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

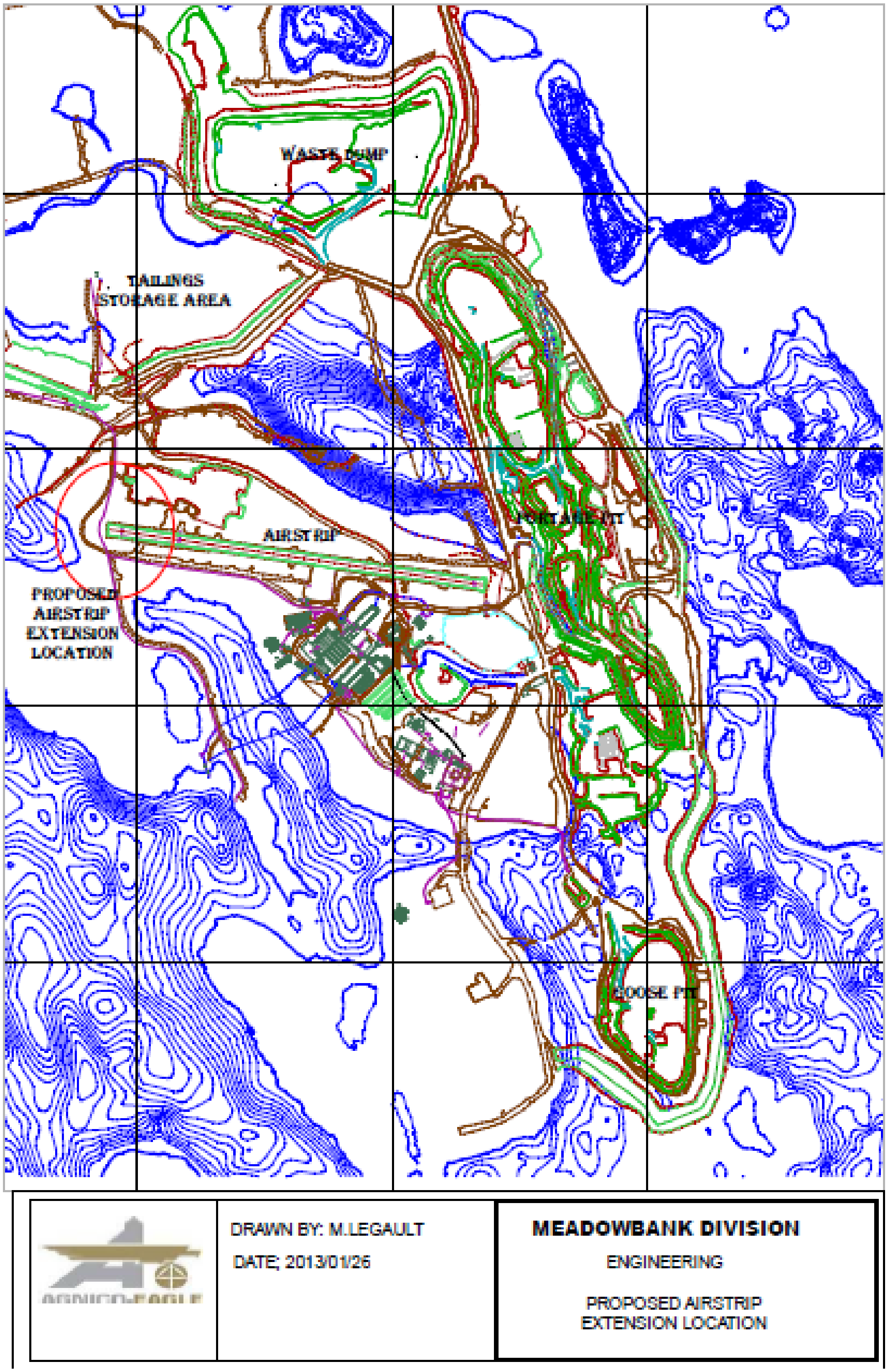
	Conformity
Part G: Conditions applying to Modifications Item 3. Application for modification shall contain:	
a. A description of the facilities and/or works to be constructed	Section 1.4
b. The proposed location of the structure(s)	Section 1.4

	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).

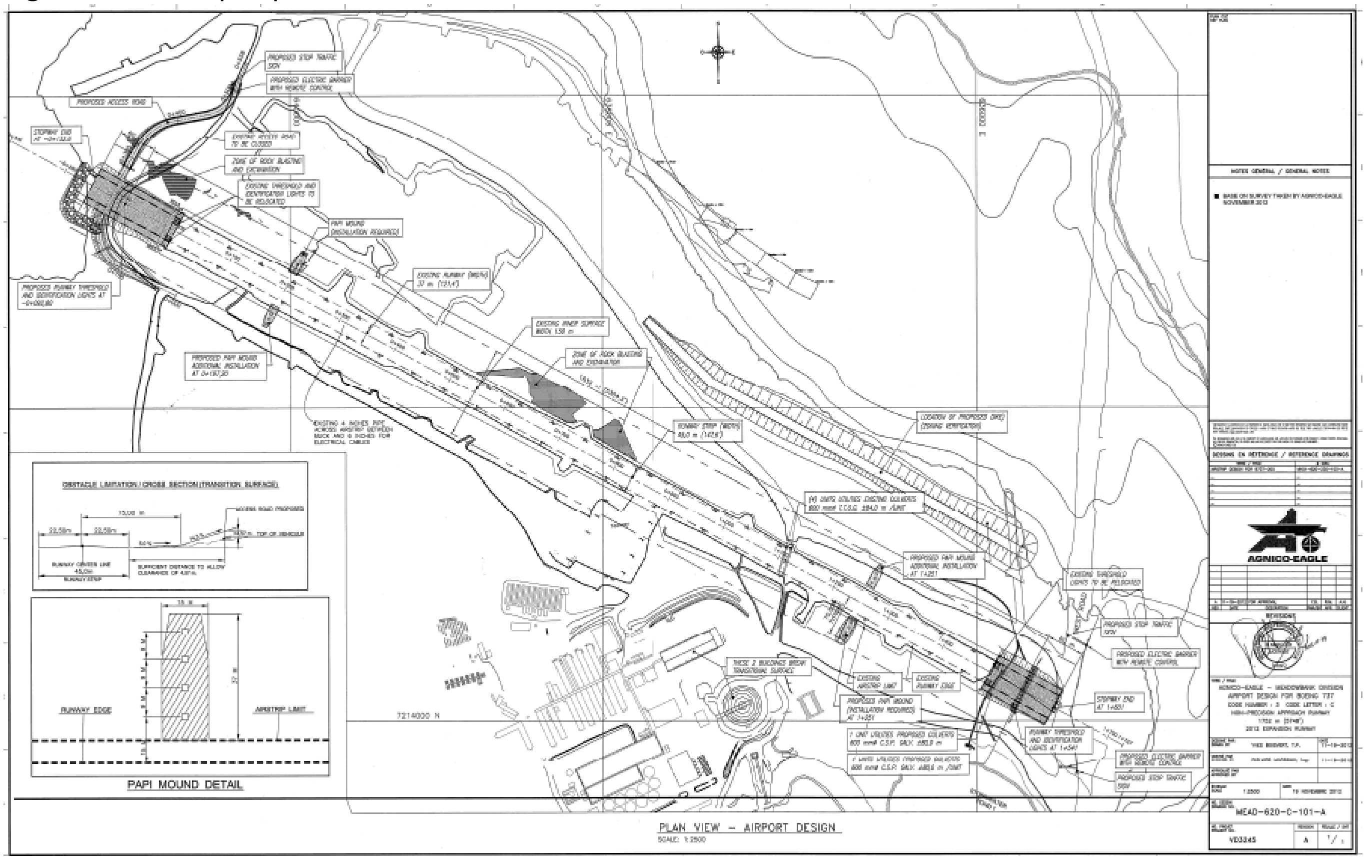
The project activities include:

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 <u>may</u> 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.

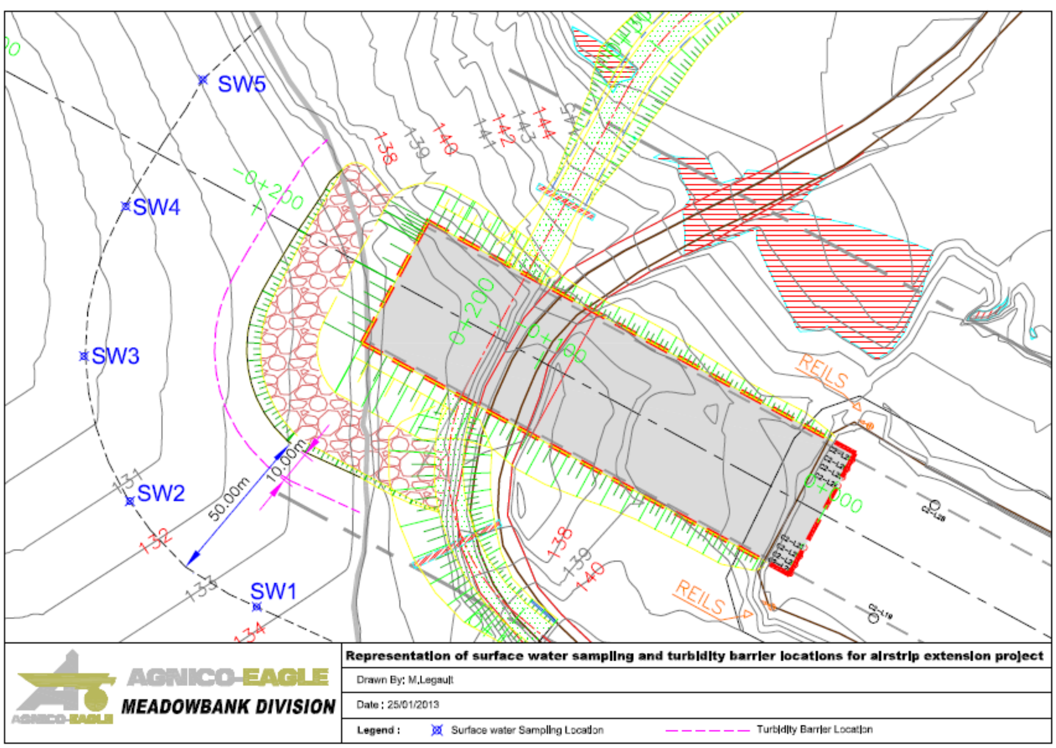
used to deposit the rock through the ice opening which AEM has found to effectively minimize the re-suspension of sediments. Sediment dispersion will be decreased or eliminated during winter construction of airstrip expansion, as ice-cover will prevent wind-driven currents and allow sediment to settle 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:
    1. 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 $CaCO_3$ equivalent.
    2. The Total Inorganic Carbon analysis is similarly converted into a Carbonate Neutralization Potential (NP) by multiplying the Total wt% Inorganic Carbon (reported as $\%CO_2$) by 22.7 which yields an NP value in Kg $CaCO_3$ equivalent.
    3. 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 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

AEM (2012). Meadowbank Gold Mine- Operational ARD/ML Testing and Sampling Plan. In accordance with Water License 2AM-MEA0815. Version 2- November 2012

Azimuth (2012). Aquatic Effects Monitoring Program Meadowbank Mine. Prepared for Agnico-Eagle Mines Ltd. – Meadowbank Division. December 2012

Azimuth (2012). Core Receiving Environmental Monitoring Program (CREMP): Design Document 2012 Meadowbank Mine. Prepared for Agnico-Eagle Mines Ltd. – Meadowbank Division. December 2012

Azimuth (2012) Aquatic Effects Monitoring Program- Core Receiving Environmental Monitoring Program 2011. Prepared for Agnico-Eagle Mines. Ltd. In AEM (2012) Meadowbank Annual Report- Appendix F2

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.

Appendix A - Nunavut Planning Commission Conformity determination

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Nunavunmi Parnaiyiit
Nunavut Planning Commission
Commission d'Aménagement du Nunavut

March 2, 2010

Ms. Maria Quqsuut
Environmental Administrator
Nunavut Impact Review Board
P.O. Box 1360
Cambridge Bay, NU., X0B 0C0
Fax   867 983 2594

Ms. Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU., X0B 1J0
Fax # 867 360 6369

Dear Ms. Qusuut, Ms. Beaulieu

RE: NWB 2BE MEA 0815 – Agnico Eagle Meadowbank Airport Extension

NWB land use license application/proposal listed above was reviewed for conformity against the Keewatin Regional Land Use Plan under file # KVL 300C184/NWB 2MEA 0002 on July 12, 2002 and file # NWB1 MEA on July 21, 2003. After reviewing the respective submissions, NPC finds that the above application/proposal does not require the proponent to agree to terms which were previously agreed.

Therefore no conformity determination is needed. As a recognized authorizing agency under the *NLCA,* agencies addressed are responsible to implement the terms to which the proponent agreed to by incorporating the requirements directly, or otherwise ensuring that they be met through any authorizations issued.

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Cambridge Bay, NU X0B 0C0
☎ 867-983-4625
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P.O. Box 2101
Ikaluktutiak, NU X0B 0C0
☎ 867-983-4625
🖷 867-983-4626

My office would be pleased to discuss these with you how to best implement these requirements and to review any draft authorizations that you wish to provide for that purpose.

Thank You

Brian Aglukark, NPC
Arviat

CC. Stéphane Robert, Agnico-Eagle Mines Limited – Meadowbank Limited
Veronica Tattuinnee, Kivalliq Inuit Association

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P.O. Box 2101
Cambridge Bay, NU X0B 0C0
867-983-4625
867-983-4626

P.O. Box 2101
Ikaluktutiak, NU X0B 0C0
867-983-4625
867-983-4626

Appendix B - NIRB Screening Decision Report 10XN039

SCREENING DECISION REPORT
NIRB FILE NO.: 10XN039

NWB File No.: 2AM-MEA0815

September 15, 2010

Honourable John Duncan
Minister of Indian and Northern Affairs Canada
Indian and Northern Affairs Canada
Ottawa, ON

Via email: Duncan.J@parl.gc.ca and minister@inac-ainc.gc.ca

Re: Screening Decision for Agnico-Eagle Mines Ltd's "Meadowbank Airstrip Expansion" Project Proposal

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Dear Honourable John Duncan:

The primary objectives of the Nunavut Impact Review Board (NIRB) are set out in Section 12.2.5 of the Nunavut Land Claims Agreement (NLCA) as follows:

> *In carrying out its functions, the primary objectives of NIRB shall be at all times to protect and promote the existing and future well-being of the residents and communities of the Nunavut Settlement Area, and to protect the ecosystemic integrity of the Nunavut Settlement Area. NIRB shall take into account the well-being of the residents of Canada outside the Nunavut Settlement Area.*

Section 12.4.4 of the NLCA states:

> *Upon receipt of a project proposal, NIRB shall screen the proposal and indicate to the Minister in writing that:*
> a) *the proposal may be processed without a review under Part 5 or 6; NIRB may recommend specific terms and conditions to be attached to any approval, reflecting the primary objectives set out in Section 12.2.5;*
> b) *the proposal requires review under Part 5 or 6; NIRB shall identify particular issues or concerns which should be considered in such a review;*
> c) *the proposal is insufficiently developed to permit proper screening, and should be returned to the proponent for clarification; or*
> d) *the potential adverse impacts of the proposal are so unacceptable that it should be modified or abandoned.*

NIRB ASSESSMENT AND DECISION

After a thorough assessment of all material provided to the Board (please see *Procedural History* and *Project Activities* in **Appendix A**), in accordance with the principles identified within Section 12.4.2 of the NLCA, the decision of the Board as per Section 12.4.4 of the NLCA is:

> **12.4.4 (a)**: the proposal may be processed without a review under Part 5 or 6; NIRB may recommend specific terms and conditions to be attached to any approval, reflecting the primary objectives set out in Section 12.2.5.

RECOMMENDED PROJECT-SPECIFIC TERMS AND CONDITIONS
(pursuant to Section 12.4.4(a) of the NLCA)

The Board is recommending that the following or similar project-specific terms and conditions be imposed upon the Proponent through all relevant legislation:

General

1. Agnico-Eagle Mines Ltd. (the Proponent) shall maintain a copy of the Project Terms and Conditions at the site of operation at all times.
2. The Proponent shall forward copies of all permits obtained and required for this project to the Nunavut Impact Review Board (NIRB) prior to the commencement of the project.
3. The Proponent shall operate in accordance with all commitments stated in correspondence provided to NIRB (AEM Letter to NIRB – February 4, 2010; Project Proposal Airstrip Expansion – February 2010; AEM Additional Information Submission – May 25, 2010, AEM Response to Comments – September 6, 2010; and Technical Memorandum Response to DOE Request for Additional Information – August 31, 2010) and to other agencies (DFO Application for HADD Authorization – April 21, 2010).
4. The Proponent shall operate the site in accordance with all applicable Acts, Regulations and Guidelines.

Water Use and Quality

5. The Proponent shall not use water, including constructing or disturbing any stream, lakebed or the banks of any definable water course unless approved by the Nunavut Water Board.
6. The Proponent shall adhere to limits on Total Suspended Solids and elevated sedimentation as outlined in the Water Quality Management Plan as previously approved by the NWB and also as provided within its Erosion/Sediment Control Plan.
7. The Proponent shall ensure that only non-potentially acid generating materials are used for the in-lake placement of rock and that where potentially acid generating materials are encountered it shall abide by previously approved mitigation plans and procedures for the safe storage and/or usage of such.

Waste Disposal

8. The Proponent shall manage all garbage and debris in a manner that is consistent with its previously approved Waste Management Plan for the Meadowbank site.

Fuel and Chemical Storage

9. The Proponent shall locate all fuel and other hazardous materials as well as re-fuelling of all equipment a minimum of thirty-one (31) metres away from the high water mark of any water body and in such a manner as to prevent their release into the environment.

10. The Proponent shall store all fuel and chemicals in such a manner that they are inaccessible to wildlife

11. The Proponent shall use adequate secondary containment or a surface liner (e.g. self-supporting insta-berms and fold-a-tanks), when storing barreled fuel and chemicals at all locations.

12. The Proponent shall ensure appropriate spill response equipment and clean-up materials (e.g., shovels, pumps, barrels, drip pans, and absorbents) be readily available during any transfer of fuel or hazardous substances, as well as at vehicle-maintenance areas and at drill sites.

13. The Proponent shall remove and treat hydrocarbon contaminated soils on site or transport them to an approved disposal site for treatment.

14. The Proponent shall ensure that all personnel are properly trained in fuel and hazardous waste handling procedures, as well as spill response procedures. All spills of fuel or other deleterious materials of any amount must be reported immediately to the 24 hour Spill Line at (867) 920-8130.

Wildlife

15. The Proponent shall ensure that there is no damage to wildlife habitat in conducting this operation.

16. The Proponent shall not harass wildlife. This includes persistently worrying or chasing animals, or disturbing large groups of animals. The Proponent shall not hunt or fish, unless proper Nunavut authorizations have been acquired.

17. The Proponent shall ensure that all project personnel are made aware of the measures to protect wildlife and are provided with training and/or advice on how to implement these measures.

18. The Proponent shall not disturb or destroy the nests or eggs of any birds. If nests are encountered and/or identified, the Proponent shall take precaution to avoid further interaction and or disturbance (e.g., a 100 metre buffer around the nests). If active nests of any birds are discovered (i.e. with eggs or young), the Proponent shall avoid these areas until nesting is complete and the young have left the nest.

Ground Disturbance

19. The Proponent shall implement suitable erosion and sediment suppression measures on disturbed areas before, during and after construction in order to prevent sediment from entering any waterbody.

20. The Proponent shall implement sediment and erosion control measures by employing erosion prevention measures (e.g., berms or silt fence) in the project area during construction and/or operation.

21. The Proponent shall stockpile all overburden/topsoil generated during construction using proper erosion prevention measures. Upon project completion, the Proponent shall back fill, reclaim/re-contour and re-vegetate all disturbed areas.

Restoration of Disturbed Areas

22. The Proponent shall ensure that all disturbed areas are restored to a stable or pre-disturbed state as practical as possible upon completion of project activities.
23. The Proponent shall remove all garbage, fuel and equipment upon abandonment.
24. The Proponent shall complete all clean-up and restoration of the lands used upon abandonment of site.

Other

25. Any activity related to this application, and outside the original scope of the project as described in the application, will be considered a new project and should be submitted to the NIRB for Screening.

MONITORING AND REPORTING REQUIREMENTS

In addition, the Board is recommending the following:

1. The Proponent shall, in its annual report to the NIRB required in accordance with Project Certificate No. 004 for the Meadowbank Gold Project(for 2010, and 2011 if the airstrip expansion activities are extended into 2011), include the following information as it pertains to the airstrip expansion and subsequent airstrip operation:
   a. A detailed summary of activities undertaken for the year;
   b. Wildlife encounters and actions/mitigation taken (as any such encounters or actions may relate to the airstrip expansion);
   c. A summary of any community consultations undertaken regarding the planned expansion;
   d. Site photos;
   e. Progressive reclamation work undertaken;
   f. Results of blast hole samples and analyses undertaken;
   g. A summary of how the Proponent has complied with the NIRB terms and conditions contained within its Screening Decision, and the conditions associated with all authorizations for the airstrip and the current expansion project.

The Proponent should note that the NIRB will incorporate the information submitted regarding the airstrip expansion into its existing monitoring program for the Meadowbank Gold Project (File No. 03MN107).

OTHER NIRB CONCERNS AND RECOMMENDATIONS

In addition to the project-specific terms and conditions, the Board is recommending the following:

1. All Authorizing Agencies shall notify the NIRB of any changes in operating plans or conditions associated with this project prior to any such change.
2. The Proponent should undertake efforts to communicate its plans to expand the airstrip with the community of Baker Lake.
3. The Proponent shall follow the Fisheries and Oceans Canada's (DFO) *Guidelines for the use of Explosives in or near Canadian Fisheries Waters* and shall not conduct blasting if wildlife is within sight or hearing distance of the project area.

REGULATORY REQUIREMENTS

The Proponent is also advised that the following legislation may apply to the project:

1. The *Fisheries Act* (http://laws.justice.gc.ca/en/showtdm/cs/F-14///en).
2. The *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (http://www.canlii.org/ca/sta/n-28.8/whole.html).
3. The *Migratory Birds Convention Act* and *Migratory Birds Regulations* (http://laws.justice.gc.ca/en/showtdm/cs/M-7.01).
4. The *Species at Risk Act* (http://laws.justice.gc.ca/en/showtdm/cs/S-15.3). Attached in **Appendix B** is a list of Species at Risk in Nunavut.
5. The *Nunavut Wildlife Act* which contains provisions to protect and conserve wildlife and wildlife habitat, including specific protection measures for wildlife habitat and species at risk.
6. The *Nunavut Act* (http://laws.justice.gc.ca/en/showtdm/cs/N-28.6). The Proponent must comply with the proposed terms and conditions listed in the attached **Appendix C**.
7. The *Navigable Waters Protection Act (NWPA)* (http://laws.justice.gc.ca/en/N-22/index.html).

Validity of Land Claims Agreement

Section 2.12.2
Where there is any inconsistency or conflict between any federal, territorial and local government laws, and the Agreement, the Agreement shall prevail to the extent of the inconsistency or conflict.

Dated September 15, 2010 at Sanikiluaq, NU.

Lucassie Arragutainaq, Chairperson

Attachments:	Appendix A:	Procedural History and Project Activities
	Appendix B:	Species at Risk in Nunavut
	Appendix C:	Archaeological and Palaeontological Resources Terms and Conditions for Land Use Permit Holders

Appendix A
Procedural History and Project Activities

Procedural History

On February 4, 2010 the NIRB received Agnico-Eagle Mines Ltd.'s (AEM) "Meadowbank Airstrip Expansion" project proposal from AEM. On February 10, 2010 the NIRB issued correspondence to AEM which advised that a conformity determination (Keewatin Regional Land Use Plan) from the Nunavut Planning Commission (NPC) and a referral for screening from one or more of the agencies responsible for authorizing the project activities would be required prior to Screening by the NIRB.

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. 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). Further, on April 18, 2010 Fisheries and Oceans Canada (DFO) advised the NIRB that the proposed airstrip expansion would require formal authorization by DFO.

After undertaking a preliminary completeness check, the NIRB determined that the project proposal as submitted did not contain sufficient information to permit proper screening and requested that additional information be submitted by May 21, 2010. On May 24, 2010 the NIRB received the requested information.

Related File History

The original Meadowbank Gold Mine project (NIRB File No. 03MN107) was screened by the NIRB in 2003 and underwent an environmental Review pursuant to Part 5, Article 12 of the Nunavut Land Claims Agreement (NLCA). The NIRB held a technical meeting, pre-hearing conference, and final hearing to facilitate its assessment of the Meadowbank Gold Mine Project. On December 30, 2006 the Board issued the Meadowbank Gold Mine Project Certificate (No. 004), allowing the project to proceed subject to terms and conditions contained therein.

Upon review of the Final Environmental Impact Statement and other materials relevant to the original NIRB file (03MN107), it was determined that the proposed expansion of the Meadowbank airstrip into Third Portage Lake was not assessed as part of the original Meadowbank Gold Mine project and therefore, the proposed Meadowbank Airstrip Expansion required screening in accordance with Part 4, Article 12 of the NLCA. The NIRB assigned this project proposal file number 10XN039.

This project proposal was distributed to community organizations in Baker Lake as well as to relevant federal and territorial government agencies, and Inuit organizations. The NIRB requested that interested parties review the proposal and provide the Board with any comments or concerns by June 22, 2010 regarding:

- Whether the project proposal is likely to arouse significant public concern; and if so, why;
- Whether the project proposal is likely to cause significant adverse eco-systemic and socio-economic effects; and if so, why;
- Whether the project is of a type where the potential adverse effects are highly predictable and mitigable with known technology, (providing any recommended mitigation measures); and
- Any matter of importance to the Party related to the project proposal.

On or before June 22, 2010, the NIRB received comments from the following interested parties:

- Environment Canada (EC)
- Indian and Northern Affairs Canada (INAC)
- Fisheries and Oceans Canada (DFO)
- Government of Nunavut – Department of Environment (GN-DOE)

On July 6, 2010, the NIRB provided an opportunity for the Proponent to respond to the concerns raised during the public commenting period. The Proponent requested additional time to provide a response to concerns and on September 6, 2010, submitted the requested response.

All comments provided to the NIRB regarding this project proposal, in addition to the Proponent's response to comments, can be viewed on the NIRB's ftp-site, at the following location: http://ftp.nirb.ca/SCREENINGS/COMPLETED%20SCREENINGS/

Project Activities

The proposed project is located at the Meadowbank Gold Mine site, approximately 70 kilometres (km) north of the hamlet of Baker Lake. The currently proposed expansion of the Meadowbank airstrip is tentatively scheduled to begin in October 2010. The Proponent has indicated that the expanded airstrip and subsequent ability to use larger aircraft will ultimately reduce the number of flights into the Meadowbank site per week from 10 to 4, increase the capacity to transport personnel and cargo to and from the site, and offer an improved safety measure for greater accessibility and evacuation potential to and from the Meadowbank site.

The project activities include:

- Expansion of Meadowbank airstrip to a total length of 2103 metres (m), with 412 m located within the high water mark of Third Portage Lake (in-lake portion);
- Expansion of Meadowbank airstrip to a width of 60 m;
- Deactivation of current all weather access road connection to Meadowbank site and subsequent diversion of the access road via the Tailings Road;
- Construction of expanded airstrip using materials generated during mining activities at Meadowbank (an estimated total of 875,000 cubic metres of non-acid generating rock material will be required) including:
    - Approximately 700,000 cubic metres of material to be placed in the water for the in-lake portion of the expansion
    - 70,000 cubic metres of material to be used to build the diverted section of the all weather road; and

- Earthwork activities associated with airstrip expansion to utilise equipment used during other Meadowbank project construction activities.

Appendix B
Species At Risk in Nunavut

This list includes species listed on one of the Schedules of SARA (*Species at Risk Act*) and under consideration for listing on Schedule 1 of SARA. These species have been designated as at risk by COSEWIC (Committee on the Status of Endangered Wildlife in Canada). This list may not include all species identified as at risk by the Territorial Government.

- Schedule 1 is the official legal list of Species at Risk for SARA. SARA applies to all species on Schedule 1. The term "listed" species refers to species on Schedule 1.
- Schedule 2 and 3 of SARA identify species that were designated at risk by the COSEWIC prior to October 1999 and must be reassessed using revised criteria before they can be considered for addition to Schedule 1.
- Some species identified at risk by COSEWIC are "pending" addition to Schedule 1 of SARA. These species are under consideration for addition to Schedule 1, subject to further consultation or assessment.

Schedules of SARA are amended on a regular basis so it is important to periodically check the SARA registry (www.sararegistry.gc.ca) to get the current status of a species.

Updated: August 4, 2009

Species at Risk	**COSEWIC Designation**	**Schedule of SARA**	**Government Organization with Lead Management Responsibility** [1]
Eskimo Curlew	Endangered	Schedule 1	EC
Ivory Gull	Endangered	Schedule 1	EC
Ross's Gull	Threatened	Schedule 1	EC
Harlequin Duck (Eastern population)	Special Concern	Schedule 1	EC
Rusty Blackbird	Special Concern	Schedule 1	Government of Nunavut
Felt-leaf Willow	Special Concern	Schedule 1	Government of Nunavut
Peregrine Falcon (*anatum-tundrius* complex)	Special Concern	Schedule 1 (*anatum*) Schedule 3 (*tundrius*)	Government of Nunavut
Short-eared Owl	Special Concern	Schedule 3	Government of Nunavut
Peary Caribou	Endangered	Pending	Government of Nunavut
Beluga Whale (Eastern Hudson Bay population)	Endangered	Pending	DFO
Red Knot (*rufa* subspecies)	Endangered	Pending	EC

Beluga Whale (Cumberland Sound population)	Threatened	Pending	DFO
Atlantic Cod (Arctic population)	Special Concern	Pending	DFO
Beluga Whale (Western Hudson Bay population)	Special Concern	Pending	DFO
Beluga Whale (Eastern High Arctic – Baffin Bay population)	Special Concern	Pending	DFO
Bowhead Whale (Eastern Canada – West Greenland population)	Special Concern	Pending	DFO
Killer Whale (Northwest Atlantic / Eastern Arctic populations)	Special Concern	Pending	DFO
Porsild's Bryum	Threatened	Pending	Government of Nunavut
Atlantic Walrus	Special Concern	Pending	DFO
Narwhal	Special Concern	Pending	DFO
Red Knot (*islandica* subspecies)	Special Concern	Pending	EC
Horned Grebe (Western population)	Special Concern	Pending	EC
Barren-ground Caribou (Dolphin and Union population)	Special Concern	Pending	Government of Nunavut
Grizzly Bear	Special Concern	Pending	Government of Nunavut
Polar Bear	Special Concern	Pending	Government of Nunavut
Wolverine (Western Population)	Special Concern	Pending	Government of Nunavut

[1] Environment Canada (EC) has a national role to play in the conservation and recovery of Species at Risk in Canada, as well as responsibility for management of birds described in the Migratory Birds Convention Act (MBCA). Day-to-day management of terrestrial species not covered in the MBCA is the responsibility of the Territorial Government. Populations that exist in National Parks are also managed under the authority of the Parks Canada Agency. The Department of Fisheries and Oceans (DFO) has responsibility for management of aquatic species.

Appendix C

Archaeological and Palaeontological Resources Terms and Conditions
for Land Use Permit Holders

INTRODUCTION

The Department of Culture, Language, Elders and Youth (CLEY) routinely reviews land use applications sent to the Nunavut Water Board, Nunavut Impact Review Board and the Department of Indian and Northern Affairs Canada. These terms and conditions provide general direction to the permittee/proponent regarding the appropriate actions to be taken to ensure the permittee/proponent carries out its role in the protection of Nunavut's archaeological and palaeontological resources.

TERMS AND CONDITIONS

1) The permittee/proponent shall have a professional archaeologist and/or palaeontologist perform the following **Functions** associated with the **Types of Development** listed below or similar development activities:

	Types of Development (See Guidelines below)	**Function** (See Guidelines below)
a)	Large scale prospecting	Archaeological/Palaeontological Overview Assessment
b)	Diamond drilling for exploration or geotechnical purpose or planning of linear disturbances	Archaeological/ Palaeontological Inventory
c)	Construction of linear disturbances, Extractive disturbances, Impounding disturbances and other land disturbance activities	Archaeological/ Palaeontological Inventory or Assessment or Mitigation

Note that the above-mentioned functions require either a Nunavut Archaeologist Permit or a Nunavut Palaeontologist Permit. CLEY is authorized by way of the *Nunavut and Archaeological and Palaeontological Site Regulations*[1] to issue such permits.

1 P.C. 2001-1111 14 June, 2001

2) The permittee/proponent shall not operate any vehicle over a known or suspected archaeological or palaeontological site.

3) The permittee/proponent shall not remove, disturb, or displace any archaeological artifact or site, or any fossil or palaeontological site.

4) The permittee/proponent shall immediately contact CLEY at (867) 934-2046 or (867) 975-5500 should an archaeological site or specimen, or a palaeontological site or fossil, be encountered or disturbed by any land use activity.

5) The permittee/proponent shall immediately cease any activity that disturbs an archaeological or palaeontological site encountered during the course of a land use operation until permitted to proceed with the authorization of CLEY.

6) The permittee/proponent shall follow the direction of CLEY in restoring disturbed archaeological or palaeontological sites to an acceptable condition. If these conditions are attached to either a Class A or B Permit under the Territorial Lands Act INAC's directions will also be followed.

7) The permittee/proponent shall provide all information requested by CLEY concerning all archaeological sites or artifacts and all palaeontological sites and fossils encountered in the course of any land use activity.

8) The permittee/proponent shall make best efforts to ensure that all persons working under its authority are aware of these conditions concerning archaeological sites and artifacts and palaeontological sites and fossils.

9) If a list of recorded archaeological and/or palaeontological sites is provided to the permittee/proponent by CLEY as part of the review of the land use application the permittee/proponent shall avoid the archaeological and/or palaeontological sites listed.

10) Should a list of recorded sites be provided to the permittee/proponent, the information is provided solely for the purpose of the proponent's land use activities as described in the land use application, and must otherwise be treated confidentially by the proponent.

LEGAL FRAMEWORK

As stated in Article 33 of the *Nunavut Land Claims Agreement*:

Where an application is made for a land use permit in the Nunavut Settlement Area, and there are reasonable grounds to believe that there could be sites of archaeological importance on the lands affected, no land use permit shall be issued without written consent of the Designated Agency. Such consent shall not be unreasonably withheld. [33.5.12]

Each land use permit referred to in Section 33.5.12 shall specify the plans and methods of archeological site protection and restoration to be followed by the permit holder, and any other conditions the Designated Agency may deem fit. [33.5.13]

Palaeontology and Archaeology

Under the *Nunavut Act*[2], the federal government can make regulations for the protection, care and preservation of palaeontological and archaeological sites and specimens in Nunavut. Under the *Nunavut Archaeological and Palaeontological Sites Regulations*[3], it is illegal to alter or disturb any palaeontological or archaeological site in Nunavut unless permission is first granted through the permitting process.

Definitions

As defined in the *Nunavut Archaeological and Palaeontological Sites Regulations*, the following definitions apply:

"archaeological site" means a place where an archaeological artifact is found.

"archaeological artifact" means any tangible evidence of human activity that is more than 50 years old and in respect of which an unbroken chain of possession or regular pattern of usage cannot be demonstrated, and includes a Denesuline archaeological specimen referred to in section 40.4.9 of the Nunavut Land Claims Agreement.

"palaeontological site" means a site where a fossil is found.

"fossil" includes:
Fossil means the hardened or preserved remains or impression of previously living organisms or vegetation and includes:

(a) natural casts;
(b) preserved tracks, coprolites and plant remains; and
(c) the preserved shells and exoskeletons of invertebrates and the preserved eggs, teeth and bones of vertebrates

[2] s. 51(1)
[3] P.C. 2001-1111 14 June, 2001

GUIDELINES FOR DEVELOPERS FOR THE PROTECTION OF ARCHAEOLOGICAL RESOURCES IN THE NUNAVUT TERRITORY

(**NOTE:** Partial document only, complete document at: http://gov.nu.ca/cley/english/arch.html)

Introduction

The following guidelines have been formulated to ensure that the impacts of proposed developments upon heritage resources are assessed and mitigated before ground surface altering activities occur. Heritage resources are defined as, but not limited to, archaeological and historical sites, burial grounds, palaeontological sites, historic buildings and cairns Effective collaboration between the developer, the Department of Culture, Language, Elders and Youth (CLEY), and the contract archaeologist(s) will ensure proper preservation of heritage resources in the Nunavut Territory. The roles of each are briefly described.

CLEY is the Nunavut Government agency which oversees the protection and management of heritage resources in Nunavut, in partnership with land claim authorities, regulatory agencies, and the federal government. Its role in mitigating impacts of developments on heritage resources is as follows: to identify the need for an impact assessment and make recommendations to the appropriate regulatory agency; set the terms of reference for the study depending upon the scope of the development; suggest the names of qualified individuals prepared to undertake the study to the developer; issue an archaeologist or palaeontologist permit authorizing field work; assess the completeness of the study and its recommendations; and ensure that the developer complies with the recommendations.

The primary regulatory agencies that CLEY provides information and assistance to are the Nunavut Impact Review Board, for development activities proposed for Inuit Owned Lands (as defined in Section 1.1.1 of the Nunavut Land Claims Agreement), and the Department of Indian and Northern Affairs, for development activities proposed for federal Crown Lands.

A developer is the initiator of a land use activity. It is the obligation of the developer to ensure that a qualified archaeologist or palaeontologist is hired to perform the required study and that provisions of the contract with the archaeologist or palaeontologist allow permit requirements to be met; i.e. fieldwork, collections management, artifact and specimen conservation, and report preparation. On the recommendation of the contract archaeologist or palaeontologist in the field and the Government of Nunavut, the developer shall implement avoidance or mitigative measures to protect heritage resources or to salvage the information they contain through excavation, analysis, and report writing. The developer assumes all costs associated with the study in its entirety.

Through his or her active participation and supervision of the study, the contract archaeologist or palaeontologist is accountable for the quality of work undertaken and the quality of the report produced. Facilities to conduct fieldwork, analysis, and report preparation should be available to this individual through institutional, agency, or company affiliations. Responsibility for the curation of objects recovered during field work while under study and for documents generated in the course of the study as well as remittance of artifacts, specimens and documents to the repository specified on the permit accrue to the contract archaeologist or palaeontologist. This individual is also bound by the legal requirements of the *Nunavut Archaeological and Palaeontological Sites Regulations*.

Types of Development

In general, those developments that cause concern for the safety of heritage resources will include one or more of the following kinds of surface disturbances. These categories, in combination, are comprehensive of the major kinds of developments commonly proposed in Nunavut. For any single development proposal, several kinds of these disturbances may be involved

- *Linear disturbances: including the construction of highways, roads, winter roads, transmission lines, and pipelines;*
- *Extractive disturbances: including mining, gravel removal, quarrying, and land filling;*
- *Impoundment disturbances: including dams, reservoirs, and tailings ponds;*
- *Intensive land use disturbances: including industrial, residential, commercial, recreational, and land reclamation work, and use of heritage resources as tourist developments.*
- *Mineral, oil and gas exploration: establishment of camps, temporary airstrips, access routes, well sites, or quarries all have potential for impacting heritage resources*.

Types of Studies Undertaken to Preserve Heritage Resources

Overview: An overview study of heritage resources should be conducted at the same time as the development project is being designed or its feasibility addressed. They usually lack specificity with regard to the exact location(s) and form(s) of impact and involve limited, if any, field surveys. Their main aim is to accumulate, evaluate, and synthesize the existing knowledge of the heritage of the known area of impact. The overview study provides managers with baseline data from which recommendations for future research and forecasts of potential impacts can be made. A Class I Permit is required for this type of study if field surveys are undertaken.

Reconnaissance: This is done to provide a judgmental appraisal of a region sufficient to provide the developer, the consultant, and government managers with recommendations for further development planning. This study may be implemented as a preliminary step to inventory and assessment investigations except in cases where a reconnaissance may indicate a very low or negligible heritage resource potential. Alternately, in the case of small-scale or linear developments, an inventory study may be recommended and obviate the need for a reconnaissance.

The main goal of a reconnaissance study is to provide baseline data for the verification of the presence of potential heritage resources, the determination of impacts to these resources, the generation of terms of reference for further studies and, if required, the advancement of preliminary mitigative and compensatory plans. The results of reconnaissance studies are primarily useful for the selection of alternatives and secondarily as a means of identifying impacts that must be mitigated after the final siting and design of the development project. Depending on the scope of the study, a Class 1 or Class 2 Permit is required for this type of investigation.

Inventory: A resource inventory is generally conducted at that stage in a project's development at which the geographical area(s) likely to sustain direct, indirect, and perceived impacts can be well defined. This requires systematic and intensive fieldwork to ascertain the effects of all possible and alternate construction components on heritage resources. All heritage sites must be recorded on Government of Nunavut Site Survey forms. Sufficient information must be amassed from field, library and archival components of the study to generate a predictive model of the heritage resource base that will:

- allow the identification of research and conservation opportunities;
- enable the developer to make planning decisions and recognize their likely effects on the known or predicted resources; and
- make the developer aware of the expenditures, which may be required for subsequent studies and mitigation. A Class 1 or 2 permit is required

Assessment: At this stage, sufficient information concerning the numbers and locations of heritage resources will be available, as well as data to predict the forms and magnitude of impacts. Assessments provide information on the size, volume, complexity and content of a heritage resource, which is used to rank the values of different sites or site types given current archaeological knowledge. As this information will shape subsequent mitigation program(s), great care is necessary during this phase.

Mitigation: This refers to the amelioration of adverse impacts to heritage resources and involves the avoidance of impact through the redesign or relocation of a development or its components; the protection of the resource by constructing physical facilities; or, the scientific investigation and recovery of information from the resource by excavation or other method. The type(s) of appropriate mitigative measures are dictated by their viability in the context of the development project. Mitigation strategies must be developed in consultation with, and approved by, the Department of Culture, Language, Elders and Youth. It is important to note that mitigation activities should be initiated as far in advance of the construction of the development as possible.

Surveillance and monitoring: These may be required as part of the mitigation program.

Surveillance may be conducted during the construction phase of a project to ensure that the developer has complied with the recommendations.

Monitoring involves identification and inspection of residual and long-term impacts of a development (i.e. shoreline stability of a reservoir); or the use of impacts to disclose the presence of heritage resources, for example, the uncovering of buried sites during the construction of a pipeline.

Appendix C - DFO Letter of Advice dated Sept. 26, 2012

Fisheries and Oceans Canada
Pêches et Océans Canada

P.O. Box 358
Iqaluit, Nunavut
X0A 0H0

Your file *Votre référence*

September 26, 2012

Our file *Notre référence*
NU-03-0191

Ryan Vanengen
Agnico Eagle Mines Ltd.
93 Rue Arsenault bureau 202
Val d' Or, Quebec
J0P 0E9

Dear Mr.Vanengen:

Subject: Proposal not likely to result in impacts to fish and fish habitat provided that additional mitigation measures are applied.

Fisheries and Oceans Canada - Fish Habitat Management Program (DFO) received your proposal on September 21, 2012 pertaining to the extension of the existing airstrip at Meadowbank Mine. Please refer to the file number and title below:

DFO File No.: **NU-03-0191**
Title: **Meadowbank Gold Mine Dike Construction and Dewatering Pits, Second Portage Lake, Kivalliq Region**

You may be aware of recent changes to the *Fisheries Act*, however these have not affected the review of your project at this time. For more information on current changes to the *Fisheries Act*, as well as changes taking effect in the coming months, please refer to the DFO website at www.dfo-mpo.gc.ca/habitat/habitat-eng.htm.

Your proposal has been reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* that apply to aquatic species.*

Our review consisted of: *Meadowbank – Airstrip Extension Risk Assessment and Categorization* Proposal dated September 21, 2012 by Agnico Eagle.

*Those sections most relevant to the review of development proposals include 20, 22, 32 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

.../2

We understand that you propose to:

-Construct an extension of the existing airstrip approximately beginning January 2013 via in-water rockfill and armouring placement into Third Portage Lake.
-Avoid in-water works during the critical spawning period for Round Whitefish, Lake Trout and Arctic Char.
-Store all material and equipment 30m above the ordinary high water mark
-Hire a qualified environmental technician to photograph pre and post construction
-Conduct follow up monitoring during freshet to evaluate bank stability, erosion and TSS inputs; and throughout the summer following rainfall events

To reduce potential impacts to fish and fish habitat we are recommending that the following mitigation measures be included into your plans:

-Machinery should arrive on site in a clean condition and is to be maintained free of fluid leaks. Wash, refuel and service machinery and store fuel and other materials for machinery away from the water to prevent any deleterious substance from entering the water. An emergency spill kit should be kept on site in case of fluid leaks or spills from machinery.

-Only clean rock, appropriately sized and free of deleterious substances should be used for riprap. These materials should be obtained off site and should not be taken from below the average high water level of any waterbody.

-All spoil materials and debris from construction should be removed from the site and properly disposed of above the high water mark such that they do not enter any waterbody.

Provided that the mitigation measures described above are incorporated into your plans, DFO has concluded that your proposal is not likely to result in impacts to fish and fish habitat and you will not need to obtain a formal approval from DFO in order to proceed with your proposal. It remains your responsibility, however, to meet the requirements of any other federal, provincial and municipal agencies.

If your plans have changed or if the description of your proposal is incomplete you should consult our website at http://www.dfo-mpo.gc.ca/habitat/habitat-eng.htm to determine if a DFO review is required, and if so contact this office to determine if the advice in this letter still applies.

Please be advised that any impacts to fish and fish habitat which result from a failure to implement this proposal as described or incorporate the additional mitigation measures included in this letter could lead to corrective action such as enforcement. In addition, under the new *Fisheries Act*, there is a requirement to notify DFO of any harmful alteration or disruption, or any destruction of fish habitat that has not been authorized.

If you have any questions please contact the undersigned at (867) 979-8019, by fax at (867) 979-8039, or by email at Elizabeth.Patreau@dfo-mpo.gc.ca.

.../3

Yours sincerely,

Elizabeth Patreau
Senior Fish Habitat Biologist

Appendix D – NWB Notification of Modification

P.O. Box 119
Gjoa Haven, NU X0B 1J0
Tel: (867) 360-6338
Fax: (867) 360-6369

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File: 2AM-MEA0815/Part G1

April 15, 2010

Stéphane Robert
Environment Superintendent
Agnico-Eagle Mines Limited – Meadowbank Division
20, Route 395
Cadillac, Quebec,
J0Y 1C0
Email: stephane.robert@agnico-eagle.com

Re: Water Licence No.2AM-MEA0815, Agnico-Eagle Mines Limited – Meadowbank Division, Meadowbank Gold Project; Notification of Modification – Proposed Expansion to the Meadowbank Airstrip under Part G, Item 1

Dear Mr. Robert,

The Nunavut Water Board (NWB) would like to acknowledge receipt of the above-cited request for modification/clarification on February 4, 2010, from Agnico-Eagle Mines Limited – Meadowbank Division (AEML), submitted in accordance with Part G, Item 1 of Licence 2AM-MEA0815.

The NWB has, in its review, determined that the proposed expansion of the airstrip at the Meadowbank Gold Project is not consistent with the scope of the Licence where the airstrip was considered, however no definition for the activity was provided for in 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.

As the modification is considered inconsistent with the Licence, the NWB has determined that AEML is required to submit an amendment application detailing the request.

As part of the amendment application, the NWB is requesting that additional information be provided by AEML, to include the following:

1. A Water Quality Monitoring and Management Plan (including TSS Management) for the construction of the airstrip expansion;
2. Proposed revisions to the Meadowbank Water Management Plan;
3. Results of any Acid Rock Drainage studies that have taken place and the results of any acid rock drainage potential testwork completed, along with metal leaching capability of the materials planned to be utilized for the construction;
4. Proposed disposal of any excavated materials in preparation of the expansion areas;
5. Information with respect to design specifications, including the 'For Construction Drawings' for the undertaking;
6. Methods of erosion and sediment control during construction (on land portion);

7. Changes to, or proposed changes and commitments with respect to environmental response plan and Spill Contingency Plan, including the prevention, containment and recovery from spills into water associated with the airstrip.

Based on the information provided to date and that expected to be submitted with the amendment application, the NWB will be requesting at the time of technical review, comment on the form of a hearing, if one is required to be held. Should you have any questions, please feel free to contact the undersigned at (780) 443-4406 or Richard Dwyer, Licensing Administrator, at (867) 360-6338, licensingadmin@nunavutwaterboard.org .

Yours truly,

Original signed by:

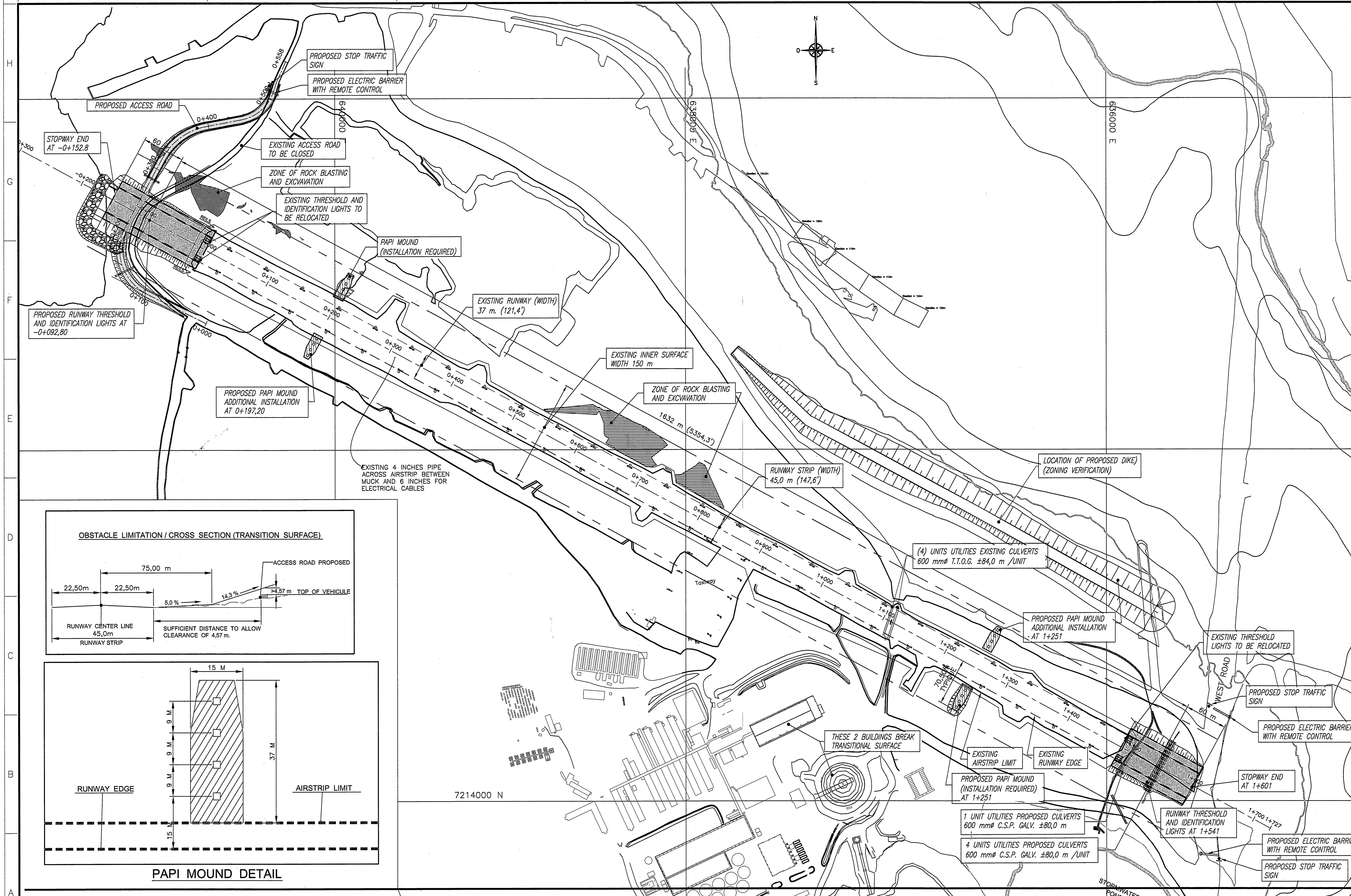
David Hohnstein, C.E.T
Director Technical Services

Cc: Distribution - Kivalliq

Appendix E – Airstrip drawing

NO. DESSIN
DRAWING NO. MEAD-620-C-100-A

FORMAT ARCHD



PLAN VIEW – AIRPORT DESIGN

SCALE: 1: 2500

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

- BASE ON SURVEY TAKEN BY AGNICO-EAGLE NOVEMBER 2012

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
AIRSTRIP DESIGN FOR B737-200	MK01-620-230-100-A
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AGNICO-EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
A	11-19-2012	FOR APPROVAL	Y.B.	R.M.	A.H.

REVISIONS

REGISTERED PROFESSIONAL ENGINEER
R. MARCOUX
LICENSEE
NT/NU
2012-11-19

TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRPORT DESIGN FOR BOEING 737
CODE NUMBER : 3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
1752 m (5748')
2012 EXPANSION RUNWAY

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VERIFIÉ PAR / CHECKED BY	RICHARD MARCOUX, ing.	11-19-2012
APPROUVÉ PAR / APPROVED BY		
ÉCHELLE / SCALE	1:2500	DATE 19 NOVEMBRE 2012

NO. DESSIN / DRAWING NO. MEAD-620-C-101-A

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
VD3245	A	1 / 1

NO. DESSIN / DRAWING NO. MEAD-620-C-100-A

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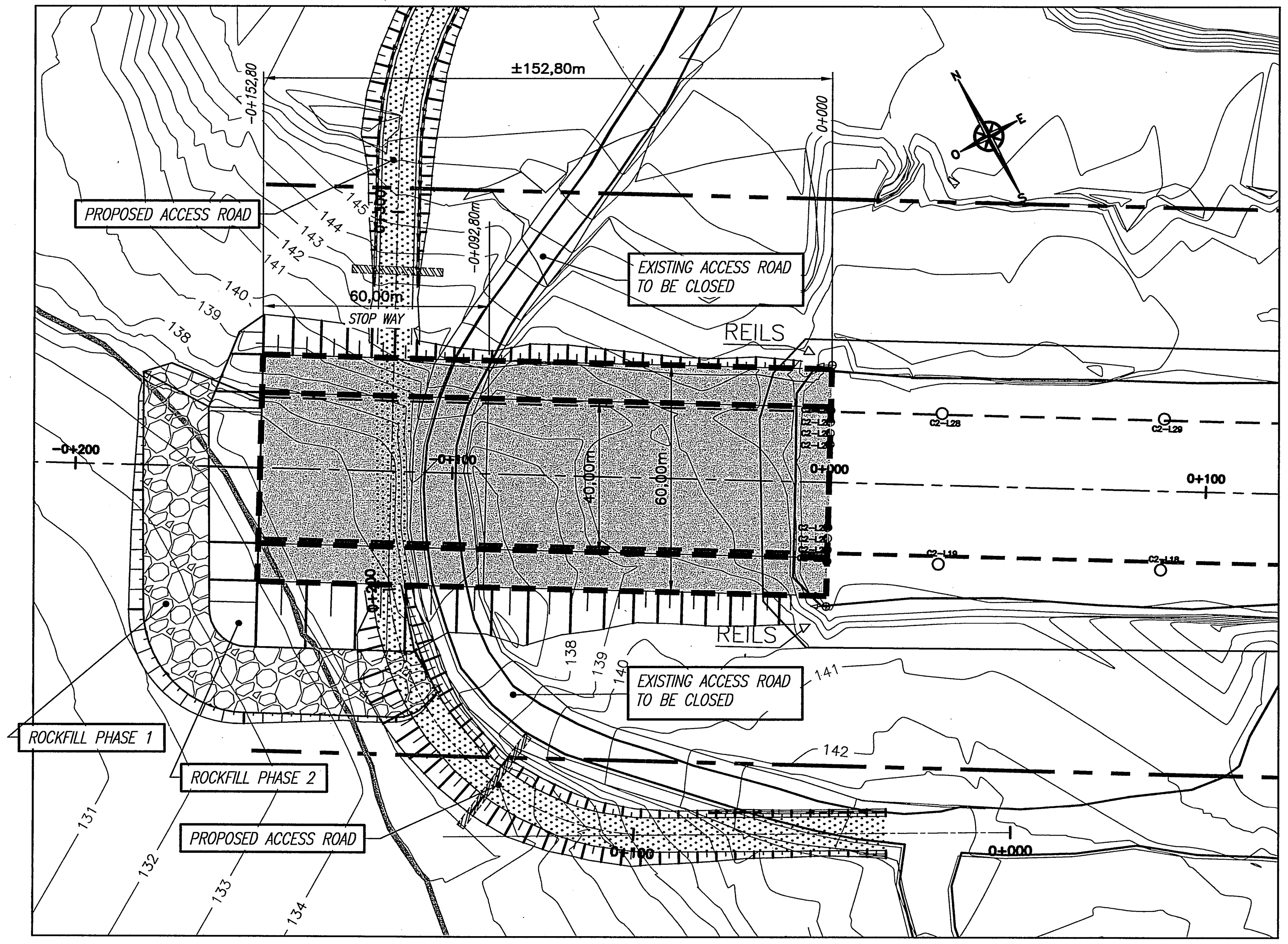

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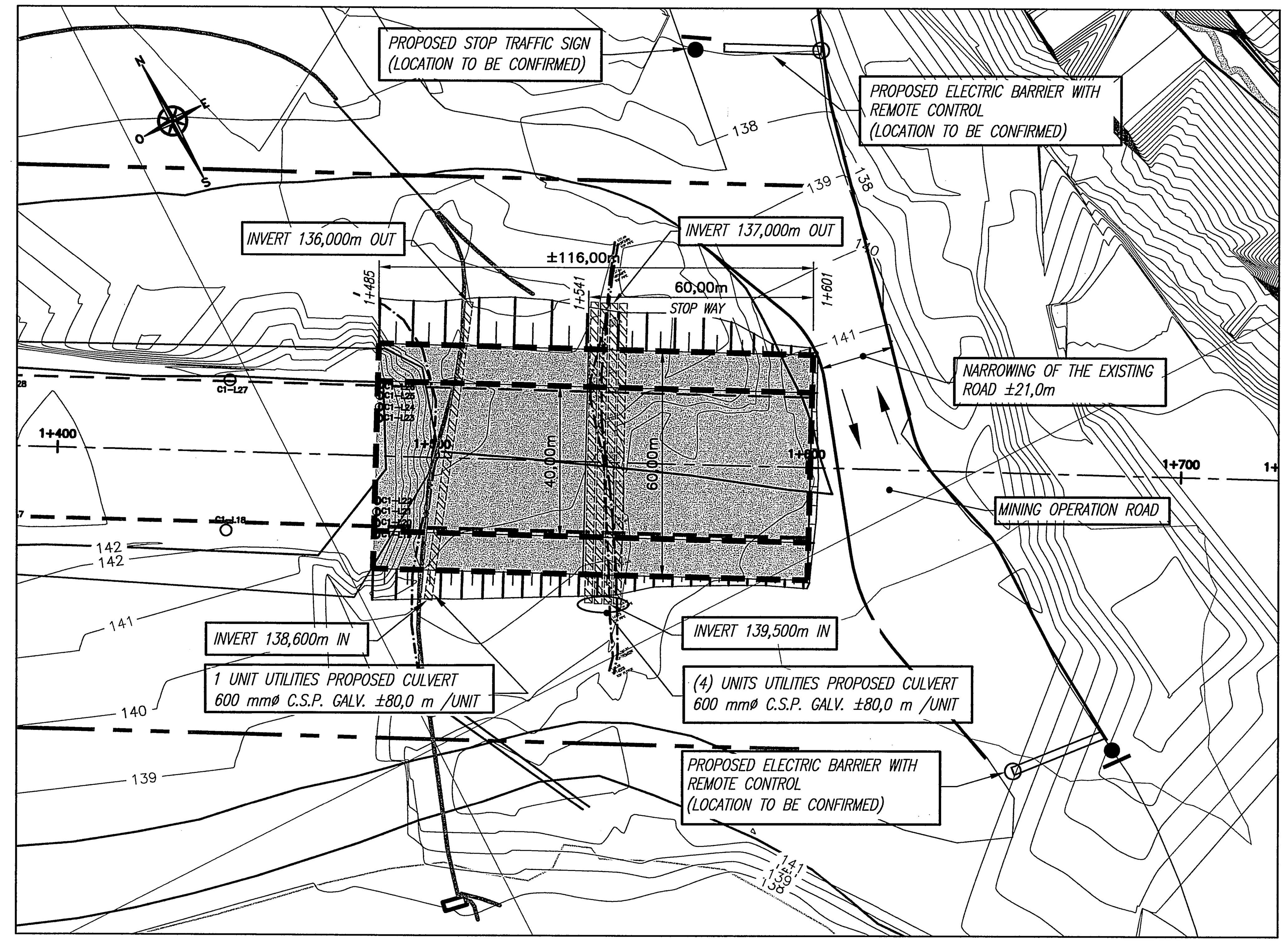
SCALE 1:1000



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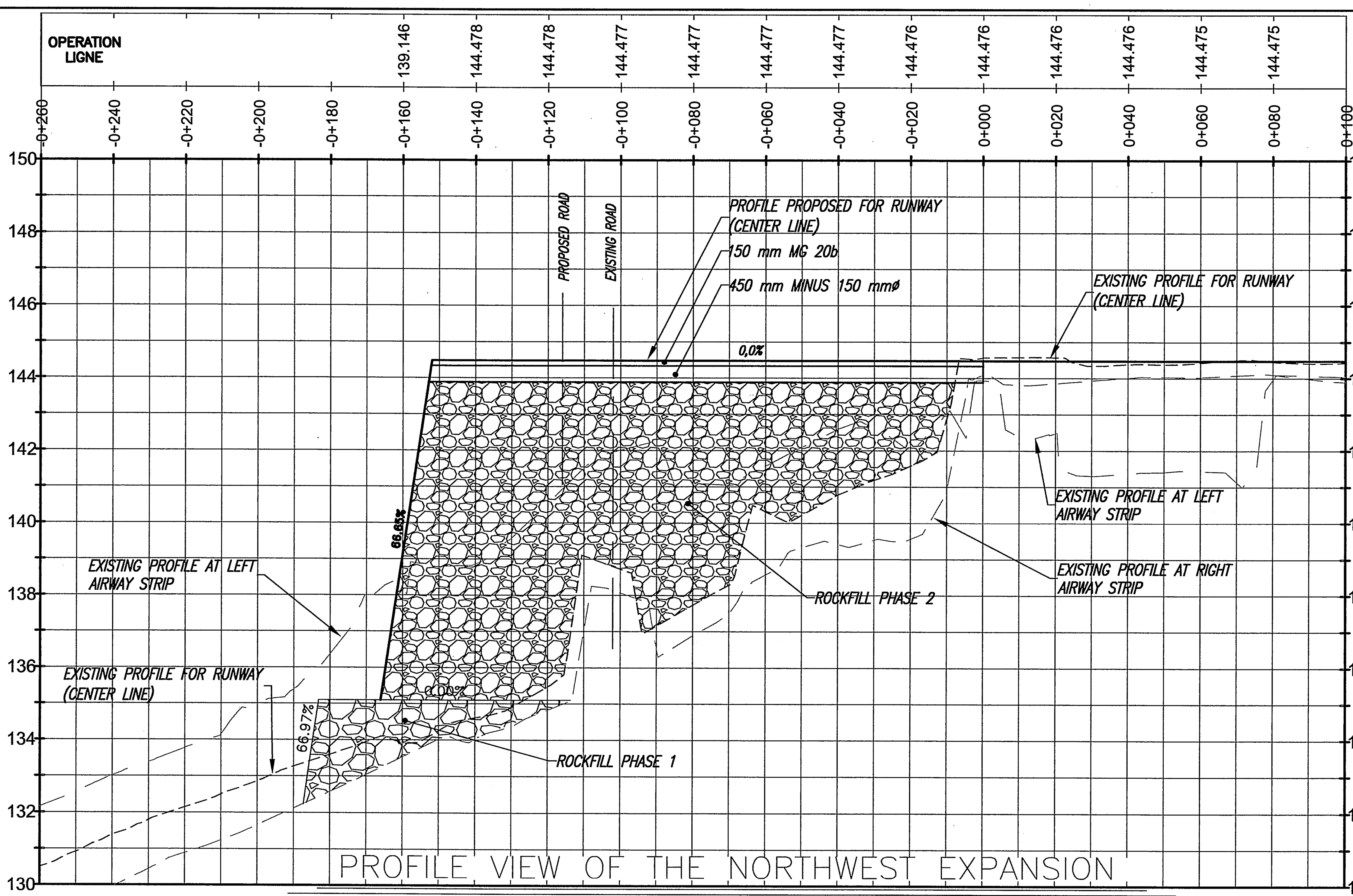

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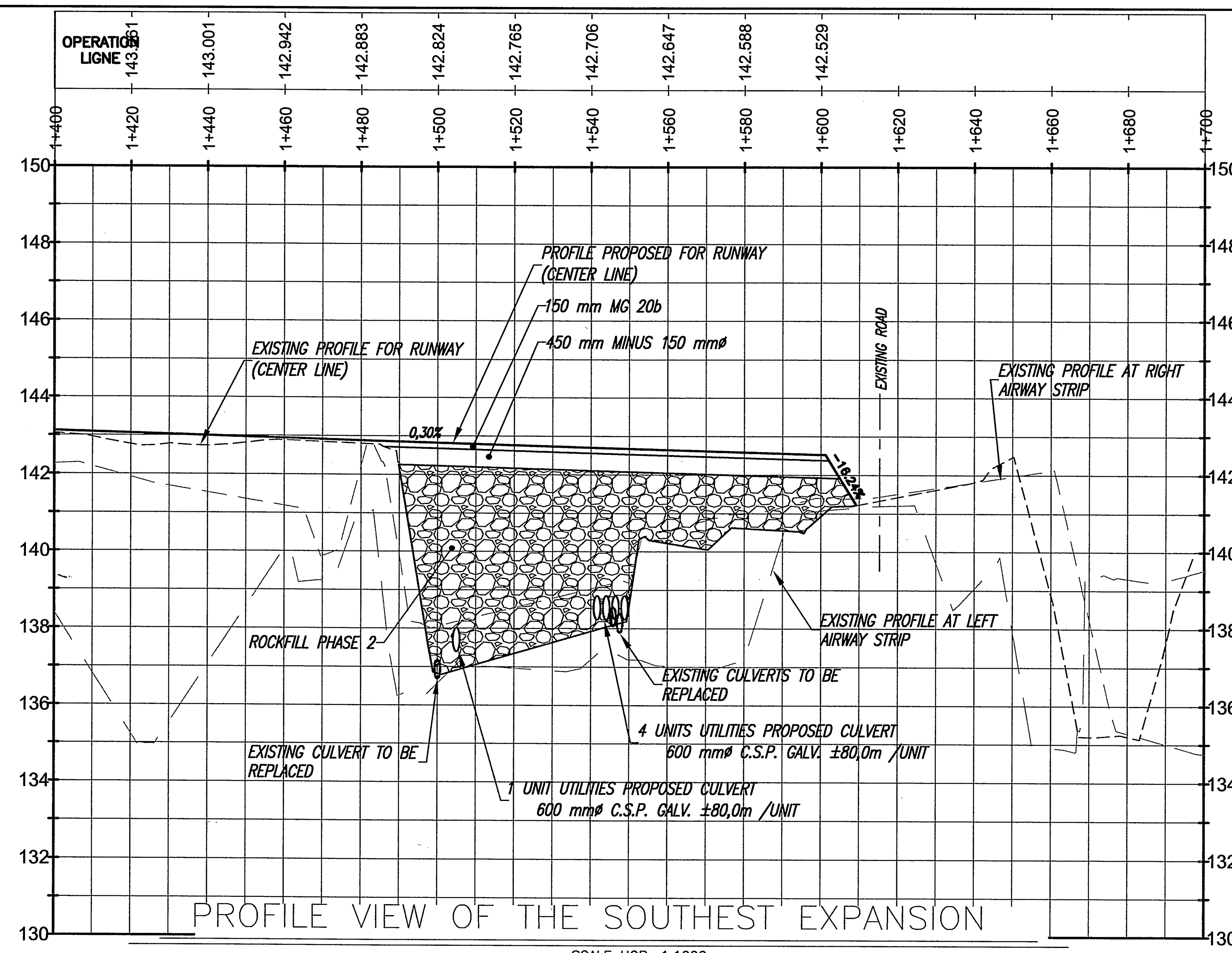

PROFILE VIEW OF THE SOUTHEST EXPANSION

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PLAN CLÉ / KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO-EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
A	11-19-2012	FOR APPROVAL	Y.B.	R.M.	A.H.

REVISIONS

REGISTERED PROFESSIONAL ENGINEER R. MARCOUX LICENSEE NT/NU
2012-11-19

TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRPORT DESIGN FOR BOEING 737
CODE NUMBER : 3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
PLAN AND PROFILE

DESSINÉ PAR / DRAWN BY	YVES BOISVERT, T.P.	DATE 11-19-2012
VERIFIÉ PAR / CHECKED BY	RICHARD MARCOUX, ing.	11-19-2012
APPROUVÉ PAR / APPROVED BY		
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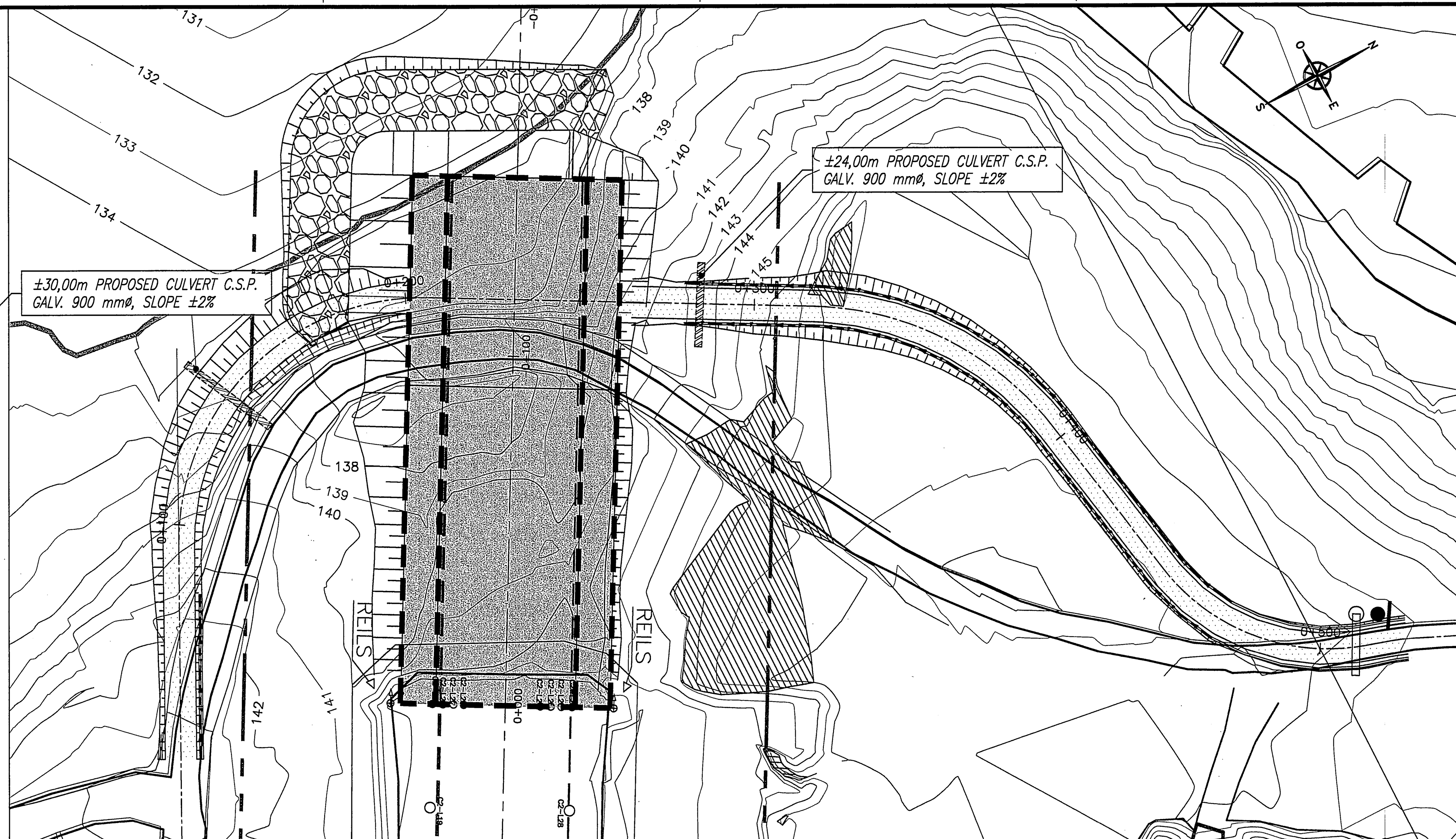

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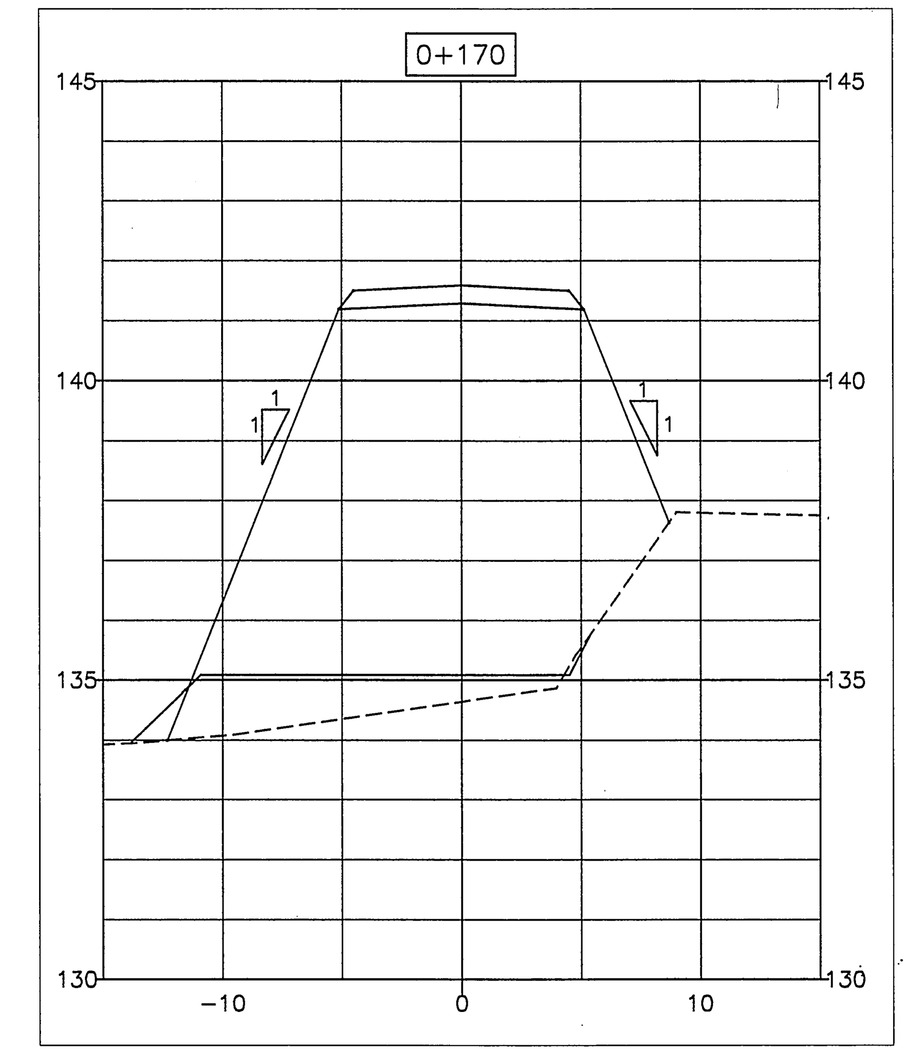

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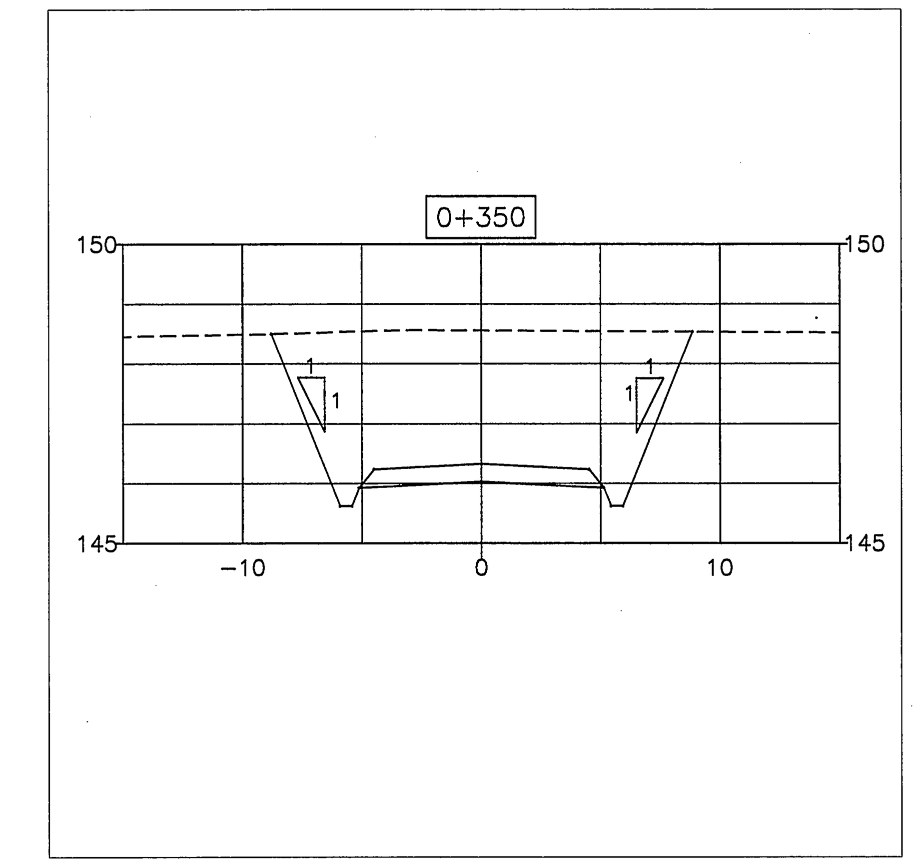

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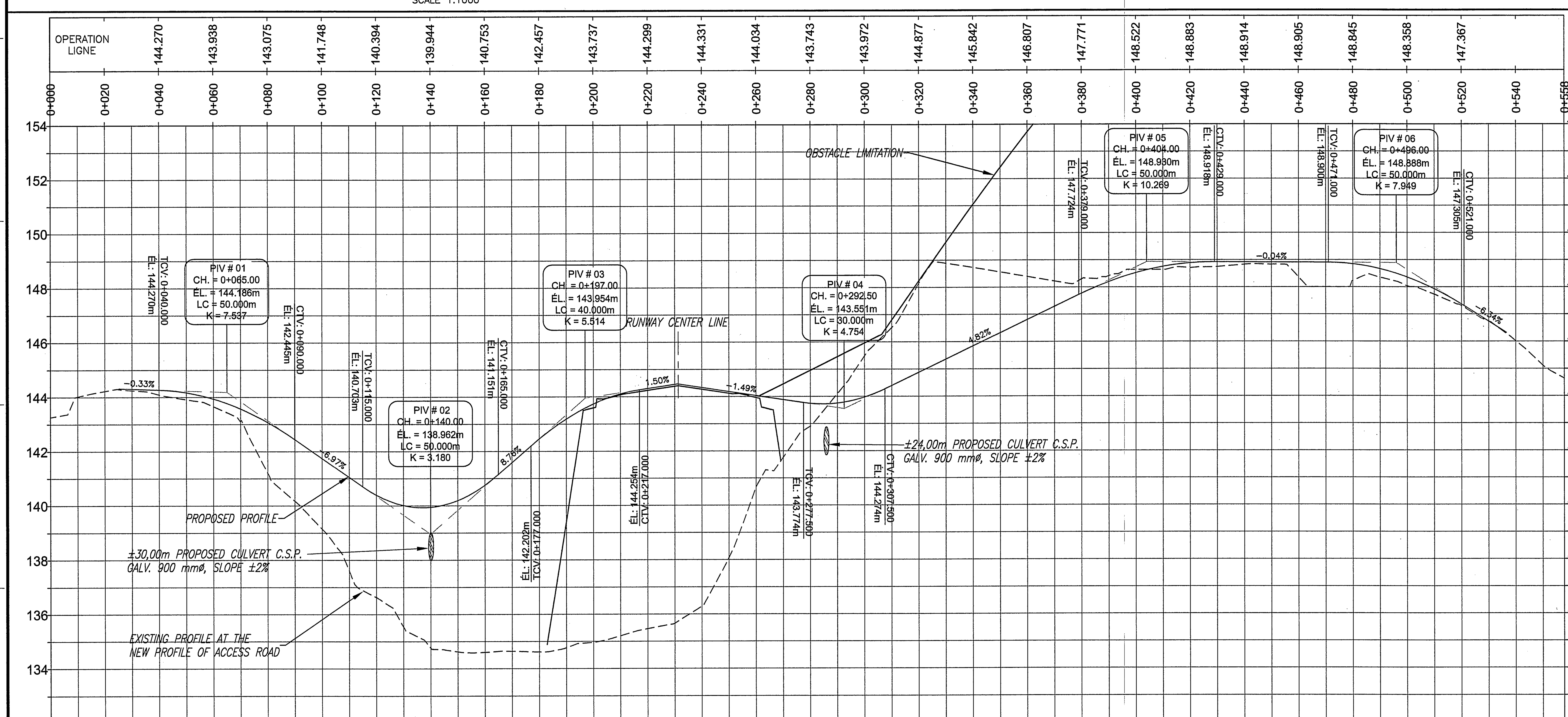

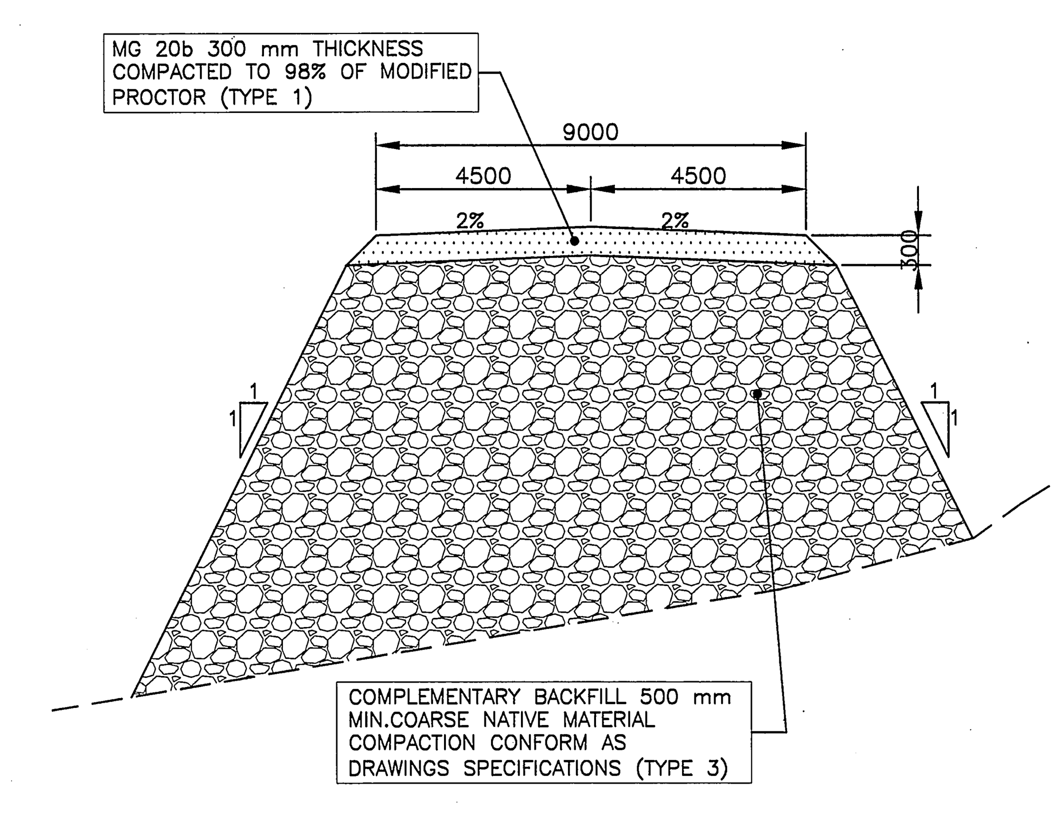

TYPICAL CROSS SECTION

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PLAN CLÉ
KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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AGNICO-EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
A	11-19-2012	FOR APPROVAL	Y.B.	R.M.	A.H.

