



8-D.2: Meadowbank Bulk Fuel Storage Facility Environmental Performance Monitoring Plan

ADDENDUM



AGNICO EAGLE

Project Name:	Meadowbank Gold Project	
Plan / Version:	Meadowbank Bulk Fuel Storage Facility: Environmental Performance Monitoring Plan	Version WT; June 2016
NIRB Requirement:	Project Certificate No. 004	Condition: not applicable
NWB Requirement:	2AM-MEA-1525	Condition: Part F, Item 8
Addendum:		
Section Change	Specify: Update or New	Details
Appendix B	New	WT Addendum



MEADOWBANK GOLD PROJECT

**Meadowbank and Whale Tail Bulk Fuel Storage
Facilities:
Environmental Performance Monitoring Plan**

In Accordance with Water License 2AM-MEA0815

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Division

Version 3
June 2016

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is currently operating the Meadowbank Gold Project approximately 70 km north of the Hamlet of Baker Lake. As part of the project, one - 5.6 million litres bulk fuel storage tank was constructed to store diesel fuel for routine operations at the mine site, and an additional 500,000 litres are to be stored at the Whale Tail Pit site in 2 – 250,000 litres tanks in the tank farm. The former bulk fuel tank facility was commissioned in January 2009 while the latter is expected to be approved in 2018. This document provides the details for the Meadowbank and Whale Tail Pit Bulk Fuel Storage Facility Environmental Performance Monitoring Plan required by Water License 2AM-MEA1525 Part B, Item 13(I). Once approved, this plan is written to replace the currently approved Meadowbank Bulk Fuel Storage Facility Environmental Performance Monitoring Plan.

To adequately assess the environmental performance of the bulk fuel storage tank at Meadowbank Mine and the construction and operation of the same at Whale Tail, this report provides: a summary of the design, installation, operation and maintenance that follows the CCME (2003) Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum and Allied Petroleum Products; a summary of the location and environmental setting; a summary of the Nunavut Water Board (NWB) Type A water license requirements; and an environmental assessment to support the recommended environmental monitoring for the ongoing evaluation of the secondary containment.

IMPLEMENTATION SCHEDULE

As required by Water License 2AM-MEA0815, Part B, Item 16, the proposed implementation schedule for this Plan is effective immediately (June 2014) subject to any modifications proposed by the NWB as a result of the review and approval process.

As required by Water Licence 2AM-MEA1525, Part B, Item 11, and with this Plan being updated and expanded to include the Whale Tail Pit, the proposed implementation schedule for this Plan is effective upon approval and subject to any modifications proposed by the NWB as a result of the review and approval process.

DISTRIBUTION LIST

Agnico Eagle – General Mine Manager

Agnico Eagle – Environment Superintendent

Agnico Eagle – Environmental Coordinator

Agnico Eagle – Environmental Technician

Agnico Eagle – Site Services Superintendent

Agnico Eagle – Field Services Supervisor

Agnico Eagle – Warehouse Supervisor

Agnico Eagle – Whale Tail Open Pit Manager

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	09/12/22			Comprehensive plan for Meadowbank Bulk Fuel Storage Facility
2	14/06/30			Comprehensive review of the plan
3	16/06/02			Addition of the Whale Tail Pit site and Whale Tail Pit haul road to the Plan

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SECTION 1. INTRODUCTION

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is operating the Meadowbank Gold Project approximately 70 km north of the Hamlet of Baker Lake. The Meadowbank Project includes the Baker Lake Marshalling Area, the All-weather private Access Road (AWPAR), the Meadowbank Mine site, the Whale Tail pit, and the Whale Tail Pit haul road. As part of the project, one 5.6 million litre bulk fuel storage tank was constructed to provide diesel fuel for routine operations at the Meadowbank mine site, and 2 – 250,000 litre tanks are to be constructed at Whale Tail. The Meadowbank bulk fuel tank facility was commissioned in January 2009 while the Whale Tail bulk fuel facility is expected to be under development in 2018.

This plan is an update to the Meadowbank Bulk Fuel Storage Facility Performing Monitoring Plan to include the Whale Tail Pit Fuel Storage Facility as part of the Meadowbank Mine operations. This document provides the details necessary to fulfill Part I, Item 17 of the Nunavut Water Board Type A License 2AM-MEA0815. In the original license it stated:

The Licensee shall submit to the Board for approval, within six (6) months following construction of each the Mine Site Bulk Fuel Storage Facility and Marshalling Area Bulk Fuel Storage Facility, a plan for the environmental and performance monitoring of each Facility. The Plans are to include:

- a) *An assessment of performance;*
- b) *Location, environmental setting and the potential for leaks or Seepage that could impact Water;*
- c) *An assessment of the need for, and if required, the design for installation, monitoring, and maintenance of vertical Ground Water monitoring wells to be installed in accordance with the Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products, 2003; CCME; and*
- d) *Recommended sampling for ongoing monitoring of the integrity of the secondary containment.*

This clause was not carried forward in the renewal of the licence in 2015. The Bulk Fuel site monitoring requirements in Parts F and H remain in the renewed licence 2AM-MEA1525.

To adequately assess the environmental performance of the bulk fuel storage tanks at Meadowbank and Whale Tail this report provides:

- a summary of the design, installation, operation and maintenance that follows the CCME (2003) Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum and Allied Petroleum Products;
- a summary of the location and environmental setting;

- a summary of the NWB Type A water license 2AM-MEA1525 requirements; and
- an environmental assessment to support the recommended environmental monitoring for the ongoing evaluation of the secondary containment.

The requirements of Part I, Item 17 in the original Type A Water licence are addressed in the following sections:

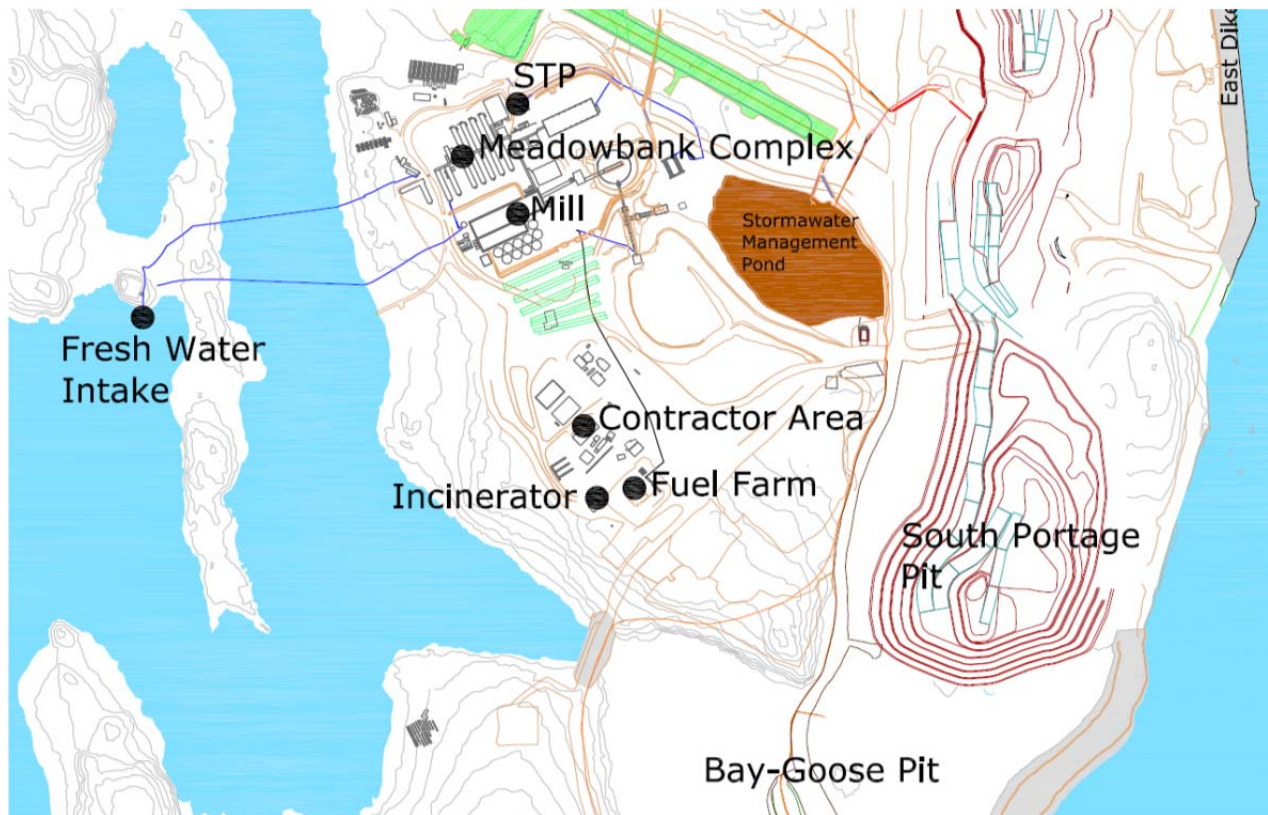
- The assessment of performance (point a above) is provided in Sections 5.1, 5.2 and 5.3;
- The location (point b) of the facility is presented in Section 2.1;
- The environmental setting (point b) is described in Section 3.0;
- The potential for leaks and seepage that could impact water (point b) is discussed in Section 5.4;
- The assessment of the need for groundwater monitoring wells (point c) is discussed in Section 6.3; and
- The recommended sampling for ongoing monitoring of the integrity of the secondary containment (point d) is provided in Section 6.1.

