MEADOWBANK MINE

# Airstrip Expansion- NWB Modification Application

JANUARY 2013

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**Executive Summary**

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AEM is proposing to expand the size of the airstrip in order to accommodate a Boeing 737 jet. In a remote work environment such as Meadowbank, an expanded airstrip and the ability to use larger aircraft will ultimately reduce the number of charter flights per week (10 to 5) and the hours per flight, while increasing the capacity to transport personnel and essential cargo to site. The expanded airstrip will also offer an improved safety measure for greater accessibility and evacuation potential to and from the Meadowbank site.

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# 1 Introduction

## 1.1 Background

Meadowbank is accessible via overland travel on the All Weather Private Access Road (AWPAR) between Baker Lake and the mine site and via chartered aircraft. The Meadowbank airstrip was commissioned for use in January 2009, and since that time, personnel have been transported to Meadowbank at a frequency of approximately 6 return charter flights per week, which originate from Montréal, Yellowknife and the Kivalliq region. The air freight such as food and cargo is transported to the site at a frequency of 4 charter flights per week. A total of 10 flights per week are coming to the site to transport people and freight. Due to the current size of the airstrip, flight access for a Boeing 737 jet is not possible.

AEM is proposing to expand the size of the airstrip in order to accommodate a Boeing 737 jet (AEM, 2010). In a remote work environment such as Meadowbank, an expanded airstrip and the ability to use larger aircraft will ultimately reduce the number of charter flights per week (10 to 5) and the hours per flight, while increasing the capacity to transport personnel and essential cargo to site. The expanded airstrip will also offer an improved safety measure for greater accessibility and evacuation potential to and from the Meadowbank site.

On February 4, 2010 AEM submitted a "Meadowbank Airstrip Expansion" project proposal . This expansion project was for a 600 m expansion to the existing airstrip, a substantial portion of which was to be constructed in Third Portage Lake. On March 2, 2010 the NIRB received notification from the Nunavut Planning Commission that no conformity determination (Keewatin Regional Land Use Plan) would be required for the "Meadowbank Airstrip Expansion" project proposal (Appendix A). On April 15, 2010 the Nunavut Water Board (NWB) advised the NIRB that AEM's application to expand the Meadowbank airstrip would require an amendment to the original NWB water license (2AM-MEA0815). On September 15, 2010, the NIRB send the decision that the airstrip expansion can proceed without a review under Part 5 or 6 (Appendix B).

During 2012, the project was refined and optimized with a goal to reduce the cost but also to limit the length of the airstrip extension in Third Portage Lake to a strict minimum. The designers have succeeded in doing so and AEM is proposing a 255 m extension, capable of accommodating a Boeing 737 jet, but with a limited encroachment of 18 meters in Third Portage Lake. An economic analysis of the modified project was performed and AEM decided to go-ahead with the airstrip expansion of 255 m compared to the 600m expansion in the proposition of February, 2010.

The current size of the airstrip is 1,495 m x 45 m and AEM is proposing an expansion to a total length of 1752 m x 45 m wide in order to accommodate a Boeing 737 jet. There will be no additional airport infrastructure required. As mentioned above, to reach the required length of the airstrip, the length must be extended on the north end by approximately 18 m beyond the ordinary high water mark of Third Portage Lake.

On September 26, 2012, DFO provided a Letter of Advice authorizing the expansion of the airstrip (Appendix C). DFO has concluded that our proposal is not likely to result in impacts to fish and fish habitat and AEM don't need to obtain a formal approval from DFO in order to proceed with the airstrip expansion.

On April 12, 2010, NWB determined that the proposed expansion of the airstrip at the Meadowbank Mine was not consistent with the scope of the Licence. Upon consultation of the Type "A" Licence Application, the proposed airstrip and impact area was defined and restricted to an on-land activity. However this determination was based on the much larger 600 m extension.

As the proposed change was considered inconsistent with the Licence, the NWB determined that AEM was required to submit an amendment application detailing the request (Appendix D). As part of the amendment application, the NWB requested that additional information be provided by AEM. Considering the much reduced scope of the change the application is now for a modification of the water licence. The following document fulfills the NWB requirement for a licence modification (2AM-MEA0815 Part G) by specifically providing the construction plans, water quality monitoring and management of the airstrip expansion, associated receiving environment monitoring, material selection to prevent ARD, and modifications to the emergency response plans. The water quality monitoring and management are identical to what is included in the current water licence. The requests are presented in Table 1 and the section where it can be found in the document is listed for conformity.

