MEADOWBANK GOLD PROJECT

2012 Annual Report

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

Prepared by:
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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 Private Access Road (AWPAR) between Baker Lake and Meadowbank and the Meadowbank mine site.

These various components and activities associated with the project require a number of different authorizations 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), Aboriginal Affairs and Northern Development Canada (AANDC) (formerly Indian and Northern Affairs Canada (INAC)); the Kivalliq Inuit Association (KIA) and the Nunavut Impact Review Board (NIRB).

This report is written to address all of the 2012 annual reporting requirements of the project under these authorizations:

NWB Type A Water License 2AM-MEA0815;
NIRB Project Certificate No. 4;
DFO HADD Authorization NU-08-0013 Western Channel Temporary Crossing;
DFO HADD Authorization NU-03-190 AWPAR;
DFO HADD Authorization NU-03-191 Mine Site;
INAC Land Leases 66A/8-71-2 (AWPAR) and 66A/8-72-2 (AWPAR 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-MEA0815.

2 SUMMARY OF ACTIVITIES

2.1 2012 ACTIVITES

2012 was a bounce-back year for Meadowbank Mine after operational difficulties hampered production, boosted costs and saw a loss of $644 million in 2011. The 2012 highlights include:

- The mill at Meadowbank processed an average of 11,193 tons per day (tpd) in the fourth quarter of 2012, 26% more than the 8,866 tpd achieved in the fourth quarter of 2011. The improved mill throughput is due to significant improvements in equipment availability and maintenance. Since the June 2011 start up of the permanent secondary crusher, the initial design rate of 8,500 tpd has been consistently exceeded.

- 2012 production saw a record 366,030 ounces of gold from Meadowbank at a total cash cost per ounce of gold of $913.00. In 2011, the mine produced 270,801 ounces at total cash costs per ounce of $1,000.00.

- Meadowbank's operating performance has been a key contributor to the overall operating success of the Company in 2012.

2012 was essentially a “prove it” year for Meadowbank and the results send a positive message to stock markets that a mining company can operate successfully in Nunavut. Agnico plans to build on these results and during 2013 the Meadowbank team will continue to reach for improved operating efficiencies, sustained throughput, better equipment availability and other operating improvements.

An important point of mention is that Agnico’s efforts to achieve record production at Meadowbank drove economic growth in Nunavut during 2012. The direct investments by Meadowbank in Nunavut’s economy during 2102 included $230 million in contracts with Inuit businesses. Agnico’s Inuit Business Opportunities Initiative will continue to support contract awards to Inuit companies.

On February 15, 2012, a press release from Agnico-Eagle Mines announced a write-down of $644.9 million dollars on the Meadowbank Gold Project. This was as a result of higher than expected operating costs and write off of lower grade ore that the company cannot economically mine. Therefore the life of the mine was reduced by approximately 3 years. According to the revised plan, operations are now scheduled to be completed by early 2018 instead of 2020.

In the first quarter, Bay Goose pit operations started and the first part of Vault road was completed. During the quarter, seven thermistors were also installed in the Waste Rock Storage Facility and Tailings Pond to measure the freeze back. In April, the construction of Central Dike began. In the fourth quarter, construction of Central Dike was completed to the elevation of 115m. In 2012, dewatering activities were completed and on-site water management involved discharging effluent from the attenuation pond (monitored at ST-9) to the receiving environment through the diffuser in Third Portage Lake. Also by the end of the year AE completed construction of the Vault Road and had commenced initial stripping and quarry construction.

The water consumption exceeded permitted amount of 700,000 m^3 of freshwater (1.05Mm^3). AE's intention is to operate in compliance. Despite completion of several successful projects at the mill to increase reclaim water it has been determined that, due to the capacity of the reclaim pumping system, increased production and the recommendations in the 2012 Water Management Plan, that an increase in freshwater is required. As a result AEM intends to submit an application to the Nunavut Water Board in April, 2013 to amend the current Water License to allow for an increase in freshwater use. AE will maintain a reclaim use percentage of approximately 70.

A recently completed Action Plan to address freshwater use at the mill includes an engineering assessment for the reuse of water collected in the present Attenuation Pond. This project will be completed in 2013 with the goal being to cease discharging to Third Portage Lake and reuse this water onsite. Further details will be presented in the application to amend the current Water License.

Quarterly progress reports, prepared for the Kivalliq Inuit Association as required by Production Lease KVPL08D280, are attached in Appendix A1. These reports provide further details of activities throughout the 2012 year.

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

2.2 2013 MINE PLAN

The Meadowbank gold mine began the operations phase of the project in February 2010, and thus, is entering its fourth year of operations. As in the past, environmental monitoring (wildlife, aquatic effects, groundwater, noise and air) will continue in 2013 in support of all operational undertakings at the Meadowbank site as required by the NWB Type A Water License 2AM-MEA0815, NIRB Project Certificate No.004, DFO authorizations, and MMER regulations.

The "2013 Mine Plan" for the Meadowbank Gold Project, prepared for the Kivalliq Inuit Association as required by Production Lease KVPL08D280, is attached in Appendix A2. This report was submitted to the KIA in January 2013, and outlines the activities planned for the project throughout the 2013 year.

Construction activities at the Meadowbank mine are mainly complete. There are a number of secondary projects and modifications to existing infrastructure that will continue in 2013. Major works will be undertaken at Vault for the preparation of the production of Vault pit (beginning of 2014) and the extension of the airstrip.

In 2013, the AEM mining plan is to operate Portage and Goose Pits at the Meadowbank operation. A total of 35.4M tonnes of rock will be hauled from these two pits during the year. The Mine Plan consists of moving some 32.1M tonnes of Waste Rock and 3.3M tonnes of ore from the Open Pits.

The Waste Management Plan for 2013 is to maximize Waste Storage Facility (WSF) utilization, commence depositing of wasterock in the mined out portion of Portage Pit B and minimize

Haulage Cycle times which will, in turn, minimize the greenhouse gas emissions and impact on the environment.

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-MEA0815, 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:

- Daily Inspection – carried out daily by designated qualified engineer or technician;
- Detailed Inspection - carried out generally monthly or bi-monthly by designated qualified engineer or technician;
- Engineering Annual Inspection – carried out annually by a 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

b. A comparison of measured versus predicted performance;

For the dewatering dikes; i.e. East Dike, Bay Goose Dike and South Camp Dike, from the analyses of the available geotechnical instrumentation data and from visual inspection, it appears that the structures are performing as expected. No major concerns were identified in 2012. Regular monitoring will continue in 2013 to assess the performance of the structures.

For the Tailing 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 from visual inspection; the structures are performing as expected. No major concerns were identified in 2012. Regular monitoring will continue in 2013 to assess the performance of the structures.

Further comparison of the measured performance to the predicted performance will continue in 2013, as additional data will be available for analysis.

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

East Dike

As discussed in the 2009 annual inspection reports (Golder Associates), during the dewatering of the northwest arm of Second Portage Lake in 2009, an apparent leak of up to 0.5 m^3/s over several days occurred through the East Dike near Sta. 60+490. The leak then appeared to self-heal following drilling works for the additional grouting carried out in this sector. A sinkhole cavity of about 18 m^3 in the general vicinity of the leak (Sta. 60+472) appeared in July 2009. The sinkhole was located immediately upstream of the cut-off wall and extended at least partially through the cut-off wall. Following the appearance of the sinkhole, a cone penetration test (CPT) investigation was conducted, and three diamond drill holes and a surface geophysical survey were advanced in the area to obtain additional information. Based on the

CPT results, there appeared to be a zone of coarser grained material (area with lower fines content) in the apparent leak area. The drilling investigation indicated that there may be soil between the base of the cut-off wall and underlying bedrock that was not completely excavated and/or grouted. An additional investigation of the sinkhole and apparent leakage area consisting of the temporary installation of thermistor strings and monitoring of the thermal condition was initially conducted in 2010 and repeated in 2011. Based on the thermal results, it appeared that a pervious zone existed within the cut-off wall and shallow bedrock between approximately Sta. 60+440 and 60+504. In the past, AEM considered potential mitigation options to reduce seepage through the dike and to provide contingency protection for the Portage Pit. Based on the stability of the dike and the seepage rate, remediation or implementation of contingency control measures is not considered necessary. The condition of the dike will continually be monitored and if the condition of the dike is judged to be deteriorating then remediation would be reassessed.

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. 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 had been stable at a rate of about 864 m^3/day (10 L/s) with no visual signs of turbidity, which 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 installation of the seepage 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 was observed. No active monitoring of the seepage rate at these locations occurred in 2012 but AEM has been visually inspecting the flow in the sumps and no turbidity was noted. AEM performed a pump test after the installation of the sumps, it was noted that the measured flow were consistent with 2010 and 2011 data. Flow meters are going to be installed in 2013 at the exit of each pump. The flow is approximately 1000 m^3/day. AE is considering requesting an amendment (2013) to the current Water License to allow for the discharge of this seepage water (from Second Portage Lake) back to Second portage Lake.

Bay Goose Dike

Four small seepage areas were identified with a total of 9 seepage channels along the dike. No turbidity was observed in the seepage. The total flow coming from these seepages is 97.2 m^3/day (1.22 L/s). The overall seepage is less than anticipated and is not a concern for now. The area will continue to be monitored to follow the evolution of the seepage in these areas.

Refer to the Annual Geotechnical Inspection (Golder Associates) for detailed field observations made on the dike. No mitigation measure has been implemented on the dike other than additional geotechnical instrumentation installation and field investigation in certain areas. No seepage collection has been implemented so far as the seepage is not affecting the mine operation or 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 remediation would be reassessed.

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

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 April 2012. As-built drawing of the system installation is available in Appendix B3.
At Saddle Dam 1, a permanent pump station was installed on the north downstream side of the dam, to collect water coming from melting during freshet and reporting to this low area. The system pumps the water into the tailing pond (TSF), to avoid water flowing into the dam foundation. Pumping has been conducted every freshet since the construction of Saddle Dam 1, but a permanent system was installed in summer 2012. A drawing of the system installation is available in Appendix B4.

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

Stage 1 of the Central Dike was constructed in 2012, to El. 115 m. According to the LOM 2012, the Central Dike was built with a footprint for a final elevation of 140 m instead of 150 m.

The most significant modification during the Central Dike Stage 1 construction was the field decision to leave the in-situ till at the bedrock contact in several areas of the central key trench, due to safety and technical reasons. The decision, made jointly between AEM and the designer, Golder Associates, to accept the till as foundation in the key trench was based on the visual appreciation of the material as exposed in the key trench. This change was also discussed with the Meadowbank Dike Review Board. The MDRB was supportive of this decision. The rock configuration at the abutments also required an adaptation of the key trench alignment and connections with the cofferdam impervious zone. The Board also judged these actions to be appropriate.

The cofferdam for Central Dike constructed in 2011 was incorporated into the Central Dike as part of the upstream face. The basin upstream of the Central Dike was used as a retention pond to contain water pumped from the pits (Portage and Goose) in 2012.

None of the changes in the design and/or as-built conditions stated above have consequence on safety, water balance and water quality. Continuous monitoring will be done to ensure that the conditions remain stable.

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

Section 4.0 of the '*2012 Annual Geotechnical Inspection'*, provided in Appendix B1, presents the instrumentation data collected in 2012.

The document '*Annual Review of Portage Pit Slope Performance (2012*)' by Golder Associates, which presents the pit wall geotechnical inspection results, is also provided in Appendix B1, 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 2012. Repairs on the geomembrane liner were done during 2012 on Saddle Dam 1, Saddle Dam 2 and Stormwater Dike.

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

See Section 8.1.8 below for a discussion of seepage from the East Dike and Bay Goose.

3.1.2 Meadowbank Dike Review Board

As required by water license 2AM-MEA0815 Part I, Item 14: ***The Licensee shall submit to the Board as part of the Annual Report required under Part B Item 5, all reports and performance evaluations prepared by the Independent Geotechnical Expert Review Panel.***

Three reports (Reports 11, 12 and 13) were prepared by the Meadowbank Dike Review Board in 2012. Reports 11 and 12 were formal reports; Report 13 was a summary of a conference call. These reports and AEM's responses to reports are included in Appendix B2.

3.1.3 East Dike and Bay-Goose Dike Construction – TSS Effects Study Follow-Up

From 2008 – 2011 AEM commissioned studies to address concerns regarding the potential impacts of elevated TSS concentrations on the local receiving environment from dike construction. Construction-related sediment inputs were initially found (lasting weeks to months) in the water column (pelagic zone), but settled over time (sedimentation) onto the lake bottom (benthic zone). In both cases, the primary concern was TSS, but nutrients and metals were also present. From a water column (pelagic zone) perspective, both TSS EAS studies identified some short-term effects to primary productivity (e.g., phytoplankton biomass). However, these did not appear to affect zooplankton. Laboratory studies confirmed no adverse effects to zooplankton or fish. Thus, while some effects were seen initially in the water column, they were limited in time and were not shown to propagate up the food chain. Benthic invertebrates showed an initial drop in abundance in Second Portage Lake in 2008. However, the subsequent recovery pattern to 2011 has been inconsistent due to high natural variability. The "*Aquatic Effects Monitoring Program – Targeted Study: Dike Construction TSS Effects assessment Study 2011*" is found in Appendix A3 of the 2011 annual report. CREMP data in 2012 noted that no residual effects due to dike construction were evident. At this stage, there are no additional follow-up studies planned in the future.

3.2 QUARRIES

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

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.***

No material was blasted from the quarries on INAC or KIA leased lands in 2012. All weather access road and mine site road maintenance used crushed material from the mine site.

4 WATER MANAGEMENT ACTIVITIES

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

4.1 LAKE LEVEL MONITORING

As required by Water License 2AM-MEA0815 Schedule B, Item 2: ***Results of lake level monitoring conducted under the protocol developed as per Part D Item 11 (Water Quality Monitoring and Management Plan for Dike Construction and Dewatering).***

Dewatering of the Bay Goose impoundment area began on July 25, 2011 and was suspended on November 14, 2011, due to ice buildup in the impoundment area. Water pumping to maintain the water level in the Bay Goose impoundment area was restarted in May 2012. This water was discharged into Third Portage Lake as effluent.

The elevation, in metres above sea level (masl), of Third Portage Lake was monitored on a weekly basis, weather and ice conditions permitting, throughout the year. 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 4.1; the lake level remained within the range of naturally occurring levels.

Lake levels of the Attenuation Pond and Bay Goose impoundment area were also monitored. Table 4.1 presents the elevation monitoring results at the dewatering intake and discharge intake; the monitoring locations are identified as SPL-IN and BG-IN on Figure 1. This information is provided for informational purposes only.

4.2 WATER BALANCE WATER QUALITY MODEL REPORTING SUMMARY

As required by Water License 2AM-MEA0815 Schedule B, Item 3: ***Summary of reporting results for the Water Balance Water Quality model and any calibrations as required in Part E Items 6 and 7.***

A water balance and water management plan update for 2012 was completed in March 2013. The technical note report, entitled "*Meadowbank Gold Project Water Management Plan 2012*", is included in Appendix C1.

The present water management plan for the Meadowbank mine site update consists of:

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

2. 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;
   - Tailings management facilities filling.

3. 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 review of the existing water management plans, the 2009 WMP, the 2010 UWMP, 2011 WMP and the 2012 Draft UWMP (Ref. 2, 3 and 15), as well as the validation and update of the design criteria were completed. In the long term, the effects of planned mining activities on the water management plan were analysed, and the duration of the mine pits flooding activities and the volume of water required from surrounding lakes were determined. A short-term analysis was performed for the Vault area, focusing on incoming mining activities. The maximum Vault Lake water level during construction of the Vault dike was established using different pumping scenarios, and the detailed dewatering plan for the Vault area was established with specific dewatering schedules for Vault and Phaser Lakes.

Mine water management was improved by decreasing the freshwater consumption and using a better sequencing of pit flooding activities. This leads to a lower reclaim water volume in the South Cell and reduced water levels at the end of the mining activities, compared to previous water management plans. It should be noted that the actual freshwater licence allows for the use of 80 m^3/hr, which is less than the 123 m^3/hr required for 2013. This difference can be explained by the fact that the actual Mill production (11,280 t/day) is higher than the previously planned production (8,500 t/day), and because the site hydrology review yielded lower precipitation values than those estimated in former water management plans.

The freshwater consumption rate of 80 m³/hr and the Mill production planned for the site leads to a reclaim water deficit with a decreasing water volume in the North Cell TSF Reclaim Pond.

This condition remains true until tailings deposition is transferred to the South Cell, at the beginning of April 2015. There is also a water deficit during the operation of the South Cell TSF Reclaim Pond. The deficit leads to the maintenance of the minimum processes reserve volume of 750,000 m³ in the South Cell Reclaim Pond and a subsequent increase in freshwater consumption to compensate for the lack of reclaim water. A deficit is predicted and our freshwater use needs to increase to supply the mill with necessary process water (as reclaim flow will need to decrease). AEM will submit an amendment application to the NWB in April, 2013.

4.3 BATHYMETRIC SURVEYS

As required by Water License 2AM-MEA0815 Schedule B, Item 4: ***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 August 30, 2012 and is included in Appendix C2.

4.4 PREDICTED VS MEASURED WATER QUALITY

As required by Water License 2AM-MEA0815 Part E, Item 8: ***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 Table 4-2 provides a comparison between predicted and measured water quantity and quality within Portage and Bay Goose Pit.

Water Quantity

The difference between water quantity predicted (during year 3 of operations) and water quantity measured in Portage Pit and Bay-goose Pit were below 20% of the predicted value. This indicates that the seepage and groundwater sources and volumes predicted that collectively make up the water in the pits, are representative of 2012 operations. More specifically, Portage Pit was within 10% of the predicted value and Bay Goose was 60% less than the predicted value. This is primarily due to the fact that mine operations just began in Goose pit and the water quantity predicted (1,235.100 m^3) was calculated for a pit of 130 m depth.

Water Quality

According to the original NWB application documents, a Probable scenario and a Possible Poor End scenario predicted water quality results 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 natural variance. The predicted values in the Probable scenario and the Possible Poor End scenario represented summer average. The measured values were the average of all the data available throughout the year.

Except Ammonia Nitrogen (0%) and Sulphate (6%) under Possible Poor End scenario for Portage Pit, all the parameters exceed 20% of difference between the predicted and measured values. 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 is monitored extensively and not discharged into the environment, rather Portage Pit and Bay Goose Pit water reports to the Attenuation Pond. The water accumulated into the Attenuation Pond is either sent to Tailings Storage Facility or treated by the water treatment plant before discharge into the receiving environment (Third Portage Lake). The results can be found in Table 8.10 under sampling ST-9 (discharge). 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).

4.5 ADDITIONAL INFORMATION

As required by Water License 2AM-MEA0815 Schedule B, Item 24: ***Any other details on Water use or Waste Disposal requested by the Board by November 1st of the year being reported.***

4.5.1 Evaluation of Freshwater Intake Barge

The intake barge is located on Third Portage Lake directly east of the camp facilities and provides freshwater for camp use and mill operations. In a letter dated January 20, 2010 (NU-08-0040- Revised Freshwater Intake), DFO approved the proposed Meadowbank intake barge specifications and the installation of the freshwater intake barge. In this letter, DFO requested that AEM follow the Freshwater Intake End of Pipe Fish Screen Guidelines and that AEM ensure fish habitat is not impacted, monitor pumping rates, velocity, monitor presence/ absence of fish and ensure fish are not impinged or entrained by the barge.

In response, AEM completed a study in 2010 to evaluate the habitat in the area of the barge (AEM, 2011). In total 42 large bodied fish (only arctic char and lake trout) with good condition factors and an even distribution through all size ranges were collected near the intake barge. One juvenile lake trout and four (4) slimy sculpin specimens were collected through a combination of electrofishing and minnow trap collection near the barge, and the same numbers of small bodied fish were collected in the reference area. Given that there was a low number of small bodied fish collected during this study, which is consistent with baseline data collection, there is indication that small bodied fish are not often present near the barge and therefore unlikely to be impinged or be entrained by the barge. As well, the data indicated that fish habitat near the intake barge is not impacted by the infrastructure installed in 2009.

AEM discussed these monitoring results during DFO site visits in 2011 and 2012. It was noted that the screen size and velocities of the intake barge met DFO approval based on mill process engineer's measurements. Furthermore, barge operators and the environment department have not observed any fish impingement or entrapment at the barge. Table 4.3 summarizes the review of the intake barge design parameters in response to DFO's request. The results confirm that the intake area and velocity of the intake barge meet the DFO guidelines.

Table 4.3- Comparison of DFO guidelines to the Meadowbank Intake Barge

Design Parameter	Meadowbank Intake Barge	DFO Guideline for Meadowbank Intake Barge
Screen Type	#2 square mesh screen- 76.4% open area	69% open area
Effective Intake Area	0.92 m^2	1.02m^2
Pump Capacity at Design	6.17m^3/min	-
Water Velocity of Screen Opening at Design	108.60 L/sec	110 L/sec

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-MEA0815 Schedule B, Item B-5: ***Geochemical monitoring results including:***

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

In 2012, AEM sampled 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 5.2 for a summary of Acid Rock Drainage (ARD) Guidelines used to classify Meadowbank Waste.

Table 5.2: 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 Not Potentially Acid Generating (NPAG)

The mine geology staff uses the derived NPR to characterize the rock in the blast pattern. The mine surveyor uses 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 5.1 for a discussion of the use and location of waste rock.

The results and the resultant 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 300 samples (including ultramafic volcanic, intermediate volcanic and iron volcanic rock types) from production drill holes 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 and metal leaching using the Shake Flask Method. The results confirmed AE's methodology and results to differentiate PAG/NPAG 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 discussion in Sections 5.1a and 5.2.

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

As recommended in the 2010 and 2011 Meadowbank annual report, unless there are significant changes during reclamation, quarry surface water sampling did not need to be completed on an annual basis as follow-up water sampling has not provided evidence of geochemical issues in the quarries. In the past, only Quarry 7 consistently had pooling; this small pool was contained within the quarry and evaporated by September. The majority of the quarries with geochemical concerns identified in AEM (2009b) did not contain pooling 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. In 2012, AWAR water quality monitoring followed these recommendations with priority placed on visual identification and turbidity monitoring, as well as evaluating erosional concerns at all crossings from pre-freshet to post freshet (June – July). Unless turbidity issues are visually observed, 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. As mentioned in Section 3.1.1 c, seepage rates and volumes through the East dike have been stable for the past three years. A seepage collection system was completed in April 2012 was constructed downstream of the East Dike, such that the volume can be accurately measured, water quality visually observed (turbidity), and the water removed (pumped), on a year round basis. An as-built drawing of the system installation is available in Appendix B3.

As mentioned in Section 8.1.8, water samples were collected monthly from January to March from the north sampling station (EDS-North) and the south sampling station (EDS-South) at the East dike to measure seepage water quality as per the NWB water license requirements. From April, 2012 the sampling station (ST-S-1) includes seepage from the north and the south East dike. Furthermore, as a requirement of the DFO authorization, fisheries habitat compensation monitoring, interstitial water quality sampling completed along East Dike and Bay-Goose dike in 2011 did not indicate any leaching potential. The results don't show any signs of leaching.

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

In 2012 there were no geochemical outcomes or observations that could imply or lead to environmental impact.

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;

The mill commenced operations in February 2010; all data associated with the tailings and cyanide destruction process is kept at the mill. Due to the large volume of data, the results are not included in this annual report. These results can be provided upon request.

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

As recommended in the 2010 and 2011 Meadowbank annual report, unless there are significant changes during reclamation, quarry surface water sampling did not need to be completed on an annual basis as follow-up water sampling has not provided evidence of geochemical issues in the quarries. In the past, only Quarry 7 consistently had pooling; this small pool was contained within the quarry and evaporated by September. The majority of the quarries with geochemical concerns identified in AEM (2009b) did not contain pooling 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. In 2012, AWAR water quality monitoring followed these recommendations with priority placed on visual identification and turbidity monitoring, as well as evaluating erosional concerns at all crossings from pre-freshet to post freshet (June – July). Unless turbidity issues are visually observed, surface water quality sampling was not deemed necessary at non-HADD crossings or quarry contact water pools.

Routine water quality sampling results along the AWPAR are presented in the document '*All Weather Private Access Road 2012 Water Quality Management Report'* included in Appendix D1.

5.2 WASTE ROCK VOLUME

In accordance with Water License 2AM-MEA0815 Schedule B, Item B-6: ***Volumes of waste rock used in construction and placed in the Rock Storage Facilities.***

The total volume of waste rock generated in 2012 was 31,543,198 tonnes. The volume of waste rock from the Portage and Bay-Goose Pits in 2012 was 30,384,892 tonnes; 11,352,760 tonnes of non-potential acid generating (NPAG) and 19,032,132 tonnes of potential acid generating (PAG). The volume of waste rock from the Vault Pit in 2012 was 1,158,306 tonnes; 1,133,808 tonnes of NPAG and 24,498 tonnes of PAG. The use and location of all of the rock, by volume, is presented in Table 5.1 and identified by the following categories:

- Tailings Dams – used for the construction of dams or dikes adjacent to the tailings pond;
- Other Construction;
- Dams and Dikes - used for construction of dams or dikes necessary for water control (not adjacent to the tailings pond);
- Roads – used for road construction;
- Crushers – taken to the mobile crusher and used for construction or maintenance purposes;
- Miscellaneous uses;
- Waste Dump – taken to the waste rock storage facilities;
- Overburden – taken to the till stockpile.

