



Mackenzie Valley Land and Water Board
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Staff Report

Applicant: Northwest Territories Power Corporation (NTPC)	
Location: Jackfish Power Generating Plant, Yellowknife NT	File Number: MV2019L1-0001
Date Prepared: April 16, 2019	Date of Board Meeting: May 1, 2019
Subject: Preliminary Screening	

1. Purpose

The purpose of this Report is to present to the Mackenzie Valley Land and Water Board (MVLWB/the Board) the draft Preliminary Screening completed for the Jackfish Power Generating Plant submitted by Northwest Territories Power Corporation (NTPC).

2. Background

- January 1, 1995 – Effective date of Licence N1L1-1632;
- February 26, 2019 – Application received;
- March 4, 2019 – Application deemed complete and review commenced;
- March 18, 2019 – Reviewer comments and recommendations due and received on the draft workplan;
- April 2, 2019 – Reviewer comments and recommendations due and received on the Application/Plans/Preliminary screening;
- April 15, 2019 – Responses due and received;
- **May 1, 2019 – Preliminary Screening presented to the Board for decision; and**
- December 31, 2019 – Expiration of Licence N1L1-1631.

3. Discussion

Project History

NTPC received Licence (N1L1-1631) which had an effective date of January 1, 1995 for the use of water for the cooling of the diesel power generating plants located on the shore of Jackfish Lake, NT. The Licence allows for the use of water in excess of 50,000m³/day.

On February 26, 2019, NTPC submitted an application for a Type A water licence to replace the current Licence.

The Jackfish Facility is a stand-by plant for the North Slave System (Yellowknife, Ndilo and Dettah). Diesel generating units at Jackfish Lake are only utilized for the following conditions:

- Instantaneous loss of hydro supply (outage);
- Shortage of hydro generating capacity (use exceeds the generating capacity of the hydro units); and
- Diminished hydro supply (low water flows).

There are three separate power generating plants on the shore of Jackfish Lake:

- Cat Plant (built in 1993);
- EMD Plant (built in 1974); and
- K Plant (built in 1969).

Each of the plants have separate intake lines and “discharge” lines. The water that is taken from Jackfish Lake is returned to Jackfish Lake through a closed loop system. When the water is taken into the diesel generating plants, there are no additives added to the water. The only change that happens to the water increase in temperature.

With the application, NTPC submitted a 2018 Discharge Quality Report which outlined the sampling that was done on the water going into the various plants as well as the water being “discharged”. The sampling results showed an increase in total metals (aluminum, copper, iron, lead and zinc). However, there was only one sampling event and the results came from the discharge from the K Plant.

NTPC has a land reserve with GNWT-Lands which was issued in 2005. NTPC has indicated that they are seeking longer term land tenure with GNWT-Lands.

Management Plans

A Waste Management Plan and Spill Contingency Plan were included with the Application. Board staff suggest that these Plans meet applicable guidelines and sufficiently reflect the scope of the proposed activities.

NTPC has also submitted a Conceptual Abandonment and Restoration Plan with the application with the understanding that the site it is not intended to be closed in the near future and that the final closure of the site is unknown.

Engagement

An Engagement Record and Engagement Plan were included in the Application. NTPC noted they engaged with the following parties:

- | | |
|--------------------------------------|--------------------------------------|
| • Akaitcho IMA Implementation Office | • North Slave Metis Alliance |
| • City of Yellowknife | • Northwest Territories Metis Nation |
| • Dene Nation | • Salt River First Nation |
| • Deninu Kue First Nation | • Smith’s Landing First Nation |
| • Fort Resolution Metis Council | • Tlicho Lands Protection Department |
| • K’atlodeeche First nation | • West Point First Nation |
| • Lutsel K’e Dene First Nation | • Yellowknives Dene First Nation |

NTPC initiated engagement with the above noted organizations on November 9, 2018, which included a summary of the application as well as the history of the operation. NTPC reached out to the organizations again on various dates ranging from November 13, 2018 to February 8, 2019 to inquire if there were any comments or concerns.

NTPC reached out and disseminated information to organizations in various forms such as emails, phone calls as well as an open house meeting.

Type of Area

This Project is located in a non-federal area.

Fees

On May 4, 1988, NTPC was witnessed as a crown corporation when the Northern Canada Power Commission was acquired from Her Majesty the Queen in Right of Canada by the Government of the Northwest Territories. As a Crown Corporation, NTPC is exempt from paying security depositions or fees in relation to its hydro facility (attached).

Term

NTPC has applied for a term of 20 years as the operating conditions have not changed and are not expected to deviate from the current values. NPTC also indicated that they are requesting the 20 years to help keep electricity rates as low as possibly for customers by minimizing frequent regulatory costs.

Section 26(2) of the *Waters Act*/subsection 72(2) of the MVRMA allows for license to be issued for the life of project.

4. Comments

Triggers

Under Schedule B of the Waters Regulation the description of an industrial activity other than mining and milling, including manufacturing processes, hydrostatic testing, fluming, and exploration for and production and transportation of oil and gas, cooling systems, food processing, tanneries, smelters, sawmills, pulp mills, metal finishing, and tailings reprocessing. NTPC falls under the industrial undertaking as the water is being used for the cooling of the power generating plants.

Under Annex D, of the Waters Regulations NTPC requires a permit for the use of water over 300m³ as well as the use of water for the cooling system.

5. Public Review

By April 2, 2019, comments and recommendations on the Application were received from 4 reviewers:

- Environment and Climate Change Canada;
- Fisheries and Oceans Canada;
- GNWT – Environment and Natural Resources; and
- MVWLB staff.

NTPC responded by April 16, 2019. The Review Summary and Attachments (attached) presents the concerns identified through this review.

Main Issues Raised during the Review

The following summarizes the main issues raised during the review:

- Water Quality Management;
- Aquatic Effects Monitoring and General Monitoring;
- Water Source and Water Quantity; and
- Term

Preliminary Screening

The draft Preliminary Screening (attached) contains information from the Application and public review regarding environmental and socio-economic concerns, along with mitigations, and is for the Board's consideration.

6. Security

Security is not applicable to this Project as per section 94 of the *Mackenzie Valley Resource Management Act* (MVRMA) because the territorial government is not required to post security pursuant to section 71 of the MVRMA.

Please see above Section 3 - Fees for further explanation.

7. Conclusion

The draft Preliminary Screening has been completed and is attached for the Boards review.

8. Recommendation

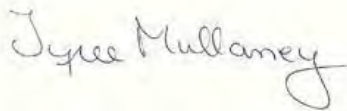
Board staff recommend the Board **make a motion to approve the Preliminary Screening** of the Application for Water Licence MV2019L1-0001 from Northwest Territories Power Corporation.

A draft decision letter is attached.