SECTION 2. SITE LOCATION, CONSTRUCTION AND OPERATION

2.1 SITE LOCATION

The Meadowbank Bulk Fuel Storage Facility is located at Meadowbank, east of the main camp facilities adjacent to the mine operations haul road. There is one (1) above ground storage tank with approximately 5.6 million liters capacity. The GPS coordinates of the facility is NAD83 14W E 0638083 N 7214288. The general location of the tank farm is provided in Figure 2-1 below.

Figure 2-1. Location Meadowbank Tank Farm



The Whale Tail Fuel Storage Facility is located at the Whale Tail satellite open pit, approximately 50 km west of the Meadowbank site. Two – 250,000 litre tanks are to be constructed. The tanks will be in a bermed and lined area and their location is shown in Figure 2-2.

2.2 DESIGN AND INSTALLATION SUMMARY

Following regulatory approval, during the summer of 2008 Agnico Eagle built the bulk fuel tank and respective secondary containment with a capacity of 5.6 million liters (AEM, 2009). The secondary containment enclosure and HDPE liner was installed in accordance with CCME (2003) specifications. The aboveground storage tanks were field erected. Construction activity was supervised by Hatch Engineering and Stavibel Engineering and included qualified steel fabricators and membrane installers.

Additionally, in the summer of 2015, an aboveground pipe was installed in accordance with CEPA (2008) specifications to supply fuel from the bulk fuel tank to the main Meadowbank power plant.

Using the same design criteria and CCME specifications, upon regulatory approval, Agnico Eagle will install 500,000 litres of fuel storage at the Whale Tail Pit site for the purposes of the open pit development and operations. Fuel storage will be in 2 - 250,000 tanks in a tank farm as shown in Figure 2-2.

2.3 OPERATION AND MAINTENANCE SUMMARY

Inventory control of transfer and weekly volume inspections using manual or electronic dip reconciliation are conducted at Meadowbank and will be conducted at the Whale Tail Pit by operations staff at the respective sites. Weekly inspections are logged and reported by Agnico Eagle. Weekly visual inspections and inventory reconciliation are used to evaluate and determine bulk fuel tank leakage at Meadowbank and Whale Tail.

The bulk fuel storage facilities are maintained in accordance with best management practices.

The bulk fuel tanks at Meadowbank and Whale Tail Pit will re-filled by a fuel truck on a regular basis throughout the year. During the period of re-filling there is the greatest risk of over-filling. Through regular visual inspections, inventory control and monitoring fuel transfer, the risk of over-filling will be significantly reduced. In the case of a spill, the Spill Contingency Plan will be implemented.

SECTION 3. ENVIRONMENTAL SETTING

3.1 TOPOGRAPHY

The surrounding area of the Meadowbank site and Whale Tail site consists of low, rolling hills with many small lakes; Third Portage Lake is located to the south and Second Portage Lake to the north. The bulk fuel storage tank at Meadowbank is bound to the north by the mine site, a haul road to the east, and the incinerator and waste management area to the south. The surface water drainage at the bulk fuel storage facility is towards the stormwater management pond to the north.

The topography of the Whale Tail area differs little from that of Meadowbank. The tank farm is located northeast of the camp as shown in Figure 2-2. The water drainage at the Whale Tail Pit bulk fuel storage facility is towards pond A53, which during operations will drain through the east channel and into Whale Tail Lake (South Basin).

3.2 GEOLOGY

The two fuel storage sites have a thin, discontinuous cover of top soil with minimal organic material. Soil thickness is typically between 1 and 5 m below which bedrock is encountered. In the area near the Meadowbank and Whale Tail Pit bulk fuel farm, bedrock is encountered within 2m of existing ground surface or is exposed with weathered fractures extending 1 to 2 m into the rock.

3.3 FLORA AND FAUNA

There are no trees and few shrubs in the area surrounding the Meadowbank and Whale Tail sites. The sites are covered by low-lying vegetation; predominated by grassy hummocks, dwarf willow, sedge, green moss, and lichen.

Arctic ground squirrels, ptarmigan and songbirds are inhabitants in the area surrounding the fuel storage areas. Lake trout, arctic char, lake whitefish, round whitefish, slimy sculpin and stickleback are predominant fish species found in local lakes.

3.4 SUBSURFACE CONDITIONS

At the two sites, soil is characterized by lateral deposits of glacial till. Bedrock is exposed at shallow depths throughout the sites. There is high site drainage due to limited soil depth, high presence of fractured bedrock and glacial till.

3.5 WATER QUALITY

Water quality closely resembles distilled water as many conventional water chemistry parameters are at or below detection limits. The water column is generally well mixed and the water chemistry homogenous. During the open water season there is limited vertical stratification in temperature and dissolved oxygen.

SECTION 4. NWB TYPE A WATER LICENSE CONDITIONS

When approved, Agnico Eagle will continue to adhere and will apply the conditions of the Nunavut Water Board (NWB) Type A water license 2AM-MEA1525 requirements related to the Meadowbank mine site bulk fuel storage facility to the Whale Tail Pit Bulk Fuel Storage Facility.. Agnico Eagle is committed to achieving all of these requirements at Meadowbank and when approved, at Whale Tail.

SECTION 5. ENVIRONMENTAL PERFORMANCE ASSESSMENT

To adequately assess the environmental performance of the Meadowbank bulk fuel storage tanks and facilities, a desk-top review of the Meadowbank Fuel Storage Installations: Final Report (AEM, 2009) was completed. In addition, on October 26th, 2009 Agnico Eagle environmental personnel completed a site inspection to visually evaluate the site drainage, tank construction, and secondary containment and performed an environmental assessment of the bulk fuel storage facility. A geotechnical inspection was also conducted annually by an external qualified engineer. The report included observations, photos and recommendations.

A similar level of assessment is to be carried out at Whale Tail Pit once the fuel storage facilities are in place.

5.1 DESK-TOP REPORT REVIEW OF THE MEADOWBANK BULK FUEL STORAGE FACILITY

The Meadowbank bulk fuel storage facility was commissioned in January 2009. The installation report (AEM, 2009; attached in Appendix A) indicated the use of best management practices during the installation of the aboveground fuel storage tank. Following the tank construction, X-Ray testing of horizontal and vertical welds was completed. All of the welds met the specifications outlined in the API Standard 650 (AEM, 2009). A similar approach is to be used at the Whale Tail tank farm.

Under the supervision of Hatch Engineering and Stavibel Engineering, the construction of the secondary containment berm was completed for the tank. Enviroline Services Inc. was hired in October 2008 to install the HDPE membrane liner in accordance with CCME (2003) specifications; this liner was subsequently covered with a surface layer of crushed stone.

A secondary containment volume calculation using Autocad Civil 3D was completed to provide verification on the liquid storage capacity of the storage tank system. The CCME Environmental Code of Practice for Aboveground Storage Tanks (2003) states:

a storage tank system that consists of more than one storage tank which should have a volumetric capacity of not less than the sum of the capacity of the largest storage tank located in the contained space and 10% of the capacity of the largest tank or the aggregate capacity of all other storage tanks located in the contained space.