REVISIONS

REGISTERED PROFESSIONAL ENGINEER
R. MARCOUX
LICENSEE
NT/NU
2011-11-19

TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRPORT DESIGN FOR BOEING 737
CODE NUMBER : 3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
PLAN AND PROFILE

DESSINÉ PAR / DRAWN BY	YVES BOISVERT, T.P.	DATE 11-19-2012
VERIFIÉ PAR / CHECKED BY	RICHARD MARCOUX, ing.	11-19-2012
APPROUVÉ PAR / APPROVED BY		
ÉCHELLE / SCALE	HOR. 1 : 1000	DATE 19 NOVEMBRE 2012

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FILE NO. MEAD-620-C-100-A.dwg

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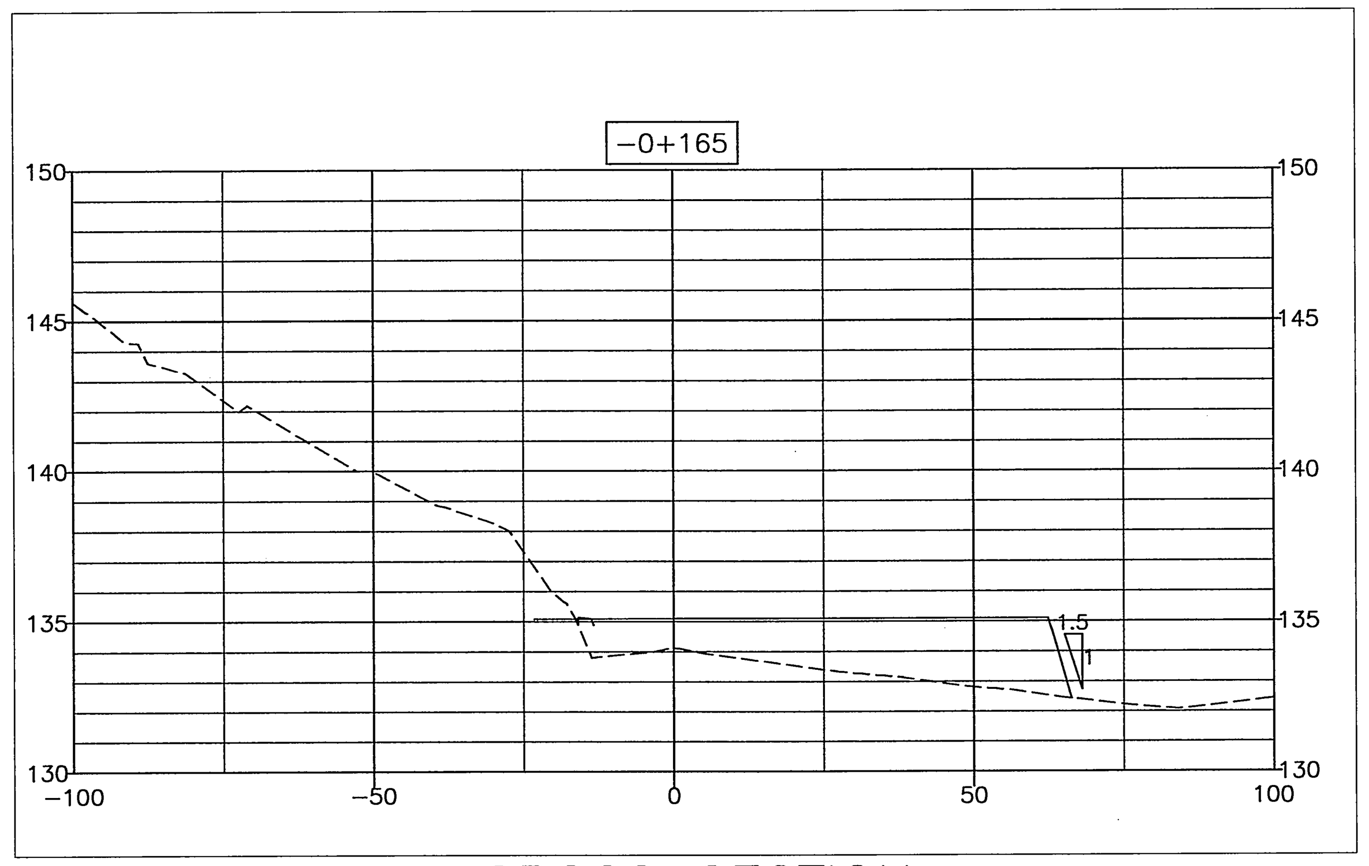

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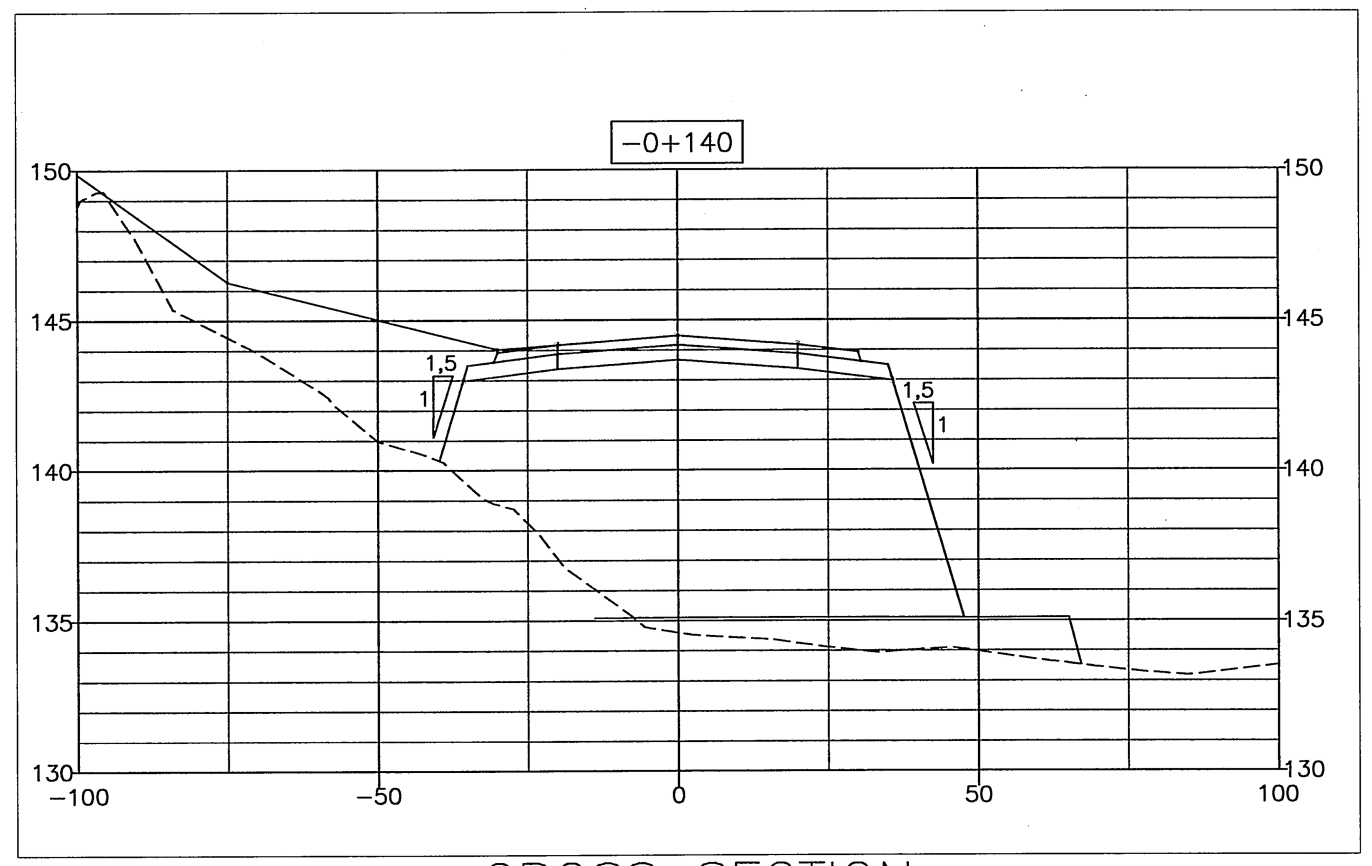

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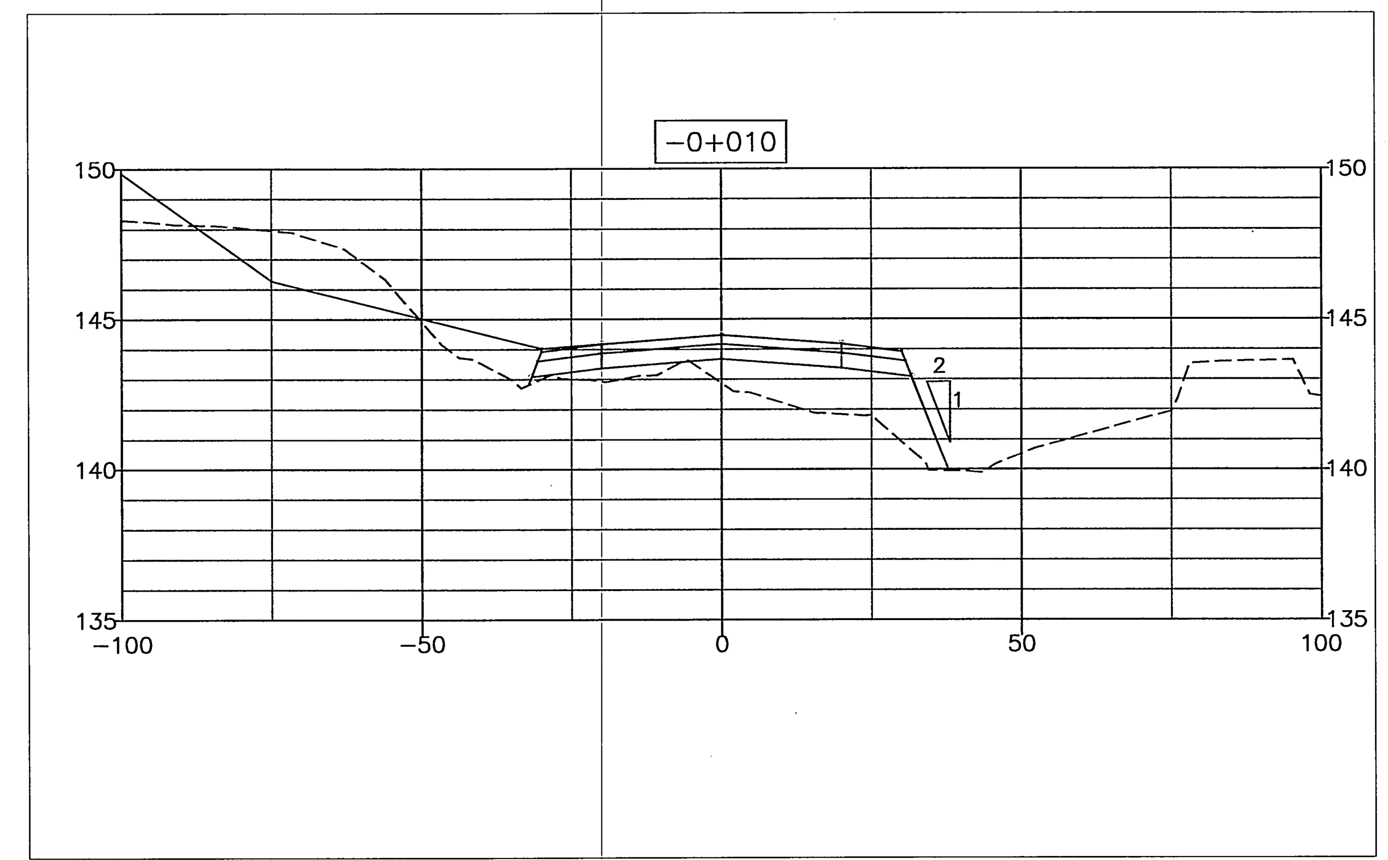

CROSS SECTION

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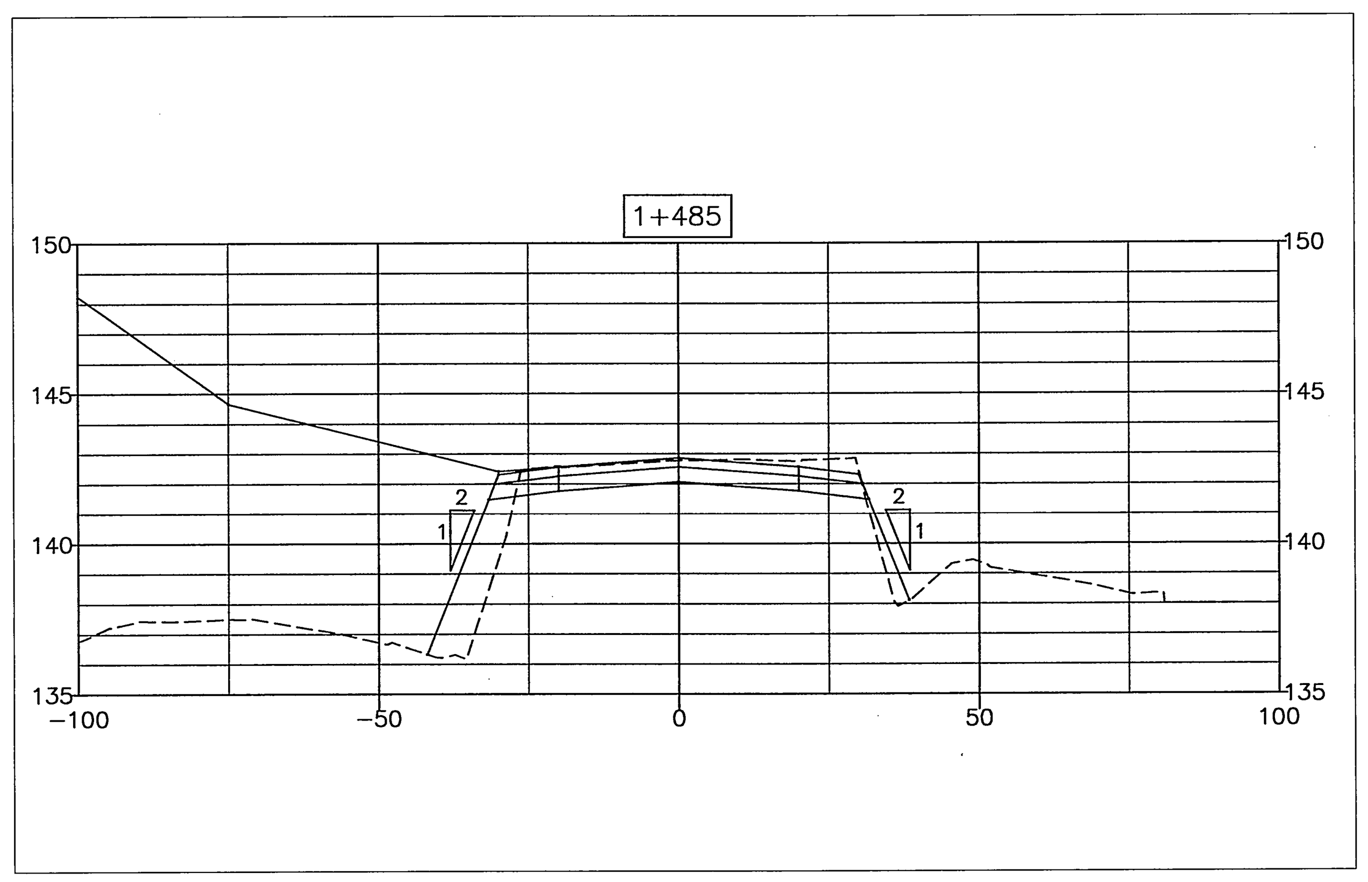

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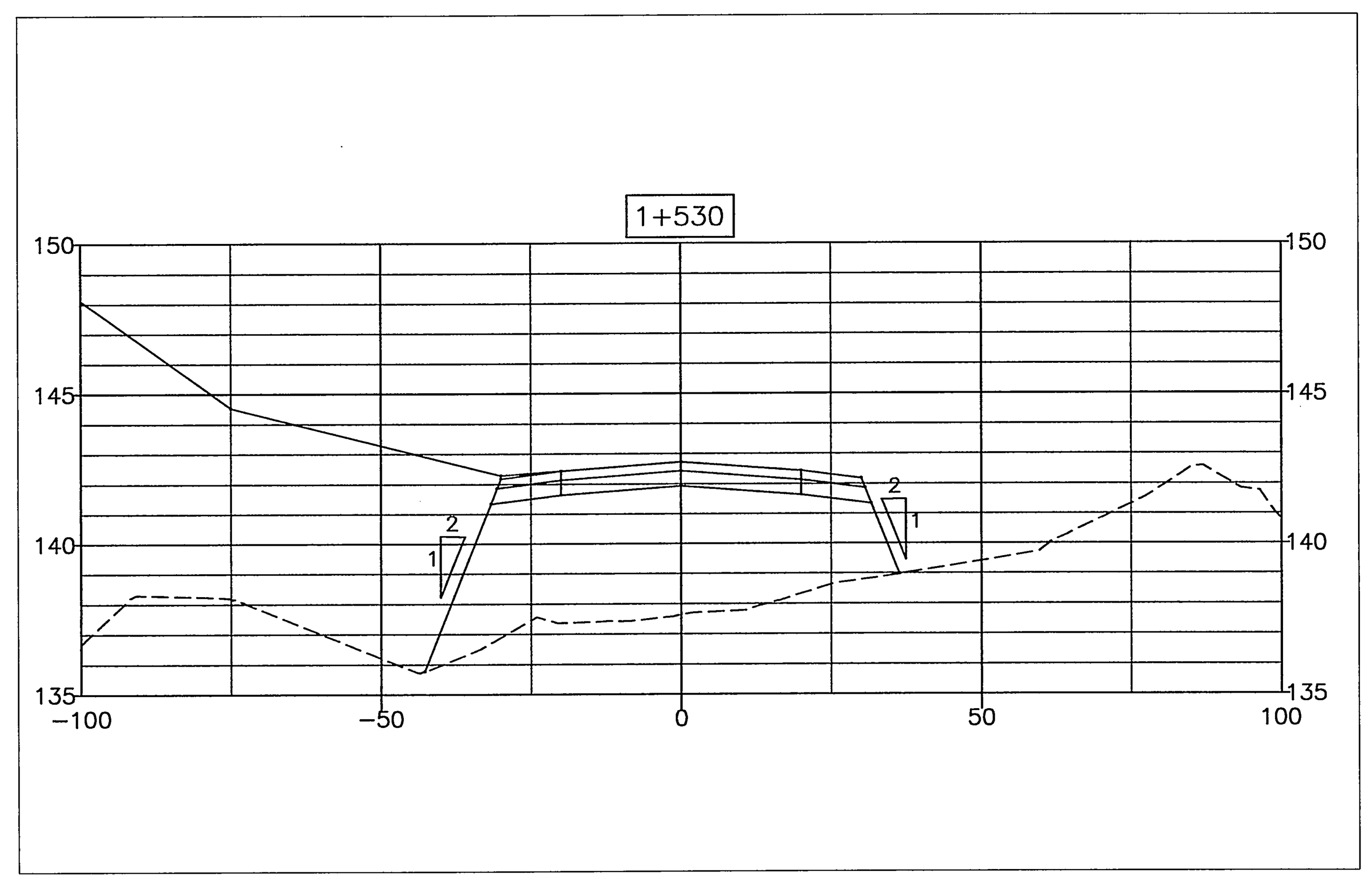

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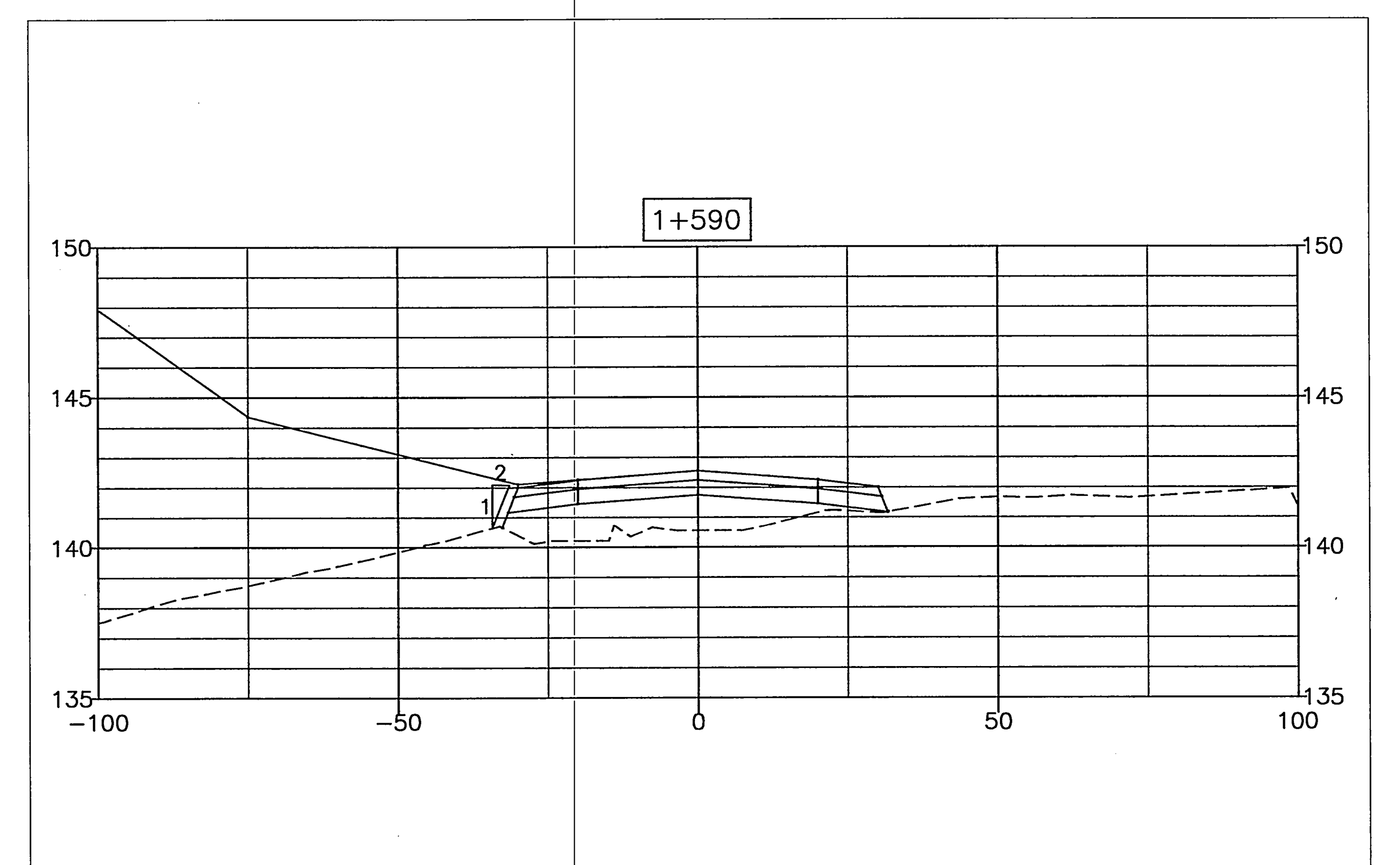

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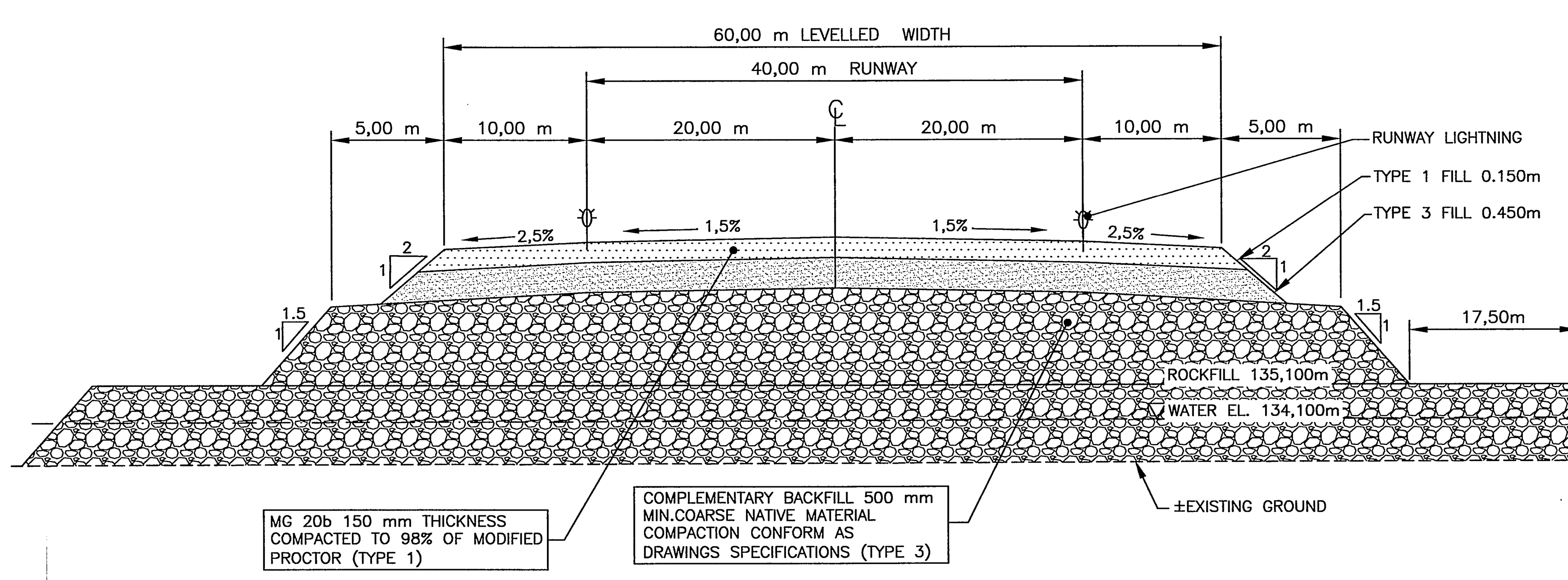

TYPICAL CROSS SECTION

SECTION - LAKE

NO SCALE

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO-EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
A	11-19-2012	FOR APPROVAL	Y.B.	R.M.	A.H.

REVISIONS

REGISTERED PROFESSIONAL ENGINEER
R. MARCOUX
LICENSEE
NT/NU
2012-11-19

TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRPORT DESIGN FOR BOEING 737
CODE NUMBER : 3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
CROSS SECTION

DESSINÉ PAR DRAWN BY	YVES BOISVERT, T.P.	DATE 11-19-2012
VERIFIÉ PAR CHECKED BY	RICHARD MARCOUX, ing.	11-19-2012
APPROUVÉ PAR APPROVED BY		
ÉCHELLE SCALE	HOR. 1:1000	DATE 19 NOVEMBRE 2012

NO. DESSIN DRAWING NO. MEAD-620-C-104-A

NO. PROJET PROJECT NO.	REVISION	FEUILLE / SHT
VD3245	A	1/1

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FILE NO. MEAD-620-C-100-A.dwg

1. SALVAGE AND STOCKPILE ORGANIC MATERIALS

1.1 Products

1. "Organic Materials" are the naturally occurring organic rich, A-Horizon soils found at ground surface and may include topsoil and/or fibrous peat.

1.2 Execution

1. Salvage Organic Materials by excavation and loading for transport from Work Site area(s) designated by the Owner's Representative.

2. Excavation of Organic Materials may require the use of drilling, blasting, ripping and or other approved techniques to prepare the Organic Materials for salvaging.

3. Organic Materials encountered within the Work Site areas of less than 0.1 m measured thickness are considered impractical to salvage and may be incorporated as part of the common excavation.

4. Haul and stockpile Organic Materials in area(s) designated on the Drawings and/or by the Owner's Representative.

5. Shape stockpile(s) of Organic Materials to smooth, uniform surface with side slopes not steeper than three horizontal to one vertical (3H:1V).

2. FOUNDATION PREPARATION

2.1 Products

1. "Unsuitable Materials" include ice, snow, topsoil, organic soils, vegetation, boulders, etc. to a depth or in a location that will impede the removal of the competent materials. Unsuitable Material may be frozen in situ depending on time of year and/or ground ice conditions. Within the foundation preparation limits of the embankments, Unsuitable Materials may include Mineral Soil that has a high silt, clay and/or ice content.

2. "Competent Materials" may include Mineral Soil overburden material and the underlying Bedrock formation as defined in Section 3 "BULK EXCAVATION."

3. Determination of Unsuitable Materials and Competent Materials will be at the discretion of the Owner's Representative, as recommended by the Geotechnical Engineer. The Contractor may be required to assist during the determination by performing such work as proof rolling, test pit excavation and the like as directed by the Owner's Representative.

2.2 Execution

1. Salvage and Stockpile Organic Materials, as outlined in Section 1, to be performed.

2. Remove Unsuitable Materials in areas indicated on the Drawings or as per the Owner's Representative and to the limits of Competent Materials.

3. In areas where Unsuitable Materials within the limits of the Work are encountered, the Contractor may be requested to advance test pit excavations as directed by the Owner's Representative to delineate the extent of the deposits. The materials encountered will be inspected by the Geotechnical Engineer. A determination of Competent Materials of the excavated and underlying materials shall be made by the Owner's Representative using recommendations provided by the Geotechnical Engineer.

4. The Contractor shall allow the Geotechnical Engineer to review the prepared foundation to evaluate conformance to the Specifications. Acceptance of foundation preparation shall be performed by the Owner's Representative using recommendations provided by the Geotechnical Engineer.

5. Stockpile excavated material which is considered by the Owner's Representative suitable for reuse as Fill Material (as defined in Section 3 "BULK EXCAVATION") at a location.

6. Stockpile excavated material which is considered by the Owner's Representative unsuitable for embankment construction at a location indicated on the Drawings or as directed by the Owner's Representative.

3. BULK EXCAVATION

3.1 Products

1."Mineral Soil" is the near surface layer of earth materials generally composed of till-like soil, including but not limited to varying proportions of sand, gravel, silt, clay cobbles and boulders. Thawed Mineral Soil materials are normally suitable for mechanical excavation. Frozen Mineral Soil materials may require the use of drilling, blasting, ripping and or other approved techniques to prepare the Mineral Soil materials for excavation.

2. "Bedrock" is the underlying rock formation comprising frost-shattered weathered Bedrock and/or intact unweathered Bedrock that will require the use of drilling, blasting, ripping and/or other approved techniques to prepare the Bedrock materials for excavation.

3.2 Execution

1. Salvage and Stockpile Organic Materials, as outlined in Section 2, to be performed.

2. Excavate from available areas of cut along the airstrip alignment to the elevations and profile shown on the Drawings or from approved local borrow areas adjacent to the proposed airstrip. Excavation of Mineral Soil and Bedrock are expected.

3. Haul and place the bulk excavation materials according to the technical specifications defined in Section 6 or stockpile Mineral Soil and Bedrock in area(s) designated by the Owner's Representative.

4. Where frozen soils are encountered, they shall be excavated using methods that conform to all applicable laws and regulations and to proven safe practices. The proposed method shall be submitted to the Engineer in writing for review and approval at least two weeks prior to beginning such excavation.

5. Where blasting is required, all operations in connection with transporting, storage and use of explosives shall be subject to the rules and regulations of governing authorities. Only perform blasting using experienced and licensed personnel. Obtain prior approval of the Owner for blasting operations.

6. Blast and remove Bedrock to the depths and profiles shown on the Drawings.

7. Shape Mineral Soil and or Bedrock subgrade to uniformly graded surfaces intended to minimize ponding of water within the drainage ditch as defined on the Drawings and to the satisfaction of the Owner's Representative.

8. Final cut slopes in Mineral Soil shall be trimmed no steeper than 3 Horizontal to 1 Vertical. Cut slopes in areas of peat or any soft or weak soil(s) may require flatter slopes, as determined by the Geotechnical Engineer.

9. Final cut slopes in bedrock shall be no steeper than 0.5 Horizontal to 1 Vertical.Flatter slopes may be required for environmental or other reasons defined by the Owner.

4. BACKFILL MATERIALS

4.1 General

1. Two structural fill types shall be used to construct the airstrip as follows:

a. Type 1 Fill – MG 20b Granular Surfacing;
b. Type 2 Fill - Minus 150mm Fine Native Material; and
c. Type 3 Fill – Minus 500 mm Coarse Native Material.

4.2 Type 1 Fill – MG 20b Granular Surfacing

1. Type 1 Fill shall consist of fragments of hard, durable rock, and meet the gradation specification in Table 1.

Table 1: Type 1 Fill Gradation Specification

Sieve Designation	Per cent by Weight Passing
31,5 mm	100%
20 mm	90-100%
14 mm	68-93%
5 mm	35-60%
315 µm	9-17%
80 µm	5-11%

2. Type 1 material shall be placed with a moisture content within + 2% of the optimum moisture content, as determined by the Engineer.

4.3 Type 2 Fill – Minus 150 mm Fine Native Material

1. Type 2 Fill shall consist of native mineral soil, bedrock and/or quarried rock fill materials excavated from cut areas or local borrow areas. The maximum particle diameter shall be 150 mm, and meet the gradation specification in Table 2.

Table 2: Type 2 Fill Gradation Specification

Sieve Designation	Per cent by Weight Passing
150 mm	100%
50 mm	70-100%
25 mm	50-100%
4.75 mm	25-100%
2 mm	10-80%
0.075 mm	0-10%

2. Care shall be taken to place the Type 2 Fill material within approximately + 4% of the optimum moisture content. If frozen material is worked until thawed, special attention must be given to observing the moisture content. Material that is visibly too wet, as determined by the Engineer, shall not be incorporated into the airstrip embankment fill, and shall be place in a designated stockpile area.

4.4 Type 3 Fill – Minus 500 mm Coarse Native Material

1. Type 3 Fill shall consist of native mineral soil, bedrock and/or quarried rock fill materials excavated from cut areas or local borrow areas. The maximum particle diameter shall be 500 mm, and meet the gradation specification in Table 3.

2. Care shall be taken to place the Type 3 material within approximately + 4% of the optimum moisture content. If frozen material is worked until thawed, special attention must be given to observing the moisture content. Material that is visibly too wet, as determined by the Engineer, shall not be incorporated into the airstrip embankment fill, and shall be placed in a designated stockpile area.

Table 2: Type 3 Fill Gradation Specification

Sieve Designation	Per cent by Weight Passing
500 mm	100%
300 mm	85-100%
100 mm	60-100%
25 mm	45-90%
4.75 mm	25-70%
0.850 mm	10-30%
0.425 mm	5-20%
0.180 mm	0-10%
0.075 mm	0-10%

4.5 Oversize Particles

1. Oversize particles are considered to be rock fragments with a diameter greater than 500 mm. Where oversize particles are encountered, the particles shall be selectively removed from the Type 2 and 3 Fill materials prior to compaction.

2. Oversize particles shall be incorporated in the production of Type 1 Fill and/or salvaged and stockpiled in a designated locations approved by the Owner's Representative.

4.6 Placement and Compaction

1. Backfill materials including rock fill and granular fill materials, should be placed in loose lifts not exceeding 150 mm in thickness, unless otherwise noted, and all granular fills should be moisture conditioned, if required, prior to compaction. Type 3 Fill shall be placed in loose lifts not exceeding 500 mm thickness. Water should be added to adjust the in situ moisture content to within 2 per cent of the optimum moisture content, as determined by the Proctor density – moisture relationship.

2. Backfill materials should be placed so as to minimize disturbance of the subgrade.

3. Compaction of Type 1 Fill material shall be obtained using a 3.5-tonne smoothdrum vibratory compactor. The compactor shall maintain a minimum 0.2 m overlap between passes. Carry out rolling over large surfaces and execute turns carefully to obtain uniform compaction.

4. Compaction of Types 2 and 3 Fill materials shall be obtained using the smooth drum vibrator roller and/or load and unloaded haul trucks. The trucks shall take care to traffic over the entire working surface of each lift. Where required, the Geotechnical Engineer shall indicate where additional compaction traffic is required.

5. Place and compact fill materials in horizontal lifts beginning in the lowest area of the foundations unless specified otherwise.

6. All lifts must pass density and gradation requirements prior to placement of subsequent lift.

7. All lifts shall be uniformly compacted using a smooth drum 3.5 tonne vibratory roller to the following in situ density:

a. Type 1 Fill: Granular base should be compacted to 100 per cent of the standard Proctor maximum dry density, as determined by ASTM Test Method D698-70.

b. Type 2 Fill: Fine Native Material should be compacted to 98 per cent of the standard Proctor maximum dry density and to 100 per cent within 300 mm of finished subgrade, as determined by ASTM Test Method D698-70.

c. Type 3 Fill: Coarse Native Material should be compacted by a minimum of 6 complete passes of a smooth drum 3.5 tonne vibratory roller, or equivalent.

8. For each fill type, a Method Compaction Technique test fill will be completed onsite to determine the number of compactor passes required to meet placed fill density specifications and confirm the maximum lift thicknesses.

9. Test fills used for determining specifics of the method compaction technique, to the extent possible, will employ the compaction equipment and simulate placement methods proposed.

10. Wherever possible, the degree of compaction shall be evaluated by nuclear densometer testing.

11. The embankment fill surfaces should be sloped to provide positive drainage to the site perimeter. Perimeter ditches may be required to control surface water runoff from this area by directing the runoff to a designated sump location(s) for monitoring prior to treatment and discharging to the environment.

5. AIRSTRIP EMBANKMENT CONSTRUCTION

5.1 Products

1. "Mineral Soil" as defined in Section 3. "BULK EXCAVATION".

2. "Bedrock" as defined in Section 3. "BULK EXCAVATION".

3. "Fill Material" is non-frozen, excavated Mineral Soil, Bedrock, Run of Mine material, processed material and/or other approved imported fill material that is suitable for use in the embankments (Type 2 Fill is expected, as defined in Section 4. "BACKFILL MATERIAL).

4. Fill Materials will be approved by the Owner's Representative, using recommendations provided by the Geotechnical Engineer, prior to usage by the Contractor

5.2 Execution

1. The airstrip embankment fills shall be constructed to the lines, grades and cross-sections shown on the Construction Drawings.

2. Salvage and Stockpile Organic Materials, as outlined in Section 1. "SALVAGE AND STOCKPILE ORGANIC MATERIALS" to be performed.

3. Foundation Preparation, as outlined in Section 2. "FOUNDATION PREPARATION", to be performed. No Fill Materials to be placed on prepared foundation surface without approval from Owner's Representative.

4. Native Fill materials for construction of the airstrip embankment will be obtained preferentially from areas of cut. In the event that insufficient quantities of bulk excavation materials are available, local borrow areas may be developed, as approved by the Owner's Representative.

5. All embankment fills shall be placed and compacted in dry conditions at temperatures above 0°C. Granular surfacing materials may be placed at temperatures below 0°C, at the discretion of the Engineer.

6. The minimum in situ compacted thickness of fill placed at any fill areas shall consist of 300 mm of Type 1 Fill material and 500 mm of Type 2 Fill material.

7. In areas where the total thickness of the embankment fill is 600 mm or less, Type 1 Fill material shall be placed, after the geotextile membrane, in lifts not exceeding 300 mm compacted thickness and no Type 2 Fill material shall be placed.

8. In areas where the total thickness of embankment fill is greater than one meter, Type 2 Fill material shall be placed to within about 300 mm of the finished subgrade surface of the airstrip embankment. The topmost lift of the Type 2 Fill material shall be of a noticeably finer gradation, as directed by the Geotechnical Engineer, in order to transition to geotextile membrane and the Type 1 Fill material.

9. Oversize Particles (greater than 500mm diameter) may be considered for placement at the base of deep embankment fills where the embankment thickness is greater than 1.5 metres, subject to approval by the Owners Representative. Oversize Particles shall be 'scalped off' by blading them off the fill grade with a bulldozer and pushing ahead of the fill into the advancing toe of the fill.

10. All embankment fill materials used for construction of the airstrip should comprise unfrozen materials, within the specified limits for particle size and moisture content.

11. Hauling and spreading equipment shall be routed approximately parallel to the axis of the embankment and the traffic patterns shall be varied to prevent rutting. Any damage to the embankment or to the Fill Materials already placed shall be repaired to the satisfaction of the Owner's Representative prior to the placement of the next lift. This may include, but shall not be limited to, the removal of ruts and repairs to fill boundaries.

12. Haul trucks should not follow existing tracks. If, however, rutting occurs, scarify and re-compact to produce an even surface. Develop a traffic pattern to achieve required densities to the satisfaction of the Owner's Representative.

13. Haul to designated fill placement area(s) within embankment footprint.

14. Adjacent lifts shall have a maximum elevation difference of one compacted lift thickness.

15. During dumping and spreading activities, remove any waste materials such as, but not limited to, debris, organics, vegetation or any other unsuitable material if such material has been transported into the working areas.

16. Spread Fill Material in even, horizontal lifts, of which the maximum loose lift thickness will be specified by the Owner's Representative based on the results of field compaction tests. The maximum loose lift thickness is expected to be in the order of 300 mm for suitable Mineral Soil materials and 500 mm for rock fill materials.

17. Oversize particles shall be removed. Where reduced lift thicknesses are required, particles larger than two-thirds (2/3) of the reduced lift thickness shall be removed prior to compaction. Requirements for reduced lift thicknesses shall be determined by the Owner's Representative.

18. Compaction to be performed using the smooth drum vibratory 3.5 tonne compactor and full-loaded Caterpillar 773 rock trucks.
19. When compacting Fill Materials, adjust the water content of the Fill Material to within 2% (by weight) of optimum water content.

20. Fill Material consisting of Mineral Soil shall be compacted to a minimum of 95% standard Proctor maximum dry density or as specified in Section 4. "BACKFILL MATERIALS". Fill Materials consisting of rock fill shall be compacted to a performance-based requirement. This compaction requirement shall be developed in the field as recommended by the Geotechnical Engineer. The resulting compaction achieved will be to the satisfaction of the Owner's Representative. The Contractor shall cooperate with the Geotechnical Engineer and the Owner's Representative to develop the performance-based requirement.

21. Water shall not be permitted to pond on surface. Ponded water should be removed from the fill.

22. Any Fill Material which has become saturated, softened, loosened or has undergone a reduction in density by precipitation, ponded water, construction traffic or frost action is to be excavated and replaced with suitable material. The Geotechnical Engineer shall identify areas in which material should be removed. This work shall be performed to the satisfaction of the Owner's Representative. The excavated material may be dried and/or thawed and used for fill upon approval from the Owner's Representative.

23. Shape the embankment to a dense, uniform surface free of ruts or loose material at a slope sufficient to promote free drainage of surface water at all times.

24. Slope exterior embankment surfaces to be plane and uniform and to the lines and grades shown on the Drawings. This will require the placement and compaction of Fill Material beyond the lines and grades shown on the Drawings followed by trimming to the said lines and grades.

25. Before suspension of operations each day or before inclement weather, the Fill Materials in place shall be compacted and the surface rolled smooth and crowned to facilitate free drainage of precipitation.

26. Where possible, Fill Material placed in the embankment shall be free from lenses, pockets or layers of materials which are significantly different in gradation from the surrounding material. The Contractor shall employ methods to limit the amount and limits of segregated materials. The Contractor shall work with the Geotechnical Engineer to develop such methods which may include, but not be limited to, the placement of parallel strips of Fill Material within a given lift and/or material blending. The Geotechnical Engineer shall provide recommendations to the Owner's Representative as to the acceptability of the results of the placed materials. Fill Material shall be placed to the satisfaction of the Owner's Representative.

6. GRANULAR PAVEMENT SURFACE CONSTRUCTION

6.1 Products

1. "Type 1 Fill Material" as defined in Section 4.

6.2 Execution

1. The Contractor shall confirm the as-built surface of the embankment fill by survey prior to applying Type 1 Fill. Any discrepancies determined by the as-built survey shall be corrected prior to applying Type 1 Fill.

2. Spread Type 1 Fill Material in an even, horizontal lift, of which the maximum loose lift thickness will be specified by the Owner's Representative based on the results of field compaction tests of the underlying embankment fill materials.

3. The maximum loose lift thickness is expected to be in the order of 400 mm for Type 1 Fill material to achieve a final in situ compacted thickness of 300 mm. However, greater thickness may be applied as directed by the Owner's Representative.

4. Type 1 Fill is considered a processed material and shall be approved for placement by the Owner's Representative prior to construction. Therefore, Oversize Particles are not considered part of this application.

5. Compaction to be performed using the smooth drum vibratory 3.5 tonne compactor and full-loaded Caterpillar 773 rock trucks, as necessary.

6. When compacting Type 1 Fill, adjust the water content of the Fill Material to within 2% (by weight) of optimum water content.

7. Compact Type 1 Fill in accordance with Section 4.

8. Shape the granular pavement surface to a dense, uniform surface free of ruts or loose material at a slope sufficient to promote free drainage of surface water at all times.

7. RUNOFF AND SEDIMENT CONTROL DITCHES AND MONITORING PONDS

7.1 Ditches

1. Ditches shall be constructed as required to:

a. Capture runoff from areas impacted by construction activities; and

b. Promote drainage away from the as-constructed airstrip embankment, in the longer term.

2. The locations and sizes of the ditches will be determined in the field by the Geotechnical Engineer. In general, ditches will have a minimum cross-sectional area of 1.0 m^2 and channel side slopes will not be steeper than 3 Horizontal to 1 Vertical.

3. Ditches shall be graded at a minimum 0.1% slope, or as directed by the Geotechnical Engineer, toward the monitoring ponds.

7.2 Monitoring Pond

1. Monitoring ponds shall be constructed to allow for sedimentation and visual observation of surface runoff water prior to discharge to the environment;

2. The monitoring pond shall be lined with a 150 mm thick layer of select Type 1 Fill material. The monitoring pond shall have minimum dimensions of 20 m length, 20 m width, and 0.5 m depth.

3. The exact location of the monitoring pond(s) will be determined by the Geotechnical Engineer during construction. The Pond shall be located at least 25 m away from settlement-sensitive structures.

4. Ditches and monitoring ponds shall be constructed and commissioned prior to beginning construction activities;

5. During the construction phase, monitoring will be limited to identifying suspended sediments in runoff discharge at the point of release from the Monitoring Pond;

6. If sediments are observed in discharge flows, immediate action shall be taken to mitigate sediment concentration to a non-observable level, or the project permit levels;

7. The Monitoring Pond will be field fit during the course of construction, and will collect ditch flow at a common point. The Pond shall be of sufficient capacity to provide adequate residence time to the collected runoff for sedimentation to a degree so that discharge from the Monitoring Pond contains little to no visible sediment in surface water runoff from the airstrip.

8. The details of erosion protection to minimize erosion and/or sedimentation will be determined during the course of construction; and

9. One test pit will be excavated and geotechnically logged in an area of the pond foundation. The pond will not be placed over thick peat deposit(s).

7.3 Access

1. Free, unrestricted access to the general open areas surrounding the developed site will not be available. Equipment movements and work operations shall be confined to the areas designated by the Owner's Representative.

7.4 Temporary Protection of Works

1. If a section of fill is to be left for a period of time (e.g., overnight) before subsequent lifts are placed, or when rain is imminent, roll smooth the surface of the top lift in order to promote drainage of surface water. Before restart of the Work on this section, scarify and re-compact, as directed by the Owner's Representative.

7.5 Weather

1. Do not place material when satisfactory work cannot be performed due to intense periods of inclement weather such as, rain, snow, extreme cold or any other unsatisfactory conditions.

8. SURVEY CONTROL

1. Sufficient survey control shall be provided to:

a. Lay out the construction;
b. Measure as-constructed quantities;
c. Prepare as-built drawings; and
d. Periodically verify the accuracy of the constructed works.

2. Survey shall be provided as required by the Owner's Representative as part of the QA/QC control.

3. In general, the constructed works shall be carried out within 50 mm vertically and 100 mm horizontally of the dimensions indicated on the Drawings. In the event that these tolerances are in conflict, the vertical tolerance shall prevail.

4. Where stricter grade control is required, at the discretion of the Owner's Representative, it shall be provided for.

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO-EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
A	11-19-2012	FOR APPROVAL	Y.B.	R.M.	A.H.

REVISIONS

REGISTERED PROFESSIONAL ENGINEER
R. MARCOUX
LICENSEE
NT/NU
2012-11-19

TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRPORT DESIGN FOR BOEING 737
CODE NUMBER : 3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
DEVIS

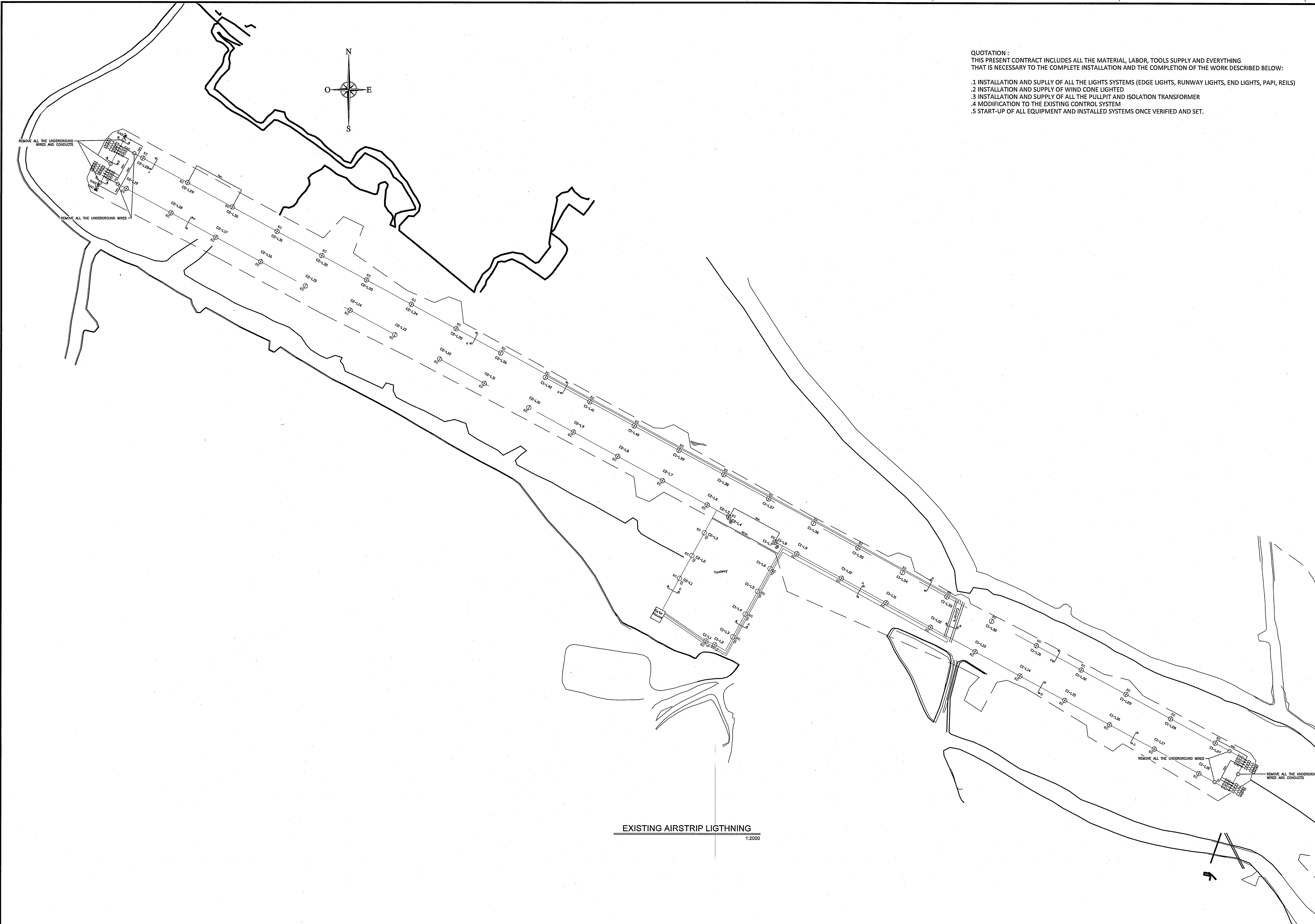
DESSINÉ PAR / DRAWN BY	YVES BOISVERT, T.P.	DATE 11-19-2012
VERIFIÉ PAR / CHECKED BY	RICHARD MARCOUX, ing.	11-19-2012
APPROUVÉ PAR / APPROVED BY		
ÉCHELLE / SCALE	NO SCALE	DATE 19 NOVEMBRE 2012

NO. DESSIN
DRAWING NO. MEAD-620-C-105-A

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
VD3245	A	1 / 1

NO. DESSIN DRAWING NO. VD3245-000-EL

FORMAT ARCHD



QUOTATION :
THIS PRESENT CONTRACT INCLUDES ALL THE MATERIAL, LABOR, TOOLS SUPPLY AND EVERYTHING THAT IS NECESSARY TO THE COMPLETE INSTALLATION AND THE COMPLETION OF THE WORK DESCRIBED BELOW:

.1 INSTALLATION AND SUPPLY OF ALL THE LIGHTS SYSTEMS (EDGE LIGHTS, RUNWAY LIGHTS, END LIGHTS, PAPI, REILS)
.2 INSTALLATION AND SUPPLY OF WIND CONE LIGHTED
.3 INSTALLATION AND SUPPLY OF ALL THE PULLPIT AND ISOLATION TRANSFORMER
.4 MODIFICATION TO THE EXISTING CONTROL SYSTEM
.5 START-UP OF ALL EQUIPMENT AND INSTALLED SYSTEMS ONCE VERIFIED AND SET.

EXISTING AIRSTRIP LIGTHNING
1:2000

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

- EDGE LIGHT (WHITE)
- THRESHOLDS / END LIGHT (GREEN–RED)
- TAXIWAY AND APRON LIGHT (BLUE)
- MARKING LIGHT (YELLOW)
- REILS
- TRANSFORMER STATION FOR RILS
- PULL PIT WITH ISOLATION TRANSFORMER

ED : EXISTING EQUIPEMENT MOVED
EC : EXISTING EQUIPEMENT CONSERVED
EAD : EXISTING EQUIPEMENT TO BE MOVED

POUR APPROBATION
FOR APPROVAL
DATE : 2012–11–21
AGNICO-EAGLE

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO-EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
A	2012–11–21	FOR APPROVAL	N.P.	J.P.	A.H.

REVISIONS

REGISTERED PROFESSIONAL ENGINEER
R. MARCOUX
LICENSEE
NT/NU
2012-11-19

TITRE / TITLE
AGNICO–EAGLE – DIVISION
AIRSTRIP DESIGN FOR B737–200
CODE NUMBER : 3 CODE LETTER : C
NON–PRÉCISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
EXISTING LIGHTING

DESSINÉ PAR / DRAWN BY	NANCY PERREAULT, TECH.	DATE 2012–10–30
VERIFIÉ PAR / CHECKED BY	SEBASTIEN PETIT, ING. JR	2012–11–21
APPROUVÉ PAR / APPROVED BY	JOEL PAQUET, ING.	2012–11–21
ÉCHELLE / SCALE 1:2000	DATE 2012–09–07	

NO. DESSIN DRAWING NO. MEAD–620–E–101–A

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
VD3245–000	A	1/7

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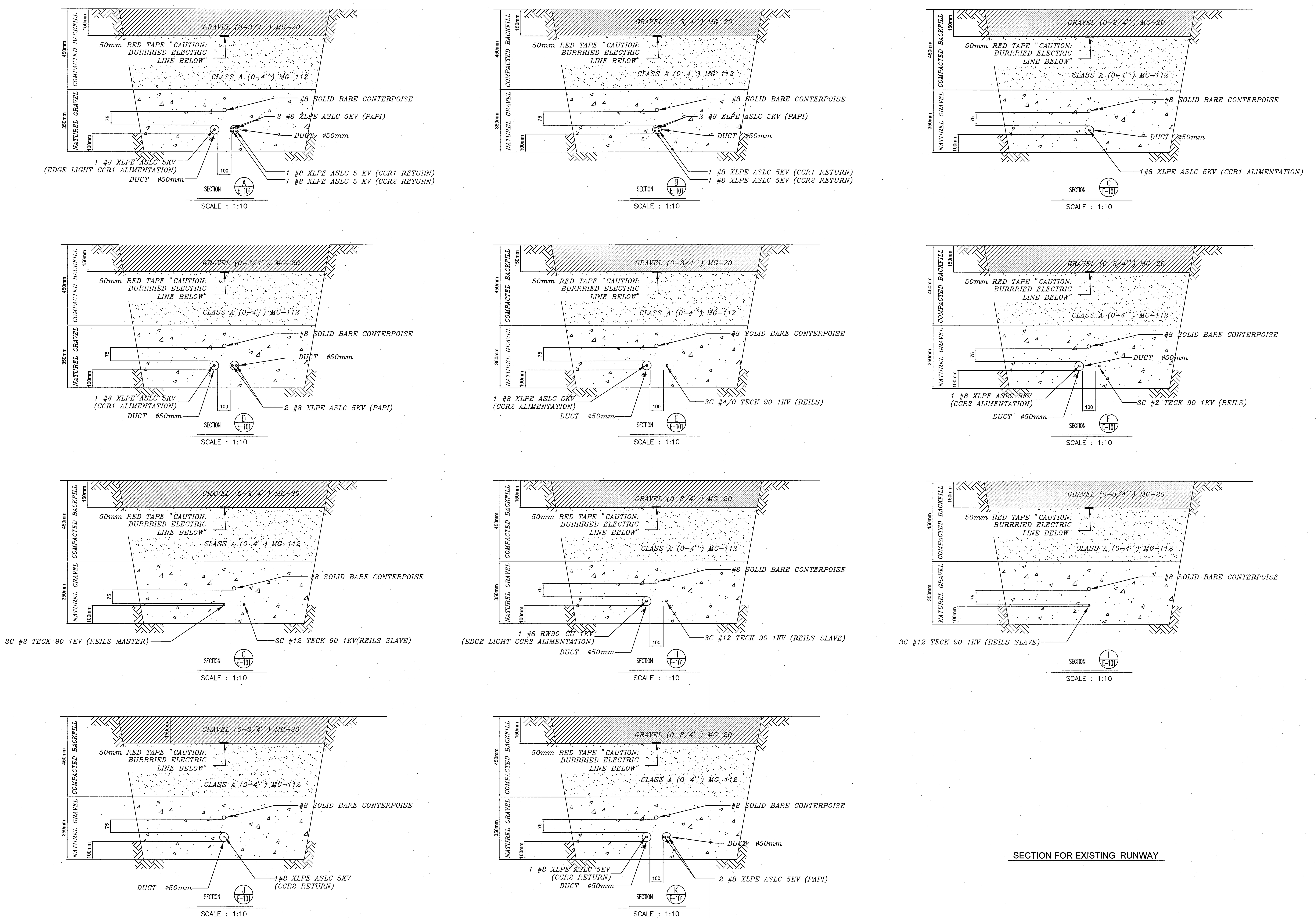

FORMAT ARCHD

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

POUR APPROBATION
FOR APPROVAL
DATE : 2012-11-21
AGNICO-EAGLE

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TITRE / TITLE	# DWG

AGNICO-EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
A	2012-11-21	FOR ~~CONSTRUCTION~~ APPROVAL	N.P.	J.P.	A.H.

REVISIONS

REGISTERED PROFESSIONAL ENGINEER
R. MARCOUX
LICENSEE
NT/NU
2012-11-19

TITRE / TITLE
AGNICO-EAGLE – DIVISION
AIRSTRIP DESIGN FOR B737-200
CODE NUMBER : 3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
EXISTING SECTION

DESSINÉ PAR / DRAWN BY	NANCY PERREAULT, TECH.	DATE 2012-10-30
VÉRIFIÉ PAR / CHECKED BY	SEBASTIEN PETIT, ING. JR	2012-11-21
APPROUVÉ PAR / APPROVED BY	JOEL PAQUET, ING.	2012-11-21
ÉCHELLE / SCALE	DATE	2012-09-07

NO. DESSIN / DRAWING NO. MEAD-620-E-102-A

NO. PROJET / PROJECT NO.	RÉVISION	FEUILLE / SHT
VD3245-000	A	2 / 7

AE-CART-ARCH D

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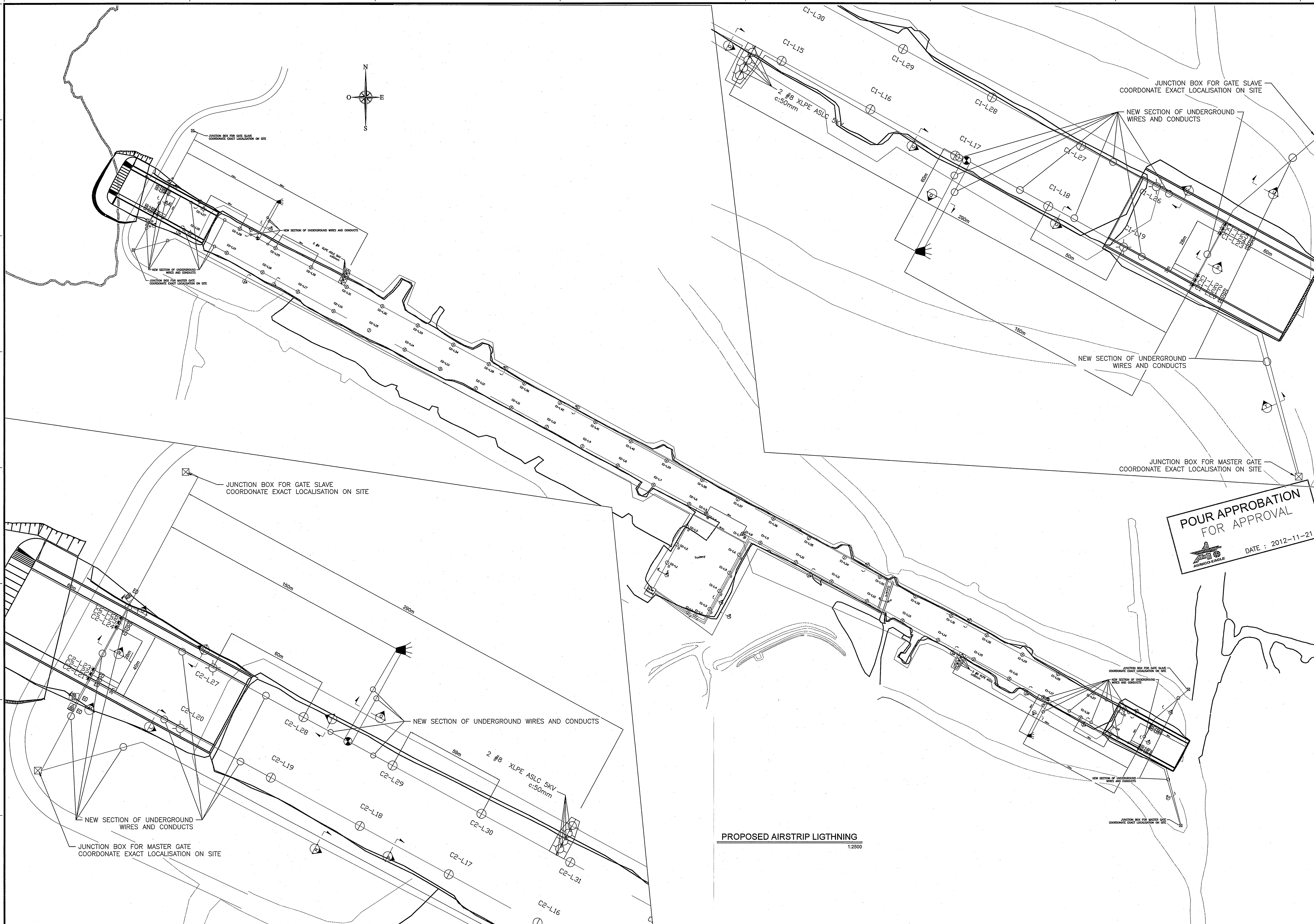

PROPOSED AIRSTRIP LIGTHNING

1:2500

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

EXISTING LEGEND

- EDGE LIGHT (WHITE)
- THRESHOLDS / END LIGHT (GREEN-RED)
- TAXIWAY AND APRON LIGHT (BLUE)
- MARKING LIGHT (YELLOW)
- REILS
- TRANSFORMER STATION FOR RILS
- PULL PIT

PROPOSED LEGEND

- TRANSFORMER STATION FOR RILS
- REILS
- HIGH INTENSITY EDGE LIGHTS (WHITE)
- HIGH INTENSITY THRESHOLDS END LIGHTS (GREEN-RED)
- HIGH INTENSITY MARKING LIGHTS (YELLOW)
- HIGH INTENSITY TAXIWAY AND APRON LIGHTS (BLUE)
- 4 KITS OF 4 UNITS (3 LIGHTS PER UNIT) (P.A.P.I.)
- PULLPIT WITH ISOLATION TRANSFORMER
- WIND CONE LIGHTED (2)

ED : EXISTING EQUIPEMENT MOVED
EC : EXISTING EQUIPEMENT CONSERVED
EAD : EXISTING EQUIPEMENT TO BE MOVED

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

AGNICO-EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
A	2012-11-21	FOR ~~CONSTRUCTION~~ APPROVAL	N.P.	J.P.	A.H.

