APPENDIX B12 - MEADOWBANK BULK FUEL STORAGE FACILITY: ENVIRONMENTAL PERFORMANCE MONITORING PLAN, VERSION 2 (JUNE 2014)

AGNICO EAGLE

MEADOWBANK GOLD PROJECT

Meadowbank Bulk Fuel Storage Facility: Environmental Performance Monitoring Plan

In Accordance with Water License 2AM-MEA0815

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Division

Version 2
June 2014

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited – Meadowbank Division (AEM) 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 provide diesel fuel for routine operations at the mine site. The bulk fuel tank facility was commissioned in January 2009. This document provides the details for the Meadowbank Bulk Fuel Storage Facility Environmental Performance Monitoring Plan required by Water License 2AM-MEA0815 Part I, Item 17.

To adequately assess the environmental performance of the bulk fuel storage tank at Meadowbank 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 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.

DISTRIBUTION LIST

AEM – General Mine Manager

AEM – Environment Superintendent

AEM – Environmental Coordinator

AEM – Environmental Technician

AEM – Site Services Superintendent

AEM – Field Services Supervisor

AEM – Warehouse Supervisor

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	09/12/22			Comprehensive plan for Meadowbank Bulk Fuel Storage Facility
2	30/06/2014			Comprehensive review of the plan

Prepared By: Environmental Department

Approved By: 

Ryan Vanengen
Environment Superintendent - Interim

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SECTION 1. INTRODUCTION

Agnico Eagle Mines Limited – Meadowbank Division (AEM) is operating the Meadowbank Gold Project approximately 70 km north of the Hamlet of Baker Lake. As part of the project, one 5.6 million liters bulk fuel storage tank was constructed to provide diesel fuel for routine operations at the mine site. The bulk fuel tank facility was commissioned in January 2009.

This update to the initial Meadowbank Bulk Fuel Storage Facility Performing Monitoring Plan document provides the details necessary to fulfill Part I, Item 17 of the Nunavut Water Board Type A License 2AM-MEA0815. In the license it states;

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.*

To adequately assess the environmental performance of the bulk fuel storage tank at Meadowbank 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 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 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 in 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

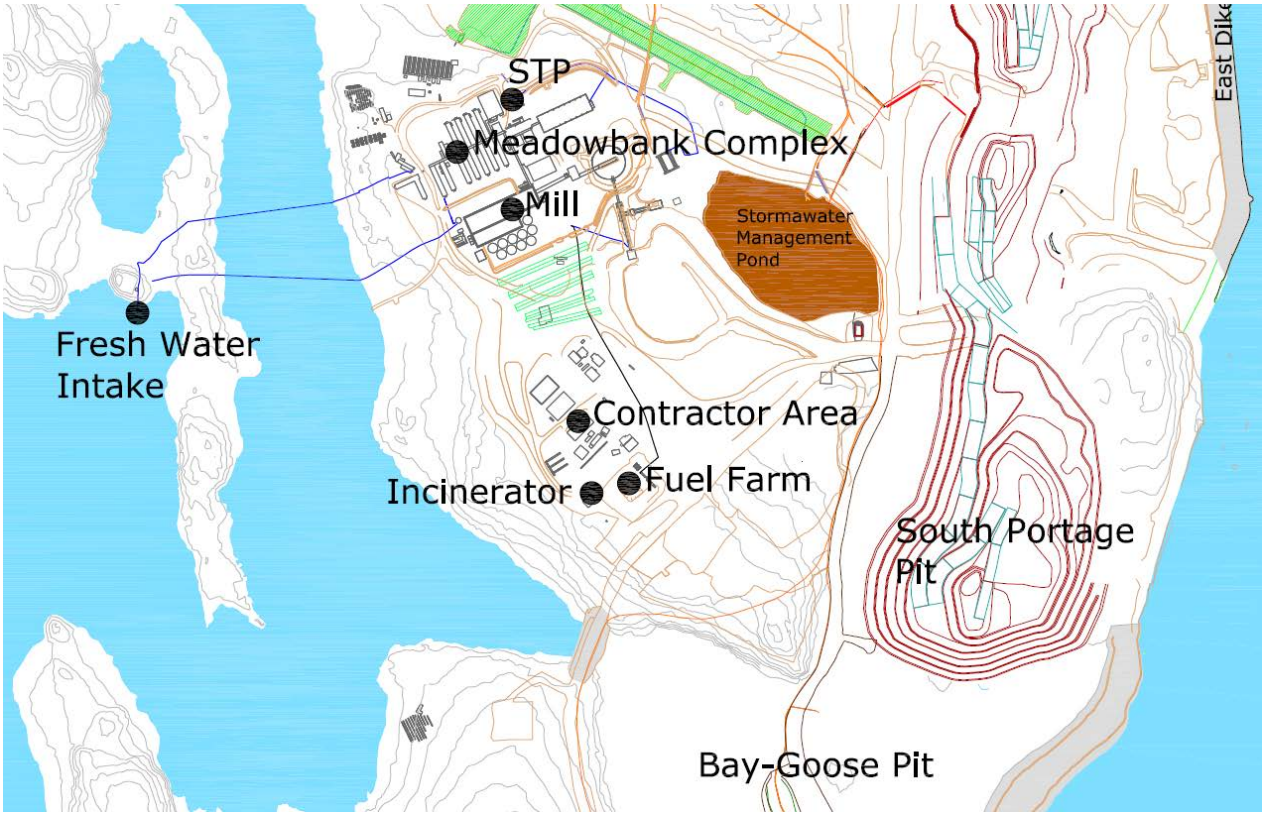
- The recommended sampling for ongoing monitoring of the integrity of the secondary containment (point d) is provided in Section 6.1.

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



2.2 DESIGN AND INSTALLATION SUMMARY

Following regulatory approval, during the summer of 2008, AEM 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 2009, an underground pipe was installed in accordance with CEPA

(2008) specifications to supply fuel from the bulk fuel tank to the main Meadowbank power plant.

2.3 OPERATION AND MAINTENANCE SUMMARY

Inventory control of transfer and weekly volume inspections using manual or electronic dip reconciliation are conducted by Meadowbank mine operations staff. Weekly inspections are logged and reported by the environmental department. Weekly visual inspections and inventory reconciliation are used to evaluate and determine bulk fuel tank leakage.

The bulk fuel storage facility is maintained in accordance with best management practices.

The bulk fuel tank is 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 mine 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.

3.2 GEOLOGY

The project site has a thin, discontinuous cover of top soil with minimal organic material. Soil thickness is typically between 1 and 5 m below which intact ultramafic and meta-sedimentary bedrock is encountered (Golder, 2004). In the area near the bulk fuel farm, bedrock is encountered within 2m of existing ground surface or is exposed with weathered fractures observed within 1 to 2 m.

3.3 FLORA AND FAUNA

There are no trees and few shrubs in the area surrounding the Meadowbank mine. The site is 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 bulk fuel storage tank. Lake trout, arctic char, lake whitefish, round whitefish, slimy sculpin and stickleback are predominant fish species found in Third Portage Lake (BAER, 2005).

