Attachment 4

Fuel Unloading Options Memo

Hatch Ltd.

Newfoundland and Labrador Hydro
150 MW Combustion Turbine Plant FEED Study

Fuel Unloading Options

[redacted]

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HATCH					

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1. Introduction

Newfoundland and Labrador Hydro (NLH) have identified the need for 150 megawatts (MW) of additional on-island generation that provides continued cost-conscious, reliable service, and consideration load growth requirements for customers.

The Holyrood Thermal Generating Station (HTGS) property is located 9.93 km away from the municipality of Conception Bay South, and 31.36 km away from St. John's. The site is situated in an industrial planning zone, with the nearest residential area 0.58 km away. The approximate coordinate of the generating station is 47.27074 N, 53.54160 W and is located within the municipal boundaries of the town of Holyrood.

NL Hydro has requested Hatch to progress Front End Engineering Design (FEED) for the 150 MW combustion turbine development project. To evaluate the delivery method to the site, Hatch reviewed truck and marine diesel fuel delivery options for the HTGS.

The evaluation of delivery of fuel is based on publicly available information and direct communication with Fuel suppliers.

1.1 Fuel Consumption

Based on the burn rate from LM 6000, approximately 850,000 liter/day at full load operation. At the time of writing this report, all relevant information was based off preliminary information from supplier.

2. Delivery Options

2.1 Delivery by Truck

The primary delivery method will be by transport truck.

Truck capacities:

- B Train – 48,000 L
- Single trailer – 38,000 L

To maintain a five-day fuel supply for the 150 MW operating at full load, it would require 24 regular tanker trucks or 20 B-train tanker trucks per day for the LM6000.

- Truck offload system will have two hose connections to facilitate simultaneous off-loading of the front and rear trailer of B-train tanker.
- The truck offloading rate will be ± 1200 lpm, which will unload a regular tanker in 35-40 mins and B-train tanker in 45-50 mins.

2.2 Delivery by Marine

To meet the fuel needs of this power generation plant, different options are reviewed below. It is assumed that the capacity of the marine tankers which will unload fuel would be 5,000,000 liters (min and max delivery can be negotiated with supplier). It is assumed that No.6 oil pipelines are still in service for existing power generation.

2.2.1 Options to Utilizing Existing Marine Facilities for Offload:

2.2.1.1 **Option 1 - Dedicated diesel marine offload system**:

Install a new pipeline from the dock to the new 150 MW tank farm. This pipeline would be constructed next to the existing No. 6 fuel pipeline and would utilize the existing jetty pipe supports. A separate stripping line would be required to strip the jetty section of the pipeline. A new offload connection point will also be required. The new pipeline will run above the existing pipeline using new independent pipe supports and will be routed to new tank farm.

It is recommended that structural dock assessment is performed.

2.2.1.1.1 Benefits

- The dedicated pipeline would not have cross contamination with the existing No. 6 fuel oil.
- No pipeline displacements required.
- Reduced operating cost for offloading not having to perform line displacements or cleaning operations.

2.2.1.1.2 Disadvantages

- Permitting and approval process for construction of new infrastructure by AHJs.
- Capital cost for construction of new piping system and supports.
- Continued dock maintenance.
- Maintenance of new piping infrastructure.
- Potential new fire suppression system.

2.2.1.2 Option 2 - Using existing No. 6 pipeline and line displacement:

This method will utilize the existing 18” pipeline infrastructure. A new diesel pipeline would be constructed from the No. 6 pipeline near the existing tank farm to the new 150 MW diesel tank farm. This method would require displacing the No. 6 fuel into the existing storage tanks using diesel. The estimated volume of diesel is 90,000 - 100,000 liters for one line displacement of pipeline. To meet quality requirements, multiple pipeline displacements may be required.

2.2.1.2.1 Benefits

- Capital cost will be reduced as this method will utilize the existing infrastructure.

2.2.1.2.2 Disadvantages

- Additional demurrage charges for time required to displace No. 6 fuel oil.
- Contamination and product quality issues are not eliminated.
- Scheduling managing and inventory in storage tanks.
- Loss of diesel product remaining in the pipeline during next No. 6 fuel oil offload.

2.2.1.3 Option 3 - Using existing No. 6 pipeline and cleaning / displacement using pigging:

This method will utilize the existing 18" pipeline infrastructure. Pig receiving and launcher station infrastructure would be required. Pipeline shall be cleaned using scraper and pushing pigs runs. The pushing media for pigs will be diesel fuel from the ship, which will be displaced into the No. 6 fuel storage tanks.

2.2.1.3.1 Benefits

- Capital cost will be reduced as this method will utilize the existing infrastructure.

2.2.1.3.2 Disadvantages

- Operational costs would be higher than the other two options as additional labour and consumables are required.
- Additional demurrage charges.
- Pig launching and receiving stations required.
- Higher potential for spills and launcher and receiver.
- Contamination and product quality issues are not eliminated.
- Modifications required to shoreline shutoff valve to make pipe piggable.
- Loss of diesel product remaining in the pipeline during next No. 6 fuel oil offload.

2.2.2 Recommendation for Marine offload:

The recommended option would be the Option -1 dedicated diesel marine offload system to maintain the quality of the product. The design basis for the marine offload system would be as follows:

- One unloading position utilizing a 200 mm marine offloading hose.
- Offloading rate for will be ± 13,500 lpm.
- System to strip the jetty pipeline.
- 300mm pipeline to the 150 MW diesel storage tanks.
- The estimated cargo size would be 5 million liters (min/ max delivery can be negotiated with supplier).

3. Fuel Suppliers

The following fuel suppliers have been contacted.

Table 3-1: Available Fuel Suppliers and Key Information

Supplier Name	Contact Information	Key Information
[redacted]	[redacted]	• [redacted] • Truck and marine deliver available • Barges size available- 8.5,15, 21 Mil liter available • Can deliver 5 million in 5 days lead time via marine • Current storage – 20 Million Liters, can expand if needed • Alternative fuel- NA.
[redacted]	[redacted]	• [redacted] • Truck and marine deliver available • Current storage – 65 Million Liters • Barge size – 3.6 Million liters • Alternative fuel – Renewable diesel by 2026/2027 • Under Ideal condition can deliver 750,000 liter/day.
[redacted]	[redacted]	• Sales team reviewing options for delivery.
[redacted]	[redacted]	• Truck delivery and marine available • No storage facility on island (uses terminals on the island and international supply partners) • Ship and blend millions of litres of biodiesel across the country • Delivery without notice- Depending on market conditions and volume needs this could be same day or a few days. Truck delivery preferred without notice for faster delivery.

All suppliers requested to provide enough notice to top off the tanks when facility is in operation.

4. Recommendations

The truck offloading will be a two-lane configuration and allow simultaneous offloading for two road tankers. This will provide a throughput capacity of 24 trucks during an 18-hour period with an allowance of 1.5 hours per truck. To maintain the fuel supply by truck deliveries, consideration should be given to having agreements with a minimum of two fuel suppliers based on the truck availability in the province. For the marine offload system, it is recommended that a dedicated diesel offload system be utilized while the No. 6 fuel oil system is still in operation. Based on the estimated marine delivery volume of 5 million liters, the five-day fuel supply could be restored with one marine offload. The estimated discharge time would be 12-14 hours. The marine offloading system will be required to maintain the fuel supply when the 150 MW system is to be run on a continuous basis. Power generation capacity increases will also necessitate marine fuel deliveries. The cost for the diesel marine offload system will be included in the Class 3 estimate.