REVISIONS

REGISTERED PROFESSIONAL ENGINEER
P. MARCOUX
LICENSEE
NT/NU
2011-11-19

TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRSTRIP DESIGN FOR B737-200
CODE NUMBER : 3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
PROPOSED LIGHTING

DESSINÉ PAR / DRAWN BY	NANCY PERREAULT, TECH.	DATE 2012-10-30
VERIFIÉ PAR / CHECKED BY	SEBASTIEN PETIT, ING. JR	2012-11-21
APPROUVÉ PAR / APPROVED BY	JOEL PAQUET, ING	2012-11-21
ÉCHELLE / SCALE	INDICATED	DATE 2012-09-07

NO. DESSIN
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NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
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NO. DESSIN DRAWING NO. VD3245-000-EL

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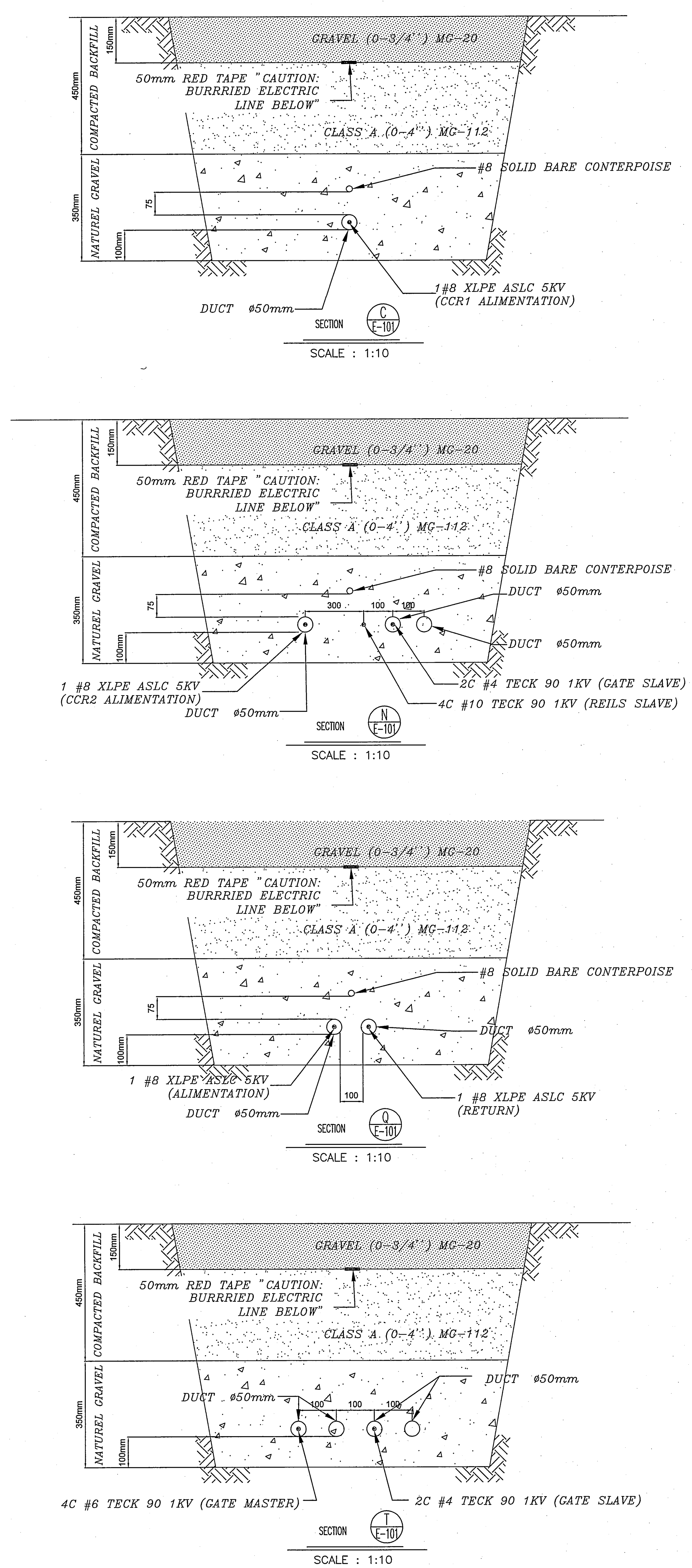

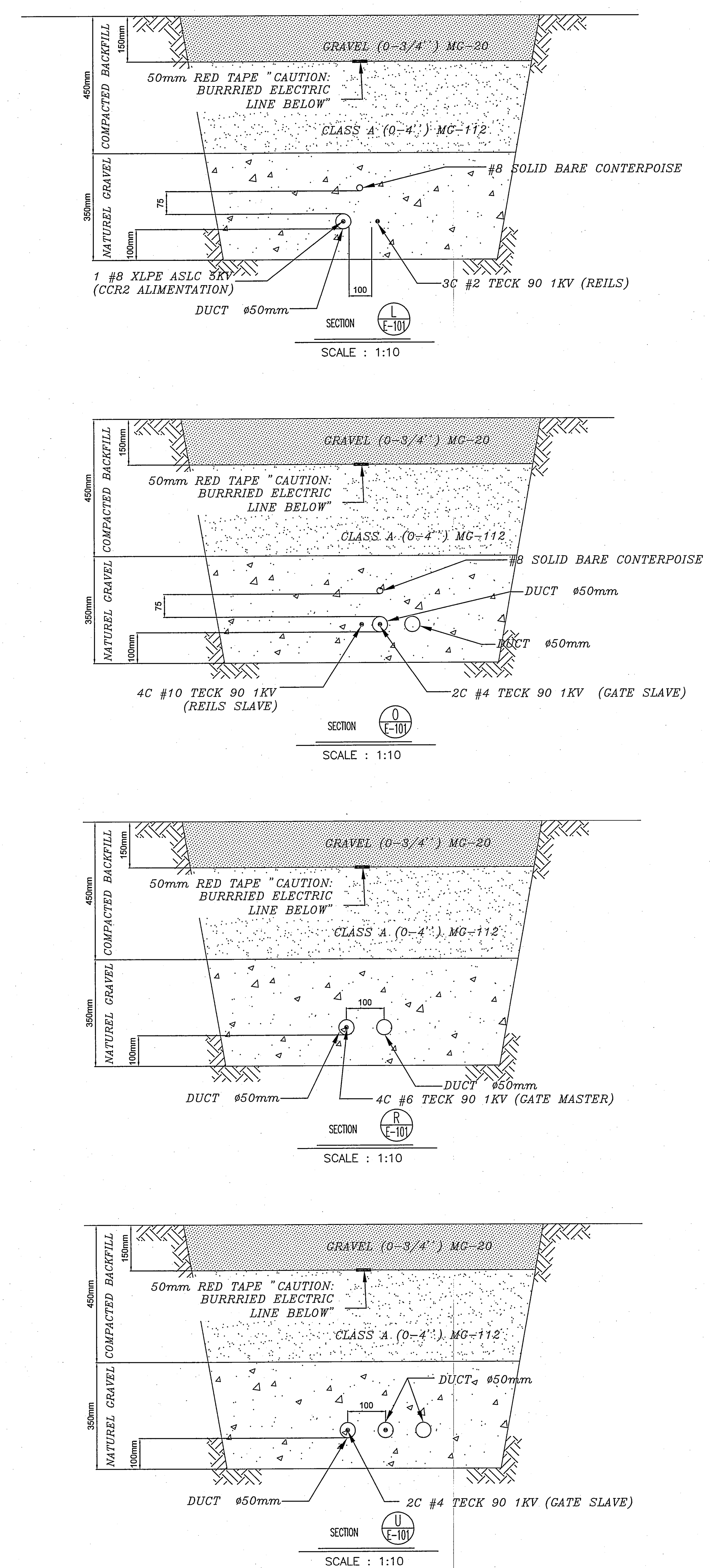

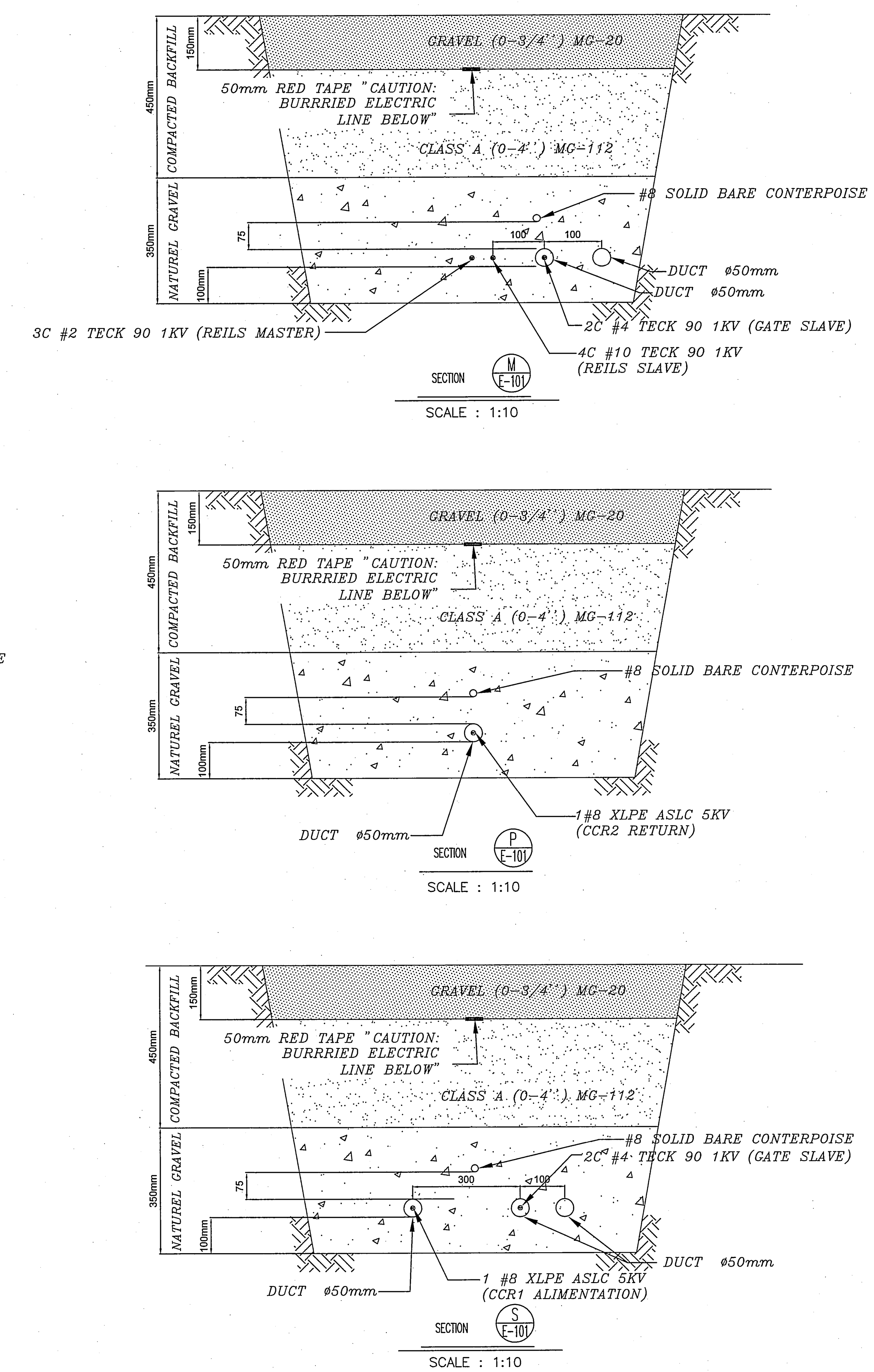

SECTION FOR PROPOSED RUNWAY

GENERAL NOTE :
CONNECT TOGETHER THE CONTERPOISE CABLE AT EACH JUNCTION BOX, PULLPIT AND AT EACH TIME THEY CROSSED.

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

POUR APPROBATION
FOR APPROVAL
DATE : 2012-11-21

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

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A	2012-11-21	FOR APPROVAL	N.P.	J.P.	A.H.

REVISIONS

R. MARCOUX LICENSEE NT/NU 2012-11-19

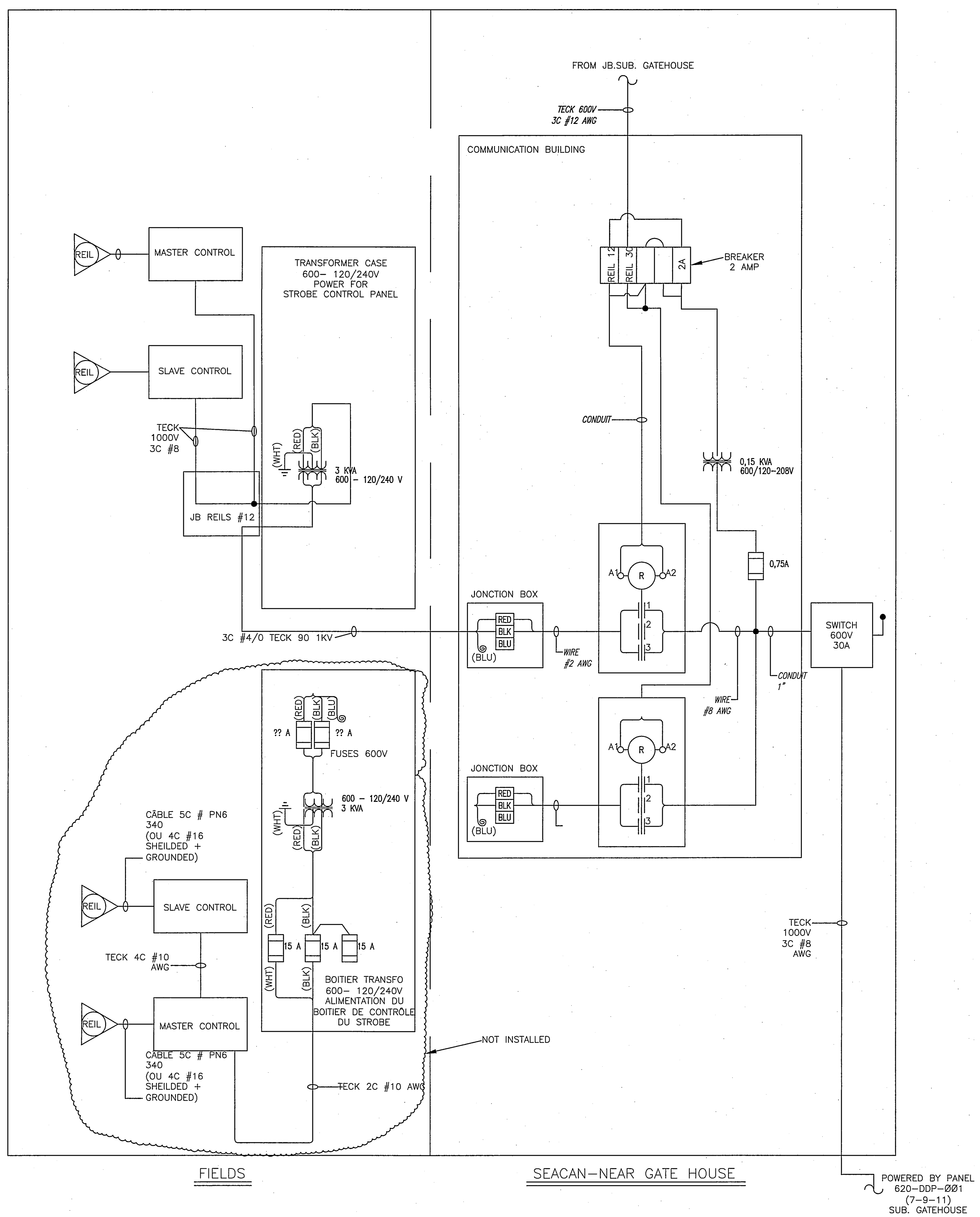
TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRSTRIP DESIGN FOR B737-200
CODE NUMBER :3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
PROPOSED SECTION

		DATE
DESSINÉ PAR / DRAWN BY	NANCY PERREAULT, TECH.	2012-10-30
VÉRIFIÉ PAR / CHECKED BY	SEBASTIEN PETIT, ING. JR	2012-11-21
APPROUVÉ PAR / APPROVED BY	JOEL PAQUET, ING.	2012-11-21
ÉCHELLE / SCALE	INDICATED	2012-09-07

NO. DESSIN DRAWING NO. MEAD-620-E-104-A

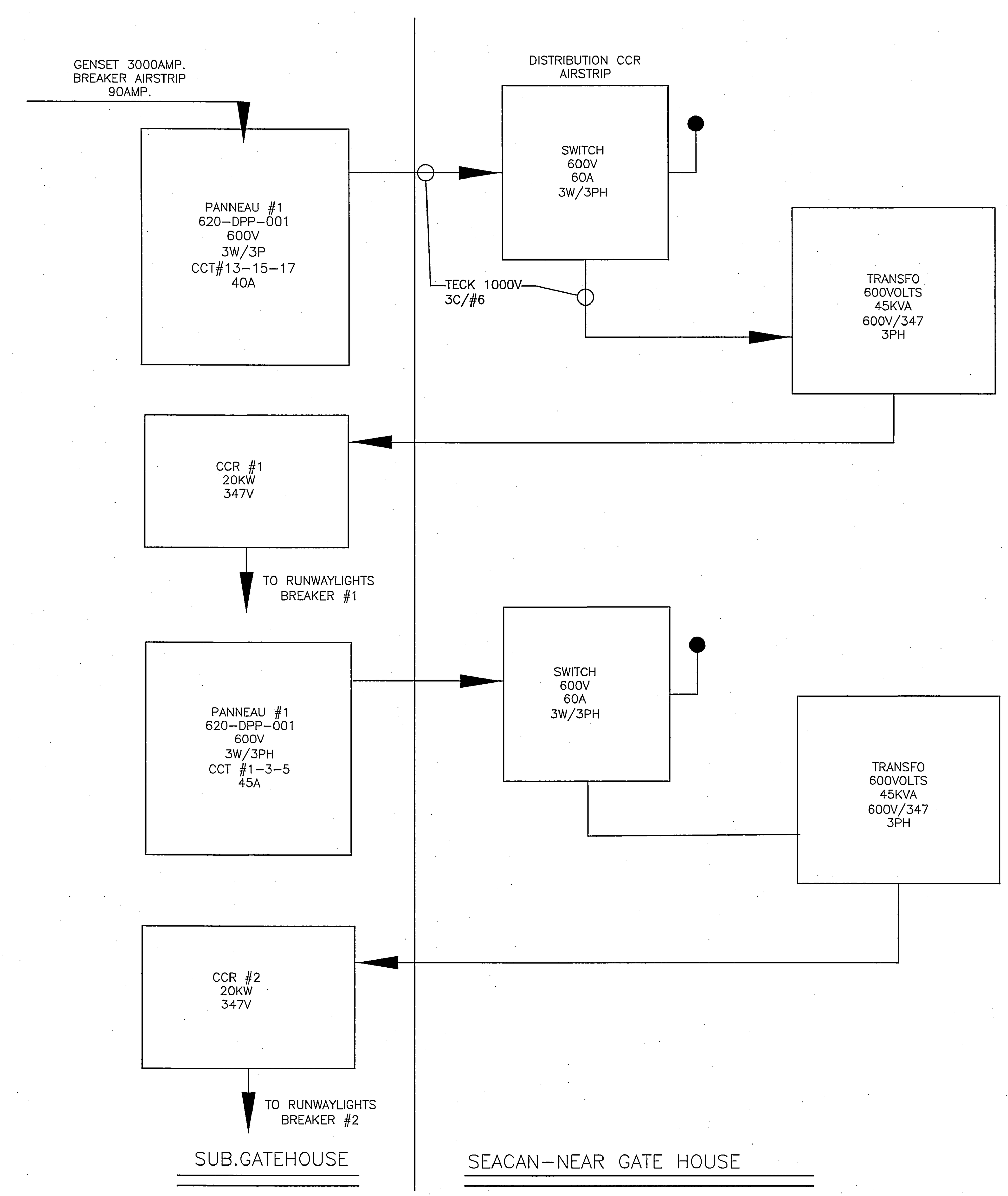
NO. PROJET PROJECT NO.	RÉVISION	FEUILLE / SHT
VD3245-000	A	4/7

NO. DESSIN DRAWING NO. VD3245-000-EL



DETAIL 1
NOT TO SCALE

EXISTING REILS CONTROL CONNECTION
NOT TO SCALE



DETAIL 2
NOT TO SCALE

EXISTING CCR CONTROL CONNECTION
NOT TO SCALE

PLAN CLÉ / KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

POUR APPROBATION
FOR APPROVAL
DATE : 2012-11-21

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TITRE / TITLE	# DWG

AGNICO-EAGLE

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A	2012-11-21	FOR APPROVAL	N.P.	J.P.	A.H.

REVISIONS

TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRSTRIP DESIGN FOR B737-200
CODE NUMBER :3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
EXISTING CONTROL CONNECTION

DESSINÉ PAR / DRAWN BY	NANCY PERREAULT, TECH.	DATE 2012-10-30
VÉRIFIÉ PAR / CHECKED BY	SEBASTIEN PETIT, ING. JR	2012-11-21
APPROUVÉ PAR / APPROVED BY	JOEL PAQUET, ING.	2012-11-21
ÉCHELLE / SCALE	INDICATED	DATE 2012-09-07

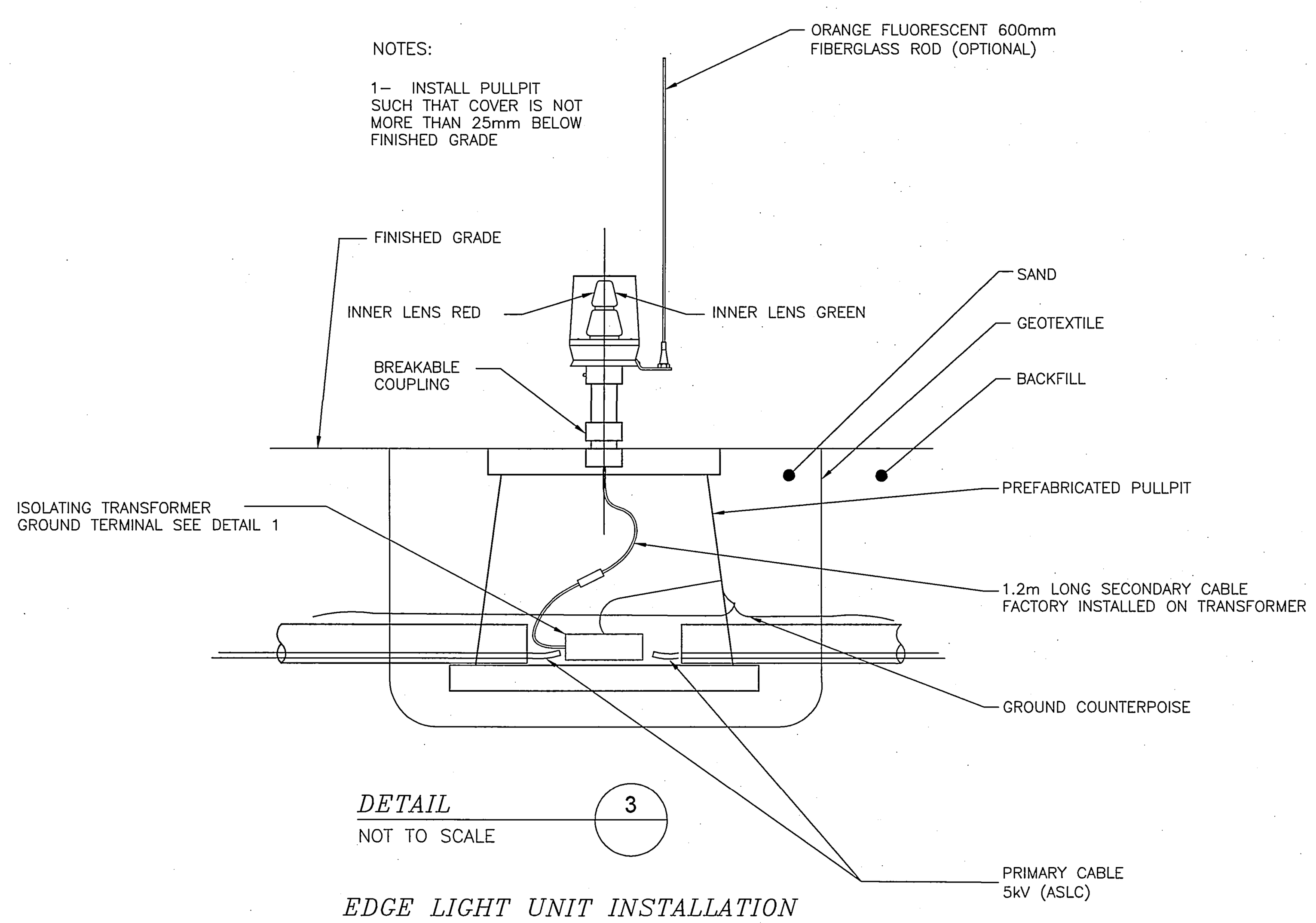
NO. DESSIN / DRAWING NO. MEAD-620-E-105-A

NO. PROJET / PROJECT NO.	REVISION	FEUILLE / SHT
VD3245-000	A	5 / 7

NO. DESSIN DRAWING NO. VD3245-000-EL

NOTES:

1– INSTALL PULLPIT SUCH THAT COVER IS NOT MORE THAN 25mm BELOW FINISHED GRADE



DETAIL 3
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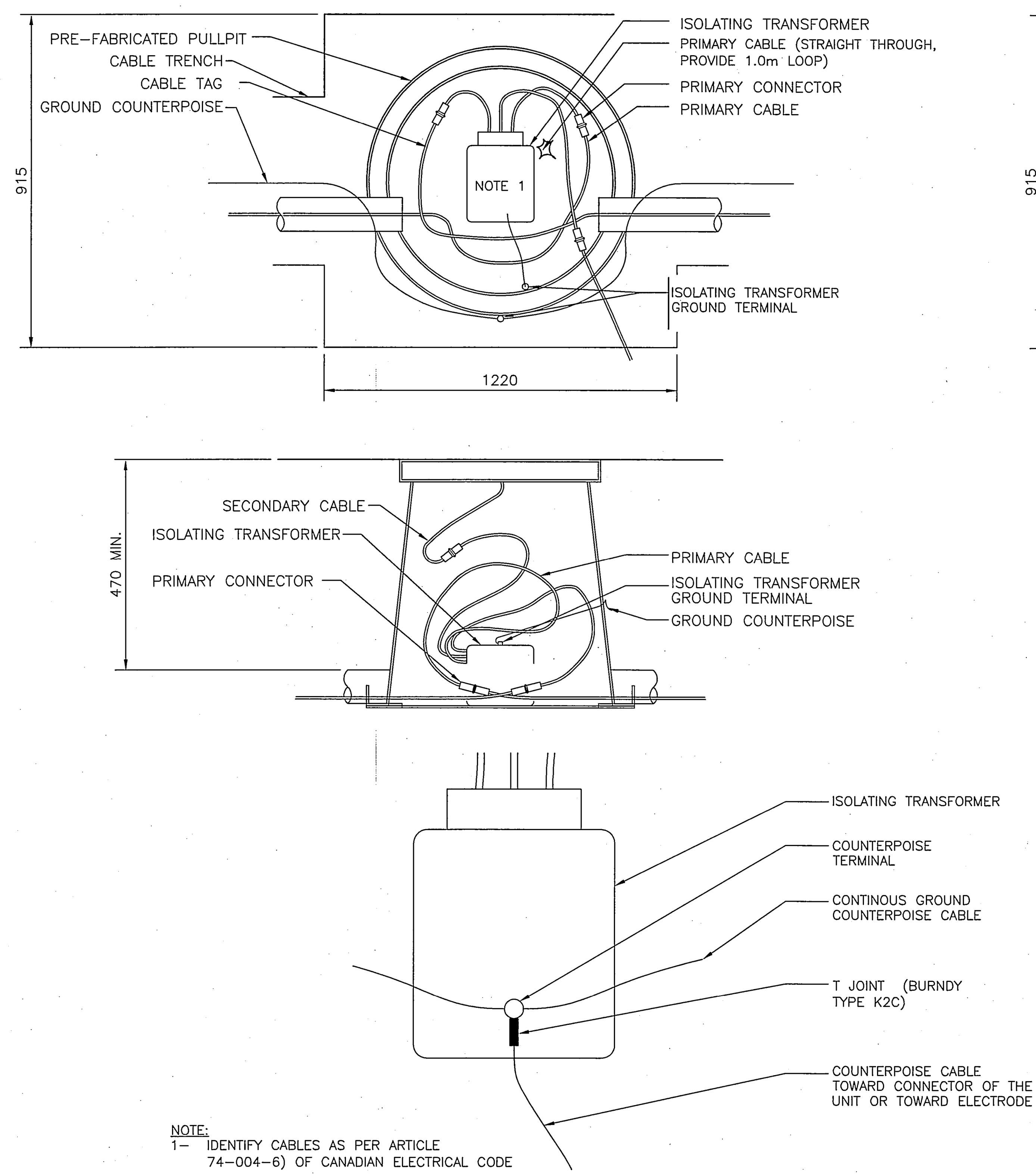
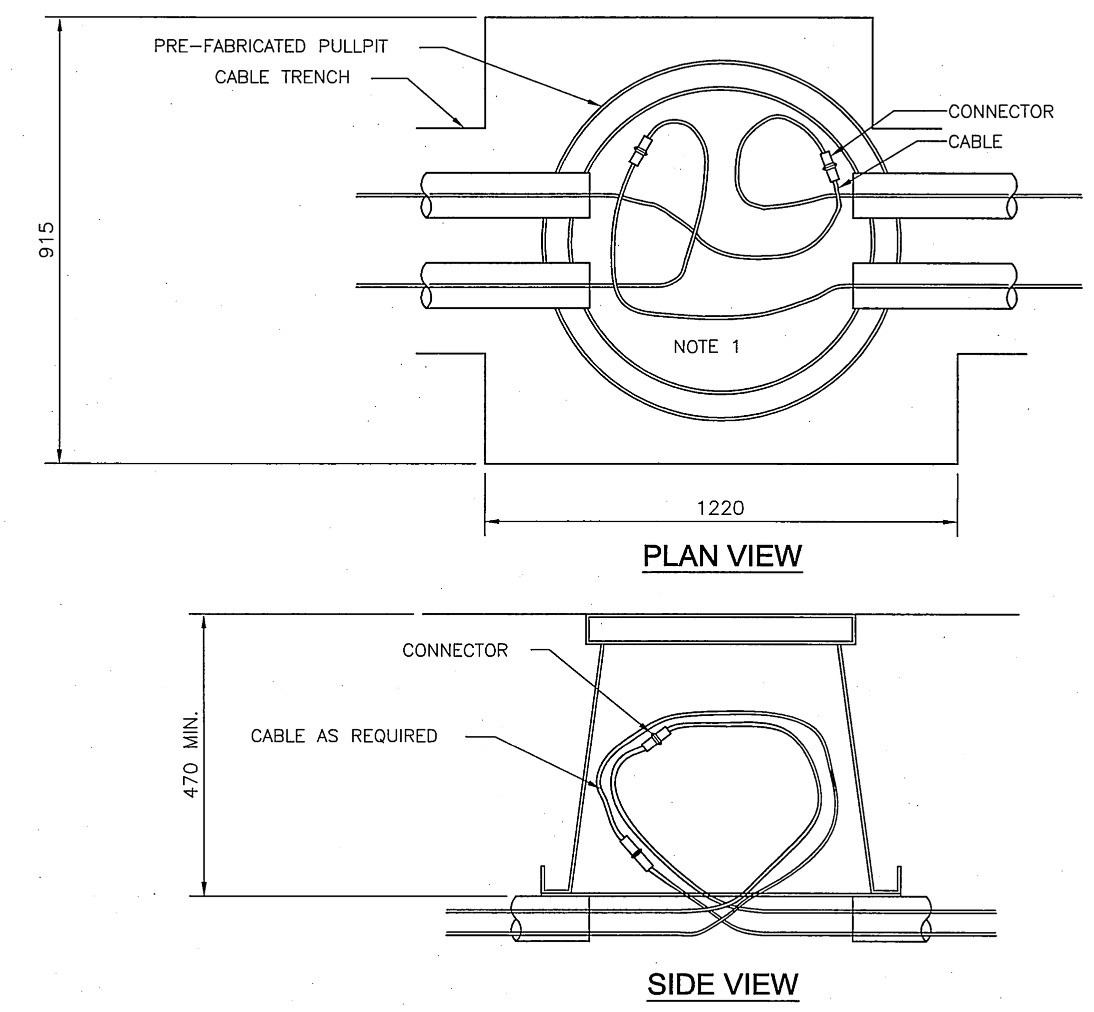
EDGE LIGHT UNIT INSTALLATION
NOT TO SCALE



NOTE:
1– IDENTIFY CABLES AS PER ARTICLE 74-004-6) OF CANADIAN ELECTRICAL CODE

DETAIL 4
NOT TO SCALE

PULLPIT WITH ISOLATING TRANSFORMER TYPICAL INSTALLATION
NOT TO SCALE

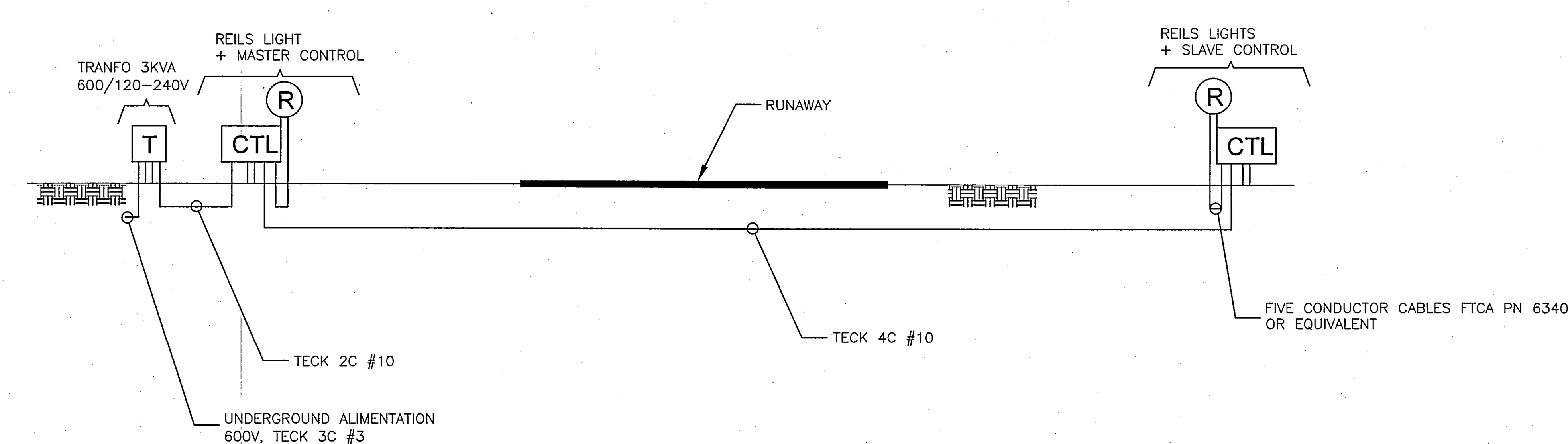


DETAIL 5
NOT TO SCALE

PULLPIT TYPICAL INSTALLATION
NOT TO SCALE

INTENSITY SCHEDULE		
LIGHT TYPE	DESCRIPTION	MAXIMUM HEIGHT OF INSTALLATION FROM ABOVE THE FINISH GROUND (mm)
Φ	EDGE LIGHT (WHITE), 1 LIGHT OF 150 W, 1 TRANSFORMER OF 200 WATTS.	350
Φ_B	TAXIWAY AND APRON LIGHT (BLUE), 1 LIGHT OF 45 WATTS, 1 TRANSFORMER OF 45 WATTS.	350
Φ_J	MARKING LIGHT (YELLOW), 1 LIGHT OF 45 WATTS,1 TRANSFORMER OF 45 WATTS.	350
R●V	THRESHOLDS / END LIGHT (GREEN AND RED) 1 LIGHT OF 100 WATTS, 1 TRANSFORMER OF 200 WATTS.	350
	PAPI 3 LIGHT OF 200 WATTS	1500
	WIND DIRECTION INDICATOR 1 LIGHT OF 100 WATTS TRANSFORMER OF 200 WATTS	6096

DETAIL 6
NOT TO SCALE



DETAIL 7
NOT TO SCALE

REILS TYPICAL INSTALLATION
NOT TO SCALE

PLAN CLÉ KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

POUR APPROBATION
FOR APPROVAL
DATE : 2012-11-21

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TITRE / TITLE	# DWG

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A	2012-11-21	FOR APPROVAL	N.P.	J.P.	A.H.

RÉVISIONS

TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRSTRIP DESIGN FOR B737-200
CODE NUMBER :3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
DETAILS

DESSINÉ PAR DRAWN BY: NANCY PERREAULT, TECH. — DATE 2012-10-30
VÉRIFIÉ PAR CHECKED BY: SEBASTIEN PETIT, ING. JR — 2012-11-21
APPROUVÉ PAR APPROVED BY: JOEL PAQUET, ING. — 2012-11-21
ÉCHELLE SCALE: INDICATED — DATE 2012-09-07

NO. DESSIN DRAWING NO. MEAD-620-E-106-A

NO. PROJET PROJECT NO. VD3245-000 — RÉVISION A — FEUILLE / SHT 6 / 7

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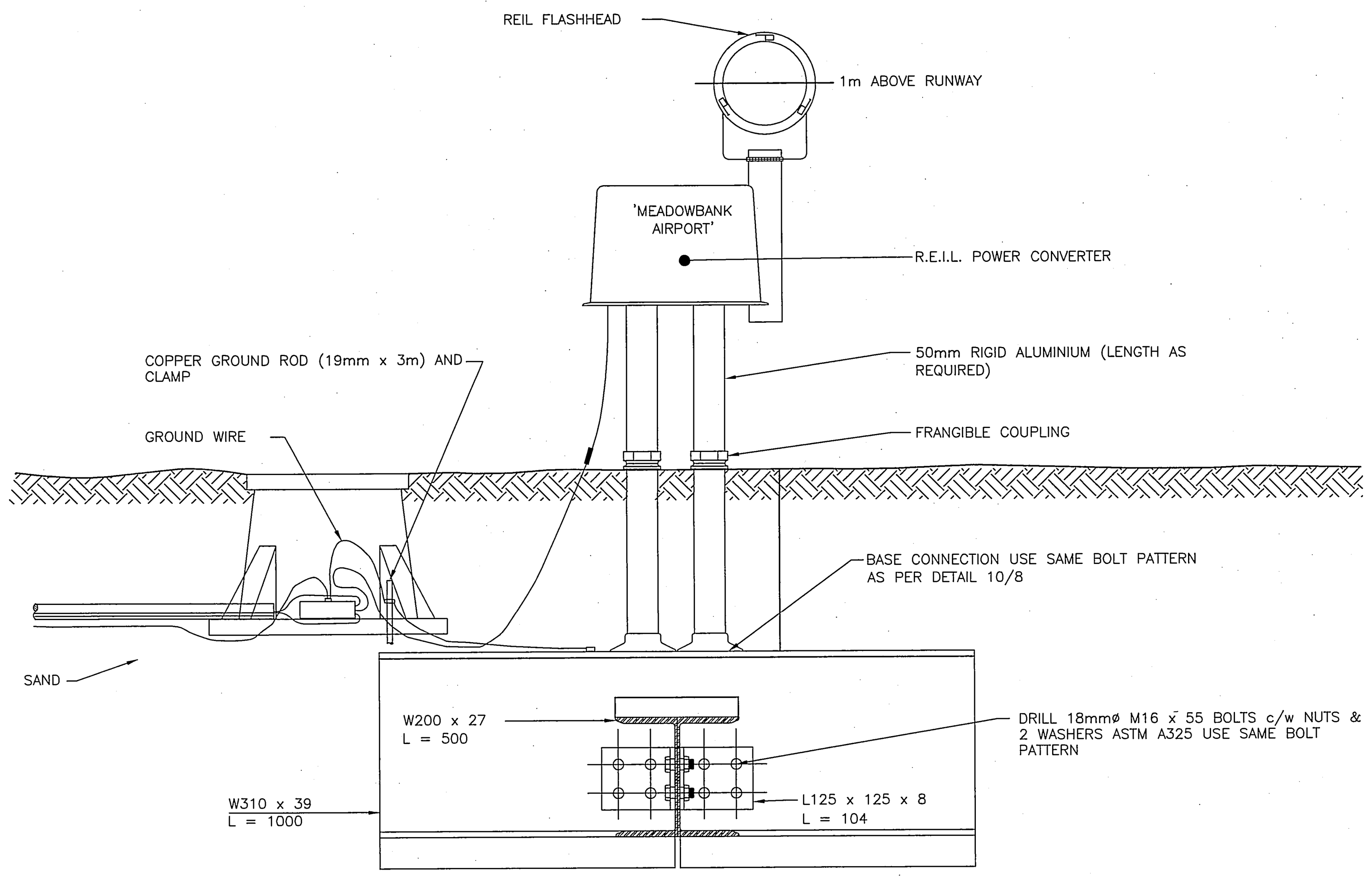
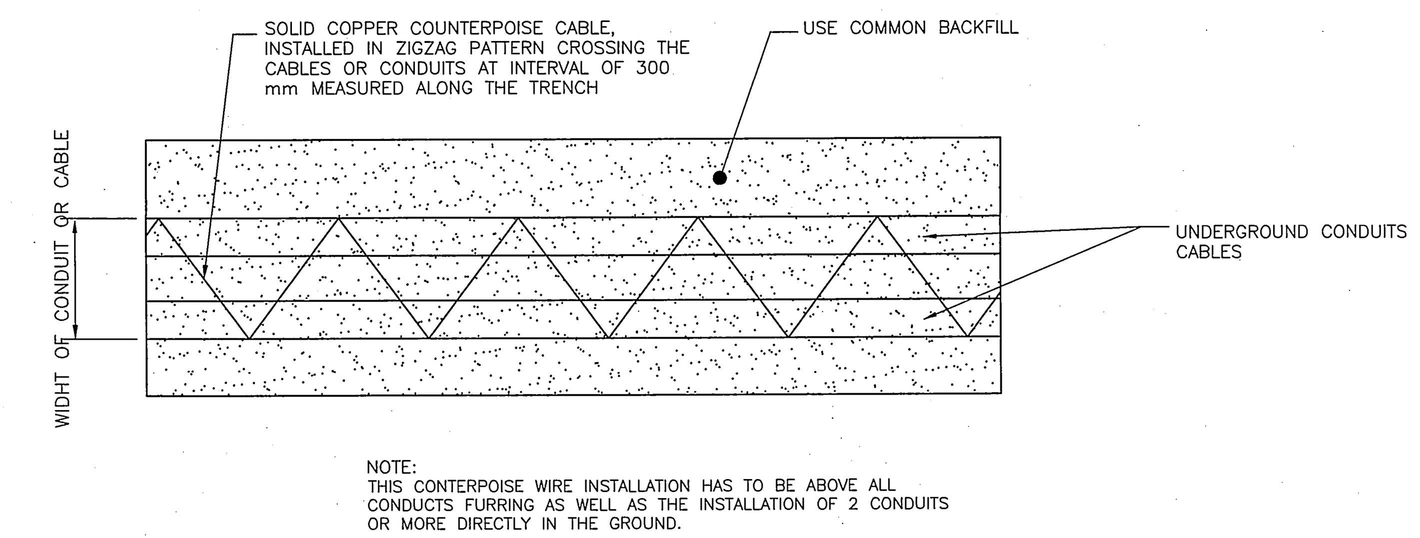
NO. DESSIN DRAWING NO. VD3245-000-EL



DETAIL 8
NOT TO SCALE

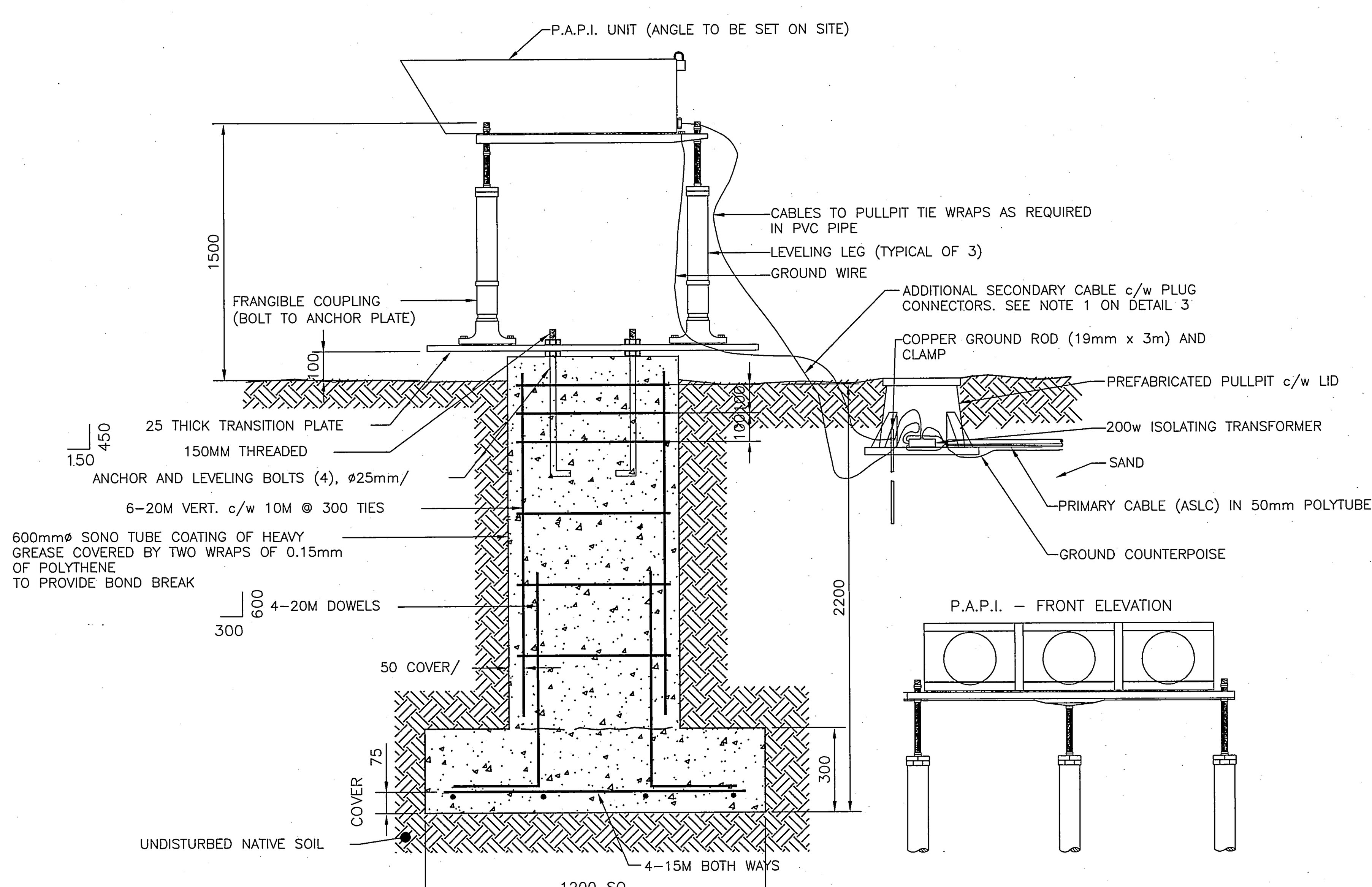
REILS
NOT TO SCALE



NOTE:
THIS CONTERPOISE WIRE INSTALLATION HAS TO BE ABOVE ALL CONDUCTS FURRING AS WELL AS THE INSTALLATION OF 2 CONDUITS OR MORE DIRECTLY IN THE GROUND.

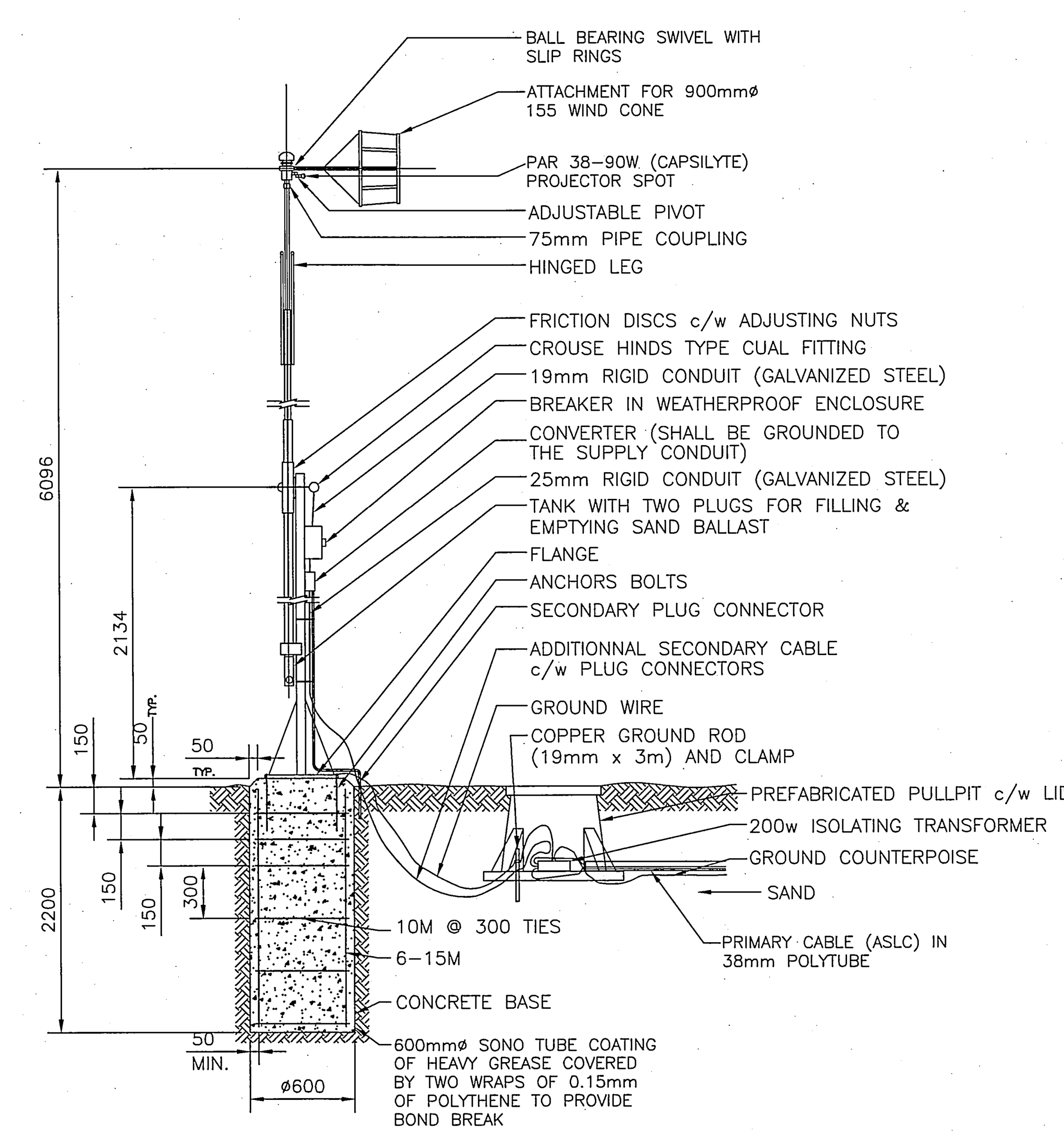
DETAIL 9
NOT TO SCALE
QTY:

GROUND COUNTERPOISE TYPICAL INSTALLATION
NOT TO SCALE



DETAIL 10
NOT TO SCALE

PAPI UNIT INSTALLATION
NOT TO SCALE



DETAIL 11
NOT TO SCALE

ILLUMINATED WIND DIRECTION INSTALLATION
NOT TO SCALE

PLAN CLÉ
KEY PLAN

NOTES GÉNÉRAL / GENERAL NOTES

POUR APPROBATION
FOR APPROVAL
AGNICO EAGLE
DATE : 2012-11-21

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG

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A	2012-11-21	FOR APPROVAL	N.P.	J.P.	A.H.

RÉVISIONS

R. MARCOUX LICENSEE NT/NU 2012-11-19

TITRE / TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION
AIRSTRIP DESIGN FOR B737-200
CODE NUMBER :3 CODE LETTER : C
NON-PRECISION APPROACH RUNWAY
2012 EXPANSION RUNWAY
DETAILS

DESSINÉ PAR DRAWN BY	NANCY PERREAULT, TECH.	DATE 2012-10-30
VÉRIFIÉ PAR CHECKED BY	SEBASTIEN PETIT, ING. JR	2012-11-21
APPROUVÉ PAR APPROVED BY	JOEL PAQUET, ING.	2012-11-21
ÉCHELLE SCALE	INDICATED	DATE 2012-09-07

NO. DESSIN DRAWING NO. MEAD-620-E-107-A

NO. PROJET PROJECT NO.	RÉVISION	FEUILLE / SHT
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FILE NO. VD3245-000-EL.dwg

Appendix F - Azimuth Technical Memo TSS-turbidity relationship Feb 2010 v3

Technical Memorandum

Date: February 5, 2010

To: Stéphane Robert (Agnico-Eagle Mines Ltd.)

From: Ryan Hill and Gary Mann (Azimuth Consulting Group Inc.)

RE: **Proposed revision to the TSS-turbidity relationship used for dike construction monitoring and dewatering (untreated water) monitoring**

Field measurements of turbidity are used as a surrogate for TSS during dike construction monitoring and dewatering monitoring. Prior to 2009, a limited data set was available, and was used to develop a single relationship that was applied to dike construction monitoring and to dewatering (of untreated water[1]) monitoring. Intensive sampling during 2009 has now provided a data set that could support development of distinct relationships for dike construction monitoring and dewatering monitoring – the relationships should be distinct in theory because conditions during dewatering are fundamentally different from conditions during dike construction.

Dike Construction Monitoring – The new proposed TSS-turbidity relationship for dike construction monitoring is:

$$\log_{10}(\text{turbidity}) = 0.62196 + (0.95619 * \log_{10}(\text{TSS})),$$

where TSS is measured in the lab in mg/L and turbidity is measured in NTUs in the field using an Analite NEP 160 meter[2].

This relationship is based on data from targeted TSS samples collected during construction of the Bay-Goose dike in 2009, as well as other relevant data collected in 2009 in Second and Third Portage Lakes (sampling associated with the AEMP, the Effects Assessment for the Bay-Goose dike construction, and weekly dike construction water quality). The 2008 data associated with the East Dike were not included because (a) the 2009 data set was very large and covered a range of conditions, and could therefore support derivation of a rigorous relationship without additional data; (b) there was some *a priori* expectation of differences between the two data sets because the nature of construction material used and the placement methods may have changed slightly in

---

[1] All discussions herein regarding dewatering refer to untreated water and are not applicable to monitoring of treated water.

[2] Different turbidity probes often differ systematically in their NTU readings. Results from other meters could only be used with the reported TSS-turbidity relationships if they are first converted to Analite NEP 160 equivalence (i.e., by deriving the relationship between observed NTU values for both meter types).

2009; and (c) statistical analysis confirmed a significant difference between the 2008 and 2009 data sets.

Dewatering Monitoring (see footnote 1) – The new proposed TSS-turbidity relationship for dewatering monitoring is:

$$\log_{10}(\text{turbidity}) = 0.53276 + (0.99276 * \log_{10}(\text{TSS})),$$

where TSS is measured in the lab in mg/L and turbidity is measured in NTUs in the field using an Analite NEP 160 meter[1].

This is based on data from 2009 dewatering of the impounded arm of Second Portage Lake, as well as all of the data related to dike construction from 2008 and 2009. The dewatering data alone are insufficient because (a) they cover only a very limited range of turbidity and TSS values, and cannot be easily extrapolated to higher values; and (b) the data were collected during a narrow time window and their applicability to dewatering conditions in general is unknown. In future it may be possible to exclude the dike construction monitoring data and use only dewatering data, if additional dewatering data are collected across a higher range of turbidity values and at different times of year.

Details regarding the selection of data sets and statistical methods are provided in **Appendix A**.

APPENDIX A – DERIVATION OF TSS-TURBIDITY RELATIONSHIPS FOR DIKE CONSTRUCTION MONITORING AND DEWATERING MONITORING

1. INTRODUCTION

Turbidity is measured in the field during dike construction as a surrogate for total suspended solids (TSS). It is well known that the relationship between turbidity and TSS is site-specific, in part because of site-specific variation in the size, shape and other properties of the suspended particulates.

A TSS-turbidity relationship for dike construction monitoring and dewatering monitoring was developed prior to construction of the East Dike in 2008, based on limited available data. As additional and more relevant data became available, the relationship was updated during construction of the East Dike. The updated relationship was applied to construction of the Bay-Goose dike in 2009.

During 2009, a significant number of paired TSS-turbidity samples were collected, including targeted sampling as well as sampling conducted as part of routine weekly water quality monitoring, the AEMP, and the Effects Assessment Strategy.

This technical appendix develops an updated TSS-turbidity relationship that could be used for dike construction monitoring in 2010, and a second TSS-turbidity relationship that is more appropriate for dewatering monitoring (for untreated water only). **Section 2** reviews the general statistical framework used to analyze the TSS-turbidity relationship. **Section 3** reviews and selects the data to be used for each analysis. **Section 4** presents the new TSS-turbidity relationships.

2. GENERAL STATISTICAL FRAMEWORK

Federal guidance on the use of turbidity as a surrogate for TSS (CCME 1999) provides an example relationship, which has log-turbidity (in NTUs) as a function of log-TSS (in mg/L). The 2008 Meadowbank data set was well described by a similar relationship (i.e., log data), so we used the same type of simple linear regression at that time. In theory, it is suspended solids that cause turbidity, not the other way around, so it makes sense to use TSS as the independent (x) variable. On the other hand, we are measuring turbidity and using it to estimate TSS, so argument could be made to make turbidity the x-variable. For this analysis we use TSS as the x-variable, consistent with the example provided by CCME (1999).

One assumption of linear regression is that data points are independent. In our case, the data points come from distinct data sets. Since the nature of the TSS-turbidity relationship may vary somewhat among these data sets, the assumption of independence may be violated. In such cases, it may be preferable to either exclude certain data sets, or to incorporate multiple data sets using a mixed-effect modeling approach, or to combine multiple data sets in spite of the violation of independence. We provide rationale for our approaches in this regard in **Section 3**.

Finally, all analyses are conducted by excluding data points where TSS concentrations were below laboratory method detection limits (DLs). We had included those data in earlier analyses (using ½ of the DL) due to the limited number of data points. Now that we have more data, we exclude any data points where measured TSS was below laboratory detection limits. In a case where regression is based on log-values, the low values at or below detection limits have considerable influence on the predicted relationship. From a regulatory perspective, the range of TSS values that we need to characterize accurately does not include the low values around the detection limits, and error at those values has relatively little impact on estimated long-term average TSS levels. It would therefore be preferable to drop some of the data at low TSS concentrations (below DLs) in order to avoid bias at higher, more relevant TSS concentrations.

All statistical analyses reported in this technical memo were implemented using R software version 2.9.0, using methods outlined in Dalgaard (2008) and Venables and Ripley (2002).

3. REVIEW AND SELECTION OF DATA

3.1. General Considerations

This section reviews the available data sets and their relevance to dike construction. There are a few considerations that apply to all of the data sets:

1. *Probe Type* – All of the data sets were generated using the same model of turbidity probe, the Analite NEP 160. It is important that the data are either based on the same probe, or are corrected for differences among probes.
2. *Spatial Bias* – All of the data collected in Second and Third Portage Lakes during dike construction activities share a common limitation which can be expected to bias any derived TSS-turbidity relationship. Specifically, the data points with high TSS / high turbidity tend to be collected near the construction zones (including inside the turbidity barriers) where we expect proportionately more large suspended particles, while the data points with low TSS / low turbidity tend to be collected further away from the construction zone where we expect fewer large suspended particles (because they would have settled out). Particle size influences any TSS-turbidity relationship – TSS is more affected by heavy particles (e.g., sand), while turbidity is more affected by the presence of lots of small particles (e.g., clay)[3]. Therefore, any TSS-turbidity relationship that is derived has an inherent spatial element – the relationship works well if applied to high turbidity values near the construction zone and to low turbidity values away from the

[3] In addition, according to the EPA (1993), coarse particles that settle out rapidly are a source of interference for measurements of turbidity by nephelometry.

construction zone, but the opposite may not be true. Fortunately, the usual pattern is to see high TSS levels near the construction zone and lower TSS levels at a distance.

3. *Temporal Bias* – In addition, since large particles settle out over time, we would also expect data collected several weeks or months after the end of construction activities to consist of proportionately fewer large particles. Therefore, given the effect of particle size on the TSS-turbidity relationship, the relationship during construction would not necessarily be the same as the relationship long after construction, particularly at locations close to the construction zones.

3.2. Description of Available Data Sets

The available data sets are summarized as follows.

East Dike 2008 – These data were collected during the early part of east dike construction in 2008. Many of the samples were taken from inside the turbidity barriers in order to characterize the high end of the TSS-turbidity relationship. Data for the East Dike are shown in **Table 1**.

Bay-Goose Dike 2009 – These data were collected during construction of the Bay-Goose dike in 2009. The Bay-Goose data were collected from all around the dike, both inside and outside the curtains, as well as far out into Third and Second Portage Lakes. Collection of the Bay-Goose data spanned a long time frame, and included many samples of turbid water in areas away from the construction zone, after a major wind event dispersed turbid water beyond the construction zone. Data for the Bay-Goose Dike are also shown in **Table 1**.

Weekly Dike Construction Monitoring Data – During construction of the East Dike in 2008 and the Bay-Goose Dike in 2009, weekly water quality monitoring was conducted at stations close to and away from the construction zone. When vertical profiles existed in the water column, various depths were sometimes targeted. The data include collection of water samples (including for TSS) at a specified depth, plus vertical profiles of turbidity. The turbidity measured at the closest depth interval to the depth of water samples can be paired with the TSS data. Since there may be a time delay in the field (e.g., a couple of minutes) between evaluation of the turbidity profile and collection of the water samples, we can expect slightly more imprecision with these data than with the targeted TSS sampling, but there is no reason to expect bias. The weekly dike construction monitoring data are shown in **Table 2**.

AEMP Water Quality Data – AEMP data are similar to the weekly dike construction monitoring data, involving collection of water samples (including TSS) and vertical profiles of turbidity. Most of the AEMP data are not useful for a TSS-turbidity relationship since they occur at sites not affected by dike construction, and where TSS is often below detection limits. However, samples taken in Second Portage Lake during dike construction activities in 2008/2009, as well as samples taken in the east basin of Third Portage Lake in 2009 can be used. The relevant AEMP data are shown in **Table 2**.

EAS Water Quality Data – As part of the assessment of potential ecological effects of dike construction, limited water quality data have been collected in both 2008 and 2009 in Second

Portage Lake and the east basin of Third Portage Lake. These data are similar to the weekly dike construction monitoring data and the AEMP data described above. The relevant EAS data are shown in **Table 2**.

Dewatering Data 2009 – Dewatering of the impoundment in Second Portage Lake began in winter/spring 2009. Starting in the spring of 2009, data collection included field turbidity, lab turbidity and lab TSS. Field turbidity measurements were taken incorrectly[4] for the first few months, but methodology was corrected and field data on or after June 20th can be used. In addition, there is a strong correlation between field and lab turbidity, so lab data can be used to predict field turbidity for the earlier period June 9-19. Dewatering data are shown in **Table 3**, with the relationship between field and lab turbidity explained in the footnote. Only those records with simultaneous water collection for field and lab were used (i.e., the water samples for both were collected at the same time). Dewatering data collected over the winter (i.e., earlier in 2009; data not shown) had consistently low turbidity, generally in the range of 2 to 5 NTU. This indicates that most of the turbidity associated with dike construction had settled out by the winter. The higher turbidity over the June-July period shown in **Table 3** is therefore reflective of newly suspended sediments – one potential explanation is erosion of newly exposed banks during freshet, but other explanations are also possible.

AWPAR and Quarry Data – The AWPAR and Quarry data collected since 2007 come from locations around Meadowbank camp and along the road between Meadowbank camp and Baker Lake. The data primarily characterize sediment introduced from quarried construction material contacting water (i.e., either runoff flowing through the road and picking up fines or material placed within stream channels), or ponded water that occurs in quarries or other areas. The quarried construction material may be similar to material used for dike construction. However, the setting for the turbid water is not the same as a lake, occurring instead in ponded water or in streams or runoff areas. In addition, the effect of erosion or resuspension of lake bottom materials would not be captured at all by the AWPAR and Quarry data. The AWPAR and Quarry data are not shown, because they are not relevant to either dike construction or dewatering; there are sufficient other data to allow us to ignore the AWPAR and Quarry data.

3.3. Data Selection for Dike Construction

For the TSS-turbidity relationship for dike construction monitoring, it is appropriate to consider all data except for the dewatering data and the AWPAR & Quarry data (i.e., we initially consider all data in **Table 1** and **Table 2**). These data sets are inherently different from data collected in the lakes during dike construction.

The remaining data sets are all directly relevant to dike construction. The only variable which could potentially differentiate among the data sets is the year (2008 vs. 2009). For example, if construction materials used to build the two dikes were different, or if placement methods changed, the TSS-turbidity relationships may also be different.

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[4] Field crews stirred the water as they measured, which creates air bubbles that interfere with probe function.

The 2008 and 2009 data relevant to dike construction are shown together in **Figure 1** (excluding data points below lab detection limits as discussed above). Log values are used to spread out the data and facilitate visual interpretation. Due to differences in detection limits between 2008 and 2009, the earlier data set lacks values at the low end.

Next, we considered alternative data transformation that would facilitate linear modeling. We evaluated various log and root transformations for both TSS and turbidity (log base 10, natural log, square root, fourth root). In each case we (a) evaluated how effectively the transformation spread the data across each axis, (b) evaluated apparent normality based on plots of the residuals, and (c) tested for normality of the residuals using a Shapiro-Wilks normality test. Our judgment was that the log base 10 transformation (for both variables) performed best overall.

The log-log data shown in **Figure 1** appear to be linear over most of the range, except at low TSS values. Given the log-scale, a log value of 0.50 on the x-axis corresponds to TSS of 3.16 mg/L, so all data to the left of log-TSS of 0.50 are close to detection limits (the detection limit was 3 mg/L for most of the 2008 data, and 1 mg/L for most of the 2009 data). It is not surprising that there is considerably more variability about the relationship at these low values, given their proximity to detection limits (in fact, there hardly appears to be any slope to the data in that range). Rather than try to fit a non-linear relationship to the data, we dropped all of the data points where TSS was less than 3.16 mg/L. Data below that range are unimportant from a decision-making perspective, since the lowest management threshold is at 6 mg/L, and long-term average estimates of TSS levels are not strongly affected by imprecision in low numbers. This cropping of the data set allows more rigorous application of a linear model across the data range from 3.16 mg/L upwards, which should result in better characterization of the relationship at higher TSS levels.

We also deleted one obvious outlier in the 2009 data set, shown in the figure at a log-TSS of 1.15 and log-turbidity of 0.66. This data point is associated with sample BG-TSS-36. The lab-measured turbidity was more than 5-fold higher than field-measured turbidity, suggesting a measurement error in the field.

Finally, we tested for differences between the 2008 and 2009 data sets using Analysis of Covariance. Analysis of covariance indicated no difference in slopes between the two data sets ($p>0.10$), but there was a significant different in the intercepts ($p<0.01$). Visually, it does appear that the 2008 data are shifted slightly down relative to the 2009 data (keeping in mind that data below log TSS of 0.5 are not included). This could be explained by a difference in construction materials or construction practices between 2008 and 2009. Given that future dike construction monitoring is more likely to use materials and practices consistent with 2009 and not 2008, it is appropriate to drop the 2008 data.

In summary, the 2009 data in Second and Third Portage Lakes at TSS values above 3.16 mg/L were retained for derivation of the TSS-turbidity relationship for dike construction monitoring, with the exception of one outlier that was deleted.

3.4. Data Selection for Dewatering

The dewatering data (**Table 3 and Figure 2**) collected in the impoundment of Second Portage Lake are the only data that we know for certain are directly relevant to dewatering monitoring. However, the data have several limitations. First, they cover a narrow range of turbidity and TSS values, so any relationship derived solely on the dewatering data could not easily be extrapolated to higher turbidity levels. Second, they were collected during a relatively narrow time window (June-July 2009) so we do not know how applicable the data would be to the full range of dewatering conditions that may exist over time. Overall, our understanding of the applicability of the data to the full range of dewatering conditions is limited.

For these two reasons, it is appropriate to consider using the dike construction data to supplement the dewatering data. The dike construction data are somewhat relevant to dewatering since some residual East Dike construction material can be expected to be suspended in the impoundment, and because construction of other smaller dikes in the impoundment may overlap in time with dewatering. **Figure 3** shows the dewatering data together with the dike construction data. If we ignore data near the detection limits (i.e., data below log-TSS of 0.5, in accordance with the analysis in **Section 3.3**), the dewatering data appear relatively similar to the dike construction data over the narrow range of overlap. Nevertheless, analysis of covariance of the two data sets (ignoring the data below log-TSS of 0.5, and deleting the outlier point BG-TSS-36 as discussed in **Section 3.3**) indicates significant differences in slope and intercept ($p<0.01$). In spite of the results of the analysis of covariance, we retain all of the data because of the limitations in the dewatering data.

In summary, all dike construction and dewatering data at TSS values above 3.16 mg/L were retained for derivation of the TSS-turbidity relationship for dewatering monitoring (except for one outlier which was deleted). In future it may be possible to exclude the dike construction monitoring data if additional dewatering data are collected across a higher range of turbidity values and across longer time periods relevant to dewatering.

4. DERIVATION OF NEW RELATIONSHIPS

4.1. Dike Construction

Results of linear regression are shown in **Figure 4**. The precise model is:

$$\log_{10}(\text{turbidity}) = 0.62196 + (0.95619 * \log_{10}(\text{TSS})) \quad [p<0.001;\ \text{r2-adj} = 0.81]$$

where turbidity is measured in NTUs in the field using an Analite NEP 160 meter, and TSS is measured in the lab as mg/L.

4.2. Dewatering

Results of linear regression are shown in **Figure 5**. The precise model is:

$$\log_{10}(\text{turbidity}) = 0.53276 + (0.99276 * \log_{10}(\text{TSS})) \quad [p<0.001;\ r2\text{-adj} = 0.85]$$

where turbidity is measured in NTUs in the field using an Analite NEP 160 meter, and TSS is measured in the lab as mg/L.

5. REFERENCES

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Table 1. Targeted Turbidity-TSS Data for East Dike and Bay-Goose North Dike

2008 East Dike Data

Sample ID	Date	Turbidity (NTU)	TSS (mg/L)
DC1	July/Aug 08	17.9	5.8
DC10	July/Aug 08	230	89.8
DC11	July/Aug 08	157	59.8
DC12	July/Aug 08	223	88.4
DC13	July/Aug 08	430	181
DC14	July/Aug 08	178	69.1
DC15	July/Aug 08	59	22.4
DC16	July/Aug 08	66	19.8
DC17	July/Aug 08	5.3	<3
DC18	July/Aug 08	2.7	<3
DC19	July/Aug 08	3.3	<3
DC2	July/Aug 08	8.3	3.8
DC20	July/Aug 08	1.3	<3
DC21	July/Aug 08	4.2	<3
DC22	July/Aug 08	10.1	4.4
DC23	July/Aug 08	10.9	4.4
DC24	July/Aug 08	21	9.8
DC25	July/Aug 08	12.6	3.8
DC26	July/Aug 08	14	4.4
DC27	July/Aug 08	13.2	4.4
DC28	July/Aug 08	8.5	3.8
DC29	July/Aug 08	8.3	<3
DC3	July/Aug 08	7.5	4.4
DC30	July/Aug 08	7.6	<3
DC31	July/Aug 08	7.9	<3
DC32	July/Aug 08	8.8	3.1
DC33	July/Aug 08	20	7.8
DC34	July/Aug 08	11.9	3.8
DC4	July/Aug 08	36.7	15.8
DC5	July/Aug 08	41.5	15.8
DC6	July/Aug 08	53.5	19.1
DC7	July/Aug 08	32	11.8
DC8	July/Aug 08	19.5	<3
DC9	July/Aug 08	36.5	7.8

2009 Bay-Goose Dike Data

Sample ID	Date	Turbidity (NTU)	TSS (mg/L)
BG-TSS-1	30-Jul-09	95.9	35
BG-TSS-2	30-Jul-09	103.4	31
BG-TSS-3	30-Jul-09	49.5	12
BG-TSS-4	30-Jul-09	123.5	44
BG-TSS-5	30-Jul-09	160.4	53
BG-TSS-6	30-Jul-09	5.4	1
BG-TSS-7	30-Jul-09	1.3	<1
BG-TSS-8	30-Jul-09	12.4	2
BG-TSS-9	30-Jul-09	2.7	<1
BG-TSS-10	30-Jul-09	38.2	9
BG-TSS-11	1-Aug-09	56.1	14
BG-TSS-12	1-Aug-09	39.6	12
BG-TSS-13	1-Aug-09	17.4	12
BG-TSS-14	1-Aug-09	3.3	<1
BG-TSS-15	1-Aug-09	1.7	<1
BG-TSS-16	1-Aug-09	14.2	4
BG-TSS-17	1-Aug-09	58.0	26
BG-TSS-18	1-Aug-09	40.6	8
BG-TSS-19	1-Aug-09	38.1	10
BG-TSS-20	1-Aug-09	38.6	9
BG-TSS-21	3-Aug-09	20.4	5
BG-TSS-22	3-Aug-09	5.1	3
BG-TSS-23	3-Aug-09	35.4	8
BG-TSS-24	3-Aug-09	17.3	<1
BG-TSS-25	3-Aug-09	10.3	2
BG-TSS-26	3-Aug-09	71.5	18
BG-TSS-27	3-Aug-09	68.3	18
BG-TSS-28	3-Aug-09	65.9	19
BG-TSS-29	3-Aug-09	60.5	15
BG-TSS-30	3-Aug-09	69.5	16
BG-TSS-31	8/9/2009	10.2	4
BG-TSS-32	8/9/2009	40.5	16
BG-TSS-33	8/9/2009	1.3	2
BG-TSS-34	8/9/2009	35.2	12
BG-TSS-35	8/9/2009	1.35	<1
BG-TSS-36	8/9/2009	4.55	14
BG-TSS-37	8/9/2009	43.8	10
BG-TSS-38	8/9/2009	61.1	19
BG-TSS-39	8/9/2009	52.9	12
BG-TSS-40	8/9/2009	50.2	16
BG-TSS-41	8/9/2009	59.1	15
BG-TSS-42	8/9/2009	62.2	20
BG-TSS-43	8/9/2009	31.2	10
BG-TSS-44	8/9/2009	57.0	14
BG-TSS-45	8/9/2009	35.9	7
BG-TSS-46	8/9/2009	62.7	16
BG-TSS-47	8/9/2009	40.5	14
BG-TSS-48	8/9/2009	56.9	12
BG-TSS-49	8/9/2009	34.9	12
BG-TSS-50	8/9/2009	61.5	16
BG-TSS-51	8/9/2009	30.0	8
BG-TSS-52	8/9/2009	31.7	9
BG-TSS-53	8/9/2009	40.3	10
BG-TSS-54	8/9/2009	40.1	10
BG-TSS-55	8/9/2009	30.0	7
BG-TSS-56	8/9/2009	34.4	8
BG-TSS-57	8/9/2009	33.2	10
BG-TSS-58	8/9/2009	39.9	8
BG-TSS-59	8/9/2009	38.3	6
BG-TSS-60	8/9/2009	37.0	10
BG-TSS-61	9/9/2009	102.1	26
BG-TSS-62	9/9/2009	69.4	12
BG-TSS-63	9/9/2009	89.9	32
BG-TSS-64	9/9/2009	52.9	11
BG-TSS-65	9/9/2009	51.0	15
BG-TSS-66	9/9/2009	14.3	2
BG-TSS-67	9/9/2009	9.9	<1
BG-TSS-68	9/9/2009	34.3	5
BG-TSS-69	9/9/2009	0.9	2
BG-TSS-70	9/9/2009	20.6	3
SP-1	9/12/2009	4.7	3
Outlet 1	9/12/2009	42.7	13
Outlet 2	9/12/2009	28.5	8
SP-10	9/12/2009	0.8	<1
BGE-5	9/12/2009	33.7	8
BGE-3	9/12/2009	34.9	8
BGW-2	9/12/2009	29.5	8
DUP	9/12/2009	29.5	8

Table 2. Additional Turbidity-TSS Data Collected During Construction of the East Dike (2008) and Bay-Goose North Dike (2009)

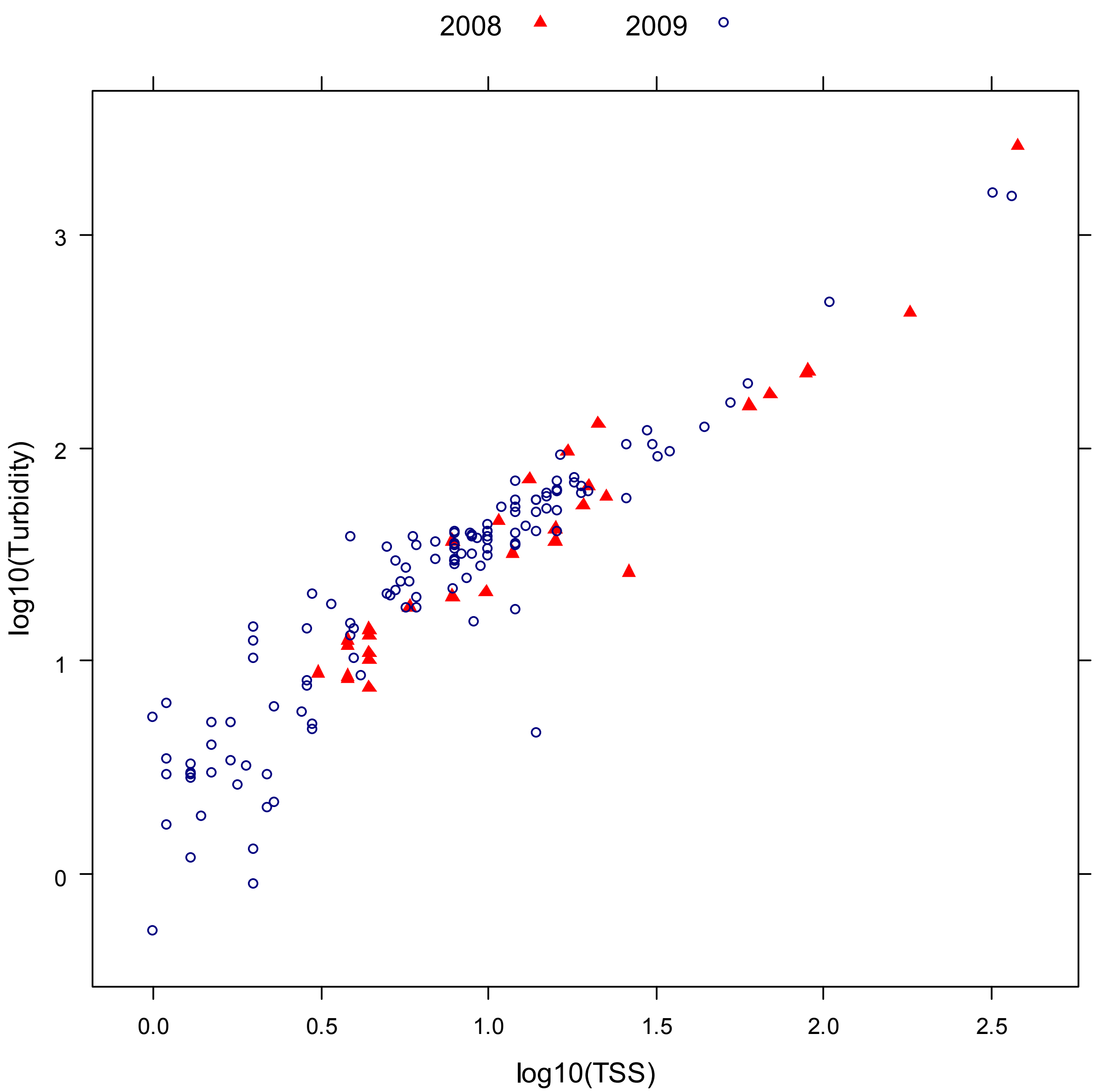
Program	Year	Date	Lake	Station ID/Rep	Field Turb (NTU)	Lab TSS (mg/L)	Lab Turb (NTU)
AEMP	2008	22-Aug-08	SPL	SP	45.5	11	NA
East Dike Construction Weekly Water Quality	2008	22-Aug-08	SPL	E214	96	17.2	NA
East Dike Construction Weekly Water Quality	2008	22-Aug-08	SPL	E214	2600	378	NA
East Dike Construction Weekly Water Quality	2008	22-Aug-08	SPL	A3	71	13.2	NA
East Dike Construction Weekly Water Quality	2008	22-Aug-08	SPL	A3	129	21.2	NA
East Dike Construction Weekly Water Quality	2008	12-Sep-08	SPL	SE2	26	26.2	NA
AEMP	2009	16-Aug-09	TPL	TPE-7	2.16	2.3	0.98
AEMP	2009	11-Sep-09	TPL	TPE-10	23.2	5.5	11
AEMP	2009	11-Sep-09	TPL	TPE-8	27.1	5.7	12.2
AEMP	2009	11-Sep-09	TPL	TPE-9	21.5	5.3	11.1
AEMP	2009	12-Aug-09	SPL	SP-7	0.54	1.00	0.52
AEMP	2009	15-Sep-09	SPL	SP-10	2.91	1.10	2.57
AEMP	2009	15-Sep-09	SPL	SP-8	2.80	1.30	2.15
Bay-Goose Dike Construction Weekly Water Quality	2009	31-Jul-09	TPL	DC-WQ-BGE1	1.2	1.3	0.76
Bay-Goose Dike Construction Weekly Water Quality	2009	31-Jul-09	TPL	DC-WQ-BGW1	17.8	5.7	10.3
Bay-Goose Dike Construction Weekly Water Quality	2009	31-Jul-09	TPL	DC-WQ-BGW2	17.7	6.1	8.54
Bay-Goose Dike Construction Weekly Water Quality	2009	31-Jul-09	TPL	DC-WQ-HVH4	1.71	1.1	1.2
Bay-Goose Dike Construction Weekly Water Quality	2009	08-Aug-09	TPL	DC-WQ-BGE1	8.47	4.2	3.13
Bay-Goose Dike Construction Weekly Water Quality	2009	08-Aug-09	TPL	DC-WQ-BGE3	18.3	3.4	4.22
Bay-Goose Dike Construction Weekly Water Quality	2009	08-Aug-09	TPL	DC-WQ-BGE5	1.85	1.4	1.66
Bay-Goose Dike Construction Weekly Water Quality	2009	08-Aug-09	TPL	DC-WQ-BGW2	5.78	2.8	2.16
Bay-Goose Dike Construction Weekly Water Quality	2009	08-Aug-09	TPL	DC-WQ-HVH2	2.04	2.2	1.36
Bay-Goose Dike Construction Weekly Water Quality	2009	08-Aug-09	TPL	DC-WQ-HVH4	2.92	2.2	1.71
Bay-Goose Dike Construction Weekly Water Quality	2009	16-Aug-09	TPL	DC-WQ-BGE1	14.2	2.9	8.83
Bay-Goose Dike Construction Weekly Water Quality	2009	16-Aug-09	TPL	DC-WQ-BGE3	6.03	2.3	5.8
Bay-Goose Dike Construction Weekly Water Quality	2009	16-Aug-09	TPL	DC-WQ-BGE5	4.05	1.5	3.32
Bay-Goose Dike Construction Weekly Water Quality	2009	16-Aug-09	TPL	DC-WQ-BGW3	3.49	1.1	3.75
Bay-Goose Dike Construction Weekly Water Quality	2009	16-Aug-09	TPL	DC-WQ-HVH2	3.4	1.7	3.46
Bay-Goose Dike Construction Weekly Water Quality	2009	16-Aug-09	TPL	DC-WQ-HVH4	5.11	1.7	3.93
Bay-Goose Dike Construction Weekly Water Quality	2009	21-Aug-09	TPL	DC-WQ-BGE2	1560	320	469
Bay-Goose Dike Construction Weekly Water Quality	2009	22-Aug-09	TPL	DC-WQ-BGE1	37.8	3.9	28
Bay-Goose Dike Construction Weekly Water Quality	2009	22-Aug-09	TPL	DC-WQ-BGW3	8.1	2.9	3.01
Bay-Goose Dike Construction Weekly Water Quality	2009	22-Aug-09	TPL	DC-WQ-HVH4	29.1	5.3	12.4
Bay-Goose Dike Construction Weekly Water Quality	2009	29-Aug-09	TPL	DC-WQ-BGE1	19.6	6.1	9.91
Bay-Goose Dike Construction Weekly Water Quality	2009	29-Aug-09	TPL	DC-WQ-BGE2	1511	367	260
Bay-Goose Dike Construction Weekly Water Quality	2009	29-Aug-09	TPL	DC-WQ-BGE3	200	59.5	86
Bay-Goose Dike Construction Weekly Water Quality	2009	29-Aug-09	TPL	DC-WQ-BGW2	480	105	206
Bay-Goose Dike Construction Weekly Water Quality	2009	29-Aug-09	TPL	DC-WQ-BGW3	6.3	1.1	3.7
Bay-Goose Dike Construction Weekly Water Quality	2009	29-Aug-09	TPL	DC-WQ-HVH4	14.9	3.9	6.3
Bay-Goose Dike Construction Weekly Water Quality	2009	04-Sep-09	TPL	DC-WQ-BGE2	92.1	16.5	32.6
Bay-Goose Dike Construction Weekly Water Quality	2009	04-Sep-09	TPL	DC-WQ-BGE5	39.5	8.9	18.4
Bay-Goose Dike Construction Weekly Water Quality	2009	04-Sep-09	TPL	DC-WQ-BGW2	120	29.7	53
Bay-Goose Dike Construction Weekly Water Quality	2009	04-Sep-09	TPL	DC-WQ-HVH5	34.5	6.1	19.7
Bay-Goose Dike Construction Weekly Water Quality	2009	11-Sep-09	TPL	DC-WQ-BGE3	49.5	13.9	27.6
Bay-Goose Dike Construction Weekly Water Quality	2009	11-Sep-09	TPL	DC-WQ-BGE5	37.7	9.3	23.7
Bay-Goose Dike Construction Weekly Water Quality	2009	11-Sep-09	TPL	DC-WQ-BGW2	20.2	5.1	13.2
Bay-Goose Dike Construction Weekly Water Quality	2009	11-Sep-09	TPL	DC-WQ-HVH5	31.5	8.3	22.8
Bay-Goose Dike Construction Weekly Water Quality	2009	04-Sep-09	TPE	DC-WQ-TPE6	27.5	9.5	21.3
Bay-Goose Dike Construction Weekly Water Quality	2009	21-Aug-09	SPL	DC-WQ-SP8	5.1	1.5	4.99
Bay-Goose Dike Construction Weekly Water Quality	2009	29-Aug-09	SPL	DC-WQ-SP6	2.93	1.3	1.89
Bay-Goose Dike Construction Weekly Water Quality	2009	29-Aug-09	SPL	DC-WQ-SP8	13.1	3.9	5.16
Bay-Goose Dike Construction Weekly Water Quality	2009	04-Sep-09	SPL	DC-WQ-SP6	3.00	1.5	5.03
Bay-Goose Dike Construction Weekly Water Quality	2009	11-Sep-09	SPL	DC-WQ-SP1	3.2	1.9	1.95
Bay-Goose Dike Construction Weekly Water Quality	2009	11-Sep-09	SPL	DC-WQ-SP6	3.27	1.3	3.09
Bay-Goose Dike Construction Weekly Water Quality	2009	11-Sep-09	SPL	DC-WQ-SP8	7.6	2.9	4.27
Bay-Goose Dike Effects Assessment	2009	18-Sep-09	TPL	EAS-BGW-1	23.5	5.8	9.47
Bay-Goose Dike Effects Assessment	2009	18-Sep-09	TPL	EAS-BGE-1	24.1	8.6	12.5
Bay-Goose Dike Effects Assessment	2009	24-Sep-09	TPL	EAS-BGW-1	15.1	9.1	11.2
Bay-Goose Dike Effects Assessment	2009	26-Sep-09	TPL	EAS-BGE-1	21.9	7.9	16.3
Bay-Goose Dike Effects Assessment	2009	19-Sep-09	SPL	EAS-SPC-1	2.6	1.8	2.06
Bay-Goose Dike Effects Assessment	2009	26-Sep-09	SPL	EAS-SPC-1	2.97	1.3	2.7