The *Mine Waste Rock and Tailings Management Plan* was revised in March 2013 and can be found on Appendix D2. In 2012, AEM decided to revise Portage rock storage facilities (PRSF) waste rock footprint which resulted in a temporary expansion from the original area of the Waste Storage Facility from 63 ha to 80.8 ha. (See Figure 14). The main reason for this was that there was no area to store NAG rock within the PRSF. The deposition of waste rock within the PRSF has to be completed according to strict engineering stability principles. The NAG could not be stored in the current storage area as we are depositing upward and the amount of NAG we are generating would have to be covered with PAG material (no area to store while the deposition upward is occurring). AEM wants to keep all available NAG material for reclamation and on site construction. Therefore a separate storage area of NAG rock was created. The total amount of waste rock is similar to the prediction in the 2009 Plan; the deposition pattern was changed to allow for a separate NAG material storage area. The expansion is still within our original mine footprint and all runoff is directed to the TSF or the Attenuation pond as originally designed. The North Diversion ditch ensures that all non-contact water drainage is diverted from the Tailings and waste rock storage areas. Construction of the diversion ditches was completed in 2012. The NPAG waste rock extension construction will continue until closure (2017). Progressive closure may allow for material to be taken from the extension beginning in 2016. The material stored in the NPAG Waste Rock Storage Facility Extension is not expected to be deleterious; however, a hydraulic gradient exists towards the Tailings Storage Facility to the southeast in conjunction with PAG Waste rock within the Portage Waste Rock Storage Facility. Ultimately, all Waste Rock Seepage will be directed towards the existing collection systems of trenches and sumps located immediately downstream of the TSF. This is considered a minor revision in that the volume is similar and the material will be used for reclamation leaving the original deposition as designed. The waste rock extension provides storage for Non- Potentially Acid Generating (NPAG) waste rock material that will used for reclamation capping of Tailings and PAG waste rock storage areas.

5.3 TAILINGS STORAGE FACILITY

5.3.1 Tailings Storage Facility Capacity

As required by Water License 2AM-MEA0815 Schedule B-7: ***An update on the remaining capacity of the Tailings Storage Facility.***

A total of 2,533,488 m^3 of tailings was placed in the tailings storage facility (North Cell TSF) in 2012. A monthly summary of the tailings volume is provided in Table 5.3.

From 2010 to 2012, a total of 6,498,955 m^3 of tailings was placed in the North Cell TSF.

A revision of the tailings deposition plan was completed in April 2012. The model deposition planning was completed for the first four years of operation of the Tailings Storage Facility. The model was based, when possible, on the data collected during the first year of operation. The filling scheme for the North cell is elaborated for a single point end of pipe discharge, aimed at minimizing the number of displacements during the year for the tailings discharge points, while maintaining the reclaim pond away from the perimeter dikes. The main conclusions from the modeling results are:

- The total estimated capacity is 38.7 M t (30.7 M m^3):
- North cell: 17.9 M t (14.1 M m^3)
- South cell: 20.8 M t (or 16.3 M m^3)

- The North cell could be used for deposition until August 2015 provided the crest of Stormwater dike is raised to 150 m;
- The reclaim causeway would need to be raise for August 2012 (to elevation 145 m), April-June 2013 deposition periods (to elevation 147m), January-March 2014 deposition periods (to elevation 149m) and May 2015 (to elevation 150m)cal discharge of tailings above 148 m along Stormwater dike should start during the July through September 2013 deposition period;
- Deposition in the northern section of the North cell could start during the October-December 2013 deposition period; structures such as SD6 should be operational by that time.

5.3.2 Fault Testing and Monitoring

As required by Water License 2AM-MEA0815 Schedule B, Item 15: ***Results of monitoring pursuant to the Fault Testing and Monitoring Plan (August 2007).***

Fault testing and monitoring were completed in 2011. See 2011 annual report for more information.

5.3.3 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-MEA0815 Schedule B, Item 17: ***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.***

AEM began field trials to determine capping thickness in 2009 by installing a thermistor (SD1-T2) on Saddle Dam 1 to monitor the thermal condition within the structure and its foundation. Another thermistor (SD1-T4) was also installing in 2009 to monitor the thermal condition of the tailings. The results are illustrated on Figure 5 and 6 respectively. The result of SD1-T2 and SD1-T4 showed that the dike foundation remained frozen during the past year. In the summer, temperatures above 0°C were recorded for elevation 138 to 140 m. Data observed were consistent with the data for 2010-2011. Overall thermistor data from within the structure indicated that the dike foundation remained frozen throughout the year. Below the rock fill shell, the foundation rock or bedrock remained in a frozen state with temperature ranging from about -4 °C to -7 °C. Thermistors data showed that the tailings remained frozen during summer 2012 and the rock fill shell remained frozen with the exception of the upper 2m that thawed in August 2012.

In 2010, AEM also installed a thermistor (SD2-T2) on Saddle Dam 2. The results are illustrated in Figure 7, showing the temperature vs. height, in function of time. The results show the active layer is above 0°C in the upper 2 m in August.

In 2012, AEM installed 2 thermistors (T121-1 and T122-1) on the first bench of the waste rock storage facilities and one thermistor (T90-2) in the tailings. The results are illustrated on Figure 8, 9 and 10 respectively Thermistor (T121-1) installed on RF1 indicates temperatures varying from 0°C to -7 °C below elevation 132 m. Thermistor (T122-1) installed on RF2 shows temperatures varying from 0°C to -7 °C indicating that the RF2 foundation is in a frozen state. Thermistor (T90-2) was installed within the talik of the former lakebed inside the North Cell TSF. Temperatures below 0°C were recorded below elevation 140 m which indicated that the tailings are continuously frozen, however it should be noted that, a complete annual cycle of temperatures have not yet been recorded at this location. An additional thermistor was installed in February 2013 on the Waste Rock Storage Facility. Results of this thermistor will be provided in the 2013 Annual Report.

6 WASTE MANAGEMENT ACTIVITIES

6.1 LANDFILL MONITORING

As required by Water license 2AM-MEA0815 Schedule B, Item 8*: Summary of quantities and analysis of seepage and runoff monitoring from the landfills.*

Seepage and runoff monitoring of the Landfill is discussed below in Sections 8.1.4 and 8.1.5.

6.2 SOLID WASTE DISPOSAL ACTIVITY

As required by Water License 2AM-MEA0815 Schedule B, Item 9: *A summary report of solid waste disposal activities including monthly and annual quantities in cubic metres of waste generated and location of disposal.*

And

NIRB Project Certificate No.004 Commitment 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 landfill and sent to the incinerator in 2012 is included as Table 6.1.

In 2012, a total of 120 seacans filled with hazardous waste materials (721 tonnes) and steel (750 tonnes) were collected from the Meadowbank project area. The seacans were shipped from the spud barge at AEM's Baker Lake marshalling facilities to Becancour, Quebec by sealift. The materials were subsequently shipped to licensed hazardous waste and metal recycling companies in the Province of Quebec (recycling or permanent disposal). These materials were transported under Waste Manifest #'s 9331151-2, 9331153-8, and 9331154-6; copies of these manifests are attached in Appendix E1. A description of the types of waste, packaging and volume is provided in Table 6.2.

Some actions were taken in 2012 regarding the waste reduction/recycling at Meadowbank:

- Plastics Reduction
    - Elimination of Styrofoam Coffee cups/plastic lids resulted in a reduction of 7,300 Kg of waste that was formerly incinerated on site;
    - Plastic ice cream bowls and plastic spoons were eliminated and replaced with stainless steel bowls resulting in a further reduction of 350 Kg that was formerly incinerated;
    - Lunches prepared for mill employees are now delivered in re-washable "Cambro Containers" instead of disposable plastic containers. This has eliminated an additional 1,250 Kg from the incinerator;
    - Total plastic/Styrofoam reduced and removed from incinerator waste stream represented 8,900 Kg. This will also reduce fuel consumption at the incinerator.
- Steel Recycling
    - A total of 750 tonnes of steel was packaged and sent south for recycling. This waste was removed from our solid waste stream and not landfilled on site.

- Aluminum Recycling

    - 400 Kg of aluminum pop cans were donated to the Baker Lake Girls Basketball team to assist in travel costs – these cans are sent south for recycling by Artic Co-Op on behalf of local groups and Sport Nunavut.

6.3 INCINERATOR

As per Water License 2AM-MEA0815 Schedule B, Item 10: ***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 2012. The incinerator daily report logbook is included in Appendix E2. The daily report logbook entry is available only for the months of March, May, June and December. Unfortunately the remaining month's logbook was misplaced. During regulatory audits in 2012, the Environmental Department was advised that the monthly entry is a required. All staff involved will ensure the logbook is maintained in the future. Based on the available data, approximately 40% of the material was food waste; the other 60% was dry waste comprised of: food containers, cardboard boxes, paper and absorbent rags. The location of the incinerator is highlighted in Figure 1.

Incinerator stack testing was completed by Exova Consultants from October 2 to October 3, 2012. The stack emission report is included in Appendix E3. Results for dioxin were 39.9 pg TEQ / Rm³ and for mercury < 0.10 µg / Rm³. The results indicate that AE met the Guidelines for Dioxin (80 pg TEQ / Rm³) and Mercury (20 µg / Rm³) emissions. As per discussions with Environment Canada, the stack testing is not necessary each year due to the fact that our waste stream has not changed AEM will conduct the next stack testing in 2014.

An ash sample was collected from the incinerator on February 14, 2012, in accordance with AEM's '*Incinerator Waste Management Plan'* (AEM, May 2009, v2). The purpose of sampling ash is to determine its acceptability for disposal in the landfill, pursuant to the Government of Nunavut (GN) Environmental Guidelines for Industrial Discharge (2002). Results from this monitoring are provided in Table 6.3. The samples met all of the GN discharge guidelines and therefore demonstrate the incinerator ash is acceptable for disposal in the Meadowbank landfill.

For 2012, it is estimated that 479,825 L of waste oil was generated on site; 3,143 L of this oil was incinerated or consumed in a waste oil furnace at site. The remaining volume was shipped south to approved recycling or disposal sites. Table 6.4 provides a breakdown of the volume of incinerated waste oil by month and location.

In addition to the above testing, waste oil destined for burning in the incinerator 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 6.5. All metals and PCB parameters

met the NWT guidelines with the exception of one sample containing an elevated level of chlorine. AEM will monitor this situation during the 2013 sampling event

6.4 ADDITIONAL INFORMATION

As required by Water License 2AM-MEA0815 Schedule B, Item 24: ***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 2012.

7 SPILL MANAGEMENT

As per Water License 2AM-MEA0815 Schedule B, Item 11 ***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 unauthorized discharges that occurred in 2012 is presented in Table 7.1. This data was also included in monthly monitoring reports submitted to the NWB. GN Spill Report Forms for 16 reported spills are included in Appendix F1. AEM did not receive the spill report identification number for these occurrences.

Spill prevention training was emphasised in 2012 for employees to prevent and to report spills, as follows:

- All employees and contractors must participate in an induction session upon 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;
- 245 toolbox meetings were given by the Environmental Department to different departments at Meadowbank. These toolbox meeting talked about waste management, hazardous materials, spills, wildlife, permitting, environmental policy and department specific subjects and were given to different departments including: the mine, mill, maintenance, site services, camp, kitchen, laboratory, exploration, DYNO, SANA Crusher, TCG dynamite, FGL maintenance, FGL pit operator and others (warehouse, human resources, contractor, dry employees, etc.);
- 4 individuals from AEM (Safety, Training, ERT, and Environment personnel) attended a Hazardous Material Spill Training in Ontario. The information gained will be relayed to ERT personnel;
- A site wide orientation for Spill management was created in 2012; this will be implemented in 2013;
- There was some informal training with ERT members on the contents of the Spill response trailer (3 sessions).

Follow-up on the October 6, 2010 spill at KM 23 on the AWPAR

Responsive Actions

Since the 3,000L spill at KM 23 on the AWPAR (GN Report #2010-408), AEM has put many plans into place to prevent its reoccurrence;

- Speed limits have been reposted along the AWPAR; dispatch routinely remind drivers of the speed limit and security officers have been enforcing the speed limit of the AWPAR with a radar gun. Furthermore, speeds are tracked through security dispatch communication records which provide an estimate of the speed of the driver based on the total time travelled along the road. This data is monitored and warnings are made to drivers accordingly.
- All users of the AWPAR are required to go through the AEM Meadowbank site induction which also includes Surface SOP (Standard Operating Procedure). The Surface SOP is an induction to driving vehicles on the Meadowbank mine site and on the AWPAR. This induction goes through the rules for driving on the site and the AWPAR, the procedures that must be followed while driving, and what potential incidents can occur if these rules

and procedures are not followed. Points that are focused on are speed, road conditions, and proper communication.

- All drivers of heavy loads are also required to make regular stops on the AWPAR to check their equipment and the load they are carrying. During these stops drivers do visual inspections on load security, tire pressure, and look for any other abnormalities with their equipment. If any problems are noticed these problems are remediated prior to continuing on.
- The road supervisor for AEM also preforms daily checks on the road. If weather conditions jeopardize the safe passage on the AWPAR, the road is closed to all traffic. In some cases, when road conditions are questionable an escort leads a convoy of vehicles that require travel (ex. crew bus, fuel trucks) in a safe manner.

Pro-Active Actions

Since the time of the spill, AEM has put in place Environmental Emergency Seacans at each water crossing along the AWPAR. These Seacans are equipped with spill supplies that will assist in minimizing the spread of contaminants in the case of an incident. The contents of these Environmental emergency Seacans are as follows:

- Empty drums (Sealed)
- Mini berm 36"x36" x4'
- 4 drum spill berm 4x8
- Tarp 20'x30'
- Tarp 30'x50'
- oil white spill pads
- Universal boom 5"x10' (Chemical)
- Universal boom 8"x10' (Chemical)
- Oil only booms 5"x10' (Hydro-carbons)
- Maritime barrier (Baffle)
- ABS pipe : 10' (4")
- Cell U-Sorb
- Amerisorb peat moss
- Oil gator absorbant
- Plug pattie
- Quattrex bags
- Long handle round point shovel
- Ice braker chisel
- Sledge hammer 12 lbs 36"
- Rod bar (4')

Although most members of the environment department have formal spill response training, during 2012 there was advanced spill response training provided to current ERT members as well as the Environment department personnel, and selected supervisors (Road Supervisor, Mine Foreman). This training was in a class room setting and included simulated spill response for individuals to put into practice. The knowledge gained from these training sessions will improve AE'S ability to react in the case of a large spill. These simulations were repeated to ensure efficient and safe spill response in the future.

Follow-up Action

Throughout the summer of 2011, AEM performed continuous clean-up of the KM 23 spill site. Maritime barriers lined with absorbent booms were installed in the stream immediately after freshet and throughout the summer. These booms were inspected at a minimum of once a week. When the booms became saturated with contamination the booms were then removed and replaced with clean booms. Surface water quality samples were taken downstream of the contained spill site and were below detection limit for hydrocarbons and BTEX.

AEM also maintained the water contained in a series of pits/sumps that were created during the excavation of contaminated soil. These pits serve as sumps for the remaining hydrocarbon contaminated soil to leach into and contain any contaminated water. AEM contracted BLCS (Baker Lake Contracting & Supplies Ltd.) to install an Oil Water Separator. This system was a gravity separator which cycled the water from the sumps and separated the hydrocarbons from the water. A vacuum truck was also taken to this site to skim the surface liquids off of the containment cells.

The maritime barriers were left in place throughout the winter, so that during the 2012 freshet there was a protective barrier to prevent any residual from flowing downstream.

In 2012 AEM contracted Sana to treat the water remaining in the sumps through an activated carbon treatment system.. Approximately 550,000 liters of water were treated at the site in 2012. After treatment the water was sampled and the results (provided to the AANDC Inspector) indicated the Type A Water License criteria for discharge were met. Confirmatory sampling indicated ND results for petroleum hydrocarbons. The sumps were refilled and contoured back to the original state. The clean-up of the 4 sumps started on July 2012 and ended on September 2012. An update report containing all sample results and treated volumes were sent to AANDC. This is provided in Appendix F2. Previously, in 2011, approximately 1500 m^3 of soil was excavated from this area (stored at Quarry 5). The contaminated soil previously stored in Quarry 5 was moved to the contaminated soil landfarm at the Meadowbank site during August/September, 2012. Maritime barriers will remain in the watercourse through the 2013 freshet as a precaution and sample monitoring will be conducted in the spring and fall of 2013. If any petroleum hydrocarbon constituents are detected then remedial measures will be undertaken (containment, treatment, interception trenches, etc,). It should be noted that results of monitoring in the watercourse in 2012 revealed no detection for any hydrocarbon material.

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 2012, AEM monitoried the ingress/egress of ship cargo at Baker Lake and the results are summarized in the below Figure 13.

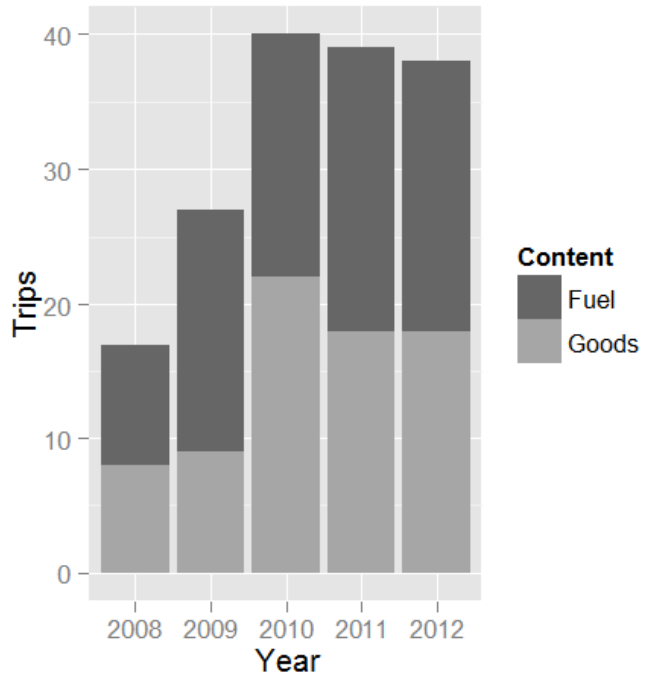


Figure 13- Barge traffic (number of trips/year) arriving in Baker Lake from Chesterfield Inlet since 2008.

On August 9, 2012, a spill occurred in Baker Lake during the filling of Agnico-Eagle's fuel tanks by the Woodward Group (shipping company). It was determined that the fuel line wore through along the shoreline and lake. A small leak hole discharged approximately 200 liters of diesel fuel into Baker Lake along the shoreline. The Woodward Group (fuel supplier) took full responsibility for the spill and responded to contain the material initially. However, staff from Agnico-Eagle also responded quickly to assist Woodward Group. To clean up the spill, maritime barriers and absorbent booms were utilized to contain and clean up any fuel and residual hydrocarbons. At no point was any fuel observed outside the barriers. A community meeting was held on August 11 to inform and update the citizens of Baker Lake on the status of the spill and the associated clean – up actions. The prime objectives of the cleanup activity were to ensure that the Hamlet of Baker Lake drinking water supply and the aquatic environment were not impacted adversely Samples were taken by AE staff at 3 locations in Baker Lake the area of the spill as well as in the vicinity of the Baker Lake Water Supply intake. The results of the sample analysis showed no exceedences of CCME drinking water criteria or of any substance associated with diesel fuel. The documents related to the spill are presented in Appendix F1.

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 H1:

• *Hazardous Materials Management Plan*, v2 March 2012;

- *Spill Contingency Plan*, v3 July 2012;
- *Emergency Response Plan,* v4, July 2012;

Table 7.1 show all spills related to all-weather road and other spills related to mine activities.

8 MONITORING

8.1 AQUATIC MONITORING

This section includes the aquatic monitoring requirements from all aspects of the Meadowbank Project.

As required by Water License 2AM-MEA0815 Schedule B-13: ***The results and interpretation of the Monitoring Program in accordance with Part I and Schedule I.***

And

As required by DFO HADD Authorizations NU-03-0191 Condition 6.1 (Mine); NU-03-0190 Condition 6 (AWPAR); NU-03-0190 Condition 6 (Western Channel Temporary Crossing): ***Submit written report summarizing monitoring results and photographic record of works and undertakings.***

A list of the sampling location GPS coordinates for aquatic monitoring programs conducted by AEM is provided in Table 8.1, summaries of these reports are presented in the following section of the report and completed documents are found in corresponding appendices. Figures 1, 2 and 3 illustrate the location of sampling stations at the Meadowbank mine site, EEM receiving environment monitoring program, and Baker Lake marshalling facilities, respectively. Certificates of Analysis are included in Appendix G1.

8.1.1 Construction Activities

All contact water around the mine site was diverted to the Stormwater Management Pond #1, the tailings pond, or the attenuation pond in 2012. Consequently, there were no incidences where runoff water from any facility under construction would flow directly or indirectly into a water body.

8.1.2 Dewatering Activities

There was no dewatering in 2012.

Channel Crossing Inspection

Inspections of the Eastern and Central Channel Crossings were undertaken during the open water season in 2012 to ensure the banks of the channels were not being eroded as a result of the increase water flow due to the Attenuation Pond discharge in Third Portage Lake. The inspections were undertaken on July 19, August 23 and September 27, 2012 by AEM environmental technicians.

There were no signs of erosion of the channel banks and no visible turbidity plumes in the channels during any of the inspections. The discharge into Third Portage Lake from the attenuation pond has no adverse erosion effect on the channel crossings.

8.1.3 Water Collection System

A water collection system comprised of the stormwater management pond, attenuation ponds, ditches and sumps has been developed to control surface water for the Meadowbank project.

Surface water runoff around the mine site is directed to the Attenuation Pond, Reclaim Pond for the water accumulated at the base of Saddle Dam 1 or the Stormwater Management Pond.

Stormwater Management Pond #1 previously referred to as Tear Drop Lake collects runoff water as well as the STP treated effluent. A total of 125,940 m^3 of water was transferred to the North Cell TSF from June to October. The water was not released into the environment. This information is presented in Table 8.2.

Dewatering of the Second Portage Lake Impoundment Area was completed on October 21, 2011. Consequently, the Attenuation Pond at the Meadowbank mine site became operational as of October 22, 2011. Surface water was sampled monthly from the Attenuation Pond as per the requirements in the NWB Type A water license (sampling station ST-18)consequently, there are no applicable license limits. The data is presented in Table 8.3 for informational purposes only. The location of sampling station ST-18 is illustrated on Figure 1.

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). However, in 2012 there was no water to take a sample. So, ST-17 was not sampled in 2012; the sampling location is illustrated in Figure 1.

In 2011 a sump was constructed in the South Portage pit in an area of water accumulation. In 2012, 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). The data is presented in Table 8.4; the sampling location is illustrated on Figure 1. There are no applicable license limits for this data as the water was not directly released into the environment; the data is presented for informational purposes only. Water from the East Dike seepage was also collected in this sump

The water collected in the South Portage pit sump, including the water that was pumped from the East Dike Seepage (ST-S-1), was transferred to the Attenuation Pond. From January to August, the water was pumped to Stormwater Management Pond #1; from September to December, the water was pumped to the Attenuation Pond. A total volume of 1,026,000 m^3 (including approximately 312,000 m^3 from East Dike Seepage) was transferred; the volume of water per month is provided in Table 8.2.

Water accumulated at the base of Saddle Dam 1 was pumped into the reclaim pond within the Tailings Storage Facility. 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 data as the water was not been released into the environment; the data is presented in Table 8.5 for informational purposes only. The sampling location (ST-S-2) is illustrated on Figure 1.

In 2012 a sump was constructed in the Bay Goose pit in an area of water accumulation. Water from the Bay Goose pit sump was sampled monthly during open water as per the requirements in the NWB water license (sampling station ST-20). The data is presented in Table 8.6; the sampling location is illustrated on Figure 1. The water that was collected in the Bay Goose pit sump was transferred to the Attenuation Pond. A total volume of 499,000 m^3 was transferred; the volume of water per month is provided in Table 8.2. There are no applicable license limits

for this data as the water was not directly released into the environment; the data is presented for informational purposes only.

The West and East diversion ditches of the Portage Area were constructed in 2012 to collect non-contact water. Water from the Diversion ditches was sampled monthly during open water as per the requirements in the NWB water license (sampling station ST-6). The data is presented in Table 8.7; the sampling location is illustrated in Figure 1. The East diversion ditch of Portage Area (ST-5) was not sampled in 2012 as there was no water present. The sampling location is illustrated in Figure 1.

8.1.4 Tailings Storage Facility, Reclaim Pond, Attenuation Pond and Waste Rock Storage Facilities

During the operations phase of the project, water quality monitoring is conducted at the Tailings Storage Facility and the Portage Waste Rock Storage Facility (PRSF).

The Tailings Storage Facility (North Cell) became operational in February 2010. Water from the Tailings Reclaim Pond is sampled, as per the requirements of the NWB water license (sampling station ST-21). 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 8.8. See Figure 1 for the location of ST-21.

