues in the quarries. As in the past, Quarry 4 and 14 are flooded, as noted in the *2015 Annual Geotechnical Inspection* (Appendix B1). The water ponding at freshet or during the summer period in the quarries does not drain to any nearby watercourse. During previous summer periods, no mitigation was deemed necessary as no significant amounts of water were observed in the quarries. During winter, the snow is also removed from the quarries to minimize water runoff at freshet. The majority of the quarries with geochemical concerns identified in AEM (2009b) have been observed to have little or no water ponding due to snow melt or precipitation during the summer period. As a result, they do not present a risk to the receiving environment and therefore do not require annual monitoring. Slope remediation is in progress in some quarries but none of them were totally reclaimed. Some work to clean unstable blocks and loose rocks was completed in 2015. If deemed necessary, additional work will be completed in 2016. AEM is currently evaluating which quarries can be progressively closed. The quarry reclamation along the AWAR will form part of the Meadowbank Final Closure Plan. Reclamation activities for some quarries may occur during operations. The remaining reclamation activities for the quarries will occur during the closure period.

Given the stability of the structures and the monitoring results of 2011 to 2015, previous annual reports recommended that unless turbidity issues were visually observed, surface water chemistry sampling should not be conducted at fish bearing watercourses. When an erosional issue occurs, it was recommended that detailed monitoring should be conducted and at a minimum, a single water chemistry sample upstream and downstream of the source. If deemed necessary, additional follow-up sampling or monitoring should be conducted and if necessary additional mitigation will be undertaken.

In May 2015, small streams began flowing and by mid-June all of the streams and rivers along the road opened up. Four formal erosion inspections were completed by qualified environment technicians on May 20th, May 22nd, June 6th and June 16th and weekly visual inspections were made during AWAR inspections. Daily inspections were made in collaboration with the Meadowbank Site Services Department (who travel the road daily for ongoing maintenance). No turbidity issues were visually observed so surface water quality sampling was not deemed necessary at non-HADD crossings or quarry contact water pools.

d. Leaching observations and tests on pit slope and dike exposure;

No leaching was observed on the pit slope or dike faces.

e. Any geochemical outcomes or observations that could imply or lead to environmental impact;

In 2013 there was seepage observed at the Portage RSF that had the potential to lead to environmental impacts. Following effective mitigative and management actions in 2013 and 2014, seepage was monitored throughout 2015. Refer to Section 8.3.3.11 regarding the seepage event; mitigation and monitoring that occurred in NP2 Lake and other downstream lakes (i.e. NP1, Dogleg, SPL).

f. Geochemical data associated with tailings solids, tailings supernatant, cyanide leach residue, and bleed from the cyanide destruction process including an interpretation of the data;

AEM takes throughout the year quarterly samples of tailings that are sent to an accredited laboratory to analyse for ABA and Metal Leaching. Table 5.2 presents the results. The results indicate that the tailings are PAG but have low metal leaching.

A research program in collaboration with the RIME (Research Institute of Mine and Environment, Quebec) includes testing and analysis of the tailings reactivity. AEM will continue to work with RIME to determine long term strategies for managing the TSF under closure and post closure scenarios.

Table 5.2. Tailings Monitoring

Analysis	**Date**	**18-Jan-15**	**6-Apr-15**	**7-Jun-15**	**15-Oct-14**
	Units				
NP	t CaCO3/1000 t	65	20	63	15
AP	t CaCO3/1000 t	53.8	46.6	82.2	80.6
Net NP	t CaCO3/1000 t	11.6	-26.46	-19.9	-65.22
NP/AP	ratio	1.21	0.43	0.77	0.19
S	%	1.72	2.19	2.79	2.53
Acid Leachable SO4-S	%	0.12	0.7	0.16	<0.01
Sulphide	%	1.72	1.49	2.63	2.58

C	%	0.831	0.221	0.785	0.150
CO3	%	2.770	0.615	2.89	0.330
Final pH	units	1.57	8.65	1.60	1.59
As	mg/L	0.0208	0.0026	0.0014	0.0231
Cu	mg/L	0.0394	0.0003	0.4350	0.4450
Ni	mg/L	0.0046	0.0001	0.2370	0.4010
Zn	mg/L	0.0005	<0.001	0.642	0.14

g. Results related to the road quarries and the All Weather Private Access Road.

See Section 5.1c above.

5.2 WASTE ROCK VOLUME

In accordance with Water License 2AM-MEA1525 Schedule B, Item B-8: *Volumes of waste rock used in construction and placed in the Rock Storage Facilities.*

The total volume of waste rock generated by Portage, Goose and Vault pits in 2015 was 32,583,434 tonnes. The volume of waste rock from the Portage pit in 2015 was 10,575,740 tonnes of which 5,444,303 tonnes were non-potentially acid generating (NPAG) and 5,131,437 tonnes which were potentially acid generating (PAG). The volume of waste rock from the Goose pit was 169,888 tonnes in 2015; 4,824 tonnes of non-potential acid generating (NPAG) and 165,064 tonnes of potential acid generating (PAG). The volume of waste rock from the Vault Pit in 2015 was 21,837,806 tonnes; 18,781,731 tonnes of NPAG and 3,056,075 tonnes of PAG. The use and location of all of the rock, by volume, is presented in Table 5.3 and is identified by the following categories:

- Tailings Dams – used for the construction of dams or dikes adjacent to the tailings pond;
- Other Construction;
  - Roads – used for road construction and maintenance;
  - Crushers – taken to the mobile crusher and used for construction or maintenance purposes;
  - Miscellaneous uses;
- Waste Dump – taken to the rock storage facilities;
- Overburden – taken to the till stockpile;
- Backfill – waste return in the pit;
- Tailings cover construction.

The *Mine Waste Rock and Tailings Management Plan* was revised in March 2016 and can be found in Appendix D1*. Details of all waste rock deposition and tailings management are contained in the revised Plan.

Table 5.3. 2015 Rock volumes

	Portage Pit (tonnes)													
	Ore	Waste Rock												
		Tailings Dams		Other Construction		Waste Dump		Overburden		Backfill		Total	
		NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG
Q1	198,310	0	0	61,787	83,346	951,581	1,051,105	0	0	421,396	460,782	1,434,764	1,595,233
Q2	439,462	58,563	30,590	856,121	23,942	104,487	1,661,278	0	0	913,221	29,041	1,932,392	1,744,851
Q3	552,345	159,427	311,818	96,801	75,947	499,565	819,322	0	0	765,971	95,697	1,521,764	1,302,784
Q4	616,595	33,744	138,767	50,187	5,964	353,994	70,462	4,276	0	113,182	273,376	555,383	488,569
TOTAL	**1,806,712**	**251,734**	**481,175**	**1,064,896**	**189,199**	**1,909,627**	**3,602,167**	**4,276**	**0**	**2,213,770**	**858,896**	**5,444,303**	**5,131,437**

	Bay-Goose Pit (tonnes)													
	Ore	Waste Rock												
		Tailings Dams		Other Construction		Waste Dump		Overburden		Backfill		Total	
		NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG
Q1	108,436	0	0	147	48,255	4,223	43,074	0	0	454	58,940	4,824	150,269
Q2	23,227	0	0	0	9,724	0	5,071	0	0	0	0	0	14,795
Q3	0	0	0	0	0	0	0	0	0	0	0	0	0
Q4	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**131,663**	**0**	**0**	**147**	**57,979**	**4,223**	**48,145**	**0**	**0**	**454**	**58,940**	**4,824**	**165,064**

	Vault Pit(tonnes)												
	Ore	Waste Rock											
		Tailings Dams		Other Construction		Waste Dump		Overburden		Backfill		Total	
		NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG
Q1	810,978	0	0	8,379	4,139	2,259,296	390,237	0	0	168,793	0	2,436,468	394,376
Q2	584,514	0	0	81,198	10,197	3,413,513	1,118,527	0	0	123,782	3,638	3,618,493	1,132,362
Q3	421,414	135	0	107,312	12,620	4,955,058	998,578	0	0	125,333	471	5,187,838	1,011,669
Q4	381,689	0	0	52,900	32,393	7,371,963	485,025	0	0	142,906	1,799	7,538,932	517,668
TOTAL	**2,198,595**	**135**	**0**	**249,789**	**59,349**	**17,999,830**	**2,992,367**	**0**	**0**	**560,814**	**5,908**	**18,781,731**	**3,056,075**

	Portage, Bay-Goose and Vault Pits (tonnes)												
	Ore	Waste Rock											
		Tailings Dams		Other Construction		Waste Dump		Overburden		Backfill		Total	
		NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG	NPAG	PAG
TOTAL	**4,136,970**	**251,869**	**481,175**	**1,314,832**	**306,527**	**19,913,680**	**6,642,679**	**4,276**	**0**	**2,775,038**	**923,744**	**24,230,858**	**8,352,576**

5.3 TAILINGS STORAGE FACILITY

5.3.1 Tailings Storage Facility Capacity*

As required by Water License 2AM-MEA1525 Schedule B-9: ***An update on the remaining capacity of the Tailings Storage Facility.***

In 2015, a total of 4,354,107 m^3 of tailings slurry was deposited in the tailings storage facilities (North Cell and South Cell TSF). A monthly summary of the tailings volume is provided in Table 5.4. From 2010 to 2015, a total of 25,018,361 m^3 of tailings slurry from the mill had been deposited in the TSF's.

To calculate the tailings volume placed within the TSF, the in situ dry density of the tailings is used, as the tailings consolidate in the TSF. As of the end of December 2015 a total of 2,307,297 m^3 (tailings dry in situ density calculated at 1.39 tons/m^3 for the period) of tailings had been deposited in the South Cell TSF. The deposition in the South Cell TSF started at the end of November 2014. In 2015 a total of 864,679 m^3 of tailings (associated tailings dry in situ density of 1.49 tons/m^3 for that period) were deposited in the North Cell TSF between July and October 2015. A total of 14.2 Mm^3 of tailings was deposited in the North Cell between 2010 and 2015. The deposition in the South Cell TSF resumed at the end of October 2015.

As updates to the mine occurred in 2015, AEM revised the tailings deposition plan (available in *Updated Mine Waste Rock and Tailing Management Plan* presented in Appendix D1). The deposition model completed is valid until the end of the mining operation in 2018. The model is based, on the data collected during previous years of operation. The filling scheme for the two cells of the tailings storage facility is designed for a single point end of pipe discharge which will:

- Avoid ice accumulation on the dike liner;
- Prevent tailings beach to reach the reclaim barge/system;
- Ensure Reclaim water pond maximum elevation of 148m for the North Cell / 141 m for the South Cell (to maintain a minimum freeboard of 2.0 m);
- Tailings beach to reach elevation 149.5 m for the North Cell / 142.5 m for the South Cell;
- Fill the North Cell to its maximum capacity during summer 2015 (completed);
- Raise the beach on RF1 and RF2 to prevent tailings water from seeping out of the North Cell (completed);
- Raise beaches on all external structures such as the roads around the tailings pond to prevent reclaim water from seeping towards the diversion ditches (completed);
- Promote a tailings beach along the upstream face of Central Dike; and
- Avoiding ice accumulation on the Central Dike liner.

As mill processing rates and tailings characteristics are liable to fluctuate over the life of the mine, the design of the TSF and tailings deposition plan will continue to evolve based on changes in design parameters including mill process rates, tailings beach slopes, ice entrapment, and tailings in-situ densities. As such, a preliminary deposition plan was done in 2009 to provide guidelines for operation of

* TSF- Tailings Storage Facility

the facility and to schedule the construction of the TSF perimeter dikes. The preliminary deposition plan was initially updated each year to include data collected from the previous year's deposition within the TSF. Since 2013 AEM has assigned dedicated engineers, who regularly review/update the deposition plan incorporating any new and relevant information and changes to mine and operational planning.

AEM performed a bathymetric analysis in July 2015 of the North Cell to further validate the key variables which influence the water balance as well as the deposition plan. Mainly, those key variables are the tailings dry density (influenced by ice entrapment) and the sub-aerial and sub-aqueous beach angles. Furthermore, a dynamic model was established with parameters influenced in accordance with the real time conditions (i.e. seasonal temperature variation) instead of working with year round estimated average and this allows AEM to better reflect the actual site conditions.

The 2015 bathymetry was compared to the 2013 and 2014 bathymetries. The findings revealed that deposition in the South Cell during the winter 2015-2016 was much more efficient than expected. Average tailings dry density measured was up to 1.45t/m³ instead of the average of 1.28t/m³ observed in the North Cell during the last years. It could be explained by the deposition conditions that changed which results as only sub-aqueous deposition was performed. An average of 38% of the original slurry water in the tailings remains in the cell through a combination of 30% being trapped as pore water within the tailings along with an additional 8% being pure ice entrapment (ice lenses). This differs with the 60% determined in 2015. The better performance observed in 2015 could be related to the deposition strategy promoted which was based on performing sub-aquatic deposition during winter time in the South Cell in order to reduce the impact of cold temperature on tailings deposition. Beach angles measured in the South Cell were also steeper as 1.1% sub-aerial beach slope instead of the 0.45% of the North Cell and 3.6% sub-aqueous slope instead of 2.36% in South Cell.

Based on that new information, AEM reviewed the tailings deposition strategy and implemented a new guideline in order to improve the efficiency of the tailings deposition and reduce the operational risk. During winter, in the past, AEM observed slurry channeling over the frozen tailings beach instead of beaching in front of the discharge point. This phenomenon could compromise the reclaim water system operation as observed in 2013 when AEM needed to stop the reclaim barge. The new guideline consists in maintaining a free water volume always at least two times greater than the subaerial tailings volume in this deposition plan. With this new free water target, AEM expects that South Cell parameters of 2015 could be used to plan deposition for 2016-2017. Previous North Cell parameters will be used for 2018 as they were considered representative of the tailings deposition occurring in a TSF pond at closure. A similar analysis will be conducted during the summer of 2016 in the both cells to confirm this assumption.

In summary, the main parameters of the deposition plan model consist of:

- The water balance used in this model assumes reclaim flow changes as a function of the season: summer 50 m³/h fresh water (FW) & 360 m^3/hr reclaim water (RW), and winter 200 m³/h FW & 210 m³/h RW, from 2016 to the end of operation in 2018;
- The model assumes a tailings dry density and a water balance that incorporates ice entrapment of 1.28t/m^3 for the North Cell. For the South Cell, the tailings dry density varies from month to month, between 1.22t/m^3 and 1.76t/m^3 ; and
- For the North and South Cells, the average measured in situ tailings dry density of 1.28t/m3 represents the deposition through the whole deposition life of a cell. Furthermore, it represents an operational capacity rather than a flat geometry i.e. what can actually be placed on the field

considering the operational constraints (minimum pond volume, beach angles, dike freeboard etc.);

- For the North Cell, sub aerial tailings slope set at 0.45% and sub aqueous tailings slope set at 2.36%. For the South Cell, sub aerial tailings slope set at 1.1% and sub aqueous tailings slope set at 3.6% (obtained from summer 2015 bathymetric analysis).

The main conclusions from the modeling results are:

- The total estimated capacity of the TSF North Cell (structures at El.150m) and South Cell (structures at El.143m) is 32.0 Mt (25.0 Mm^3).
- The total capacity of the North Cell is estimated at: 18.2 Mt (14.2 Mm^3);
- The total capacity of the South Cell is estimated at: 13.8 Mt (10.8 Mm^3);
- The estimated remaining capacity in the TSF (in the South Cell only) as of end of December 2015 is 8.1 Mm^3 (10.4 Mt);
- Tailings were deposited in the South Cell from November 2014 to July 2015;
- The final phase of North cell deposition was completed between July 2015 and the end of October 2015;
- The second phase of South cell deposition started at the end of October 2015 and will proceed until the end of operations planned in September 2018;
- The reclaim water system is located in the South Cell;
- During the final deposition phase in the North Cell, the water was transferred from the North Cell to the South Cell, as the reclaim water system remained in the South Cell;
- The South cell reclaim road and the peripheral infrastructures of the South Cell (Central Dike, Saddle Dams 3, 4 and 5) needed for the tailings deposition are planned to be raised during summer season of 2016 to provide the required tailings storage capacity.

Table 5.4. 2015 Tailings Volumes.

	Total Tailings Slurry (tonnes)	Density of Tailings (% Solid)	Density of Slurry (tonnes/m^3)	Slurry pumped to TSF (m^3)
January	666,211	55%	1.59	419,980
February	545,822	56%	1.61	339,800
March	578,206	56%	1.61	359,494
April	525,560	57%	1.63	321,506
May	634,049	57%	1.62	391,002
June	611,979	59%	1.66	368,731
July	635,369	56%	1.61	395,681
August	631,604	57%	1.63	386,537
September	476,006	59%	1.66	286,170
October	615,401	58%	1.64	374,939
November	608,552	59%	1.66	365,695
December	557,279	56%	1.62	344,574
Total				4,354,107

5.3.2 Tailings Freezeback and Capping Thickness

As required by NIRB Project Certificate No.004, Condition 19: ***Provide for a minimum of two (2) metres cover of tailings at closure, and shall install thermistor cables, temperature loggers, and core sampling technology as required to monitor tailing freezeback efficiency. Report to NIRB's Monitoring Officer for the annual reporting of freezeback effectiveness.***

And

As required by Water License 2AM-MEA1525 Schedule B, Item 18: ***A summary of on-going field trials to determine effective capping thickness for the Tailings Storage Facility and Waste Rock Storage Facilities for the purpose of long term environmental protection.***

Description of the instrumentation (thermistors) installed within the tailings storages facilities structures, the tailings, the rock storage facility and the pits are described below, along with the presentation of the latest results for 2015. The research project on going at Meadowbank including test pads for cover trials on the TSF are is also described below.

In the 2012-2013 Annual Monitoring report NIRB (recommendation 14) "*The Board requests that AEM provide a plan of action and a discussion on its permafrost monitoring program that would include Second Portage Lake, Portage Pit and Bay Goose Pit as outlined in the FEIS*". The action plan and permafrost monitoring program for Second Portage Lake, Portage Pit and Goose Pits were submitted to NIRB previously in response to the above mentioned recommendation. Below is an update with the 2015 data.

Instrumentation in Tailings Storage Facility (TSF) Structures

Saddle Dam 1

AEM began to determine capping thickness in 2009 by installing thermistor SD1-T2, SD1-T3 and SD1-T4 on Saddle Dam 1 to monitor the thermal condition within the structure and its foundation. The results are illustrated on Figure 6 to 9. Thermistor data from within the structure indicates that the dike foundation remained frozen during the past few years. The foundation soil and bedrock remained in a frozen state with temperatures ranging from about -2°C to -10°C. At the upstream toe, below El. 132 m, the compacted till base material below the liner remained frozen. No sign of seepage or thawing of the foundation soil was observed. The structure is performing as expected. The SD1-T1 thermistor string was installed in the centre of the upstream face of the dike immediately beneath the geomembrane liner to monitor temperatures within the deposited tailings. Stable values around 0°C were recorded during the year (in the winter and in the summer) below El. 144 m. It is anticipated that data collected from this location will be useful in monitoring the freezing of the tailings in the coming years. The SD1-T2 thermistor string was installed vertically through the upstream Stage 1 crest in the centre of the dike at El. 140 m. The data show that the dike foundation remained frozen during the past year with temperatures fluctuating between -2°C and -4.5°C which is consistent with historical data. It can be observed that the temperature of the foundation material has increase by 4°C on average since 2010. Temperatures between 0°C and -2°C were recorded in the rockfill of the dike which remained frozen all year long. The SD1-T3 thermistor string was installed vertically through the upstream Stage 2 crest in the centre of the dike at El. 150 m. It can be observed that the dike foundation and dike rockfill remained frozen during the past year with temperatures fluctuation between -2.5°C and -10°C. The SD1-T4 thermistor string was installed vertically through the upstream toe of the dike near the centre of the dike. It indicates that the dike foundation on the upstream toe, including the liner tie-in till plug, remained frozen during the past year. It can be observed that the temperature of the foundation material has increased by 5°C on average since 2010.

Additional information on instrumentation results for Saddle Dam 1 can be found in the *2015 Annual Geotechnical Inspection* (Appendix B1).

Figure 6. Thermistor Results SD1-T1

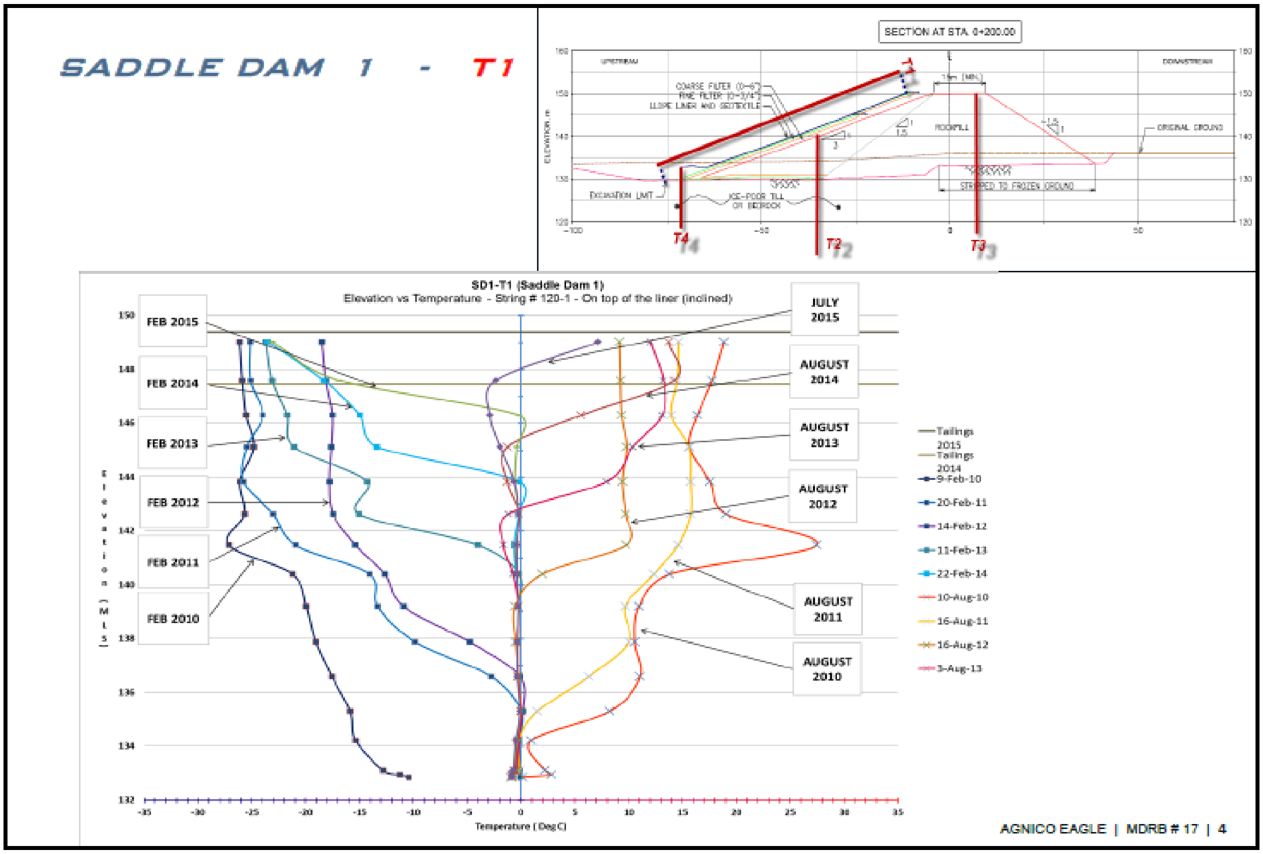


Figure 7. Thermistor Results SD1-T2

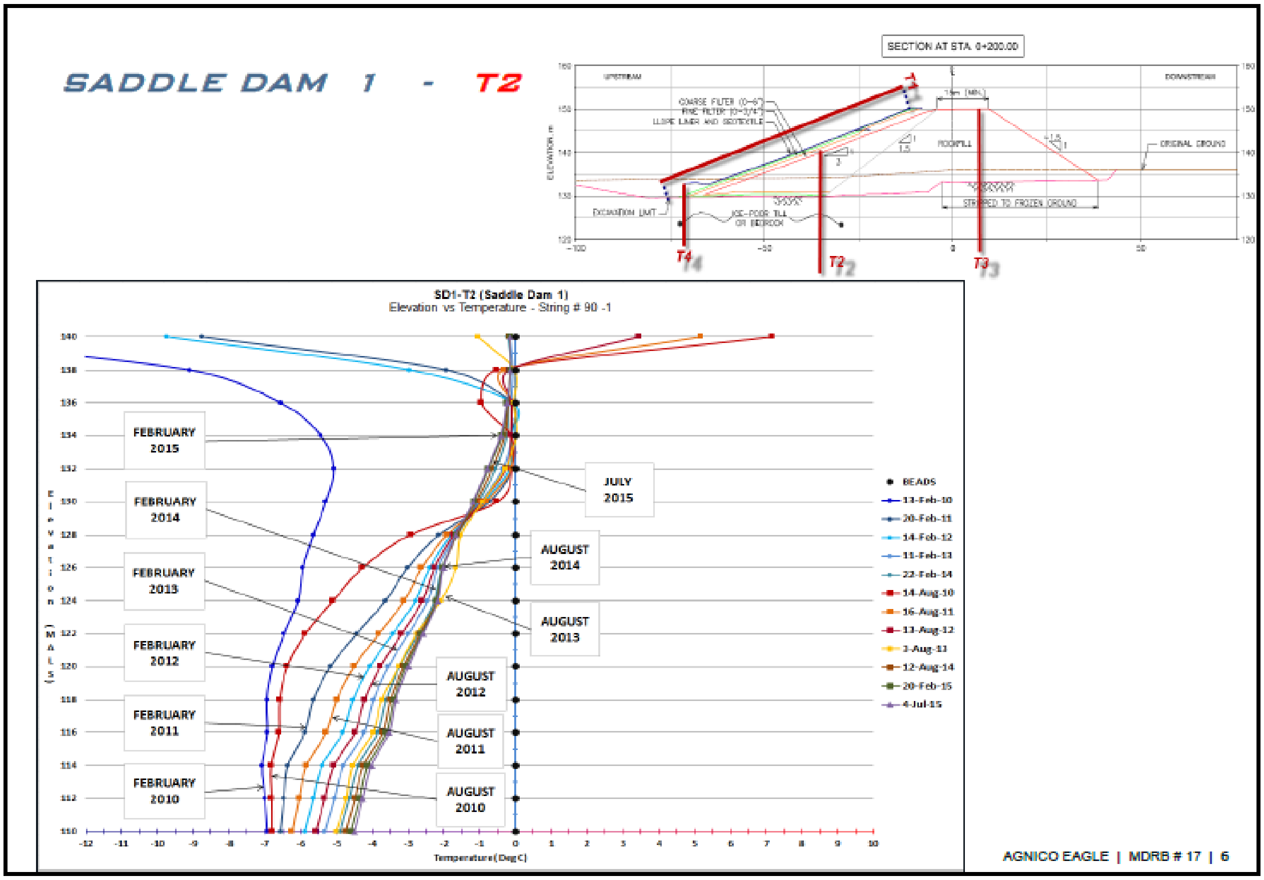


Figure 8. Thermistor Results SD1-T3

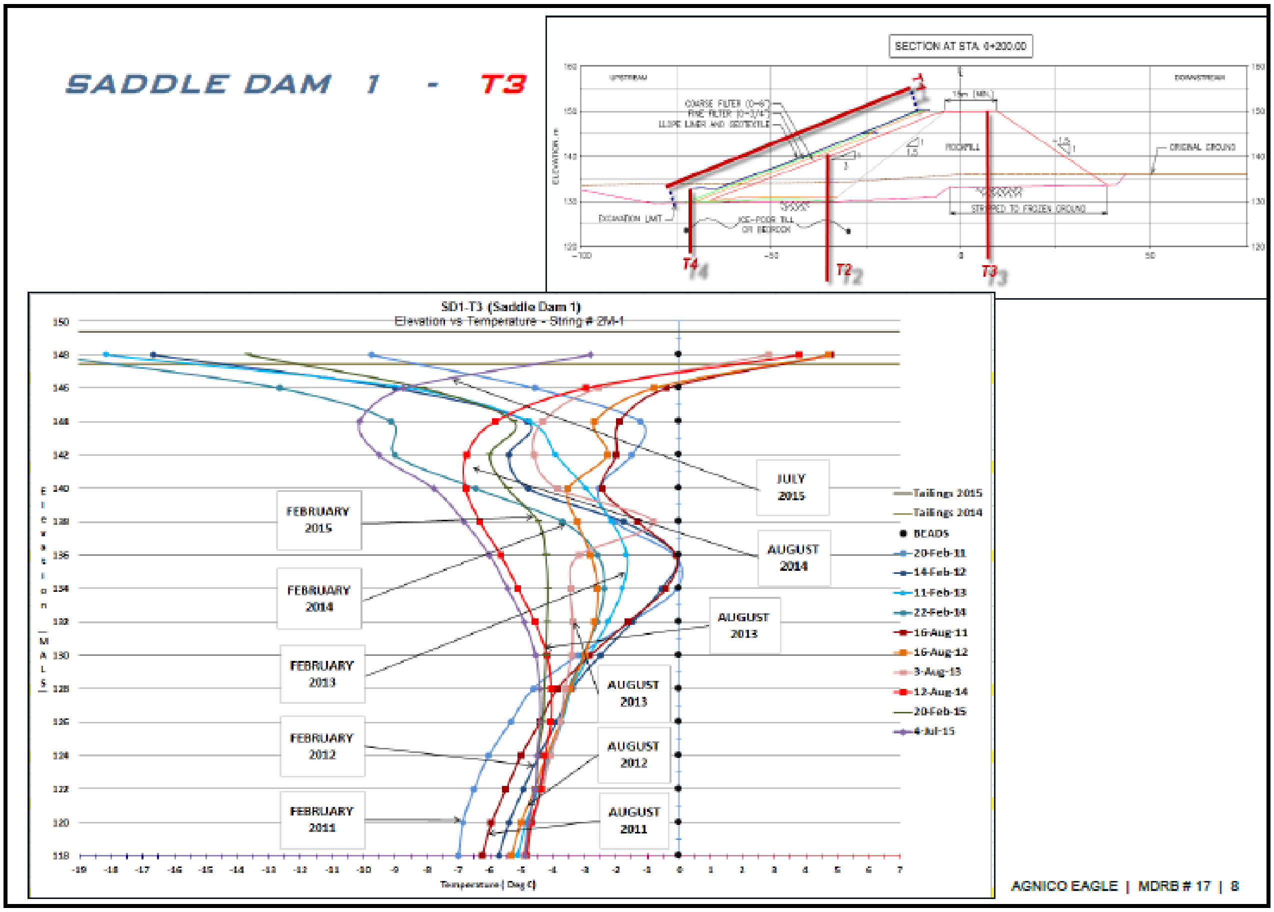
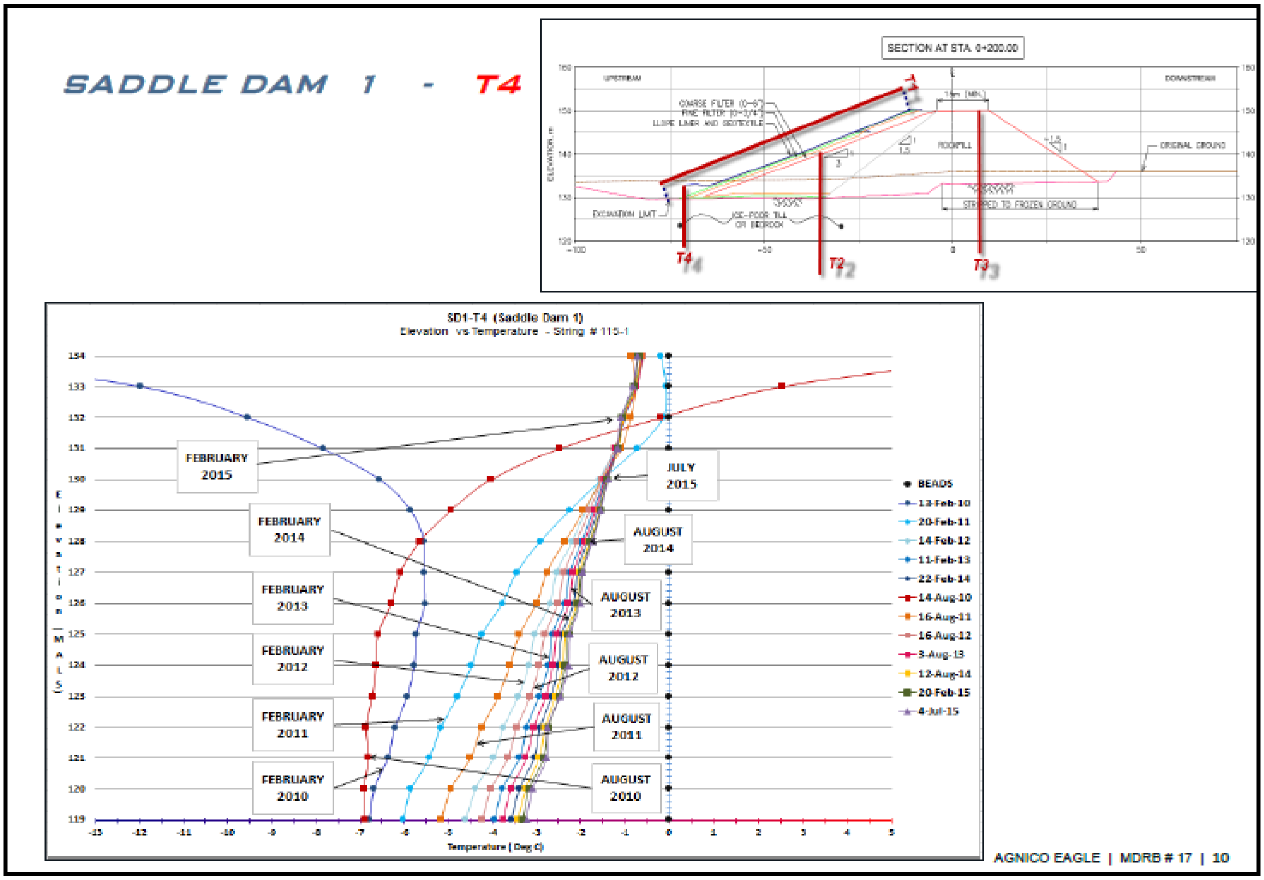


Figure 9. Thermistor Results SD1-T4



Saddle Dam 2

AEM also installed thermistors SD2-T1, SD2-T2, SD2-T3 and SD2-T4 on Saddle Dam 2. The results are illustrated on Figure 10 to 13. Thermistor data from within the structure indicates that the dike foundation remained frozen for the past years with temperatures ranging from about -3°C to -7.5°C. At the upstream toe of the dike, the semi-pervious backfill remained frozen during the year. The rockfill stayed in frozen condition without any active layer. No signs of seepage or thawing of the foundation soil were observed. The structure is performing as expected. The SD2-T1 thermistor string was installed in 2012 in the centre of the upstream face of the dike immediately on top of the geomembrane liner to monitor the thermal regime of the tailings in contact with the structure. Value between 0°C and -5°C were recorded during the year (in the winter and in the summer) below El. 147.7 m. It is anticipated that data collected from this location will be useful in monitoring the freezing of the tailings in the coming years. The SD2-T2 thermistor string was installed vertically through the upstream crest in the centre of the dike at El. 140 m. It shows that the dike foundation and rockfill shell remained frozen during the past year (temperature varying from -1.5°C to -7.5°C). The SD2-T3 thermistor string was installed vertically through the upstream liner tie-in trench near the centre of the dike at about El. 144 m. It shows that the dike foundation and the semi-pervious backfill placed on top of the compacted till remained frozen during the past year (temperature of the foundation between -5.5°C and -7.5°C). The range of temperature recorded is smaller than in past year at this location. The SD2-T4 thermistor string was installed vertically through the upstream toe about mid-way between the centre of the dike and the northwestern abutment. It shows that the dike foundation remained frozen during the past year along with the compacted till base material below the geomembrane liner in this area. The semi-pervious backfill placed on top of the compacted till also remained frozen during the summer of 2015. The temperature varied between -3°C to -6°C.

Additional information on instrumentation results for Saddle Dam 2 can be found in the *Annual Geotechnical Inspection* (Appendix B1).

Figure 10. Thermistor Results SD2-T1

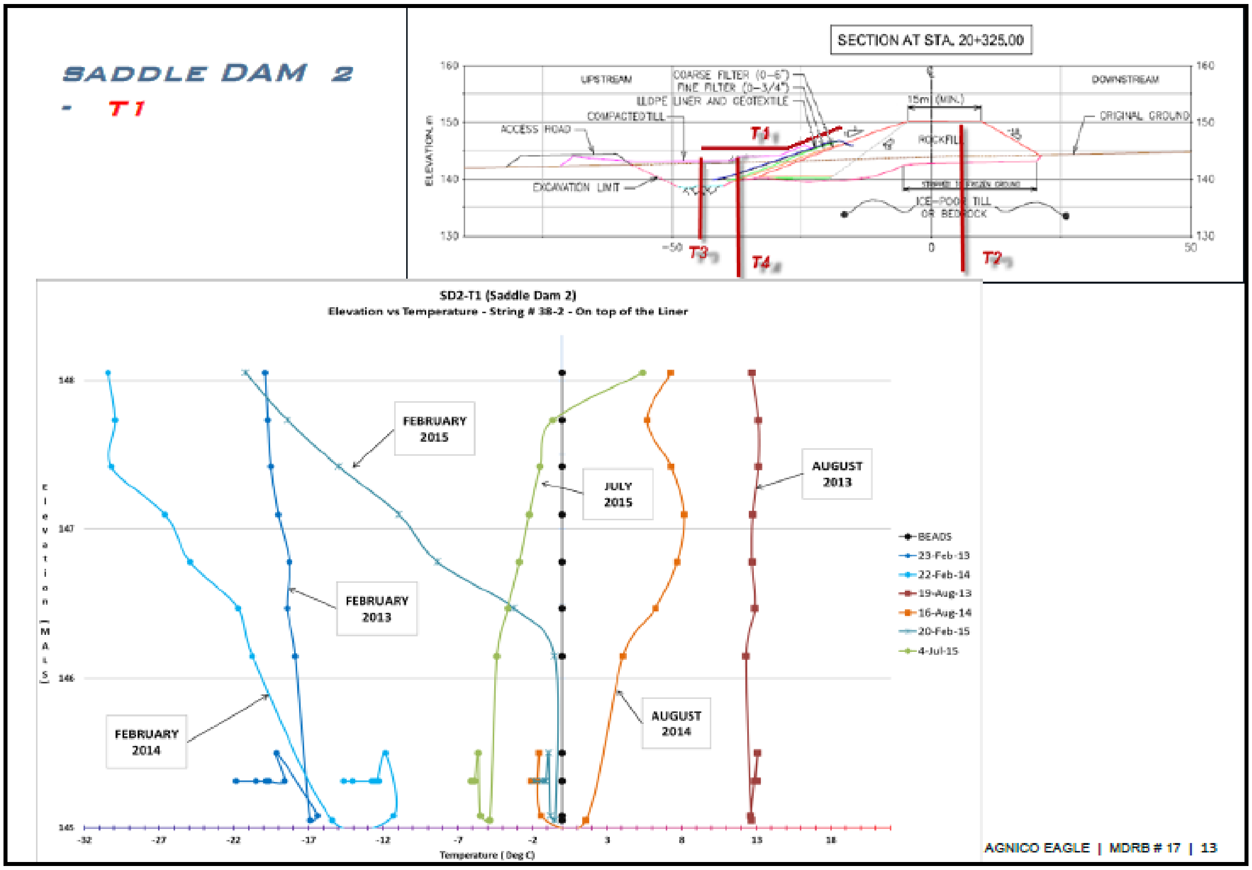


Figure 11. Thermistor Results SD2-T2

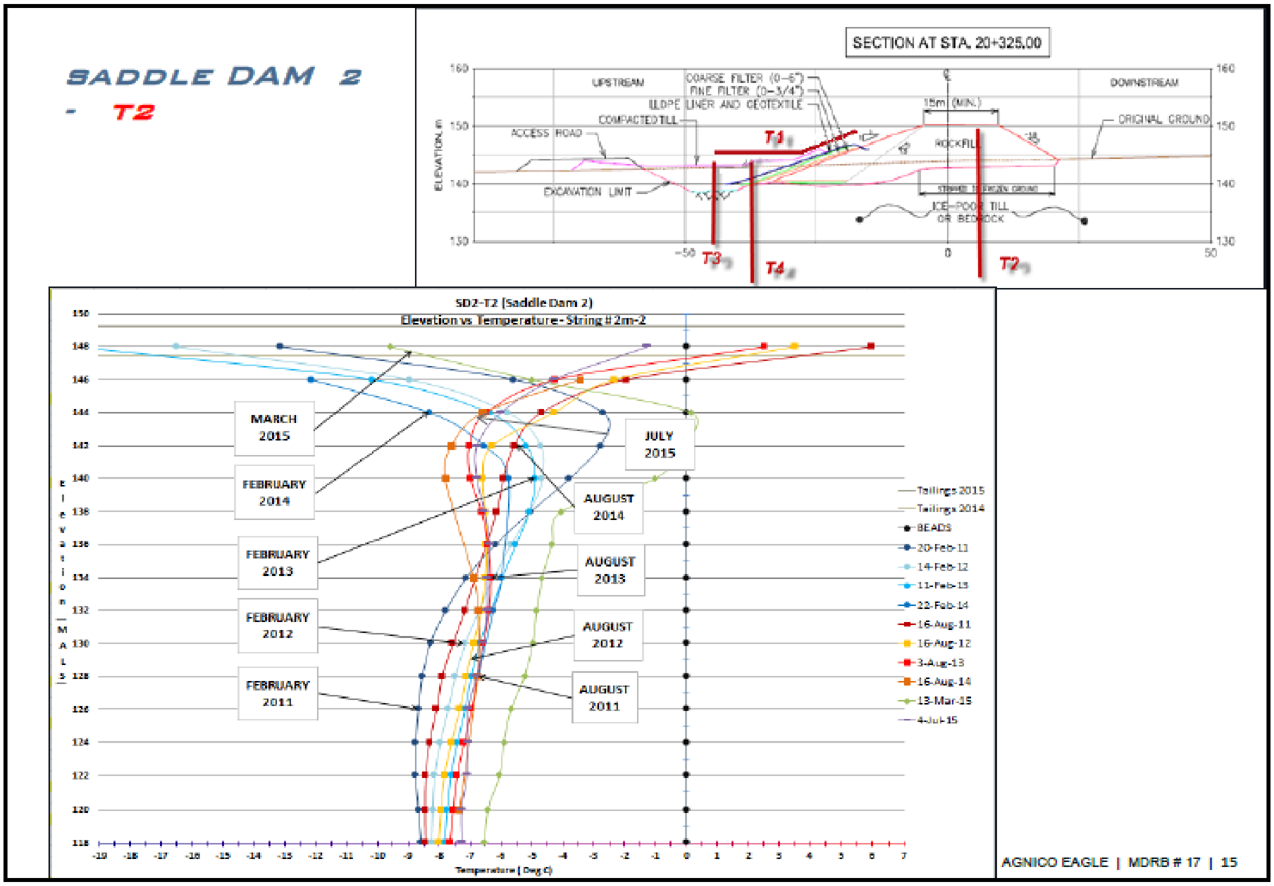


Figure 12. Thermistor Results SD2-T3

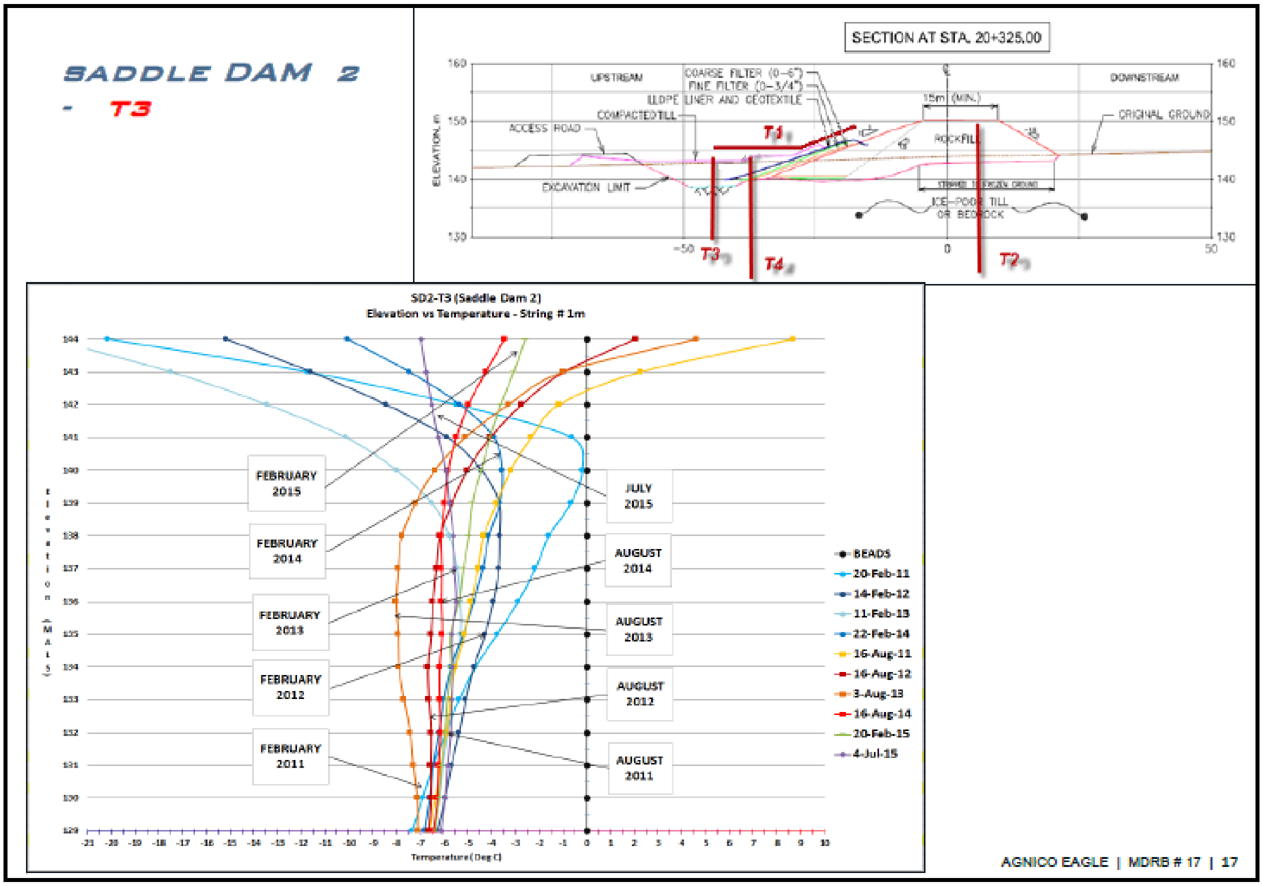
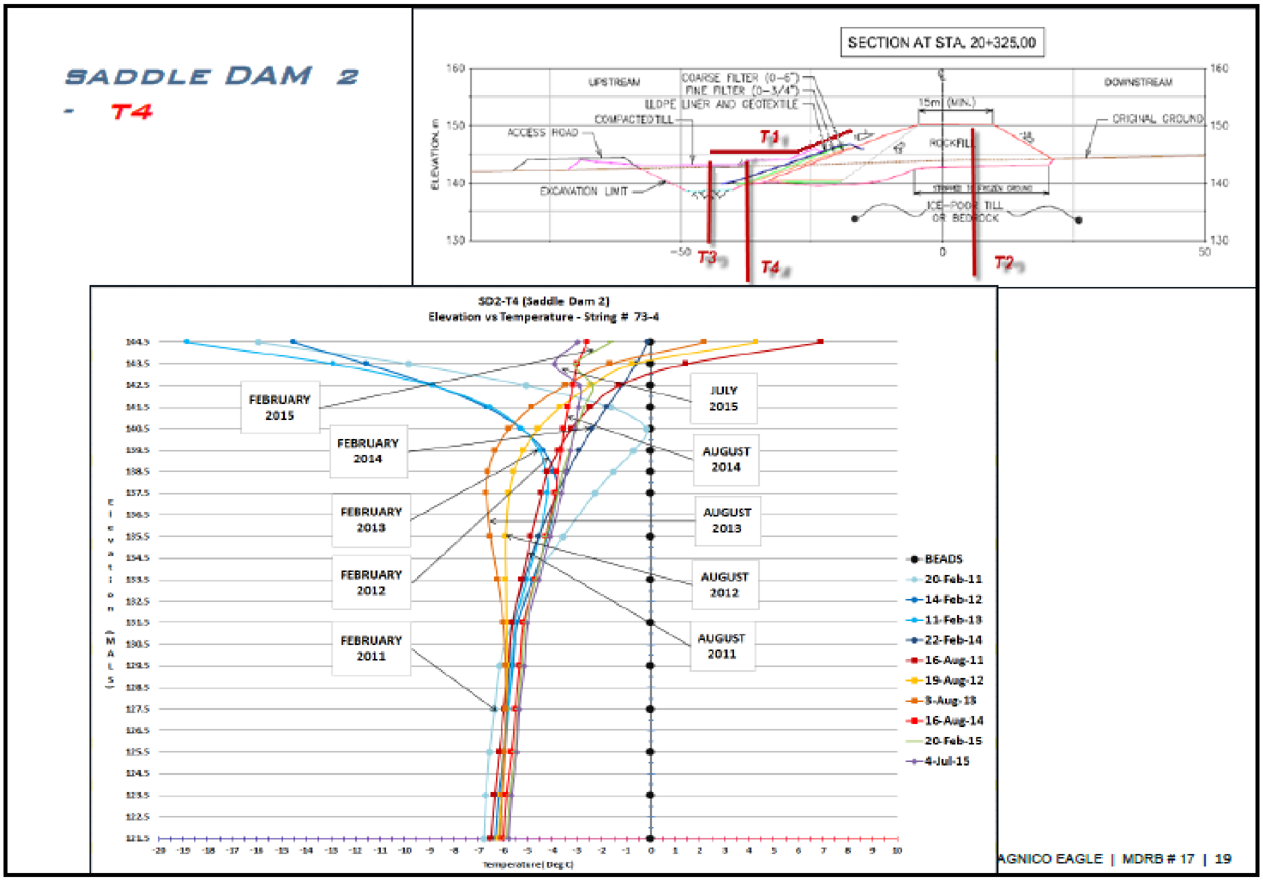


Figure 13. Thermistor Results SD2-T4

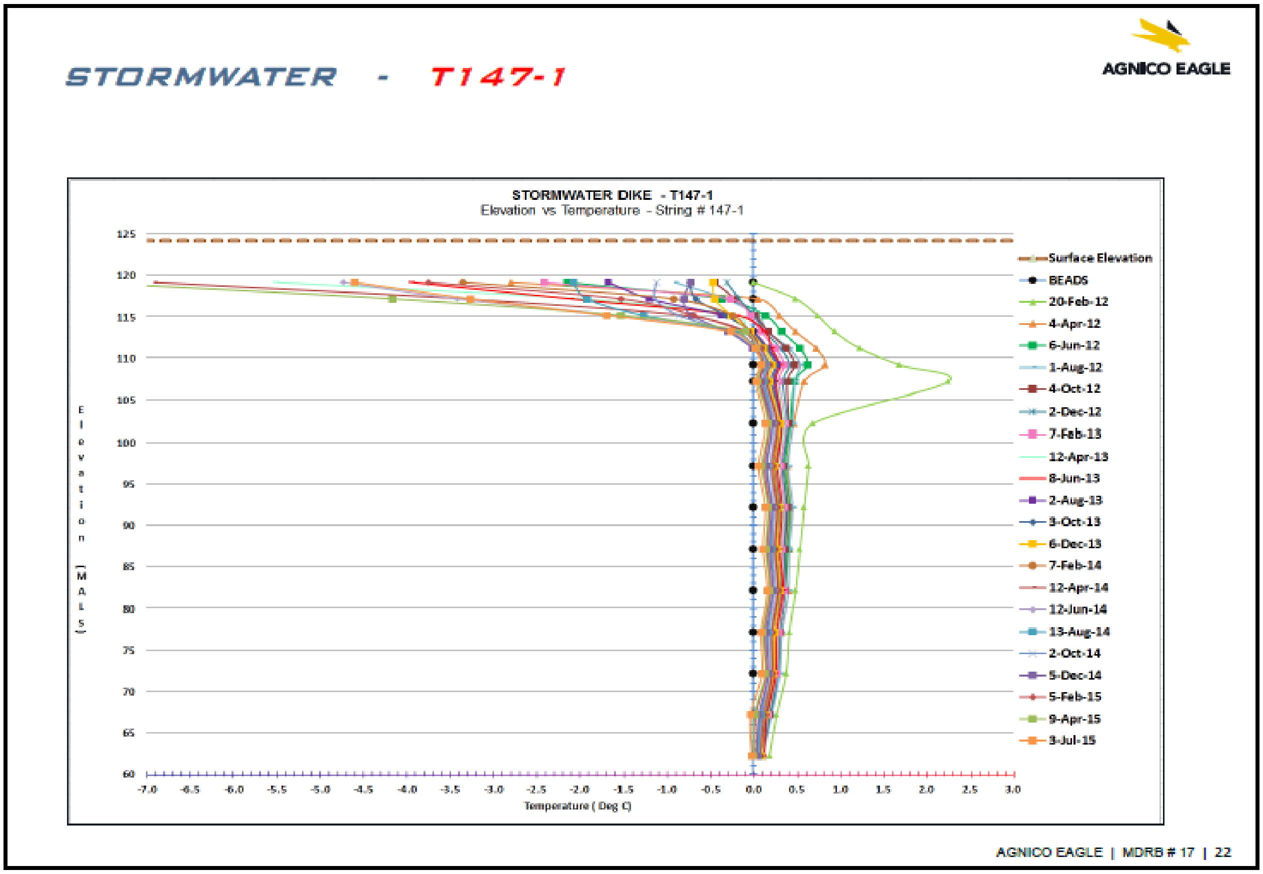


Stormwater Dike

In 2012, AEM installed a thermistor (T147-1) at the downstream toe of Stormwater Dike. Results for this thermistor can be found in Figure 14. This thermistor is being utilized to monitor the freeze back of the talik, and in the future will be used to monitor the thermal regime beneath the tailings in the South Cell. Thermistor T147-1 shows the existence of a frozen crust of material from El. 120 m to El. 112 m that stayed frozen during the summer of 2015. Below El. 112 m, the temperature varied between 0.3°C and 0.1°C.

Additional information on instrumentation results for Stormwater dike can be found in the *Annual Geotechnical Inspection* (Appendix B1).

Figure 14. Thermistor Results SWD-147-1



Instruments in RF1, RF2

Other thermistors were installed in 2012 in the TSF to monitor the temperature of the tailings as well as the temperature of RF1 and RF2 (which delineates the northeastern side of the TSF's North Cell). Plots of these thermistors data are presented in Figure 15 to 18. Three thermistors are installed on RF1 (T121-1, T73-6, and RF1-3). Thermistor T121-1 shows temperatures which vary from -0.8°C to -5.4°C. Thermistor T73-6 shows a wide range of temperatures above El. 145 m, but below that elevation the temperature fluctuates between 0.5°C and -0.5°C. A similar trend was observed last year. This trend indicates the presence of an active zone within the upper elevation of the deposited tailings. RF1-3 shows frozen conditions all year long below El. 147 m with temperatures varying between 0°C and -4°C. Above that elevation, the temperature seems to fluctuate seasonally between 11°C and -11°C. This trend indicates the presence of an active zone within the upper elevation of the deposited tailings. One thermistor is installed on RF2 (T122-1) and shows temperatures which vary from -2°C to -6.5°C, indicating that the RF2 foundation is in a frozen state.

Additional information on instrumentation results for RF1-RF2 can be found in the Annual Geotechnical Inspection (Appendix B1).