Table 3. Turbidity-TSS Data for 2009 Dewatering of the Impounded Arm of Second Portage Lake [1]

Sample ID	Date	Time	Measured Field Turbidity	Predicted Field Turbidity	Time	Lab Turbidity	Lab TSS (mg/L)
Intake Unit 1	6/10/2009	8:30	22.40	15.42	8:30	11.00	2
Intake Unit 2	6/10/2009	8:30	22.20	16.80	8:30	12.80	2
Intake Unit 3	6/10/2009	8:30	20.50	15.58	8:30	11.20	1
Intake Unit 4	6/10/2009	8:30	21.50	37.67	8:30	40.10	3
Intake Unit 5	6/10/2009	8:30	17.94	14.89	8:30	10.30	2
Intake Unit 6	6/10/2009	8:30	17.82	14.89	8:30	10.30	2
Intake Unit 1	6/11/2009	8:00	27.10	17.79	8:00	14.10	5
Intake Unit 2	6/11/2009	8:00	27.50	17.41	8:00	13.60	4
Intake Unit 3	6/11/2009	8:00	26.70	16.95	8:00	13.00	4
Intake Unit 4	6/11/2009	8:00	26.70	18.48	8:00	15.00	5
Intake Unit 5	6/11/2009	8:00	20.50	16.03	8:00	11.80	2
Intake Unit 6	6/11/2009	8:00	21.10	15.73	8:00	11.40	3
Intake Unit 1	6/12/2009	7:00	25.10	18.48	7:00	15.00	4
Intake Unit 2	6/12/2009	7:00	23.70	18.10	7:00	14.50	4
Intake Unit 3	6/12/2009	7:00	24.20	17.26	7:00	13.40	4
Intake Unit 4	6/12/2009	7:00	23.70	15.81	7:00	11.50	5
Intake Unit 5	6/12/2009	7:00	22.40	16.95	7:00	13.00	3
Intake Unit 6	6/12/2009	7:00	22.50	16.03	7:00	11.80	3
Intake Unit 5	6/19/2009	17:00	29.90	18.94	17:00	15.60	6
Intake Unit 6	6/19/2009	17:00	32.50	18.79	17:00	15.40	4
Intake Unit 1	6/21/2009	17:30	22.10		17:30	19.80	10
Intake Unit 2	6/21/2009	17:30	21.80		17:30	19.30	10
Intake Unit 3	6/21/2009	17:30	21.30		17:30	21.60	10
Intake Unit 4	6/21/2009	17:30	22.30		17:30	19.60	9
Intake Unit 5	6/21/2009	17:30	17.28		17:30	16.36	7
Intake Unit 6	6/21/2009	17:30	19.01		17:30	17.30	7
Intake Unit 1	6/22/2009	6:30	23.20		6:30	20.40	9
Intake Unit 2	6/22/2009	6:30	21.80		6:30	18.70	9
Intake Unit 3	6/22/2009	6:30	21.40		6:30	17.90	8
Intake Unit 4	6/22/2009	6:30	21.90		6:30	18.90	9
Intake Unit 5	6/22/2009	6:30	16.74		6:30	15.50	6
Intake Unit 6	6/22/2009	6:30	18.18		6:30	15.60	7
Intake Unit 1	6/23/2009	6:30	23.90		6:30	25.60	7
Intake Unit 2	6/23/2009	6:30	20.50		6:30	20.40	5
Intake Unit 3	6/23/2009	6:30	19.52		6:30	20.80	8
Intake Unit 4	6/23/2009	6:30	20.10		6:30	21.00	7
Intake Unit 5	6/23/2009	6:30	22.00		6:30	22.50	7
Intake Unit 6	6/23/2009	6:30	22.10		6:30	22.30	6
Intake Unit 1	6/24/2009	17:30	23.90		17:30	20.30	8
Intake Unit 2	6/24/2009	17:30	23.40		17:30	16.90	7
Intake Unit 3	6/24/2009	17:30	23.80		17:30	17.40	7
Intake Unit 4	6/24/2009	17:30	22.80		17:30	16.60	8
Intake Unit 5	6/24/2009	17:30	18.75		17:30	16.90	7
Intake Unit 6	6/24/2009	17:30	19.07		17:30	17.50	8
Intake Unit 1	6/25/2009	6:30	24.90		6:30	20.70	8
Intake Unit 2	6/25/2009	6:30	22.50		6:30	17.10	8
Intake Unit 3	6/25/2009	6:30	24.50		6:30	17.90	8
Intake Unit 4	6/25/2009	6:30	25.10		6:30	18.80	10
Intake Unit 5	6/25/2009	6:30	20.80		6:30	15.70	7
Intake Unit 6	6/25/2009	6:30	21.90		6:30	17.90	7
Intake Unit 1	6/25/2009	17:30	23.80		17:30	21.20	8
Intake Unit 2	6/25/2009	17:30	22.50		17:30	21.10	6
Intake Unit 3	6/25/2009	17:30	20.10		17:30	19.60	6
Intake Unit 4	6/25/2009	17:30	21.10		17:30	19.80	6
Intake Unit 5	6/25/2009	17:30	17.30		17:30	16.10	4
Intake Unit 6	6/25/2009	17:30	24.40		17:30	24.80	6
Intake Unit 1	6/28/2009	17:30	27.30		17:30	24.00	8
Intake Unit 2	6/28/2009	17:30	24.20		17:30	19.20	7
Intake Unit 3	6/28/2009	17:30	22.60		17:30	19.80	8
Intake Unit 4	6/28/2009	17:30	22.90		17:30	21.40	6
Intake Unit 5	6/28/2009	17:30	17.37		17:30	16.50	6
Intake Unit 6	6/28/2009	17:30	35.10		17:30	35.10	13
Intake Unit 1	7/5/2009	17:30	23.00		17:30	18.30	8
Intake Unit 2	7/5/2009	17:30	22.90		17:30	17.70	8
Intake Unit 6	7/5/2009	17:30	11.97		17:30	10.30	5
Intake Unit 1	7/6/2009	7:00	21.00		7:00	16.30	7
Intake Unit 2	7/6/2009	7:00	17.24		7:00	14.30	8
Intake Unit 6	7/6/2009	7:00	13.16		7:00	12.00	7
Intake Unit 1	7/7/2009	18:00	23.90		18:00	21.50	7
Intake Unit 2	7/7/2009	18:00	24.40		18:00	21.90	9
Intake Unit 1	7/8/2009	18:00	22.60		18:00	16.90	7
Intake Unit 2	7/8/2009	18:00	22.20		18:00	19.80	6
Intake Unit 1	7/9/2009	6:40	22.30		6:40	21.40	8
Intake Unit 2	7/9/2009	6:40	22.80		6:40	22.30	8

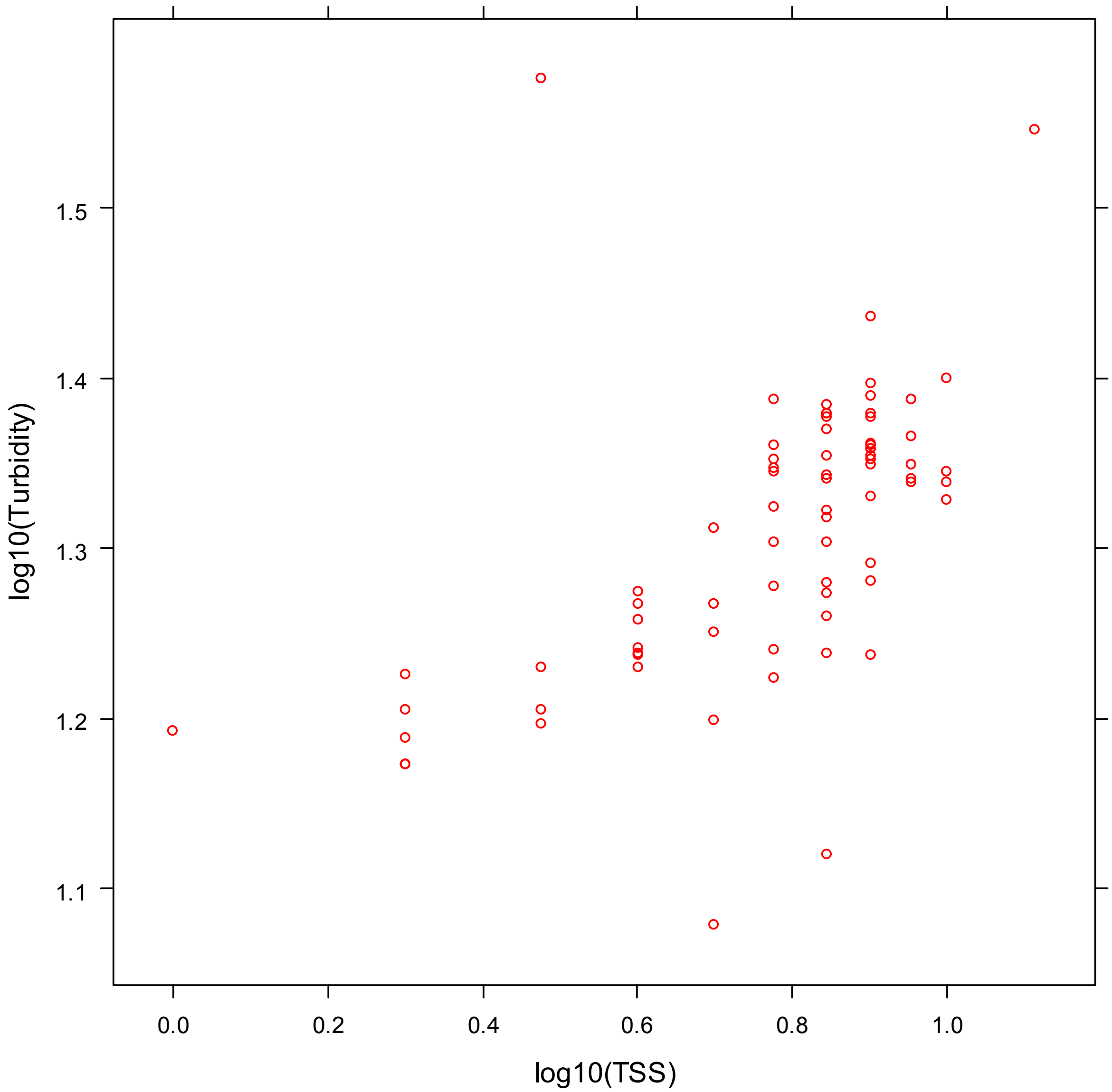
[1] For grey-shaded cells, field turbidity was measured incorrectly so predicted field turbidity is used. Predictions are based on the relationship between field and lab turbidity for other data points (Field=7.014+(0.7645*lab); $p<0.001$; r2 =0.66)

Figure 1. All paired TSS-turbidity data relevant to dike construction monitoring[5] (2008 and 2009)



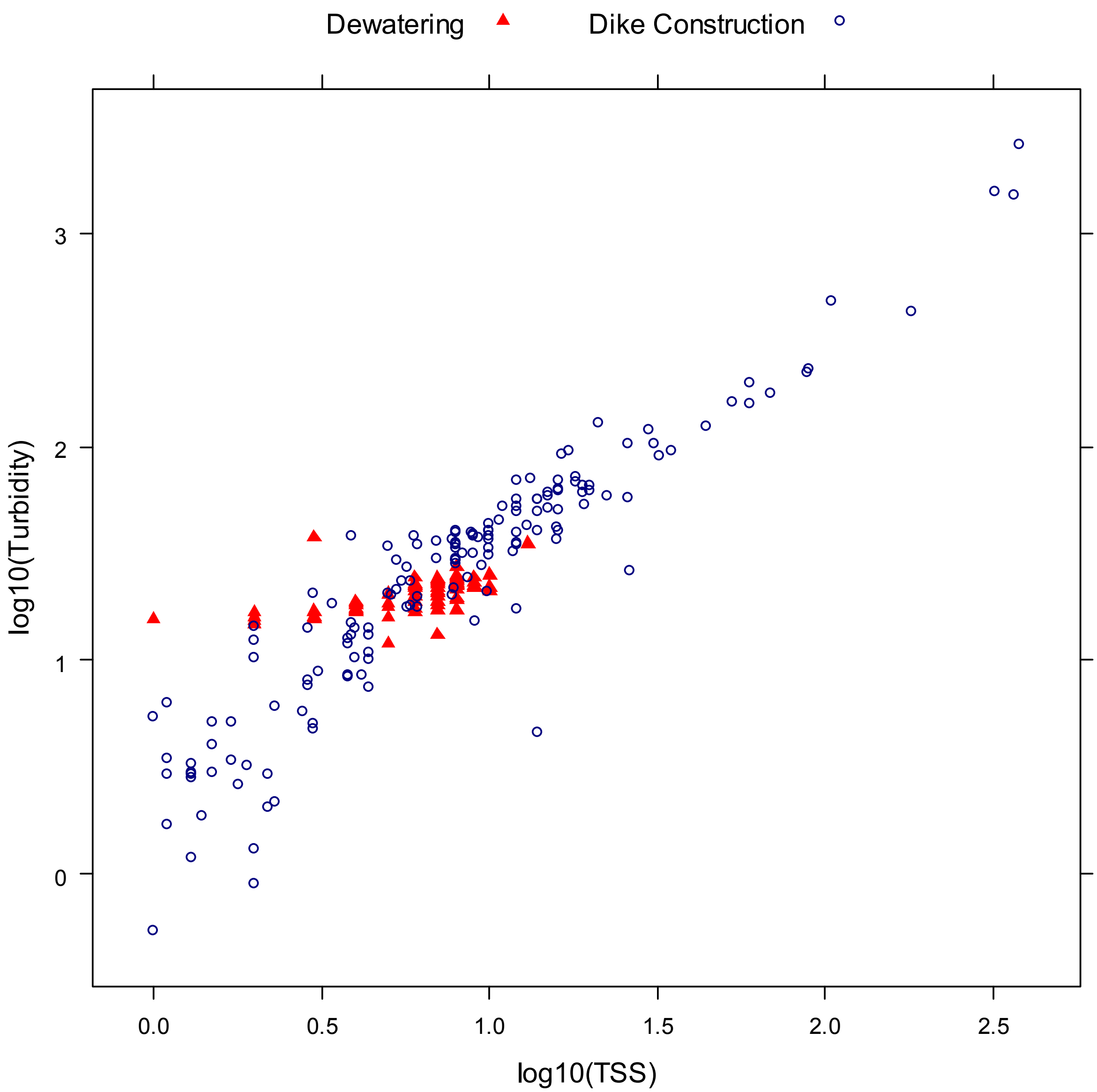
[5] This figure shows all data contained in Tables 1 and 2, except for data below detection limits.

Figure 2. Paired TSS-turbidity data for dewatering of the impoundment[6].



[6] This figure shows all data contained in Table 3, except for data below detection limits

Figure 3. All paired TSS-turbidity data for dewatering and dike construction[7].



[7] This figure shows all data contained in Tables 1 to 3, except for data below detection limits

Figure 4. Final data set and recommended TSS-turbidity relationship for dike construction monitoring

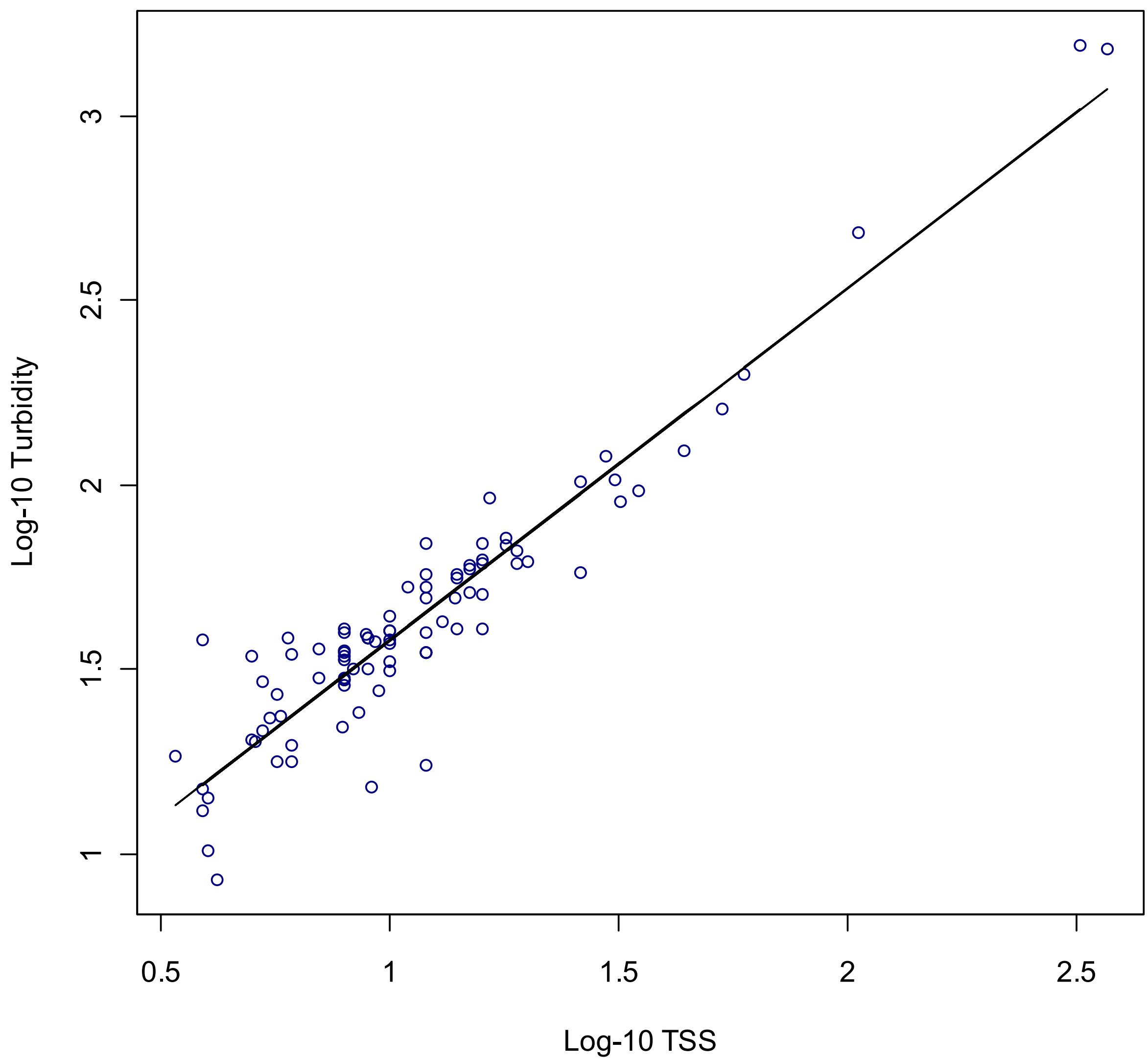
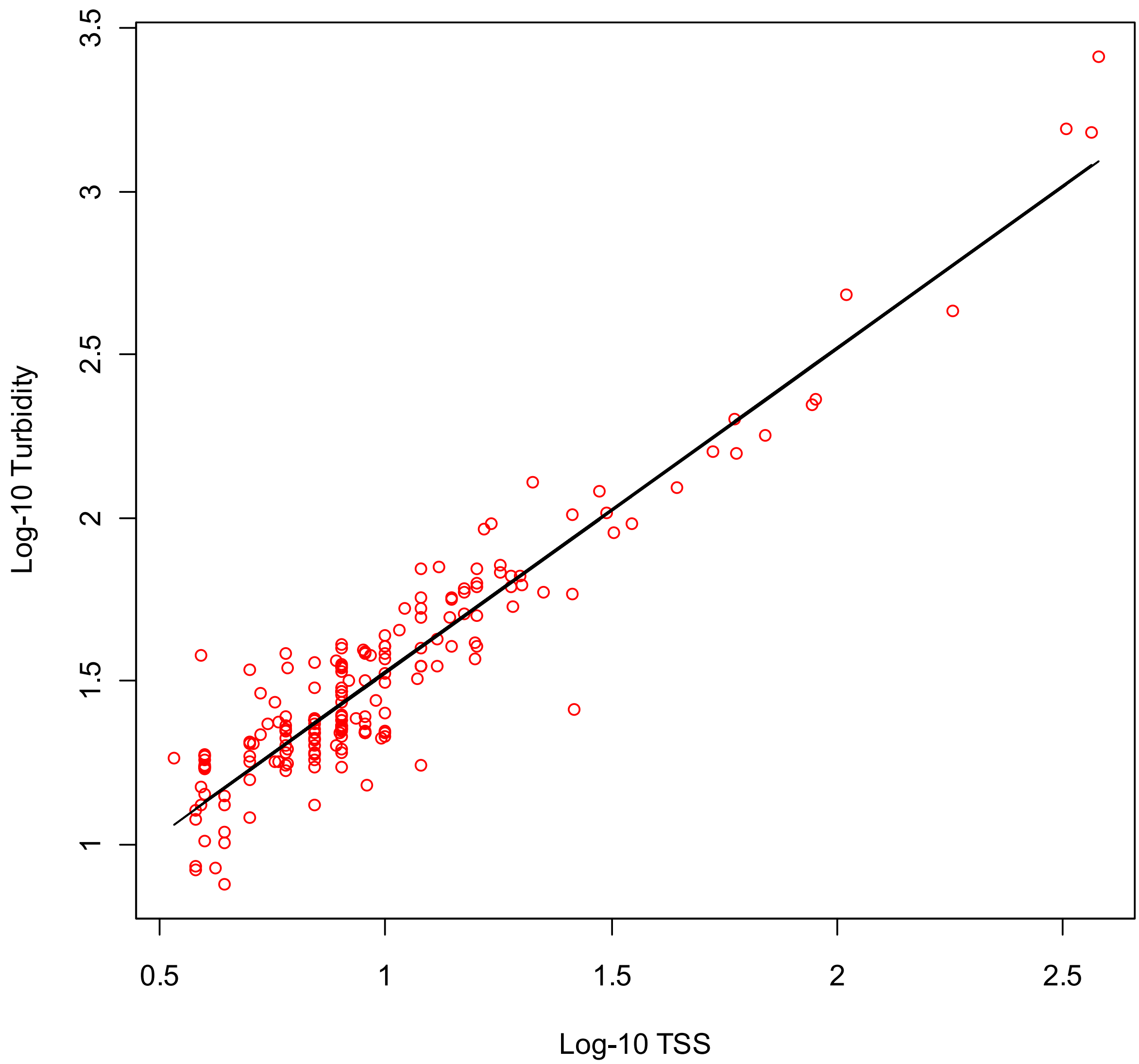


Figure 5. Final data set and recommended TSS-turbidity relationship for dewatering monitoring



Appendix G – Emergency Response Plan V4

MEADOWBANK GOLD PROJECT

Emergency Response Plan

Prepared by:
Agnico-Eagle Mines Limited – Meadowbank Division

Version 4
July 2012

EXECUTIVE SUMMARY

The Emergency Response Plan (ERP) is activated when a operations-related emergency, accident or malfunction occurs, or if such an incident is foreseeable. The ERP outlines potential emergency scenarios, initial actions for emergencies and the internal and external resources available including personnel, emergency response equipment and communication systems.

The ERP will be reviewed and updated at least annually.

IMPLEMENTATION SCHEDULE

This Plan will be immediately implemented**.**

DISTRIBUTION LIST

AEM – General Mine Manager / Designate

AEM – General Superintendent Operations

AEM – General Superintendent Maintenance

AEM - General Superintendent General Services

AEM – Health and Safety Superintendent / Designate

AEM – Human Resources Superintendent / Designate

AEM – Engineering Superintendent / Designate

AEM – Geology Superintendent / Designate

AEM – Environment Superintendent / Designate

AEM – Mill Superintendent / Designate

AEM – Site Services Superintendent / Designate

AEM – Mine Superintendent / Designate

AEM – Maintenance Superintendent / designate

AEM – Emergency Response Counselors

AEM – OHSC Co-chairs

AEM - Security

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	08/10/31	Appendix A		Revision to include East Dike design modifications
2	09/11/16	All Sections		Confirmation of specific details and procedures Account for as-built designs and emergency preparedness for dike failure scenarios
3	12/01/31	All Sections		Review of all the documents
4	12/07/27	All Sections		Review of all documents

Prepared By: ______________________________
Len Kutchaw.
Health and Safety Superintendent

Prepared By: ______________________________
Stéphane Robert.
Environment Superintendent

Approved By: ____________________
Dominique Girard
General Manager

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SECTION 1 • INTRODUCTION

1.1 PURPOSE AND SCOPE OF THE EMERGENCY RESPONSE PLAN

The purpose of this Emergency Response Plan (ERP) is to provide 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. This 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.

This ERP addresses gold mining, processing, transportation and related activities at the Meadowbank site as well as possible emergency scenarios that may occur off-site along the All Weather Private Access Road or at the Baker Lake Marshalling Facility. Guiding the development of this document has been the principle that an effective ERP must provide:

- 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.

AEM will ensure that all employees, contractors and site visitors fully understand and comply with all legislated safety standards, and the policies and procedures outlined in the ERP.

This ERP will be reviewed annually, or more frequently as required, to ensure compliance with applicable legislation, to evaluate its effectiveness and to continually improve the procedures. All employees, contractors and site visitors are encouraged to offer suggestions for ways to eliminate potential hazards and improve work procedures.

1.2 AEM'S POLICY STATEMENT

AEM is committed to protecting the health and safety of all its workers and the environment, and to adhering to all legislated safety standards. The necessary resources will be available to respond quickly and efficiently to all emergencies to prevent injury to, or degradation of, the health of individuals or the environment. In implementing this emergency response policy, AEM will set preparedness targets and report its progress on a regular basis.

To this end:

All relevant safety and emergency response laws and regulations will be incorporated into the ERP as minimum standards.

Senior management is responsible for making funds and other resources available, including hiring and training qualified personnel, to ensure the successful implementation of the ERP in the event of an emergency.

All supervisors are responsible for ensuring that their employees are aware of, and trained in, the proper emergency response procedures and that procedures and contact information are posted in all work areas. Supervisors are also responsible for ensuring that all employees follow safe work methods and all related regulations to prevent emergencies from occurring, and that they are provided with the proper tools to do so, including Personal Protective Equipment (PPE).

An emergency response team and coordination centre is establishes at the Meadowbank site.

The ERP will be tested on a periodic basis to ensure its effectiveness.

1.3 POLICY WITH RESPECT TO CONTRACTORS AND VISITORS

Every person working at or visiting the Meadowbank site receives an orientation upon arrival and as such is apprised of, and required to follow the ERP policies and procedures set forth in this manual. For a list of responsibilities, see Section 2.

Major contractors, such as those for mining and hauling, are required to have their own HS services. This is verified by AEM management prior to engagement of the contractor.

1.4 ENVIRONMENTAL POLICY

AEM is committed to achieving a high standard of environmental care in conducting its mineral exploration activities. AEM's Environmental Policy includes:

- Compliance with all applicable legislation including laws, regulations, and standards. Where laws do not exist, appropriate standards will be applied to minimize environmental impacts resulting from exploration activities.
- Open communication with government, the community, and employees on environmental issues.
- Development and adherence to management systems that adequately identify, monitor, and control environmental risks associated with AEM's exploration activities.
- Assurance that the employees are aware of their responsibilities and comply with AEM's Environmental Policy and field guide.

It is the policy of AEM to protect the environment, public health and safety, and natural resources by conducting operations in an environmentally sound manner while pursuing continuous improvement of our environmental performance.

SECTION 2 • ORGANIZATIONAL AND RESPONSIBILITIES

This section details the roles and responsibilities of all parties involved in emergency response planning and implementation at the Meadowbank mine site.

2.1 GENERAL MANAGER

The General Manager is responsible for implementing and maintaining the ERP. In addition, the General Manager's responsibilities are to:

- Act as a spokesperson on behalf of AEM with the public, media, and government agencies, as required;
- Prepare and submit any formal reports (within the required time frame) to regulators and AEM management detailing the occurrence of an emergency; this includes submitting an incident reporting form;
- Ensure that the Health & Safety and Environment Superintendents have the means (financial and otherwise) to ensure that all required resources are made available, or provided from off-site if required;
- Work with the H&S, Human Resources and Environment Superintendent to evaluate what training is required by all staff, ensure that all staff are given appropriate training, and ensure that all staff are retrained as needed;
- Ensure that the Human Resources Superintendent has the means (financial and otherwise) to ensure that all employees' training requirements are current;
- Ensure that inspections of emergency response training practices and emergency response equipment are carried out;
- Ensure that emergency response exercises are conducted annually,
- Ensure that the results of the regular inspections are used to improve emergency response practices, and improve relevant plans accordingly;
- Complete an annual detailed review of the ERP with the management team and the Join Health and Safety Committee with particular emphasis on the objectives and methods of the plan, and the job descriptions of all positions named within;
- Ensure that updates to new emergency communications information (new phone numbers, changes in reporting structure, etc.) are distributed as soon as the new information becomes available;
- Keep a formal record of distribution and amendments to the ERP; and

2.2 EMERGENCY CONTROL TEAM – ***ON SITE MANAGEMENT TEAM***

No single department can handle an emergency situation alone. Everyone must work together to manage the emergency and coordinate the effective use of all available resources.

Therefore at the time of any emergency, all the management team and/or their designate must report to the 3rd floor Emergency Response Control room #1 or to the Emergency Response Control Room #2, at the Training room.

The Emergency Control Team structure lends support, fosters efficiency and provides additional knowledge during an emergency response situation.

The Official In-Charge, (General Mine Manager or Designate) maintains the overall coordination and direction of the Emergency and ensures the continued safety of all employees and the public.

However, the Superintendent or designate of the Area affected by the emergency, will assist with the development of the overall emergency response plan.

The remainder of the Emergency Control Team will be given specific tasks to perform that will assist with the management and coordination of the emergency response plan.

Roles & Responsibilities of the Emergency Control Group

2.2.1 Official In-Charge

The Official In-Charge (General Manager or designate) will take charge for overseeing and approving the overall emergency strategy.

Immediate duties of the Official In-Charge include:

- Consult with the Incident Commander the status of emergency.
- Appoint an Emergency Log Recorder to maintain a written record of the time and events, including all discussions, instructions and decisions made by the Emergency Control Team;
- Appoint a Muster Station Coordinator, who will ensure that proper head counts are conducted at three (3) designated Muster Stations.
- Issues specific tasks to the members of the Management as they arrive at the Control Room, as per this guideline;
- Brief the Emergency Control Team;
- Ensure that the safety of personnel is maintained, throughout the operation.
- Ensure procedures are in place for prompt dispatch of requested personnel, materials and equipment to the emergency area.

- Arrange for all reports to be presented at specific intervals to the Emergency Control Team

- Finalize the recommendations of the Incident Commander for rescue and recovery operations.

- The Official In-Charge is the only person authorized to release information to Government Agencies, Corporate Office or the Local Communities. He may delegate this activity to other members of the Emergency Control Team.

    - Verify all information you release;
    - Keep a record of all inquiries (media and non-media);
    - Do not speculate on causes;
    - Do not speculate on resumption of normal operations or when the problem will be solved;
    - Advise that further updates will be forth coming.

- Notify the corporate management, if the following appear probable:
    - fatalities;
    - injuries that could probably become items of local, regional or national media interest;
    - there is a public health or environmental risk;
    - an incident involving chemicals where there is a large volume or the potential for over reaction (e.g., cyanide);
    - a spill of effluent or contaminated water or chemical substance to an area that lies outside the area of drainage control of the mine site (i.e., an external spill);
    - mine operations may be stopped for more than two (2) days;
    - Government authorities will become involved.

- Ensure all response teams, regulatory agencies and any other agency on emergency alert notice are advised when the emergency has ended.

- Ensure all documentation (i.e., notes, log sheets, written instructions, etc.) is gathered for the creation of the final report.

- Participate in debriefing.

2.2.2 General Superintendents:

- General Services, Operations and Maintenance will report to the Emergency Control Room and support the General manager/Designate in whatever capacity required.

- They will also ensure that the Superintendent/Designate in each of their respective Department's is aware of the emergency.

- They will assist with the investigation and write up of the final report

2.2.3 **Incident Commander**: – **Usually a Trained Staff Member (ERT Coordinators or Supt. / GF.)**

The responsibilities of the Incident Commander include;

- Ensure Security has been notified of emergency;
- Ensure the evacuation procedures have been activated, if required;
- Ensure that there are sufficient ERT members available to respond to the emergency;
- Ensure that the ERT has back-up support, a standby Team;
- Ensure that ERT Team has refreshments and nourishment (if the emergency requires several hours to resolve);
- Assess the size and severity of the emergency and the likely consequences. Establish response priorities;
- Maintain communication with the ERT Captain.
- Advise the Official In-Charge of the ERT Team's activities, regarding the rescue and recovery operations.
- Appoint sufficient personnel, equipment and outside services are available. Utilize the members of the Emergency Control Team to organize these resources.
- Advise Official In-Charge when the emergency situation is under control and give the "All Clear".
- Participate in emergency investigation.
- Coordinate an orderly return to normal operating conditions.
- Arrange for a debriefing session, and utilize the services of all involved in resolving the emergency.
- Assist to write the final report.

2.2.4 **Emergency Log Recorder / Muster Station Coordinator: - "***keep a systematic record of the emergency events" and get an accurate "Head Count during Emergencies***"**

- These persons can be the Geology/ Engineering Supt/Designate/ General Supt.(whoever is available to perform these duties)

- The log is intended to be a systematic record of the events from the start of the emergency through all phases to termination, and will be used in the preparation of the final report. It is important that the log be legible and that all information is recorded.

Emergency Log Recorder: **"***Keep a systematic record of the emergency events, phone calls and directives,."*

- Date and time the incident was reported, who reported the event;
- Record all subsequent developments as they occur;
- Record all phone calls all discussions and decisions made;
- Record any other information that needs to be captured for the final report;
- Keep all the sheets of paper used to record information numbered, for the final report;
- All the pages will be initialed by the recorder and official in-charge;
- The official document will stay with the Health & Safety Department upon completion of the emergency.

Muster Station Coordinator: *" Provide a Head Count during Emergencies".*

- As soon as Management begins to assemble in the Emergency Control Room , the Person In Charge (the manager/designate) needs to assign a member of the Management Team to be responsible for ensuring that the Muster Stations are contacted.

- The Muster Station Coordinator is required to contact the three Muster Stations by telephone, to ensure that there is a Supervisor is in charge of that specific muster station and give him/her 20 minutes to achieve the head count.

- The Muster Station Coordinator will need to record the time the muster station was called, who is in-charge of the muster station, and any other instructions that have been given.

- The Muster Station Coordinator needs to open the Flo on his/her laptop in order to cross reference the names, once they receive the lists from the Muster Stations.(additional persons may need to be assigned to assist with the cross reference, in order to complete the head count in a timely manner).

2.2.5 Emergency Response Team (ERT Team) Duties:

- The ERT Team Members must report to the Fire Hall, when paged for a “code One” emergency;
- ERT Team Members will be given instructions on the emergency by the Incident Commander;
- ERT Team Members will follow instructions from the Incident Commander and will not put the Team at risk;
- The ERT Team Captain will maintain radio contact with the Incident Commander throughout the emergency:

2.2.6 Mine Superintendent/Designate Duties;

- Ensure that all employees working, are accounted for;
- Ensure that the ERT Members of his crew have responded to the “code One” emergency;
- If the “Emergency” is in the Pit, them assist the Official-in-Charge with the action plan to deal with the emergency:
- Assist as required by supplying equipment and/or manpower;
- Assist with restoring of the Operations back to normal operating standards:

2.2.7 Mill Superintendent/Designate Duties;

- Ensure all employees working, at this time, are accounted for;
- Ensure that the ERT Members on his crew, have responded to the “ Code One” emergency;
- If the “ Emergency” is in the Mill facilities, assist the Official-in-Charge with the action plan to deal with the emergency:
- Assist as required by supplying equipment and/or manpower;
- Assist with restoring of the Operations back to normal operating standards:

2.2.8 Environmental Superintendent/Designate Duties:

- The following are the responsibilities of the Environmental Superintendent/Designate;
- Provide technical advice on probable environmental effects resulting from a spill and how to minimize them;
- Provide advice to the Official-in-Charge for appropriate spill response procedures;
- Ensure that Environmental Staff are available to direct the spill response action plan;
- Assist with restoring of the Operations back to normal operating standards:

2.2.9 Health and Safety Superintendent/Designate Duties:

The Health and Safety Superintendent/Designate will be responsible for:

- Ensure that an Incident Commander is in place to oversee the ERT Teams;
- Ensure that all Management respond to the emergency and meet in the emergency control room;
- He will oversee all activities that require Security or Nursing. He will arrange for Medevac transport, if required;
- Will assist with getting a “head count” for the Official in-charge;
- Assist with obtaining outside help if required:

2.2.10 Site Services Superintendent/Designate Duties:

The following are the responsibilities of the Site Services Superintendent/Designate;

- Ensure that all his employees are accounted for
- Ensure that all ERT Member on his Crew, respond to the “ code One” emergency;
- If the “ Emergency” is involves the Site facilities, assist the Official-in-Charge with the action plan to deal with the emergency:
- Assist as required by supplying equipment and/or manpower;
- Assist with restoring of the Operations back to normal operating standards:

2.2.11 Maintenance Superintendent/Designate:

The following are the responsibilities of the Maintenance Superintendent/Designate:

- Ensure that all of his employees are accounted for;
- Ensure that all ERT Members of his crew respond to the “Code One” emergency;
- If the “Emergency” is in the Maintenance Shops, then assist the Official-in-Charge with the action plan to deal with the emergency;
- Assist as required by supplying equipment and/or manpower;
- Assist with restoring of the Operations back to normal operating standards:

2.2.12 Human Resources Superintendent/Designate Duties:

The following are the responsibilities of the Human Resources (HR) Superintendent/Designate;

- Ensure that all HR employees are accounted for;
- Provide assistance to the Official-in-Charge if there are employees issues, such as injuries, transportation requirements, etc.:

2.2.13 Health Care Professional (Nurse/Medic):

The on-site health professionals are responsible for the following:

- Providing on-site first aid and other medical support;
- Establish a triage location if there are multiple casualties;
- Arrange for medevac transportation, if required;
- Ensuring that the first aid room is maintained at all times, by using First Responders as support:

2.2.14 Security Department:

The on-Site Security Supervisor is responsible for the following:

- Ensuring that the Security officer has activated the appropriate level of emergency notification;
- Ensure that access points to the emergency are properly guarded.

- Notify the Baker Lake Gatehouse if the emergency involves the Alll weather private Road (AWPR).

- Assist with other duties as requested by the Emergency Control Group.

2.2. OCCUPATIONAL HEALTH AND SAFETY COMMITTEE:

The Occupational Health and Safety Committee is responsible for:

- Review the emergency response plan on an annual basis.
- Assist with any investigation resulting from the emergency.

2.3 ALL EMPLOYEES:

All employees are responsible for:

- Reporting to the nearest Muster Station when an fire alarm is sounded;;
- Employees reporting to the Muster Station need to assemble at the placard that has their department name.
- Employee's must be quiet and await the "head count**".**
- Reporting any emergency by either using the radio on the dedicated emergency channel (#1) or using the telephone to call 6911, to describe the type, the location, and nature the emergency, including possible injuries, trapped personnel, and the presence of any chemical or explosive hazards.

2.4 SUPERVISOR:

The Supervisor is responsible for:

- Ensuring the " Code One" call in, is accurate and that all the pertinent information is available for the official-in-Charge. (providing details regarding the type, the location, and the nature of the emergency, including possible hazardous materials involved and health and safety concerns);
- Ensure all workers on his shift are accounted for:

2.5 OTHER PERSONNEL:

Depending on the nature of the emergency (medical, electrical, mechanical, fire, etc.) other site personnel, including the Site Electrician, Site Mechanic, and others, may be called upon to play key roles.

2.6 EMERGENCY RESPONSE CONTACT INFORMATION – INTERNAL & EXTERNAL

AEM internal emergency response personnel, their duties, and phone numbers has been compiled in Table 2.1, Important external contacts such as regulatory agencies, health organizations and transportation companies providing evacuation support are listed in Table 2.2.

Table 2.1: Internal Emergency Response Contact Information Chart

Position	Name/Location	24-Hour Contact #
General Manager	Dominique Girard	Ph: 867-793-4610 ext. 6901 cell: 819-277-4080
Ast. General Manager	Jean Beliveau	Ph: 867-793-4610 ext. 6901 Cell: 416-315-6745
Meadowbank Security	Denis Roy/Charles Blouin	Ph: 867-793-4610 ext. 6847
Emergency Response Team	Emergency response personnel available on site to assist with spill and emergency response activities	Code One activated by Site Security
Incident Commander	Philippe Beaudoin	Ph: 867-793-4610 ext. 6809 Radio Channel # 2
	Andre Rouleau	Ph: 867-793-4610 ext.6809 Radio channel # 2
Health and Safety Superintendent	Normand Ladouceur	Ph: 867-793-4610 ext. 6720 cell: 819-860-6258
Health and safety Superintendent Assistant	Len Kutchaw (temp)	Ph: 867-793-4610 ext. 6720 cell: 819-856-9051
Health Professionals / Medical Clinic	Medical Clinic 1	Ph: 867-793-4610 ext. 6734
	Medical Clinic 2	Ph: 867-793-4610 ext. 6751
Human Resource Superintendent	Not filled	Ph: ext 6723 cell:
HR Ast. Supt.	Krystel Mayrand	Ph: 867-793-4610 ext 6723 Cell: 819-856-9556
Environment Superintendent	Kevin Buck	Ph: 867-793-4610 ext 6838 Cell: 819 856-1956

Table 2.2: External Emergency Phone Numbers

Organization / Authority	Telephone Number	Fax Number
NT-NU 24-HOUR SPILL REPORT LINE	867.920.8130	867.873.6924
Nunavut Water Board	867.360.6338	867.360.6369
Environment Canada, Environmental Protection Branch	867.669.4700	867.873.8185
Environment Canada: 24-hour emergency pager monitored by Emergency and Enforcement	867.920.5131	
Manager Pollution Control & Air Quality Environmental Protection, Government of Nunavut	867.975.7748	867.975.5981
General Inquiry Department of Environment, Government of Nunavut	867.975.7700	
Indian and Northern Affairs Canada (INAC) – Water Resources Manager, Nunavut Regional Office	867.975.4550	867.975.4585
Indian and Northern Affairs Canada (INAC) – Manager, Land Administration, Nunavut Regional Office	867.975.4280	867.975.4286
Kivalliq Inuit Association – Reporting Line	867.645.2810 or 867.645.2800	
Department of Fisheries and Oceans (DFO) – Nunavut Regional Office	867.979.8000	867.979.8039
Workers Safety and Compensation Commission Mine Inspector: Martin Van Rooy	800.661.0792 867.979.8527	
Keewatin Health Services – Baker Lake	867.793.2816 867.793.2813	
Keewatin Air Ambulance (Medevac) 24h/7 – Rankin Inlet dispatch	867.645.4455	
Baffin Regional Hospital (Iqaluit)	867.979.7300	
Baker Lake RCMP Baker Lake RCMP – emergency number Cambridge Bay RCMP	867.793.0123 867.793.1111 867.983.2111	
Baker Lake Hamlet Office	867.793.2874	
Baker Lake Fire Emergency	867.793.2900	
Baker Lake Fire Marshall's Office	867.873.7944	
Baker Lake Radio Station	867.793.2962	
Baker Lake Airport	867.793.2564	
Department of Environment Health	867.983.7328	
Poison Control Centre	867.920.4111	
Search and rescue – Artic Armed Forces Rescue Coordination Centre Trenton	800.267.7270 613.965.3870	
NAVCAN (Flight Information Center North Bay)	866.541.4109	
CANUTEC (Spill Support Information)	613.996.6666	
Charter Aircraft (for Evacuation)		
Keewatin Air Ambulance (Medevac)	867.645.4455	

24h/7 – Rankin Inlet dispatch		
Calm Air	204.677.0513 204.677.0519	
Nolinor	450.476.0018 888.505.7025	
First Air	867.669.6694 867.444.2002	
Helicopter Transport Services	613.839.5868	
Nunavut Emergency Management – Rankin Inlet	1-867-645-6803	
Nunavut Emergency Management – Iqaluit	1-800-693-1666 1-867-979-6262	

2.7 EMERGENCY COORDINATION CENTRE

Emergency operations will be directed out of the Emergency Control Centre (ECC). The ECC is located in the 3rd Floor of the Service Building Conference Room, or in the Training room on the main floor, from where the following will take place:

- Key decisions will be made and operations will be managed;
- Technical information to direct emergency activities will be provided;
- A communications centre will be established for emergency operations and to communicate with other organizations;
- Resource procurement will be provided and resource use will be directed;
- Any damage will be assessed and long-range objectives and plans will be developed; and
- Information on the emergency will be stored and disseminated to all necessary internal and external parties.

The following information is available at the centre:

- Shutdown procedures for operations;
- Locations of hazardous material storage areas;
- Locations of emergency and safety equipment;
- Locations of first aid stations and muster areas;
- Maps of communities and environmental maps;
- Information on location of other communications equipment, including portable sets;
- Information on emergency power;

- Contacts for other utilities;
- Operating manuals;
- Materials Safety Data Sheets (MSDS);
- List of personnel with alternate skills for use in emergencies;
- Type and location of alarm systems;
- Accident report forms;
- Accident status board and log book;
- Notification lists, staff lists, contact lists, with regular and emergency telephone/pages numbers, etc.

The ICC will be located at a safe and secure place near the site of the emergency. All responses and mitigation efforts developed at the ECC will be implemented through the ICC.

In the event of an emergency, security personnel may be required to establish and maintain a security perimeter to prevent or minimize injury to personnel, to preserve evidence for investigation, or to prevent unauthorized access to the scene.

2.8 TRAINING

The HR Superintendent is responsible for documenting, tracking, and updating all training activities. Record of training requirements and training attendance will be kept, tracked and updated for all employees by the HR Superintendent to ensure that retraining occurs as required.

For mine operations, AEM will ensure a sufficient number of trained ERT team members are on site at all times. All members of the ERT will be trained and familiar with emergency and spill response procedures. Emergency training will be conducted annually to ensure that a sufficient number of team members are available and that their training is up-to-date. The following will be included in the training:

- A review of the SCP and responsibilities of the team members;
- The nature, status, and location of fuel and chemical storage facilities;
- The location of on-site and off-site spill response equipment, and how to use it;
- Emergency contact lists;
- Desktop exercises of “worst case” scenarios; and
- The likely causes and possible effects of spills.

SECTION 3 • EMERGENCY RESPONSE EQUIPMENT

The Emergency Measures Counsellor will ensure that site drawings and equipment lists are posted conspicuously in key locations throughout the site so that important information is always readily available. This will include the following:

- Location and isolation points of energy sources;
- Location of emergency equipment (e.g., fire water pumps, fire extinguishers, monitors, self-contained breathing apparatus);
- Emergency procedures outlines, such as specialist firefighting, chemical neutralization;
- Location of equipment for combating pollution (e.g., booms, skimmers, pumps, absorbents, dispersants);
- Availability of internal and external emergency medical support (e.g., hospitals, clinics, ambulances, medical supplies, personnel with medical or first aid training);
- Location of toxicity testing facilities (e.g., gas and water);
- Location of wind direction / speed indicators;
- Directions on how to contact the local or regional weather forecasting service;
- Location of personal protective equipment and directions on its proper use; and
- Location of first aid stations and muster areas.

The Incident Commander, EMC, and Health and Safety Superintendent will know where, throughout the project site, all of this information is posted and where emergency equipment is stored. These individuals will also be trained in the proper use of emergency equipment.

External emergency response equipment includes the mobile emergency response equipment described in the SCP.

SECTION 4 • COMMUNICATION SYSTEMS

The primary basis for communication will be the phone system; back-up communication will be available via satellite phone. For on-site communication, hand-held radios will be mandatory for all employees working or travelling in remote areas from the main camp. Cell phones can be used as an additional means of communication. Back-up power sources and replacement batteries for communications equipment will be available to provide continuous, uninterrupted operation either at fixed facilities or at emergency sites.

Key site personnel will be accessible at all times by either portable radios, radios in vehicles, or office radios. The Health Care Professional will carry a hand-held radio and will be available at all times. Security personnel will monitor the emergency channel twenty-four hours per day. Senior management personnel will rotate as “On-Call Managers” for after-hour emergencies. An accommodations list that highlights key personnel will be posted and updated as required.

Lists of employees trained in first aid, mine rescue, and Emergency Response will also be posted. Employees and contractors who will be on site for extended periods will be trained initially and then retrained annually. This training will include the locations and use of emergency equipment, terminology used, and who needs to be contacted immediately in the event of an emergency.

SECTION 5 • EMERGENCY MEASURES

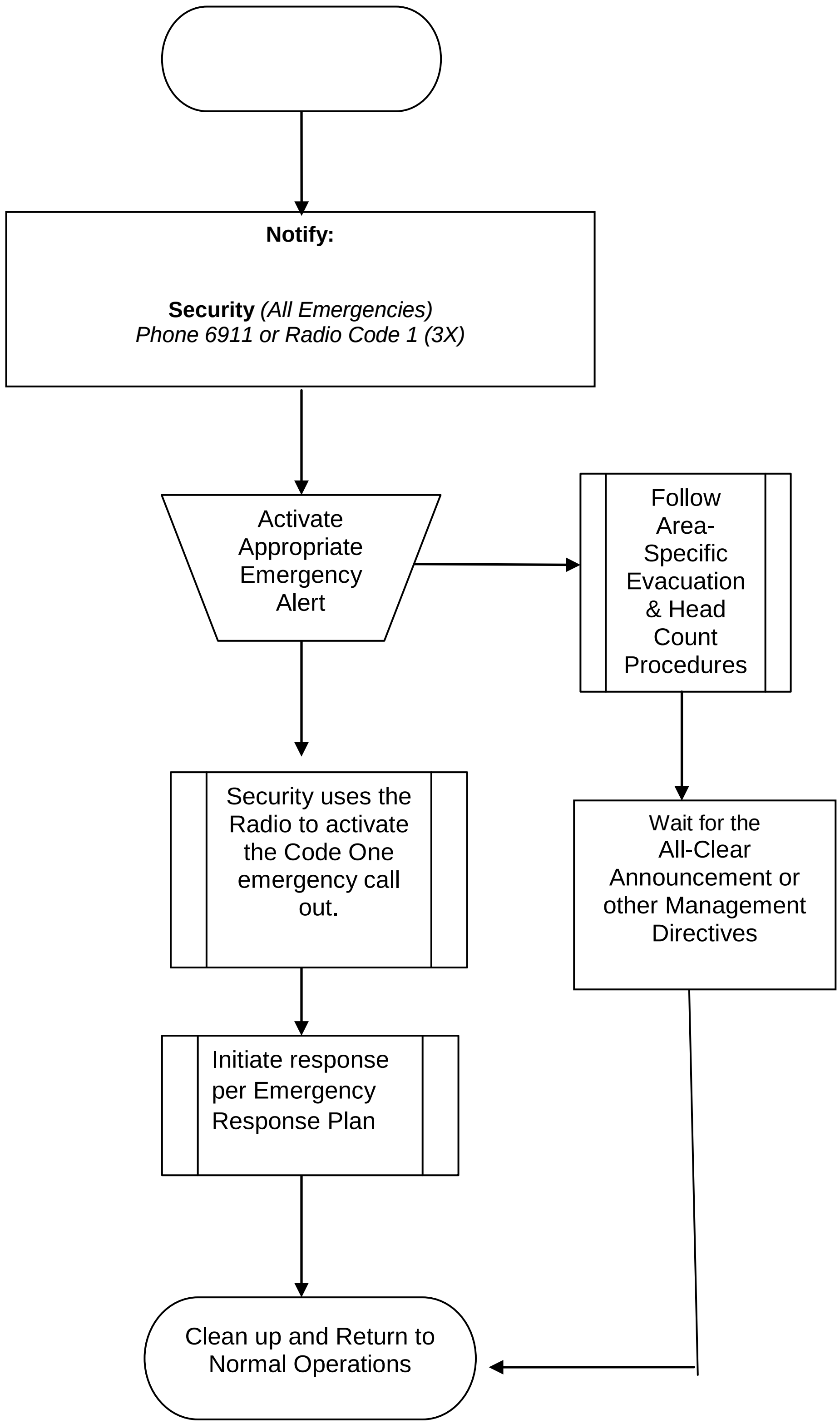
In the event of an emergency, the employee will have to follow our emergency procedure:

- Emergency is initiated - by calling **6911** on desk type phones, or calling on Two-way radio on **Channel 1 – Code 1 – Code 1 – Code 1.**
- All communication stops except for those involved with the Emergency – I.e.: First Aid Room attendants, Medics, ERT as required.
- All work stops in First Aid Room / Clinic – and in affected area – depending on seriousness of Emergency – the whole site.
- First Aid Room Attendant / Medic will answer the phone and/or radio.

  Note: if the First Aid Room Attendant / Medic do not answer, then Security Guard will answer and/or a Supervisor on radio will answer so that Emergency Response can be initiated.
- **Responder –** will ask where the medic is required?
- **Caller –** will give a brief description of the Emergency – name, location and what is wrong and/or required.
- **Responder –** will confirm location and details of incident and activate the **ERT** team. Security will be notified by responder and a page will be sent out to all **ERT** team members on site. (All **ERT** team members on site now carry pagers).
- The person at the casualty(s) will administer First Aid if trained to do so.
- Incident Commander Center will be immobilized as to ensure that communications, transportation, and effective deployment of **ERT** resources are conducted. It is mandatory that the Official In-Charge be notified immediately.
  - Transportation will be arranged to meet at the **ERT** hall by the two large doors for medical gear and **ERT** team members.

The **ERT** team (minimum of 6 team members) will assemble as quickly as possible. (Expectation – when the page goes off – all **ERT** team members will make their way expediently to the **ERT** hall.

GENERAL EMERGENCY RESPONSE FLOWCHART



FIRE

The Camp Complex and Process Plant is equipped with a fire detection and audible fire warning system. All site operating personnel receive basic training in the use of fire extinguishers. This training is tracked by the HR Superintendent.

For any situation involving fires, the first action will be to extinguish the fire if it is safe to do so and then report the incident. If the person cannot safely put out the fire, it must be reported as quickly as possible. In the event of a fire alarm, all employees not directly involved with fighting the fire will report to the designated muster location (section 5.2). Employees will remain in this area until assigned other duties by the ERT or until given clearance that the emergency is over.

In the event that a fire causes damage to mining equipment, site buildings, or chemical containers, particulates and/or gases could be released into the air, and hazardous materials and/or other chemicals (e.g., fuels, oils, battery acid, lime, etc.) could be spilled. In the short-term, this could result in air quality degradation, and potentially affect the local vegetation in the case of a spill or burn scar. Should such scenarios occur, the following actions will be taken, as required and WHEN IT IS SAFE TO DO SO:

- Air quality monitoring for airborne emissions;
- Collection and incineration of all putrescibles (food items);
- Removal of debris and contaminated soil for disposal on-site or off-site at a licensed disposal facility;

Further details on the cleanup of chemical spills are provided in the Spill Contingency Plan.

The incident commander will;

- Locate the source of fire.
- Dispatch the evacuation at the safest muster point.
- Assign a captain and his team.
- Ensure the security of all the ERT's members or any other service persons (medics, security guard, electricians, etc…).
- If the intervention of the mine inspector is necessary for a special investigation, he will ask to the security department to ensure the integrity of the scene.
- Call the end of the emergency measures and invites everyone evacuated to reintegrates their original locations.

General Manager or designate can decide to use any available machinery to separate all or part of a building to protect people or minimize losses.

Incident Reports are to be filed detailing the causes of the fires and responses undertaken. This information will be used by the EMC in subsequent fire prevention activities

5.1 MUSTER POINT

In the event that an evacuation is necessary, it is important that all affected personnel leave the emergency area and congregate at a pre-determined area or *Muster point* so that a head count can be taken to determine if there are any missing persons. Employees must remain at the muster point until the supervisor of the emergency area gives permission to return to work.

Upon hearing a fire alarm, smoke alarm, or evacuation alarm you shall ….

- ***Do Not Panic*** – Always ensure that you are prepared for the weather conditions – Dress appropriately – (Winter clothing during winter months).
- ***DO NOT*** delay and ***DO NOT*** stay and finish work before taking the proper steps to evacuate.
- Always **close** windows/doors as you leave your office etc.
- ***Always*** head to the ***closest*** **EXIT** door and follow **EXIT** signs to the closest outside door.
- Once outside head to the ***closest*** **"*Muster Station*".**
- Once in **"*Muster Station*"** – Stay put until relieved or instructed otherwise by your Supervisor.
- Your Supervisor and/or Senior Management person in your dept. will ***conduct a tally*** **(head count)** of everyone in his/her department. Ensure that you get your name on the **tally form**.
- Note: on nightshift, the highest level of Management may be a front line Supervisor.
- ***DO NOT* enter** a building when the alarm is sounding. Head straight to a "**Muster Station**".
- ***Never*** go through a building to get to a "**Muster Station**". Once you are outside, the first door you open should be the one to the "**Muster Station**".
- ***Never*** disregard an evacuation alarm. We understand that the system goes off without incident on occasion, but to disregard an ***alarm is to endanger your life and the lives of others.***
- ***Stay in*** "**Muster Station**" until you are instructed to "**Stand Down**" by the Incident Commander.
- ***Do Not*** leave "**Muster Station**" to go outside for a smoke. It is important for your Supervisor to know where you are at all times – especially during an "**Emergency**".
- The only person authorized to initiate a "**Stand Down**" is the incident commander or the General Manager or designate.
- **Failure to follow** proper Evacuation Procedures will result in Discipline.
- The following areas are considered "**Muster Stations**" (see Figure)

5.2 MEDICAL EVACUATION PLAN

In the event of serious injury, it may be necessary to remove the individual from the source of the danger and to administer emergency first aid. The Health Professional will be notified immediately in order to take charge of the situation and ensure the safe removal of the injured person to the first aid room if possible.

- The **ERT** team will respond with (Nurse / Medic) and assist as necessary with equipment, treatment etc.
- The (Nurse / Medic) and as many **ERT** team members as required will respond to the incident site. When the (Nurse / Medic) arrives at the scene, they will notify the First Aid Treatment Room.
- First Aid will be administered to casualty(s); the casualty(s) will be secured and transported to the First Aid Room. Vehicles transporting casualty(s) will have priority over any other vehicle on site.
- Once the “Mechanisms of Injury” and the patient’s condition have been assessed, a decision will be made by the (Nurse / Medic) whether a Medevac is required and decide on ground or air transportation. There are guidelines to follow to make this determination.

- As per guidelines for transportation, the “Mechanism of Injury” and/or patient condition, the (Nurse / Medic) will contact one of the following Medical facilities:

Winnipeg Health and Science Centre

Trauma team	**204-774-6511**	**or**	**204-787-3901**
Main ER doctor in charge	**204-774-6511**		

Baker Lake Health Centre - 867-793-2816

Churchill Hospital - 204-675-8881

Rankin Inlet Health Care Centre - 867-645-2816

In addition: Dr. Lee (AEM – MBK) Medical Director - will be notified.

If a **MEDEVAC** is required, the Health Care Provider, will call one of the following airlines::

- ❖ Baker Lake Medical Clinic (**867)-793-2816**
- ❖ Rankin Inlet Medical Clinic (**867)-645-2816**

The following **INFORMATION** will be relayed to **Medical Facility** that you have reached and to **MEDEVAC** dispatcher:

- ❖ Give Patient’s Name, Age, Mechanism of Injury, Nature of Injuries, and Medical Condition. Give all tests, treatment which you have done as well as ALL of the medication that has been administered to patient including the patient’s past medical history and medications that he/she is taking.
- ❖ The TRANSFER sheet should be included and if possible FAX: to the Health Care Facility who will be receiving the **MEDEVAC and patient.**

If a **MEDEVAC** is required and decision is made to go with one:

- ❖ The patient will STAY in First Aid Room until his/her **Condition is stabilized.**
- ❖ Unnecessary delays will be avoided in transportation of Patient to Receiving Health Care Provider.
- ❖ When **MEDEVAC** personnel arrive on site – they will help establish the patient for air transportation.
- ❖ (Nurse / Medic) will take instructions from Medical Director and act according to his/her instructions.
- ❖ All decision/interventions will be documented with time lines.

Depending on the **MEDEVAC** Company that has been chosen, the (Nurse / Medic) may have to escort the patient to the receiving Health Care Facility.

The Official In-Charge will notify the (Nurse / Medic) when the **MEDEVAC** has arrived and landed. The (Nurse / Medic) with the help of the **ERT** team will transfer the patient into the ambulance, to the aircraft.

If the **MEDEVAC** comes to site with a **Medical crew:**

- The **MEDEVAC** team will call ahead to notify their ETA.
- The Manager on Duty or designate will ensure that a vehicle is sent to the airstrip at the ETA.
- The **Medical crew** with their equipment will be brought to the First Aid Room.
- Once the **MEDEVAC** equipment is in place, the **ERT** team will assist the **MEDEVAC Medical crew,** and (Nurse / Medic) with the transfer of the patient to the ambulance, and into the aircraft.

After the aircraft has left AEM – MBK site, the (Nurse / Medic) will notify the receiving Medical facility with the ETA to their closest airport. The **MEDEVAC** pilot will advise receiving airport air traffic controller that an ambulance is required for transportation to receiving Medical facility.

All Operations type work will be suspended until (Nurse / Medic) are back in First Aid Room. The incident scene, materials, machinery, medical equipment etc. will remain undisturbed until the investigating team has conducted the investigation. This type of incident is considered a "Reportable Incident" therefore the Mines Inspector shall be notified (without delay). The Official In-Charge will be responsible for ensure that this occurs. Under no circumstances shall any person move, or otherwise interfere with any wreckage or equipment at the scene of a "reportable incident" until an inspector has conducted an investigation of the incident and has given permission to do so.

The Official In-Charge will make all necessary calls to the outside for notification purposes: I.e.: Corporate Office notification, Mines Inspector, RCMP, etc.

If the incident is of a fatality, it is CLEAR that the Coroner or in his/her absence, the RCMP are in total control of the incident scene. The scene is to remain undisturbed until orders have been issued by either of these two authorities.

The scene will then be released to the local authorities such as the Mines Inspector for their portion of the investigation.

Upon arrival of the aircraft to the airport of the Receiving Medical Facility (other than Baker Lake), the receiving team will be notified and a designated person will call the Incident Command (control center) and update them on their arrival and the next steps to be taken. I.e.: transportation to Receiving Medical Facility.

The Receiving Medical Facility will communicate with AEM – MBK Division (Nurse / Medic) on frequent basis to update site on patient's condition and treatment. Such as surgery required,

As soon as steps have been implemented to properly attend to the injuries, the Incident Commander will notify the appropriate authorities of the accident by telephone, providing as much information as possible. A complete accident description and investigation form is required to be submitted as soon as possible. The accident description and investigation form will be completed and submitted by the General Mine Manager. Unless some action is required to remove an immediate hazard, the site of any serious accident will be cordoned off and remain unchanged until clearance is received from the appropriate authorities.

5.3 AIRPLAN CRASH DISASTER

Emergency Response begins as soon as an air crash is identified or reported.

- When the Meadowbank Air Traffic Controller or Meadowbank Security is notified that an approaching aircraft is having difficulty, they will immediately notify the General Manager or Designate.
- In the event of reported air crash off-site the Meadowbank Air Traffic Controller or Meadowbank Security will notify the General Manager or Designate.
- Emergency Response procedure will be initiated if required for response by ERT
- The ERT Team on scene will make a preliminary assessment and notify the Nursing Clinic.
- The Nurse or Medic, with the ERT Team, shall establish triage, treatment, transportation, communication, and staging.
- The ERT Incident Commander will direct all emergency response actions, and assess the need for additional resources keeping the Command Post updated as to all actions
- The RCMP will establish access and traffic control and assist the Coroner in body recovery and identification, if necessary.
- The Incident Commander will instruct emergency response personnel to not move debris associated with the wreckage, ie. cargo, plane remnants, passenger belongings, unless there is imminent danger of items being destroyed, or unless they inhibit access to passenger rescue.
- The Coroner/RCMP is responsible for the identification, movement and/or removal of the fatality. Unauthorized personnel are not to move the dead without express approval of the Coroner/RCMP, except when there is a question of whether the person is deceased or if the body is in danger of being destroyed. In all cases involving the movement of a body, personnel moving the body shall make careful note of the location and condition of the body for the Coroner/RCMP.
- Upon notification of an air disaster, NAV Canada will be responsible for air traffic in proximity to the scene, with immediate regulatory control of airspace around the area.

They will keep the airspace clear of intrusive air traffic, to the limits of the regulations.

Recovery:

- Recovery immediately follows emergency response. It involves direction from the General Manager or Designate.

- Maintaining access control to the scene.
- Providing emergency social services (critical stress debriefing), for employees and rescue workers.
- Investigating the accident.
- Clean-up of the crash site.

5.4 PIPELINE BREAKAGE

Pipelines will be used to transport tailings solids, reclaim water, freshwater, and domestic sewage on site. Pipeline breakage could lead to localized, short-term smothering of vegetation, the release of poor-quality water, and potentially exposure of mine personnel to infectious or toxic substances. In the event of a pipeline breakage, the following actions will be taken as required and when it is safe to do so:

- Shut off the feed to the pipeline;

- Physically contain the spill through the construction of dikes, berms, sumps and collection ditches;

- Pump collected water to the tailings reclaim pond or sewage treatment plant;

- Collect and remove solids for disposal in the tailings facility, incineration, or off-site disposal at a licensed disposal facility; and

- Monitor for residual contaminants on land and in surface water.

A general response procedure for the handling of spilled domestic sewage (infectious substances) is provided in the Spill Contingency Plan.

5.5 TOXIC GAS RELEASES

In the event of a toxic gas release, the following actions will be taken:

- Immediately evacuate the area/building and notify the incident commander;

- If possible and safety permits, turn off the source of the gas and ventilate (i.e., open windows/doors to outdoors) the area;

- Isolate the area and restrict access to ERT personnel only; and

- Implement air quality monitoring.

For the mill, refer to the specific procedure *Toxic gas alarm emergency evacuation procedure*. A general response procedure for the release of compressed gases is provided in the SCP.

5.6 DIKE FAILURE

A detailed Emergency Preparedness Plan (EPP) will be developed to address the consequences of failure of any of the dikes on site. The procedure will be developed by the EMC and the Safety Superintendent with the assistance of the dike designer and Engineering Superintendent. Potential failure scenarios of the dikes and Tailings Storage Facility are provided in Appendix A.

5.7 EMULSION PLANT

A detailed Emergency Response Plan (ERP) was prepared by Dyno Nobel and addresses incidents and potential incidents involving the manufacturing, handling and storage of explosives and related products in Dyno Nobel Canada Inc.' magazines, emulsion plants and worksites at Meadowbank. The ERP for Dyno Nobel emulsion plant is provided in Appendix B.

5.8 BAKER LAKE MARSHALLING FACILITY

The Baker Lake Marshaling Facility is located 2 km east of the Hamlet of Baker Lake and is used for the interim storage of supplies, including hazardous materials, prior to being transported to the mine site. The fuel tank farm at the Facility is used for bulk fuel storage. Emergencies occurring at the Marshaling Facility will be handled according to the SCP.

SECTION 6 • REFERENCES

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Golder Associated Ltd. March 2007b. Final Report Detailed Design of Central Dike, Meadowbank Gold Project, Volumes 1 to 3.

ICOLD. 1995. Dam failures statistical analysis – International Commission on Large Dams, Paris, Bulletin 99.

NWT Water Board. January 1987. Guidelines for Contingency Planning. Government of the Northwest Territories.

SECTION 7 • LIST OF ACRONYMS

AEM	Agnico-Eagle Mines Limited – Meadowbank Division
AWPAR	All Weather Private Access Road
CDA	Canadian Dam Association
DFO	Fisheries and Oceans Canada
ECC	Emergency Coordination Centre
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EPP	Emergency Preparedness Plan
ERP	Emergency Response Plan
ERT	Emergency Response Team
FoS	Factors-of-Safety
GN	Government of Nunavut
HAZCOM	Hazard Communication
HMMP	Hazardous Materials Management Plan
HR	Human Resources
HSC	Occupational Health & Safety Committee
IATA	International Air Transport Association
ICC	Incident Command Centre
INAC	Indian and Northern Affairs Canada
KIA	Kivalliq Inuit Association
MMER	Metal Mining Effluent Regulations
MSDS	Materials Safety Data Sheets

MSHA	Mine Safety and Health Administration
NWB	Nunavut Water Board
OHSA	Occupational Health and Safety Administration
OHSP	Occupational Health & Safety Plan
PPE	Personal Protective Equipment
SCP	Spill Contingency Plan
TDG	Transportation of Dangerous Goods
TSF	Tailings Storage Facility
WCB	Worker's Compensation Board
WHMIS	Workplace Hazardous Materials Information Syste

APPENDIX A

Dike Failure Scenarios

A.1 Dewatering Dikes

A.2 Central Dike

A.3 Saddle Dams

A.4 Stormwater Dike

Appendix A.1

Dewatering Dikes

Dewatering Dike System

The Dewatering Dike System includes the East Dike and the Bay Goose Dike, as shown on the general mine site plan provided at the beginning of this document. The dike construction will involve the dumping of rockfill into water to create the shells of the dikes, excavation through rockfill and lakebed soils to bedrock, placement of granular filter and core materials, dynamic compaction, construction of the cutoff wall using slurry supported trench techniques and grouting of the bedrock and contact between the cutoff wall and bedrock using cementitious grout. The dikes will have crest widths in excess of 50 m and may be used as a one-way haul road.

The East Dike was constructed in 2008, with foundation grouting continuing into early 2009. The East Dike has a crest length of 700 m, excluding abutments, was constructed in water with a maximum water depth to bedrock at the cutoff of 7.2 m. The crest of the East Dike is at elevation 137.1 m and the average lake level along the dike is 133.1 m.

The dewatering dikes are considered high consequence structures, based on Canadian Dam Association (CDA, 2007) Dam Safety Guidelines. The dikes are relatively low, wide structures that exceed the minimum design criteria factors-of-safety (FoS) for stability for pre-drawdown conditions, operation conditions with maximum head difference across the dikes, pseudo-static earthquake conditions, and post closure conditions. Consequently, the probability of dike failure is considered to be low provided that the dikes are constructed according to the design. Mitigation against failure of the dikes includes a quality control and quality assurance program during construction, and an ongoing program of dike surveillance and monitoring during operations, as specified in the design.

East Dike

During operations, the East Dike separates the eastern portion of Second Portage Lake from the Portage Pit and the Tailings Storage Facility behind the Central Dike. Following closure, the East Dike will remain as a permanent structure that will separate Third Portage Lake (El. 134.1 m) from Second Portage Lake (El. 133.1 m) and maintain the existing water elevation difference of 1 metre.

The East Dike is approximately 720 m in length through an average water depth of approximately 2.3 metres, and a maximum water depth to bedrock of about 7.2 m. Crest width is approximately 55 metres. Minimum setback from the Portage Pit (distance between dike toe and pit crest) is greater than 170 metres.

Bay Goose Dike

The Bay Goose Dike separates the Portage Pit from Third Portage Lake. The Bay Goose Dike acts as a permanent structure to allow mining of the south end of Portage Pit and the Goose pit.

The Bay Goose Dike will be approximately 2 km long, and will be constructed in water depths less than 10 metres at the cutoff. Crest width varies between approximately 85 and 100 m. Minimum design setback from the Portage and Goose Pit is 70 metres.

Table A.1: Meadowbank Dewatering Dikes Summary of Consequences and Proposed Monitoring/Action for Rare Events Based on Water Retaining Embankment Failure Modes Identified in ICOLD Study (1995)

Failure Mode	Scenario	Consequence	Monitoring/Action
Overtopping	(1) Lake level rise because of restricted outflow from Third Portage or Second Portage Lake (excessive inflow is a far less likely scenario).	Water spilling over the crest. The crest is wide and comprises coarse rockfill. Significant damage to the dike is not credible, based on performance of other rockfill structures subjected to overtopping or flow through events. Mining operations might need to be suspended, but there will be considerable warning time given the design freeboard and the storage volume within the lakes.	Lake levels should be part of safety information provided to mine management. Outflow channels should be inspected weekly during thaw, open water season, and during ice break-up. If overtopping is likely, a temporary spillway could be constructed and armoured to control and localize flow at shallow dike sections.
	(2) Dam crest settles more than 2m over a distance of (say) 50m or so. This scenario requires extensive loss of support in the foundation since the rockfill of the dikes is essentially not settlement prone itself. For foundation settlement of this magnitude to occur, a piping event must develop and which in itself might be a failure mode. Or, there would have to be an unexpected layer of compressible soil in the foundation.	Same as (1).	The situation envisaged in this scenario should develop slowly with crest settlement evident at least several weeks before a run-away event develops. Easily observed cracks should be evident. Monitoring of crest settlement is appropriate, and is included in the design. Rockfill and till available from the mining operation can be placed to raise the dike crest.