The PRSF has been in operation since 2009. In 2012, ponded water was observed at the East base of the PRSF (sampling station ST-16). After reviewing sample analysis results it was determined that this water was similar in quality to a small pond located east of the PRSF. The water had seeped through the pond to a depression at the base of the PRSF and was not runoff from the PRSF. Monthly samples were collected to assess water quality and the results are presented in Table 8.9. There are no applicable license limits for this data as the water has not been released into the environment; the data is presented for informational purposes only. After the road had been reinforced with NPAG material no further water was observed in this location indicating it was indeed natural non-contact watershed drainage. As a precaution the ponded water was pumped to the TSF. The location of this sampling station (ST-16) is illustrated on Figure 1.

The water collected in the Attenuation Pond was discharged through the diffuser to Third Portage Lake as effluent, from May to November, 2012, after being treated at the onsite WTP for TSS removal. Samples were taken weekly from the discharge (ST-9) as per the requirements of the Water License and MMER. Results are detailed in Table 8.10 and the location of ST-9 is shown in Figure 1.

8.1.5 Mine Site

Other locations for water quality monitoring at the mine site include runoff from the landfill and water collected in the secondary containment area of the bulk fuel storage tank. The site layout is presented in Figure 1.

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 stream directed to Stormwater Management Pond #1. This water is collected and is not

discharged into the receiving environment; if needed water is pumped into the Tailings Storage Facility.

Samples are taken in accordance with AE's Sewage Treatment Operational Plan for the purpose of determining operating efficiency of the units. The influent and effluent are sampled on a bi-weekly basis in accordance with the Plan. Sample results are available in Table 8.11. Results of the sample analysis are submitted to the NWB in monthly monitoring reports.

The total volume of treated sewage discharged in 2012 was 33,304 m^3. In addition 382.3 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 8.12.

Landfill

The Meadowbank Landfill #1 has been operational as of November 2008. The total volume of waste transferred to the landfill in 2012 is 14,062 m^3. A monthly summary of the solid waste disposed at the landfill is presented on Table 6.1.

Landfarm

The Meadowbank landfarm was constructed at the end of 2012. There was no water collected in 2012 therefore there is no results in this regard.

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 May 28 and September 4, 2012 and analyzed for hydrocarbons, metals, ammonia, turbidity and TSS. The data is presented in Table 8.13; the sampling location (called MB-fuel) is highlighted on Figure 1. One parameter, Lead, on the May 28 sample (0.0026 mg/L) and September 4, 2012 sample (0.0016 mg/L) exceeded the water quality limit (0.001 mg/L) stipulated in Part F, Item 6 in the water license. As a result, there was no discharge to land from the secondary containment area of the bulk fuel storage tank at the Meadowbank mine site in 2012. The water license allows for this water to be discharged to land if the results indicate that license criteria is met; otherwise it can be discharged to Stormwater Pond #1. In any event AE did not discharge any water from this facility.

8.1.6 Baker Lake Marshalling Facilities

The design of the Baker Lake marshalling facility includes a number of facilities that were not constructed. This include: two storage ponds to collect site precipitation runoff (east and west), an explosives storage area and an ammonium nitrate storage area. Consequently, no water quality monitoring of these facilities was conducted as these facilities as they do not exist.

Water collected in the secondary containment areas of the bulk fuel storage tanks at the Baker Lake marshalling facility was sampled on May 27 and September 27, 2012 prior to discharge in accordance with Water License conditions. The location of this sampling station (ST-40) is illustrated on Figure 3.

The samples were analyzed for hydrocarbons, metals, ammonia, conductivity and TSS; the results are presented in Table 8.14. One parameter, total oil and grease, on the September 27

sample for Tanks 5 and 6 (7 mg/L) exceeded the water quality limit (5 mg/L) stipulated in Part F, Item 23 in the water license.

Only one discharge from the secondary containment area of the bulk fuel storage tank at the Baker Lake marshalling facility occurred in 2012. After notification provided to the AANDC Water Inspector, the discharge took place on June. Approximately 1000 m^3 of water was discharged on the East side of the tank farm, on the land.

As part of the Core Receiving Environment Monitoring Program (CREMP), water quality samples are collected from Baker Lake. 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. The marshalling area monitoring station meets the sampling requirements of ST-37. For more details, please refer to the report entitled *''Aquatic Effects Monitoring Program – Core Receiving Environment Monitoring Program 2012'* prepared for AEM by Azimuth Consulting Group, attached as Appendix G2.

8.1.7 All Weather Private Access Road (AWPAR) and Quarries

The construction of the AWPAR between the Hamlet of Baker Lake and the Meadowbank mine was completed on March 21, 2008. Monitoring along the AWPAR continued throughout the 2012 season and included water quality sampling along the road, erosion and flow inspections, structural crossing inspections and fisheries studies.

As in the past, the 2012 AWAR water quality management consisted of routine and event (freshet) inspections of all water crossings to ensure that there are no erosion or sedimentation problems. Water quality sampling was undertaken at all major crossings as well as HADD crossings, during the months of June and July.

HADD crossings R02, R06, R09 and R15 water quality monitoring results continue to suggest an improvement from post AWAR construction as mine related road activity did not cause any observable effects on the receiving environment from the field observations and water chemistry data collected in 2012. Consistent with 2011, the AWAR surface water quality results did not present concerns to the receiving environment as none of the parameters exceeded CCME (2007) in 2012. Based on the monitoring results, the road construction material appears to be stable; therefore it is AE's intent to not conduct any surface water chemistry sampling in 2013 unless visual turbidity observed. If in the future, an erosion issue occurs, detailed monitoring will be conducted in response to the event.

The sampling design and results of the 2012 AWPAR water quality monitoring are available in the report entitled '*All Weather Access Road: 2012 Water Quality Management Report*' prepared by AE and attached as Appendix D1.

A geotechnical structural inspection of the AWPAR, including all culverts, bridges and quarries, was conducted by Golder Associates in September 2012. The findings are presented in the report entitled '*2012 Annual Geotechnical Inspection, Meadowbank Gold Mine, Nunavut*', attached in Appendix B1.

As per AE's DFO authorization, no AWPAR fisheries monitoring was done in 2012. The results of the 2011 AWPAR fisheries monitoring are available in the report entitled '*2011 All Weather*

Access Road Fisheries Report' prepared by AEM, and found in the 2011 annual report. This report includes the results and a discussion of the fisheries habitat compensation monitoring at bridge crossing R02.

8.1.8 Seepage

As required by Water License 2AM-MEA0815 Part I, Item 16: ***The results and interpretation of the Seepage Monitoring program in accordance with Part I, Item 15***
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; and
Permafrost Aggradation.

Lake water seepage through dewatering dikes

As mentioned in Section 3.1.1 c, seepage rates and volumes through the East dike have been stable for the past three years.

Water samples were collected monthly from January to March from the north sampling station (EDS-North) and the south sampling station (EDS-South) at the East dike to measure seepage water quality as per the NWB water license requirements. From April, the sampling station (ST-S-1) includes seepage from the north and the south East dike. There are no applicable license limits for this data; it is presented in Table 8.15, for informational purposes only. The sampling locations are highlighted on Figure 1.Seepage water collected at the East dike was pumped to the South Pit basin. Approximately 312,000 m^3 of water was pumped.

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 no evidence of significant seepage had been observed.

Seepage (of any kind) through Central Dike

No seepage was observed in 2012.

Seepage and runoff from the landfill

See Sections 8.1.4 and 8.1.5 above.

Subsurface seepage and surface runoff from waste rock piles

See Section 8.1.4 above.

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

No seepage was observed in 2012.

8.1.9 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 results of the 2012 groundwater monitoring program are available in the report entitled '*2012 Groundwater monitoring and water quality, Meadowbank Mine, Nunavut'* prepared for AEM by Golder Associates, attached as Appendix G4.

The groundwater monitoring program was conducted in July 2012. Monitoring well MW08-02 was successfully sampled in triplicate. Monitoring well MW08-03 could not be sampled because of an ice bridge inside the well pipe that could not be removed. This prevented formation groundwater from entering the well. Monitoring well MW11-01 was damaged in spring 2012 and was deemed inoperable, therefore no groundwater samples were collected and the well was subsequently decommissioned in July 2012. Monitoring well MW11-02 located east of the tailings storage facility could not be sampled due to a blockage comprised of well development tubing which prevented access to the formation groundwater.

Three groundwater sample including two duplicates were collected from MW08-02 in 2012. The concentrations of salinity components in 2012 are the lowest since monitoring was initiated in 2008, but nonetheless, are of similar magnitude to previous values measured at this location. Exceptions include alkalinity and ammonia, where increased concentrations are observed. Concentrations of manganese observed in 2011 and 2012 are consistently elevated compared to results previously obtained in 2008, 2009 and 2010. All parameter concentrations observed in 2012 met ST-9 effluent quality criteria.

AEM will be performing a groundwater sampling program in 2013 following recommendations from Golder Associates technical Memorandum. It is also the intent of AEM to reinstate two wells in 2013: MW 11-02 & MW 08-03.

8.1.10 Core Receiving Environment

The CREMP (Appendix G2) focuses on identifying changes in limnological parameters, water and sediment chemistry, or changes to primary (phytoplankton) and secondary aquatic producers (benthic community structure) that may be associated with major mine development activities. CREMP reporting changed substantially in 2011, with an emphasis on assessing temporal/spatial trends in the data. This process was further revised in 2012 to include quantitative decision criteria (i.e., early warning "triggers" and action "thresholds") to facilitate immediate and objective decision-making as well as facilitate annual integration into the Aquatic Ecosystem Monitoring Program (AEMP) for environmental management and decision making.

Meadowbank Study Lakes

CREMP monitoring started in 2006. 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 impoundments (2009-12), effluent discharge (2012) 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 2012 are summarized below:

- Water Chemistry – There were some apparent mine-related changes in 2012 identified at one or more near-field (NF) areas. Conductivity (Secod Portage Lake only), sulphate (Third Portage Lake North, South and East stations and Tehek Lake) and Total Dissolved Solids (in SP only) were elevated above their respective trigger values with statistically significant changes at one or more NF areas relative to baseline/reference conditions. These triggers were were set at the 95% percentile of baseline data using an approach that evaluates a statistically significant trend as compared to baseline data, and were not derived from effects-based thresholds (e.g., CCME water quality criteria). The absolute concentrations for sulphate were 3 to 4 mg/L. To put this in context, BC's present aquatic life water quality guideline is currently 100 mg/L and sulphate concentrations in Baker Lake often naturally exceed 10 mg/L. As a result none of the 2012 concentrations or measures would suggest risks to aquatic life. Updating of triggers/thresholds is recommended along with continued trend monitoring in 2013.

- Sediment Chemistry – A full sediment coring program was conducted in 2012. Zinc at SP was the only metal with statistically-significant temporal changes exceeding the site-specific triggers. While the cause may be related to dike construction in 2008, follow-up studies suggest that the metals are not bioavailable and not toxic. No action is needed.

- Phytoplankton Community – statistically significant increases in total biomass (TPN and TPE) and taxa richness (TPN) were seen in 2012 relative to baseline/reference conditions. At this time, it is unclear as to whether this increased productivity is mine-related or due to natural variability; the trend should be followed closely for 2013.

Baker Lake

CREMP monitoring started in 2008. Key mine-related activities include barge/shipping traffic and general land-based activities associated with the tank farm area. One 200 L spill occurred on August 9, 2012 during fuel transfer. No other spills of fuels, hydrocarbons or any other materials have occurred in the vicinity of the barge dock and jetty. Despite the spill, no changes in the aquatic receiving environment were observed that were attributable to AEM's activities in Baker Lake. No follow-up management actions are required for 2013.

CREMP reporting will be streamlined in 2013 to facilitate review of the annual reports.

8.1.11 Blasting Activities

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.*

As required by the NIRB Project Certificate No.004, Condition 85 and as part of the mine site fisheries monitoring in the DFO Authorization, AEM Meadowbank Division conducts monitoring to evaluate blast related peak particle velocity and overpressure to protect nearby fish bearing waters. Guidelines have been developed by DFO to protect fish and fish habitat from works or undertakings that involve explosives in or near fisheries waters.

The results of the 2012 blast monitoring program are available in the report entitled "*2012 Blast Monitoring Report for the Protection of Nearby Fish Habitat*" prepared by AEM, attached as Appendix G6.

In 2012, PPV concentrations exceeded the DFO limit of 13 mm/s on 13 occasions over the entire year (n = 231 monitored blasts for the entire year). The average PPV was 5.09 mm/s (CI +/- 0.51) with a maximum of 25 mm/s which have decreased from 2011. From August 15 to June 30, during egg incubation, there were 7 exceedences all of which were in Goose Pit due to surface blasts closest to the monitoring station. The upper 95% confidence limit for all of the annual data was 13.25 mm/s. The IPC measurements were all below the DFO limit of 50 kpa. The blast monitoring results are reviewed after each blast and the blast mitigation plan was implemented immediately if the vibrations or the overpressure exceed the guidelines. At Meadowbank, it is important to consider the location of the monitoring stations and distances to spawning and nursery habitat identified in the baseline habitat mapping. The closest high value habitat area is greater than 250m away from the monitoring station (Goose Pit station), thus incubating eggs would be exposed to significantly less PPV given the distance of the spawning and incubation site from the blast location compared to the distance from the blast to the monitoring station. Based on the monitoring station locations and comparison to Faulkner et al. (2006), few exceedances of 13 mm/s PPV at monitoring stations from the 2012 blasting are unlikely to impact salmonid incubation sites near to the Meadowbank Mine site operations.

8.1.12 MMER and EEM Sampling

The Meadowbank gold mine became subject to the Metal Mines Effluent Regulations (MMER) on January 1, 2010. Discharge to the north basin of Third Portage Lake (TPN) changed in 2012 from dewatering discharge in 2011, to effluent discharge (a combination of dewatering water from Bay-Goose, contact water from pit operations, east dike seepage and run-off effluent) and discharged via a diffuser. Dewatering activity in Bay-Goose basin and accumulated freshet drainage water required AEM to release effluent from the attenuation pond into Third Portage North in May and June through the dewatering discharge pipe with the station location name DD-FD1. In April and May 2012, pipes and associated pumps were installed in preparation for discharge through a diffuser as per the Type A license. Anchored pipe with a diffuser was extended onto the ice approximately 100m from shore and allowed to sink to a depth of approximately 15m during the June and July ice thaw. In July and August, water collection from the pit and site contact water was transferred to the attenuation area and discharged through the diffuser as needed in August and thereafter. From July 2012 to present, the discharge location comes from the attenuation pond (sampling ST-9, also named ST-MMER-1). Monthly effluent volume discharged in 2012 began in May and ranged from a maximum of 660,905 m^3 (June) to 127,390 m^3 (November) with no effluent release in October and December.

All water discharged to Third Portage Lake (TPL) is treated for TSS removal in the onsite WTP. The “MMER Final Discharge Location Revision” was sent to Environment Canada is presented in Appendix G8. Water quality samples were collected weekly and acute toxicity samples quarterly, as per the approved ‘reduced sampling frequency’ program. The volume of water discharged to the environment is reported on a weekly basis under the MMER monitoring program. Under the Environmental Effects Monitoring (EEM) program, AEM also collects sub-lethal toxicity biannually and water quality samples four times per year from the discharge location, the receiving environment exposure area (TPN or ST-MMER-1-EEM-TPN [named TPL in the dewatering program]) and reference area (TPS or ST-MMER-1-EEM-TPS). These sampling locations are highlighted on Figures 1 and 2. Results of the MMER and EEM water quality monitoring programs are presented in Tables 8.16 and 8.17, respectively. The volume of water discharged to the environment is presented in Table 8.18. This data was previously reported to Environment Canada via the RISS electronic database reporting system.

There were no exceedences of the MMER water quality criteria in 2012. On several occasions there was no water quality monitoring completed as discharge did not occur; these sampling weeks are identified with 'NDEP' on Table 8.16. Parameters identified with 'NMR' on the table are not required due to the approved reduced sampling frequency program.

The EEM effluent characterization monitoring samples were collected in May, July, August and November 2012. Samples were collected from the exposure (TPN) and reference (TPS) areas.

8.1.13 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.

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 QAQC process, including the use of spiked samples and duplicate samples. All QAQC data passed the laboratories acceptable limits. The laboratory Certificates of Quality Control are presented in Appendix G1, following the corresponding Certificates of Analysis.

All toxicity tests were performed by Maxxam Analytique in Quebec City. Testing was conducted as stipulated in the corresponding Environment Canada Biological Test Methods. QAQC measures implemented by the lab, including the use of reference toxicants, met the acceptable limits. QAQC data is presented with the toxicity reports in Appendix G1.

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: 7 duplicate samples and 6 field blanks were collected from a total of 33 samples, representing 39.4%;
- STP monitoring program: 12 duplicate samples were collected from a total of 101 samples, representing 11.9%;
- Surface water monitoring programs: 17 duplicate samples and 8 field blanks were collected from a total of 103 samples, representing 24.3%; and
- Bulk fuel storage facilities monitoring program: 1 duplicate sample and 1 field blank were collected from a total of 5 samples, representing 40.0%.

This represents approximately 21.5% of the samples collected, which is higher than the QAQC 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 = analytical result; B = duplicate result.

RPD values may be either positive or negative, and ideally should provide a mix of the two, clustered around zero. Consistently positive or negative values may indicate a bias. Large variations in RPD values are often observed between duplicate samples when the concentrations of analytes are very low and approaching the detection limit. Consequently, a RPD of 50% for concentrations that exceed 10x the method detection limit (MDL) is considered unacceptable.

Results for the QAQC data are presented in Tables 8.19 to 8.22 for the MMER and EEM, STP, Surface Water, and Bulk Fuel Storage Facility monitoring programs, respectively. The following is a brief summary of the QAQC results, per table:

- MMER and EEM: 0 parameters exceeded the data quality objectives. However, for one sample (original or duplicate) value are within the 10x MDL but the other sample (original or duplicate) value are exceed the 10x MDL. This sample was not considered as exceeding the data quality objectives;
- STP: 5 parameters exceeded the data quality objectives. However, for 5 samples (original or duplicate) value were within the 10x MDL but the other samples (original or duplicate) value were exceed the 10x MDL. These samples were not considered as exceeding the data quality objectives;
- Surface Water: 5 parameters exceeded the data quality objectives. However, for 20 samples (original or duplicate) value were within the 10x MDL but the other samples (original or duplicate) value exceeded the 10x MDL. These samples were not considered as exceeding the data the data quality objectives; and
- Bulk Fuel Storage Facility: 1 parameter exceeded the data quality objectives.

The QA/QC plan was followed and samples were collected by qualified technicians or biologists. Given the high number of samples collected in 2012, it is common to have few RPD exceedances as result of the discrete differences in the original and field duplicate. 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 2012. In the future, AEM technicians will continue to follow standard QA/QC procedures (AEM, 2009) 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

There did not appear to be any trends with the parameters that exceeded the QAQC data quality objectives, nor were there any indications of sampling errors or variability. All of the

results of the field blank samples were acceptable and all other duplicate sample parameters met the QAQC data quality objectives. Consequently, the QAQC results indicate that the data quality is sufficient to meet the objectives of the monitoring programs.

For field measurements, the following equipment is used:

- Analite NEP 160 Meter (Turbidity);
- Hoskin Scientific 340l pH Meter (pH);
- Hanna Multi-Parameter Meter (pH, Dissolved Oxygen and Conductivity); and
- YSI Multi-Parameter Meter (pH, Dissolved Oxygen and Conductivity).

The calibration data are presented in Tables 8.23 to 8.27 for Analite Meters, the Hoskin Meter, Hanna Meters 1 and 2, and the YSI Meter, respectively.

QAQC 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 D1: *All Weather Access Road: 2012 Water Quality Management Report* – Section 4;
- Appendix G2: *Core Receiving Environment Monitoring Program 2012* – Sections 2.7 and 3.1;
- Appendix G4: *2012 Groundwater monitoring and water quality, Meadowbank Mine, Nunavut*– Sections 3.2 and 4.2.

8.1.14 Water Usage

The volume of freshwater pumped from the surrounding lakes and used for the Meadowbank Gold Project is listed in Table 8.28. A total volume of 1,044,675 m^3 of freshwater was used for the project in 2012. This volume exceeds the 2AM-MEA0815 water license limit of 700,000 m^3 per year.

It is the intent of AEM to minimize freshwater use at the Meadowbank site. For the previous 6 months Process Plant personnel have been investigating and designing methods to reduce freshwater usage. The Process Plant uses approximately 90% of the freshwater pumped by Meadowbank. We finalized the implementation of our action plan in mid-December 2012. This included a new cooling system, installed and put into operation, using reclaim water for the SAG mill. Since the summer, 2012, AE increased recirculation of reclaim water to 80% (72% in the second quarter of 2012) which has reduced our fresh water consumption by almost 40 m^3/hr (which represents a reduction of 350,000 m^3 per year). The ratio of water used (m^3) per tonne milled decreased significantly, by 24 m^3/tonne (46 m^3/tonne, Q3 2010, to 22 m^3/tonne in Q4 2012). This information was submitted to the Nunavut Water Board on Jan 4, 2013.

However with the completion of AE's 2012 Water Management Plan it has become evident that we cannot maintain a reclaim rate of 70 - 80%. The Plan has determined that there will be a deficit of reclaim water in early 2013. This is largely due to reclaim water loss of approximately 40% as a result of ice entrapment and tailings pore water entrainment (this is comparable to original predictions made by Golder). It has determined that AE will have to apply to the NWB for a freshwater use increase to compensate for this deficit and keep the mill operational. Currently an application is being prepared and will be submitted in April, 2013.

The volume of reclaim water used in the mill in 2012 was 2,908,839 m^3. The volume of freshwater that came with the ore to the mill in 2012 was 40,118 m^3.

AE is currently assessing the reuse of the Attenuation Pond water in the mill for use as process water. The assessment should be completed by the end of Q2. This project has the potential of decreasing total freshwater use at the site.

8.1.15 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.***

A creel study is conducted as part of a Hunter Harvest Study by Agnico-Eagle in association with the Baker Lake Hunters and Trappers Organization (HTO). This is done 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). As in previous years, creel data suggest that the fish catch remains high in the spring and summer (especially in May and June). A second peak for fish catch totals was observed in November 2012 (similarly, fish catch totals were highest in November 2011, during a year when winter fish harvest monthly totals exceeded spring and summer totals). Standardized results indicate that the highest number of catches per participant occurred in November and December, when fewer participants were fishing but catches were higher. This is, likely due to the use of nets.

Arctic Grayling catches continue to remain low. Arctic Char catches in 2012 were lower than reported catches from the past three years (2009-2011). Lake Trout and Lake Whitefish catches continue to vary widely between years, generally increasing, and may be confounded by the use of nets in some years (e.g., 2011 and 2012). Lake Trout catch in 2012 is higher than most other years, except for 2011. Total Lake Whitefish reported was similar in 2011 and 2012. The majority of participants continue to fish around the perimeters of Baker Lake and Whitehills Lake irrespective of the AWAR as high fishing rates were also reported for Whitehills Lake in 2007 and 2008 prior to AWAR construction. Thus, unless fishing trips are tied to hunting trips, it would appear that study participants are less willing to travel long distances to catch fish, regardless of AWAR access. This is likely due to the abundance of fish in close proximity to the Hamlet of Baker Lake.

The results of the creel survey are available in the report entitled *'2012 Hamlet of Baker Lake Harvest Study – Creel Results'* prepared by Nunavut Environmental Consulting Ltd, attached as Appendix G3.

8.1.16 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.***

No Fish-out was conducted in 2012.

8.1.17 Fish Habitat Mapping

Under Fisheries and Oceans Canada (DFO) authorization for works or undertakings affecting fish habitat (NU-03-0191), a No Net Loss Plan (NNLP; Cumberland, 2006) was developed for the minesite to quantify baseline fish habitat and describe compensation for losses to habitat that would occur as a result of mine development. In 2012, an updated NNLP was created for the entire site (AEM, 2012) using a new method of habitat classification was developed in consultation with Golder Associates, DFO, KIA and HTO. The results of the re-mapping of the fish habitat at the Meadowbank Mine are presented in AEM (2012) that was provided to DFO on October 15, 2012. A revised mine site authorization was subsequently received in 2013.

In addition to this, AEM completed a post-dewatering evaluation of fish habitat in the northwest arm of Second Portage Lake in 2009. This assessment was conducted in compliance with the DFO Fisheries Authorization issued in 2008, and DFO's draft fishout protocol. In 2012, dewatering was complete in the Bay-Goose basin of Third Portage Lake, and a similar evaluation was completed for this area. The objective of the 2012 evaluation was to delineate habitat types in a portion of the de-watered basin, and compare these results with predictions made prior to dewatering. The complete report is found in Appendix G10. Methods were generally the same as in 2009, however changes in the use of GIS technology and the incorporation of statistical approaches have allowed for an improved analysis, specifically with regard to the classification of habitat types and estimates of habitat type areas. The evaluation consisted of aerial photo interpretation and field transects, detailed surveying (+/- 0.25m accuracy) and GIS interpretation within a sub-basin of Bay-Goose basin that was not disturbed by mine operations. The overall goal of the 2012 evaluation was to help quantify habitat type classification error in order to assist in informing future HEP methods and identifying uncertainties specific to habitat area calculations.