**Table 1 - Conformity with Part G: Conditions applying to Modifications**

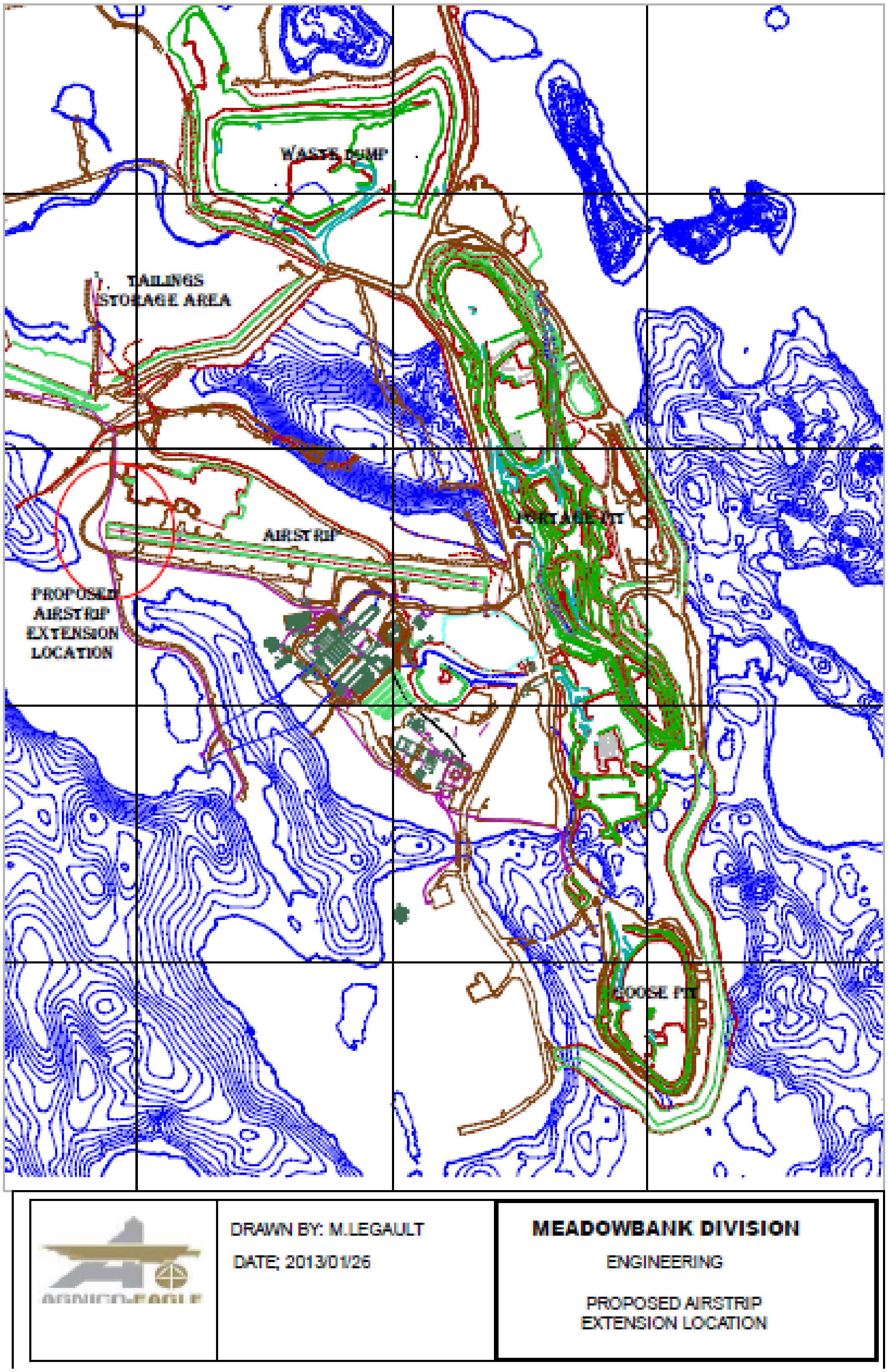
| | Conformity |
|---|---|
| Part G: Conditions applying to Modifications<br>Item 3. Application for modification shall contain: | |
| a. A description of the facilities and/or works to be constructed | Section 1.4 |
| b. The proposed location of the structure(s) | Section 1.4 |

| | Conformity |
|---|---|
| c. Identification of any potential impacts to the receiving environment | Section 3 |
| d. A description of any monitoring required, including sampling locations, parameters to be measured and frequencies of sampling | Section 2.1 |
| e. Schedule of Construction | Section 1.5 |
| f. Drawings of engineered Structures stamped by a Professional Engineer | Section 1.4 and Appendix E |
| g. Proposed sediment and erosion control measures | Section 2.2 |

### 1.2 Meadowbank Gold Mine Operational Overview

Since 2010, AEM has operated the Meadowbank Gold Mine, which is located 70 km north of the Hamlet of Baker Lake, Nunavut. The Meadowbank mine consists of several gold-bearing deposits that will be mined until 2018. Mining at Meadowbank is planned to occur in three open pits (Goose Pit, Portage Pit and Vault Pit), two of which are currently operational (Portage Pit and Goose Pit). Much of the pit development is located in close proximity to the mill, office and lodging infrastructure, with the exception of the Vault Pit which is approximately 10 km northeast of the main mine site. The airstrip is located north-west of the mill, office and lodging infrastructure, and will be extended to the north towards Third Portage Lake and extend south, towards the Portage Pit (Figure 1-1).