9. Attachments

- [Application](#)
- [Waste Management Plan](#)
- [Engagement Plan](#)
- [Engagement Log](#)
- [Spill Contingency Plan](#)
- [Conceptual Abandonment and Restoration Plan](#)
- [Figure 1](#)
- [News Paper Ad – Application receipt](#)
- Review Summary and Attachments
- Draft Preliminary Screening
- Draft Decision Letter from the Board

Respectfully submitted,



Tyree Mullaney
Regulatory Specialist

Review Comment Table

Board:	MVLWB
Review Item:	Northwest Territories Power Corporation - Renewal Type A Water Licence - MV2019L1-0001
File(s):	MV2019L1-0001
Proponent:	Northwest Territories Power Corporation
Document(s):	Application (19.34 MB) Engagement Log (1.36 MB) Engagement Plan (717.92 KB) Waste Management Plan (859.06 KB) Spill Contingency Plan (1.41 MB) Conceptual Abandonment and Restoration Plan (218.82 KB) Draft Work Plan - V1 (43 KB)
Item For Review Distributed On:	Mar 4 at 10:48 Distribution List
Reviewer Comments Due By:	Apr 2, 2019
Proponent Responses Due By:	Apr 15, 2019
Item Description:	<p>Northwest Territories Power Corporation (NTPC) submitted a complete renewal application for a type A water licence MV2019L1-0001. This Application is to renew NTPC’s current Water Licence (Licence) N1L1-1632. The purpose of this Application is to use water for the cooling of the power generating system at Jackfish Lake.</p> <p>Reviewers are invited to submit comments and recommendations using the Online Review System (ORS) by the review comment deadline specified below. Notices of application for water compensation must also be submitted by the review comment deadline. If reviewers seek clarification on the submission, they are encouraged to correspond directly with the proponent prior to submitting comments and recommendations.</p> <p>Reviewers may also wish to consider providing an overarching recommendation regarding whether the Board should approve the submission, to provide context for the comments and recommendations and assist the Board with its decision.</p> <p>Please provide comments and recommendations on the: Application; Engagement Log; Engagement Plan; Waste Management Plan; Spill Contingency Plan; Conceptual Abandonment and Restoration Plan; and Draft Work Plan.</p> <p>A draft work plan for this Application has been developed by Board staff. Board staff are requesting your comments on the draft work plan by March 18,</p>

	<p>2019. Comments on the draft work plan should be submitted by email to tyree@mvlwb.com.</p> <p>Under the Preliminary Screening Requirement Regulations of the Mackenzie Valley Resource Management Act (MVRMA), the Board must conduct a preliminary screening for an application for a proposed development that requires a water licence, unless it is exempt from Part 5 of the MVRMA. Reviewers are encouraged to provide comments and recommendations (e.g., on impacts and mitigation measures) to assist with the completion of the preliminary screening.</p> <p>All documents that have been uploaded to this review are also available on our Public Registry. If you have any questions or comments about the ORS or this review, please contact Board staff identified below.</p> <p>Tyree Mullaney tyree@mvlwb.com (867) 766-7464</p>
General Reviewer Information:	<p>The following organization has received this review by fax:</p> <p>NWT Metis Nation Tim Heron NWTMN IMA Coordinator (867)872-3586</p>
Contact Information:	<p>Jen Potten 867-766-7468 Tyree Mullaney 867-766-7464</p>

Comment Summary

Environment and Climate Change Canada: Bradley Summerfield				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
1	<p>Topic: Discharge temperature monitoring</p> <p>Reference(s): 1. 2018 Environmental Monitoring Report - Jackfish Lake Generating Facility, Table 2-1: 2018 Environmental Monitoring Stations, Jackfish Lake PDF 154</p>	<p>Comment Table 2-1 provides an overview of the environmental monitoring stations and monitoring components. According to this table, water temperature monitoring was conducted at facility intake locations and at in-lake discharge locations, but discharge temperature was not monitored in the power plant facilities. Water quality monitoring stations for intake and discharge were located within the power plant facilities.</p> <p>Recommendation ECCC recommends that Northwest Territories Power Corporation (the Proponent) clarify if water temperature was measured inside the facility; and if so, how and where discharge water temperature was measured within the power plants.</p>	<p>Apr 15: Intake and discharge temperatures were not measured inside the facility. Four thermistors were installed at each of the four intake structures by fastening the thermistor directly to the intake structure screens. The three discharge thermistors were installed at the outlet of the discharge pipe by drilling a hole through the center end of the discharge pipe (approximately 0.3 m before the end of the pipe) and inserting a galvanized steel wire with the thermistor bead attached through the drilled hole. The in-lake discharge temperature loggers were located approximately 5 m from the discharge end of pipe.</p>	
2	<p>Topic: Thermal monitoring results</p> <p>Reference(s): 1. 2018 Environmental Monitoring Report - Jackfish Lake Generating Facility PDF 157</p>	<p>Comment The environmental monitoring report presents a tabular summary of minimum and maximum intake/discharge temperatures, as well as graphical representations of intake and discharge temperature measurements. However, the report does not appear to provide a tabular summary of all intake and discharge temperature monitoring.</p> <p>Recommendation ECCC recommends that the Proponent provide: 1. A tabular summary of all intake and discharge temperature</p>	<p>Apr 15: A tabular summary of intake and discharge temperature monitoring results, and cooling water temperature change results, are provided as Excel tables in the attachment. The cooling water temperature change (i.e., discharge water temperature minus intake water temperature) is provided in Figure 1 in the attachment. &nbsp;</p>	

		monitoring results, including any in-facility discharge temperatures; and 2. A tabular summary and graphical representation(s) of the cooling water temperature change, i.e., discharge temperature minus intake temperature (y-axis) over time (x-axis).	
3	<p>Topic: Effluent discharges</p> <p>Reference(s): 1. 2018 Environmental Monitoring Report - Jackfish Lake Generating Facility, Sections 7.5.5 Thermal Effects on Fish and 7.6 Summary and Conclusions, and Table 8-1: 2018 Jackfish Lake Environmental Monitoring Summary PDF 241, 242, 246</p>	<p>Comment Near the discharges, a maximum water temperature of 23.1°C was recorded. However, the report does not appear to provide the distances between effluent discharge points and lake thermistors.</p> <p>Recommendation ECCC recommends that the Proponent manage effluent such that effluent discharges and mixing zones are not acutely lethal to aquatic life. ECCC also recommends that distances between effluent discharge points and lake thermistors be provided.</p>	<p>Apr 15: The discharge thermistors are located within the discharge pipes, approximately 0.3 m from the end of the pipe. The in-lake discharge temperature loggers are located approximately 5 m from the end of the discharge pipes. Please note an error on page 21 of Golder (2019b), the near-field stations (i.e., the in-lake discharge stations) are located 5 m from the end of the discharge pipe, not 500 m as indicated. A mixing zone has not been calculated; however, based on a comparison of in-lake discharge water temperatures (i.e., 5m from the end of pipe) to lethal temperatures of the three fish species documented in Jackfish Lake,, it was concluded that acute thermal impacts to fish populations were not expected to have occurred for the 2018 operating year (Golder 2019a, 2019b); References: Golder (Golder Associates Ltd.). 2019a. 2018 Environmental Monitoring Report; Jackfish Lake. Prepared for Northwest Territories Power Corporation, Hay River, NT, Canada. Golder. 2019b. 2018 Discharge Quality Report; Jackfish Lake Generating Facility. Prepared for Northwest Territories Power Corporation, Hay River, NT, Canada.</p>
4	<p>Topic: Mixing zone</p> <p>Reference(s): 1. 2018 Discharge Quality Report for Jackfish Lake</p>	<p>Comment ECCC notes that the monitoring report does not discuss mixing zones for the four discharge points. Thermal monitoring results should be used to determine the extent of</p>	<p>Apr 15: The extent of thermal mixing zones were not estimated for each of the discharge points. However, monitoring data collected in-lake approximately 5 m from the end of the discharge pipes were used to</p>