3.4 SUBSURFACE CONDITIONS

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

3.5 WATER QUALITY

Third Portage Lake water quality closely resembles distilled water as many conventional water chemistry parameters are at or below detection limits (BAER, 2005). 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

The Nunavut Water Board (NWB) Type A water license 2AM-MEA0815 requirements related to the Meadowbank mine site bulk fuel storage facility are provided below. AEM is committed to achieving all of these requirements.

Part F: Conditions Applying to Waste Disposal and Management

5. Effluent from the Mine Site Bulk Fuel Storage Facility and other fuel containment facilities that are within proximity of the Stormwater Management Pond shall be directed to the Stormwater Management Pond.

6. Effluent from fuel containment facilities that require Discharge to land, shall not exceed the following Effluent quality limits:

Parameter	Maximum Average Concentration
Benzene (ug/L)	370
Toluene (ug/L)	2
Ethylbenzene (ug/L)	90
Lead (ug/L)	1
Oil and Grease (mg/L)	15 and no visible sheen

7. The Licensee shall confirm compliance with Effluent quality limits in Part F, Items 2, 3, and 6 prior to Discharge.

8. The Licensee shall provide at least ten (10) days' notice to the Inspector prior to any planned Discharges from any facilities. The notice shall include an estimated volume proposed for Discharge and the receiving location.

9. The Licensee shall, under Part Item 6, discharge effluent in such a manner as to minimize surface erosion at a distance of at least thirty (30) meters above the ordinary high water mark of any Water body, where direct flow into a Water body is not possible and no additional impacts are created, or as otherwise approved by the Board in writing.

Part H: Conditions Applying to Emergency Response and Contingency Planning:

3. The License shall prevent any chemicals, petroleum product or unauthorized Wastes associated with the project from entering Water.

4. The License shall provide secondary containment for fuel and chemical storage as required by applicable standards and acceptable industry practice.

5. The License shall perform weekly inspections of fuel containment facilities for leaks and settlement and shall keep a written log of inspections to be made to an Inspector upon request.

SECTION 5. ENVIRONMENTAL PERFORMANCE ASSESSMENT

To adequately assess the environmental performance of the 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 AEM 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.

5.1 DESK-TOP REPORT REVIEW

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).

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).

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 INSPECTION

A consultant performs a geotechnical inspection annually and inspects the bulk fuel secondary containment structures, the report is sent to NWB annually. Last inspection was performed in

September of 2013 by Golder Associates (Golder, 2013).

5.3 ENVIRONMENTAL ASSESSMENT

The management of 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 to 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.

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, bulk fuel storage facility structures have been 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 bulk fuel storage facility 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 refuelling 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, 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 bulk fuel storage facility. 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.

However, given the presence of shallow bedrock and the natural topography of the mine site, contaminants in groundwater would be expected to travel towards the storm water management pond or follow intact bedrock and fractures toward the tailings impoundment area.

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 bulk fuel storage facility 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 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 environmental department once per week and weekly manual or electronic dip tests are conducted for inventory reconciliation by sites services department. The environmental department inspect the facilities 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.

Environmental staff will follow-up with sites services department if any non-compliance are observed. A weekly written inspection sheet is 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 discharging. The water accumulated into the secondary containment is not release into the environment but discharge to the stormwater management plan.

During visual inspections the quantity of contact water collected inside the secondary containment area 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 discharge to the environment (as per Part F, Item 6): 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 mine are collected as part of the Aquatic Effects

Management Program (AEMP 2008). The results of these analyzes are included in the annual report. These samples are used to evaluate the performance of the overall water management plan for the mine.

6.3 EVENT MONITORING

In the event of a spill occurrence at the bulk fuel storage facility, the spill contingency plan will be followed (AEM, 2013). 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), soil or groundwater.

6.3.1 Soil Sampling

Following the unlikely event where a spill is not contained within the secondary containment area, 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, an environmental assessment will be conducted. Similar to routine contact water sampling (inside the secondary containment area), 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 pond. Prior to withdrawal, samples will be analyzed at a certified laboratory.

As part of the Aquatic Effects Management Program (AEMP, 2008), receiving environment surface and at-depth water samples will be taken on Third Portage 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, 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 (2013). Meadowbank Gold Project: Spill Contingency Plan. August 2013.

AEMP (2012). Aquatic Ecosystem Management Program - Receiving Environment Monitoring: Meadowbank Gold Project. December 2012.

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.

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

PREPARED BY :

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AGNICO-EAGLE MINES LTD
MEADOWBANK DIVISION

MEADOWBANK FUEL STORAGE INSTALLATIONS

FINAL REPORT
FOLLOWING THE CONSTRUCTION

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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
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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.

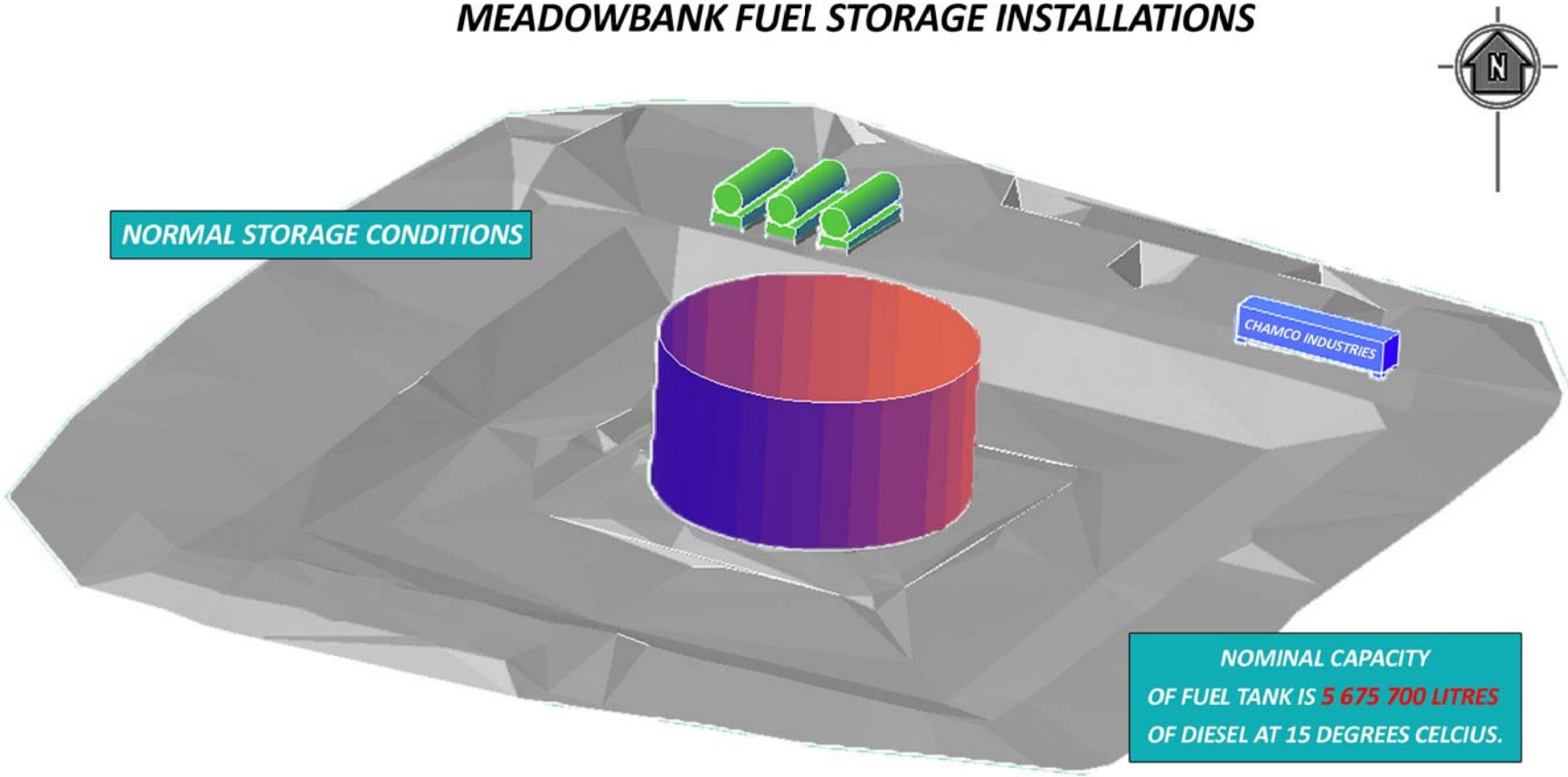
Thus, the lowest point of the HDPE membrane that sits atop the containment area is sufficiently high (at elevation 150.94 m) to meet the above criteria.