In accordance with the CCME (2003) code of practice, the Meadowbank bulk fuel storage tank meets the volumetric requirements for a storage tank system (AEM, 2009). The Whale Tail bulk fuel storage tanks are to be constructed to meet CCME (2003) code of practice.

In the summer of 2009, a 4 inch below-ground pipe was installed to supply fuel from the Bulk Fuel storage tank to the Meadowbank main power plant. The pipe was installed according to the CEPA (2008) regulations.

5.2 SECONDARY CONTAINMENT VISUAL INSPECTIONS

A consultant performs a geotechnical inspection annually and inspects the bulk fuel secondary containment structures at the Meadowbank Bulk Fuel Storage Facility, the report is sent to NWB annually. The same inspections and reporting will be carried out at Whale Tail Pit once the fuel storage facilities are in place.

5.3 ENVIRONMENTAL ASSESSMENT

The management at the site drainage, surface water collection, and water/fuel removal within the secondary containment area is an important measure in the protection of the terrestrial environment, surface water, and ground water from potential sources of contamination. The environmental protection objectives, strategy, and an evaluation of the potential of leaks or seepage that could contaminate the terrestrial environment, surface water and ground water are provided in the following sections. Much of the environmental protection strategies focus on the control of contact water. In this report contact water is defined as any water that may be physically or chemically affected by the nearby operational activities.

At Meadowbank and Whale Tail Pit, the bermed and lined tank farm provides secondary containment. If fuel escapes from the tanks holding the fuel, the bermed and lined area will not allow the fuel to escape to the receiving terrestrial and aquatic environment. As there is expected to be a high volume of fuel transfer and activity around the modular fuel dispenser and refueling station, inadvertent fuel spills during refueling are expected but will be retained on the impermeable, lined pad. The liner is sloped such that any fuel spilled on the pad would flow to a sump where it collects and can be recovered.

5.3.1 Terrestrial Environment

The primary objective of the terrestrial management plan is to minimize any adverse impacts to the terrestrial (soil, flora and fauna) environment. To meet this objective, the Meadowbank and Whale Tail Pit bulk fuel storage facility structures have been constructed, or will be constructed, to minimize the operational footprint and control contact run-off water within the secondary containment area. Due to the site grading, all water that comes into contact with the bulk fuel storage facility (including the modular fuel dispenser) is intercepted and directed into the impermeable HDPE lined secondary containment area.

The ground beneath the secondary containment area has been graded to ensure berm stability.

5.3.2 Surface Water

The objective of water management around the Meadowbank and Whale Tail bulk fuel storage facilities is to minimize impacts on the quantity and quality of surface water and groundwater. To meet this objective, the bulk fuel storage facility structures have been constructed to intercept and direct contact run-off water to the impermeable HDPE lined secondary containment area. As there is a high volume of fuel transfer and activity around the modular fuel dispenser, the pad below the modular fuel dispenser and refueling station is lined and sloped toward the secondary containment berm.

Due to the high compaction of the surrounding mine site pad, natural topography of the site, shallow top soil and predominate bedrock, should contact water reach the natural environment at Meadowbank, the ultimate fate of the contaminants is to the stormwater management pond.

5.3.3 Groundwater

It is not expected that groundwater would be impacted as there is no direct pathway for contaminated water to seep from the Meadowbank and Whale Tail bulk fuel storage facilities. Due to the site grading, all contact water from the bulk fuel storage facility is directed inside the HDPE lined secondary containment area. Should the integrity of the liner become compromised, there could be leakage into the below grade soil, which is within a zone of continuous permafrost.

SECTION 6. PERFORMANCE MONITORING PLAN

The environmental performance monitoring plan is a tiered approach with an emphasis on visual and operational inspections; routine surface water sampling to control and monitor the quality of the contact water; and event monitoring (in the case of a spill emergency or occurrence). Management of the Meadowbank and Whale fuel storage facilities will be guided by the monitoring results.

6.1 VISUAL AND OPERATIONAL INSPECTIONS

Visual and operational inspections are a central component of the environmental performance monitoring plan. Visual inspections of the Meadowbank and Whale Tail secondary containment structure are important because if the integrity of the berm walls or liner is compromised, this presents the greatest potential for leaks or seepage.

Visual inspections are conducted by the environmental department once per week and weekly manual or electronic dip tests are conducted for inventory reconciliation by sites services department. Staff will inspect the bulk fuel storage facilities pad for: tank and piping condition, secondary containment berm structure and integrity, indicators of liner damage, precipitation/run-off accumulation, evidence of tampering or misuse, any structural abnormalities and visible sheens on contact water pools and crush material inside the secondary containment.

The Environment staff will follow-up with sites services department if any non-compliance are observed. A weekly written inspection sheet will continue to be completed and signed by the site services supervisor and available upon request.

6.2 ROUTINE CONTACT WATER MONITORING

Due to snow accumulation, melting and precipitation, contact water is unavoidably collected inside the secondary containment area. Contact water from inside the secondary containment area is sampled as described below before being discharged. The water accumulated in the Meadowbank and Whale Tail secondary containment will be released in accordance with the Type A Water License Part F Item 8 and 9 conditions.

During visual inspections the quantity of contact water collected inside the secondary containment area and sump will be evaluated. If there is a visible sheen on the contact water or if water withdrawal is deemed necessary, water samples will be collected and analyzed for the following parameters only if the water is not to be discharged to the environment (as per Part F, Item 8): Benzene, Toluene, Ethylbenzene, Lead, and Oil and Grease. If the contact water exceeds the licensed limits, the portable oil-water separator can be used to treat the water. Prior to withdrawal, samples will be analyzed at a certified laboratory and the 10 day notice will be sent to the inspector.

In addition, water samples from lakes near the Meadowbank and Whale Tail Pit site are collected as part of the Core Receiving Environmental Monitoring Plan (CREMP) and Aquatic Environmental Management Plan. The CREMP will be expanded to include the Whale Tail site upon approval. The results of these analyzes will continue to be included in the annual report. These samples are used to evaluate the performance of the overall water management plan for the Meadowbank and Whale Tail sites.

6.3 EVENT MONITORING

In the event of a spill occurrence at fuel storage facilities, the Spill Contingency Plan will be followed. As a follow-up to the spill response, the environmental staff will conduct an environmental assessment to determine the extent of impacts of the spill occurrence on the nearby environment. This will include the identification of the potential environmental pathways of concern that may result in impacts to surface water (i.e. Third Portage Lake near-shore surface water or east channel that drains into Whale Tail Lake (South Basin)), soil or groundwater.

6.3.1 Soil Sampling

Following the unlikely event where a spill is not contained within the secondary containment area or on the lined pad, soil sampling may be required to locate and prevent further impact to the terrestrial and aquatic receiving environment. Depending on the quantity of the spill, the organic surface soils and shallow till are a likely sink for hydrocarbons, thus soil samples will be taken at selected locations to horizontally and vertically delineate the impacted areas. Furthermore, the soil samples will provide valuable information used to determine the necessity of installing groundwater wells (see Section 6.3.3 below).

6.3.2 Water Sampling

Following a spill event escaping secondary containment, an environmental assessment will be conducted. Similar to routine contact water sampling (inside the secondary containment area or on the lined pad), water samples will be collected and analyzed for the following parameters: Benzene, Toluene, Ethylbenzene, Lead, and Oil and Grease. If the contact water exceeds the licensed limits, the portable oil-water separator can be used to treat the water before it was disposed to the stormwater management ponds. Prior to withdrawal, samples will be analyzed at a certified laboratory.

As part of the CREMP, receiving environment surface and at-depth water samples will be taken from Third Portage Lake or Whale Tail Lake, and analyzed for the same parameters as listed above.

6.3.3 Assessment of the Need for Groundwater Well Installation

Following a spill event escaping secondary containment, if soil sample results identify elevated concentrations of contaminants (i.e. exceeding the CCME Canada-Wide Standard (CWS) for Petroleum Hydrocarbons (PHC) in Soil) and/or if water samples identify elevated receiving

environment water samples (i.e. exceeding licensed limits caused as a result of the spill event), an assessment of the need for groundwater wells will be conducted. The assessment, and if required, design for installation, monitoring and maintenance of vertical ground water monitoring wells will be in accordance with CCME (2003) procedures.

SECTION 7. REFERENCES

AEM (2009). Meadowbank Fuel Storage Installations: Final Report Following Construction. April 2009.