**Figure 1.1: Mine site overview**



### 1.3 Biophysical Characteristics of Third Portage Lake

The project lakes are cold-water oligotrophic lakes (i.e. low in nutrients and low in productivity) and are isothermal throughout the year. Diversity and abundance of flora and fauna is low because of the paucity of nutrients and severity of the climate. Open water season is very short; from mid-July until early October. Because the lakes are ice covered for most of the year, atmospheric exchange is limited, however oxygen levels generally remain high due to the low rates of biological activity and decomposition of organic material within the project lakes.

Third Portage Lake is a headwater lake with no streams entering the waterbody. Baseline fisheries data collection suggested that throughout the Third Portage Lake, lake trout and round whitefish dominated the fish assemblage with only a few char and fewer burbot. Based on the 2010 fishout results of a portion of Third Portage East basin (referred to as Bay-goose basin), population assemblage of fish were: 36% arctic char, 29% lake trout and 24% round whitefish, 11% burbot and less than 1% ninespine stickleback. The shorelines in Third Portage Lake are predominantly boulder and cobble with a mixed substrate zone of sediment and pockets of cobble and boulders between 4 and 6 meters. The course material transitions at approximately 6-8 meters to predominantly fines and is most commonly silty- clay sediment. The small footprint of the airstrip that extends into Third Portage Lake into the shallow shoreline of boulder and cobble substrate that is very common in the project lakes and that mostly freezes-thru for 8 months of the year.

### 1.4 Airstrip Expansion, Location and Engineered Drawings

The airstrip expansion into Third Portage Lake is located at 65 01’44” N and 96 05’19” W (Figure 1.2).

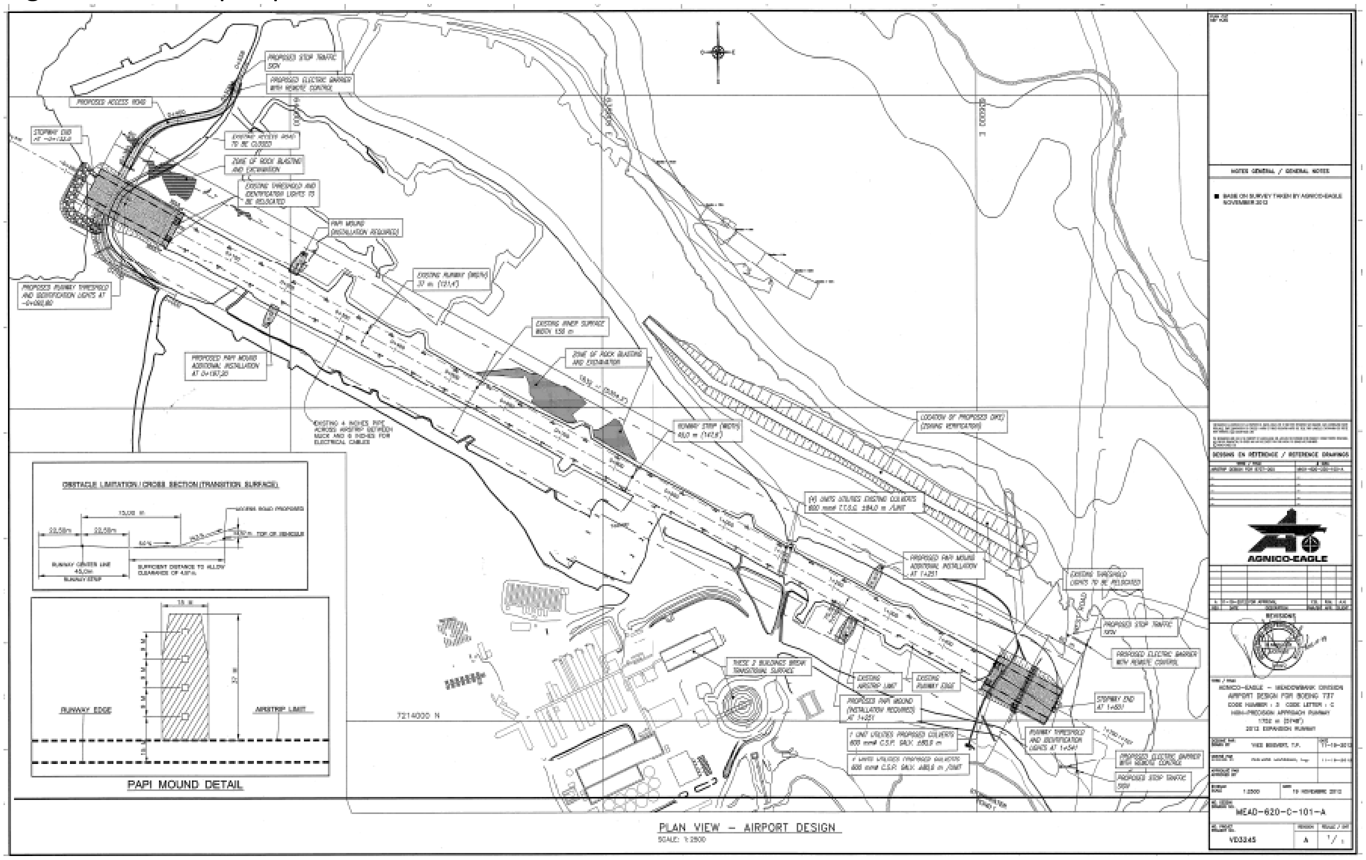
The project activities include:

