
PROJECT BRIEF

Iqaluit Bulk Fuel Storage Farm Upgrade

Client: Qulliq Energy Corporation (QEC)

Location: Iqaluit Power Plant, Iqaluit, NU

Construction Period: 2017 - 2019



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1.0 INTRODUCTION

1.1 QULLIQ ENERGY CORPORATION

Qulliq Energy Corporation (QEC), a territorial utility corporation is 100 per cent owned by the Government of Nunavut, who are the only generator, transmitter and distributor of electrical energy in Nunavut.

Qulliq Energy Corporation is incorporated and operates under the Qulliq Energy Corporation Act. QEC operates under three trade names;

- Nunavut Power: generates and supplies electricity
- Nunavut Energy Centre: addressed the energy conservation and demand side management mandate, and
- Qulliq Energy: provides core services to corporate functions.

QEC generates and distributes power to Nunavummiut through the operation of twenty-six (26) standalone diesel plants in 25 communities, providing mechanical, electrical and line maintenance from three regional centers, and administering the corporation's business activities from a headquarters in Baker Lake and offices in Iqaluit.

All electricity needs in Nunavut are met by imported fossil fuel supplies. Qulliq Energy Corporation is the only energy corporation in Canada without developed local energy resources or regional electricity transmission capability, creating a situation of huge fossil fuel dependency. Each community in Nunavut has its own independent electricity generation and distribution system.

1.2 PROJECT LOCATION - TANK FARM SITE AND SETTING

The existing diesel fuel storage facility is located adjacent to the QEC's Iqaluit main power plant, Iqaluit, Nunavut. The site is subject to a commercial/industrial zoning and is located on the north side of Iqaluit on the side of a steep hill, as illustrated in the locality map below. The Municipality of Iqaluit is located on Koojessee Inlet, near the northeast head of Frobisher Bay in southern Baffin Island in Nunavut. The legal description of the site is Lot 31, Group 1087, Plan 1033 in the Municipality of Iqaluit, Nunavut. The property is owned by Qulliq Energy Corporation. The site has an approximate area of 25,400 m². The site corresponds to the following approximate geographical coordinates: Latitude: 63° 44' 55" N; Longitude: 068° 31' 11" W.

The area surrounding the site is mostly vacant with one adjacent industrial area to the east (water treatment plant). The land slopes upward to the north and towards the community water supply at Lake Geraldine. A road and adjacent water main are aligned from the lake to the northwest to the water treatment plant located directly east of the site. Two buildings, the former and the current water treatment plants, are located east of the site, sharing the same



driveway up the hillside from the town. The access road crosses south of the site, and the stream draining Lake Geraldine runs down the hillside. The fuel resupply pipeline from the city's farm is aligned between the access road and the stream. To the west, the land slopes steeply to a small stream gorge and a pond into which Lake Geraldine drains. The land is otherwise vacant and undeveloped. Neighboring properties are not suspected to represent a significant potential area of concern for the site, except for the City of Iqaluit's fresh water supply pipeline which is adjacent to the containment berm. Access to the berm for construction will therefore require coordination with the City.

The following information for proposal reference:

- 1.1. Post-Disaster Designation - Clause 1.1.3.2 of NBCC 2010, the power plant facility is classified as a post-disaster building. The post-disaster building designation means that the power plant must remain operational, suffering only light non-structural damage, after an extreme environmental event such as a wind storm or earthquake. As a consequence, the building must withstand a 1/100 year design wind and an importance factor of 1.5 must be used in determining seismic loads.
- 1.2. Rain - The following rainfall data was obtained from Climate Services Canada for Iqaluit:
 1. 15-minute rainfall (1 in 10 years): 5 mm
 2. One day rainfall (1 in 50 years): 58 mm
 3. Annual rainfall (average): 200 mm
 4. Annual total precipitation (average): 433 mm
- 1.3. Snow - The snow load data for Iqaluit was obtained from Climate Services Canada. It indicates the following data for ground snow load (1 in 50 year):
 1. $S_s = 2.9 \text{ kPa}$
 2. $S_r = 0.2 \text{ kPa}$
- 1.4. Wind - Post-Disaster Designation – Per clause 1.1.3.2 of NBCC 2010, the power plant facility is classified as a post-disaster building. As a consequence, the new Tank #2 must withstand a 1/100 year design wind.