In summary, the evaluation found that substrate was misclassified 8% of the time and depth was misclassified 38% of the time. Overall, the observed classification error was 42% for the model used to predict habitat types (which integrates both depth and substrate) prior to dewatering Bay-Goose basin. As may be expected, shallow coarse-grained areas and deep fine-grained areas tended to be classified correctly, whereas mid-depth, mixed-substrate areas were more often miss-classified. Advances in GIS data collection and high resolution CMS laser scanning are expected to be the primary reasons for habitat type classification errors. The choice of a shallow sub-basin for this study that was difficult to map pre-dewatering likely enhanced the observed error rate compared to the 2009 study in Second Portage Lake. The 2012 evaluation results indicate areas for which methods can be improved for classifying habitat types. This evaluation will ultimately assist in refining calculations for habitat compensation projects and follow-up monitoring programs.

8.2 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 2012 noise monitoring program at Meadowbank was conducted in support of the Noise Abatement and Management Plan (AEM, 2009). In Appendix G11 you will find the complete report. The objective of the 2012 program was to measure noise levels at five previously determined monitoring locations around the Meadowbank site, over two 24 hr periods. Due to equipment malfunction or difficulties with software, usable data was only obtained for three locations (R1, R2, R5).

Since noise levels vary constantly over time, the monitoring instrument used at Meadowbank measures acoustical energy near-continuously and reports a single number for each minute, representing the "equivalent sound level" (L_{eq}). This value represents the sound level that would produce the same amount of acoustical energy in the specified time period as the time-varying measured sound levels. L_{eq} values for various time periods recommended by Health Canada are provided for each monitoring location in Table 8.31.

Table 8.31: Summary of L_{eq} values for Health Canada-recommended time periods at three locations around the Meadowbank site (R1, R2, R5). Hourly data was filtered to remove set-up/take-down noises, and data collected outside of optimal weather conditions. Total hours used to calculate each L_{eq} after data filtering are provided.

Site	Dates (2012)	$L_{eq, day}$ 7am-11pm (dBA)	Total Hours	$L_{eq, night}$ 11pm-7am (dBA)	Total Hours	$L_{eq, 1hr}$ 10pm-11pm (dBA)	$L_{eq, 24hr}$ (dBA)	Total Hours
R1	July 2-3	51.1	13	45.8	8	44.21	49.7	21
	July 3-4	57.6	16	55.3	6	46.49	57.1	21
R2	July 25-26	48.7	5	38.0	1	33.43	48.0	6
R5	July 5-6	57.5	16	56.7	8	45.54	57.4	23
	July 6-7	64.5	9	58.1	6	49.79	62.9	15

Since three hours of data are considered representative of the acoustic environment for the daytime and nighttime L_{eq}, all values are considered valid except the nighttime L_{eq} for R2. Noted sounds that contributed to noise levels at each location include wind, waves, insects, birds, vehicle traffic, air traffic (helicopter, airplane) and blasting.

8.3 AIR QALITY 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*

The 2012 dust and air quality monitoring program at Meadowbank was conducted in support of the Air Quality Monitoring Plan - Addendum (Golder, 2008). We will find in Appendix G7 the "*2012 Air Quality and Dustfall Monitoring Report*". The objective of the 2012 program was to measure dustfall, total suspended particulates (TSP), PM10, PM2.5 and NO2 at four monitoring locations around the Meadowbank site. Monitoring locations were determined in consultation with Environment Canada in 2011. One station (DF-4) was moved in 2012 due to changes in the location of the Vault haul road.. Note that only the final position of DF-4 is shown on the figure, but coordinates for both locations are provided. Station DF-4 is approximately 1,500 m southwest of the future location of Vault Pit. This monitoring station was installed before the beginning of the construction of the Vault Road. Realignment of the road during construction placed the station within 10 feet of the road. Therefore, AEM re-positioned Station DF-4 approximately 480 m to the north-west on February 29, 2012 to be representative of the originally intended location relative to the road. Dustfall only was monitored at this location from January through December 2012

Results obtained for the measured parameters were compared to Government of Nunavut Environmental Standards for Ambient Air Quality (October, 2011), where applicable (TSP, PM2.5, NO2).

Mass concentrations of suspended particulates (ie TSP, PM10, and PM2.5) could not be normalized to standard temperature and pressure (STP) as required for direct comparison to GN standards. However, the values obtained in this monitoring program are expected to be higher than they would be if calculated for STP. With this assumption, GN standards were not exceeded for the applicable measured parameters (TSP, PM2.5, NO2) at any time point or monitoring location in 2012.

Dustfall results were compared to the Alberta Environment Department's recreational area dustfall guideline for context. This guideline was exceeded at least once at all stations prior to May, 2012. However, the guideline was not exceeded at any site beginning in June 2012, which coincided with increased dust suppression efforts at the mine site.

As well, a preliminary dust fall study was completed along the AWAR in 2012. The complete report is found in Appendix G7. The primary objective of the dustfall study was to characterize dust deposition based on proximity to the roadway. To fulfill this objective, samples were collected at 50 m intervals to a distance of 100 or 150 m on either side (west or east) of the AWAR, at two locations (km 76 and km 78). This section of the road is relatively straight with few notable topographical features, which limited factors that could alter prevailing winds and prevented micro-climates from influencing dust deposition. The secondary objective of the study was to compare rates of dustfall on the minesite with those along the AWAR. To address this objective, dustfall samples were collected at two locations on the minesite (DF-1 and DF-2).

Overall, rates of dustfall along the AWAR were within the range of Alberta Environment's ambient air quality guidelines (recreational or industrial). Dustfall rates were not significantly different between 100 and 150 m from the road, and these rates were not significantly different from those at the minesite, it is likely that elevated rates of dustfall are confined to < 100 m from the road. This is in agreement with TEIA predictions (Cumberland, 2005) and Male and Nol (2005) who found the most pronounced dustfall rates within 50 m of roads at the Ekati mine site. Notably, 30-d rates of dust deposition at 50 m from the Meadowbank AWAR were more than 20 x lower than those reported along Ekati Diamond Mine haul roads in 2003 (extrapolated from 72-h studies; 0.7 g/m2/day; Male and Nol, 2005). Furthermore, reported dust depositions along Ekati haul roads after application of dust suppressants (extrapolated from 72-h studies; 0.2 g/m2/day; Male and Nol, 2005) was still more than 4 x higher than observed along Meadowbank's AWAR in this study. Despite higher levels of dust deposition at Ekati, Male and Nol (2005) did not find a measurable effect of roads on Lapland longspurs. Similar results were reported in AEM (2012) annual report for the 2011 AWAR Meadowbank breeding bird survey that found higher bird diversity within 150m of the east side compared to the west side of the road and no road related effects on bird abundance (eg. Lapland longspur abundance) or richness (AEM, 2012). A 2013 dustfall study will be completed to follow-up on the findings of the preliminary study.

8.4 WILDLIFE MONITORING

8.4.1 Annual Monitoring

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

This Wildlife Monitoring Summary Report represents the seventh in a series of annual Wildlife Monitoring Summary Reports for the Agnico-Eagle (AE) Meadowbank Mine. The report is provided in Appendix G5. 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 (TEMP) (Cumberland 2006). The 2012 report provides the objectives, methodology, historical and current year results as well as the accuracy of impact predictors and management recommendations of each monitoring program in a standalone section.

Basic metrics (e.g., abundance, diversity, richness) are provided for breeding bird PRISM plots survey data up to 2012. Detailed analyses of the bird PRISM plot data are planned for the 2015 annual report, following an additional survey during the operational phase of the mine. In 2012, five active Peregrine Falcon (*Falco peregrinus*) nests were observed and monitored at quarry sites along the AWAR. A sixth nest was monitored at Portage Pit, and a management and protection plan was developed for this nest. Waterbird nest surveys were conducted at the mine site and along the AWAR. No project-related effects on nesting success were noted for falcons or waterbirds.

A Caribou collaring program (13 collars) was completed in April 2011 and tracking of caribou continued in 2012 to assist in understanding caribou movements. The Hunter Harvest Study participation rates continued to increase (62 respondents in 2012); however, the overall reported number of Caribou harvested in 2012 was lower than reported in the past three years. In 2012, 35% of all reported Caribou harvests were within 5 km of the AWAR. As in previous years, the AWAR was temporarily closed during a peak Caribou migration period and speed limits were reduced in some sections. One Caribou and one Wolverine fatality did occur on the AWAR in 2012. To further reduce wildlife mortalities, AE has implemented some adaptive management measures including increased monitoring frequency at the mine site and along the AWAR, improved waste handling, and implementation of an independent Wildlife Safety Site Audit (Bear Wise).

Each subsequent Wildlife Monitoring Summary Report builds on data presented in the previous year's report. Analyses of data from monitoring programs to date indicate that they are appropriate for comparing baseline conditions and reference areas to current conditions and the mine site. The monitoring programs will continue to meet the conditions of the NIRB Project Certificate but will evolve throughout the life of the mine, contingent on data quality objectives and the necessity for adaptive management strategy implementation and subsequent effectiveness monitoring. The ongoing collection of data will allow for increasingly robust statistical analyses each year, where warranted. That will build on an understanding of naturally occurring and potential mine-related effects.

The "*Meadowbank Mine 2012 Wildlife Monitoring Summary Report*" is attached in Appendix G5.

8.4.2 Harvest Study Results

As required by NIRB Project Certificate No.004 Condition 54

a. Updated terrestrial ecosystem baseline data

See "*Meadowbank Mine 2012 Wildlife Monitoring Summary Report*" attached in Appendix G5.

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.

Briefly, the harvest study administrator currently visits with hunter harvest study participants on a quarterly basis, documenting harvests (which are written on the provided annual hunter harvest calendar) and discussing general hunting trends and observations. The harvest study administrator also conducts local radio announcements and posts promotional material around the Hamlet of Baker Lake during the quarterly visits. Participation has continued to increase steadily since 2007 and the dataset is becoming increasingly robust with increasing participation.

At the end of 2012, hunting data had been collected from 62 participants (an increase from 2011 when data were collected from 46 participants). The estimated 10% of Baker Lake hunters

participating in the HHS continues to be used as the estimate of overall participation based on the 2008 HTO member list and an assumption that there is an increase in overall number of hunters in the community.

In 2012, 174 Caribou (35% of total) were harvested within 5 km of the AWAR, a similar proportion as most previous years. Total harvests per participant within 5 km of the AWAR have decreased as compared to the past. In 2012 the harvest rate was 5.6 Caribou per participant. In the historical NWMB study, Caribou harvests within 5 km of the road were lower at 18% of total harvest. In the HHS data set, harvest along the AWAR has been around 36% of total harvest. The total number of Caribou harvested along the AWAR showed a decrease, likely related to an overall decrease in harvest, but an increase in total harvest numbers along the road in the winter season . The road appeared to be important to hunters in the winter season, despite relatively unrestricted access to unroaded areas in the Baker Lake area. The harvest peak observed in November 2012 may be related to larger herds of Caribou observed along the AWAR during this time period.

Counts remained low for Muskox and Wolverine, precluding any interpretation of potential minerelated effects. Low densities of Muskox and Wolverine and general aversion to human activities require hunters to explore areas well outside areas occupied by the AWAR; therefore, the AWAR is anticipated to have little effect on Muskox and Wolverine hunting patterns. Wolverine harvest was half of the number recorded in 2010.

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.

AE did not conduct aerial surveys to assess waterfowl densities in the regional study area in 2012. However, AE conducted a waterbird nest survey. Below is a summary of the results and the complete report is in Appendix G5.

The waterbird nest survey monitoring program has been designed to evaluate potential changes in nesting distribution of waterbirds utilizing ponds, wetlands, lake shorelines and islands within 200 m of mine facilities (200 m considered to be the approximate ‘zone of influence’ for waterfowl). Given the low numbers of nesting waterfowl observed within the mine site and AWAR during nest surveys to date, the number of waterfowl nesting within 200 m of mine facilities within any given year is predicted to be very small; however, potential changes in waterfowl nesting distribution may occur and should be documented and monitored.

Waterbird nests were not observed at the mine site in 2012. The 2012 survey marked the eighth consecutive year that waterbird nest surveys were conducted at the mine site and the seventh year of the more intensive protocols established in 2006. The intensive protocol resulted in a more comprehensive dataset relative to previous years; however, counts, nest locations and species continued to vary between years. Waterbird nest density in the mine site continues to remain very low.

The 2012 waterbird nest data for ponds and lakes within 200 m of the AWAR are provided in Table 8.29. Four active nests, one recently occupied nest (predated), and one likely nest were observed in 2012. 2012 marked the sixth consecutive year that waterbird nest surveys were conducted along the AWAR. Overall the density is very low and; therefore, statistically, these data are not reliably able to predict impacts related to AWAR activities.

Table 8.29: 2012 Waterbird Nest Survey Results for Ponds and Lakes within 200 m of the AWAR

Date	Species	Pond ID	UTM Coordinates	Comments
29 June	Canada Goose	P52	14W 634138 7216168	Nest with 3 eggs on islet
30 June	Cackling Goose	L44	14W 627715 7204071	Recently predated nest on islet
30 June	Canada Goose	L17	14W 642899 7146376	Nest with 3 eggs
30 June	Canada Goose	P43	14W 627682 7202117	Nest with 3 eggs on islet
30 June	Red-breasted Merganser	L23	14W 630114 7168200	Nest with 1 egg
30 June	Semipalmated Sandpiper	P42	14W 627182 7203559	Probable nest site

Given the low densities of waterbird nests identified at the mine site and along the AWAR since 2005 (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 2012 Wildlife Monitoring Summary Report*". Here is a summary:

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). 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.

The breeding bird plot monitoring program is to continue every year during the construction period and for at least the first three full years of mine operation (2010-2012) in accordance with the TEMP (Cumberland 2006). The next PRISM plot survey is planned for 2015, following which detailed analyses of project effects will be undertaken. Only basic abundance and diversity metrics are provided in this report.

The survey methodology involves a survey of twenty-five (25) control and mine site plots, measuring 400 x 400 m (16 ha) following the CWS PRISM protocols (CWS 2005). Specifically, two observers, spaced at 25 m intervals, walk slowly back and forth (north-south direction) across each plot (1.5 to 2.0 hours per plot) and record all birds and nests observed. Based on the 25 m intervals, 17 transects need to be traversed to complete each survey plot.

Species Relative Abundance

Lapland Longspur (LALO), Horned Lark (HOLA) and Savannah Sparrow (SAVS) were most commonly reported. Observation of the distribution of counts suggested similar trends in both control and mine plots. Similarly, analysis suggested that there were no temporal trends, or differences in abundance for Lapland Longspurs between control and mine sites or specific differences (impacts) of mine areas (after 2007).

Species Richness

Species richness increased in 2009, decreased in 2010 and 2011, and then increased again in 2012 with trends similar between mine and control plots. Similar trends have been observed in the cumulative number of species and the number of unique species identified in mine and control plots by year in previous analyses. The number of new species detected each year has decreased over the duration of the monitoring program for both mine and control sites, which is expected since most species are observed in the first few years of a study.

Species Diversity

Both mine and control sites were heavily dominated by Lapland Longspur (LOLA), Horned Lark (HOLA), Savannah Sparrow (SAVS), Common Redpoll (CORE) and Rock Ptarmigan (ROPT). Most other species were only occasionally sighted on plots. Species diversity increased for both mine and control sites up to 2009 then decreased in 2010 before increasing again.

8.4.3 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.***

See figure 11 for maps of caribou migration corridors.

8.4.4 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*

The joint 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 Beverly and Qamanirjuaq herds. The satellite-collaring program has become increasingly important as both a monitoring and management tool in recent years. The satellite-collaring program, along with GN DoE regional data, is also serving to provide a regional perspective on Caribou activity near mine operations and natural changes in Caribou populations in the region.

The satellite-collaring program was designed to continue for five consecutive years in accordance with the TEMP (Cumberland 2006). Caribou were collared in May 2008, November

2009 and April 2011 with monitoring scheduled to continue to 2014. An additional collar deployment is planned for April 2013.

As of December 2012, 15 collars were still active and transmitting signals (none from 2008 deployment, seven from 2009, and eight from 2011). A summary of 2012 locations and movement patterns is provided on section 10 and Figure 10.1 of the *2012 Wildlife Monitoring Summary Report*.

A summary of Caribou migration patterns, which synthesizes migration information from satellite-collaring data, has been developed by the GN for the spring and fall migrations (Figures 10.2a and 10b of the report in Appendix G5).

To generate the maps, satellite-collaring data was first used to generate 'walk lines' for each animal, and then a 'density' analysis was run on the walk lines for Caribou in spring and fall migration (on a per year and subpopulation basis). This path-derived analysis assesses continuous corridors rather than points, which can artificially elevate density estimates for an area. The approach generates spatial patterns of migration and compares areas by relative intensity of use. Higher use areas represent more intense use by multiple animals within a particular year and/or regions of repeated use occurring over multiple years. One limitation of the data is that areas outside of defined migration corridors do not necessarily indicate it is unimportant to, or uninhabited by, caribou, but instead could be an area where collared animals have not been located (i.e., and could potentially be an area of high density for non-collared animals).

8.4.5 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 walls and overhangs. Established nests within some of these quarries are monitored on an annual basis to evaluate occupancy.

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

1. Confirm that raptor nest failures will 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 will occur. The threshold level of mortality is one individual per year.

Details of raptor (primarily Peregrine Falcon) nest sites identified along the AWAR during the 2012 field season are provided in Table 8.30. No new active nest sites were identified in quarries in 2012. In 2012, a Peregrine Falcon pair successfully nested on the Portage Pit walls despite initial efforts to deter the pair from nesting. According to regular monitoring of the nest

two chicks appear to have successfully fledged from the nest. Raptor Nest Management Plans were not warranted at any of the nest sites along the AWAR during the 2012 field season. A general mine site Peregrine Falcon management and protection plan was developed in accordance with the TEMP for the nest in Portage Pit. Observations can be found in Appendix A of the report.

Table 8.30: 2012 Raptor and Raven Nests Identified and Monitored at the Mine Site and along the AWAR between Baker Lake and the Meadowbank Mine Site

Date First Observed	Species	Location (UTM)	Location	GN Site #[1]	Comments
02 July 2012	Peregrine Falcon	14W 0642068 7147616	Quarry 2	4003	Nest with 4 eggs on 02 July; 2 adults and 3 chicks on 23 July
02 July 2012	Peregrine Falcon	14W 0637952 7156371	Quarry 3	4004	Nest with 4 eggs on 02 July; 1 adult and 3 chicks on 18 July; 1 adult and 2 chicks on 23 July
30 June 2012	Peregrine Falcon	14W 627351 7202109	Quarry 18	4008	Nest with 4 eggs on 30 June
30 June 2012	Peregrine Falcon	14W 628686 7204285	Quarry 19	3901	Nest with 4 eggs on 30 June; 2 adults and 2 chicks on 23 July.
29 June 2012	Peregrine Falcon	14W 0630781 7211705	Quarry 21	4009	Nest with 4 eggs on 29 June
07-June-2012	Peregrine Falcon	14W 0639109 7213617	Portage Pit wall	Not Determined	Nest with 2 chicks

[1] Government of Nunavut Raptor Database site number

Quarry mining activities along the AWAR corridor have created moderate to high potential raptor nesting habitat. Raptors are expected to continue to use select quarries for the foreseeable future, which may necessitate the implementation of a formal nest management plan for raptor nests, as was done in 2012 for the Portage Pit nest. Another raptor nest survey should be conducted in 2013 at each of the quarries along the AWAR early in the nesting season (mid-late June) to confirm the activity status of previously confirmed raptor nests, assess for the presence of new raptor nests and determine the need, if any, for development and implementation of nest-specific management plans. Informal raptor and raptor nest monitoring should continue around the mine site LSA and along the AWAR during road surveys, and daily and weekly mine-site ground surveys.

8.5 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***

As per the TEMP, in 2011, AE completed a wildlife Screening Level Risk Assessment (WSLRA) using field data collected in 2011. AEM has also completed a Human Health Risk Assessment with respect to monitoring the contaminant levels in country foods. The document speaks to the possible effects of mine activity and contaminant levels. See 2011 NIRB annual report for more details.

On December 7, 2012, NIRB sent a letter to Health Canada, Environmental Assessment Division. The NIRB invites Health Canada to provide comments on the results of both the

WSLRA and PQRA reports as provided by AEM, and to indicate whether or not further information may be required with respect to the monitoring program as outlined in Condition 67. The Board respectfully requests that Health Canada provide comments regarding these reports to the NIRB by February 4, 2013. You will find the letter sent to Health Canada on Appendix G9.

8.6 ARCHEOLOGY

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.

No archaeological work was conducted at the Meadowbank site in 2012. Should future expansion occur AEM would comply with the guidance provided in the Socioeconomic and Archaeology Management Plan and the requirements of our Production Lease with the KIA regarding any new archaeological or heritage sites.

8.7 AEMP

As required by Water License 2AM-MEA0815 Schedule B, Item 14: ***The results of monitoring under the Aquatics Effect Management Plan (AEMP).***

8.7.1 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 2008, the Nunavut Water Board (NWB) issued Meadowbank's Type A water license (2AM-MEA0815), and requested a revised AEMP, and specifies some of the requirements for that revision. Most importantly, while the 2005 AEMP focused on core receiving environment studies at the level of basins and lakes, the NWB advised that the revised AEMP needed to be broader in scope to comply with the following Type A water licence requirements (as stipulated in Part I-1):

- A detailed monitoring protocol to verify that the Canadian Council of Ministers of Environment Fresh Water Aquatic Life Guidelines are met thirty (30) metres from the outfall diffusers;
- Annual reporting for more immediate adaptive management;
- Mechanisms to measure changes to productivity in the lake as a result of the mine adding nutrients;
- Sampling and Analysis Plans; and
- Monitoring under Fisheries Authorizations, NWB Licence Compliance Monitoring, Environmental Effects Monitoring, and Groundwater Monitoring.

The last requirement diverged from traditional AEMPs (INAC, 2009) and required AEM to propose a new approach, which was presented in draft to the NWB (March 2-3, 2010). This draft was accepted without additional comments and submitted as a final revised plan in December 2012, and necessitated the restructuring of the AEMP. Through this process, 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 2012 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 2012, or that should be considered in future monitoring.

8.7.2 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 8.32 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 to the water column, and then most 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 2012, all of the potential pathways, exposure media and receptors of concern listed in Table 8.7-1 were relevant to the 2012 AEMP analysis and were evaluated with the exception of fish tissue (i.e. no fish tissue collected in 2012) and periphyton (see Section 8.7.3).

Table 8.32- Primary transport pathways, exposure media, and receptors of concern for the AEMP.

	Transport Pathways		Exposure Media		Receptors of Concern
				a, g	Phytoplankton
g,h	Effluent				
				g	Zooplankton
f	Groundwater	a,f,g,h,j,l	Water		
				g	Fish
h,j	Surface water	a	Sediments		
				a	Benthic community
l	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 - No Net Loss Fisheries Planning
~~e~~	~~Dewatering Monitoring~~
f	Groundwater Monitoring
g	MMER Monitoring
h	Water Quality and Flow Monitoring
~~i~~	~~Fish Out Studies~~
j	AWPAR and Quarry Water Quality Montoring
k	Blasting
l	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 2012

8.7.3 Summary of Results of AEMP-Related Monitoring Programs

In 2012, in accordance with the Type A 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;
- Blast Monitoring; and
- Groundwater Monitoring.

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

Air quality was also considered as part of the conceptual site model and are included in the AEMP discussion to inform the process, but this program is not a requirement of the Type A License; Part I-1.

Table 8.33 summarizes the results of the AEMP programs in 2012. Details of the programs are described previously in this Monitoring Section (Section 8 of the annual report). For detailed results on individual monitoring programs, refer to the appended reports.

Table 8.33- Summary of results for aquatic effect monitoring programs in 2012.

	Core Receiving Environment Monitoring Program	Effects Assessment Studies	Dike Construction Monitoring	Habitat Compensation Monitoring Program - NNL related monitoring	Dewatering Monitoring	MMER Monitoring	Environmental Effects Monitoring (as part of MMER)	Water Quality and Flow Monitoring	Fish-Out Studies	AWPAR and Quarry Water Quality Montoring	Blasting Monitoring	Groundwater Monitoring
Completed in 2012?	**Yes**	**No**	**No**	**No**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**Yes**	
Stressor Variables												
suspended solids	○					○		○		○	NA	○
sediment deposition	NA					NA		NA		NA	NA	NA
water-borne toxicants	○					○		○		○	NA	○
sediment toxicants	●					NA		NA		NA	NA	NA
nutrients	○					○		○		○	NA	○
other physical stressors	●					○		○		○	●	○
Effects Variables												
Phytoplankton	●					○		NA		NA	NA	NA
Zooplankton	NA					○		NA		NA	NA	NA
Fish	NA					○		NA		NA	NA	NA
Benthic invertebrate community	○					NA		NA		NA	NA	NA
Periphyton	NA					NA		NA		NA	NA	NA
Fish habitat	○					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 8.33. As per Environment Canada regulations, Environmental Effects Monitoring (EEM) studies that include fish population surveys and fish health monitoring were completed in 2011 and were not required in 2012. According to DFO authorizations, no habitat compensation monitoring programs along the AWAR or near the mine site (which uses periphyton as an assessment endpoint), were required in 2012. Rather, fisheries monitoring in 2012 focused on baseline collection in Wally and Vault Lakes to provide for No Net Loss Planning. These data are summarized in the 2012 Meadowbank Mine No Net Loss Plan submitted to the DFO on October 15, 2012.