Failure Mode	Scenario	Consequence	Monitoring/Action
Internal Erosion	(1) Dike Section: Cutoff wall is defective, allowing high water flow across the wall. This defect occurs at a deep water location where the core backfill and filters are segregated and permeable; the combination allows erosion of the cutoff wall and increasing seepage.	The cutoff wall will develop a progressively increasing void ratio, thereby increasing the rate of water flow through the dike. This is not a catastrophic failure mode as the rockfill shoulders of the dike will be stable, and at its worst, would lead to temporary suspension of mining.	Monitor seepage from downstream face for rate of seepage, and for presence of sediment in seepage. Will become evident as localized intensive seepage at dike toe and can be repaired. May also see settlement in the cutoff wall. Will be most likely in deep water sections. Gradients across the cutoff wall in shallow water are not high enough to cause piping.
	(2) Dike Section: Cutoff wall loses bentonite because of improper construction.	Same consequences as erosion because of defect, as above.	Bentonite makes up 2% of the cutoff wall fill. Loss of this material will increase the permeability of the cutoff wall and increase the rate of seepage.
	(3) Foundation: Till is possibly non-uniform with more transmissive zones and not self-filtering. It is possible that one of these zones may align with defective construction of the core backfill and defective construction of the cutoff wall allowing high flows. Seepage could along the transmissive zone beneath the downstream rockfill section could erode the foundation tills at the downstream toe or into the downstream rockfill because of the lack of filtering.	Limited seepage at the toe or into the rockfill would accelerate into a large inflow, and could lead to the undermining of the dike if no action was taken. This is a credible catastrophic failure mode if increased seepage is not detected in time.	No particular instrumentation is needed as this failure mode will show itself as localized and increasing seepage. It could be detected by walk-over inspection by an experienced engineer or technician. Remedial action could comprise a reverse filter and rockfill buttress depending on location of the flow and configuration of the foundation, freezing, or grouting if identified in time. Quality control of cutoff is important, and most important for deep water sections. In the worst case, the pit may be deliberately flooded in a

Failure Mode	Scenario	Consequence	Monitoring/Action
			controlled manner, the cutoff repaired, and the pit dewatered.
Seepage within Embankment	Seepage on its own is not a credible failure scenario. The downstream rockfill shell has extremely high flow through capacity. The rockfill zone is both large and pervious, so that seepage will not daylight on the downstream face and lead to instability. Any seepage related failures must include internal erosion, see above.	No credible consequences. May require upgrade of the seepage collection system. May need to suspend mining activities while reducing seepage.	Seepage monitoring program.
Seepage within Foundation	Defective construction of cutoff leading to transfer of unexpectedly high fraction of the reservoir head into the downstream part of the dike foundation, or leading to a piping event as above.	This failure mechanism has caused embankment failures elsewhere because of straightforward pore pressure induced instability. However, it is unclear that it could cause failure of the Dewatering Dikes because of their large width compared to the retained water head. The most likely consequence is downstream toe slumping requiring a localized stabilizing berm before the crest roadway could be reinstated.	If this mechanism arises it should show itself during initial dewatering or very shortly thereafter.

Failure Mode	Scenario	Consequence	Monitoring/Action
Internal Conduit Rupture	There are no water offtake works or other structures extending through the dikes.	Not applicable.	Not applicable.
Slope Instability	(1) Normal Operation: The rockfill shoulders of the dike are wide and have high shear strength, making it a conservative design. Slope failure requires failure in the foundation and which would then extend into the overlying dike. Sliding failure is considered unlikely given the low horizontal forces generated by water and ice forces relative to the normal frictional force due to the weight of the dikes and the friction angles of foundation materials	A foundation failure would cause a rotational slip or sliding failure until equilibrium was reached. This mechanism would limit access along the dike until repaired. Failure through the rockfill shoulders will not necessarily compromise the water retaining function of the dikes. Failures which reach the core may cause failure.	This mechanism should develop during construction or dewatering, due to increase in load and associated pore water pressure increase. Initial stages of failure should be observable as tension cracks in the dike crest. Walk-over inspection of the dikes by a trained inspector is an appropriate monitoring strategy. Survey of crest, face, and toe is also appropriate. Stabilizing berms can be placed inside the dikes or through water along the upstream shoulder.
	(2) Earthquake Induced: Occurrence of an extreme earthquake, much in excess of the current understanding of seismicity of the area.	The extreme earthquake loading for this site is a low magnitude. Settlement of the dikes could occur in the event of a large earthquake. Dynamic compaction of the core during construction may have subjected the rockfill shells to accelerations equivalent to the expected earthquake loading. This would not be a failure situation. The crest is also erosion resistant for any earthquake induced wave action in the impounded water.	Dike inspection following earthquakes felt on site.

Failure Mode	Scenario	Consequence	Monitoring/Action
Failure of Cutoff Wall Due to Movement of the Dikes	Differential horizontal movement of dikes due to water or ice loading, or pit wall failure. Creates a breach in the cutoff wall. Ice and water forces are not credible due to the ratio of frictional forces generated by the self weight of the dike versus ice loads and water pressure. Pit wall failure involving the dike unlikely based on assessments of pit wall stability and setback distance between the pit and the dikes.	Large inflows through the breach. Pit would flood requiring suspension of mining activities. Potential for loss of life for workers inside dikes.	No enhanced monitoring. Prism monitoring program sufficient. If the pit floods, then repairs to cutoff would be done prior to dewatering.
Unexpected Settlements	Unexpected foundation soils consolidate during dike construction. A significant quantity of clay, that was not recognized during foundation excavation, would be required to generate settlement required for a water release event. Settlement of the core will be limited by dynamic compaction.	2 m of Core settlement would be required to allow water flow through the rockfill and over the settled core. This flow would not cause failure of the rockfill shells. It would also be readily repaired by placing more end-dumped till into the settled zone.	No enhanced monitoring required, as settlement would be apparent from prism monitoring data and visual inspection. Excessive settlements may be remediated by excavating rockfill above the core and placing more till. Soil conditions will be observed during construction, and design revised to accommodate actual conditions.

A.1.1 Failure Scenario during Operations

The 'worst-case' scenario for failure of the dewatering dikes during operations would involve a movement of the dikes that compromises the integrity of the cutoff wall. However, the rockfill has a very high flow-through capacity and a high strength and will not move unless the foundation is involved. The water will flow through the upstream rockfill first, then through the core and cutoff wall, and finally through the downstream rockfill berm. Flow through cracks opening in the foundation may erode the foundation soils and the core. The upstream rockfill will choke the flow to some degree, and flow will decrease once the downstream toe of the dike is inundated and the head difference across the dike begins to reduce.

Although this describes a 'worst-case' scenario, a catastrophic failure of the pit dewatering dike system is not considered a credible failure mode. Elements of the dike design, including the width of the dike section, and the inclusion of filters, in addition to the cutoff wall make catastrophic failure of the dike highly unlikely. However, for the purposes of this document, the effects of such a failure are described below.

<u>Potential Effect</u>

In the case of the East Dike, the worst-case scenario would be associated with the short portion of the dike through the deepest water along the alignment at the centre of the dike. In this area water depth is as much as 7 m to bedrock at the cutoff wall within the dike. This inflow could potentially result in loss of workers caught in flowing water. Breach of the East Dike would be unlikely to trap workers in the pit when access ramps are on the west side, opposite the inflows. Breach of the East Dike would result in cessation of mining, either temporarily or permanently.

Upon completion of the East Dike and dewatering of the northwest arm of Second Portage Lake, there will be approximately 17 million m^3 (Mm^3) of water remaining in Second Portage Lake. If the segment of dike at the deepest portion were suddenly removed, flow from Second Portage Lake into the pit would continue until the elevation of the lake drops by several metres, at which time the current lake bottom would be exposed and would act as a barrier to flow towards the pit. This scenario is the worst in the final year of pit operation when pit volume is the largest. The volume of water associated with this drawdown would be on the order of about 10 Mm^3. Some erosion of the till between the pit crest and dike toe would be expected, so the depth of water loss from the lake may be larger, but this would take some time to fully develop.

Inflow to the pit could expose large amounts of shoreline and shoal habitat around the lake. Water flowing into the pit could entrain suspended solids and dissolved constituents from the dike material and pit walls. If necessary, the water could be retained within the pit and diked area and would be amenable to treatment (e.g., particle settling, in-situ amendment) before discharge, should it be required.

The ecological effects of the exposure of shoreline and shoal habitat on fish and fish habitat would be to temporarily eliminate spawning areas and result in reduced water quality from exposure of sediment to wave and wind induced erosion. The effect of this would last approximately one year as inflow from Third Portage Lake to Second Portage Lake averages 10 Mm^3 annually (AMEC, 2003). Presuming that the dike breach is repaired, water levels in Second Portage Lake would rise over the spring and summer to return to pre-breach elevations and would re-fill the lake in the event of a 'worst-case' scenario.

In the case of the Bay Goose Dike, the worst-case scenario dike breach that could allow the greatest amount of water inflow would be associated with the southeast segment of the dike through the deepest water along the alignment. In this area, water depth is as much as 20 m deep at the cutoff, and the pit could be as deep as 130 m. This inflow could potentially result in loss of workers caught in flowing water. Breach of the Goose Island Dike would be unlikely to trap workers in the pit when access ramps are on the northwest side, opposite the inflows. Breach of the Goose Island Dike would result in cessation of mining of the Goose Pit, either temporarily or permanently.

In the unlikely even that such a failure of the Bay Goose Dike were to occur, the rate and volume of water entering the downstream pit would depend on the magnitude of the breach and the length of time to repair the breach. Third Portage Lake has an estimated volume of the lake is 446 Mm^3 (Golder, 2006). The final volume of Portage Pit (30.0 Mm^3) is roughly 6.7% of the volume of the lake, while Goose Pit (14.8 Mm^3) is approximately 3.3% of the volume. In the case of a catastrophic breach of the Bay Goose Dike, the estimated Third Portage Lake water level drawdown would be approximately 1.0 m and 0.5 m, respectively assuming that the failure occurs when the pits are completely excavated and a complete filling of the pits. These estimated worst-case scenario changes in water level are comparable to the mean average annual difference between high and low water (0.3 m) on Third Portage Lake.

There would be a small impact to fish and fish habitat in Third Portage Lake in the event of a 0.5 m to 1.0 m drop in water level. Areas used for spawning may be slightly nearer to the ice cover and a small amount of habitat might be vulnerable to freezing. Water quality within the pit would be temporarily impaired from an increase in suspended and dissolved solids, although water quality would return to near background during the first winter as sediment would settle under the ice cover.

Mitigation, Management, and Monitoring

A major cutoff breach scenario due to pit wall movement, while possible, has a low probability of occurrence. If foundation movement was sufficient to compromise the cutoff wall, then the core backfill would act as a semi-permeable element and limit flow. Water would first need to flow through the rockfill shell, the core backfill, the damaged cutoff wall, and then through more of the core, filters, and the downstream rockfill. Provided that the downstream filter elements against the rockfill shell are properly constructed, then migration of the core and cutoff wall into the rockfill will not occur. Some additional seepage may occur due to failure of the cutoff wall; however this would be noted during regular monitoring. Mitigation could be by jet grouting, freezing, or installation of sheet piling through the cutoff wall.

The use of appropriately graded filters in the design of dikes and dams is standard engineering practice, and is the key to preventing internal erosion. The dike design includes the use of a two zone filter on the upstream face of the pit side rockfill. During the construction of the dikes a quality control and quality assurance program will be undertaken.

Routine visual inspection of the dikes will be conducted on a regular basis to document any changes in the dikes.

During the operation of the dike, a series of monitoring instrumentation will be installed, including:

- Thermistors to monitor the thermal regime in the dike and foundations;

- Slope inclinometers and prisms to monitor deformations within the dikes; and
- Piezometers to measure pressure and to infer flow through the dikes.

Piezometers downstream of the cutoff wall would be monitored for pressure changes as the pit is deepened. Increasing pressure would indicate that less head loss is occurring across the seepage cutoff, which might indicate that a crack has formed, permeability is increasing, or the pit is experiencing inflows from some other potential flow pathway. The instrumentation will be monitored to identify any potentially problematic areas relating to dike instability. Mitigation measures for seepage and piping could include:

- Additional pressure grouting of bedrock materials;
- De-pressurization wells;
- Construction of a slurry cutoff wall within the core just upstream of the suspected seepage area;
- Jet grouting of the core and foundation in the suspected seepage or crack area;
- Construction of a cutter soil mixing (CSM) wall in the suspected crack area;
- Freezing;
- Installation of toe drains; and
- Construction of interceptor ditches within the down-stream overburden materials.
- Allow pit to flood, install new cutoff under no-flow conditions, then dewater and resume mining.

Specific monitoring and mitigation strategies will be developed as part of an Operations Plan for the de-watering dikes.

A.1.2 Failure Scenario during Closure

At end of mine life, once the water quality of the pit lake has been determined to be suitable for release, a portion of the south end of the Bay-Goose Dike will be removed resulting in a hydraulic connection between the Goose/Portage Pit Lake and Third Portage Lake. The East Dike will be the only dike that will remain in service. The elevation of the pit lake will be equal to Third Portage Lake. The elevation difference between the pit lake and Second Portage Lake will be approximately 1 m. Consequently, there will be a low hydraulic gradient from the pit lake towards Second Portage Lake. During the closure and post-closure period, the natural central and east channel outlets that connect Third Portage to Second Portage Lake will continue to carry the entire flow between the two lakes.

Potential Effect

A breach of the East Dike would create an additional outlet and cause water to leave the Portage/Goose pit area and spill into Second Portage Lake at a greater rate, partly at the expense of flow from the central and east channel outlets. This would cause a rise in water level in Second Portage Lake and a reduction in level in Third Portage Lake. The additional water would flow through the channel connecting Second Portage Lake to Tehek Lake until the water elevations in Second and Third Portage lakes equilibrated.

In the event of such a scenario, water would flow from Third Portage Lake, northward through the pit lake area, and then east through a potential East Dike breach and into Second Portage Lake. There is a naturally large outlet capacity via the connecting channel from Second Portage to Tehek Lake. Water residence time in Second Portage Lake during and after mine development is less than one year. Thus, in the event of an East Dike breach, any additional water added to Second Portage Lake would leave the system relatively quickly. Given the flow-through nature of the lake there would be little net change in Second Portage Lake volume or lake elevation as water would easily be absorbed into the much larger Tehek Lake.

Drawdown of Third Portage Lake would be limited, given the large size of the lake (33 km^2) and the constriction points within the system that would slow drawdown. Specifically, the magnitude of drawdown in the event of a breach would depend on the magnitude and depth of the breach, time of year (winter ice cover would prevent loss of water), response time, flow rate (i.e., the loss of water depends on the location of the breach and friction through the system), and the outlet capacity of Second Portage Lake. For example, total annual average discharge from Third Portage to Second Portage Lake is approximately 10 Mm^3 with a mean annual difference in water level between spring and fall of 0.3 m. Given the large size of Third Portage Lake, a breach resulting in the loss of 10 Mm^3 of water, which is equivalent to an entire open water season of runoff through all discharge channels would result in a drawdown of only about 0.3 m. Maximum drawdown would be one metre.

Reductions in water level would therefore be small and have only minor impacts to fish habitat in Third Portage Lake. Adverse impacts to water quality would not be expected given that water quality within Goose/Portage pits is expected to be very high.

Mitigation, Management and Monitoring

Internal erosion of the cutoff wall could result in increase of the rate of water flow through the East Dike. However, this is extremely unlikely due to the low hydraulic gradient across the East Dike (~ 1 m of head difference) and filter effect of the core backfill. Such a scenario is more likely to occur during the operational phase of the East Dike when the hydraulic gradient across the dike section is much higher, though in the opposite direction. If such a scenario were to occur, it would not be considered a catastrophic failure mode due to the stability of the rockfill shoulders comprising the outside structural elements of the dike.

A breach in the East Dike during closure could be managed by the placement of material to reduce the flow of water and reduce potential erosion of the till core. The hydraulic gradient across the dike at closure is low. The dike could be repaired and hydrologic conditions restored without any danger to the overall stability of the dike, provided annual monitoring is carried out following closure.

Appendix A.2

Central Dike

Tailings Storage Facility

The Central Dike system is comprised of a Central Dike, a series of perimeter dikes, and the natural basin of the northwest arm of Second Portage Lake, as shown on the general mine site plan provided at the beginning of this document. The Central Dike cross-section consists of:

- A rockfill embankment, constructed from run-of-mine waste rock, placed in lifts and compacted, with the upstream face designed at 1.5H:1V or flatter and the downstream face designed at a 1.5H:1V slope;
- An upstream two zone granular filter;
- A bituminous liner with appropriate cover on the upstream face;
- An upstream cutoff through the foundation soils to bedrock; and
- A grout curtain through the fractured bedrock zone (at this time it has been assumed that the fractured bedrock is up to 20 m deep, based on available geotechnical drilling information along the dike alignment).

The Central Dike is a high consequence structure, based on Dam Safety Guidelines (CDA, 2007). Slope stability analyses show that the dike will meet or exceed design FoS for stability under static and pseudostatic earthquake load conditions. Consequently, the probability of failure of the Central Dike is considered to be very low.

Table A.2: Meadowbank Central Dike Summary of Consequences and Proposed Monitoring / Action for Rare Event Based On Water Retaining Embankment Failure Modes Identified in ICOLD Study (1995)

Failure Mode	Scenario	Consequence	Monitoring/Action
Overtopping	(1) Pond Level rises because of restricted outflow (excessive inflow is a far less likely scenario). Water will spill at the low point on the dike system, which will depend on the construction schedule.	Water spills over the crest but, as this crest is both wide and comprises coarse compacted rockfill, minimal damage to the dike is credible. There will be considerable warning time prior to overtopping given the design freeboard and the storage volume.	Adjust decant and/or deposition rate. Add spillway in Central Dike, Saddle Dam, or natural ground.
	(2) Dam crest settles more than available freeboard over a distance of (say) 50m or so. This scenario requires unexpected foundation condition, such as glacial lake clay deposit. Settlement would occur upon placement of rockfill during dike raise construction. Freeboard is greatest immediately after a raise and this scenario is therefore unlikely to occur.	Water and tailings spill over crest and if settlement was rapid might erode the crest. Travel of tailings will be dependent on volume of water available, and level of thaw. Tailings would only go to the pit, and not reach the lake.	The situation envisaged is unlikely. This scenario would develop slowly during construction of the dike. Crest settlement would be evident at least several weeks before an overtopping event occurred. Easily observed cracks should be evident during summer period, but could be hidden during the winter. Systematic crest settlement monitoring is appropriate, and included in the design. Production and addition of tailings to the Tailings Storage Facility could be stopped to maintain freeboard. A spillway could also be constructed. The tailings deposition plan maintains a long beach between the dike and the pond, which provides additional freeboard to overtopping of the dike by pond water.

Failure Mode	Scenario	Consequence	Monitoring/Action
Internal Erosion	(1) Dike Section: Upstream bituminous liner contains defects arising from undetected damage during installation. May lead to loss of water, but filter retains tailing.	Loss of water into the rockfill. This is not a catastrophic failure mode, because the rockfill of the dike will be stable, and at its worst, would lead to temporary suspension of mining. Plus the bituminous liner does not propagate a tear like a plastic liner, so undetected damage is typically small and does not grow. Also, foundation slopes down towards the tailings, so seepage impounds in the rockfill and will tend to reduce further seepage	Not necessary to monitor directly. Will become evident as possible seepage at dike toe. QA/QC program during construction is the main defence against this scenario.
	(2) Dike Section: Upstream bituminous liner contains defects arising from undetected damage during installation. This defect occurs at the same location as a filter defect.	Loss of tailings and water into the rockfill. This is not a catastrophic failure mode, because the rockfill of the dike will be stable, and at its worst, would lead to temporary suspension of mining. Accumulation of ponded water within the rockfill would decrease the head difference driving flow, thereby limiting the potential for a catastrophic failure.	Not necessary to monitor directly. Will become evident as possible intensive seepage at dike toe, and potentially as tailings fines within seepage downstream of the toe. QA/QC program during construction is the main defence against this scenario.

Failure Mode	Scenario	Consequence	Monitoring/Action
Seepage within Embankment	Seepage on its own is not a credible failure scenario. The rockfill is pervious so seepage will not daylight on the downstream face. Flow through the rockfill will not lead to instability. Any seepage related failures must include internal erosion, see above.	No credible consequences.	No scenario specific monitoring required.
Seepage within Foundation	If the till foundation had a zone of more pervious soil (e.g. gravel seams) and the more pervious zone was preferentially exposed to water pressure, then normal seepage would transmit an unexpectedly high fraction of the reservoir head into the downstream part of the dike foundation. This scenario requires construction defects in filters, liner, and cutoff trench fill.	This failure mechanism has caused other embankment failures elsewhere because of straightforward pore pressure induced instability. However, it is unclear that it could cause failure of the Central Dike because of its large width compared to the retained water head. The most likely consequence is downstream toe slumping requiring a localized stabilizing berm.	If this mechanism arises it should show itself gradually as the tailings and water level increase in the basin by build up of pore water pressures in the foundation. This would be detected during routine monitoring of piezometers installed in the foundation. Pressure relief wells could be installed in the foundation during operations. The tailings deposition plan maintains a long beach between the pond and the dike. This will reduce seepage gradients beneath the dike. In addition, the tailings act as an upstream blanket on the bottom of the TSF to limit seepage into the foundation.
Internal Conduit Rupture	There are no water offtake works or other structures extending through the dikes.	Not applicable.	Not applicable.

Failure Mode	Scenario	Consequence	Monitoring/Action
Slope Instability	(1) Normal Operation: The rockfill has high frictional strength and the design widths make it conservative. Slope failure requires failure in the foundation, which would then extend into the overlying dike.	A foundation failure would cause a rotational slip or sliding failure until equilibrium was reached. This mechanism would limit access along the dike until repaired. Failure through the rockfill will not necessarily compromise the tailings or water retaining function of the dike.	Initial stages of failure should be observable as tension cracks in dike crest and movement at dike toe. Walk-over inspection of dikes by a trained inspector is an appropriate monitoring strategy. Survey of crest, face and toe is also appropriate. If movements associated with increases in foundation pore pressures, then construction could be stopped or staged to allow pore pressure dissipation. Placement of rockfill as a downstream toe berm could help prevent failure.
	(2) Earthquake Induced: Occurrence of an extreme earthquake, a very rare event.	The extreme earthquake loading for site is a low magnitude event. A large earthquake would not be expected to cause a catastrophic failure, rather the dike would settle. The Central Dike rockfill is placed in the dry and compacted, and will therefore have limited settlement. This would not be a failure situation. The crest is also erosion resistant for earthquake induced wave action in the impounded water.	No monitoring is necessary. Dike should be inspected following any earthquakes felt on site.

Failure Mode	Scenario	Consequence	Monitoring/Action
Liner Failure Due To Foundation Movement	Differential horizontal movement of the dike due to pit wall failure. Creates a breach in the liner and filter. Pit wall failure is unlikely based on assessments of pit wall stability and the setback between the pit and the toe of the dike. Also, the liner and rockfill can withstand significant deformation, making this an unlikely scenario.	Tailings and water escape into the dike rockfill, but pond there because the foundation slopes towards the dike, rather than the pit. It is noted that the tailings pond is operated approximately 500 metres away. Rapid escape of water will therefore be limited.	No enhanced monitoring. Prism monitoring program and visual inspection sufficient. Movement would be evident in setback area between dike and pit. Tailings at face of dike may be excavated to allow repair of liner, or placement of filter material. Other options include freezing tailings at face of dike.
Unexpected Settlements	The foundation till is expected to consolidate during construction and operations. There is no credible mechanism for a large degree of unexpected settlement following construction required to eliminate freeboard and release tailings/water.	A large settlement could lead to water flowing through the rockfill, but this would not cause failure of the rockfill. It could also be readily repaired by placing more end-dumped rockfill, and extending the liner, in a manner similar to the periodic raise.	No enhanced monitoring required, as excessive settlement would be apparent from prism monitoring data, and visual inspection.

A.2.1 Failure Scenario during Operations

In the case of failure of the Central Dike during operations, the 'worst-case' scenario would involve a flow of unfrozen water and tailings in association with a catastrophic failure of the dike in the later stages of mining when personnel and machinery are working in the open pit directly down-stream of the Tailings Storage Facility (TSF).

Potential Effect

The failure of the Central Dike could result in the sudden release of dike material and tailings from the TSF into that portion of the Portage Pit immediately adjacent to the dike. This could potentially result in loss of life. This would result in cessation of mining activities, either temporarily or permanently.

There would be no effect on the receiving environment water quality, fish or fish habitat because tailings would be contained within the pit and the dewatering dikes and the area would not yet be flooded.

Mitigation, Management and Monitoring

The calculated FoS for this failure mode, under static and pseudo-static conditions, are above design criteria in the Dam Safety Guidelines (CDA, 2007). Consequently, the probability of such a failure developing is low. Based on the tailings deposition plan, it is expected that the tailings pond will typically be 500 m or more from the face of the Central Dike. Furthermore, thermal modeling indicates the tailings and Central Dike will be frozen or partially frozen, and that the facility will tend to the frozen state in the long term. Therefore, a catastrophic failure of the Central Dike without some form of prior dam distress providing a warning of deteriorating conditions is not considered a credible catastrophic failure mode.

Mitigation against such a failure mode occurring will be to construct the Central Dike to design so that it is physically stable under all loading conditions. A comprehensive quality control and quality assurance program will be undertaken during dike construction to confirm foundation conditions, material type and quality, and to adjust designs as necessary to accommodate actual or unexpected conditions found at site.

A management plan will be developed for the operation of the tailings facility, and will include appropriate operational controls and monitoring activities. During operations, instrumentation will be installed to monitor not only the physical performance of the Central Dike itself, but also the performance of the TSF. The instrumentation to be installed include:

- Thermistors to monitor the thermal regime in the dike and foundations, and deposited tailings;
- Prisms to monitor deformations within the dike; and
- Piezometers to measure pressure and to infer flow through the dike and foundation materials.

If necessary, the stability of the foundation materials and of the dike during operations can be enhanced through the construction of a stabilizing toe berm or through freezing.

A.2.2 Failure Scenario during Closure

In the case of failure of the Central Dike during or following closure, the 'worst-case' scenario would involve a catastrophic failure of the dike and the release of tailings into the lake.

Potential Effect

Failure of the Central Dike during or following closure is not expected to result in loss of life, as mining operations will have finished.

Under this scenario, a catastrophic failure of the Central Dike could result in the sudden and unexpected release of dike material and tailings into the Portage Pit lake area. This could potentially produce a wave of sediment laden water that could over-top the East Dike.

Such a scenario would destroy fish habitat along the dike face and smother benthic habitat outwards from the failure area. Suspended solids and dissolved metals would increase in the water column and would cause displacement of fish and possible toxicity of some bottom sediments, depending on how much tailings material was lost. The new face would be subject to chronic erosion of fine tailings material until such time as a new, stable dike face could be established. Failure of the dike would not cause a change in water level. Impacts would be localized because the Central Dike is situated in the upper part of a blind arm of the lake with an extremely limited drainage area and low turnover. Consequently, transport of suspended sediment away from the area would be restricted and the area of impact would be relatively small.

Mitigation, Management, and Monitoring

The calculated FoS for the Central Dike design are greater than design criteria for post closure for static and pseudo-static (earthquake) conditions. Consequently, the likelihood of a failure occurring is low. Furthermore, thermal modeling indicates the tailings and Central Dike will progressively freeze, and that the facility will tend to the frozen state in the long term. Freezing will increase dike and tailings stability and decrease tailings mobility, and therefore this is not considered a credible catastrophic failure mode.

Mitigation against such a failure mode occurring will be to construct the Central Dike to the design so that it is physically stable under static and pseudo-static loading conditions, and to monitor during the mine life to assess the overall performance of the dike and the TSF. Data gathered during the operational period of the TSF can be used to re-evaluate the performance of the Central Dike structure in the context of longer term stability post closure.

Appendix A.3

Saddle Dams

Saddle Dams

Six Saddle dams will be constructed around the limits of the tailings basin. The saddle dam locations are shown on the general mine site plan provided at the beginning of this document. The saddle dams will be constructed by dumping a rockfill berm with a crest width of 30 m to allow haul truck traffic. The Saddle Dams will be re-sloped, with a minimum 6 m crest width. The downstream face will be angle of repose, or 1.32H:1V (Horizontal:Vertical), and the upstream face will be 3H:1V. The Saddle Dams will have an upstream two-zone granular filter and a liner. There is a potential for release of either attenuation water, reclaim water, or tailings to Third Portage Lake in the event of an overtopping or catastrophic failure..

A.3.1 Failure Scenario during Operation

Depending upon the phase of operations, breach or complete failure of a Saddle Dams could result in the uncontrolled release of Attenuation Pond water, Reclaim Pond water or tailings to Third Portage Lake. There is also the possibility of the Saddle Dams to be overtopped through the formation of a wave resulting from a slope failure within the Portage Waste Rock Storage Facility and the sudden release of waste rock into the TSF.

A tailings beach will be formed on the toe of each Saddle Dams. As a result, the Reclaim Pond will be pushed away from the Saddle Dams. As the tailings and Saddle Dam are expected to freeze, and freezing will reduce the chance of tailings reaching Third Portage Lake, failure of the Saddle Dams at with release of tailings to Third Portage Lake is not considered to be credible.

An overtopping or breach failure of the section of the Saddle Dams located just south of the intersection with the Stormwater Dike could potentially result in flow of Reclaim Pond water and/or tailings toward Third Portage Lake.

<u>Potential Effect</u>

Should an overtopping event or breach occur in a Saddle Dam water flowing toward Third Portage Lake would consist of Reclaim Pond water which is predicted to exceed Metal Mining Effluent Regulations (MMER) guidelines for a number of constituents.

As a worst case of failure resulting in a dam breach, the total predicted Reclaim Pond volume of 0.75 Mm^3 could be released towards Third Portage Lake. The Saddle Dam would not be expected to fail due to overtopping. This failure mode is not expected to release a considerable volume of water to Third Portage Lake. Given the size of Third Portage Lake, the impacts to water quality and on fish from a release of Reclaim Pond water would likely be localized.

A worst case scenario would also involve the flow of non-frozen tailings into Third Portage Lake. The distance between the toe of the Saddle Dam and Third Portage Lake is on the order of 150 m to 300 m. Such a scenario would destroy fish habitat and smother benthic habitat outwards from the failure area. Suspended solids and dissolved metals would increase in the water column and would cause displacement of fish and possible toxicity of some bottom sediments, depending on how much tailings material was lost.

Mitigation, Management, and Monitoring

The dams are designed according to Dam Safety Guidelines (CDA, 2007), and will be constructed under controlled conditions. A comprehensive quality control and quality assurance program will be undertaken during construction to confirm foundation conditions, material type and quality, and to adjust designs as necessary to reflect actual conditions found at site. The dams are predicted to eventually freeze, which will enhance stability. Therefore, failure of Saddle Dam by overtopping, full breaching or foundation and slope failure is not considered to be credible.

With respect to slope stability failure, the Saddle Dams are constructed of rockfill, which has high shear strength. Slope stability failures must therefore occur through foundation soils. The calculated FoS for slope stability failure modes through foundation soils are above design criteria in the Dam Safety Guidelines (CDA, 2007) for static and pseudo-static conditions. Consequently, the probability of such a failure developing is low.

The tailings are expected to freeze, and freezing will reduce the chance of tailings reaching Third Portage Lake. The distance from Saddle Dam 1 to Third Portage Lake is about 300 m at its closest point. Leaks of supernatant water and or tailings from the South Saddle Dam would be most likely to occur during operations. Leaks would be visible, and could be mitigated during operations.

A.3.2 Failure Scenario during Closure

At closure Reclaim Pond water will be pumped to Portage pit, the basin behind the Saddle Dams will be drained and filled with run-of-mine, acid-buffering ultramafic waste rock. The rock is expected to freeze over time. Failure of the Saddle Dam following closure is not considered to be credible. Further, the lack of water will reduce mobility of tailings if failure occurs.

Potential Effect

No effects to water quality, fish or fish habitat is expected.

Mitigation, Management, and Monitoring

As described previously, the dams will be designed meet Dam Safety Guidelines (CDA, 2007). The dams will be constructed under controlled conditions. During the construction of the dams a comprehensive quality control and quality assurance program will be undertaken to confirm foundation conditions, material type and quality, and to adjust designs as necessary to reflect actual or unexpected conditions found at site. Monitoring during operations will ensure the South Saddle Dams perform as intended. The dams will eventually freeze, which will enhance stability. Therefore, post-closure failure of the Saddle Dams by full breaching or foundation and slope failure is not considered to be credible.

Appendix A.4

Stormwater Dike

Stormwater Dike

The Stormwater Dike is located at the northwest end of Second Portage Lake, within the TSF as shown on the general mine site plan provided at the beginning of this document. The location of the Stormwater Dike was selected to optimize the storage capacity of the main tailings basin, and of the Portage Attenuation Pond. The dike will separate the tailings basin from the Attenuation Pond until approximately Year 4, at which point the Reclaim and Attenuation ponds will combine. At the end of mine life, any remaining water will be treated within the TSF and released once discharge criteria are met.

The Stormwater Dike will be constructed using rockfill, with south face slope of 3H:1V, and a north face slope at angle of repose for rockfill. The minimum crest width will be 6 m. The dike will have a filter zone placed on the south face, underlying an impermeable element of bituminous geomembrane. The maximum height of the dike will be about 13 m. At the maximum cross section, the width of the base of the dike will be approximately 95 m.

A.4.1 Failure Scenario During Operation

If slope failure of the Stormwater Dike were to occur when tailings are at their maximum elevation in the main tailings basin, and if the tailings are not frozen, this could potentially result in the sudden flow of tailings into the Attenuation Pond area. This in turn could potentially result in the development of a wave which overtops the South Saddle Dam at the northwest end, releasing tailings and reclaim water to Third Portage Lake.

Potential Effect

A breach or failure of the Stormwater Dike may cause a wave-induced overtopping of the Saddle Dam at the northwest end. The Saddle Dam would not be expected to fail due to a single overtopping wave event.

This failure mode is not expected to release water to Third Portage Lake. The distance between the toe of the Saddle Dam and Third Portage Lake is on the order of 150 m, so tailings would likely settle out. The potential impacts on Third Portage Lake water quality, fish and fish habitat would likely be minor, localized and short-lived.

Mitigation, Management, and Monitoring

The Stormwater Dike was designed to meet Dam Safety Guidelines (CDA, 1999). The upstream side slopes were designed to allow machine traffic, and are therefore highly conservative with respect to slope stability. The dike will be constructed in the dry under controlled conditions. During the construction of the dike a comprehensive quality control and quality assurance program would be undertaken to confirm foundation conditions, material type and quality, and to adjust designs as necessary to reflect actual conditions found at site. The dike will eventually freeze, which will enhance stability. Therefore, failure of the dike due to overtopping is not considered to be credible.

A.4.2 Failure Scenario during Closure

The Stormwater Dike will be covered by tailings during operations and will not exist at closure.

Potential Effect

There will be no environmental effect on the receiving environment.

Mitigation, Management, and Monitoring

None required.

APPENDIX B

Emergency Response Plan for Dyno Nobel Emulsion Plant

DYNO
Dyno Nobel
Groundbreaking Performance

EMERGENCY RESPONSE PLAN

QAAQTUQ
Dyno Nobel

Meadowbank Mine Site.

Magazine, Plant and Work Sites

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

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

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

Publication/Amendment

Original Date of Publication: 15 October 2003, as amended site specific, June 14, 2011

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

Table of Contents

1.0 SCOPE

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

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

2.0 RELATED DOCUMENTS

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

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

3.0 ERP OUTLINE

3.1 The following materials are covered by this ERP:

Fuel Oil
ATF Hydraulic Fluid
Ammonium Nitrate Prills and Solution
Sodium Nitrite
Sodium Thiocyanate
ANFO
Emulsion
Packaged Explosives
Detonators
Diethylene glycol

3.2 The following situations are addressed in this ERP:

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

3.3 This ERP covers:

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

3.4 The following definitions apply to this plan:

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

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

OSC: (DNCI) On Scene Coordinator, the Senior DNCI employee at an incident site who manages and controls DNCI resources in support of First Responders and incident recovery.

ERT: Emergency Response Team, DNCI personnel dispatched to an incident site to assist First Responders and conduct incident recovery under the direction of the OSC.

4.0 PREPARATION AND PLANNING

4.1 In order to provide competent emergency response at Dyno Nobel Canada Inc. magazines, plants and worksites, first responders (local fire departments and mine rescue personnel) must be thoroughly briefed on an annual basis of the potential hazards involved in a Dyno Nobel Canada Inc. worksite fire. To this end, Work Site Supervisors must take fire department plus mine safety and security representatives on an annual magazine/plant tour to view:

Explosives Storage Areas	Evacuation (Meeting) Area
Bulk Emulsion Equipment	Communications Equipment
ANFO Blending Area	Facility Layout
Fire Fighting Equipment Sites	(Waste) Burn Facilities

A record of each explosives worksite tour and the names of the first responder representatives attending are to be documented and kept on file.

Annual Fire Department Review Form (Appendix 9)

4.2 All DNCI employees shall review this ERP on an annual basis and participate in ERP drills / exercises when scheduled.

4.3 All worksite accidents involving fire, explosion, reportable spills/emissions, breaches of security and bomb threats are to be reported to applicable authorities and senior management. As per incident reporting procedure

4. 4 Spill procedures for each of the materials listed in section 3.1 are outlined in Table 6-3. All procedures specify: Method of Cleanup, Method of Disposal and Protective Clothing. Based on the procedures presented in Table 6-3, worksite supervisors must ensure that adequate clean-up equipment and materials are readily available and in good condition.

4.5 Worksite information for each of DNCI's facilities is contained in the attached appendices. The ERP is revised whenever significant changes are made.

4.6 Current Material Safety Data Sheets (MSDS) are to be kept at each Work Site for all hazardous materials that are stored and handled at the Work Site. Copies of current product MSDS' are also made available to customers and landowners. Obsolete MSDS' will be replaced as new ones are issued.

4.7 Each Work Site will hold and maintain in good repair, appropriate fire fighting and spill control equipment for potential emergencies. Fire extinguishers, hoses and other fire fighting equipment are to be visually inspected on a monthly basis to ensure Magazine, Plant, Work Site and delivery vehicle readiness.

5.0 TRAINING

5.1 All employees will complete training on the contents of this Plan during their "new hire" orientation and review the plan annually.

5.2 A trained person is considered to have reviewed all related documents (Section 2.0), to have been instructed on the use of related equipment and procedures, and to have discussed with their Supervisor or trainer, questions and issues of concern.

5.3 Training records, including certificates for training completed, are to be kept onsite in the Employee's Training Record.

5.4 The Magazine, Plant or Work Site Supervisor/Manager will certify their employees as having received training by signing the training form. In signing the training form, the Supervisor / Manager will have satisfied themselves that trained employees are able to:

- Recognize fire and explosive hazards for the materials and processes to which they are exposed /involved with;
- Competently use Fire Fighting / Fire Protection Equipment (Note: employees should receive refresher training in the use of fire extinguishers at least every three years)
- Competently use applicable personal protective equipment (PPE) when handling hazardous substances;
- Recognize and be familiar with substances which become hazardous wastes when spilled; and
- Follow SOP's and use established work practices to minimize the potential for fires, explosions, environmental releases and other accidents.
- Worksite Managers / Supervisors will ensure that all contractors receive a worksite orientation before commencing work or being left unaccompanied in the worksite. Following the orientation process, the contractors will be required to sign off on the Contractor Checklist acknowledging training in the applicable areas including the site emergency response plan.

- All Plant & Magazine sites will have in place, a continuous (24 hour) access control system to control the entrance, presence and exit of visitor and contractors and their equipment and materials
- Employees must be trained on Reportable Quantities to the Government in the unlikely event of a spill.
- All employees are aware of evacuation routes, muster point location, and all-clear notice procedure.
- New/Transferred employee or Annual Refresher sign-off form located in Appendix 8

6.0 EMERGENCY PROCEDURES AND LINES OF AUTHORITY

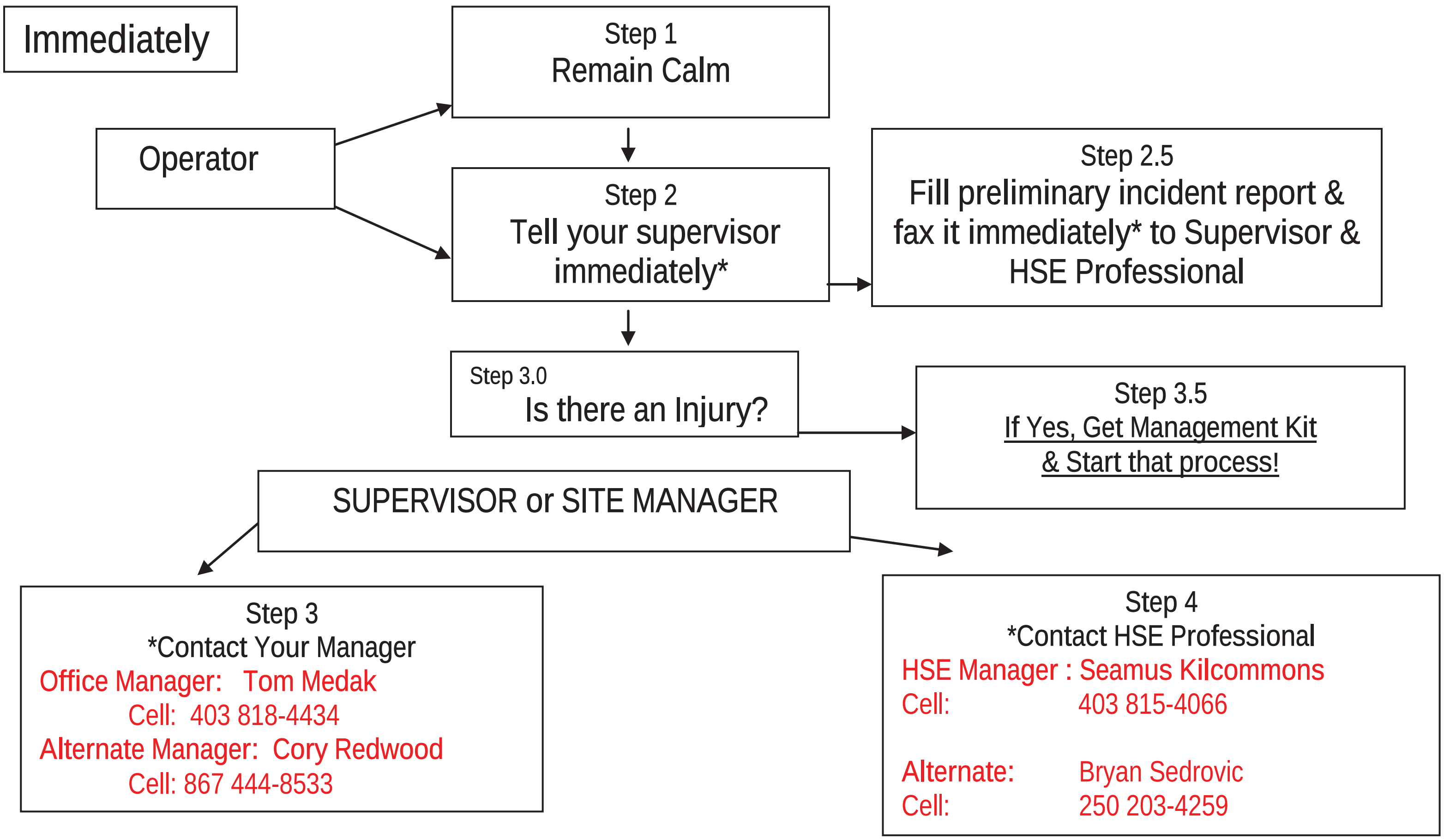
6.1 GENERAL

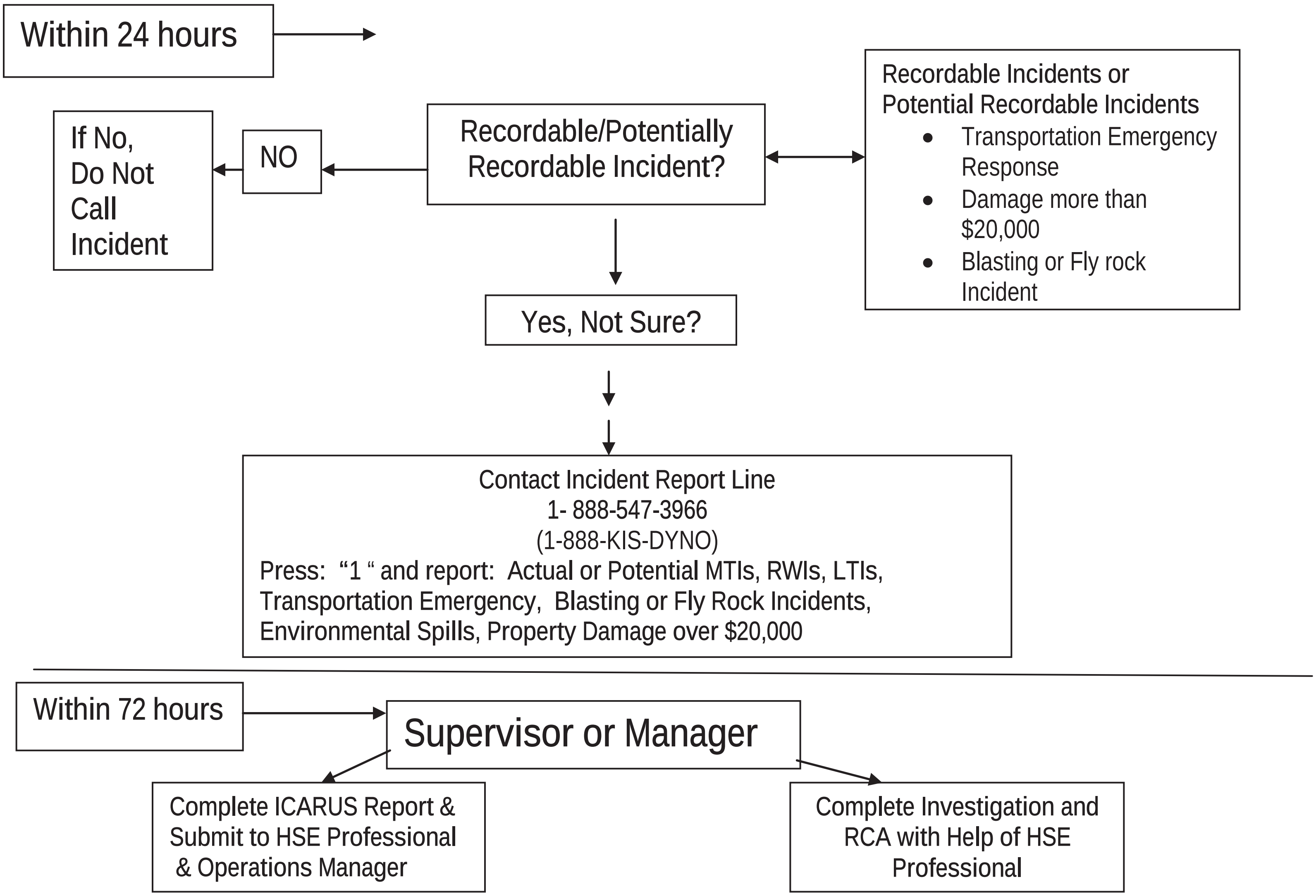
Reporting Incidents Flow Chart (Following page)

Table 6-1
Emergency Response Flow Chart

Reporting Incidents

Property Loss/Fly Rock/Environmental Spill/Injury




Within 24 hours
Recordable Incidents or Potential Recordable Incidents
• Transportation Emergency Response
• Damage more than $20,000
• Blasting or Fly rock Incident
If No, Do Not Call Incident
NO
Recordable/Potentially Recordable Incident?
Yes, Not Sure?
Contact Incident Report Line
1- 888-547-3966
(1-888-KIS-DYNO)
Press: "1 " and report: Actual or Potential MTIs, RWIs, LTIs, Transportation Emergency, Blasting or Fly Rock Incidents, Environmental Spills, Property Damage over $20,000
Within 72 hours
Supervisor or Manager
Complete ICARUS Report & Submit to HSE Professional & Operations Manager
Complete Investigation and RCA with Help of HSE Professional

SITE SUPERVISOR/DELAGATE
EXPERIENCING EMERGENCY / POTENTIAL EMERGENCY

- **CALL FOR EMERGENCY ASSISTANCE**
  In the event of an emergency, accidental release or imminent accidental release involving explosives, eliminate potential sources of detonation where possible (eg. turn off the ignition of a vehicle), call **6911** (or the local emergency number) for immediate assistance, **call the site Supervisor/Area Manager** and initiate the site's Emergency Response Plan. If normal phone systems are down other methods of communication can include two way radios, satellite phones, pager, e mail and vehicle satellite tracking systems.

- **WARN PUBLIC WITHIN EVACUATION DISTANCES IF RISK OF DETONATION**
  Should there be explosive detonations, or the risk of detonations due to the presence of fire or other detonating factors, advise the First Responders (or anyone within the immediate vicinity if First Responders are not at the scene) of the risk and applicable safety distances per Table 6-4, page 17 (liaise with Emergency Response Advisor (ERA) if time permits). Help organize perimeter guards to prevent people from entering the evacuation zone.
  Note: See ERP, page 17 Table 6-4 for Evacuation Procedures.

- **ASSIST LOCAL AUTHORITIES**
  Assist First Responders and Local Authorities in eliminating the emergency situation, and liaise with DNCI's On-Call Employee / ERA until relieved by the Company's Emergency Response Team (ERT).

TO RESPOND TO AN EMERGENCY CALL

DNCI Corporate contact instructions:

Upon receiving a call for emergency response assistance, keep a log of all subsequent communications and actions, and do the following:

1. Immediately obtain the name and callback number of the caller, in case the telephone line is lost.

2. Obtain information as fully and accurately as possible following the emergency report form (see appendix 1).

3. Call an ER Advisor for the applicable Region (see appendix 2) and report the emergency situation. In turn, the ER Advisor will phone the emergency scene caller, establish ongoing contact, assess the emergency, determine what Company resources and/or contracted emergency response services are required and organize an Emergency Response Team – ERT to proceed to the emergency scene if required.

4. Assist the Emergency Response Advisor (ERA).

5. Liaise with Company Executive / Senior Managers.

Emergency Response Advisor (ERA) instructions:

1.Call the Branch/Plant Supervisor nearest the emergency scene plus territorial & federal authorities (see applicable appendix to Annex D) to advise them of the situation and the need for an emergency response.

2. Designate, assemble and dispatch an Emergency Response Team (ERT), made up of Groups 1 & 2 personnel (see ERAP pg. 16 and Annex D) under the leadership of an On Scene Coordinator (OSC), if required.

3. Authorize the dispatching of additional resources, communications, transportation and contracted services as necessary.

4. Contact and instruct the designated Emergency Response Team (ERT) to proceed to the emergency scene with the required vehicles and equipment.

5. Liaise with the Person in Charge of the Emergency) and/or Local Authorities to obtain a situation update.

6.Advise Local Authorities as appropriate, regarding the properties, hazards and handling procedures for the explosives involved in the emergency. In particular, advise the Local Authorities of appropriate evacuation distances per Table 6-4 pg. 17.

7. Continue to consult with the Local Authorities as appropriate, plus the Company's On-Scene Coordinator (OSC), to stabilize and eliminate the emergency.

8. Refer to **Regional Manager** *(Tom Medak, Willard Pierce, Dale Bodnarchuk or Francois Lambert)* for any media requests in accordance to the Crisis Communication Plan (CCP). Media contacts shall be through Regional Manager designated for the area.

9. Contact the explosives supplier and / or transporter (if other than DNCI) to advise them of the emergency and to request their assistance if/as required.

ON-SCENE CO-ORDINATOR (OSC)

- The On-Scene Coordinator (OSC) is the Company's representative and local authority in charge of all company actions and resources at the emergency scene. Once the OSC arrives at the emergency scene, the ERA will transfer communication with First Responders/Local Authorities to the OSC. In turn, the OSC will liaise with the ER Advisor as required. Throughout the Company's emergency response, the OSC will ensure that First Responders and Company personnel (employees and contractors) observe all safety and regulatory standards and procedures.
- The OSC may revise / adjust the composition of the Emergency Response Team (ERT) and supporting resources as required. The OSC may, in consultation with the ER Advisor, contract commercial services to assist in addressing and resolving the emergency situation.

- The OSC will oversee the Company's local involvement with emergency services, government (municipal & provincial) and public interests until the emergency is fully resolved. Post-emergency activities (clean-up, restoration, etc.) under the direction of the Environment Manager may be delegated to an appropriate Branch, Plant or Area Manager. **EMERGENCY RESPONSE TEAM (ERT)**

- Selected emergency response personnel will take their direction to assemble and proceed to the emergency scene from the ERA or their representative. Team members will immediately report to the On-Scene-Coordinator.

- The primary role of the ERT is to provide a competent and trained / certified workforce plus specialized equipment and material to assist First Responders / Local Authorities in the stabilizing and elimination of an 'explosives emergency', and to retrieve / recover, repackage and remove to safe and secure storage, non-detonated explosives.

- While at the emergency scene, ERT members will take their direction from the Company's OSC and remain available until released by the OSC.

NOTE:

ONLY INDIVIDUALS WHO HAVE RECEIVED TRAINING AS REQUIRED UNDER THE TRANSPORTATION OF DANGEROUS GOODS (CLEAR LANGUAGE) REGULATIONS, OR WHO ARE WORKING UNDER THE DIRECT AND CONTINUOUS SUPERVISION OF AN EMPLOYEE WHO HAS BEEN TRAINED FOR CLASS 1 DANGEROUS GOODS UNDER TDG, MAY PARTICIPATE IN SITE CLEAN-UP ACTIVITIES SUCH AS PICKING UP, REPACKAGING AND TRANSPORTING EXPLOSIVE MATERIAL.

6.1.1 In any emergency the Work Site Supervisor/Manager or their delegate must take certain actions, including the following:

- Call local fire/emergency authorities (at mine sites, also call Mine Fire, Safety and Security if different and give relevant information).
- Account for all employees and visitors. Arrange for Rescue of anyone who may be trapped, without endangering oneself or others.
- Notify Dyno Nobel Canada Inc. ERA's so that necessary arrangements can be made for technical / administrative support, including accident reporting and investigation plus continued/alternate production. The following information should be provided and refer to appendix 1:

What Occurred	Time of Occurrence
Action Taken	People Contacted
Status of Situation	Anticipated Follow-up

6.2 FIRE & EXPLOSIVES

6.2.1. There are three categories of fire that may involve explosives:

I. Fires Directly Involving Class 1 Explosives and Blasting Agents

- **DO NOT FIGHT THE FIRE.** Instruct all fire fighters on the scene not to fight fire with explosives.
- Shut off power at main breakers if possible. At mine sites, call Mine Security or Fire/Rescue. At all other DNCI locations call local Fire/Rescue personnel.
- Evacuate all personnel from the Work Site to the safe meeting place as outlined in the Work Site Appendix.
- Set up a communications base at the meeting place and guard
- against anyone entering the area.

II. Fires Involving Components For Manufacture of Blasting Agents

Bulk blasting agents may be in the form of emulsion or ANFO. ANFO is a mixture of prilled ammonium nitrate and fuel oil.

Under conditions of large mass, intense heat, confined dust / vapor buildup, and the right mixture combination of the basic ingredients, emulsion and ANFO will explode. The probability of explosion with ammonium nitrate (AN) alone is very small, but increases when under intense heat and confinement. Table 6-1 includes recommended fire fighting procedures for each of these substances.

III. Fires Involving Dyno Nobel Canada Inc. Trucks

In cases where the Dyno Nobel Canada Inc. delivery trucks are in a building that is on fire, if there is no explosives and safe to do so, may be moved provided access to the truck and exit from the building is not barred by flames or smoke, with available fire extinguishers with caution only if the fire is small and not in the storage compartment.

Fires on re-pump or other bulk explosive delivery vehicles shall not be fought if the fire involves the explosives compartment. Fire fighting measures should be taken immediately to prevent any fire such as a tire, electrical or cab fire from reaching the explosives compartment.

Fires on other transport vehicles may be fought with caution. Fires that cannot be controlled sufficiently to avoid involvement of the vehicle's fuel compartment shall be left and personnel evacuated to a safe distance.

6.2.2. When a fire is small and does not involve any explosive agents, it may be fought with plant extinguishing equipment. If the fire is widespread and intense, all personnel, including visitors and contractors should be evacuated to the meeting area outside the main gate.

Table 6 - 2
FIRE FIGHTING INFORMATION

MATERIAL	RECOMMENDED FIRE-FIGHTING METHODS	SPECIAL CONSIDERATION
Ammonium Nitrate Prill – Odorless white to light tan crystaline solid	Use flooding amounts of water in early stages of fire. Keep upwind. AN is an oxidizing agent which supports combustion and is an explosive hazard if heated under confinement that allows high-pressure buildup. Ensure good ventilation and remove combustible materials if it can be safely done. Evacuate to designated area if fire cannot be controlled.	Toxic oxides of nitrogen are given off during combustion. Fire fighters require self-contained positive pressure breathing apparatus. Avoid contaminating with organic materials. Many powdered metals such as Al, Sb, Si, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, Sn, Zn and brass react violently and explosively with fused AN below 200˚C Sensitivity to detonation increases when heated.
Ammonium Nitrate Solution- Colorless/Odourless Liquid – white paste like solid when cooled	Use flooding amounts of water in early stages of fire. Cool containing vessels with flooding quantities of water until after fire is out	Material will not burn, but thermal decomposition may result in flammable/toxic gases being formed. These products are nitrogen oxides and ammonia. (NO, NO_2 NH_3). Product may form explosive mixtures when contaminated and comes in contact with organic materials. Explosive when exposed to heat or flame under confinement. Avoid temperatures over 210°C (410°F) A self contained breathing apparatus should be used to avoid inhalation of toxic fumes
Sodium Thiocyanate – White solid - odourless	Use extinguishing media most appropriate for the surrounding fire	Wear self contained breathing apparatus – MSHA/NIOSH approved or equivalent, and full protective gear. During a fire, irritating or highly toxic gases may be generated by thermal decomposition or combustion.
Sodium Nitrite – Oxydizing agent - white to light yellow crystals- faint odour	Flammability class – not regulated. Flood with water only – Isolate materials not involved in the fire and cool containers with flooding quantities of water until well after the fire is out.	Self contained apparatus should be worn in a fire involving Sodium Nitite.Thermal decomposition will cause reddish brown nitrogen oxides to be released.
Fuel Oil (No. 2 diesel) Dyed or pale yellow liquid with petroleum odor; and/or ATF Fluid	Use water spray to cool fire-exposed surfaces and to protect personnel. Shut off fuel from fire. Use foam, dry chemical or water spray to extinguish fire. Avoid spraying water directly into storage container due to danger of boil-over.	Avoid strong oxidizing agents.

Explosive emulsions, ANFO, packaged explosives and firing devices.	**Fire involving explosive materials must never be fought. Evacuate the incident scene. Do not confine (ventilate to prevent / reduce pressure build-up if safe to do so).**	Explosion hazard.
Enviro CFE	Dry chemical, foam, water spray (fog). Use water spray to cool exposed surfaces and containers	OIL FLOATS ON WATER. Do not use direct or heavy water stream to fight fire. Use organic vapour respirator or self-contained breathing apparatus to fight fire.

Table 6 - 3

CONTROL MEASURES FOR FIRE

MATERIAL	RECOMMENDED FIRE-FIGHTING METHODS	SPECIAL CONSIDERATION
Diethylene glycol	Small fire: type ABC dry chemical or CO_2 fire extinguisher. Large fire: water fog.	Keep away from oxidizers (nitrates and perchlorate). Explosion hazard if heated under confinement.

EVACUATION PROCEDURES

Advise the first emergency responders at the scene (police or fire) of the need to evacuate using the guidance in the Emergency Response Plan. Employees at the scene should assist local emergency services to the best of their ability to accomplish this. For incidents within a worksite such as a mine, quarry or construction operation, in most cases access is radio controlled. The quickest way of alerting people, therefore, is by site radio. Clearly state your location, situation and call for assistance in evacuating the area.

DO NOT FIGHT EXPLOSIVES FIRES. EVACUATE THE AREA AND LET THE FIRE BURN ITSELF OUT.

THE MINIMUM EVACUATION DISTANCE IS AS OUTLINED IN TABLE 6-4 (Pg. 17) FOR ALL DIRECTIONS (which is based on a higher traffic / risk / population density within the area, without benefit of protective features such as berms and hills. (**Transport Canada requires 1,600 meters for situations that involve high-risk surroundings**) upon determining actual quantity of explosives refer to Table 6-4 as per ERD quantity of distances.

Table 6 - 4
EVACUATION DISTANCES
Based On Amount of Explosives Present

Explosive Quantity		Metric Distance		English Distance
250 kg		70 Meters		230 Feet
500 kg		100 Meters		320 Feet
1,000 kg		150 Meters		500 Feet
2,000 kg		240 Meters		800 Feet
5,000 kg		400 Meters		1,300 Feet
7,000 kg		450 Meters		1,450 Feet
10,000 kg		480 Meters		1,550 Feet
20,000 kg		700 Meters		2,300 Feet
40,000 kg		800 Meters		2,640 Feet
60,000 kg		870 Meters		2,860 Feet
80,000 kg		960 Meters		3,150 Feet
100,000 kg		1040 Meters		3,420 Feet
120,000 kg		1100 Meters		3,610 Feet
>120,000 kg		1600 Meters		5,250 Feet

6.3 ENVIRONMENTAL RELEASES

6.3.1 Procedure For Fuel Oil Storage Tank Failure

- Assess the magnitude of the leak.
- If the leak is slow and the source can be determined, take the appropriate action to prevent further leakage.
- Transfer fuel from storage tank into drums if necessary.
- Collect spilled material, including contaminated soil, with absorbent pads or inert solid absorbent and store in drums labeled for disposal.
- If the leak is large and further leakage cannot be prevented, allow the dyke to fill. Transfer to drums, label for reuse or disposal, and store.
- Inspect empty tank to identify failure/cause of leak and repair tank.

6.3.2 Procedure For Raw Material Truck Spills

- Identify the material involved, assess the magnitude of the spill or leak and assist the driver to take appropriate action to stop the leak, taking care to prevent run off and/or entry into any water course or drainage system near the spill site.
- For AN prill, shovel spilled material into drums, label for reuse or disposal, and store. Use a non-sparking shovel to transfer spilled material into lined drums.
- For spilled fuel, contain by dyking with earth. Collect spilled fuel with absorbent pads or solid inert absorbent, transfer into drums, label and store for disposal.
- Remove contaminated soil for disposal in conformance with Environment Canada standards.

6.3.3 Procedure For Process Spills

- Identify the material involved and assess the magnitude of the spill or leak, taking care to prevent run off and/or entry into any watercourse or drainage system near the spill site.
- For AN prill, shovel spilled material into drums, label for reuse or disposal, and store.
- For spilled fuel, contain by dyking with earth. Collect with absorbent pads or solid inert absorbent, transfer into drums, label, and store for disposal.
- In the case of leaking bags of ANFO, sweep or shovel the spilled material into a clean drum or other suitable container, label for reuse or disposal, and store.
- Remove contaminated soil for disposal in conformance with Environment Canada standards.
- Have any process equipment (pumps, process lines, parts, gauges, etc.) involved in a leak or spill inspected and repaired or replaced. Re-inspect and test if necessary after repair is affected.

6.3.4 **Procedure For Emulsion Tank Failure**

- Assess the magnitude of the leak.
- If the leak is slow and the source can be determined, take the appropriate action to prevent further leakage.
- Transfer remaining emulsion from leaking storage tank into another storage tank, a tanker trailer if available, or into drums as necessary.
- Collect spilled material using double diaphragm pump(s) and store in labeled drums for reuse or disposal at the mine.
- If the leak is large and further leakage cannot be prevented, allow the room to fill. Transfer to drums, label for reuse or disposal, and store.
- Inspect empty tank to identify failure/cause of leak and repair or replace the tank

6.3.5 **Procedure For Fire**

- In the event of a raw material or product fire, take care to protect all persons from exposure to smoke and gaseous emissions from the fire.
- Potential toxic gaseous emissions from fires involving explosive materials include:

  Oxides of Nitrogen
  Carbon Monoxide
  Cyanide Gas

- All fires must be reported to local authorities and Mine Site Security as soon as possible.
- Self contained breathing apparatus is required for fighting a fire in the plant.
- Follow procedures outlined above for any spills and leaks resulting from fire when it is safe to do so

Table 6 – 5
ENVIRONMENTAL RELEASE PROCEDURES

MATERIAL	SPILL AND LEAK PROCEDURES	WASTE DISPOSAL
Ammonium Nitrate Prill (odorless white to light tan crystalline solid)	Remove source of heat and ignition. Sweep or shovel spill into a clean, non-combustible container. Wash remaining trace residues with water. Wear rubber gloves and safety glasses to minimize contact with skin and eyes.	Re-use if possible or give it to a farmer as a fertilizer. If not possible, dispose of as-is in approved. Remove as much as possible the spilled material as a solid.
Ammonium Nitrate Solution-Colorless/Odourless Liquid – white paste like solid when cooled	Small spill - Dike and contain spilled material. Ensure spilled material does not enter sewers, wells or water courses. Allow to solidify. Use appropriate tools to place in container for disposal. Larger spill - Dike and contain spilled material. Ensure spilled material does not enter sewers, wells or water courses. Notify downstream water users. Allow to solidify. Use appropriate tools to place in container for disposal.	Call for assistance for disposal. Ensure disposal complies with regulatory requirements and regulations.
Fuel Oil (dyed or pale yellow liquid with petroleum odor)	Eliminate any source of ignition. Prevent spills from entering watercourses or drainage systems. Contain with sand or earth. Recover with pump or inert absorbent material into clean container. Wear safety glasses and rubber gloves to prevent contact with the eyes and skin.	Dispose of recovered material in approved landfill or other waste disposal facility.
ANFO (Ammonium Nitrate Fuel Oil)	This material is an explosive. Remove all sources of heat and ignition. Transfer into clean plastic container with a plastic shovel. Label drums. Wear rubber gloves.	Recycle product, if possible. If not practical, explode it inside a borehole or burn it in an authorized burning ground.
Emulsion	This product is a blasting agent. Remove all sources of heat and ignition. Prevent spills from entering watercourses or drainage systems. If large amount of emulsion is involved, contain spill with earth or sand found locally. Recover spilled material with a diaphragm pump. Use of a diaphragm pump also requires an air compressor. Limitation of the pump suction is approximately 2.5 meters, pump discharge is approximately 8 meters. Use a screening device on pump suction hose. Out of area spills will require taking two pumps and extra hose. Transfer the product into a tanker trailer or clean 200 liter drums. If small amount of emulsion is involved, transfer material into a clean plastic container with a plastic shovel. Label tanker trailer or drums. Wear rubber gloves and rubber boots.	Recycle product, if possible. If not practical, explode it inside a borehole or if large amount is involved, demulsify it with liquid detergent.

Enviro CFE	Eliminate any source of ignition. Prevent spills from entering watercourses or drainage systems. Contain with sand or earth. Recover with pump or inert absorbent material into clean container. Wear safety glasses and rubber gloves to prevent contact with the eyes and skin.	Dispose of recovered material in approved landfill or other waste disposal facility.
Sodium Thiocyanate – White solid - odourless	Ensure adequate ventilation whe handling Sodium Thiocyanate. Keep containers closed when not in use. Wear appropriate PPE – eye protection, gloves and appropriate clothing to prevent skin exposure.	Vacuum or sweep up material and place into a suitable disposal container. Avoid run off into storm sewers and ditches which lead to waterways. Not regulated as a hazardous material. Chemical waste generators must consult appropriate hazardous waste regulations to ensure complete and accurate classification.
Sodium Nitrite – Oxydizing agent - white to light yellow crystals- faint odour	In the event of a spill or leak, contact the vendor (403-263-8660) for advice. Wear respirator, protective clothing and gloves. Vacuuming is the recommended method to clean up spills. Do **not** sweep or use compressed air for clean up. Recover spilled material on non-combustible material, such as vermiculite. Use non-sparking tools and place in covered containers for disposal. Any recovered material mau be used for it's intended purpose , depending on contamination.	Dispose of the waste material at an approved hazardous waste treatment/disposal facility.
Acetic Acid – Colourless liquid with a pungent odour	Wear appropriate PPE – evacuate downind areas as required to prevent exposure and to allow fumes and vapours to dissipate. Prevent entry into sewers or streams. Dike if needed. Eliminate all sources of ignition. Neutralize the residue with sodium carbonate or crushed limestone. Absorb win an inert dry material and place in an appropriate container for disposal. Flush area with water to remove trace residue.	Waste disposal must be done in accordance with provincial and federal regulations. Empty containers must be recycled or disposed of through an approved waste management facility.

6.4 SECURITY

6.4.1. In the event of a breach of security at a Dyno Nobel Canada Inc. Work Site, a call is to be made to the RCMP / local Police Department at the discretion of the Supervisor/Manager, or their delegate. In the case of a breach of security, Dyno Nobel Canada Inc.' HSE, Regulatory Affairs and Executive / Senior Management shall also be informed immediately and provided with the same information as outlined in Section 6.1

6.4.2. Any person(s) apprehended during the course of a serious security breach shall be detained until the Police arrive (note: employees are not to put themselves at undue risk by attempting to apprehend or restrain a potentially violent person).

6.5 BOMB THREAT

6.5.1. The safety of employees and the public is of primary concern. A person receiving a bomb threat over the telephone should attempt to remain calm and keep the caller talking by asking the questions listed in Table 6-6 (ERP pg. 20). Recording (writing) as much information about the caller and their comments is also very important for future reference. If possible, alert a co-worker to the situation while talking to the caller.

6.5.2. The police / mine security should be advised of the bomb threat as soon as possible. Unless there is good reason to the contrary, all personnel should evacuate the Work Site and await the arrival of the police / first responders at the designated meeting area. Suspicious objects should be reported but not tampered with and other people should be prevented from entering the Work Site until the local authority has authorized a return to the Work Site. Employees should be prepared to assist local authorities in their search / inspection of the Work Site as necessary.

Table 6 - 6

CONVERSATION GUIDELINES IN THE EVENT OF RECEIVING A BOMB THREAT

See Appendix 7

6.6 LINES OF AUTHORITY

6.6.1 Based upon the information available at the time of the incident, the Work Site Supervisor/Manager, in consultation with others (such as DNCI Senior Management, Mine/local authorities and/or Dyno Nobel advisors), will evaluate the incident and proceed with appropriate steps to implement this ERP. A decision on when to return to the scene of a serious incident will be made in like fashion, subject to approval by public authorities overseeing the incident.

6.6.2 The Work Site Supervisor/Manager will have overall responsibility for the implementation of this ERP and the supervision of all Company activities. Public authorities and the site owner have ultimate authority regarding the resumption of normal production activities.

7.0 NOTIFICATION AND REPORTING

7.1 Any incident that activates this ERP shall be documented on the DYNO Incident (Cintellate) Report. The Corporate Emergency Response Advisor must also be notified and in turn will advise the:

HSE Manager	Vice President Operations
Area Manager	

It is the responsibility of the HSE Manager or his delegate to report the incident to DYNO's HSE Management Team. A major incident involving a fire with emissions and/or a hazardous material spill shall be reported to a provincial Environment Officer under the direction of the Environmental Manager. Major incidents shall also be reported to the Chief Inspector, Explosives Branch, Natural Resources Canada; a Provincial/Territorial Safety Officer; and as applicable, an Emergency Measures Official.

Any incident which involves a spill at a Mine Site shall be immediately reported to the Mine Site Environmental Representative, and followed up with a copy of the incident report when complete.

7.2 Spills and Releases – Reportable and Significant Classifications

1) Determine if the spill/release is reportable

All environmental incidents are to be input into Cintellate. Reportable spills/releases are not only input into Cintellate, but the investigation and corrective action sections of Cintellate must be completed. To assist in determining if a spill/release is reportable, a listing of common materials with assigned reportable quantities is referenced (see Appendix 5, Reportable Substance List). The reportable quantities utilize the most stringent "reportable quantity" in Canada. Even if the spill/released material is recovered, the media impacted by the spill/release may be reportable to authorities (e.g., a portion of a spill reaching a source of drinking water or wetland). In addition, a spill/release is reportable if the amount equals or exceeds the Dyno Nobel Default Threshold.

<u>2) Determine if the spill/release is significant</u>

- Significant spills/releases are disclosed in the company's annual report. Significant spills/releases trigger time-critical internal actions as required by the company's procedures (crisis communication, internal investigation, etc)

The following table is provided to assist in making these determinations:

Reporting of Environmental Spills

Is the spill reportable?

- Yes if above a Reportable Quantity
- Yes if oil sheen is visible or sludge/emulsion is deposited beneath water surface
- Yes if water quality standards are exceeded
- Yes if from a UST exceeding 25 gallons or result in a sheen

Is the spill significant?

- Yes if authorities implement a national contingency plan
- Yes if "sensitive" environmental features have been impacted
- Yes if neighbors are evacuated
- Yes if authorities and/or neighbors file complaints and/or demand response activities
- Yes if financial impact is >US$100K
- Yes if media coverage is adverse.

7.3 Internal investigation reports will include:

- Name, work address, and phone number of the investigating (reporting) individual
- Identification and quantity of the released substance
- Time, duration, and location of the release
- Nature and quantity of injuries, property damage, production loss, administrative penalty and/or legal liability
- Precautions taken during the incident
- Relevant environmental conditions
- Corrective actions taken at the time of the incident
- Recommended corrective actions to prevent future occurrence

7.4 Senior Management shall be immediately informed by telephone of any major incident that requires Government notification as per Dyno Nobel's reporting procedures.

7.5 Major incidents involving explosive material shall also be reported to the Chief Inspector, Explosives Branch, and Natural Resources Canada by the applicable Regulatory Affairs Coordinator.

Table 7 – 1
REPORTABLE SUBSTANCE QUANTITY LIST

Material Released	Reportable to Authorities		Dyno Nobel Default Threshold (Proposed)
	If Recovered	If Unrecoverable/ Abandoned / Disposed	
AN Solution	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)	225 Kg (500 lbs)
	44 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)	
AN Prill	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)	225 Kg (500 lbs)
	45 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
Sodium Nitrite	45 Kg (100 lbs)	45 Kg (100 lbs)	225 Kg (500 lbs)
	Report if released to Drinking Water (DW std at 1mg/L-N)	Report if released to Drinking Water (DW std at 1mg/L-N)	
Fuel Oil	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such	225 Kg (500 lbs); 261 L (69 gallons)
	State Regulations - Varies from Any Amount to specific Trigger Amounts	State Regulations - Varies from All Spills to specific Trigger Amounts	
	95 L (25 gallons) from UST	96 L (25 gallons) from UST	
Mineral Oil	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such	225 Kg (500 lbs); 261 L (69 gallons)
	State Regulations - Varies from Any Amount to specific Trigger Amounts	State Regulations - Varies from All Spills to specific Trigger Amounts	
	95 L (25 gallons) from UST	96 L (25 gallons) from UST	

Emulsifier Agents	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such	225 Kg (500 lbs); 261 L (69 gallons)
	State Regulations - Varies from Any Amount to specific Trigger Amounts	State Regulations - Varies from All Spills to specific Trigger Amounts	
ANFO	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)	225 Kg (500 lbs)
	45 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)	
	Reportable if sheen on surface of pond, stream, etc.	Reportable if sheen on surface of pond, stream, etc.	
Emulsion	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)	225 Kg (500 lbs)
	44 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water	
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)	
	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such	
Ethylene Glycol	2250 Kg (5000 lbs)	2250 Kg (5000 lbs)	225 Kg (500 lbs)
Sodium Thiocyanate	45 Kg (100 lbs)	45 Kg (100 lbs)	225 Kg (500 lbs)
	Report if released to Drinking Water (DW std at 1mg/L-N)	Report if released to Drinking Water (DW std at 1mg/L-N)	

8.0 DECONTAMINATION

8.1 DNCI's Standard Operating Procedures and safety rules establish work practices that minimize employees' direct and indirect contact with hazardous substances.

8.2 Equipment, rubber boots, gloves and clothes that have been contaminated can be washed with soap and water. Wash water should be collected and disposed of in an approved manner with other contaminated material.

9.0 WORKSITE CLOSURE / SHUT DOWN

9.1 **Plant Shutdown** **(use appropriate lock-out/tag-out procedures)**

- In the event that a plant is shut down due to weather, flood, or other adverse situation, the Plant Manager / Supervisor or his delegate will ensure that all non-essential power is shut off. The Plant Manager / Supervisor will secure all valves and flow devices so as to prevent accidental opening.
- The Plant Manager / Supervisor shall determine if any raw material or raw material storage will be contaminated or at risk of fire/explosion, and take steps to move the material or isolate it from the contamination / hazard source.
- If the power and/or gas will create a dangerous situation the Plant Manager / Supervisor will cut the outside supply of power, thereby isolating all plant equipment.
- The Plant Manager /Supervisor will advise local Mine authorities of the plant shutdown and preventative actions taken.
- All sensitive documents must be secured.

9.2 **Magazine Closure** **(use appropriate lock-out/tag-out procedures)**

- In the event that a magazine is closed due to weather, flood, or other adverse situation, the Supervisor/Manager or his delegate will ensure that all non-essential power is shut off. Also, the Supervisor/Manager will ensure that all magazines and compound gates are locked before leaving the site.
- The Supervisor/Manager shall determine if any products or raw materials will be contaminated and take steps to move the material or isolate it from the contamination source.
- If power and/or gas will create a dangerous situation the Supervisor/Manager will cut the outside supply of power, thereby isolating all magazine equipment.