AEM (2016). Meadowbank Gold Project: Spill Contingency Plan. June 2016

Azimuth (2016). Core Receiving Environmental Monitoring Program: Whale Tail Pit Addendum. May 2016

BAER (2005). Meadowbank Gold Project Baseline Aquatic Ecosystem Report. October 2005.

CCME (2008). Canadian Council of Ministers of the Environment: Canada Wide Standards for Petroleum Hydrocarbons in Soil. PN 1398. January 2008.

CCME (2003). Canadian Council of Ministers of the Environment: Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products. ISBN 1-896997-33-3.

CEPA (2008). Canadian Environmental Protection Act. Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations. June 12, 2008.

Golder Associates Ltd. (2004). Geotechnical Input to Infrastructure Design. Meadowbank Gold Project. Nunavut. Report submitted to Cumberland Resources Ltd, March 2004.

Golder Associates Ltd (2014). 2014 Annual Geotechnical Inspection Meadowbank Gold Mine, Nunavut.

Appendix A

Meadowbank Fuel Storage Installations – Final Report



**AGNICO-EAGLE MINES LTD
MEADOWBANK DIVISION**

MEADOWBANK FUEL STORAGE INSTALLATIONS

**FINAL REPORT
FOLLOWING THE CONSTRUCTION**



**AGNICO-EAGLE MINES LTD
MEADOWBANK DIVISION**

MEADOWBANK FUEL STORAGE INSTALLATIONS

**FINAL REPORT
FOLLOWING THE CONSTRUCTION**

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MEADOWBANK DIVISION**

MEADOWBANK FUEL STORAGE INSTALLATIONS

**FINAL REPORT
FOLLOWING THE CONSTRUCTION**

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- D** VERIFICATIONS TO STORAGE CAPACITY WITHIN BERMS

APPENDIX 1 : DRAWINGS

AS-BUILT : VD2259-MBD-001, VD2259-MBD-002, VD2259-MBD-003

REVISION 1 OF 17202-2000-46D6-2001 IFC DRAWING from SNC-LAVALIN
VENDOR DRAWING FROM CHAMCO INDUSTRIES LTD : CUP1014938-21

APPENDIX 2

SAFE FILL LEVEL FOR FUEL TANK 680-TK-042

DESCRIPTION OF THE MANDATE

Agnico-Eagle Mines has given a mandate to the undersigned in order to verify the compliance with applicable regulations of its fuel storage installations at the Meadowbank gold mining site, in Nunavut.

According to the terms of reference, the mandate consists summarily in the following activities.

- A. Review and compilation of the available documentation ;
- B. Collection of any information that may be missing ;
- C. Preparation of an *AS BUILT* version of the construction drawings ;
- D. Verifications to the storage capacity within the containment berms in regards to the applicable regulations.

A. DOCUMENTATION READILY AVAILABLE

HATCH - Vancouver Office

Only one (1) layout drawing showing the berm enclosure was issued from Hatch. No detailed design or cross-sections of containment berms was available prior to the construction phase. The original design of the fuel containment area is shown on revision 0B of drawing 325174-600-C-0135, which was issued **for information**.

NISHI-KHON / SNC-LAVALIN LTD - Vancouver Office

This firm was responsible for issuing the piping layout drawings and P&ID's for the Baker Lake fuel storage installations, which is a similar project located 100 km further South. During the construction and installation of piping for the Meadowbank bulk fuel storage tank, the *Process and Instrumentation Diagram* issued for construction was not readily available to the pipefitters.

GEM STEEL EDMONTON LTD

This vendor has submitted a set of drawings issued **for review**, consisting in three (3) structural drawings showing the details of a fuel tank of 5.6 million liters nominal capacity. The original design of this fuel tank is shown on revision A0 of drawings BL-2008-80-1, BL-2008-80-2, and BL-2008-80-3.

CHAMCO INDUSTRIES LTD

This vendor has submitted a set of preliminary drawings issued **for approval**, consisting in twenty-five (25) documents showing details of a fuel dispensing module. These documents have been reviewed by HATCH, and bear the following identification, which has been assigned by HATCH Document Control.

DRAWING NUMBER	H325174-M268-VD-0040	H325174-M268-VD-0041	H325174-M268-VD-0010
H325174-M268-VD-0011	H325174-M268-VD-0012	H325174-M268-VD-0013	H325174-M268-VD-0014
H325174-M268-VD-0015	H325174-M268-VD-0016	H325174-M268-VD-0017	H325174-M268-VD-0019
H325174-M268-VD-0020	H325174-M268-VD-0021	H325174-M268-VD-0029	H325174-M268-VD-0030
H325174-M268-VD-0031	H325174-M268-VD-0032	H325174-M268-VD-0033	H325174-M268-VD-0034
H325174-M268-VD-0035	H325174-M268-VD-0036	H325174-M268-VD-0037	H325174-M268-VD-0039

B. ADDITIONAL COLLECTION OF INFORMATION

HATCH - Vancouver Office

Role during construction phase : Design & Field Supervision during construction of berms.

Mr. Marlon Coakley and Jim Bonia, both of which were HATCH employees at the time, have supervised the construction of the fuel containment area. They have also hired a specialized crew from Saskatoon (Enviroline Service inc.) in October 2008 to install the HDPE membrane covering the berms. This HDPE membrane has since been covered with a layer of about 100 mm thickness of crushed stone.

NISHI-KHON / SNC-LAVALIN LTD - Vancouver Office

Role during construction phase : So far, I have never communicated with these people.

A research of all files provided by HATCH Document Control has permitted to find **Revision 0** of drawing 017202-2000-46D6-2001 from SNC-LAVALIN.

This document was not readily available to the construction team at the time when the crew from Mosher Engineering Ltd were installing the piping and commissioning the fuel dispensing module.

AGNICO-EAGLE MINES LTD, Meadowbank Surveying Team

Role during construction phase : Surveying of quantities & grades for berms, HDPE liner.

A surveying crew from AEM has monitored the quantities of granular materials and required berm elevations, as well as the installation of the HDPE membrane and grounding wire around the fuel tank. All of this work was done with the same specifications which were observed during the construction of the berms around the AEM bulk fuel storage tanks, which are located in Baker Lake.

GEM STEEL EDMONTON LTD

Role during construction phase : Fabrication and field assembly of the 5.6 M liters tank

A crew of ten (10) workers has started the construction of fuel tank 680-TK-042 on August 25, 2008 and the field erection was completed over a period of 16 days. Following this field work, a crew from ACUREN has proceeded to X-RAY testing of horizontal and vertical welds according to specifications described in the latest edition of API Standard 650. According to the report made by ACUREN, no repairs of defective welds were required, either on the tank shell or nozzles.

MOSHER ENGINEERING LTD

Role during construction phase : Welding of pipelines and support brackets between the 5.6 M liters tank and the fuel dispensing module.

In early November 2008, a crew of two (2) workers has welded the pipelines and installed the flanged connections and gate valves between fuel tank 680-TK-042 and the fuel dispensing module manufactured by CHAMCO INDUSTRIES LTD.

They have also installed check valves on the 100 mm diameter inlet and outlet nozzles on this tank, as well as a pressure relief valve set at 75 psi to bypass the check valve on the pipeline between the tank outlet and the fuel dispensing module. The grade of material that was used for this pipeline was A333 cold temperature rated steel.

CHAMCO INDUSTRIES LTD

Role during construction phase : Manufacturing of the fuel dispensing module.

This fuel dispensing module was manufactured in the summer of 2007 and sent to the Meadowbank site. No representatives of CHAMCO were present during the commissioning. Possibly due to vibrations during transport, there were many flanged connections that needed tightening, and it was found that this was not a turn-key installation. The air eliminator unit on the fuel tanker unloading area leaked fuel extensively during operation, as it was often locked in open position.

C. REVISION OF CONSTRUCTION DRAWINGS

AEM has hired STAVIBEL Engineering Services, a firm based in Val-d'Or, in order to complete the drawings that were used in producing this report.

Those four (4) drawings are enclosed in **Appendix 1** of this report.

Drawing VD2259-MDB-001 shows the general layout of the fuel tank 680-TK-042 and containment area. It has been compiled using surveying data collected by a crew from AEM. It also shows the location of pipelines, fuel dispensing module, and some three (3) additional fuel tanks.