Overall, none of the site specific stressor or effects based trigger exceedances or guideline exceedances had the potential to caused significant risks to the aquatic environment. The CREMP found that there were some apparent mine-related changes identified in the 2012 data at one or more near-field (NF) areas. Specifically, conductivity (near Second Portage Lake only), sulphate (Third Portage North, South, East and in Tehek near-field station) and total dissolved solids (TDS) (Second Portage Lake only) were elevated above their respective trigger values with statistically significant changes at one or more NF areas relative to baseline/reference conditions. These triggers were not derived from effects-based thresholds (e.g., CCME water quality criteria) rather were set at the 95% percentile of baseline data using an approach that evaluates a statistically significant trend as compared to baseline data. The absolute concentrations for sulphate were low (3 to 4 mg/L) and to put this in context, BC's present aquatic life water quality guideline is currently 100 mg/L and sulphate concentrations in Baker Lake often naturally exceed 10 mg/L. Therefore it was determined that none of the 2012 CREMP water quality results would suggest risks to aquatic life. The results of the CREMP are summarized in Table 8.34. Additionally, the CREMP identified sediment toxicants (zinc) in Second Portage Lake that exceeded trigger levels, indicating that it is elevated beyond baseline conditions. Lastly phytoplankton populations exceeded early warning trigger values (>20% change in species richness and >50% change in total biomass) in near-field stations, which may be attributed to changes in water chemistry due to mine activity or natural variability.

Blast monitoring results exceeded DFO guidelines for peak particle velocity (PPV) on a few occasions due to pre-sheer surface blasting immediately adjacent to the monitoring station. It should be noted that blast monitoring stations are set up on land to permit accurate and consistent readings, and are therefore overly protective of spawning habitat which is at least 250 m away. Furthermore, in comparison to other studies conducted at Ekati, the numbers of observed PPV exceedances at Meadowbank are well below a "no-observed-effect-level". Site water quality monitoring demonstrated elevated levels of sulphate (avg. 181.6 mg/L and max 305 mg/L) and TDS (avg. 519.87 and max.1104 mg/L) at samples taken from ST-9 (located in the attenuation area), there were no observed MMER (or Water License) exceedances. As discussed in the previous monitoring sections of the annual report and summarized in Table 8.33, MMER, site water quality and flow monitoring and groundwater monitoring programs had no observed effects as compared to license limits and reference conditions.

Table 8.34- Summary of results of the CREMP

Variable Type & Variable	Magnitude[1]	Spatial Scale[2]	Causation[3]	Reversibility[4]	Uncertainty[5]	Comments
Exposure - Limnology						
Oxygen	○	n/a	n/a	n/a	?	
Temperature	○	n/a	n/a	n/a	?	
Conductivity	○	n/a	n/a	n/a	?	
Exposure - Water Chemistry						
Conventionals	●	Large	High	High	?	Sulphate (TPN,TPS,TPE,TE), conductivity (SP) and TDS (SP); concentrations suggest low potential for adverse effects.
Nutrients	○	n/a	n/a	n/a	?	TOC "elevated" but threshold needs revision
Total Metals	○	n/a	n/a	n/a	?	Strontium "elevated" but threshold needs revision
Dissolved Metals	○	n/a	n/a	n/a	?	Strontium "elevated" but threshold needs revision
Total Suspended Solids	○	n/a	n/a	n/a	?	
Exposure - Sediment Chemistry						
Physical	○	n/a	n/a	n/a	?	
Total Metals	●	Moderate	Moderate	Moderate	??	Elevated zinc at SP; not bioavailable & not toxic.
Organics	○	n/a	n/a	n/a	?	
Effects - Phytoplankton						
Chlorophyll-a	○	n/a	n/a	n/a	?	
Total Biomass	●	Large	Low-Mod	High	???	>50% higher at TPN/TPE (possible lake effect)
Species Richness	●	Mod-Large	Low-Mod	High	???	>20% higher at TPN (possible lake effect)
Effects - Benthic Invertebrates						
Total Abundance	○	n/a	n/a	n/a	?	
Total Richness	○	n/a	n/a	n/a	?	

[1] Magnitude Ratings (narrative in brackets used in the absence of specific triggers/thresholds):

○ no exceedances of triggers or thresholds (or no apparent changes from baseline of concern)

● early warning trigger exceeded (or change from baseline warranting concern)

● 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] Reversibility Ratings:

n/a – no magnitude of effect, therefore not evaluated

Low – largely irreversible (e.g., decades +)

Moderate – slowly reversible (e.g., years to decades)

High – rapidly reversible (e.g., months to years)

[5] Uncertainty Ratings:

? – low uncertainty

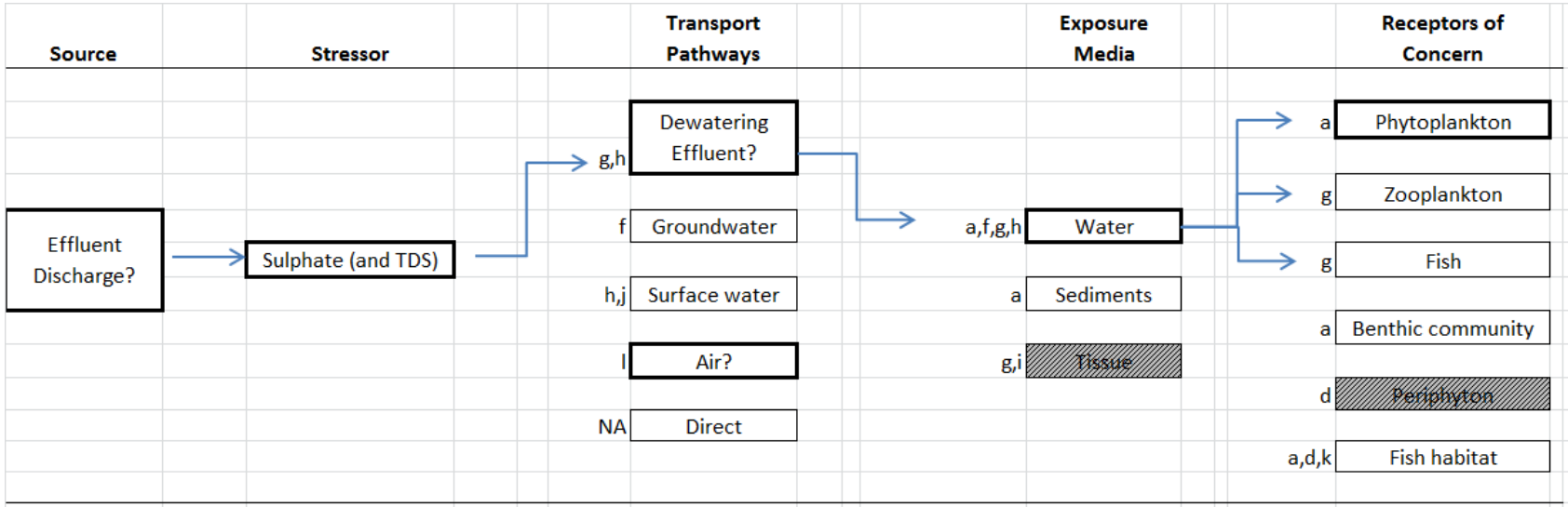
?? – moderate uncertainty

??? – high uncertainty

8.7.4 Integration of Monitoring Results

The 2012 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 and periphyton data were not collected in 2012 and therefore are not included in the conceptual model (shaded grey in the table).

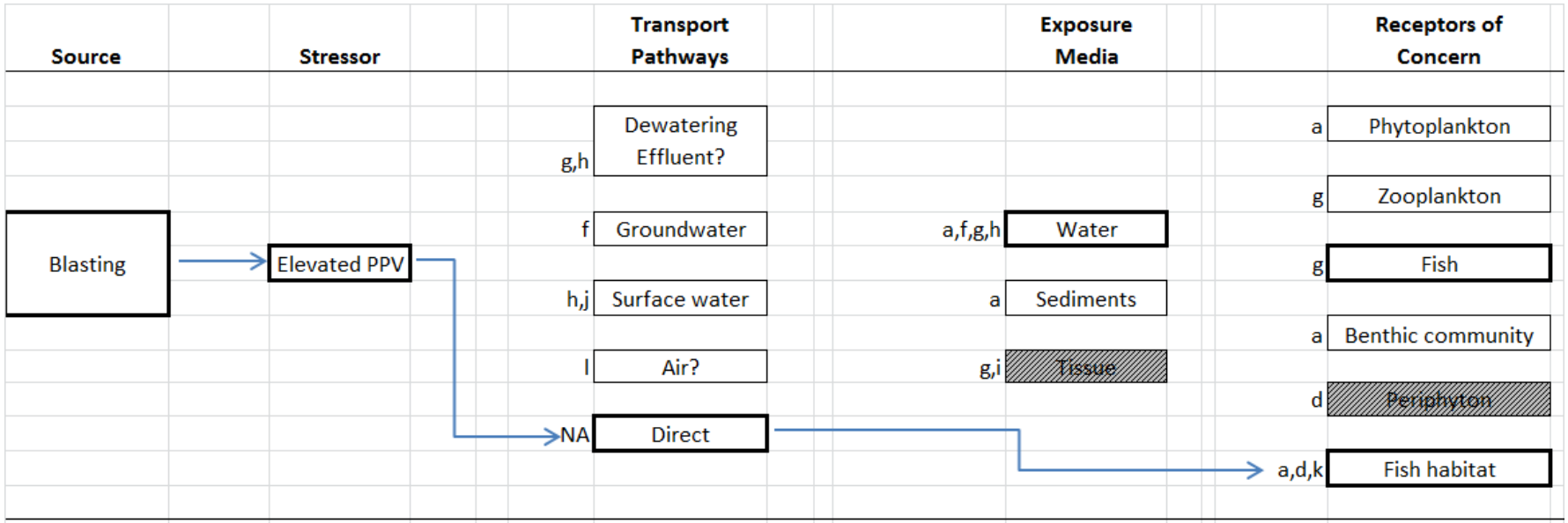
As per Azimuth (2012), the results of the monitoring programs were integrated in a mechanistic fashion that required a thorough review of the results to identify any patterns among the programs. Although the receiving environment water quality changes at TPN, TPS, and TPE in 2012 are considered unlikely to cause any adverse environmental effects, a conceptual site model was developed to address the issue of elevated sulphate to determine if the cause to observed changes in phytoplankton are a result of mine related sources (see Figure 8.7-1). As per Azimuth (2012), source, stressor, transport pathways, exposure media, and effects measures was evaluated in 2012. 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 progams that had exceedances of relevant guidelines (blast monitoring) or triggers (CREMP).



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	Water Quality and Flow Monitoring
~~i~~	~~Fish-Out Studies~~
j	AWPAR and Quarry Water Quality Montoring
k	Blasting
l	Air quality monitoring
NA	Direct, so measured in exposure medium.

Figure 15a: Integrated conceptual site model for 2012 AEMP – Sulphate (and TDS)



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	Water Quality and Flow Monitoring
~~i~~	~~Fish Out Studies~~
j	AWPAR and Quarry Water Quality Montoring
k	Blasting
l	Air quality monitoring
NA	Direct, so measured in exposure medium.

Figure 15b: Integrated conceptual site model for 2012 AEMP – Elevated Peak Particle Velocity (PPV)

8.7.5 Identification of Potential Risks and Discussion

The only mine-related activities undertaken in 2012 with point-source discharges to the receiving environment were effluent discharges to Third Portage North (TPN) (ie, no in-water dike construction activity in 2012). As reported in the CREMP, receiving environment water quality changes at TPN (and TPS and TPE) in 2012 would not suggest any risk to aquatic life. Notwithstanding, consideration was taken in the AEMP for all of the potential mine-related sources of sulphate and total dissolved solids in near-field stations (Third Portage Lake North (TPN) and East (TPE) were considered in the AEMP. The conceptual site model presented in Figure 8.32 assisted in understanding the possible linkages (i.e., effect to stressor to source) and it was determined that the most likely sources of elevated sulphate and TDS are effluent discharge and/or dust deposition. Air quality monitoring results indicated that dustfall, total suspended particulates (TSP), PM10, and PM2.5 (potential sources of sulphate) generally did not exceed available standards or guidelines at stations nearest to the mine. Although dust is considered another likely source of elevated sulphate, the dust levels generated in 2012 were not high enough to cause the observed increase. Despite very low levels that do not exceed BC effects based guidelines it is likely that effluent discharge is the primary cause of changes in sulphate and TDS from baseline conditions potentially leading to changes in phytoplankton populations.

Based on the conceptual site model, effects to receptors of concern (phytoplankton, zooplankton and fish) are considered as a result of elevated sulphate and TDS. However, effluent acute toxicity testing prior to discharge (through the MMER monitoring program) did not indictate any significant mortality in Rainbow trout survival (zero mortality throughout the year) or *Daphnia magna* (cladocerean) survival (zero mortality throughout most of the year and 10 % mortality in August sampling). Therefore, it is unlikely that the observed increase in the phytoplankton population is occuring as a result of reductions in zooplankton or fish populations, due to contaminants in effluent discharge. Given that no other effects were identified and the phytoplankton surveys are inherently uncertain, it remains unclear if these changes in phytoplankton productivity are due to mine-related activities or due to natural variability. As discussed in the CREMP further trend monitoring in 2013 will be required to determine the source.

The trigger exceedances for zinc in sediment have been previously observed, and are not likely to be related to 2012 activities. Statistical analyses of the 2012 sediment core data relative to the 2008 baseline data identified zinc at SP as the only case with statistically-significant temporal changes exceeding the site-specific triggers. There was some uncertainty as to whether the result is due to sedimentation that occurred during dike construction, or was due to spatial heterogeneity. Potential metals toxicity in SP related to dike construction were directly tested in 2010 using sediment toxicity tests and sequential extraction analysis (Azimuth, 2011). Results indictated that while elevated zinc concentrationsmay have been related to dike construction in 2008, follow-up studies suggest that the metals are not bioavailable and therefore not toxic. This analysis is explained in detail in the CREMP report and in previous annual reports.

In 2012, the average PPV at Meadowbank was 5.09 mm/s, with 13 DFO guidance exceedances and a maximum of 25 mm/s. 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. At Meadowbank habitat compensation monitoring in 2009 and 2011 indicated fish use with greater catch per unit effort along East Dike and Bay-Goose dike faces than in reference areas. Based on these findings, the 2012 blasting are unlikely to impact salmonid incubation sites at the Meadowbank Mine site there are no expected risks to fish habitat due to few PPV exceedances.

8.7.6 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 in the CREMP and water quality monitoring prior to discharge at station ST-9 demonstrated elevated sulfate and TDS, no additional monitoring is required in 2013. More specifically, water chemistry sampling will continue at all stations at the mine-site and for the CREMP and in particular, several parameters should be closely monitored for continued trend analysis (namely, sulphate, TDS and conductivity). No additional sediment sampling is required and there are no follow-up actions required related to sediment, because the source of zinc contamination was previously determined. Lastly, trends in phytoplankton community metrics will be watched closely in 2013 to see if the pattern identified in 2012 continues.

In addition to water quality sampling, to investigate the potential point sources of sulphate, a targeted dustfall monitoring study will be conducted in 2013 which will further evaluate dust deposition around the mine site that have the greatest sources of dust deposition (i.e. vault haul road) and along the All Weather Private Access Road. The results of this study will be integrated in the 2013 AEMP synthesis report in addition to annual air quality monitoring.

9 CLOSURE

9.1 PROGRESSIVE RECLAMATION

9.1.1 Mine Site

As required by Water License 2AM-MEA0815 Schedule B, Item 16: ***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 2013, AEM will update the site closure plan using revised life of mine calculations.

Under the current design plans, waste rock from Portage and Goose Pits are currently being stored in the Portage Rock Storage Facility and will be stored in the Portage Pit following the completion of mining in this area. The Portage Waste Rock Storage Facility was constructed to minimize the disturbed area, restrict runoff to the Tailings Storage Facility and subsequently be capped with a 4 meters layer of non-acid-generating (NAG) 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. In 2012, AEM completed a major portion of the reclamation of the Portage waste rock storage facility (PRSF). NAG quantities used for Portage RSF capping are 3.1 Mt in 2012 and expected quantities of 0.43 Mt in Jan 2013. See Appendix J1 for PRSF reclamation step.

The same principle is 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 reaches the groundwater below the permafrost. The tailings are potentially acid generating (PAG), therefore a minimum 2-m thick cover of NPAG rockfill will be placed over the tailings to physically isolate the tailings and to confine the active layer within relatively inert materials. Cover trials were started in 2012 and will be completed during operations to confirm the required cover thickness 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.

9.1.2 AWPAR

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 restoration work was completed in 2012.

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 2012.

9.2 RECLAMATION COSTS

9.2.1 Project Estimate

As required by Water License 2AM-MEA0815 Schedule B, Item 18: ***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.***

See Section 9.1 for the 2012 progressive reclamation. In 2013, AEM will update the site closure plan using revised life of mine calculations. An updated estimate of current restoration liability will form part of the updated plan. The amount of reclamation security will be affected by Portage Waste Rock Facility reclamation work and this will be a consideration included in the 2013 update of the site Closure Plan.

Estimates of current restoration liability and the amount of security posted for the project are the same as was approved by the NWB in July 2008 (at the time of license issuance).

9.2.2 AWPAR 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 progressive reclamation has been completed on the AWPAR or associated quarries. Closure activities are consistent with the '*AEM Closure and Reclamation Plan, September 2008*', and original cost estimate.

10 PLANS / REPORTS / STUDIES

10.1 SUMMARY OF STUDIES

As required by Water License 2AM-MEA0815 Schedule B, Item 19: ***A summary of any studies requested by the Board that relate to Waste disposal, Water use or Reclamation, and a brief description of any future studies planned.***

No studies were requested by the NWB.

10.2 SUMMARY OF REVISIONS

As required by Water License 2AM-MEA0815 Schedule B, Item 20: ***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 2012:

- Landfarm Design and Management Plan, Version 3;;
- Groundwater Monitoring Plan, Version 3;
- No-Net-Loss Plan, Version 3;
- Emergency Response Plan, Version 4;
- Hazardous Materials Management, Meadowbank Mine Site and Baker Lake Facilities, Version 2;
- Oil Pollution Emergency Plan; Meadowbank Mine Fuel Farm in Baker Lake, Version 1;
- Spill Contingency Plan, Version 3;
- Wildlife protection and Response Plan, Version
- Incinerator Waste Management Plan, Version 4;
- Operation & Maintenance Manual : Sewage Treatment Plan, Version 3;
- Water Management Plan 2012, Version 2 (Appendix C1);
- Updated Mine Waste Rock and Tailings Management Plan, Version 2 (Appendix D2);
- Core Recieving Environmental Monitoring Program (CREMP) : Design Document 2012; Version 1;
- Aquatic Effects Management Program (AEMP) Meadowbank Mine- Version 2

The above listed plans are included in Appendix H1. A brief description of revisions made to each of plans is provided in Appendix H2.

10.3 EXECUTIVE SUMMARY TRANSLATIONS

As required by Water License 2AM-MEA0815 Schedule B, Item 21: ***An executive summary in English, Inuktitut and French of all plans, reports, or studies conducted under this Licence.***

Appendix H2 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 2012:

- 2011 Annual Geotechnical Inspection;
- 2011 Independent Geotechnical Expert Review Panel Report;
- All Weather Private Access Road: 2011 Water Quality Management Report;
- Aquatic Effects Monitoring Program – Targeted Study: Dike Construction TSS Effect Assessment Study 2011;
- Site Wide Water Balance Model Update;
- 2011 All Weather Access Road Fisheries Report;
- Aquatic Effects Monitoring Program – Core Receiving Environment Monitoring Program 2011;
- 2011 Groundwater Monotoring Well Installations And Water Quality Results;
- Aquatic Effects Monotoring Program (AEMP) : 2011, Meadowbank Mine Site Habitat Compensation Monotoring;
- 2011 Blast Monitoring and Recommendations for Future Monitoring.

11 MODIFICATIONS / GENERAL / OTHER

11.1 MODIFICATIONS

As required by Water License 2AM-MEA0815 Schedule B, Item 12: ***A summary of modifications and/or major maintenance work carried out on all water and waste related structures and facilities.***

There were no modifications in 2012.

11.2 INSPECTIONS, COMPLIANCE REPORTS AND NON-COMPLIANCES ISSUES

As required by Water License 2AM-MEA0815 Schedule B, Item 22: ***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.***

On March 23 and 24, 2012, Aboriginal Affairs and Northern Development Canada (AANDC) conducted an inspection of the bulk fuel storage facilities, incinerator, Bay Goose Dike, Portage Pit, Goose Pit, waste rock storage facility, landfill, tailings storage facility and potable water treatment plan. Two compliance issues were identified. You will find in Appendix I1 the inspection report and AEM response.

On July 5 and 6, 2011, Aboriginal Affairs and Northern Development Canada (AANDC) conducted inspections at the mine site, AWPAR and Baker Lake marshalling area for the NWB water license. No compliance issues were identified. The NWB acknowledges receipt of a submission from AANDC on June 29, 2012, dated July 5, 2011 A copy of the inspection report and the acknowledges receipt are attached in Appendix I1.

On July 11 and 12, 2012, the Kivalliq Inuit Association (KIA) conducted an inspection on the Meadowbank Mine Site. Some recommendations were made. A copy of the KIA report and AEM actions taken in response to the recommendations are attached in Appendix I1.

Environment Canada conducted a site inspection on July 24 and 25, 2012. Their inspection was conducted at the Meadowbank mine site and the Baker Lake Tank Farm. A sample for ST-9 (Attenuation pond discharge thru diffusor) was taken by the inspector. No report was issued. AEM received a Compliance Order (# 4408-2012-07-31-002) dated October 11th for the Baker Lake Fuel Storage Facility regarding visible fuel storage tank registration #'s not posted, no monthly visual inspection form, secondary containment at ship to shore fuel transfer area, and single walled pipe underground outside secondary containment. Items have been addressed. The first compliance date was November 1, 2012 for confirmation that registration #'s were posted on the fuel tanks and monthly visual inspection forms were prepared and implemented. These items were complied with. Subsequent compliance dates (December 15th)-plans for implementation of secondary containment at ship to shore fuel transfer area and a plan to permanently withdraw single walled piping outside secondary containment. This was completed. AEM forwarded response to Environment Canada on November 19th regarding the compliance order issue in October. You will find in Appendix I1 the Compliance Order form Environment

Canada and the AEM response to the compliance order. AEM has fully complied with the Order.

On July 26 and 27, 2012, Aboriginal Affairs and Northern Development Canada (AANDC) conducted an inspection at the mine site. One noncompliance issue was identified: the total volume of fresh water for all uses shall not exceed 700, 000 cubic metres per year (Part E item 3). A copy of the inspection report and the response to the inspector requirements are attached in Appendix I1.

On August 13 to 15, 2012, Department of Fisheries and Oceans Canada (DFO) conducted an inspection of fisheries related permits. The visit included presentations on Meadowbank mine operations, DFO Authorization monitoring, review of No-Net Loss methods and compensation planning at Meadowbank. The visit also included a site tour by truck and a helicopter tour around the mine site and along the AWAR with a stop at the R02 fisheries habitat compensation area. No formal inspection report was provided.

As an integrated part of the NIRB's continuous monitoring program of the Project, the NIRB's Monitoring Officer visited the Meadowbank site on September 12 and 13, 2012. The site visit included the Meadowbank site facility, the access road and the Baker Lake fuel tank farm and marshalling facilities. Based on the observations made during this site visit, all facilities which are in operation and all sites currently under construction appear to be well managed and maintained with adequate environmental protection measures and procedures in place. However, the Monitoring Officer noted that there may be certain situations in which the Proponent has not yet fully met the requirements of the Meadowbank Project Certificate (condition 8, 25, 26, 27 and 74) which requires further consideration and attention. A copy of the NIRB inspection report is attached as Appendix I1.

The KIA also contracted an independent auditor, EEM to conduct an environmental compliance audit of the Meadowbank mine in October, 2012. The report "*Environmental Legal Compliance Audit Report*", found in Appendix I1, covers the environmental compliance evaluation conducted by ÉEM. AEM responded to the audit recommendations with an action plan in Feb, 2013.

On November 28, 2012 the Government of Nunavut (GN) wildlife officer was on Meadowbank Site. No formal inspection report was made.

A total volume of 1,044,675 m^3 of freshwater was used for the project in 2012. This exceeded the water license limit of 700,000 m^3 per year. See section 8.1.14 for explanation.