Figure 15. Thermistor Results RF1-T121-1

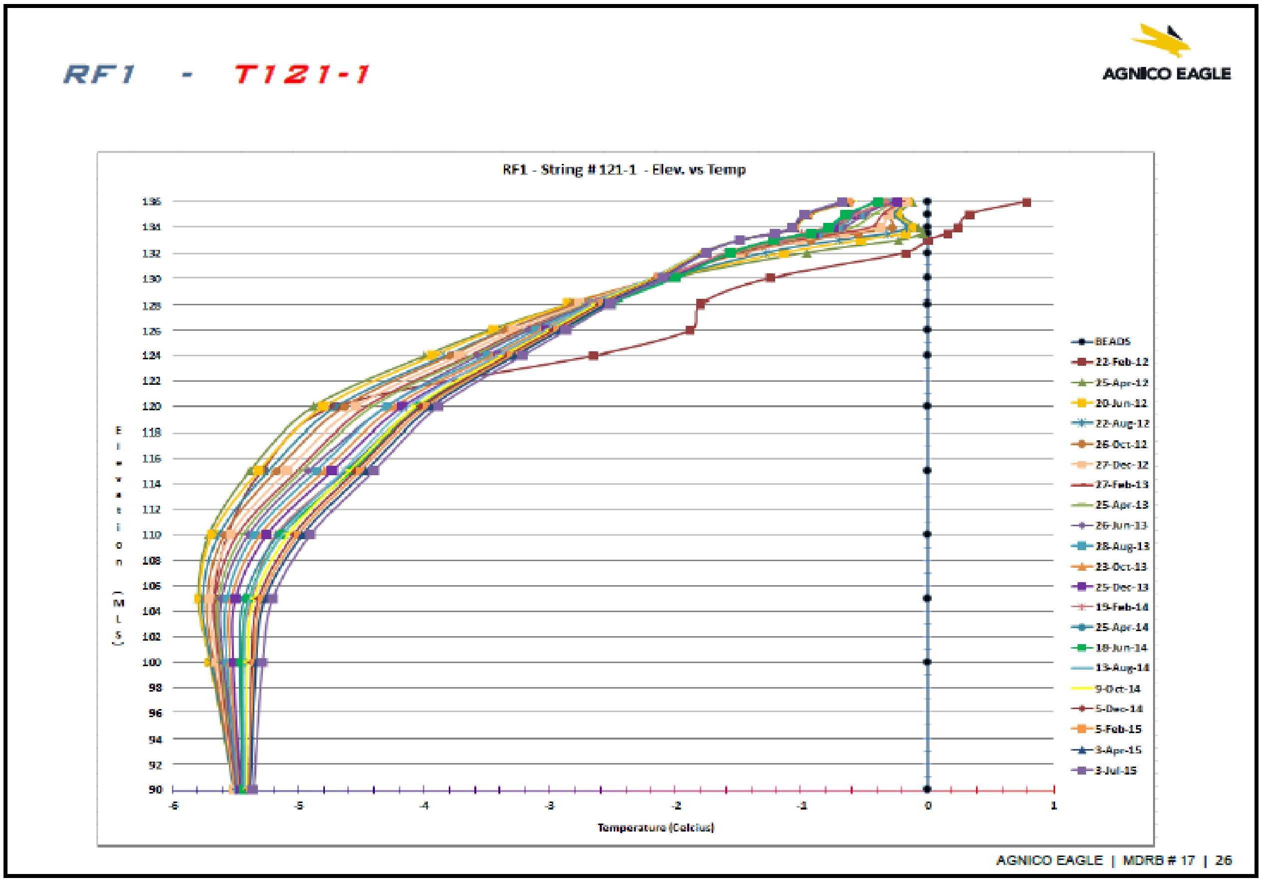


Figure 16. Thermistor Results RF1-T73-6

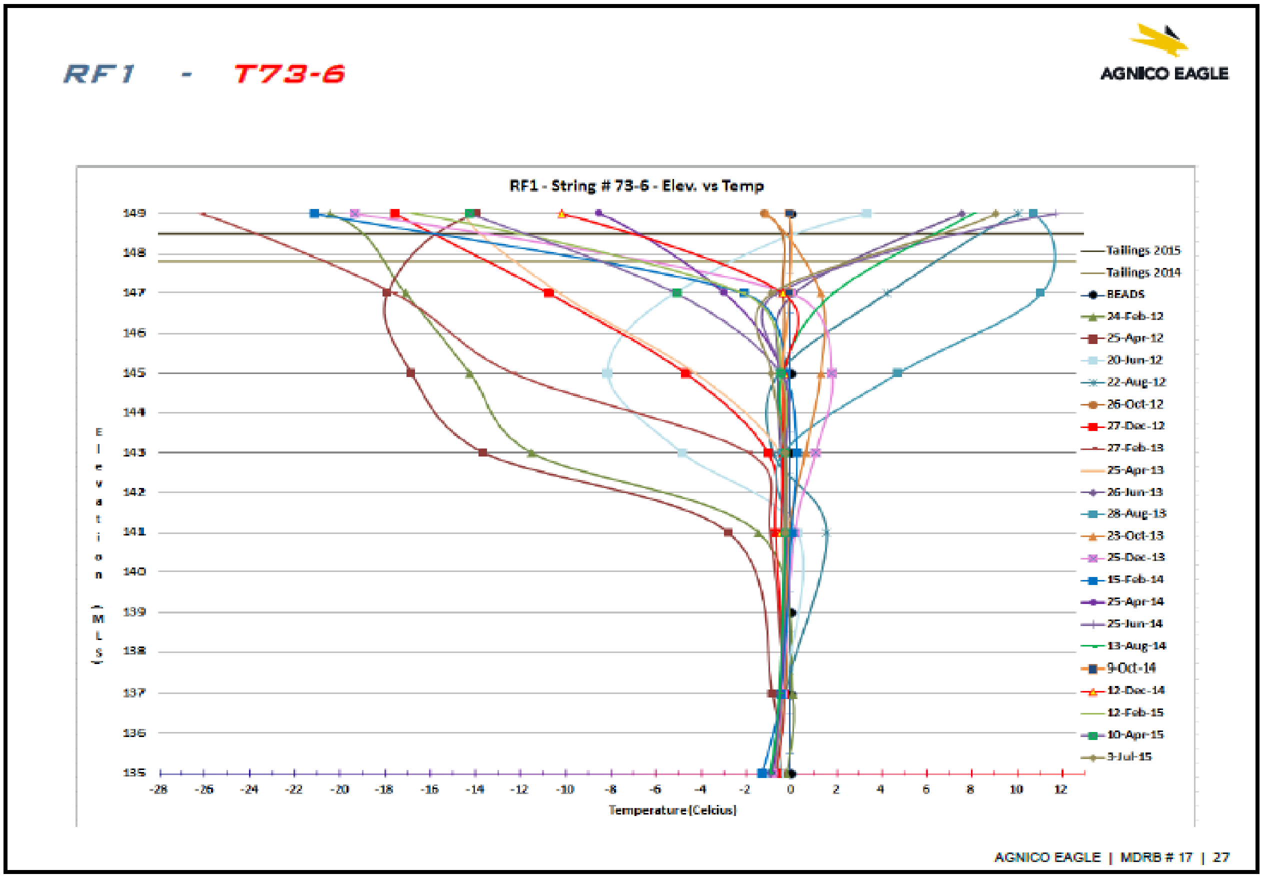


Figure 17. Thermistor Results RF1-RF1-3

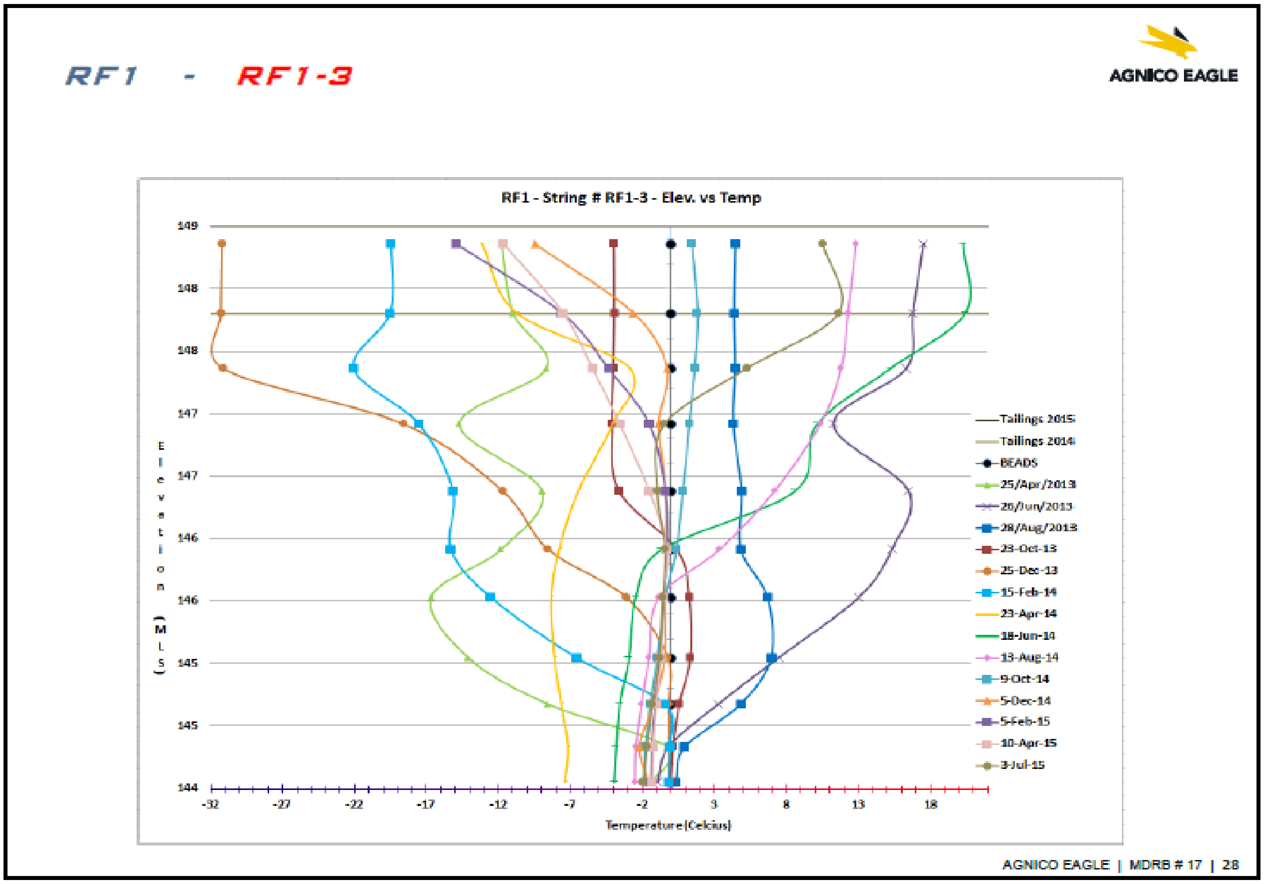
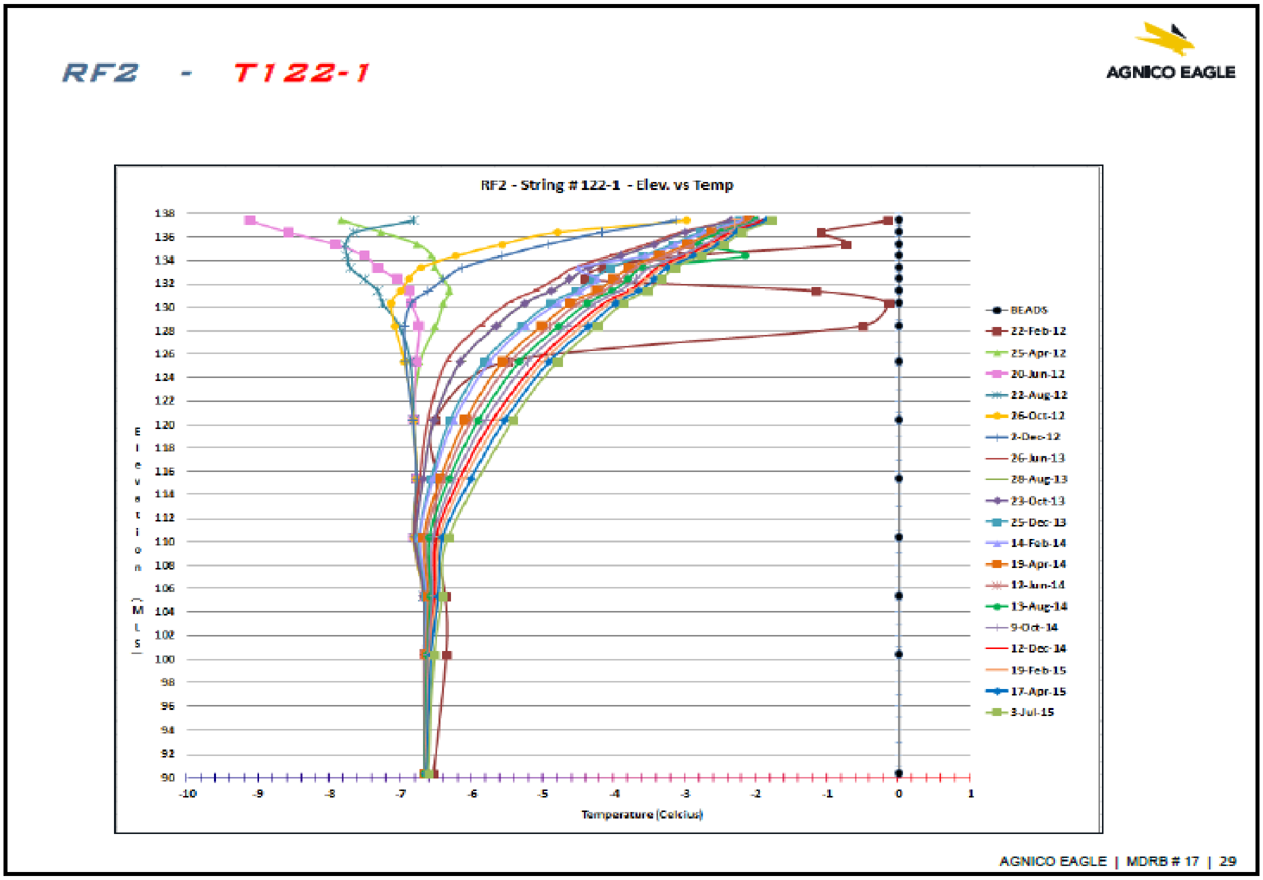


Figure 18. Thermistor Results RF2-T122-1



Central Dike and Second Portage Lake Arm

Thermistors were installed on Central Dike in the winter of 2013 to monitor the dike's performance, and provide information on the permafrost aggradation of Second Portage Lake Arm, along and following construction, operation, and into closure. The instruments installed along the central key trench show thawed conditions within the till and the bedrock and most of the rockfill (except for the presence of an active layer in the upper portion of the dike). The instruments installed along the downstream toe of the final Central Dike footprint indicate that permafrost conditions are developing. Additional thermistors were installed in the area of Central Dike at the end of 2015. Data analysis will be available in the next Annual Report.

Additional information on instrumentation results for Central DIke can be found in the *Annual Geotechnical Inspection* (Appendix B1).

The thermistor (T147-1) located at the downstream toe of Stormwater Dike is also being utilized to monitor the freeze back of the talik.

Saddle Dams 3, 4, 5

The construction of these structures was initiated in 2015. No instruments have been installed in these structures in 2015. Instruments are planned to be installed in these structures in 2016 and 2017.

Instrumentation in Tailings

To monitor the permafrost aggradation and talik beneath Second Portage Lake, AEM installed a thermistor (SD1-1 T90-2) in the North Cell tailings, beside Saddle Dam 1 in 2012. Thermistor SD2-1 was installed upstream of the Saddle Dam 2 and SWD-1 was installed upstream of the Stormwater Dike in April 2014, both directly in the tailings.

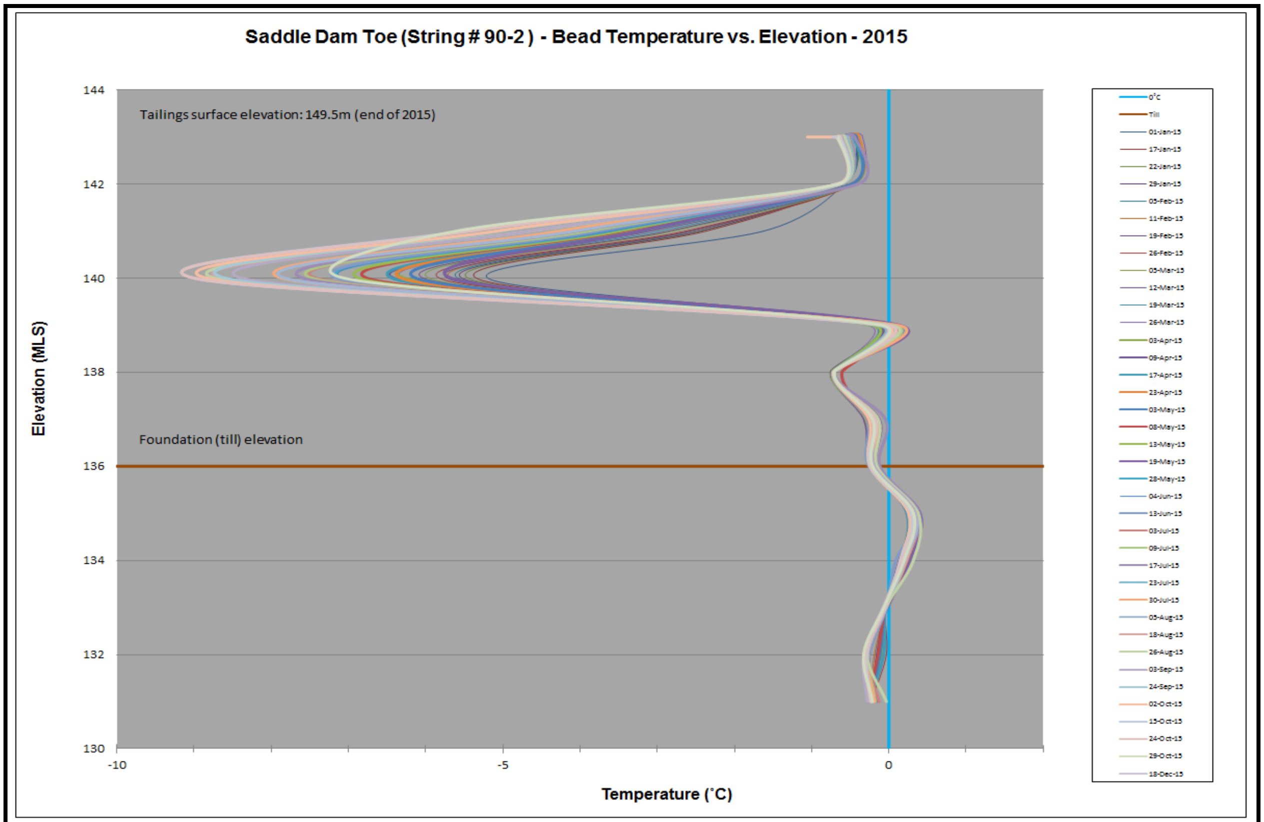
Thermistor SD1-1 was installed in 2012 in the tailings upstream of SD1. All the nodes from SD-1 are covered by more than 6.0 m of tailings. The thermal results from this thermistor show that the tailings are frozen. The foundation (till from the tundra) showed temperature close or below 0 Celsius. Plot of this thermistor data for 2015 are presented in Figure 19.

Additional thermistors were installed in the tailings in April 2014. Thermistor SD2-1 was installed upstream of Saddle Dam 2 and SWD-1 was installed upstream of the Stormwater Dike. For thermistors SD2-1 and SWD-1, thermal results show that tailings are completely frozen in the winter and from approximately 1.2 m down to the tailings surface during summer period. For the thermistor SD2-1, the foundation (till from the tundra) showed temperature below 0 Celsius. For the thermistor SWD-1, the foundation (till and bedrock) show temperatures above 0 Celsius, as expected since this thermistor is located in the talik portion of Second Portage Arm. Due to technical difficulties to protect the thermistor cables from excessive tension, thermistors SD2-1 and SWD-1 were operational respectively until July 2014 and October 2014. It is anticipated that data collected from the tailings will be useful in monitoring the freezing of the tailings in the coming years. These data are also being used in the design work of the tailings cover required at closure. Additional thermistors will be installed in 2016 in the North Tailings Cell to monitor the tailings freezeback, the permafrost aggradation and talik beneath Second Portage Lake.

The thermistor (T147-1) located at the downstream toe of Stormwater Dike will eventually be covered with tailings. As discussed above, this thermistor is being utilized to monitor the freeze back of the talik.

Additionally, 3 test pads (experimental cells) were constructed in June 2014 and in July 2015 in the North Tailings Cell to evaluate the efficiency of different tailings cover designs and thickness. This work was done in collaboration with the RIME (Research Institute of Mine and Environment) as part of a research project. This work in discussed further in this section of the report.

Figure 19. Thermistor Results SD1-90-2



<u>Instruments in Rock Storage Facility</u>

Thermistors are also installed in the Waste Rock Storage Facility, to measure the freeze back of the waste rock pile and also to verify the performance of the NAG cover placed over the PAG material in the RSF. RSF-1 was installed in February 2013 and RSF-3, RSF-4, RSF-5 and RSF-6 were installed on the RSF in November 2013. Plots of these thermistor data are presented in Figure 20 to Figure 24. The results of the thermistor RSF-1 for 2015 indicate that below approximately 5.5 m from the surface, the temperature remains below 0 Celsius all year long. The results of the thermistor RSF-3 for 2015 indicate that below approximately 3.0 m from the surface, the temperature remains below 0 Celsius all year long. Between approximately 28.0 m to 39.0 m from the surface, the temperatures can get close to 0 Celsius and then decrease with depth. The results for the thermistor RSF-3 indicates that below approximately 5.5 m from the surface, the temperature remains below 0 Celsius all year long. The results of the thermistor RSF-4 for 2014-2015 indicate that below approximately 3.0 m from the surface, the temperature remains below 0 Celsius all year long. Between approximately 35.0 m to 65.0 m from the surface, the temperatures are between -1 and 0 Celsius and then decrease with depth. This instrument was damaged in spring 2015. The results of the thermistor RSF-5 for 2015 indicates that below approximately 2.0 m from the surface the temperature remains below 0 Celsius all year long, and at further depth, the temperature remains between 0 and -9 Celsius all year long. The results of the thermistor RSF-6 for 2015 indicates that below approximately 4.5 m from the surface the temperature remains below 0 Celsius all year long, and at further depth, the temperature remains between -1 and -18 Celsius all year long.

A total of 10 additional thermistors were installed in November 2015 in the Portage RSF; results will be presented in the 2016 Annual Report.

Figure 20. Thermistor Results RSF1

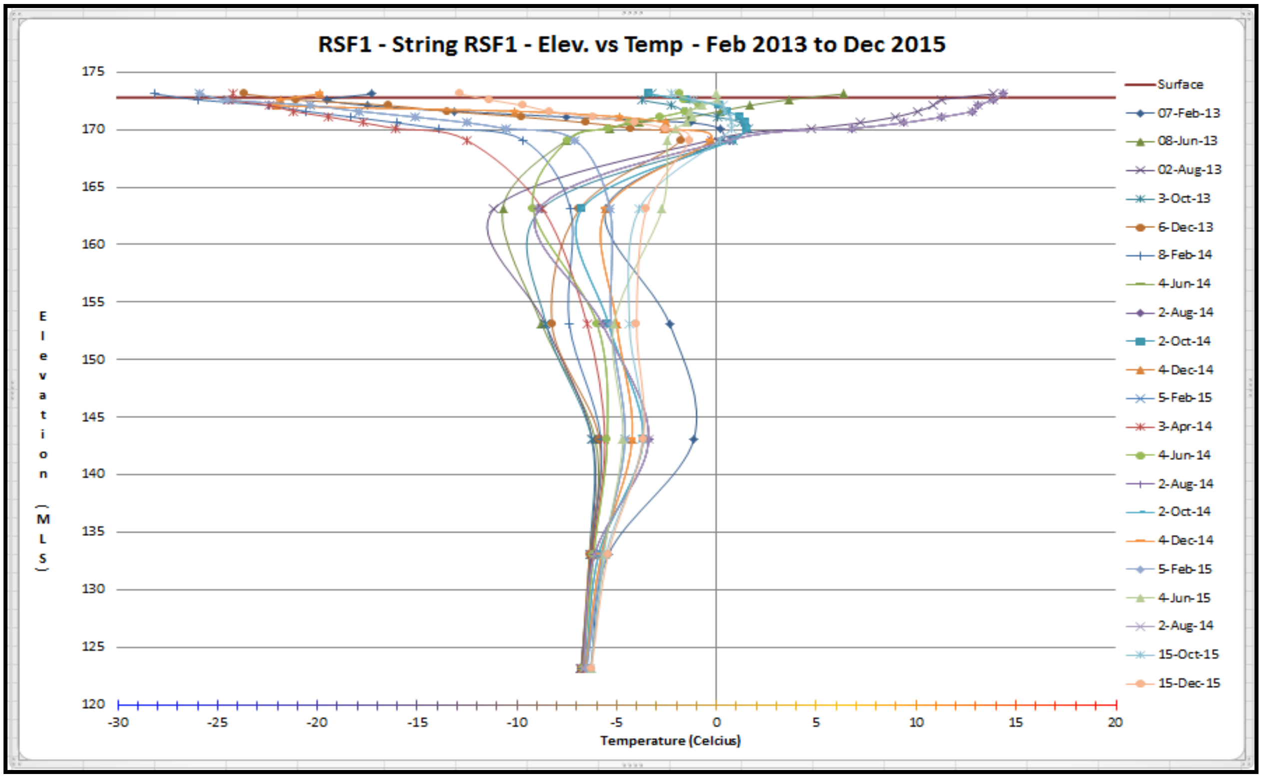


Figure 21. Thermistor Results RSF-3

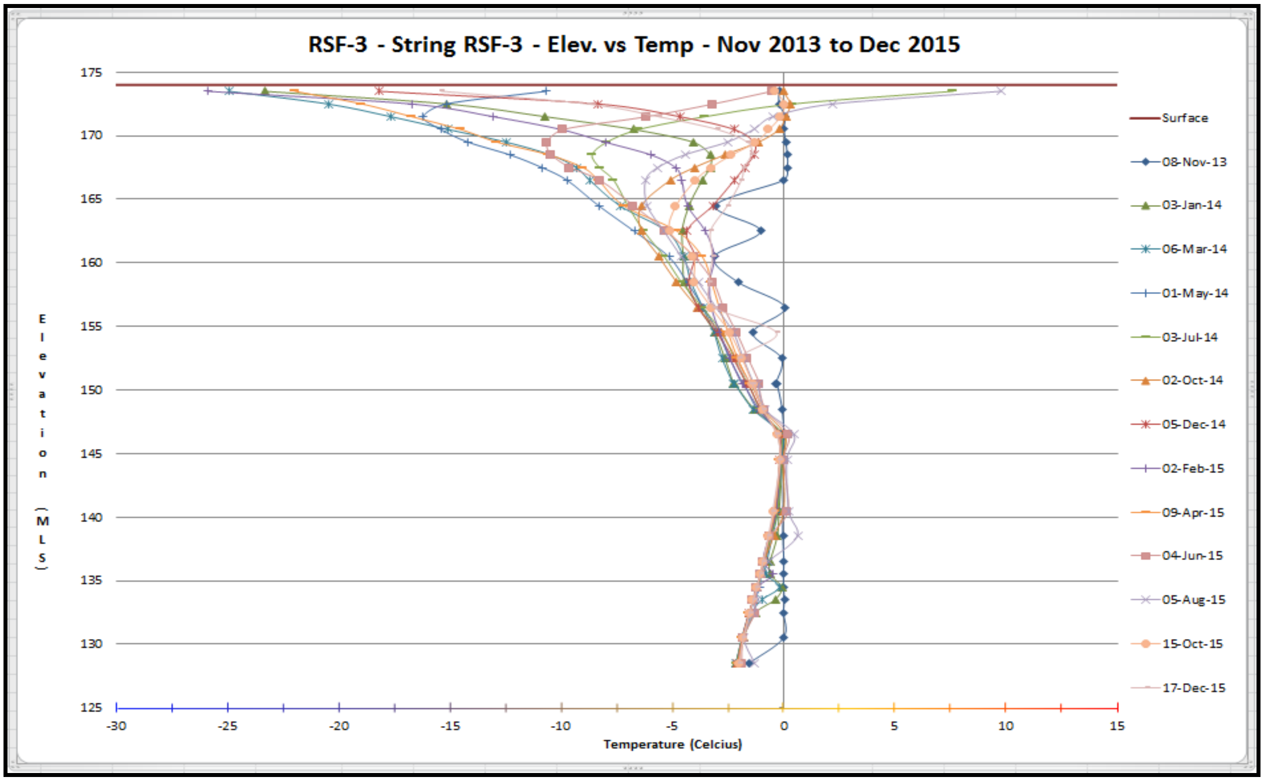


Figure 22. Thermistor Results RSF-4

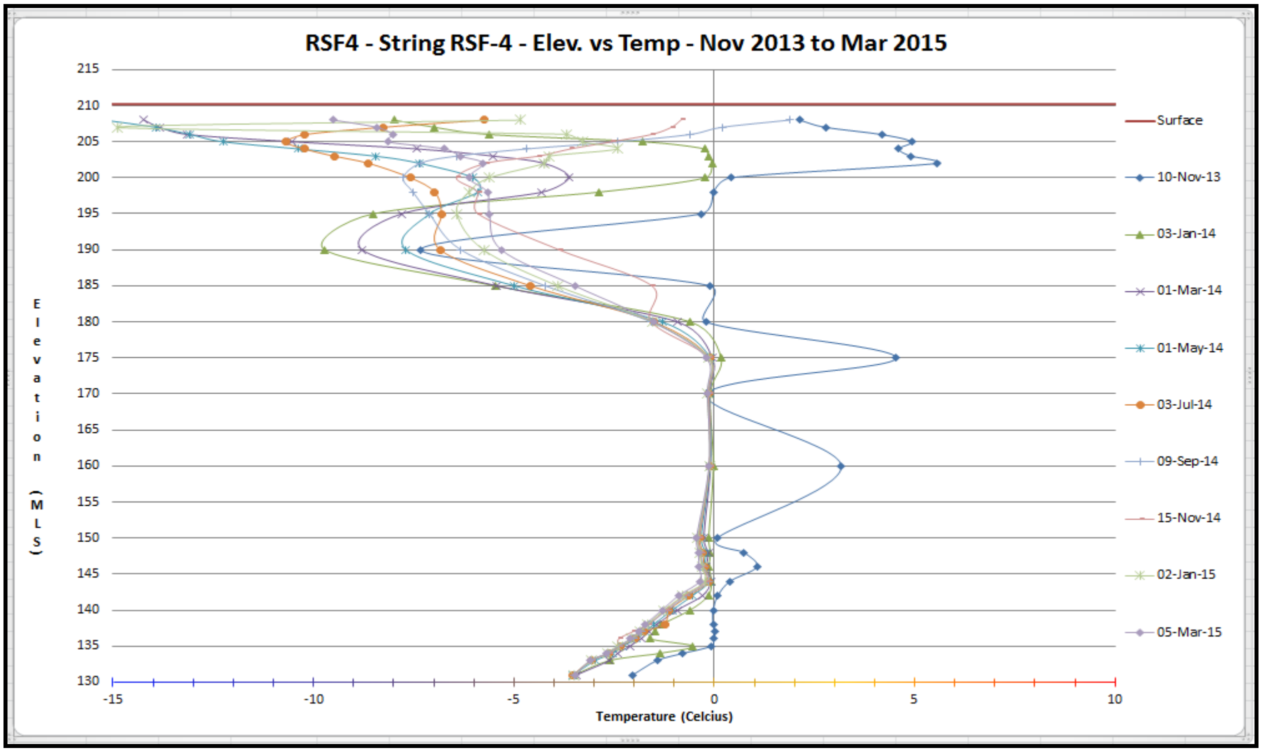


Figure 23. Thermistor Results RSF-5

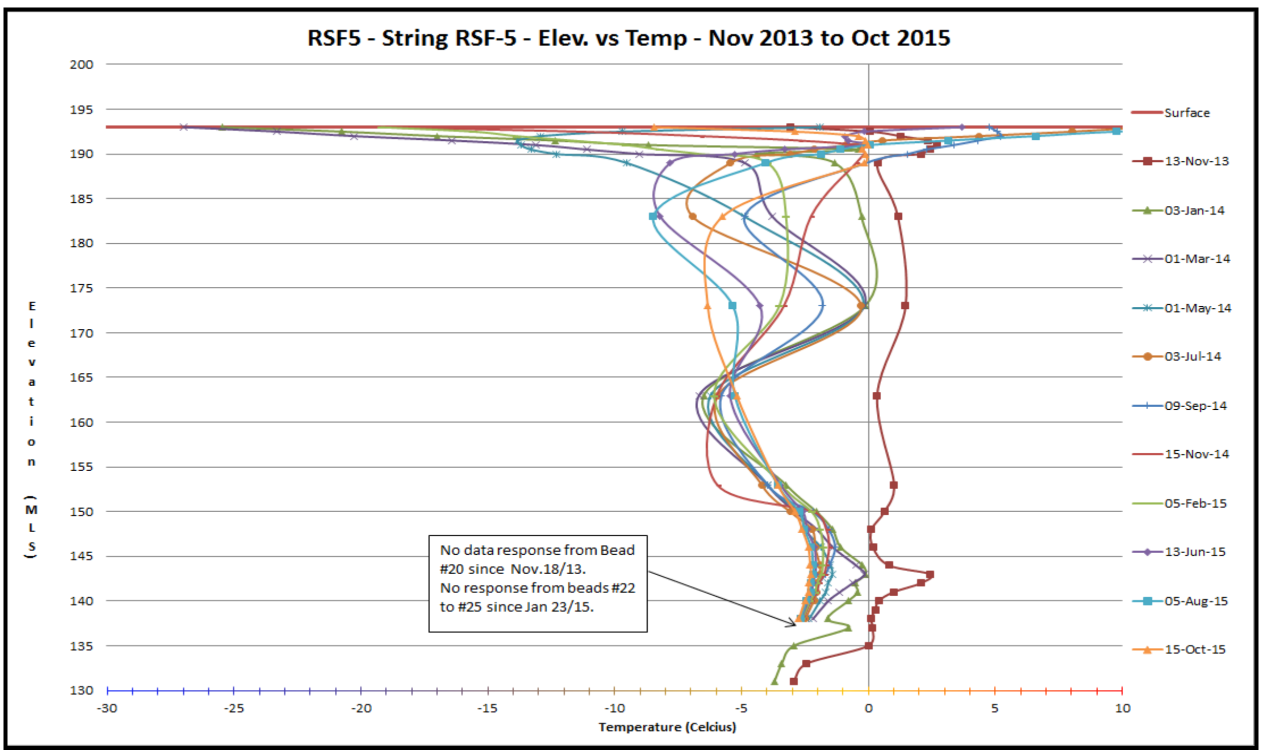
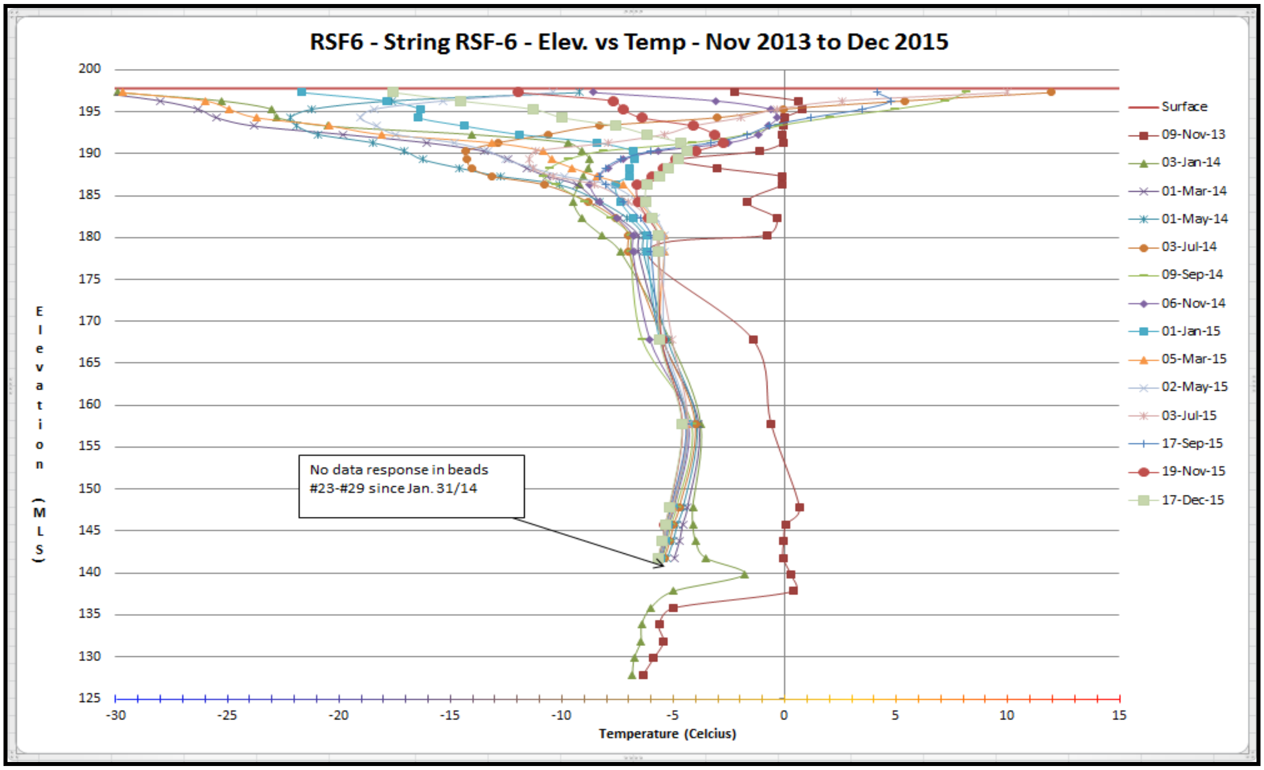


Figure 24. Thermistor Results RSF-6



Instruments in Pits

Portage Pit

No thermistors were installed directly in Portage Pit because of the mining and rock backfilling activities. However, the permafrost aggradation can be monitored with the thermistors installed in the East Dike and Central Dike.

Five thermistors have been installed on East Dike. Since different observations were made for each thermistors please refer to Section 4.1.2 of the *2015 Annual Geotechnical Inspection* found in Appendix B1.

As part of the instrumentation in the Central Dike, thermistors, as mentioned, were installed during the winter of 2013 to monitor the dike's performance. These were installed along the west side of Portage Pit. The instruments along the Portage Pit limit show variable results. The bedrock temperature decreases from -6 °C (El. 105 m) to -3.5°C (El. 50 m) at 465-P3, decreases from -8 °C (El. 105 m) to -0.5 °C (El. 60 m) at 650-P3 and is about 1°C at 875-P3. This seems to indicate that a permafrost condition is still developing along the Portage Pit west wall perimeter.

Goose Pit

The permafrost in Goose pit can be monitored by the thermistor SD-09-A which is located on South Camp Dike approximately 20 m further upstream within Third Portage Lake. As mentioned in Section 4.2 of the *2015 Annual Geotechnical Inspection* found in Appendix B1, this thermistor showed that the temperature profile at SD-09 on the upstream side of the dike shows that the soils located beneath the dike foundation and liner appear to have remained frozen (permafrost) below El. 128 m.

Also, thirty-three thermistors (from T1 to T30 and T3' to T5') are installed on Bay-Goose Dike. Please refer to Section 4.3.2 of the *2015 Annual Geotechnical Inspection* in Appendix B1 for a complete review. New thermistors were installed in 2012 between Bay Goose Dike and Bay Goose Pit to monitor aggradation of permafrost. To date, result show that the freezeback is occurring.

Summary of On-Going Field Trials

A research project in collaboration with the Research Institute of Mines and Environment (RIME) was initiated in 2014 at Meadowbank. The Research Institute on Mines and Environment, through the NSERC-UQAT Chair on Mine Site Reclamation, is mandated to evaluate the performance of three field experimental cells constructed in 2014 and 2015 on Meadowbank's North Cell TSF. The three experimental cells that were built on Meadowbank's TSF are two insulation covers and one thermal cover with capillary barrier effects (CCBE).

The tested experimental cells are a 2m and a 4m thick insulation cover as well as a 2m thick cover with capillary barrier effects. The cells were built with coarse and fine non-potentially acid generating (NAG) ultramafic waste rock (soapstone) and are instrumented in order to follow their thermal and hydrogeological behaviors.

Results have been reviewed by the RIME and AEM. The results of the experimental cells have been used in the work for the cover design of the TSF North Cell, completed by O'Kane in 2015. Details on the tailings cover design for the North Cell are available in the *2015 Mine Waste Rock and Tailings Management Plan* available in Appendix D1 of this report.

Also in collaboration with the RIME, a laboratory testing program was developed to obtain a good overview of the effects of frost/thawing (F/T) and wetting/drying (W/D) cycles on the soapstone. The developed experimental program is primarily focussed towards the evaluation of the resistance to F/T and W/D of the soapstone to be used as cover materials for the TSF and RSF. Other laboratory work (such as frost heave or bearing capacity tests) could be necessary if required for other engineering purposes.

SECTION 6. WASTE MANAGEMENT ACTIVITIES

6.1 LANDFILL MONITORING, WASTE ROCK STORAGE FACILITY AND CENTRAL DIKE

As required by Water License 2AM-MEA1525 Schedule B, Item 10*: Summary of quantities and analysis of seepage and runoff monitoring from the Landfills, Waste Rock Storage Facility and Central Dike.*

Seepage and runoff monitoring of the Landfill is discussed below in Sections 8.3.3.17. Seepage and runoff from the Rock Storage Facility and Central Dike are discussed in sections 8.3.3.11 and 8.3.7, respectively.

6.2 GENERAL WASTE DISPOSAL ACTIVITY

As required by Water License 2AM-MEA1525 Schedule B, Item 11: *A summary report of general waste disposal activities including monthly and annual quantities in cubic metres of waste generated and location of disposal.*

And

NIRB Project Certificate No.004 Condition 74*: Provide annual report of the quantity and type of waste generated at the mine site distinguishing landfilled, recycled and incinerated streams.*

A monthly summary of the amount of waste transferred to the incinerator in 2015 is included in Table 6.1. more details regarding quantities incinerated can be found in Section 6.3.

Table 6.2 below indicates the volume of waste in m^3 disposed of in each sub-landfill and Figure 25 indicates the location of each sub-landfill used to date. Sub-landfill #6C is currently in operation and sub-landfill #1 to #6B were closed and covered with NPAG waste rock. Based on surveys conducted at the end of each quarter, AEM landfilled 11,526 m^3 between December 1st 2014 and December 31st 2015.

The waste consists primarily of plastics, fiberglass, wood, cardboard, rubber, clothing and some metal that was not recycled.

Table 6.1. 2015 Volumes of waste transferred to the incinerator.

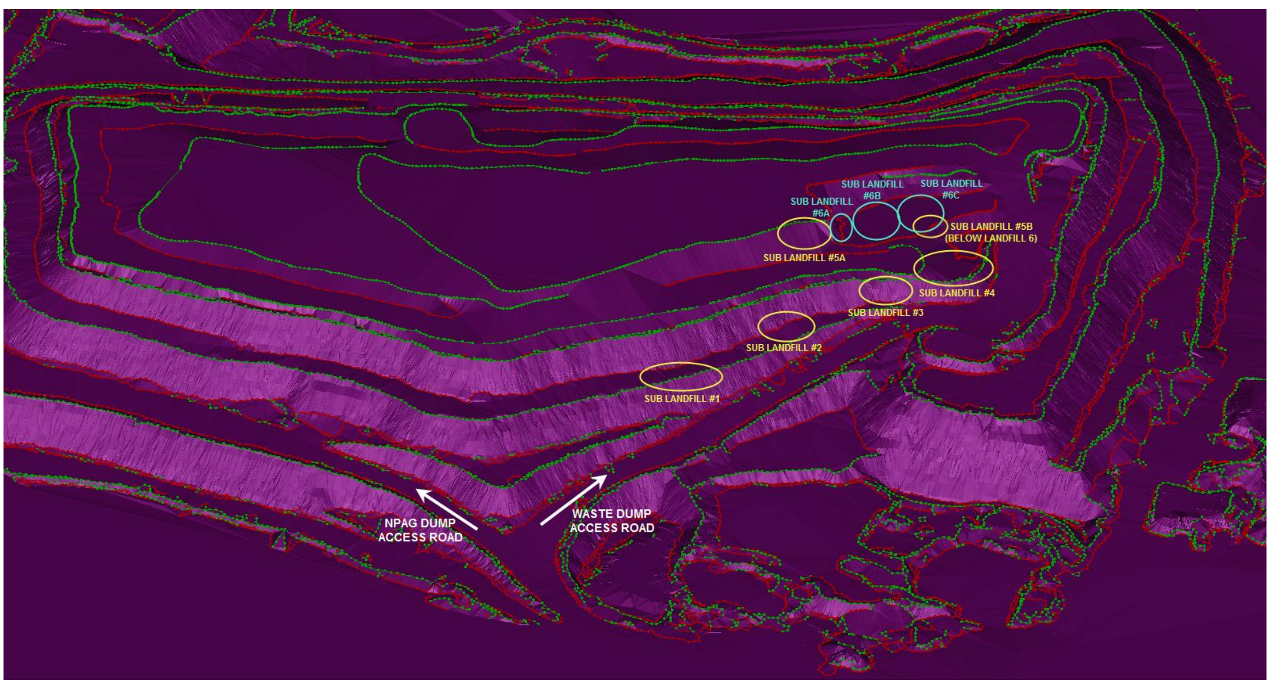
Month	Volume of Waste Sent to Incinerator (m^3)
January	332
February	310
March	332
April	321
May	343
June	332
July	343
August	332

September	321
October	210
November	321
December	321
Total	**3,816**

Table 6.2. Volume of waste disposed in each sub-landfill (from survey).

Landfill	Coordinates (UTM)			Volume (m^3)	Date Covered
	Northing	Easting	Elevation		
#1	7215715.6	638601.5	160	3650	Dec-12-2012
#2	7215795.8	638711.4	186	840	Feb-27-2013
#3	7215743.1	638827.8	195	1656	May-14-2013
#4	7215796.5	638890.9	200	9507	Jan-19-2014
#5A	7206586.1	643115.9	210	3870	Nov-30-2014
#5B	7206586.1	643115.9	210	2768	Mar-13-2015
#6A	7215788.8	638793.3	212	278	Mar-21-2015
#6B	7215789.3	638853.1	212	3260	Sept-05-2015
#6C	7215790.8	638878.1	212	TBA	TBA

Figure 25. Sub-landfill location.



In 2015, a total of 52 sea cans filled with hazmat waste and recyclable material was shipped to an approved waste disposal facility in Quebec. The total weight was 289 tonnes. The sea cans were shipped from the spud barge at AEM's Baker Lake marshalling facilities to Bécancour, Quebec by sealift. These materials were transported under Waste Manifest #'s HL55775-1, HL55776-9 and HL55777-7 in accordance with the GN Guidelines for the shipment of such waste. Copies of these manifests are attached in Appendix E1. A description of the types of waste, packaging and volume is provided in Table 6.3.

Table 6.3. Waste shipped to licensed hazardous waste companies.

	Drum	Tote	Quatrex	20 L plastic pail
Airplane de-icing	2			
Crushed neon	1			
Empty content	104			
Flammable liquid N.O.S.		1		
Glycol		3		
Glycol and oil mix		65		
Oil filters	193		5	
Oily sludge		6		
Oily solids waste	2		238	
Oily water		43		
Plastic pail lids (SO)			16	
Plastic pail			3	3836
Sulfuric Acid	2			
Vegetal grease (cooking)	47			
Waste diesel	2			
Waste Jet fuel	1			
Waste grease	81		7	
Waste Kerosene	4			
Waste oil	1			
Waste paint	1		18	
Waste spray cans (aerosols)			2	
TOTAL	441	118	289	3836

Several projects for waste reduction/recycling were undertaken or were ongoing in 2015 at Meadowbank:

- Recycling of used protective personnel equipment (PPE) ongoing
    - The objective of the *Used PPE Project* is to provide a second life to reusable PPEs. With the collaboration of all departments, AEM collected used PPE around the Meadowbank site to create a used PPE inventory. This used PPE is now reused instead of ordering

new equipment and disposing of reusable materials in the landfill. This initiative has been successful in reducing waste sent to landfill and as an overall cost saving measure.

- Waste oil recycling plan
    - AEM has an existing waste oil reuse plan. In 2015 AEM reused approximately 407,802L of waste oil as a fuel source in the on-site incinerator (2790L) and in waste oil heaters (405,012L). Table 6.6 provides a breakdown of the volume of waste oil incinerated by month. All waste oil produced in 2014 was kept onsite, filtered and reused. AEM is planning on continuing to reuse all waste oil produced in 2015 during 2016. A project to separate glycol and water from waste oil is currently being reviewed by AEM and could contribute to higher amount of used oil being reused.
- Steel Recycling
    - A total of 1,449 tonnes of steel was packaged and transported south for recycling. This material was removed from our solid waste stream and not landfilled on site.
- Aluminum Recycling
    - In 2015, no aluminum pop cans were donated to local groups as was done in 2014. In 2015 AEM stored the aluminum cans on site. It is anticipated that these will be donated in 2016 to a local charity or shipped south for recycling.
- Wood Recycling
    - In 2015 the Meadowbank Environmental Committee continued an initiative to start a used wooden recycling program with the community of Baker Lake. Used pallets, that were free of contamination, were stored at the Meadowbank site in sea cans. Sea cans, once full, were taken to the local high school's Carpentry department (Jonah Amitnaaq Secondary school). The teacher of this department planned projects for students, utilizing the free wood supplied by Meadowbank. A mini-golf course is being built with recycled wood (Figure 26). In 2015 a total of 4411 used pallets were sent to the community of Baker Lake.
- Battery recycling
    - In 2015, 37,500lb of batteries were shipped south and recycled in an accredited facility.

Figure 26. Mini-golf course being built by carpentry students of Jonah Amitnaaq Secondary school with recycled wood.

6.3 INCINERATOR

As per Water License 2AM-MEA1525 Schedule B, Item 12: ***Report of Incinerator test results including the materials burned and the efficiency of the Incinerator as they relate to water and the deposit of waste into water*.**

And

NIRB Project Certificate No.004 Condition 72: ***On-site incinerators shall comply with Canadian Council of Ministers of Environment and Canada-Wide Standards for dioxins and furan emissions, and Canada-wide Standards for mercury emissions, and AEM shall conduct annual stack testing to demonstrate that the on-site incinerators are operating in compliance with these standards. The results of stack testing shall be contained in an annual monitoring report submitted to GN, EC and NIRB's Monitoring Officer*.**

The incinerator was in operation throughout 2015. The incinerator daily report logbook is included in Appendix E2 and covers all months of the year. Secondary chamber temperature trends for December 16 to 31 (13 burns) 2015 can be found in Appendix E2 as these data are missing in the daily report logbook.

Based on the data, approximately 60% of the material incinerated was food waste; the other 40% was dry waste comprised of food containers, cardboard boxes, paper and absorbent rags. The location of the incinerator is highlighted in Figure 1.

Maintenance work was conducted at the incinerator in 2014 and 2015. Work conducted was designed to maximise heat in the primary and secondary chambers to enhance gas burning. In June 2014, maintenance was conducted on both chambers of the incinerators. In the primary chamber, ceramic fiber blocks used as refractory material were replaced by firebricks on all walls excluding the ceiling. In February 2015, the first phase of the secondary chamber renovation was conducted. Firebricks were installed at the burner end of the chamber and on portions of the inner wall of the chamber. This work was continued in October 2015.

The January 2015 logbook recorded temperatures slightly below 1000ºC in the secondary chamber. Additional improvements at the incinerator were completed in February 2015. Incinerator logbooks from February thru December 2015 show that temperature in the secondary chamber was above 1000ºC except on August 22nd (998ºC) and November 24th (810ºC). AEM considers that maintenance work conducted at the incinerator in 2014 and 2015 was effective in improving efficiency of the unit. AEM will continue monitoring temperatures in the secondary chamber.

As per discussions with Environment Canada, the frequency of stack testing changed in 2012 to every other year. Results from the 2014 test indicated that mercury level average (64.09 µg / Rm³ @ 11 % v/v O_2) exceeded the Environment Canada guideline (20 µg / Rm³ @ 11 % v/v O_2) during the incinerator stack testing. As a result an investigation with Meadowbank's site services department was performed to determine the potential sources of this exceedance. Although AEM had an alkaline battery recycling program, the investigation revealed that there could be a significant volume of batteries disposed of along with regular solid waste destined for the onsite incinerator. As a result, AEM committed to conduct confirmatory stack testing in the summer of 2015 and implemented a comprehensive site wide information program to reinforce the requirements of the battery recycling program. This included regular meetings with individual departments as well as placing information on the AEM intranet site. During meetings conducted by the Environmental Department, employees were reminded about the Waste Management Flow Chart and copies of the documents were distributed to all Departments. This flowchart describes how batteries should properly be disposed of onsite. Eighteen (18) meetings were held regarding this issue. Waste management technical memos were also published on AEM's intranet and sent to all contractors and employees (Appendix E3).

The number of quatrex of batteries backhauled in 2015 (table 6.4) confirms that segregation efforts were effective at reducing the number of batteries burnt in the incinerator.

Table 6.4. Number of quatrex of batteries backhauled

Year	Quantity (unit)
2013	29
2014	12
2015	34

In accordance with AEM's *Incinerator Waste Management Plan*, stack testing was conducted from June 19 to June 21, 2015 by Exova. The "*Stack sampling tests Report*" is provided in Appendix E4. Results from the 2015 test indicated that mercury level average (of 3 tests) were well below (<0.22 µg / Rm³ @ 11 % v/v O_2) the Environment Canada guideline (20 µg / Rm³ @ 11 % v/v O_2) during the incinerator stack testing. This is similar to results obtained in 2012 (<0.10 µg / Rm³ @ 11 % v/v O_2). AEM is of the opinion that actions taken were effective at addressing high mercury levels in stack testing. AEM will continue its efforts to ensure batteries used on site are recycled adequately. The dioxin and furans results (21.0 pg TEQ / Rm³ @ 11 % v/v O2) are well below the EC guideline (80 pg TEQ / Rm³ @ 11 % v/v O_2). AEM will be conducting stack testing again in 2016.

In 2015 AEM monitored the ash quality quarterly which is an increase from the 1x/year sampling frequency stated in the *Incinerator Waste Management Plan (AEM, July 2014, v5)*. Starting in January 2015, ash was disposed of in the landfill instead of TSF. Samples were collected from the incinerator on January 5th, April 6th, July 6th and October 6th. Results contained in Table 6.5 indicate no exceedance of Environmental Guidelines for Industrial Discharge. AEM will continue to monitor the ash quality quarterly in 2016.

In 2015, approximately 2,790 L of waste oil was burned in the incinerator. Volumes of waste oil reused as fuel in 2015 are presented in Table 6.6.

Waste oil destined for reuse in the incinerator (and waste oil heaters) was randomly sampled on a monthly basis and compared to the NWT Used Oil and Waste Fuel Management Regulations (NWT, 2003). This data is presented in Table 6.7. All metals and PCB parameters met the NWT guidelines.

Table 6.5. 2015 Incinerator Ash Monitoring

Parameters	Units	Guideline for Industrial Waste Discharge*	Mine Site Incinerator	Mine Site Incinerator	Mine Site Incinerator	Mine Site Incinerator
			1/5/2015	4/6/2015	7/6/2015	10/6/2015
Arsenic	mg/L	2.5	0.013	0.079	0.0073	<0.0005
Barium	mg/L	100	0.19	0.21	0.23	0.36
Cadmium	mg/L	0.5	0.0039	0.014	0.0056	0.0021
Chromium	mg/L	5	0.017	**	0.0038	0.64
Lead	mg/L	5	<0.0005	<0.0005	<0.0005	0.035
Mercury	mg/L	0.1	0.0024	0.020	0.0015	0.0006
Selenium	mg/L	1	0.025	0.036	0.021	0.007
Silver	mg/L	5	<0.0005	<0.0005	<0.0005	<0.0005
Zinc	mg/L	500	<0.001	0.004	<0.001	0.012

Footnotes: * Government of Nunavut Environmental Guideline for Industrial Waste Discharges (D of SD, 2011).
** Parameter not analysed.

Table 6.6. Volume of waste oil incinerated or consumed at the Meadowbank site.

Month	Volume of Waste Oil Incinerated at the Incinerator (m^3)	Volume of Waste Oil Consumed in the Furnace (m^3)*
January	0	46.5*
February	0	42*
March	0	46.5*
April	0.75	45*
May	0.99	46.5*
June	0	0
July	0	0
August	0.5	0
September	0.25	45*
October	0.3	42.012**
November	0	45*
December	0	46.5*
Total	**2.79**	**405**

Footnotes: *Values estimated based on consumption of 1500L per day from September to May.
**October consumption was measured daily.

Table 6.7. 2015 waste oil monitoring

	Units	Maximum Allowable Concentration *	5-Jan-15	2-Feb-15	3-Mar-15	6-Apr-15	4-May-15	16-Jun-15
Cadmium	mg/L	2	< 1	< 1	< 1	< 1	< 1	< 1
Chromium	mg/L	10	2	1	< 1	< 2.6	1.6	< 1
Lead	mg/L	100	< 5	< 5	< 5	< 5	< 5	< 5
PCB	mg/L	2	0.5	0.5	1	1	1	0.5
Chlorine	mg/L	1000	256	199	< 50	70	182	< 25
Flash point	°C	≥ 37.7	> 80	71	> 80	> 80	> 80	> 80

	Units	Maximum Allowable Concentration *	6-Jul-15	3-Aug-15	8-Sep-15	6-Oct-15	2-Nov-15	7-Dec-15
Cadmium	mg/L	2	< 1	< 1	< 1	< 1	< 1	< 1
Chromium	mg/L	10	1.9	< 1	< 1	3.7	< 1	< 1
Lead	mg/L	100	< 5	< 5	< 5	< 5	< 5	< 5
PCB	mg/L	2	1	1	1	1	1	1
Chlorine	mg/L	1000	688	60	68	176	613	< 50
Flash point	°C	≥ 37.7	> 80	62	> 80	68	> 80	> 80

Footnotes: * GN Environmental Guideline for Used Oil and Waste Fuel

6.4 ADDITIONAL INFORMATION

As required by Water License 2AM-MEA1525 Schedule B, Item 25: ***Any other details on Water use or Waste Disposal requested by the Board by November 1st of the year being reported.***

The Board did not request any additional details on waste disposal in 2015.

SECTION 7. SPILL MANAGEMENT

As per Water License 2AM-MEA1525 Schedule B, Item 13 *A list and description of all unauthorized discharges including volumes, spill report line identification number and summaries of follow-up action taken.*

A summary of all unauthorized discharges that were reported to the GN Spill hotline in 2015 is presented in Table 7.1. Non–reportable spills can be found in Table 7.2 This data was also included in monthly monitoring reports submitted to the NWB. GN Spill Reporting Forms for reported spills are included in Appendix F1. Spill report identification numbers are included in Table 7.1.

In 2015, eighteen (18) spills were reported to the GN Spill hotline. Twelve (12), sixteen (16), seven (7) and, nine (9) spills were reported in 2011, 2012, 2013 and, 2014 respectively. AEM acknowledges that there is an increase in the number of reported spills. All spills reported internally and to regulators are managed appropriately on site according to AEM's spill contingency plan. Spills are contained and cleaned, contaminated material is disposed of in the appropriate area (landfarm, TSF, if required), and the clean-up actions are monitored closely by the Environment Department. There was no off site impact to any watercourses as a result of spills in 2015. The recent spill increase is mainly due to mechanical issues with the equipment due to the cold weather, site conditions and possibly current maintenance procedures. Operators' awareness and pre-operational checking of equipment may also be contributing to the increase in spills. A team of personnel from the Maintenance, Mine operations, Environment, and Strategic Optimization Departments is investigating ways to address this issue. This will include a review of current maintenance practices, operation of the equipment, operators' awareness and any other relevant matters the investigation may reveal. An action plan will be developed in 2016.

To prevent and ensure all spills are reported internally, spill prevention training was provided to employees in 2015. Training activities include the following:

- All employees and contractors must participate in an induction session online prior to the arrival at the mine site, which includes a training section on spill management (prevention, reporting and cleaning);

- Every employee and contractor who operates a vehicle on the site must participate in training on vehicle operation. Spill management is a component of this training session;

- 27 toolbox meetings were given by the Environmental Department to different departments at Meadowbank. Topics during the meetings included spill reporting, spill response, and boat operations. Departments receiving these toolbox sessions included security, powerhouse, warehouse, mine, mill, maintenance, site services, camp, kitchen, FGL maintenance and others (housekeeping, Arctic Fuels, etc.);

- Personnel at the Baker Lake Marshalling facility were given an information/training session on how to react to a major spill at the Baker Lake Bulk Fuel Storage & Marshalling Facility in July 2015. Among these personnel were Marshalling Area Supervisors, Warehouse Technicians, Environmental Technicians, and contractors from Intertek. This training was provided by the

Environment Department. During the training, a mock spill at Baker Lake was completed with warehouse and Intertek personnel.

- During the transport of cyanide in 2015, on one of the northbound trips, a mock scenario was carried out in which the Nurse and ERT member had to rescue a victim who was exposed to cyanide in a tractor trailer roll-over. From this, much knowledge was gained and several action items and changes were implemented to ensure a better reaction but above all to ensure better prevention.

On September 15 2014, hydrostatic tests conducted on the fuel line between tank farm and power house indicated a failure. The line was immediately decommissioned and a system of trucking fuel to the power house was implemented. Replacement aboveground piping was installed and commissioned in Q1 of 2015. Investigation work to determine the location of possible leakage started in July, 2015 and was completed in August 2015. Air pressure testing and soil testing were performed. With the results obtained from the air pressure tests and the soil testing, it was concluded that there was no evidence of any defect in the underground line nor any evidence of a leakage or spill. The result of the hydrostatic test conducted on September 14th, 2014 was likely caused by a false reading or a problem with the equipment used. The underground fuel line will not be utilized in the future and will be removed and decommissioned at closure. The fuel will be transferred from the fuel farm to the power house by the above ground line completed in January 2015. Additional inspection and soil testing will be performed during closure to ensure there is no hydrocarbon contamination in the ground surrounding the fuel line. A report detailing investigative actions undertaken (including sample analysis results) during 2015 is included in Appendix F2. Starting October 30th 2015, weekly inspections of the aboveground fuel line were completed. No non-conformance has been observed. Inspection reports can be found in Appendix F3.

Table 7.1. 2015 spills reported to the 24Hr Line.