Expansion of Meadowbank airstrip to a total length of 1752 metres (m), with 18 m located within the high water mark of Third Portage Lake (in-lake portion);

- the width of the Meadowbank airstrip is the same 45 m;
- The all weather access road will stay at the same place and will pass on the air strip;
- Construction of expanded airstrip using materials generated during mining activities at Meadowbank (an estimated total of 100,000 cubic metres of non-acid generating rock material will be required) including:
  - Approximately 3,366 cubic metres of material to be placed in the water for the in-lake portion of the expansion

See Appendix E for detailed airstrip drawing for construction.

Figure 1.2 Airstrip Expansion




### 1.5 Timing of Construction

To reduce the pathway of effects on water quality, fish and fish habitat, construction is planned for the winter period, thus significantly reducing the effects of total suspended solids inputs and spread of disturbed lake-bottom sediments due to the freeze thru of ice into Third Portage Lake. Plans are to complete the “in-water rockfill and armouring material placement” of the airstrip expansion under frozen conditions. As a result, most of the footprint of the airstrip expansion freezes to depth therefore potential effects due to construction is anticipated to be minor. Monitoring stations will be set-up and best management actions will be adopted. The banks of the airstrip expansion into Third Portage Lake will be stabilized with large coarse clean substrate to armour the base, thus preventing erosion and reducing future impacts within the vicinity of the airstrip expansion.

## 2 Water Quality Monitoring and Management of Airstrip Expansion

Despite having a small footprint into Third Portage Lake and low risk to fish and fish habitat, the receiving aquatic environment may be impacted due to the airstrip expansion. The same monitoring and mitigation measures contained in the current licence will be applied to the airstrip expansion. Most of the potential impacts will be mitigated by constructing the expansion during frozen conditions, which will minimize the potential area of disturbance[1] and, if necessary, turbidity curtains will be installed to protect the receiving environment during the open water season. The physical habitat (water quality and sediment quality) and fish food supply (benthic invertebrates) will be monitored near the potential area of disturbance before and post construction in the Third Portage North basin. Non- potentially acid generating rock will be used for construction and water run-off from the extended length of the airstrip will be directed through drainage ditches (which will be lengthened accordingly) toward the Attenuation and Reclaim Ponds. Furthermore, monitoring programs will be conducted to evaluate both the physical and biological impacts - this will be done through routine daily construction monitoring (see Section 2.1). The monitoring, management and mitigation are discussed in the following section.

### 2.1 Water Quality Monitoring and Management

#### 2.1.1 Method of Construction to Minimize TSS disturbance

During airstrip expansion construction, both the construction material itself, as well as the disturbed material on the lake floor may contribute to increases in concentrations of suspended sediments in the water column. During the ice-up period, the monitoring methods and means for minimizing suspended sediment discharges inputs from the airstrip expansion construction will be mainly the same as the those used previously at Meadowbank for dike and causeway construction during the frozen period (Bay-Goose Dike).

For in-water airstrip expansion construction, ice-cover is expected to extend to the lakebed. During this construction period there will be no exchange of water between the construction area and the lake as the area will be entirely frozen. AEM has developed a low-impact construction technique for the placement of the rock platform reducing the introduction of fines. This begins with rock selection process in the open pit; rocks containing greater fines will not be selected for the airstrip expansion construction. The selected material will be placed in the water with an excavator, rather than directly placed in the water. The shovel will be

[1] Based on the winter 2010 monitoring of the construction of the Bay-Goose causeway, the ability of the Total suspended solids (TSS) to spread was greatly reduced compared to construction during the open water season where wind-driven currents tend to spread the TSS. Results suggest that the potential area of disturbance (based on turbidity readings) is reduced.