	<p>Generating Facility PDF 513</p>	<p>the discharge mixing zones. In lakes, the volume of mixing zones should not exceed 10% of the volume of those portions of the receiving waters available for mixing; or 100 m in radius, whichever is less.</p> <p>Recommendation ECCC recommends that the mixing zones for the discharges be as small as practicable. ECCC recommends that the extent of thermal mixing zones be estimated (for the conditions of greatest change) for each of the discharge points, based on the thermal monitoring results.</p>	<p>evaluate potential thermal impacts near the discharge locations. Based on a comparison of in-lake discharge water temperatures (i.e., 5 m from the end of pipe), to lethal temperatures of the three fish species documented in Jackfish Lake, it was concluded that acute thermal impacts to fish populations were not expected to have occurred for the 2018 operating year (Golder 2019a, 2019b) References: Golder (Golder Associates Ltd.). 2019a. 2018 Environmental Monitoring Report Jackfish Lake. Prepared for Northwest Territories Power Corporation, Hay River, NT, Canada. Golder. 2019b. 2018 Discharge Quality Report Jackfish Lake Generating Facility. Prepared for Northwest Territories Power Corporation, Hay River, NT, Canada</p>	
5	<p>Topic: Potential discharge contaminants Reference(s): 1. 2018 Environmental Monitoring Report - Jackfish Lake Generating Facility</p>	<p>Comment The Jackfish Facility has three different diesel power plants (CAT, EMD and K); each plant has an engine cooling system that circulates water to and from Jackfish Lake. The cooling systems consist of intake pipes that allow water from Jackfish Lake to flow through closed-loop cooling systems. Raw water is pumped through the system and returns to Jackfish Lake via a common gravity pipe. K-Plant has two intakes, and EMD Plant and CAT Plant each have one intake; each plant has one discharge pipe.</p> <p>Recommendation ECCC recommends that the Proponent discuss whether and how there may be potential for the cooling water quality to be altered beyond thermal changes, including any potential for exposure to contaminants or algicides, following intake by the power plant facilities.</p>	<p>Apr 15: NTPC does not administer additives to the cooling water at the Jackfish facility; therefore, there potential for the cooling water quality to be altered beyond thermal changes is minimal.</p>	

6	<p>Topic: Thermal discharge effects assessment</p> <p>Reference(s): 1. Environmental Effects Assessment of Freshwater Thermal Discharge guidance document Sections (Environment and Climate Change Canada, February 2019)</p> <p>2. 2018 Environmental Monitoring Report - Jackfish Lake Generating Facility</p>	<p>Comment Environment and Climate Change Canada recently released the guidance document Environmental Effects Assessment of Freshwater Thermal Discharge (February 2019). This document addresses legislation and environmental quality guidelines for thermal effluents. It contains environmental assessment guidance for freshwater thermal discharge, including: environmental baseline data requirements, thermal plume modelling approaches, thermal plume effects assessment, mitigation strategies and monitoring requirements.</p> <p>Recommendation Information is provided for Proponent's benefit.</p>	<p>Apr 15: Information received, thank you</p>	
7	<p>Topic: Discharge objectives</p> <p>Reference(s): 1. Environmental Effects Assessment of Freshwater Thermal Discharge guidance document, Section 2 (Environment and Climate Change Canada, February 2019)</p> <p>2. DRAFT CONDITIONS ANNEXED TO AND FORMING PART OF WATER LICENCE NUMBER MV2019L1-00** PDF 124-132</p>	<p>Comment Maximum Weekly Average Temperature (MWAT), short-term exposure to extreme temperatures (i.e. Short Term Maximum), and thermal stratification are the three key temperature criteria specified in the Canadian Council of Ministers of the Environment Canadian Water Quality Guidelines for evaluating temperature effects upon various life stages of fish.</p> <p>Recommendation ECCC recommends that the water licence incorporate discharge objectives, including numerical thermal discharge objectives that are protective of aquatic life, and are based on the site-specific aquatic receiving environment (i.e., Jackfish Lake) and it's biological community. Thermal discharge objectives should reflect national guidelines with respect to</p>	<p>Apr 15: Three species of fish were documented in Jackfish Lake in 2018, Northern Pike, Lake Whitefish and Trout-perch. A comparison of the range of temperatures measured in Jackfish Lake, including at the in-lake discharge locations, to lethal temperatures for Northern Pike, Lake Whitefish, and Trout-perch concluded that acute thermal impacts to fish populations were not expected to have occurred for the 2018 operating year. Discharge water temperature (i.e., water temperature measured at the end of the discharge pipe, prior to being released into Jackfish Lake), may be lethal to fish; however, lethal thresholds for fish were not exceeded at the in-lake discharge locations (i.e., 5 m from end of pipe) Further, cooler, deeper water in the lake is available for fish to access. Based on the this, setting thermal discharge criteria for Jackfish Facility discharges was not recommended</p>	

		<p>thermal stratification, maximum weekly average temperature, and short-term exposure to extreme temperature. ECCC recommends that contingency measures be identified to manage any effluent that does not meet discharge objectives, including thermal objectives.</p>	<p>(Golder 2019a, 2019b). Discharge limits for chemistry parameters were also not recommended at this time. There are no additives to the water pumped from Jackfish Lake and through the pipes in the cooling system, and evaporation is expected to be negligible because it is a closed system. It is acknowledged that thermal discharge objectives developed with respect to thermal stratification, maximum weekly average temperature and short-term exposure to extreme temperature were not conducted. However, further comparisons were not completed given that: 1) acute thermal impacts to fish populations were not expected to have occurred for the 2018 operating year, 2) fish have deeper cooler water in the lake available for access, and 3) fish are present and have acclimated to conditions, as the Jackfish Facility has been in operation since the 1960's. It is acknowledged that the continuous temperature data is limited to one year (March to December 2018); NTPC plans to expand on the 2018 temperature dataset, both within the intake and discharge locations, and in Jackfish Lake to help characterize water temperatures in Jackfish Lake and the potential effects of the thermal discharges on lake temperatures. References: Golder (Golder Associates Ltd.). 2019a. 2018 Environmental Monitoring Report Jackfish Lake. Prepared for Northwest Territories Power Corporation, Hay River, NT, Canada. Golder. 2019b. 2018 Discharge Quality Report Jackfish Lake Generating Facility. Prepared for Northwest Territories Power Corporation, Hay River, NT, Canada</p>	
8	Topic: Discharge management and mitigation	<p>Comment A water and waste management plan was mentioned in Part F of the Draft</p>	<p>Apr 15: 1. NTPC facilities at Jackfish Lake include three power plants that utilize lake water for engine cooling.</p>	