Date of Spill	Hazardous Material	Quantity (L/Kg)	Location	Cause of spill	Clean-up action taken	Reported to Spill Hot Line
2015-01-29	Hydraulic Oil	235L	Vault Pit to ramp and waste dump	Broken hydraulic hose on Haul truck	Contaminated material was cleaned up and disposed adequately	Yes Spill #2015031
2015/02/18	Waste Oil	200L	Outside Incinerator Building	Loader operator was moving a tote of waste oil into a seacan. A fitting on the waste oil tote was not fully closed and caught on another tote while being moved into the seacan. The fitting broke and caused the waste oil to spill.	The operator quickly moved the leaking tote to a near-by roll off bin that was full of contaminated snow to allow leaking to continue in the roll off bin. An empty tote was then brought to the same location and remaining contents of leaking tote was put into the empty tote. A loader with bucket was then used to clean up the contaminated material on the ground.	Yes Spill #2015058
2015/05/21	Diesel	250L	Baker LakeL Tank Farm	Fuel Tanker operator hooked up fuel arm to wrong compartment. When fuel was turned on, it came out of the overflow pipe on the tanker.	Operator hit the emergency stop button at the refueling station. Spill pads were placed on spill area. A second operator with a 980 loader was able to scrape away some material. Another set of spill pads was laid down where the operator scraped the contaminated material. Refer to spill report sent to regulators on May 22 and follow up on May 29.	Yes No spill report number was received.
2015/07/04	Mill Slurry	1500	Mill	On the tailings line a “Y” is used at the mill to send the pig in the tailing line for clean-up. This "Y" was worn-out and a hole appeared in the side of the tailings line outside the mill. The majority of the slurry that exited the tailings pipe from this worn hole, was collected in the tailings line trench. Other slurry was sprayed directly into the secondary containment for the leech pad.	All slurry was immediately pumped into leech pad secondary containment. From here the slurry will be re-introduced into the mill circuit. Tailings disposal has ceased and will not recommence until the "Y" is fixed. Other potential worn components will be inspected for integrity.	Yes Spill #2015286

2015/07/07	Sulfur prill	150	Overpad	While in the process of putting a container on a tractor/trailer with a forklift, the container floor collapsed which caused it to tip over (away from container handler) fall to the ground. While putting it back upright, the product inside (sulfur prills) leaked out from the openings created by the impact.	The spilled product was quickly collected with a loader and brought to the landfill for disposal. It will be covered immediately. The material is not soluble in water. The remainder of product left in and/or around container will taken to the mill for use in the S02 unit. Any unsalvageable material will be disposed at the Landfill.	Yes Spill #2015292
2015/07/24	Tailings slurry	5000	RF1 Dike	While switching the tailings deposition point in the North Tailings Cell, a leak was identified on the tailings pipe causing a spill on RF1 .	Stop the deposition with the broken pipe and repair it. Scrap the tailings and put it back in the tailings pond.	YesSpill #2015318
2015/07/30	Diesel	300	Vault Pit 5116818	A piece of loose rock fell from the pit wall and struck the large excavator on the track and then hit the fuel tank, puncturing it.	All fueled spilled was contained inside the pit with no effect to any waterways. The contaminated area was excavated to remove all contaminated material. This contaminated material will be taken to the Meadowbank landfarm for remediation.	Yes Spill #2015323
2015/09/04	Waste oil	160L	Oil filtering trailer	While moving the waste oil tote, the forks of a loader hit the outlet valve.	A worker nearby noted that it was leaking and asked the loader operator to lift it on its side to prevent further spilling. Waste oil in the tote that was leaking was pumped into another one. Contaminated material was cleaned up and put in a roll off bin to be sent to the landfarm.	Yes Spill #2015368
2015/09/18	Glycol	900L	Along Arctic Corridor and the Dome warehouse	While moving a pallet a glycol pipe was struck by a loader.	The valve was shut off immediately to prevent further spillage. Contaminated material was cleaned up and adequately disposed of in the yellow roll-off bin.	Yes Spill #2015394
2015/10/11	Tailings slurry	500L	RF-2 along Tailings pond	While switching the tailings deposition point in the North Tailings Cell, a slurry spill occurred. While separating the inactive tailings pipe to complete the pipe clean up, some residual slurry left in the pipe spilled on the road surface.	The contaminated soil was picked up by a loader and disposed of in the tailings pond	Yes Spill #2015427

2015-11-27	Hydraulic Oil	300L	Vault Pit	In the process of removing hydraulic oil from the reservoir of a loader, the spring in the valve did not release to turn off the valve. Oil spilled on the ground during operations to shut off the valve.	The equipment was moved and the spill contained in the area. Material was scraped up with backhoe and put in a pile on the pit floor. The contaminated material was put in a 50t truck and brought to the landfarm.	Yes Spill #2015478
2015-11-27	Sewage	900L	Nova Camp Sewage Junction	A fitting on the sewage line was loose due to expansion and contraction of the pipe.The pipe did not come apart. Each time the pump from the Nova Camp lift station pumped the sewage to the STP a small amount would leak out onto the tundra.	A vacuum truck was used for approximately an hour to remove the sewage. The ground was frozen so most of the contaminated material remained on top of the ground. What remained on the surface after the use of the vacuum truck was collected with backhoe shovel. Afterwards the joint was completely taken apart, reinstalled and checked for leaks after reinstallation. The area was monitored in the following days.	YesSpill #2015480
2015-11-30	Hydraulic Oil	250L	PIT E Pushback drill pattern 5025611	A hydraulic hose broke provoking the leak.	The spill was cleaned up using rags. Contaminated soil was brought to the landfarm.	Yes Spill #2015485
2015-12-17	Hydraulic oil	175L	Vault Pit	A hydraulic hose on piece of heavy equipment broke provoking the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.	Yes Spill #2015503
2015-12-18	Hydraulic oil	150L	Laydown Row 3	On Dec 18, when operator went to remove pallet of drums, a pool of oil was noticed on the floor of sea-can. Sept 12 was approximately the last time material was removed from the sea-can. Zoom boom operator must have pierced drums with forks while removing material.	Pallet of drums was removed and placed in secondary containment. Spill pads were placed on the floor of sea-can. When sea-can was removed, spill was observed on the ground. Contaminated soil was picked up. The sea-can with oil & spill pads was moved to the transit laydown to be cleaned.	Yes No spill report number was received.
2015-12-18	Hydraulic oil	200L	Vault Pit	A hydraulic hose on piece of heavy equipment broke causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.	Yes Spill #2015504
2015-12-22	Hydraulic oil	550L	Vault Pit	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.	Yes Spill #2015511

2015-12-23	Hydraulic oil	400L	Vault Pit	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.	Yes Spill #2015507

Table 7.2. 2015 Non-reportable spills

Date of Spill	Hazardous Material	Quantity (L/Kg)	Location	Cause of spill	Clean-up action taken
2015/01/16	Motor oil	75L	Vault Pit	Engine Failure on loader 04 caused coolant / motor oil leak.	Absorbant Pads were placed on the spill. Contaminated material was picked up and sent to the contaminated soil pad. 50 tons of contaminated material was sent to the contaminated soil pad.
2015/01/17	Hydraulic Oil	33L	Vault Pit	Blown Hydraulic Hose on Baco 09	Loaded contaminated soil in haul truck and delivered it to contaminated soil containment area. Picket #3
2015/01/17	Hydraulic Oil	3L	Quarry 19	Hydraulic hose broke under the loader 966 at the joint	Picked up with a hand shovel immediately, transported loader back to Meadowbank with a tractor trailer. Contaminated soil disposed in the yellow roll off bin.
2015/01/18	Hydraulic Oil	6L	Site Services Coverall	Machine was frozen and would not start. When machine was moved, hydraulic oil started leaking.	Hydraulic Oil was cleaned up with Backhoe and disposed in the yellow roll off bin.
2015/01/18	Engine Oil	95L	Haul truck Winter parking area	Mechanical failure	Contaminated snow cleaned up and disposed adequately.
2015/01/22	Hydraulic Oil	33L	Haul Truck Winter Parking	A blown Hydraulic Hose on HTR 03 Tow Haul	Contaminated soil picked up by site services with their 446 rubber tire back-hoe. 2 buckets were put in the yellow bin near the incinerator.

2015/01/24	Diesel	55L	Vault Coverall	The overflow drain on top of the fuel truck was frozen when the Fuel truck was parked at the Vault Coverall. The coverall is heated so over time the overflow drain thawed and the heat from the coverall caused expansion and the overflow drain started leaking.	Fuel Truck was checked to ensure no other leaks were present. Area was scraped clean with 345 Baco #7. Contaminated material was sent to contaminated soil pad. Contaminated Soil Pad. HTR 14 brought 2 bucket loads of contaminated material to the Contaminated Soil Pad - picket # 0005
2015/01/24	Hydraulic Oil	80L	Vault Pattern 5109725	Hydraulic pump broke	Machine was shut down while Spill was cleaned and Pump was replaced.
2015/01/25	Hydraulic Oil	20L	Pit E3	Left hand front travel brake hose on Baco 10 - 4 24” hose that has leaked approx 20 L of oil. Only leaked when the machine was not travelling. Hose changed, leak was spread over about 30 meters in small amounts.	Spill pads were used to clean oil in the track motor guard. Area was scraped with grader.
2015/01/29	Coolant	50L	Haul Truck Winter Parking	Coolant was added to the radiator so the HTR 26 could be brought into the shop for a radiator and fan hub repair. When HTR was started the radiator leaked.	Area was taped off so no one could drive through the spill area. Site Services was notified to clean up spill with loader. Contaminated material disposed in the yellow roll off.
2015/02/01	Hydraulic Oil	15L	Vault pit	Broken final drive on equipment	Contaminated material was cleaned up and disposed adequately.
2015/02/01	Power Sterring oil	5L	Row #1 Toromont section	Pick up 15 hit a sea can and blew a steering hose	Put absorbant pads, barricade the area. Pick up the contaminated material and disposed it in a drum at maintenance made for that.
2015/02/02	Transmission oil	15L	Fountain Tire Parking Lot	Hydraulic line near front axel seal on Haul Truck broke.	Spill was contained and Site Services was called to clean up the spill. Contaminated materail disposed adequately.
2015/02/02	Engine oil	10L	Dispatch parking	Damage engine oil pan	Put some rags to collect the oil and disposed of contaminated material adequately
2015/02/02	Diesel	30L	Meadowbank refueling station	Fuel leaked out of the filling station hose	Clean up the contaminated soil and put it in yellow bin
2015/02/08	Hydraulic Oil	10L	Maintenance	Hydraulic hose broke on the zoom boom	Site services contacted to pick up contaminated snow. Contaminated material disposed adequately.

2015/02/09	Hydraulic Oil	40L	Vault pit Blast #5109-725	Excavator came in contact with muck pile puncturing the solenoid	Contaminated soil collected by Mine equipment, spill was on a ore packet so soil was disposed of at the crusher
2015/02/10	Diesel	71L	Pit E3	Cracked fuel line on HTR21	Contacted Supervisor. Contaminated material was cleaned up and disposed adequately
2015/02/11	Hydraulic Oil	35L	Pit E3	HRT 11 blown o-ring on a hydraulic line	Contaminated snow picked up by Mine operations and disposed adequately
2015/02/12	Coolant	40L	Fountain tire	Engine Failure on HRT 11	Contacted Site Services to pick up contaminated snow and disposed adequately.
2015/02/12	Engine / compressor oil	1.5L	South View point	Filters plugged up on a drill causing oil to by-pass through overflow	Used an IT-14 to pick up contaminated and disposed adequately.
2015/02/14	Hydraulic Oil	15L	Service building yard	Compressor failed in the lube truck causing oil to spill to the ground	Placed spill rags where the spill is, contained spill with rags. Contaminated material disposed adequately.
2015/02/16	Compressor oil	20L	Goose Pit	Broken hose on drill	Contaminated material was cleaned up and disposed adequately
2015/02/22	Hydraulic Oil	30L	Vault Parking	Leak on brake hose valve on HTR 21	Haul Truck was shut down to prevent further spill. Spill pads were place on the ground to absorb and contain the leaking hose. Hydraulic hose was repaired and pads were picked up.
2015/02/22	Hydraulic Oil	50L	Outside Maintenance Shop Bay 1	Broken hose on RBD74	Area was barricaded off to prevent further spill. Site Services was notified to clean area with loader.
2015/02/28	Hydraulic Oil	25L	Truck shop	Gearbox on HTR 21 overheated causing damage which generated the spill	Spill rags were placed on spill. Contaminated material was cleaned up and disposed adequately
2015/03/01	Hydraulic Oil	20L	Winter Parking	Tranny filter cover broke at start up collaps	Used absorbant pads and disposed of in waste pad container
2015/03/01	Compressor oil	15L	Push back	Compressor filter leaked	Used absorbant pads and disposed of in waste pad container

2015/03/03	Hydraulic Oil	10L	PIT E3- Pattern 5067619 hole 2623	Back jack cylinder busted	Collected with waste oil pads and then sent to oily rag seacan at incinerator/hazmat area.
2015/03/12	Hydraulic Oil	30L	Site services parking	Broken hydraulic hoses on the loader	Removed the contaminant with rags, shoveled the contaminated snow and dump it in the yellow roll off bin
2015/03/26	Diesel	50L	MBK Fuel Farm	The Valve for the fuel pump to refill the fuel tanker was left open by previous operator. When the fuel man started the pump fuel spilled on the ground.	Fuel Pump was stopped. Site Services was notified to clean up the spill with loader. Contaminated material adquately disposed of.
2015/03/28	Diesel	80L	MBK Fuel Farm	The valve on the top loading arm was open because the rope to manipulate the arm was rolled around the valve. The fuel operator did not check the top loading arm valve before pushing the start button.	Fuel pump was stopped. ENV was called and spill pads were laid down on the ground to absorb spill. Area was then scraped with loader and 0-3/4 material was placed on the ground.
2015/03/29	Hydraulic Oil	20L	Pushback Parking	Hydraulic Hose ruptured	Vehicle was shut down and hose was replaced. Spill contained and Site Services notified to clean up area.
2015/03/31	Hydraulic Oil	30L	Push back parking	Broken hose on HTR 02	Spill pick up by Site services and contaminated material adquately disposed of.
2015/03/31	Hydraulic Oil	20L	Push back parking	Broken hose on HTR 04	Spill pick up by Site services and contaminated material adquately disposed of.
2015/04/01	Hydraulic Oil	10L	Vault pit pattern 5123801	Broken hose on LOA 02	Put some absorbant pads and pick up contaminated soil.
2015/04/06	Diesel	40L	Pit E3	While refueling the drill, the fuel nozzle did not stop creating an overflow	Pick up the contaminated material and disposed it in the landfarm
2015/04/18	Oil	95L	Bay Goose Communication tower	Unknow - unreported spill	Contaminated material was cleaned up and disposed adequately
2015/04/19	Hydraulic Oil	20L	Bottom of Goose Pit BAC06	Left over oil in the HYD system when removing the pump leaked.	A container was placed directly under the pump to avoid any other spills and absorbant pads were placed on the oil spill.

2015/04/19	Hydraulic Oil	10L	PIT E3	Hydraulic Line broke	Dug up the dirt in the area and put it into a 20L pail which was taken to the contaminated area and dumped for proper actions/ Oily Rags were taken to the shop for proper dispoal
2015/04/19	Hydraulic Oil	5L	Fountain Tire	Hose busted on the TPA01 (zoomboom)	Shovel the contaminated soil into bag brought to hazmat area.
2015/04/22	Hydraulic Oil	20L	Vault pit at BAC10	Spill while removing an hydraulics pump	Install drums under machine and get pads to remove oil from the ground.
2015/04/25	Hydraulic Oil	25L	End of maintenance shop	Ripper valve off of the equipment	Put absorbant pads and call site service for clean up.
2015/04/27	Coolant	25L	Primary crusher pad	Coolant hose busted	Stop the machine, put absorbant pads and pick up contaminated material.
2015/05/03	Diesel	10L	Vault WTP	Fuel leaking of the fuel truck parked inside the WTP	Absorbant Pads were placed on the spill and contaminted material disposed off adequately
2015/05/06	Hydraulic Oil	45L	Pushback parking	Leak from an haul truck	Pick up contaminated soil and send it to the landfarm
2015/05/07	Diesel	6L	Pattern 5116802 Vault	Fuel tank leak	Absorb pads were put down. Loader cleanup the area and contaminated material disposed adequately.
2015/05/07	Hydraulic Oil	50L	D-Dump	Hydraulic component failure on equipment	Used spill pads. Shoveled all contaminate snow and disposed off adequately.
2015/05/07	Transmission oil	20L	Baker Lake guest house	Broken hose on loader	Contaminated snow removed and bring back to Meadowbank mine site for adequate disposal.
2015/05/08	Hydraulic Oil	25L	AWAR Km 62	Failure on hydraulic pump	Contaminated snow removed and brought to Meadowbank mine site for adequate disposal.
2015/05/09	Hydraulic Oil	70L	South of pushback	Equipment failure	Contaminated material celaned up and adequately disposed of.

2015/05/10	Hydraulic Oil	15L	Fountain Tire area	Component failure on HTR 12	Absorbant pad was put on the spilled area to contain the spill. Site service cleaned up the contaminated material and disposed of adequately.
2015/05/11	Engine oil	12.5L	Maintenance shope dome side	Pushed oil out of the breather tube as the engine failed	Absorbant pad was put on the spilled area to contain the spill and site service was advised to scrape and clean up.
2015/05/14	Hydraulic Oil	20L	Vault BAC10	Changed components of hydraulic tank and hose leaked	Had a quadrex to contain the spill and the rest has been picked with absorbant pads.
2015/05/15	Hydraulic Oil	10L	Outside Maintenance shop Bay 7	Hydraulic hose broken on equipment	Contain most of the spill with absorbant pads. Site service came over to cleaned up and adequately dispsoed of the contmainate material.
2015/05/21	Engine/Transmission oil	30L	Bottom of South Pit Ramp	Vehicle was in contact with boulder at the bottom of South Pit ramp and punctured the Engine Oil Pan and Transmission Oil Pan.	Absorbant Pads were placed on the spill and contaminate material adequately cleaned up.
2015/05/24	Engine Oil	35L	Truck shop dome side	Punctured oil pan on Truck 17	Contaminated material cleaned upo and adequately disposed of.
2015/05/25	Hydraulic Oil	30L	Pushback parking	Broken hose on HTR 12	Spill picked up by IT 28 and put in contaminated soil bin.
2015/05/26	Hydraulic Oil	25L	Pit E3	Broken hose on equipment	No clean up because of loaded holes for blast near.
2015/06/07	Hydraulic Oil	20	"D" Dump	Mechanical failure	Spill collected using spill pads. All contaminated material disposed adequatly.
2015/06/08	Hydraulic Oil	40	Pit E3	Dump cylinder failed on Bac 13	Placed absorbant pads on the ground and pails under leak to collect oil. All contaminated material disposed adequatly.
2015/06/10	Hydraulic Oil	10	Pit D Dump	While lifting disabled RH-120 to load onto tow sleigh the bucket closed and approximately 10 liters of hydraulic oil spill on the ground	Used absorbing pads to contain and capture spilled oil, disposed used pads into a sealed drum. All contaminated material disposed adequatly.
2015/06/11	Waste Oil	20	HAZMAT transit	Probably coming from sea can stacked at Hazmat wall.	Sea can were removed from area. Soil was collected and brought to yellow-roll-off.

2015/06/25	Contaminated water	80	HAZMAT transit	Punctured tote with forth	Turned the tote around to stop the leak and put the tote inside a burm to have the material melt and pump into an other tote.
2015/06/26	Contaminated water	60	HAZMAT transit	Punctured tote with forth	Turned the tote around to stop the leak and put the tote inside a burm to have the material melt and pump into an other tote.
2015/06/28	Contaminated water	80	HAZMAT transit	Loader backed up into a drum	Put some gravel and scrap it up
2015/07/01	Hydraulic Oil	3	Pit E	Rock punctured Oil pan.	Vehicle was stopped and an oil pan was placed under the vehicle to drain.
2015/07/03	Hydraulic Oil	75	Vault Pit	While replacing a Hydraulic Cylinder the residual oil from the failed cylinder leaked onto the ground.	Spill pads were placed on the ground prior to the cylinder being removed. Once the cylinder was replaced the spill pads were picked up and adequately disposed in the hazmat area
2015/07/07	Hydraulic Oil	10	Maintenance Oil Pad - Dome Side	Hydraulic fitting was not tight enough and oil started to leak onto the ground when pressure was applied.	Equipment was stopped and fitting was tightened. Contaminated material was then collected with a shovel and placed in a yellow roll off bin.
2015/07/07	Sulfur prill	2	Overpad	The container had a fork pole hole from a long time ago, while moving the seacan the sulfur prill started to leak from the seacan.	Contaminated soil was removed and taken to the roll-off for adequate disposal.
2015/07/07	Hydraulic Oil	85	Pit E	While replacing hydraulic cylinders, residual oil from failed cylinders leaked on the ground.	Spill pads were placed on the ground prior to the cylinder being removed. Once the cylinder was replaced the spill pads were picked up and adequately disposed in the hazmat area
2015/07/07	Hydraulic Oil	30	Pit E	While replacing a hydraulic cylinder on the bucket dump, residual oil from the failed cylinder leaked onto the ground.	Spill pads were placed on the ground prior to the cylinder being removed. Once the cylinder was replaced the spill pads were picked up and adequately disposed in the hazmat area

2015/07/16	Hydraulic Oil	40	Pushback	Opened plug under main pump and was not able to reinstall the plug back on place.	Collected spill with absorbant pads and shoveled contaimnted soil into a secondary container. Contaminated material sent to landfarm.
2015/07/24	Oil	60	Warehouse Row 10	While transporting 4 drums of oil, one fall to the ground and the zoom boom crushed it.	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/07/28	Hydraulic Oil	10	Old toromont office	Busted hose on loader 09	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/07/28	Used oil	25	Lube station	Shut valve of lube cube left open while pumping so it went out of the lube station on the ground	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/08/01	Propylene glycol	2L	Transit Laydown	Workers were moving the rad with the crane, when the rad tilted left. Glycol from rad spilled in through the pipes.	Glycol was soaked up through spill rags. The pipe was recaped with diapers. Contamined material was adequately disposed of in the yellow roll-off bin.
2015/08/05	Hydraulic Oil	20L	Power plant G4 rad	Hydraulic hose designed to lift the box of a truck leaked.	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/08/10	Hydraulic Oil	5L	Pushback parking	Broken hydraulic line.	Absorbant pads were applied on the spill absorbing all the contaminated oil. Contaminated pads were adequately disposed of in the yellow roll-off bin.
2015/08/09	Fuel	90L	Tankfarm	A rock got caught under the fuel tank of a truck and ruptured the bottom of the tank.	The spill was scraped on the floor with an excavator. Spilled contaminants were disposed off adequately.
2015/08/13	Diesel	5L	BL spud barge	The fuel tank in a truck parked in a slope overfilled during fueling operations.	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/08/16	Fuel	40L	Tankfarm	The fuel tank in a truck overfilled during fueling operations.	The fuel valve was shut off and contaminated soil was collected and disposed of in the roll-off bin.

2015/08/20	Coolant	50L	Vault pit 5116820	Mechanical issues encountered with a haul truck.	Secondary containment was applied under the leak. Spill rags were applied on top of the contaminated soil.
2015/08/22	Propylene glycol	5L	AWAR km 73	During refilling operations, the vent valve got stuck causing a spill of propylene glycol.	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/08/29	Calcium chloride	30L	On the road between gym and sewage treatment plant	A tote of liquid calcium chloride was cracked and some leaked onto the seacan floor during transportation between Baker Lake and AEM minesite.	No action was taken. Product is used as dust suppressant on the road.
2015/09/02	Hydraulic Oil	30L	Winter Parking	During cleaning activities, hydraulic oil leaked out.	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/09/02	Hydraulic Oil	55L	Winter Parking	During maintenance work on cylinder, contaminant leaked out.	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/09/02	Hydraulic Oil	25L	Winter Parking	During cleaning activities, hydraulic oil leaked out.	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/09/04	Hydraulic Oil	15L	Vault Parking Area	A leak occurred during maintenance activities on a stick cylinder.	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/09/05	Diesel	15L	Maintenance Shop outside of Bay 1	Overfilling a piece of equipment	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/09/16	Hydraulic Oil	50L	Winter parking	A hydraulic hose burst out provoking the leak.	Contaminated material cleaned up and adequately disposed of in the yellow roll-off bin.
2015/09/27	Hydraulic Oil	20L	Winter Parking	When doing maintenance on hydraulic hose, hydraulic oil was spilled on the ground.	Secondary containment was used to contain most of the spill. Contaminated material was cleaned up and adequately disposed of in the yellow roll-off bin.

2015/10/01	Compressor oil	30L	Vault Pit	A rock, overturned by the tracks of a loader, came into contact with the compressor oil tank fitting causing an oil leak.	The contaminated soil was picked up and adequately disposed of in the yellow roll-off bin.
2015/10/06	Diesel	10L	South pit ramp	The undercarriage of a truck hit the ground puncturing the oil pan.	The contaminated soil was picked up and adequately disposed of in the yellow roll-off bin.
2015/10/10	Hydraulic oil	70L	Pit E3	A hydraulic hose broke provoking the leak.	The contaminated soil was picked up and adequately disposed of in the yellow roll-off bin.
2015/10/11	Hydraulic oil	20L	Site Services coverall parking	A hydraulic hose broke provoking the leak.	The contaminated soil was picked up and adequately disposed of in the yellow roll-off bin.
2015/10/15	Hydraulic oil	30L	AWAR Km 95	A hydraulic hose broke provoking the leak.	The contaminated soil was picked up and adequately disposed of in the yellow roll-off bin.
2015/10/18	Hydraulic oil	95L	Maintenance shop	Brake cooler broke in the left rear wheel provoking an oil leak.	Absorbant pads were placed on the ground to contain the spill. Contaminated pads were adequately disposed of in the yellow roll-off bin.
2015/10/21	Hydraulic oil	15L	Winter parking	Oil leaked during maintenance operations on a bucket.	The contaminated soil was picked up and adequately disposed of in the yellow roll-off bin.
2015-11-05	Grey water and kitchen grease	10000L	Under the kitchen	Kitchen pipes broke provoking the leak.	The sucker truck was used to collect contaminated material.
2015-11-05	Hydraulic Oil	80L	AWAR km 90	The truck went in the ditch breaking hydraulic hose.	Spill was cleaned up and adequately disposed of.
2015-11-06	Hydraulic Oil	20L	Truck Shop	A hydraulic hose broke provoking the leak.	The contaminated soil was picked up and adequately disposed of in the yellow roll-off bin.
2015-11-24	Tanner Gas	15L	Inventory sea-can pad	The forks of a zoom boom punctured a tanner gas jug.	Contaminated snow was picked up and disposed of in the yellow roll-off bin.

2015-11-26	Hydraulic Oil	90L	Pit E Drill Pattern 5018610	A hydraulic hose broke on drill provoking the leak.	Equipment was shut off. Spill was contained and collected using backhoe. The contaminated soil was disposed of in the yellow roll-off bin.
2015-11-29	Hydraulic Oil	5L	Pushback Pit	Piece of heavy equipment was constantly leaking while waiting for spare parts.	The spill was contained and absorbants pads were placed under the piece of equipment. The mechanical issue will be fixed when parts ordered comes in.
2015-11-29	Hydraulic Oil	5L	Vault parking	During maintenance operations on hydraulic hose of a haul truck a leak occurred.	The spill was cleaned up using rags. Contaminated soil was brought to the landfarm.
2015-11-29	Hydraulic Oil	10L	Winter parking	A leak occurred during maintenance operations on piece of heavy equipment	Absorbant pads were placed to contain the spill. The contaminated soil was picked up and disposed of in the yellow roll-off bin.
2015-12-01	Hydraulic Oil	10L	Vault	During maintenance operations on piece of heavy equipment an oil spill occurred.	Oil was collected using spill rags which was disposed of in the yellow roll-off bin.
2015-12-02	Coolant	20L	Vault Parking	The valve at the bottom of the tote broke causing the leak.	Contaminant was collected and placed in 20 L pail. Contaminated material was disposed of in the yellow roll-off bin.
2015-12-03	Transmission oil	20L	Vault Parking	The transmission broke causing the leak.	The contaminated soil was picked up and adequately disposed of in the yellow roll-off bin.
2015-12-03	Fuel	10L	Vault Pit	The fuel tank air vent froze or broke causing the leak.	Contaminated soil was collected and disposed of in yellow roll-off bin by the incinerator. The fuel tank was fixed.
2015-12-04	Coolant	1L	Portage PAG dump	Coolant overflowed during refilling process causing the leak.	Contaminated soil was picked up and placed in a 20L pail. Contaminated material was disposed of in the yellow roll-off bin.
2015-12-04	Hydraulic hose	40L	Portage Pit E3	A hydraulic hose broke on a piece of heavy equipment provoking the leak.	Contaminated material was picked up using an excavator and disposed of in the yellow roll-off bin.

2015-12-04	Fuel	20L	Truck shop	Fuel pump was leaking on truck causing the leak.	Equipment was fixed and contaminated material was adequately disposed of.
2015-12-05	Hydraulic oil	20L	Vault parking	Hydraulic hose was leaking on haul truck.	Contaminated material was picked up and adequately disposed of in the yellow roll-off bin.
2015-12-06	Coolant	10L	Pit E3	A coolant hose broke on a piece of heavy equipment causing the leak.	Contaminated material was picked up and adequately disposed of in the yellow roll-off bin.
2015-12-08	Hydraulic oil	70L	Pushback parking	Hydraulic hose was leaking on haul truck.	Contaminated material was picked up and adequately disposed of in the yellow roll-off bin.
2015-12-11	Hydraulic oil	50L	Vault pit Pattern	A hydraulic hose broke on drill provoking the leak.	Contaminated material was picked up and adequately disposed of in the yellow roll-off bin.
2015-12-13	Hydraulic oil	60L	Vault parking	During unloading operations, cylinder broke on haul truck causing the leak.	Contaminated material was picked up and adequately disposed of in the yellow roll-off bin.
2015-12-14	Hydraulic oil	60L	Vault parking	Spout on tote broke causing the leak.	Leak was contained using absorbant pads. Contaminated material was picked up and adequately disposed of in the yellow roll-off bin.
2015-12-15	Fuel	2L	Meadowbank Tankfarm	When moving loading arm to fuel truck and clean the snow in it, fuel came out of the arm.	Contaminated material was picked up and adequately disposed of in the yellow roll-off bin.
2015-12-16	Hydraulic oil	20L	Vault Pit	A hydraulic hose on drill broke provoking the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-17	Hydraulic oil	50L	Vault Pit	A hydraulic hose on piece of heavy equipment broke provoking the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-17	Windshield washer fluid	80L	Vault Coverall	While replacing the windshield washer fluid, the security lock strap was cut by error. Operator turned valve on not knowing that hose had no trigger valve and 80L of fluid leaked before another worker noticed it.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.

2015-12-17	Hydraulic oil	90L	Pit E3	Hydraulic hose was leaking.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-18	Hydraulic oil	10L	Vault Pit	Cylinder on piece of heavy equipment is leaking.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Cylinder was fixed.
2015-12-19	Hydraulic oil	85L	Vault Pit	While replacing pump drive on piece of heavy equipment oil was spilled on the ground	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin.
2015-12-19	Hydraulic oil	50L	Pushback	Hydraulic hose on piece of heavy equipment came loose causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-19	Hydraulic oil	40L	Pushback Parking	A hydraulic hose broke causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-20	Hydraulic oil	<100L	Primary Crusher Stockpile	A hydraulic hose broke causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-20	Hydraulic oil	20L	Vault Pit	During maintenance operations on hydraulic hose, oil was spilled.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin.
2015-12-20	Hydraulic oil	<100L	Vault Pit	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-21	Hydraulic oil	30L	South Pit Ramp	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-22	Hydraulic oil	30L	Vault Pit	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.

2015-12-24	Hydraulic oil	20L	Vault Coverall	During maintenance operations oil spilled on the ground.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin.
2015-12-24	Hydraulic oil	90L	Vault Pit	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-24	Hydraulic oil	90L	Vault Pit	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-24	Transmission oil	40L	Vault Pit	A transmission failure occured causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-25	Fuel	20L	Meadowbank area	Hole in the fuel tank created a steady leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Mechanical issue was fixed.
2015-12-26	Hydraulic oil	10L	Winter Parking	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-26	Hydraulic oil	15L	Pit A	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-27	Hydraulic oil	20L	Pit B	A cylinder hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Cylinder hose was fixed.
2015-12-27	Hydraulic oil	20L	Truck shop	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-28	Hydraulic oil	45L	Vault pit	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-28	Hydraulic oil	5L	Pit E	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.

2015-12-29	Fuel	5L	Blasting sign at Vault	A fuel line broke on light plan#1 causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off at the landfarm. Light was fixed.
2015-12-29	Hydraulic Oil	50L	Vault Pit	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.
2015-12-30	Hydraulic oil	40L	Vault Pit	A hydraulic hose broke on piece of heavy equipment causing the leak.	Contaminated soil was collected using absorbant pads and was disposed off in the yellow roll-off bin. Hydraulic hose was fixed.

Landfarm

The Meadowbank landfarm was constructed in 2012 to treat petroleum hydrocarbon-contaminated soil generated at Meadowbank facilities and the Exploration Camp. The landfarm is located within the perimeter of the South Cell TSF at a sufficient elevation so as to not affect the TSF until closure.

The majority of material deposited in the Landfarm was generated through the clean-up of spills at the Meadowbank site with additional material generated from spills occurring in Baker Lake locations and along the AWAR. A summary of spills occurring in 2015 including those sent to the landfarm are provided in Table 7.2. In 2015 a new method of monitoring landfarm volumes was established following a review of record-keeping methods. Rather than monitoring the quantity of each individual addition of contaminated soil to the landfarm, AEM conducted two surveys of landfarm material – one before and one after soil sampling/removal activities. While total soil additions in 2015 can therefore only be determined from January - August (when the first survey took place); this method will increase the accuracy of tracking landfarm additions and removals in future years.

End-of-year estimates in 2014 indicated a total landfarm contaminated soil volume of 2347 m^3. In August 2015, the landfarm held a total of 2587.2 m^3 of contaminated soil, based on survey results. Therefore approximately 240.2 m^3 was added from January – August, 2015.

Following screening and sampling, confirming remediated soil met GN criteria for Industrial Use; a total of 238.2m^3 of course rock material and remediated soil were removed in 2015 and disposed of in the waste rock facility.

Sewage sludge continues to be used in the landfarm as a soil amendment. Sewage sludge was spread across all piles as a nutrient amendment on August 6 2015 (6.8 m^3). Landfarm piles were aerated in August 2015 by mixing the top half of each windrow with a front-end loader or excavator, and again in late September, 2015 by re-piling after screening.

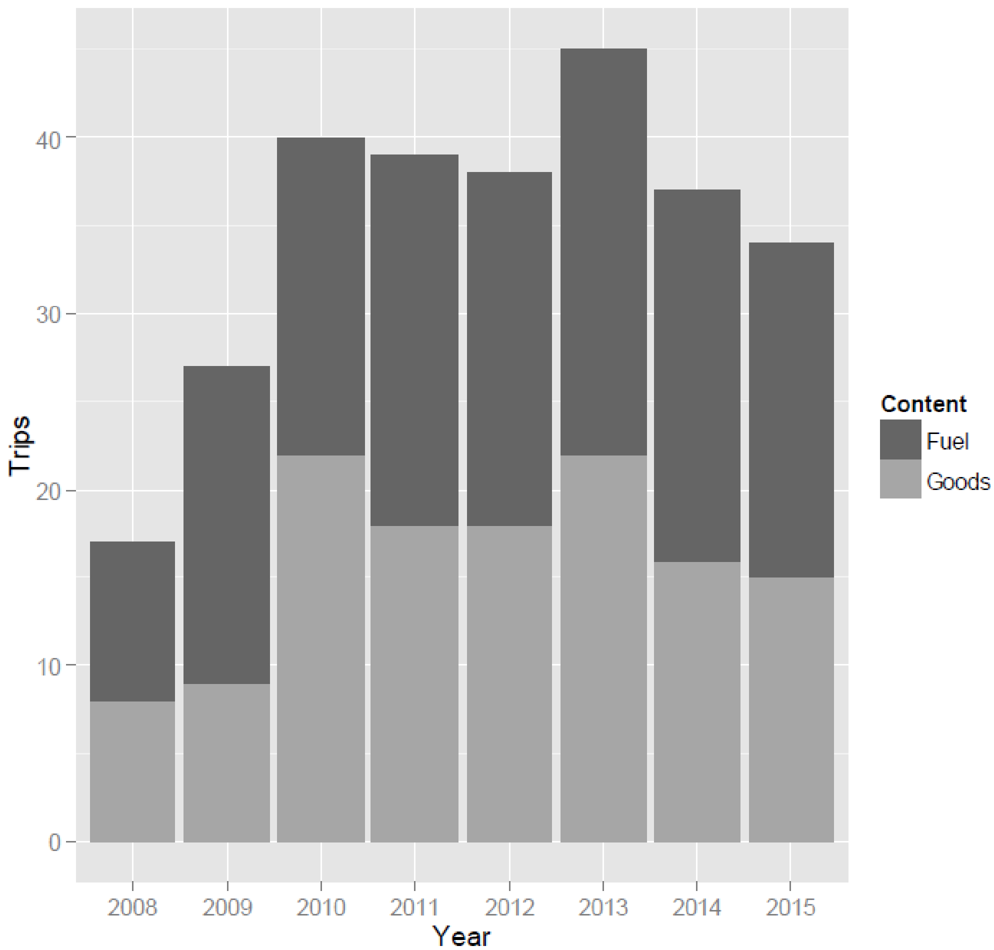
The total volume of the landfarm is 11,136 m3. Based on the survey conducted, the total remaining capacity of the landfarm is 8,787 m3.

Appendix F4, the "*2015 Landfarm Report",* contains more information on landfarm activities in 2015.

As required by NIRB Project Certificate No.004 Condition 82: ***Monitor the ingress/egress of ship cargo at Baker Lake and report any accidents or spills immediately to the regulatory agencies as required by law and to NIRB's Monitoring Officer annually.***

In 2015, AEM monitored the ingress/egress of ship cargo at Baker Lake and the results are summarized in the below Figure 27.

Figure 27. Barge traffic (number of trips/year) arriving in Baker Lake from Chesterfield Inlet since 2008.



In 2015, no spills occurred during the ship cargo ingress/egress.

As required by NIRB Project Certificate No.004 Condition 75: ***provide a complete list of possible accidents and malfunctions for the Project; it must consider the all-weather road, shipping spills, cyanide and other hazardous material spills, and pitwall/dikes /dam failure, and include an assessment of the accident risk and mitigation developed in consultation with Elders and potentially affected communities***

A list of possible accidents and malfunctions are included in the following Meadowbank Gold Project management plans provided in Appendix I1 of the 2013, 2014 and 2015 Annual Report:

• *Hazardous Materials Management Plan*, v3, October 2013;
• *Spill Contingency Plan*, v6, March 2016;
• *Emergency Response Plan,* v6, February 2016;
• *Oil Pollution Emergency Plan* v6, July 2015;
• *OMS Manual for the TSF and dewatering dikes*, V5, October 2015.

Table 7.2 shows all spills that occurred on site, in Baker Lake and along the AWAR in 2015. Most spills were between 10 and 50L and were due to mechanical issues (e.g. broken hydraulic hoses).

As per NIRB Recommendation 14 found in "*NIRB's 2014-2015 Annual Monitoring Report for the Meadowbank Gold Project and Board's Recommendation*": Condition 75 requires that the Proponent provide a complete list of possible accidents and malfunctions for various Project components which includes an assessment of the accident risk and mitigation developed in consultation with Elders and Meadowbank Gold Project – 2014 Annual Report potentially affected communities. Although it is unclear in the submitted management plans whether and how these were developed in consultation with Elders and potentially affected communities. The Board requests that AEM provide within its 2014 annual reporting, further discussion as to how various management plans relating to accident risk and mitigation have been developed in consultation with Elders and potentially affected *communities*.

In the 2014 Annual Report, AEM complied with most of this condition, including the provision of a list of possible accidents and malfunctions as contained in the Spill Contingency and Emergency Response Plans. These Plans were originally reviewed as part of the NIRB and NWB License application process. As such there was extensive public review which included elders' participation at the associated hearings.

Furthermore, AEM has consulted, yearly, with Elder representation as part of the Baker Lake Liaison Committee. AEM hosted meetings on February 26th, June 23rd, September 17th and October 27th 2015. No significant spills occurred in 2015 and therefore possible accidents and malfunctions were not specifically discussed at the committee meetings in 2015. Although there were no concerns raised regarding this issue, AEM did reassure the committee that the company would respond adequately to any spills occurring on the road. AEM holds a yearly meeting with the community at large (May 11, 2015), which includes elders, regarding road safety to prevent accidents on the AWAR (as per Condition 32e) and this also included discussion about trucks hauling dangerous goods, a discussion regarding the Cyanide Code, the location of Spill response seacans and AEM spill response.

In 2015, as part of the International Cyanide Management Code (ICMC), AEM engaged and consulted with the communities of Baker Lake (May 11, 2015) and Chesterfield Inlet (September 8, 2015) regarding the requirements of transportation and management of cyanide. AEM also discussed management of other hazardous materials that are transported to the mine site and the Emergency Response Plan at these consultations. There was also discussion on spill prevention and contingency plans during the fuel transfers for the mine. There was elder participation at these events. AEM is of the opinion that this NIRB condition has been complied with.

To prevent and ensure accidents and malfunctions are dealt appropriately the following activities were held in 2015:

- On September 1, crisis management training was held at the Meadowbank site to test AEM's ability to respond to a crisis. Personnel from all departments participated in the mock crisis scenario.
- During the transport of cyanide, on one of the northbound trips, a mock spill was carried out in which the Nurse and ERT member had to rescue a victim who was exposed to cyanide in a tractor trailer roll-over. From this, much knowledge was gained and several action items and changes were implemented to ensure a better reaction but above all to ensure better prevention.

- Personnel at the Baker Lake Marshalling facility were given an information/training session on how to react to a major spill at the Baker Lake Bulk Fuel Storage & Marshalling Facility in July 2015. Among these personnel were Marshalling Area Supervisors, Warehouse Technicians, Environmental Technicians, and contractors from Intertek. This training was provided by the Environment Department. During the training, a mock spill at Baker Lake was completed with warehouse and Intertek personnel.

SECTION 8. MONITORING

As required by Water License 2AM-MEA1525 Schedule B, Item 16: ***The results of monitoring under the Aquatic Effects Management Plan (AEMP) including:***

- ***Core Receiving Monitoring Program (CREMP);***
- ***Metal Mining Effluent Regulation (MMER) Monitoring;***
- ***Mine Site Water Quality and Flow Monitoring (and evaluation of NP-2);***
- ***Visual AWAR water quality monitoring;***
- ***Blast Monitoring;***
- ***Groundwater Monitoring.***

8.1 CORE RECEIVING MONITORING PROGRAM (CREMP)*

The CREMP (Appendix G1) focuses on identifying changes in limnological parameters, water and sediment chemistry, or changes to primary (phytoplankton) and secondary (benthic invertebrate community) aquatic producers that may be associated with mine development activities. This is accomplished through the application of a temporal/spatial trend assessment that includes application of quantitative decision criteria (i.e., early warning "triggers" and action "thresholds") to facilitate immediate and objective decision-making regarding appropriate management actions. This information is integrated annually into the Aquatic Ecosystem Monitoring Program (AEMP) for holistic environmental management and decision making.

Meadowbank Study Lakes

CREMP monitoring started in 2006 and in-water mine development started in 2008. Key mine development activities that could result in changes to the aquatic receiving environment include: East Dike construction (2008), Bay-Goose Dike construction (2009-10), dewatering of both lakes and impoundments (2009-11, 2013), effluent discharge (2012 to present), and general site-related mining activities that mostly generate dust (e.g., rock crushing, blasting, ore and waste hauling; 2008 to present). Key findings for 2015 are summarized in Table ES-1:

- Water Chemistry – As in the past, there were some statistically significant mine-related changes relative to baseline/reference conditions identified in 2014 at one or more near-field (NF) areas that exceeded their respective triggers: alkalinity (SP); conductivity (TPN, TPE, TPS, SP, WAL, TE); hardness (TPN, TPE, TPS, SP, WAL, TE); major cations (i.e., calcium, potassium, magnesium, and sodium [TPN, TPE, SP, WAL]); TDS (TPN, TPE, TPS, SP, WAL, TE); and TKN (WAL). In the absence of effects-based thresholds (e.g., CCME water quality criteria) for these parameters, their triggers were set at the 95th percentile of baseline data. While these results represent mine-related changes, the observed concentrations are still relatively low and unlikely to adversely affect aquatic life. These trends need to be reviewed again in 2016.

- Sediment Chemistry – Quantitative trigger analysis for sediment is based on coring results, which are conducted on a three-year cycle to coincide with MMER EEM field studies. This program was last conducted in 2014 and will be conducted next in 2017. Grab samples submitted for analysis

* TSM- Biodiversity Conservation

in 2015 showed similar concentrations to previous years based on visual comparison of the data. With the exception of chromium at TPE, none of the grab samples exceeded the trigger values in 2015. The 2014 CREMP report provided a thorough examination of the temporal and spatial trend of chromium at TPE, with an overall conclusion that ultramafic rock used to construct the Bay- Goose Dike is the likely source of increased sediment chromium concentrations at TPE relative to baseline conditions. As per the recommendations in last year's CREMP (Azimuth, 2015b), the 2015 program incorporated bioavailability and toxicity testing to evaluated whether sediment chromium concentrations pose a risk to the benthic invertebrate community at TPE. Sequential extraction tests on sediment show the majority of sediment chromium is sequestered in the sediment matrix, which is largely non-bioavailable. Furthermore, the fractions that are bioavailable occur at concentrations below effects-based threshold concentrations (i.e., ISQG and PEL). Toxicity tests on amphipod (Hyalella) and midge larvae (Chironomus) survival and growth provided no evidence of contaminant-related effects to the test organisms exposed to sediments from TPE compared to the field control treatment (INUG and PDL). These results provide effects-based evidence that chromium concentrations at TPE are unlikely to adversely affect the benthic invertebrate community. No targeted follow-up studies are proposed for TPE beyond continued scrutiny of the temporal trend in sediment chromium concentrations in 2016.

- Phytoplankton Community – TPE and TPS both had slightly reduced biomass relative to reference in 2015, but in both cases the results were not statistically significant. Overall, the phytoplankton results from 2015 were within the range of reference/baseline conditions in each area.

- Benthic Invertebrate Community – A few locations had particularly high abundance in 2015 relative to previous years, notably INUG and TPS. There was an "apparent" reduction (>20%) in total abundance at TPE, TEFF, and WAL when compared to INUG, but none of the results were statistically significant. Furthermore, when compared to previous years the results are well within the range of natural variability. In summary, there were no statistically significant short-term (i.e., past year) or longer-term (i.e., past two to four years) trends in reduced abundance or richness at the NF, MF, or FF locations in 2015.

Baker Lake

CREMP monitoring at Baker Lake started in 2008. Key mine-related activities include barge/shipping traffic and general land-based activities associated with the tank farm area. No spills of fuels, hydrocarbons or any other materials were reported in the vicinity of the barge dock and jetty in 2015. There were no cases where water quality parameters exceeded the triggers in 2015. A minor decrease in phytoplankton biomass was noted at BBD in 2015, but the result is considered representative of the variability in this endpoint given there were no instances of trigger exceedances in water quality parameters in 2015. Overall, there were no changes in the aquatic receiving environment were observed that were attributable to AEM's activities in Baker Lake, and as such, no follow-up management actions are required for 2016.

8.2 MMER AND EEM SAMPLING

This section includes the results of the monitoring programs conducted under the Metal Mining Effluent Regulations (MMER) and its Schedule 5 Environmental Effects Monitoring (EEM) Studies. A list of the sampling location GPS coordinates is provided in Table 8.1. Figures 1, 2, 3 and 4 illustrate the location of sampling stations at the Meadowbank mine site, EEM receiving environment monitoring program, the Vault Site, and Baker Lake marshalling facilities, respectively. Certificates of Analysis are included in Appendix G2.

8.2.1 Portage Attenuation Pond Discharge

On November 19, 2014 tailings deposition commenced in the South Cell (Portage Attenuation Pond) and this represented the end of use of the Portage Attenuation Pond. There has been no further effluent discharge to Third Portage Lake since November, 2014. Therefore sample locations ST-9 (Portage Attenuation Pond effluent discharge point) or ST-MMER-1 are no longer active. The 2015 summary of activities is provided in Tables 8.2 and 8.3 for the Portage Attenuation Pond discharge.

On February 13, 2014, AEM submitted the EEM Biological Study Design 2 to Environment Canada. On August 11, the approval letter from Environment Canada (dated July 21, 2014) was received. On August 12 2015, AEM provided EC the updated schedule for the EEM Cycle 2 as outlined in the approval letter. The sampling for the EEM successfully took place at the end of August and was completed during the first week of September. As per MMER requirements, the interpretive report was submitted to Environment Canada in June 26 2015.

The next Biological Monitoring Study will be conducted in the summer of 2017. AEM will conduct an EEM Cycle 3 study evaluating Wally Lake (Vault Discharge) as requested by EC. The Vault discharge is currently the effluent which has the greatest potential to have an adverse effect on the receiving environment. While discharge is occurring, plume/effluent mixing in the exposure area will be assessed during the summer of 2016 in support of the Cycle 3 study design. A study design will be submitted to EC in early 2017 and the next Interpretive Report will be provided to EC by July 2018.

8.2.2 Vault Attenuation Pond Discharge

The Vault Discharge became subject to the Metal Mines Effluent Regulations (MMER) on June 27, 2013 during the dewatering of Vault Lake. Vault Discharge (sampling station ST-10, also named ST-MMER-2) from the Vault Attenuation Pond to Wally Lake occurred from July 7 to September 10 2015. The total amount discharged in 2015 was 1,065,433 m3.

In 2015, the TSS removal water treatment plant was not required as the contact water from the Vault attenuation pond was compliant with section 4 (1) of the of the MMER regulation as well as the Type A Water license criteria for TSS. Discharge monitoring samples were collected weekly and acute toxicity was sampled monthly. Results are provided in Table 8.4. The volume of water discharged to the environment was reported on a weekly basis under the MMER monitoring program and can be found in Table 8.5.

Under the Environmental Effects Monitoring (EEM) program, AEM was required in 2015 to collect sub-lethal toxicity samples at this discharge point. As per subsection 6(1) *“[…] sub-lethal toxicity test under Section 5 shall be conducted two times each calendar year for three years and once each year after the third year […]*” because the Vault Lake Attenuation Pond Discharge became, in 2015, the mine’s final discharge point that has potentially the most adverse environmental impact on the environment. The sub-lethal toxicity samples were collected on July 21 and August 24, 2015. The water quality samples were taken from the discharge location, the receiving environment exposure area (WLE or ST-MMER-2-EEM-WLE) and reference area (TPS or ST-MMER-1-EEM-TPS). Results of the EEM water quality monitoring programs is presented in Table 8.6. The EEM effluent characterization monitoring samples were collected in July and August, 2015. Samples were collected from the exposure (WLE) and reference (TPS) areas in July and September only. Given the short duration of discharge only two samples were collected from the exposure (WLE) and reference (TPS) areas in 2015. This data was previously reported to Environment Canada via the RISS electronic database reporting system.

8.2.3 East Dike Discharge

The East Dike Seepage Discharge became subject to the Metal Mines Effluent Regulations (MMER) on January 6, 2014. In 2015, there were two seepage collection points (North and South) on the west side of the East dike which collect Second Portage Lake seepage. Water was pumped from both South and North seepage and discharged through a common header through a diffuser into Second Portage Lake. The seepage water was released into the environment, prior to contact with mining activity, without treatment as it is compliant with section 4 (1) of the regulation. Discharge monitoring samples were collected weekly and acute toxicity was sampled monthly. Results are provided in Table 8.7.

East Dike Seepage (Water License sampling point ST-8, MMER - ST-MMER-3) was discharged into the receiving environment, Second Portage Lake (2PL), from January 1 to June 15 and from August 8 to December 31, 2015. The total volume discharged in 2015 was 163,183 m^3. From June 16 to August 7, seepage water was directed to the Portage Pit sumps as concentrations were approaching TSS MMER and Water License criteria.

The volume of water discharged to the environment was reported on a weekly basis pursuant to the MMER monitoring program requirements. Table 8.8 provides a daily breakdown of volumes of water pumped.

Under the Environmental Effects Monitoring (EEM) program, AEM was not required to collect sub-lethal toxicity samples at this discharge point as per subsection 5(2) of MMER regulation. The water quality samples were taken from the discharge location, ST-MMER-3, the receiving environment exposure area (SPLE or ST-MMER-3-EEM-SPLE) and reference area (TPS or ST-MMER-1-EEM-TPS). These sampling locations are highlighted on Figures 3 and 2. Results of the EEM water quality monitoring program are presented in Tables 8.9. The EEM effluent characterization monitoring samples were collected in May, September, November and December. Samples were also collected from the exposure (SPLE) and reference (TPS) areas in May, September, November and December. This data was previously reported to Environment Canada via the RISS electronic database reporting system.

8.2.4 EEM interpretive Report Cycle 2

The Meadowbank Mine began discharging treated effluent (TSS removal during dewatering activity) during 2009, and was subsequently required under the Metal Mining Effluent Regulations (MMER) to monitor effects of that effluent on fish and fish habitat. The Second EEM Interpretive Report was submitted to Environment Canada on June 26, 2015 (Appendix G3). This report documents the results of the adult fish population survey and the benthic invertebrate community survey completed for the mine`s Cycle 2 EEM biological monitoring studies, as well as the sub-lethal toxicity testing carried out on the Meadowbank Division effluent since the drafting of the Cycle 2 Study Design.

Lake trout was the sentinel fish species used in the 2014 Cycle 2 EEM survey; other species are not present in sufficient numbers. Lake trout from the exposed area in Third Portage North Lake (TPN) were compared to those from two reference lakes, Innuguguayalik Lake (INUG) and Pipedream Lake (PDL). The study was designed as a non-lethal study, with additional data collected from incident mortalities. The parameters examined were size distribution, age distribution, weight adjusted for length, liver weight adjusted for weight and length, weight at age and length at age. The Lake Trout from TPN were similar to those from PDL with a significant difference ($P<0.05$) only for the weight versus length relationship. Lake Trout from TPN were 4.2% heavier than Lake Trout from PDL when adjusted for length. Compared to Lake Trout from the INUG reference area, those from TPN were 5.7% heavier when adjusted for length ($P=0.000$), 11.3% shorter when adjusted for age determined from otoliths ($P=0.015$) and 28.4% lighter when adjuster for age determined from otoliths ($P=0.010$). It should be noted that the power of tests involving otolith age was low due to the small sample sizes, which increases for both false positives and false negatives.

The Cycle 1 EEM study did not find any effects on the Lake Trout populations.

This 2014 survey of benthic invertebrates focused on the exposure area in Third Portage North Lake (TPN), with INUG and PDL as local reference areas. This is the second invertebrate community survey for the Meadowbank Mine under the MMER. Benthos have been sampled from TPN and INUG since 2006, while PDL has been sampled since 2009. TPN was in a baseline condition from 2006 to 2008, and has been in an exposed condition since 2009. Benthos invertebrates were collected on August 22 (TPN) and 23 (INUG, PDL), 2014. Effects assessment involved use of baseline period data dating back to 2006, and involved testing of before-after-control-impact (BACI) and trend over time variations.

Sediments in the three sampling areas have been similar among sampling years, consisting largely of fines (silt and clay sized materials), and relatively low concentrations of organic carbon (normally 1 to 3%). Benthic communities of the three study areas were similar in 2014, and similar to what had been described in previous years. The communities were dominated numerically by chironomids (50 to 80%) and Sphaeridae (16 to 32%). Sub-dominant taxa in each of the three sample areas were, variously, Nematoda, Naididae, Tubifcidae, Lumbriculidae and Acarina.

Total abundances in 2014 were generally <1,000 organisms per m^2, similar to what was observed in 2011. INUG and PDL sample areas produced an average of about four families per sample, whereas TPN produced an average of about 3 (2 to 4) families per sample in 2014. The number of taxa observed was generally lower in 2014 in all sample areas relative to what was observed in 2013, but within the range of values previously observed across the complete data record. Reflecting somewhat lower taxa richness per sample, equitability was generally higher in 2014 in each of the sample areas, with INUG producing values of about 0.5-0.8, PDL producing values ranging between about 0.4 and 0.8, and TPN producing values ranging between about 0.35 and 0.9

Mercury concentrations have been monitored in the Meadowbank Mine effluent since August 2009. Concentrations have remained below or near the detection limit of 0.01 µg/L. There was, therefore, no requirement to conduct a fish tissue survey during Cycle 2.

Cycle 2 tests with fathead minnows and Pseudokirchneriella subcapitata were similar to Cycle 1 in that little or no inhibition was observed in any of the samples tested. Inhibition of Ceriodaphnia dubia survival and reproduction and of Lemna minor growth was often significant but was highly variable from sample to sample in both Cycle 1 and Cycle 2. The potential for effects on the receiving water (Third Portage Lake) has been eliminated with the closure of the effluent stream (former Portage Attenuation Pond).

In the future, the Meadowbank mine does not expect to discharge any water from the Portage Attenuation Pond (South Cell Tailings Storage Facility) to the receiving environment. Discharge from the Vault Attenuation Pond to Wally Lake began in 2014 and will continue until the end of production.

8.3 MINE SITE WATER QUALITY AND FLOW MONITORING (AND EVALUATION OF NP2)

As required by Water License 2AM-MEA1525 Schedule B-15: ***The results and interpretation of the Monitoring Program in accordance with Part I and Schedule I.***

And

As required by DFO Authorizations NU-03-0191.3 Condition 3.1 (Mine), NU-03-0191.4 (Vault) Condition 3.1; NU-03-0190 Condition 6 (AWPAR); ***Submit written report summarizing monitoring results and photographic record of works and undertakings.***

This section includes the aquatic monitoring requirements as detailed under the Water Quality and Flow Monitoring Plan (AEM, 2016). A list of the sampling location GPS coordinates for aquatic monitoring programs conducted by AEM is provided in Table 8.1. Summaries of associated aquatic monitoring reports are presented in the following section of this report and supporting documents are located in the listed appendices. Figures 1, 2, 3 and 4 illustrate the location of sampling stations at the Meadowbank mine site, EEM receiving environment monitoring program, Vault Site, and Baker Lake marshalling facilities respectively. Certificates of Analysis are included in Appendix G2.

8.3.1 Construction Activities

As required by DFO Authorization NU-03-0191.3 Condition 3.1: ***The Proponent shall undertake monitoring and report to DFO annually, by March 31st, whether works, undertakings, activities or operations for the mitigation of potential impacts to fish and fish habitat were conducted according to the conditions of this Authorization.***

And

As required by DFO Authorization NU-03-0191.4 Condition 3.1: ***The Proponent shall undertake monitoring and report to DFO annually, by December 31st, whether works, undertakings, activities or operations for the mitigation of potential impacts to fish and fish habitat were conducted according to the conditions of this Authorization.***

In 2015, there were no occurrences where runoff water from any work, undertaking, activity or operation would flow directly or indirectly into a water body. No mitigation was necessary.

8.3.2 Dewatering Activities

No dewatering activities occurred in 2015.

8.3.3 Mine Site Water Collection System

A water collection system comprised of the Stormwater Management Pond, attenuation ponds, tailings storage facilities, diversion ditches and sumps has been developed to control surface and groundwater at the Meadowbank project. The following section reviews the water quality monitoring conducted around the mine site. Volumes of water transferred around the mine site are also discussed (Table 8.10). Specific details regarding water transfers can be found in the Water Management Plan and Report (Appendix C2).

8.3.3.1 Stormwater Management Pond

The Stormwater Management Pond collects runoff water as well as the STP treated effluent. A total of 53,394 m^3 of water was transferred from the Stormwater Management Pond to the South Cell TSF in June, September and October. No water was released into the environment.

8.3.3.2 Portage Attenuation Pond (ST-9)

As of November 19, 2014 when tailings deposition began in the South Cell TSF, the Portage Attenuation Pond ceased operation as an effluent discharge pond. Water in the South Cell TSF is currently used as reclaim water for the mill. There was no discharge from ST-9 into Third Portage Lake in 2015.

Channel crossing inspections will not be undertaken in 2016 as no further discharge is planned from the Portage Attenuation Pond into Third Portage Lake.

8.3.3.3 Vault Attenuation Pond (ST-25)

The dewatering of Vault Lake was officially completed on June 29, 2014. The dewatered Vault Lake became the Vault Attenuation Pond. Sampling of ST-25 (Vault Attenuation Pond) as per water license 2AM-MEA1525 started in July 2014.

Surface water was sampled monthly during open water from the Vault Attenuation Pond as per the requirements in the NWB Type A water license (sampling station ST-25). There are no applicable license limits. The data is presented in Table 8.11 for information purposes only. The location of sampling station ST-25 is illustrated on Figure 3.

8.3.3.4 Vault Discharge (ST-10, ST-MMER-2)

The water collected in the Vault Attenuation Pond was discharged through the diffuser to Wally Lake as effluent from July 7 to September 10, 2015 for a total of 1,116,846 m^3. Prior to discharge (June 29, 2015), samples were collected to confirm that no regulatory limits would be exceeded. The water was not treated at the onsite WTP for TSS removal as the water quality was in compliance with Water License Part F, Item 4 and MMER. Samples were collected weekly from the final discharge point (ST-10) as per the requirements of the Water License and MMER. Results are detailed in Table 8.12 and the location of ST-10 is shown on Figure 3. All results were in compliance with the Water License Part F, Item 4 for effluent quality limits as well as MMER criteria.

8.3.3.5 East Dike Discharge (ST-8, ST-MMER-3)

As mentioned in Section 3.1.1 c, seepage rates and volumes through the East dike have been stable for the past five years. In 2015, approximately 162,734 m3 of water collected from the seepage at the East dike was pumped to Second Portage Lake through the diffuser.