1.3 BACKGROUND OF PROJECT

.1 Current Power Generation Plant

The Iqaluit power plant building, built in 1962 and refurbished in 2013, is constructed with a steel girder frame, has metal-clad exterior walls, concrete interior walls and a concrete foundation. Offices are located on the second floor, have drywall covered walls and vinyl tile flooring.



The power plant contains 4 operating diesel-powered generators plus one emergency unit. The total capacity is 13.6 MW. The power plant area is also fitted with a mezzanine, where electrical control panels are located. The control room has electrical control panels, computers and alarms. The west section of the control room is a pre-fabricated building of recent construction attached to the existing building.

.2 Current Fuel Delivery, Storage, and Use

QEC's Iqaluit fuel storage facility provides diesel fuel (Arctic Grade P-50) to its generators in the main power plant in Iqaluit. The existing fuel tank farm consists of one (1) field-erected 5,700,000 litre vertical bulk fuel storage tank (TK#1), one (1) horizontal 15,000 litre intermediate tank and one fuel cooling equipment with four (4) units of fuel cooler within a secondary containment berm. The berm is made of aggregate material, and a liner of impervious PVC membrane. It includes a raised aggregate foundation pad for the existing vertical tank and another for a future bulk fuel tank. The fuel storage infrastructure was refurbished in 1994. Refer to attachment Figure 1: Iqaluit Site Facilities Overall Site Plan shows the general layout of the fuel storage facility and figure 2: Iqaluit General Layout shows a detail of the existing fuel storage tanks.

Current Bulk Fuel Storage Farm Capacity

Tank No.	Product Type	Existing Total Volume	Type of Tank	Foundation	Built Year
Tank #1 – Bulk Storage Exterior	P-50	Initial capacity 5,700,000 Liters	Welded / Single Walled, Vertical	Granular Base	Built in 1962. Refurbished with a new floor in 1994
Intermediate - Exterior	P-50	15,000 Litres (Nom.)	Single Walled Horizontal	Granular Base / Concrete Pads	2013
Tank #2 *- Exterior	P-50	To be constructed	To be Vertical	Granular Base	To be constructed
Day Tanks - Interior	P-50	2 x 2,270 Litres	Single Walled Vertical	Within Fuel Room (Plant)	2001

Note *: Tank #2 is to be designed and built in this project

The Iqaluit power plant currently consumes approximately 16,000,000 to 20,000,000 liters of fuel per year. QEC requires multiple fuel transfers throughout the year to ensure adequate volumes of fuel oil for the required consumption rates.

A fuel consumption of Iqaluit power plants is estimated as the following table for future fuel need based on the Iqaluit population projections from the Nunavut Community Population Projections 2010 to 2036 prepared in August 2010 by Ronald C. McMahon (Nunavut Bureau of Statistics).



The following table presents the results:

Nunavut Bureau of Statistics									WSP estimate				
1996	2001	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051	2056	2061
4,417	5,543	6,517	7,010	7,405	7,722	7,967	8,237	8,551	8,893	9,249	9,619	10,004	10,404
	25.5%	17.6%	7.6%	5.6%	4.3%	3.2%	3.4%	3.8%	4.0%	4.0%	4.0%	4.0%	4.0%

1. Annual fuel consumption – Low (in million liters) 21
2. Annual fuel consumption – High (in million liters) 28

Currently, the existing main tank (TK#1) had an initial capacity of 5,700,000 liters that was refurbished in 1994 with a new floor installed above the initial one. As a result, its capacity was reduced to about 5,400,000 liters; TK#1 is supplied by a pipeline from the Iqaluit PPD tank farm and connected to the roof of TK#1 at an elevation much higher than the tank farm. TK#1 supply operations are monitored by dips taken prior and after the operation by GN's PPD. Quantity of fuel transferred is registered by GN's Department of Environment.