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.

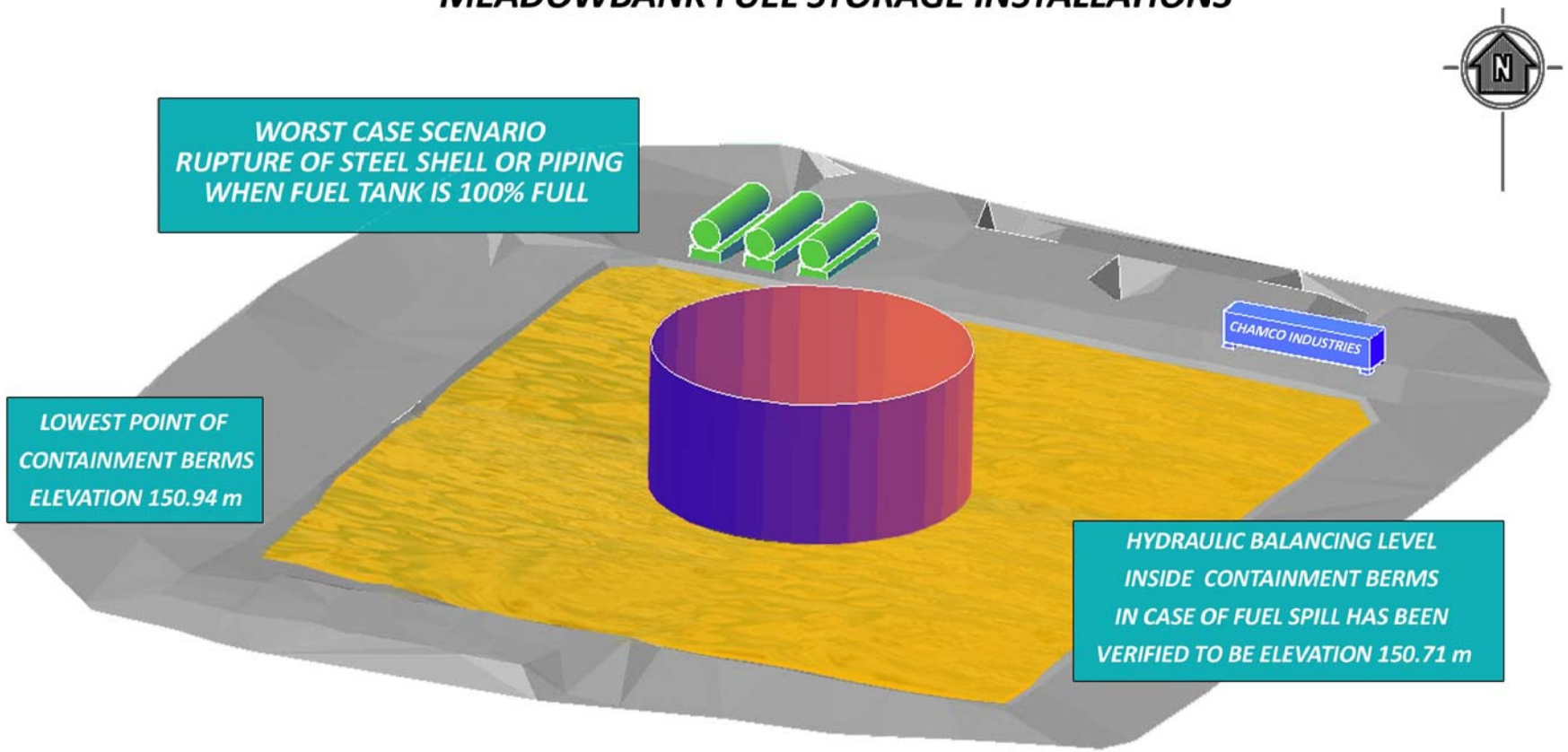
This worst case scenario would consist in either a rupture of the first course of side plates in the tank shell, or a failure in the outlet piping, when the tank is 100% full.