10. RESPONSE TO NATURAL DISASTER

Hurricanes, tornadoes, floods, slides, forest fires, and earthquakes, have the ability to damage or destroy everything in their path. Yet much of the damage or destruction associated with such phenomena is the result of some secondary event, e.g. fallen power lines, ruptured tanks valves, pipes etc. If reasonable warning of an approaching disaster is received, efforts can be made to minimize damage by taking specific preventative measures. These measures are outlined in the following procedures.

1.Consult the Site Supervisor for guidance and proceed according to his direction.
2. If so directed, notify key personnel regarding the action being taken.
3. Collect important files, records and papers for safekeeping.
4. Open main electrical breaker to cut off all power to the site. (The main breaker is marked for easy identification).
5. Secure all buildings and equipment and lock the site gate.
6. Evacuate the site taking mobile equipment to safety.
7. Post Guards on site access routes to monitor the activities of unauthorized personnel.
8. A report of the incident must be submitted to the Area Manager within 24 hours.

10.1 PREVENTIVE MEASURES

10.2 <u>Waste Disposal Permits</u>

If nitrate waste is generated, a disposal permit must be obtained and kept up to date if the product will be disposed of off-site, or in mine tailings. Permits to dispose of other collected waste in the event of spills or leaks (such as described in Section 6.3) must also be obtained in consultation with mine / provincial environmental representatives

10.3 <u>Liquid Containment</u>

All fuel / oil storage tanks must be dyked according to the provisions of Federal and/or Provincial regulations (eg. National Fire Code, Environmental Protection Act), or have a double-walled tank.

A plan must be in place and materials on hand to create a dyke in the event of a large fuel or solution leak or spill or other emergency spill situation.

10.4 <u>Inspection</u>

All site emergency storage areas and equipment must be inspected monthly by qualified personnel, monthly for physical condition and serviceability, and the results recorded according to quality and safety standard operating procedures.

All recommendations/orders made by NRC Explosives Branch inspectors, Fire Marshals and insurance inspectors must be responded to and acted upon accordingly. Copies of their reports are to be forwarded to DNCI's HSE representative for the region.

10.5 **Maintenance**

All preventive and breakdown maintenance must be carried out and recorded in accordance with standard operating procedures.

11.0 WORK SITE START UP (Restoration of Business)

11.1 Before startup, the condition prompting the shutdown / closure must be over / corrected (i.e. flood, fire, explosion or blizzard).

11.2 All decontamination procedures must be followed and the site cleared and cleaned of any environmental waste hazards.

11.3 All repairs to plant equipment involving safety shutdowns and essential operating machinery must be completed.

11.4 All electrical circuits, plumbing and piping must be tested.

11.5 The Work Site Supervisor / Manager will ensure that all lockout and tag-out procedures have been followed and signed off.

11.6 The Work Site Supervisor / Manager will start up the facility by turning on individual switches to the components that have been shutdown.

11.7 Operational checks will be done to ensure that all equipment is functioning at safe working pressures and voltage.

11.8 The Work Site Supervisor / Manager will give the verbal "all clear" before workers will be allowed to return to work.

11.9 The Work Site Supervisor / Manager or one of their delegates will cancel / remove all roadblocks, terminate evacuation activities, and notify employees to return to normal activities.

APPENDIX 1

DNCI'S EMERGENCY REPORT FORM FOR INCIDENTS INVOLVING EXPLOSIVES

WHO IS CALLING? NAME:____

PHONE #: ______________________ TIME:_____________DATE:_____________

CALLER'S ORGANIZATION:____

LOCATION OF INCIDENT: ____

WHAT IS THE EMERGENCY?
PROBLEM**:** (Motor Vehicle Accident, Fire, Scattered Product, Disabled Truck, etc.)

____

PRODUCTS INVOLVED : VISIBLE PLACARDS ? YES_________ NO__________

SHIPPING NAME(S)____

UN NUMBER(S)____

HAZARD CLASSIFICATION (ex: 1.1 D) :_____________________________________

QUANTITY: ____

INJURIES: ____

PROPERTY DAMAGE:____

EXPLOSIVES VEHICLE UNIT NUMBER:_______________LICENSE NO._____________

DRIVER:______________________________CARRIER:____________________________

WHEN DID INCIDENT OCCUR? DATE: ___________________TIME: _____________

WHERE IS THE EMERGENCY? (City, Town, Rural Area, Lat. & Long., Specific Directions)

____

ARE THERE RESIDENCES, BUSINESSES, OR OTHER PUBLIC GATHERING PLACES WITHIN THE EVACUATION ZONE (what, where)?

____

WHAT ACTION HAS BEEN TAKEN TO THIS POINT IN TIME?____________________
(Medical, evacuation, fire fighting, etc.)

____

APPENDIX 2

DNCI Corporate contact

Name	Position	Cell number
Benoit Choquette	Environmental Manager - Canada	(514) 246-6285
Nicholas Ebsworth	General Manager HSE - Canada	(514) 708-5417
Hubert Fafard	HSE Manager Eastern Canada	(418) 570-9257
Willard Pierce	Regional Manager -West	(403) 836-9029
Francois Lambert	Regional Manager –East	(514) 212-3490
Dale Bodnarchuk	Regional Manager – Central	(705) 715-6672
Seamus Kilcommons	HSE Manager Western Canada	(403) 815-4066
Brad Rhude	Sales Manager - Central	(705) 494-5171
Rick Chopp	HSE Manager – Central Canada	(705) 498-2855
Pierre Poulin	Sales Manager – Quebec/Maritimes	(418) 569-5565
Greg Brown	Sales Manager Western	(403) 512-5127
Bryan Sedrovic	HSE/ Regulatory Affairs Coordinator West	(250) 203-4259

APPENDIX 3

DNCI Emergency Response Advisors (ERA) per area

Name	Position	Cell number	Area (West, Central or East)
Tom Medak	Mgr, Bulk Emulsion Operations	(403) 818-4434	West
Ralph Olson	Operations Manager, Vancouver Island	(250) 713-8720	West
Darren Woodhead	Gregg River worksite supervisor	(780) 223-4491	West
Randy Armella	Bulk Operations Manager	(780) 865-6580	West
Cory Redwood	Manager dnx Drilling/ Joint Ventures	(867) 444 - 8533	West
Kevin S Kelly	Operations Manager – Seismic	(403) 934-0753	West
Tyrone McClean	Operations manager, Manitoba and Saskatchewan	(204) 687-0046	Central
Scott Smith	Operations Manager, Red Lake Ontario	(807) 727-7300	Central
Mike Ertel	Operation Manager – Ontario	(807) 629-9660	Central
Joss Forget	Operations Manager Northern Ontario	(705) 471- 8745	East
David Roy	Manager Plant operations	(418) 570-5604	East
Francois Lambert	Operations Manager	(514) 212-3490	East
Daniel Roy	Dyno Consult , Ste-Sophie	(514) 213-5889	East
Pierre St-George	Regulatory Affairs Canada	(613) 677 - 1051	Canada

APPENDIX 4

SITE: Meadowbank Site

MANAGEMENT AND WORK SITE CONTACT LIST

NAME	TITLE	BUSINESS PHONE	HOME PHONE	CELL PHONE
Doug Robertson	**Site Supervisor**	**(867) 793-4610 *(Option 2; option 1 ext 6804)***		**(867) 222-3930**
Dennis Wall	**Site Supervisor**	**(867) 793-4610 *(Option 2; option 1 ext 6804)***		**(867) 222-3930**
Site employees	**All employees on shift**	**(867) 793-4610 *(Option 2; option 1 ext 6804)***		
Tom Medak	**Operations Manager**	**(403) 723-7530**		**(403) 818-4434**
Seamus Kilcommons	**HSE Manager**	**(403) 236-9160 Ext 7547**		**(403) 815-4066**

EXTERNAL CONTACT NUMBERS

ORGANIZATION/CONTACT	LOCATION	PHONE NUMBER
Mine security	Meadowbank	Ext. 6817
Local Fire; ERT	Hinton	Ext 6911
Local Ambulance	Hinton	Ext 6911
Baker Lake RCMP	Hinton	867 793-1111

APPENDIX 5

Area Office Address:
Meadowbank site
Baker Lake, NU

Type of Facility:
Emulsion Plant
AN Tote storage

Emergency Meeting Place Upon Evacuation:
As identified on site orientation forms, employees and visitors are to meet at muster point for head count. Once all persons are accounted for, all will proceed to the Muster Point located at Security Gate #1, located at junction of All Weather Road. (see map)

Emergency Equipment On Hand:
Fire Extinguishers, First Aid Kits, Fire alarm system, video monitoring,

FY 2011 drill conducted

APPENDIX 6

BOMB THREAT CHECKLIST

Exact time of call:
Exact words of caller:
QUESTIONS TO ASK
1- When is bomb going to explode?
2- Where is the bomb?
3- What does it look like?
4- What kind of bomb is it?
5-What will cause it to explode?
6- Did you place the bomb?
7- Why?
8- Where are you calling from?
9- What is your address?
10- What is your name?

CALLER'S VOICE (circle)

Calm	Slow	Crying	Slurred
Stutter	Deep	Loud	Broken
Giggling	Accent	Angry	Rapid
Stressed	Nasal	Lisp	Excited
Disguised	Sincere	Squeaky	Normal

If voice is familiar, whom did it sound like?	
Were there any background noises?	
Remarks:	
Person receiving call:	Telephone number call received at:
Date:	Report call immediately to:

APPENDIX 7

NEW/TRANSFERED EMPLOYEE OR ANNUAL REFRESHER FORM

HSE Employee Orientation Form

To Be Completed By Supervisor (within 2 to 4 weeks of hiring)

(Employee Surname) (Given Names) (Worksite) (Date of Hire)

(Job / Position) (RFT/ RPT/ Casual / Temp) (End date if applic)

Show & Tell

	Date Completed		Date Completed
Tour Of Facility		Introduction To Staff	
Emergency/Fire Exits & Procedures		Workplace Hazards & Controls	
Environmental Clothing Issued		First Aid & WCB Reporting	
Overview Of Organization		Telephone Contacts	
Work Schedules		Time Sheets & Pay Periods	
Security & Key Control		E-mail & Website Access	
Expense Claims Procedures		Other:	

Documentation Given To & / or Discussed With Employee

Position Description		DYNO G & S Work Rules	
Worksite ERP, TDG ERAP & CCP		MSDS's	
Handling/Transporting Explosives		SOP's	
Employee Guidelines		Policy: HSE & Quality	
Policy: Privacy & Confidentiality		Policy: Substance Abuse	
icy: Violence In The Workplace		Policy: Security	
Policy: Smoking In The Workplace		Performance Reviews	
Other:		Other:	

New Hire Training Completed

Customer Orientation		WHMIS	
TDG Clear Language		PPE (as applicable)	
Handling/Transporting Explosives		Fire Extinguisher	
ICARUS (Incident Reporting)		Take 5 (Hazard Assessment)	
Worksite ERP, TDG ERAP & CCP			

______________________________ ____________________________ ______________

Supervisor (Print Name) Supervisor Signature Date

APPENDIX 8

ANNUAL ERT VISIT REVIEW FORM

Information to be released to Emergency Services

From: Local Emergency Services

Subject: Emergency Response Plan for ________________________________.

The following is a copy of the Emergency Response Plan that has been prepared by Dyno Nobel Inc. Has been received from _________________ operations. The ERP has been discussed and being kept on file for future reference. If questions arise, we have been given the contact information for the ___________________________ operations staff.

On _______________________ the ____________ of 2011, AEM ERT responder ____________________________ attended the Dyno Nobel Meadowbank site for an annual visit and ERP review.

Signed:____

Position:____

Date:____

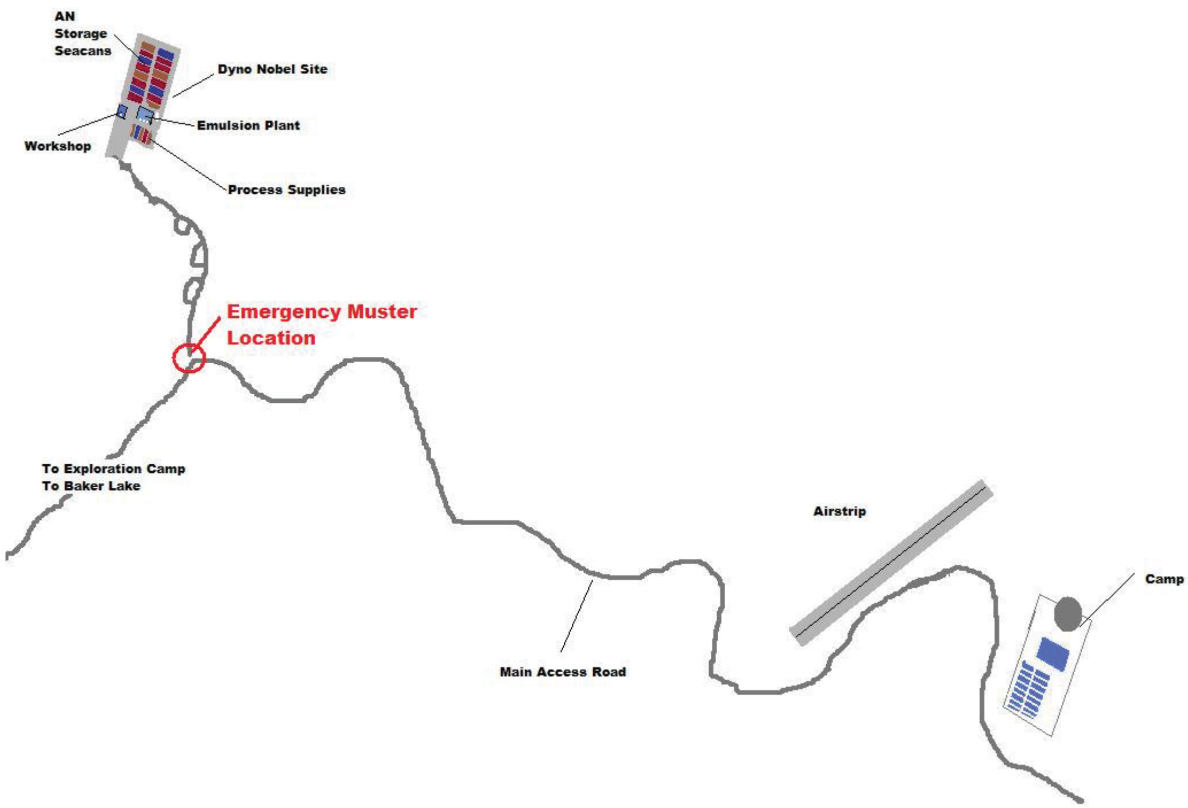
APPENDIX 9

Transportation of Dangerous Goods Regulation
Class Quantity Emission Limit

1	Any quantity that could pose a danger to public safety or 50 kg
2	Any quantity that could pose a danger to public safety or any sustained release of 10 minutes or more
3	200 L
4	25 kg
5.1	50 kg or 50 L
5.2	1 kg or 1 L
6.1	5 kg or 5 L
6.2	Any quantity that could pose a danger to public safety or 1 kg or 1 L
7	Any quantity that could pose a danger to public safety. An emission level greater than the level established in section 20 of the *Packaging and Transport of Nuclear Substances Regulations*
8	5 kg or 5 L
9	25 kg or 25 L

Table identified in Section 8.1(1) of Part 8 of the Transportation of Dangerous Goods Regulation Class Quantity Emission Limit

Evacuation/ Muster location



Appendix H – Spill Contingency Plan Ver3

MEADOWBANK GOLD PROJECT

Spill Contingency Plan

Meadowbank Mine Site
All Weather Private Access Road (AWPAR)
Baker Lake Facilities

In Accordance with Water License 2AM-MEA0815

Prepared by:
Agnico-Eagle Mines Limited – Meadowbank Division

Version 3
July 2012

EXECUTIVE SUMMARY

This document presents the Spill Contingency Plan for Agnico-Eagle Mines Limited (AEM) Meadowbank Mine Site, All Weather Private Access Road (AWPAR) and Baker Lake Facilities, which is a requirement of the Meadowbank Gold Project Type A Water License No. 2AM-MEA0815 issued on June 09, 2008. The Spill Contingency Plan (SCP) designates lines of authority, responsibility, establishes proper reporting and details plans of action in the event of a spill. This plan applies to the operational phase of the mine and is applicable to all AEM employees and any contractors associated with the project located at latitude 65°01'52"N longitude 96° 04'22"W approximately 70 km north of Baker Lake in Nunavut including the Baker Lake Marshalling Facilities located at latitude 64°18'36"N and longitude 95° 58'04"W and the AWPAR.

IMPLEMENTATION SCHEDULE

As required by Water License 2AM-MEA0815, Part B, Item 16, the proposed implementation schedule for this Plan is effective immediately (December 2011) subject to any modification proposed by the NWB as a result of the review and approval process.

DISTRIBUTION LIST

AEM - Environmental Superintendent

AEM – General Mine Manager

AEM – Engineering Superintendent

AEM – Health and Safety Superintendent

AEM – Geology Superintendent

AEM – Mill Superintendent

AEM – Maintenance Superintendent

AEM – Mine Superintendent

AEM – Project Construction Manager

AEM – Site Services Superintendent

AEM – General Services Superintendent

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	08/08/08			Comprehensive plan for Meadowbank Mine Site, Exploration Camp and Baker Lake Facilities
2	11/12/04			Update of Contacts, Spill management materials, include AWPAR map and Spill KIT Location Map
3	12/07/25			Update of the hazardous materials stored on site

Table 1 - Document Control

Version 2:

Prepared By: ______________________

Jeffrey Pratt
Environment Coordinator

Approved By: ______________________

Kevin Buck
Environmental Superintendent

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SECTION 1 • INTRODUCTION

1.1 PURPOSE AND SCOPE OF THE SPILL CONTINGENCY PLAN

The overall purpose of creating a spill contingency plan is to minimize the impacts of spills by the establishment of predetermined lines of response and plans of action. This plan has been designed to facilitate effective communication and the efficient clean-up of spills from potentially hazardous materials. These hazardous materials include:

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

More specifically the objectives of this 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.

. This plan has been prepared in accordance with the following reference documents:

- Indian and Northern Affairs Canada (INAC) 2007. *Guidelines for Spill Contingency Planning*.
- Government of Nunavut (GN), *Contingency Planning and Spill Reporting in Nunavut. A Guide to the New Regulations.*
- Government of Nunavut (GN) 2002, *Guideline General Management of Hazardous Wastes in Nunavut.*
- Northwest Territories Resources Wildlife and Economic Development Environmental Protection Service. 1988. *Spill Contingency Planning and Reporting Regulations.*

SECTION 2 • PROJECT DESCRIPTION

The Meadowbank Gold Project, operated by Agnico-Eagle Mines Limited, is located approximately 70 km north of the Hamlet of Baker Lake in Nunavut. The project is located on Inuit Owned surface lands (IOL BL-14) and has the following coordinates:

Latitude: 65°01'52"N
Longitude: 96° 04'22"W
NTS map sheet 66H/1.

Meadowbank Project components include marshalling facilities in Baker Lake, and the 110 kilometer All Weather Private Access Road (AWPAR) from Baker Lake to the Meadowbank Mine Site **(Figure 2)**. The Meadowbank mine site consists of the process plant, sewage treatment plant, water intake, accommodation buildings, power plant, tank farm, warehouse, truck shop, emulsion plant, and the open pit (**Figure 2.2**). The fuel farm at the Meadowbank mine site consists of a single 5.6 million liter tank. The Baker Lake Marshalling Area consists of a laydown transfer area to temporarily store materials prior to the delivery to the Meadowbank mine site. A fuel tank farm is located at Baker Lake marshalling facility which consists of six, 10 million liter tanks and fuel is delivered in bulk by sealift to the fuel farm **(Figure 2.3)**. From there, fuel is hauled to the Meadowbank mine site by tanker trucks on the AWPAR. Fuel storage locations have been designed to meet the CCME guidelines for Aboveground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.

Emergency spill response equipment (i.e. spill kits) is installed at each fuel storage location. Spill kits contain the appropriate type, size and quantity of equipment for the volume and type of product present at the storage location. Transport trucks, heavy equipment and light vehicles are all equipped with spill kits.

Construction at the mine site began with the issuance of the Type A Water License and other pertinent authorizations in July 2008 with Operations commencing in January 2010.

2.1 PREVENTION AND INSPECTIONS

The first step in spill response is to take actions to prevent the spill from occurring. Transport, transfer and storage of materials are performed by trained personnel using secondary containment, with well-maintained equipment and containers. Refuelling stations in Baker Lake and at the mine site are equipped with a lined area to contain any minor leaks or spills while refuelling. Transfer of fuel from tanks to tanker trucks are performed with the aid of fuel pumps. Good housekeeping practices are adopted especially in areas such as storage facilities, loading and unloading zones. Site orientations are conducted with all employees and spill prevention and response is discussed in detail. Regular worksite inspections are conducted to identify measures to minimize the risk of spills. All personnel are trained to be aware of the potential hazards associated with the fuel/chemicals with which they are assigned to work. In addition to work site inspections conducted by area specific employees, the Environmental Department conducts weekly inspections to audit facilities handling or storing hazardous materials.

AEM supports the following general principles for spill prevention:

- Provide up to date and accessible Material Safety Data Sheets (MSDS) for all hazardous materials
- Daily inspections fuel/chemical storage areas for leaks (including flex connectors and plumbing) and platform shifting
- Daily inspections of hazardous materials storage areas
- Train workers in the use of safe work procedures for hazardous materials, and procedures to clean up spills
- Encourage workers to take reasonable measures to prevent spills
- Keep drums/containers sealed or closed,
- Place drums/containers within a suitable form of secondary or spill containment
- Keep “overpack” or “salvage” drums nearby to contain leaking drums
- Keep storage areas secure from unauthorized access
- Segregate incompatible materials
- Ensure chemical storage areas are adequately protected from weather and physical damage
- Provide adequate spill response materials at storage areas (details of spill prevention equipment are outlined in Section 8).

SECTION 3 • DEFINITIONS

3.1 WHAT IS A SPILL?

For the purposes of this plan, a major spill is defined as an accidental release of product into the environment that has the potential for adverse impact. The emergency response team must be notified immediately of a major spill or emergency. A tanker truck overturn on the AWPAR is considered a major spill for the purpose of this plan and Section 7 provides response procedures for an incident of this type.

A minor spill is defined as any hazardous chemical spill that does not involve highly toxic, highly reactive, or explosive chemicals in a situation that is not life threatening. Furthermore, this type of spill presents a manageable physical or health hazard to personnel who, when wearing proper personal protective equipment, will not be exposed to any chemical at a level that exceeds any recognized action level or permissible exposure limit. Minor or simple spills are still to be reported to the Environment Department but they are not expected to involve emergency responders.

3.2 MATERIALS AND REPORTABLE SPILLS ON SITE

As a precaution, if there is any doubt as to whether the quantity spilled meets the minimum reportable thresholds listed in **Table 2**, the spill incident will be reported. Furthermore, AEM will maintain a detailed log of all spills of hazardous materials, including non-reportable spills. As part of AEM's overall environmental management system and in the spirit of a continuous improvement of environmental performance, procedures will be implemented to encourage all employees to communicate non-reportable spill incidents.

To ensure compliance with Section 36(3) of the *Fisheries Act* and Section 35 of the *Migratory Bird Regulations* all spills of fuel or hazardous materials, regardless of quantity into a water body (including frozen), shall be reported immediately to the NT-NU 24-HOUR SPILL REPORT LINE (at 867.920.8130).

Table 2 - Spill Quantities That Must Be Reported To The NT-NU 24-HOUR SPILL REPORT LINE

Transportation Class	***Type of Substance***	***Compulsory Reporting Amount***
1	Explosives	Any amount
2.1	Compressed gas (flammable)	Any amount of gas from containers with a capacity exceeding 100 L
2.2	Compressed gas (non-corrosive, non-flammable)	Any amount from containers with a capacity exceeding 100 L
2.3	Compressed gas	Any amount
2.4	Compressed gas (corrosive)	Any amount
3.1, 3.2, 3.3	Flammable liquid	100 L
4.1	Flammable solid	25 kg
4.2	Spontaneously combustible solid	25 kg
4.3	Water reactant solids	25 kg
5.1	Oxidizing substances	50 L or 50 kg
5.2	Organic peroxides	1 L or 1 kg
6.1	Poisonous substances	5 L or 5 kg
7	Radioactive substances	Any amount
8	Corrosive substances	5 L or 5 kg
9.1 (in part)	Miscellaneous substances	50 L or 50 kg
9.2	Environmentally hazardous	1 L or 1 kg
9.3	Dangerous wastes	5L or 5 kg
9.1 (in part)	PCB mixtures of 5 ppm or more	0.5 L or 0.5 kg
None	Other contaminants	100 L or 100 kg

Note: L = litre; kg = kilogram; PCB = polychlorinated biphenyls; ppm = parts per million.

SECTION 4 • RESPONSE ORGANIZATION

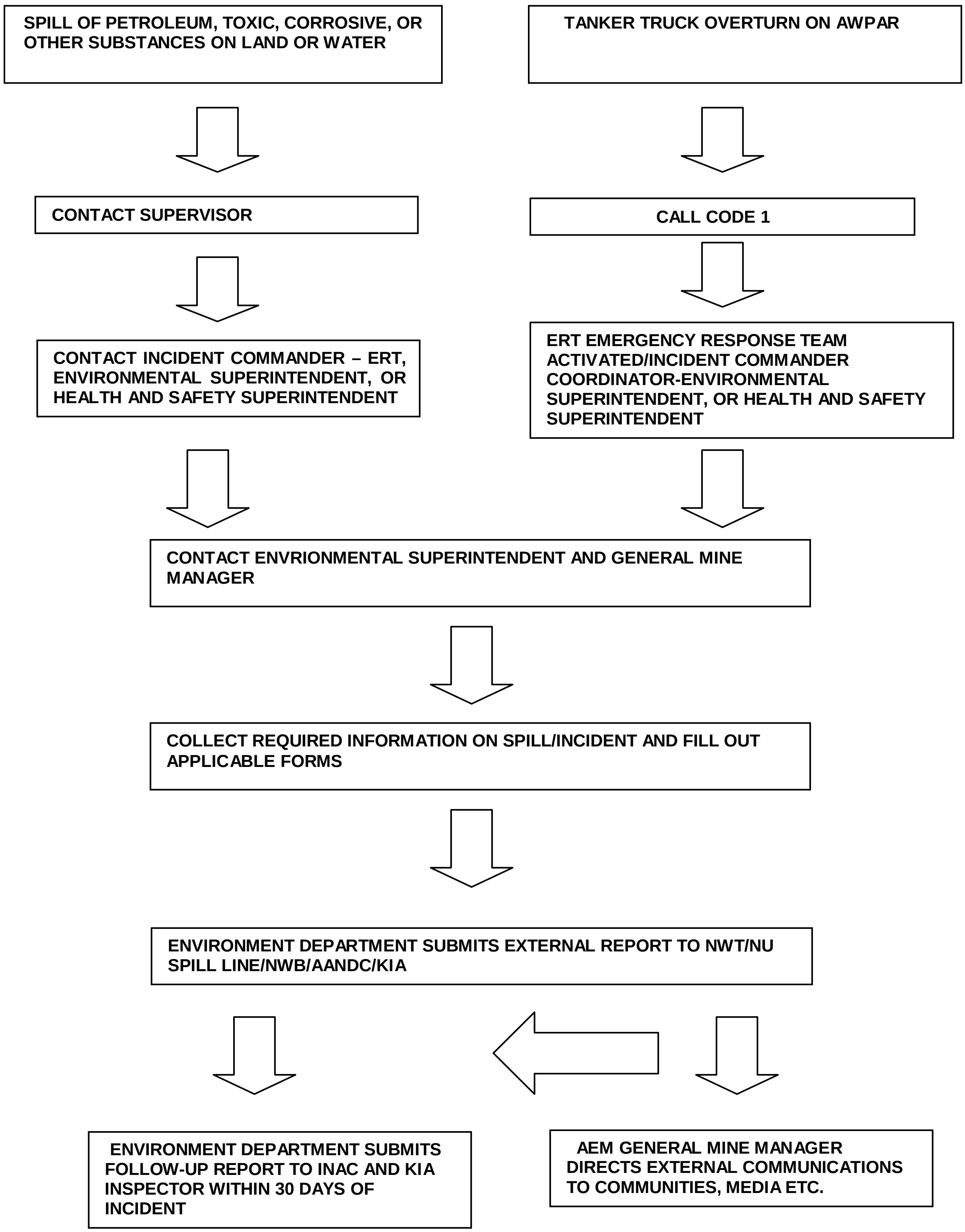
This section addresses the response organization and the responsibilities of each individual during response to an incident.

Figure 4.1 illustrates AEM's Spill Reporting Procedure in the event of a spill and Sections 4.1- 4.9 list the major responsibilities of site staff that will be participating in the emergency response management.

The first person (first responder) to notice, or come in contact with, any spill situation either initiates a Code 1 (in the case tanker truck overturn on AWPAR) or reports to his/her immediate supervisor (in the case of all other spills on land or water). The supervisor is responsible to report the incident to the designated Incident Commander for a major spill or to the environment department for a minor spill. If a Code 1 is initiated, the incident commander will respond to any tanker truck overturns along AWPAR in conjunction with the ERT. Major responsibilities such as initial coordination, spill clean-up and mobilizing the Emergency Response Team (ERT) are part of the Incident Commander's duties.

The Incident Commander will contact the Environmental Superintendent and/or General Mine Manager or alternate, who in turn will inform the VP, Environment and Sustainable Development. After all information has been collected, the Environmental Superintendent or alternate will submit a spill report and follow up spill report to the NWT/NU Spill Line, Nunavut Water Board, Kivalliq Inuit Association and Aboriginal Affairs and Northern Development Canada. Incidents' involving tanker truck overturns that require media communications will be the responsibility of AEM General Mine Manager or alternate.

Figure 1: Spill/Incident Reporting Procedure



4.1 FIRST RESPONDER

The person who has caused a spill or is the first to observe the spill is the first responder.

The responsibilities of the First Responder are as follows:

- In case of a tanker truck overturn, initiate a Code 1. Remain on radio to provide guidance to the ERT.
- In case of spill to land or water, contact the supervisor to report the incident.
- Identify and contain the spill, IF SAFE TO DO SO.
- Participate in spill response as a member of the clean-up crew.

4.2 SUPERVISOR

The responsibilities of the Supervisor are as follows:

- Initial assessment of the severity of the incident.
- Contacts the Incident Commander.
- Gathers facts about the spill.
- Participate in spill response as a member of the clean-up crew.

4.3 INCIDENT COMMANDER

Responsibilities of the Incident Commander are as follows:

- Assume complete authority over cleanup personnel and the spill scene, as well as assume responsibility for all mitigation efforts.
- Evaluate the initial situation and assess the magnitude of the problem.
- Activates the initial response plan.
- Alert and assemble key personnel in the response team, as deemed appropriate, to handle the situation.
- In consultation with the Environmental Superintendent or designate, develop the overall plan of action for containment and cleanup of the specific incident, as well as direct and implement the plan.
- Ensure assigned responsibilities are carried out and the activities of team members are coordinated.
- Assess the requirements for people, equipment, materials, and tools to contain the spill in light of what resources are immediately available; urgency will depend on the nature of the spill.

- In consultation with the Environmental Superintendent or designate mobilize any additional resources that may be required and arrange for the transportation of necessary personnel and/or materials to the site.

4.4 EMERGENCY RESPONSE TEAM

AEM has an Emergency Response Team (ERT) that is trained and responsible for controlling the large spills as well as spills from tanker truck overturns along AWPAR, and assisting with medical and other emergencies that may occur at the camp. These team members attend regular training sessions.

4.5 EMERGENCY RESPONSE TEAM COORDINATOR

The responsibilities of the Emergency Response Team Coordinator (ERTC) are as follows:

- Mobilize all ERT personnel, equipment, personal protective equipment and supplies as required to the site of the spill.
- Assist Incident Commander in obtaining any additional resources not available on site.
- Ensure that appropriate PPE is worn properly.
- Assist in developing and implementing emergency response training programs and exercises.
- Ensure that all spill response personnel receive adequate training to fulfil their responsibilities as part of the ERT.

4.6 ENIVRONMENTAL SUPERINTENDENT OR DESIGNATE

The Environmental Superintendent or designate is responsible for implementing and maintaining the SCP. In addition, the Environmental Superintendent's or designates responsibilities in the case of a spill are to:

- Liaise with the Incident Commander.
- Provide technical advice on the anticipated environmental impacts of the spill.
- Advise on the effectiveness of various containment, recoveries, and disposal options, and suggest the most appropriate approach.
- Prepare and submit any formal reports (see Appendix A for NWT/NU Spill Report Form) to regulators and AEM management detailing the occurrence of a spill.
- Contact the Senior Vice President - Environment and Sustainable Development immediately for a major spill.
- Act as the spokesperson with regulatory and government agencies.
- If authorized by the General Mine Manager, act as a spokesperson with the public and media, as required.

- Implement a sampling protocol for the collection and analysis of samples to identify and monitor possible contaminant levels resulting from the spill.
- Ensure on-site resources for spill response and cleanup are available.
- Monitor the effectiveness of the cleanup operation and recommend further work, if necessary.
- Reviews incident occurrences and recommends preventative measures.
- Assists in implementing training and simulation requirements for spill response personnel.

4.7 GENERAL MINE MANAGER ON DUTY

The General Mine Manager / designate is required to inform team members of the detailed nature of the operations to be performed in the event of a facility malfunction causing a spill during the Operations phase. The responsibilities of the General Mine Manager/designate are as follows:

- Liaise with AEM personnel resources and keep them informed of cleanup activities.
- Assist the Incident Commander and ERT as needed, particularly in obtaining any additional resources not available onsite for spill response and cleanup.

4.8 HEALTH AND SAFETY SUPERINTENDENT OR DESIGNATE

The following are the responsibilities of the Health and Safety Superintendent or designate in conjunction with the Training Department:

- Maintain emergency and health and safety records.
- Assist in conducting emergency spill response exercises.
- Track all emergency and health and safety training that on-site staff have received, and when retraining will be required.
- Notify the Incident Commander (related to ERT) when retraining is required.
- Ensure that employees are retrained in appropriate emergency response skills, Workplace Hazardous Materials Information System (WHMIS) training, Hazard Communication (HAZCOM), Occupational Health and Safety Administration (OHSA) training, first aid, and respirator fit-testing prior to expiry of existing training certification.
- Consult with appropriate organizations regarding retraining requirements and schedules.

4.9 ON-SITE HEALTH CARE PROVIDERS

On-site medics are responsible for the following:

- Providing on-site first aid and other medical support.
- Providing additional training for ERT members.

In addition to the health care providers on site, the Baker Lake Hamlet health professionals will be called first on the scene, if required.

4.10 SPILL RESPONSE TEAM CONTACT INFORMATION

Internal contact information is contained in Table 4.2 for all AEM personnel involved in spill recovery and subsequent reporting. Table 4.3 provides contact information for AEM contractors present at the mine site. Important external contacts such as regulatory agencies and health organizations are listed in Table 4.4. Table 4.5 provides contact information for external contractors should incident warrant assistance from outside sources.

Table 3 - Internal Contacts

Title	Name	Telephone No.
Vice President, Environment and Sustainable Development	Louise Grondin	416-847-8656 Cell:819-724-2020
General Mine Manager	Dominique Girard	867.793.4610 ext.6910 Cell: 819.856.7863
Health and Safety Superintendent or Assistant Superintendent	Len Kutchaw Or Norm Ladouceur	867.793.4610 ext.6720
Emergency Response Team	Len Kutchaw/Andre Rouleau	867.793.4610 ext.6809
Environmental Superintendent	Kevin Buck	867.793.4610 ext. 6838 Cell: 819.856.1956
Environmental Coordinator Or Environmental Department	Jeffrey Pratt Or Environmental Technicians	867.793.4610 ext. 6728 Or 867.793.4610 ext. 6747
Incident Commander	Jeffrey Pratt/ Kevin Buck	867-793-4610 ext. 6728
On site Medics	On-site Nurses	867.793.4610 ext.6734
Site Security	On-site Security	867.793.4610 ext.6748

Table 4 - Contractor Contacts

Title	Telephone No.
Nolinor Aviation Services	Protocol Agent 867.793.4610 ext. 6808
First Air	867.446.1744
Calm Air	867.793.2873
Dyno Nobel Explosives Ltd.	867.793.4610 ext.6804
Woodward Group of Companies (Shipping)	709.896.2421 or 709.896.6569

Table 5 - External Contacts

Organization/Authority	Telephone Number	Fax Number
NT-NU 24-Hour Spill Report Line	867-920-8130 spills@gov.nt.ca	867-873-6924
Workers Safety and Compensation Commission	867-979-8637	867-979-8501
Kivalliq Inuit Association	867-645-5725	867-645-2348
Nunavut Water Board	867-360-6338	867-360-6369
AANDC Inspector	867-975-4548	867-979-6445
Environment Canada, Enforcement Branch	867-975-4644	867-975-4594
Department of Fisheries and Ocean (DFO) – Nunavut Regional Office	867-979-8000	867-979-8039
Manager, Environmental Protection, Government of Nunavut	867-975-7748	867-975-5981
Kivalliq Health Services – Baker Lake (Health Centre)	867-793-2816	867-793-2813
Baker Lake Hamlet Office	867-793-2874	
Baker Lake Fire Emergency	867-793-2900	N/A

Table 6 - External Spill Response Contractor Phone Numbers

Contractor	Telephone No.	Area of expertise
Local		
Baker Lake Contracting & Supplies	867.793.2831	General Contracting and repairs
Peter's Expediting	867.793.2703	Transportation
NWT Ltd (Arctic Fuel)	867.793.2311	Fuel Transportation

SECTION 5 • ACTION PLAN

Spills may be the result of any of the following occurrences:

- Tanks, drums or containers may develop leaks or rupture.
- Failure of equipment such as valves, piping or containment structures.
- Overfilling.
- Improper storage.
- Spills during transfer of fuel, chemicals or waste products.
- Spills resulting from accidents during transportation.

5.1 INITIAL ACTION

For all spill emergencies, it is required that priority actions be undertaken. These are:

- Respond Quickly;
- Ensure Safety; and
- Report the Spill.

5.1.1 Respond Quickly

- Identify the spilled material.
- Be alert – ensure safety of yourself and others by notifying them of the incident.
- Shut off ignition sources such as vehicles and unplug electrical equipment – NO SMOKING.
- Attend to the injured.
- Assess the severity of the spill.
- Contact the Incident Commander, identify the location and request assistance as required. Incident Commander will mobilize the Emergency Response Team if required.

The primary form of ensuring safety is by using preventative measures. All personnel who deal with chemicals must have training in first aid and safe materials handling, including the Workplace Hazardous Materials Information System (WHMIS). In addition, regular training updates and site-specific exercises / drills are integral to preventing incidents.

5.1.2 Respond Safely

- Consult the MSDS and Product Guides for further information on the substance;
- Keep people away from spill site;
- Wear appropriate PPE such as impervious clothing, goggles, and gloves when containing the spill
- Approach spill from upwind IF IT IS SAFE TO DO SO
- Assess whether the spill, leak, or system failure can be readily stopped or brought under control;
- Stop product flow or leak if possible and IF IT IS SAFE TO DO SO
- Do not contain compounds (e.g gasoline, aviation fuel) if vapours might ignite – allow them to evaporate.
- Depending on the type of compound spilled and IF IT IS SAFE TO DO SO, contain product using booms, berms, absorbent pads, earthen dike, trenches or improvise with materials at hand.

5.1.3 Report Spill

- Obtain all necessary information to complete the external reportable spill. External reportable spills must be reported to the NWT-NU 24 Hour Spill Line/AANDC/Kivalliq Inuit Association (KIA) and the Nunavut Water Board by AEM Environment Staff.
- A detailed spill report, no later than 30 days after reporting the spill, will be submitted to the AANDC Water License Inspector and the KIA Land's Inspector by AEM Environment Staff. This report will contain the amount and type of spilled product, the GPS location of the spill and the measures taken to contain, cleanup and restore the spill site.

Procedures will vary depending on the season and hazardous material lost. The MSDS must be consulted to ensure that safety procedures are followed. Response procedures specific to spills on land, water, snow and ice are presented in the following sections as general guidelines.

5.2 SPILLS ON LAND

Response to spills on land will include the general procedures detailed in the following section. The main spill control techniques involve the use of two types of barriers: dykes and trenches. Barriers should be placed down-gradient (down-slope) from the source of the spill, and as close as possible to the source of the spill. Barriers will slow the progression of the fuel and will also serve as containment to allow recovery of the fuel.

Depending on the volume spilled, the site of the spill as well as available material, a dyke may be built with soil, booms, lumber, snow, etc. A plastic liner should be placed at the foot of and over the dykes to protect the underlying soil or other material and to facilitate recovery of the fuel. Construct dykes in such a way as to accumulate a thick layer of free product in a single area (V-shaped or U shaped).

Trenches are useful in the presence of permeable soil and when the spilled fuel is migrating below the ground surface. A plastic liner should be placed on the down-gradient edge of the trench to protect the underlying soil. Liners should not be placed at the bottom of the trench to allow water to continue flowing underneath the layer floating oil.

The use of large quantities of absorbent materials to recover important volumes of fuel should be avoided. Large volumes of free-product should be recovered, as much as possible, by using vacuums and pumps, and containerized. Mixtures of water and fuel may be processed through an oil-water separator. Absorbent sheets should be used to soak up residual fuel on water, on the ground (soil and rock), and on vegetation. Peat moss may also be sprinkled on vegetation to absorb films of petroleum products.

5.3 SPILLS ON WATER

Response to spills on water will include the general procedures provided in the following section. Various containment, diversion and recovery techniques are discussed in the following sections. The following elements must be taken into consideration when conducting response operations:

- type of water body or water course (lake, stream, river)
- water depth and surface area
- wind speed and direction
- type of shoreline
- seasonal considerations (open-water, freeze-up, break-up, frozen)

Containment of an oil slick in water will require the deployment of mobile floating booms to intercept, control, contain and concentrate (i.e., increase thickness) the floating oil. One end of the boom will be anchored to shore while the other will be towed by a boat and used to circle the oil slick and return it close to shore for recovery using a skimmer. Reducing the surface area of the slick will increase its thickness and thereby improve recovery. Mechanical recovery equipment (*i.e.,* skimmers and oil/water separators) will be mobilized to site if required.

Measures will be taken to protect sensitive and accessible shoreline. The oil slick will be monitored to determine the direction of migration. In the absence of strong winds the oil will likely flow towards the discharge of the lake. Measures will be taken to block and concentrate the oil slick at the lake discharge using booms where it will subsequently be recovered using a portable skimmer, a vacuum, or sorbent materials.

In small slowly-flowing rivers, streams, channels, inlets or ditches, inverted weirs (i.e., siphon dams) will be used to stop and concentrate moving oil for collection while allowing water to continue to flow unimpeded. In the case of floating oil, in a stream, heading for a culvert (i.e., at a road crossing) a culvert block will be used to stop and concentrate moving oil for collection while allowing water to continue to flow unimpeded. In both cases oil will then be recovered using a portable skimmer or sorbent materials.

In the case of spills in larger rivers, with fast moving currents, diversion booming will be used to direct the oil slick ashore for recovery. Single or multiple booms (i.e., cascading) may be used for diversion. Typically, the booms are anchored across the river at an angle. The angle will depend on the current velocity. Choosing a section of a river that is both wider and shallower will make boom deployment easier. Diversion booming may also be used to direct an oil slick away from a sensitive area to be protected.

5.4 SPILLS ON SNOW AND ICE

In general, snow and ice will slow the movement of hydrocarbons. The presence of snow may also hide the oil slick and make it more difficult to follow its progression. Snow is generally a good natural sorbent, as hydrocarbons will have a tendency to be soaked up by snow through capillary action. However, the use of snow as a sorbent material will be limited as much as possible. Snow and frozen ground will also prevent hydrocarbons from migrating down into soil or at least slow the migration process. Ice will prevent seepage of fuel into the water.

Most response procedures for spills on land may be used for spills on snow and ice. The use of dykes (i.e., compacted snow berms lined with plastic sheeting) or trenches (dug in ice) will slow the progression of the fuel and will also serve as containment to allow recovery of the fuel.

Free-product will be recovered by using a vacuum, a pump, or sorbent materials. Contaminated snow and ice will be scraped up manually or using heavy equipment depending on volumes. The contaminated snow and ice will be placed in containers or within plastic lined berms on land.

5.5 DISPOSAL OF SPILLED MATERIAL

All contaminated spill pads, and booms are placed within Quatrex bags and contaminated water is placed within drums for shipment to an approved disposal facility. All contaminated soil is placed in a temporary site to be treated later on.

SECTION 6 • HAZARDOUS MATERIALS STORED ON SITE

A variety of petroleum products and other hazardous materials will be used as part of the mining operations. Large quantities of petroleum products will be stored at various sites. Explosives will also be stored on site. Other hazardous materials will be used but in smaller quantities. Nonetheless, all these products are considered as potential environmental and safety hazards.

Material Safety Data Sheets (MSDS) of all materials transported, stored and used on-site will be made available at strategic locations near to where hazardous materials or toxic substances are stored or utilized. Appendices B to G provide General Response Procedures for Spilled Chemical Substances.

Table 7 identifies the predominant hazardous materials transported, stored and generated at the site.

Table 7- Materials Stored At Site During Operations

Material	Maximum Amount present on Site	Maximum Amount transported per unit	Storage Location
Acetylene	500 cylinders	300 cylinders per c-cans	Inventory Lay down
Activated Carbon	350 MT	10 mt per c-can	Inventory Lay down and Process Plant lay down
Ammonium Nitrate	10 000 MT	20 mt per c-can	Emulsion plant
Ammonium Nitrate Fuel Oil (ANFO)	Manufactured on demand	20 000 kg per truck	Emulsion plant
Motor Oil	Estimated at 800 000L	20 800L per c-can	Inventory Lay down, garage
Trojan Boosters (Blasting Systems)	34 000 KG	15 mt per c-cans	Emulsion plant
Borax, Anhydrous	7 500KG	3 375KG per c-cans	Inventory Lay down and Process Plant lay down
Calcium Chloride	600 000L	10 000L per c-cans	Inventory Lay down
Calcium Hydroxide	NOT IN INVENTORY		Inventory Lay down
Calcium Oxide	NOT IN INVENTORY		
Calcium Peroxide	NOT IN INVENTORY		
Carbon Dioxide	10 cylinders	10 cylinders per c-can	
Copper Sulphate	500 MT	20 MT Per c-can	Inventory Lay down and Process Plant lay down
Diesel Fuel	5.5 million Liters	40 000L per tanker	Tank farm
Dyno Split (Detagel)	135 000 KG	15 mt per c-cans	Emulsion plant

Nonel EZTL	1 400 KG	15 mt per c-cans	Emulsion plant
Nonel MS	1 800 KG	15 mt per c-cans	Emulsion plant
Ethylene Glycol	60 000L	10 000L per c-can	Inventory Lay down
Ferric Chloride Hexahydrate	NOT IN INVENTORY		
Ferric Subsulfate Solution	NOT IN INVENTORY		
Hydrofluoric Acid	NOT IN INVENTORY		
Hydrogen Peroxide	NOT IN INVENTORY		
Jet B Fuel	20 000L	11 000L Tanker	Tank, tarmac
Lead Acid Batteries	500L	500L per c-can	Warehouse
Magnafloc 10 (Flocculant)	300 MT	15 MT per c-can	Inventory Lay down
Nitric Acid	120 000L	8 000L per c-can	Inventory Lay down
Portland Cement	3 500 mt	20 mt per c-can	Dyke and
Sodium Cyanide	1 300 MT	19 mt per c-can	Inventory Lay down and Process Plant lay
Sodium Hydroxide	10 KG	10 kg in c-can	Warehouse
Sodium Nitrate	10.2 MT	5.1 MT per c -can	Inventory Lay down
Sulphuric Acid			
Sulfur	4 600MT	20 MT per c-can	Inventory Lay down
Unleaded Gasoline	50 000L	40 000L tanker	Tank farm
Varsol	4 000L	2000 L per c-can	Inventory Lay down

SECTION 7 • POTENTIAL SPILL ANALYSIS

In order to prepare for emergency spill response, potential spill analysis was conducted and on various worst case scenarios. The exercise serves to identify potential risk areas, as well as to determine the fate of spilled products and their environmental effects. One potential scenario was identified for the Meadowbank Gold Project:

- Road between Baker Lake and the Meadowbank Mine Site – spill contents of a tanker truck into water body.

Scenario #1: Road Accident Tanker Truck Spill on AWPAR

Description of incident: Spill of the contents of a fuel tanker to the ground or water during transport from the Baker Lake to the Meadowbank Mine Site.

Potential causes: Vehicle accident, human error

Hazardous products spilled: Diesel fuel

Maximum volume spilled: 40,000 litres.

Immediate receiving medium: stream, river or lake.

Distance and direction to nearest receiving body of water: N/A

Resources to protect: streams, rivers and lakes

Estimated emergency response time: Maximum time is 90 minutes depending on location of spill (assuming truck driver is injured and cannot commence spill response procedures). Minimum time to respond to a spill on the AWPAR is 15 minutes.

Spill response procedures: Contain and recover oil slick downriver as described in Section 5.3, protect shorelines using sorbent booms. Collect free-product for temporary storage. Clean-up soiled shorelines. If the response crew arrives before the complete spill, seal the leak where feasible, contain and recover oil spill on ground using dykes, sumps or trenches as described in Section 5.2. Also if the truck driver is not injured, he will act as a first responder and immediately initiate the spill contingency plan as defined in Section 5 using the spill kit kept in the fuel trucks.

SECTION 8 • RESPONSE EQUIPMENT

8.1 GENERAL EQUIPMENT

This section addresses the emergency response machinery, equipment, tools and other resources that will be made available on-site for spill counter measures.

Mobile Equipment available to AEM, that will be used for spill contingency include:

- Graders
- Cranes
- Snowmobiles
- Vacuum Truck
- Loaders
- Backhoe
- Bulldozer
- Forklift
- Water Trucks
- Excavators
- Winch Trucks
- Pickup Trucks
- Generator Sets
- Fire Truck
- Aluminum Boats
- Fuel Trucks
- Bobcat
- Haul Trucks
- Snow Cat

If required, additional equipment on site will be made available to assist with spill recovery.

Temporary containment systems are also available on site and include:

- Booms
- Drums
- Tanks
- Tailings Pond
- Spill absorbent material packages/pads
- Silt fencing
- Maritime Barrier

Emergency transportation that will be used under an emergency situation are:

- Aircraft (fixed wing or helicopter)
- 4-wheel drive vehicles
- Snowmobiles
- Boats

Communication equipment on site includes radios, telephones, faxes and other wireless communication systems that will be used in the event of an emergency situation.

Spill Response kits are strategically located where required. Each department and work area is responsible for providing sufficient spill response kits in their respective work areas. The kits are kept in marked and accessible locations. The locations include all fuel storage areas, chemical storage areas and so on.

All of the mobile equipment on site (heavy equipment) contains an emergency spill kit.

An Environmental Emergency Trailer which is easily accessible and mobile is located on site which contains the following items:

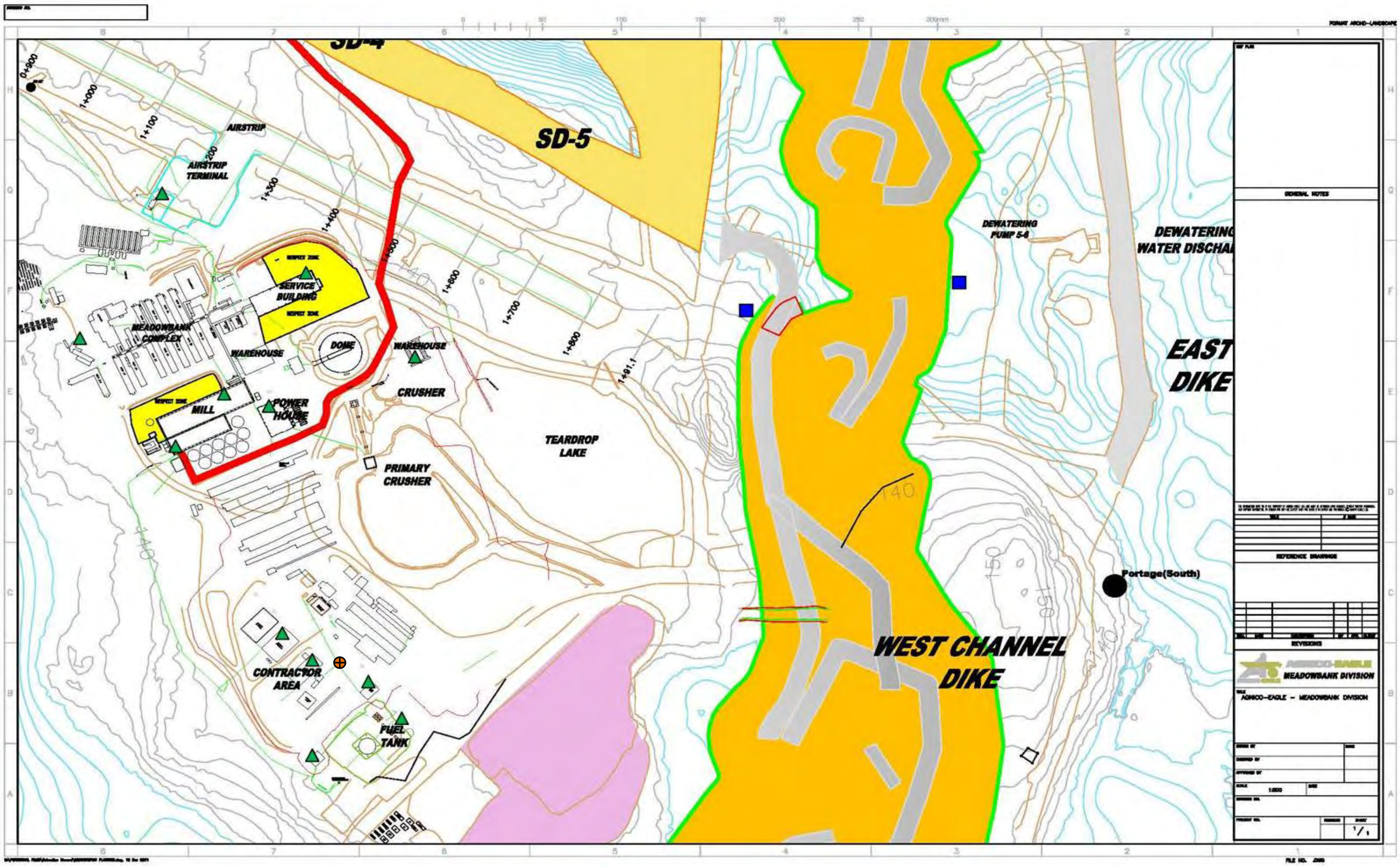
- Pump Elastec
- Pump accessories
- Vaccum ends
- 45 gallons top
- Tubing 2 inches diameter
- Tubing 3 or 4 inches diameter?
- Diesel Fuel jerry can (place on a miniberm)
- Spill kit accessory (red box)
- Drums opener
- Wescot (to open empty drum screw)
- Empty drums
- 2 drums berm
- 4 drums berm 4x8
- Tarp 20x30
- Tarp 30x50
- oil white spill pads
- Universal boom 5x10
- Universal boom 8x10
- ABS pipe : 10' (4")
- ABS pipe : 10' (6")
- Cell U-Sorb
- Sphagsorb
- 3 Size of Wedge wood
- Plug pattie
- Quattrex bags
- Hand shovel
- Ice braker chisel
- Sledge hammer
- Rod bar (4')

Along the AWPR there are 9 environmental emergency sea cans. These sea cans are strategically placed along the road at water crossings. Each environmental emergency sea can contains the following material:

- 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
- Fork lift crate (pallets)
- Long handle round point shovel
- Chisel point crow bar 16 lbs 57"
- Ice braker chisel
- Sledge hammer 12 lbs 36"
- Rod bar (4')

If required, external resources are available in the Hamlet of Baker Lake and those contacts are found in Table 6.



Spill Kits

Large Spill Kits for Mine OPs

Emergency Response Trailer

Figure 3 - Map of AWAPR Including Locations of Environmental Emergency Seacans

Environmental Emergency Seacans

SECTION 9 • TRAINING & EMERGENCY SPILL / EXERCISE

9.1 TRAINING

9.1.1 On-site Personnel

A designated ERT consisting of on-site personnel has been established. AEM will ensure that the ERT is trained and present at all times. All members of the team are trained and familiar with emergency and spill response resources, including their location and access, the SCP, and appropriate emergency spill response methodologies. The ERT has up to 40 members, each of whom train 8 hours per month.

The following training is included:

- A review of the spill response plan and responsibilities of the ERT members.
- The nature, status, and location of fuel and chemical storage facilities.
- The on-site and off-site spill response equipment and how to use it.
- Emergency contact lists.
- Desktop exercises of “worst case” scenarios.
- The likely causes and possible effects of spills.

Every employee at AEM receives spill and waste management training during their initial site orientation so they are able to respond to small spills and raise the alarm if a larger response is required. ERT members receive more extensive HAZMAT training and learn how to respond while wearing personal protective clothing.

The Environmental Department regularly attends tool-box sessions to provide information on spill response and reporting procedures.

SECTION 10 • LIST OF ACRONYMS

ANFO Ammonium Nitrate Fuel Oil
AWPR All Weather Private Road
CCME Canadian Council of Ministers of the Environment
DFO Fisheries and Oceans Canada
EMS Environmental Management System
ERP Emergency Response Plan
ERT Emergency Response Team
ERTC Emergency Response Team Coordinator
GN Government of Nunavut
HCN Hydrogen Cyanide
HMMP Hazardous Materials Management Plan
INAC Indian and Northern Affairs Canada
LEL Lower Explosion Limit
AEM Agnico-Eagle Mines Limited
MSDS Materials Safety Data Sheets
NIOSH National Institute for Occupational Safety and Health
OHSP Occupational Health & Safety Plan
PCB Polychlorinated Biphenyls
PPE Personal Protective Equipment
SCP Spill Contingency Plan
TDG Transportation of Dangerous Goods
WHMIS Workplace Hazardous Materials

Appendix A

NWT/NU Spill Report Form

Northwest Territories Nunavut Canadä

NT-NU SPILL REPORT

OIL, GASWNE, GHEI.!ICM.S AND OIHEIR HAZARDOUS MATERI.US

NT..JIII 24-KOUR SPiLJ1IlEPOHT UNE
IR.: [867)9211-8130
FAX: [867) 873-6!124
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PAGE 1 OF

Appendix B

General Response Procedures for Spilled Chemical Substances

Explosives

B.1 Ammonium Nitrate
B.2 Ammonium Nitrate Fuel Oil (ANFO)

B.1 Ammonium Nitrate

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank camp.

The first step against prevention of potential spills and association hazards is the application of proper storage procedures for bulk Ammonium Nitrate, including the following:

- Good housekeeping of the storage facility will prevent spilling and or contamination of materials.
- Ammonium nitrate should be stored away from combustible materials and fuels, as well as other blasting accessories (i.e. boosters, delays, detonating cords and detonators).
- The storage facility should be well ventilated.
- Proper signage restricting the use/exposure of ammonium nitrate to ignition sources should be posted (e.g. no hot work, smoking or vehicle maintenance).
- The storage facility should be locked at all times with only authorized personnel allowed access.

The following is a general spill response procedure for ammonium nitrate. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

<u>For an **ammonium nitrate spill (solid)**:</u>

1) Isolate and evacuate the spill area.

2) Contact the your Supervisor who will then contact the On-Scene Coordinator and coordinate appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on appropriate personal protective equipment. For an ammonium nitrate spill this includes:

a. Gloves **as recommended by the MSDS or glove manufacturer**

b. Protective eyeglasses or chemical safety goggles or face shield **as recommended by the MSDS**

c. Lab coat, coveralls or TyvekTM coveralls **as recommended by the MSDS**

d. Half mask air-purifying respirator with cartridges and/filters **as recommended by the MSDS or respirator manufacturer**

4) Ventilate (open windows/doors to outdoors) closed spaces before entering.

5) Remove all sources of heat and ignition (no smoking, flares, sparks or flames in immediate area) and remove uncontaminated combustible materials and organic compounds (wood, paper, oil, etc.,) from spill area.

6) For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using suitable absorbent materials, soil or other appropriate barrier.

7) Vacuum or sweep the spill residue using non-metal, non-sparking tools and place the residue in a labelled, plastic, container (plastic pail with lid or double heavy duty plastic bags) for re-use or off-site disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**. Note: Minimize dust generation during the operation.

8) Remove and bag personal protective equipment for cleaning and disposal at a licensed facility. Thoroughly wash potential skin contact locations after handling.

B.2 Ammonium Nitrate Fuel Oil (ANFO)

Currently no ANFO is stored at the site. ANFO is fabricated as required, with ammonium nitrate and fuel oil. In the event that ANFO would be stored at the camp, AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project. Proper handling and disposal of ANFO is an important first step in mitigating against spills and associated hazards.

The proper storage procedures are as follows:

- ANFO should only be used under the supervision of authorized trained personnel.
- ANFO should be kept away from heat, sparks, and flames, as well as initiating explosives, oxidizing agents, combustibles, and other sources of heat.
- Containers should be protected from physical damage and in dry, well ventilated conditions.
- Transportation to the Mine site will be in accordance with Section 14 of the *Mines Act* and Regulations and the *Transportation of Dangerous Goods Act*. Transport vehicles will be in sound mechanical condition and equipped with proper safety equipment. Loaded vehicles will not be left unattended and only authorized personnel will be responsible for the security of the explosives under their control.
- Explosives that have been identified as deteriorated or damaged will need to be disposed of or destroyed. The appropriate method of disposal or destruction and subsequent course of action will be determined by authorized personnel or the explosive supplier.

The following is a general spill response procedure for ammonium nitrate fuel oil – ANFO. The following procedure does not apply to emulsions or other explosives. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For an **ANFO spill (solid)**:

1) Isolate and evacuate the spill area.

2) Immediately extinguish any open flames and remove ignition sources (no smoking, flares,sparks in immediate area) IF SAFE TO DO SO. **Fires involving large quantities of ANFO should not be fought.**

3) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) Put on appropriate personal protective equipment. For an ANFO spill this includes:

a. Gloves **as recommended by the MSDS or glove manufacturer.**

b. Protective eyeglasses or chemical safety goggles or face shield **as recommended by the MSDS.**

c. Lab coat, coveralls or TyvekTM coveralls **as recommended by the MSDS.**

d. Shoe covers or rubber boots.

e. Half mask air-purifying respirator with cartridges and/filters **as recommended by the MSDS or respirator manufacturer.**

5) If the spill has occurred outdoors, stay upwind and avoid low lying areas. Ventilate

(open windows/doors to outdoors) closed spaces before entering. Ensure adequate explosion proof ventilation for clean-up.

6) Remove all sources of heat and ignition (no smoking, flares, sparks or flames in immediate area) and remove uncontaminated combustible materials and organic compounds (wood, paper, oil, etc.,) from spill area.

7) Do not operate radio transmitters within 100 m of electric detonators.

8) For spill on land, protect the spill area from storm water runoff by constructing a ditch or dike using suitable absorbent materials, soil or other appropriate barrier. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

9) Collect, sweep or shovel spilled material and the other contaminated material/soil using non-metallic, spark-proof tools and place residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines.**

Note: The drums/containers/residues are to be stored in ventilated areas away from incompatible materials for eventual off-site disposal at a licensed disposal facility.

10) Remove and bag personal protective equipment for cleaning or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated leather articles including shoes that cannot be decontaminated.

Appendix C

General Response Procedures for Spilled Chemical Substances

C.1 Compressed Gases

C.1 Compressed Gases

AEM commits to review, modify and approve as required to establish this procedure as appropriate for Meadowbank Gold Project.

The following is a general spill response procedure for compressed gases. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **compressed (inert and flammable) gas leak:**

1) IF SAFE TO DO SO and it will stop the gas leak, turn off cylinder valve.

2) If the leak cannot be stopped by closing the cylinder valve, and it is **an inert atmospheric gas** (e.g. nitrogen, carbon dioxide, etc) isolate and evacuate the affected area. If the leak is a **flammable gas** and the leak is outside of a ventilated building enclosure that will contain the gas, immediately activate the fire alarm system and evacuate the area/building.

3) Contact the On-Scene Coordinator who will assemble spill response team members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) If possible and safety permits, adjust leaking cylinder so that gas escapes rather than liquid.

5) If possible and safety permits, eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area) and turn off electrical equipment.

6) If the spilled has occurred outdoors, stay upwind and avoid low lying areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room’s air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down. Allow vapours to ventilate outdoors by opening windows and doors to the exterior.

7) Isolate area until gas has dispersed. On-Scene Coordinator to verify safe conditions.

Appendix D

General Response Procedures for Spilled Chemical Substances

D.1 Flammable and Combustible Liquids

D.1 Flammable and Combustible Liquids

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project. The following is a general spill response procedure for flammable or combustible liquids, particularly petroleum hydrocarbon products. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **spill of flammable or combustible petroleum hydrocarbon product (liquid):**

1) Isolate and evacuate the spill area.

2) Immediately extinguish any open flames and remove ignition sources (no smoking, flares, sparks in immediate area) IF SAFE TO DO SO.

3) Stop leak and contain spill (**see Step 9**) IF SAFE TO DO SO.

4) Contact the On-Scene Coordinator who will assemble ERT members if required and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

5) Put on appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:

- a. Gloves **as recommended by the MSDS or glove manufacturer.**
- b. Splash goggles or face shield.
- c. Shoe covers or rubber boots.
- d. Lab coat or TyvekTM coveralls.
- e. Half mask air-purifying respirator with **organic vapour or combination** cartridges, or **as otherwise recommended by the MSDS or respirator manufacturer**.

6) If the spilled has occurred outdoors, stay upwind and avoid low lying areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down.

7) Ventilate (open windows/doors to outdoors) closed spaces before entering. Ensure adequate explosion-proof ventilation for clean-up. A vapour suppressing foam or water spray may be used to reduce vapours.

8) Remove all sources of ignition (no smoking, flares, sparks or flames in immediate area) and combustible materials (wood, paper, oil, etc.) within the spilled area.

9) Contain spill by using spill absorbent, spill pads or pillows, soil or snow to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate. If possible, compact soil or snow dikes, and place plastic tarps over the dike and at its foot to allow the product to pool on the plastic for easy recovery.

> Note: Do not use paper towels to absorb spill as this increases the rate of evaporation and vapour concentration in the air.
>
> Note: Do not flush with water into drainage areas or ditches as this will spread spill.
>
> Note: Snow works well as a natural absorbent to collect and contain spilled petroleum hydrocarbons. However, its use in containing a spill will result in a water-contaminant mixture that may be more difficult to manage. It is important to scrape up the contaminated snow and ice as soon as possible.

10) Carefully cover the spill area with spill absorbent, spill pads, soil or snow, starting at the outside and working inward. Do not touch or walk through spilled material.

11) Sweep up or shovel the residue using non-metallic, spark-proof tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). For larger spills to land, excavate impacted absorbent material and soil, place in lined and bermed temporary storage area or directly into sealed drums/containers.

> Note: The drums/containers/residues are to be stored in ventilated areas away from incompatible materials for eventual treatment at on-site landfarm (if present) or off-site disposal at a licensed disposal facility. Electrically ground all containers and transporting equipment.
>
> Note: Larger pools of product may be pumped into empty storage tanks or drums.

12) If spill is indoors, mop the affected area using detergent and water. Dispose of this water to drums for eventual off-site disposal at a licensed disposal facility. Spills to land may require further excavation or remediation of contaminated soil until acceptable soil quality is achieved. The On-Scene Coordinator and/or Environmental Superintendent will assess this requirement.

13) For spills to water, immediately limit the area of the spill on water using absorbent pads and booms and similar materials to capture small spills on water. Deploy and slowly draw in absorbent booms to encircle and absorb the spilled product. Recover larger spills on water with floating skimmers and pumps, as required, and discharge recovered product to drums or tanks.

> Note: Petroleum hydrocarbons are generally hydrophobic, and as such, do not readily dissolve in water. They typically tend to float on the water's surface. Absorbent booms are often relied on to recover hydrocarbons that escape land containment and enter water.

Note: Antifreeze sinks and mixes with water. If released to water, attempt to isolate/confine the spill by damming or diverting the spill. Pump contaminated water to tanks or drums.

14) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated leather articles, (including shoes) that cannot be decontaminated.

Appendix E

General Response Procedures for Spilled Chemical Substances

Oxidizing Substances

E.1 Liquids
E.2 Solids

E.1 Liquids

AEM commits to review, modify and approve as required and to establish this procedure as appropriate for use at the Meadowbank Gold Project. The following is a general spill response procedure for liquid oxidizer compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **liquid oxidizer spill**:

1) Isolate and evacuate the spill area.

2) Stop leak and contain spill (**see Step 8**) IF SAFE TO DO SO.

3) Contact the On-Scene Coordinator who will assemble ERT members if required and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:

a. Gloves **as recommended by the MSDS or glove manufacturer.**

b. Splash goggles or face shield.

c. Shoe covers or rubber boots.

d. Lab coat, coveralls or TyvekTM coveralls **as recommended by the MSDS.**

e. Half mask air-purifying respirator with cartridges and/or filters **as recommended by the MSDS or respirator manufacturer**.

5) Ventilate closed spaces before entering. Ensure adequate explosion-proof ventilation for clean-up.

6) Remove and/or moisten with water any combustible material (wood, paper, oil, etc.) affected by the spill.

7) Use water spray to reduce vapours or divert vapour cloud drift, if required.

8) Contain spill by using non-combustible spill absorbent, soil or snow to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate.

<u>Note</u>: Flushing area with flooding quantities of water may also be appropriate assuming this does not make clean up and waste management more difficult– **refer to the MSDS**.

9) Carefully cover the spill area with spill absorbent, soil or snow, starting at the outside and working inward. Use non-combustible absorbent. Do not touch or walk though spilled material.

10) Sweep up or shovel the spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility.

11) For indoor spills, mop the affected area using detergent and water. Flushing area with flooding quantities of water may also be appropriate – **refer to the MSDS**. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate. Spills to land may require further excavation or remediation of contaminated soil until acceptable soil quality is achieved. The On-Scene Coordinator and/or Environmental Superintendent will assess this requirement.

12) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

E.2 Solids

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project.

The following is a general spill response procedure for solid oxidizer compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **solid oxidizer spill:**

1) Isolate and evacuate the spill area.

2) Contact the On-Scene Coordinator who will assemble ERT members if required and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:

a. Gloves **as recommended by the MSDS or glove manufacturer.**

b. Safety glasses or goggles.

c. Lab coat.

d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter or **as recommended by the MSDS or respirator manufacturer**.

4) Remove all sources of heat and ignition (no smoking, flares, sparks or flames in immediate area) and remove uncontaminated combustible materials and organic compounds (wood, paper, oil, etc.,) from spill area.

5) For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using suitable non-combustible absorbent materials, soil or other appropriate barrier. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

6) Vacuum, sweep or shovel the spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, container (plastic pail with lid or double heavy duty plastic bags) for re-use or off-site disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.

Note: Minimize dust generation.

7) If there is still oxidizer residue left in the spill area, neutralize with appropriate agent **as recommended by the MSDS**, or for spills to land continue to excavate until no visible spilled solid remains. Use non-combustible spill absorbent or soil to absorb the neutralized residue. Place in suitable drums/containers for disposal to a licensed facility.

8) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

9) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

Appendix F

General Response Procedures for Spilled Chemical Substances

Poisonous and Toxic Substances

F.1 Sodium Cyanide

F.1 Sodium Cyanide

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project.

The following is a general spill response procedure for solid Sodium Cyanide.
AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **Sodium Cyanide (solid) spill:**

1) Isolate and evacuate the spill area.

2) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
e. Gloves **as recommended by the MSDS or glove manufacturer.**
f. Safety glasses or goggles.
g. Lab coat.
h. Half mask air-purifying respirator **as recommended by the MSDS or respirator manufacturer**.

Note: For worker safety, maintain readily accessible supply of cyanide antidote kits on site.

4) Ventilate area of spill or leak.

5) Avoid exposure to acids, water or weak alkalies which can react to form toxic hydrogen cyanide (HCN) gas.

6) Contain spill to prevent release to sewer, waterway or onto ice. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using absorbent materials, soil or other appropriate barrier. If raining, cover spill area with tarp or plastic to minimize contact with water and prevent subsequent runoff. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

7) Shovel the spilled material into labelled drums, containers or plastic bags for re-use or off-site disposal at a licensed disposal facility.

> Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.
>
> Note: Minimize dust generation.

8) If there is still spilled sodium cyanide residue left in the spill area, neutralize with appropriate agent **as recommended by the MSDS** (sodium or calcium hypochlorite solution), or for spills to land continue to excavate until no visible spilled solid remains. Use suitable spill absorbent or soil to absorb the neutralized residue. Place in suitable drums/containers for disposal to a licensed facility. Collect material and place in a closed container for recovery or disposal.

9) For indoor spills, mop the affected area using detergent and water. Dispose of this water to waste drums/containers for disposal to a licensed facility.

10) Remove and bag personal protective equipment for disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

Appendix G

<u>General Response Procedures for Spilled Chemical Substances</u>

Corrosive Substances

G.1 Acids, Liquids
G.2 Acids, Solids
G.3 Bases/Alkali, Liquids
G.4 Bases/Alkali, Solids

G.1 Acids, Liquids

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project.

The following is a general spill response procedure for liquid acid compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **liquid acid spill**:

1) Isolate & evacuate the spill area.

2) Stop leak and contain spill (**see Step 8 below**) IF SAFE TO DO SO.

3) Contact the On-Scene Coordinator who will assemble ERT members if required and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) Put on appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:

a. Gloves **as recommended by the MSDS or glove manufacturer.**

b. Splash goggles or face shield.

c. Shoe covers or rubber boots.

d. Lab coat or TyvekTM coveralls.

e. Half mask air-purifying respirator with **acid gas or combination** cartridges, or **as otherwise recommended by the MSDS or respirator manufacturer**.

5) If the spill has occurred outdoors, stay upwind and stay out of low areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down.

6) Ventilate (open windows/doors to outdoors) closed spaces before entering.

7) Remove all sources of ignition (no smoking, flares, sparks or flames in immediate area).

8) Contain spill by using spill absorbent, spill pads or pillows, or dry soil to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate. Ideally, use spill absorbent that contains a mild neutralizing agent **as recommended by the MSDS**.

Note: Many acids, particularly concentrated acids react violently in the presence of water. Do not flush spill area with water unless the **MSDS** indicates acceptable.

Note: Nitric Acid reacts violently and explosively with organic chemicals and organic material such as wood, cotton and paper; therefore, do not use organic absorbent material on Nitric acid.

Note: Hydrofluoric acid will fume during neutralization. Provide adequate ventilation and approach from upwind. Neutralize carefully with sodium bicarbonate, soda ash or lime. Use water spray to disperse the gas/vapour if required. Remove all sources of ignition.

9) Carefully cover the spill area with spill absorbent, spill pads or dry soil, starting at the outside and working inward. If practical, neutralize spill using **MSDS-recommended** or commercially available neutralizers. Use pH indicator paper to determine if spill is neutralized (pH 7).

Note: Use caution as neutralization reactions generate heat.

10) Sweep or shovel the neutralized spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility.

11) Check the pH of the spill area. If it is less than pH 6, then further neutralize with a dilute solution of a suitable reagent **as identified on the MSDS** or for spill to land continue to excavate contaminated soil.

12) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

13) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

14) After the spill has been cleaned up, the area should be free of vapours. However, if personnel note odours or irritation, isolate the spill area, re-clean the area as per **Steps 11 and 12** or wait at least **1 hour** before re-entering or until considered safe by the On-Scene Coordinator or Environmental Superintendent.

G.2 Acids, Solids

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use on the Meadowbank Gold Project.

The following is a general spill response procedure for solid acid compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **solid acid spill**;

1) Isolate and evacuate the spill area.

2) Contact the On-Scene Coordinator who will assemble ERT members if required and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:

a. Gloves **as recommended by the MSDS or glove manufacturer.**

b. Safety glasses or goggles.

c. Lab coat.

d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter, or **as otherwise recommended by the MSDS or respirator manufacturer**.

4) Contain spill to prevent release to sewer, waterway or onto ice. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using absorbent materials, dry soil or other appropriate barrier. If raining, cover spill area with tarp or plastic to minimize contact with water and prevent reaction and/or subsequent runoff. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

5) If necessary to minimize dust production, slightly moisten the solid. Use water, or if the material is water reactive, another inert liquid **as recommended by the MSDS**.

6) Sweep up or shovel the residue using non-metallic, spark-proof tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for reuse or off-site disposal at a licensed disposal facility

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.

7) Remaining solid acid residue may be neutralized using a dilute solution of appropriate agent **as recommended by the MSDS** (e.g. sodium bicarbonate - baking soda), or for spills to land continue to excavate until no visible spilled solid remains. Check the pH of the spill area; the final pH should be between pH 6 and 10. Use spill absorbent, spill pads or dry soil to absorb the neutralized residue.

Note: Use caution as neutralization reactions generate heat.

8) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

9) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

G.3 Bases/Alkali, Liquids

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank exploration camp.

The following is a general spill response procedure for liquid alkali or base compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **liquid alkali or base spill**:

1) Isolate & evacuate the spill area.

2) Stop leak and contain spill (**see Step 8**) IF SAFE TO DO SO.

3) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:

> a. Gloves **as recommended by the MSDS or glove manufacturer.**
>
> b. Splash goggles or face shield.
>
> c. Shoe covers or rubber boots.
>
> d. Lab coat or TyvekTM coveralls.
>
> e. Half mask air-purifying respirator with cartridges/filters **as recommended by the MSDS or respirator manufacturer**.