11.3 AWPAR USAGE REPORTS

11.3.1 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***

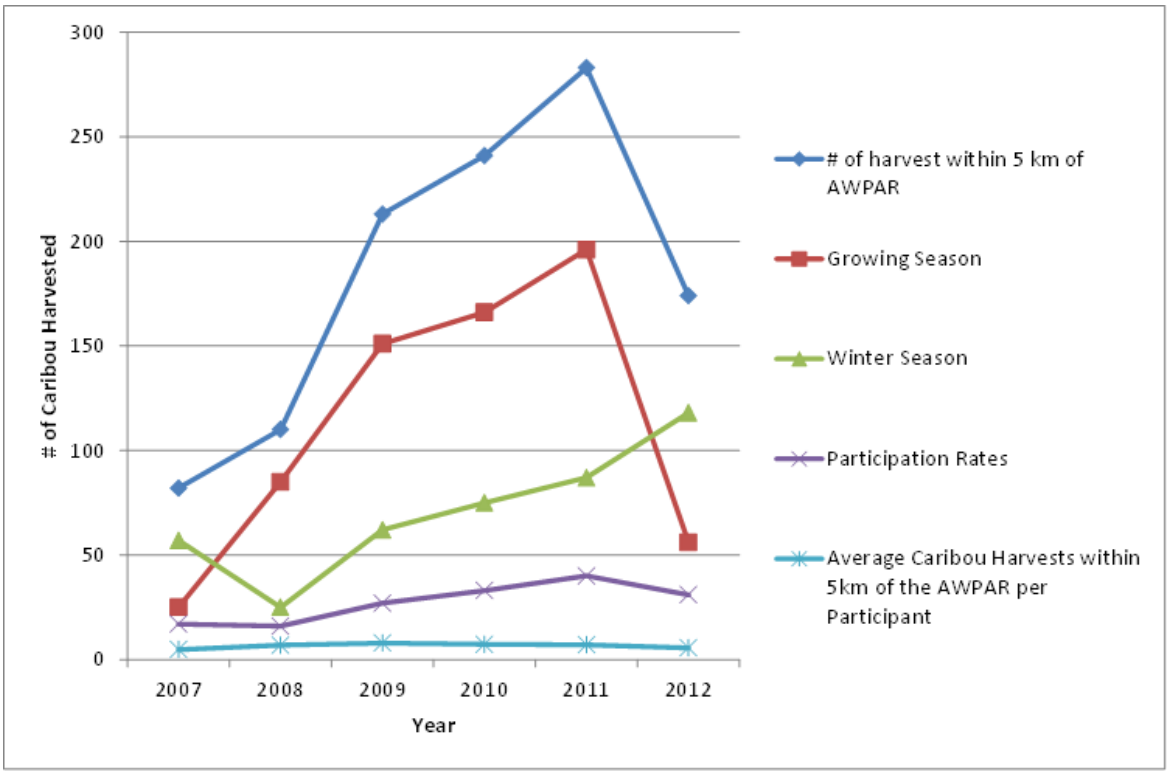
operation of the all-weather private access road; and 2. To facilitate monitoring of the environmental and socio-economic impacts of the private road and undertake adaptive management practices as required, including responding to any concerns regarding the locked gates.

The security department at the Meadowbank Gold Project maintains fully staffed security entry gates house on a 24/7 schedule; one at the entrance to the AWPR in Baker Lake and one at the entrance to the Meadowbank mine site. Security staffs monitor the safety and security of all personnel using the road. AEM procedures for non-mine uses of the road requires 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 2012 are provided in Table 11.1. In 2012 AE 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. There have been no accidents to date involving mine related truck traffic and locals using ATV's.

Table 11.1 2012 AWPAR ATV Usage Records

Month	# of ATV's
January	0
February	0
March	0
April	0
May	32
June	308
July	240
August	241
September	477
October	158
November	0
December	0

According to *"Meadowbank Mine 2012 Wildlife Monitoring Summary Report*", in 2012, 174 Caribou (35% of total) were harvested within 5 km of the AWAR, a similar proportion as most previous years. Total harvests per participant within 5 km of the AWAR have decreased as compared to the past (Figure 12), as it was at its lowest in 2012 at 5.6 Caribou per participant. In the historical NWMB study, Caribou harvests within 5 km of the road were lower at 18% of total harvest; in the HHS data set, harvest along the AWAR has been around 36% of total harvest. The total number of Caribou harvested along the AWAR showed a decrease, likely related to an overall decrease in harvest, but an increase in total harvest numbers along the road in the winter season. The road appeared to be important to hunters in the winter season, despite relatively unrestricted access to unroaded areas in the Baker Lake area. The harvest peak observed in November 2012 may be related to larger herds of Caribou observed along the AWAR during this time period.



Note that sharp decreases in 2012 data points reflect lower overall harvest totals

Figure 12: Caribou Harvests (Total Harvest and Average by Participant) Along the AWAR (2007 to 2012).

Counts remained low for Muskox and Wolverine, precluding any interpretation of potential mine related effects. Low densities of Muskox and Wolverine and general aversion to human activities require hunters to explore areas well outside areas occupied by the AWAR; therefore, the AWAR is anticipated to have little effect on Muskox and Wolverine hunting patterns. Wolverine harvest was half of the number recorded in 2010.

11.3.2 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.***

In 2012, AEM did not hold a meeting in the Hamlet of Baker Lake to explain to the community the Policies and Procedures of the All Weather Private Road from Baker Lake to the Meadowbank Mine site. However, AE did place a notice on the local radio station talking about Policies and Procedures of the All Weather Private Road from Baker Lake to the Meadowbank Mine site. You will find the message in Appendix I3. AE also conducts quarterly meetings with the Baker Lake Community Liaison Committee and issues related to the use of the AWPR are discussed regularly.

A total of 3 environmental spills occurred along the AWPAR in 2012. Table 7.1 provides details on each of these spills.

Road kill data along the AWAR for 2012 are provided in Table 11.2. Road kill counts for 2012 were similar to 2011. To avoid this kind of incident, messages are continually provided to employees and contractors to reinforce the procedures for wildlife protection during road use. The "*Wildlife Protection Protocol on the Meadowbank Road*" is attached in Appendix I4.

Table 11.2: 2012 AWAR Wildlife Mortality Data

Dates	Species	Count	Comments
18 January	Snowshoe Hare	1	Hit by vehicle at Km 33
22 January	Arctic Hare	1	Found dead on road at Km 33
31 January	Arctic Hare	1	Found dead on road at Km 45
26 March	Caribou	1	Wolf kill with four wolves nearby at Km 53 – 350m from road
28 March	Arctic Hare	1	Found dead on road at Km 36
11 April	Caribou	1	Found dead at Km 32. Cause of death unknown.
01 May	Caribou	1	Hunter or wolf kill near Km 37 – 80m from road
05 June	Ptarmigan	1	Found dead on road
07 June	Sik Sik	1	Found dead on road at Km 44
28 June	Ptarmigan	1	Found dead on road
28 June	Sik Sik	2	One dead at Km 41, the other at Km 49
04 July	Sik Sik	1	Found dead on road
23 July	Sik Sik	1	Found dead on road
31 July	Ptarmigan	1	Along AWAR
06 September	Arctic Hare	1	Found dead on road
02 October	Ptarmigan	2	Found dead on road
24 November	Caribou	1	Ran towards and collided with grader at Km 32
31 December	Wolverine	1	Ran out of ditch and hit by tanker

11.4 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 engaged one local representative to act as marine mammal monitors for the 2012 shipping season.

In fulfillment of NIRB Condition 36, the following table summarizes the observations made by local marine mammal monitors onboard AEM vessels transporting fuel or materials for the Meadowbank Mine through Chesterfield Inlet. Gulls are the main wildlife observed. There were no adverse incidents reported. One musk-ox was observed on land.

Table 11.3: 2012 Summary of local area marine mammal monitor's observations

Name	Direction	Start Date	Finish Date	Observations	Comments
Paul Amitnaaq	Baker Lake to Helicopter Island	Aug. 06	Aug. 07	5 Seagulls (North of Christopher Island)	No spills reported, no near misses
Paul Amitnaaq	Baker Lake to Helicopter Island	Aug. 06	Aug. 07	2 Seagulls, 2 Arctic Terns (North of Christopher Island)	
Paul Amitnaaq	Baker Lake to Helicopter Island	Aug. 06	Aug. 07	1 Seagull (South Channel)	
Paul Amitnaaq	Baker Lake to Helicopter Island	Aug. 06	Aug. 07	3 Seagulls (South Channel)	
Paul Amitnnaq	Baker Lake to Helicopter Island	Aug. 06	Aug. 07	1 Musk-ox (End of South Channel)	
Paul Amitnaaq	Baker Lake to Helicopter Island	Aug.06	Aug. 07	11 Seagulls (between South Channel & Helicopter Island)	
Paul Amitnaaq	Helicopter Island to Baker Lake	Aug. 06	Aug. 07	Started trip back to Baker Lake	

11.5 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-MEA0815 Schedule B, Item 23: ***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.***

In 2012, meetings were held to discuss different topics with the community of Chesterfield Inlet including shipping.

A log of 2012 public consultation activities is included in Appendix I2.

11.6 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.***

No plans to expand the Meadowbank Gold Project were developed in 2012.

11.7 INSURANCE

As required by NIRB Project Certificate 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"***

No claim was reported by our marine shipper in 2012.

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***

Contractors have 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.

11.8 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.***

And

The 2012 annual report "*Socio-economic Monitoring Committee*" will be complete only in the 2nd quarter of 2013. You will find below the executive summary of this draft report. The final report will be send to NIRB when complete.

Summary of meeting

The Sixth Kivalliq SEMC Meeting took place in Rankin Inlet, on 16-17 October 2012. The meeting proceeded well overall, and included presentations from the Government of Nunavut on some regional and territorial statistics, and Aboriginal Affairs and Northern Development Canada on their roles in establishing the Nunavut General Monitoring Plan and on the monitoring of socio-economic impacts. Areva presented an update of its Kiggavik project, and Agnico-Eagle discussed some statistics of its Meadowbank mine and on interesting initiatives they are implementing in the Kivalliq communities.

Participants were engaged and asked many questions about the statistics presented, and raised the concern that some statistics were dated. Many of the statistics presented have been updated in this report as newer information was made available through sources such as the Nunavut Bureau of Statistics. Many participants also proposed a shift from discussing issues to actually doing something about them. While this enthusiasm to get things done was well-received, the primary function of SEMCs is to assess the health of our communities through discussing pertinent issues with community leaders and organizations so that participants can return to their communities and organizations well-informed to effect change. Nonetheless, in the spirit of collaborative action, the Government of Nunavut, Aboriginal Affairs and Northern Development Canada, Agnico Eagle, and the Hamlet of Arviat have embarked in a new initiative that they hope to start implementing in the first half of 2013, and sharing more details with the Committee at the next meeting.

Highlights of indicators and associated data

This section briefly outlines some of the statistics associated with the valued socio-economic components below.

Demographics

- Population continues to increase in Nunavut and in the Kivalliq, growing by 2,432 and 607 respectively from 2006 to 2011.
- Arviat experienced the largest growth (258 new residents) and Rankin Inlet the largest decline (92 less residents).
- 54% of the Kivalliq population in 2011 was under the age of 25.

Health and well-being

- Nunavut women are more fertile at ages 20 to 24 – in 2012 the fertility rate was 200.3 live births per 1,000 people, compared to the second highest 25-29 at 147.
- The value of sales of spirits and wines has increased from 2010 to 2011 by $553,000 and $323,000, while the sales of beer have decreased by $777,000.
- Suicides in the Kivalliq have decreased from 9 in 2010 and are currently at the same 2009 number at 5 suicides per year. Suicides in Nunavut have increased by four from 30 in 2010 to 34 in 2011.
- Suicide still continued to affect the Inuit (100%) and male population (79.4%) in 2011.
- Community health centre visits have decreased in the region from 50,345 in 2010 to 49,895.

Food security

- The Consumer Price Index for Iqaluit (only available in the territory) continues to go up, from 111.8 in 2010 to 113.4 in 2011.
- A Northern Food Basket is most expensive in Coral Harbour ($442) in 2010, and cheapest in Whale Cove ($408).
- Coral Harbour received the highest amount of Nutrition North subsidies at almost $1,000 per person in the 2011-2012 fiscal year, whereas Arviat received the least, at around $400 per person.

Education

- Graduation rates in the Kivalliq are higher than in Nunavut as a whole by approximately 8% in 2011.
- Grade 10 attendance continues to be the lowest in comparison with other grades, at less than 55% in 2010-2011.

Housing

- Public housing continues to be the dominant type of housing in the region, consisting of 60% of the total number of dwellings in 2009-2010.
- Dwellings were the most crowded in Repulse Bay, and lest crowded in Chesterfield Inlet from 2009-2010.

Crime

- The number of actual violations is highest in Rankin Inlet, followed by Baker Lake at 49,245 and 38,854 per 100,000 people respectively in 2011.

Employment

- For the past four years, the Inuit employment rate has been just under 50%.
- Income support cases in the region have been steadily going down in all communities except for Coral Harbour and Whale Cove.
- Likewise, social insurance assistance caseload has been decreasing except for Coral Harbour. Arviat is still, by far, the community that has the highest number of cases, at 320 in 2011.

11.9 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.***

11.9.1 Meadowbank Workforce

The total number of people working at the Meadowbank Mine site as of December 31, 2012 was 1157 persons (Contractors, AEM Permanent + Temporary), broken down as follows:

- # Working for contractors: 368
- # Working for AEM: 787

The total AEM workforce at the end of 2012 was 787 broken down as follows:

• Permanent AEM employees	673	85.5%
• Temporary AEM employees	114	14.5%
• AEM employees who are Inuit / Nunavummiut	247	31.4%
• Proportion of AEM employees who are female	114	14.5%

Total # of AEM employees on AEM on December 31, 2012; 787		
# *of above employees who are permanent AEM employees*	**673**	**85.5%**
of these employees who are Inuit /Nunavummiut	166	24.7%
of these employees who are female	74	11%
# *of above employees who are temporary employees*	**114**	**14.5%**
of these employees who are Inuit	81	71%
of these employees who are female	40	35.1%

Table 11.4 -Total Workforce at the Meadowbank Mine as of Dec 31, 2012

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 LOM. A temporary employee is considered as an employee whose current job will not continue beyond a specified period of time. One of our practices is also to hire employees on a temporary basis for the time they complete their mandatory medical exam. This is caused by the fact that there are no resources available in the communities to do the pre-employment medical exams prior to hiring. Therefore it has to be done onsite by our own medical staff. Until it is done employees cannot be offered a permanent status. We have a new procedure that will be implemented in 2013 which will help reduce considerably the amount of time required to do the medical exams. Therefore employees will be under a temporary status for a maximum of 3 months unless they are hired for a short period due to a special project or situations (e. replacement of sick leave). It should be noted that under AEM's definitions a Temporary Employee is not a Part Time Employee. AEM has no Part Time Employees at the current time working at the Meadowbank Mine.

Consequently as of December 31, 2012 there were 114 AEM temporary employees working at the Meadowbank site. Of these 114 temporary AEM employees, 81 were Inuit (71%).

At the end of December 2012, 247 Inuit were employed at Meadowbank. Table 11.5 lists the types of jobs held by Inuit employed at Meadowbank as of December 2012.

Table 11.5 - Types of job positions held by Inuit/Nunavummiut at Meadowbank as of 12.31.12

Job position	Total
Apprentice	4
Auxiliary Equip. Operator	6
Career Development Services	1
Community Liaison Officer	1
Cook Helper	3
Cook Trainee	2
Dewatering Technician	1
Dishwasher	16
Driller & Blaster	5
Environmental Technician	1
Exploration sampler	2
Field Supervisor	1
Fixed Equipment Operator	1
General Helper	5
Grade Control Sampler	2
Grade control Technician Trainee	1
Haul truck Leader	1
Haul Truck Operator	60
Health & Safety Officer	1
Heavy Equipment Operator	11
Helper	30
Human Resources Agent	2
IIBA Coordinator	1
Janitor	55
Labourer BL	1
Labourer MBK	15
Labourer Specialized	1
Millwright	1
Mine Clerk	1
Office Clerk	1
Production Loading Equip. Operator	1
Pump Man	1
Receptionist	1
Security Guard	6
Security Guard - On Call	3
Trainee	1
Utility Man	1
TOTAL	**247**

Total # of AEM Inuit employees as of December 31, 2012		
# of these employees that have a *Management* level job	1	0.04%
# of these employees that have a *skilled* level job	30	12%
# of these employees that have a *semi-skilled* level job	90	36%
# of these employees that have a *unskilled* level job	126	52%
Total	**247**	**100.00%**

Table 11.6 - Skill level of position held by Inuit/Nunavummiut at Meadowbank as of 12.31.12

11.9.2 Hours Worked by AEM Employees at Meadowbank

The total person hours worked by all AEM Meadowbank employees (Permanent + Temporary) for the 12-month period ending December 31st, 2012 was 1,646,140. Table 11.7 provides a breakdown on Nunavut and non-Nunavut based employees.

Jan. 1st 2012 to Dec. 31st, 2012	Person-Hours	%
All AEM Employees		
Nunavut Based AEM Employees	516,888	31,4%
Non Nunavut Based Employees	1,129,252	68.6%
Total	**1,646,140**	100.00%

Table 11.7: - Person-hours Worked for Inuit/Nunavummiut vs. Non-Nunavut Resident Employees

11.9.3 Employment Demographics for Nunavut Based Employees

The Meadowbank Nunavut workforce is primarily from Baker Lake and the numbers from the other Kivalliq Communities are pretty much stable. Table 11.8 shows the breakdown of the home communities of the Nunavut based employees as of December 31, 2012 compared to December 2011 and December 2010.

	As of December 31, 2012		As of December 31, 2011		As of December 31, 2010	
Arviat	44	17.8%	48	19.3%	26	17.4%
Baker Lake	154	62.3%	138	55.4%	84	56.4%
Chesterfield Inlet	5	2.0%	5	2.0%	4	2.7%
Coral Harbor	1	0.4%	4	1.6%	6	4.0%
Rankin Inlet	29	11.7%	35	14.1%	24	16.1%
Repulse Bay	2	0.8%	2	0.8%	3	2.0%
Whale Cove	2	0.8%	10	4.0%	2	1.3%
Others	10	4.0%	7	2.8%	-	0.0%
Total	**247**	**100.00%**	**249**	**100.00%**	**149**	**100.00%**

Table 11.8 - Home Communities of Nunavut Based Employees

AEM pays for the transportation of all Nunavut based employees from their point of hire to the Mine for each work rotation. AEM has a service contract with First Air to transport AEM employees by charter plane from Kivalliq Communities directly to and from the Meadowbank Mine airstrip. Currently all Nunavut resident employees from the southern Kivalliq communities

(Arviat, Chesterfield Inlet, Whale Cove and Rankin Inlet) are flying by charter direct from their home communities into the Meadowbank mine site. Employees based out of Coral Harbour and Repulse Bay is still being transported by commercial carrier to Rankin Inlet to connect to the First Air charter to the mine site. All travel costs for employees coming to and from their work rotation at Meadowbank are paid by AEM.

During 2012 AEM saw a total of 181 Nunavummiut employees terminate their employment (voluntary and termination for cause). Of these, 157 were temporary employees and 24 were permanent employees.

11.9.4 Education & Training

The total hours of training provided to all AEM Meadowbank employees over the period from January 1st 2012 to December 31st 2012 is 25,168 hours. From that number, 8,662 hours of training were provided to Nunavut resident employees, which represents 34% of the total training delivered in 2012. The mandatory training provided to Nunavut based employees represent 15% of the overall mandatory training, but 46% of the general and specific training has been delivered to Nunavut based residents, which illustrates the opportunity of career advancements offered to Nunavut residents in Meadowbank. The data shows that we provide to Inuit a major opportunity for skill development as 85% of all training provided to Nunavut based employees is general and specific training. These data, as well as the comparison for the previous 12 month period is shown in Table 11.9.

Total training hours				
Training Hours for AEM Employees	**Training Hours (Jan. 1 2011 - Dec. 31 2011)**	**Training Hours (Jan. 1 2012 - Dec. 31 2012)**		
Nunavut Based Employees	**Total**	Mandatory Training	General & Specific Training	**Total**
	22,060	1,338	7,324	8,662
Non - Nunavut Based Employees	**Total**	Mandatory Training	General & Specific Training	**Total**
	16,027	7,905	8,601	16,506
Total	**38,087**	**9,243**	**15,925**	**25,168**

Table 11.9 - Training Hours for Meadowbank Employees Period Ending December 31, 2012

11.9.4.1 On the Job Training Provided by AEM to Meadowbank Employees

In 2009 AEM established an in-house training group at the Meadowbank Mine. Under this group all formal on the job training performed at Meadowbank for employees is recorded on computer based employment records. The records show the date of the training, the hours of training, the type of training, the trainees' names, the trainer's name, certificates or permits issued if applicable and the date of expiry of that specific training (i.e., the date the training should be refreshed if applicable).

These statistics and numbers reinforce AEM's commitment to provide training and opportunities to our Inuit employees with an objective to maximize the level of employment and contribution of the Inuit Beneficiaries at the Meadowbank Mine. Skill levels are being improved and this will lead to Inuit employees to qualify for higher-level employment opportunities.

As AEM believes that training is critical to effective operations and the various training initiatives delivered in 2011 and are listed below.

11.9.4.2 Haul Truck Driver Training

As of December 31st 2012, haul truck driver team at the Meadowbank mine are mostly composed of Inuit. In 2012, 15 Inuit have been trained, of which 5 are woman (33%). Among this number, 13 Inuit succeed their course and 11 are still working in the department. On a total of 60 Inuit working as haul truck driver, 14 women are currently in that position for AEM and 36% of them were trained in 2012. These data illustrate that we welcome and encourage women to work in the company in any position. In 2013, we are planning to have a minimum of 4 waves of haul truck training. In each of them, we are expecting to train 4 Inuit, for a total of 16 new Inuit haul truck driver. We believe that the Haul Truck driver training that was developed at Meadowbank is a success story and we are proud of our achievement.

11.9.5 Career Path

11.9.5.1 Mine Operation

In 2012 we implemented a “Career Path” program for heavy equipment operators in the Mine department. This program is the creation of a career possibility and a development plan for heavy equipment operator. It ensures a faster evolution of the operators towards higher classes of equipment by combining in-house training on different equipment with infield practice for skills development.

With such a program, all AEM Meadowbank heavy equipment operators will benefit the same career progression in the mine department. They will all be subject to the same training, assessments and skills development, in order to give the same chance to everyone to reach their goals. Consequently, AEM gets the insurance to have top of the line operators. As in December 31st 2012, 73 Inuit are part of this program. Among this number, we can find 14 women and 59 men which mean that 19% of the operators are women.

11.9.5.2 Mine Drillers

The career path has been implemented for the drillers as well. It is designed to give a career opportunity for the AEM employees as well as a career development possibility to mine helpers, bit sharpeners and drillers, actual and future, at Meadowbank.

As in December 31st 2012, 14 Inuit are part of this program. No women are part of the driller career path for now. On this regard we must consider that this is a much more physical job so less acceptable for women.

11.9.5.3 Process Plant

In 2012, we also implemented a career path in the process plant department. With its creation the mill employees now have the opportunity to become a mill operator at different positions faster by combining in-house training on equipment as well as on different procedures with in the field practice for skills and competencies development.

One of the main goals with the creation of the process plant career path was to create a development plan as a utility man, crushing, reagent, grinding and leach/CIP operator for our employees, as shown in the figure below. All AEM Meadowbank employees will face a standard in their career progression and they will all be subject to the same training, assessments and skills development. As in December 31st 2012, 14 Inuit, which are all men, are part of this program.

11.9.5.4 Site Services

In 2013, we will finalize the implementation of the career path by introducing it into the Site Service department, which is divided in two fields; Road Maintenance and Field Service. Below, the career path of both divisions is shown. As in December 31st 2013, 2 Inuit from Road Maintenance, 22 Inuit from Field Service for a total of 24 Inuit, including 2 women, are part of this program in the Site Service department.

11.9.6 Finding solutions

During the winter of 2012 Agnico travelled to each community to begin discussions with Municipal leaders on the issues of absenteeism and turnover. Mayors and councils provided community based insight on the causes and potential solutions. Community leaders and Agnico's HR department agreed that beginning in April 2012 Agnico will sponsor a part time AEM Coordinator with the Hamlets of Repulse Bay, Coral Harbour, Whale Cove, Chesterfield Inlet and Arviat. AEM's offices in the communities of Rankin Inlet and Baker Lake will receive new resources to provide enhanced community based HR services.

The objectives of the community based AEM coordinators are to provide a point of contact in each community to provide the following services;

- Advertise job openings with AEM
- Collect resumes & assist with interviews as required
- Provide communications and advice to AEM on an ongoing basis
- Provide information to employees
- Assist HR and other AEM departments to contact employees as required
- Contact employees in advance of their shift departure times
- Pick up employees from their residence and take them to the airport on shift departure days
- Pick up employees from the airport on return from their shift
- 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, employee family assistance programs, promotional activities, career fairs, etc as required)
- Provide updates to the Hamlet Council on AEM activities
- Distribute AEM information and promotional materials

Agnico has also implemented a new Employee Family Assistance program in 2012 as part of the approach to reduce absenteeism and improve retention. The program is including the following:

- Employee & Family Counselling available by telephone or online 24 hours a day
- Confidential service
- Reference to local offices and organizations
- Coaching for employees on life event and career planning

The community based HR coordinators, employee family assistance program and labour force development initiatives are viewed by Agnico as pillars towards resolving absenteeism and retention issues, while at the same time reducing costs and increasing Inuit content and capacity.

12 POST-ENVIRONMENTAL ASSESSMENT MONITORING PROGRAM (PEAMP) – EVALUATION OF IMPACT PREDICTIONS

In 2012, AEM completed numerous monitoring programs that were originally described in the Final Environmental Impact Statement (FEIS), are conditions in the NIRB Project Certificate, and are regulated by the NWB Type A license or other authorizations and permits. The following section provides an evaluation of the FEIS impact predictions to meet the condition of the NIRB Project Certificate, Appendix D entitled the Post-Environmental Assessment Monitoring Program (PEAMP). In accordance with the NIRB Project Certificate, the PEAMP is a conceptual program that the NIRB advised to be 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 minesite 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.

This section of the annual report presents the 2012 PEAMP evaluation, which addresses the above objectives.