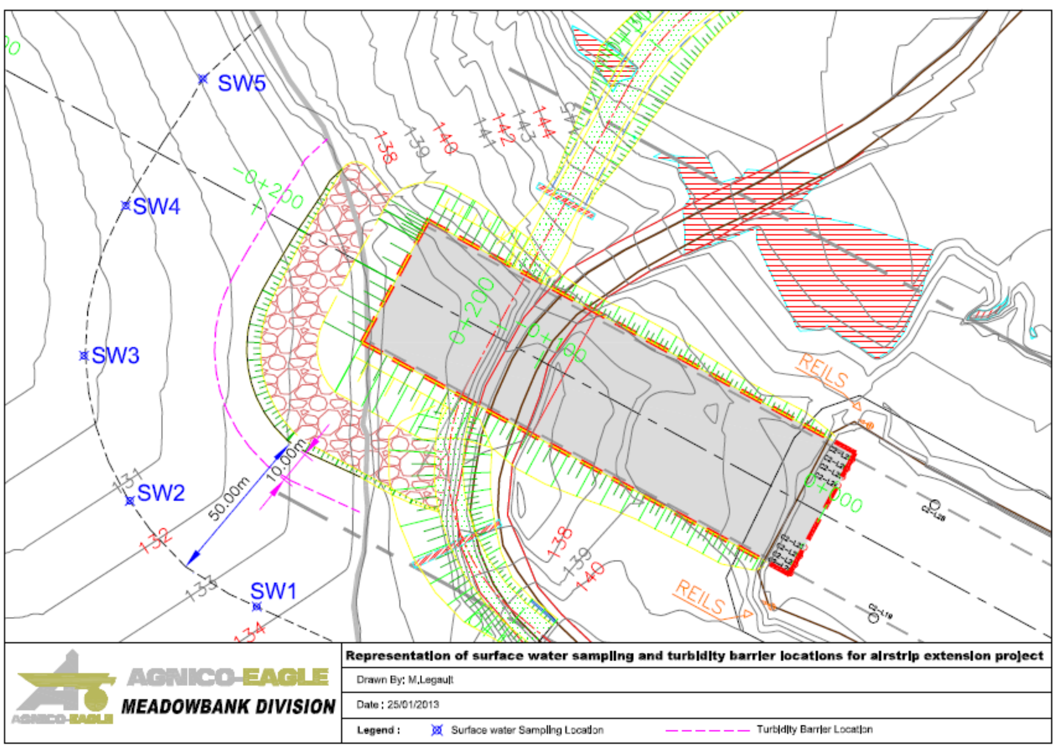
used to deposit the rock through the ice opening which AEM has found to effectively minimize the re-suspension of sediments. Sediment dispersion will be decreased or eliminated during winter construction of airstrip expansion, as ice-cover will prevent wind-driven currents and allow sediment to settle immediately adjacent to the construction activity. As well, the advancement of the rock platform will be done at a very slow rate. The rate of construction will be monitored, in combination with the other mitigation measures, to control the TSS loading.

If construction has to continue after the winter season and into the open water season, then the actions will be taken that will include the deployment of turbidity curtains and daily water quality monitoring at routine and broad stations similar to dike construction of the past

### 2.1.2 Construction Monitoring of Total Suspended Solids

Similar to 2010 on-ice Bay-Goose causeway construction monitoring, moving stations approximately 50m (or as close as safety permits) will be established in front of the airstrip expansion platform. TSS will be sampled at all monitoring stations on a daily basis. The general locations of the stations are presented in Figure 2.1. Although it is not expected, if construction needs to be extended to the open water season, turbidity curtains will be installed and stations for routine monitoring will be established at a distance of approximately 50 m from the curtains (figure 2.1).

**Figure 2.1: Water monitoring station and turbidity barrier location**



During dike construction activities at Meadowbank, the following maximum monthly mean (MMM) and short term maximum (STM) TSS concentrations must be met, in accordance with the NWB Type A Water License, Part D, Item 15. The same maximums are considered for the airstrip expansion construction monitoring, as techniques of material deposition are quite similar.

**Table 2.1- Maximum allowable TSS concentrations during airstrip expansion construction**

| Parameter | Maximum Monthly | Short Term Maximum |
|---|---|---|
| TSS in areas where there is spawning habitat and at times when eggs or larvae are expected to be present (applied at monitoring stations located closest to the high value shoal areas starting Sept 1) | 6 | 25 |
| TSS in all other areas and at times when eggs or larvae are not present | 15 | 50 |

As stipulated in the water license, Part D, Items 12 and 14, trigger values have been developed with corresponding management action plans; should TSS concentrations in the water body exceed the trigger values during airstrip expansion construction, a management action plan consisting of a series of steps to be undertaken will be initiated. The trigger value for the short term maximum concentration is a single sample that exceeds the STM concentration. The trigger value for the maximum monthly mean is a 7-day moving average concentration that exceeds the MMM. The management action plans for the airstrip expansion construction STM and MMM are discussed in detail in Section 4.

AEM is committed to proactive, immediate and effective response to any potential TSS exceedances. As a result the monitoring program has been designed to provide quick feedback which is based on the previously developed relationship between turbidity and TSS, that allows the use of turbidity as a surrogate for TSS to obtain real-time results. The regression is provided in Appendix F and real-time results will allow for immediate responses and avoid extended TSS exceedances.

### 2.2 Sediment and Erosion Control Measures

Best management construction practices will be used for the airstrip expansion as were used for the Bay-Goose causeway. All measures will be implemented to control sediment and erosion during "in-water" (under frozen conditions) construction activities. The following measures will also be employed according to Department of Fisheries and Oceans- Operational Statements and will include, but are not limited, to the following:

- Rock material used for in water placement will be clean (few fines similar to dike construction) and Non- Potentially Acid Generating (NPAG) rock.
- Construction material will not be stored within 30m of the high water mark to prevent any deleterious substances from entering the water way in the spring.
- Construction material will not be taken from Third Portage Lake.
- Banks will be stabilized with coarse material to prevent erosion during the spring freshet and rain events.