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

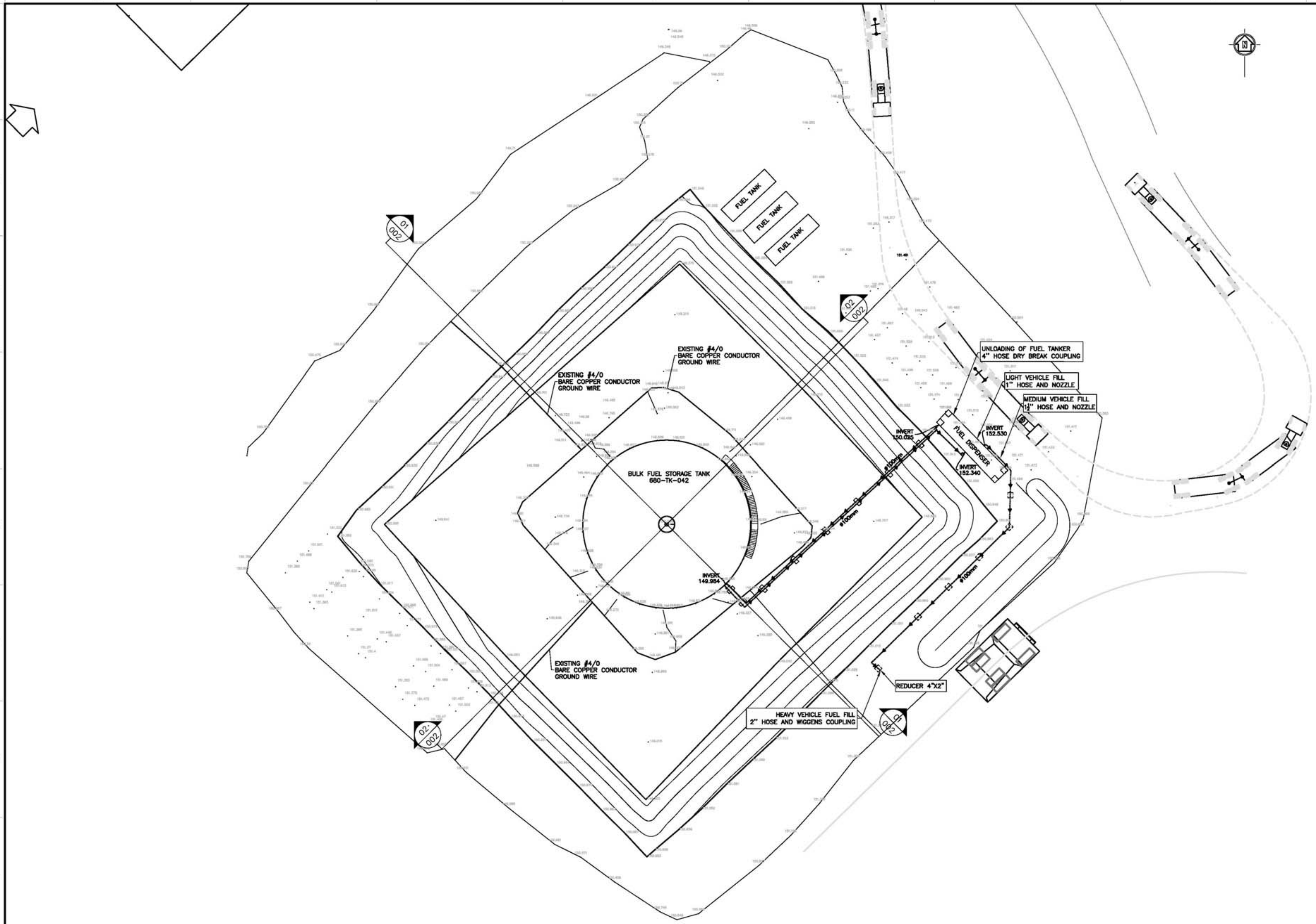
017202-2000-46D6-2001 IFC DRAWING from SNC-LAVALIN

Plus one (1) drawing from CHAMCO INDUSTRIES LTD

Vendor ref. # CUP1014938-21

DRAWING NO.

FORMAT ARCHD-LANDSCAPE



KEY PLAN

GENERAL NOTES

Groupe STAVIBEL
Consultants en Ingénierie
1271, 7e Rue
Val-d'Or (Québec) J9P 3S1
Tél: (819) 825-2233 Téléc: (819) 825-1322
Courriel : stavibel-vd@stavibel.qc.ca
Site internet : www.stavibel.qc.ca

TITLE	# DWG

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	BY	APP.	CLIENT
1	09-03-31	AS-BUILT (ADD GROUNDWIRE)	F.R.	P.G.	
0	09-03-12	AS-BUILT	F.R.	P.G.	

REVISIONS

AGNICO-EAGLE
MEADOWBANK DIVISION

TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION

GENERAL LAYOUT

DRAWN BY	CHRISTIAN DÉRY	DATE 2009-02-25
CHECKED BY	FRANCIS ROSE	2009-03-31
APPROVED BY	PATRICK GIARD, P.ENG	2009-03-31
SCALE 1:250	DATE 2009-03-31	

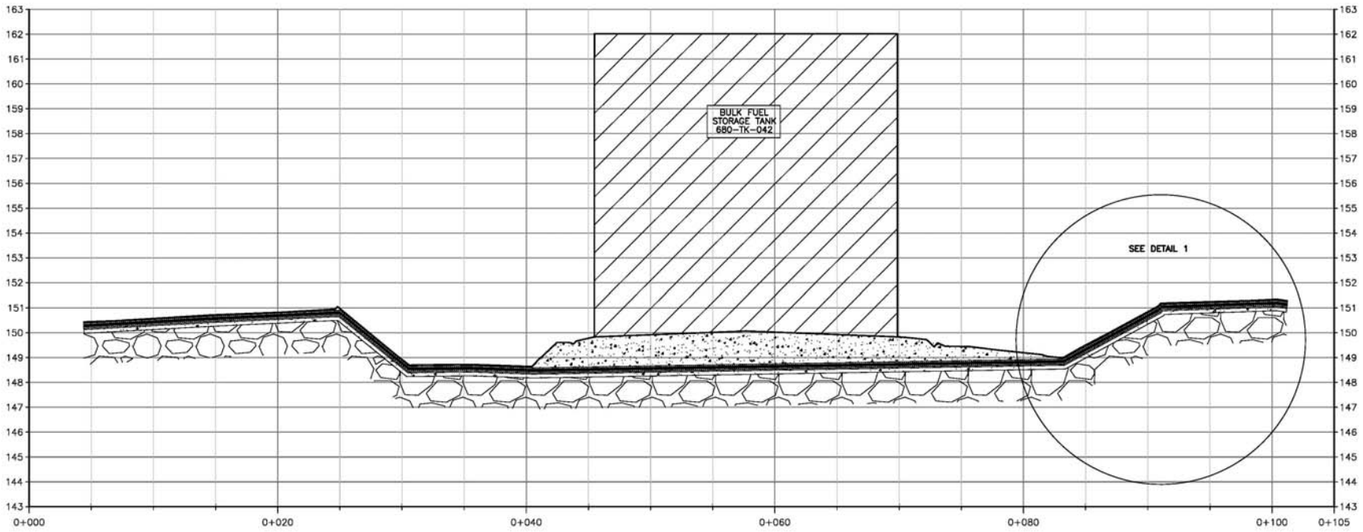
DRAWING NO.
VD2259-MDB-001

PROJECT NO.	REVISION	SHEET
VD2259-1	1	1/4

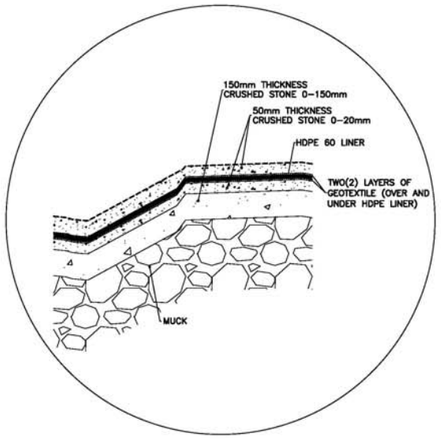
FILE NO. .DWG

DRAWING NO.