The secondary containment is an aggregate (granular) berm built in 1994 with an approximate capacity of 6,800 m³. The PVC liner was installed in second containment in 1994 that is protected from UV by aggregate materials.

The intermediate double wall tank with a capacity of 15,000 Litres installed within the berm in 2013. Four units of fuel cooler connecting to the plant engine return lines is also installed within the berm in 2010.

1.4 PURPOSE OF PROPOSAL

To meet this shortfall in required diesel fuel storage capacity and comply with legislative regulations and codes, QEC plans to construct one additional tank (Tank#2) with a storage capacity of 5,700,000 Litres diesel fuel and replace a half of the farm liner within the area known as prescribed, which applies to the portion of the site outlined in red on the aerial photograph below. The proposed upgrade will increase diesel fuel storage capacity from 5.6 ML to 11.3 ML.

2.0 PROJECT SCOPE OF WORK

2.1 The mechanical Work of this Contract comprises of the following tasks;

- .1 Installation of a new 5,700,000L field erected tank with associated fill and supply piping.
- .2 Installation of a remote fill for the intermediate tank
- .3 The installation of an audible/visual overfill protection system on Tank #2

2.2 The Civil Work of this Contract comprises of the following tasks;

- .1 Removal of the existing berm liner for portion of berm liner being upgraded.



.2 Installation and welding of new HDPE liner within a portion of the secondary containment area.

.3 Installation of a new tank foundation

.4 Forming of concrete apron for truck refueling

2.3 The electrical Work of this Contract comprises of the following tasks;

.1 The installation of MOV control unit.

.2 The installation of overfill protection control unit.

.3 Installation of new grounding for new Tank #2.

.4 Grounding all electrical components as specified by the manufacturer and indicated in these specifications.

2.4 Additional tasks to be completed by the contractor detailed in the specifications, include but are not limited to:

.1 Hydrostatically testing the tank and obtaining all permits associated with this.

.2 Completing the relevant ultrasonic and x-ray testing as required by the specifications.

.3 Testing, commissioning, training, and demonstration of all components as per the specifications.

3. DESIGN AND CONSTRUCTION SCHEDULE

The following outlines the anticipated schedule for the Request for Design and Engineering construction process. The timing and sequence of events resulting from this Proposal may vary and shall ultimately be determined by QEC

ANTICIPATED SCHEDULES		DATES (Iqaluit Time)
	Design	
1.	Deadline for submittal of Proponent requests for clarifications, modifications or questions regarding the RFP	Jan 13 th , 2017
2.	Modifications and/or answers to questions posted on the GN's Tendering Website	Jan 17 rd , 2017
3.	<u>Submittal Deadline for Request for Proposals</u>	2 PM on Jan 24 th , 2017
4.	Site Survey & Design	TBD by Contractor



5.	Submittal Deadline for Completion of Design Documentations (Final Design documents For QEC Tender)	May 17 th , 2017
	Construction (Following is the anticipated Schedule of Construction)	
1.	Tender for Construction	July 26 th , 2017
2.	Materials Delivery for Construction(Construction contractor)	August to September, 2017 & July, 2018
3.	Starting Construction of New Tank &Farm Upgrade	May / August, 2018
4.	Substantial Completion of New Tank Construction	November 31 , 2018
5.	Closeout of New Tank Construction	August 31, 2019