<p>measures Reference(s): 1. 2018 Environmental Monitoring Report - Jackfish Lake Generating Facility 2. DRAFT CONDITIONS ANNEXED TO AND FORMING PART OF WATER LICENCE NUMBER MV2019L1-00** PDF 127</p>	<p>Conditions, but only a waste management plan was accounted for. Limited details of discharge management were provided in the environmental report. Details of facility discharge management should be discussed in the environmental report, and measures to mitigate potential effects on the aquatic receiving environment should be described in detail. Recommendation ECCC recommends that the Proponent provide the following information: 1. Details of facility discharge management (e.g., discharge method(s), rates, volumes, frequency, duration, locations); 2. Identify mitigations currently in place to minimize the effects of thermal discharges on the aquatic receiving environment; and 3. Identify potential mitigation options to further minimize the effects of thermal discharges on the aquatic receiving environment.</p>	<p>A total of ten pumps are connected to the cooling system. The operating hours of the pumps are recorded on a monthly basis, and used to calculate total water usage in gallons based on the rated capacity of each pump. The rated capacities of the cooling system pumps vary from 440 gpm to 1245 gpm. Pumps are operated to circulate water for the purposes of keeping the intake and outlet pipes clear of ice and sediment in addition to supplying sufficient flow for the purposes of engine cooling. Normal operation has approximately half of the pumps running at any time. The Jackfish facility provides backup and peaking capacity for the North Slave integrated power grid, and rarely operates at full output for extended periods. Diesel generation at Jackfish is required throughout the year for a variety of reasons, making the water usage relatively constant from month to month. In the 2018 calendar year, an average of 3,000 gallons/month was circulated to the lake, with individual monthly volumes ranging from 2,705 gallons in March to 3,565 gallons in July. 2. To minimize the thermal discharge to the cooling system heat recovery systems are present on the most frequently used engines to recover heat for use within within the Jackfish facility rather than directing it to the cooling system. The cooling outlet pipes are buried and there is some potential for cooling between the plants and the discharge points within the lake. Examples of heat use within the Jackfish facility include building space heat and block heat for engines. A planned cleaning and de-scaling of the plant heating systems in the summer of 2019 is expected to improve the efficiency of heat transfer from the engine cooling systems, reducing the</p>	
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			<p>amount of thermal discharge to the lake. Additional generating capacity installed at Jackfish over the last two years utilizes radiator-based cooling, and is not connected to the lake water cooling system, further reducing the expected thermal discharge to Jackfish Lake. 3. The effects of thermal discharges on the aquatic receiving environment have not yet been determined. A monitoring program has been implemented and the potential effects will be further investigated throughout the term of the new licence. Once potential effects have been determined potential mitigation options can be further assessed References: Jackfish Lake Generating Facility- Operations Maintenance and Surveillance Manual (NTPC, 2019)</p>	
9	<p>Topic: Non-Hazardous Waste Segregation Reference(s): 1. Waste Management Plan - Jackfish Lake Generating Facility Section 2.2.1.1 PDF 16-17</p>	<p>Comment General classes of wastes for disposal in dumpster bins are incorrectly listed incorrectly. The list given includes hazardous wastes that are not appropriate for landfill disposal, but they are classified as non-hazardous in Section 2.2.1.1. Recommendation ECCC recommends that the Proponent clarify how hazardous wastes, and other non-hazardous wastes will be disposed of separately.</p>	<p>Apr 15: There were errors in Section 2.2.1 of the Waste Management Plan: Section was listed as 2.2.1.1. was updated to 2.2.1 General classes of wastes for disposal in dumpster bins include but are not limited to was updated to; General classes of wastes that are inappropriate for disposal in the general waste dumpster bins include but are not limited to Added the statement The wastes listed are inappropriate for disposal in the general waste dumpster bins and are disposed of as per procedures listed in this plan in other sections. Section 2.5 of the plan was updated from Hazardous Waste Storage to Hazardous Waste. Section 2.5.1 Hazardous Waste Management was added to the plan: This section provided general information with respect to the management of hazardous waste such as storage, handling, monitoring, tracking and disposal of the hazardous wastes. Section 2.5.6 Hazardous Waste Disposal was added to the plan: This section</p>	

			presented procedures on how hazardous waste is stored for disposal and disposed of at the Hazardous Waste Transfer Facility located in Yellowknives Kam Lake Industrial Park. References: Waste Management Plan- Jackfish Lake Generating Facility, NWT, (NTPC, 2019)	
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Fisheries and Oceans Canada: Triage Group Fisheries Protection Program

ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
1	7. QUANTITY OF WATER INVOLVED (Litres per second, litres per day or cubic meters per year, including both quantity to be used and quality to be returned to source): Less than 50,000 cubic meters per day	<p>Comment The proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the Fisheries Act unless authorized. The proposal has also been reviewed to determine whether it is likely to affect listed aquatic species at risk, any part of their critical habitat or the residences of their individuals in a manner which is prohibited under sections 32, 33 and subsection 58(1) of the Species at Risk Act, unless authorized.</p> <p>Recommendation Provided that the plans are implemented in the manner, and during the timeframe, described, the Program has determined that the proposal will not result in serious harm to fish or prohibited effects on listed aquatic species at risk. As such, an authorization under the Fisheries Act or a permit under the Species at Risk Act is not required at this stage.</p>	Apr 15: Comment received thank you for your time.	

ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
11	General File	Comment (doc) ENR Letter with Comments and Recommendations Recommendation		
1	Topic 1: Water Quantity	Comment The Water Licence application references 50,000 m ³ /day of water usage. Can NTPC confirm this amount is accurate? Are generators running in any given day to supplement the City's power or it is only during peak loads? Does water use change with the number of generators going? Recommendation 1) ENR requests that NTPC clarify the following points: Daily water usage; The frequency of generator use (daily vs peak loads); and Any change to water use based on fluctuations in generator use.	Apr 15: The reference to 50,000 m ³ /day of water usage is based on the total pumping capacity of the cooling system at NTPCs Jackfish facility. When all ten pumps connected to the system are operating, they have a combined capacity of 49,877 m ³ /day. As the Jackfish facility primarily provides backup and peak capacity only, on most days pumps are only run to maintain circulation in the cooling system and prevent sedimentation or freezing of intake and outlet lines at the lake. The average daily water usage in 2018 was 16,414 m ³ . Normal operation at Jackfish does not require all of the generators to be operated simultaneously. In 2018, the average number of operating hours per generator was 287, with individual units accumulating between 63 and 580 hours. On many days during a typical year, there are no generators in operation at Jackfish. However, if the generators at Jackfish were to be operated at full capacity for a 24-hour period due to an emergency situation, such as the loss of the Snare hydro transmission line, the full 50,000 m ³ /day water usage would be required during that period. References: Jackfish Lake Generating Facility- Operations Maintenance and Surveillance Manual (NTPC, 2019) 	
2	Topic 2: Water Source	Comment Under Part D of the draft Water licence, there is no water source listed. ENR understands the source of cooling water to be Jackfish	Apr 15: Part D of the draft Water licence has been updated to include Condition 1 that states Jackfish Lake (Stock Lake) is the source water for the cooling systems. Part 1 (a) has	