Results from samples collected in 2015 at the final discharge point (ST-8) can be found in Table 8.13. Effluent water is analyzed as per NWB Water License Schedule I. In 2015, all results were compliant with Water License Part F, Item 6 for TSS and MMER criteria. The sampling location is illustrated on Figure 1.

8.3.3.6 Tailings Storage Facility (ST-21)

The North Cell Tailings Storage Facility became operational in February 2010. On November 17, 2014 the reclaim water intake was transferred from the North Cell TSF to the South Cell TSF. Tailings deposition was also stopped in the North Cell TSF and commenced in the South Cell TSF at that time. As per the NWB Water License, sampling station ST-21 changed location from the North to the South Cell. Sampling was conducted monthly as per the requirements of the NWB water license. There are no applicable license limits for this station as the water is used as reclaim water at the mill. Sample results are presented in Table 8.14. The location of sampling station ST-21 (South Cell TSF) is illustrated on Figure 1. As per the water license, no more monitoring in the TSF North Cell is required.

8.3.3.7 North Portage Pit Sump (ST-17)

In 2011 a sump was constructed in the North Portage pit in an area of water accumulation. Water from the North Portage Pit sump was sampled monthly during open water as per the requirements in the NWB water license (sampling station ST-17). There are no applicable license limits. The sampling location is illustrated on Figure 1 and results are presented in Table 8.15.

In 2015, 49,898 m^3 of water was transferred from the North Portage Pit Sump to the South Cell TSF.

8.3.3.8 South Portage Pit Sump (ST-19)

In 2015, water from the South Portage Pit sump was sampled monthly during open water as per the requirements in the NWB water license (sampling station ST-19 on Figure 1). Results are presented in Table 8.16.

In the past, seepage water (ST-S-1) from East Dike was pumped in this sump and ultimately pumped to the Portage Attenuation Pond or the Stormwater Management Pond. However, as of January 2014, water from the East Dike Seepage (ST-8) was pumped back to Second Portage Lake. By discharging the seepage water back to the lake, the volume of water to be pumped from the Portage Pit sumps has significantly decreased.

In 2015, 44,686 m^3 of water was transferred from the South Portage Pit Sump to the South Cell TSF.

8.3.3.9 Goose Island Pit Sump/Lake (ST-20)

In 2012 a sump was constructed in the Bay Goose pit in an area of water accumulation. The water that was collected in the Goose Island Pit sump was transferred to the South Cell TSF from January to June 2015. A total volume of 56,590m^3 was transferred; the volume of water per month is provided in Table 8.10. Starting in June 2015, no additional water was pumped out of the Bay Goose Pit; instead runoff and groundwater were kept in the pit to contribute to natural re-flooding of the pit. In September 50,431m^3 of water was pumped to Bay Goose Pit from ST-S-5 (Central Dike Seepage) as part of the mitigation actions undertaken during fall 2015. Artificial re-flooding of Goose Pit with water from Third Portage Lake could start during the summer of 2016. AEM will provide at least thirty (30) days' notice to the NWB and Inspector prior to the re-flooding as per water license 2AM-MEA1525 Part E Item 12.

As mentioned in Section 3.1.1 c, seepage rates and volumes through the Bay Goose dike are not significant. No seepage collection system has been implemented because there is no evidence of significant seepage that affects the mining operation or the dike integrity, and that warrants a collection system.

In 2015 due to safety issues (no secure access to the pit area) water quality samples at the bottom of the pit at station ST-20 Goose Island Pit Lake were only collected in August. Results of sampling conducted at station ST-20 Goose Island Pit Lake are presented in Table 8.17; the sampling location is illustrated on Figure 1. Additional samples will be taken in 2016 when secure access to the pit will be available. Samples were collected monthly during open water as per the requirements in the NWB water license at a sump a top of Bay Goose Pit (sampling station ST-20 Goose Island Pit Sump). The data are presented in Table 8.18; the sampling location is illustrated on Figure 1. There are no applicable license limits for ST-20 Goose Island Pit Sump as the water was not directly released into the environment; the data is presented for information purposes only. Data analysis for samples collected at ST-20 Goose Island Pit Lake is presented in the *2015 Meadowbank Water Quality Forecasting Update* (Appendix C of *2015 Water Management Report and Plan in Appendix C2*).

8.3.3.10 Vault Pit Sump (ST-23)

In 2014 a sump was constructed in the Vault pit in an area of water accumulation. Water from the Vault Pit is to be sampled monthly during open water as per the requirements in the NWB water license (Figure 1). However, in 2015 due to safety issues (no secure access), water samples were collected only in June and July (Table 8.19). The water accumulated in the Vault Pit sump was pumped to the Vault Attenuation Pond. A total volume of 118,240 m^3 was transferred in 2015; the monthly breakdown is provided in Table 8.10.

8.3.3.11 Portage Rock Storage Facility (ST-16)

The Portage Waste Rock Storage Facility (PRSF) has been in operation since 2009. In 2013, ponded water was observed at the south-east base of the PRSF (sampling station ST-16). This was first reported in the 2013 Annual Report (as well as to regulators in July 2013) as a small volume of the seepage, with elevated levels of Cyanide, Nickel and Copper (among other constituents) had migrated, through a rockfill perimeter road, to the near shore area of NP-2 Lake. AEM determined, in 2013, that the seepage contained reclaim water from the North Cell TSF that had flowed under the PRSF to a sump area designated as sampling station ST-16 (refer to *RSF Seepage Golder Report* in Appendix G5 of the 2013 Annual Report).

Mitigation measures were implemented in 2013, 2014 and 2015 and this included daily inspections during the freshet period, the installation of a pumping system in ST-16 to direct accumulated water back to the North Cell TSF, installation of four thermistors to analyse freezing in the PRSF and installation of a filter barrier along RF-1 and 2 to prevent water and tailings egress from the North Cell (tailings water) through the PRSF to ST-16. As part of progressive reclamation capping of the North Cell tailings commenced in late 2014 and early 2015 along RF-2. Capping of the North Cell is continuing in 2016. The tailings are capped in the area of RF-1 and RF-2 which will further assist to prevent any seepage migration from the North Cell. Also in 2015, 1,134,174 m^3 of North Cell water was transferred to the South Cell reclaim pond minimizing the water contained in this cell. Thermistors installed in 2013 indicate that freezeback is occurring along the seepage path. Since 2014, a permanent pumping system has been operating at ST-16, to collect water and pump it to the TSF North Cell. Water volumes pumped from ST-16 and deposited in the North Cell TSF are provided in Table 8.10. Water volumes pumped decreased in 2015 (19,236m^3) compared to 2014 (32,169m^3) despite a higher volume of snow and increased freshet flows around site. The installation of the filters at RF-1 and RF-2, capping of tailings and decreased water volume in the North Cell likely contributed to the lower volumes pumped. It is also an indication that mitigation measures have been effective in controlling and minimizing seepage from the North Cell.

In accordance with the 2015 Freshet Action Plan (see Appendix D of the *2015 Water Management Report and Plan* (Appendix C2)), AEM continued in 2015 to monitor water quality and contain the ST-16 Seepage. This is conducted to assess and prevent any impact to the receiving environment (NP2) and to downstream lakes (NP-1, Dogleg and Second Portage). Monitoring stations are illustrated on Figure 1. Water quality results can be found in Table 8.20 for ST-16, Table 8.21 for NP2, Table 8.22 for downstream lakes (NP-1, Dogleg and Second Portage Lake). 2015 and 2014 averages for parameters of concern can be found in Tables 8.22 and 8.23, respectively. Results are presented for information purposes only as there are no applicable license limits at this location.

The 2015 and 2014 average analysis results for applicable parameters confirmed no impacts to downstream lakes (NP-1, Dogleg, Second Portage Lake). The average Nickel, Cyanide Free, Ammonia (NH3) and Ammonia Nitrogen results are all below CCME, Water Licence and MMER criteria in NP-2 Lake. No cyanide in any form has been detected in NP-2 or downstream lakes for the past 2 years. Copper is slightly elevated above CCME at NP-2 South and NP-2 East but has decreased from 2014 results. Under ice samples collected at NP2 show a similar trend. Also, to be noted in the 2015 results are the significantly decreasing analysis results for contaminants of concern at the receiving environment and the downstream lakes monitoring stations. A valid case can be made that the action plan implemented by AEM has been very successful in preventing any further seepage into NP-2 Lake and into the ST-16 sump itself. The MDRB has commented on the success of this action plan. The till plug, pumping system, installation of filters and effective tailings beaches at RF-1 and RF-2, progressive tailings capping at RF-1 and RF-2 and the dewatering of the North Cell in 2015 have effectively mitigated this problem. In addition, thermistors installed in the RSF indicate freezing in the former seep path is occurring (which would mean that no water is migrating), as described in section 5.3.2.

Table 8.23 - 2015 Monitoring Results for ST-16, NP2, NP1, Dogleg and Second Portage Lake

Parameters	Regulatory limit			Unit	2015 Average							
	Water License	MMER	CCME		ST-16	NP-2 South	NP-2 East	NP-2 West	NP-1 West	Dogleg North	SPL-RSF Seep	NP-2 Winter
Ammonia (NH3)	NA	NA	2.33 as N	mg N/L	0.01	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**
Ammonia nitrogen (NH3-NH4)	32	NA	NA	mg N/L	1.1	**0.005**	0.027	**0.005**	**0.005**	**0.005**	**0.005**	0.007
CN total	1.00	1.00	NA	mg/L	0.02	**0.0025**	**0.0025**	**0.0025**	**0.0025**	**0.0025**	**0.0025**	**0.0025**
CN Free (SGS)	NA	NA	0.005	mg/L	**0.0025***	**0.0025***	**0.0025***	**0.0025***	**0.0025***	**0.0025***	**0.0025***	**0.0025**
CN WAD	NA	NA	NA	mg/L	0.007	**0.0025**	**0.0025**	**0.0025**	**0.0025**	**0.0025**	**0.0025**	**0.0025**
Copper	0.2	0.60	0.002	mg/L	0.047	0.005	0.006	0.005	0.0025	0.0004	**0.00025**	0.006
Nickel	0.4	1.00	0.025	mg/L	0.05	0.005	0.009	0.005	0.0025	0.0005	**0.00025**	0.006

Bold values correspond to half detection limits.
**Cn Free sample collected on August 18, 2015 was damaged during transportation. Therefore, it was not analysed. When AEM noticed the situation, it was too late to collect another sample for the month.*

Table 8.24 - 2014 Monitoring Results for ST-16, NP2, NP1, Dogleg and Second Portage Lake

Parameters	Regulatory limit			Unit	2014 Average							
	Water License	MMER	CCME		ST-16	NP-2 South	NP-2 East	NP-2 West	NP-1 West	Dogleg North	SPL-RSF Seep	NP-2 Winter
Ammonia (NH3)	NA	NA	2.33 as N	mg N/L	0.62	0.02	0.03	0.03	**0.01**	**0.01**	**0.01**	
Ammonia nitrogen (NH3-NH4)	32	NA	NA	mg N/L	28.85	2.90	2.93	3.19	0.22	0.01	0.02	7.10
CN total	1.00	1.00	NA	mg/L	1.38	0.02	0.01	0.01	0.003	**0.003**	**0.003**	0.03
CN Free (SGS)	NA	NA	0.005	mg/L	0.18	0.004	0.004	0.004	0.004	0.004	0.004	
CN WAD	NA	NA	NA	mg/L	1.12	0.02	0.004	0.01	0.004	0.003	0.003	0.05
Copper	0.2	0.60	0.002	mg/L	0.4871	0.0085	0.0076	0.0107	0.0021	0.0008	0.0006	0.0340
Nickel	0.4	1.00	0.025	mg/L	0.4934	0.0134	0.0126	0.0138	0.0043	0.0010	0.0006	0.0360

Bold values correspond to half detection limits.

The KIA requested that AEM continue monitoring until there is a 5 year period of non-detect cyanide results. To date (previous 2 years) the monitoring has indicated no CN levels in NP-2, NP-1 and downstream lakes, Dogleg and Second Portage. Thus the current program will continue in 2016, 2017 and 2018. In 2016, AEM will assess the data after the sampling season as required.

8.3.3.12 PRSF – Waste Extension Pool (WEP)

In 2014, as per inspections conducted within the framework of the Freshet Action Plan, run off was noted at the northeast side of the NPAG waste rock extension pile in a natural depression (WEP). AEM contained this run off and pumped it back to the North Cell TSF as a precaution and to prevent egress to the East Diversion non-contact ditch. In 2015, 15,569 m^3 of water was pumped from the WEP collection system to the North Cell TSF.

WEP1 and WEP2 sumps were constructed in September 2015 (Appendix G4) to better manage water around the northeast side of the PRSF and to ensure that all water ponding behind the PRSF is transferred back to the North Cell TSF (and eventually transferred to the South Cell). The sumps WEP 1 and WEP 2 have replaced the natural depression forming the former WEP for the water management in this area. Sumps locations are illustrated on Appendix G4. No water has been pumped in 2015 from the sumps, as water was frozen after the sumps' construction. Sampling will commence in 2016 at sumps WEP1 and WEP2 as per NWB water license 2AM-MEA1525.

Table 8.25 – 2014-2015 Monitoring Results for WEP Collection System

Parameters	Regulatory Limit			Unit	26-May-14	17-June-14	2-July-14	29-June-15
	Water License	MMER	CCME					
CN total	1.00	1.00	NA	mg/L	2.45	0.394	-	0.018
CN Free (SGS)	NA	NA	0.005	mg/L	0.02	0.014	0.006	-
TSS	30	30	NA	mg/L	-	-	-	<1
Copper	0.2	0.60	0.002	mg/L	2.09	0.44	-	<0.0005
Iron	NA	NA	0.3	mg/L	1.1	5.1	-	-

Results of samples collected in 2015 at station ST-5 (East Diversion ditch discharge point into NP2) are documented in Table 8.26. The results from summer 2015 show that no water coming from the former WEP collection system was in contact with the East Diversion ditch. AEM will continue to monitor the area and will ensure that water collected in WEP1 and WEP2 sumps are pumped back into the North Cell TSF.

8.3.3.13 Vault Rock Storage Facility (ST-24)

The Vault Waste Rock Storage Facility (VRSF) has been in operation since 2013. In 2015, ponded water was observed at the base of the VRSF (sampling station ST-24) in June and July. As per NWB water license, samples were collected to assess water quality and the results are presented in Table 8.27. No water was pumped from this location as it's just a ponding area without flow. There are no applicable license limits at this location as there is no discharge to the environment; the data is presented for information purposes only. The location of this sampling station (ST-24) is illustrated on Figure 3.

8.3.3.14 ST-S-2

Water accumulated at the base of Saddle Dam 1 was pumped into the North Cell TSF (7,185 m^3 in 2015). This water originates from non-contact surface runoff from the surrounding terrain. Water samples were collected during the open water season to assess water quality. There are no applicable license limits for this location as the water was not being released into the environment; the data is presented in Table 8.28 for information purposes only. The sampling location (ST-S-2) is illustrated on Figure 1.

8.3.3.15 ST-S-5

Sampling was conducted monthly as per the requirements of the NWB water license. There are no applicable license limits for this station as the water is pumped back to the South Cell TSF. Sample results are presented in Table 8.29. See Figure 1 for the location of ST-S-5. Refer to section 8.3.7.2 for details on the Central Dike seepage.

8.3.3.16 Landfarm

The Meadowbank landfarm was constructed at the end of 2012. In 2015, following the freshet a very small pool of water was identified in the landfarm. One sample was collected in July 7, 2015 to assess water quality and the results are presented in Table 8.30. There are no applicable license limits for this location as the water was not being released into the environment. Pooled water was pumped into the South Cell TSF. No seepage of water outside of the landfarm was observed in 2015.

8.3.3.17 Landfill

No water quality monitoring was completed at the landfill in 2015 as no leachate was observed. The total volume of waste transferred to the landfill in 2015 was 11,526 m^3. A monthly summary of the solid waste disposed at the landfill is presented in Table 6.2.

8.3.3.18 Sewage Treatment Plant

The Meadowbank mine site has one Seprotech L333 sewage treatment plant (STP) and three Little John 100 units in operation; the equipment operates together with one sewage discharge effluent stream directed to the Stormwater Management Pond (SMP). Water is pumped from the SMP twice yearly during the spring and fall to the South Cell TSF. There is no discharge to any receiving waters. The SMP also collects spring runoff from the surrounding area.

Samples are taken in accordance with *Operation & Maintenance Manual – Sewage Treatment Plan (September 2015)* for the purpose of determining operating efficiency of the units. Sample results are available in Table 8.31. Results of the sample analysis are submitted to the NWB in the monthly monitoring reports.

The total volume of treated sewage discharged in 2015 was 38,931 m^3. In addition, 263 m^3 of sewage sludge was collected and disposed of in the Tailings Storage Facility. A monthly summary of the volume of STP waste is presented in Table 8.32.

8.3.3.19 Meadowbank Bulk Fuel Storage Facility

Water collected in the secondary containment area of the bulk fuel storage tank at the Meadowbank mine site was sampled on June 4 and September 10, 2015. Results are presented in Table 8.33 and the sampling location (ST-37) is illustrated on Figure 1. No water quality parameters exceeded the water quality limit stipulated in Part F, Item 6 of the 2AM-MEA0815 water license for samples collected on June 4, 2015. Notifications to the INAC Inspector, made in accordance with Part F, Item 12 of NWB License 2AM-MEA1525, were sent June 3 and September 9 2015. As a result, 200 m^3 of water was discharged to the Stormwater Management Pond in June and July via a temporary pipe from the secondary containment area of the Meadowbank bulk fuel storage tank. The discharge of 2500 m^3 of water did not occur in September as water collected was frozen.

8.3.3.20 East and West 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 (via NP2) and Third Portage Lakes. Water from the East diversion ditch (sampling station ST-5) and the West diversion ditch (sampling station ST-6) were sampled monthly during open water as per the requirements in the NWB water license. Results are presented in Table 8.26 and Table 8.34 respectively; the sampling location is illustrated on Figure 1. Results complied with the Water License criteria - stated in Part E Item 6.

8.3.4 Baker Lake Marshalling Facilities

Water collected in the secondary containment areas of the main (Tanks 1 – 4; ST-40.1) and additional (Tanks #5 and #6; ST-40.2) diesel bulk fuel storage facilities at the Baker Lake Marshalling Facility were sampled on June 11, 2015. Notification to the INAC Inspector, made in accordance with Part F, Item 12 of NWB License 2AM-MEA1525, was sent on June 3, 2015. All parameters were below the water quality limits stipulated in Part F, Item 23 in the Water License. The locations of these sampling stations (ST-40.1 and ST-40.2) are illustrated on Figure 4 and results are presented in Table 8.35. Approximately 2500 m^3 of water was discharged to land on the East side of the tank farm.

On July 5 2015, the Jet A secondary containment water (ST-38) was sampled prior to discharge in accordance with Water License conditions. The TSS limit was exceeded (123 mg/L, limit is 30 mg/L). The sampling location is illustrated in Figure 4 and results are presented in Table 8.36. To proceed with secondary containment's liner repair, approximately 190 m^3 of water was transferred into the secondary containment of tanks #5 and #6. On September 29, 54 m^3 of water was pumped from the Jet A fuel secondary containment into secondary containment of tanks #5 and #6.

As part of the Core Receiving Environment Monitoring Program (CREMP), water quality samples are collected at stations on Baker Lake during the open water season. Four monitoring stations are sampled; one at the Baker Lake community barge dock, one at the Baker Lake marshalling area, and two at upstream reference locations. For more details, please refer to the report entitled ''*Core Receiving Environment Monitoring Program 2015"* prepared for AEM by Azimuth Consulting Group, attached as Appendix G1. The results indicate no effects from mine related activities.

8.3.5 All Weather Access Road (AWAR) and Quarries*

A geotechnical structural inspection of the AWAR, including all culverts, bridges and quarries, was conducted by Golder Associates in 2015. This annual inspection is a requirement of the Water License. The findings are presented in the report entitled '*2015 Annual Geotechnical Inspection, Meadowbank Gold Mine, Nunavut*', attached in Appendix B1.

According to Fisheries and Oceans Canada (DFO) Authorizations NU-03-0191.2, NU-03-0191.3 and NU-03-0191.4, AEM maintains a Habitat Compensation Monitoring Plan (HCMP; AEM, 2014a) to ensure that fish habitat compensation features are constructed and functioning as intended. Based on the schedule described in the HCMP, monitoring of compensation features currently occurs every 2 years.

In 2015, monitoring was conducted for the constructed spawning pad, located at stream crossing R02 along the all-weather access road (AWAR). They were visually confirmed to be stable as designed. Generally, condition factors of adult fish, population size distributions and timing of migration were within the range of values seen in previous years, confirming continued use of this area by Arctic grayling. Larval drift rates of collection continue to exceed those observed prior to construction of the spawning pad, suggesting a net positive increase in Arctic grayling reproduction, either through direct increased use or reduced pressure on upstream spawning areas. Overall, the constructed spawning pads at R02 have not only increased the quantity of high-value habitat, but appear to be effectively increasing production rates in the local population. The full report can be found in Appendix G8

8.3.6 QAQC Sampling

As required by NIRB Project Certificate No.004, Condition 23: ***ensure that water quality monitoring performed at locations within receiving waters that allow for an assimilative capacity assessment of concern to regulators, be carried out by an independent contractor and submitted to an independent accredited lab for analysis, on a type and frequency basis as determined by the NWB; results of analysis shall be provided to the NWB and NIRB's Monitoring Officer.***

The objective of quality assurance and quality control (QA/QC) is to assure that the chemical data collected are representative of the material being sampled, are of known quality, are properly documented, and are scientifically defensible. Data quality was assured throughout the collection and analysis of samples using specified standardized procedures, by the employment of accredited laboratories, and by staffing the program with experienced technicians.

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All chemical analyses were performed by Multi-Lab Direct in Val d'Or, Quebec, an accredited facility. All data from Multi-Lab underwent a vigorous internal QA/QC process, including the use of spiked samples and duplicate samples. All QA/QC data passed the laboratories acceptable limits. The laboratory certificates of quality control are presented in Appendix G2, following the corresponding certificates of analysis.

All toxicity tests were performed by Maxxam Analytique in Quebec City and Exova in Saint-Augustin-de-Desmaures, QC. Testing was conducted as stipulated in the corresponding Environment Canada Biological Test Methods. QA/QC measures implemented by the lab, including the use of reference toxicants, met the acceptable limits. QA/QC data is presented with the toxicity reports in Appendix G2.

Field blanks are laboratory bottles filled with deionized water in the field, and then treated as a normal sample. They are used to identify errors or contamination in sample collection and analysis. Duplicate field water quality samples are collected simultaneously in the field and used to assess sampling variability and sample homogeneity. The following presents the percentage of duplicate and field samples collected from each of the monitoring programs:

- MMER and EEM monitoring programs: 11 duplicate samples and 11 field blanks were collected from a total of 73 samples, representing 15.1%;
- STP monitoring program: 4 duplicate samples were collected from a total of 24 samples, representing 16.7%;
- Surface water monitoring programs: 29 duplicate samples and 9 field blanks were collected from a total of 125 samples, representing 23.2% and 7.2 respectively%; and
- Bulk fuel storage facilities monitoring program: 1 duplicate samples and 1 field blank were collected from a total of 5 samples, representing 20%.

This represents approximately 19.8% of the samples collected, which is higher than the QA/QC duplicate program objective of 10%.

Analytical precision is a measurement of the variability associated with duplicate analyses of the same sample in the laboratory. Duplicate results were assessed using the relative percent difference (RPD) between measurements. The equation used to calculate a RPD is:

RPD = (A-B)/ ((A+B)/2)*100; where: A = field sample; B = duplicate sample.

Large variations in RPD values are often observed between duplicate samples when the concentrations of analytes are low and approaching the detection limit. Consequently, a RPD of 20% for concentrations of field and duplicates samples that both exceed 10x the method detection limit (MDL) is considered notable. The analytical precision of one QAQC sampling event is characterized as:

- High, when less than 10% of the parameters have variations that are notable;
- Medium, when 10 to 30% of the parameters have variations that are notable;
- Low, when more than 30% of the parameters have variations that are notable.

Results of the QA/QC data are presented in Tables 8.37 to 8.51 for the MMER and EEM, STP, Surface Water, and Bulk Fuel Storage Facility monitoring programs, respectively. The following is a brief summary of the QA/QC results, per sampling program:

- MMER and EEM (tables 8.37 and 8.38): Among the duplicate samples collected, eight (8) were considered as having high analytical precision. Three (3) QAQC samples collected at ST-MMER-3 were considered as having medium analytical precision as 13% of the parameters had notable variations. However, as the number of parameters analysed is low, one sample with notable variation between field and duplicate samples will trigger a medium analytical precision.
- STP (table 8.39): Two (2) parameters exceeded the data quality objectives. However, in one (1) occasion, one sample out of the two (field sample) had values exceeding 10x the MDL. This sample was not considered as exceeding the data quality objectives. Analytical precision is rated high for one sampling event and medium for the other one. However, as the number of parameters analysed is low, one sample with notable variation between field and duplicate samples will trigger a medium analytical precision.
- Surface Water (tables 8.40-8.49): All QAQC sampling events conducted within the surface water quality program are rated as having high analytical precision with the highest number of notable variations being recorded at ST-8 on November 2 (10%) and SPL RSF on September 8 (6%).
- Bulk Fuel Storage Facility (table 8.50): One (1) parameter exceeded the data quality objectives. However, both field and duplicate samples were within the 10x MDL. This sample was not considered as exceeding the data quality objectives. Analytical precision is rated high for both sampling events conducted at the Bulk Storage Facility.

The QA/QC plan was followed and samples were collected by qualified technicians. Given the high number of samples collected in 2015, it is common to have some RPD exceedances as a result of the discrete differences in the original and field duplicates. Given the variability of these exceedances (occurring with different parameters, on different dates for different sampling programs) and the high number of successful samples, it is evident that field QA/QC standards during water sampling were maintained during sampling in 2015. In the future, AEM technicians will continue to follow standard QA/QC procedures (AEM, 2014) for surface water sampling that requires the use of sample bottles that are provided by an accredited laboratory, proper handling and storage of bottles to prevent cross-contamination between areas and, if appropriate, thoroughly rinsing the sample containers with sample water prior to sample collection

For field measurements, the following equipment is used:

- Analite NEP 160 Meter (turbidity);
- YSI (DO, conductivity)
- Oakton PCS35 Meter (pH and conductivity); and
- Hanna Multi-Parameter Meter (pH, dissolved oxygen and conductivity).

The calibration data regarding these instruments is presented in Tables 8.51 to 8.55 for Analite Meters #2 and #4, the Oakton PCS35 Meter, Hanna Meters #1 and YSI, respectively.

QA/QC methods and results for specific field programs are discussed separately in their respective reports; these field programs are presented in the Appendices listed below:

- Appendix G1: *Core Receiving Environment Monitoring Program 2015* – Sections 2.4 and 3.1;
- Appendix G7: *2015 Groundwater monitoring report* – Sections 5.4.
- Appendix G10: *Air Quality and Dustfall Monitoring Report 2014*– Section 4.4;

8.3.7 Seepage

As required by Water License 2AM-MEA1525 Part I, Item 14: *The results and interpretation of the Seepage Monitoring program in accordance with Part I, Item 13*

The Seepage Monitoring program includes the following locations:

- **Lake water Seepage Through Dewatering Dikes;**
- **Seepage (of any kind) Through Central Dike;**
- **Seepage and Runoff from the Landfill(s);**
- **Subsurface Seepage and Surface Runoff from Waste Rock Piles;**
- **Seepage at Pit Wall and Pit Wall Freeze/Thaw;**
- **Permafrost Aggradation;**
- **Mill Seepage.**

8.3.7.1 Lake water seepage through dewatering dikes

As discussed previously, see Sections 3.1.1 and 8.3.3.5 regarding East Dike seepage interpretation and monitoring.

8.3.7.2 Seepage (of any kind) through Central Dike

As mentioned in Section 3.1.1c of this report, seepage was observed at the downstream toe of Central Dike during the fall period of 2014. The seepage appeared to be of low magnitude and of small volume. In December, 2014 it was observed that the seepage was contained at the toe of Central Dike and frozen. It is located within the mining footprint, away from the receiving environment and is confined directly downstream.

Additional monitoring conducted in summer 2015 confirmed that the water originates from the South Cell TSF reclaim water and leakage is increasing proportionately with tailings deposition. Currently, the seepage is being monitored by the Engineering Department. Starting in April 2015, water at the toe of the dike has been collected into ST-S-5 and pumped back into the South Cell Tailings Storage Facility. From a geochemical perspective, pumping the seepage back into the South Cell will help limit a wet-dry cycle within the dike rockfill embankment and the associated initiation of an acid drainage reaction in the potentially acid generating (PAG) rockfill. In 2015, 2,948,024 m^3 of water was pumped back into the South Cell TSF.

In August 2015, AEM developed a Central Dike seepage action plan. The main objectives were to validate that the South Cell TSF is safe to operate and to determine if physical remediation of the Central Dike structure and foundation had to be undertaken. The following studies were completed: seepage modelling and stability analysis, geophysical surveying, seepage flow measurement, mitigation plan assessment, instrumentation data analysis and, water quality modelling. Results show that the South Cell TSF can be operated safely. The Meadowbank Dike Review Board (MDRB) has been informed and agrees that no physical mitigation work is required. It recommended that operations in the South Cell TSF be resumed (Nov, 2015). See Appendix B4 for 2015 MDRB reports and AEM's responses. In the upcoming months, AEM will conduct seepage modelling studies, compile data from drilling investigations undertaken and, modify its deposition plan according to the investigation's findings. Daily visual inspections will also be completed. The monitoring of the Central Dike will continue throughout the operating life of the dike, with analysis of the instrumentation results and water quality testing.

8.3.7.3 Seepage and runoff from the landfill

Results and interpretation of this monitoring program are discussed in section 8.3.3.17 above.

8.3.7.4 Subsurface seepage and surface runoff from waste rock piles

Sections 8.3.3.11 to 8.3.3.13 provide details regarding seepage monitoring at the Portage and Vault Rock Storage Facilities.

8.3.7.5 Seepage at pit wall and pit wall freeze/thaw and permafrost aggradation

No significant seepage was observed in 2015 in Portage Pit A. Some seepage faces were noted along the south/west wall of Portage pit E3. A series of drainage holes were drilled in pit E south wall to relieve water pressure build up. The goal was to depressurize the wall to assure stability. Only one (1) drainage hole generated a permanent flow. The flow rate is approximately $6m^3$ per day. The other holes are frozen.

The Goose pit mining activities were completed in April 2015 prior to any melting or spring shifting. Therefore, the seepage in Goose Pit did not jeopardize any mining activity and now contributes to the re-flooding of the pit.

Water inflows and seepage were noted in a number of areas of the Vault pit in 2015. They were generally related to the dewatering of Vault Lake, and to the current lake level. An area of seepage adjacent to the ramp was observed. It appears to be derived from hydraulic connection by the major east-west and north-south structures to the talik beneath the dewatered Vault Lake. Currently, the seepage does not appear to be affecting the bench-scale stability of the rock above the ramp.

The "*Annual Review of Portage and Goose Pit Slope Performance (2015) - Meadowbank Mine*" prepared by Golder provides more details regarding seepage at pit walls (Appendix B3).

8.3.7.6 Mill Seepage

On November 4, 2013, it was observed that water was seeping thru the road in front of the Assay Lab Road. In December 2013, AEM hired Tetra Tech (formerly EBA) to perform an assessment, drilling delineation program and provide a report with recommendations in early 2014. All recommendations made in this report will be completed, prior to closure. Construction of an interception trench was completed in April-May 2014 and repairs and sealing of containment structures within the mill were completed during the summer of 2014. In November 2015 work was conducted to repair portions of the mill floor and ensure its watertight integrity. Additional elastomeric sealant was applied in the floor joints. AEM also put in place an internal action plan and monitoring program for this seep in 2014. The monitoring is part of the Freshet Action Plan (2015). Refer to Appendix D of the *2015 Water Management Report and Plan* (Appendix C2) for more details regarding the monitoring and action taken by AEM before, during and after the freshet at this seepage area.

Water in the interception trench and the original containment berm and sumps was frozen from January to May and from October to December 2015 and therefore water was pumped from well MW-203 back to the mill during that period. Water in the interception trench and the original containment berm and sumps was pumped back to the mill from June to September. No flow in MW-203 was measured in December 2015. The total volume pumped back to the mill from the well and containment sump was 30,543 m^3. Refer to Table 8.56 for a breakdown per month. The increased volume in 2015 was due to increased snow and freshet flows above those seen in 2014.

Table 8.56. Assay Road Seepage pumped volume – 2014-2015

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

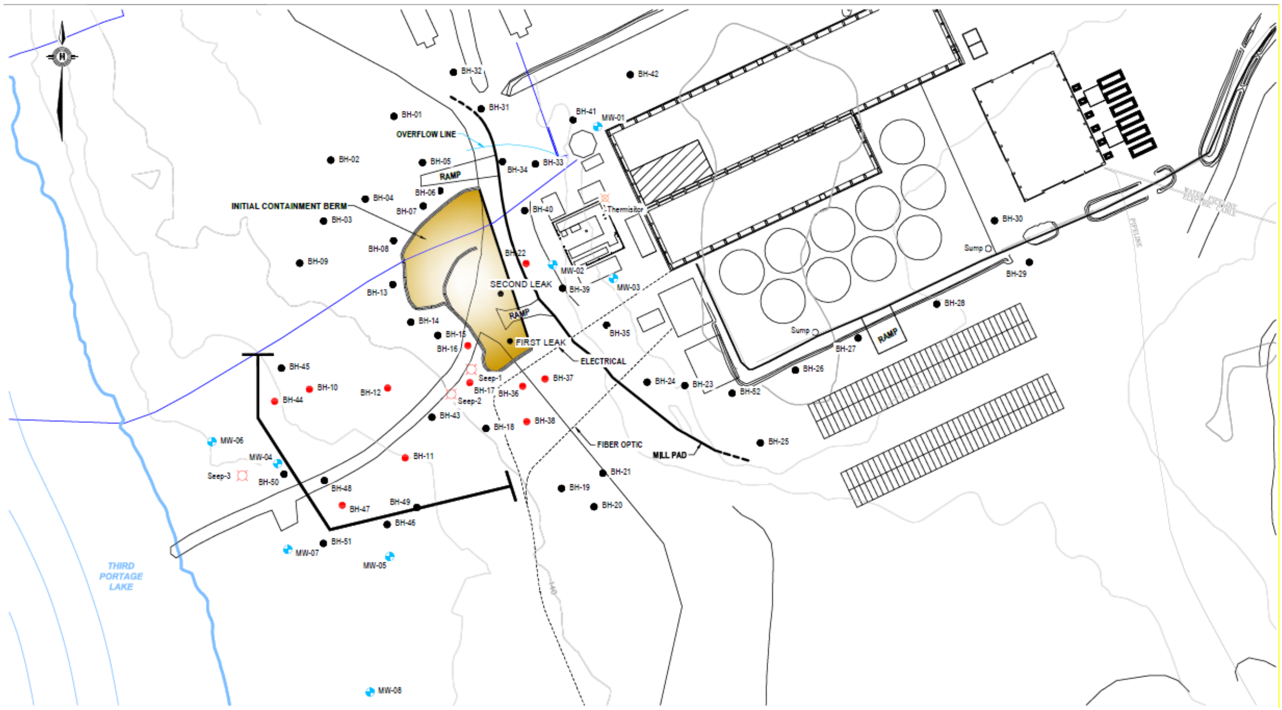
Daily visual inspections were conducted during freshet. Prior and after freshet, inspection were conducted weekly and after rain events.

Weekly water samples were collected for CN WAD in well and trench. In addition, as per the Freshet Action Plan, monthly CN Free, CN total, copper and iron samples were collected when water was present at the interception trench and Third Portage Lake as well as Monitoring Wells 4, 5, 6, 7 and 8 (on Figure 28 below). At KIA's request, additional monitoring was also conducted monthly during open water at TPL. Table 8.57, 8.58 and 8.59 contain regulatory guidelines, and monitoring results from the seepage and Third Portage Lake (TPL-Assay), respectively. It should be noted that wells MW-04 and MW-06 were dry in 2015.

CN Free results at MW-203, MW-07 and MW-08 in 2015 were all below the CCME guideline for the Protection of Aquatic Life. Concentrations of CN total are below the detection limits at all locations sampled except at MW-07 in September (0.008 mg/L). Concentrations of copper are below MMER and water licence guidelines at the trench and monitoring wells. Iron concentrations are higher than the CCME guideline at monitoring wells MW-203, MW-05, MW-07 and MW-08. Copper, iron and CN concentrations at TPL are below the CCME guideline for the Protection of Aquatic Life.

In summary, monitoring in TPL indicates that there has been no impact to the near shore receiving waters. The seepage appears to be effectively contained and the source area has been repaired. Follow up monitoring will continue in 2016 in accordance with the 2015 Freshet Action Plan which includes requests made by KIA in 2014 at the Water Licence renewal hearing.

Figure 28. General Layout of the Assay Road Seepage



8.4 VISUAL AWAR WATER QUALITY MONITORING

Pre-freshet and freshet inspections were conducted at crossings along the AWAR in 2015. These inspections are conducted to document the presence/absence of flow, erosional concerns and turbidity plumes. No flow was observed during the two (2) pre-freshet inspections conducted on May 20 and 22, 2015. Flow was observed, but no erosional concern or visual turbidity plumes were observed during the freshet inspections conducted on June 14 and 16. Inspection reports can be found in Appendix G5.

Weekly inspections are also conducted along the AWAR. During the freshet and open water season, any visual turbidity plumes or erosion along the AWAR, culverts or HADD crossings are documented by Environmental Technicians. In 2015, no visual turbidity plumes or erosion was observed.

8.5 BLAST MONITORING*

As required by NIRB Project Certificate No.004, Condition 85*: develop a detailed blasting program to minimize the effects of blasting on fish and fish habitat, water quality, and wildlife and terrestrial VECs.*

In accordance with NIRB Project Certificate No.004, Condition 85, AEM Meadowbank Division developed a blasting program which complies with *The Guidelines for the Use of Explosives In or Near Canadian Fisheries Water* (Wright and Hopky, 1998) as modified by the DFO for use in the North. As a result, AEM

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conducts monitoring to evaluate blast related peak particle velocity and overpressure to protect nearby fish bearing waters.

The results of the 2015 blast monitoring program are available in the report entitled "*2015 Blast Monitoring Report for the Protection of Nearby Fish Habitat*" prepared by AEM, attached as Appendix G6.

Peak particle velocity (PPV) and overpressure monitoring data were recorded throughout 2015 during blasting activities at the North Portage Pit, South Portage Pit, Bay Goose Pit and Vault Pit. The blast monitoring stations are illustrated in Figure 1 and Figure 2 of the report. The Portage stations are located near the shoreline of Second Portage Lake and the station located on the Bay Goose Dike is near Third Portage Lake, East Basin. The Vault Pit station #1 is located between the Vault Attenuation Pond (dewatered Vault Lake) and the Vault Pit, and Vault Pit station #2 is located near Wally Lake.

Blast monitoring was conducted at Goose Pit from January to April 2015 (when mining ceased).

In 2015, the average PPV recorded at all monitoring stations was 2.38 (CI +/- 0.33) with a maximum of 16.5 mm/s (maximum in 2014 and 2013 were 23.8 and 32.7 mm/s respectively). The average was lower than the 2014 (3.93 mm/s) and 2013 (5.39 mm/s) averages. PPV concentrations exceeded the DFO limit of 13 mm/s on two (2) occasions. Both exceedances occurred during the period of egg incubation which is from August 15 to June 30 for lakes around the Meadowbank mine site. Overpressure measurements were all below the DFO limit of 50 kpa. The number of PPV exceedances has decreased significantly in 2015 compared to 2013 and 2014 which recorded 16 and 8 exceedances, respectively. Exceedances recorded in 2015 occurred in Portage Pit E3 – the closest to the blast monitoring station. They were triggered by large blast patterns with numerous holes being blasted at the same time. These types of blast are rarely conducted and AEM will attempt to eliminate these in the future.

As in the past, based on the monitoring station locations and in comparison to other studies conducted at Ekati, exceedances of 13 mm/s PPV recorded in 2015 were unlikely to impact salmonid incubation sites at the Meadowbank Mine site. This is supported by data collected along the East dike, near South Portage Pit, as part of the Habitat Compensation Monitoring Program which documented the presence of spawning lake trout, despite blasting occurring nearby.

8.6 GROUNDWATER

As required by NIRB Project Certificate No.004 Condition 8: Continue to undertake semi-annual groundwater samples and re-evaluate the groundwater quality after each sample collection; report the results of each re-evaluation to NIRB's Monitoring Officer, INAC and EC.

The full results of the 2015 groundwater monitoring program are available in the report entitled '2015 Groundwater Monitoring Report' prepared by AEM, attached as Appendix G7.

The 2015 groundwater monitoring program at Meadowbank was conducted in accordance with the Groundwater Monitoring Plan (AEM, 2014). The objectives of this program are to monitor the salinity of shallow and deep groundwater in order to update site water quality predictions and to document any effects of mining on groundwater quality, particularly with respect to tailings deposition.

In 2015, wells MW-14-01 and MW-08-02 were each sampled twice as per the 2014 Plan. As recommended by Golder (2012), attempts were also made to augment the groundwater sampling program using alternative sources such as production drill holes. In 2015 the alternate sources included two geotechnical drill holes that were successfully sampled in Portage pit E3 in December, 2015. Analysis of key parameters indicated this to be groundwater. Therefore, these results are included in the 2015 report.

Concentrations of all parameters measured in groundwater samples in 2015 are provided in this report, along with a year-over-year comparison of salinity-related results that are relevant to the site water quality model. All historical results are provided in Appendix A of the report. Of note, is that groundwater encountered in the Portage Pit is no longer pumped to the Portage Attenuation pond as this pond became the South Cell Tailings Storage Facility in 2014. Therefore, there is no further discharge to Third Portage Lake. Any pit water is pumped to the South Cell and the water quality considered for predictions and modeling is that of the South Cell. Pit sumps are sampled during open water periods as a component of the Water Quality and Flow Monitoring Plan, and could contain groundwater. These results are also used as input parameters for overall South Cell water quality modelling (SNC, 2016).

For salinity-related parameters (conductivity, TDS, chloride), results for MW-08-02 and the Pit E3 drill hole samples were lower than or within the range of those observed historically onsite. Elevated concentrations of salinity-related parameters encountered previously (2014) at MW-14-01, which were related to well installation (salt used in drilling process), decreased by more than 50% in 2015. For tailings-related parameters (total cyanide and dissolved copper), results for the samples collected from well MW-08-02 and Pit E3 drill holes in 2015 were similar to those observed historically onsite (near detection limits), indicating no measureable movement of tailings into deep groundwater at these locations. For well MW-14-01, total CN values were recorded in the range of 0.1 mg/L, which is slightly lower than or similar to the 2014 concentrations at this location and lower than NWB limits for discharge to surface water, but higher than observed in groundwater elsewhere onsite historically (<0.005 mg/L). Results for dissolved copper were lower than those observed at this location in 2014, and similar to or lower than those observed historically in groundwater onsite since 2008 (prior to commencement of operations – background levels). These results (i.e. below or at background levels) for dissolved copper, which is associated with tailings, suggest that the observed cyanide values are unlikely to be due to significant migration of tailings into groundwater. However, concentrations of tailings-related parameters will continue to be closely monitored at this location to ensure concentrations in groundwater are not rising. Two sampling events are planned again for 2016 (spring and fall).

All measured concentrations of other metals were below NWB license limits for discharge to surface water for all locations, and were within the range of historical results, with the exception of zinc at MW-08-02 and aluminum at Pit E3 (likely due to residual rock dust in the drill hole).

8.7 HABITAT COMPENSATION MONITORING PROGRAM

According to Fisheries and Oceans Canada (DFO) Authorizations NU-03-0191.2, NU-03-0191.3 and NU-03-0191.4, AEM maintains a Habitat Compensation Monitoring Plan (HCMP; AEM, 2014a) to ensure that fish habitat compensation features are constructed and functioning as intended. Based on the schedule described in the HCMP, monitoring of compensation features currently occurs every 2 years.

In 2015, monitoring was conducted for several mine site habitat compensation features (East Dike, Bay-Goose Dike, Dogleg Ponds). The onsite monitoring included an assessment of interstitial water quality, periphyton growth, and fish use. The full report is attached as appendix G8.

Onsite, interstitial water quality within the dike faces met CCME guidelines for the protection of aquatic life (with the exception of TSS in one sample), and healthy periphyton community growth with increasing biomass was observed, compared to values from 2013. Angling and underwater motion camera monitoring proved to be a successful non-lethal program that demonstrated continued fish use of the dikes as habitat. CPUE of dike face monitoring stations was similar to or higher than reference stations. A total of 85 fish were caught through angling and there were no mortalities. A total of 32 fish were captured on camera during the underwater motion camera program. Angling in the Dogleg system identified presence of both lake trout and Arctic char in the previously fishless Dogleg North, as well as Arctic char in Dogleg Pond. Bathymetric surveys were not completed, but fish presence in Dogleg North indicates that access to this pond has been established. In particular, presence of char suggests a seasonal connection to Second Portage Lake, since Dogleg Pond and NP-2 were previously determined to be inhabited by lake trout and round whitefish. Water levels and connectivity will be confirmed during the next monitoring event.

8.8 FISH-OUT PROGRAM SUMMARY*

As required by NIRB Project Certificate No.004 Condition 49: ***develop, implement and report on the fish-out programs for the dewatering of Second Portage Lake, Third Portage Lake and Vault Lake.***

As required by DFO Authorizations NU-03-0191.4 Condition 2.1, 2.2, 2.2.1;

No fish-out program was conducted in 2015.

8.9 AEMP

8.9.1 Introduction

The Aquatic Effects Management Program (AEMP) for Agnico Eagle Mines' (AEM) Meadowbank Gold Mine site was developed in 2005 as part of the project's Final Environmental Impact Statement (FEIS) (AEMP 2005), and has been formally implemented since 2006. In December 2012, the AEMP was restructured to serve as an overarching "umbrella" program that conceptually provides an opportunity to integrate results of individual, but related, monitoring programs in accordance with the Type A water license requirements (Azimuth, 2012). The scope of the 2005 AEMP, which was essentially the core receiving environment monitoring, is now one of the monitoring programs that is integrated under the restructured AEMP, and has been renamed the Core Receiving Environment Monitoring Program (CREMP).

The 2015 AEMP synthesis report aims to:

- Identify potential sources of impact and develop a conceptual site model;
- Summarize the results of each of the underlying monitoring programs, including the CREMP (the cornerstone broad-level monitoring program);
- Review the inter-linkages among the monitoring programs;
- Integrate the results for each component program;
- Identify potential risks to the aquatic ecosystem; and
- Provide conclusions and recommend additional management actions, undertaken in 2015, or that should be considered in future monitoring.

8.9.2 Potential Sources of Impacts and the Conceptual Site Model (CSM)

The framework for the AEMP is founded on a conceptual site model, which is used in ecological risk assessment to help understand potential relationships between site activities and the environment (e.g., water quality or certain ecological receptors). The foundation of the 2012 conceptual site model (CSM) is presented in Table 8.60 and consists of the following elements (Azimuth, 2012):

- Stressor sources –the sources of chemical (e.g., metals) or physical (e.g., total suspended solids) stressors that can potentially impact the environment.
- Stressors –the actual agents that have the potential to cause adverse effects to the receiving environment.
- Transport pathways –the ways in which a stressor is released from the source to the receiving environment.
- Exposure media –the media where a stressor occurs in the receiving environment. A single stressor might actually end up in multiple exposure media, with different ones being most important at different times. For example, if an effluent contained mercury, it would initially be found in the water column, and then most likely would settle to sediments where it would then enter the food chain (i.e., biota tissue).
- Receptors of concern –ecological entities selected for a variety of reasons, usually including sensitivity to relevant stressors and perceived ecological importance (i.e. could be determined to be valued ecosystem components).

In 2015, all of the potential pathways, exposure media and receptors of concern listed in Table 8.60 were relevant to the AEMP analysis and were evaluated with the exception of tissue. There was no requirement to conduct a fish tissue survey during the Cycle EEM Biological Monitoring as mercury concentrations have remained below or near the detection limit of 0.01 µg/L.

Table 8.60- Primary transport pathways, exposure media, and receptors of concern for the AEMP

	Transport Pathways		Exposure Media		Receptors of Concern
				a, g	Phytoplankton
g,i	Effluent				
				g	Zooplankton
f	Groundwater	a,d,f,g,h,i,k,m	Water		
				d,g,h	Fish
i,k	Surface water	a	Sediments		
				a,h	Benthic community
m	Air		~~Tissue~~		
				d	Periphyton
NA	Direct				
				a,d,k	Fish habitat

Notes:

a	Core Receiving Environment Monitoring Program
~~b~~	~~Effects Assessment Studies~~
~~c~~	~~Dike Construction Monitoring~~
d	Habitat Compensation Monitoring Program
e	~~Dewatering Monitoring (Vault Lake in June)~~
f	Groundwater Monitoring
g	MMER Monitoring
h	EEM Biological Monitoring Studies
i	Water Quality and Flow Monitoring
j	~~Fish-Out Studies~~
k	AWAR and Quarry Water Quality Monitoring
l	Blast Monitoring
m	Air quality monitoring
NA	Direct, so measured in exposure medium.

Note: ~~strikethrough~~ text is an "AEMP" monitoring program that was not required to be completed in 2015

8.9.3 Summary of Results of AEMP- Related Monitoring Programs

In 2015, in accordance with the Type A water license the AEMP-related monitoring programs included:

- the Core Receiving Environment Monitoring Program (CREMP);
- Metal Mining Effluent Regulation (MMER) Monitoring;
- Mine site Water Quality and Flow Monitoring (and evaluation of NP-2);
- Visual AWAR water quality monitoring;
- Habitat Compensation Monitoring Program;
- Air quality monitoring;
- Blast Monitoring; and
- Groundwater Monitoring.

The results of the monitoring programs are integrated in the AEMP, and assist in the evaluation of potential effects of mining activities on the aquatic environment.

Air quality, the EEM Biological Studies and the Habitat Compensation Monitoring Program were also considered as part of the conceptual site model and are included in the AEMP discussion to inform the process, but these programs are not a requirement of the Type A water license; Part I-1.

Table 8.61 summarizes the results of the AEMP programs in 2015. Summaries of the monitoring programs are provided in Sections 8.1 to 8.7 of this annual report. For detailed results on individual monitoring programs, refer to the appended reports.

Table 8.61- Summary of results for aquatic effect monitoring programs in 2015

	Core Receiving Environment Monitoring Program	Effects Assessment Studies	Dike Construction Monitoring	Habitat Compensation Monitoring Program - NNL related monitoring	Dewatering Monitoring	MMER Monitoring	EEM Biological Monitoring Studies	Water Quality and Flow Monitoring	Fish-Out Studies	AWAR and Quarry Water Quality Monitoring	Blasting Monitoring	Groundwater Monitoring
Completed in 2015?	**Yes**	**No**	**NA**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**Yes**
Stressor Variables												
suspended solids	○			○		○	NA	○		○	NA	○
sediment deposition	NA			NA		NA	NA	NA		NA	NA	NA
water-borne toxicants	◍			○		○	NA	○		○	NA	○
sediment toxicants	◍			NA		NA	NA	NA		NA	NA	NA
nutrients	◍			NA		○	NA	○		○	NA	○
other physical stressors	○			○		○	○	○		○	◍	○
Effects Variables												
Phytoplankton	○			NA		○	NA	NA		NA	NA	NA
Zooplankton	NA			NA		○	NA	NA		NA	NA	NA
Fish	NA			NA		○	◍	NA		NA	NA	NA
Benthic invertebrate community	○			NA		NA	○	NA		NA	NA	NA
Periphyton	NA			○		NA	NA	NA		NA	NA	NA
Fish habitat	○			○		NA	NA	NA		NA	NA	NA

Notes:

○ No observed effects

◍ Trigger or guideline exceedance - early warning explained in report

● Observed effects explained in report

The following section discusses the stressor and effects based results of the monitoring programs presented in Table 8.62. On June 26, 2015 AEM submitted to EC the Cycle 2 Interpretive Report discussing the results of the sampling program conducted in August and September 2014. Results specific to the Cycle 2 program are therefore discussed in the AEMP. Mine effluent was discharged at two (2) locations in 2015: East Dike Seepage water was discharged into Second Portage Lake all year except from June 16 to August 10, and effluent from the Vault Attenuation Pond was discharged into Wally Lake from July 7 to September 10. As per MMER requirements given the short duration of discharge into Wally, only two (2) samples were collected from the exposure and reference area and reported to Environment Canada. The EEM water quality monitoring conducted in 2015 and collected at the same time as the EEM Cycle 2 was reported to Environment Canada via the RISS electronic database reporting system. In 2015, Habitat Compensation Monitoring along the AWAR and mine site was completed.

Overall, none of the site specific stressors, effects based triggers or guideline exceedances monitored onsite had the potential to cause significant risks to the aquatic environment.

The CREMP determined that there were some apparent mine-related changes relative to baseline/reference conditions at one or more near-field and mid-field areas: alkalinity (SP), conductivity (TPN, TPE, TPS, SP, WAL, TE), hardness (TPN, TPE, TPS, SP, WAL, TE), major cations (i.e., calcium, potassium, magnesium and sodium (TPN, TPE, SP, WAL)), TDS (TPN, TPE, TPS, SP, WAL, TE) and TKN (WAL). In the absence of effects-based thresholds (e.g., CCME water quality criteria) for these parameters, their triggers were set at the 95th percentile of baseline data. While these results represent mine-related changes, the observed concentrations are still relatively low and unlikely to adversely affect aquatic life. These trends need to be reviewed again in 2016. As per the recommendations in last year's CREMP, the 2015 program incorporated bioavailability and toxicity testing to evaluate whether sediment chromium concentration pose a risk to the benthic invertebrate community at TPE. Sequential extractions tests on sediment show the majority of sediment chromium is sequestered in the sediment matrix, which is largely non-bioavailable. Furthermore, the fractions that are bioavailable occur at concentrations below effects-based threshold concentrations (i.e. ISQG and PEL). Toxicity tests provided effects-based evidence that chromium concentrations at TPE are unlikely to adversely affect the benthic invertebrate community. Lastly phytoplankton and benthic metrics demonstrated variability that could not be explained as mine related. The results of the CREMP are summarized in Table 8.62 and these results are subsequently evaluated in the AEMP.

The HCMP determined onsite interstitial water quality within the dike faces met CCME guidelines for the protection of aquatic life (with the exception of TSS in one sample), and healthy periphyton community growth with increasing biomass was observed. Angling and underwater motion camera monitoring showed that fish appear to be using habitat created by dikes and diversion channels around the mine site. The constructed spawning pads at R02 have not only increased the quantity of high-value habitat, but appear to be effectively increasing production rates in the local population.

All sampling events conducted at final discharge points and non-contact diversion ditches within the Water Quality and Flow Monitoring Program and MMER Monitoring Program complied with NWB license limits and MMER criteria.

Some changes relative to reference conditions were observed during the Cycle 2 EEM Biological Monitoring Studies at Third Portage North. Specifically, Lake trout at TPN was heavier when adjusted for length (PDL, INUG), shorter when adjusted for age determined from otoliths, and lighter when adjusted for age determined from otoliths. Benthic communities, abundance, and richness were similar to what has been described in previous years and found at reference areas.

In 2015 AEM continued the monitoring in NP-2 (as a result of seepage from the Portage Rock Storage Facility migrating to NP-2 Lake – see Section 8.3.3.11) during freshet and completed additional monitoring at stations requested by the KIA (which included monitoring at NP-1, Dogleg and Second

Portage Lake). Water quality monitoring results showed significantly decreasing trends for contaminants of concern at the receiving environment and the downstream lakes monitoring stations. As demonstrated in the water quality results, the action plan implemented by AEM has been very successful in preventing any further seepage into NP-2 Lake and into the ST-16 sump itself. Monitoring will continue in 2016.

Monitoring in Third Portage Lake in response to the mill seepage through the assay road continues to indicate that there has been no impact to the near shore receiving waters. The seepage appears to be effectively contained and the source area has been repaired. Follow up monitoring will continue in 2016.

The number of PPV exceedances has decreased in 2015 compared to previous years. The two (2) exceedances were triggered by large blast patterns with numerous holes being blasted at the same time. These types of blast are rarely conducted and AEM will attempt to eliminate these in the future. As in the past, based on the monitoring station locations and in comparison to other studies conducted at Ekati, exceedances of 13 mm/s PPV recorded in 2015 were unlikely to impact salmonid incubation sites at the Meadowbank Mine site. This is supported by data collected along the East dike, near South Portage Pit, as part of the Habitat Compensation Monitoring Program which documented the presence of spawning lake trout, despite blasting occurring nearby.

Table 8.62- Summary of CREMP results

Variable Type & Variable	Magnitude[1]	Spatial Scale[2]	Causation[3]	Permanence[4]	Uncertainty[5]	Comments	Management Action[6]
Exposure - Limnology							
Oxygen	**0**	n/a	n/a	n/a	?		**0**
Temperature	**0**	n/a	n/a	n/a	?		**0**
Conductivity	**0**	n/a	n/a	n/a	?		**0**
Exposure - Water Chemistry							
Conventionals	**1**	Large	High	Low	?	The following parameters (conventionals and nutrients) were elevated relative to reference/baseline conditions. However, concentrations suggest low potential for adverse effects. **Alkalinity** (SP); **Conductivity** (TPN, TPE, TPS, SP, WAL, TE); **Hardness** (TPN, TPE, TPS, SP, WAL, TE); **Ca/K/Mg/Na** (TPN, TPE, SP, WAL [not Na]); **TDS** (TPN, TPE, TPS, SP, WAL, TE)	**1**
Nutrients	**1**	Small	Moderate	Low	?	**TKN** (WAL)	**1**
Total Metals	**0**	n/a	n/a	n/a	?		**0**
Dissolved Metals	**0**	n/a	n/a	n/a	?		**0**
Total Suspended Solids	**0**	n/a	n/a	n/a	?		**0**
Exposure - Sediment Chemistry							
Physical	**0**	n/a	n/a	n/a	?		**0**
Total Metals	**1**	Large	High	Moderate	??	Sediment chromium concentrations exceed the trigger at TPE, but appear to have stabilized. Results of a targeted chromium bioavailability study showed low potential for adverse effects (toxicity testing) and that the majority of chromium in the sediments is associated with the least bioavailable fraction (sequential extraction). These results are consistent with benthic invertebrate community results at TPE (see text for details) and indicate that the changes in sediment chromium concentrations observed at TPE over the past few years are not affecting biota	**1**
Organics	**0**	n/a	n/a	n/a	?		**0**
Effects - Phytoplankton							
Chlorophyll-*a* *	**0**	n/a	n/a	n/a	?	Continued data quality issue for chlorophyll-*a* (temperature control in transit)	**0**
Total Biomass	**0**	n/a	n/a	n/a	?		**0**
Taxa Richness	**1**	Moderate	Low	Low	?	>20% lower at BBD than reference conditions. Result is attributed to natural variability given no trigger exceedances were reported in 2015.	**1**
Effects - Benthic Invertebrates							
Total Abundance	**0**	n/a	n/a	n/a	?		**0**
Total Richness	**0**	n/a	n/a	n/a	?		**0**

Notes:

[1] **Magnitude Ratings (narrative in brackets used in the absence of specific triggers/thresholds):**
- **0** – no exceedances of triggers or thresholds (or no apparent changes from baseline of concern)
- **1** – early warning trigger exceeded (or change from baseline warranting concern)
- **2** – threshold exceeded (or change from baseline exceeding magnitude of concern)

[2] **Spatial Scale Ratings:**
- n/a – no magnitude of effect, therefore not evaluated
- Small – localized scale
- Moderate – sub-basin to basin scale
- Large – basin to whole lake scale

[3] **Causation Ratings:**
- n/a – no magnitude of effect, therefore not evaluated
- Low – no evidence for a mine-related source
- Moderate – some likelihood of a mine-related source
- High – the source of the problem is very likely to be mine-related

[4] **Permanence Ratings:**
- n/a – no magnitude of effect, therefore not evaluated
- Low – rapidly reversible (e.g., months to years)
- Moderate – slowly reversible (e.g., years to decades)
- High – largely irreversible (e.g., decades+)

[5] **Uncertainty Ratings:**
- ? – low uncertainty
- ?? – moderate uncertainty
- ??? – high uncertainty

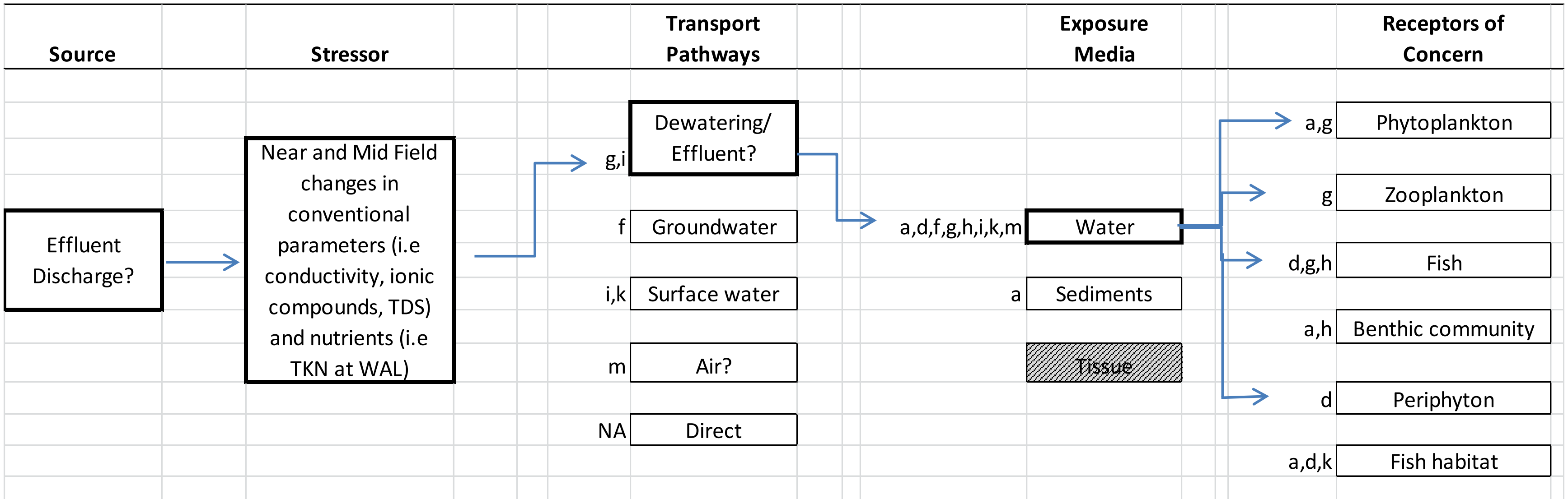
[6] **Management Actions:**
- **0** – no action
- **1** – continued trend monitoring in 2015
- **2** – active follow-up with more detailed quantitative assessment in 2015

8.9.4 Integration of Monitoring Results

The 2015 AEMP monitoring programs were integrated into the conceptual site model which assists in the evaluation of the transport pathways, provides information on specific media (identifies stressors) and evaluates receptors of concern (effects variables). As previously discussed, fish tissue data were not reported nor collected in 2015 in the mine site area and therefore are not included in the conceptual model (shaded grey in the table).