4.0 CONSTRUCTION

1. N/A

5.0 APPENDIX – SITE PLAN AND PICTURES

1. Appendix A: Proposed Site Plan and General Layout



Figure 1: Iqaluit General Site Plan



Figure 2: Iqaluit Site Facilities Overall Site Plan



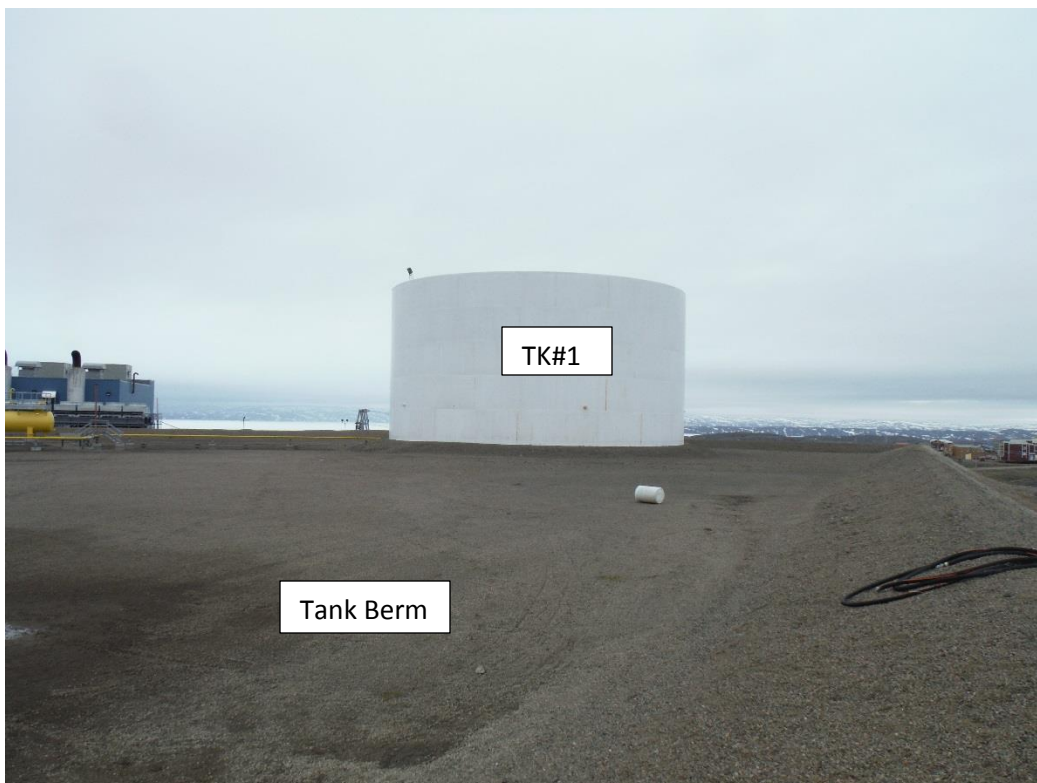
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5.2 Appendix B: The current Fuel Storage Farm Site Details – Iqaluit Power Plant







Tank Berm



Tank Berm





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Fuel Cooler & Fuel Cooling
Lines from Plant Engine
Hall