		<p>Lake.</p> <p>Recommendation 1) ENR recommends that Jackfish Lake be identified as the water source within the Water Licence.</p>	<p>been updated to state This Licence entitles the Northwest Territories Power Corporation to use water from Jackfish Lake (Stock Lake) for cooling systems at the Jackfish Lake Generating Facility located in Yellowknife, Northwest Territories at Latitude 62° 28' 10" North and Longitude 114° 23' 00" West. References: Jackfish Lake Generating Facility-Proposed Jackfish Water Licence Conditions (NTPC, 2019)</p>	
3	Topic 3: Baseline Data	<p>Comment Section 4 of Water Licence Questionnaire (WLQ) says baseline information is limited to the existing reports collected in 2018. Given that the operation has been active prior to 2018, this data should be characterized as ambient data as opposed to baseline.</p> <p>Recommendation 1) ENR recommends that any reference to environmental data in Jackfish Lake observed after the commencement of operations at Jackfish Lake should be referenced as ambient data (existing conditions) as opposed to baseline conditions (pre-development).</p>	<p>Apr 15: This will be implemented moving forward.</p>	
4	Topic 4: Sump Discharge	<p>Comment Section 2.6.2 of the Operations and Maintenance Manual references various sumps that are pumped out through an oil/water separator. It isn't clear if this water is monitored or sampled or where it is discharged. Currently there is SNP sampling occurring at the intakes and discharge. If this sump discharge is combined with other discharge water it may be sampled; however, sampling parameters are currently limited to temperature and flow. Other parameters will have to be</p>	<p>Apr 15: Section 2.6.2 of the Operations and Maintenance Manual was updated to include: The sumps within the plants are visually monitored for level as part of standard inspections. When they reach a level that requires discharge they are pumped out through an oil/water separator into a Vacuum Truck and taken to the City of Yellowknife Water Treatment Plant. No sump water is discharged into the environment. References: Jackfish Lake Generating Facility-Operations Maintenance and Surveillance Manual (NTPC, 2019)</p>	

		<p>considered if this water is discharged to land or into Jackfish Lake.</p> <p>Recommendation 1) ENR recommends that NTPC clarify the discharge location or other management techniques used to manage sump water from within the plants.</p>		
5	None	<p>Comment None</p> <p>Recommendation 2) If sump water is discharged into the environment, NTPC should provide the discharge location and the SNP should be updated to monitor for potential contaminants related to this waste stream, such as total petroleum hydrocarbons.</p>	<p>Apr 15: Sump water is not discharged to the environment and no SNP locations are required.</p>	
6	Topic 5: AEMP	<p>Comment Part I of the draft Water Licence notes that an AEMP Design should be submitted 90 days following issuance and then updated every 3 years. Part I 2-3 following the submission of the design plan mentions that the Licensee shall implement the "AEMP Response Plan as and when approved by the Board" (emphasis added). ENR believes this to mean the "AEMP" itself will be implemented as opposed to a "Response Plan". The requirement for responses plans will be outlined as required within the AEMP.</p> <p>Recommendation 1) ENR recommends that the condition in the draft Water Licence related to AEMP Response Plan should be corrected to the AEMP.</p>	<p>Apr 15: NTPC supports this comment. Part I 2-3 has been updated to read: 2)The Licensee shall implement the AEMP as and when approved by the Board. 3) The Licensee shall submit a revised AEMP as directed by the Board. The AEMP Response Framework will be included as a component of the AEMP Design Plan. References: Jackfish Lake Generating Facility- Proposed Jackfish Water Licence Conditions (NTPC, 2019)</p>	
7	None	<p>Comment None</p> <p>Recommendation 2) It is recommended that a response</p>	<p>Apr 15: NTPC supports this comment.</p>	

		framework including the requirement for response plans should be included within the AEMP itself.		
8	Topic 6: Monitoring	<p>Comment ENR notes that while the 2018 Monitoring Program was informative, it is a snapshot in time. As such, ENR supports the inclusion of an AEMP as outlined in the draft Water Licence; however, the AEMP should be scoped appropriately to reflect the scope of the project and the size of the receiving environment.</p> <p>Recommendation 1) ENR supports the inclusion of an Aquatic Effects Monitoring Program for the Jackfish Lake Generating Station. The AEMP should be scoped appropriately.</p>	<p>Apr 15: NTPC supports this comment.</p>	
9	None	<p>Comment None</p> <p>Recommendation 2) ENR will provide additional comments on the program through any review of the AEMP as may be requested by the Board.</p>		
10	Topic 7: Security	<p>Comment Part C of the Water Licence includes a requirement for 50k in security. Given that NTPC is a Crown Corporation, ENR does not believe that a security posting is necessary.</p> <p>Recommendation 1) ENR recommends that security not be required for the Water Licence.</p>	<p>Apr 15: NTPC supports this comment.</p>	
MVLWB: Tyree Mullaney				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
1	Water Use	<p>Comment In the application NTPC indicates that the water volume being requested is 50,000m3/day.</p> <p>Recommendation Board staff are requesting that NTPC provide rationale and evidence</p>	<p>Apr 15: The requested water volume is 50,000 m3/day. This is the daily water usage limit for current water licence (N1L1-1632) for the Jackfish Facility. Operating conditions and the resulting water usage are not expected to deviate from current</p>	

		relating to the amount of water being requested.	values and for this reason the daily water usage limit of 50,000 m3/day is again being requested. The requested volume allows the cooling system at Jackfish to be operated at full capacity without restrictions on electrical power output which is required for backup and peaking capacity for the North Slave integrated power grid. References: Jackfish Lake Generating Facility- Proposed Jackfish Water Licence Conditions (NTPC, 2019)	
2	Term of Licence	<p>Comment In the application NTPC indicates that the term of the licence being requested is 20 years.</p> <p>Recommendation Board staff are requesting that NTPC provide rationale and evidence relating to the requested term.</p>	<p>Apr 15: The term for current water licence for the Jackfish Facility (N1L1-1632) was 25 years. The Jackfish facility has been operating since 1969 and operating conditions and resulting water usage are not expected to deviate from current values. Given the stability of operations NTPC is requesting a 20 year term to help keep electricity rates as low as possible for customers by minimizing regulatory costs. References: Jackfish Lake Generating Facility- Proposed Jackfish Water Licence Conditions (NTPC, 2019)</p>	



**NORTHWEST TERRITORIES
POWER
CORPORATION**

Empowering Communities

OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL

**JACKFISH LAKE
GENERATING FACILITY, NWT
PLANT #120
YELLOWKNIFE, NORTHWEST TERRITORIES**

April 2019

DOCUMENT MAINTENANCE AND CONTROL

This document will be reviewed annually by the Plant Operations Manager and updated as required. Changes in phone numbers, names of individuals, etc. that do not affect the intent of the plan are to be made as required.