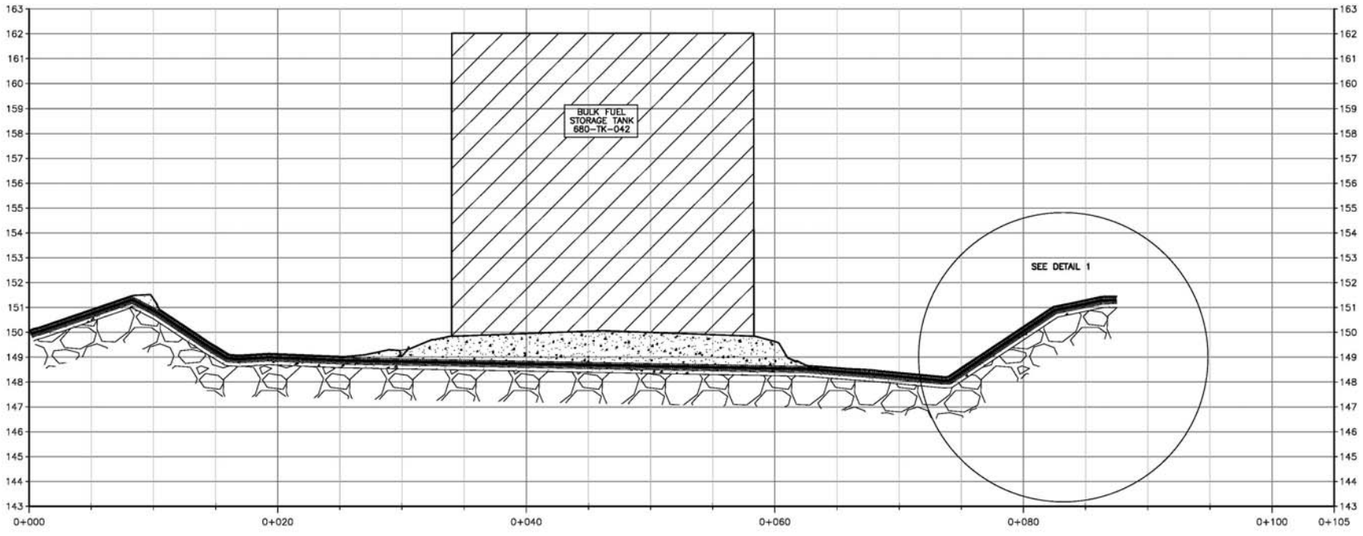
FORMAT ARCH-D-LANDSCAPE



CROSS-SECTION 01/001



DETAIL 1
NOT TO SCALE



CROSS-SECTION 02/001

Property Specifications for High Density Polyethylene (HDPE 60):

Style	ASTM	Qualifier	Unit	Specified Value	Minimum Test Frequency
Average Thickness	D5994	minimum	mm	1.5	1 per 50,000 kg
Density (Untextured)	D792	minimum		0.94	1 per 50,000 kg
Tensile Strength	D638	minimum	kN/m	23.1	1 per 4,000 m^2
Tear Resistance	D1004	minimum	N	200	1 per 4,000 m^2
Low Temperature	D746	minimum	°C	-60	1 per 4,000 m^2
Dimension Stability	D1204	maximum	%	+/- 1.5	1 per 4,000 m^2
Notched Constant Load	D5397	minimum	hours	200	1 per 4,000 m^2
Puncture Resistance	2065	minimum	N	347	1 per 4,000 m^2
Carbon Black Content	D1603	minimum	%	2.0	1 per 4,000 m^2

Property Specifications for Geotextile:

Material Property	Qualifier	Unit	Specified Value	Test Method	Minimum Frequency	Test
Mass / Unit Area	minimum	g/m	270	ASTM D5261	1 per 10,000 m^2	
Grab Tensile Strength	minimum	N	975	ASTM D4632	1 per 10,000 m^2	
Grab Elongation	minimum	%	50	ASTM D4632	1 per 10,000 m^2	
Puncture Strength	minimum	N	525	ASTM D4833	1 per 10,000 m^2	
Apparent Opening Size	maximum	mm	0.180	ASTM D4751	1 per 60,000 m^2	
Permeability	minimum	cm/sec	0.30	ASTM D4491	1 per 60,000 m^2	
Water Flow Rate	minimum	L/min/m^2	4,480	ASTM D4491	1 per 60,000 m^2	
UV Resistance	minimum	%	70	ASTM D355	1 per 60,000 m^2	

SPECIFICATIONS FOR
GEOTEXTILE AND HDPE LINER

KEY PLAN

GENERAL NOTES

Groupe STAVIBEL
Consultants en ingénierie
1271, 7e Rue
Val-d'Or (Québec) J9P 3S1
Tél: (819) 825-2233 Télécopieur: (819) 825-1322
Courriel : stavibel-vd@stavibel.qc.ca
Site Internet : www.stavibel.qc.ca

REFERENCE DRAWINGS

REV.	DATE	DESCRIPTION	BY	APP.	CLIENT
1	09-03-31	AS-BUILT	F.R.	P.G.	
0	09-03-13	AS-BUILT	F.R.	P.G.	

REVISIONS

AGNICO-EAGLE
MEADOWBANK DIVISION

TITLE
AGNICO-EAGLE - MEADOWBANK DIVISION

CROSS-SECTION AND DETAILS

DRAWN BY	FRANCIS ROSE	DATE 2009-03-31
CHECKED BY	PATRICK GIARD, P.ENG	2009-03-31
APPROVED BY		

SCALE HOR:1:200 VER:1:100 DATE 2009-03-31

DRAWING NO.
VD2259-MDB-002

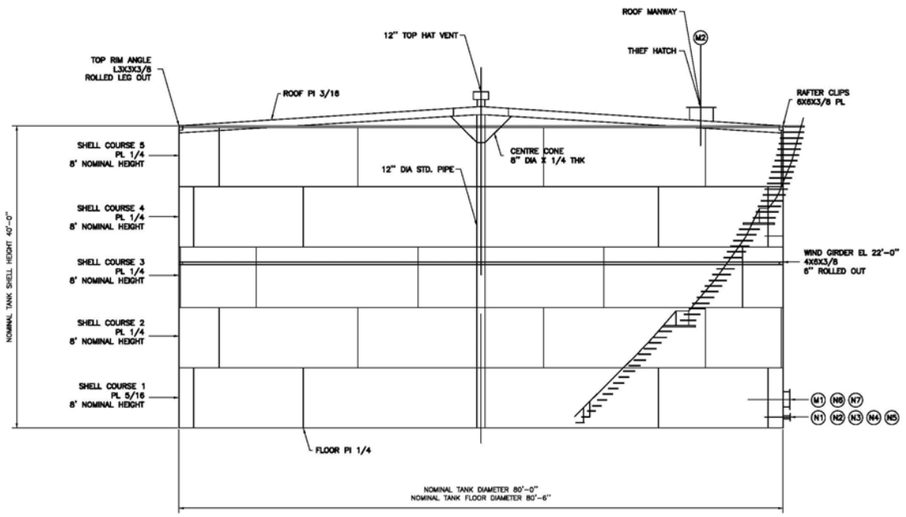
PROJECT NO.	REVISION	SHEET
VD2259-1	1	2/4