The methods, objectives, results and recommendations of the specific monitoring reports are discussed in greater detail in the preceeding annual report or 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 to reflect actual mine operations. These differences should be taken into account when making comparisons to FEIS predictions.

To assist in the PEAMP evaluation process, Section 12 has been organized into 6 main PEAMP categories based on these VECs: Aquatic Environment, Wildlife and Terrestrial Environment, Noise Quality, Air Quality, Permafrost, and Socio-Economics. Table 12.1 summarizes the valued ecosystem components, potential sources of impact/ assessment endpoints and the original impact predictions and management plans and mitigative measures submitted as part of the FEIS. All predicted sources of mine related impacts were reviewed and evaluated but the discussion of PEAMP focuses on those areas for which significant effects were predicted, or monitoring was recommended.

Table 12.1 - Summary of FEIS VECs, assessment endpoints and references for the predictions, management and mitigative measures.

VEC	Potential Sources of Impact/ Assessment endpoint according to FEIS	Reference for Impact Predictions	Reference for Management and Mitigative Measures
Aquatic Environment			
mine site water quality and quantity	water quality modeling - pit lakes, contact water	FEIS App B, Tables B4 and B5 FEIS App E FEIS - WQ	FEIS, Section 4.24.2.5
surface water quantity	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	water quality in 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	water quality & quantity, habitat loss; blasting	FEIS, Section 4.21.2.7 FEIS App B, Table B13	
fish habitat	water quality & quantity, habitat loss	FEIS, Section 4.21.2.7 FEIS App B, Table B14	FEIS, Section 4.24.2.3 NNL
Wildlife and 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
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	emissions and dust	FEIS, Section 4.21.2.2 FEIS App B, Table B2	FEIS, Section 4.24.2.3
Noise Quality	noise	FEIS, Section 4.21.2.2 FEIS App B, Table B3	FEIS, Section 4.24.2.3
Permafrost	thaw instability	FEIS, Section 4.21.2.1 FEIS App B, Table B1	FEIS, Section 4.24.2.4
Socio-economic	employment, training and business opportunities; traditional ways of life; individual and community wellness; infrastructue and social services; sites of heritage significance; fiscal benefits to territorial government	FEIS, Section 4.21.4 FEIS App B, Table B15 (App C = data)	FEIS, Section 4.24.3

12.1 AQUATIC ENVIRONMENT

In agreement with the PEAMP objectives, the results of the 2012 aquatic monitoring programs were evaluated and a comparison was made to the impacts predicted in the FEIS. The VECs identified in the FEIS were subdivided into: surface water quantity, surface water quality, and fish/fish habitat for this assessment. The following sections summarize the predicted impacts to the aquatic environment, 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.

12.1.1 Identification of Predicted Impacts

The following table summarizes the activities that were predicted in the FEIS to impact water quantity, water quality, and fish/fish habitat, and identifies whether they occurred in 2012.

Table 12.2 - Activities that were predicted in the FEIS to impact water quantity, water quality, and fish/fish habitat.

Activity	Occurred in 2012
General Construction	X
Dikes	
Dewatering	X
Pits	X
Rock storage facilities (Portage and Vault)	
Main site roads & traffic	X
Airstrip & air traffic	X
Mine plant and facilities	X
Freshwater intake and pipeline	X
Discharge facilities and pipeline	
Vault area effluent discharge	
Non-contact diversion facilities	X
Dewatering and draining facility	X
Turn Lake road crossing	
Plant site storage	X
AN/Explosives storage and emulsion plant	X
Site accommodations	X
Sewage and waste disposal	X
Access roads and traffic	X

12.1.2 Accuracy of Predictions

In general, Meadowbank's water quality and quantity monitoring programs aim to meet the requirements of the NWB (Type A license) and Environment Canada (MMER). 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 2012 appear to have been within FEIS predictions, as described in the following text, and summarized in Tables 12.3 – 12.5.

Water Quantity

Water usage predictions were made during the FEIS to predict potential impacts to water levels due to dewatering activity in Third Portage Lake, Second Portage Lake that would influence untouched portions of these lakes. Although rates of dewatering (i.e. pumping rates) were underestimated during the FEIS, water levels have not significantly changed at monitoring stations in TPL and SPL and have fluctuated within a normal range since dewatering began in 2009.

Table 12.3 - Comparison of observed impacts in 2012 to potential impacts on water quantity identified in the Aquatic Ecosystem/Fish Habitat Impact Assessment (AEIA, 2005) for the operations phase of the Meadowbank Gold Project.

Potential Impact (AEIA, 2005)	Observed Impact (2012) Compared to Prediction	Discussion
Potentially high seepage rates (from lakes into pits)	Within FEIS Predictions	All East Dike Seepage water is collected in the pit and pumped to the attenuation pond. No significant changes in water level in TPL due to mine activities.
Lost natural storage capacity in small ponds and wetlands	Within FEIS Predictions	No additional ponds, wetlands or waterbodies were affected due to operations as compared to the FEIS.
Water circulation pattern change in Wally Lake	NA	-
Lost natural surface drainage (project lakes)	Within FEIS Predictions	No significant changes in water level in TPL due to mine activities.
Decreased water volume (TPL, Phaser Lake)	No Observed Effect	No significant changes in water level in TPL due to mine activities.
Increased water volume (Wall/Drilltrail Lake, Turn Lake (1 m))	NA	-
Culvert (seasonal increase in lake water level)	No Observed Effect	Water levels have not significantly changed in Second Portage Lake and Third Portage Lake due to culverts, discharging or dewatering

Water Quality

Many monitoring programs evaluate water quality at Meadowbank, because this is the first tier in informing mitigation and adaptive management. The Core Receiving Environment Monitoring Program (CREMP)(commonly referred to as the AEMP at other mining projects in the NWT and NT) is the core, broad scale program that is aimed at detecting potential impacts at the scale of lakes or basins. As outlined in the FEIS, the CREMP (appropriately referred to as the AEMP in the FEIS) is intended to monitor large-scale 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, for which other programs provide additional support and verification. Each year, information from the CREMP and other targeted programs is evaluated in an integrated manner to assist in informing adaptive management.

In 2012 AEM submitted an updated CREMP design to the NWB and NIRB. It provided a thorough review of the historical data, updating the analysis that was completed as part of the FEIS by incorporating all of the baseline data (1992-2008). An updated CREMP was submitted to address the requirements in the Type A water license, DFO authorization for the protection of fish habitat and FEIS. The redesign of this extensive monitoring program submitted in 2012 ensures the ability of the CREMP to detect potential mine related impacts as compared to baseline and reference conditions.

In 2012, the Aquatic Ecosystem Monitoring Program (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 (presented in Section 8.7). 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 CREMP to minimize confusion. The 2012 AEMP synthesis report aimed to summarize the results of each of the underlying monitoring programs, including the CREMP, reviewed the inter-linkages among the monitoring programs; integrated the results for each component program; and provided conclusions and recommends management actions that were undertaken in 2012 or should be considered in the future. Neither the 2012 CREMP nor AEMP detected any significant changes in the water quality that had the potential to cause risks to the aquatic environment. This is consistent with FEIS predictions.

In 2012 a comparison was made to evaluate the predicted versus measured water quantity and quality in the pits. Overall, the water quantity predictions were less than was originally predicted. The original water quality predictions in the FEIS did not adequately predict actual water quality in the pits. The results of the monitoring programs demonstrated their intended purpose to evaluate and ensure the protection of the receiving environment

The objective of the groundwater quality monitoring is to: monitoring of the natural salinity of talik groundwater seeping into the Portage and Goose open pits in order to validate the ability of the proposed water management and treatment plans to attenuate salinity in the

effluent prior to release to receiving waters; and monitoring of groundwater in the vicinity of the tailings storage facility (TSF) located in Second Portage Arm in order to detect potential seepage of tailing process water through fractures in the bedrock below the TSF to the Portage open pit.

Groundwater studies undertaken in 2012 were a continuation of previous studies. and indicated that the concentrations of salinity components in 2012 are the lowest since monitoring was initiated in 2008, but nonetheless, are of similar magnitude to previous values measured at this location. Exceptions include alkalinity and ammonia, where increased concentrations were observed. Concentrations of manganese observed in 2011 and 2012 are consistently elevated compared to results previously obtained in 2008, 2009 and 2010. All parameter concentrations observed in 2012 met Portage effluent quality criteria.

The groundwater monitoring program was conducted in July 2012. Monitoring well MW08-02 was successfully sampled in triplicate. Monitoring well MW08-03 could not be sampled because of an ice bridge inside the well pipe that could not be removed. This prevented formation groundwater from entering the well. Monitoring well MW11-01 was damaged in spring 2012 and was deemed inoperable, therefore no groundwater samples were collected and the well was subsequently decommissioned in July 2012. Monitoring well MW11-02 located east of the tailings storage facility could not be sampled due to a blockage comprised of well development tubing which prevented access to the formation groundwater.

Collecting groundwater samples from monitoring wells only partially achieves the purpose of monitoring of salinity and quality of open pit seepage. Monitoring wells provide groundwater information at one specific location that represents one or a small set of more less impermeable fractures in rock at a distance from where seepage will daylight in the Goose or Portage open pits. Given the very low hydraulic conductivity of the bedrock at 150 meters (2×10^{-8} m/s in the bedrock mass, and up to 10^{-6} m/s in the Second Portage Fault; Golder, 2004), the groundwater sampled in the wells is far in distance and time from reaching the open pit.

The advantage of the well, being the ability to repeatedly sample a same location, is undermined by its fragility in an arctic environment where frost action can damage even robust wells. At Meadowbank, monitoring of talik water means the well collars must be positioned close to the open pit crest to reach the talik. Vehicular traffic and blasting pose both a constant threat to equipment (like well MW11-01 damaged in 2011) and to the safety of personnel carrying out the monitoring program.

AEM is committed to recovering operable wells that are blocked (monitoring wells MW11-02 and MW08-03) in 2013. However, instead of replacing the wells that have been destroyed, AEM is considering using alternate methods to more effectively achieve the purpose of condition 8 of the NIRB certificate for salinity of water reporting to the open pit. Methods currently being considered include, but may not be limited to, the following:

- Collecting samples from the groundwater that infiltrated into production holes at the base of open pits (Goose, North Portage, Third Portage);
- Collecting samples of groundwater from horizontal borehole that could be drilled at the base of open pit walls where seeps are observed, and/or from groundwater seeps into open pits;
- Measuring conductivity of groundwater in-situ (without sampling groundwater) through the installation of conductivity probes in boreholes drilled to the talik. These probes measure water conductivity (and therefore salinity) in real time.

Production holes are used for blasting and drilled to approximately 8.5 metres depth with a 0.17 metre diameter bore. A groundwater sample could be collected from a production hole that contains water prior to the addition of explosives in the hole. Instrumenting a horizontal borehole with a piezometer could also facilitate monitoring of inflow to the open pit, although this may not be needed if groundwater is flowing in the horizontal borehole. If water is flowing into a horizontal borehole, a sample would be collected after an adequate volume of water has been flushed out of the borehole. The location of horizontal boreholes would need to be designed to target locations and geological features that augment the likelihood of encountering water. For both production holes and horizontal boreholes, new holes would be drilled as the pit expands.

The installation of conductivity probes can be an effective method of monitoring the in-situ groundwater salinity in real time in arctic environments (Martin *et al*., 2013).

Groundwater chemistry was similar to results previously obtained except for lower concentrations of salinity parameters; however concentrations are within the same magnitude as historic values. Groundwater quality results met the Portage effluent quality criteria.

The target dates for the Groundwater Plan will be August/September, 2013. Results of sample analysis will be compared to historical values.

Table 12.4 - Comparison of observed impacts in 2012 to potential impacts on water quality identified in the Aquatic Ecosystem/Fish Habitat Impact Assessment (AEIA, 2005) for the operations phase of the Meadowbank Gold Project.

Potential Impacts (AEIA, 2005)	Observed Impact (2012) Compared to Prediction	Discussion
Release of soluble dike material	No Observed Effect	Dike construction was completed in 2011; 2011 pore water sampling did not demonstrate any release of material; confirmed in 2012 CREMP sampling
Dust (terrain, tailings desiccate)	No Observed Effect	See Section 12.4
Blasting residues	Within FEIS Predictions	All run-off contact water from pits is collected in the attenuation area. No observed effect in receiving environment

Potential Impacts (AEIA, 2005)	Observed Impact (2012) Compared to Prediction	Discussion
		in CREMP sampling; see Section 12.4.
Increased TSS	No Observed Effect	No increase in TSS as discussed in 2012 CREMP
Emissions (hydrocarbons, incinerated waste)	No Observed Effect	See Section 12.4
Runoff from pit walls and tailings (TSS, metals, acid, nitrogen spp., reagent spills)	NA	All run-off and contact water from waste rock and pits is collected in the attenuation area. No observed effect in receiving environment in CREMP sampling.
Concentrated pore water release during tailings freeze back	No Observed Effect	-
Attenuation pond effluent (yr1-5: TSS, metals, acidity, explosives residues; yr 5+: tailings supernatant, cyanide spp.)	Within FEIS Predictions	Discharge of effluent began in 2012; no impacts to the receiving environment were observed as discussed in 2012 CREMP
Sediment losses via permafrost degradation (mainly through bogs)	Within FEIS Predictions	No additional sediment loss observed to have caused impacts to water quality
Leaching incineration ashes	No Observed Effect	No evidence of effects
Waste water/ sewage discharge to tailings pond	Within FEIS Predictions	No evidence of effects
Sediment loading during drawdown	No Observed Effect	Final dewatering of Bay-Goose basin did not cause additional sediment loading in the receiving environment; discussed in 2012 CREMP
Release of water from waste rock piles (to attenuation pond)	Within FEIS Predictions	No evidence of effects
Spills (fuel, diesel, transferred metals, explosives, tailings, reagents)	Within FEIS Predictions	No spills were near enough to waterbodies to cause impacts
Changes in whole lake water quality compared to CWQG	No Observed Effect	Discussed in 2012 CREMP
Changes in groundwater	Within FEIS Predictions	No evidence of effects; Discussed in 2012 groundwater monitoring report

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) as set out in the DFO authorization for the mine-site. Results of these programs are summarized in Table 12.5, below. All measured impacts to fish and fish habitat were within FEIS predictions.

In addition to continued monitoring of habitat compensation features at the minesite and along the AWAR, AEM has evaluated the accuracy of the fisheries habitat evaluation procedure (HEP) used in the FEIS (under the NNLP) to estimate expected habitat losses in Second Portage Lake's northwest arm (2009) and in Bay-Goose Basin (2012). The 2009 evaluation in Second Portage Lake found that the pre-construction method of quantifying habitat (prior to dewatering) overestimated the actual habitat units lost, as measured after dewatering, by approximately 15% (AEM, 2010). This discrepancy occurred primarily because the footprint decreased but also due to methods of habitat evaluation that appear to overestimate the proportion of high-value habitat[1]. In 2012 Bay-Goose basin was similarly evaluated to provide a habitat type classification error that will assist in informing future HEP methods and identify uncertainties specific to habitat area calculations. Overall, the observed classification error was quite high as 42% of the study area was mis-classified pre-dewatering. As is expected, shallow coarse areas were classified correctly and fine deep substrate areas were also classified correctly. Advances in GIS data collection and high resolution CMS laser scanning are the primary differences for habitat type classification errors. These classification errors are likely a result of mis-selecting a shallow sub-basin that was difficult to map pre-dewatering. Nonetheless, the 2012 evaluation results indicate areas that can be improved for classifying habitat types and will ultimately assist in improving the determination of habitat compensation projects a priori and follow-up monitoring programs.

Table 12.5 - Comparison of observed impacts in 2012 to potential impacts on fish/fish habitat identified in the Aquatic Ecosystem/Fish Habitat Impact Assessment (AEIA, 2005) for the operations phase of the Meadowbank Gold Project.

Potential Impacts (AEIA, 2005)	Observed Impact (2012) Compared to Prediction	Discussion
Fish larvae entrainment into TPL intake pipe	No Observed Effects	Velocities and screen mesh size meets DFO requirements.
Fish Populations	No Observed Effects	Population estimates conducted in Wally and Vault Lakes in 2012; not required elsewhere in 2012
Fish Habitat	Within FEIS Prediction	Revised No Net Loss Plan (submitted to DFO on October 15, 2012) which required the recalculations of fish habitat losses and offset gains with the new Life of Mine. Revised Authorization received on
Sedimentation	Within FEIS Prediction	Final dewatering of Bay-Goose basin did not cause additional sediment loading in the receiving environment; discussed in 2012 CREMP
Blasting (physical effect)	Within FEIS Prediction	No effects as discussed in the Blast Monitoring report
Attenuation pond effluent discharge	No Observed Effects	Discharge of effluent began in 2012; no impacts to the receiving environment were observed as

[1] Furthermore, DFO No Net Loss Planning requested the proponent to compensateion at a 2:1 ratio of habitat units gained to habitat units lost for the Schedule II authorization of the Tailings impoundment area. This overestimated ratio, is to reduce uncertainty in the proposed habitat compensation to offset lost fish habitat.

Potential Impacts (AEIA, 2005)	Observed Impact (2012) Compared to Prediction	Discussion
		discussed in 2012 CREMP
Reduced fish passage: culvert at Turn Lake crossing, SPL/TPL channel closure	No Observed Effects	Low risk to fisheries as deemed by DFO and letter of advice
Noise (Barge)	No Observed Effects	Barge monitoring studies demonstrated that fish habitat is not impacted by the intake barge and that pumping rates and screen size mesh meets DFO guidance.

12.1.3 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 2012 aquatic monitoring programs addressed all relevant potential impacts to water quantity, water quality and fish/fish habitat identified in the FEIS. Table 12.6 provides a summary of the evaluation of the monitoring programs.

Table 12.6 Summary of the aquatic environment monitoring programs at the Meadowbank site

		Aquatic Environment Monitoring Programs											
	VEC	Mine Site Water Quality Sampling*	Core Receiving Environment Monitoring Program	Water Quality and Flow Monitoring	Effects Assessment Studies	Dike Construction Monitoring	Habitat Compensation Monitoring Program - No Net Loss	Dewatering Monitoring	MMER Monitoring	Environmental Effects Monitoring (EEM) (part of MMER)	Fish-Out Studies	AWPAR and Quarry Water Quality Montoring	Blast Monitoring
	Completed in 2012?	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	Yes	Yes
	Water Quality	o	o	o	o	o	o	o	o	o	o	o	NA
	Water Quantity	NA	o	o	o	o	NA	NA	o	o	NA	NA	NA
	Fish Populations	NA	NA	NA	o	NA	o	NA	NA	o	o	NA	NA
	Fish Habitat	NA	o	NA	o	NA	o	NA	NA	o	o	NA	o
*	Type A Water License requirement												
o	Evaluates impacts to VEC												
NA	Not Applicable												

12.1.4 Conclusions and Recommendations

Overall, the measured impacts to water quantity, water quality, fish and fish habitat appeared to be within the FEIS predictions. In most cases operation activities were accurately predicted (summarized in Table 12.2) and occurred in 2012. Potential impacts onsite in 2012 were within impact predictions or had no observed effects, indicating that the original predictions were conservative.

In 2012, AE met with the HTO, KIA, and DFO to discuss environmental issues related to water quality and quantity and, fish and fish habitat on a number of occasions. More specifically, in collaboration with DFO, HTO and KIA, AEM revised the no net loss plan using a refined HEP based on historical mapping, the adjusted mine footprint and updated fisheries data (including fishout data). The fisheries data that AEM has collected since 2005 and the detailed methods of calculating habitat losses and gains have assisted DFO in decision making and fisheries planning in the north. In addition, AE has worked closely with the University of Guelph to evaluate the effects of total suspended solids on aquatic ecology. In the future, AEM will endeavour to develop relationships with academic institutions and fisheries researchers at DFO to use the data and experience at Meadowbank to further habitat protection and monitoring in the north. At a regional level, the information and modelling that is used for fish habitat mapping methods are currently being applied by AEM and other consultants at other proposed projects in Nunavut including, but not limited to the Meliadine Gold Project.

Other than the development of a new NNLP, which was based on regulatory considerations, no additional specific recommendations for further mitigation of impacts to water quality, water quantity or fish/fish habitat were required in 2012, because all impacts were within predicted and acceptable limits.

12.2 TERRESTRIAL AND WILDLIFE ENVIRONMENT

In agreement with the PEAMP objectives, the results of the 2012 terrestrial and wildlife monitoring programs were evaluated and a comparison was made to the impact predictions by subdividing the VECs as follows: vegetation (wildlife habitat), ungulates, predatory mammals, small mammals, raptors, waterfowl and breeding birds.

The following sections summarize the predicted impacts to terrestrial and wildlife VECs, 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.

12.2.1 Identification of Predicted Impacts

A summary of predicted impacts, threshold levels developed during the FEIS, and the 2012 monitoring results is provided in Table 12.7.

Table 12.7 – Predicted impacts, thresholds and results of monitoring in 2012 taken from Nunavut Environmental (2013). The complete report is presented in Appendix G5.

Predicted Impact	TEMP (2005) Thresholds	Monitoring Methods	Frequency	Completed in 2012	Summary of Results
Vegetation (Wildlife Habitat)					
Habitat Loss	Mine Site – 703ha AWAR – 281ha	Ground Surveys, Mapping, GIS Analysis	Every Two Years	Yes	Below Threshold: Mine Site – 211 ha < predicted (Heath Tundra exceeds) AWAR – 173ha < predicted
Habitat Degradation by Contamination	TBD - SLRA	Vegetation and Soil Samples	Every 3 Years	In 2011	NA
Habitat Reclamation following Mine Closure	NA	Ground Surveys, Vegetation Plots, Mapping	Every 3-11 Years Post-Closure	NA	NA
Ungulates					
Habitat Loss and Degradation	Growing - 239ha of High Suitability Winter – 145ha of High Suitability	Ground Surveys, Mapping, GIS Analysis	Every Two Years	Yes	Below Threshold: Growing - 144ha of High Suitability Habitat (60% of Predicted) Winter – 99ha (68%)
Sensory Disturbance	500m	Ground Surveys, Satellite-collaring	Daily/Weekly	Yes	NA
Vehicle Collisions	1 individual	Ground surveys	Daily	Yes	Threshold Exceeded – 1 Caribou Mortality
Hunting by Baker Lake Residents	20% Change from Historic	Hunter Harvest Study	Yearly	Yes	Below Threshold
Other Mine-related Mortality	1 individual	Ground surveys	Daily	No	Below Threshold
Exposure to Contaminated Water or Vegetation	TBD - SLRA	Vegetation and Soil Samples	Every 3 Years	In 2011	NA
Predatory Mammals					

Predicted Impact	TEMP (2005) Thresholds	Monitoring Methods	Frequency	Completed in 2012	Summary of Results
Project-related Mortality	1 individual	Ground Surveys	Daily	Yes	Threshold Exceeded – 1 Wolverine Mortality
Small Mammals					
Habitat Loss and Degradation	172ha of High Suitability	Ground Surveys, Mapping, GIS Analysis	Every Two Years	Yes	Below Threshold- 95ha of High Suitability Habitat (55% of Predicted)
Project-related Mortality	100 Individuals	Ground Surveys, Collision Reporting System	Mine Site- Daily AWAR - 2x/Week	Yes	Below Threshold - 18 Mortalities
Exposure to Contaminated Water or Vegetation	TBD - SLRA	Vegetation and Soil Samples	Every 3 Years	In 2011	NA
Raptors					
Healthy Prey populations	TBD - SLRA	Vegetation and Soil Samples	Every 3 Years	In 2011	NA
Disturbance of Nesting Raptors	1 Nest Failure	Active Nest Monitoring	Nests within 200m - Daily Nests from 200-1000m - Weekly	Yes	Below Threshold
Project-related Mortality	1 individual	Ground Surveys, Collision Reporting System	Mine Site- Daily AWAR - 2x/Week	Yes	Below Threshold
Waterbirds					
Habitat Loss and Degradation	386ha of High Suitability	Ground Surveys, Mapping, GIS Analysis	Every Two Years	Yes	Below Threshold: 304ha of High Suitability Habitat (79% of Predicted)
Disturbance of Nesting Waterfowl	1 Nest Failure	Waterfowl Nest Surveys	Yearly - For Active Nests within 200m	Yes	Below Threshold
Exposure to Contaminated Water or	TBD - SLRA	Vegetation and Soil Samples	Every 3 Years	In 2011	NA

Predicted Impact	TEMP (2005) Thresholds	Monitoring Methods	Frequency	Completed in 2012	Summary of Results
Vegetation					
Project-related Mortality	1 individual	Ground Surveys, Collision Reporting System	Mine Site-Daily AWAR - 2x/Week	Yes	Below Threshold
Other Breeding Birds					
Habitat Loss and Degradation	288ha of High Suitability	Ground Surveys, Mapping, GIS Analysis	Every Two Years	Yes	Below Threshold: 197ha of High Suitability Habitat (69% of Predicted)
Project-related Mortality	50 Individuals Per Year	Ground Surveys, Collision Reporting System	Mine Site-Daily AWAR - 2x/Week	Yes	Below Threshold (7 Individuals)
Exposure to Contaminated Water or Vegetation	TBD - SLRA	Vegetation and Soil Samples	Every 3 Years	In 2011	NA
Changes in Breeding Bird Populations	20% Change from Natural	Breeding Bird Plots and Transects	Yearly	Plots – 2012 Transects - 2011	Below Threshold

12.2.2 Accuracy of Predictions and Effectiveness of Monitoring

Overall, the zones of influence predicted for wildlife and vegetation were overestimated during the FEIS. The majority of impacts to terrestrial VECs were below predicted thresholds. Although a few mortality thresholds were exceeded in 2012 due to AWAR travel, consistent with FEIS predictions, these thresholds informed management and mitigation action (see Section 12.2.3).