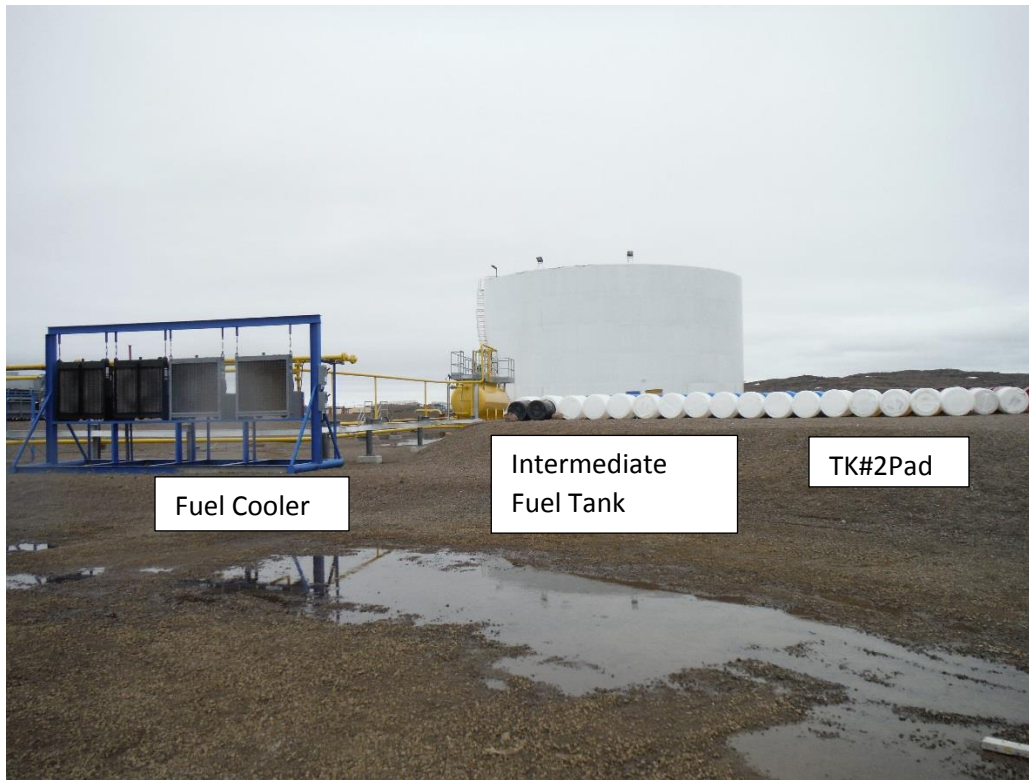


Fuel Supply Line to
Intermediate Tank & Plant





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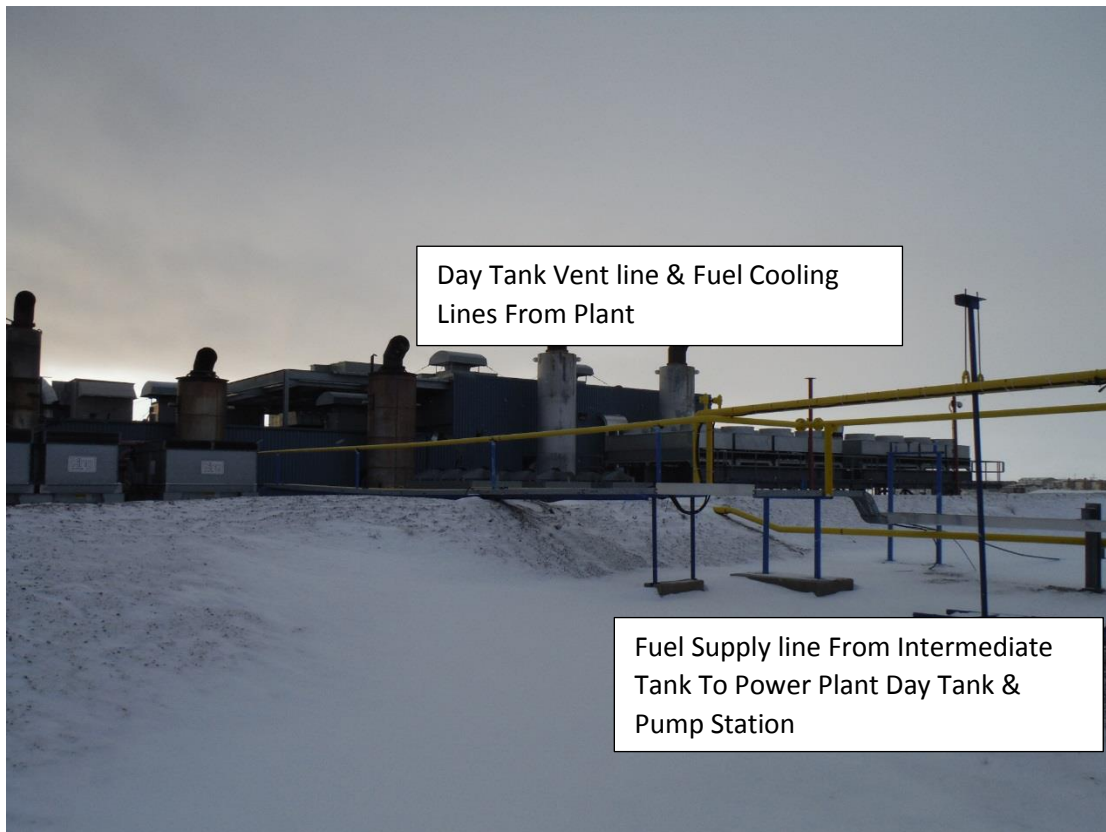




Plant Fuel Cooler



Day Tank Vent line & Fuel Cooling
Lines From Plant



Fuel Supply line From Intermediate
Tank To Power Plant Day Tank &
Pump Station