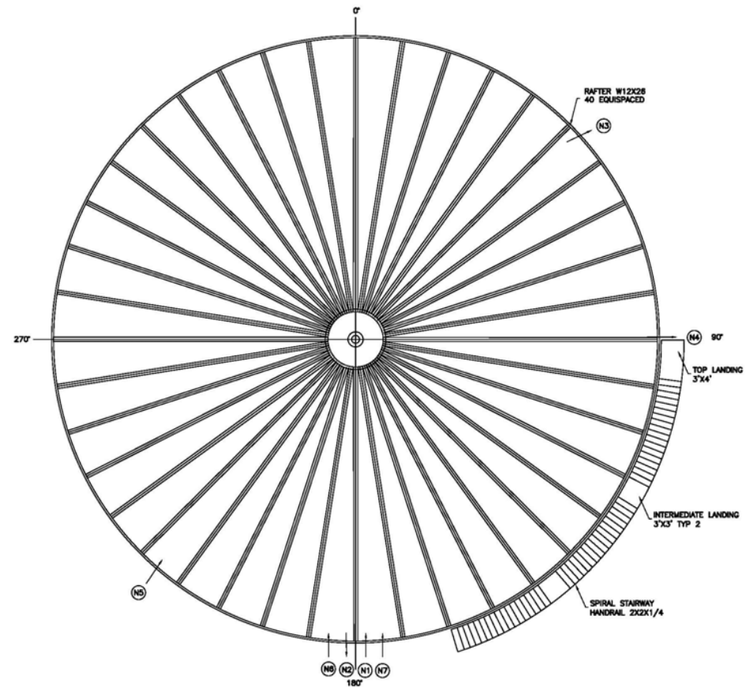
P:\VD2259 - AGNICO-MEADOWBANK\VD2259-1\FUEL DISPENSER\Mandataire fuel models\DWG\VD2259-1 AS BUILT FUEL TANK MEADOWBANK 2009-03-12 (REV 1).DWG, 31 Mar 2009

FILE NO. .DWG

DRAWING NO.

FORMAT ARCH-D-LANDSCAPE





* ALL NOZZLE ORIENTATIONS ARE APPROXIMATE

GENERAL NOTES

DESIGN

1. CODE OF CONSTRUCTION: API-650, LATEST EDITION
2. ALL DIMENSIONS ARE IN IMPERIAL UNLESS NOTED OTHERWISE
3. PRODUCT STORED: DIESEL
4. DIAMETER 80'-0"
5. HEIGHT: 40'-0"
6. NOMINAL CAPACITY: 5.6 MILLION LITRES.
7. OPERATING TEMPERATURE RANGE: -45/+100°C
8. PRODUCT SPECIFIC GRAVITY: 0.9
9. VENTING: PRESSURE: ATMOSPHERIC

INSPECTION

1. VACUUM TESTING: FLOOR
2. LIQUID PENETRANT INSPECTION: SHELL TO FLOOR WELD
3. RADIOGRAPHY: VERTICAL SHELL WELDS-SPOT AS PER API 650
4. RADIOGRAPHY: HORIZONTAL SHELL WELDS-SPOT AS PER API 650

MATERIALS

1. STRUCTURAL BOLTS: A-325
2. REGULAR BOLTS: A-193 GR.B7
3. NUTS: A-194 GR.2H
4. PIPE NOZZLES: A106 GR.B SCH.80
5. FORGED FLAMINGS AND COUPLINGS:LF2
6. PIPE FITTINGS: A234 GR.WPB
7. STRUCTURAL STEEL: G40.21 44W
8. STEEL PLATE: G40.21M-260WT
9. GASKETS: NA60
10. ROOF SUPPORT COLUMN: 12" STD PIPE STRUCTURAL GRADE OR BETTER

NOZZLE SCHEDULE (ALL NOZZLE ORIENTATIONS ARE APPROXIMATE)

MARK	DESCRIPTION	SIZE	INT.PROJ.	PROJ.	TYPE	RATING	NOTES
M1	SHELL MANWAY	24"					180°
M2	ROOF MANWAY	24"					
N1	RE-SUPPLY	4"			RFSO	150#	175°
N2	SUCTION FOR FUEL DISPENSING	4"			RFSO	150#	185°
N3	DRAW-OFF	3"	152		RFSO	150#	40°
N4	SUCTION FOR FUEL TRANSFER	4"	152		RFSO	150#	90°
N5	SPARE	4"			RFSO	150#	220°
N6	PRESSURE RELIEF FOR N2	2"			RFSO	150#	
N7	SPARE	2"					190°
TH	THIEF HATCH (ON M2)	8"					170°

KEY PLAN

GENERAL NOTES

GEM STEEL
9060-24 STREET
EDMONTON, ALBERTA
CANADA T6P 1X8
PH. (780) 449-0000
FAX. (780) 449-0001

TITLE	# DWG
GENERAL TANK ELEVATION	SL3008-80-01
ROOF AND NOZZLE PLAN	SL3008-80-01
GENERAL TANK DETAILS	SL3008-80-01

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION	BY	APP.	CLIENT
1	12/03/09	AS-BUILT DRAWING	PR		P.G.
A	10/09/09	ISSUED FOR REVIEW	JGC	BNB	

REVISIONS

AGNICO-EAGLE
MEADOWBANK DIVISION

TITLE
AGNICO-EAGLE - MEADOWBANK DIVISION
GENERAL TANK LAYOUT
80' DIAX40' HIGH
DIESEL FUEL STORAGE TANKS

DRAWN BY	GEM STEEL EDMONTON LTD	DATE 2008-08-08
CHECKED BY	PATRICK GIARD, P.ENG	2009-03-31
APPROVED BY		
SCALE	N.T.S.	DATE