Drawing VD2259-MDB-002 shows the cross-sections on both sides of the containment area. These cross-sections are derived from surfaces that were generated using the *Autocad Civil 3D* software, and are also based on information collected from AEM Construction Supervisors. This drawing file was also used to verify containment volumes, as it is described further in section D.

Drawing VD2259-MDB-003 is an as-built version of Vendor drawing BL-2008-80-1 which has been updated to reflect nozzle orientations that were noted during a site visit. No changes were noted except those made to the nozzle schedule.

The enclosed **Revision 1** of drawing 017202-2000-46D6-2001 from SNC-LAVALIN is also an as-built drawing. It shows a few items from the proposed piping layout for the Meadowbank bulk fuel storage that have not yet been put in place. These missing items consists in three (3) pressure relief loops around gate valves, and a 300 US gallon floor sump, which was to be located inside the fuel dispensing module. This floor sump has not been supplied by CHAMCO INDUSTRIES LTD.

Also enclosed is a vendor drawing from CHAMCO INDUSTRIES LTD, which shows the piping details inside the fuel dispensing module.

D. VERIFICATIONS TO STORAGE CAPACITY WITHIN BERMS

STAVIBEL Engineering Services has completed verifications on the liquid storage capacity inside the containment berms, which create an impermeable enclosure around tank 680-TK-042.

The method used was a volume calculation using *Autocad CIVIL 3D* software.

The maximum storage capacity of fuel tank 680-TK-042 is 5 675 700 litres of diesel fuel at a standard temperature of fifteen degrees Celcius (15 °C).

It has been verified using the above software that the impermeable enclosure around this fuel tank will effectively hold one hundred and ten percent (110 %) of its maximum storage capacity. This theoretical calculation does not include the volume inside the tank itself, as if the fuel was pumped outside the tank.

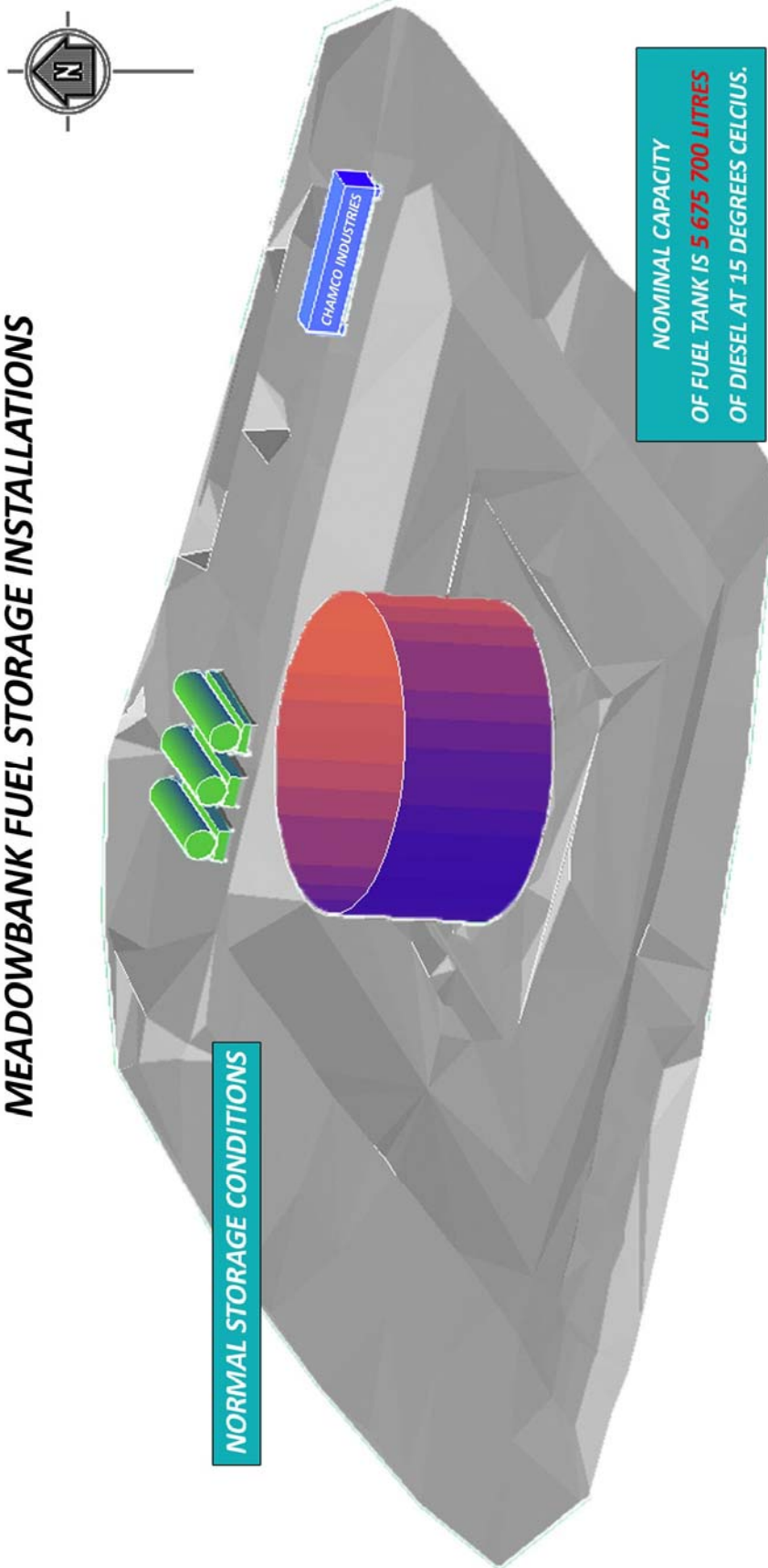
Thus, the lowest point of the HDPE membrane that sits atop the containment area is sufficiently high (at elevation 150.94 m) to meet the above criteria.

On the following pages are the results of a software simulation, which are showing a 3D view of the containment area in normal storage conditions, as well as another view showing the worst case scenario.

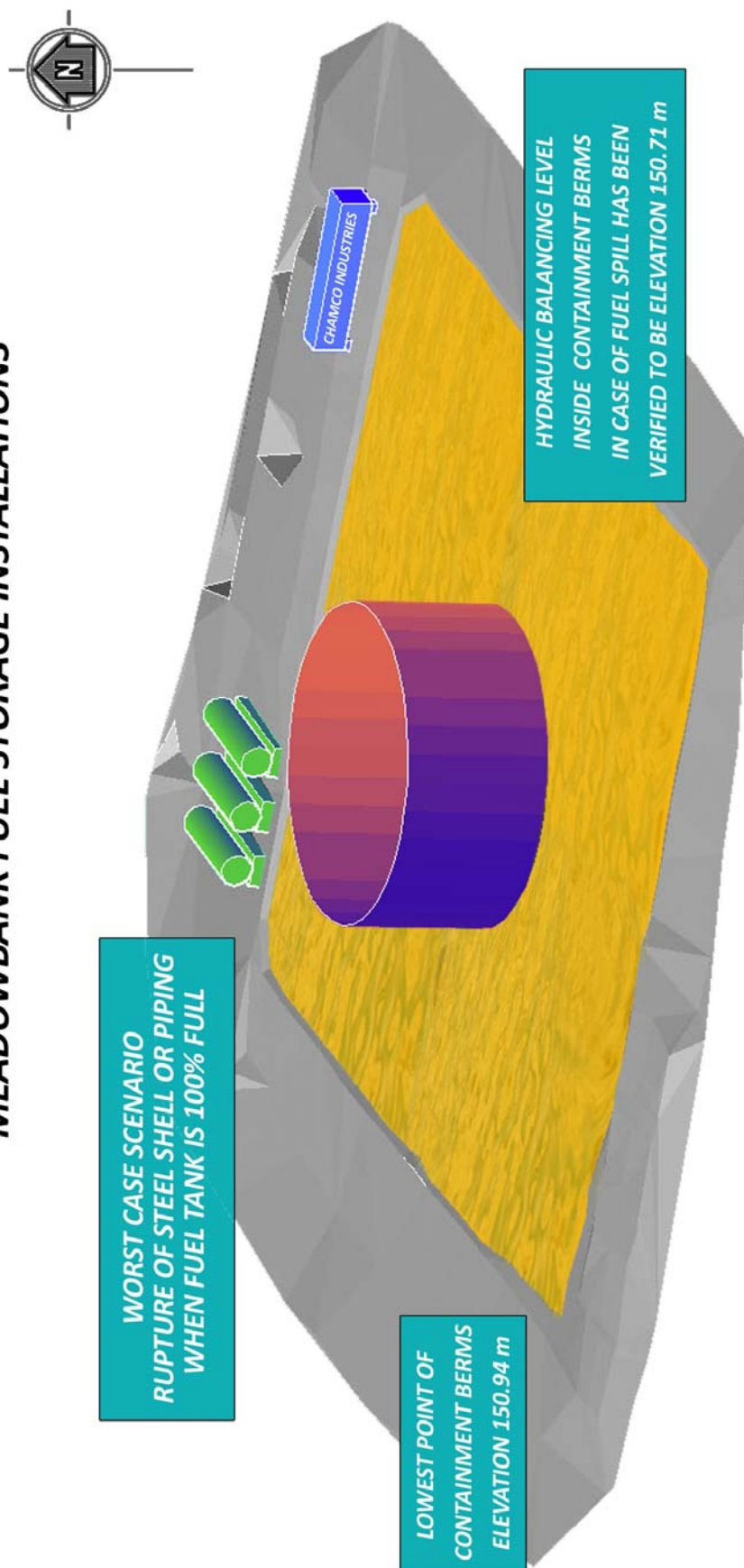
This worst case scenario would consist in either a rupture of the first course of side plates in the tank shell, or a failure in the outlet piping, when the tank is 100% full.