### 2.3 Additional Receiving Environment Monitoring in Third Portage Lake North Basin

AEM's Core Receiving Environmental Monitoring Program (CREMP) is the core, broad scale program that is aimed at detecting potential impacts due to mining at the scale of lakes or basins. It is intended to monitor large-scale basin-wide changes in physical and biological variables to evaluate potential impacts from all mine related stressors to 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.

As discussed in Azimuth (2012), the CREMP study design was tailored based on our understanding of mine construction, operation and infrastructure (e.g., dikes, effluents, stream crossings, roads, etc.) and was developed to detect mine-related impacts at temporal and spatial scales that are ecologically relevant. The program targets general limnology, water and sediment quality, primary productivity (phytoplankton), and benthic community structure. The core program initially focused solely on the project lakes (i.e., those in close proximity to the mine site), but was expanded to Baker Lake in 2008 to ensure that monitoring was also in place to track project-related activities in that area related primarily to barge traffic and shipping. To date, monitoring has been conducted throughout the year where ice conditions permitted.

In addition to airstrip expansion construction monitoring, CREMP monitoring and data collection will evaluate the basin wide water quality effects that could be caused by general mine-site activities and effluent discharge in Third Portage Lake North basin. The CREMP consists of the following general elements:

- Sampling Components – limnology, water and sediment chemistry, phytoplankton, and benthic invertebrate community.
- Sampling Areas – Near-field stations include: Third Portage North, Third Portage East, Second Portage Lake, Wally Lake and Baker Lake stations (BBD and BPJ); far-field stations include: Tehek Lake, Tehek FarField; reference stations include: Third Portage South, Innug lake, Pipedream Lake and Baker Lake station (BAP).
- Timing – water sampling (including limnology and phytoplankton) will be conducted up to 6 months of the year. The exception to this will be during periods when ice conditions are not deemed safe (i.e., likely June and October, but may vary).
- Sampling through-ice will take place in May and December at all stations and at least once in the winter at locations closest to the mine site. Open-water sampling will take place in July, August and September. Sediment chemistry and benthic invertebrate sampling will be conducted in August only.
- Spatial coverage – water sampling within each lake basin is randomly distributed and possibly replicated to quantify the horizontal and vertical components of spatial variability (high intensity events only). The intensity (number of samples) of the events alternate between high (all areas, full reps) and low (all areas, no reps) both during open-water and through-ice sampling.

More specifically, the CREMP will monitor receiving environment at randomly selected stations throughout Third Portage Lake North Basin and include the following components:

- Water chemistry data will be collected up to 6 months per year (April, May, July, August, September and November/December -depending on logistical constraints - e.g., snow and ice conditions). Two randomly located subsamples will be collected at each station in each month. All samples are surface samples (3 m from the surface). In addition to the core water chemistry program, basic water quality data will be collected at key near-field areas (including Third Portage Lake) at least once mid-winter to reduce uncertainty regarding the potential occurrence of changes over winter.
- Sediment chemistry core sampling for the CREMP is intended to detect long term trends, therefore a sampling frequency of approximately every three years is recommended or will be aligned with the sampling times for benthic invertebrates required for the EEM program.

- Sediment chemistry grab sampling that matches benthic invertebrate sampling (i.e., once per year) are collected to ensure basic physical variables (e.g., particle size) not covered by sediment core sampling (due to volume limitations) but which may nevertheless affect benthic invertebrates.
- Phytoplankton is collected at the same time as the water chemistry data are collected, but only the open water samples (July to September). Two randomly located subsamples will be collected at each station for each sampling event. All samples should be surface samples (3m from the surface).
- Benthic invertebrates are collected once per year in August at all stations, with 5 subsamples per station.

The CREMP monitoring program is an iterative process and the study design is revisited periodically based on accumulated data to ensure the ability of the CREMP to detect impacts to the receiving environment. Between erosion control measures, routine construction monitoring and CREMP monitoring, the potential impacts to the receiving environment due to the airstrip expansion will be thoroughly assessed.

# 3 Material Selection for the Construction of the Airstrip Expansion to Prevent Acid Rock Drainage

Evaluation, identification and segregation of potential acid generating material is an important operational procedure implemented throughout the Meadowbank operations to protect and minimize potential impacts to the terrestrial and aquatic ecosystems. The same segregation approach of potentially acid generating material versus non-potentially acid generating material for the mine site will be used for the construction of the airstrip expansion. Identification of potential sources of acid rock drainage prior to use as construction material is a high priority as it will minimize the potential effects in the vicinity of the airstrip expansion. Given the success of managing PAG material since 2008 for mine-site construction, the same methodology as describe in the updated “Operation ARD Testing and Sampling Plan” (AEM, 2008) in Accordance with the Water License 2AM-MEA0815 will be applied to the airstrip expansion.