As per Azimuth (2012), the results of the monitoring programs were integrated in a mechanistic fashion that required a thorough review of the results to identify any patterns among the relevant receiving water monitoring programs. Although the receiving environment water quality changes at TPN, TPE, SP and WAL in 2015 are considered unlikely to cause any adverse environmental effects, a conceptual site model was developed to address the issue of changes in conductivity and increases observed in ionic compounds parameters. This will ultimately assist in linking possible incremental changes in the receiving environment, that are evaluated in separate monitoring reports, into the bigger picture to ensure all mine activities and sources, are accounted for and are not resulting in receiving environment impacts (see Figure 29 – evaluation of TDS, conductivity, ionic and nutrient parameters; Figure 30 – evaluation of PPV exceedances; Figure 31 – evaluation of elevated chromium in TPE sediment). As per Azimuth (2012), source, stressor, transport pathways, exposure media, and effects measures were evaluated in 2015. Although independent programs did not identify risks to the environment, each stressor/transport-pathway, stressor/medium and medium/effect measure combination related to the issue was assessed for programs that had exceedances of relevant guidelines (blast monitoring, water quality and flow monitoring) or triggers (changes in sediment chemistry in TPE reported in the CREMP).

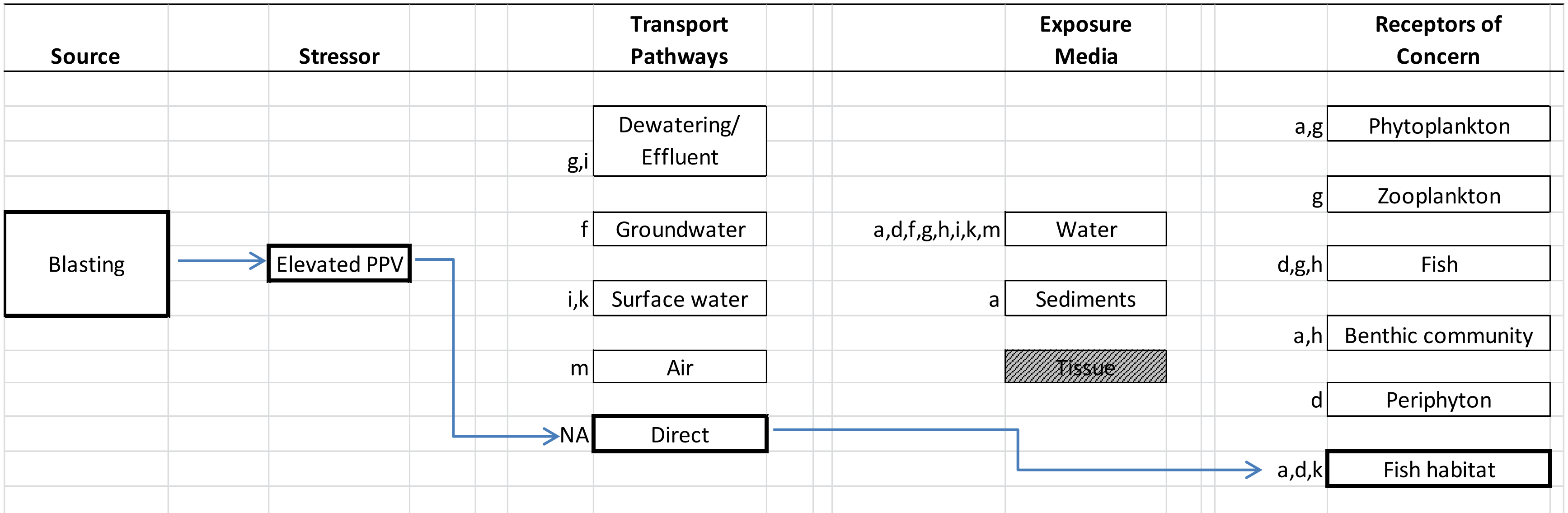
Figure 29. Integrated conceptual site model for 2015 AEMP – Near Field changes in conductivity parameters



Notes:

a	Core Receiving Environment Monitoring Program
~~b~~	~~Effects Assessment Studies~~
~~c~~	~~Dike Construction Monitoring~~
d	Habitat Compensation Monitoring Program
e	Dewatering Monitoring
f	Groundwater Monitoring
g	MMER Monitoring
h	EEM Biological Monitoring Studies
i	Water Quality and Flow Monitoring
~~j~~	~~Fish-Out Studies~~
k	AWPAR and Quarry Water Quality Montoring
l	Blasting
m	Air quality monitoring
NA	Direct, so measured in exposure medium.

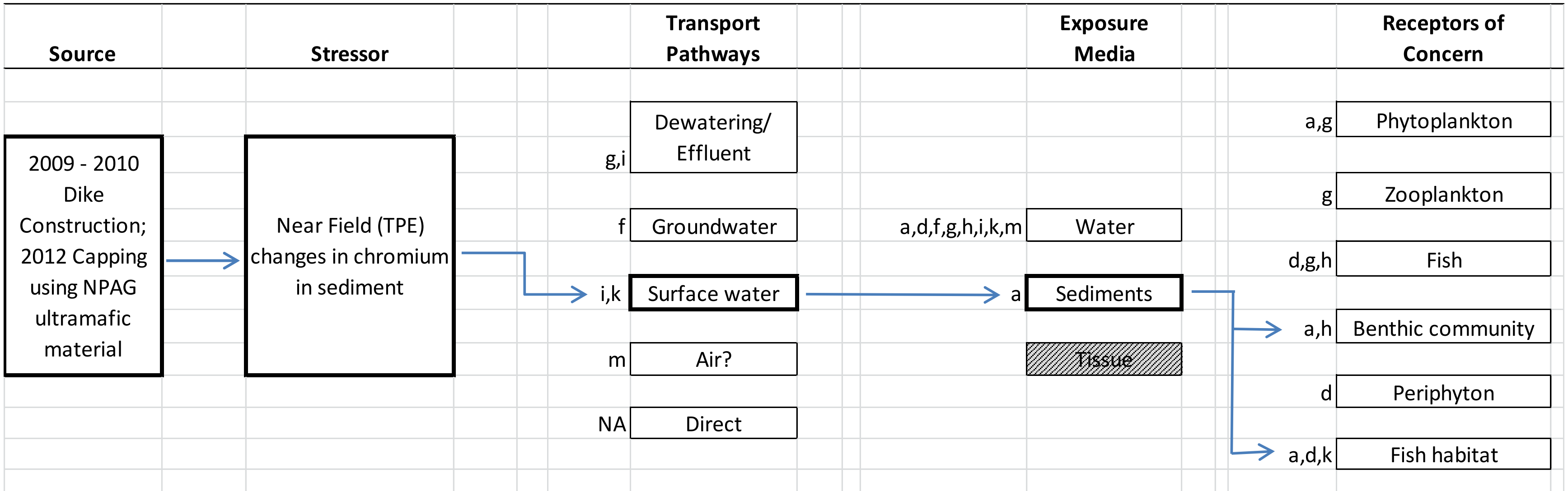
Figure 30. Integrated conceptual site model for 2015 AEMP – Elevated Peak Particle Velocity (PPV)



Notes:

a	Core Receiving Environment Monitoring Program
~~b~~	~~Effects Assessment Studies~~
~~c~~	~~Dike Construction Monitoring~~
d	Habitat Compensation Monitoring Program
e	Dewatering Monitoring
f	Groundwater Monitoring
g	MMER Monitoring
h	EEM Biological Monitoring Studies
i	Water Quality and Flow Monitoring
j	~~Fish-Out Studies~~
k	AWPAR and Quarry Water Quality Montoring
l	Blasting
m	Air quality monitoring
NA	Direct, so measured in exposure medium.

Figure 31. Integrated conceptual site model for 2015 AEMP – Elevated Chromium in TPE sediment



Notes:	
a	Core Receiving Environment Monitoring Program
~~b~~	~~Effects Assessment Studies~~
~~c~~	~~Dike Construction Monitoring~~
d	Habitat Compensation Monitoring Program
e	Dewatering Monitoring
f	Groundwater Monitoring
g	MMER Monitoring
h	EEM Biological Monitoring Studies
i	Water Quality and Flow Monitoring
j	~~Fish-Out Studies~~
k	AWPAR and Quarry Water Quality Montoring
l	Blasting
m	Air quality monitoring
NA	Direct, so measured in exposure medium.

8.9.5 Identification of Potential Risks and Discussion

Assessment of changes in Water Quality due to Effluent Discharge

The mine-related activities undertaken in 2015 with point-source discharges were effluent discharges to Second Portage (SP) and Wally (WAL). In addition, the Waste Rock seepage event in July 2013 from the Waste Rock Storage Facility which migrated through the perimeter rockfill road at sample station ST-16 into NP-2 Lake was considered a potential source of impacts to NP-2 and ultimately Second Portage Lake. In 2013, elevated Copper, Nickel and Total Cyanide were noted; monitoring results in 2014 confirmed that this seepage was short in duration and isolated to the nearshore area of NP-2. Decreasing trend in contaminants of concern were confirmed in 2015. Based on the monitoring data, it was evident that appropriate actions undertaken in 2013, 2014 and 2015 were effective in stopping any further seepage to the NP-2 lake. Furthermore, mitigative and management control measures that were put in place to protect TPL from mill seepage through the assay road were effective (including sealing up cracks in the mill floor, collecting and pumping water from the temporary berms and constructing an interception trench). Downgradient groundwater analytical results and TPL water quality results substantiate these conclusions. See Section 8.3.7.6 for discussion and analysis.

In 2015, as reported in the CREMP, receiving environment water quality changed relative to baseline/ reference conditions for conventional parameters (TDS, conductivity, alkalinity and hardness) and ionic parameters at SP, TPE, TPN, TPS, TE and WAL and for nutrients (TKN) at WAL. However, these results do not suggest any risk to aquatic life. Notwithstanding, consideration was taken in the AEMP for all of the potential mine-related sources (effluent release, fugitive dust, and seepage) that may contribute to changes in general parameters in near-field (TPN, TPE, SP and WAL), mid-field (TPS, TE) and the far-field (TEFF) were considered in the AEMP. The conceptual site model presented in Figure 29 assisted in understanding the possible linkages (i.e., effect to stressor from the source). Based on the monitoring results for 2015, it was determined that the most likely source of changes to conventional parameters and nutrients is effluent discharge. Another possible contributer, albeit not likely based on air monitoring results to date, could be fugitive dust migration. Based on receiving water quality monitoring in nearshore TPL and NP-2, historical seepage events were not considered as a source of changes to the surface water quality observed in the CREMP.

Air quality monitoring results indicated that dustfall, total suspended particulates (TSP), PM10, and PM2.5 (potential sources of changes to conventional parameters) generally did not exceed available standards or guidelines at stations nearest to the mine. Although dust is considered an unlikely, but possible contributor source that might cause changes to conventional parameters evaluated in the CREMP, the dust levels generated in 2015 were not high enough to cause the observed changes. Although no Screening Level Risk Assessment (SLRA) was conducted in 2015, results of the 2014 sampling program confirmed that effluent discharge is the primary cause of minor changes in conventional parameters in TPN, WAL and SP; the changes in TPE and TPS could be related to fugitive dust as a contributor, however the source of these changes is uncertain.

Water Chemistry changes observed may be a result of effluent (at stations TPN, SP and WAL) from baseline conditions and dust may be altering the water quality (as compared to baseline) at stations (TPE and TPS). That said, all water quality samples collected in 2015 at final discharge points complied with MMER criteria and water license limits and TPN, which experienced some changes in Water Quality was not a discharge point in 2015. Effects of TPN effluent on lake trout was assessed in the EEM Cycle 2

Interpretive Report. Lake trout size and weight was observed to have changed compared to reference areas which were not reported in the Cycle 1 and may be due to an inherent difference between TPN and the reference lakes and an artifact of using lake trout as a sentinal species. The CREMP results did not detect significant changes in phytoplankton in these basins. Sub-toxicity samples collected at the Vault final discharge point in 2015 complied with MMER criteria; water was non-toxic to fish (*fathead minnow*), invertebrate (*cerodaphnia dubia*), algae (*pseudokirchneriella subcapitata*) and plant (*lemna minor*). Discharge from the Portage Attenuation Pond into Third Portage North stopped in 2014. Therefore, no more effluent will be discharged in this area. The next EEM Biological Monitoring studies (Cycle 3) will be conducted at the Vault discharge into Wally Lake in 2017. Effluent effects on Wally Lake water quality, sediment, fish and benthos will continue to be assessed.

Assessment of the Blast Monitoring Exceedances

The conceptual model for blast exceedances and potential effects to fish habitat are presented in Figure 30. In 2015, the average PPV was 2.38 (CI +/- 0.33) with a maximum of 16.5 mm/s (maximum in 2014 and 2013 were 23.8 and 32.7 mm/s respectively). The average was lower than 2014 (3.93 mm/s) and 2013 (5.39 mm/s) averages. PPV concentrations exceeded the DFO limit of 13 mm/s on two (2) occasions (16 in 2013 and 8 in 2014). Faulkner et al. (2006) found no effects on lake trout eggs due to blasts at Diavik Mine, NWT, with a maximum PPV of 28.5 mm/s and reported 80 exceedances of DFO guidance of 13 mm/s PPV at these stations. This study found there were no differences in mortality of lake trout eggs in incubators between exposure sites and reference sites that resulted from blasting at Diavik in 2003-2004. Exceedance recorded in 2015 were therefore unlikely to impact salmonid incubation sites. This is supported by data collected along the East dike, near South Portage Pit, as part of the Habitat Compensation Monitoring Program which documented the presence of spawning lake trout, despite blasting occurring nearby.

Assessment of the Changes in Chromium in TPE Sediment

The trigger exceedance for chromium in sediment at TPE was identified in 2013 and coring samples in 2014 determined that there was a temporal trend in chromium concentration increases within a localized area of TPE and mine related. Although elevated chromium levels have also been found in reference areas of PDL and TPS (PEL exceedances have been previously observed in reference areas) the chromium exceedance is likely related to mine activities, more specifically due to Bay-Goose dike capping and construction activity. This may be explained by the fact that ultramafic rock, which is commonly found in the region and was used to construct the Bay-Goose dike, is generally known to contain elevated concentrations of chromium (e.g., on the order of 2000 mg/kg) relative to other rock types (Motzer and Engineers, 2004).

Figure 31 provides the conceptual site model of impacts due to capping and construction of the Bay-Goose dike. Upon review of the sediment data and historical water quality data, effluent and dust were ruled out the most likely source of change, as the discharge point is nearest to TPN, where water quality changes in chromium have not been found. Furthermore, review of the construction monitoring data in the CREMP indicated elevated chromium in water quality data and sediment traps. Sequential extraction tests conducted in 2015, demonstrated that the majority of sediment chromium is sequestered in the mostly non-bioavailable sediment matrix. Furthermore, the fractions that are bioavailable occur at concentrations below effects-based threshold concentrations. This was further showed by toxicity tests conducted on benthic invertebrates; no evidence of contaminant-related effects was noted. CREMP results showed no evidence that the changes in chromium has impacted the benthic community nor fish habitat in TPE (no statistically significant difference or decline in total abundance, taxa richness). Therefore, there is likely no impact on benthic communities and fish habitat at TPE due to dike construction.

8.9.6 Recommended Management Actions

Overall, based on the integration of results from the monitoring programs, the AEMP evaluation did not find an apparent excess risk to the aquatic environment due to mine-related activities. Although some trigger levels were exceeded: chromium in TPE sediment, conductivity, TDS, ionic and nutrient parameters in water quality at near field stations, and an emphasis in monitoring to ensure seepage occurrences of assay road and at NP-2 in 2013 did not impact the receiving environment; AEM has adequately addressed these concerns.

Based on the 2015 AEMP evaluation, it is recommended that:

- Water quality monitoring as per the license and MMER requirements continue in 2016;
- Continue closely examining monitoring results to ensure the protection of the receiving environment;
- Conduct spring and fall groundwater monitoring at well MW-14-01;
- (As recommended by KIA and integrated into the Meadowbank License renewal) water quality samples will be collected in NP-2, NP-1 and Dogleg pond and total cyanide continue to be added to the list of parameters in the CREMP;
- Complete a review of the freshet action plan and update it as needed to ensure contact and non-contact water quality and flow are monitored and immediately managed to avoid any impacts to nearby receiving water environments (i.e. in TPN, SP, NP2, etc.).
- Await EC's review of EEM Cycle 2 Interpretive Report to determine path forward.

8.10 NOISE MONITORING

As required by NIRB Project Certificate No.004 Condition 62: ***Develop and implement a noise abatement plan to protect wildlife from significant mine activity noise, including blasting, drilling, equipment, vehicles and aircraft; sound meters are to be set up immediately upon issuance of the Project Certificate for the purpose of obtaining baseline data, and monitoring during and after operations.***

The 2015 noise monitoring program at Meadowbank was conducted in support of the Noise Monitoring and Abatement Plan (AEM, 2014). This report is provided in Appendix G9. The objective of the program is to measure noise levels at five previously determined monitoring locations around the Meadowbank site, over at least two 24 h periods. In 2015 AEM's objective was to increase noise monitoring to include two monitoring rounds of 3-4 days per station, since high winds in the area tend to substantially reduce the quantity of available valid data (see previous reports). While monitoring was conducted for a total of 21 days, total usable hours of data for each station ranged from 8 - 36 hours. Since noise levels vary constantly over time, Meadowbank's noise monitoring instruments measure acoustical energy near-continuously and report a single number for each minute, representing the "equivalent sound level" (Leq). Daytime, nighttime, 10-11pm and 24 h Leq values are shown for each monitoring location in Table 8.63.

Two Leq values exceeded the daytime target sound level of 55 dBA. Both were at station R5, with recorded values of 55.4 and 61.7 dBA. These values are well within the range of those observed in previous years, and are likely a result of increased helicopter activity associated with exploration projects during the monitoring time period, since this station is close to the helicopter pad at the exploration camp. One value at R5 exceeded the nighttime target sound level (45 dBA), with a recorded Leq-night value of 51.6 dBA. An examination of the data for the nighttime period indicated that the 1-h Leq only exceeded 45 dBA for the 6 am – 7 am hour, likely as a result of the morning helicopter shift beginning at 6 am. While station R5 is located near a known caribou migration route, helicopter activity during the caribou migration time period is minimized compared to the summer monitoring months, so sound levels are expected to be lower at the time of year when caribou are migrating in the area. Further, noise levels recorded at this station for all time periods were within the range of those observed historically. Nevertheless, a reminder of AEM's wildlife policy regarding helicopter use (Cumberland, 2005) was sent to the Exploration group during the migration to help ensure minimal impacts on wildlife.

AEM will continue to monitor noise levels around site and particularly at the R5 location in 2016, and will ensure two noise meters are available to reduce the potential for sampling delays related to instrument malfunction.

Table 8.63. Daytime, nighttime, 10-11 pm and 24-h L_{eq} values for each monitoring location and total hours used to calculate each L_{eq}. Time periods with fewer than 3 hours of valid data are excluded (-), and those exceeding corresponding target sound levels are shaded grey. Na = period not monitored.

Site	Dates (2015)	$L_{eq, day}$ 7am-11pm (dBA)	Total Hours	$L_{eq, night}$ 11pm-7am (dBA)	Total Hours	$L_{eq, 1 h}$ 10pm-11pm (dBA)	$L_{eq, 24 h}$ (dBA)	Total Hours
R1	04/07	49.1	7	37.0	8	36.7	48.5	8
	05/07	54.8	5	40.2	4	-	51.1	12
	06/07	49.5	12	-	0	-	48.5	16
	07/07	-	0	-	0	-	-	0
	08/07	-	0	na	na	na	-	0
R1	19/09	-	0	-	0	-	-	0
	20/09	-	0	-	0	-	-	0
	21/09	-	0	-	0	-	-	0
	22/09	-	0	-	0	-	-	0
R2	08/07 09/07	Instrument malfunction – no data						
R2	10/07 11/07 12/07	Instrument malfunction – no data						
R2	16/09	-	0	-	0	-	-	0
	17/09	-	0	-	0	-	-	0
	18/09	39.3	11	36.8	8	30.9	38.9	12
	19/09	39.3	6	na	na	na	39.3	9
R3	31/08	-	0	-	0	-	-	0
	01/09	-	0	-	0	-	-	0

Site	Dates (2015)	$L_{eq, day}$ 7am-11pm (dBA)	Total Hours	$L_{eq, night}$ 11pm-7am (dBA)	Total Hours	$L_{eq, 1 h}$ 10pm-11pm (dBA)	$L_{eq, 24 h}$ (dBA)	Total Hours
	02/09	22.2	3	38.2	3	18.9	21.8	4
	03/09	-	2	na	na	na	44.3	4
R4	04/09	40.2	12	44	8	45.2	40.9	13
	05/09	37.7	6	na	na	na	41.9	13
R5	05/09	55.4	3	51.6	7	-	55.4	5
	06/09	61.7	15	31.2	8	31.1	60.0	23
	07/09	-	2	na	na	na	55.1	9

In their 2015 report entitled "The Nunavut Impact Review Board's 2014 – 2015 Annual Monitoring Report for the Meadowbank Gold Project and Board's Recommendations" (October 23, 2015), NIRB requested that AEM provide a summary of the communication AEM has had with the GN in 2015 regarding mine related noise disturbance on caribou and wildlife and whether any changes have been recommended to the Noise Monitoring and Abatement Plan. In 2014, by way of responding to NIRB's annual report, AEM reached out to the GN, however AEM did not receive any direct feedback from the GN. AEM has not held any formal discussions with the GN regarding mine noise on caribou and wildlife since operation began in 2010. That said, AEM has not observed any impacts to caribou due to noise : 1) there have been no significant numbers or herds of caribou around the mine site since 2010; 2) small groups of caribou (i.e., < 10) observed at the mine area do not appear affected by mine-related noise (i.e., grazing); 3) no direct effects on caribou due to noise have been documented; and 4) no clear trends towards increasing noise levels at any station have been observed (see Appendix G9, 2015 Noise Monitoring Report).

8.11 AIR QUALITY MONITORING

As required by NIRB Project Certificate No.004 Condition 71*: In consultation with EC, install and fund an atmospheric monitoring station to focus on particulates of concern generated at the mine site. The results of air-quality monitoring are to be reported annually to NIRB.*

Onsite Monitoring

The 2015 air quality and dustfall monitoring program at Meadowbank was conducted in support of the Air Quality and Dustfall Monitoring Plan - Version 2 (November, 2013). This report is provided in Appendix G10.

The objective of the 2015 program was to measure dustfall, total suspended particulates (TSP), PM_{10}, $PM_{2.5}$ and NO_2 at four monitoring locations around the Meadowbank site. Locations were established in 2011 in consultation with Environment Canada.

Results obtained for the measured parameters were compared to Government of Nunavut (GN) Environmental Guidelines for Ambient Air Quality (October, 2011) for TSP, $PM_{2.5}$ and NO_2; BC Air Quality Objectives (August, 2013) for PM_{10}; and Alberta Ambient Air Quality Guidelines (August, 2013) for dustfall. The Canadian Ambient Air Quality Standards for $PM_{2.5}$ (May, 2013) are also referenced.

Of 114 TSP samples obtained, one sample exceeded the relevant GN standard of 120 μg/m^3, with a concentration of 210 μg/m^3. This sample was obtained from DF-2, which is located immediately south (downwind) of the main mine plant area and adjacent to the TCG contractor area. Annual average TSP values at each station did not exceed the GN guideline for that time period of 60 μg/m^3. For PM_{10}, no samples exceeded the BC Air Quality Objective of 50 μg/m^3 for the 24-h average. For $PM_{2.5}$, no samples exceeded the GN guideline of 30 μg/m^3 or the Canadian Ambient Air Quality Standard of 28 μg/m^3 for the 24-h average. No suspended particulates exceeded the relevant GN or Canadian standards for annual averages.

The Alberta recreational area guideline for dustfall was exceeded in one out of 48 samples, which is lower than all previous years. The industrial area guideline was not exceeded in any sample. The GN annual average standard for NO_2 of 32 ppb was not exceeded, with a maximum monthly average of 3.3 ppb.

Estimated greenhouse gas emissions for the Meadowbank site as reported to Environment Canada's Greenhouse Gas Emissions Reporting Program in 2015 were 187,280 tonnes CO_2 equivalent, which is similar to the value obtained in 2014 (179,889 tonnes CO_2 equivalent).

A summary of incinerator stack testing results is provided. The result for mercury (average) was <0.22 μg/Rm^3 @11%O_2, which is below the Environment Canada guideline of 20 μg/Rm^3. Measured concentrations of dioxins and furans (21.0 pg TEQ / Rm^3 @ 11 % v/v O_2) also met Environment Canada guidelines (80 pg TEQ / Rm^3 @ 11 % v/v O_2).

Overall, there are no apparent trends towards increasing air quality concerns at the Meadowbank site.

AWAR Monitoring

Similar to 2014, the 2015 study aimed to characterize dust deposition rates with respect to distance from the Meadowbank AWAR in order to determine the potential for impacts to habitat in excess of those predicted in the FEIS. In addition, dustfall was measured in the area of the proposed Amaruq AWAR to obtain measurements of background dustfall in this location, and to act as reference samples for the Meadowbank AWAR. The *2015 All-weather Access Road Dust Monitoring Report* can be found in Appendix G11.

The objectives of the study conducted in 2015 were to:

1. Characterize the dustfall gradient in relation to distance from the Meadowbank AWAR.
2. Compare rates of dustfall with background concentrations and regulatory guidelines.
3. Identify inter-annual trends in rates of dustfall.
4. Relate results to impact predictions as described in the Terrestrial Ecosystem Impact Assessment (Cumberland, 2005).
5. Record the range of background rates of dustfall occurring in the area of the proposed Amaruq AWAR.

Dustfall samples were collected in open vessels containing a purified liquid matrix provided by an accredited laboratory (Maxxam Analytics). Particles are deposited and retained in the liquid, which is then filtered to remove large particles (e.g. leaves, twigs) and analyzed by the accredited laboratory for total and fixed (non-combustible) dustfall.

Dustfall canisters were deployed from August 5 to September 7, 2015 (Meadowbank AWAR) and August 8 to September 9, 2015 (proposed Amaruq AWAR route), and calculated dustfall rates were normalized to 30 days (mg/cm2/30 days, per ASTM 1739-98). Thus dustfall sampling is conducted in August, which is one of the driest months with a high volume of traffic (i.e. at the peak of the shipping season at Meadowbank).

All samples were compared to available regulatory guidelines from Alberta Environment, as well as to the range of background dustfall rates (samples collected at the Inuggugayualik Lake reference site in 2014, and proposed Amaruq road location in 2015). No regulatory standards for dustfall are available for the territory of Nunavut, and those available elsewhere are based on aesthetic or nuisance concerns. On this basis, Alberta Environment has published a guideline for recreational/residential areas of 0.53 mg/cm2/30d, and a guideline for commercial/industrial areas of 1.58 mg/cm2/30d. Total dustfall results are compared to these guidelines to provide context.

Under assumptions of continuous, long-term dust emissions from AWAR traffic, the FEIS predicted that effects of dust on vegetation and wildlife would not be significant (<1% change in the Local Study Area, outside an assumed zone of influence), even without the use of mitigation measures such as minimizing traffic and applying dust suppressants. Although the FEIS does not quantify anticipated dust levels in relation to the AWAR, it is stated that "Results from modeling, air monitoring, and snow surveys indicate that most dust particles will settle out within 100 m of the source (BHP, 2000)." The smallest zone of influence (ZOI; area where habitat is assumed lost due to sensory disturbance and other factors) for any wildlife VEC is also 100 m. Therefore, the main goal of the AWAR dustfall studies is to determine whether the majority of dustfall does settle out within 100 m.

Results to date indicate that more than a 50% reduction in average total dustfall is occurring from 25 m to 100 m on the downwind (most impacted) side of the road, indicating that the majority of dustfall does settle within the predicted 100 m zone. In addition, average rates of dustfall decline below Alberta Environment's guideline for recreational areas within 100 m of the AWAR. Further, all but one sample collected 300 m from the AWAR and many samples collected at 100 and 150 m have been within the range of background dustfall levels. Based on these results, it is unlikely that FEIS predictions are being exceeded and that impacts to VECs (vegetation community productivity and wildlife) due to dust are occurring beyond the smallest assumed ZOI (100 m).

These results are supported by wildlife monitoring conducted under the Terrestrial Ecosystem Management Plan, including the Wildlife Screening Level Risk Assessment.

Wildlife monitoring to date has indicated no significant road-related effects, dust monitoring has indicated no trend towards increasing rates of dustfall, and risk assessment has indicated no incremental risk for wildlife from chemical contaminants near the AWAR. Therefore, impacts of Meadowbank AWAR road dust to not appear to be exceeding predictions made in the FEIS.

8.12 CREEL SURVEY RESULTS

As required by DFO Authorization NU-03-0190 (AWPAR) Condition 5.2.4: ***Engage the local Hunter Trapper Organization(s) in the development, implementation and reporting of annual creel surveys within the water bodies affected by the Plan.***

And

NIRB Project Certificate No.004 Condition 51: ***engage the HTOs in the development, implementation and reporting of creel surveys within waterbodies affected by the Project to the GN, DFO and local HTO.***

In March 2007, a harvest study was initiated by Agnico Eagle in association with the Baker Lake Hunters and Trappers Organization (HTO) in order to monitor and document the spatial distribution, seasonal patterns and harvest rates of hunter kills before and after construction of the Meadowbank All-Weather Access Road (AWAR). The harvest study is conducted annually and is open to Inuit and non-Inuit residents of Baker Lake who are at least 16 years of age. The harvest study focuses primarily on terrestrial wildlife harvests; however, fishing results are also recorded by the harvest study administrator in support of on-going creel surveys. The 2015 Hamlet of Baker Lake Harvest Study - Creel results is provided in Appendix G12.

In 2015, creel results were collected from 16 participants over the course of the year. For comparison, nine (9) participants recorded fish harvests in 2014. The number of participants from whom creel results were collected had dramatically decreased in 2014, but increased again in 2015, although the participation rate was still average to low. Lower numbers are likely a reflection of participant fatigue and declining response rate, given the length of time the study has been ongoing.

Total fish harvest was highest in November 2015, followed by December. The number of fish reported caught in November 2015 was the highest monthly catch recorded during the creel study to date. The high catch number recorded by one participant for November 2015 has skewed the total reported fish catch, which is the second highest total annual catch recorded, despite participation rates in the creel study being average to low. Excluding this one month of record, reported total fish catch increased slightly in 2015, as would be expected with the small increase in participation observed from 2014 records. In previous years, a comparable summer and winter peak in fish catch was observed; however, summer fish harvest in 2014 and 2015 was much lower than winter harvest. A smaller peak in fish caught was observed from May to July, but amounts were lower than previously.

When data are standardized for fish harvested by the number of participants each month, the highest number of catches per participant occurred in November and December, when fewer participants are fishing but catches are much higher. These data are based on only four participants reporting fish catch in November and two reporting in December. Over the last two years of the creel study, participant harvest rates in November were the maximum observed in the historical dataset (2007 to 2015 inclusive). Excluding November and December 2015, the average monthly catch per participant was generally comparable to median monthly trends for most of the year.

Total catch for each species is considered in context with changes in participation and reporting rates. Arctic Grayling catch was the highest reported to date, with 29 fish caught (by one participant) compared to a previous record of three (3) fish caught in 2010. Arctic Char catch in 2015 increased over 2014 records, likely reflecting higher participation rates. Lake Trout harvest rates remained comparable to recent years. Lake Whitefish catch continues to vary widely, often a result of very few participants catching a large quantity of fish in November and December. One participant reported catching over 1,000 Lake Whitefish, resulting in the highest reported total annual harvest for this species, despite an average to low year for participation.

Participation levels were higher than in 2014, but overall fishing effort per participant decreased. The number of fish harvested per trip was at its highest level in 2015 (11.3 fish per trip on average), again because of high daily catch rates for whitefish.

Fishing trips, regardless of relative success rate, did not generally venture beyond the immediate areas of Baker Lake, Whitehills Lake, and along the AWAR. Most fish reported harvested in 2015 were caught near the Hamlet of Baker Lake. Some fishing activity was observed north of Whitehills Lake and north of Meadowbank in 2015.

The majority of participants continue to fish around the perimeters of Baker Lake and Whitehills Lake. High fishing rates were also reported for Whitehills Lake in 2007 and 2008 prior to AWAR construction. Some fishing effort was observed north of Whitehills Lake in 2015, which was not observed in 2014, but results generally indicate that study participants are less willing to travel long distances to catch fish, regardless of AWAR access, likely due to the abundance of fish in close proximity to the Hamlet of Baker Lake. Fishing trips in 2015 continued to be centred along the southern portion of the AWAR.

8.13 WILDLIFE MONITORING*

8.13.1 Annual Monitoring

As Required by NIRB Project Certificate No.004, Condition 55: *Provide the Annual Wildlife Summary Monitoring Report.*

As a requirement of the NIRB Project Certificate, the 2015 Wildlife Monitoring Summary Report represents the 10th of a series of annual Wildlife Monitoring Summary Reports for the Agnico Eagle Mines Ltd. Meadowbank Mine. This report is provided in Appendix G13. Baseline and monitoring programs were first initiated in 1999 and will continue throughout the life of the mine. Details of the wildlife monitoring program for the project are provided in the Terrestrial Ecosystem Management Plan (Cumberland 2006). The 2015 report provides the objectives, methodology, historical and current year results, and management recommendations for each monitoring program. Each subsequent Wildlife Monitoring Summary Report builds on data presented in the previous year's report and monitoring incorporates recommendations from the previous reports.

* TSM- Biodiversity and Conservation Management

Four active Peregrine Falcon (*Falco peregrinus*) nests were observed and monitored at quarry sites along the AWAR in 2015; no nesting activity was observed at Portage Pit or other pits at the Meadowbank site in 2015. Raptor nest management plans were not warranted at any of the active nest sites as no project-related effects on falcon nesting success were observed.

The Government of Nunavut (GN) Caribou (*Rangifer tarandus*) collaring program, ongoing for the past seven years in the Baker Lake area, continued in 2015 with monitoring of existing collared animals and 10 additional collars deployed in 2015, as part of regional efforts to understand Caribou populations. Seasonal Caribou movements within and adjacent to the Meadowbank Regional Study Area (RSA) were tracked and mapped throughout the year. In 2015, collared Caribou were present in the RSA during the spring, late summer, fall, and early winter seasons, and several movements of collared Caribou were recorded across the Meadowbank AWAR.

Hunter Harvest Study (HHS) participation rates declined in 2015 (35 respondents), although overall reported number of Caribou harvested in 2015 was slightly higher than in 2014 (n=305, compared to n=269 last year). In 2015, 54% of all reported Caribou harvests were within 5 km of the AWAR, which was higher than the average of 40% since the study began. To date, the threshold level of 20% change in hunting patterns within the RSA has not been exceeded. With a declining participant rate, interpretation of hunting data becomes increasingly difficult. Agnico Eagle has suspended the program for 2016, but will be consulting with the Baker Lake HTO and GN representatives to discuss the findings of the study to date, explore other options for collecting hunting and fishing data in the Baker Lake area, and facilitate greater involvement of the local community, including the HTO, in future years of the study.

The AWAR was closed as a proactive and mitigative measure for approximately 10 days in October and November, as large herds of Caribou were observed nearby. No Caribou fatalities occurred at the mine site or along the AWAR in 2015. Improved food-handling practices and employee awareness programs at the mine site helped ensure that there were no mine-related Wolf (*Canis lupus*) or Wolverine (*Gulo gulo*) fatalities. With the Authorization of the GN officer, one Arctic Fox (*Vulpes lagopus*) needed to be euthanized after attempts to deter the animal were unsuccessful.

8.13.2 Harvest Study Results

As required by NIRB Project Certificate No.004 Condition 54

a. Updated terrestrial ecosystem baseline data

See "*Meadowbank Mine 2015 Wildlife Monitoring Summary Report*" attached in Appendix G13.

e. Details of a comprehensive hunter harvest survey to determine the effect on ungulate populations resulting from increased human access caused by the all-weather private access road, including establishing preconstruction baseline harvesting data, to be developed in consultation with local HTOs, the GN-DOE and the Nunavut Wildlife Management Board.

At the end of 2015, hunting data had been collected from 36 participants interviewed, which is a continued decrease from a peak in 2012 when 62 were participants interviewed (the highest number of participants in a single study year). The total number of participants recording Caribou harvest during the course of each study year has remained fairly constant (ranging between 35 and 45 hunters each year); however, in 2014 and 2015, only 27 and 28 participants, respectively, recorded Caribou harvests with an average of 6.3 and 7.6 participants recording harvest each month. Lower reported harvest numbers are likely a reflection of participant fatigue and declining response rate, given the length of time the study has been ongoing. Based on 2014 and 2015 results, an estimated 5% of Baker Lake hunters are actively participating in the HHS. Prior to 2014, the estimated rate of participation was 10% of Baker Lake hunters participating (based on the 2008 HTO member list). Increased involvement of the HTO in subsequent years will help refine some of these assumptions.

In total, 305 animals were reported harvested in 2015, consisting of 304 Caribou and one Wolverine.

The total number of Caribou harvested along the AWAR increased during the first few years of the HHS, but has been lower over the past three years of data, likely related to an overall decrease in number of participants and total harvest.

In 2015, the percent of harvest within the RSA was 84% (83% in 2014), higher than the average from 2007 to 2014 (79%). Comparatively, in the historical NWMB study (i.e., baseline condition), percent Caribou harvest within the RSA was 67%. To date, the threshold level of 20% change in hunting patterns within the RSA has not been exceeded (e.g., in 2015, 67% baseline compared to 84% = 17% change) (Note: previous annual reports reported results and exceedances of 20% within 5 km of the road, but according to the TEMP [2006] actual thresholds of 20% are linked to the RSA). The total number of Caribou harvested within 5 km of the AWAR in 2015 was 165 animals, which represented 54% of all harvests recorded by participants and is higher than the average of 40% since 2007. In the historical NWMB study (i.e., baseline condition), Caribou harvests within 5 km of the road were estimated to be 18% of total harvest year round. As participant rates decline, interpretations of data become more challenging because of the inherent biases of a smaller sample set.

As stated in the TEMP (Cumberland 2006), the HHS was established to monitor the spatial distribution, seasonal patterns, and harvest rates prior to and following construction of the AWAR. Declining participant rates in 2014 and 2015, likely due to participant fatigue, has led to reconsideration of the HHS approach in 2016. Lower participant rates and reduced data make it increasingly difficult to determine hunting patterns in the Baker Lake area and along the AWAR, and to answer fundamental questions on the effect of the mine on regional Caribou populations. Agnico Eagle has suspended the program for 2016, but will be consulting with the Baker Lake HTO and GN representatives to discuss the findings of the study to date, explore other options for collecting hunting and fishing data in the Baker Lake area in 2017, and facilitate greater involvement of the local community, including the HTO, in future years of the study.

f. Details of annual aerial surveys to be conducted to assess waterfowl densities in the regional study area during the construction phase and for at least the first three (3) years of operation, with the data analyzed and compared to baseline data to determine if significant effects are occurring and require mitigation.

Given the low densities of waterbird nests identified at the mine site and along the AWAR from 2005 - 2012 (i.e., too low to determine whether changes in nest abundance or success have occurred), and the absence of data suggesting that mine or road-related effects are occurring, the waterbird nest survey program has been discontinued.

g. Details of an annual breeding bird plot surveys and transects along the all-weather road to be conducted during the construction phase and for at least the first three (3) years of operation.

Details of the breeding bird plot surveys are provided in Section 4 of the "*Meadowbank Mine 2015 Wildlife Monitoring Summary Report*" (Appendix G13). The breeding bird plot monitoring program is to continue every year during the construction period, for at least the first three full years of mine operation (2010 to 2012), and every three years after 2012 in accordance with the TEMP (Cumberland 2006). The most recent PRISM plot survey was conducted in 2015, and the next survey is planned for 2018.

The objective of the breeding bird plot monitoring program is to confirm that a mine-related change of 20% function, determined by an increase or decrease in local breeding bird abundance, richness, and diversity, has not occurred. The program uses the widely accepted Canadian Wildlife Service's (CWS) Program for Regional and International Shorebird Monitoring (PRISM) protocols (CWS 2005).

To date, PRISM plot data show that most community indices are temporally variable with little difference in the overall trends of mine and control plots; therefore, no mine-related effects on bird relative abundance, richness, diversity, and evenness appear to have occurred. Various factors such as seasonality, weather, and larger-scale trends in distribution and abundance could influence the community metrics. The next set of PRISM plot surveys are planned for 2018.

The objective of the breeding bird transects monitoring program is to confirm that an AWAR-related reduction in local breeding bird abundance, richness, and diversity will not occur beyond a threshold level. A secondary objective of the monitoring program is to determine more effective ways to prevent disturbance to nesting birds based on feedback from mitigation measures and observations. For the bird transect monitoring program, a detailed analysis of transect data in 2011 indicated that no road-related effects have been documented; therefore, the breeding bird transect monitoring program had been suspended indefinitely. Surveys of a subset of transects in 2015 were conducted in support of a dustfall monitoring program conducted since 2012. Given the results of the 2015 survey, which reflect data collected in previous years, annual transect surveys do not need to be reinstated in 2016 or future years.

8.13.3 Caribou Migration Corridor Information Summary

As required by NIRB Project Certificate No.004 Condition 56: ***Maps of caribou migration corridors shall be developed in consultation with Elders and local HTOs, including Chesterfield Inlet and placed in site offices and upgraded as new information on corridors becomes available. Information on caribou migration corridors shall be reported to the GN, KIA and NIRB's Monitoring Officer annually.***

Caribou telemetry data are provided in Section 9 of the "*Meadowbank Mine 2015 Wildlife Monitoring Summary Report*" (Appendix G13).

8.13.4 Caribou Collaring Study

As required by NIRB Project Certificate No.004 Condition 57*: participate in a caribou collaring program as directed by the GN-DOE*

Agnico Eagle is participating in the GN DoE Caribou satellite-collaring program that includes data collected within the Meadowbank RSA. The GN biologists discuss collar deployments with hunters and elders, and get approval prior to proceeding. In 2016, Agnico Eagle will discuss with GN the best path forward to ensure caribou maps continue to integrate elders and local HTO input. Detailed results can be found in Section 9 of the "*Meadowbank Mine 2015 Wildlife Monitoring Summary Report*" (Appendix G13).

The satellite-collaring program was developed to provide information on the distribution of Caribou occurring within the Meadowbank RSA and contribute data to other ongoing satellite-collaring programs for the Ahiak, Qamanirjuaq, and other herds. The satellite-collaring program, along with GN DoE regional data, is an important monitoring and management tool that provides a regional perspective on Caribou activity near mine operations.

As of December 2015, 15 collars were active, seven from the 2013 deployment and eight from the 2015 deployment. General trends in seasonal distribution are evident and are comparable to findings from previous years for animals collared in this area. Collared Caribou calved (medium green symbol) in four distinct areas: 1) McLoughlin Bay (Ahiak herd); 2) the base of the Boothia Peninsula, between Rasmussen Basin and Kugaaruk (Ahiak herd); 3) between Chesterfield Inlet and Wager Bay (Lorillard herd); and 4) south of Chesterfield Inlet in the traditional calving grounds of the Qamanirjuaq herd. In winter, animals were either north of the Thelon River system from east of Baker Lake to east of Bathurst Inlet, or on Qamanirjuaq wintering grounds (see discussion below).

Within the Meadowbank RSA, collared Caribou were present during the spring, late summer, fall, and early winter (Figure 9.2 for the *Wildlife Monitoring Summary Report*). Movements of collared Caribou across the Meadowbank AWAR in 2015 occurred during the spring and fall migrations of the Lorillard herd. As in most monitoring years to date, no collared Caribou were found within the Meadowbank RSA during the calving or post-calving seasons.

The AWAR appears to be altering natural movement patterns by collared Caribou. AEM will request an analysis of the collar data from the GN.

8.13.5 Raptor Nest Survey

The raptor nest survey monitoring program has been designed to confirm that mine-related activities do not result in inadvertent negative effects on nesting raptors. Raptor surveys along the proposed AWAR alignment in 2005 (i.e., prior to construction) indicated that only low suitability habitat for nesting raptors was available. To construct the AWAR in 2007/2008, excavated and blasted rock materials were used from numerous quarries along the alignment, resulting in the creation of some moderate and high suitability raptor nesting habitat areas characterized by steep rock walls. Established nests within some of these quarries are monitored on an annual basis to evaluate occupancy. Detailed results can be found in Section 5 of the "Meadowbank Mine 2015 Wildlife Monitoring Summary Report" (Appendix G13).

The primary objectives of the raptor nest survey monitoring program are to:

1. Confirm that raptor nest failures are not be caused by mine-related activities. The threshold level is one nest failure per year; and

2. Confirm that no project-related mortality of raptors occurs. The threshold level of mortality is one individual per year.

In 2015, four active Peregrine Falcon nests were documented in quarries along the AWAR. Two traditional nest sites were not used in 2015 (Quarries 2 and 18), while a nest was established at a new site (Quarry 16). In 2015, Agnico Eagle conducted raptor nest success monitoring along the AWAR. Environmental personnel performed surveys of the Portage, Goose, and Vault pits to determine if falcons were nesting. Two falcons were observed at the Vault Pit in late June and early July, but did not establish a nest. Specific raptor nest management plans were not warranted at any of the active nest sites.

8.14 COUNTRY FOOD

As required by NIRB Project Certificate No.004 Condition 67: ***Develop and implement a program to monitor contaminant levels in country foods in consultation with HC; a copy of the plan shall be submitted to NIRB's Monitoring Officer.***

In keeping with AEM's Terrestrial Ecosystem Monitoring Plan and Nunavut Impact Review Board Project Certificate, Condition 67, a Wildlife Screening Level Risk Assessment (WSLRA) and Human Health Risk Assessment for the Consumption of Country Foods (HHRA) were completed in 2014 to evaluate risks to wildlife and human health from contaminant exposure during operation of the Meadowbank mine. The full WSLRA and HHRA reports for 2014 are provided in Appendix G15 and G16 of the 2014 Annual Report, respectively. Sampling activities will resume in 2017.

8.15 ARCHAEOLOGY

As required by NIRB Project Certificate No.004 Condition 69: carry out the Project to minimize the impacts on archeological sites, including conducting proper archeological surveys of the Project area (including the all-weather road and all quarry sites); [Cumberland] shall provide to the GN an updated baseline report for archeological sites in the Project area.

In 2015, there were no additional impact assessments carried out at Meadowbank. In 2015, an archaeological impact assessment for the Meadowbank (Amaruq) Gold Project exploration activities was conducted, including borrow sources. The 2015 Archeology Site Status Report was sent to the GN on February 1, 2016, in response to a request sent by email from Sylvie LeBlanc (GN Department of Culture) to AEM's consultant, Jennifer Tischer (Nunami Stantec), on June 25, 2015.

8.16 CLIMATE

During the technical meeting and pre-hearing conference held in Baker Lake on January 14 -15, 2015 regarding the NWB Water License renewal, INAC mentioned that *climate data provide important input for interpreting site-specific geothermal aspects, such as the rate of mine waste freezeback and active layer thicknesses, for permafrost encapsulation of the mine wastes. In addition, the previous year's climate is useful for interpreting the hydrology and water balance for the site.*" It was recommended that the annual monitoring report summarize monthly climatic conditions at the Meadowbank site over a 12-month period. Table 8.64 includes average, minimum and maximum air temperatures, average and maximum wind speed as well as daily average, total and maximum volume of precipitation (rainfall / snowfall). It should be noted that AEM does not have a snow gauge but rather a rain gauge. For this reason, snow precipitations are reported as mm of rain.

In 2015, temperatures recorded were similar to annual trends observed from 2009-2014. Slightly stronger winds were recorded in 2015 compared to previous years (2009-2014). The maximum wind speed recorded in 2015 was 29.22 m/s. The maximum wind speed recorded between 2008 and 2014 was 27.45 m/s. There were more precipitation in 2015 (300mm) compared to 2014 (150mm). 2015 daily average precipitation was similar to 2013.

Table 8.64 – 2015 Monthly climate data

Date	Temperature Average	Temperature Max	Temperature Min	Wind Speed Average	Wind Speed Max	Total Precipitation	Daily average Precipitation	Max Precipitation
	^{0}C	^{0}C	^{0}C	m/s	m/s	mm	mm	mm
Jan-15	-32.54	-12.61	-41.45	5.58	25.70	28.25	0.97	20.30
Feb-15	-34.43	-15.08	-40.23	5.00	16.60	17.55	0.63	12.50
Mar-15	-28.10	-11.70	-39.69	6.21	27.85	30.85	1.10	16.85
Apr-15	-18.25	-2.67	-36.10	5.58	17.30	11.50	0.38	4.45
May-15	-7.04	4.66	-20.94	6.91	29.22	17.10	0.55	9.80
Jun-15	3.54	15.95	-2.75	4.84	18.17	32.15	1.56	9.20
Jul-15	11.45	20.18	4.05	4.00	14.80	49.70	1.91	12.80
Aug-15	11.19	23.26	3.38	5.03	17.76	7.50	0.24	5.50
Sep-15	4.28	13.79	-3.89	6.63	24.93	67.20	2.24	18.40
Oct-15	-8.14	10.90	-22.23	6.55	21.64	25.20	0.81	16.15
Nov-15	-18.18	-1.59	-34.55	5.15	25.19	13.50	0.54	8.80
Dec-15	-26.74	-6.50	-39.42	4.89	17.6	2.50	0.08	1.00

SECTION 9. CLOSURE

9.1 PROGRESSIVE RECLAMATION

9.1.1 Mine Site

As required by Water License 2AM-MEA1525 Schedule B, Item 17: *A summary of any progressive closure and reclamation work undertaken including photographic records of site conditions before and after completion of operations, and an outline of any work anticipated for the next year, including any changes to implementation and scheduling.*

In January 2014, AEM updated the 2008 site closure plan using revised life of mine calculations. The report “Interim Closure and Reclamation Plan for Meadowbank” can be found in Appendix H1 of the 2013 Annual report. This document was provided to the NWB in support of the Type A Water License renewal. The Plan was approved during the renewal process.

The current mine plan includes progressive closure associated with the following mine components: Portage and Goose open pits, Portage Waste Rock Storage Facility, Tailings Storage Facilities, water management infrastructure, and site infrastructure (limited structures).

Progressive reclamation of Goose and Portage will start once the mining activities in each pit has ceased, 2015 and 2018 respectively. For Goose Pit, mining activities were completed in April 2015. There is no pumping activity to dewater the pit anymore and natural reflooding with inflows such as seepage and natural runoff is occurring. No active pumping system is operating in Goose pit and part of the system has been decommissioned. Active reflooding of the Goose Pit could possibly be undertaken in 2016 or 2017, by pumping water from the Third Portage Lake into Goose Pit. The reflooding of Goose Pit will be completed in accordance with the requirements of the Water License. Overall, progressive closure for the pits will consist of decommissioning and removing the pumping systems and actively (and passively) reflooding the pits.

Water management infrastructure to be decommissioned consists of all the pumping systems that had served for the dewatering of Second Portage Arm and the Bay Goose impoundment, as well as the reclaim water system. Following conversion of the Portage Attenuation Pond into the Reclaim Pond (South Tailings Cell) in 2014, all of the dewatering equipment from the North Cell reclaim system (i.e. dewatering pipelines, reclaim barge, effluent diffuser pipelines, and pumps) has been dismantled and removed. This activity occurred in 2015. Following the cessation of operations, all reclaim pipelines and pumps will be dismantled. The tailings pumping system including pipelines will also be decommissioned at the end of mining operations.

Under the current design plans, waste rock from Portage and Goose Pits (ceased mining in April, 2015) is currently being stored in the Portage Rock Storage Facility, in the Goose NPAG Rock Storage Facility (NPAG for reuse at closure – capping of South Cell TSF) or in the Central Portage Pit (as fish habitat structure – mining completed in this area). For more detail please refer to the 2016 Waste Rock Management Plan, Appendix D1. The Portage waste rock storage facility (PRSF) was constructed to minimize the disturbed area and restrict runoff to the Tailings Storage Facility. The PRSF is composed of an internal sector comprising potentially acid generating (PAG) waste rock and a cover comprising of non-acid generating (NPAG) waste rock. The PAG rock portion of the PRSF has subsequently been capped, around the perimeter as the facility has risen, progressively, during operations with a 4m layer of NPAG rock to constrain the active layer within relatively inert materials. The control strategy to minimize the onset of oxidation and the subsequent generation of acid rock drainage includes freeze control of the waste rock through permafrost encapsulation and capping with an insulating convective layer of NPAG rock. The waste rock below the capping layer is expected to freeze, resulting in low rates of acid rock drainage (ARD) generation in the long term. Instrumentation has been installed in the PRSF to monitor the freeze back in the waste rock. Results to date from the thermistors indicate that freeze back is occurring in the PRSF structures, as described in section 5.3.2 of this report. Monitoring will continue during operations and closure. The placement of the NPAG rock cover over the PAG rock has been progressively completed during operations and has been ongoing since 2012. As mentioned, there has been placement of a 4m NPAG rock cover over the exterior slopes, around the perimeter, as the PRSF is filled in lifts. As of January 2015, 62.3% of the area of the Portage PRSF had been covered with NPAG rock. Additional cover will be completed on the PRSF in 2017. The capping of the top of the facility will be completed during final closure operations after mining in Portage Pit has been completed in 2018.

A similar principle will be used for the Tailings Storage Facility. Thermal modelling indicates that the tailings will freeze in the long term, and that the talik that currently exists below 2PL Arm will freeze before seepage from the TSF will reach the groundwater below the permafrost. The tailings are potentially acid generating (PAG); therefore a cover of NPAG material will be placed over the tailings to physically isolate the tailings and to confine the active layer within relatively inert materials. The control strategy to minimize water infiltration into the TSF and the migration of constituents out of the facility includes freeze control of the tailings through permafrost encapsulation.

On November 2015, O'Kane Consultants Inc (OKC) submitted the AEM Meadowbank TSF Closure Design Report which presents the detailed design and construction plan for reclamation of the North Cell Tailings Storage Facility (TSF) at the Meadowbank Mine. The design work for the South Cell cover will be undertaken in 2016. The ultimate goals for reclamation of the TSF are to mitigate long-term environmental effects to the aquatic receiving environment and to establish a landform similar to that of the natural surrounding area. Conceptual cover system designs previously modelled (Golder 2008) and presented in interim closure plan (Golder 2014) rely on aggradation of the tailings material into the surrounding permafrost to limit the production of Acid Mine Drainage (AMD) and the movement of contaminants through surface and groundwater. The construction of a cover system consisting of non-acid generating granular material (NAG) over the tailings material ensures that the active layer (material going through freeze-thaw cycles, overlying permafrost) remains within the benign material. The objectives of the cover system are to maintain the tailings material below 0°C under most conditions and to maintain saturation above 85%.

To achieve the goals and criteria for the reclaimed TSF, the final design will consist of a landform that promotes water shedding from all surfaces covered by an engineered cover system. The final design for the engineered cover system is a layer of compacted NAG waste rock (soapstone) of a minimal thickness of 2.0 m. The design was developed as a result of soil-plant-atmospheric (S-P-A) modelling, as well as thermal and seepage modelling. The nominal cover design thickness over most of the landform is well over the minimum and up to 8.0 m in some portions. This thickness variation is required to obtain the designed landform. Cover material is used to build up the landform because the tailings material displays a low angle of deposition and its frozen state makes it difficult to re-handle economically. In this current design, under the 2.0 m minimal cover, the tailings material remains frozen for all but the warmest years of the 100-year database, accounting for climate change. The unfrozen tailings are segregated in the upper 0.5 m of the TSF and remain above 85% saturation, thus reducing the risk of oxidation until the material freezes back into the permafrost over time.

The final landform consists of two watersheds with several catchments in each watershed creating positive drainage off all surfaces of the TSF. Design objectives were to minimize cover material volumes and tailings excavation by taking advantage of the tailings surface and balancing the required excavation and cover system material volumes. Several scenarios were prepared to compare tailings excavation volumes to cover material and the optimal option was selected based on site constraints. Facility minimum slope angle for the cover surface is 1%. Water is moved off the cover using a surface water management system consisting of grading the plateau areas towards engineered surface runoff drainage channels. The runoff drains have a minimum slope of 0.5%. The surface water management plan for the reclaimed TSF is to minimize erosion, thus reducing suspended sediment loading to the receiving environment, and to safely convey runoff waters off the facility in the event of a storm event coupled with spring snowmelt. To achieve these, the surface water management system will be constructed using riprap-lined drainage channels and riprap-lined aprons at the outlet of each catchment. The drainage channels convey surface runoff water off the TSF footprint through two surface runoff outlets located in the South and North-West portions of the TSF.

The proposed reclamation plan for the North Cell TSF is designed to be essentially maintenance free over the long term; however, AEM is committed to monitor, repair, and maintain the final reclaimed landform as required. South Cell TSF capping detail design and construction plan will be completed one year prior to closure of the Meadowbank site.

During the post-closure period, the tailings are predicted to freeze with time, resulting in permafrost encapsulation. It is possible that a very low seepage flux of tailings pore water could flow to the flooded Portage Pit (at closure before any breach of the dikes) until the tailings are frozen. Groundwater monitoring to date downstream indicates minimal, if, any impacts that are associated with the TSF's (see 2015 Groundwater Report attached to the 2015 Annual Report). The pit lake will be isolated from the adjacent 3PL until monitoring indicates the pit lake water quality achieves acceptable levels to breach of sections of the Bay-Goose Dike and South Camp Dike and allow for complete mixing with Second Portage Lake.