5) If the spill has occurred outdoors, stay upwind and stay out of low areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down.

6) Ventilate (open/windows to outdoors) closed spaces before entering.

7) Remove all sources of ignition (no smoking, flares, sparks or flames in immediate area) and combustible materials (wood, paper, oil, etc.).

8) Contain spill by using spill absorbent, spill pads or pillows, or dry soil to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits

to capture spill flow may also be appropriate. Ideally, use spill absorbent that contains a mild neutralizing agent **as recommended by MSDS**.

Note: Use caution as neutralization reactions generate heat.

9) Carefully cover the spill area with spill absorbent, spill pads or dry soil, starting at the outside and working inward. If practical, neutralize spill using MSDS-recommended or commercially available neutralizers. Use pH indicator paper to determine if spill is neutralized (pH 7).

Note: Use caution as neutralization reactions generate heat.

10) Sweep or shovel the neutralized spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility.

11) Check the pH of the spill area. If it is greater than pH 10, then further neutralize with a dilute solution of a suitable reagent **as identified on the MSDS**, or for spill to land continue to excavate contaminated soil.

12) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

13) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

14) After the spill has been cleaned up, the area should be free of vapours. However, if personnel note odours or irritation, isolate the spill area, re-clean as per **Steps 11 and 12** or wait at least **1 hour** before re-entering or until it is considered to be safe by the On-Scene Coordinator or Environmental Superintendent.

G.4 Bases/Alkali, Solids

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project.

The following is a general spill response procedure for solid alkali or base compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **solid alkali or base spill**;

1) Isolate and evacuate the spill area.

2) Contact the On-Scene Coordinator who will assemble ERT members if required and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:

> a. Gloves **as recommended by the MSDS or glove manufacturer.**
>
> b. Safety glasses or goggles.
>
> c. Lab coat.
>
> d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter or **as recommended by the MSDS or respirator manufacturer**.

4) Contain spill to prevent release to sewer, waterway or onto ice. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using absorbent materials, dry soil or other appropriate barrier. If raining, cover spill area with tarp or plastic to minimize contact with water and prevent reaction and/or subsequent runoff. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

5) If necessary to minimize dust production, slightly moisten the solid. Use water, or if the material is water reactive, another inert liquid **as recommended by the MSDS**.

> Note: Do not use water to flush bases in powdered form, such as calcium oxide (lime), as this material is not very soluble.

6) Sweep or shovel the residue using non-metallic, spark-proof tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for offsite disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.

7) Remaining solid alkali or base residue may be neutralized using a dilute solution of appropriate acid. Check the pH of the spill area; the final pH should be between pH 6 and 10. Use spill absorbent, spill pads or dry soil to absorb the neutralized residue.

8) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

9) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

Appendix K

Woodward Group of Company Spill Contingency Plans

SCHEDULE E

PRODUCT DISCHARGE AND DISTRIBUTION PROCEDURES

Advance Preparation

At least two months prior to delivery confirm with the customer the following:

✓ Determine the time that the ship is expected to arrive.

✓ Arrange for berthing availability.

✓ Verify space available in storage tanks.

✓ Ensure preventative maintenance checks are conducted and any deficiencies or problems identified are corrected.

✓ Ensure any major maintenance work, that may in some way inhibit normal operations during transfer of product, is completed.

Before Discharge from Tanker Vessel

Prior to receiving product from tanker, a Woodward's Oil representative will ensure the following is conducted:

✓ A safety meeting is held to review and discuss local safety regulations and operating procedures, facilities contingency plan, ship emergency procedures, location of fire alarms, closing down of operations, closing of valves and disconnection of hoses or metal arms.

✓ The deployment and checking of all safety equipment, such as portable fire extinguishers, portable fire pumps, hoses, absorbent booms and absorbent pads to ensure that they are ready for use.

✓ Portable communications equipment is agreed upon by vessel, berth and tank field personnel, and equipment is tested.

✓ Storage tanks are properly prepared prior to measuring so that if water is found to be present, the water is removed, if possible, transfer to other tanks have been made, and if tank can be isolated during discharge, close all suction valves on tanks to be gauged.

- ✓ Check on pipeline is made to determine if pipeline is full or not. If pipeline is empty or partially full then vent and fill line with appropriate product prior to measuring the tanks, open all lever check valves, and patrol the line to detect leakage, physical damage, and in line failure. When the line has been filled, place the open level check valves in the normal position for receiving cargo and close the marine line valve of the storage tanks.

- ✓ All shore tanks are gauged and a record is kept of the number of liters on-hand. For non-isolated tanks suspend all transfer activity prior to gauging. Ensure that suction valves on tanks to be gauged are in the closed position.

- ✓ Readings are recorded from dispenser units.

- ✓ Quality Control procedures for all shore tanks are conducted.

- ✓ Calculations of quantities of products to be received must be re-checked and verified. A cut-off point for each tank to receive products must be determined and agreed upon by both shore and ship personnel.

- ✓ A review and an evaluation of the results of the Quality Control checks is completed, and if all tests are verified as passing then discharge may commence.

During Cargo Discharge

Ship and shore personnel are jointly responsible for controlling cargo discharge and both must adhere to the following:

- ✓ Since discharging cargo from ship to shore tanks is a remote control operation it requires good communication to coordinate the work of ship and shore personnel. The methods of communication used during pumping operations shall be portable radios, when a fixed system is not available or a flag and whistle system, when telephone/portable radios are not available. Communications must be maintained at all times throughout discharging operations to ensure immediate response to emergency situations to reduce pumping rates as cut-off points are neared.

- ✓ Before starting to pump all connections must be checked to ensure that they are properly made. Shore, line and ship manifold valves must have settings checked to ensure that they are in correct position.

Bonded drip pans must be placed under ship and shore connections to catch minor leaks.

✓ Review method of communication and pumping schedule to ensure that both are clearly understood by ship and shore personnel.

✓ Periodic checks must be made on all connections throughout pumping operations to ensure that no leaks have occurred.

✓ Shore personnel must ensure sufficient notice is supplied to ship personnel to alert them about switching shore tanks, discontinuing or altering cargo discharge or topping shore tanks.

✓ The most vulnerable part of the system is the ship to shore connection. Throughout the pumping operations, ensure that no abrupt changes occur in the flow rate. The main cause of surge pressure in pipelines is the valve closing quickly against the flow of product, either partially or completely. When shore tanks are switched, open the valve to the tank receiving the product at the proper time before closing the valve on the tank which had been receiving product.

✓ Discontinue discharging if: an electrical storm occurs; fire breaks out; leakage exists and cannot be stopped; the product spills, because of system failure or tank overfill; conditions develop that jeopardize the mooring hold of the ship; all product required has been transferred.

✓ Once pumping has stopped the discharge hose will be pigged to push through any product left in the hose and then the sea hose will be disconnected from the shore manifold and retrieved.

Completing Cargo Discharge

After the cargo has been discharged ship and shore personnel should:

✓ Close and lock all valves in the system from berth to tankage.

✓ Measure and record all compartments of the ship containing product for ullage, water, and average temperature. Calculate amount of product transferred from ship to shore tanks.

✓ Gauge all shore tanks into which the ship has discharged product, thus determining the amount of product received. Be sure to allow a minimum settling time of thirty minutes prior to gauging.

DH

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✓ Take readings of all dispenser meters if product was dispensed during the discharge operation.

✓ Determine from measurements taken actual quantity of product received.

✓ Perform Quality Control checks on all shore tanks.

✓ Prepare report on the re-supply operation and submit to AEM.

SHIPBOARD OIL POLLUTION EMERGENCY PLAN

for

MT DORSCH

6720Gross Tons Register of St. John's, NL

PREPARED BY: ***Poseidon Marine Consultants Ltd.***
391 Stavanger Drive
St. John's NL A1A 5G1
Telephone: (709) 739-4321
Fax: (709) 739-4421

PREPARED FOR: ***Coastal Shipping Ltd.***
The Fortis Bldg.
139 Water St.
St. John's, NL
A1C 1B2

Issued: June 2005
Job Number: 05-037

Change Number

Examined under the provisions of Annex 1 of MARPOL 73/78 and the Canadian Oil Pollution Prevention Regulations (SOR/93-3) and found satisfactory.

Cliff Harvey July 8/06

Clifford Harvey/PPO Date

TRANSPORT CANADA TRANSPORTS CANADA MARINE SAFETY SÉCURITÉ MARITIME CANADA St. John's, NL

Change Number

Official Stamp Examined by Date

Change Number

Official Stamp Examined by Date

RECORD OF CHANGES

Amendment Number	Section and Page Affected	Date Entered	Remarks	Name and Position of Person Making Entry

RECORD OF OIL POLLUTION EMERGENCY DRILLS

DATE	TYPE OF OIL POLLUTION DRILL	LOCATION	REMARKS MASTER'S SIGNATURE

TABLE OF CONTENTS

SHIP'S PARTICULARS

PRINCIPAL PARTICULARS

Vessel Name:	Dorsch
Flag / Port of Registry:	Canada / St John's, NL
GL Number:	16648
IMO Number:	8007195
Gross Registered Tonnage:	6720 (ITC69)
Net Registered Tonnage:	3548 (ITC69)
Length, Overall:	130 72 m
Length, B.P.:	122 0 m
Breadth, Max. at Deck:	18.5 m
Depth to Main Deck:	10.6 m
Design Draft (Summer):	7.2 m
Built:	Berner Schiffswerft GmbH & Co. KG
Year of Build:	1980
Complement:	18
Propulsion Power:	Krupp Mak 8 MU 552 AK 4410kW @ 480RPM

CAPACITIES

Fresh Water	Approx. 118m^3
Fuel Oil (MDO)	Approx. 171m^3
Fuel Oil (HFO)	Approx. 452m^3
Ballast Water	Approx 2459m^3
Cargo Hold (Incl. Slop Tanks)	Approx. 12153m^3

TRANSPORTS CANADA SÉCURITÉ MARITIME TRANSPORT CANADA MARINE SAFETY CANADA St. John's, NL

INTRODUCTION

1 This Plan is written in accordance with the Canadian Oil Pollution Prevention Regulations and also in accordance with the requirements of regulation 26 of annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 thereto.

2. The purpose of the Plan is to provide guidance to on board operating personnel the vessel with respect to the steps to be taken when a pollution incident has or is likely to occur

3. The Plan contains all information and operational instructions required by the guidelines. The appendices contain names, telephone, telex numbers, etc. of all contacts referenced in the Plan, as well as other reference material

4. This Plan has been examined by the Canadian Board of Steamship Inspection, (herein after referred to as "the Board") and, except as provided below, no alteration or revision shall be made to any part of it without prior approval of the Board.

5. Changes to Sections 6, 7, 8, and the appendices will not be required to be approved by the Board. The appendices should be maintained up to date by the Owners, Operators, and Managers.

6. For the purposes of this Plan, the Master is taken to be that person who is a member of the vessel's operational personnel and to which is given senior responsibility for the vessel and any circumstances pertaining thereto.

7. Before entering a port of call, the Master should be aware of local emergency response procedures and organizations and have up to date contact information readily available.

SECTION 1 • Preamble

1.1 PURPOSE AND INTENT OF THIS PLAN

This Shipboard Oil Pollution Emergency Plan is intended to assist the vessel's officers, crew and management personnel in dealing with an unexpected discharge of oil Its primary purpose is to set in motion the necessary actions to stop or minimize the discharge and to mitigate its effects.

1.2 SUPPORT BY VESSEL'S MANAGEMENT

In accordance with the plans and policies of the vessel's management organization, management personnel will support the vessel's crew with additional resources, i e. personnel and materials, as the situation warrants.

1.3 PERSONNEL TRAINING AND EXERCISES

1 ***It is the responsibility of the Vessel's Management to ensure that, through training and exercises, all officers and crew are capable of confidently and safely carrying out their assigned duties.***

Officers responsible for maintaining the trim of the vessel and ordering transfers of ballast and/or cargo should be fully aware of the consequences of their actions and are expected to comply with the regulations and any documentation aboard the vessel which prescribes conditions of trim and stability , e.g. “Approved Stability Booklet”

Officers and crew responsible for cargo and or bunkering operations should also be fully aware of the consequences of their actions and are expected to comply with the regulations and any documentation aboard the vessel which prescribes methods of operation

Officers and crew assigned additional responsibilities for fire fighting or emergency response should have appropriate training as per the regulations and should participate in specific drills and exercises to maintain their abilities and be fully familiar with appropriate vessel systems.

2 ***The vessel's management and operating personnel should become familiar with this document and its format so that should an emergency occur, the response of the officers and crew and the vessel's management personnel will be carried out in a structured, logical and timely manner.***

In order to ensure that the crew and management are completely familiar with this document and its prescribed procedures, training should be offered and oil pollution emergency drills should be carried out regularly.

A blank "Record of Oil Pollution Emergency Drills" form is provided at the beginning of this Plan to document the dates and results of such training exercises. This documentation is to be in addition to normal record keeping and log book entries.

3. ***All crew members should become familiar with the fundamentals of the ship's mechanical and electrical systems in order to be more confident and capable during an emergency.***

It is the responsibility of the vessel's senior officers to ensure that engineering fundamentals are taught to the crew and that the crew remain familiar with them through regular drills. Drawings detailing the various mechanical and electrical systems are carried aboard the vessel. Any drawing (e.g. "Natural Vents", "Engine Room Ventilation", "One Line Electrical Diagram", "Fuel Oil Transfer Diagram") can be obtained for study from the Engineering Document Library located in the Chief Engineer's Office. These drawings are thoroughly catalogued and easily referenced

In order to ensure a fundamental familiarity with the various engineering systems, oil pollution emergency drills should include such exercises as:

isolating and sealing off accommodations and/or machinery spaces using louvers and fan shutoffs to prevent ingress of dangerous fumes; and

isolating, at the distribution panels, various electrical circuits, e.g. lighting, panel feeds, in order to reduce or eliminate sources of ignition in areas of risk.

1.4 PLAN FORMAT

This plan is divided into five sections as follows:

Section 1 provides an introduction for this document and highlights some important considerations regarding the spillage of oil at sea.

Section 2 outlines the procedure and requirements for making a report to authorities in the event of a discharge or probable discharge of oil.

Section 3 provides a checklist of steps to be taken in the event of various operational or casualty related spills.

Section 4 outlines procedures for national and local coordination of response efforts.

Section 5 outlines procedures for ship to ship transfer operations

Section 6 outlines safety precautions for bunkering operations

Section 7 deals with non-mandatory provisions such as oil spill response materials onboard, media information, and plan review

Section 8 outlines the responsabilities of the Oil Pollution Prevention Team

Following the main body of this plan are appendices which provide contact information and/or useful forms. Appendix 1 is an example of an unofficial facsimile report, the use of which is outlined in Section 2. Appendix 2 provides contact information for coastal authorities and ship interests. Appendix 3 is a blank calculation form for vessel stress and stability which can be filled out by an officer of the vessel and sent to the vessel owners for calculation. The use of this calculation form is described in Section 3 Appendix 4 contains flowcharts and checklists for use in the event of an emergency. Appendix 5 contains relevant ship's drawings.

1.5 OIL DISCHARGE MONITORING SYSTEM

In accordance with MARPOL 73/78 Annex 1 Regulation 16 this ship is fitted with a Jowa Oil-A Triosep and Duosep bilge water separator and Jawa M-87 and M-93 ballast water monitors, both manufactured by Jowa AB, Sweden. The oil content meters associated with these units are fitted with 15ppm oil content alarms.

IMPORTANT:

1. ANY OIL SPILLAGE SHOULD BE TREATED AS AN EMERGENCY.
2. IN RESPONDING TO AN OIL SPILLAGE, THE MASTER'S PRIORITY WILL BE TO ENSURE THE SAFETY OF THE CREW AND OF THE VESSEL, AND TO TAKE ACTION TO PREVENT ESCALATION OF THE INCIDENT. IMMEDIATE CONSIDERATION SHOULD BE GIVEN TO MEASURES AIMED AT PREVENTING FIRE AND EXPLOSION

SECTION 2 • Reporting Requirements

Coast guard of nearest coastal State (see Appendix 2) is to be notified whenever there is:

a) **An actual discharge of oil**
b) **Reason to suspect a probable discharge of oil due to fire, grounding, list, loss of power, collision, flooding, explosion, structural failure, etc.**
c) **Any damage or failure which may affect the safety of the vessel, such as failure or breakdown of the electrical generating system, or essential shipborne navigational aids.**

2.1 DISCHARGE OF OIL

When reporting a discharge of oil, the Master is to provide all relevant information (as per section 2.4) to:

a) Coast Guard of nearest coastal State, or
b) Port Authorities, and also to
c) Vessel Interest Contacts.

A discharge of oil, for the purposes of this plan, refers to:

a) A discharge of oil, resulting from damage to the vessel or its equipment, or for the purpose of securing the safety of a vessel or saving life at sea; or
b) A discharge during the operation of the vessel of oil in excess of the quantity or instantaneous rate permitted under the present Convention.

2.2 PROBABLE DISCHARGE OF OIL

The Master must use good judgment to assess any circumstance which might be cause for probable discharge of oil. When making such judgment the following factors must be taken into account:

a) The nature of the damage, failure, or breakdown of the vessel, machinery, or equipment;
b) Vessel location and proximity to land or other navigational hazards;
c) Weather, tide, current, and sea state;
d) Traffic density; and
e) Morale, health and ability of crew onboard to deal with situation

2.3 DAMAGES AND/OR FAILURES

The Master must report any damage which may affect the safety of the vessel: collision, fire, grounding, explosion, cargo shifting, list, etc. The Master must also report any failure or breakdown of essential machinery which results in impairment of the safety of navigation: i.e electrical generating system or essential vessel-borne navigational aids

2.4 INITIAL REPORT

An initial report is to be made by radio communication without delay to one of the following Canadian radio ship reporting stations; Canadian Coast Guard Radio Station, Canadian Vessel Traffic Service Center, St. Lawrence Seaway Authority marine radio station, or Canadian harbour radio station. The report is to be made following the format given below. Where the report cannot be communicated by radio, it shall be communicated by telephone to the local Canadian radio ship reporting station or to the Canadian Coast Guard Operations Center in Ottawa. Contact information is provided in Appendix 2.

FOLLOW-UP REPORTS

Follow-up reports should be made at regular intervals to keep the coastal State and other concerned parties informed of developments including, but not limited to, change of course or position, change in quantity, rate or probability of oil discharge, injuries or casualties, or effects of actions taken to control discharge or assure safety of the vessel and crew. Follow-up reports should be made in the same format as the initial report.

WRITTEN REPORT

Within 24 hours of the incident, or as soon as possible thereafter, a written report on the incident, including a statement as to its probable cause, shall be forwarded by air mail without delay to the Chief, Marine Casualty Investigations, Department of Transport, Ottawa.

UNOFFICIAL FACSIMILE REPORT

An unofficial facsimile report is included in Appendix 1. This may be sent to any concerned parties but is not consistent with IMO Resolution A 648(16) for reporting of incidents involving dangerous goods, harmful substances and/or marine pollutants, and therefore cannot constitute an official report to the coastal State.

FORMAT AND INFORMATION REQUIRED FOR OFFICIAL REPORT

AA VESSEL NAME, CALL SIGN, FLAG

BB DATE AND TIME (GMT) OF INCIDENT: 111935 meaning 11th of month at 7:35 pm

CC SHIPS POSITION: 2230N 0600E meaning 22 deg. 30 min. N, 6 deg. E

or

DD SHIPS POSITION BY TRUE BEARING (3 DIGITS) AND DISTANCE FROM CLEARLY IDENTIFIED LANDMARK.

EE TRUE COURSE (3 DIGITS)

FF SPEED IN KNOTS AND TENTHS OF A KNOT (3 DIGITS)

LL ROUTE INFORMATION - INTENDED TRACK

MM RADIO STATIONS AND FREQUENCIES GUARDED

NN TIME OF NEXT REPORT (same as in BB)

OO DRAFT (4 DIGITS - meters and centimeters)

PP TYPES AND QUANTITIES OF CARGO AND BUNKERS ON BOARD

QQ BRIEF DETAILS OF DAMAGE, LIMITATIONS ETC. (must include condition of vessel and ability to transfer cargo, ballast, or fuel)

RR BRIEF DETAILS OF ACTUAL POLLUTION (oil type, estimate of quantity discharged, whether discharge continues, cause, estimate of slick movement)

SS WEATHER AND SEA CONDITIONS (wind force/direction, relevant tidal and/or current information)

TT NAME, ADDRESS, TELEX, FAX, TELEPHONE NUMBERS OF VESSEL OWNER OR REPRESENTATIVE

UU DETAILS OF LENGTH, BREADTH, TONNAGE, AND TYPE OF VESSEL

WW TOTAL NUMBER OF PERSONS ON BOARD

XX MISC. DETAILS (This includes brief details of incident, actions taken, injuries sustained and assistance required. If no outside assistance is required, then this should be clearly stated.)

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2.5 WHO TO CONTACT

Contact information for coastal State and other concerned parties (port contacts, vessel interest contacts) is located in Appendix 2

2.6 ARRANGED RESPONSE ORGANIZATION(S)

The vessel, in accordance with the regulations, has onboard a **declaration** that the vessel's management has, in accordance with 660 2(2) of the Canada Shipping Act, entered into an arrangement with a response organization to which a certificate of designation has been issued pursuant to subsection 660.4(1) in respect of the quantity of oil that is carried both as fuel and cargo on board the vessel

The person or persons identified in the **declaration** shall be responsible for contacting and mobilizing the response organization.

SECTION 3 • Steps to Control Discharge

In cases of small spills on deck, the vessel's crew should take whatever actions are necessary to prevent oil from escaping over the side. Once the spill is contained on deck, the crew will need to take action to clean up the oil. SPILLED OIL SHOULD NOT BE WASHED OVER THE SIDE. Once oil is in the water, the crew's ability to respond in a practical manner is greatly reduced.

3.1 OPERATIONAL SPILLS

In the event of an operational spill which occurs during bunkering or cargo operations, it is important that the bunkering party terminate any and all bunkering operations and close all manifold valves.

Before closing any manifold valves, the bunkering / cargo party must immediately inform the terminal / loading master so that they may take action to eliminate the possibility of over-pressurization of the shore side transfer components.

After dealing with the cause of the spill, it may be necessary to obtain permission from local authorities and/or the terminal before resuming bunkering or cargo operations

If the possibility of fire or explosion exists, nonessential air intakes to accommodations and machinery spaces should be closed and all sources of sources of ignition should be eliminated. See Section 1 3 3 of this Plan.

In accordance with Section 1.3.3 of this Plan, all members of the vessel's crew should be familiar with the fundamentals of the ship's vital systems including the ventilation and electrical systems. Crew members should be able to: isolate the accommodation and/or machinery spaces using the louvers and fan shutoffs; and, from the distribution panels, isolate electrical circuits in areas of risk. Please refer to Section 1 3 3 of this Plan for additional details.

Care must be taken to consider stability and stress when taking action to mitigate the spillage of oil. Internal transfers should be undertaken only with a full appreciation of the likely impact on the vessel's overall stress and stability. Please refer to the "Approved Stability Booklet" carried on board.

Operational Spill Checklist

Action Considered	Designated Person	Completed
Sound emergency alarm	Person Discovering Incident	Y / N
Initiate emergency response procedures	Chief Officer	Y / N
Cease all bunkering operations	Chief / 2nd Engineer	Y / N
Locate source of leakage	Chief / 2nd Engineer	Y / N
Operate manifold valves	Chief / 2nd Engineer	Y / N
Close all nonessential vent intakes and tank vents as required	Chief / 2nd Engineer	Y / N
Stop or reduce outflow	Chief / 2nd Engineer	Y / N
Assess fire risk	Chief Officer	Y / N
Commence clean up	Chief Officer	Y / N
Assess Stress / Stability	Master / Chief Officer	Y / N
Transfer fuel from damaged area to slack tanks or other containment space	Chief / 2nd Engineer	Y / N
Request outside assistance if required	Master	Y / N
Counter excessive list if required / possible	Chief Officer	Y / N

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1. PIPE LEAKAGE

In the event of an oil pipe leakage, the Chief Engineer must ensure that the following actions are taken:

1. Stop oil flow and close manifold and other valves.
2. Sound Emergency Alarm and initiate emergency response procedures as posted aboard the vessel.
3. Locate the source and drain affected section into an available empty or slack tank. Repair if possible.
4. If there is any possibility of released vapours entering an engine room or the accommodation intake, appropriate preventative steps must be taken quickly.
5. Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container.
6. If oil is overboard, report to proper authorities immediately (as per section 2 of this plan).
7. If oil is in bilges, pump through oil/water separator as per approved procedures.

2. TANK OVERFLOW

In the event of an oil tank overflow, the Chief Engineer must ensure that the following actions are taken:

1. Stop oil flow and close manifold and other valves.
2. Sound Emergency Alarm and initiate emergency response procedures as posted aboard the vessel.
3. Place drain buckets under overflow pipes to contain possible spills.
4. If there is any possibility of released vapours entering an engine room or the accommodation intake, appropriate preventative steps must be taken quickly.
5. Drain or transfer oil to slack or empty tanks if possible with due consideration paid to vessel stability. If no slack or empty tanks are available then oil may be pumped back ashore through delivery line, having first gained permission to do so.
6. Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container.
7. If oil is overboard, report to proper authorities immediately (as per section 2 of this plan).
8. If oil is in bilges, pump through oil/water separator as per approved procedures.

3. HULL LEAKAGE

If oil is noticed on the water near the vessel during normal operations and cannot be accounted for, the possibility of hull leakage should be suspected.

In the event of a hull leakage, the Master must ensure that the following actions are taken:

1 Sound Emergency Alarm and initiate emergency response procedures as posted aboard the vessel.
1. Stop any and all transfer or bunkering operations.
2. Identify damage and report to proper authorities immediately (as per section 2 of this plan); consider a diver if necessary and possible.
3. If possible, contain spill using materials on hand and dispose of oil-soaked materials in an appropriate container.
4. If there is any possibility of released vapours entering an engine room or the accommodation intake, appropriate preventative steps must be taken quickly.

5. Transfer fuel away from suspected leaks to empty or slack tanks if possible or to a ballast tank if necessary. If in port, arrangements can be made to pump oil ashore to tank or truck Due consideration is to be paid to vessel stress and stability
6. If it is not possible to identify the leaking tank, reduce level in all tanks in vicinity, giving due consideration to vessel stress and stability.

4. SPILLS CAUSED BY EQUIPMENT IN MACHINERY SPACES

1. If operational spills are caused by a failure of equipment in machinery spaces, any further operations of this equipment should be stopped immediately and measures are to be taken to avoid a spill.
2. Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container.
3. Do not restart equipment until problem has been rectified.

3.2 SPILLS RESULTING FROM CASUALTIES

ALL CASUALTIES ARE TO BE REPORTED BY THE MASTER AS PER SECTION 2.

The Master's priority, when responding to a casualty, will be to ensure the safety of personnel and the vessel and to take action to prevent escalation of the incident

In casualties involving spills, immediate consideration should be given to measures aimed at preventing fire and explosion, such as altering course so that the vessel is upwind of the slick, shutting down nonessential air intakes, etc.
If the vessel is aground, and therefore cannot maneuver, all possible sources of ignition should be eliminated and action taken to prevent flammable vapors entering accommodation and engine room spaces Please refer to Section 1.3.3

In accordance with Section 1.3.3 of this Plan, all members of the vessel's crew should be familiar with the fundamentals of the ship's vital systems including the ventilation and electrical systems. Crew members should be able to isolate the accommodation and/or machinery spaces using the louvers and fan shutoffs; and, from the distribution panels, isolate electrical circuits in areas of risk. Please refer to Section 1.3.3 of this Plan for additional details.

Prior to considering remedial action, the Master will need to obtain detailed information on the damage sustained by the vessel. A visual inspection should be carried out and all bunker tanks and other compartments sounded. However, due regard should be paid to the indiscriminate opening of ullage plugs or sighting ports, especially when the vessel is aground, as loss of buoyancy could result. The Master shall also ensure that all covers, doors, vents, and hatches to any and all holds, ballast tanks, and fuel tanks are sealed tightly and remain sealed to prevent possible loss of buoyancy. Having assessed the damage sustained by the vessel, the Master will be in a position to decide what action should be taken to prevent or minimize further spillage.

Great care must be taken to consider stability and stress when taking action to mitigate the spillage of oil or to free the vessel if aground Internal transfers should be undertaken only with a full appreciation of the likely impact on the vessel's overall stress and stability. Please refer to the "Approved Stability Booklet" carried on board.

Should the damage sustained be extensive, the impact of internal transfers on stress and stability may be impossible for the vessel's personnel to assess. In such cases, Appendix 3 of this plan is to be filled out as completely as possible and forwarded to the Owners to ensure the appropriate calculations can be done.

When it is possible to maneuver, the Master, in conjunction with the proper shore authorities, may consider moving the vessel to a more suitable location in order, for example, to facilitate emergency repair work or lightening operations, or to reduce the threat posed to any particularly sensitive shoreline areas Such maneuvering may be subject to coastal state jurisdiction.

Oil Spill Resulting from Casualty (Grounding, Collision, Fire, or Explosion)

Action Considered	Designated Person	Completed
Sound emergency alarm	Chief Officer / OOW	Y / N
Initiate emergency response procedures	Master / Chief Officer	Y / N
Close all nonessential vent intakes and tank vents as appropriate	Chief Officer / Chief Engineer	Y / N
Assess further danger to ship or personnel such as capsize or sinking	Master	Y / N
Cease all nonessential operations	Chief Officer / Chief Engineer	Y / N
Assess whether oil has actually been spilt / probability of spill	Chief Officer / Chief Engineer	Y / N
Sound all ER compartments to determine extent of damage	2nd Engineer	Y / N
Sound around vessel if grounded	Chief Officer	Y / N
Where possible transfer fuel away from damaged compartments	Chief Officer	Y / N
Request outside assistance if required	Master	Y / N
Contain / reduce oil outflow with resources on hand	Chief Officer / 2nd Engineer	Y / N
Commence Cleanup if possible	Chief Officer	Y / N

1. GROUNDING

If the vessel grounds, the Master must ensure that the following actions are taken:

1. Sound Emergency Alarm and muster crew.
2. Eliminate all avoidable sources of ignition and ban smoking on board. Action must be taken to prevent hazardous vapours from entering accommodation and machinery spaces. See Section 1.3.3.
3. Identify damage by means of a visual inspection.
4. Take soundings around vessel to determine nature and gradient of seabed.
5. Check differences in tidal ranges at grounding site.
6. Evaluate tidal current in grounding area.
7. Take soundings of all tanks on shell and compare with departure soundings.
8. Determine probability and/or quantity of oil released
9. If oil release is determined or is probable, this is to be included in the casualty report
10. Determine other possible hazards to the vessel, such as sliding off the grounding site, further damage from the seas / swell, and torsion forces.

At this point, determine risk of additional damage to vessel by attempting to refloat. If remaining aground is determined to be less of a risk then:

1. Use anchors to prevent vessel movement.
2. Take in ballast in empty tanks, with due consideration paid to stress and stability. Please refer to the "Approved Stability Booklet."
3. Consider transfer of fuel from damaged tanks, with due consideration paid to stress and stability. Please refer to the "Approved Stability Booklet."
4. Reduce longitudinal stress on hull by transfer of cargo internally. Please refer to the "Approved Stability Booklet."
5. If the change in stability and stress cannot be calculated on board, contact the Vessel's management to arrange for the necessary calculations. Refer to Appendix 3 for information which should be provided

2. FIRE / EXPLOSION

If a fire or explosion occurs on board, the vessel's fire control party must ensure that the following actions are taken:

1. Sound Emergency Alarm and muster crew.
1. Determine extent of damage and what damage control measures can be taken.
2. Determine whether there are casualties
3. Request assistance as deemed necessary.
4. Take necessary actions to prevent smoke and other hazardous vapours from entering the accommodation and machinery spaces.
5. Assess possibility of oil leakage.
6. Determine possible actions to control the discharge of oil. This will depend largely on the damage to the ship and cargo.
7. If there is a discharge or possible discharge of oil, this is to be included in the casualty report.
8. Should abandonment be necessary, the Master must ensure that every effort is made to maneuver survival craft upwind of any oil spill.

3 COLLISION

If a collision occurs, the Master must ensure that the following actions are taken:

1. Sound Emergency Alarm and muster crew.
2. Determine whether there are casualties.
3. If there is a possibility of fire or explosion, eliminate all avoidable sources of ignition and ban smoking on board Action should be taken to prevent flammable vapours from entering accommodation and machinery spaces. See Section 1.3.3.
4. Decide whether separation of vessels may cause or increase spillage of oil, or increase the risk of sinking.
5. If any oil tanks are penetrated, isolate the penetrated tank or transfer oil to slack or empty tanks with due attention paid to stress and stability of the vessel. Please refer to the "Approved Stability Booklet."
6. If there is an oil spill, make a report as per section 2
7. If possible to maneuver, the Master, in conjunction with the appropriate shore authorities, should consider moving his ship to a more suitable location in order to facilitate emergency repair work or lightening operations, or to reduce the threat posed to any sensitive shoreline areas.

4. HULL FAILURE (INCLUDING ICE DAMAGE)

If the vessel suffers structural hull failure, the Master must ensure that the following actions are taken:

1. Sound Emergency Alarm and muster crew.
2. Reduce speed or stop to minimize stress on hull.
3. Assess immediate danger of sinking or capsizing.
4. Initiate damage control measures if possible.
5. If lightening is required, all efforts should be made to wait for a barge or other ship to receive the cargo.
6. If oil has spilled, or if it is necessary to jettison oil to maintain stability, make a report as per section 2.
7. If the change in stability and stress cannot be calculated on board, contact the Vessel's management to arrange for the necessary calculations
8. Consider forecast weather conditions and their effect on the situation.
9. Should abandonment be necessary, the Master must ensure that every effort is made to maneuver survival craft upwind of any oil spill

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5. EXCESSIVE LIST

If excessive list occurs rapidly and unexpectedly, it may be due to:

1. Failure of hull plating.
2. Failure of internal bulkhead between compartments
3. Shift of cargo.
4. Damage through grounding or collision.
5. Incorrect operating condition. Refer to "Approved Stability Booklet."
6. Flooding in Engine Room, where free surface can cause a list.

The Master must ensure the following steps are taken immediately:

1. Stop any cargo, bunkering, or ballast operations in progress.
2. Sound Emergency Alarm and muster crew
3. Determine whether there are casualties.
4. If under way, reduce speed or stop
5. Establish reason for list. See above.
6. Sound all tanks and compare with departure soundings
7. Close all openings and vent pipes.
8. Prepare ballast and transfer pumps for possible remedial action.
9. If lightening is required, all efforts should be made to wait for a barge or other ship to receive the cargo.
10. If oil has spilled, or it is necessary to jettison oil to maintain stability, make a report as per section 2.
11. If possible, take corrective action to rectify the situation with due consideration paid to vessel stress and stability. Please refer to the "Approved Stability Booklet."

SECTION 4 • National and Local Coordination

1 The Master will advise the Coast Guard of nearest coastal state regarding any oil spill. Vessel Interest Contacts must also be notified of any such incident. See Appendix 2 for details.

2. The Master will be the point of contact on the vessel for coordinating shipboard activities with national and local authorities, act as the Company's on-scene representative, and will be responsible for overseeing the action of any salvage or spill contractors employed until such time as he/she has been FORMALLY relieved of these responsibilities by the Company.

3. The person or persons identified in the declaration shall be responsible for contacting and mobilizing the response organization(s). These organizations will coordinate and conduct the response. It is not normally practical for vessel's personnel to be directly involved in cleanup activities. Therefore, their primary role will be to provide as much information as necessary to assist the response and to cooperate with cleanup personnel. However, where no local response is forthcoming, or is delayed, the Master should consider the use of available shipboard materials to clean up or contain the spilled oil by, for example, using ship-stocked absorbent materials or utilizing mooring ropes or air-filled hoses as makeshift booms.

4. Dispersants or degreasers should not be used on oil spilled in the water as their use may contravene local regulations. However, dispersants may be used if they are approved by Environment Canada specifically for a given incident. Environment Canada will allow and approve the use of dispersants on a case by case basis only

SECTION 5 • Ship to Ship Transfer Operations

Should a situation such as lightening due to damage require a ship to ship transfer of petroleum products, the Master must take into account but not limited to the following:

1. Proper lines of communication between ships including language and radio working frequency;
2. Current and forecasted weather conditions for the intended area of transfer;
3. The compatibility of the vessels involved with regards to size, freeboard, manifold location, list, trim, etc
4. The elimination of all possible ignition sources;
5. Oil spill clean up equipment and procedures in place;
6. Contingency planning for emergency situations in place
7. The need to notify and obtain the agreement of any responsible authority.
8. Site conditions such as available shelter, water depth, and available anchorage.
9. Traffic density.

For detailed procedures concerning ship to ship transfer of petroleum products, please refer to ***The Ship to Ship Transfer Guide (Petroleum)****, published by The International Chamber of Shipping Oil Companies International Marine Forum, 3rd edition, 1997 A copy of which is to be kept on board the ship at all times.*

SECTION 6 • Safety Precautions For Bunkering Operations

NO SMOKING THROUGHOUT BUNKERING OPERATION

Before beginning refuelling operations:

1. The spill control equipment should be in the immediate vicinity and readily accessible should it be required in the event of a fuel spillage. Note that the tanker or refueling station should also have its own spillage control kit.
2. Ensure that the approximate amount of fuel required is known. This can be confirmed from the Chief Engineer, Captain, or Vessel Manager.
3. The location and ready access to the nearest fire extinguishers should be confirmed
4. All save-alls must be empty and drain holes plugged.
5. Check that no *hot work* is being carried out in the vicinity
6. Check position (Open) of interconnecting valves.
7. Establish communication with tanker or fueling station operator using portable radios.
8. Check mooring lines are secure, to prevent the vessel hanging up on the hoses.
9. Confirm system alarms are activated.
10. Bunkering should take place with the vessel upright and with a minimal trim.
    During refueling operations:
11. Tank fluid levels are to be closely monitored through soundings or some other means of accurately reading instantaneous volume.
12. A close watch must be maintained on the tank vents. In the event of foaming from the vent pipe, stop bunkering operations
13. Keep close watch on the trim of the vessel. As much as possible, minimize heel and trim by loading fuel in a symmetrical order.

After refueling operations:

1. Clean up any spills with available spill equipment.
2. Ensure all save-alls are clean and empty, then remove plugs.

SECTION 7 • Additional Information (Non-Mandatory)

This section provides for additional information that local authorities, insurance underwriters, or Vessel Management may wish to include, but is not mandatory. (Regulation 26, Annex I, Marpol 73/78)

MEDIA INFORMATION

In the event of an oil spill or other related casualty, the Master is to direct any Coastal Radio station being worked that inquiries from any of the various media nodes are to be directed to the Vessel Management, who will handle such incidents shore-side. This will enable the Master to concentrate on the matter at hand.

PLAN REVIEW

This plan is to be reviewed at regular intervals by the Vessel Management and Master such that the information contained herein is current. Changes should be incorporated in the plan as and when they occur and the changes noted and by whom. Reviews should be conducted annually to reflect changes in local laws or policies, contact names or numbers, vessel characteristics, or company policy.

Reviews should also be conducted after any use of the plan in response to an incident, in order to evaluate its effectiveness and make any modifications deemed prudent at that time.

COMPANY POLICY

The Master is responsible for maintaining the vessel's plans and technical information, in addition to the drawings contained in this plan, in an orderly and readily accessible fashion. The Master is to satisfy himself to the fact that the vessel's Chief Engineer complies in similar fashion as regards to plans and technical information in his possession.

DIAGRAMS AND DRAWINGS

Should the Master or Chief Engineer discover that crucial plans or manuals covering the operation of essential parts of the vessel are not on board, they are to request the company's head office in writing, to supply such plans and manuals.

RECORD KEEPING

As stated elsewhere in this plan, the Master shall use every effort to retain all records of a pollution incident and responses thereto, for later review by the company's technical department in conjunction with the crew. Such record keeping should include actual samples of oil spilled.

ONBOARD SPILL RESPONSE EQUIPMENT

<u>Absorbent rags and boom are stored in the SOPEP store room at the aft stbd. side of the Main Deck.</u> It is the responsibility of the Chief Engineer to keep inventory and maintain an adequate stock of equipment

SECTION 8 • Oil Pollution Prevention Team

The master of the vessel is to appoint an Oil Pollution Prevention Team on board, to initiate recovery or cleanup procedures, and to secure the ship immediately if an incident occurs

The OPPT consists of the following crew members:

Master
Chief Officer
Chief Engineer

In the event of an emergency, the team should be called out immediately.

The team should be given necessary training in the use of such equipment as oil absorbents that the vessel may carry All members of the OPPT should be aware of their duties should an oil spill occur.

Instructions to the Oil Pollution Prevention Team

8.1 Master

In overall charge.
Informs terminal authorities or coastal authorities of incident.
Informs the local agent and requests agent to inform the local underwriter's representative.
Advises the company's head office of the situation. Keeps everyone updated at regular intervals and advises of any changes in status of the emergency
Keeps log of all events and progress of actions.

8.2 Chief Officer

In charge of deck / cargo operations.
In charge of lifeboats if required.
Keeps the Master informed and updated on the situation and of the results of steps taken to contain any spills and limit outflow.
Insures all openings in the deck and superstructure are closed to limit vapour entry

8.3 Chief Engineer

In charge of bunkering operations.
Organizes distribution of oil spill detergents if required.
Stops bunkering operations if applicable.
Stops pumps and any unnecessary pieces of machinery

Other Personnel

Deck Officer on duty
  Alerts and informs Chief Officer / Chief Engineer on the situation.
  Mobilize off duty crew as necessary.
Engineer on duty
  Assists the Chief Engineer.
  Prepare for fire fighting.
  Ensure sufficient power and water to deck.
  Organizes onboard clean up equipment.

Deck Officer off duty

Under the direction of the Master, responsible for the reporting and record keeping of all events.

On duty Ratings

Alerts the Officer on duty of any leakage.

Position sorbent / clean up material to prevent any fluid escape.

Off duty personnel

Assist as required

APPENDIX 1 • Report Format and Content

The report should contain the following:

AA VESSEL NAME, CALL SIGN, FLAG

BB DATE & TIME (GMT) OF INCIDENT: 111935 meaning 11th of month at 7:35 pm.

CC SHIPS POSITION: 2230N 0600E meaning 22 deg. 30 min. N, 6 deg. E

or

DD SHIPS POSITION BY TRUE BEARING (3 DIGITS) AND DISTANCE FROM CLEARLY IDENTIFIED LANDMARK

EE TRUE COURSE (3 DIGITS)

FF SPEED IN KNOTS AND TENTHS OF A KNOT (3 DIGITS)

LL ROUTE INFORMATION - INTENDED TRACK

MM RADIO STATIONS AND FREQUENCIES GUARDED

NN TIME OF NEXT REPORT (same as in BB)

OO DRAFT (4 DIGITS - meters and centimeters)

PP TYPES AND QUANTITIES OF CARGO AND BUNKERS ON BOARD

QQ BRIEF DETAILS OF DAMAGE, LIMITATIONS ETC (must include condition of vessel and ability to transfer cargo, ballast, or fuel)

RR BRIEF DETAILS OF ACTUAL POLLUTION (oil type, estimate of quantity discharged, whether discharge continues, cause, estimate of slick movement)

SS WEATHER AND SEA CONDITIONS (wind force/direction, relevant tidal and/or current information)

TT NAME, ADDRESS, TELEX, FAX, TELEPHONE NUMBERS OF VESSEL OWNER OR REPRESENTATIVE

UU DETAILS OF LENGTH, BREADTH, TONNAGE, AND TYPE OF VESSEL

WW TOTAL NUMBER OF PERSONS ON BOARD

XX MISC. DETAILS (brief details of incident, actions taken, injuries, assistance required)

UNOFFICIAL OIL POLLUTION EMERGENCY REPORT BY FACSIMILE

Vessel Name Call Sign Flag

Date and Time of Event

Vessel Position (Latitude & Longitude, Bearing & Distance from Landmark)

Course Speed

Intended Track

Radio Station

Date and Time of Next Report

Type and Quantity of Oil On board

Brief Details of Damage

Brief Details of Pollution

Details of Weather & Sea Conditions (Wind Speed/Direction, Swell Height/Direction)

Names of Vessel's Owner

Vessel Size and Type

Any Other Additional Information as Determined by Master

APPENDIX 2 • Who to Contact

In accordance with the Canadian Pollutant Discharge Reporting Regulations, the Master or Owner of a ship must report, without delay, any discharge or anticipated discharge of a pollutant in Canadian waters or fishing zones, to a Pollution Prevention Officer (PPO). Reports must be made in the manner described in Guidelines for Reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine Pollutants, TP 9834, or "General Principles for Ship Reporting Systems and Ship Reporting Requirements, including Guidelines for Reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine Pollutants" adopted by the IMO by Resolution A 648(16). These initial reports can be made to a Vessel Traffic Service Center (VTS) or any other Canadian Coast Guard Radio Station (CGRS), on the frequencies listed in the publication, Radio Aids to Marine Navigation (RAMN).

In addition to the above process for reporting a spill from a vessel to a PPO through a CGRS or VTS, the Canadian Coast Guard maintains a 24 hour Operations Center which can be contacted at:

Canadian Coast Guard Operations Center
344 Slater Street
Ottawa, Ontario
K1A 0N7

Tel: (613) 990-5600 Fax: (613) 995-4700 Tlx: (613) 053 3128

Alternatively, spills may be reported to the appropriate regional center or nearest Vessel Traffic Service Center:

Newfoundland

St. John's	Tel:	1-709-772-2083
		1-800-563-2444 (24 hr.)
	Fax:	1-709-772-5369
	Tlx:	016-4044
Placentia Bay	Tel:	1-709-227-2182
	Fax:	1-709-227-5637
Port Aux Basques	Tel:	1-709-695-2167
	Fax:	1-709-695-7784
Goose Bay	Tel:	1-709-896-2252
	Fax:	1-709-896-8455
St. Anthony	Tel:	1-709-454-3852
	Fax:	1-709-454-3716

Nunavut

Nordreg Canada	Tel:	1-867-979-5724
P.O. Box 189	Fax:	1-867-979-2464
Iqaluit, NU		
X0A 0H0		

Nova Scotia

Halifax	Tel:	(902) 426-9750 (MCTS Operations)
		(902) 426-9738 (Officer in charge)
	Fax:	(702) 426-4483
Sydney	Tel:	(902) 564-7751 (MCTS Operations)
		(902) 564-7752 (Officer in charge)
	Fax:	(702) 564-7662

New Brunswick

Saint John	Tel:	(506) 636-4696 (MCTS Operations)
		(506) 636-4269 (Officer in charge)
	Fax:	(506) 636-5000

Quebec

Quebec City	Tel:	(418) 648-4427 (MCTS Operations)
		(418) 648-7459 (Officer in charge)
	Fax:	(418) 648-7244
Montreal	Tel:	(450) 928-4544 (MCTS Operations)
		(450) 928-4547 (Officer in charge)
	Fax:	(450) 928-4547
Riviere-Au-Renard	Tel:	(418) 269-5686 (MCTS Operations)
		(418) 269-7718 (Officer in charge)
	Fax:	(418) 269-5514

Greenland

Spill Notification Point	Tel:	+299-101111
Groenlands Kommando	Fax:	+299-10112
Maritime Rescue Coordination Center Gronnedal	Tlx:	90502 GLK GD
KK-3930 Gronnedal		

Competent National Authority	Tel:	+45-31 578310
National Agency of Environmental Protection		+45-86 123099 (24 hr)
Strandgade 29	Fax:	+45-31 572449/+45-86 181140
DK-1401 Copenhagen	Tlx:	31209 MILJOE DK

Note:

The following contacts have been included as they are within the expected range of operation of the Vessel. Due to the nature of the Vessel's voyages and varied ports of call this list should not be considered exhaustive. For this reason space has been included at the end of this section for addenda.

Within Canada, administrative inquiries related to pollution prevention, compliance and enforcement, vessel regulations, design and construction should be directed to:

Director General, Marine Safety
Transport Canada
Mailstop: AMS
330 Sparks Street
Ottawa, Ontario
K1A 0N5
Tel: (613) 998-0610 Fax: (613) 954-1032

Inquiries relating to pollution response should be directed to:

Director General, Rescue and Environmental Response
Canadian Coast Guard
344 Slater Street
Ottawa, Ontario
K1A 0N7

Tel: (613) 990-3110 Fax: (613) 996-8902

Additional Contact Information

Region	
Spill Notification Point	Contact Numbers

Region	
Spill Notification Point	Contact Numbers

Region	
Spill Notification Point	Contact Numbers

Region	
Spill Notification Point	Contact Numbers

VESSEL INTEREST CONTACTS

VESSEL MANAGEMENT

Coastal Shipping Ltd.
P.O. Box 913
Happy Valley-Goose Bay, NL
A0P 1S0

Telephone: (709) 896-2421
Facsimile: (709) 896-5028

24 HOUR CONTACT

The following phone numbers are provided
for 24 hour contact, year round:

Kevin Brewer	(709) 682-0826	(Cellular)
	(709) 227-2600	(Home)
Gerry Burgess	(709) 745-2684	(Home)

APPENDIX 3 • Vessel Stress and Stability Calculations

VOYAGE PARTICULARS

Departure Port

Departure Date

Time (GMT)

VESSEL CONDITION IMMEDIATELY BEFORE CASUALTY

Mean Draft Forward

Mean Draft Aft

KG(solid)

KG(fluid)

LCG of Vessel

#	COMPARTMENT	S.G.	TONNES

DATA RELATING TO VESSEL AFTER CASUALTY

Nature of Casualty: Collision / Grounding (Fixed / Free) / Fire
Explosion / Heavy Weather / Other

Casualty Date Report Time (GMT)

Geographical Location of Casualty: LAT
LONG

Conditions at Site at Time of Casualty Report

Weather

Sea State

Tidal State

Tidal Range

Forecast

S G. of Surrounding Water

Position of Vessel relative to Wind, Waves, Tides, etc.

Drafts Measured Port and Starboard:

Drafts at Fwd Marks/F.P.(Best Estimate)
Drafts at Aft Marks/A.P (Best Estimate)
Drafts at Midships (Best Estimate)
Angle of Heel (Port / Starboard)

Best Estimate of Depth of Water (for Grounding)

Location	Port	Starboard

REPORTED DAMAGE

Details of each damaged compartment known to be open to the sea, including those damaged above the present waterline.

Compartment	Estimated Cargo Weight (tonnes)	Permeability of Cargo (%)	Comments

Extent and location of structural damage in way of above compartments. (Attach sketch)

Extent of additional damage to pipes, valves, hatches, doors, etc and list of compartments which may be subject to progressive flooding as a result.

Soundings from or estimates of amounts of flood water in spaces not directly open to sea

PROPOSED ACTION AND REQUIREMENTS

Any other relevant information, details of action being undertaken or proposed course of action, salvage operation etc.

APPENDIX 4 • Flowcharts and Checklists

HULL LEAKAGE

In the event of a hull leakage, the MASTER must ensure that the following actions are taken:

- [ ] Stop Oil Flow
- [ ] Sound Emergency Alarm and initiate Emergency Response
- [ ] Place drain buckets under overflow pipes to contain possible spills
- [ ] Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container
- [ ] Drain or transfer oil into empty or slack tanks if possible or arrange for transfer to shore
- [ ] If oil is overboard, REPORT to proper authorities immediately as per section 2 of this plan
- [ ] If oil is in bilges, pump through oil/water separator

✓ YES X NO NA Not Applicable

PIPE LEAKAGE

In the event of a pipe leakage, the CHIEF ENGINEER must ensure that the following actions are taken:

- **Stop Oil Flow** ☐
- **Sound Emergency Alarm and initiate Emergency Response** ☐
- **Locate the source and repair if possible** ☐
- **Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container** ☐
- **Drain affected section of pipe into empty or slack tank if possible** ☐
- **If oil is overboard, REPORT to proper authorities immediately as per section 2 of this plan** ☐
- **If oil is in bilges, pump through oil/water separator** ☐

✓ YES   **X** NO   **NA** Not Applicable

TANK OVERFLOW

In the event of a tank overflow, the CHIEF ENGINEER must ensure that the following actions are taken:

- [ ] **Stop Oil Flow**
- [ ] **Sound Emergency Alarm and initiate Emergency Response**
- [ ] **Place drain buckets under overflow pipes to contain possible spills**
- [ ] **Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container**
- [ ] **Drain or transfer oil into empty or slack tanks if possible or arrange for transfer to shore**
- [ ] **If oil is overboard, REPORT to proper authorities immediately as per section 2 of this plan**
- [ ] **If oil is in bilges, pump through oil/water separator**

✓ YES X NO NA Not Applicable

CASUALTY SPILL CHECKLIST

HULL FAILURE including Ice Damage

In the event of hull failure (including ice damage), the MASTER must ensure that the following actions are taken:

- Stop Oil Flow ☐
- Sound Emergency Alarm and initiate Emergency Response ☐
- Place drain buckets under overflow pipes to contain possible spills ☐
- Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container ☐
- Drain or transfer oil into empty or slack tanks if possible or arrange for transfer to shore ☐
- If oil is overboard, REPORT to proper authorities immediately as per section 2 of this plan ☐
- If oil is in bilges, pump through oil/water separator ☐

✓ YES   X NO   NA Not Applicable

GROUNDING

In the event of a grounding incident, the MASTER must ensure that the following actions are taken:

Stop Oil Flow	☐
Sound Emergency Alarm and initiate Emergency Response	☐
Place drain buckets under overflow pipes to contain possible spills	☐
Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container	☐
Drain or transfer oil into empty or slack tanks if possible or arrange for transfer to shore	☐
If oil is overboard, REPORT to proper authorities immediately as per section 2 of this plan	☐
If oil is in bilges, pump through oil/water separator	☐

✓ YES   X NO   NA Not Applicable

FIRE / EXPLOSION

In the event of a fire or explosion, the FIRE CONTROL PARTY CHIEF must ensure that the following actions are taken:

- ☐ Stop Oil Flow
- ☐ Sound Emergency Alarm and initiate Emergency Response
- ☐ Place drain buckets under overflow pipes to contain possible spills
- ☐ Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container
- ☐ Drain or transfer oil into empty or slack tanks if possible or arrange for transfer to shore
- ☐ If oil is overboard, REPORT to proper authorities immediately as per section 2 of this plan
- ☐ If oil is in bilges, pump through oil/water separator

✓ YES　　X NO　　NA Not Applicable

COLLISION

In the event of a collision, the MASTER must ensure that the following actions are taken:

- [ ] **Stop Oil Flow**
- [ ] **Sound Emergency Alarm and initiate Emergency Response**
- [ ] **Place drain buckets under overflow pipes to contain possible spills**
- [ ] **Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container**
- [ ] **Drain or transfer oil into empty or slack tanks if possible or arrange for transfer to shore**
- [ ] **If oil is overboard, REPORT to proper authorities immediately as per section 2 of this plan**
- [ ] **If oil is in bilges, pump through oil/water separator**

✓ YES | **X** NO | **NA** Not Applicable

EXCESSIVE LIST

In the event of excessive listing, the MASTER must ensure that the following actions are taken:

- Stop Oil Flow ☐
- Sound Emergency Alarm and initiate Emergency Response ☐
- Place drain buckets under overflow pipes to contain possible spills ☐
- Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container ☐
- Drain or transfer oil into empty or slack tanks if possible or arrange for transfer to shore ☐
- If oil is overboard, REPORT to proper authorities immediately as per section 2 of this plan ☐
- If oil is in bilges, pump through oil/water separator ☐

✓ YES X NO NA Not Applicable

SUMMARY FLOWCHART

Incident involving Discharge of Oil (Probable or Actual)

Assess Nature of Incident

Sound Alarm and Muster Crew

Identify Source of Discharge

Spill Assessment

REPORTING

- By Master and/or Designated Crew Member

When to Report

- all probable and actual spills

How to Report

- by quickest possible means to Coastal Radio Station, Designated Ship Movement Reporting Station or Rescue Coordination Centre
- by quickest possible means to local authorities

Who to Contact

- nearest coastal state
- harbour and terminal operators (in port)
- Vessel Management

What to Report

- Initial Report - Res.646(16)
- regular Follow Up Reports
- characteristics of spilled oil
- cargo, ballast, and bunkers
- weather and sea conditions
- slick movement
- assistance required (e.g. salvage, lightening, equipment, personnel, chemicals)
- assistance NOT required

ACTIONS TO CONTROL DISCHARGE

- measures to minimize the escpae of oil and threat to the marine environment

NAVIGATIONAL MEASURES

- alter course, speed, or position
- change of list and/or trim
- anchoring
- setting aground
- initiate towage
- assess safe haven requirements
- weather, tide, swell forecasts
- slick monitoring
- recording of events & communications

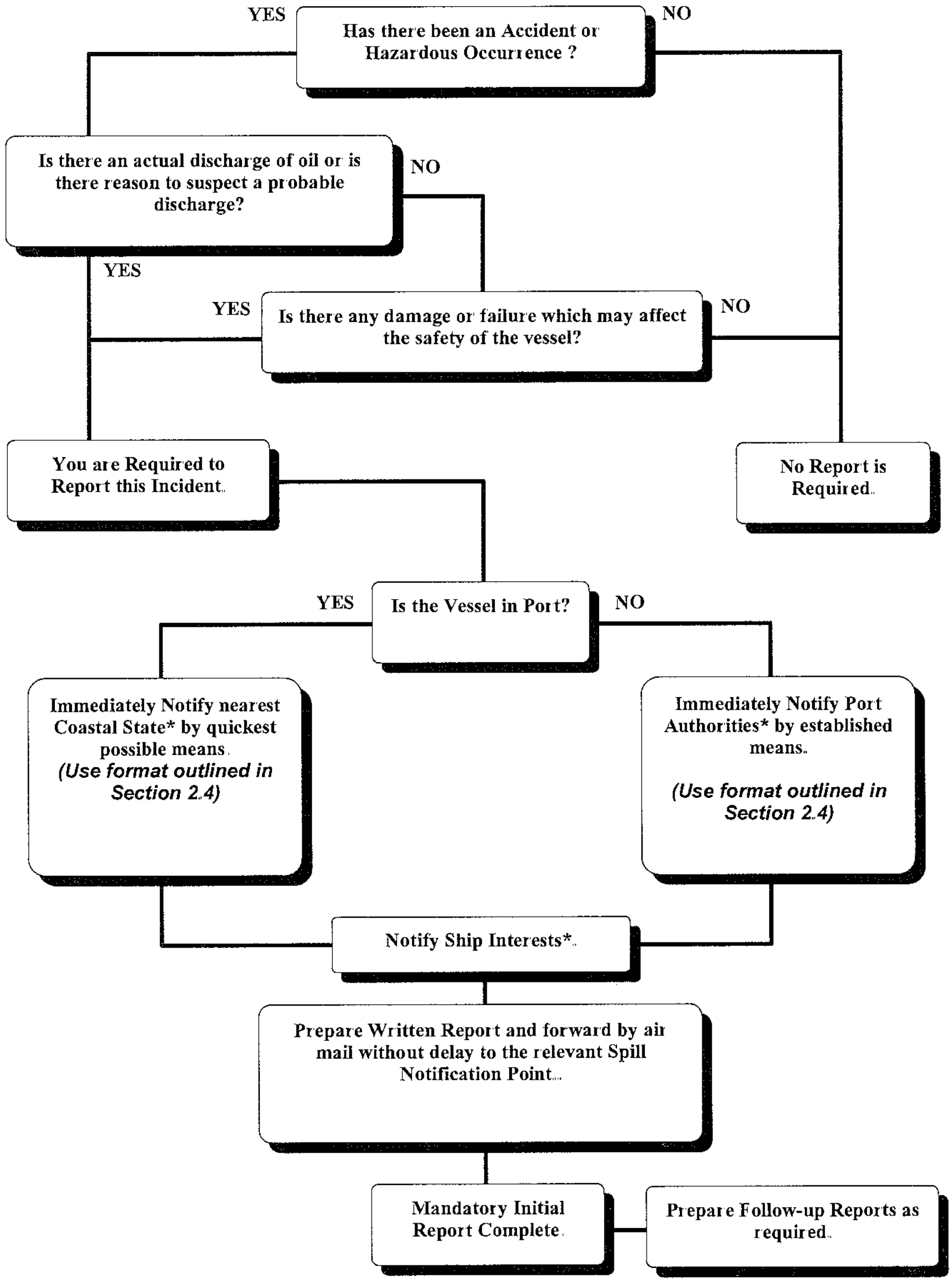
SEAMANSHIP MEASURES

- safety assessment and precautions
- advice on priority countermeasures
- damage stability and stress considerations
- ballast / deballasting
- internal cargo transfer operations
- emergency ship-to- ship transfers of cargo and/or bunkers
- set up shipboard responses for repairs, firefighting, cleanup operations, etc.

STEPS TO INITIATE EXTERNAL RESPONSE

- refer to coastal Port State listings for local help
- refer to Vessel Interests contact list
- external clean-up resources required
- continued monitoring of activities

REPORTING REQUIREMENTS (as per Section 2)



** contact information is located in Appendix 2.*

APPENDIX 5 • Relevant Drawings

FOLLOWING ARE DRAWINGS RELEVANT TO THIS VESSEL

General Arrangement
Tank Capacity Plan
Bilge and Ballast System
Fuel Oil System
Cargo Handling System

SHIPBOARD OIL POLLUTION EMERGENCY PLAN

for

MT NANNY

6,544 Gross Tons Register of St. John's, NL

PREPARED BY: ***Poseidon Marine Consultants Ltd.***
391 Stavanger Drive
St. John's NL A1A 5G1
Telephone: (709) 739-4321
Fax: (709) 739-4421

PREPARED FOR: ***Coastal Shipping Limited***
The Fortis Building
139 Water Street
St. John's, NL
A1C 1B2

Issued. April 2009
Job Number: *2008-118*

Change Number

Official Stamp Examined by Date

Examined under the provisions of Annex I and Annex II of MARPOL 73/78 and the Canadian Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals SOR/2007-86

Stan Gutt Pollution Prevention Officer

2009-05-06

Date

Change Number

Official Stamp Examined by Date

Change Number

Official Stamp Examined by Date

RECORD OF CHANGES

Amendment Number	Section and Page Affected	Date Entered	Remarks	Name and Position of Person Making Entry

RECORD OF OIL POLLUTION EMERGENCY DRILLS

DATE	TYPE OF OIL POLLUTION DRILL	LOCATION	REMARKS MASTER'S SIGNATURE

TABLE OF CONTENTS

A3 Vessel Stress and Stability Calculations
A4 Flowcharts and Checklists
A5 Relevant Drawings

SHIP'S PARTICULARS

PRINCIPAL PARTICULARS

Vessel Name:	Nanny (ex. Nathalie SIF)
Flag / Port of Registry:	Canada / St John's, NL
Official Number:	833250
Det Norske Veritas Number:	18064
IMO Number:	9051399
Call Sign:	CFN 5289
Gross Registered Tonnage:	6544 (ITC69)
Net Registered Tonnage:	3081 (ITC69)
Length, Overall:	116.40 m
Length, B.P.:	110.56 m
Breadth, Max. at Deck:	19.001 m
Depth, Moulded:	10.10 m
Design Draft (Summer):	7.814 m
Deadweight:	9,176 metric tons
Built:	Hyundai Heavy Industries Co., Republic of Korea.
Year of Build:	1993
Complement (Maximum):	17
Complement (Safemanning):	10
Propulsion Power:	1 X MAK 6M552C 4050 KW @ 500 rpm

CAPACITIES

Pot Fresh Water	Approx. 69.0 m^3	18,227 Gallons
Technical Fresh Water	Approx. 332.4 m^3	87,810 Gallons
Fuel Oil (MDO)	Approx. 70.8m^3	18,703 Gallons
Fuel Oil (HFO)	Approx. 524.8 m^3	138,637 Gallons
Cargo Hold Incl. Slop Tanks	Approx 10,942.4 m^3	2,890,571 Gallons
Ballast Water	Approx. 3728.4 m^3	984,833 Gallons
Lube Oil	Approx. 29.8 m^3	7,872 Gallons
F.O Overflow (S)	Approx. 31.4 m^3	8,295 Gallons
L.O. Drain (P)	Approx. 8.8 m^3	2,324 Gallons
Oily Bilge (S)	Approx. 3.9 m^3	1,030 Gallons
F.W. Drain Tk (P)	Approx. 3.3 m^3	872 Gallons
Bilge Holding Tk	Approx. 15.8 m^3	4,174 Gallons
Sludge Tk (S)	Approx. 12.2 m^3	3,223 Gallons
Boiler Water Drain Tk (S)	Approx. 2.4 m^3	634 Gallons
Chain Locker (P)	Approx. 22.7 m^3	5,997 Gallons
Chain Locker (S)	Approx. 22.7 m^3	5,997 Gallons
M/E L.O. Sump Tk. (C)	Approx. 8.4 m^3	2,219 Gallons

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA

INTRODUCTION

1. This Plan is written in accordance with the Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals and also in accordance with the requirements of regulation 37 of annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 thereto.

2. The purpose of the Plan is to provide guidance to on board operating personnel the vessel with respect to the steps to be taken when a pollution incident has or is likely to occur.

3. The Plan contains all information and operational instructions required by the guidelines. The appendices contain names, telephone, fax numbers, etc of all contacts referenced in the Plan, as well as other reference material.

4 This Plan has been examined by the Transport Canada - Marine Safety, (herein after referred to as "the Board") and, except as provided below, no alteration or revision shall be made to any part of it without prior approval of the Board.

5 Changes to Sections 6, 7, 8, and the appendices will not be required to be approved by the Board The appendices should be maintained up to date by the Owners, Operators, and Managers.

6 For the purposes of this Plan, the Master is taken to be that person who is a member of the vessel's operational personnel and to which is given senior responsibility for the vessel and any circumstances pertaining thereto

7. Before entering a port of call, the Master should be aware of local emergency response procedures and organizations and have up to date contact information readily available.

SECTION 1 • Preamble

1.1 PURPOSE AND INTENT OF THIS PLAN

This Shipboard Oil Pollution Emergency Plan is intended to assist the vessel's officers, crew and management personnel in dealing with an unexpected discharge of oil. Its primary purpose is to set in motion the necessary actions to stop or minimize the discharge and to mitigate its effects. For quick reference the responsibilities of the Oil Pollution Prevention Team is contained in Section 8 on Page 28.

1.2 SUPPORT BY VESSEL'S MANAGEMENT

In accordance with the plans and policies of the vessel's management organization, management personnel will support the vessel's crew with additional resources, i.e. personnel and materials, as the situation warrants.

1.3 PERSONNEL TRAINING AND EXERCISES

1. ***It is the responsibility of the Vessel's Management to ensure that, through training and exercises, all officers and crew are capable of confidently and safely carrying out their assigned duties.***

   Officers responsible for maintaining the trim of the vessel and ordering transfers of ballast and/or cargo should be fully aware of the consequences of their actions and are expected to comply with the regulations and any documentation aboard the vessel which prescribes conditions of trim and stability , e.g. "Approved Stability Booklet".

   Officers and crew responsible for cargo and or bunkering operations should also be fully aware of the consequences of their actions and are expected to comply with the regulations and any documentation aboard the vessel which prescribes methods of operation.

   Officers and crew assigned additional responsibilities for fire fighting or emergency response should have appropriate training as per the regulations and should participate in specific drills and exercises to maintain their abilities and be fully familiar with appropriate vessel systems.

2. ***The vessel's management and operating personnel should become familiar with this document and its format so that should an emergency occur, the response of the officers and crew and the vessel's management personnel will be carried out in a structured, logical and timely manner.***

   In order to ensure that the crew and management are completely familiar with this document and its prescribed procedures, training should be offered and oil pollution emergency drills should be carried out regularly.

TRANSPORT CANADA TRANSPORTS CANADA MARINE SAFETY SÉCURITÉ MARITIME

A blank "Record of Oil Pollution Emergency Drills" form is provided at the beginning of this Plan to document the dates and results of such training exercises. This documentation is to be in addition to normal record keeping and log book entries.

3. ***All crew members should become familiar with the fundamentals of the ship's mechanical and electrical systems in order to be more confident and capable during an emergency.***

It is the responsibility of the vessel's senior officers to ensure that engineering fundamentals are taught to the crew and that the crew remain familiar with them through regular drills. Drawings detailing the various mechanical and electrical systems are carried aboard the vessel. Any drawing (e.g. "Natural Vents", "Engine Room Ventilation", "One Line Electrical Diagram", "Fuel Oil Transfer Diagram") can be obtained for study from the Engineering Document Library located in the Chief Engineer's Office These drawings are thoroughly catalogued and easily referenced.

In order to ensure a fundamental familiarity with the various engineering systems, oil pollution emergency drills should include but not limited to such exercises as:

- isolating and sealing off accommodations and/or machinery spaces using louvers and fan shutoffs to prevent ingress of dangerous fumes; and
- isolating, at the distribution panels, various electrical circuits, e.g. lighting, panel feeds, in order to reduce or eliminate sources of ignition in areas of risk

1.4 PLAN FORMAT

This plan is divided into Eight sections as follows:

Section 1 provides an introduction for this document and highlights some important considerations regarding the spillage of oil at sea.

Section 2 outlines the procedure and requirements for making a report to authorities in the event of a discharge or probable discharge of oil.

Section 3 provides a checklist of steps to be taken in the event of various operational or casualty related spills.

Section 4 outlines procedures for national and local coordination of response efforts.

Section 5 outlines procedures for ship to ship transfer operations

Section 6 outlines safety precautions for bunkering operations

Section 7 deals with non-mandatory provisions such as oil spill response materials onboard, media information, and plan review.

Section 8 outlines the responsabilities of the Oil Pollution Prevention Team.

Following the main body of this plan are appendices which provide contact information and/or useful forms. Appendix 1 is an example of an unofficial facsimile report, the use of which is outlined in Section 2. Appendix 2 provides contact information for coastal authorities and ship interests. Appendix 3 is a blank calculation form for vessel stress and stability which can be filled out by an officer of the vessel and sent to the vessel owners for calculation. The use of this calculation form is described in Section 3. Appendix 4 contains flowcharts and checklists for use in the event of an emergency. Appendix 5 contains relevant ship's drawings.

1.5 OIL DISCHARGE MONITORING SYSTEM

In accordance with MARPOL 73/78 Annex 1 Regulation 14 this ship is fitted with a Hanyoung OS-3.0 Capacity 3 m^3/hr oily water separator, manufactured by Hanyoung Engineering Ltd and Seres MKIII, S 663 ballast water monitor manufactured by Seres environment, France. The oil content meters associated with these units are fitted with 15ppm oil content alarms.

IMPORTANT:

1. **ANY** OIL SPILLAGE SHOULD BE TREATED AS AN EMERGENCY.
2. IN RESPONDING TO AN OIL SPILLAGE, THE MASTER'S PRIORITY WILL BE TO ENSURE THE SAFETY OF THE CREW AND OF THE VESSEL, AND TO TAKE ACTION TO PREVENT ESCALATION OF THE INCIDENT. IMMEDIATE CONSIDERATION SHOULD BE GIVEN TO MEASURES AIMED AT PREVENTING FIRE AND EXPLOSION

SECTION 2 • Reporting Requirements

Coast guard of nearest coastal State (see Appendix 2) is to be notified whenever there is:

a) **An actual discharge of oil**
b) **Reason to suspect a probable discharge of oil due to fire, grounding, list, loss of power, collision, flooding, explosion, structural failure, etc.**
c) **Any damage or failure which may affect the safety of the vessel, such as failure or breakdown of the electrical generating system, or essential shipborne navigational aids.**

*****See Reporting Requirement and Summary flowcharts in Appendix 4 for details*****

2.1 DISCHARGE OF OIL

When reporting a discharge of oil, the Master is to provide all relevant information (as per section 2.4) to:

a) Coast Guard of nearest coastal State, or
b) Port Authorities, and also to
c) Vessel Interest Contacts.

A discharge of oil, for the purposes of this plan, refers to:

a) A discharge of oil, resulting from damage to the vessel or its equipment, or for the purpose of securing the safety of a vessel or saving life at sea; or
b) A discharge during the operation of the vessel of oil in excess of the quantity or instantaneous rate permitted under the present Convention

2.2 PROBABLE DISCHARGE OF OIL

The Master must use good judgment to assess any circumstance which might be cause for probable discharge of oil. When making such judgment the following factors must be taken into account:

a) The nature of the damage, failure, or breakdown of the vessel, machinery, or equipment;
b) Vessel location and proximity to land or other navigational hazards;
c) Weather, tide, current, and sea state;
d) Traffic density; and
e) Morale, health and ability of crew onboard to deal with situation.

2.3 DAMAGES AND/OR FAILURES

The Master must report any damage which may affect the safety of the vessel: collision, fire, grounding, explosion, cargo shifting, list, etc. The Master must also report any failure or breakdown of essential machinery which results in impairment of the safety of navigation: i.e. electrical generating system or essential vessel-borne navigational aids.

2.4 INITIAL REPORT

An initial report is to be made by radio communication without delay to one of the following Canadian radio ship reporting stations; Canadian Coast Guard Radio Station, Marine Communication Traffic Services, St. Lawrence Seaway Authority marine radio station, or Canadian harbour radio station. The report is to be made following the format given in this section on the next page. Where the report cannot be communicated by radio, it shall be communicated by telephone to the local Canadian radio ship reporting station or to the Canadian Coast Guard Operations Center in Ottawa. Contact information is provided in Appendix 2.

FOLLOW-UP REPORTS

Follow-up reports should be made at regular intervals to keep the coastal State and other concerned parties informed of developments including, but not limited to, change of course or position, change in quantity, rate or probability of oil discharge, injuries or casualties, or effects of actions taken to control discharge or assure safety of the vessel and crew. Follow-up reports should be made in the same format as the initial report

WRITTEN REPORT

Within 24 hours of the incident, or as soon as possible thereafter, a written report on the incident, including a statement as to its probable cause, shall be forwarded by air mail without delay to the Chief, Marine Casualty Investigations, Department of Transport, Ottawa.

UNOFFICIAL FACSIMILE REPORT

An unofficial facsimile report is included in Appendix 1. This may be sent to any concerned parties but is not consistent with IMO Resolution A 851(20) for reporting of incidents involving dangerous goods, harmful substances and/or marine pollutants, and therefore cannot constitute an official report to the coastal State

FORMAT AND INFORMATION REQUIRED FOR OFFICIAL REPORT

AA VESSEL NAME, CALL SIGN, FLAG

BB DATE AND TIME (GMT) OF INCIDENT: 111935 meaning 11th of month at 7:35 pm.

CC SHIPS POSITION: 2230N 0600E meaning 22 deg. 30 min. N, 6 deg. E

or

DD SHIPS POSITION BY TRUE BEARING (3 DIGITS) AND DISTANCE FROM CLEARLY IDENTIFIED LANDMARK.

EE TRUE COURSE (3 DIGITS)

FF SPEED IN KNOTS AND TENTHS OF A KNOT (3 DIGITS)

LL ROUTE INFORMATION - INTENDED TRACK

MM RADIO STATIONS AND FREQUENCIES GUARDED

NN TIME OF NEXT REPORT (same as in BB)

OO DRAFT (4 DIGITS - meters and centimeters)

PP TYPES AND QUANTITIES OF CARGO AND BUNKERS ON BOARD

QQ BRIEF DETAILS OF DAMAGE, LIMITATIONS ETC. (must include condition of vessel and ability to transfer cargo, ballast, or fuel)

RR BRIEF DETAILS OF ACTUAL POLLUTION (oil type, estimate of quantity discharged, whether discharge continues, cause, estimate of slick movement)

SS WEATHER AND SEA CONDITIONS (wind force/direction, relevant tidal and/or current information)

TT NAME, ADDRESS, FAX, TELEPHONE NUMBERS OF VESSEL OWNER OR REPRESENTATIVE

UU DETAILS OF LENGTH, BREADTH, TONNAGE, AND TYPE OF VESSEL

WW TOTAL NUMBER OF PERSONS ON BOARD

XX MISC. DETAILS (This includes brief details of incident, actions taken, injuries sustained and assistance required. If no outside assistance is required, then this should be clearly stated.)

2.5 WHO TO CONTACT

Contact information for coastal State and other concerned parties (port contacts, vessel interest contacts) is located in Appendix 2

2.6 ARRANGED RESPONSE ORGANIZATION(S)

The vessel, in accordance with the regulations, has onboard a **declaration** that the vessel's management has, in accordance with 167 of the Canada Shipping Act 2001, entered into an arrangement with a response organization to which a certificate of designation has been issued pursuant to section 169 in respect of the quantity of oil that is carried both as fuel and cargo on board the vessel.

Four response organizations (RO) have been established in Canada. Although each of the RO's are independent Corporations they are linked together through various support and mutual aid agreements. Each of the RO's has a specific Geographic Area of Response (GAR) and a certified response capability of 10,000 tonnes. The following table provides a list of the RO's and a general description of their GAR's. A detailed description of the GAR for each of the RO's is provided in Item 3.5.

Response Organization	Geographic Area of Response (GAR)
• Western Canada Marine Response Corporation(WCMRC)	• In general the waters bordering British Columbia
• Eastern Canada Response Corporation Ltd. (ECRC)	• In general the waters of the Canadian Great Lakes, Quebec and the Atlantic Coast excluding areas covered by Alert and PTMS
• Atlantic Emergency Response Team ("ALERT") Inc.	• In general the Port of Saint John, New Brunswick and surrounding waters.
• Point Tupper Marine Services Limited (PTMS)	• In general the Port of Port Hawkesbury, Nova Scotia and surrounding waters .

Prior to commencing a voyage the master or his onboard designate is responsible to ensure that the necessary declarations for the intended voyage are onboard and necessary contact information has been inserted in the manual in Appendix 2: Who to contact under section " additional contact information".

As an example of whom to contact please refer to the page 34 for Eastern Canada Response Corporation (ECRC) call out sheet. If conditions permit i.e. time, prevailing conditions , MASTER shall consult with vessel management contact prior to activation of any response organization.