DRAWING NO.
VD2259-MDB-003

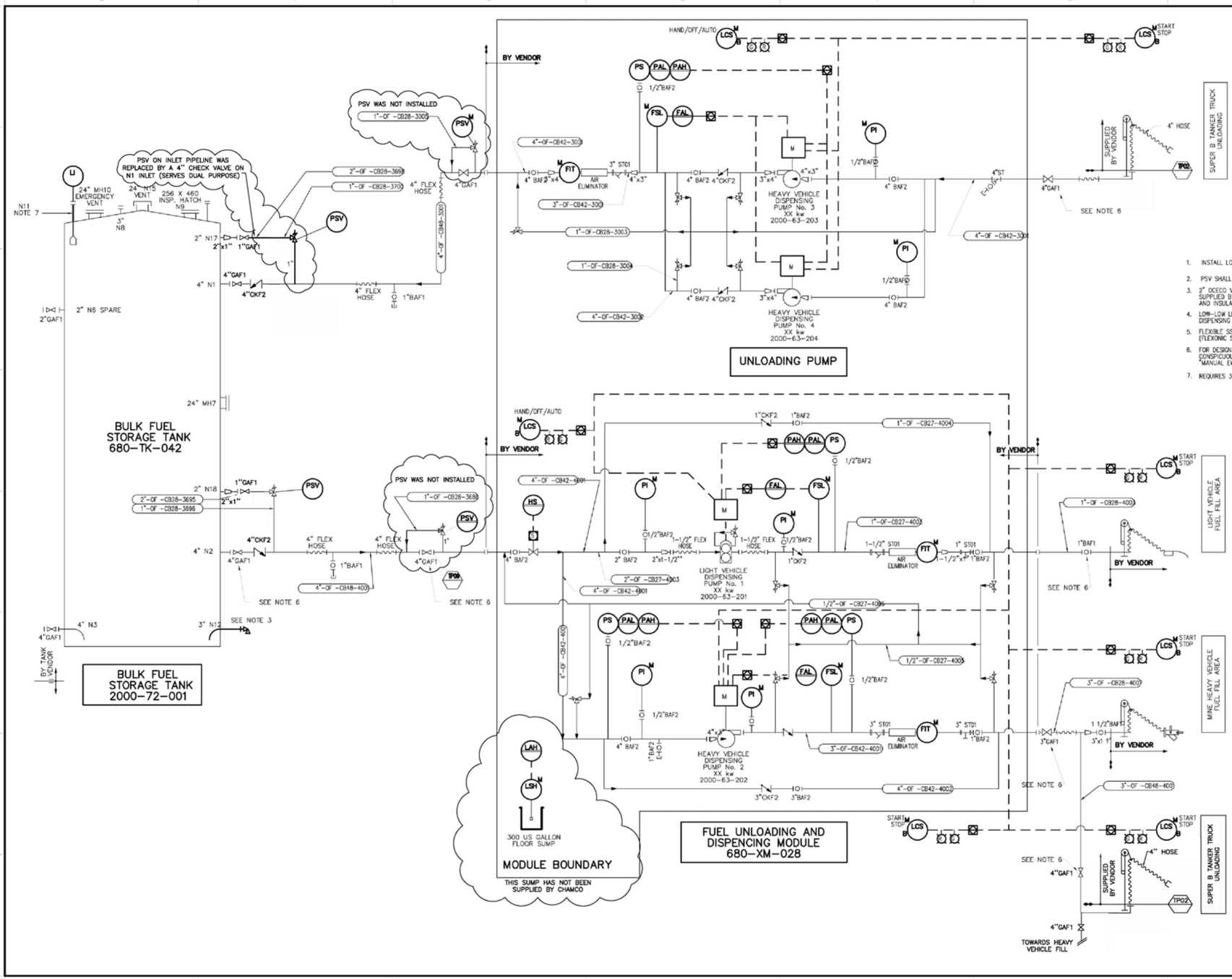
PROJECT NO.	REVISION	SHEET
VD2259-1	1	3/4

P:\VD2259 - AGNICO-MEADOWBANK\VD2259-7\FUEL DISPENSER\Meadowbank fuel models\DRAWINGS\REV 1\VD2259-1 AS BUILT FUEL TANK MEDOWBANK 2009-03-12 (REV 1).DWG, 31 Mar 2009

FILE NO. .DWG

DRAWING NO.

FORMAT ARCH-D-LANDSCAPE



KEY PLAN

GENERAL NOTES

1. INSTALL LOW POINT DRAINS
2. PSV SHALL BE SUITABLE FOR FLUID AT -54 ℃.
3. 2" OCECO V-144 WATER DRAWOFF VALVE (3" ANSI 150# FLG. SUPPLIED BY TANK VENDOR. VALVE TO BE HEAT TRACED AND INSULATED.
4. LOW-LOW LEVEL IN TANK STOPS DISTRIBUTION AND DISPENSING PUMPS.
5. FLEXIBLE SS BRAIDED HOSE, 750mm LG. (FLEXONIC SENIOR, OR EQUAL).
6. FOR DESIGNATED VALVES, POST SIGNS NEARBY IN CONSPICUOUS LOCATIONS READING "MANUAL EMERGENCY SHUTOFF VALVE".
7. REQUIRES 3-NOZZLES, 2 x 1-1/4" & 1 x 1-1/2".

TITLE	# DWG

REFERENCE DRAWINGS

REVISIONS

REV.	DATE	DESCRIPTION	BY	APP.	CLIENT
1	31/03/09	AS-BUILT DRAWING	FR		P.G.
0	03/08/07	ISSUED FOR CONSTRUCTION	RU	ARW	

AGNICO-EAGLE
MEADOWBANK DIVISION

TITLE
AGNICO-EAGLE – MEADOWBANK DIVISION

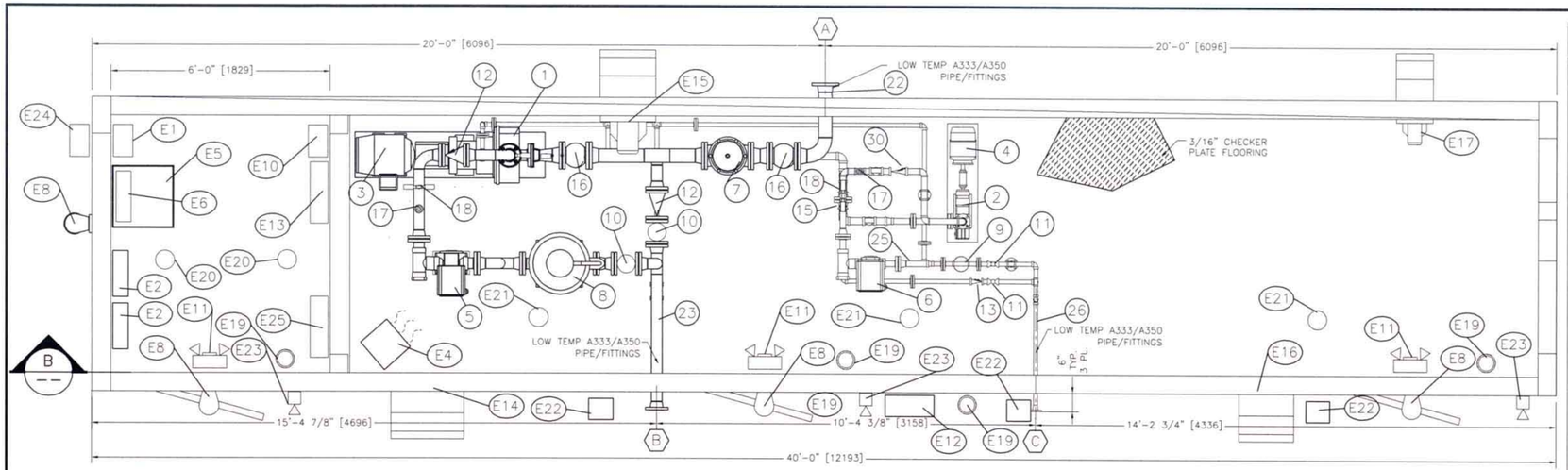
PROCESS AND INSTRUMENTATION DIAGRAM

DRAWN BY F.REYES/CHL	DATE MARCH 2006
CHECKED BY PATRICK GIARD, P.ENG	2009-03-31
APPROVED BY A.R. WACHMANN, P.ENG	2007-08-03
SCALE N.T.S.	DATE 2009-03-31