Additional details on the tailings cover design developed in 2015 are available in the *2015 Mine Waste Rock and Tailings Management Plan* in Appendix D1. The final design of the tailings cover will be presented in the final closure and reclamation plan presented one year prior to the end of mine operations.

Progressive reclamation by capping the tailings in the North Cell was undertaken in winter of 2015 following the completion of the tailings deposition in this cell. Capping occurred in sections (perimeter areas) where the tailings were at elevation 149.5m (design level). This consisted of capping with 2.0m of NPAG material. Site inspection during the construction as well as Quality Control sampling were completed to ensure that material used for the cover was NPAG, as discussed in section 5.1 of this report. A total of 275,469 m3 of NPAG material was placed on the tailings North Cell between March and May 2015. Photos of the 2015 TSF Cover Construction log are available in Appendix H1. Progressive closure will continue on the North Cell in winter 2016. As the tailings deposition is completed in the North Cell, additional areas of the tailings can be covered with NPAG material. The capping of the North Cell in 2016 will be in accordance with the O'Kane design described above.

As part of the closure and reclamation planning, AEM has undertaken a research program in collaboration with the RIME (Research Institute in Mine and Environment). As discussed in section 5.3.2, the focus of this research program is the reclamation of the tailings storage and waste rock storage facilities. Refer to this section of the report for additional details on the research project.

As per the Meadowbank No Net Loss Plan (NNLP) (October, 2012), compensation measures will have to be applied on site for closure. The NNLP quantifies the losses to fish habitat that will occur throughout the mine development and operational phase, and the gains that will be achieved through compensation measures. As part of the compensation measures, creation of fish habitat features within the mined out pits (Portage and Goose) is ongoing. The creation of fish reefs has been undertaken in the Central Portage Pit since the completion of mining. The construction of finger dikes in Second or Third Portage Lakes is in the design phase and could begin in 2016. The dikes faces (East Dike, Bay Goose Dike, South Camp Dike, Central Dike) are also considered as compensation features in the NNLP and have been completed during operations.

Finally, certain site infrastructure could be closed progressively during the life of the mine, such as camps, temporary workspace, marshalling yards, quarries and storage areas. During 2015 the removal of excess inventory commenced with shipments south during the barge season. Buildings that are no longer required will be dismantled and the areas contoured to restore natural drainage or new acceptable drainage. The disturbed areas will also be scarified to promote natural re-colonization of vegetation from surrounding areas.

For more information regarding these activities, refer to the *Interim Closure and Reclamation Plan* found in Appendix H1 of the 2013 Annual Report.

9.1.2 AWAR

As required by INAC Land Lease 66A/8-71-2, Condition 33: ***The lessee shall file annually a report for the preceding year, outlining ongoing restoration completed in conformity with the approved Abandonment and Restoration Plan, as well as any variations from the said Plan.***

And

As required by KIA Right of Way KVRW06F04, Condition 26: ***File annually a progress report for the preceding year, outlining any ongoing restoration completed, in conformity with the Abandonment and Restoration plan*.**

No extensive progressive reclamation has been completed on the AWAR or associated quarries in 2015.

9.1.3 Quarries

As required by INAC Land Lease 66A/8-72-2, Condition 33: ***The lessee shall file annually a report for the preceding year, outlining ongoing restoration completed in conformity with C&R Plan, as well as any variations from the said Plan.***

No restoration work was completed in 2014. Before the construction of the landfarm facility at the mine site in 2012, contaminated soils from spills occurring on the AWAR were stored in quarries 5 and 22 along the AWAR. In 2014, AEM completed assessments in Quarry 5 and 22 to verify if the substrate where contaminated materials (with petroleum hydrocarbons (PHC"S) were stored met CCME Remediation Criteria for Industrial use of Coarse Material. Quarry 5 was deemed remediated and details were provided in the 2014 Annual Report Please refer to Section 3.2 for more details regarding Quarry 22.

9.2 RECLAMATION COSTS

9.2.1 Project Estimate

As required by Water License 2AM-MEA1525 Schedule B, Item 19: ***An updated estimate of the current restoration liability based on project development monitoring, results of restoration research and any changes or modifications to the Appurtenant Undertaking.***

And

As required by NIRB Project Certificate No.004, Condition 80: ***File annually with NIRB's Monitoring Officer an updated report on progressive reclamation and the amount of security posted, as required by KivIA, INAC, and/or the NWB.***

Refer to Section 9.1 for the progressive reclamation completed in 2015 and in previous years. Progressive reclamation measures undertaken to date, which are reflected in the financial security cost estimate, include perimeter cover of the Portage Waste Rock Storage Facility with 4m of NPAG material. The financial security cost estimate from 2014 has been conservatively developed assuming no further progressive rehabilitation activities are completed through the remaining life of the mine, and all remaining reclamation costs are incurred at the onset of permanent closure. For this reason the financial security cost estimate should be revisited as progressive reclamation measures are completed.

A financial security cost estimate of the closure and reclamation activities for the Project, based on the current end of mine life configuration, was previously prepared using the RECLAIM template (Version 6.1, March 2009); details of this estimate are provided in Section 4.0, Appendix I1 and I2 of the closure plan found in Appendix H1 of the 2013 Annual Report. An update of the financial security cost presented in the Interim Closure and Reclamation Plan was prepared in December 2014 and is available in Appendix H1 of the 2014 Annual Report. The updated financial security cost estimate has been prepared using a more recent version of RECLAIM template (Version 7.0, March 2014). This updated closure cost was approved during the Type A Water License renewal process and forms part of the renewed Water License (July, 2015). The updated closure and reclamation cost estimate for the Meadowbank Gold Project using RECLAIM version 7.0 is $84,869,488

No additional work on the financial security cost estimate of the closure and reclamation activities with RECLAIM was completed in 2015.

9.2.2 AWAR and Quarries

As required by INAC Land Lease 66A/8-71-2, Condition 19: *The lessee shall submit to the Minister every two years after the commencement date of this lease (January 2007), a report describing any variations from the Abandonment and Restoration Plan and updated cost estimates.*

And

As required by INAC Land Lease 66A/8-72-2, Condition 37: *The lessee shall submit to the Minister every 2 years after the commencement date of this lease (January 2007), a report describing cumulative variations from the C&R Plan with updated cost estimates.*

And

As required by KIA Right of Way KVRW06F04, Condition 14: *Submit to KIA every two years on each anniversary of the commencement date (February 2007), a report describing any variations from the Abandonment and Restoration Plan and updated cost estimates.*

No extensive progressive reclamation has been completed on the AWAR or associated quarries in 2015.

No major modifications were made in the updated interim closure plan from 2014 compared to with the '*AEM Closure and Reclamation Plan, September 2008*'. The cost estimate for the reclamation of the AWAR and quarries in the December 2014 cost estimation is 991,072$ with RECLAIM 7.0 instead of $1,061,664 estimated previously with Reclaim 6.1. The difference in cost is explained by 8.6 % increase in scarifying unit rate and by the drill/blast unit rate removed and replaced with drill/blast/load/short haul which represented a 28% decrease. No change to this estimate based on RECLAIM 7.0 was made in 2015.

SECTION 10. PLANS / REPORTS / STUDIES

10.1 SUMMARY OF STUDIES

As required by Water License 2AM-MEA1525 Schedule B, Item 20: *A summary of any studies requested by the Board that relate to Water use, Waste disposal or Reclamation, and a brief description of any future studies planned.*

No studies were requested by the NWB in 2015.

10.2 SUMMARY OF REVISIONS

As required by Water License 2AM-MEA1525 Schedule B, Item 21: ***Where applicable, revisions will be completed as Addendums, with an indication of where changes have been made, for Plans, Reports, and Manuals.***

The following monitoring and management plans were revised in 2015:

- Incinerator Waste Management Plan, Version 6;
- Spill Contingency Plan, Version 6;
- Water Quality and Flow Monitoring Plan, Version 5;
- Mine Waste Rock and Tailings Management Plan, Version 5 (Appendix D1);
- Tailings Storage Facility – Operation, Maintenance and Surveillance Manual, Version 6;
- Dewatering Dikes – Operation, Maintenance and Surveillance Manual, Version 5;
- 2015 Water Management Report and Plan (Appendix C2) including the Ammonia Management Plan and the Freshet Action Plan;
- Emergency Response Plan, Version 18.

The above listed plans are included in Appendix C2, D1, and I1. A brief description of revisions made to each of plans is provided in Appendix I2.

10.3 EXECUTIVE SUMMARY TRANSLATIONS

As required by Water License 2AM-MEA1525 Schedule B, Item 22: ***An executive summary in English, Inuktitut and French of all plans, reports, or studies conducted under this Licence.***

Appendix I2 includes an executive summary in English, French and Inuktitut for the following documents:

- All monitoring and management plans listed in Section 10.2 above.

- Reports or studies submitted in 2015:
    - 2015 Annual Geotechnical Inspection;
    - Annual Review of Portage and Goose Pit Slope Performance (2015);
    - 2015 Independent Geotechnical Expert Review Panel Reports;
    - 2015 Landfarm Report;
    - 2015 Habitat Compensation Monitoring Report;
    - 2015 Core Receiving Environment Monitoring Program Report;
    - 2015 Hamlet of Baker Lake Harvest Study – Creel Results;
    - 2015 Groundwater Monitoring Report;
    - 2015 Wildlife Monitoring Summary Report;
    - 2015 Q22 Report
    - EEM Cycle 2 Interpretive Report;
    - 2015 All-weather Access Road Dust Monitoring Report;
    - 2015 Blast Monitoring Report for the Protection of Nearby Fish Habitat;
    - 2015 Air Quality and Dustfall Monitoring Report; and
    - 2015 Noise Monitoring Report.

SECTION 11. MODIFICATIONS / GENERAL / OTHER

11.1 MODIFICATIONS

As required by Water License 2AM-MEA1525 Schedule B, Item 14: ***A summary of modifications and/or major maintenance work carried out on all water and waste related structures and facilities.***

In accordance with Water License 2AM-MEA1525, Part D, Item 1, AEM submitted on August 20, 2015 a copy of the final design and construction drawings for Saddle Dams 3, 4 and 5. The summary of construction activities was submitted on January 20, 2016.

The Construction Summary Report for the Phase 1 of the Diversion Ditch Interception Sump was submitted to the NWB on April 30, 2015.

11.2 NWB TYPE A WATER LICENSE RENEWAL

On July 23, 2014 AEM submitted an application to the NWB for a Type A Water License Renewal. License 2AM-MEA0815 was expiring on May 31, 2015. The technical review comments from NWB and the interveners AANDC, EC, KIA and DFO were received on December 24. AEM submitted responses to these comments to NWB on January 7, 2015 and updated responses on January 13 following a call with KIA on January 9. The pre-hearing conference and technical meeting was held in Baker Lake on January 14-15. In the days leading up to the technical meetings and during the meetings AEM and the regulators came to an agreement on all of the 97 technical comments. On January 30, the NPC confirmed again that no conformity review was necessary. On February 18, Environment Canada's submission was received regarding the recommendation for the proposed criteria for total dissolved solids as discussed during technical meeting and pre-hearing conference. On February 20, AEM received the PHC decision from NWB. On March 20, AEM received notification that a request for an extension to the deadline for intervener submissions was received from KIA and AANDC in regard to the Public Hearing – deadline submission by interested parties was extended from March 24 to March 30 and the deadline for submission by AEM to respond was been extended from April 7 to April 13. The final hearing was held in Baker Lake on April 28-29, 2015.

On January 23 2015, AEM submitted the 2AM-MEA0815 Type A Water License Short Term Renewal 180 days (contingency as license would expire at the end of May 2015 and AEM may not have received the renewed license). On February 9, AEM received notice from NWB that interested parties should submit comments by March 9 regarding the AEM Short Term Water License Renewal. AEM received the NWB approval decision regarding the Short Term Water License on March 21. On April 28, the AANDC Minister sent his final approval. The Short Term license would expire on November 27, 2015.

As mentioned, the final hearing for the Type A Water License renewal was held in Baker Lake on April 29-30. On May 4, NWB advised that the Final Hearing records will remain open until May 22 to allow additional submissions regarding the over bonding issue raised by AEM, AANDC and KIA. On May 20, the deadline was extended to May 26. Final documents from AANDC and KIA regarding over bonding were received and the final hearing closed on May 26. NWB issued a decision report to the Minister of AANDC. On August 5, the NWB agreed to renew and amend Water License 2AM-MEA1525. On September 2, the AANDC Minister sent his final approval for the renewed water license 2AM-MEA1525.

As per of Part B Item 14 of license 2AM-MEA1525, AEM was requested to update and revise for submission the following Management Plans:
Aquatic Effect Management Program (AEMP);
Core Receiving Environment Monitoring Program (CREMP);
Water Management Report and Plan (Appendix C2);
Freshet Action Plan (Appendix D of *Water Management Report and Plan*);
Ammonia Management Plan (Appendix E of *Water Management Report and Plan*);
Groundwater Monitoring Plan;
Tailings Storage Facility: Operation, Maintenance and Surveillance Manual (Appendix H1);
Operation and Maintenance Manual: Sewage Treatment Plan;
Spill Contingency Plan (Appendix H1).

These plans were submitted to the NWB on November 3, 2015. The NWB advised AEM to update the Water Management Report and Plan, the Ammonia Management Plan, the Freshet Action Plan and the Spill Contingency Plan to address issues raised by interveners and include the updates in revised Plans to be submitted in the 2015 Annual report. Updates are provided in Appendices C2 and H1 of this Annual Report.

11.3 INTERNATIONAL CYANIDE MANAGEMENT CODE

As required by NIRB Project Certificate No.004, Condition 28: *Cumberland shall become a signatory to the International Cyanide Management Code, communicate this to shippers, and do so prior to Cumberland storing or handling cyanide for the Project.*

In 2014, the Meadowbank site had its first external audit by two ICMC auditors. At the end of the audit findings were presented. Overall, the auditors were pleased with the Meadowbank site. However, there were items that required attention to reach full compliance status with the ICMC. Meadowbank achieved a status of Substantial Compliance. This is considered the norm after an initial audit.

Items that needed to be addressed were as follows:

- be sure all containment areas for cyanide related fluids have adequate secondary containment (110% of the largest tank);
- be sure all storage pads for cyanide are constructed to protect against cyanide exposure and releases;
- implement a Management of Change process;
- proof of enhanced inspection procedures for Mill maintenance;
- a report signed by an engineer concluding that the facility’s continued operation within established parameters will protect against cyanide exposure and releases.;
- improve dialogue with community by developing written descriptions of how Cyanide is used and managed;
- improve Emergency Response Plan for the AWAR while transporting cyanide;
- perform a mock training drill for cyanide spills.

In 2015, the above mentioned items were all completed except the Management of Change process. Many repairs were completed in the mill to ensure all secondary containments could adequately hold 110% of the largest tank.

A cyanide information brochure was published and provided to employees and the public. Copies are available at the AEM office in Baker Lake. A copy of this can be found in Appendix J1.

During the transport of cyanide in 2015 a nurse and an Emergency Response Team (ERT) member escorted each convoy of cyanide up to the Meadowbank mine site. In addition, these personnel were present at the Baker Lake Marshalling facility for the removal of cyanide from the barge and the loading of the tractor trailers for hauling. On one of the northbound trips with cyanide, a mock spill was carried out in which the Nurse and ERT member had to rescue a victim who was exposed to cyanide in a tractor trailer roll-over. From this, much knowledge was gained and several action items and changes were implemented to ensure a better reaction but above all to ensure better prevention.

The management of change process was not finalized in 2015. A draft document was submitted to the ICMI and the document is anticipated to be approved in Q1, 2016. AEM expects to be in full compliance with the code in 2016.

11.4 INSPECTIONS, COMPLIANCE REPORTS AND NON-COMPLIANCES ISSUES

As required by Water License 2AM-MEA1525 Schedule B, Item 23: ***A summary of actions taken to address concerns or deficiencies listed in the inspection reports and/or compliance reports filed by an Inspector.***

And

As required by NIRB Project Certificate Condition 4: ***Take prompt and appropriate action to remedy any noncompliance with environmental laws and regulations and/or regulatory instruments, and shall report any noncompliance as required by law immediately and report the same to NIRB annually.***

INAC conducted an inspection on site from March 22 to 24, 2015. The Inspection report was received on April 2. No non-compliance was observed. Requested documentation was sent on April 30.

An inspection was conducted from June 16 to 18, 2015 by EC. Locations inspected include the Baker Lake Tankfarm and Meadowbank mine site. No non-compliance was observed and no inspection report was received. Positive feedback was communicated afterwards to AEM by EC. Minor issues at Baker Lake and with MMER sampling were addressed.

KIA performed an inspection at NP-1, NP-2 and Dogleg Lake on June 11 in response to AEM's report "Elevated TSS in the water running under Vault Road (culvert) toward Lake NP-1" sent on June 9, 2015. No non-compliance was observed. An Inspection Report was received on June 15. Requested documents were sent to KIA inspector on July 13, 2015.

An inspection was conducted by GN Wildlife Officers on June 19, 2015. No non-compliance was observed and no report was received. Officers requested AEM to submit monthly wildlife reports. AEM has since complied with this request.

Mine site tour and overview of Meadowbank and the Amaruq project was held on site with KIA inspectors, KIA consultants and INAC Resources Officers on July 9, 2015. Sample training was also provided.

On July 13 2015, KIA conducted surface water sampling at the Meadowbank site. AEM did not receive any follow up report or the sample results in 2015 for this event.

An inspection was conducted by INAC on July 24, 2015. The TSS event in NP1 Lake that occurred in June 2015, Turbidity Curtain Removal in Third Portage, Vault Discharge, Fresh Water Consumption and the Freshet Action Plan were discussed. A site tour was also completed. Sampling and inspection of old reported spills were conducted on the last inspection day. No non-compliance was observed. AEM replied to inspection report comments on August 25.

A KIA inspector came to site on July 30, 2015 to inspect a reported spill of tailings at TSF on July 24, and a Vault reported spill on July 30. No inspection report was received.

An inspection was conducted by NIRB and INAC on site and along the AWAR on September 6 and 7, 2015. AEM received the 2015 NIRB Inspection Report on October 9, 2015 which formed part of the 2014-2015 Monitoring Report and Board Recommendations. AEM responses were submitted on December 11, 2015. Documents can be found in Appendix J2.

On September 8 2015, KIA conducted surface water sampling at the Meadowbank site. AEM did not receive any follow up report or the sample results in 2015 for this event.

A Transport Canada Inspector attended Meadowbank on September 14, 2015. A Transportation of Dangerous Goods inspection report was received on October 9. Responses were sent to TC on November 23, 2015 with final documentation sent to the inspector on December 7, 2015.

An INAC Inspector attended Meadowbank on October 22, 2015. Old reported spills at Baker Lake Tankfarm and marshalling area were inspected. A compliance inspection was also conducted on site. The Report from the inspector was received on November 17, 2015. No non-compliance was noted. Minor issues were addressed. AEM sent responses to inspector on January 4, 2016.

DFO didn’t conduct any site inspections in 2015.

In 2015, all water quality results complied with Water License and MMER authorized limits. In addition, results from Incinerator stack testing, Incinerator ash testing and waste oil testing complied with the applicable regulatory and guideline criteria. All results can be found in Section 6.3.

11.5 AWAR USAGE REPORTS

11.5.1 Authorized and Unauthorized Non-Mine Use

As required by NIRB Project Certificate Condition 32g: ***Record all authorized non-mine use of the road, and require all mine personnel using the road to monitor and report unauthorized non-mine use of the road, and collect and report this data to NIRB one (1) year after the road is opened and annually thereafter.***

And

As required by NIRB Project Certificate Condition 33: *Cumberland shall update the Access and Air Traffic Management Plan to: 1. Include an All-weather Private Access Road Management Plan, including a right-of-way policy developed in consultation with the KivIA, GN, INAC and the Hamlet of Baker Lake, for the safe operation of the all-weather private access road; and 2. To facilitate monitoring of the environmental and socio-economic impacts of the private road and undertake adaptive management practices as required, including responding to any concerns regarding the locked gates.*

The security department at the Meadowbank Gold Project maintains fully staffed security gatehouse at Baker Lake on a 24/7 schedule. The Security staff monitors the safety, traffic and security of all personnel and the public using the road. AEM procedures for non-mine uses of the road require that any local users report to the Baker Lake Gatehouse and sign a form that describes the safety protocol while on the road. The road is used primarily by local hunters using ATV's and snowmobiles. Daily records are kept. A summary of the non-mine authorized road use for 2015 is provided in Table 11.1. In 2015 2366 non-mine authorized road uses were recorded. This corresponds to an increase compared to previous years. In 2012, 2013 and 2014, 1456, 1958 and 1319 non-mine authorized road uses were recorded respectively. In 2015 one incident involving non-mine authorized use occurred on September 19 when a local ran into the gate of the Baker Lake gatehouse with his ATV while it was down. The gate was broken due to the impact but was fixed shortly afterwards. No one was injured. AEM is confident that our current procedures and protocols provide for the safety of the local public while using the road either for hunting access or for general recreational opportunities.

Table 11.1 2015 AWAR ATVs and Snowmobile Usage Records

Month	# of ATV's
January	0
February	0
March	0
April	1
May	73
June	617
July	214
August	264
September	898
October	298
November	1
December	0
Total 2015	2366

AEM's Project Certificate 004 was issued in 2006. Following the approval of the All Weather Access Road (AWAR) in 2007, the Project Certificate was revised in 2009 to address concerns regarding access to the AWAR. Pursuant to condition 33, AEM prepared the Transportation Management Plan: All weather Private Access Road in 2009. It was submitted and later approved by AANDC and GN. Therefore no revision of the 2005 Access and Air Traffic Management Plan was undertaken. AEM is of the opinion that the Transportation Management Plan replaced the Access and Air Traffic Management Plan in 2009. The Transportation Management Plan was last updated in March 2014 and submitted with the 2013 Annual Report.

11.5.2 Safety Incidents

As required by NIRB Project Certificate Condition 32e: ***Prior to opening of the road, and annually thereafter, advertise and hold at least one community meeting in the Hamlet of Baker Lake to explain to the community that the road is a private road with non-mine use of the road limited to approved, safe and controlled use by all-terrain-vehicles for the purpose of carrying out traditional Inuit activities.***

And

As required by NIRB Project Certificate Condition 32f: ***Place notices at least quarterly on the radio and television to explain to the community that the road is a private road with non-mine use of road limited to authorized, safe and controlled use by all-terrain-vehicles for the purpose of carrying out traditional Inuit activities.***

And

As required by NIRB Project Certificate Condition 32h: ***Report all accidents or other safety incidents on the road, to the GN, KivIA [KIA], and the Hamlet immediately, and to NIRB annually.***

On May 11, 2015, AEM held a meeting in the Hamlet of Baker Lake to explain to the community the Policies and Procedures of the All Weather Access Road from Baker Lake to the Meadowbank Mine site. The presentation is attached in Appendix J3. AEM also placed a notice on the local radio station describing the Policies and Procedures for use of the All Weather Access Road from Baker Lake to the Meadowbank Mine site. AEM also conducts quarterly meetings with the Baker Lake Community Liaison Committee and issues related to the use of the AWAR are discussed regularly.

In 2015 one incident involving non-mine authorized use occurred on September 19 when a local ran into the gate of the Baker Lake gatehouse with his ATV while it was down.

There have been no accidents to date involving mine related truck traffic and locals using ATV's.

A total of nine (9) environmental spills occurred along the AWAR in 2015. Table 7.2 provides details on each of these spills. All spills were managed appropriately according to AEM's spill contingency plan. The spills were remediated and contaminated material was deposited at the Meadowbank Landfarm. There were no impacts to any watercourses.

In 2015, two (2) arctic fox road kills were reported along the AWAR. To avoid further incidents, messages are continually provided to employees and contractors to reinforce the procedures for wildlife protection during road use.

11.6 ON-BOARD VESSEL ENCOUNTER REPORTS

As required by NIRB Project Certificate Condition 36: *Inuit observation and encounter reports for on-board vessels transporting goods and fuel through Chesterfield Inlet.*

AEM hired three local representatives from Chesterfield Inlet to act as a marine mammal monitors for the transport of fuel during the 2015 shipping season. The monitors boarded the barges in July, August and October.

In fulfillment of NIRB Condition 36, Table 11.2 summarizes the observations made by the local marine mammal monitors onboard contractor vessels transporting fuel for the Meadowbank Mine through Chesterfield Inlet. The observation reports from the monitors are located in Appendix J4. There were no adverse incidents reported. No marine mammals were observed. Loons, muskox and caribou were observed on the land.

Table 11.2: 2015 Summary of local area marine mammal monitor's observations

Name	Direction/Location	Start Date	Finish Date	Observations	Comments
Lucien Taleriktok	Helicopter Island to Baker Lake	July 9th	July 22th	Muskox, Loons	Numerous loons observed
Trevor Autut	Helicopter Island to Baker Lake	July 23th	August 5th	Muskox	Nineteen (19) muskoxen observed
Trevor Autut	Helicopter Island to Baker Lake	October 13th	October 21st	Caribou	Walking west

11.7 TRADITIONAL KNOWLEDGE, CONSULTATION WITH ELDERS AND PUBLIC CONSULTATION

As required by NIRB Project Certificate No.004, Condition 39: *annually advertise and hold a community information meeting in Chesterfield Inlet to report on the Project and to hear from Chesterfield Inlet residents and respond to concerns; a consultation report shall be submitted to NIRB's Monitoring Officer within one month of the meeting.*

And

As required by NIRB Project Certificate No.004, Condition 40: *Gather Traditional Knowledge from the local HTOs and conduct a minimum of a one-day workshop with residents of Chesterfield Inlet to more fully gather Traditional Knowledge about the marine mammals, cabins, hunting, and other local activities in the Inlet*. *Report to the KIA and NIRB's Monitoring Officer annually on the Traditional Knowledge gathered including any operational changes that resulted from concerns shared at the workshop.*

And

As required by NIRB Project Certificate No.004, Condition 58: "*in consultation with Elders and the HTOs and subject to safety requirements, design the lighting and use of lights at the mine site to minimize the disturbance of lights on sensitive wildlife and birds*"

And

As required by NIRB Project Certificate No.004, Condition 59: ***In consultation with Elders and the HTOs, design and implement means of deterring caribou from the tailing ponds, such as temporary ribbon placement or Inukshuks, with such designs not to include the use of fencing"***

And

As required by Water License 2AM-MEA1525 Schedule B, Item 24: ***A summary of public consultation and participation with local organizations and the residents of the nearby communities, including a schedule of upcoming community events and information sessions.***

11.7.1 Community Meetings in Chesterfield Inlet

In accordance with NIRB Project Certificate No. 004, Condition 39 and 40, AEM conducts a minimum of one community meeting a year in Chesterfield Inlet. During these meetings IQ is gathered and reported annually. Traditional knowledge is defined by the NIRB as a "cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission." (NIRB, 2007). AEM held meetings with Chesterfield Hamlet representatives in February and September 2015. On February 19, a verbal overview of AEM's projects and concerns on impacts to Marine Mammals and Wildlife were discussed. During the meeting, the Hamlet stated that marine mammals used to be closer to the community and that shipping is driving marine mammals away from traditional feeding and harvesting areas. There was also concern that barges travelling between Chesterfield Inlet and Baker Lake are affecting caribou. AEM, the Hamlet and, HTO are currently discussing ways to work together to address these issues. Shipping of hazardous goods was also discussed during the February 19 meeting. AEM committed to provide the Hamlet with a presentation regarding measures that AEM takes to ensure safe shipping of hazardous goods and information on contingency plans in the event of hazardous goods spills. In response to this commitment, AEM held a meeting on September 8, 2015.

During the meeting held on September 8, AEM received TK information from the mayor stating that "the currents are extremely strong" and the hamlet wondered about the possibility of AEM providing marine spill kits. As a follow-up, AEM intends to meet with community members in 2016 to provide updated information regarding shipment of hazardous material as well as consulting with the community to determine specific impacts to marine mammals due to shipping. During the meeting, AEM will specifically solicit any TK from the community members attending. AEM is also considering the provision of spill response training to appropriate community members as well as providing spill response material.

As per water license 2AM-MEA1525 Schedule B Item 24, a log of 2015 public consultation activities can be found in Appendix J5.

11.7.2 Community Meetings in Baker Lake

AEM held a community meeting in Baker Lake on May 11, 2015. The meeting focused on the AWAR and included discussions on safety rules, procedures to access road, dust suppression, caribou migration, 2015 predicted road closure and the International Cyanide Management Code.

On September 9, 2015 a NIRB Community Session was organized to discuss Vault Expansion and Meadowbank Annual Monitoring. Community representatives and residents attended the event. All attendees were invited to share their concerns.

On October 28, more than 120 people attended the Baker Lake community session regarding environmental monitoring on the road. Wildlife monitoring and dust monitoring programs were discussed. After the presentation, residents were invited to share their concerns.

More details regarding topics discussed and concerns shared can be found in Appendix J5.

11.7.3 Meetings with Baker Lake HTO

In 2015, three meetings were held with the Baker Lake HTO on April 7, June 5 and September 8 at the mine site. A site visit was organized on August 27, 2015. These meetings were general in nature and will be used to develop a better relationship with HTO in 2016. AEM intends to work with the HTO in 2016 to develop a revised Hunter Harvest methodology for implementation in 2017.

11.7.4 Community Liaison Committee Meetings

AEM continued to facilitate meetings with the Meadowbank Community Liaison Committee to discuss issues of concern or interest in 2015. The committee consists of various representatives including the Elders Society, Youth, the business community, adult education committee, the Hamlet, Nunavut Arctic College, the RCMP and the Hunters and Trappers Organization of Baker Lake. Meetings are held in both English and Inuktitut and meetings are held quarterly. The Committee brings insight on issues and provides advice to Management for solutions.

11.7.5 Meeting with the Kivalliq Wildlife Board

Attendees at the event held on October 28, 2015 included representatives from the Kivalliq HTOs, NTI, GN DOE, KIA and their consultants. The theme of the presentation was on AEM working with the GN biologists and using collaring data to implement a “mobile caribou monitoring and mitigative approach” to monitoring caribou. Also presented at the event was AEM agreement with KIA for protection of Caribou at Meliadine. Participants were informed that a similar approach is used at Meadowbank.

11.7.6 Community Engagement Initiatives

Community initiatives that AEM participated in during 2015 and including work readiness training, donations, mine site tours, school training week, etc. are summarized in Appendix J6.

11.7.6.1 Community Coordinators Program

During 2015 Agnico sponsored part time AEM Coordinators within the Hamlets of Chesterfield Inlet and Arviat. AEM’s offices in the communities of Rankin Inlet and Baker Lake already had community relation resources.

The objectives of the community based AEM coordinators is to provide a point of contact in each community to facilitate communications, provide services and coordinate activities in the following areas.

- Provide support to the HR Department:
    - Assist HR and other AEM departments to contact employees as required
    - Contact employees in advance of their shift departure times
- Provide advice and assistance to AEM to organize and hold community information sessions on AEM projects and initiatives
- Provide advice and assistance on the design, development and implementation of community based projects (training, AEM employee well-being and community development initiatives)
- Provide updates to the Hamlet Council on AEM activities
- Distribute AEM information and promotional materials

AEM is generally satisfied with this program. A roving AEM coordinator makes regular visits to other Kivalliq communities. AEM is considering new Community Coordinator agreements with the Hamlets of Naujaat, Whale Cove and Coral Harbour in 2016.

11.7.6.2 Summer Student Employment program

AEM's companywide policy offers summer employment programs to the children of all AEM employees (both Inuit and non-Inuit) that are undertaking postsecondary education. Summer job opportunities were also offered to Inuit students who are participating in post-secondary activity, even if they had no family relative working at the mine. There were, unfortunately, no Inuit students working at the mine site in 2015. The program will continue to be offered in 2016.

In 2015, Agnico advertised a new summer student program to attract Inuit post-secondary student's from through-out Kivalliq communities, including students enrolled at trades with Nunavut Arctic College and with the Nunavut Sivuniksavut program. This program was advertised in each Kivalliq Community. There were 6 applications, of which 3 were declined as they were under the age of 18. Two applicants worked at Meadowbank mine and one worked at the Rankin Inlet office. The program will be offered again in 2016 and will be advertised in all Kivalliq communities.

11.8 MINE EXPANSION

As required by NIRB Project Certificate Condition 29: ***report to NIRB if and when [Cumberland] develops plans for an expansion of the Meadowbank Gold Mine, and in particular if those plans affect the selection of Second Portage Lake as the preferred alternative for tailings management.***

11.8.1 Vault Pit Expansion into Phaser Lake

On July 15, 2014 AEM submitted an application (which included supporting documents that described the project) to NIRB and DFO for the Vault Pit Expansion into Phaser Lake. NIRB determined that Vault Pit Expansion into Phaser Lake application required more information and NIRB requested that AEM prepare a comprehensive addendum to the FEIS and submit it to NIRB. The AEM EIS Addendum was submitted to NIRB on July 3, 2015. AEM received Information requests (IRs) and comments from NIRB on September 4, 2015. Community sessions were held in Baker Lake and Chesterfield Inlet on September 9 and 11, 2015. On October 1st 2015, AEM submitted its IRs response package to NIRB. A Technical Review meeting hosted by NIRB was held on December 1, 2015. AEM received the final NIRB Technical

Review Comments on December 8. AEM's responses were sent on December 22, 2015 to NIRB. The final Public Hearing took place in Baker Lake on March 1 and 2, 2016.

11.9 INSURANCE

As required by NIRB Project Certificate No.004 Condition 45: ***"[Cumberland] shall carry, and require contracted shippers to carry adequate insurance to fully compensate losses arising from a spill or accident, including but not limited to the loss of resources arising from the spill or accident; any claims are to be reported to proper officials with a copy to NIRB's Monitoring Officer"***

All shipping contractors have insurance to fully compensate losses arising from a spill or accident, including but not limited to the loss of resources arising from spill or accident for all marine transport vessels and vehicles travelling on the AWAR.

No claim was reported by our marine or trucking shippers in 2015.

11.10 SEMC

As required by NIRB Project Certificate Condition 63: ***the GN and INAC shall form a Meadowbank Gold Mine Socio-Economic Monitoring Committee ("Meadowbank SEMC") to monitor the socio-economic impacts of the Project and the effectiveness of the Project's mitigation strategies; the monitoring shall supplement, not duplicate, the monitoring required pursuant to the IIBA negotiated for the Project, and on the request of Government or NPC, could assist in the coordination of data collection and tracking data trends in a comparable form to facilitate the analysis of cumulative effects; the terms of reference shall focus on the Project, include a plan for ongoing consultation with KivIA and affected local governments and a funding formula jointly submitted by GN, INAC and [Cumberland]; the terms of reference shall be submitted to NIRB for review and subsequent direction within six (6) months of the issuance of a Project Certificate; [Cumberland] is entitled to be included in the Meadowbank SEMC***

And

As required by NIRB Project Certificate No.004, Condition 64: ***[Cumberland] shall work with the GN and INAC to develop the terms of reference for a socio-economic monitoring program for the Meadowbank Project, including the carrying out of monitoring and research activities in a manner which will provide project specific data which will be useful in cumulative effects monitoring (upon request of Government or NPC) and consulting and cooperating with agencies undertaking such programs; [Cumberland] shall submit draft terms of reference for the socio-economic monitoring program to the Meadowbank SEMC for review and comment within six (6) months of the issuance of a Project Certificate, with a copy to NIRB's Monitoring Officer.***

AEM has retained Stratos Inc, a qualified socio-economic consultant, to work with the GN, INAC and AEM on the development of a socio-economic monitoring report. Officials from the GN and INAC provided input and advice through-out the process. A draft of the report was presented to the Socio Economic Monitoring Committee (SEMC) in Rankin Inlet on October 27 and 28th, 2015. This SEMC workshop was attended by officials from NIRB, the GN and INAC. The final report included their input and was submitted to the SEMC, KIA and NIRB in December 2015 (Appendix J7). The socio-economic monitoring report will be updated yearly and submitted with the annual report.

The socio-economic indicators and associated metrics in this report are categorized according to the following valued socio-economic components, or VSECs.

1. Employment
2. Income
3. Contracting and Business Opportunities
4. Education and Training
5. Culture and Traditional Lifestyle
6. Migration
7. Individual and Community Wellness
8. Health and Safety
9. Community Infrastructure and Services
10. Nunavut Economy

AEM will continue to actively participate in the Kivalliq Regional SEMC and will meet its socio-economic reporting requirements to NIRB through the SEMC annual report. AEM has complied with all of the requests for data made by the SEMC and is current with all commitments made to the SEMC.

11.11 SOCIO ECONOMIC

As required by NIRB Project Certificate No.004, Condition 65: ***Cumberland shall include in its socio-economic monitoring program for the Meadowbank Project the collection and reporting of data of community of origin of hired Nunavummiut.***

11.11.1 Meadowbank Workforce

The headcount of people working at Meadowbank on December 31, 2015 was 1117 persons (contractors, AEM permanent, temporary and on-call), broken down as follows:

- Working for contractors: 304
- Working for AEM: 813

The total AEM workforce at the end of 2015 was 813 broken down as follows:

• Permanent AEM employees	705	87%
• Temporary AEM employees	21	3%
• On Call Part Time AEM employees	87	11%
• AEM employees who are Inuit	302	37%
• AEM employees who are female	139	17%

Table 11.3 -Total Workforce at the Meadowbank Mine as of Dec 31, 2015

Headcount on December 31, 2015: 814		
# of above employees who are permanent AEM employees	**705**	**87%**
of these employees who are Inuit	200	28%
of these employees who are female	99	14%
# of above employees who are temporary employees	**21**	**3%**
of these employees who are Inuit	15	71%
of these employees who are female	8	38%
# of above employees who are On-Call employees	**87**	11%
of these employees who are Inuit	87	100%
of these employees who are female	31	36%

At the end of December 2015, 302 Inuit were employed at Meadowbank. Out of those employees, 87 of them are on-call employees, 200 are permanent employees and 15 are temporary employees. AEM defines a permanent employee as an employee whose current job is not specifically tied to a short-term project and the position is expected to be required throughout the life of mine (LOM). A temporary employee is an employee whose current job will not continue beyond a specified period of time. An on-call employee is an employee who has an undefined contract and is called upon when the need arises. On-call employees could work a 2 week, 2 month or 3 month term pending demand. It is expected that on-call employees will replace vacancies in temporary or permanent positons as they become available.

It is important to understand that the 200 permanent employees and 15 temporary employees are enrolled on the payroll system and are expected to work full time hours as of January 1, 2016. The 87 on-call employees are also enrolled in the payroll system but are not guaranteed to be employed as of January 1, 2016. These employees are called on an as needed basis depending on demand.

All AEM employees are required to provide a medical health certificate before they are offered a permanent position. Most Inuit employees, in particular those from Baker Lake, have been unable to provide a medical certificate as examination services are not available to our employees from the community Nursing Station. In 2015, AEM continued providing medical exam services at Meadowbank using qualified medical staff from outside of Nunavut. These services are provided at no cost to employees. In the future, unless Inuit employees are hired specifically for a short period due to a special project or situations (i.e. replacement leave); employees will undergo a medical examination after maximum three months of temporary status.

Table 11.4 lists the types of jobs held by Temporary and Permanent Inuit employed at Meadowbank on December 31st 2015 and Table 11.4 lists the types of jobs held by On-Call Inuit employed at Meadowbank on December 31st 2015.

Table 11.4 - Types of job positions held by Temporary and Permanent-Inuit on Dec 31, 2015

Job position	Skill level	Total
Apprentice	*Semi-Skilled*	9
Auxiliary Equipment Operator	*Semi-Skilled*	13
Camp Helper	*Unskilled*	1
Cook Helper	*Unskilled*	5
Dishwasher	*Unskilled*	10
Driller and Blaster	*Semi-Skilled*	2
Energy and Infrastructure Helper	*Unskilled*	3
Energy and Infrastructure Laborer	*Unskilled*	8
Environment Helper	*Unskilled*	1
Environmental Technician	*Skilled*	1
Guests Services Leader	*Semi-Skilled*	1
Haul Truck Operator	*Semi-Skilled*	75
Haul Truck Trainee	*Semi-Skilled*	7
Haul Truck Trainer	*Semi-Skilled*	1
Heavy Equipment Operator	*Semi-Skilled*	9
Janitor	*Unskilled*	32
Maintenance Helper	*Unskilled*	2
Mill Trainee	*Semi-Skilled*	2
HR Inuit Agent	*Semi-Skilled*	2
Millwright	*Skilled*	2
Mine Helper	*Unskilled*	7
Procurement & Logistic Helper	*Unskilled*	3
Process Plant Helper	*Unskilled*	5
Production Loading Equipment Operator	*Semi-Skilled*	2
Receptionist	*Semi-Skilled*	1
Recreational Agent	*Semi-Skilled*	1
Security Guard	*Semi-Skilled*	4
Sharpener	*Semi-Skilled*	1
Surveyor Helper	*Unskilled*	2
Utility Person	*Semi-Skilled*	3
TOTAL		**215**

Table 11.5 - Types of job positions held by Inuit On-Call at Meadowbank as of Dec 31, 2015

Job position	Skill level	Total
Camp Helper	*Semi-Skilled*	4
Mine Helper	*Unskilled*	2
Environment Helper	*Unskilled*	2
Janitor	*Unskilled*	63
Dishwasher	*Unskilled*	11
Security Guard	*Semi-Skilled*	2
Energy and Infrastructure Labourer	*Unskilled*	3
TOTAL		**87**

As of the end of 2015, the Inuit employees working at Meadowbank in unskilled, semi-skilled or skilled occupations are described in Table 11.6 and 11.7 by percentage.

Table 11.6 - Skill level of positions held by Temporary and Permanent Inuit at Meadowbank on Dec *31, 2015*

Total # of AEM Inuit Temporary and Permanent employees on December 31, 2015		
# of these employees that have a *professional* level job	0	0%
# of these employees that have a *skilled* level job	8	4%
# of these employees that have a *semi-skilled* level job	124	57%
# of these employees that have a *unskilled* level job	83	39%
Total	**215**	**100%**

Table 11.7 - Skill level of positions held by on call employees at Meadowbank on Dec *31, 2015*

Total # of AEM On-Call Inuit employees as on December 31, 2015		
# of these employees that have a *professional* level job	0	0%
# of these employees that have a *skilled* level job	0	0%
# of these employees that have a *semi-skilled* level job	6	2%
# of these employees that have a *unskilled* level job	81	98%
Total	**87**	**100%**

At the request of the GN in 2013, Agnico Eagle began using a simple system for classification by level of qualification of the various positions held at Meadowbank. This system is related tothe National Occupations Classification system (NOC) although it was adapted to the needs of the Meadowbank mine site.

The system was reviewed in 2014, in order to better differentiate between different positions. As a result of this re-evaluation a new category, called '*Professionals'* was created to better differentiate positions within recognized occupations and those requiring a university education. These types of positions were previously included in the category '*Skilled* '. The definition and requirements of each category were also reviewed and some positions previously considered as '*Skilled*' are now classified under the '*Semi-skilled'* category in order to clarify levels of qualification compared to other positions classified as '*Skilled*'.

11.11.2 Hours Worked by AEM Employees at Meadowbank

In 2015, Agnico and the KIA agreed in the Meliadine IIBA on a minimum Inuit employment goal of 50% during production from any of the AEM project sites, ie. Meadowbank, Amaruq or Meliadine projects. The goal will be measured by the total number of person hours that Inuit are expected to work, compared to the total number of person hours that all persons are expected to work, expressed as a percentage.

Table 11.8 shows the total hours that AEM employees were expected to work in 2015. The total includes hours worked, vacation leave hours, sick leave hours and unapproved lost time leave hours.

Table 11.8 – Total work

Total hours AEM employees are expected to work	Jan 1st, 2014 to Dec 31st, 2014		Jan 1st, 2015 to Dec 31st, 2015	
	Inuit	Non-Inuit	Inuit	Non-Inuit
Total Hours	585,312	1,135,680	565,483	1,303,065
Inuit Content	34%	66%	30%	70%

Table 11.9 shows the actual work and benefit hours (such as vacations and other paid leaves) worked by all employees at Meadowbank in 2014 and 2015. Inuit actual work and benefit hours increased by 44,742 in 2015, or 9% over 2014. Non-Inuit actual hours increased by 13% over 2014.

Table 11.9 – Actual hours worked & paid benefit hours

Actual Work & Benefit Hours	Jan 1st, 2014 to Dec 31st, 2014		Jan 1st, 2015 to Dec 31st, 2015	
	Inuit	Non-Inuit	Inuit	Non-Inuit
Actual Hours	437,016	1,084,405	481,758	1,250,648
Inuit FTE Content	29%	71%	28%	72%

Table 11.10 shows hours of works lost due to unapproved leave of absence for all AEM employees at Meadowbank. Unapproved leave occurs when an employee does not to show up for work. In such cases employees lose hours of work, pay and benefit opportunities.

Table 11.10 – Hours of work missed

Hours of Work Missed	Jan 1st, 2014 to Dec 31st, 2014		Jan 1st, 2015 to Dec 31st, 2015	
	Inuit	Non-Inuit	Inuit	Non-Inuit
Hours missed	148,296	51,275	83,725	52,417
Inuit Content	74%	26%	61%	39%

The hours missed by Inuit in 2015, were 83,725 hours which is equivalent to about 40 full time jobs. When comparing the proportion of missed hours, Inuit missed hours are notably higher than those of non-Inuit employees. If unapproved absences are lower, the actual work and benefit hours increase.

Unapproved leave absences have, in fact started to decline. Inuit hours of work missed decreased by 64,571 hours in 2015, or 44% over 2014. This is a notable decrease and correlates with a similar improvement in Inuit turnover rates as noted in the following section. These declines are related to the recruitment, retention and training initiatives that Agnico employed during 2015.

11.11.3 Employee retention

Based on AEM's past experience it is apparent that many Inuit have never had full time work in their home communities, where full time employment opportunities are often limited. Many such individuals want a job, but working away from home for two weeks at a time in a structured industrial environment is a change that many have been unable adapt to.

Exit interviews and focus group meetings support this assumption and the following provides the most common reasons given for voluntary terminations and high turnover rates;

- *Spousal relationship issues*
- *Did not like the work or too tired to continue working*
- *Too much gossip amongst co-workers*
- *No babysitter or daycare*
- *Found a new job in town*
- *Home sick – need to go home*
- *Family wanted them to come home*
- *Work was too hard or did not like the work*
- *Increase in rent for social service housing (example $30 to $880 per month)*

Agnico Eagle developed a new approach with a focus on providing information, skills, and education to job applicants to ensure that they are better informed about what working life is like at a remote mine site, and to be better prepared to adapt, cope, and be successful with employment. The result is the development and implementation of a Labour Pool Program that consists of a linked series of activities, including;

- Community-based information sessions
- Community-based Work Readiness initiative
- E-learning for mandatory training
- Orientation Week at Meadowbank
- On-call Contract Program

The Labour Pool Program consists of a suite of activities that provide future employees with information, skills, and education for working life and conditions in a remote, fly in/fly out, industrial workplace. The On-Call Program allows new employees opportunities to experience and adapt to a new work environment by practicing camp life for short periods of time.

Due to the Labour Pool programs, on-call employees are better prepared to cope with the mine employment environment. The On-Call Program allows participants to discuss employment and upward mobility opportunities, gain a variety of employment experiences and decide if the mining work life is for them. The program also allows AEM to assess employees and ensure proper placement of employees.

The Labour Pool Program has proven to be popular with communities and participants and has achieved good results. As seen in the following charts, during 2015 there has been a notable decline in voluntary resignations and turnover rates compared to 2014.

Table 11.11 – 2014 turnover rates

2014 TURNOVER RATES*							
Department	**Southern Permanent**	**Inuit Permanent**	**Inuit Temporary** (Without On-call)	**Inuit Temporary Turnover**	**Inuit Total** (Without On Call)	**Inuit Total**	**All**
TOTAL	**7%**	**26%**	**70%**	**85%**	**36%**	**46%**	**17%**
Mine operation	4%	14%	13%	20%	14%	13%	9%
Mill operation	3%	4%	5%	20%	4%	5%	3%
Maintenance	3%	1%	4%	14%	2%	4%	3%
Services	4%	20%	51%	22%	29%	29%	12%

Table 11.12 – 2015 turnover rates

2015 TURNOVER RATES*							
Department	**Southern Permanent**	**Inuit Permanent**	**Inuit Temporary** (Without on-call)	**Inuit Temporary Turnover**	**Inuit Total** (Without on-call)	**Inuit Total**	**All**
TOTAL	**3%**	**12%**	**26%**	**25%**	**15%**	**16%**	**7%**
Mine operation	1%	8%	4%	38%	7%	11%	3%
Mill operation	1%	3%	0%	0%	2%	2%	0.7%
Maintenance	1%	0%	0%	0%	0%	0%	0%
Services	1%	6%	23%	21%	11%	15%	4%

**Employee Turnover = (# of terminations / (avg.# of employees for the year)) X 100*

The global turnover rate of Inuit employee's has decreased from 46% in 2014 to 16% in 2015. Although the Inuit turnover rate remains higher than the southern-based employee rate this is a significant improvement.

The following table shows the Inuit employee turnover experience from January 1st, 2015 to December 31, 2015. During 2015, AEM saw a total of 80 Inuit employees terminate their employment (voluntary and involuntary), down from 119 in 2014. Of these, 10 were temporary employees, 30 were on-call and 40 were permanent employees. During 2015, the average length of employment for employees terminated was 1,040 days, with a range from 4 to 3,066 days. This is a significant improvement compared to 2014, where the average length of employment for employees terminated was 356 days, with a range from 3 to 2,619 days.

Table 11.13 – 2015 Inuit Employee Turnover experience

Inuit Employee Turnover Experience (2015)	
Inuit Employees Terminated	**80**
Resignation or Voluntary Termination	48
Dismissal	17
End of contract - Chose not to return or not asked back by AEM	10
Deceased	3
Lay Off	2
Average length of employment (days)	1,040
Minimum length of employment (days)	4
Maximum length of employment (days)	3,066

The following table presents the top positions with the highest turnover rates in 2015. These rates are significantly lower than 2014. For example in 2014, the haul truck operator's turnover rate was 33%, and helper's was 45%, compared to 9% and 17% respectively in 2015.

Table 11.14 – 2015 Top turnover positions

Top Positions with Highest Turnover, 2015			
Position	**Department**	**Inuit Content**	**Turnover Rate**
Janitor	Camp	100%	33%
Helper	Various	100%	17%
Dishwasher	Camp	100%	14%
Haul Truck	Mine	96%	9%

The decline in Inuit turnover and termination rates are attributed with Agnico's Labour Pool Program. This program will continue to be delivered throughout the Kivalliq region during 2016.

11.11.4 Employment Demographics for Nunavut Based Employees

Table 11.15 shows a comparative breakdown of the home communities of temporary and permanent Inuit employees. Table 11.16 shows the breakdown of the home communities of on-call Inuit employees.

Table 11.15 – Home communities of Inuit temporary and permanent employees.

	As of December 31, 2015		As of December 31, 2014	
Arviat	34	16%	33	17%
Baker Lake	120	56%	114	57%
Chesterfield Inlet	4	2%	1	1%
Coral Harbor	2	1%	5	3%
Rankin Inlet	31	14%	31	16%
Naujaat	3	1%	3	2%
Whale Cove	1	1%	2	1%
Others	20	9%	11	6%
Total	**215**	**100%**	**200**	**100%**

Table 11.16 – Home communities of Inuit On-Call employees.

	As of December 31, 2015		As of December 31, 2014	
Arviat	23	26%	5	7%
Baker Lake	36	41%	41	59%
Chesterfield Inlet	4	5%	2	3%
Coral Harbor	1	1%	0	0%
Rankin Inlet	11	13%	13	19%
Naujaat	3	3%	7	10%
Whale Cove	8	9%	0	0%
Others	1	1%	1	1%
Total	**87**	**100%**	**69**	**100%**

AEM pays for the transportation of all Kivalliq-based employees from their home community to the mine for each work rotation. AEM has a service contract with Calm Air to transport AEM employees by charter plane from Rankin Inlet directly to and from the Meadowbank mine airstrip. Employees from Baker Lake are transported by bus to and from the mine site.

11.11.5 Education & Training

11.11.5.1 Training Hours

During 2015, a total of 37,503 hours of training was provided to 890 AEM Meadowbank employees. Of these, 340 were Inuit employees, including 100 women (29% of all Inuit employees). AEM identifies three main categories of training; health and safety (including e-learning), general and specific training.

Health and safety training includes mandatory training related to compliance with the Nunavut Mine Act, as well as training that is required according to AEM Health and Safety policies.

The majority of mandatory training sessions are offered via e-learning prior to an employee's arrival on site.

General training consists of training activities required by departments and includes training in such areas as light duty equipment, enterprise software systems and cross-cultural training.

Specific training is focused on developing individual competencies related to a specific position. This training qualifies individual workers for promotion following their progression through a Career Path. These training programs are provided by in classroom learning (theory) as well as practical learning (one on one).

Table 11.17 – Training hours of Meadowbank employees during 2014

Training Hours for AEM Employees	Training Hours (Jan 1st. – Dec 31st. 2014)			
	Health and Safety	General	Specific	Total
Inuit Employees	1,522	647	12,175	14,344
Non Inuit Employees	7,756	1,367	9,275	18,398
Total	9,278	2,014	21,450	32,742

Table 11.18 – Training hours of Meadowbank employees during 2015

Training Hours for AEM Employees	Training Hours (Jan 1st. – Dec 31st. 2015)				
	Health and Safety		General	Specific	Total
	e-Learning	In class			
Inuit Employees	343	1,046	1,440	18,545	21,374
Non Inuit Employees	235	5,065	1,967	8,882	16,129
Total	578	6,091	3,407	27,427	37,503

Compared to 2014, there was an increase in the total of hours for training for all employees by 4,671 hours, with Inuit training increasing by 7,030 hours.

The majority of training provided at Meadowbank was provided to Inuit employees (56%). This efforts reflects the commitment to support the continuous development of skills and the upwards mobility of Inuit employees.

11.11.5.2 E-Learning Training Hours Provided to Inuit

After its successful implementation in 2013, the e-learning program gained high praise and awards. Before coming to Meadowbank for the first time, newly hired employees must complete their Mandatory Training on-line. The General Induction consists of on-line chapters that provide general information about Agnico Eagle and working life at Meadowbank. Once completed, employees are invited to access the online training that includes health and safety training. To implement the e-learning approach, training material has been translated into English, French, and Inuktitut. Lesson plans have been created and updated in order to improve the quality and the consistency of the training. In 2015, AEM employees spent a total of 578 hours on the e-learning modules, with Inuit employees spending over half of that time, 343 hours, on the platform.

The training team at Meadowbank continues to find ways to improve training curriculum and develop new programs. A process plant induction, as well as chemical awareness training program, were implemented in September 2015, in the form of an e-learning module.

Also in September, a new Skill Assessment module was implemented for the building maintenance positions in order to analyze the training needs within the Maintenance Department. The Training Department plans to add more skill assessment content and electronic evaluations (e-evaluations) as part of the Career Path's evaluation system during 2016.

Two new e-learning modules are planned for 2016: the Lockout and Confined Spaces & the Hot Work modules. The two training courses are currently given in-class by a trainer. By implementing the two new modules on-line, Agnico ensures that contractors coming on site are fully prepared for work. With the upcoming implementation of the modules, general trainers will have more time to train employees on various pieces of equipment related to specific skills development.

11.11.5.3 Health and Safety Training Hours Provided to Inuit

Health and safety training is provided to employees to ensure that all employees are aware of the potential risks, within the mine site and in their line of work, and are trained in proper procedure to avoid accidents. In 2015, a total of 1,046 hours of in–class health & safety training was provided to Inuit employees in the following health and safety training activities:

Table 11.19 – In Class, Health and Safety training hours provided to Inuit in 2015.

Health & safety provided to Inuit in 2015	**Hours**
Standard Operating Procedure	266
Respiratory Protection	194
First Aid	128
Process Plant Induction	94
Chemical Awareness	90
Supervision Formula	72
Other	202
Total	**1,046**

11.11.5.4 General Training Hours Provided to Inuit

Of the total 3,407 general training hours provided to all employees in 2015, 1,440 hours were provided to Inuit employees. Of this, 920 hours were provided to Inuit in the cross-cultural program, 160 hours in skills development, and 360 in introduction to mobile equipment (aerial work platform, forklift, overhead crane, skid steer and tele-handler).

11.11.5.5 Specific Training Hours Provided to Inuit

In 2015, 27,427 hours of training were provided to all AEM employees, of which 18,545 hours was provided to Inuit employees. The specific training hours are associated with the Career Path Program, which supports Inuit in their chosen career of interest.

Table 11.20 – Specific training hours provided to Inuit in 2015

Specific training provided to Inuit	Hours
Container handler	24
Dozer – open pit	672
Drill DM45	84
Excavator – auxiliary	840
Excavator – production	84
Grader – open pit	420
Haul Truck – 777	1,176
Haul Truck Trainee Program	8,400
Hyster forklift	35
Loader – auxiliary – open pit	672
Loader – auxiliary – site services	168
Loader – production equipment	84
Loader – service equipment	336
Process Plant Trainee Program	3,360
Tandem Truck – open pit	1,108
Tandem Truck – site services	504
Wheel Dozer	420
Other equipment	158
Total	**18,545**

11.11.5.6 Career Path

In 2012, with the intention of supporting the upward mobility of Inuit employees, a Career Path Program was designed by the Meadowbank training team. This program is designed to provide the opportunity to Inuit employees who have limited formal skills or education to progress in their careers. The program identifies the incremental steps that an employee is required to accomplish to advance in their chosen career of interest. The path directs a combination of work experiences, hours of completion, training, and skills development for an employee to achieve each step. The Career Path system is now available in six (6) areas of activity; driller, site services, maintenance, mine, process plant and road maintenance.

The purpose of the program is to support internal promotions for Inuit employees and that no external candidates (southerners) will be hired to fill a position that is part of a specific path. In 2015, new building maintenance and process plant components were created and implemented. During 2016, a new maintenance career path will be developed and will include steps towards the apprenticeship program.

11.11.5.7 Haul Truck Trainee Program

Agnico believes that it is important for every employee to have an opportunity to improve their skills and enhance their future career opportunities within the Company. The vast majority of the Company's Inuit haul truck drivers started in an entry level position such as dishwasher, janitor, chambermaid, housekeeper, etc. The Haul Truck Driver program, a component of the mine career path, is popular amongst Inuit employees, who appreciate an opportunity to start a career in the mining industry.

The current haul truck driver crew for the mine department is mostly composed of Inuit workers. Throughout 2015, 28 Inuit workers (including 7 women) enrolled in the Haul Truck Driver Training program. Among those, 25 Haul Truck Trainees (including 6 women) successfully completed the program and are now fully certified haul truck operators working with the mine department.

In order to be certified on the equipment, the operators have to complete a total of 336 training hours comprised of training on a simulator, on the job and in the classroom. During the year, an increased demand for haul truck training required the retention of a new haul truck trainer and an Inuit employee originally from Baker Lake, was retained for the position. This employee started with the Company as a mine helper and then became a haul truck operator.

With the additional new trainer, Agnico can ensure a constant flow of new drivers. AEM plans to train 36 new haul truck operators in 2016.

Since the Vault project started, twelve (12) new positions were created and filled. This provided new opportunities for Inuit employees in entry levels positions to move up the Career Path and apply for training. In turn, this created 12 new positions at the entry level. In 2015, Agnico invested in four additional haul trucks which created a further 16 new operator positions.

The Haul Truck driver training developed at Meadowbank has been successful. Although Agnico's training expenses have increased, the company believes that increased training reduces the level of pressure and stress on trainees, lowers the risk of accident and results in a more confident, productive, and competent employee.

11.11.5.8 Process Plant Trainee Program

With the success of the Haul Truck Trainee Program, a new Process Plant Trainee Program was developed in 2015. This trainee program is conducted over a 28-day period and provides employees with an understanding of the mining and milling process and trains them to be fully competent and certified to take positions as a process plant helper or a utility person. These positions are the first steps in the Process Plant Career Path ladder.

Launched in April 2015, a total of 10 employees participated in the new program throughout the year. In 2016, 8 trainees are scheduled to enter the program.

11.11.5.9 Apprenticeship Program at Meadowbank

AEM is committed to hire Kivalliq-based Inuit employees to fill as many available trades- positions as possible. An Apprenticeship Program for the training of Inuit employees in skilled trades is being reviewed and improved.