DOCUMENT HISTORY				
Revision #	Revised Section(s)	Description of Revision	Prepared by	Issue Date
0	N/A	First Version	NTPC	Feb 2019
1	2.6.2	Information on disposal of plant sump water	NTPC	April 2019

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- Appendix B- Incident Report Form
- Appendix C- Log Sheets
- Appendix D- Cooling System Drawings

1 GENERAL

1.1 DESCRIPTION OF FACILITIES

Yellowknife is located on the west shore of Yellowknife Bay on the north arm of Great Slave Lake (Figure 1). The Jackfish Lake Generating Facility (the Jackfish Facility) is located at the north end of Yellowknife on the north shore of Jackfish Lake (formerly known as Stock Lake) and is surrounded by chain-link fencing (Figure 2).

The arrangement of buildings from east to west along the south side of the property is as follows: the office building, Cat Plant, EMD Plant, K-Plant (the three plants are joined by covered walkways), the warehouse, and the line shop. There is a water pump house located south of the K-Plant, a fuel pump house north of the K-Plant, and a storage shed northeast of the line shop. On the north side of the property from east to west sits the substation, the Ruston Plant, a drum storage berm, the tank farm, and five modular gen-sets with a fuel storage tank and control building (Figure 3).

The K-plant built in 1969 and extended in 1988 contains two Mirrlees KV-16 gen-sets rated at 5000 kilowatts (kW) each; only one is in service at this time. The EMD Plant (Photo 1) built in 1974 and extended in 1988 contains four EMD's (Electro-Motive Division of GM); two E-series gen-sets rated at 2500 kW each and two F-series gen-sets rated at 2850 kW each. The Cat plant built in 1993 contains two Caterpillar 3612 gen-sets rated at 2700 kW.

Figure 1: Regional Project Location



Figure 2: Location of Jackfish Diesel Generating Facility

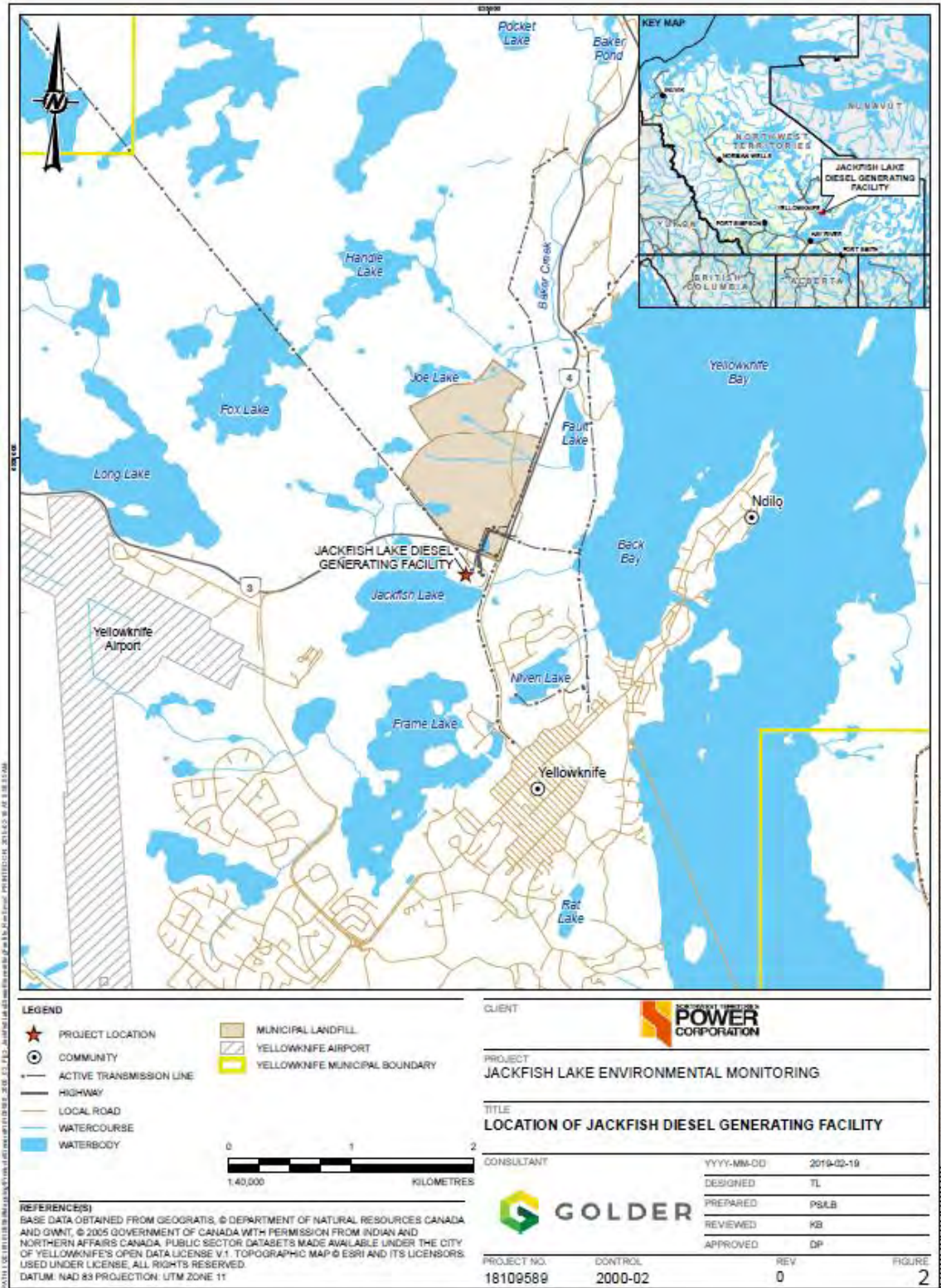


Figure 3: Jackfish Diesel Generating Facility





Photo 1: EMD Plant

The Jackfish Facility is an important component of the North Slave Power System which is the sole supplier of electricity to the communities of Yellowknife, Behchokò, Ndilo, and Dettah (Figure 4).