This simulation shows that, in such a worst case scenario, the hydraulic balancing level inside the containment area would not exceed the point with the lowest elevation on the surrounding berms. There is a safety margin of about 200 mm.

MEADOWBANK FUEL STORAGE INSTALLATIONS



MEADOWBANK FUEL STORAGE INSTALLATIONS



APPENDIX 1

AS BUILT DRAWINGS

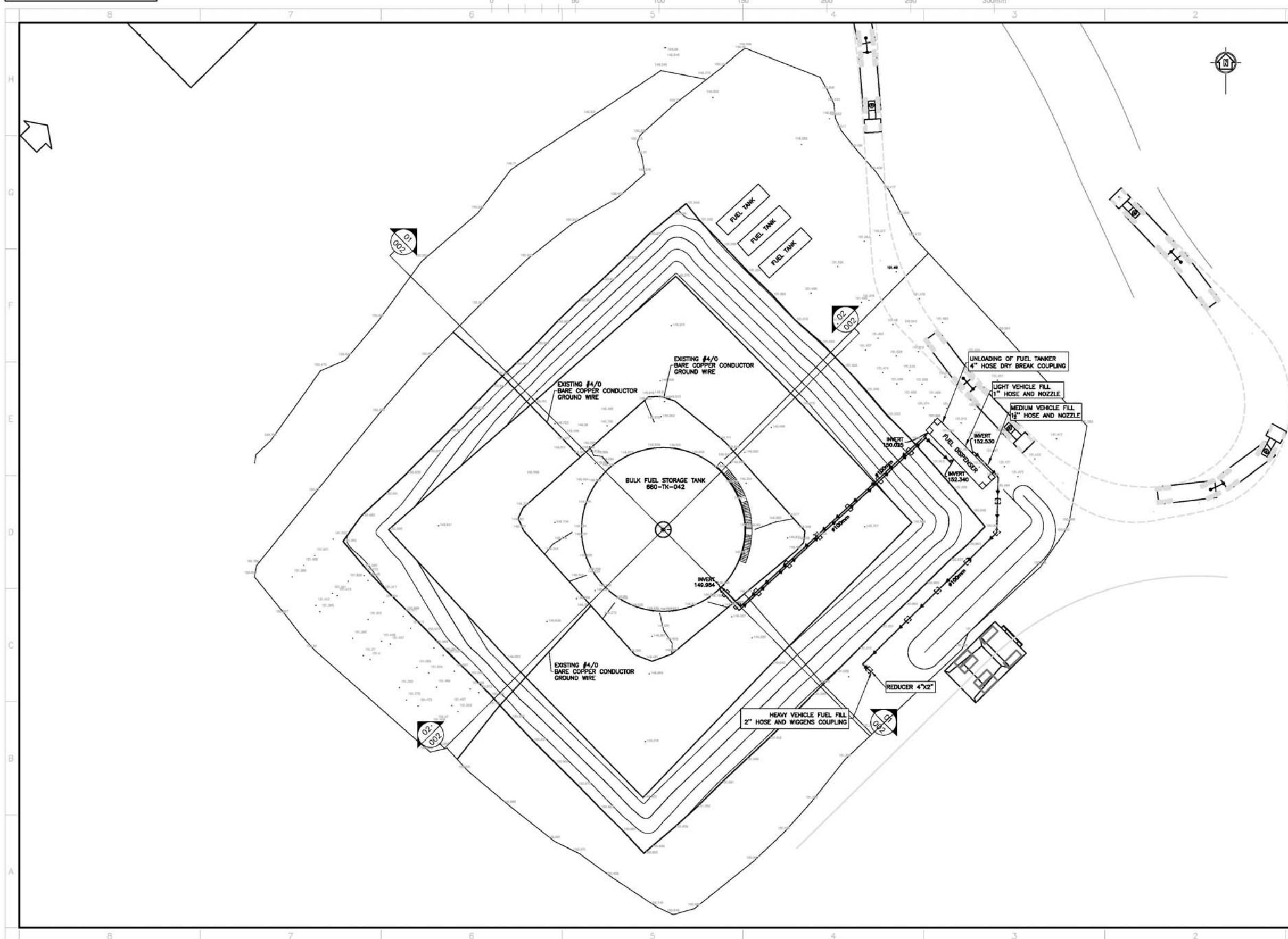
VD2259-MDB-001
VD2259-MDB-002
VD2259-MDB-003

017202-2000-46D6-2001 IFC DRAWING from SNC-LAVALIN

**Plus one (1) drawing from
CHAMCO INDUSTRIES LTD**

Vendor ref. # CUP1014938-21

DRAWING NO.



P:\V2259 - AGNICO-MEADOWBANK\VD2259-1\FUEL DISPENSING\plan\plan.mxd (VD2259-1 AG BULK FUEL TANK MEADOWBANK 2008-03-31) (DWG) (1/4) 31 Mar 2008

FORMAT ARCHD-LANDSCAPE

KEY PLAN

GENERAL NOTES

Groupe STAVIBEL
Consultants en Ingénierie
1271, 7e Rue
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Tél: (819) 825-2233 Téléc: (819) 825-1322
Courriel : stavibel@stavibel.qc.ca
Site Internet : www.stavibel.qc.ca