12.2.3 Conclusions and Recommendations

As summarized in Table 12.5, two Terrestrial Ecosystem Monitoring Program (TEMP - developed as part of the FEIS) threshold levels were exceeded in 2012, namely for the road-related mortality of one caribou and one wolverine. The incidences were reported to AE staff and thereafter to the DOE Conservation Officer; in both cases the incidents were accidental. These incidents resulted in the implementation of mitigative action to reduce mortalities along the AWAR, such as signage, announcing wildlife presence on the radio, reminders to yield to traffic, caribou migration management (including road closures) and

reducing speeds for daily traffic. Furthermore, monitoring and frequent ground surveys reduced any wildlife-related incidents around the mine site. Overall, AEM has impacted a smaller terrestrial footprint than originally predicted and the analysis in 2012 found that the majority of potential impacts had no observed effects or were within FEIS predictions.

Regional Monitoring

Throughout the year, Meadowbank environment staff routinely monitored the pit and other areas on the mine site for birds to ensure their protection and adequate management. In June 2012, Peregrine falcons were observed nesting in the Portage Pit directly within mine operations. In response, a general mine site Peregrine falcon management and protection plan was developed in accordance with the TEMP. Furthermore, in response to the increased falcon activity, Agnico-Eagle recently began working with Dr. Alastair Franke from the University of Alberta. Dr. Alastair Franke has been conducting research on raptors in Nunavut since 2003. He has extensive knowledge of falcon behavior and is recognized by the DOE as a raptor expert for the territory. In the future, if falcon activity is observed near mine operations, Agnico-Eagle will immediately consult with Dr. Franke and he will provide site-specific protective measures and if needed deterrence recommendations to ensure falcon protection. Regionally, AEM is working with Dr. Franke to conduct surveys near Rankin Inlet; in the future he may extend his work to the Baker Lake area.

In addition, Meadowbank has been contributing to the GN DOE caribou collaring program since 2009. To date, Meadowbank has funded the deployment of 25 caribou collars (greater than $250 000). In early 2011, Meadowbank contributed an additional $35 000 towards the GN-led program to estimate the number of breeding females in the Beverly herd of taiga-wintering barren-ground caribou. In 2012, Meadowbank intended to contribute an additional $50 000 for the deployment of 5 additional collars, but this program was halted by the GN. In 2012, AEM began discussions with the GN to enter 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. The contribution agreement will be finalized in 2013 and will continue to assist the GN- DOE- Wildlife branch in directing the implementation, data analysis and management of caribou populations in the Kivalliq region.

12.3 NOISE

In support of the PEAMP, a review was conducted of the predictions made in the FEIS regarding sources of noise and potential effects. While noise generation was predicted 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 proposed in association with pit development, waste rock, tailings handling and the mine plant. Therefore, although all predicted noise sources are summarized, the discussion of PEAMP objectives focuses on those areas for which significant effects were predicted, or monitoring was recommended.

The following sections summarize the predicted sources and effects of noise generated in relation to the Meadowbank site, 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.

12.3.1 Identification of Predicted Impacts

Table 12.8, below, summarizes the noise impacts and associated effects predicted in the FEIS, identifies the monitoring measures proposed in the FEIS, and indicates whether monitoring was conducted in 2012.

Table 12.8 - Predicted noise sources and effects; and proposed monitoring per the FEIS. Grey cells indicate those impacts identified as "significant", according to FEIS.

Minesite Component	Predicted Impact	Potential Effect	Proposed Monitoring	Monitored in 2012?
Dikes	Noise from dike construction			
Pits	Noise from blasting, etc.	Disturbance of wildlife; reduced habitat effectiveness	Monitor noise levels and responses of wildlife	Yes (Blast monitoring and general sound levels)
Waste Rock Pile/Tailings Facility	Noise from berm construction, material handling		Monitor noise levels and responses of wildlife	Yes
Roads and Traffic	Noise from maintenance and use	Disturbance of wildlife; reduced habitat effectiveness	Monitor noise levels and responses of wildlife	Yes
Airstrip	Noise from air traffic	Disturbance of wildlife; reduced habitat effectiveness	Monitor noise levels and responses of wildlife	Yes
Mine plant and associated facilities	Noise	Disturbance of wildlife; reduced habitat effectiveness	Monitor sound levels of various activities	Yes (general sound levels)
In-town Staging Facility	Noise from onsite activity			
Barge	Noise associated with barge engines and beach landing		None	

12.3.2 Accuracy of Predictions and Effectiveness of Monitoring

All sources of noise identified in the FEIS are realistic based on operations in 2012. Noise generation is associated with all of the mine components listed. Disturbance of wildlife and

reduced habitat effectiveness was identified as an effect of noise generation from pits, the airstrip, and the mine plant. According to the Alberta Energy and Resources Board Directive 038 (February 16, 2007), it is unlikely that noise generated by industrial sources, such as the minesite, has a significant long-term effect on wildlife populations and habitat use. AEM conducts terrestrial wildlife monitoring, including analyses of sensory disturbance for caribou and raptors. In both cases, disturbance was below the threshold of predicted effects (see Table 12.7). Based on the lack of evidence from the literature, and the results of the terrestrial wildlife monitoring program, effects of noise on wildlife identified in the FEIS do not appear to be occurring as predicted.

In addition, AEM conducts annual noise monitoring at 5 locations around the minesite, according to the Noise Management and Abatement Plan (September, 2009). Although this program does not specifically isolate sounds from pit development, the waste rock pile, the tailings facility, or the mine plant, as identified in the FEIS, samples are representative of the combination of minesite activities that occur on a daily basis. The chosen locations encompass a variety of distances from the site, allowing for a thorough analysis of generated noise levels. Overall, since noise level and terrestrial wildlife monitoring is being conducted in a manner that addresses the impacts predicted in the FEIS, these monitoring programs are judged to be effective.

12.3.3 Conclusions and Recommendations

In 2012, some difficulties with the noise monitoring equipment were encountered, and sound levels were recorded for only three locations. Recommendations to ensure monitoring is conducted at all locations in 2013 were included in the 2012 noise monitoring report. In general, the mitigation and management actions proposed in the FEIS are being implemented. No additional mitigation measures were recommended in 2012. However, since sound levels have been recorded above the site-derived sound limit at certain locations, additional mitigation may be recommended in the future if these sound levels are sustained for an unreasonable amount of time, according to the Noise Management and Abatement Plan (2009).

12.4 AIR QUALITY

A review was conducted of the predicted sources of impacts to air quality and associated effects 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). Therefore, although all predicted sources and effects are outlined, the discussion of PEAMP objectives focuses on these areas for which significant effects were predicted.

The following sections summarize the predicted impacts to air quality in relation to the Meadowbank site, 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 Identification of Predicted Impacts

Table 12.9, below, summarizes the predicted impacts to air quality, associated effects, and monitoring measures proposed in the FEIS, and indicates whether monitoring was conducted in 2012.

Table 12.9 - Predicted impacts to air quality, subsequent effects and proposed monitoring per the FEIS. Grey cells indicate those impacts identified as "significant", according to the FEIS.

Minesite Component	Predicted Impact	Predicted Effect	Proposed Monitoring	Monitored in 2012?
Dikes	Generation of dust during placement of dike material		Static dustfall	Yes
Dewatered Basins	Generation of dust from exposed lake sediment		Static dustfall	Yes
Pits	Generation of dust and gases from blasting, excavation etc.	Poor air quality and terrestrial/aquatic contamination	Static dustfall	Yes
Waste Rock Pile and Tailings Facility	Generation of dust from material deposited on waste rock pile or tailings		Static dustfall	Yes
Roads and Traffic	Generation of dust and emissions from development, maintenance and use		Static dustfall	Yes
Airstrip	Generation of dust and emissions from development, maintenance and use		Static dustfall	Yes
Fuel/ Emulsion/ Explosives Storage	Release of contaminants from fire		Monitor fuel handling procedures	Yes
Sewage and Solid Waste Disposal	Release of pollutants from incineration; odours		Monitor adherence to daily burning policy	Yes
Barge	Emissions from barge		None	N/A

12.4.2 Accuracy of Predictions and Effectiveness of Monitoring

All sources of impacts to air quality identified in the FEIS are realistic based on operations in 2012. Dust generation is the major air quality concern, and sources are accurately identified in the FEIS.

Effects of dust generation were predicted to occur due to operation activities in pits, the mine plant and associated facilities. These effects were described as “impacts on terrestrial and aquatic habitats”. For the purposes of this assessment, impacts on terrestrial habitats are taken to include 1) ground-level air quality, 2) smothering of vegetation, and 3) consumption of excess chemical contamination in dust. Impacts on aquatic habitat are taken to mean degradation in water quality. While these effects are possible, monitoring programs have indicated they are unlikely to be occurring under current operations. Firstly, ground-level air quality (total suspended particulates, PM10, PM2.5, and NO_2) is monitored at two minesite locations through the Air Quality and Dustfall Monitoring Plan. Although 2012 was the first year of full implementation, no exceedances of relevant GN standards were recorded. Total dustfall, which may contribute to smothering of vegetation, is also monitored at four locations through this plan, and along the AWAR through a specific dustfall study (that will be conducted in 2012 and 2013). While some exceedances of nuisance guidelines published by Alberta Environment were observed in the 2012 study, total dustfall rates were an order of magnitude lower than those measured at Ekati Diamond Mine, where no change in vegetative communities was reported (Male and Nol, 2006). Lastly, risk to terrestrial wildlife from chemical contaminants is assessed through the Wildlife Screening Level Risk Assessment, which was conducted in 2006, 2011 and will be again in 2014. Although this assessment does not specifically examine contaminants in dust, to date no excess risk for wildlife from contamination of soil, water or plant tissue due to mine operations has been identified. Impacts on aquatic habitat are monitored through the AEMP and specifically the CREMP, described in Section 12.1. As discussed in that section, no impacts to water quality in the surrounding area have been observed to date. Based on the results of these monitoring programs, the effects of dust generation and air emissions on terrestrial and aquatic habitat identified in the FEIS do not appear to be occurring as predicted.

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, PM10, PM2.5 and NO_2, in accordance with the 2009 Air Quality and Dustfall Monitoring Plan.

12.4.3 Conclusions and Recommendations

In 2012, some difficulties with the TSP monitoring equipment were encountered, and some assumptions had to be made in comparing final results to GN standards. Recommendations to ensure instrument calibration and proper set-up in 2013 were included in the 2012 Air Quality and Dustfall Monitoring Report. In general, the mitigation and management actions proposed in the FEIS are being implemented. Dust suppression efforts were increased in 2012 in order to reduce dust generation. Beginning in June 2012, calcium chloride was applied as a dust suppressant on the roads onsite. Several applications were made throughout the summer of 2012. A light oil based dust suppressant was tested on a portion

of the airstrip and will continue to be used. Water was also used daily during summer months as dust suppressant on the airstrip and mine haul roads in 2012. These efforts corresponded with a decrease in recorded dustfall rates, and no additional mitigation measures were recommended in 2012.

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 component. The following tables and concluding text summarize the impacts on the permafrost due to specific mine activities in 2012 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 Identification of Predicted Impacts

A summary of FEIS potential project effects, potential mitigation, management and monitoring developed during the FEIS and the 2012 monitoring results is provided in Table 12.10. Results are present only for activities with potential mitigation and/or management and monitoring plan into FEIS.

Table 12-10 Potential Project Effects, Potential Mitigation, Management and Monitoring and Results of Monitoring in 2012.

Project Component	Potential Effect	Potential Mitigation	Management and Monitoring	Summary of Results
Dike				
East Dike	Continued permafrost aggradation and stabilization of new active layer in upstream portion of dike above 2PL level, across top, all of downstream side, and all sides of the abutments -POSITIVE	None	Monitoring of ground temperatures to ensure permafrost aggradation into the dike. This will facilitate optimum closure planning. Monitoring of slopes.	Generally, upper 0.5 to 2m thawed during the summer but frozen during winter. Depending where thermistor were installed, cut-off walls have been subject to frozen and thaw cycles. See section 4.1.2 of 2012 Annual Geotechnical report.
Tailings Dike	Continued permafrost aggradation and stabilization of new active layer - POSITIVE	None	Monitor ground temperatures and sub permafrost pore pressures to ensure permafrost aquitard can be relied upon as an effective barrier against contaminant movement from the tailings facility eastward toward the Portage Pit.	Dike foundation remained frozen during the year. See section 4.4, 4.5, 4.6 of 2012 Annual Geotechnical report.
Bay Zone Dike	Continued permafrost aggradation and stabilization of new active layer in upstream portion of dike above 3PL level, across top, all of downstream side, and all of abutments - POSITIVE; later, after construction of Goose Island & 3PL dikes and dewatering of pond, permafrost aggradation into upstream side and development of a new active layer - POSITIVE; finally, loss of this permafrost and development of a new active layer where portions of the dike are removed for	None	Monitoring of ground temperatures to ensure permafrost aggradation into the dike. This will facilitate optimum closure planning. Monitoring of slopes.	Thermistor installed in the soil-bentonite of the cut-off wall: Generally, frozen upper portion of the cut-off wall thawed during summer (El 132 to 131). El. 135 to 132 stays frozen during the whole year. Thermistors installed in areas where the bottom of the cut-off wall was jet grounded: top of the cut-off wall thawed during the summer and portion of the walls remains frozen beneath the thaw part. See section 4.3.2 of 2012 Annual Geotechnical report.

Project Component	Potential Effect	Potential Mitigation	Management and Monitoring	Summary of Results
	completion of the Portage Pit			
Goose Island & South Camp Island Dikes	Permafrost aggradation and formation of new active layer in portion of dike above 3PL level on upstream side, across top, all of downstream side, and all of abutments - POSITIVE	None	Commence ground temperature monitoring in dike and dike foundation as soon as possible. Continue monitoring to ensure permafrost aggradation into the dike. This will facilitate optimum closure planning. Commence slope monitoring as soon as the structure is completed.	Soil locate beneath the dike foundation and liner appear to remained frozen (permafrost) below elevation 130m and the active layer in frozen mid-October to late June.
Dewatering				
Second Portage Lake	Continued permafrost aggradation in talik under former 2PL NW arm and stabilization of new active layer as long as subaerial exposure persists - POSITIVE; loss of this permafrost when levels of reclaim and attenuation ponds rise and flood former lake bottom; reestablishment of permafrost and development of a new active layer in conjunction with subaerial tailings	None	Representative monitoring of ground temperatures to ensure permafrost aggradation into the talik beneath 2PL. Assessment of anticipated ice entrapment (i.e. ground ice development) in conjunction with permafrost aggradation. Assessment of suspected ground ice development in conjunction with permafrost aggradation (ie. outside of tailings area). These initiatives will facilitate optimum closure planning of the tailings facility.	No monitoring was done. In 2013, thermistors were installed between Central Dike and Portage Pit. Data will provide information about permafrost.
Portage Pit (Third Portage Lake)	Continued permafrost aggradation in talik under former 3PL north central shoreline area and stabilization of new active layer as long as subaerial exposure persists; loss of a portion of this permafrost and formation of a new active layer as the Portage pit walls are pushed back	None	Assessment of suspected ground ice development in conjunction with permafrost aggradation. Assessment of ground ice content of select shoreline polygons.	No monitoring was done. In 2013, thermistors were installed between Central Dike and Portage Pit. Data will provide information about permafrost

Project Component	Potential Effect	Potential Mitigation	Management and Monitoring	Summary of Results
Goose Island (Third Portage Lake)	A – Permafrost aggradation in talik under former 3PL NE arm and formation of a new active layer; B - lowering of water table in nearby possibly ice rich areas may cause temporary deepening of the active layer, minor warming of permafrost, melting of ground ice, thaw subsidence and sediment loss	B only: Silt fences to restrict movement of sediment into diked off portion of 3PL; adjust pumping rate to deal with high TSS; in last phase of drawdown use locally isolated clarification pond(s) inside diked off area	B only: Only required during dewatering in so far as the condition influences TSS build-up in pumped discharge from pond. Assessment of suspected ground ice development in conjunction with permafrost aggradation. Assessment of ground ice content of select shoreline polygons. These initiatives will facilitate optimum closure planning.	Thermistors were installed in November 2012 between Bay Goose Dike and Bay Goose Pit. Data will provided information about aggradation of permafrost.
Pits				
Portage Pit	A - Loss of permafrost and development of a new active layer in terrestrial areas as pit slopes are pushed back; B - aggradation of permafrost and development of a new active layer in talik under former 2PL NW arm after mining of benches is completed	None	Assessment of suspected ground ice development in conjunction with permafrost aggradation.	No results
Portage Rock Storage Facility	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 nearsurface permafrost and possible subsidence, particularly in lowlying areas; C - where new lifts are added to older lifts,	B only: Schedule placement of waste rock on thaw sensitive Polygons during winter months, possibly in conjunction with proactive measures to enhance ground chilling prior to placement (e.g. snow removal and/or compaction); use flatter side slopes	Internal and foundation temperatures to be monitored. These initiatives will facilitate optimum cap rock design and closure planning of the Portage waste rock pile.	A thermistor was installed on Portage Rock Storage Facility (RSF) in 2013. Result and discussion will be provided in 2013 Annual Report. Dike around RSF indicated that the foundation is in a frozen state.

Project Component	Potential Effect	Potential Mitigation	Management and Monitoring	Summary of Results
	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 cooling – NET POSITIVE			
Tailings storage Facilities	Permafrost aggradation into subaerial tailings and ice entrapment. Entrapped ice originates from in situ freezing of transport water as interstitial ground ice and burial of reclaim/attenuation pond ice during winter operations. The large quantity of ice that forms in the long and cold winter months together with the high latent heat barrier it represents to melting in the short summer season accounts for the net accumulation of entrapped ice. The preliminary tailings facility design report provides volume elevation curves for 0%, 10%, 20% and 30% net volume entrapment scenarios	Ice entrapment can be managed in one of three ways: First, by subaqueous discharge during the winter months; second, by minimizing the thickness of winter placement to what will thaw the following summer season, which is usually 1 to 1.5 metres; and third, by thicker subaerial deposition where the entrapped ice content of the new permafrost is monitored so as to keep the net volume of entrapped ice within the design tolerance, which is less than or equal to 30% of the total unfrozen tailings volume. Choosing the first option requires relatively more reclaim / attenuation pond volume. Choosing the second or third options requires careful monitoring and regular relocation of the spigot points.	Ice entrapment is poorly constrained at this time, although there is momentum in the Northern Mining Industry toward valuable research and development (e.g. Diavik Diamond Mines water license).	Thermistor was installed within the talik of the former lakebed inside the North Cell of the TSF: temperatures below 0C are recorded below El 140 m which seems to indicate that the tailings are continually frozen at this place.

Project Component	Potential Effect	Potential Mitigation	Management and Monitoring	Summary of Results
Ditches (Roads, Airstrip & Contact Water)	Stabilization of permafrost temperatures and active layer thickness; stabilization of thaw subsidence and sediment loss in bog areas	Silt fences as required to manage sediment loss; rock aprons as required to slow the rate of thaw penetration and stabilize the underlying soils	none recommended	Slit fences were installed and minimize sediment loss
Mine Plant & Associated Facilities	A - Stabilization of permafrost temperatures and active layer thickness in outside areas; B - loss of permafrost under heated structures and potential settlement where ground ice is present and degrades under imposed ground temperatures	B only: Locate heated structures (at the design phase) where ground ice is not present in the subgrade materials. Alternatively, insulate foundations to retard thaw; artificially chill foundations to prevent thaw; and/or elevate structures on piles or insulated gravel pads to prevent thaw.	B only: Ground temperature measurements will be taken during operations where there is a need to monitor foundation temperatures	No ground temperature measurements but no sign of thawing of the foundation during the year.
Freshwater Intake & Pipeline	Stabilization of permafrost temperatures and active layer thickness in the vicinity of the wet well and beneath the pipeline	Use insulated pipe with heat tracing; elevate pipeline across thaw sensitive terrain	Monitor pipeline alignment for potential permafrost degradation. Monitoring may include one or both of ground surveys or ground temperature measurements.	No ground temperature measurements but no sign of thawing due to pipeline.
Discharge Facilities & Pipeline	Stabilization of permafrost temperatures and active layer thickness beneath the pipeline	Use insulated pipe with heat tracing; elevate pipeline across thaw sensitive terrain	Monitor pipeline alignment for potential permafrost degradation. Monitoring may include one or both of ground surveys or ground temperature measurements.	No ground temperature measurements but no sign of thawing due to pipeline.
Non-Contact Diversion Facilities	Stabilization of permafrost temperatures and active layer thickness; stabilization of thaw subsidence and sediment loss in bog areas	Silt fences as required to manage sediment loss; gravel aprons as required to slow the rate of thaw penetration and stabilize the underlying soils	none recommended	Slit fences were installed and minimize sediment loss
Site Accommodations	A - Stabilization of permafrost temperatures and active layer thickness in outside areas; B - loss of permafrost under	B only: Locate heated structures (at the design phase) where ground ice is not present in the subgrade	B only: Ground temperature measurements will be taken during operations where there is a need to monitor foundation	No ground temperature measurements but no sign of thawing of the foundation during the year.

Project Component	Potential Effect	Potential Mitigation	Management and Monitoring	Summary of Results
	heated structures and potential settlement where ground ice is present and degrades under imposed ground temperatures	materials. Alternatively, insulate foundations to retard thaw; artificially chill foundations to prevent thaw; and/or elevate structures on piles or insulated gravel pads to prevent thaw.	temperatures	
Sewage & Waste disposal	A - Stabilization of permafrost temperatures and active layer thickness in outside areas; B - loss of permafrost under heated structures and potential settlement where ground ice is present and degrades under imposed ground temperatures	B only: Locate heated structures (at the design phase) where ground ice is not present in the subgrade materials. Alternatively, insulate foundations to retard thaw; artificially chill foundations to prevent thaw; and/or elevate structures on piles or insulated gravel pads to prevent thaw.	B only: Ground temperature measurements will be taken during operations where there is a need to monitor foundation temperatures	No ground temperature measurements but no sign of thawing of the foundation during the year.

12.5.2 Accuracy of Predictions

Overall, the potential effect 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 dike and tailings storage facility. However, no monitoring was done in 2012 to monitor permafrost aggradation in talik for Second Portage Lake, Portage Pit and Bay Goose Pit because no instruments were in place to collect data. The FEIS cannot be verified.

The potential mitigation was put in place for ditches, infrastructures and pipeline. However, no instrumentation was in place to monitor stabilization or loss of permafrost. As the pipeline and the infrastructure are stable, we can suppose that the permafrost is lightly impacted by the mine activities. Furthermore, monitoring and ground surveys reduced any occurrences around the mine site.

12.5.3 Conclusions and Recommendations

Generally, FEIS predictions were consistent with the result.

Throughout the year, Meadowbank staff routinely monitored thermistors, dike, pits and pipeline. Some thermistor was installed in 2012 to monitor aggradation of permafrost within Bay Gosse Pit. The data and discussion will be providing in the 2013 Annual report. Other thermistors will be installed in 2013 near Portage Pit to increase monitoring of permafrost.

12.6 SOCIO ECONOMIC

In the Meadowbank IIBA AEM has committed to prepare an annual report on the wellness of the Inuit residents of Baker Lake. The KIA has agreed that the report will be community based and driven. The Hamlet of Baker Lake is directing the wellness report with support from the University of Guelph.

The objective of each Wellness Report and Implementation Plan is to provide an overview of any impacts of the Meadowbank Mine on the wellness of the Inuit residents of Baker Lake in as much detail as practically possible, including any impacts on:

(a) the state of the physical and mental health of the Inuit residents of Baker Lake;

(b) the extent of alcohol and drug abuse in the community of Baker Lake;

(c) personal and family relationships of the Inuit residents of Baker Lake, including any impacts attributable to employment at a remote work site under a rotational work schedule;

(d) migration into or out of the community;

(e) the prevalence and use of Inuktitut in the community of Baker Lake;

(f) Inuit culture and traditional practices;

(g) job satisfaction of the Inuit residents of Baker Lake employed at the Meadowbank Project;

(h) management of personal finances by the Inuit residents of Baker Lake; and

(i) any other aspect of the wellness of the Inuit residents of Baker Lake that the Meadowbank Mine could reasonably be expected to affect.

For the purpose of developing Hamlet wellness indicators that is meaningful to Baker Lake residents, qualitative community-based research was conducted to capture how Baker Lake residents define and perceive their Hamlet's wellness. Between July and September 2012, two focus groups and 45 semi-structured interviews were conducted. One focus group was held with women and another with youth, with a total of 15 participants. Interview participants represented a diverse cross-section of the community in terms of age, gender, education and socio-economic background. These 45 interviews included elders, young adults, Meadowbank Mine employees, community leaders, front-line workers and administrators.

A proposed list of wellness indicators, based upon interviews and focus groups with Baker Lake residents in 2011 and 2012, is attached to Appendix K1 of this report. The first Wellness Report and Implementation Plan is currently under development and expected to be completed by June 2013.