DRAWING NO.
2000-46D6-2001

PROJECT NO.	REVISION	SHEET
017202	1	4/4

FILE NO. .DWG

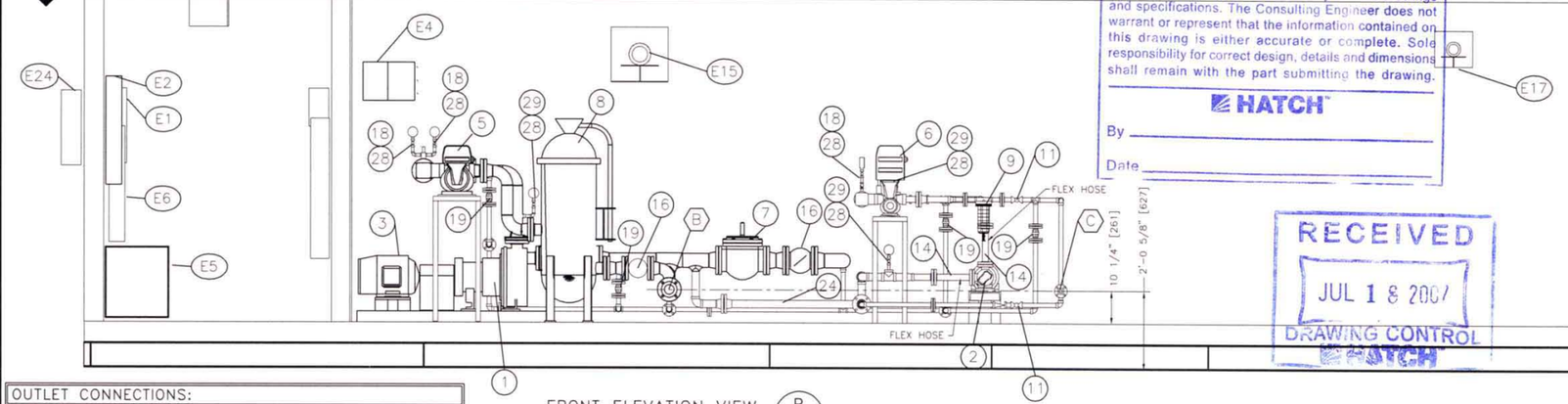


PLAN VIEW A

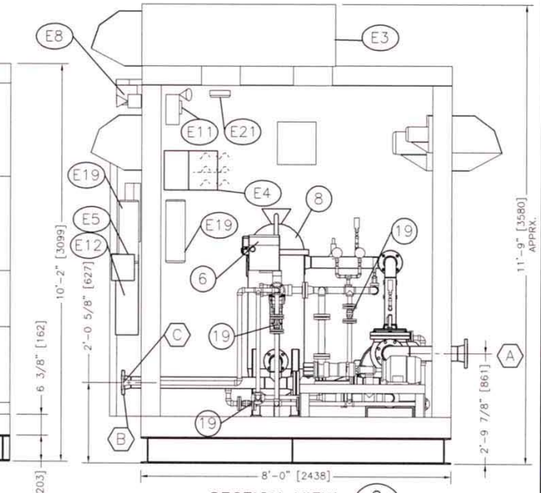
LEGEND

1. PEERLESS – 3"X3" 13 MTP 8796 PUMP
2. GORMAN RUPP GHS 1.5 GC 32–B PUMP
3. ELECTRIC MOTOR 15HP
4. ELECTRIC MOTOR 1.5HP
5. TCS 700–30 3" AIR FLOW METER
6. TCS 700–15 1–1/2" FLOW METER
7. 4" 120VAC SOLENOID FIRE SAFE VALVE
8. 3" BASKET FILTER
9. 1" BASKET FILTER
10. 3" BALL VALVE
11. 1" BALL VALVE
12. 3" CHECK VALVE
13. 1" CHECK VALVE
14. 1–1/2" FLEX HOSE
15. 2" BALL VALVE
16. 4" BALL VALVE
17. FLOW SWITCH
18. PRESSURE SWITCH
19. 1" PSV SET AT 75PSI
20. 3" API DRY BREAK (HEAVY FILL)
21. 1" NOZZLE (LIGHT FILL)
22. 4" LOW TEMP PIPE AND FITTINGS
23. 3" LOW TEMP PIPE AND FITTINGS
24. 2" LOW TEMP PIPE AND FITTINGS
25. 1–1/2" LOW TEMP PIPE AND FITTINGS
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

E1. DISTRIBUTION PANEL
E2. FUEL PUMP CONTROLLER
E3. AIR MAKE UP UNIT
E4. 10 kW HEATER
E5. 15 KVA TRANSFORMER
E6. LIGHTING PANEL
E7. INTERIOR LIGHT (NOT SHOWN)
E8. EXTERIOR LIGHT
E9. DUPLEX RECEPTACLE (NOT SHOWN)
E10. VENT CONTROL J.B.
E11. EXIT LIGHT/EMRGENCY LIGHT
E12. SCULLY SYSTEM
E13. FIRE ALARM PANEL
E14. 24" ARCTIC LOUVRE
E15. 18" EXHAUST FAN
E16. 18" ARCTIC LOUVRE
E17. 12" EXHAUST FAN
E18. LIGHT SWITCH (NOT SHOWN)
E19. FIRE EXTINGUISHER
E20. SMOKE/HEAT DETECTOR (ELEC. ROOM)
E21. SMOKE/HEAT DETECTOR (MECH. ROOM)
E22. EXTERIOR PULL STATION
E23. RED STROBE
E24. EXTERIOR JUNCTION BOX
E25. ALARM JUNCTION BOX



FRONT ELEVATION VIEW B



SECTION VIEW C

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].

HATCH
- ☐ Code 1" Proceed, No Exception Taken"
- ☐ Code 2 "Proceed, with Exceptions as Noted and **Re-submit**"
- ☐ Code 3 "Do not Proceed, Revise as Noted and **Re-submit**"
- ☐ Code 4 "Information Only"

Reviewed only for general conformity with the drawings and specifications. The Consulting Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the part submitting the drawing.

HATCH

By _____

Date _____

RECEIVED
JUL 18 2007
DRAWING CONTROL
HATCH

PRELIMINARY
FOR APPROVAL
CHAMCO INDUSTRIES LTD.

REV.	DATE	BY	DESCRIPTION

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

H325179-M268-VD-0011

CUMBERLAND RESOURCES
BAKER LAKE, NUNAVUT
.
P.O. No. M268

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

DESIGNED BY	D.J.C.
DRAWN BY	G.R.M.
CHECKED BY	.
JOB No.	1014938ABS

DATE	SCALE	DWG No.	REV.
25–APRIL–07	N.T.S.	CUP1014938–21	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