In brief, sampling and testing of waste materials produced at Meadowbank is ensured during operation in order to segregate the PAG waste from the NPAG waste, such that waste materials can be assigned to specific locations for storage or use for construction and maintenance. The evaluation process methodology for Acid Rock Drainage at Meadowbank involves sampling and testing of waste materials produced at Meadowbank is ensured during operation in order to segregate the PAG waste from the NPAG waste, such that waste materials can be assigned to specific locations. In consideration of the mining rate, test procedures have to be rapid and easy to complete. The proposed tests are described in the following subsections. These tests are conducted at an on-site assay lab. The mine staff applies the following procedure to characterize the waste rock:

- Samples of drill cuttings are collected and analyzed on site for Total S (Sulfur) and Total Inorganic Carbon analysis. The results from these analyses are used to calculate the Net Potential Ratio (NPR) which will define NPAG from PAG materials. The following steps lead to the calculation of the NPR:
    i. The Total S analysis is converted into a Maximum Potential Acidity (MPA) value by multiplying the Total S wt% by 31.25 which yields an MPA value in Kg CaCO3 equivalent.
    ii. The Total Inorganic Carbon analysis is similarly converted into a Carbonate Neutralization Potential (NP) by multiplying the Total wt% Inorganic Carbon (reported as %CO2) by 22.7 which yields an NP value in Kg CaCO3 equivalent.
    iii. The Net Potential Ratio (NPR) for the blast hole drill cutting sample is then calculated as follows: NPR = NP/MPA.
- The NPR is then used to determine whether the rock associated with this specific drill hole is to be characterized as NPAG or PAG (material with an uncertain potential is characterized as PAG);
- The frequency of sampling of the drill hole cuttings for all drill patterns is determined by the Geology Superintendent and communicated in written form to the samplers. The default sampling frequency is the sampling of every second drill hole in each drill hole pattern. The Geology Superintendent will vary this frequency based on his knowledge from previous drilling and from visual inspections depending on where the drill pattern is situated. In areas where the Geology Superintendent has already characterized the rock as PAG and directed that this block be sent to segregation as PAG material no sampling at all may be required as the whole pattern has been classified as PAG and treated accordingly;
- The mine geology staff uses the derived NPR to characterize the rock in the blast pattern and provide the information to the mine surveyor who will delineate the dig limits within the blasted rock to guide the shovel and loader operators in directing where the rock is to be taken;
- In some cases it may be appropriate to calculate a weighted bulk average NPR for the whole block of rock and use the blended NPR to classify the rock. In such cases the Geology Superintendent should be consulted and the calculation of the weighted average NPR documented. In these cases the blended material should only be classified as being NPAG with the written informed approval of the Geology Superintendent.

- For QA/QC purposes, samples of drill cuttings are sent on a quarterly base to an external laboratory which will conduct ABA tests to assess the validity of the segregation method applied on-site. Thus, the external lab results (NPP) are compared to the calculated NPR derived from the on-site lab results.
- The results and the resultant NPAG-PAG classification confirmation are to be logged in a manner that allows this classification to be audited by an external auditor. They are also to be included in the annual water license report to the Water Board.

Sampling methodology:

- Drill holes are to be sampled individually in accordance with the frequency as set out in writing by the Geology Superintendent.
- Each sample should weigh no less that 1 KG.
- The sample is to be labeled using a convention that is readily traceable back to the production drill hole numbers. The analyses of the sample will then be applied to define the NPAG or PAG potential of the block of rock representing that drill hole.
- The Geology Superintendent is responsible for determining and communicating to the sampler how many drill holes are to be sampled for any given drill hole pattern. In this way the data can be tied to a single hole making it useable in creating and tracking block geology models. Composite samples are not to be used. Composite confuse the data and render it more difficult for use in model creation or comparison.

The most conventional method of evaluating the acid generation potential of a material using ABA data is to classify it as Potentially Acid Generating (PAG), not Potentially Acid Generating (NPAG), or of uncertain acid generating potential (uncertain ARD potential) based on its neutralization potential ratio (NPR). The NPR of a material is calculated as the ratio of its measured neutralization potential (NP) to its calculated maximum potential acidity (MPA). The ARD potential of waste rock, till (overburden) and tailings materials from the Meadowbank Mine were previously classified by Golder Associates using the NPR-based guidelines published by Indian and Northern Affairs Canada (INAC, 1992), which are summarized in Table 3-1. The NPR guideline value has been adjusted from 3 to 2 using the criteria quoted (knowledge of rock chemistry, mineralogy and reactivity of neutralizing minerals) in the INAC reference guide. This adjustment was covered off and accepted during the NIRB environmental assessment process.