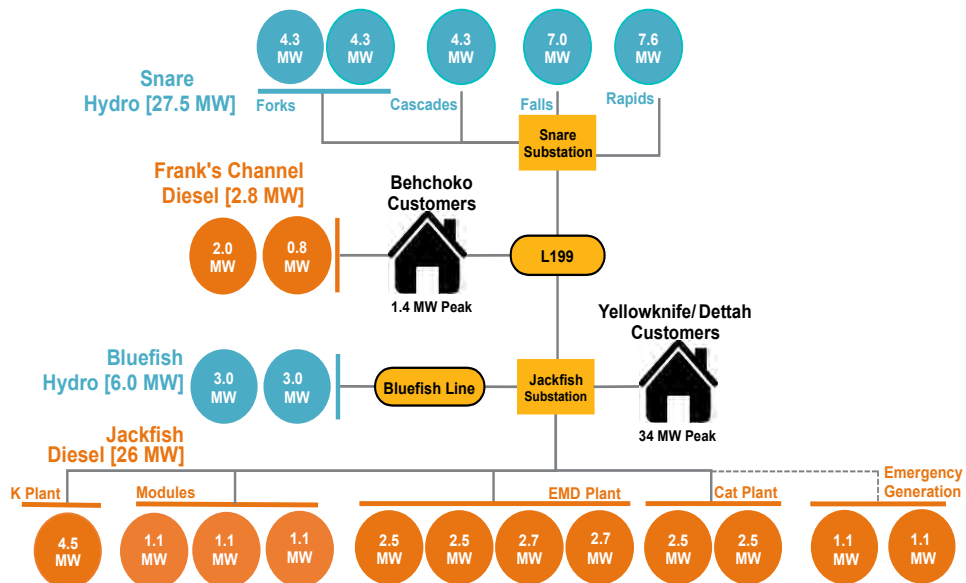


Figure 4: North Slave Power System Diagram

Historically, and recommended by the Northwest Territories (NWT) Public Utilities Board, the Jackfish Facility has been developed so the total installed diesel generating capacity can provide power to the communities in the event of a failure of the L199 transmission line from the Snare Hydro System (Table 1). The diesel generating capacity was sequentially increased until the construction of the 4300 kW Snare Cascades Hydro Plant in 1996 (Table 2). The closure of Con Mine in 2003 and Giant Mine in 2004 and resulting drop in the system load has made further expansion unlikely.

Table 1: North Slave System Generation Maximum Continuous Capacity

<u>System</u>	<u>Plant and Unit</u>	<u>Continuous Capacity (kW)</u>
Snare Hydro	Snare Rapids	7600
	Snare Falls	7000
	Snare Cascades	4300
	Snare Forks #1	4300
	Snare Forks #2	4300
	Total Snare Hydro	27,500 kW
Bluefish Hydro	Bluefish G1	3000
	Bluefish G2	3000
	Total Bluefish Hydro	6,000 kW
Jackfish Diesel	Mirrlees KV16 (G1)	4500
	Mirrlees KV16 (G4)	0
	EMD S20-645 (G2)	2500
	EMD S20-645 (G3)	2500
	EMD S20-645 (G5)	2700
	EMD S20-645 (G8)	2700
	CAT 3612 (G14)	2500
	CAT 3612 (G15)	2500
	Cummins (G20)	1100
	Cummins (G22)	1100
	Cummins (G25)	1100
	MTU (EM9)	1100
	MTU (EM10)	1100
Total Jackfish Diesel	25,400 kW	
Behchokò Diesel	Behchokò G5	2000
	Behchokò G1	800
	Total Behchokò Diesel	2,800 kW
	Yellowknife Peak Demand	34,000 kW
	Behchokò Peak	1,400 kW

Note: EM9 and EM10 to be replaced by two Cummins units of the same capacity.

Table 2: Jackfish Diesel Generating Units in Service

UNIT	MANUFACTURER	MODEL	YEAR	Theoretical kW	Continuous Generation kW	Raw Water Cooling
G1	Mirrlees	KV16	1971	5000	4500	YES
G2	EMD	S20-645E4B	1974	2500	2500	YES
G3	EMD	S20-645-E4B	1974	2500	2500	YES
G5	EMD	S20-645-F4B	1993	2800	2700	YES
G8	EMD	S20-645-F4B	1988	2800	2700	YES
G14	CAT	3612	1993	2700	2500	YES
G15	CAT	3612	1997	2700	2500	YES
G20	Cummins	QSK50-G4	2017	1150	1100	NO
G22	Cummins	QSK50-G4	2017	1150	1100	NO
G23	Cummins	QSK50-G4	2017	1150	1100	NO
EM9	MTU	16V4000G03	2016	1150	1100	NO
EM10	MTU	16V4000	2015	1150	1100	NO

Note: EM9 and EM10 to be replaced in the future by two Cummins units of the same capacity.

2 OPERATION

2.1 OPERATING PRINCIPLES

The Jackfish Facility is a standby plant for the North Slave System. Hydroelectric power, while expensive in capital, is very economic to operate compared to diesel generation. Diesel generating units at Jackfish are therefore only utilized for the following conditions:

Instantaneous loss of hydro supply (Outage). This could be caused by a temporary issue such as lightning strike, failed insulator, or broken conductor on the transmission line, or a hydro unit(s) unplanned shutdown.

Shortage of hydro generating capacity. This occurs when the total system (customers) load exceeds the total available generating capacity of the hydro units. This generally occurs during the winter but may occur due to maintenance on the hydro components.

Diminished hydro supply. Due to low water inflows this may exist for a short duration due to a late spring runoff or for a longer term due to extended drought conditions in the Snare and/or Yellowknife River basins.

2.2 ACTUAL OPERATION

Actual system generation throughout various conditions is shown in Figure 4.

When Jackfish Facility needs to generate due to an instantaneous loss of hydro supply it is generally of short duration and is not significant on a monthly basis. The vast majority of electrical generation comes from Snare or Bluefish Hydro.

A shortage of hydro generating capacity can be seen in the winter months of the normal water year of 2015-2016 and a hydro unit overhaul in July of 2015 (Figure 5).

Diminished hydro supply can be seen in the drought period of 2014-2015 (Figure 5). Considerable diesel generation was required, particularly in the summer, to save water in the reservoirs required for the winter peak demand months.