SECTION 3 • Steps to Control Discharge

In cases of small spills on deck, the vessel's crew should take whatever actions are necessary to prevent oil from escaping over the side. Once the spill is contained on deck, the crew will need to take action to clean up the oil. SPILLED OIL SHALL NOT BE WASHED OVER THE SIDE. Once oil is in the water, the crew's ability to respond in a practical manner is greatly reduced.

3.1 OPERATIONAL SPILLS

In the event of an operational spill which occurs during bunkering or cargo operations, it is important that the bunkering party terminate any and all bunkering operations and close all manifold valves.

Before closing any manifold valves, the bunkering / cargo party must immediately inform the terminal / loading master so that they may take action to eliminate the possibility of over-pressurization of the shore side transfer components.

After dealing with the cause of the spill, it may be necessary to obtain permission from local authorities and/or the terminal before resuming bunkering or cargo operations

If the possibility of fire or explosion exists, nonessential air intakes to accommodations and machinery spaces should be closed and all sources of sources of ignition should be eliminated. See Section 1.3.3 of this Plan

In accordance with Section 1.3.3 of this Plan, all members of the vessel's crew should be familiar with the fundamentals of the ship's vital systems including the ventilation and electrical systems. Crew members should be able to: isolate the accommodation and/or machinery spaces using the louvers and fan shutoffs; and, from the distribution panels, isolate electrical circuits in areas of risk

Care must be taken to consider stability and stress when taking action to mitigate the spillage of oil. Internal transfers should be undertaken only with a full appreciation of the likely impact on the vessel's overall stress and stability. Please refer to the "Approved Stability Booklet" carried on board.

Operational Spill Checklist

Action Considered	Designated Person	Completed
Sound emergency alarm	Person Discovering Incident	Y / N
Mobilize Oil Pollution Prevention Team	Chief Engineer / Master	Y / N
Cease all bunkering operations	Chief / 2nd Engineer	Y / N
Locate source of leakage	Chief / 2nd Engineer	Y / N
Operate manifold valves	Chief / 2nd Engineer	Y / N
Close all nonessential vent intakes and tank vents as required	Chief / 2nd Engineer	Y / N
Stop or reduce outflow	Chief / 2nd Engineer	Y / N
Assess fire risk	Chief Officer	Y / N
Commence clean up	Chief Officer	Y / N
Assess Stress / Stability	Master / Chief Officer	Y / N
Transfer fuel from damaged area to slack tanks or other containment space	Chief / 2nd Engineer	Y / N
Request outside assistance if required	Master	Y / N
Counter excessive list if required / possible	Chief Officer	Y / N

1. PIPE LEAKAGE

In the event of an oil pipe leakage, the Chief Engineer must ensure that the following actions are taken:

1. Stop oil flow and close manifold and other valves.
2. Sound Emergency Alarm and Mobilize Oil Pollution Prevention Team.
3. Locate the source and drain affected section into an available empty or slack tank. Repair if possible.
4. If there is any possibility of released vapours entering an engine room or the accommodation intake, appropriate preventative steps must be taken quickly.
5. Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container.
6. If oil is overboard, report to proper authorities immediately (as per section 2 of this plan)
7. If oil is in bilges, pump through oil/water separator as per approved procedures.

2. TANK OVERFLOW

In the event of an oil tank overflow, the Chief Engineer must ensure that the following actions are taken:

1. Stop oil flow and close manifold and other valves
2. Sound Emergency Alarm and Mobilize Oil Pollution Prevention Team
3. Place drain buckets under overflow pipes to contain possible spills.
4. If there is any possibility of released vapours entering an engine room or the accommodation intake, appropriate preventative steps must be taken quickly.
5. Drain or transfer oil to slack or empty tanks if possible with due consideration paid to vessel stability. If no slack or empty tanks are available then oil may be pumped back ashore through delivery line, having first gained permission to do so.
6. Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container
7. If oil is overboard, report to proper authorities immediately (as per section 2 of this plan)
8. If oil is in bilges, pump through oil/water separator as per approved procedures.

3. HULL LEAKAGE

If oil is noticed on the water near the vessel during normal operations and cannot be accounted for, the possibility of hull leakage should be suspected.

In the event of a hull leakage, the Master must ensure that the following actions are taken:

1. Sound Emergency Alarm and Mobilize Oil Pollution Prevention Team.
2. Stop any and all transfer or bunkering operations.
3. Identify damage and report to proper authorities immediately (as per section 2 of this plan); consider a diver if necessary and possible
4. If possible, contain spill using materials on hand and dispose of oil-soaked materials in an appropriate container.
5. If there is any possibility of released vapours entering an engine room or the accommodation intake, appropriate preventative steps must be taken quickly.
6. Transfer fuel away from suspected leaks to empty or slack tanks if possible or to a ballast tank if necessary. If in port, arrangements can be made to pump oil ashore to tank or truck. Due consideration is to be paid to vessel stress and stability.

7. If it is not possible to identify the leaking tank, reduce level in all tanks in vicinity, giving due consideration to vessel stress and stability.

4. SPILLS CAUSED BY EQUIPMENT IN MACHINERY SPACES

1. If operational spills are caused by a failure of equipment in machinery spaces, any further operations of this equipment should be stopped immediately and measures are to be taken to avoid a spill.
2. Sound Emergency Alarm and Mobilize Oil Pollution Prevention Team
3. Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container.
4. Do not restart equipment until problem has been rectified.

3.2 SPILLS RESULTING FROM CASUALTIES

ALL CASUALTIES ARE TO BE REPORTED BY THE MASTER AS PER SECTION 2.

The Master's priority, when responding to a casualty, will be to ensure the safety of personnel and the vessel and to take action to prevent escalation of the incident.

In casualties involving spills, immediate consideration should be given to measures aimed at preventing fire and explosion, such as altering course so that the vessel is upwind of the slick, shutting down nonessential air intakes, etc.
If the vessel is aground, and therefore cannot maneuver, all possible sources of ignition should be eliminated and action taken to prevent flammable vapors entering accommodation and engine room spaces. Please refer to Section 1.3.3

In accordance with Section 1.3.3 of this Plan, all members of the vessel's crew should be familiar with the fundamentals of the ship's vital systems including the ventilation and electrical systems. Crew members should be able to isolate the accommodation and/or machinery spaces using the louvers and fan shutoffs; and, from the distribution panels, isolate electrical circuits in areas of risk. Please refer to Section 1.3.3 of this Plan for additional details.

Prior to considering remedial action, the Master will need to obtain detailed information on the damage sustained by the vessel. A visual inspection should be carried out and all bunker tanks and other compartments sounded. However, due regard should be paid to the indiscriminate opening of ullage plugs or sighting ports, especially when the vessel is aground, as loss of buoyancy could result. The Master shall also ensure that all covers, doors, vents, and hatches to any and all holds, ballast tanks, and fuel tanks are sealed tightly and remain sealed to prevent possible loss of buoyancy. Having assessed the damage sustained by the vessel, the Master will be in a position to decide what action should be taken to prevent or minimize further spillage

Great care must be taken to consider stability and stress when taking action to mitigate the spillage of oil or to free the vessel if aground. Internal transfers should be undertaken only with a full appreciation of the likely impact on the vessel's overall stress and stability. Please refer to the "Approved Stability Booklet" carried on board.

Should the damage sustained be extensive, the impact of internal transfers on stress and stability may be impossible for the vessel's personnel to assess. In such cases, Appendix 3 of this plan is to be filled out as completely as possible and forwarded to the Owners to ensure the appropriate calculations can be done.

When it is possible to maneuver, the Master, in conjunction with the proper shore authorities, may consider moving the vessel to a more suitable location in order, for example, to facilitate emergency repair work or lightening operations, or to reduce the threat posed to any particularly sensitive shoreline areas. Such maneuvering may be subject to coastal state jurisdiction.

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's

Oil Spill Resulting from Casualty (Grounding, Collision, Fire, or Explosion)

Action Considered	Designated Person	Completed
Sound emergency alarm	Chief Officer / OOW	Y / N
Mobilize Oil Pollution Prevention Team	Master / Chief Officer	Y / N
Close all nonessential vent intakes and tank vents as appropriate	Chief Officer / Chief Engineer	Y / N
Assess further danger to ship or personnel such as capsize or sinking	Master	Y / N
Cease all nonessential operations	Chief Officer / Chief Engineer	Y / N
Assess whether oil has actually been spilt / probability of spill	Chief Officer / Chief Engineer	Y / N
Sound all compartments to determine extent of damage	2nd Engineer	Y / N
Sound around vessel if grounded	Chief Officer	Y / N
Where possible transfer fuel away from damaged compartments	Chief Engineer	Y / N
Request outside assistance if required	Master	Y / N
Contain / reduce oil outflow with resources on hand	2nd Engineer	Y / N
Initiate Cleanup (if possible)	Chief Officer	Y / N

1. GROUNDING

If the vessel grounds, the Master must ensure that the following actions are taken:

1. Sound Emergency Alarm, muster crew and Mobilize Oil Pollution Prevention Team.
2. Eliminate all avoidable sources of ignition and ban smoking on board. Action must be taken to prevent hazardous vapours from entering accommodation and machinery spaces. See Section 1.3.3.
3. Identify damage by means of a visual inspection.
4. Take soundings around vessel to determine nature and gradient of seabed.
5. Check differences in tidal ranges at grounding site.
6. Evaluate tidal current in grounding area.
7. Take soundings of all tanks on shell and compare with departure soundings
8. Determine probability and/or quantity of oil released.
9. If oil release is determined or is probable, this is to be included in the casualty report.
10. Determine other possible hazards to the vessel, such as sliding off the grounding site, further damage from the seas / swell, and torsion forces.

At this point, determine risk of additional damage to vessel by attempting to refloat. If remaining aground is determined to be less of a risk then:

1. Use anchors to prevent vessel movement.
2. Take in ballast in empty tanks, with due consideration paid to stress and stability. Please refer to the "Approved Stability Booklet."
3. Consider transfer of fuel from damaged tanks, with due consideration paid to stress and stability. Please refer to the "Approved Stability Booklet."
4. Reduce longitudinal stress on the hull by transfer of fluids internally. Please refer to the "Approved Stability Booklet."
5. If the change in stability and stress cannot be calculated on board, contact the Vessel's management to arrange for the necessary calculations. Refer to Appendix 3 for information which should be provided

2. FIRE / EXPLOSION

If a fire or explosion occurs on board, the vessel's fire control party must ensure that the following actions are taken:

1. Sound Emergency Alarm muster crew and Mobilize Oil Pollution Prevention Team.
2. Determine extent of damage and what damage control measures can be taken.
3. Determine whether there are casualties.
4. Request assistance as deemed necessary.
5. Take necessary actions to prevent smoke and other hazardous vapours from entering the accommodation and machinery spaces.
6. Assess possibility of oil leakage
7. Determine possible actions to control the discharge of oil. This will depend largely on the damage to the ship and cargo.
8. If there is a discharge or possible discharge of oil, this is to be included in the casualty report.
9. Should abandonment be necessary, the Master must ensure that every effort is made to maneuver survival craft upwind of any oil spill.

3. COLLISION

If a collision occurs, the Master must ensure that the following actions are taken:

1. Sound Emergency Alarm muster crew and Mobilize Oil Pollution Prevention Team
2. Determine whether there are casualties.
3. If there is a possibility of fire or explosion, eliminate all avoidable sources of ignition and ban smoking on board. Action should be taken to prevent flammable vapours from entering accommodation and machinery spaces See Section 1.3.3.
4. Decide whether separation of vessels may cause or increase spillage of oil, or increase the risk of sinking
5. If any oil tanks are penetrated, isolate the penetrated tank or transfer oil to slack or empty tanks with due attention paid to stress and stability of the vessel. Please refer to the "Approved Stability Booklet."
6. If there is an oil spill, make a report as per section 2.
7. If possible to maneuver, the Master, in conjunction with the appropriate shore authorities, should consider moving his ship to a more suitable location in order to facilitate emergency repair work or lightening operations, or to reduce the threat posed to any sensitive shoreline areas

4. HULL FAILURE (INCLUDING ICE DAMAGE)

If the vessel suffers structural hull failure, the Master must ensure that the following actions are taken:

1. Sound Emergency Alarm muster crew and Mobilize Oil Pollution Prevention Team
2. Reduce speed or stop to minimize stress on hull.
3. Assess immediate danger of sinking or capsizing.
4. Initiate damage control measures if possible.
5. If lightening is required, all efforts should be made to wait for a barge or other ship to receive the cargo.
6. If oil has spilled, or if it is necessary to jettison oil to maintain stability, make a report as per section 2.
7. If the change in stability and stress cannot be calculated on board, contact the Vessel's management to arrange for the necessary calculations.
8. Consider forecast weather conditions and their effect on the situation.
9. Should abandonment be necessary, the Master must ensure that every effort is made to maneuver survival craft upwind of any oil spill.

5. EXCESSIVE LIST

If excessive list occurs rapidly and unexpectedly, it may be due to:

1. Failure of hull plating.
2. Failure of internal bulkhead between compartments.
3. Shift of cargo
4. Damage through grounding or collision
5. Incorrect operating condition Refer to "Approved Stability Booklet"
6. Flooding in Engine Room, where free surface can cause a list.

The Master must ensure the following steps are taken immediately:

1. Stop any cargo, bunkering, or ballast operations in progress.
2. Sound Emergency Alarm muster crew and Mobilize Oil Pollution Prevention Team.
3. Determine whether there are casualties.
4. If under way, reduce speed or stop.
5. Establish reason for list. See above.
6. Sound all tanks and compare with departure soundings.
7. Close all openings and vent pipes.
8. Prepare ballast and transfer pumps for possible remedial action
9. If lightening is required, all efforts should be made to wait for a barge or other ship to receive the cargo.
10. If oil has spilled, or it is necessary to jettison oil to maintain stability, make a report as per section 2.
11. If possible, take corrective action to rectify the situation with due consideration paid to vessel stress and stability Please refer to the "Approved Stability Booklet."

SECTION 4 • National and Local Coordination

1. The Master will advise the Coast Guard of nearest coastal state regarding any oil spill. Vessel Interest Contacts must also be notified of any such incident. See Appendix 2 for details.

2. The Master will be the point of contact on the vessel for coordinating shipboard activities with national and local authorities, act as the Company's on-scene representative, and will be responsible for overseeing the action of any salvage or spill contractors employed until such time as he/she has been FORMALLY relieved of these responsibilities by the Company.

3. The person or persons identified in the declaration shall be responsible for contacting and mobilizing the response organization(s). These organizations will coordinate and conduct the response. It is not normally practical for vessel's personnel to be directly involved in cleanup activities. Therefore, their primary role will be to provide as much information as necessary to assist the response and to cooperate with cleanup personnel. However, where no local response is forthcoming, or is delayed, the Master should consider the use of available shipboard materials to clean up or contain the spilled oil by, for example, using ship-stocked absorbent materials or utilizing mooring ropes or air-filled hoses as makeshift booms.

4. Dispersants or degreasers should not be used on oil spilled in the water as their use may contravene local regulations. However, dispersants may be used if they are approved by Environment Canada specifically for a given incident. Environment Canada will allow and approve the use of dispersants on a case by case basis only

SECTION 5 • Ship to Ship Transfer Operations

Should a situation such as lightening due to damage require a ship to ship transfer of petroleum products, the Master must take into account but not limited to the following:

1. Proper lines of communication between ships including language and radio working frequency;
2. Current and forecasted weather conditions for the intended area of transfer;
3. The compatibility of the vessels involved with regards to size, freeboard, manifold location, list, trim, etc.
4. The elimination of all possible ignition sources;
5. Oil spill clean up equipment and procedures in place;
6. Contingency planning for emergency situations in place.
7. The need to notify and obtain the agreement of any responsible authority.
8. Site conditions such as available shelter, water depth, and available anchorage
9. Traffic density.

For detailed procedures concerning ship to ship transfer of petroleum products, please refer to ***The Ship to Ship Transfer Guide (Petroleum)****, published by The International Chamber of Shipping Oil Companies International Marine Forum, 3rd edition, 1997*

SECTION 6 • Safety Precautions For Bunkering Operations

SHIP

1. International code flag BRAVO to be flown while fueling.
2. Ensure the vessel is adequately secured and has no excessive list or trim.
3. Plug all deck scuppers (openings) to ensure effective containment of a minor spill from tank vents, sounding pipes, manifolds and hose connections.
4. Support hose as necessary to prevent excessive strain.
5. Ensure overboards and other unused fuel manifold valves are closed and secured shut.
6. Monitor hose and connections on the vessel.
7. Monitor tanks, manifolds and vents.
8. Direct fuel to the designated tanks and allow for topping off of tanks. Request reduction in flow rate, when required, and always when topping off tanks.
9. Ship is responsible for and must report any pollutant discharge from the vessel.
10. Provide cleanup materials for minor shipboard spills.

DRIVER / SITE SUPERVISOR

1. Inspect and monitor hose and connections ashore.
2. Monitor truck tank and metering unit if used.
3. Reduce flow rate when requested.
4. Report spills from truck and hoses (If supplier becomes aware of a spill he/she should verify whether or not the spill has been reported. If it has not been reported he/she should do so).
5. Provide clean up materials for minor shore spills.
6. Locate hoses to minimize possibility of damage. Use safety cones to alert traffic if necessary.

COMMON

1. All personnel involved in the fueling operation must not be impaired for the duration of the fueling period Impairment includes but is not limited to impairment by alcohol, drugs or fatigue.
2. Observe no smoking or open flame requirement for the area.
3. Establish and maintain effective voice communication. Prearrange signals for:
   - A - Standby to start transfer
   - B - start transfer
   - C - slow down transfer
   - D - standby to stop transfer
   - E - stop transfer
   - F - emergency stop of transfer
   - G - emergency shutdown of transfer
4. When fueling at night provide sufficient lighting for the area.
5. In case of emergency take all necessary measures to rectify or minimize the effects of the emergency. Dispersants must not be used without the approval of Environment Canada.
6. In the event of a spill, fueling will stop until relevant authorities have been notified. Containment and clean up measures must be taken at this time. Fueling process will recommence only when the cause of the spill has been determined and rectified unless prohibited by a recognized authority. The restarting of the fueling process must not interfere with the immediate, effective and sustained response to the spill incident.

SECTION 7 • Additional Information (Non-Mandatory)

This section provides for additional information that local authorities, insurance underwriters, or Vessel Management may wish to include, but is not mandatory. (Regulation 37, Annex I, Marpol 73/78)

MEDIA INFORMATION

In the event of an oil spill or other related casualty, the Master is to direct any Coastal Radio station being worked that inquiries from any of the various media nodes are to be directed to the Vessel Management, who will handle such incidents shore-side. This will enable the Master to concentrate on the matter at hand.

PLAN REVIEW

This plan is to be reviewed at regular intervals by the Vessel Management and Master such that the information contained herein is current. Changes should be incorporated in the plan as and when they occur and the changes noted and by whom. Reviews should be conducted annually to reflect changes in local laws or policies, contact names or numbers, vessel characteristics, or company policy

Reviews should also be conducted after any use of the plan in response to an incident, in order to evaluate its effectiveness and make any modifications deemed prudent at that time. Any changes or revisions to the mandatory sections of this manual are to be resubmitted and approved by Transport Canada Marine Safety

COMPANY POLICY

The Master is responsible for maintaining the vessel's plans and technical information, in addition to the drawings contained in this plan, in an orderly and readily accessible fashion. The Master is to satisfy himself to the fact that the vessel's Chief Engineer complies in similar fashion as regards to plans and technical information in his possession.

DIAGRAMS AND DRAWINGS

Should the Master or Chief Engineer discover that crucial plans or manuals covering the operation of essential parts of the vessel are not on board, they are to request the company's head office in writing, to supply such plans and manuals.

RECORD KEEPING

As stated elsewhere in this plan, the Master shall use every effort to retain all records of a pollution incident and responses thereto, for later review by the company's technical department in conjunction with the crew. Such record keeping should include actual samples of oil spilled.

ONBOARD SPILL RESPONSE EQUIPMENT

Anchors, Buoys, Booms, Collapsible Tanks, Oil skimmer and Power pack with 100 feet of Hydraulic Hose, Air driven pump, Two 225 liter spill kits containing absorbent pads, booms, absorbant granular, spark proof shovels, protective clothing, etc., are stored onboard the vessel in the EQUIPMENT ROOM, Starboard side, main deck and readily accessible by the crew in case of spill . It is the responsibility of the Chief Engineer to keep inventory and maintain an adequate stock of equipment

SECTION 8 • Oil Pollution Prevention Team

The master of the vessel is to appoint an Oil Pollution Prevention Team (OPPT) on board, to initiate recovery or cleanup procedures, and to secure the ship immediately if an incident occurs.

The following is an example which can be used by the Master to aid in designating members of the OPPT. Should changes to the team be made, please make a record in this section :

Master
Chief Officer
Chief Engineer

In the event of an emergency, the team should be called out immediately

The team should be given necessary training in the use of such equipment as oil absorbents that the vessel may carry All members of the OPPT should be aware of their duties should an oil spill occur

Instructions to the Oil Pollution Prevention Team

8.1 Master

- In overall charge.
- Informs terminal authorities or coastal authorities of incident.
- Informs the local agent and requests agent to inform the local underwriter's representative.
- Advises the company's head office of the situation Keeps everyone updated at regular intervals. and advises of any changes in status of the emergency.
- Keeps log of all events and progress of actions

8.2 Chief Officer

- In charge of deck / cargo operations.
- In charge of lifeboats if required.
- Keeps the Master informed and updated on the situation and of the results of steps taken to contain any spills and limit outflow.
- Insures all openings in the deck and superstructure are closed to limit vapour entry

8.3 Chief Engineer

- In charge of bunkering operations.
- Organizes distribution of oil spill detergents if required.
- Stops bunkering operations if applicable.
- Stops pumps and any unnecessary pieces of machinery.

Other Personnel

Deck Officer on duty

- Alerts and informs Chief Officer / Chief Engineer on the situation.
- Mobilize off duty crew as necessary.

Engineer on duty

- Assists the Chief Engineer.
- Prepare for fire fighting
- Ensure sufficient power and water to deck.
- Organizes onboard clean up equipment.

Deck Officer off duty

- Under the direction of the Master, responsible for the reporting and record keeping of all events.

On duty Ratings

- Alerts the Officer on duty of any leakage.
- Position sorbent / clean up material to prevent any fluid escape

Off duty personnel

- Assist as required

APPENDIX 1 • Report Format and Content

The report should contain the following:

AA VESSEL NAME, CALL SIGN, FLAG

BB DATE & TIME (GMT) OF INCIDENT: 111935 meaning 11th of month at 7:35 pm

CC SHIPS POSITION: 2230N 0600E meaning 22 deg. 30 min. N, 6 deg. E

or

DD SHIPS POSITION BY TRUE BEARING (3 DIGITS) AND DISTANCE FROM CLEARLY IDENTIFIED LANDMARK.

EE TRUE COURSE (3 DIGITS)

FF SPEED IN KNOTS AND TENTHS OF A KNOT (3 DIGITS)

LL ROUTE INFORMATION - INTENDED TRACK

MM RADIO STATIONS AND FREQUENCIES GUARDED

NN TIME OF NEXT REPORT (same as in BB)

OO DRAFT (4 DIGITS - meters and centimeters)

PP TYPES AND QUANTITIES OF CARGO AND BUNKERS ON BOARD

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RR BRIEF DETAILS OF ACTUAL POLLUTION (oil type, estimate of quantity discharged, whether discharge continues, cause, estimate of slick movement)

SS WEATHER AND SEA CONDITIONS (wind force/direction, relevant tidal and/or current information)

TT NAME, ADDRESS, TELEX, FAX, TELEPHONE NUMBERS OF VESSEL OWNER OR REPRESENTATIVE

UU DETAILS OF LENGTH, BREADTH, TONNAGE, AND TYPE OF VESSEL

WW TOTAL NUMBER OF PERSONS ON BOARD

XX MISC. DETAILS (brief details of incident, actions taken, injuries, assistance required)

TRANSPORT CANADA TRANSPORTS CANADA MARINE SAFETY SÉCURITÉ MARITIME CANADA

UNOFFICIAL OIL POLLUTION EMERGENCY REPORT BY FACSIMILE

Vessel Name Call Sign Flag

Date and Time of Event

Vessel Position (Latitude & Longitude, Bearing & Distance from Landmark)

Course Speed

Intended Track

Radio Station

Date and Time of Next Report

Type and Quantity of Oil On board

Brief Details of Damage

Brief Details of Pollution

Details of Weather & Sea Conditions (Wind Speed/Direction, Swell Height/Direction)

Names of Vessel's Owner

Vessel Size and Type

Any Other Additional Information as Determined by Master

APPENDIX 2 • Who to Contact

In accordance with the Canadian Pollutant Discharge Reporting Regulations, the Master or Owner of a ship must report, without delay, any discharge or anticipated discharge of a pollutant in Canadian waters or fishing zones, to a Pollution Prevention Officer (PPO) Reports must be made in the manner described in Guidelines for Reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine Pollutants, TP 9834, or "General Principles for Ship Reporting Systems and Ship Reporting Requirements, including Guidelines for Reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine Pollutants" adopted by the IMO by Resolution A.851(20) These initial reports can be made to Marine Communication and Traffic Service (MCTS) or any other Canadian Coast Guard Radio Station (CGRS), on the frequencies listed in the publication, Radio Aids to Marine Navigation (RAMN)

In addition to the above process for reporting a spill from a vessel to a PPO through a CGRS or MCTS, the Canadian Coast Guard maintains a 24 hour Operations Center which can be contacted at:

Canadian Coast Guard Operations Center
344 Slater Street
Ottawa, Ontario
K1A 0N7

Tel: (613) 990-5600 Fax: (613) 995-4700 Tlx: (613) 053 3128

Alternatively, spills may be reported to the appropriate regional center or nearest Vessel Traffic Service Center:

Newfoundland

St. John's	Tel:	1-709-772-2083
		1-800-563-2444 (24 hr.)
	Fax:	1-709-772-5369
Placentia Bay	Tel:	1-709-227-2182
	Fax:	1-709-227-5637
Port Aux Basques	Tel:	1-709-695-2167
	Fax:	1-709-695-7784
Goose Bay	Tel:	1-709-896-2252
	Fax:	1-709-896-8455
St. Anthony	Tel:	1-709-454-3852
	Fax:	1-709-454-3716

Nunavut

Nordreg Canada	Tel:	1-867-979-5724
P.O Box 189	Fax:	1-867-979-2464
Iqaluit, NU		
X0A 0H0		

Nova Scotia

Halifax	Tel:	1-902-426-9750 (MCTS Operations)
		1-902-426-9738 (Officer in Charge)
	Fax:	1-702-426-4483
Sydney	Tel:	1-902-564-7751 (MCTS Operations)
		1-902-564-7752 (Officer in Charge)
	Fax:	1-702-564-7662

New Brunswick

Saint John	Tel:	1-506-636-4696 (MCTS Operations)
		1-506-636-4269 (Officer in Charge)
	Fax:	1-506-636-5000

Quebec

Quebec City	Tel:	1-418-648-4427 (MCTS Operations)
		1-418-648-7459 (Officer in Charge)
	Fax:	1-418-648-7244
Montreal	Tel:	1-450-928-4544 (MCTS Operations)
		1-450-928-4547 (Officer in Charge)
	Fax:	1-450-928-4547
Riviere-Au-Renard	Tel:	1-418-269-5686 (MCTS Operations)
		1-418-269-7718 (Officer in Charge)
	Fax:	1-418-269-5514

Greenland

Spill Notification Point	Tel:	+299-101111
Groenlands Kommando	Fax:	+299-10112
Maritime Rescue Coordination Center Gronnedal		
KK-3930 Gronnndell		

Competant National Authority	Tel:	+45-31 578310
National Agency of Environmental Protection		+45-86 123099 (24hr)
Strandgade 29	Fax:	+45-31 572449/+45-86 181140
DK- 1401 Copenhagen		

Note:

The following contacts have been included as they are within the expected range of operation of the Vessel Due to the nature of the Vessel's voyages and varied ports of call this list should not be considered exhaustive For this reason space has been included at the end of this section for addenda.

Within Canada, administrative inquiries related to pollution prevention, compliance and enforcement, vessel regulations, design and construction should be directed to:

Director General, Marine Safety
Transport Canada
Mailstop: AMS
330 Sparks Street
Ottawa, Ontario
K1A 0N5
Tel: (613) 998-0610 Fax: (613) 954-1032

Inquiries relating to pollution response should be directed to:

Director General, Rescue and Environmental Response
Canadian Coast Guard
344 Slater Street
Ottawa, Ontario
K1A 0N7

Tel: (613) 990-3110 Fax: (613) 996-8902

Additional Contact Information

Region	
Spill Notification Point	Contact Numbers

Region	
Spill Notification Point	Contact Numbers

Region	
Spill Notification Point	Contact Numbers

Region	
Spill Notification Point	Contact Numbers

VESSEL INTEREST CONTACTS

Vessel Management
Coastal Shipping Limited (Owners)
P. O. Box 300, Station C
Happy Valley-Goose Bay, NL
A0P 1C0
Canada
Ph: (709) 896-2421
Fax: (709) 896-5028

Vessel Operations
Coastal Shipping Limited
139 Water Street, Suite 502
St. John's, NL
A1C 1B2
Canada
Ph: (709) 579-6127
Fax: (709) 579-8103

24 Hour Emergency Contact

(709) 896-5036
(709) 896-9348

General Manager	Dennis White	(709) 896-2421 work (709) 896-1404 cell (709) 896-2870 home
Engineering Superintendent	Jim Babij	(709) 579-6127 work (709) 727-5065 cell (709) 576-0160 home
	Kevin Brewer	(709) 579-6127 work (709) 682-0826 cell (709) 227 2600 home
Designated Person Ashore	Philip Martin	(709) 579-6127 work (709) 727-4242 cell (709) 722-3781 home

Eastern Canada Response Corporation
Required Call Out Information

ECRC EMERGENCY NUMBER: 613 930-9690

CONTRACT NUMBER: ______________________________

PROBLEM: ______________________________

CURRENT STATUS: ______________________________

CONDITIONS AT SPILL SITE: ______________________________

THIS IS AN *(CIRCLE ONE)* EMERGENCY EXERCISE ALERT

R.O. RESPONSE REQUESTED BY *(PERSON S NAME)* ______________________________

OF *(MEMBER COMPANY NAME)* ______________________________ ON BEHALF OF

THE ✎SHIP / FACILITY *(NAME)* ______________________________

THE PRODUCT IS ______________________________

SPILL VOLUME IS *(CIRCLE ONE)* ______________________________ GAL / Litres / BBL /Tonnes

TOTAL VOLUME AT RISK IS *(STATE UNITS)* ______________________________

LOCATED AT LATITUDE ______________ LONGITUDE ______________

OR GEOGRAPHIC LOCATION NAME IS ______________________________

OR IT IS LOCATED ________km / miles ✎(N / NE / E / SE / S / SW / W / NW) OF

(CITY NAME) ______________________________

THE CLOSEST AIRPORT IS ______________________________

I CAN BE REACHED AT THE FOLLOWING NUMBERS:

TEL: ______________ CELL: ______________ PAGER: ______________

APPENDIX 3 • Vessel Stress and Stability Calculations

VOYAGE PARTICULARS

Departure Port

Departure Date

Time (GMT)

VESSEL CONDITION IMMEDIATELY BEFORE CASUALTY

Mean Draft Forward

Mean Draft Aft

KG(solid)

KG(fluid)

LCG of Vessel

#	COMPARTMENT	S.G.	TONNES

DATA RELATING TO VESSEL AFTER CASUALTY

Nature of Casualty: Collision / Grounding (Fixed / Free) / Fire
Explosion / Heavy Weather / Other

Casualty Date Report Time (GMT)

Geographical Location of Casualty: LAT
LONG

Conditions at Site at Time of Casualty Report

Weather

Sea State

Tidal State

Tidal Range

Forecast

S.G. of Surrounding Water

Position of Vessel relative to Wind, Waves, Tides, etc

Drafts Measured Port and Starboard:

Drafts at Fwd Marks/F.P (Best Estimate)
Drafts at Aft Marks/A.P (Best Estimate)
Drafts at Midships (Best Estimate)
Angle of Heel (Port / Starboard)

Best Estimate of Depth of Water (for Grounding)

Location	Port	Starboard

REPORTED DAMAGE

Details of each damaged compartment known to be open to the sea, including those damaged above the present waterline

Compartment	Estimated Cargo Weight (tonnes)	Permeability of Cargo (%)	Comments

Extent and location of structural damage in way of above compartments (Attach sketch)

Extent of additional damage to pipes, valves, hatches, doors, etc and list of compartments which may be subject to progressive flooding as a result.

Soundings from or estimates of amounts of flood water in spaces not directly open to sea.

PROPOSED ACTION AND REQUIREMENTS

Any other relevant information, details of action being undertaken or proposed course of action, salvage operation etc.

4A . OPERATIONAL SPILL CHECKLISTS

OPERATIONAL SPILL CHECKLIST

HULL LEAKAGE

In the event of a hull leakage, the MASTER must ensure that the following actions are taken:

- **Sound Emergency Alarm and Mobilize Oil Pollution Prevention Team** ☐
- **Stop all transfers or bunkering operations** ☐
- **Identify the damage and REPORT to proper authorities immediately as per Section 2 of this plan** ☐
- **Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container** ☐
- **Contain any spill vapours from entering Engine room or Accommodations** ☐
- **Drain or transfer oil into empty or slack tanks if possible or arrange for transfer to shore** ☐
- **If oil is in bilges, pump through oil/water separator** ☐

✓ YES X NO NA Not Applicable

OPERATIONAL SPILL CHECKLIST

PIPE LEAKAGE

In the event of a pipe leakage, the CHIEF ENGINEER must ensure that the following actions are taken:

Stop Oil Flow and close manifold and other valves.	☐
Sound Emergency Alarm and Mobilize Oil Pollution Prevention Team	☐
Place drain buckets under overflow pipes to contain possible	☐
Locate the source and drain affected section into an available empty or slack tank. Repair.	☐
Contain any spill vapours from entering Engine room or Accommodations	☐
Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container	☐
If oil is overboard, REPORT to proper authorities immediately as per section 2 of this plan	☐

✓ YES X NO NA Not Applicable

4B. CASUALTY SPILL CHECKLISTS

CASUALTY SPILL CHECKLIST

HULL FAILURE including Ice Damage

In the event of hull failure (including ice damage), the MASTER must ensure that the following actions are taken:

Sound Emergency Alarm and Muster Crew	☐
Mobilize the Oil Pollution Prevention Team	☐
Reduce Speed or Stop to Mimimize Hull Stress	☐
Assess Immediate Danger of Sinking/Capsizing	☐
Initiate Damage Control Measures with Due Care Paid to Vessel Strength and Stability	☐
REPORT to Proper Authorities Immediately as per Section 2 of this Plan	☐
Is Abandonment Necessary? **If YES then Ensure Every Effort is Made to Manoeuvre Survival Craft Upwind Of Any Oil Spill**	☐

✓ YES X NO NA Not Applicable

CASUALTY SPILL CHECKLIST

GROUNDING

In the event of a grounding incident, the MASTER must ensure that the following actions are taken:

- ☐ **Sound Emergency Alarm and Muster Crew**
- ☐ **Mobilize the Oil Pollution Prevention Team**
- ☐ **Eliminate All Avoidable Sources of Ignition and Ban Smoking on Board**
- ☐ **Identify Damage by Visual Inspection**
- ☐ **Take Soundings to Determine Nature and Gradient of Seabed**
- ☐ **Check Tidal Ranges at Grounding Site**
- ☐ **Evaluate Tidal Current at Grounding Site**
- ☐ **Take Sounding of All Tanks on Shell and Compare with Departure Soundings to Determine Probability and/or Quantity of Oil Released**
- ☐ **REPORT to Proper Authorities Immediately as per Section 2 of this Plan**
- ☐ **Determine Best Course of Action: Refloat or Remain Aground**
- ☐ **If Remaining Aground is Best, Take Additional Measures to Prevent Vessel Movement and Reduce Longitudinal Stress as per Section 3.1**

✓ YES X NO NA Not Applicable

CASUALTY SPILL CHECKLIST

FIRE / EXPLOSION

In the event of a fire or explosion, the FIRE CONTROL PARTY CHIEF must ensure that the following actions are taken:

Sound Emergency Alarm and Muster Crew ☐

Mobilize the Oil Pollution Prevention Team ☐

Determine Extent of Damage and Damage

☐

Control Measures to be Taken

Determine Whether there are Casualties ☐

Request Assistance as Necessary ☐

Assess Possibility of Oil Leakage ☐

REPORT to Proper Authorities Immediately ☐
as per Section 2 of this Plan

Is Abandonment Necessary? ☐
If YES then Ensure Every Effort is Made to Manoeuvre Survival Craft Upwind Of Any Oil Spill

✓ YES X NO NA Not Applicable

CASUALTY SPILL CHECKLIST

COLLISION

In the event of a collision, the MASTER must ensure that the following actions are taken:

- [ ] **Sound Emergency Alarm and Muster Crew**
- [ ] **Determine Whether there are Casualties**
- [ ] **Mobilize the Oil Pollution Prevention Team**
- [ ] **Determine Whether Separation of Vessels May Cause or Increase Spillage of Oil**
- [ ] **Are Any Oil Tanks Penetrated?**
  If YES then Isolate Penetrated Tanks and/or Transfer Oil to Slack or Empty Tanks with Due Care Paid to Vessel Stress and Stability
- [ ] **REPORT to Proper Authorities Immediately as per Section 2 of this Plan**

✓ YES X NO NA Not Applicable

CASUALTY SPILL CHECKLIST

EXCESSIVE LIST

In the event of excessive listing, the MASTER must ensure that the following actions are taken:

Sound Emergency Alarm and Muster Crew ☐

Stop any Cargo, Bunkering or Ballasting Operations in Progress ☐

Determine Whether there are Casualties ☐

If Under Way then Reduce Speed or Stop ☐

Establish Reason for Excessive List ☐

- ☐ ***Failure of Hull Plating?***
- ☐ ***Failure of Internal Bulkhead between Compartments?***
- ☐ ***Shift of Cargo?***
- ☐ ***Damage from Grounding or Collision?***
- ☐ ***Incorrect Operational Procedures?***
- ☐ ***Flooding in Engine Room with Resultant Free Surface?***
- ☐ ***Other?*** ______________________________

Sound All Tanks and Compare with Departure Soundings ☐

REPORT to Proper Authorities Immediately as per Section 2 of this Plan ☐

Initiate Corrective Action with Due Care Paid to Vessel Strength and Stability ☐

Is Abandonment Necessary? ☐

If YES then Ensure Every Effort is Made to Manoeuvre Survival Craft Upwind Of Any Oil Spill

✓ YES　　**X** NO　　**NA** Not Applicable

4C. FLOW CHARTS

SUMMARY FLOWCHART

Incident involving Discharge of Oil (Probable or Actual)

Assess Nature of Incident

Mobilize Oil Pollution Team

Sound Alarm and Muster Crew

Identify Source of Discharge

Spill Assessment

REPORTING

- By Master and/or Designated Crew Member

When to Report

- all probable and actual spills

How to Report

- by quickest possible means to Coastal Radio Station, Designated Ship Movement Reporting Station or Rescue Coordination Centre
- by quickest possible means to local authorities

Who to Contact

- nearest coastal state
- harbour and terminal operators (in port)
- Vessel Management

What to Report

- Initial Report - Res.A 851(20)
- regular Follow Up Reports
- characteristics of spilled oil
- cargo, ballast, and bunkers
- weather and sea conditions
- slick movement
- assistance required (e.g. salvage, lightening, equipment, personnel, chemicals)
- assistance NOT required

ACTIONS TO CONTROL DISCHARGE

- measures to minimize the escpae of oil and threat to the marine environment

NAVIGATIONAL MEASURES

- alter course, speed, or position
- change of list and/or trim
- anchoring
- setting aground
- initiate towage
- assess safe haven requirements
- weather, tide, swell forecasts
- slick monitoring
- recording of events & communications

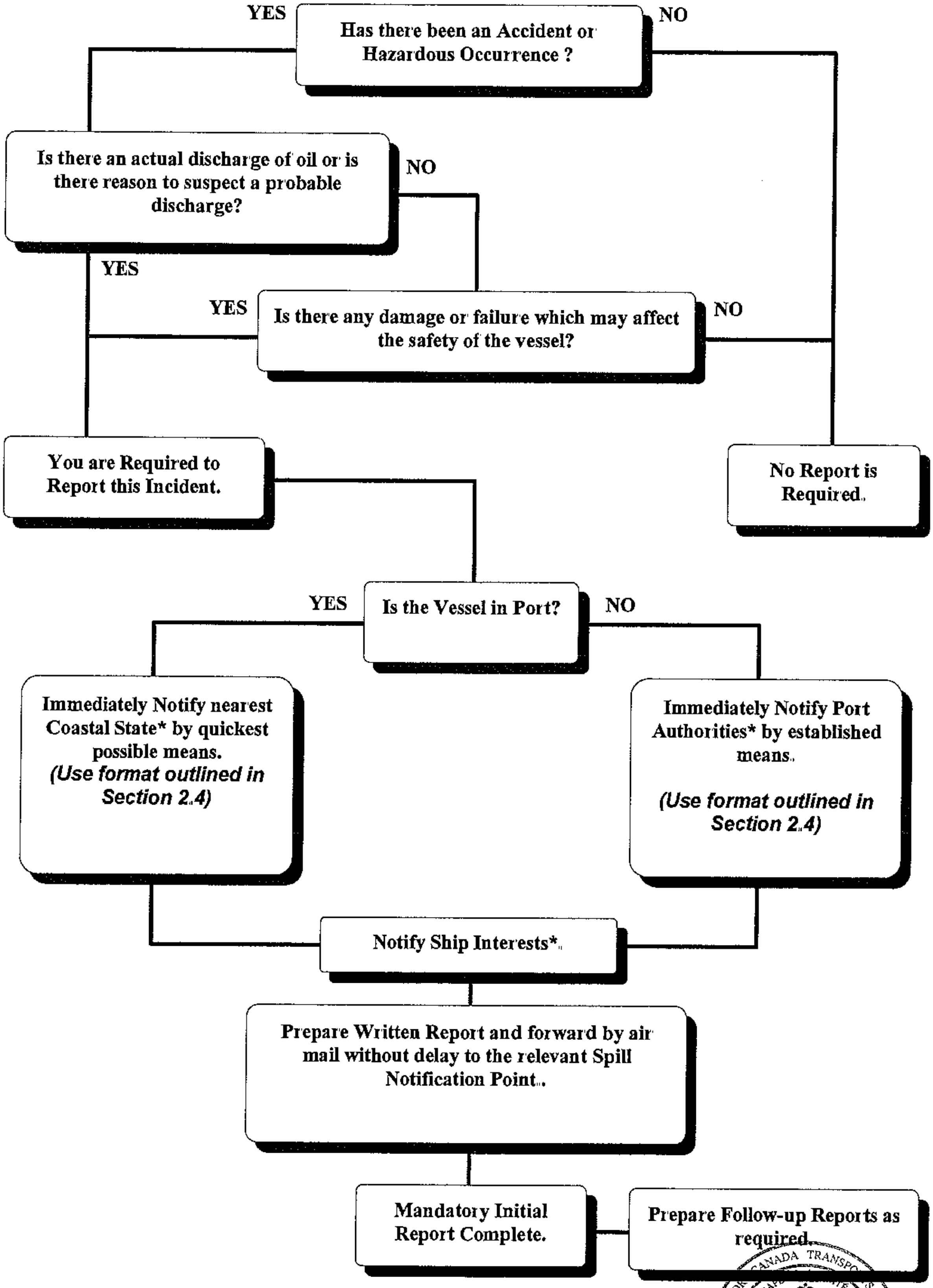
SEAMANSHIP MEASURES

- safety assessment and precautions
- advice on priority countermeasures
- damage stability and stress considerations
- ballast / deballasting
- internal cargo transfer operations
- emergency ship-to- ship transfers of cargo and/or bunkers
- set up shipboard responses for repairs, firefighting, cleanup operations, etc.

STEPS TO INITIATE EXTERNAL RESPONSE

- refer to coastal Port State listings for local help
- refer to Vessel Interests contact list
- external clean-up resources required
- continued monitoring of activities

REPORTING REQUIREMENTS (as per Section 2)



** contact information is located in Appendix 2.*

APPENDIX 5 • Relevant Drawings

FOLLOWING ARE DRAWINGS RELEVANT TO THIS VESSEL

General Arrangement
Tank Capacity Plan
Arrangement of Cargo Tank Cleaning / Ballast Pumping System
Arrangement of Cargo / Stripping System
Fuel Oil Service System
Fuel Oil Transfer & Purifying System
Fuel Oil & Diesel Oil Filling System
Deck Scupper System

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NL

Examined under the provisions of Annex 1 of MARPOL 73/78 and the Canadian Oil Pollution Prevention Regulations (SOR/93-3) and found satisfactory.

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NF

W. S. Atkinson, Pollution Prevention Officer

SHIPBOARD OIL POLLUTION EMERGENCY PLAN

for

MT Tuvaq

11290 Gross Tons Register of St. John's, NL

PREPARED BY: ***Poseidon Marine Consultants Limited***
391 Stavanger Drive
St. John's NL A1A 5G1
TELEPHONE: (709) 739-4321
TELEFAX: (709) 739-4421

PREPARED FOR: ***Coastal Shipping***
Suite 502,
139 Water St. (Fortis Bldg.)
St. John's NL
A1C 1B2

Issued: April 2003
Job Number: 03-009

Change Number

Official Stamp Examined by Date

Change Number

Official Stamp Examined by Date

Change Number

Official Stamp Examined by Date

RECORD OF CHANGES

Amendment Number	Section and Page Affected	Date Entered	Remarks	Name and Position of Person Making Entry

RECORD OF OIL POLLUTION EMERGENCY DRILLS

DATE	TYPE OF OIL POLLUTION DRILL	LOCATION	REMARKS MASTER'S SIGNATURE

TABLE OF CONTENTS

SHIP'S PARTICULARS

PRINCIPAL PARTICULARS

Vessel Name:	IUVAQ ex. Tiira
Flag / Port of Registry:	Canada / St. John's, NL
Call Sign:	OIHO
DNV Number:	10520
IMO Number:	7421966
Gross Registered Tonnage:	11290
Net Registered Tonnage:	5941
Length, Overall:	164.2 m
Length, B.P.:	150 m
Breadth, Max at Deck:	22.2 m
Depth:	12.00 m
Design Draft (Loadline Summer):	9.5 m
Built:	Werft Nobiskrug GMBH. Rendisburg, Germany
Year of Build:	1977
Complement:	21
Propulsion Power:	2 Wartsila 6L46B engines totaling 15368 BHP

CARGO PARTICULARS

Tank Capacities:	Water Ballast -	6247.30 m^3 @100%
	Heavy Fuel Oil -	1532.90 m^3
	Diesel Oil -	410.40 m^3
	Cargo-	16542.61 m^3 @100%
	Slops -	664.20 m^3 @ 100%
Cargo Pumps:	Deep well hydraulically Driven Frank Mohn	
Cargo Manifolds:	Four (4) 250 mm ID cargo lines per side	

INTRODUCTION

1. This Plan is written in accordance with the Canadian Oil Pollution Prevention Regulations and also in accordance with the requirements of regulation 26 of annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 thereto.

2. The purpose of the Plan is to provide guidance to on board operating personnel the vessel with respect to the steps to be taken when a pollution incident has or is likely to occur.

3. The Plan contains all information and operational instructions required by the guidelines. The appendices contain names, telephone, telex numbers, etc. of all contacts referenced in the Plan, as well as other reference material.

4. This Plan has been examined by the Canadian Board of Steamship Inspection, (hereinafter referred to as "the Board") and, except as provided below, no alteration or revision shall be made to any part of it without prior approval of the Board.

5. Changes to Section 5 and the appendices will not be required to be approved by the Board. The appendices should be maintained up to date by the Owners, Operators, and Managers.

6. For the purposes of this Plan, the Master is taken to be that person who is a member of the vessel's operational personnel and to which is given senior responsibility for the vessel and any circumstances pertaining thereto.

7. Before entering a port of call, the Master should be aware of local emergency response proceedures and organisations and have up to date contact information readily available.

SECTION 1 • Preamble

1.1 PURPOSE AND INTENT OF THIS PLAN

This Shipboard Oil Pollution Emergency Plan is intended to assist the vessel's officers, crew and management personnel in dealing with an unexpected discharge of oil. Its primary purpose is to set in motion the necessary actions to stop or minimize the discharge and to mitigate its effects.

1.2 SUPPORT BY VESSEL'S MANAGEMENT

In accordance with the plans and policies of the vessel's management organization, management personnel will support the vessel's crew with additional resources, i.e. personnel and materials, as the situation warrants.

1.3 PERSONNEL TRAINING AND EXERCISES

1. ***It is the responsibility of the Vessel's Management to ensure that, through training and exercises, all officers and crew are capable of confidently and safely carrying out their assigned duties.***

   Officers responsible for maintaining the trim of the vessel and ordering transfers of ballast and/or cargo should be fully aware of the consequences of their actions and are expected to comply with the regulations and any documentation aboard the vessel which prescribes conditions of trim and stability , e.g. "Approved Stability Booklet".

   Officers and crew responsible for cargo and or bunkering operations should also be fully aware of the consequences of their actions and are expected to comply with the regulations and any documentation aboard the vessel which prescribes methods of operation.

   Officers and crew assigned additional responsibilities for fire fighting or emergency response should have appropriate training as per the regulations and should participate in specific drills and exercises to maintain their abilities and be fully familiar with appropriate vessel systems.

2. ***The vessel's management and operating personnel should become familiar with this document and its format so that should an emergency occur, the response of the officers and crew and the vessel's management personnel will be carried out in a structured, logical and timely manner.***

In order to ensure that the crew and management are completely familiar with this document and its prescribed procedures, training should be offered and oil pollution emergency drills should be carried out regularly.

A blank "Record of Oil Pollution Emergency Drills" form is provided at the beginning of this Plan to document the dates and results of such training exercises. This documentation is to be in addition to normal record keeping and log book entries.

3. ***All crew members should become familiar with the fundamentals of the ship's mechanical and electrical systems in order to be more confident and capable during an emergency.***

It is the responsibility of the vessel's senior officers to ensure that engineering fundamentals are taught to the crew and that the crew remain familiar with them through regular drills. Drawings detailing the various mechanical and electrical systems are carried aboard the vessel. Any drawing (e.g. "Natural Vents", "Engine Room Ventilation", "One Line Electrical Diagram", "Fuel Oil Transfer Diagram") can be obtained for study from the Engineering Document Library located in the Chief Engineer's Office. These drawings are thoroughly catalogued and easily referenced.

In order to ensure a fundamental familiarity with the various engineering systems, oil pollution emergency drills should include such exercises as:

- isolating and sealing off accommodations and/or machinery spaces using louvres and fan shut-offs to prevent ingress of dangerous fumes; and
- isolating, at the distribution panels, various electrical circuits, e.g. lighting, panel feeds, in order to reduce or eliminate sources of ignition in areas of risk.

1.4 PLAN FORMAT

This plan is divided into five sections as follows:

Section 1 provides an introduction for this document and highlights some important considerations regarding the spillage of oil at sea.

Section 2 outlines the procedure and requirements for making a report to authorities in the event of a discharge or probable discharge of oil.

Section 4 outlines procedures for national and local coordination of response efforts.

Section 5 outlines procedures for ship to ship transfer operations

Section 6 deals with non-mandatory provisions such as oil spill response materials onboard, media information, and plan review.

Following the main body of this plan are appendices which provide contact information and/or useful forms. Appendix 1 is an example of an unofficial facsimile report, the use of which is outlined in Section 2. Appendix 2 provides contact information for coastal authorities and ship interests. Appendix 3 is a blank calculation form for vessel stress and stability which can be filled out by an officer of the vessel and sent to the vessel owners for calculation. The use of this calculation form is described in Section 3. Appendix 4 contains relevant ship's drawings.

1.5 OIL DISCHARGE MONITORING SYSTEM

In accordance with MARPOL 73/78 Annex 1 Regulation 16 this ship is fitted with an Oilcon MK4 monitoring system by STC International Marine Limited which gives an impulse when any of the following occurs

- Flow rate of discharge is greater than ordered
- Impurities exceed 15ppm
- Total of maximum oil output limit is reached

IMPORTANT:

1. ANY OIL SPILLAGE SHOULD BE TREATED AS AN EMERGENCY.

2. IN RESPONDING TO AN OIL SPILLAGE, THE MASTER'S PRIORITY WILL BE TO ENSURE THE SAFETY OF THE CREW AND OF THE VESSEL, AND TO TAKE ACTION TO PREVENT ESCALATION OF THE INCIDENT. IMMEDIATE CONSIDERATION SHOULD BE GIVEN TO MEASURES AIMED AT PREVENTING FIRE AND EXPLOSION.

SECTION 2 • Reporting Requirements

Coast guard of nearest coastal State (see Appendix 2) is to be notified whenever there is:

a) **an actual discharge of oil**

b) **reason to suspect a probable discharge of oil due to fire, grounding, list, loss of power, collision, flooding, explosion, structural failure, etc.**

c) **any damage or failure which may affect the safety of the vessel, such as failure or breakdown of the electrical generating system, or essential shipborne navigational aids.**

2.1 DISCHARGE OF OIL

When reporting a discharge of oil, the Master is to provide all relevant information (as per section 2.4) to:

a) Coast Guard of nearest coastal State, or

b) Port Authorities, and also to

c) Vessel Interest Contacts.

A discharge of oil, for the purposes of this plan, refers to:

a) a discharge of oil, resulting from damage to the vessel or its equipment, or for the purpose of securing the safety of a vessel or saving life at sea; or

b) a discharge during the operation of the vessel of oil in excess of the quantity or instantaneous rate permitted under the present Convention.

2.2 PROBABLE DISCHARGE OF OIL

The Master must use good judgment to assess any circumstance which might be cause for probable discharge of oil. When making such judgment the following factors must be taken into account:

a) the nature of the damage, failure, or breakdown of the vessel, machinery, or equipment;

b) vessel location and proximity to land or other navigational hazards;

c) weather, tide, current, and sea state;

d) traffic density; and

e) morale, health and ability of crew onboard to deal with situation.

2.3 DAMAGES AND/OR FAILURES

The Master must report any damage which may affect the safety of the vessel: collision, fire, grounding, explosion, cargo shifting, list, etc. The Master must also report any failure or breakdown of essential machinery which results in impairment of the safety of navigation: i.e. electrical generating system or essential vessel-borne navigational aids.

2.4 INITIAL REPORT

An initial report is to be made by radio communication without delay to one of the following Canadian radio ship reporting stations; Canadian Coast Guard Radio Station, Canadian Vessel Traffic Service Centre, St. Lawrence Seaway Authority marine radio station, or Canadian harbour radio station. The report is to be made following the format given below. Where the report cannot be communicated by radio, it shall be communicated by telephone to the local Canadian radio ship reporting station or to the Canadian Coast Guard Operations Centre in Ottawa. Contact information is provided in Appendix 2.

FOLLOW-UP REPORTS

Follow-up reports should be made at regular intervals to keep the coastal State and other concerned parties informed of developments including, but not limited to, change of course or position, change in quantity, rate or probability of oil discharge, injuries or casualties, or effects of actions taken to control discharge or assure safety of the vessel and crew. Follow-up reports should be made in the same format as the initial report.

WRITTEN REPORT

Within 24 hours of the incident, or as soon as possible thereafter, a written report on the incident, including a statement as to its probable cause, shall be forwarded by air mail without delay to the Chief, Marine Casualty Investigations, Department of Transport, Ottawa.

UNOFFICIAL FACSIMILE REPORT

An unofficial facsimile report is included in Appendix 1. This may be sent to any concerned parties but is not consistent with IMO Resolution A 648(16) for reporting of incidents involving dangerous goods, harmful substances and/or marine pollutants, and therefore cannot constitute an official report to the coastal State.

FORMAT AND INFORMATION REQUIRED FOR OFFICIAL REPORT

AA VESSEL NAME, CALL SIGN, FLAG

BB DATE AND TIME (GMT) OF INCIDENT: 111935 meaning 11th of month at 7:35 pm.

CC SHIPS POSITION: 2230N 0600E meaning 22 deg. 30 min. N, 6 deg. E

or

DD SHIPS POSITION BY TRUE BEARING (3 DIGITS) AND DISTANCE FROM CLEARLY IDENTIFIED LANDMARK.

EE TRUE COURSE (3 DIGITS)

FF SPEED IN KNOTS AND TENTHS OF A KNOT (3 DIGITS)

LL ROUTE INFORMATION - INTENDED TRACK

MM RADIO STATIONS AND FREQUENCIES GUARDED

NN TIME OF NEXT REPORT (same as in BB)

OO DRAFT (4 DIGITS - meters and centimeters)

PP TYPES AND QUANTITIES OF CARGO AND BUNKERS ON BOARD

QQ BRIEF DETAILS OF DAMAGE, LIMITATIONS ETC. (must include condition of vessel and ability to transfer cargo, ballast, or fuel)

RR BRIEF DETAILS OF ACTUAL POLLUTION (oil type, estimate of quantity discharged, whether discharge continues, cause, estimate of slick movement)

SS WEATHER AND SEA CONDITIONS (wind force/direction, relevant tidal and/or current information)

TT NAME, ADDRESS, TELEX, FAX, TELEPHONE NUMBERS OF VESSEL OWNER OR REPRESENTATIVE

UU DETAILS OF LENGTH, BREADTH, TONNAGE, AND TYPE OF VESSEL

WW TOTAL NUMBER OF PERSONS ON BOARD

XX MISC. DETAILS (This includes brief details of incident, actions taken, injuries sustained and assistance required. If no outside assistance is required, then this should be clearly stated.)

2.5 WHO TO CONTACT

Contact information for coastal State and other concerned parties (port contacts, vessel interest contacts) is located in Appendix 2.

2.6 ARRANGED RESPONSE ORGANIZATION(S)

The vessel, in accordance with the regulations, has onboard a **declaration** that the vessel's management has, in accordance with 660.2(2) of the Canada Shipping Act, entered into an arrangement with a response organization to which a certificate of designation has been issued pursuant to subsection 660.4(1) in respect of the quantity of oil that is carried both as fuel and cargo on board the vessel.

The person or persons identified in the **declaration** shall be responsible for contacting and mobilizing the response organization.

SECTION 3 • Steps to Control Discharge

In cases of small spills on deck, the vessel's crew should take whatever actions are necessary to prevent oil from escaping over the side. Once the spill is contained on deck, the crew will need to take action to clean up the oil. SPILLED OIL SHOULD NOT BE WASHED OVER THE SIDE. Once oil is in the water, the crew's ability to respond in a practical manner is greatly reduced.

3.1 OPERATIONAL SPILLS

In the event of an operational spill which occurs during bunkering or cargo operations, it is important that the bunkering party terminate any and all bunkering operations and close all manifold valves.

Before closing any manifold valves, the bunkering / cargo party must immediately inform the terminal / loading master so that they may take action to eliminate the possibility of over-pressurization of the shore side transfer components.

After dealing with the cause of the spill, it may be necessary to obtain permission from local authorities and/or the terminal before resuming bunkering or cargo operations.

If the possibility of fire or explosion exists, nonessential air intakes to accommodations and machinery spaces should be closed and all sources of sources of ignition should be eliminated. See Section 1.3.3 of this Plan.

In accordance with Section 1.3.3 of this Plan, all members of the vessel's crew should be familiar with the fundamentals of the ship's vital systems including the ventilation and electrical systems. Crew members should be able to: isolate the accommodation and/or machinery spaces using the louvres and fan shut-offs; and, from the distribution panels, isolate electrical circuits in areas of risk. Please refer to Section 1.3.3 of this Plan for additional details.

Care must be taken to consider stability and stress when taking action to mitigate the spillage of oil. Internal transfers should be undertaken only with a full appreciation of the likely impact on the vessel's overall stress and stability. Please refer to the "Approved Stability Booklet" carried on board.

1. PIPE LEAKAGE

In the event of a oil pipe leakage, the Chief Engineer must ensure that the following actions are taken:

a) Stop oil flow and close manifold and other valves.

b) Sound Emergency Alarm and initiate emergency response procedures as posted aboard the vessel.

c) Locate the source and repair if possible.

d) Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container.

e) Drain affected section of pipe into empty or slack tank if possible.

f) If oil is overboard, report to proper authorities immediately (as per section 2 of this plan).

g) If oil is in bilges, pump through oil/water separator as per approved procedures.

2. TANK OVERFLOW

In the event of an oil tank overflow, the Chief Engineer must ensure that the following actions are taken:

a) Stop oil flow and close manifold and other valves.

b) Sound Emergency Alarm and initiate emergency response procedures as posted aboard the vessel.

c) Place drain buckets under overflow pipes to contain possible spills.

d) Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container.

e) Drain or transfer oil to slack or empty tanks if possible with due consideration paid to vessel stability. If no slack or empty tanks are available then oil may be pumped back ashore through delivery line, having first gained permission to do so.

f) If oil is overboard, report to proper authorities immediately (as per section 2 of this plan).

g) If oil is in bilges, pump through oil/water separator as per approved procedures.

TRANSPORT CANADA TRANSPORTS CANADA
MARINE SAFETY SÉCURITÉ MARITIME
CANADA
St. John's, NF

3. HULL LEAKAGE

If oil is noticed on the water near the vessel during normal operations and cannot be accounted for, the possibility of hull leakage should be suspected.

In the event of a hull leakage, the Master must ensure that the following actions are taken:

a) Sound Emergency Alarm and initiate emergency response procedures as posted aboard the vessel.

b) Stop any and all transfer or bunkering operations.

c) Identify damage and report to proper authorities immediately (as per section 2 of this plan).

d) If possible, contain spill using materials on hand

e) Transfer fuel away from suspected leaks to empty or slack tanks if possible or to a ballast tank if necessary. If in port, arrangements can be made to pump oil ashore to tank or truck. Due consideration is to be paid to vessel stress and stability.

f) Locate and repair if possible.

g) Absorb spill with any absorbent materials on hand and dispose of oil-soaked materials in an appropriate container.

3.2 SPILLS RESULTING FROM CASUALTIES

ALL CASUALTIES ARE TO BE REPORTED BY THE MASTER AS PER SECTION 2.

The Master's priority, when responding to a casualty, will be to ensure the safety of personnel and the vessel and to take action to prevent escalation of the incident.

In casualties involving spills, immediate consideration should be given to measures aimed at preventing fire and explosion, such as altering course so that the vessel is upwind of the slick, shutting down nonessential air intakes, etc.
If the vessel is aground, and therefore cannot maneuver, all possible sources of ignition should be eliminated and action taken to prevent flammable vapors entering accommodation and engine room spaces. Please refer to Section 1.3.3.

In accordance with Section 1.3.3 of this Plan, all members of the vessel's crew should be familiar with the fundamentals of the ship's vital systems including the ventilation and electrical systems. Crew members should be able to isolate the accommodation and/or machinery spaces using the louvres and fan shut-offs; and, from the distribution panels, isolate electrical circuits in areas of risk. Please refer to Section 1.3.3 of this Plan for additional details.

Prior to considering remedial action, the Master will need to obtain detailed information on the damage sustained by the vessel. A visual inspection should be carried out and all bunker tanks and other compartments sounded. However, due regard should be paid to the indiscriminate opening of ullage plugs or sighting ports, especially when the vessel is aground, as loss of buoyancy could result. The Master shall also ensure that all covers, doors, vents, and hatches to any and all holds, ballast tanks, and fuel tanks are sealed tightly and remain sealed to prevent possible loss of buoyancy Having assessed the damage sustained by the vessel, the Master will be in a position to decide what action should be taken to prevent or minimize further spillage.

Great care must be taken to consider stability and stress when taking action to mitigate the spillage of oil or to free the vessel if aground. Internal transfers should be undertaken only with a full appreciation of the likely impact on the vessel's overall stress and stability. Please refer to the "Approved Stability Booklet" carried on board.

Should the damage sustained be extensive, the impact of internal transfers on stress and stability may be impossible for the vessel's personnel to assess. In such cases, Appendix 3 of this plan is to be filled out as completely as possible and forwarded to the Owner's to ensure the appropriate calculations can be done.

When it is possible to maneuver, the Master, in conjunction with the proper shore authorities, may consider moving the vessel to a more suitable location in order, for example, to facilitate emergency repair work or lightening operations, or to reduce the threat posed to any particularly sensitive shoreline areas. Such maneuvering may be subject to coastal state jurisdiction.

1. GROUNDING

If the vessel grounds, the Master must ensure that the following actions are taken:

a) Sound Emergency Alarm and muster crew.

b) Eliminate all avoidable sources of ignition and ban smoking on board. Action must be taken to prevent inflammable vapors from entering accommodation and machinery spaces. See Section 1.3.3.

c) Identify damage by means of a visual inspection.

d) Take soundings around vessel to determine nature and gradient of seabed.

e) Check differences in tidal ranges at grounding site.

f) Evaluate tidal current in grounding area.

g) Take soundings of all tanks on shell and compare with departure soundings.

h) Determine probability and/or quantity of oil released.

i) If oil release is determined or is probable, this is to be included in the casualty report.

At this point, determine risk of additional damage to vessel by attempting to refloat. If remaining aground is determined to be less of a risk then:

a) Use anchors to prevent vessel movement.

b) Take in ballast in empty tanks, with due consideration paid to stress and stability. Please refer to the "Approved Stability Booklet."

c) Consider transfer of fuel from damaged tanks, with due consideration paid to stress and stability. Please refer to the "Approved Stability Booklet."

d) Reduce longitudinal stress on hull by transfer of cargo internally. Please refer to the "Approved Stability Booklet."

e) If the change in stability and stress cannot be calculated on board, contact the Vessel's management to arrange for the necessary calculations. Refer to Appendix 3 for information which should be provided.

2. FIRE / EXPLOSION

If a fire or explosion occurs on board, the vessel's fire control party must ensure that the following actions are taken:

a) Sound Emergency Alarm and muster crew.

b) Determine extent of damage and what damage control measures can be taken.

c) Determine whether there are casualties.

d) Request assistance as deemed necessary

e) Assess possibility of oil leakage.

f) If there is a discharge or possible discharge of oil, this is to be included in the casualty report.

g) Should abandonment be necessary, the Master must ensure that every effort is made to maneuver survival craft upwind of any oil spill.

3. COLLISION

If a collision occurs, the Master must ensure that the following actions are taken:

a) Sound Emergency Alarm and muster crew.

b) Determine whether there are casualties.

c) If there is a possibility of fire or explosion, eliminate all avoidable sources of ignition and ban smoking on board. Action should be taken to prevent inflammable vapors from entering accommodation and machinery spaces. See Section 1.3.3.

d) Decide whether separation of vessels may cause or increase spillage of oil.

e) If any oil tanks are penetrated, isolate the penetrated tank or transfer oil to slack or empty tanks with due attention paid to stress and stability of the vessel. Please refer to the "Approved Stability Booklet."

f) If there is an oil spill, make a report as per section 2.

4. HULL FAILURE including ice damage

If the vessel suffers structural hull failure, the Master must ensure that the following actions are taken:

a) Sound Emergency Alarm and muster crew.

b) Reduce speed or stop to minimize stress on hull.

c) Assess immediate danger of sinking or capsizing.

d) Initiate damage control measures.

e) If oil has spilled, or if it is necessary to jettison oil to maintain stability, make a report as per section 2.

f) If the change in stability and stress cannot be calculated on board, contact the Vessel's management to arrange for the necessary calculations.

g) Consider forecast weather conditions and their effect on the situation.

h) Should abandonment be necessary, the Master must ensure that every effort is made to maneuver survival craft upwind of any oil spill.

5. EXCESSIVE LIST

If excessive list occurs rapidly and unexpectedly, it may be due to:

a) Failure of hull plating.

b) Failure of internal bulkhead between compartments.

c) Shift of cargo.

d) Damage through grounding or collision.

e) Incorrect operating condition. Refer to "Approved Stability Booklet."

f) Flooding in Engine Room, where free surface can cause a list.

The Master must ensure the following steps are taken immediately:

a) Stop any cargo, bunkering, or ballast operations in progress.

b) Sound Emergency Alarm and muster crew.

c) Determine whether there are casualties.

d) If under way, reduce speed or stop.

e) Establish reason for list. See above.

f) Sound all tanks and compare with departure soundings.

g) If oil has spilled, or it is necessary to jettison oil to maintain stability, make a report as per section 2.

h) If possible, take corrective action to rectify the situation with due consideration paid to vessel stress and stability. Please refer to the "Approved Stability Booklet."

SECTION 4 • National and Local Coordination

1. The Master will advise the Coast Guard of nearest coastal state regarding any oil spill. Vessel Interest Contacts must also be notified of any such incident. See Appendix 2 for details.

2. The Master will be the point of contact on the vessel for coordinating shipboard activities with national and local authorities, act as the Company's on-scene representative, and will be responsible for overseeing the action of any salvage or spill contractors employed until such time as he/she has been FORMALLY relieved of these responsibilities by the Company.

3. The person or persons identified in the declaration shall be responsible for contacting and mobilizing the response organization(s). These organizations will coordinate and conduct the response. It is not normally practical for vessel's personnel to be directly involved in cleanup activities. Therefore, their primary role will be to provide as much information as necessary to assist the response and to cooperate with cleanup personnel. However, where no local response is forthcoming, or is delayed, the Master should consider the use of available shipboard materials to clean up or contain the spilled oil by, for example, using ship-stocked absorbent materials or utilizing mooring ropes or air-filled hoses as makeshift booms.

4. Dispersants or degreasers should not be used on oil spilled in the water as their use may contravene local regulations. However, dispersants may be used if they are approved by Environment Canada specifically for a given incident. Environment Canada will allow and approve the use of dispersants on a case by case basis only

SECTION 5 • Ship to Ship Transfer Operations

Should a situation such as lightening due to grounding require a ship to ship transfer of petroleum products, the Master must take into account but not limited to the following:

1. Proper lines of communication between ships including language and radio working frequency;
2. Current and forecasted weather conditions for the intended area of transfer;
3. The compatibility of the vessels involved with regards to size, freeboard, manifold location, list, trim, etc.
4. The elimination of all possible ignition sources;
5. Oil spill clean up equipment and procedures in place;
6. Contingency planning for emergency situations in place.

For detailed procedures concerning ship to ship transfer of petroleum products, please refer to ***The Ship to Ship Transfer Guide (Petroleum)****, published by The International Chamber of Shipping Oil Companies International Marine Forum, 3rd edition, 1997. A copy of which is to be kept on board the ship at all times.*

SECTION 6 • Additional Information (Non-Mandatory)

This section provides for additional information that local authorities, insurance underwriters, or Vessel Management may wish to include, but is not mandatory. (Regulation 26, Annex I, Marpol 73/78)

MEDIA INFORMATION

In the event of an oil spill or other related casualty, the Master is to direct any Coastal Radio station being worked that inquiries from any of the various media nodes are to be directed to the Vessel Management, who will handle such incidents shore-side. This will enable the Master to concentrate on the matter at hand.

PLAN REVIEW

This plan is to be reviewed at regular intervals by the Vessel Management and Master such that the information contained herein is current. Changes should be incorporated in the plan as and when they occur and the changes noted and by whom. Reviews should be conducted annually to reflect changes in local laws or policies, contact names or numbers, vessel characteristics, or company policy.

Reviews should also be conducted after any use of the plan in response to an incident, in order to evaluate its effectiveness and make any modifications deemed prudent at that time.

APPENDIX 1 • Report Format and Content

The report should contain the following:

AA VESSEL NAME, CALL SIGN, FLAG

BB DATE & TIME (GMT) OF INCIDENT: 111935 meaning 11th of month at 7:35 pm.

CC SHIPS POSITION: 2230N 0600E meaning 22 deg. 30 min. N, 6 deg. E

or

DD SHIPS POSITION BY TRUE BEARING (3 DIGITS) AND DISTANCE FROM CLEARLY IDENTIFIED LANDMARK.

EE TRUE COURSE (3 DIGITS)

FF SPEED IN KNOTS AND TENTHS OF A KNOT (3 DIGITS)

LL ROUTE INFORMATION - INTENDED TRACK

MM RADIO STATIONS AND FREQUENCIES GUARDED

NN TIME OF NEXT REPORT (same as in BB)

OO DRAFT (4 DIGITS - meters and centimeters)

PP TYPES AND QUANTITIES OF CARGO AND BUNKERS ON BOARD

QQ BRIEF DETAILS OF DAMAGE, LIMITATIONS ETC. (must include condition of vessel and ability to transfer cargo, ballast, or fuel)

RR BRIEF DETAILS OF ACTUAL POLLUTION (oil type, estimate of quantity discharged, whether discharge continues, cause, estimate of slick movement)

SS WEATHER AND SEA CONDITIONS (wind force/direction, relevant tidal and/or current information)

TT NAME, ADDRESS, TELEX, FAX, TELEPHONE NUMBERS OF VESSEL OWNER OR REPRESENTATIVE

UU DETAILS OF LENGTH, BREADTH, TONNAGE, AND TYPE OF VESSEL

WW TOTAL NUMBER OF PERSONS ON BOARD

XX MISC. DETAILS (brief details of incident, actions taken, injuries, assistance required)

UNOFFICIAL OIL POLLUTION EMERGENCY REPORT BY FACSIMILE

Vessel Name Call Sign Flag

Date and Time of Event

Vessel Position (Latitude & Longitude, Bearing & Distance from Landmark)

Course Speed

Intended Track

Radio Station

Date and Time of Next Report

Type and Quantity of Oil On board

Brief Details of Damage

Brief Details of Pollution

Details of Weather & Sea Conditions (Wind Speed/Direction, Swell Height/Direction)

Names of Vessel's Owner

Vessel Size and Type

Any Other Additional Information as Determined by Master

APPENDIX 2 • Who to Contact

In accordance with the Canadian Pollutant Discharge Reporting Regulations, the Master or Owner of a ship must report, without delay, any discharge or anticipated discharge of a pollutant in Canadian waters or fishing zones, to a Pollution Prevention Officer (PPO). Reports must be made in the manner described in Guidelines for Reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine Pollutants, TP 9834, or "General Principles for Ship Reporting Systems and Ship Reporting Requirements, including Guidelines for Reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine Pollutants" adopted by the IMO by Resolution A 648(16) These initial reports can be made to a Vessel Traffic Service Centre (VTS) or any other Canadian Coast Guard Radio Station (CGRS), on the frequencies listed in the publication, Radio Aids to Marine Navigation (RAMN).

In addition to the above process for reporting a spill from a vessel to a PPO through a CGRS or VTS, the Canadian Coast Guard maintains a 24 hour Operations Centre which can be contacted at:

Canadian Coast Guard Operations Centre
344 Slater Street
Ottawa, Ontario
K1A 0N7

Tel: (613) 990-5600 Fax: (613) 995-4700 Tlx: (613) 053 3128

Within Canada, administrative inquiries related to pollution prevention, compliance and enforcement, vessel regulations, design and construction should be directed to:

Director General, Marine Safety
Transport Canada
Mailstop: AMS
330 Sparks Street
Ottawa, Ontario
K1A 0N5

Tel: (613) 998-0610 Fax: (613) 954-1032

Inquiries relating to pollution response should be directed to:

Director General, Rescue and Environmental Response
Canadian Coast Guard
344 Slater Street
Ottawa, Ontario
K1A 0N7

Tel: (613) 990-3110 Fax: (613) 996-8902

VESSEL INTEREST CONTACTS

VESSEL MANAGEMENT

Coastal Shipping Limited (Owners)
P.O. Box 913
Happy Valley-Goose Bay, Labrador
A0P 1S0

Office:	(709) 896 - 2421
Fax:	(709) 896 - 5028

24 HOUR CONTACT

The following phone numbers are provided
for 24 hour contact, year round:

Cell:	(709) 682 - 0826	Kevin Brewer or Gerry Burgess
Home:	(709) 227 - 2600	Kevin Brewer
	(709) 745 - 2684	Gerry Burgess

APPENDIX 3 • Vessel Stress and Stability Calculations

VOYAGE PARTICULARS

Departure Port

Departure Date

Time (GMT)

VESSEL CONDITION IMMEDIATELY BEFORE CASUALTY

Mean Draft Forward

Mean Draft Aft

KG(solid)

KG(fluid)

LCG of Vessel

#	COMPARTMENT	S.G.	TONNES

#	Compartment	S.G.	Tonnes

DATA RELATING TO VESSEL AFTER CASUALTY

Nature of Casualty: Collision / Grounding (Fixed / Free) / Fire
Explosion / Heavy Weather / Other

Casualty Date Report Time (GMT)

Geographical Location of Casualty: LAT
LONG

Conditions at Site at Time of Casualty Report

Weather

Sea State

Tidal State

Tidal Range

Forecast

S.G. of Surrounding Water

Position of Vessel relative to Wind, Waves, Tides, etc.

Drafts Measured Port and Starboard:

Drafts at Fwd Marks/F.P.(Best Estimate)
Drafts at Aft Marks/A.P.(Best Estimate)
Drafts at Midships (Best Estimate)
Angle of Heel (Port / Starboard)

Best Estimate of Depth of Water (for Grounding)

Location	Port	Starboard

REPORTED DAMAGE

Details of each damaged compartment known to be open to the sea, including those damaged above the present waterline

Compartment	Estimated Cargo Weight (tonnes)	Permeability of Cargo (%)	Comments

Extent and location of structural damage in way of above compartments. (Attach sketch)

Extent of additional damage to pipes, valves, hatches, doors, etc. and list of compartments which may be subject to progressive flooding as a result.

Soundings from or estimates of amounts of flood water in spaces not directly open to sea.

PROPOSED ACTION AND REQUIREMENTS

Any other relevant information, details of action being undertaken or proposed course of action, salvage operation etc.

APPENDIX 4 • Relevant Drawings

FOLLOWING ARE DRAWINGS RELEVANT TO THIS VESSEL

General Arrangement Drawing
Tank Capacity Plan
Cargo Piping Diagram