SE CONFORMER À LA NORME DE CONSTRUCTION D'UN PÉTROLE EN ALUMINE, D'UNE PÉTROLE EN ALUMINE

NO.	DATE	REVISION

REFERENCE DRAWINGS



NO.	DATE	REVISION

REVISIONS

AGNICO-EAGLE
MEADOWBANK DIVISION

WILE
AGNICO-EAGLE - MEADOWBANK DIVISION

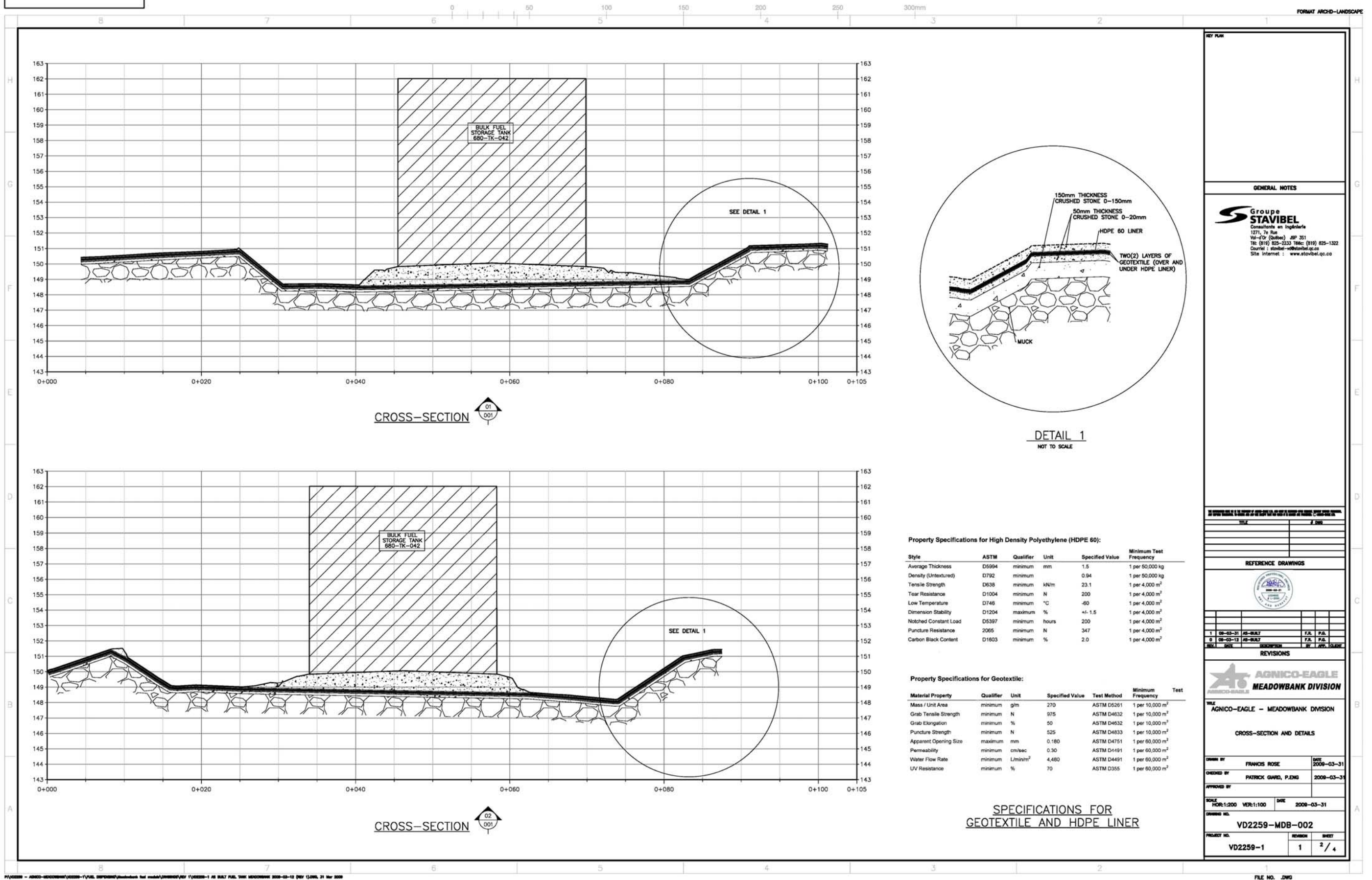
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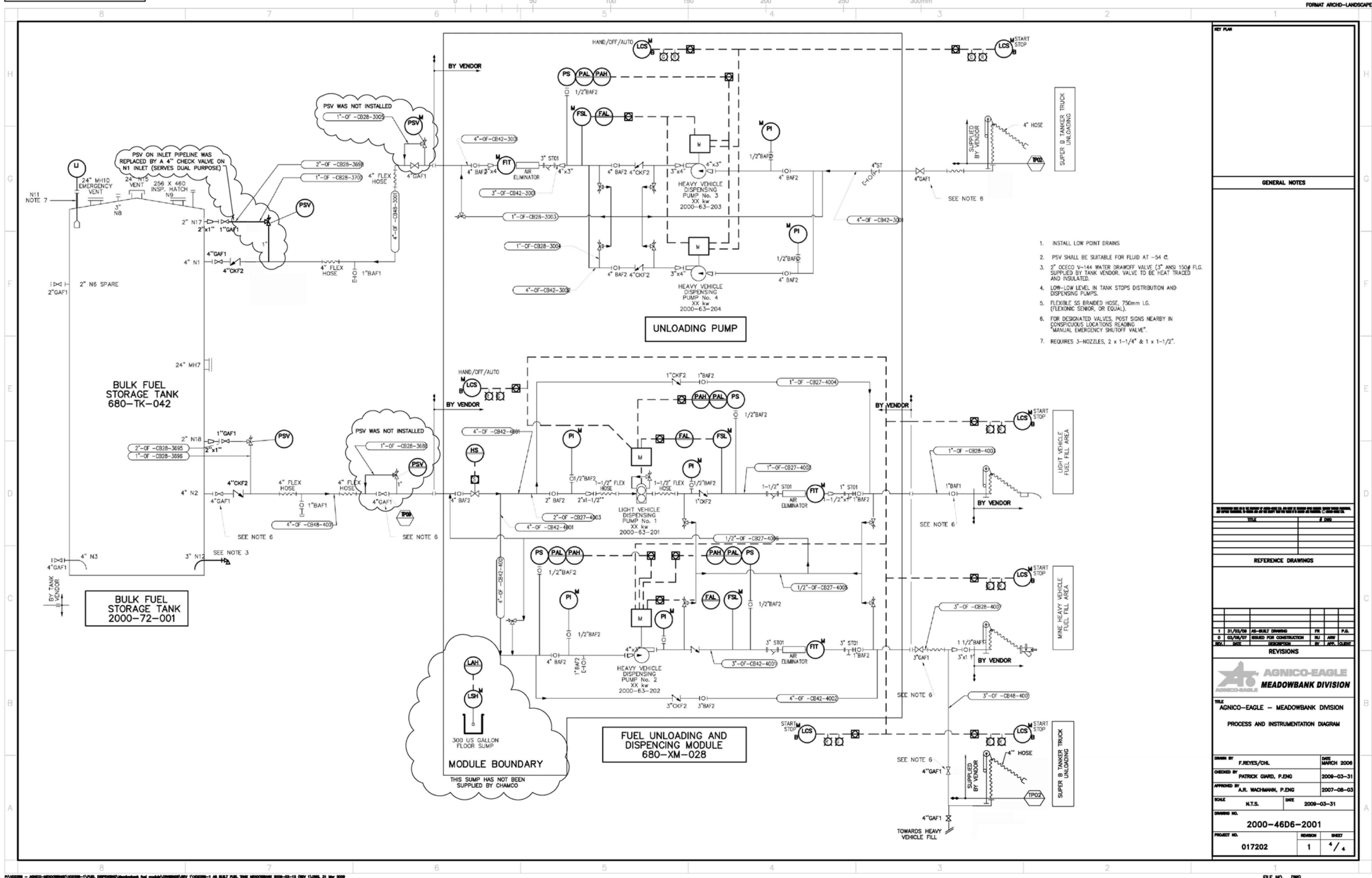
DRAWN BY	CHRISTIAN DERY	DATE	2008-02-29
CHECKED BY	FRANCIS ROSE	DATE	2008-03-31
APPROVED BY	PATRICK GARD, P.ENG	DATE	2008-03-31
SCALE	1:250	DATE	2008-03-31