Many apprenticeships are available, and the Company is aiming at acquiring more diversity in terms of trades at Meadowbank. The apprentice positions allow employees to work in various departments such as mobile maintenance, site services, process plant, kitchen and electrical.

There are many Inuit who are interested in becoming an apprentice. However, Agnico Eagle is finding that most fail the trades' entrance exam due to low comprehension, literacy, and numeracy skills. This is recognized as a problem within the mining industry and the private sector in Nunavut. To tackle this problem, in collaboration with the KMTS and Nunavut Arctic College, AEM has supported a pre-trades program in 2015.

This program has been positive and has resulted in providing applicants the skills, knowledge and confidence to successfully apply for apprenticeships. In 2015, seven Inuit employees enrolled in the pre-trades assessment program, including two women and five men. Among those, five passed the pre-apprenticeship exam. They are currently working in their field of expertise at the Meadowbank mine.

Table 11.21 – Participants in Agnico's apprenticeship program

	Number of Program Participants					
	Pre-Apprenticeship	Apprenticeship Year 1	Apprenticeship Year 2	Apprenticeship Year 3	Apprenticeship Year 4	Graduates
Carpenter		1				
Welder	3			1		1
Cook	1	1				
Electrician	1	1				
Heavy Duty Equipment Technician	1		1		2	
Plumber		1				
Millwright	1			1		1
Total	**7**	**4**	**1**	**2**	**2**	**2**

In 2012, there were 4 Inuit registered in the program with Meadowbank and the program has grown and evolved over time. As of the end of December 2015, Agnico's apprenticeship program supported 9 apprentices and 7 pre-apprentices that are alternating between trades school and work, as well as two graduate apprentices who received their Red Seal certification. Agnico now offers apprenticeship opportunities in seven trades areas, including, cook, carpenter, millwright, electrician, heavy duty equipment technician, welder, and plumber.

Throughout the year the promotion of the program increased and the training team is currently working on optimizing methods for better management of the program in order to provide more opportunities for future apprentices and better support to those already enrolled.

One Inuit employee from Chesterfield Inlet, graduated as a millwright and obtained his red seal certificate in June, 2015. Another employee from Rankin Inlet graduated as a welder and obtained his red seal certificate in December 2015. These are the first land claim beneficiaries to graduate from Agnico Eagle's apprenticeship program.

Table 11.22 – Evolution of the Apprenticeship Program participants.

AEM Apprenticeship Program	
Year	Number of Participants
2012	4
2013	8
2014	6
2015	16

11.11.5.10 Labor Pool Initiative

The Labor Pool initiative is based on an agreement between Agnico Eagle and the KIA to offer pre-employment opportunities to Inuit from all Kivalliq communities. The program was implemented in 2014.

The goal of the program is to create a pool of work ready, pre-qualified candidates from Kivalliq communities for Agnico Eagle to draw future employees from. In 2015, Agnico Eagle visited six Kivalliq communities (Arviat, Baker Lake, Chesterfield Inlet, Coral Harbor, Rankin Inlet and Whale Cove) to provide information sessions and conduct interviews with potential candidates. Individuals were selected based on their motivation and previous work experience and then required to complete mandatory training by e-learning as well as participate in the 5-day Work Readiness training program. Participants were then invited for an Orientation Week at Meadowbank mine.

Labor pool participants are retained for short term on call assignments to ensure a good fit within the Company and are then eligible to obtain a full time position.

11.11.5.11 Work Readiness Training Program

In collaboration with the Kivalliq Mine Training Society (KMTS), Agnico Eagle developed a Work Readiness Training program as a pre-employment initiative. The program is delivered over a 5-day period at the community level. Since its implementation, the course has been optimized and the training content was delivered by the KMTS in partnership with Agnico Eagle. During 2015, the program was delivered in six Kivalliq communities and saw a total of 155 people from the various communities graduate from the program.

The Work Readiness program provides coaching in the following areas:

(1) Insight into personal beliefs that drive behaviors in their social lives;

(2) Awareness of employers' unspoken expectations;

(3) Self-control skills for managing strong emotions;

(4) Communication skills for dealing with difficult social interactions, and;
(5) Problem solving skills for logically resolving interpersonal workplace issues.
The intent is for Inuit workers to be better prepared for the work environment in an industrial setting. Graduates of the program are eligible to join the AEM Labor Pool and participate in the next level of the program, the Orientation Week.

11.11.5.12 Orientation week

In order to enhance the worksite orientation plan for new employees, an Orientation Week program was developed. Provided to all new Inuit employees, this training program provides a better understanding of the multi-cultural and multi-lingual experience that is found working at Meadowbank.
Implemented in April 2015, the Orientation Week consists of a one-week on the job training plan. Employees that have successfully completed the Work Readiness program are eligible to apply for the 7-day program held directly at the Meadowbank site. While in camp, the selected Inuit employees are provided various training opportunities related to entry level positions. Along with training, a complete mine site tour and description of all job opportunities within the departments are provided to the trainees. This provides an opportunity to better understand the jobs that are performed and available at Meadowbank.
After the successful completion of their Orientation Week, the graduates are added to the ‘’on-call’’ list and invited for short term work assignments. Based on their experience, attendance, and work ethic they may be offered a permanent position as positions become available.

Table 11.23 – Number of participants to the Orientation Week in 2015.

	Orientation Week participants per intake - 2015							
	April	May	June	July	September	October	November	Total
Number of Employees	15	18	17	30	5	11	15	111

11.11.5.13 Emergency Response Team (ERT) training

At Agnico Eagle, our most important priority is to keep employees safe. At Meadowbank, the Emergency Response Team (ERT) is well trained and ready to assist and help in any type of situation to ensure the safety of our employees. To join the team, a candidate must show interest in safety, demonstrate good attendance and behavior at work, and also be in good physical condition. An ERT practice takes place weekly and each member must attend at least 6 practices throughout the year. In 2015, there were a total of 41 ERT members. Among them, 4 were Inuit (2 men & 2 women). Throughout the year, they were trained in first aid, firefighting, extraction, search & rescue, rope rappelling, etc. This training includes practical aspects as well written exams.

11.11.5.14 Cross Cultural training program

Implemented in 2010, the Cross Cultural Training Program was provided to many AEM employees. The 5-hour course allows employees from different cultures and background to understand each other’s culture in order to improve understanding and communications in the workplace. The program was revisited with the assistance of the Nunavut Literacy Council in 2013, and revised again in 2014. Throughout 2015, 521 employees received the training. Among them, 184 were Inuit employees, including 73 women and 111 men.

11.11.5.15 Collaboration Committee Training

In 2015, members of AEM's collaboration committee took part in training sessions designed to provide tools to help manage their responsibilities as employee representatives. Committee members sometimes encounter situations that can be challenging or outside of their comfort zones. The training addressed these challenges by focusing on skills such as communication, teamwork, conflict management, motivation, and personality and emotions management. An external trainer visited the site to provide coaching to collaboration committee members in May, August, and September 2015 in order to cover all working schedules. Three (3) Kivalliq Inuit employees participated in this training.

11.11.5.16 JOH&S Committee Training

Members of the Meadowbank Joint Occupational Health and Safety (JOH&S) committee received training in order to improve their skills related to the management of Health & Safety. The training covered various topics including: roles & responsibilities of the JOH&S committee, interpretation of the Mine Health & Safety Act and regulations, conducting inspections, accident/incident investigation due diligence, the criminal code, the Supervision Formula, and a coaching session. New in 2015, a Supervisor Safety Responsibilities course was offered at Meadowbank for JOH&S committee members. In 2015, a total of five (5) Inuit employees received training for and participated in the JOH&S committee.

11.11.5.17 Memorandum of Understanding (MOU) with Department of Education

The Department of Education, Government of Nunavut (EDU) and AEM share the belief that developing the capacity of Inuit students to pursue skilled trades and professional careers will lead to confident, responsible, and capable individuals who are prepared to join the labor force or purse relevant trades or professional careers. Both parties have agreed to develop a partnership agreement that recognizes the mutual benefit to be gained through collaborative efforts.

A Memorandum of Understanding was signed in April 2012, to establish a strengthened partnership between the Department of Education and AEM, with a focus on increasing the number of students in the Kivalliq region who are able to successfully transition from high school to trades and mining related careers. The MOU with the Department of Education is currently under review and a renewed agreement should be available in 2016.

11.11.5.18 Kivalliq Science Educations Community

In 2015, AEM invested $25,000 towards the regional Math Camp, Science Camp, and Kivalliq Science Fair operated by the Kivalliq Science Educators Community (KSEC). The Science camp was organized just outside of Baker Lake and the weeklong program included a mix of traditional, cultural and educational studies related to sciences and a visit to Meadowbank Mine. The KSEC programs provide science credits to participants.

11.11.5.19 Arviat Community Training Programs

There is a long-term requirement for diamond core drilling to support Agnico's exploration activities as well as other mining companies with active exploration projects in the Nunavut territory. This has created a demand for locally available diamond driller's helpers.

In 2011, the Hamlet of Arviat proposed a partnership to invest in a community based drilling school that would provide Inuit with the skills needed to work in diamond drilling. With advice and support of AEM the Hamlet brought together a range of partners to acquire the drilling equipment, develop the curriculum and operate the training program. Government training agencies, the KIA and drilling companies provided partnership investments.

The curriculum of Arviat's driller's school has been modeled based on a well-developed and successful program offered by Northern Ontario College. The program is taught by experienced trainers and includes both in class theory and practical hands-on training. Graduates receive a certificate that is recognized by the diamond drilling industry across Canada. The program is steered by an Advisory Group that is comprised of colleges, drilling contractors, Agnico, the KMTS, the Hamlet and the GN ED&T.

In 2013, the program was expanded to include a welders helpers program. Renovations to the Hamlet's training facility included the addition of two welding bays. The 8-week program is delivered using curriculum and instructors from the Northern Ontario College.
The 2015 drillers program took place between April and June and 12 students participated, of which 11 graduated. Over the past 4 years the program has graduated 65 trained driller's helpers, all who have found employment. The welders program did not operate in 2015.

Agnico invested $190,000 in the Arviat training programs in 2015. The Advisory Group will meet in April, 2016 to consider programs for 2016-17.

11.11.5.20 Kivalliq Mine Training Society

In May 2012, AEM was invited by Employment Skills Development Canada (ESDC) to participate in discussions with KMTS members on a new mine training initiative. ESDC proposed a two-year "northern pilot project" program that would see five of Canada's program areas bundled in a seamless application and delivery program. The parties agreed to proceed and a proposal has since been approved by ESDC. The KMTS has also enjoyed financial support from the GN, Department of Economic Development and Transportation.

The KMTS program was valued at approximately $9.5 million over a two year period, from April 2013 to the end of March 2015, of which AEM has provided $6.8 million in cash and in kind support towards the overall initiative.

A one year extension of the program for 2015-16 has been approved by ESDC. The 2015-16 KMTS program is valued at $3.65 Million to the end of March 2016, of which AEM will contribute $2.18 Million. A further extension of the program is currently being considered by the KMTS Board for 2016-17.

A major focus of the KMTS program has been to support AEM's Mine Training Initiatives, such as the Career Path, Apprenticeship and Haul Truck Operators' programs.

The KMTS program had provided support for the development and delivery of the community based Work Readiness and Labor Pool initiatives to help prepare Inuit for employment opportunities. The KMTS has also supported the Arviat Drillers program as well as some interesting community-based initiatives, such as the Make it Work program, which have provided support to employees and their families cope with the challenges that come with employment.

By June 2016, the KMTS will provide all sponsors, including the GN, an audited report of activities for April 2015 to March 2016.

SECTION 12. POST-ENVIRONMENTAL ASSESSMENT MONITORING PROGRAM (PEAMP) – EVALUATION OF IMPACT PREDICTIONS

As per Meadowbank's NIRB Project Certificate, Appendix D (Post-Environmental Assessment Monitoring Program (PEAMP)), the following provides a review of monitoring conducted in 2015 in relation to impacts described in the Final Environmental Impact Statement (FEIS; Cumberland, 2005). As stated in the NIRB Project Certificate, the PEAMP is a conceptual program designed "*to work as an instrument of the proponent's overall monitoring efforts and should provide feedback to the NIRB and other agencies regarding ongoing project monitoring*." The overall goal of this program is to provide the NIRB and other regulatory agencies with information on how current environmental and socioeconomic effects of the Meadowbank mine site compare to impacts predicted in the FEIS.

More specifically, the objectives of the PEAMP as specified in the Project Certificate Appendix D are to:

a) Measure the relevant effects of the project on the ecosystemic and socioeconomic environment(s). These effects may be measured through biophysical and socioeconomic monitoring programs undertaken by the Proponent or by other means as described in the Project Certificate;
b) Assess the accuracy of the predictions made within the FEIS;
c) Evaluate the effectiveness of project monitoring procedures and plans;
d) Identify impacts requiring additional mitigation or adaptive management; and
e) Provide relevant data and information to support regional monitoring initiatives where feasible.

The methods, objectives, results and recommendations of the specific monitoring reports and results are discussed in greater detail in the preceding annual report or in attached appendices.

It should be noted that the monitoring programs as described in the FEIS were developed at a conceptual level to assist in evaluating the overall potential impacts of the project. These were supporting documents in the FEIS and assisted in informing predictions, establishing regulatory limits, and forecasting management and mitigation actions to assist in the impact prediction process. Monitoring plans and sampling locations have since undergone changes and revisions to reflect actual mine operations. Monitoring and Management Plan revisions have been approved by the Nunavut Water Board, most recently during the renewal process for the Meadowbank Type A Water License which was completed in 2015. These differences are taken into account when making comparisons to FEIS predictions.

This section has been organized into 6 main categories: Aquatic Environment, Wildlife and Terrestrial Environment, Noise Quality, Air Quality, Permafrost, and Socio-Economics. For each of these categories, Table 12.1 summarizes the valued ecosystem components (VECs) identified in the FEIS, the original impact predictions and the management plans/mitigative measures submitted as part of the FEIS. This review focuses on the potential impacts for which monitoring were recommended, for the phase of mine activity currently underway (i.e. operations).

AEM is currently working with various researchers in multiple disciplines (i.e. tailings storage and optimization, wildlife and aquatic researchers, socio-economic researchers, etc.) and would be interested in discussing other opportunities with the NIRB to advance regional monitoring initiatives as requested.

Table 12.1 - Summary of FEIS VECs, assessment endpoints and references for the predictions, management and mitigative measures.

VEC	Summary of Potential Impacts	Reference for Impact Predictions	Reference for Management and Mitigative Measures
Aquatic Environment			
Surface water quantity	Reduced water level and flow in receiving lakes	FEIS, Section 4.21.2.3 FEIS App B, Table B4	FEIS, Section 4.24.2.5
Surface water quality	Contamination of receiving lakes	FEIS, Section 4.21.2.3 FEIS App B, Table B5 FEIS App E FEIS - WQ	FEIS, Section 4.24.2.5
Fish populations	Direct impacts through blasting. Indirect impacts through habitat changes.	FEIS, Section 4.21.2.7 FEIS App B, Table B13	
Fish habitat	Direct impacts through habitat destruction or alteration. Indirect impacts through introduction of contaminants.	FEIS, Section 4.21.2.7 FEIS App B, Table B14	FEIS, Section 4.24.2.3 NNL
Terrestrial Environment			
Vegetation (wildlife habitat)	Removal of plant cover, abrasion/grading, salt, dust, grey water release	FEIS, Section 4.21.2.4 FEIS App B, Table B6	FEIS, Section 4.24.2.1 TEMP
Ungulates	Habitat loss, mortality	FEIS, Section 4.21.2.5 FEIS App B, Table B7	FEIS, Section 4.24.2.2 TEMP
Predatory mammals	Habitat loss, mortality	FEIS, Section 4.21.2.5 FEIS App B, Table B8	FEIS, Section 4.24.2.2 TEMP
Small mammals	Habitat loss, mortality	FEIS, Table 4.24 FEIS App B, Table B9	FEIS, Section 4.24.2.2 TEMP

VEC	Summary of Potential Impacts	Reference for Impact Predictions	Reference for Management and Mitigative Measures
Raptors	Habitat loss, noise	FEIS, Section 4.21.2.6 FEIS App B, Table B10	FEIS, Section 4.24.2.2 TEMP FEIS App B, Table B10
Waterfowl	Habitat loss, ingestion of contaminants	FEIS, Section 4.21.2.6 FEIS App B, Table B11	FEIS, Section 4.24.2.2 TEMP
Breeding birds	Habitat loss, mortality	FEIS, Section 4.21.2.6 FEIS App B, Table B12	FEIS, Section 4.24.2.2 TEMP
Air Quality	Contamination of aquatic environment by dust. Contamination of terrestrial environment by dust. Poor air quality. Odours may attract scavengers. Production of greenhouse gases, other gaseous contaminants and particulate matter.	FEIS, Section 4.21.2.2 FEIS App B, Table B2	FEIS, Section 4.24.2.3
Noise	General disturbance of wildlife as a result of regular noises (behavioural changes, displacement). Reduced habitat effectiveness.	FEIS, Section 4.21.2.2 FEIS App B, Table B3	FEIS, Section 4.24.2.3
Permafrost	Thaw instability. Changes in permafrost depth in various areas (increase/decrease). Ice entrapment in tailings/reclaim.	FEIS, Section 4.21.2.1 FEIS App B, Table B1	FEIS, Section 4.24.2.4
Socio-economic		FEIS, Section 4.21.4 FEIS App B, Table B15	FEIS, Section 4.24.3
Traditional Ways of Life (personal and community)	Reduced access to land. Reduction in traditional activities including harvesting. Undervaluing traditional ways and loss of knowledge.		

VEC	Summary of Potential Impacts	Reference for Impact Predictions	Reference for Management and Mitigative Measures
Wellness (personal and community)	Poor financial decision making. Increased income disparity. Increased public health and safety risks. Stress from rotational employment. Increased traffic accidents and emergencies. Disturbance by project activities.		
Infrastructure and social services	Shortage of housing and other infrastructure. Increased demand for social services.		
Sites of heritage significance	Potential degradation of historically significant sites.		

12.1 AQUATIC ENVIRONMENT

The results of the 2015 aquatic ecosystem and physical environment monitoring programs were evaluated and a comparison was made to the impacts predicted in the FEIS. The aquatic environment VECs identified in the FEIS were: surface water quantity, surface water quality, and fish/fish habitat. The following sections summarize the predicted impacts to the aquatic environment, assess the accuracy of the predictions, discuss the effectiveness of the monitoring program at targeting predicted impacts and provide recommendations for any additional required mitigation or adaptive management. Any use of the monitoring data in regional monitoring initiatives is described.

12.1.1 Accuracy of Predictions

In general, Meadowbank's water quality and quantity monitoring programs intend to meet the requirements of the NWB (Type A license) and Environment Canada MMER criteria. As anticipated, the mine lay-out and infrastructure have changed since the FEIS was produced, and sampling locations have been adjusted accordingly. Overall, observed impacts to water quantity, water quality, fish and fish habitat measured in 2015 are within FEIS predictions or, if not, are not expected to result in adverse environmental impacts. See Tables 12-2, 12-3 and 12-4 for summaries.

12.1.1.1 Water Quantity

A summary of predictions for impacts to water quantity and the accuracy of these predictions (measured impacts) is provided in Table 12.2.

Water usage predictions were made during the FEIS to predict potential impacts to water levels in Third Portage Lake, Second Portage Lake, and Wally Lake. Modeling predicted the natural range of water levels in Third Portage Lake to be 133.82 – 134.19 masl, and the impact assessment indicated that this range would not be exceeded (Physical Environment Impact Assessment Report, 2005). Although these values accounted for 1-in-100 yr precipitation or drought events, prior to operation, water levels were already below this range when monitoring began (prior to any significant freshwater consumption) in 2009 and continue to be today. Although rates of dewatering (i.e. pumping rates) were underestimated during the FEIS, water levels have not significantly changed at monitoring stations since monitoring began. Similarly, discharge volumes from the Vault Attenuation Pond to Wally Lake were underestimated in the FEIS (potentially due to changes in site designs since that time) but impacts to water levels in Wally Lake have not been observed, as anticipated.

Table 12.2. Water Quantity. *when monitoring began in 2009 (prior to significant freshwater use), water level was already outside this range at 133.5 masl, which is lower than the 2015 average.

Potential Impact	Potential Cause(s)	Proposed Monitoring	Monitoring Conducted (2015)	Predicted Impact	Measured Impact (2015)
Altered water levels in Third Portage Lake	Potentially high seepage rates (from lakes into pits)	Monitor pit seepage rates	Lake levels monitored	No change in lake level (modeled range = 133.82 – 134.19 masl*; 2009 measured = 133.5 masl)	133.41 – 133.78 masl (average = 133.64 masl)

	Freshwater consumption	Monitor freshwater use	Freshwater use monitored	0.53 M m^3/yr (Year 5 – 8; FEIS) NWB renewed water license and approved 2.35 Mm^3/yr until 2017 and 9.12 Mm^3/yr in 2018 through to expiry of license.	811,807 m^3 in 2015
	Discharge from Portage Attenuation Pond	Monitor discharge volumes and timing	Discharge volumes monitored	458,400 m^3/yr (max)	No discharge in 2015
	Non-contact water diverted from Second Portage Lake drainage into TPL	Monitor discharge volumes of non-contact water	Lake levels monitored	No change in lake level (modeled range = 133.82 – 134.19 masl*; 2009 measured = 133.5 masl)	133.41 – 133.78 masl (average = 133.64 masl)
Altered water levels in Second Portage Lake	Potentially high seepage rates (from lakes into pits)	Monitor pit seepage rates	Lake levels monitored	Dike seepage rates predicted at 10^{-2} – 10^{-4} L/s/m of dike; Minor effect on lake level (baseline = 133.1 masl)	132.85 – 133.79 masl (average = 133.12 masl)
	Non-contact water diverted from Second Portage Lake drainage	Monitor discharge volumes of non-contact water	Lake levels monitored	Minor effect on lake level (baseline = 133.1 masl)	132.85 – 133.79 masl (average = 133.12 masl)
Increased water levels in Wally Lake	Discharge from Attenuation Pond	Monitor discharge rates	Monitored discharge rates	Minimal increase in water levels. Total average annual discharge is approximately 456,450 m^3 during open water months	Water levels = 139.29 – 139.76 masl (average = 139.47 masl) 1,116,846 m^3 discharged, however highest water level occurred prior to discharge commencing (June, 2015 – 139.755 masl) so no anticipated impact.

12.1.1.2 Water Quality

There are many monitoring programs conducted to evaluate water quality at Meadowbank. These are mainly a requirement of the Type A Water License as well as the federal MMER. They are designed to provide immediate feedback such that mitigation or adaptive management can be implemented. As outlined in the FEIS, the Core Receiving Environment Monitoring Program is intended to monitor large-scale (e.g. basin-wide) changes in physical and biological variables to evaluate potential impacts from all mine related sources in the receiving environment. It therefore serves as the most important monitoring program for evaluating short term and long term potential impacts to populations. In 2015, AEM implemented an updated CREMP plan in accordance with the terms of their renewed NWB water license (2AM-MEA1525) for the Meadowbank site. Each year, information from the CREMP and other targeted programs is evaluated in an integrated manner and reported as the AEMP (Section 8.9 of this document) to determine any required changes to mitigation practices. The AEMP summarizes the results of each of the underlying monitoring programs, including the CREMP, reviews the inter-linkages among the monitoring programs; integrates the results, and recommends management actions. The AEMP did not detect any significant mine-related changes in the water quality that had the potential to cause risks to the aquatic environment. This is consistent with FEIS predictions.

Aspects of the mine that were identified in the FEIS as potentially leading to significant impacts during operations are summarized Table 12.3, along with results of the monitoring programs aimed at assessing these impacts. Note that this assessment focuses on comparing current measured effects with predictions made in the Physical Environment Impact Assessment Report (2005); it does not attempt to compare effects of all aquatic environment monitoring programs with respective threshold or trigger values developed for AEMP programs or to regulatory criteria imposed. For results of those assessments, see individual monitoring reports, or the summary provided under Section 8.7 of this report.

It is also important to note that discharge of effluent into Third Portage Lake from the Portage Attenuation pond ceased prior to 2015. However, discharge of effluent into Wally Lake from the Vault Attenuation Pond occurred from July 7 – September 10, 2015. Discharge of East Dike seepage to Second Portage Lake occurred throughout the year. This discharge point was not identified in the original FEIS, but impaired water quality in Second Portage Lake from Portage Attenuation Pond effluent and dike leaching were identified as potential impacts, so monitoring of effluent and receiving environment water quality were proposed. Since discharge from the Portage Attenuation Pond ceased, the effluent monitoring for Second Portage Lake described below refers to discharge from the East Dike seepage discharge only (see also Section 8.2.3).

Table 12.3. Water quality.

Potential Impact	Potential Cause(s)	Proposed Monitoring	Monitoring Conducted (2015)	Predicted Impact	Measured Impact
Impaired Wally Lake water quality	Vault attenuation pond effluent discharge; dike leaching	Effluent and receiving environment monitoring	Receiving environment: CREMP Effluent: MMER, Water License	Receiving environment: CREMP results <CWQG except arsenic and cadmium Effluent: <MMER	Receiving environment: CREMP results <CWQG where available; some trigger exceedances relative to reference/baseline (conductivity, hardness, some major ions, TDS and TKN) but low potential for adverse impacts. Effluent: <MMER and Water License Criteria
Impaired Second Portage Lake water quality	Portage Attenuation pond effluent discharge; dike leaching; (East Dike seepage)	Effluent and receiving environment monitoring	Receiving environment: CREMP Effluent: MMER, Water License	Receiving environment: CREMP results <CWQG except cadmium Effluent: <MMER, Water License	Receiving environment: CREMP results <CWQG where available; some exceedances relative to reference/baseline (alkalinity, hardness, conductivity, major ions and TDS) but low potential for adverse impacts. Cadmiun below CWQG. Effluent: <MMER, Water License
Impaired Third Portage Lake water quality	Portage Attenuation pond effluent; dike leaching	Effluent and receiving environment monitoring	Receiving environment: CREMP (MMER effluent monitoring not required)	CREMP results <CWQG except cadmium	Receiving environment: CREMP results <CWQG where available; some exceedances relative to reference/baseline (conductivity, hardness, major ions and TDS) but low potential for adverse impacts. Cadmium below CWQG.

12.1.1.3 Fish and Fish Habitat

In addition to water quality and quantity, site specific monitoring programs were developed to address the impacts of mining activities to fish and fish habitat. These are primarily guided by the No Net Loss Plan (NNLP) and associated fisheries monitoring (e.g. CREMP, Habitat Compensation Monitoring Plan, blast monitoring) as set out in the DFO Authorization for the mine-site. Results of these programs are summarized in relation to FEIS predictions in Table 12.4, below. Again, only predictions for which monitoring was proposed are discussed. All measured impacts to fish and fish habitat were within FEIS predictions, except for two exceedances of the DFO guideline for peak particle velocity (PPV), due to blasting. However, no adverse impacts to fish or fish habitat are anticipated as a result (see Section 8.5 for a discussion of blast monitoring results).

Table 12.4 Fish and Fish Habitat

Potential Impact	Potential Cause(s)	Proposed Monitoring	Monitoring Conducted (2015)	Predicted Impact in FEIS	Observed Impacts (2015)
Loss/impairment of fish habitat	Construction of temporary and permanent in-water features (e.g. TSF, dikes, pits).	Monitoring of compensation features per NNLP (targeted studies under AEMP for dike "pore water" (interstitial water) quality, periphyton growth, fish use).	HCMP: Dike interstitial water quality, periphyton, fish use around dikes and Dogleg system; fish use of AWAR compensation feature	Dikes will provide a medium for lower trophic growth; habitat for non-spawning life functions except Goose Island dike where spawning may occur.	Compensation features appear to be functioning as intended (good interstitial water quality, continuing periphyton growth, fish presence around dikes and in Dogleg system, use of AWAR feature for spawning)
	Construction of barge facility in Baker Lake	Annual monitoring of shoreline stability and integrity	N/A	Negligible impact	No impacts observed (CREMP)
Reduced fish egg survival	Metals and particulates from dike leachate, effluent, and road dust. Blasting	Dike leachate: Targeted studies under AEMP ("pore water" (interstitial water) sampling during year 1 Effluent: Water quality monitoring under MMER. Dust: Whole-lake water quality under CREMP	Dike leachate: Interstitial water quality monitoring under HCMP Effluent: MMER monitoring Dust: Whole-lake water quality under CREMP Blasting: Blast monitoring	Dike leachate: Dissolved metals may reduce fish egg survival and larval development during overwinter incubation. Effluent: < MMER (2002) regulations Dust (whole-lake water quality under CREMP): negligible ecological effect, <CWQG for aquatic life (CCME) except cadmium (TPL), and arsenic and cadmium (Wally Lake)	Dike leachate: No adverse effects anticipated related to interstitial water quality (< CCME guidelines except 1 TSS sample). Effluent: < MMER, Water License Dust (whole-lake water quality under CREMP): CREMP results <CWQG where available; some exceedances relative to reference/baseline

Table 12.4 Fish and Fish Habitat

Potential Impact	Potential Cause(s)	Proposed Monitoring	Monitoring Conducted (2015)	Predicted Impact in FEIS	Observed Impacts (2015)
		Blasting: Blast monitoring		Blasting: Most blasts will not exceed DFO overpressure guideline (50 kPa); no exceedances of PPV guideline (13 mm/s)	(some conventionals) but low potential for adverse impacts. Blasting: All overpressure values < 50 kPa; two exceedances of PPV guideline (no anticipated significant impacts to spawning fish).
Mortality of fish and fish eggs	Blasting	Blast monitoring	Blast monitoring	Most blasts will not exceed DFO overpressure guideline (50 kPa); no exceedances of PPV guideline (13 mm/s)	All overpressure values < 50 kPa; two exceedances of PPV guideline (no anticipated significant impacts to spawning fish).
	Worker fishing in project area, despite no-fishing policy; increased fishing in area due to AWAR	Worker fishing: Staff interviews AWAR fishing: Creel survey	Creel survey	Unknown	No fish were caught in the project lakes by Baker Lake residents participating in the creel survey.
	Accidental spills (e.g. fuel)	Event-based monitoring; spill emergency response plan	Monitoring spills during site inspections and as part of managing the TSF	Not defined	No observed impacts

Table 12.4 Fish and Fish Habitat

Potential Impact	Potential Cause(s)	Proposed Monitoring	Monitoring Conducted (2015)	Predicted Impact in FEIS	Observed Impacts (2015)
Fish stress, behavioural changes, avoidance	Increased concentrations of dissolved metals and TSS from dust and effluent discharge	Dust: Whole-lake water quality monitoring under CREMP Effluent: Monitoring under MMER program	Dust: Whole-lake water quality under CREMP Effluent: MMER monitoring	Dust (whole-lake water quality under CREMP): negligible ecological effect; <CWQG for aquatic life (CCME) except cadmium (TPL), and arsenic and cadmium (Wally Lake) Effluent: < MMER criteria	Dust (whole-lake water quality under CREMP): CREMP results <CWQG where available; some exceedances relative to reference/baseline (some conventionals) but low potential for adverse impacts. Cadmium, Arsenic<CWQG in all lakes Effluent: < MMER, Water License
Impaired lower trophic levels (incl. loss of phytoplankton, periphyton and benthos)	Leaching of metals from dikes	Targeted studies under AEMP ("pore water" sampling; periphyton sampling) during year 1	Ongoing interstitial water quality and periphyton monitoring under HCMP	Dike faces will provide a medium for periphyton growth	Interstitial water quality <CCME except 1 TSS sample. Healthy periphyton community growth with increasing biomass was observed.
	Sedimentation through dust/particulate dispersion (road dust, wind dispersal, terrain disturbance) and	Dust: Water quality monitoring through CREMP Effluent: MMER monitoring	Dust: CREMP (water quality and lower trophic level monitoring) Effluent: MMER monitoring	Dust: negligible ecological effect; CREMP results <CWQG for aquatic life (CCME) except cadmium (TPL), and arsenic and cadmium (Wally Lake)	Dust: CREMP results <CWQG where available; some exceedances relative to reference/baseline (some conventionals) but low potential for

Table 12.4 Fish and Fish Habitat

Potential Impact	Potential Cause(s)	Proposed Monitoring	Monitoring Conducted (2015)	Predicted Impact in FEIS	Observed Impacts (2015)
	effluent discharge			Effluent: Settling of TSS and altered sediment chemistry may impact benthos.	adverse impacts. Effluent: <MMER
Increased fish biomass	Release of nutrients in treated sewage	Nutrients, chlorophyll a, and phytoplankton monitoring through CREMP in TPL	Nutrients, chlorophyll a, and phytoplankton monitoring through CREMP in TPL	Increase in nitrogen concentrations; change in phytoplankton species in TPL	No exceedance of nitrogen trigger value, no mine-related changes to chlorophyll a or phytoplankton in TPL. No direct discharge of sewage to receiving body.
Impaired fish passage along AWAR streams	Culvert installation	AWAR Fish Monitoring Report: (targeted monitoring study under AEMP - hoopnets at culvert crossings only; 1 year minimum)	Not required – program complete in 2011 after 5 years	Negligible residual impact on fish and their movements within streams and channels	N/A

12.1.2 Effectiveness of Monitoring Programs

The aquatic monitoring programs at Meadowbank were originally designed as part of the FEIS and adapted to meet the requirements of the NWB Type A License, Environment Canada regulations and DFO authorizations for the protection of the aquatic system. Beyond meeting the regulatory requirements, the numerous 2015 aquatic monitoring programs addressed all relevant potential impacts to water quantity, water quality and fish/fish habitat identified in the FEIS, as demonstrated in Tables 12.2, 12.3, and 12.4.

12.1.3 Recommendations for Additional Mitigation or Adaptive Management

Overall, the measured impacts to water quantity, water quality, fish and fish habitat appeared to be within the FEIS predictions, or were not expected to result in adverse effects (i.e. 2 exceedances of PPV guideline), indicating that the original predictions were conservative. In the case where water levels in Third Portage Lake are occasionally below predicted levels, it is not clear that this impact is mine-related, since significant changes in water levels have not occurred since prior to dewatering and freshwater use began (2009). Based on FEIS predictions, there are no other specific recommendations for further mitigation of impacts to water quality, water quantity, or fish/fish habitat. However, several amendments to monitoring programs are recommended in AEMP-related studies (see Section 8.9.6).

12.1.4 Contributions to Regional Monitoring

AEM is working closely with University of Guelph and University of Alberta researchers, who are extending terrestrial modelling to include linkages to aquatic food webs, and initiating a study on use of eDNA for predicting fish presence, which will assist in developing future aquatic habitat productivity models. Furthermore, AEM continues to discuss current methods of evaluating fish habitat and productivity of a fishery under the new DFO Fisheries Act and fisheries protection policy with consultants, academic researchers and have provided all of the raw fishout data and habitat mapping to DFO scientists. At a regional level, the information, monitoring tools, monitoring data and modelling that is used at Meadowbank has been applied by AEM and other consultants at other proposed projects in Nunavut including, the Meliadine Gold Project.

Furthermore, AEM is contributing to the Baker Lake Watershed Monitoring Organization to assist in developing and engaging in the development of the Baker Lake Aquatic Cumulative Effects Monitoring Program. The Baker Lake Basin includes watershed that encompass a large portion of the southern Kivalliq region of Nunavut and feeds into estuaries of Chesterfield. In 2012, KivIA and AANDC partnered with the Nunavut General Monitoring Program (NGMP) to develop a high-level aquatic cumulative effect monitoring framework and preliminary program for the Baker Lake Basin. In 2014, an AEM representative participated in the design workshops and participated in the development of the program as a member of the Technical Advisory Group. AEM provided assistance to KIA in 2015 during their sampling program in Baker Lake. This program is cumulative effects based.

12.2 TERRESTRIAL AND WILDLIFE ENVIRONMENT

In accordance with the PEAMP objectives, the results of the 2015 wildlife monitoring programs were evaluated and a comparison was made to the thresholds for adaptive management established for each VEC (vegetation (wildlife habitat), ungulates, predatory mammals, small mammals, raptors, waterfowl and breeding birds). Thresholds, as developed in the Terrestrial Ecosystem Management Plan (a component of the FEIS), were used in this comparison because most impact predictions in the Terrestrial Ecosystem Impact Assessment were qualitative (other than loss of habitat area).

The following sections summarize the thresholds for terrestrial and wildlife VECs, provide an assessment of any exceedances of thresholds, and discuss the effectiveness of the monitoring program at targeting predicted impacts. Additional recommendations are made for any required mitigation or adaptive management. Any use of the monitoring data in regional monitoring initiatives is described.

12.2.1 Accuracy of Predictions

For each VEC, a summary of predicted impacts and the accuracy of those predictions (observed impacts) as determined through various monitoring programs is provided in Tables 12.5.

Overall, only one impact to terrestrial VECs exceeded the established threshold.

Table 12.5. Terrestrial impacts and associated effects predicted in the FEIS, proposed monitoring, actual monitoring (2015) and any observed impacts (2015). Adapted from Table 10.1 in the 2015 Wildlife Monitoring Summary Report (Appendix G13. Measured impacts exceeding predictions/thresholds are indicated in grey.

Potential Impact	Potential Cause(s)	Monitoring Methods	Monitoring Conducted (2015)	Threshold/ Prediction	Measured Impact (2015)
Vegetation (Wildlife Habitat)					
Habitat Loss	Mine site footprint, pits, roads, water management and collection systems	Ground Surveys, Mapping, GIS Analysis	No - not scheduled, see 2014 Wildlife Summary Report, scheduled again in 2017.	-	-
Habitat Degradation by Contamination	Dust from roads, TSF, airstrip	Vegetation and Soil Samples (SLRA)	No - not scheduled, scheduled again in 2017.	-	-
Ungulates					
Habitat Loss and Degradation	Mine site footprint, pits, roads, water management and collection systems	Ground Surveys, Mapping, GIS Analysis	No - not scheduled	-	-
Sensory Disturbance	Avoidance due to noise and activity (roads, airstrip, mine	Ground Surveys, Satellite-collaring	Yes	Avoidance of habitat more than 500 m from site;	Possible exceedance of threshold; see Appendix G13 for

Potential Impact	Potential Cause(s)	Monitoring Methods	Monitoring Conducted (2015)	Threshold/ Prediction	Measured Impact (2015)
	site)			1000 m from AWAR	planned management actions
Vehicle Collisions	Vehicular or air traffic collisions	Ground surveys, Collision Reporting System	Yes	One mortality per year	No mortalities
Hunting by Baker Lake Residents	Improved access to hunting along the AWAR	Hunter Harvest Study	Yes	< 20% increase of historical harvest activities within the RSA; no significant impact to herds	Average of 79% [max of 85%] harvest within RSA since 2007 compared to 67% pre-project; no significant impact to herds, <20%
Other Mine-related Mortality	Falling into pits, TSF or other means	Ground surveys	Yes	One mortality per year	No mortalities
Exposure to Contaminated Water or Vegetation	Consumption of contaminated dust deposited on vegetation	Vegetation and Soil Samples (SLRA)	No - not scheduled	-	-
Predatory Mammals					
Project-related Mortality	Vehicular or air traffic collisions, falling into pits, TSF or other means	Ground Surveys, Collision Reporting System	Yes	One mortality per year	One fox euthanized after not responding to deterrents
Small Mammals					
Habitat Loss and Degradation	Mine site footprint, pits, roads, water management and collection systems	Ground Surveys, Mapping, GIS Analysis	No - not scheduled	-	-
Project-related Mortality	Vehicular or air traffic collisions, falling into pits, TSF or other means	Ground Surveys, Collision Reporting System	Yes	Mortality of 100 individuals per year	No mortalities

Potential Impact	Potential Cause(s)	Monitoring Methods	Monitoring Conducted (2015)	Threshold/ Prediction	Measured Impact (2015)
Exposure to Contaminated Water or Vegetation	Consumption of contaminated dust deposited on vegetation	Vegetation and Soil Samples	No - not scheduled	-	-
Raptors					
Healthy Prey Populations	Mine Footprint, dust and exhaust, noise (road, airstrip, mine site, Baker Lake barge area)	Vegetation and Soil Samples; PRISM plot surveys; ELC habitat mapping	PRISM plots only	Thresholds are qualitative, and can be achieved through management and maintenance of vegetation and healthy prey communities.	N/A
Disturbance of Nesting Raptors	Noise and Activity	Active Nest Monitoring	Yes	One nest failure per year	4 nests, no failure observed (same as 2014)
Project-related Mortality	Vehicle/ bird collisions	Ground Surveys, Collision Reporting System	Yes	One mortality per year	No mortalities
Waterbirds					
Habitat Loss and Degradation	Mine Footprint, dewatering dust and exhaust, noise (road, airstrip, mine site, Baker Lake barge area)	Ground Surveys, Mapping, GIS Analysis	No - not scheduled	-	-
Disturbance of Nesting Waterfowl	Noise and Activity; dewatering	Waterfowl Nest Surveys	Yes	One nest failure per year	No waterfowl nesting onsite identified
Exposure to Contaminated Water or Vegetation	Mine site dust; Secondary containment structures and tailings storage facilities	Vegetation and Soil Samples	No - not scheduled	-	-

Potential Impact	Potential Cause(s)	Monitoring Methods	Monitoring Conducted (2015)	Threshold/ Prediction	Measured Impact (2015)
Project-related Mortality	Vehicle/ bird collisions	Ground Surveys, Collision Reporting System	Yes	One mortality per year	One duck mortality, suspect collision with building/window (cause unknown) and one Canada goose mortality (TSF-related), exceed prediction onsite
Other Breeding Birds					
Habitat Loss and Degradation	Mine Footprint, dewatering dust and exhaust, noise (road, airstrip, mine site, Baker Lake barge area)	Ground Surveys, Mapping, GIS Analysis	No - not scheduled	-	-
Project-related Mortality	Vehicle/ bird collisions	Ground Surveys, Collision Reporting System	Yes	50 project-related mortalities per year	No mortalities
Exposure to Contaminated Water or Vegetation	Mine site dust	Vegetation and Soil Samples	No - not scheduled	-	-
Changes in Breeding Bird Populations	Mine Footprint, dewatering dust and exhaust, noise (road, airstrip, mine site, Baker Lake barge area)	Breeding Bird Plots and Transects	Yes	For PRISM plots, threshold is > 20% from control plots. For transect surveys, threshold is reduced use beyond 100 m of road centreline.	PRISM plot threshold not exceeded; transect results similar to previous years (threshold not exceeded)

12.2.2 Effectiveness of Monitoring

Current monitoring programs are effectively able to measure impacts as they relate to established threshold levels.

12.2.3 Recommendations for Additional Mitigation or Adaptive Management

As summarized in Table 12.5, two Terrestrial Ecosystem Monitoring Program thresholds were exceeded or potentially exceeded in 2015 (waterfowl mortalities; and potentially, sensory disturbance of caribou related to the AWAR). Additional mitigation to reduce waterfowl mortalities will be implemented in 2016, including increased monitoring of the tailings storage facility (daily) during the waterfowl migratory period, and increased frequency of deterrent use if required. To address results suggesting potential deflection of caribou walkpaths in relation to the Meadowbank AWAR, an analysis of collar data by the GN (in partnership with AEM) as part of the caribou collaring and monitoring program will be conducted to determine project-related effects due to the AWAR. AEM will continue to closely monitor caribou movement in the weeks leading up to these annual migrations using the latest available satellite-collaring and AWAR survey data as well as incidental reports from staff utilizing the AWAR on a regular basis (e.g., security personnel). Notification and announcements, staff re-education, specific dispatch protocols, and temporary road closures will continue to be implemented as in previous years, as a proactive management strategy. As well, the GN, with support from Agnico Eagle, is planning on deploying additional collars on caribou in the Baker Lake area in 2016, which will ensure that ongoing satellite-collaring information on caribou movements and distribution are accessible to Agnico Eagle for monitoring purposes.

12.2.4 Contributions to Regional Monitoring

In 2015, Meadowbank continued to contribute to the GN DOE caribou collaring which started in 2009. Five deployments have been completed in the area around Baker Lake since Agnico Eagle became involved in the collaring program. Nine (2008), twenty one (2009; shared with AREVA), thirteen (2011), fifteen (2013; shared with AREVA) and ten (2015) caribou collars were deployed (greater than $250 000). In early 2011, Meadowbank contributed additional funding toward the GN-led program to estimate the number of breeding females in the Beverly herd of taiga-wintering barren-ground caribou. In 2013, AEM finalized discussions with the GN and entered into a new Memorandum of Understanding (MOU) to commit to another long term (3 year) contribution in support of the regional GN caribou monitoring program. This agreement will continue to assist the GN- DOE- Wildlife branch in directing the implementation, data analysis and management of caribou populations in the Kivalliq region. The program continued in 2015. AEM will be working with the GN to renew the MOU in September 2016.

12.3 NOISE

While noise generation was predicted in the FEIS for many minesite components, a significant effect of noise (disturbance of wildlife; reduced habitat effectiveness) was only associated with three components: pit development, the mine plant and the airstrip. Noise monitoring was therefore proposed in association with pit development, waste rock, tailings handling and the mill.

The following section summarizes the predicted sources of significant noise impacts at the Meadowbank site, identifies predicted sound levels at established monitoring locations, provides an assessment of the accuracy of the predictions and discusses the effectiveness of the monitoring program at targeting predicted impacts. Furthermore, additional recommendations are made for any required mitigation or adaptive management. Any use of the monitoring data in regional monitoring initiatives is described.

12.3.1 Accuracy of Predicted Impacts

Table 12.6, below, summarizes the noise impacts and associated effects predicted in the FEIS, identifies the monitoring measures conducted to assess actual impacts, and indicates the accuracy of predictions based on results of monitoring conducted in 2015 (measured sound level). Since the potential impacts of noise were all identified as wildlife disturbance, the accuracy of these predictions is also monitored through the terrestrial environment monitoring programs, as discussed in Section 12.2.

In 2015, measured sound levels exceeded predicted sound levels only at station R5 on one (1) occasion. This is likely because FEIS predictions for noise did not include helicopter activities at the exploration camp and AWAR located adjacent to station R5 as noise sources in modeling. Therefore predicted noise levels for this location were not realistic based on actual site activities.

Table 12.6. Noise impacts and associated effects predicted in the FEIS, proposed monitoring, actual monitoring (2015) and any observed impacts (2015). *at indicated monitoring station, based on FEIS modeling. ** excludes noise due to AWAR traffic. * 24 h Leq**

Potential Impact	Potential Cause(s)		Proposed Monitoring	Monitoring Conducted (2015)	Predicted Sound Level*	Measured Sound Level***
Disturbance of wildlife; reduced habitat effectiveness	Pits	Noise from blasting, etc.	Monitor noise levels and responses of wildlife	Monitored noise levels (see Section 12.2 for wildlife monitoring)	R1 = 58-63 dBA R2 = 58-63 dBA R3 = 49-53 dBA R4 = 58-63 dBA R5 = 44-49 dBA**	R1 = 48 – 51 dBA R2 = 39 dBA R3 = 21.8 – 44.3 dBA R4 = 41 - 42 dBA R5 = 55 - 60 dBA
	Waste Rock /Tailings Facility	Noise from berm construction, material handling				
	Roads and Traffic	Noise from maintenance and use				
	Airstrip	Noise from air traffic				
	Mine plant and associated facilities	Noise				

12.3.2 Effectiveness of Monitoring

By monitoring sound levels at five locations around the minesite for a 3-4 day period annually, the current monitoring program is effectively able to assess the accuracy of impact predictions with respect to noise levels. Impacts of mine-related activities (including noise) on wildlife are monitored through the Terrestrial Ecosystem Monitoring Program (TEMP). However, calculated sound levels are compared to targets established in the Noise Monitoring and Abatement Plan, which are recommended in Environment Canada's Environmental Code of Practice for Metal Mines (55 dBA daytime; 45 dBA nighttime). These values are based on considerations for wildlife. These values are lower than the predicted sound levels, and few exceedances have occurred (see 2015 Noise Monitoring Report, Appendix G9).

12.3.3 Recommendations for Additional Mitigation or Adaptive Management

Overall, impact predictions are not being exceeded at four out of five monitoring stations. Noise levels at the fifth station (R5) are likely higher than predicted because noise levels were not adequately modelled in the FEIS for the chosen monitoring location. In 2015, two out of ten recorded L_{eq} values exceeded the daytime target sound level of 55 dBA. Both were at station R5, with recorded values of 55.4 and 61.7 dBA. These values are well within the range of those observed in previous years, and are likely a result of increased helicopter activity associated with exploration projects during the monitoring time period. The R5 station is in close proximity to the helicopter pad at the exploration camp. One value exceeded the nighttime target sound level (45 dBA), with a recorded L_{eq}-night value of 51.6 dBA (occurring at R5). An examination of the data for the nighttime period indicated that the 1-h L_{eq} only exceeded 45 dBA for the 6 am – 7 am hour, likely as a result of the morning helicopter shift beginning at 6 am. AEM will continue to monitor noise levels around site and particularly at the R5 location in 2016, and will ensure two noise meters are available to reduce the potential for sampling delays related to instrument malfunction, which occurred in 2015.

12.3.4 Contributions to Regional Monitoring

In 2015, Meadowbank has not contributed to regional monitoring of noise.

12.4 AIR QUALITY

A review was conducted of the predicted impacts to air quality identified in the FEIS. While dust generation or air emissions were predicted for many minesite components, a significant effect on terrestrial and aquatic environments was only associated with three components (pit development, the mine plant and the waste rock and tailings facilities).

The following sections summarize the predicted impacts to air quality, provide an assessment of the accuracy of the predictions and discuss the effectiveness of the monitoring program at targeting predicted impacts. Furthermore, additional recommendations are made for any required mitigation or adaptive management. Any use of the monitoring data in regional monitoring initiatives is described.

12.4.1 Accuracy of Predicted Impacts

Table 12.7, below, summarizes the predicted impacts to air quality, associated effects, monitoring measures proposed in the FEIS, and results of monitoring conducted in 2015.

The main monitoring program for air quality recommended in the FEIS is static dustfall, which is being continuously monitored at four locations around the minesite. In addition, AEM conducts monitoring of TSP, PM_{10}, $PM_{2.5}$ and NO_2, in accordance with the Air Quality and Dustfall Monitoring Plan.

In the FEIS, air quality modeling was conducted for fugitive dust ($PM_{2.5}$, PM_{10} and TSP) originating from the TSF, WRSF, and ore stockpile, for 24h and annual averaging times. Deposition rates for dust from these sources were also calculated ($g/m^2/30d$). Since field monitoring captures emissions from all sources (including mobile sources and background in addition to those used in the model), accuracy of these quantitative predictions cannot adequately be assessed through field monitoring. However, modeling was also conducted for criteria pollutants (CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$) emitted from the power plant and mobile sources for 1h, 24h and annual averaging times (basis of criteria), and concentration contour plots were provided for most analyses. Carbon monoxide and sulphur dioxide were not required to be monitored as part of the program developed by AEM in consultation with regulatory agencies. Therefore, the following predicted values were able to be compared to measured values: NO_2 (annual), $PM_{2.5}$ and PM_{10} (24 h). However, it should be noted that for NO_2, modeling results were only provided for the maximum predicted ground-level concentration, which occurred adjacent to the power plant. The closest NO_2 monitoring station is at a distance of approximately 1 km southwest (cross-wind) from this location. Further, modeling results do not account for background concentrations, or contributions from sources other than the power plant and mobile sources, while field monitoring results naturally include all inputs.

Despite the conservative nature of this comparison, the results provided in Table 12.7 indicate that only 4 out of 228 suspended particulate samples exceeded impact predictions in 2015. In addition, rates of dustfall along the AWAR fall within impact predictions, and GHG emissions are below the predicted value.

Table 12.7. Predicted impact to air quality, associated effects, monitoring measures proposed in the FEIS, and results of monitoring conducted in 2015. *see explanation in Section 12.4.1.

Potential Impact	Potential Cause(s)		Proposed Monitoring (FEIS)	Monitoring Conducted (2015)	Predicted Values (FEIS)	Measured Values (2015)
Poor air quality and terrestrial/aquatic contamination	Dikes	Generation of dust during placement of dike material	Static dustfall	N/A (no dikes constructed)	-	-
	Dewatered Basins	Generation of dust from exposed lake sediment	Static dustfall	As proposed plus NO_2 (four locations around site) and suspended particulates (2 locations)	NO_2 (ug/m^3; annual avg.)* = 9.5 PM_{10} (ug/m^3; 24 h): DF-1: 30-40 DF-2: 10-20 $PM_{2.5}$ (ug/m^3; 24 h): DF-1: 15-20 DF-2: 5-10	NO_2 (ug/m^3; annual avg.; DF-2)* = 1.7 PM_{10} (24 h): DF-1: 0/59 samples > 40 ug/m^3 DF-2: 3/55 samples >20 ug/m^3 $PM_{2.5}$ (24 h): DF-1: 0/59 samples > 10 ug/m^3 DF-2: 1/55 samples > 10 ug/m^3
	Pits	Generation of dust and gases from blasting, excavation etc.	Static dustfall			
	Waste Rock Pile and Tailings Facility	Generation of dust from material deposited on waste rock pile or tailings	Static dustfall			
	Airstrip	Generation of dust and emissions from development, maintenance and use	Static dustfall			
	Roads and Traffic	Generation of dust and emissions from development, maintenance and use	Static dustfall	As above, plus AWAR targeted study	As above for site. For AWAR: Majority of dustfall expected to occur within 100 m.	More than 2x reduction in average total dustfall occurred between 25 and 100 m; see 2015 All-Weather Access Road Dust Monitoring Report
	Sewage and Solid Waste	Release of pollutants from incineration	Maintain scrubbers; report	GHG emissions reported	190,768 t CO_2 equivalent	187,280 t CO_2 equivalent

Potential Impact	Potential Cause(s)		Proposed Monitoring (FEIS)	Monitoring Conducted (2015)	Predicted Values (FEIS)	Measured Values (2015)
	Disposal		emissions			

12.4.2 Effectiveness of Monitoring

Impacts to air quality were predicted in the FEIS through standard modeling procedures, which predict concentrations of criteria contaminants emitted from a designated source. Since field monitoring identifies concentrations occurring from the combination of all sources (including background), it is difficult to compare results of the air quality monitoring program with predicted values. Furthermore, while concentration contour plots were provided in the FEIS for several analyses (allowing for interpolation of predicted values at current monitoring stations), only maximum predicted ground-level concentrations were provided for others.

As a result of these issues, air quality monitoring results are more effectively compared to established regulatory guidelines and standards (as in the 2015 Air Quality Monitoring Report), which in all cases are higher than predicted concentrations at the current monitoring stations. This comparison is considered to be conservative, since air quality standards are typically for emissions above background, while monitoring results are total values.

12.4.3 Recommendations for Additional Mitigation or Adaptive Management

Based on this analysis, no additional mitigation or management actions are recommended.

12.4.4 Contributions to Regional Monitoring

In 2015, Meadowbank has not contributed to regional monitoring of air quality.

12.5 PERMAFROST

In agreement with the PEAMP objectives, the results of permafrost were evaluated and a comparison was made to the potential effect predictions by subdividing the project components. The following section and concluding text summarize the impacts on permafrost due to specific mine activities in 2015 as compared to the FEIS predictions, provides an assessment of the accuracy of the predictions, effectiveness of the monitoring program and provides conclusions. Furthermore, recommendations are made for mitigation or adaptive management.

12.5.1 Accuracy of Predicted Impacts

A summary of potential project effects, as described in the FEIS and results of monitoring in 2015 to assess the accuracy of these predictions is provided in below:

1- Potential Impact: Permafrost aggradation and stabilization of new active layer in dikes

Potential Cause(s): -

Proposed Monitoring: Monitor ground temperatures; monitor slopes; monitor sub-permafrost pore pressures (tailings dike).

Monitoring Conducted: Thermistor monitoring of permafrost are done for the dewatering dikes (East Dike, Bay Goose Dike, Vault Dike, and South Camp Dike) and the TSF dikes (Central Dike, Saddle Dam 1-2, Stormwater Dike).

<u>For TSF:</u>

- Instruments (thermistors) are installed on the TSF structures for thermal monitoring of the dike structures and foundation.
- Instruments (thermistors) are installed in the tailings for thermal monitoring and freezeback measurement of the tailings.

<u>For Dewatering Dikes:</u>

- Instruments (thermistors) are installed on the structures for thermal monitoring of the dike structures and foundation.

Refer to the 2015 Annual Geotechnical Inspection (Appendix B1) and the 2015 Mine Waste Rock and Tailings Management Plan, section 8 (Appendix D1) for the location of the instruments.

Predicted Effect in the FEIS:

- Net increase in permafrost distribution and/or decrease in ground temperatures.
- Effect is restricted to the component being considered.
- Effect occurs during the mine operation period.

Observed Impact: The foundations of the TSF structures are frozen. Central dike and the seepage will continue to be monitored. The tailings are freezing as predicted. These observations are in accordance with the FEIS prediction – increase in permafrost and effect localized to the dike.

For a complete review of the instrumentation results, refer to:

- Section 5.4.2 of this report;
- 2015 Annual Geotechnical Inspection, section 4 (Appendix B1).

2- Potential Impact: Permafrost changes in Second Portage Lake (2PL) NW arm area.

Potential Cause(s): Dewatering, reclaim and attenuation pond filling, and tailings deposition.

Proposed Monitoring: Representative monitoring of ground temperatures; assessment of anticipated ice entrapment (i.e. ground ice development).

Monitoring Conducted: To monitor the permafrost aggradation and talik beneath (2PL), AEM installed, a single deep thermistor (T147-1) at the downstream toe of Stormwater Dike in 2012. Thermistors were installed on Central Dike in the winter of 2013 and 2015 to monitor the dike's performance, and provide information on the permafrost aggradation of SPL, along and following construction, operation, and into closure. These thermistors provide information on the permafrost aggradation of 2PL.

Predicted Effect in the FEIS:

- Net increase in permafrost distribution and/or decrease in ground temperatures.
- Effect is restricted to the component being considered.
- Effect occurs during the mine operation period and continues beyond the mine life.

Observed Impact: Overall monitoring results show an increase in the permafrost aggradation in SPL talik. The effect will not be permanent for the Portage pit (until flooding) but will be for the TSF's. This is within the FEIS prediction. For a complete review of the instrumentation results, refer to:

- Section 5.3.2 of this report;
- 2015 Annual Geotechnical Inspection, section 4 (Appendix B1).

3- Potential Impact: Permafrost changes in Third Portage Lake (TPL) north central shoreline and Portage Pit area.

Potential Cause(s): Portage pit development.

Proposed Monitoring: Assessment of suspected ground ice development in conjunction with permafrost aggradation. Assessment of ground ice content of select shoreline polygons.

Monitoring Conducted: The permafrost in Goose pit is monitored by thermistor SD-09-A, which is located on South Camp Dike approximately 20 m further upstream within Third Portage Lake. A total of 33 thermistors (from T1 to T30 and T3' to T5') are installed on Bay-Goose Dike. Thermistors were also installed in 2012 between Bay Goose Dike and Bay Goose Pit to monitor aggradation of permafrost. No thermistors were installed directly in Portage Pit because of the mining activities. However, the permafrost aggradation can be monitored with the thermistors installed along the west side of Portage Pit, in Central Dike and in East Dike.

Predicted Effect in the FEIS:

- Net increase in permafrost distribution and/or decrease in ground temperatures.
- Loss of permafrost and development of a new active layer in terrestrial areas as pit slope are pushed back.

Observed Impact: Overall, AEM has observed a net increase in permafrost aggradation and the structure remains in a frozen state. The thermistors seem to indicate that a permafrost condition is still developing along the Portage Pit west wall perimeter. To date for Goose Pit, results indicate show that freezeback is occurring.

. For a complete review of the instrumentation results, refer to:

- Section 5.3.2 of this report;
- 2015 Annual Geotechnical Inspection, section 4 (Appendix B1).

4- Potential Impact: Permafrost changes in waste rock area.

Potential Cause(s): Construction of waste rock facility (RSF).

Proposed Monitoring: Internal and foundation temperatures to be monitored.

Monitoring Conducted: Thermistors were installed in 2012 in RF1 and RF2 to monitor the temperature of the tailings as well as the temperature of RF1 and RF2 (which delineates the northeastern side of the TSF's North Cell and the RSF).Thermistors are also installed in the Waste Rock Storage Facility, to measure the freeze back of the waste rock and also to verify the performance of the NAG cover placed over the PAG material in the RSF. RSF-1 was installed in February 2013 and RSF-3, RSF-4, RSF-5 and RSF-6 were installed on the RSF in November 2013.