**Table 3.1: Summary of ARD Guidelines Used To Classify Meadowbank Waste Rock And Overburden (INAC, 1992)**

| Initial Screening Criteria | ARD Potential |
|---|---|
| NPR < 1 | Likely Acid Generating (PAG) |
| 1 < NPR < 2 | Uncertain |
| 2 < NPR | Acid Consuming<br>Not Potentially Acid Generating (NPAG) |

Knowledge of rock chemistry, mineralogy and reactivity of neutralizing minerals support the use of an NPR of 2 to designate rock that is NPAG (INAC, 1992).

At Meadowbank, AEM is using the criteria developed by Golder based on INAC (1992) to determine the acid generation potential of all waste rock and overburden materials from the three open pits (i.e. a listed above in Table 3.1). Consequently, geology staff will classify waste rock and overburden as not potentially acid generating (NPAG) if the NPR value is greater than 2. The material will be classified as potentially acid generating (PAG) if the NPR value is less than 1. For NPR values between 1 and 2 the material will be classified as having an uncertain acid generating potential (uncertain ARD potential). Uncertain ARD material is to be treated as PAG material.

The grade control geologist will use the Total Sulphur analysis provided by the on-site assay lab for the drill hole cuttings and then use the correlation curve to convert Total Sulphur into an NPR value. The resultant NPR value will then be used to classify the block of rock that is associated with the production drill hole as NPAG or PAG. These values will be transferred to the mine plans for that specific blast.

Once blasting is complete the mine surveyor will use these NPAG and PAG outlines from the drill pattern to outline the respective dig limits in the open pit so that the shovel or loader operator can identify whether he is digging in ore, PAG or NPAG waste rock and thus direct the haul truck drivers accordingly to the appropriate dump location. The NPAG dumping location may be at the airstrip expansion construction area or in the rock storage facility (crushed and then sent to the Airstrip) No PAG material would be directed to the Airstrip expansion location.

## 4 Emergency Response Plan and Spill Contingency Plan

A revised Meadowbank Emergency Response Plan (ERP) dated July, 2012 (Appendix G) provides a consolidated source of information for employees, contractors, and site visitors to respond quickly and efficiently to any foreseeable emergency that would likely occur at the

Meadowbank project site. The ERP forms a component of the Environmental Management System (EMS) for the Project. As such, it is a working document that will be reviewed and updated on a regular basis as mine development, construction and operations proceed and will integrate changes to the mine site. The ERP addresses gold mining, processing, transportation and related activities at the Meadowbank site as well as possible emergency scenarios that may occur along All Weather Private Access Road or at the Baker Lake Marshalling Facility and any aircraft incidents at the mine-site airport. The principals that guide the ERP development and implementation are to ensure:

- A clear chain of command for safety and health activities;
- Well-defined corporate expectations regarding safety and health;
- Comprehensive hazard prevention and control methods; and
- Record-keeping requirements to track program progress.

The ERP specifically addresses emergency scenarios such as an aircraft incident.
Due to the reduced frequency of flights, it is expected that the probability of an aircraft accident will decrease, however the same principles and response measures outlined in the ERP apply for the proposed airstrip expansion which will accommodate a Boeing 737. Additional flight safety measures will be implemented by the airline that are outside the purview of the ERP. AEM will continue to ensure that all employees, contractors and site visitors fully understand and comply with all legislated safety standards, and the policies and procedures that are associated with the airstrip expansion.

The overall purpose of the Meadowbank Spill Contingency Plan (SCP) (Appendix H) is to minimize the impacts of spills by spill prevention, the establishment of predetermined lines of response and plans of action for all types of spills including aircraft incidences that might affect land or water. The SCP has been designed to facilitate effective communication and the efficient clean-up of spills from potentially hazardous materials. These hazardous materials might include:

- Hydrocarbon liquids such as diesel fuel, gasoline, hydraulic oil;
- Soluble solids such as ammonium nitrate spill;
- Soluble liquids, such as glycols, acids, and paints;
- Corrosive liquids such as sulphuric acid and sodium cyanide.

More specifically the objectives of the Spill Contingency Plan (SCP) are to:

- Identify roles, responsibilities, and reporting procedures.
- Provide readily accessible emergency information to the cleanup crews, management, and government agencies.

- Comply with federal and territorial regulations and guidelines pertaining to the preparation of contingency plans and notification requirements.
- Promote the safe and effective recovery of spilled materials.
- Minimize the environmental impacts of spills to water or land.

The SCP specifically addresses emergency scenarios such as an aircraft incident.
The same principles and response measures outlined in this plan apply for the proposed airstrip expansion.. AEM will continue to ensure that all employees, contractors and site visitors fully understand and comply with all legislated standards, and the policies and procedures. The SCP is reviewed and will be updated as necessary to ensure compliance, to evaluate its effectiveness as new activities are introduced, and to continually improve the procedures to ensure spills are prevented and managed properly.

## 5 References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INAC (Indian and Northern Affairs Canada), 1992. Guidelines for ARD Prediction in the North – Northern Mine Environment Neutral Drainage Studies No. 1. Department of Indian Affairs and Northern Development, Ottawa, 1993.