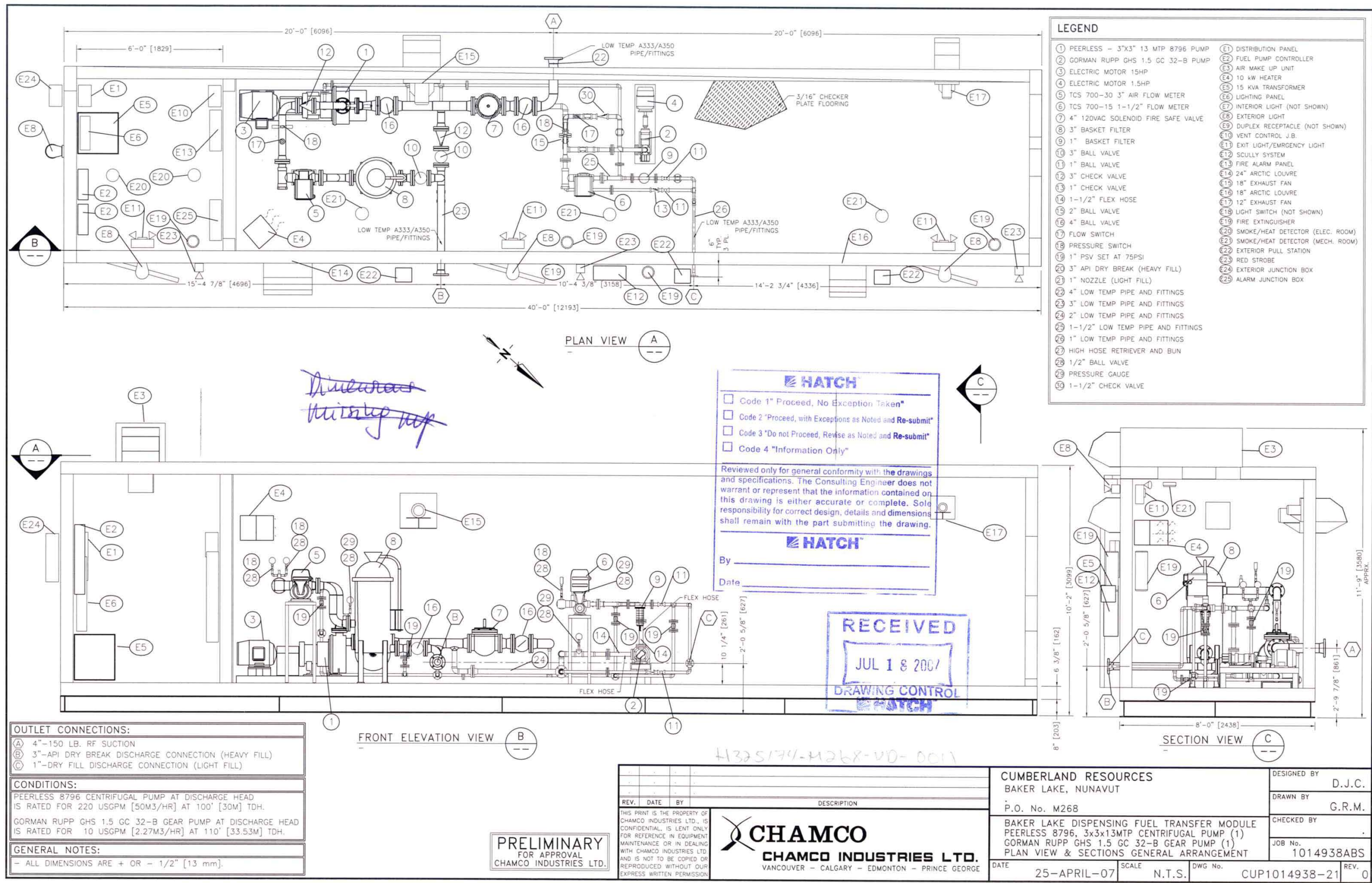
DRAWING NO.	VD2259-MDB-001
PROJECT NO.	VD2259-1
REVISION	1
SHEET	1 / 4

FILE NO. .DWG

DRAWING NO.







- LEGEND**
- | | |
|--------------------------------------|--------------------------------------|
| 1 PEERLESS - 3"x3" 13 MTP 8796 PUMP | E1 DISTRIBUTION PANEL |
| 2 GORMAN RUPP GHS 1.5 GC 32-B PUMP | E2 FUEL PUMP CONTROLLER |
| 3 ELECTRIC MOTOR 15HP | E3 AIR MAKE UP UNIT |
| 4 ELECTRIC MOTOR 1.5HP | E4 10 KW HEATER |
| 5 TCS 700-30 3" AIR FLOW METER | E5 15 KVA TRANSFORMER |
| 6 TCS 700-15 1-1/2" FLOW METER | E6 LIGHTING PANEL |
| 7 4" 120VAC SOLENOID FIRE SAFE VALVE | E7 INTERIOR LIGHT (NOT SHOWN) |
| 8 3" BASKET FILTER | E8 EXTERIOR LIGHT |
| 9 1" BASKET FILTER | E9 DUPLEX RECEPTACLE (NOT SHOWN) |
| 10 3" BALL VALVE | E10 VENT CONTROL J.B. |
| 11 1" BALL VALVE | E11 EXIT LIGHT/EMERGENCY LIGHT |
| 12 3" CHECK VALVE | E12 SCULLY SYSTEM |
| 13 1" CHECK VALVE | E13 FIRE ALARM PANEL |
| 14 1-1/2" FLEX HOSE | E14 24" ARCTIC LOUVRE |
| 15 2" BALL VALVE | E15 18" EXHAUST FAN |
| 16 4" BALL VALVE | E16 18" ARCTIC LOUVRE |
| 17 FLOW SWITCH | E17 12" EXHAUST FAN |
| 18 PRESSURE SWITCH | E18 LIGHT SWITCH (NOT SHOWN) |
| 19 1" PSV SET AT 75PSI | E19 FIRE EXTINGUISHER |
| 20 3" API DRY BREAK (HEAVY FILL) | E20 SMOKE/HEAT DETECTOR (ELEC. ROOM) |
| 21 1" NOZZLE (LIGHT FILL) | E21 SMOKE/HEAT DETECTOR (MECH. ROOM) |
| 22 4" LOW TEMP PIPE AND FITTINGS | E22 EXTERIOR PULL STATION |
| 23 3" LOW TEMP PIPE AND FITTINGS | E23 RED STROBE |
| 24 2" LOW TEMP PIPE AND FITTINGS | E24 EXTERIOR JUNCTION BOX |
| 25 1-1/2" LOW TEMP PIPE AND FITTINGS | E25 ALARM JUNCTION BOX |
| 26 1" LOW TEMP PIPE AND FITTINGS | |
| 27 HIGH HOSE RETRIEVER AND BUN | |
| 28 1/2" BALL VALVE | |
| 29 PRESSURE GAUGE | |
| 30 1-1/2" CHECK VALVE | |

OUTLET CONNECTIONS:

(A) 4"-150 LB. RF SUCTION
(B) 3"-API DRY BREAK DISCHARGE CONNECTION (HEAVY FILL)
(C) 1"-DRY FILL DISCHARGE CONNECTION (LIGHT FILL)

CONDITIONS:

PEERLESS 8796 CENTRIFUGAL PUMP AT DISCHARGE HEAD IS RATED FOR 220 USGPM [50M3/HR] AT 100' [30M] TDH.

GORMAN RUPP GHS 1.5 GC 32-B GEAR PUMP AT DISCHARGE HEAD IS RATED FOR 10 USGPM [2.27M3/HR] AT 110' [33.53M] TDH.

GENERAL NOTES:

- ALL DIMENSIONS ARE + OR - 1/2" [13 mm].

PRELIMINARY
FOR APPROVAL
CHAMCO INDUSTRIES LTD.

41325174-M268-VD-0011

REV.	DATE	BY	DESCRIPTION

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CHAMCO
CHAMCO INDUSTRIES LTD.
VANCOUVER - CALGARY - EDMONTON - PRINCE GEORGE

CUMBERLAND RESOURCES BAKER LAKE, NUNAVUT P.O. No. M268		DESIGNED BY D.J.C.
BAKER LAKE DISPENSING FUEL TRANSFER MODULE PEERLESS 8796, 3x3x13MTP CENTRIFUGAL PUMP (1) GORMAN RUPP GHS 1.5 GC 32-B GEAR PUMP (1) PLAN VIEW & SECTIONS GENERAL ARRANGEMENT		DRAWN BY G.R.M.
DATE 25-APRIL-07		CHECKED BY
SCALE N.T.S.		JOB No. 1014938ABS
DWG No. CUP1014938-21		REV. 0

APPENDIX 2

SAFE FILL LEVEL FOR FUEL TANK 680-TK-042

The safe fill level of fuel tank 680-TK-042 depends on the temperature of the fuel inside the tanker, as well as outside temperature. In order to allow room for thermal expansion of diesel fuel, some care must be taken not to exceed the safe fill levels stated hereunder. The VAREC float gives imperial readings.

safe fill for fuel tank 680-TK-042			
TEMPERATURE of fuel unloaded	MAXIMUM FUEL LEVEL		
	feet	inches	fraction
- 40°C	38	1	9/16
- 35°C	38	3	3/8
- 30°C	38	5	3/16
- 25°C	38	7	1/16
- 20°C	38	8	7/8
- 15°C	38	10	3/4
- 10°C	39	0	5/8
- 5°C	39	2	9/16
0°C	39	4	9/16
+ 5°C	39	6	1/2
+10°C	39	8	1/2
+15°C	39	10	1/2