Predicted Effect in the FEIS:

- A - Fall, winter and spring placement will continue to bury the natural ground surface and permafrost will aggrade into the waste rock where a new and temporary active layer will form - POSITIVE;

- B - Placement of lifts on natural ground in the summer may continue to cause temporary and localized. Deepening of the active layer, warming of near surface permafrost and possible subsidence, particularly in low lying areas; C - where new lifts are added to older lifts, permafrost will continue to aggrade into both new and older waste rock and new active layers will form, although summer placement conditions will include temporary and localized loss of new permafrost, the net effect will be permafrost aggradation and general ground

Observed Impact: At the RF1 location**,** the temperature trend indicates the presence of an active zone within the upper elevation of the deposited tailings. At the RF2 foundation is in a frozen state. On the RSF, the results for the thermistors indicate that below approximately 2.0 to 5.5 m from the surface, the temperature remains below 0 Celsius all year long. Further down from the surface, the temperatures get close to 0 Celsius and then generally decrease with depth. For a complete review of the instrumentation results, refer to:

- Section 5.3.2 of this report;
- 2015 Annual Geotechnical Inspection, section 4 (Appendix B1).

5- Potential Impact: Potential settlement of buildings.

Potential Cause(s): Loss of permafrost under heated structures.

Proposed Monitoring: Ground temperature measurements where there is a need to monitor foundation temperatures.

Monitoring Conducted: None.

Predicted Effect in the FEIS: Net decrease in permafrost distribution and/or increase in ground temperatures.

Observed Impact: No ground temperature measurements have been undertaken at or near buildings on site. To date there has been no observed thawing of foundations.

6- Potential Impact: Permafrost changes below pipelines.

Potential Cause(s): Stabilization of permafrost temperature and active layer thickness.

Proposed Monitoring: Monitor pipeline alignment for potential permafrost degradation.

Monitoring Conducted: None.

Predicted Effect in the FEIS: Minor and undifferentiated net gain or loss of permafrost.

Observed Impact: No ground temperature measurements but no observations of thawing due to pipelines.

12.5.2 Effectiveness of Monitoring

Overall, the potential impact predicted for mine activities impacts to permafrost were adequately estimated during the FEIS.

Aggradation of permafrost and stabilization of the active layer can be monitoring adequately for the dikes and tailings storage facilities. However, no instrumentation was in place to monitor stabilization or loss of permafrost below pipelines and building infrastructure. As the pipelines and the infrastructure are stable, it is considered that the permafrost is lightly impacted by the mine activities. Thermal monitoring and ground surveys are considered effective to monitor the permafrost state and ground thermal conditions on site.

12.5.3 Recommendations for Additional Mitigation or Adaptive Management

Generally, FEIS predictions were consistent with the result.

Throughout the year in 2015, Meadowbank staff routinely monitored thermistors, dike, pits and pipelines. As mentioned above and in section 5.3.2, thermistors are installed within the TSF dikes, the tailings, the RSF, the west side of Portage Pit and the dewatering dikes to monitor thermal conditions and permafrost aggradation. New thermistors were installed in 2015 in the Central Dike and RSF. Regular field inspections, monitoring and assessment of the monitoring data will continue on regular basis in 2016.

12.6 SOCIO ECONOMIC

In 2015, the first report on the results of the Meadowbank Gold Mine Socio-Economic Monitoring Program (SEMP) was submitted to the KIA and NIRB. It was developed in consultation with the Kivalliq Socio-Economic Monitoring Committee (SEMC). Monitoring results were provided on the following valued socio-economic components (VSEC):

1. Employment
2. Income
3. Contracting and Business Opportunities
4. Education and Training
5. Culture and Traditional Lifestyle
6. Migration
7. Individual and Community Wellness
8. Health and Safety
9. Community Infrastructure and Services
10. Nunavut Economy

Table 18 of the 2014 Socio-Economic Monitoring Report summarizes socio-economic indicators, metrics, trend, observed impact and observations/impacts vs predictions. Data are summarized in the following section.

In the Meadowbank IIBA AEM has committed to prepare an annual Baker Lake Wellness Report & Implementation Plan. The KIA has agreed that the report and plan will be community-based and driven. In 2015, AEM retained Stratos Inc, a reputable Ottawa-based consulting firm, to work with community based stakeholders to identify:

- wellness indicators that are meaningful to the community of Baker Lake,
- priority areas of community wellness,
- opportunities for interagency collaboration,
- potential initiatives to address impacts.

With the initial input from community stakeholders a draft Wellness Report and Implementation plan was developed. During the 1st quarter of 2016, AEM and Stratos will meet with community-based stakeholders and relevant organizations to consult on the draft Wellness Report and Implementation Plan and make any adjustments as required. A final Wellness Report and Implementation Plan will be submitted by May 2016, followed by a community wide information session. The 2016 Report will be updated and tentatively submitted in December 2016.

The following sections summarize the predicted impacts to socio-economic parameters, provide an assessment of the accuracy of the predictions and discuss the effectiveness of the monitoring program at targeting predicted impacts. Furthermore, additional recommendations are made for any required mitigation or adaptive management. Any use of the monitoring data in regional monitoring initiatives is described.

12.6.1 Accuracy of Predicted Impacts - Positive

Based on results of this report, the accuracy of positive impacts as predicted in the FEIS are assessed in sections 12.6.1.1 to 12.6.1.7.

12.6.1.1 Contracting and Business Expenditures for Nunavut

Potential Impact (as in FEIS):

- Expenditure of $20 million in annual business expenditures in Nunavut over a ten year operation phase.
- Total expenditures of $224M for Nunavut over the lifetime of the project.
- As project expenditures are comparatively large relative to the size of the regional and territorial economies, the impact is considered of medium magnitude, positive, long term and of moderate significance.
- The potential impacts of business expansion and creation are likely to take some time to gain momentum, but overall are considered of high magnitude, positive, long term and of high significance, particularly to those individuals and their families who are able to benefit. The impacts at the community level, of moderate significance, are most likely to be seen in Baker Lake and Rankin Inlet, but some stimulus to business will be felt across the region.

Metric: Meadowbank contract expenditures, by type of business, 2011-2014. Expenditures by vendor type, 2007-2015, Contract expenditures on Baker Lake and Nunavut-Based Businesses, 2011-2014, Contract Expenditures on NTI Registered Businesses, 2011-2014.

Monitoring Conducted:

Table 12.8. Expenditures for materials and services by vendor type, 2007-2015.

Vendor type	2007-2015	% Expenditures
Total Expenditures	$ 2,884,539,492	100%
NTI Registered	$ 821,343,194	28%
Nunavut-based	$ 1,163,806,472	40%
Northern-based (NU & NT)	$ 1,355,116,828	47%
Baker Lake-Based	$ 453,746,947	16%

Figure 32. Contract Expenditures on Baker Lake and Nunavut-Based Businesses 2011-2014 (Source: Chart 15, SEMC, Appendix J7).

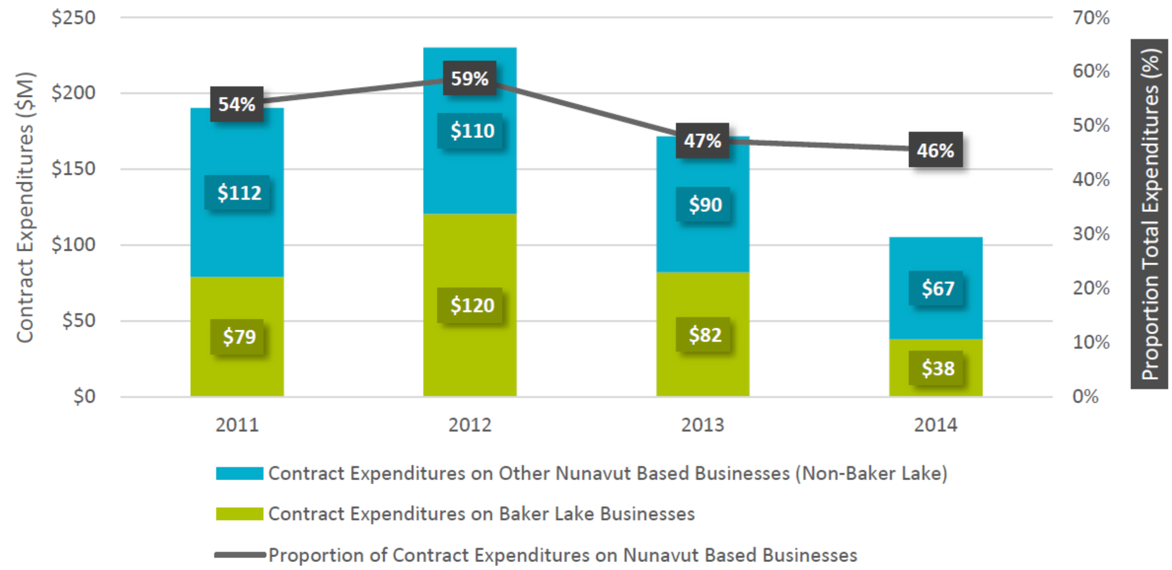


Figure 33. Contract Expenditures on NTI Registered Businesses, 2011-2014 (Source: Chart 16, SEMC, Appendix J7).

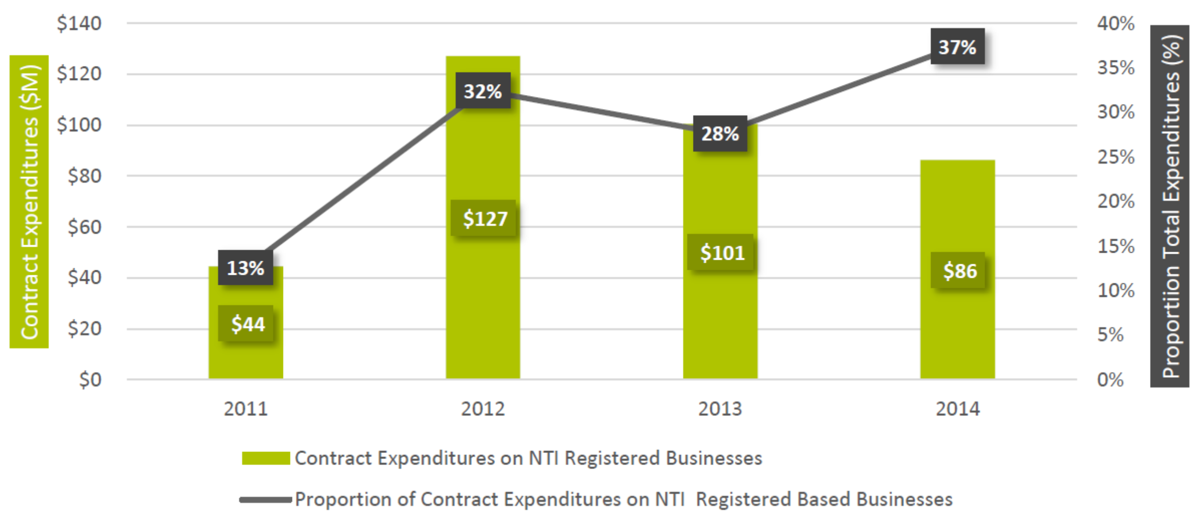
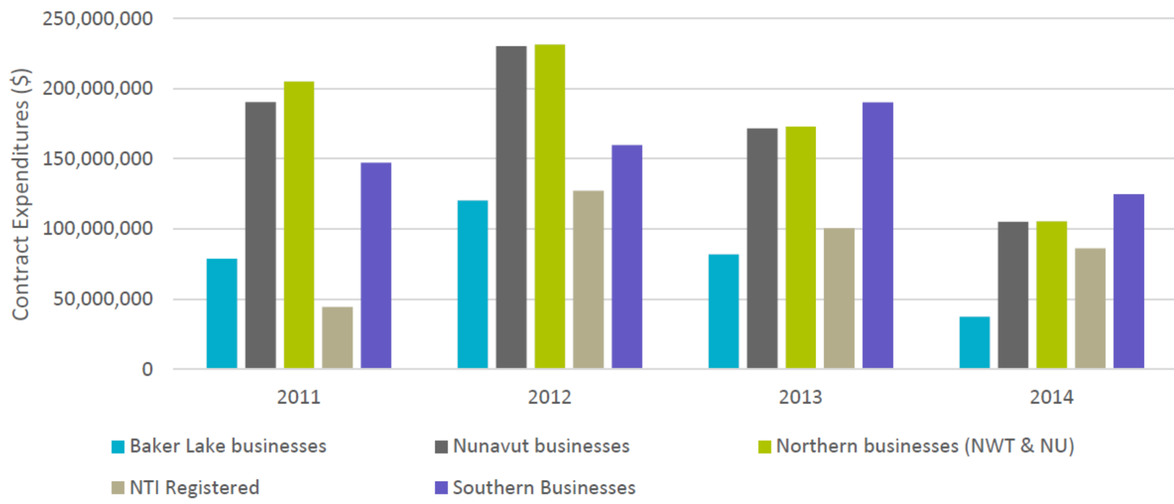


Figure 34. Meadowbank Contract Expenditures, by Type of Business, 2011-2014 (Source: Chart 39, SEMC, Appendix J7).



Observed impacts as compared to FEIS predictions:

- The expenditures have exceeded predictions, with over $100M of annual expenditures for Nunavut based businesses. From 2011 to 2014, the predicted total expenditure for Nunavut over the lifetime of the project had already been exceeded despite being only 4 years in operation.
- Since 2007 Agnico has spent $1.16 billion on goods and services with Nunavut based companies. This has allowed for these businesses to expand and create new employment oppurtunities. Agnico continues to be a pillar in the Kivalliq economy, stimulating new employment and a better standard of living for many Kivalliq families.
- In absolute dollar terms, the annual value of AEM contract expenditures has fallen significantly since commissioning, with the largest drops being in the past 2 years. The relative proportion of contract expenditures on Nunavut-based businesses has remained close to 50%, with the annual percentage varying from a high of 59% in 2012, to a low of 46% in 2014. As anticipated, Baker Lake based businesses have received a significant portion of those expenditures, although their relative share decreased in 2014.
- At the time of the FEIS, it was predicted that 25% of exploration expenditures would be to Nunavut-based businesses. As indicated above, local business participation (of Nunavut-based businesses and of NTI registered businesses) has exceeded this level since 2012, although contract expenditures in absolute dollars, including those for Nunavut-based businesses have been declining.

12.6.1.2 Employment

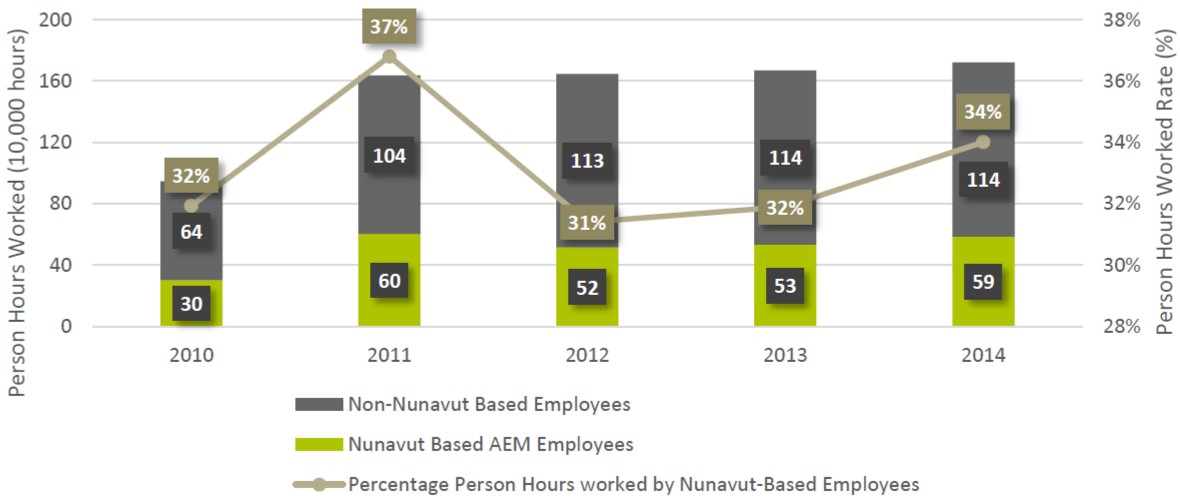
Potential Impact (as in FEIS):

- The potential impacts of employment are likely to take some time to gain full momentum, and overall are considered of high magnitude, positive, long term and of high significance, specifically to those individuals and their families who are able to benefit.

Metric: Person Hours Worked, 2010-2014. Number of Inuit employed, 2011-2015.

Monitoring Conducted:
The overall number of Inuit employed at Meadowbank has remained steady since production began, with 249 in 2011 (36.8% of the workforce), 247 in 2012 (31.4% of the workforce), 244 in 2013 (32%), 269 in 2014 (34.13%) and 215 (permanent and temporary) in 2015 (28% of permanent employees and 71% of temporary employees).

Figure 35. Person Hours Worked, 2010-2014 (Source: Chart 4, SEMC, Appendix J7)



Observed impacts as compared to FEIS predictions:

- No predictions were made in the FEIS regarding Inuit employment rates.
- Between 2010 and 2015, the total number of Inuit workers at Meadowbank has remained stable. However, as the total workforce has grown in recent years, the proportion of Inuit employees decreased slightly until 2012 but has remained steady in the low 30% range over the last three years. Inuit comprise the vast majority of temporary employees, averaging 85% over the past 5 years, compared to only 25% of permanent employees. Most of these temporary positions are temporary on-call contracts. These on-call employees, 100% filled by Kivalliq residents, have indefinite contracts and are called upon as the need arises.

12.6.1.3 GDP of Nunavut

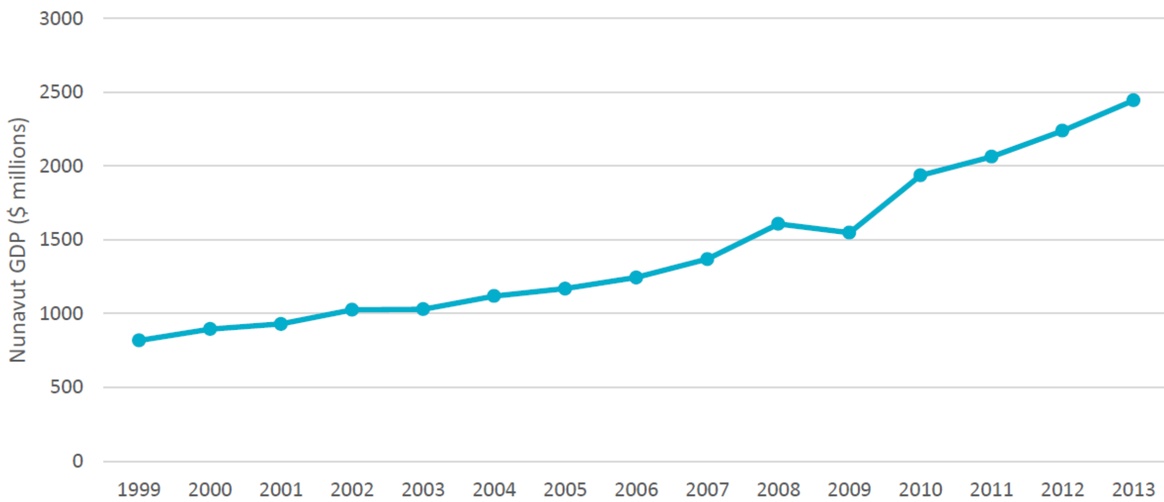
Potential Impact (as in FEIS):

- The results indicate that during the construction phase, the project would contribute $120.3 M to the GDP of Nunavut.
- During the operations phase, the annual contribution to GDP would be $35.5 M.

Metric: Nunavut Gross Domestic Product from 1999 to 2013

Monitoring Conducted:

Figure 36. Nunavut GDP, 1999-2013 (Source: Chart 40, SEMC, Appendix J7).



Observed impacts as compared to FEIS predictions:

- Nunavut's GDP steadily increased from 1999 to 2008. Following a decline in 2009 due to the global recession, a sharp increase was seen in 2010, when Meadowbank began production. In the operations phase (i.e. from 2010 onwards), these increases ranged from $127M to $388M.
- Overall, Nunavut GDP has grown at a faster rate from 2009 to 2013, coinciding with Meadowbank becoming operational, than during the previous period of 1999 to 2008. Together with the data on contract expenditures and the fact that Meadowbank has been the only operating mine in Nunavut during this period, the GDP growth data suggest that the contribution to GDP predicted in the FEIS has been exceeded.

12.6.1.4 Income

Potential Impact (as in FEIS):

- Direct project wages paid to people in Kivalliq Region, primarily Baker Lake, could exceed $4 M annually.
- The potential impacts of increased income are considered of high magnitude, positive, long term and of high significance, particularly to those individuals and their families who are able to benefit. It is expected that overall community effects, moderate in significance, are likely to be most experienced in Baker Lake, as most direct employment will occur here.

Metric: Employment Income

Monitoring Conducted:

Figure 37. Income Paid to Meadowbank Inuit Employees, 2010-2014, (Source: Chart 12, SEMC, Appendix J7).

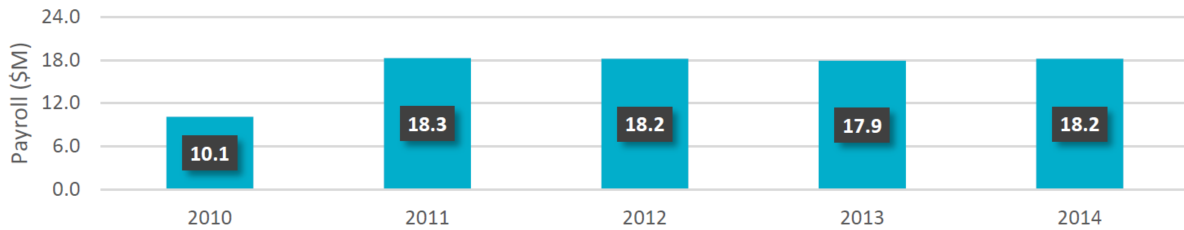
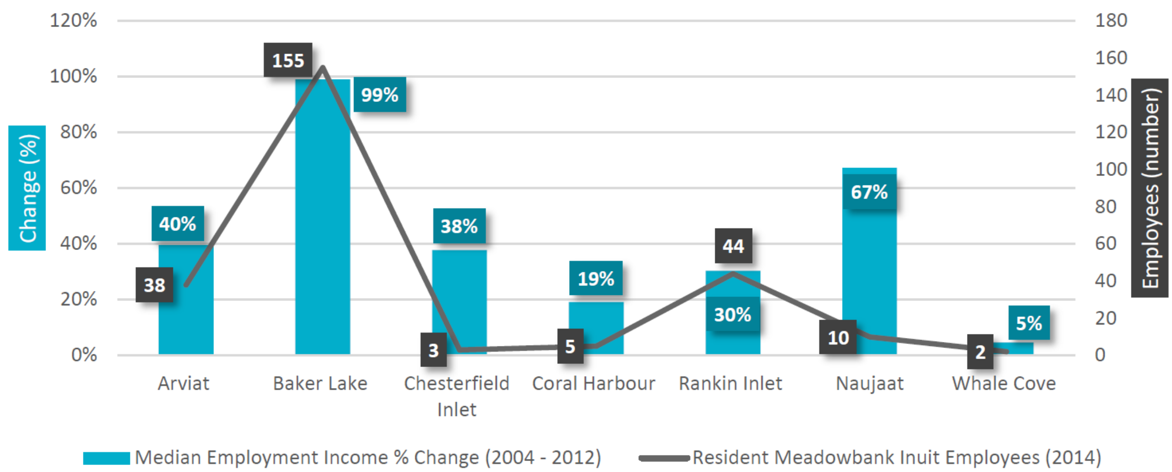


Figure 38. Change in Median Employment Income for Kivalliq Communities, 2004-2012. (Source: Chart 14, SEMC, Appendix J7).



Observed impacts as compared to FEIS predictions:

- Income paid to Meadowbank's Inuit employees has been holding steady at approximately $18 million since the mine entered the operation phase in 2010. With 95% of Meadowbank's Inuit workforce residing in the Kivalliq region (58% in Baker Lake), this far exceeds the FEIS prediction of $4 million in direct project wages annually to Kivalliq residents.
- Baker Lake, which has the highest number of Meadowbank employees, experienced the largest increase in median income. It is recognized that other factors influence median employment income and that these factors may mask the effect of Meadowbank employment income, especially for communities that have relatively few Meadowbank employees or that have a high median employment income to start with.

12.6.1.5 Education and Training

Potential Impact (as in FEIS):

- Cumberland and KIA will address the need for a broader based project education and training initiatives to assist those who wish to develop skills that will position them for project employment. This [sic] education and training initiative [sic] will also include an element to address motivational issues around getting children through high school. Such measures would be intended to contribute to encouraging a commitment to education on the part of youth.

- The potential impacts of education and training are considered of medium magnitude, positive, long term and of high significance, specifically to those individuals and their families who are able to benefit.
- Cumberland and KIA will address the need for broader based project education and training initiatives to assist those who wish to develop skills that will position them for project employment.
- Provide on the job training…to improve skills towards improved job performance and promotion.

Metric: Secondary School Graduate Rate by Region, 1999-2014. Specific Training Hours Provided to Inuit and non-Inuit Employees, 2012-2014, Apprenticeships for Inuit Employees, 2010-2014, Inuit Employment by Skill Level, 2012-2014

Monitoring Conducted:

Figure 39. Secondary School Graduation Rate by Region, 1999-2014 (Source: Chart 19, SEMC, Appendix J7).

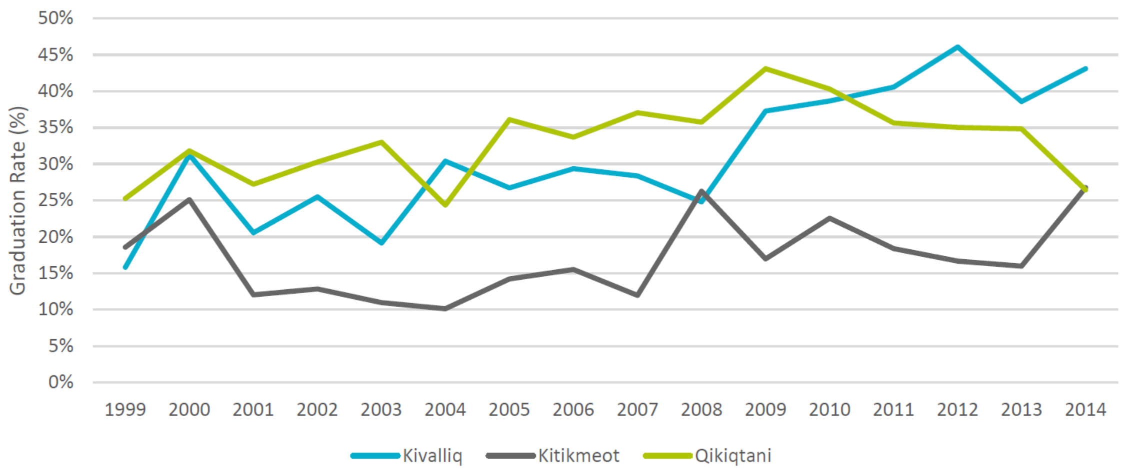
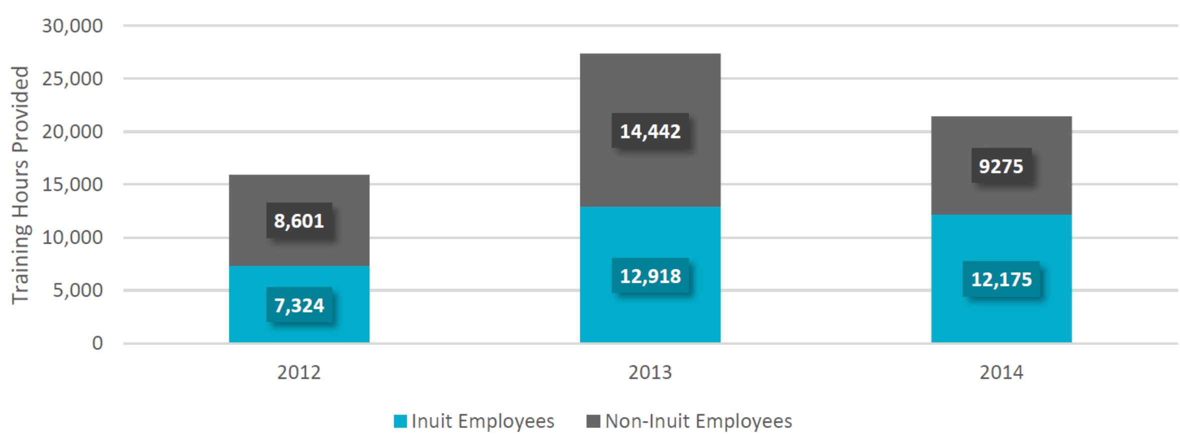
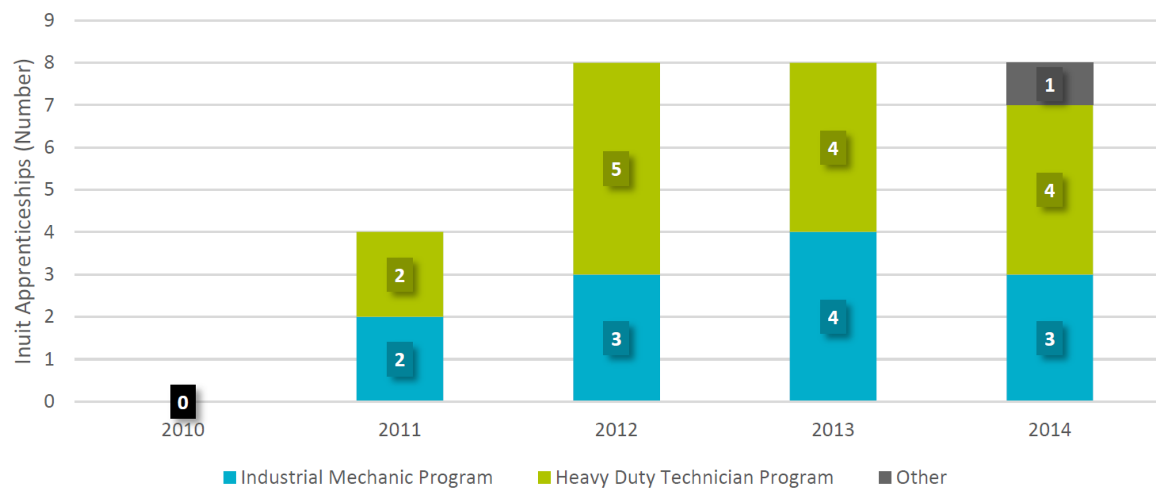


Figure 40. Specific Training Hours Provided to Inuit and non-Inuit Employees, 2012-2014 (Source: Chart 21, SEMC, Appendix J7).



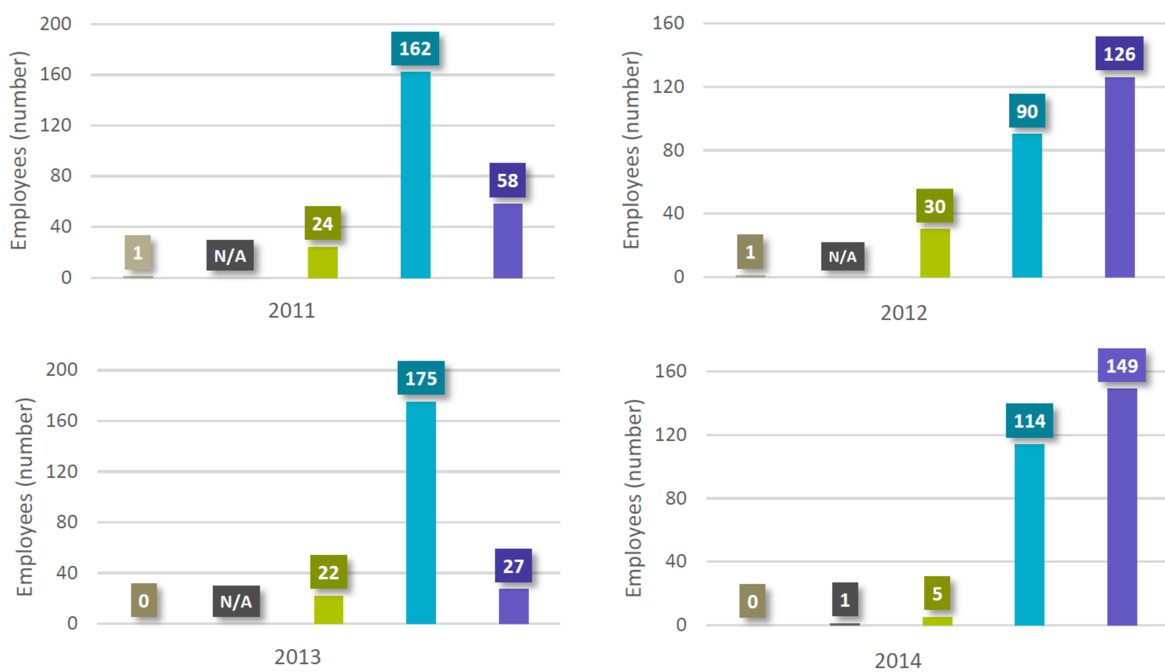
In 2015, 18,545 and 8,882 hours of specific training were provided Inuit and non-Inuit employees respectively. Specific training is focused on developing individual competencies related to a specific position. This training qualifies individual workers for promotion following their progression through a Career Path. These training programs are provided by in classroom learning (theory) as well as practical learning (one on one).

Figure 41. Apprenticeships for Inuit Employees, 2010-2014 (Source: Chart 23, SEMC, Appendix J7).



In 2015, 16 participants were registered in the Apprenticeship Program. Two (2) graduated and obtained their red seal certificate.

Figure 42. Inuit Employment by Skill Level (Source: Chart 25, SEMC, Appendix J7).



In 2011 and 2012 AEM used their own skills classification system to classify all jobs as either: Management, Skilled, Semi-Skilled or unskilled. In 2013, at the request of the GN, AEM began to employ a skills classification system based on National Occupations Classification System (NOC). The system was reviewed again in 2014, resulting in a new category called ‘Professional’, to better differentiate positions within recognized occupations and those requiring university education. These types of positions were previously included in the category ‘Skilled ’.

In addition, as a result of these changes, some positions previously considered as ‘Skilled’ are now classified under the ‘Semi-Skilled’ category in order more accurately clarify levels of qualification. For example, heavy equipment operator positions – which do not require the same education level required of skilled trades positions such as electricians – were moved from the ‘Skilled’ category to the “Semi-Skilled’ category.

Observed impacts as compared to FEIS predictions:

- The graduation rate in Kivalliq region has fluctuated since the opening of the Meadowbank mine with no significant trend since 2010. However, graduation rates in Kivalliq region have been at all-time highs for the region, and consistently higher than those in the other two regions, since 2010. A range of complex and interacting factors affect graduation rates, including the housing shortage, household food insecurity, health status, social problems such as high rates of teenage pregnancy and substance abuse, and the legacy of the residential school system. The Meadowbank mine may have an impact on some these factors, as described in subsequent sections, but attribution is a challenge due to the multiple and interacting factors.
- The scope of, and participation in, in-house training and apprenticeship programs has been relatively consistent throughout the mine’s operation. Annual fluctuations in the number of specific training hours and haul truck driver program graduates largely reflect changing demand at Meadowbank for additional positions for which specific training is provided.
- In 2014, the vast majority of Inuit employees hold unskilled and semi-skilled jobs, with only 6 employees holding jobs classified as “skilled” or higher. While changes in the job classification scheme limit the ability to directly compare data from different years, there are no indications in the data of increasing Inuit employment at “skilled” or higher job classifications despite individual success stories of Inuit employees advancing within the company as a result of training and education. It is possible that promotion of Inuit workers at the mine could be offset by the turnover of Inuit employees at higher skills, but more data and analysis are required to understand causes and trends.

12.6.2 Accuracy of Predicted Impacts - Negative

Based on results of this report, the accuracy of negative impacts as predicted in the FEIS are assessed in sections 12.6.2.1 to 12.6.1.4.

12.6.2.1 Culture and Traditional Lifestyle

Potential Impact (as in FEIS):

- There is potential for both negative and positive impacts, of any magnitude, on traditional ways of life, which could be of high significance. Any net impact, since it would be an impact of cultural change, would be long term and continue beyond the life of the project. The impact would be experienced primarily in Baker Lake.
- The project will not significantly restrict access to or productivity of lands used for traditional activity.

Metric: Proportion of total population identifying Inuktitut as the mother tongue, by Kivalliq community, 2006 and 2011, Percentage of Nunavut Inuit Population 15 years of age and older partaking in traditional activities, 2006 and 2012.

Monitoring Conducted:

Figure 43. Proportion of total population identifying Inuktitut as the mother tongue, by Kivalliq community, 2006 and 2011 (Source: Chart 27, SEMC, Appendix J7).

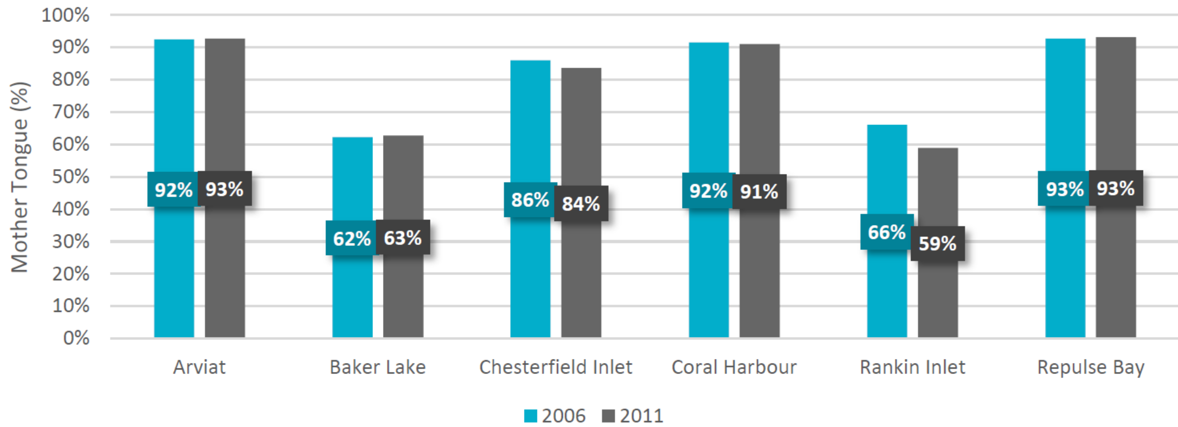


Figure 44. Percentage of Nunavut Inuit Population 15 years and older partaking in traditional activities, 2006 and 2012. (Source: Table 8, SEMC, Appendix J7).

Traditional Activity	2006	2012
Hunted in the past 12 months	72%	--
Fished in the past 12 months	76%	--
Gathered wild plants (berries, sweet grass, etc.) in the past 12 months	79%	--
Trapped in the past 12 months	30%	--
Hunted, fished, trapped or gathered in previous 12 months	--	81%

Observed impacts as compared to FEIS predictions:

- The proportion of the population identifying Inuktitut as the mother tongue has remained relatively stable in all Kivalliq communities from 2006 to 2011 with the exception of Rankin Inlet, where there was a 7% decline. While the mine offers some services and documentation in Inuktitut, it must also enforce the use of English as the standard language for communication in the workplace for safety reasons.
- Environmental information pertaining to potential impacts of the mine on the productivity of lands used for traditional activities is not addressed in this report. This indicator only addresses the degree to which Inuit still engage in traditional activity.
- Since the 2012 data only includes a composite metric (hunted, fished, trapped, or gathered), no conclusions can be drawn regarding changes in individual activities (including any that relate to changes in lifestyle associated with employment at Meadowbank).
- Other observations made as part of the Wellness Report include impact of road on caribou migration, and increased emphasis on jobs and income could be contributing to individualism.

There is conflicting accounts on whether work schedule creates time for traditional activities or leaves employees too tired to participate.

12.6.2.2 Migration

Potential Impact (as in FEIS):

- The potential impacts of migration are complex, and are likely to have both positive and negative components, but of low magnitude. Any effects of migration are long term but are likely to be low significance. It is not likely that migration to any other community than Baker Lake would be significant.

Metric: Number and Rate of Inuit Workforce Who Have Moved to Southern Provinces, 2011-2014. Annual Percentage Change in Population Estimates of Kivalliq Communities 15 years of age and older, 2007-2014.

Monitoring Conducted:

Figure 45. Number and Rate of Inuit Workforce Who Have Moved to Southern Provinces, 2010-2014 (Source: Chart 28, SEMC, Appendix J7).

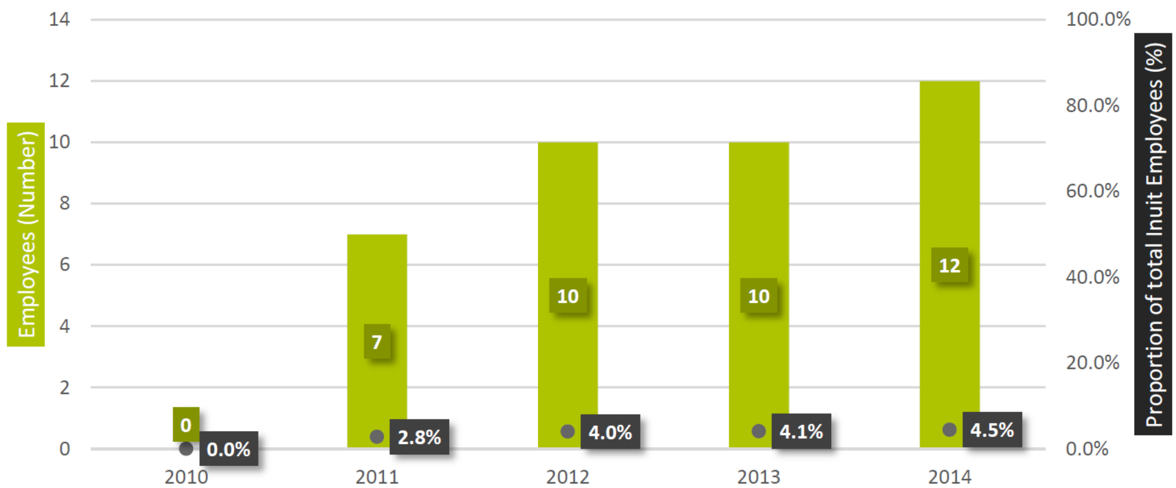


Figure 46. Annual Percentage Change in Population Estimates of Kivalliq Communities 15 years of age and older, 2007-2014 (Source: Table 9, SEMC, Appendix J7).

Community	2007	2008	2009	2010	2011	2012	2013	2014
Arviat	4%	4%	3%	3%	2%	2%	3%	4%
Baker Lake	4%	4%	4%	3%	3%	2%	2%	2%
Chesterfield Inlet	7%	1%	3%	3%	-1%	3%	0%	3%
Coral Harbour	4%	0%	-1%	5%	4%	3%	5%	0%
Rankin Inlet	2%	-1%	3%	0%	3%	2%	3%	4%
Naujaat	8%	2%	1%	3%	0%	3%	5%	4%

Observed impacts as compared to FEIS predictions:

- There has been a gradual increase in the number of Inuit workers moving to southern provinces, from 7 in 2011 to 12 in 2014. However, since 2012 this number has remained between 4 and 4.5% of the Inuit workforce. Other migration data (e.g. Inuit workforce moving to/from Baker Lake following employment) is not available. Employment at Meadowbank provides Inuit workers with income and skills that may facilitate moving out of the territory. Other factors unrelated to the mine, such as the housing shortage in Nunavut and improved educational and job opportunities in the provinces, may also contribute to migration south.
- Population change results from the interaction of three variables: births, deaths, and migration. Migration can be for economic or other reasons. The populations of all Kivalliq communities have increased at a relatively steady rate since 2006 (with the exception of some years of zero or slightly negative growth in some communities). The data do not indicate an increase in the population growth rate of Baker Lake or in other communities with significant Meadowbank employment (Arviat, Rankin Inlet) since the mine opened, or relative to other communities in the region. If other factors are assumed constant, the population data does not indicate any significant migration to Baker Lake (or other communities with high Meadowbank employment). At this time, both population data and Agnico Eagle's data on employees moving to southern provinces are not inconsistent with the FEIS prediction that any effects of migration are long term but are likely to be low significance.

12.6.2.3 Community Infrastructure and Services

Potential Impact (as in FEIS):

- The impacts on social services and infrastructure, of low to medium magnitude, are considered largely positive in the medium term and of moderate significance. There is some potential for closure to have a negative impact on social service delivery.
- The potential public health and safety impacts of the project, of unknown magnitude, are negative, and, because there is such high impact at the individual level in the event that a risk is realized, the effects must be considered long term and of high significance.
- Increased employment and business opportunities will result in increased income, a measure of economic security, capacity building that will contribute to employability over the long term, and improved self-image of employees and their families. This could result in reducing dependence on government social services.

Metric: Estimates of use of GN infrastructure directly related to Meadowbank, 2014, Kivalliq Community Health Centre Visits Per Capita, 2006-2013, Social Assistance Recipients by Kivalliq Communities, 2006-2013.

Monitoring Conducted: The Meadowbank mine has its own dedicated energy, water, and communications infrastructure, so it is largely independent of the public physical infrastructure. Areas of potential impact on public infrastructure include the use of airports for travel to and from the mine (e.g. employees beginning and ending their two work rotations), the use of community meeting spaces for public engagement and the use of local health care facilities.

Estimates of use of this infrastructure directly related to Meadowbank are as follows:

- Use of Baker Lake Airport to access commercial flights: Between 300 and 400 times per year (passenger trips)

- Use of other Nunavut airports to access commercial flights: Between 200 and 400 times per year (passenger trips)
- Use of Baker Lake Community Centre: Between 5 and 10 times per year

Figure 47. Kivalliq Community Health Centre Visits Per Capita, 2006-2013 (Source: Chart 35, SEMC, Appendix J7).

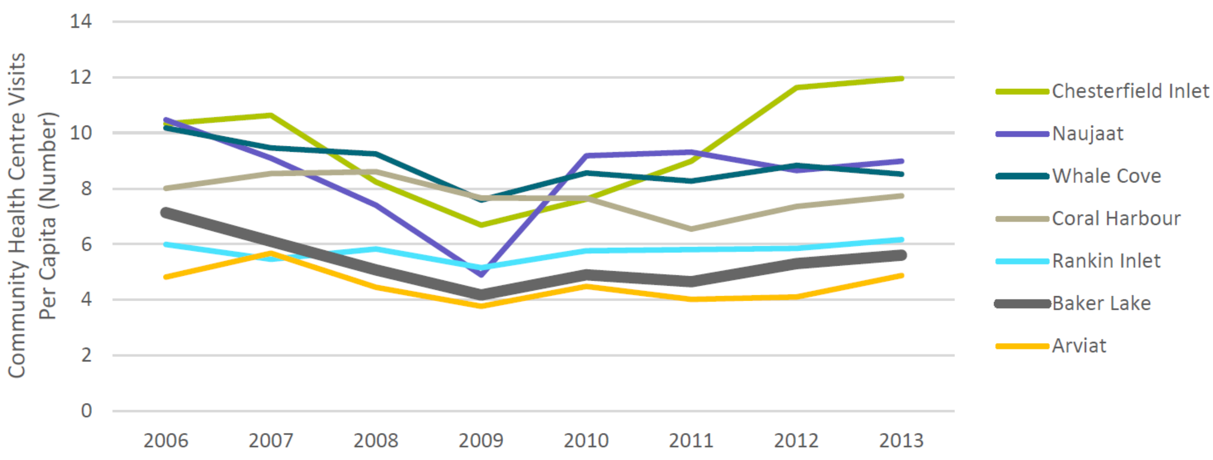
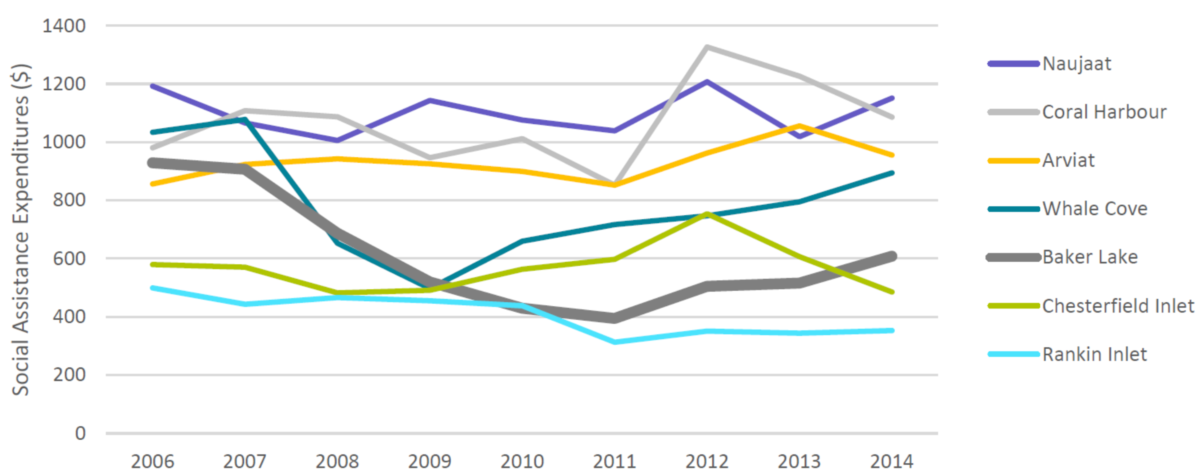


Figure 48. Social Assistance Recipients by Kivalliq Communities, 2006-2013 (Source: Chart 38, SEMC, Appendix J7).



Observed impacts as compared to FEIS predictions:

- The use of public physical infrastructure by Meadowbank and its employees consists primarily of the use of airports and has been relatively consistent since operation began in 2010. There are no indications of significant positive or negative impacts on this infrastructure.
- Most Kivalliq communities experienced steady or declining community health centre visits up to 2009. From 2009 to 2010, which coincides with Meadowbank's start-up and operation, per capita visits increased in every community except Coral Harbour. However, since 2010, per capita visits have remained relatively steady in most communities with the exception of Chesterfield Inlet and Baker Lake. While per capita visits increased slightly in Baker Lake from 2011 to 2013, the levels

remain lower than 2006 and 2007 levels. Overall, per capita health centre visits in communities with the most Meadowbank employees (Baker Lake, Rankin Inlet, and Arviat) have not increased significantly since Meadowbank began operating.

- Since the mine began production, between 14 and 47 employees are referred to community health care centres per year. The number of referrals have been highest in recent years (2013 and 2014). Referrals for work-related reasons may represent increased demand on GN health services. However, this data alone does not indicate whether a Meadowbank worker, on average, is a higher user of health care services than other workers or unemployed people.
- The number of social assistance recipients, as a fraction of the population, declined by approximately 15 percentage points from 2008 to 2011 in Baker Lake, Arviat, and Rankin Inlet, coinciding with construction at Meadowbank and the opening of the mine. This trend supports the prediction of decreased dependence on social assistance. The relative number of recipients have levelled off or slightly increased in 2012 and 2013. Future years will confirm whether this reversal is a lasting trend or whether the number of recipients may drop further in communities where employees and contractors are living.
- As the data suggests, social assistance expenditures may not be proportional to the number of recipients because different recipients have different needs. Given these factors and the uncertainty in these data (as indicated by the Government of Nunavut), we are not able to draw conclusions about how the mine is impacting social assistance needs in the Kivalliq region overall.

12.6.2.4 Individual and Community Wellness

Potential Impact (as in FEIS):

- Potential impacts on individual and community wellness are complex, far reaching, and given human nature, difficult to predict with certainty. Individual and community wellness is intimately associated with potential impacts on traditional ways of life as discussed above. In addition, however, individual decisions on the use of increased income, household management in relation to rotational employment, migration, public health and safety, disturbance particularly during the construction phase, and Cumberland's support for community initiatives are being negotiated in the IIBA are [sic] the other drivers that have the potential to effect individual and community wellness.

Metric: Criminal violations per Hundred People, by Kivalliq Community, 2006-2013, Persons aged 15 years and over who are on a waiting list for public housing, 2010, Inuit Suicide Rates by Community per Ten Thousand People, 2008-2014 – 3 Year Rolling Average.

Monitoring Conducted:

Figure 49. Criminal violations per Hundred People, by Kivalliq Community, 2006-2013.

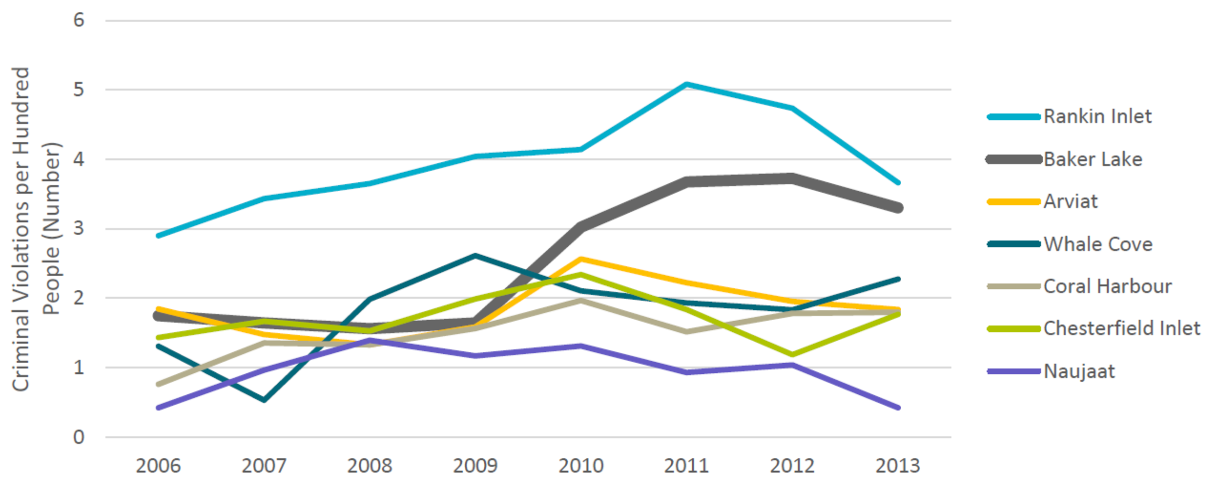
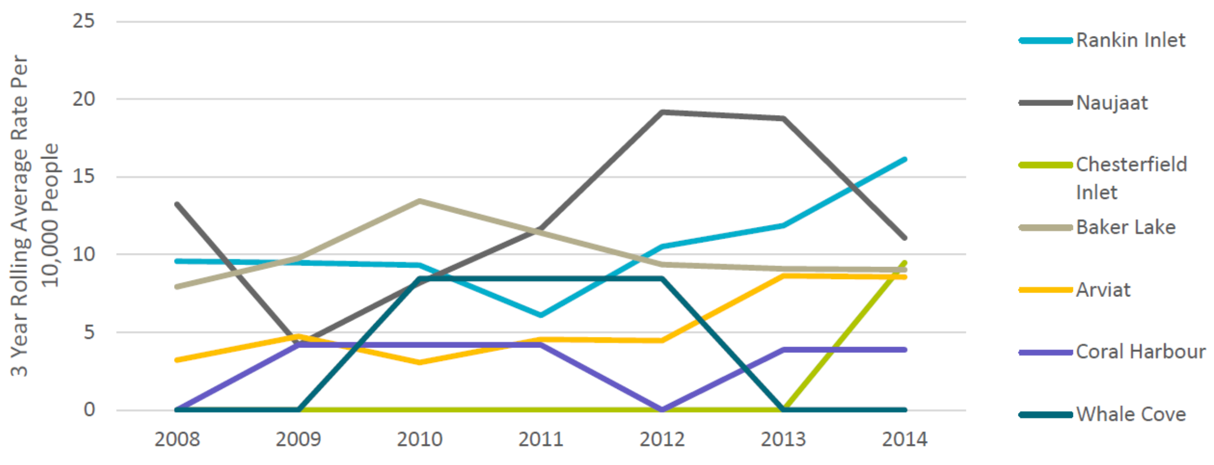


Figure 50. Persons aged 15 years and over who are on a waiting list for public housing, 2010 (Source: Table 14, SEMC, Appendix J7).

Community / Region	Number	% total population
Kivalliq Region	**1120**	**19%**
Arviat	210	16%
Baker Lake	300	22%
Chesterfield Inlet	40	17%
Coral Harbour	120	25%
Rankin Inlet	270	15%
Naujaat	120	25%
Whale Cove	60	27%

Figure 51. Inuit Suicide Rates by Community per Ten Thousand People, 2008-2014 - 3 Year Rolling Average (Source: Chart 32, SEMC, Appendix J7).



Observed impacts as compared to FEIS predictions:

- With the exception of Rankin Inlet, all communities had 2 or fewer total criminal violations per hundred people in the 2006 - 2009 period (baseline). Baker Lake, Rankin Inlet, and Arviat all experienced significant increases in total criminal violations rates since the Meadowbank mine began operations. After 2010, the total criminal violations rate in Arviat has steadily decreased and has returned to approximately 2006-levels in 2013. Total criminal violation rates in Baker Lake and Rankin Inlet reached historic high levels of approximately 3.5 and 5 per 100 people, respectively, in 2011 and 2012. Recent data (2013) may signal the beginning of a downward trend in criminal violations in Baker Lake, but the rate remains above the 2006-2009 baseline and above those for other Kivalliq communities (except Rankin Inlet).
- The high percentage of people waiting for public housing (15% - 27%) across Kivalliq communities demonstrates the region-wide housing shortage. While Baker Lake had one of the highest percentages of people on the waiting list in 2010, other communities with fewer Meadowbank employees, including Naujaat and Whale Cove, had similar rates. Additional data on changes over time will be required to assess the potential impact that Meadowbank may have on demand for and availability of public housing.
- The suicide rate in Nunavut is at crisis levels – 13 times higher than in the rest of Canada. Underlying risk factors are numerous and long-standing and range from the effects of historical trauma and its symptoms to the high rates of child sexual abuse, alcohol and drug use, poverty, high school dropout rates, and the cultural losses brought about by residential schools and forced relocations. Due to the persistent and territory-wide nature of this crisis, it is difficult to assess the impacts of the mine on suicide rates in Kivalliq communities. Furthermore, given the small populations of Kivalliq communities and the highly variable numbers of suicides observed in each community (0 – 4 suicides / community / year), trends are difficult to discern. For example, there were 3 suicides in Baker Lake in 2010 and 2013, and 1 suicide each year in 2011, 2012, and 2014. These numbers do not point to a particular trend since the mine began production.
- The Wellness Report outlined other impact from the mine including:
    - Jobs and income contribute to an increased hierarchical structure in the community, weakening community bonds;
    - Increased disposable income increases access to alcohol and drugs;
    - The work schedule and work stress impact individual and family mental health;

- planning and management of personal and family finances can be weak; many people reportedly live one paycheque behind and do not budget for food, housing or household expenses;
- many people are generous with their money, sharing with a wide network of family and friends;
- it was reported that a number of people have increased their spending on alcohol and drugs now that their large purchases (e.g. ATVs, trucks) have already been made;
- poor financial management contributes to high usage of expensive credit and debt (e.g. very high-cost personal loans, on-line paycheque lending services, and the ‘We’ card at the Northern store.

12.6.3 Effectiveness of Monitoring

Potential impacts to socio economic identified in the FEIS are realistic based on results obtained in the Socio-economic monitoring, and wellness report. Overall, the mines have a positive economic impact on Nunavut Community. AEM contributes to the development of the community by giving contract and jobs to people, even if are unskilled. Meadowbank thru is socioeconomic program help the worker to develop itself. AEM also have a positive impact on the scholarship of the young. The students want to graduate because they have now something concrete to have as a goal for employment. On the other side, with an increased standard of living, there are some concerns associated with the lack of money management skills and the expenditure for drug, alcohol and gambling. Overall, the predictions made in the FEIS are accurate.

12.6.4 Recommendations for Additional Mitigation or Adaptive Management

AEM will continue to listen to the Nunavut Community and worker about concerns they may have and will address it in the best manner possible. AEM will also continue to submit both Wellness (as requested by the Meadowbank IIBA) and Socio-economic monitoring program annually.

12.6.5 Contributions to Regional Monitoring

Overall, AEM contribute to the regional economy and socio economic part of the Nunavut Community.