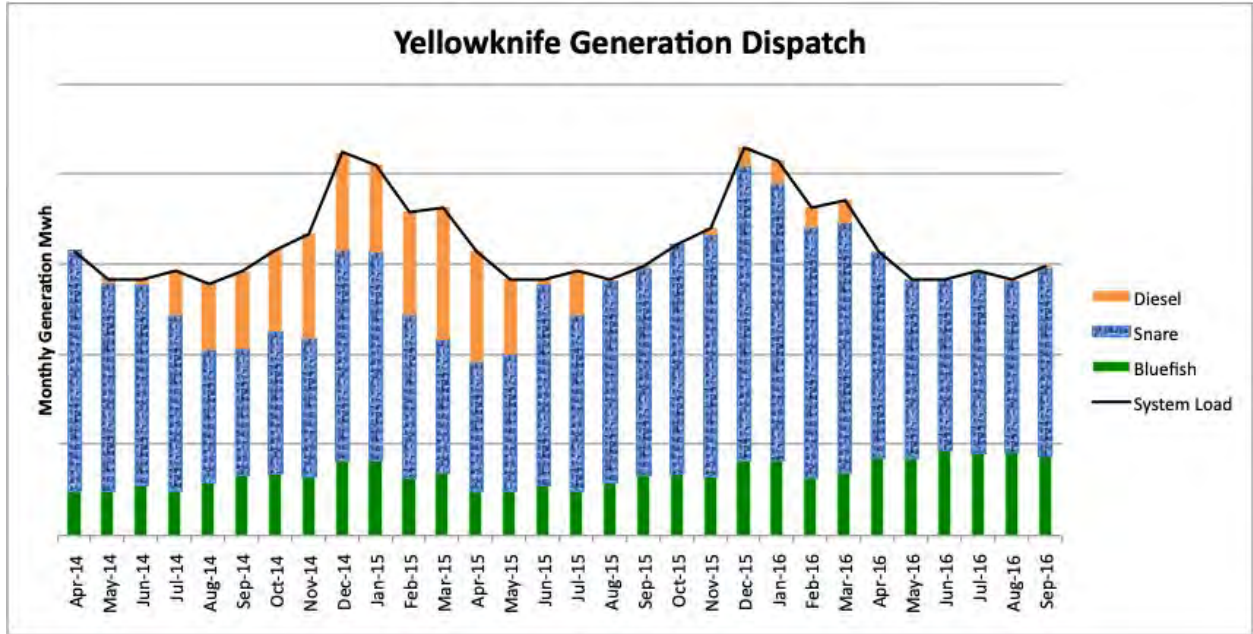


Figure 5: Yellowknife Generation Dispatch

2.3 DIESEL FORECASTING

Forecast Diesel Generation is the remainder of the Forecast System Load minus the Forecast Hydro Generation. This includes a shortage of capacity due to system load peaking in the winter and potential hydro from available reservoir storage and forecast inflows.

The forecasting process is a dynamic process that involves a series of forecasts, updates and adjustments during the year. The process uses some knowledge of hydrologic conditions and the manner in which runoff travels through the Snare River and Yellowknife River basins.

- STEP 1: The first forecast is based on an estimated annual runoff derived from the **April** snow surveys conducted on the Snare River and Yellowknife River basins.
- STEP 2: The next occasion to update the forecast occurs when the spring peak is observed at the Indin River gauge. This peak occurs, typically in **mid-June**, and is a good predictor of the eventual peak flow that will be observed at the Snare Ghost gauge, upstream of the Big Spruce Reservoir. This information is then used to forecast the spring peak flow at Snare Ghost. The resulting update forecast is then used to revise the reservoir-operating plan, the monthly water allocations and plant operations are adjusted accordingly.
- STEP 3: The next occasion to update the forecast occurs when the spring peak is observed at Snare Ghost gauge, normally during the period **mid- to late July**. The forecast is updated based on the observed peak and the recession (falling limb) of the annual hydrograph is adjusted to fit. The inflow hydrograph, water management plan and power plant operations are then updated.
- STEP 4: The fourth step involves monitoring the recession of the annual hydrograph, for the remainder of the year. The initial rate of recession until freeze up, typically in **mid-October**, varies somewhat from year to year. During this period, the performance of the forecast is reviewed and adjusted, normally at monthly intervals.

- STEP 5: After October 15, precipitation measured at Indin River, Snare Rapids and Yellowknife is normally in the form of snow and is a precursor of conditions in the coming year. Snow accumulations estimated for these stations give an indication of the future conditions and forewarning of possible problems.

2.4 OPERATIONAL RESPONSIBILITIES

Staffing levels at Jackfish Facility vary due to the rotation of staff to the Snare and Bluefish hydro plants and North Slave Communities. There are Mechanics, Electricians, and Millwrights as a resource for preventive maintenance, trouble shooting, and emergency repair. In general, there are eight Hydro Plant Operators skilled at operating the Jackfish Facility, although this number may fluctuate according to diesel demand. These operators also rotate through a days on / days off schedule to the Snare and Bluefish hydro systems. Their working hours at Jackfish Facility are scheduled depending on the current role of that plant to the system. An additional and critical role of the operators are supporting inspections for Health and Safety in addition to maintenance tasks identified by the central maintenance system.

There are five System Operators that monitor the North Slave System via SCADA (System Control and Data Acquisition) over a 24/7 shift in addition to 26 other communities.

2.4.1 Plant Operators

Reporting Structure

The Hydro Plant Operators report to the Plant Operations Manager in Yellowknife who reports directly to the Hydro Divisional Director. For technical assistance, there is the Mechanical Services Manager, Electrical Services Manager and System Control Manager in Yellowknife who may provide input and support staff.

Duties of Plant Operators

At a minimum, the Plant Operator does a visual inspection of the entire facility at least once a day. This includes a walk around of each unit, a check of sumps, raw water pumps, tank farm and modules. When Diesel Units are being operated the Plant Operator's duties increase to observing and recording generating data, temperatures and pressures on the units and auxiliary equipment. The Plant Operator also performs or assists in maintenance.

2.4.2 System Operators

Reporting Structure

The System Operators report to the System Control Manager in Yellowknife who reports directly to the Hydro Divisional Director. For technical assistance, there is the Mechanical Services Manager, Electrical Services Manager, Transmission and Distribution Manager, and Plant Operations Manager in Yellowknife that may provide input and support staff.

Duties of System Operators

The System Operator monitors and controls the various components of the North Slave System to ensure safe, efficient, and reliable power generation. The System Operator directs the dispatch of diesel generating units, based on short- and long-term operating schedules. This may be performed by the Plant Operator or remotely through SCADA. Some high-level monitoring of information and alarms of the Jackfish Facility and units are also performed with SCADA.

2.5 DIESEL GENERATING UNIT COOLING SYSTEMS

The three main plants use Jackfish Lake water (raw water) to circulate cooling between the internal plant heat exchangers and back out to Jackfish Lake (Table 3, Figure 6). Jacket Water is the term used for the internal “closed loop” system for engine cooling which contains a corrosion inhibitor called Powercool 3000 (mixture of 95% water to 5% powercool). The five modular gen-sets use antifreeze for cooling and are not connected to Jackfish Lake for cooling requirements. All pumps are 3-phase, 600 volts. Maximum flow rate is 7,619 imperial gallons per minute, or 34.6 m³ per minute and 49,882 m³ per day.

Table 3: Jackfish Facility Raw Water Pumps

<u>K-Plant Vertical 2 Stage Pumps</u>				
PUMP	HP	RPM	GPM US	GPM IMP
W1-1	50	1800	1500	1245
W1-2	20	1800	910	755
W4-1	50	1800	1500	1245
W4-2	20	1800	910	755
<u>EMD Plant Horizontal Double Suction Pumps</u>				
PUMP	HP	RPM	GPM US	GPM IMP
W2-1	30	1800	840	697
W2-2	30	1800	840	697
W2-3	30	1200	560	465
<u>Cat Plant Vertical Single Stage Pumps</u>				
PUMP	HP	RPM	GPM US	GPM IMP
1	15	1750	1060	880
2	7.5	1750	530	440
3	7.5	1750	530	440

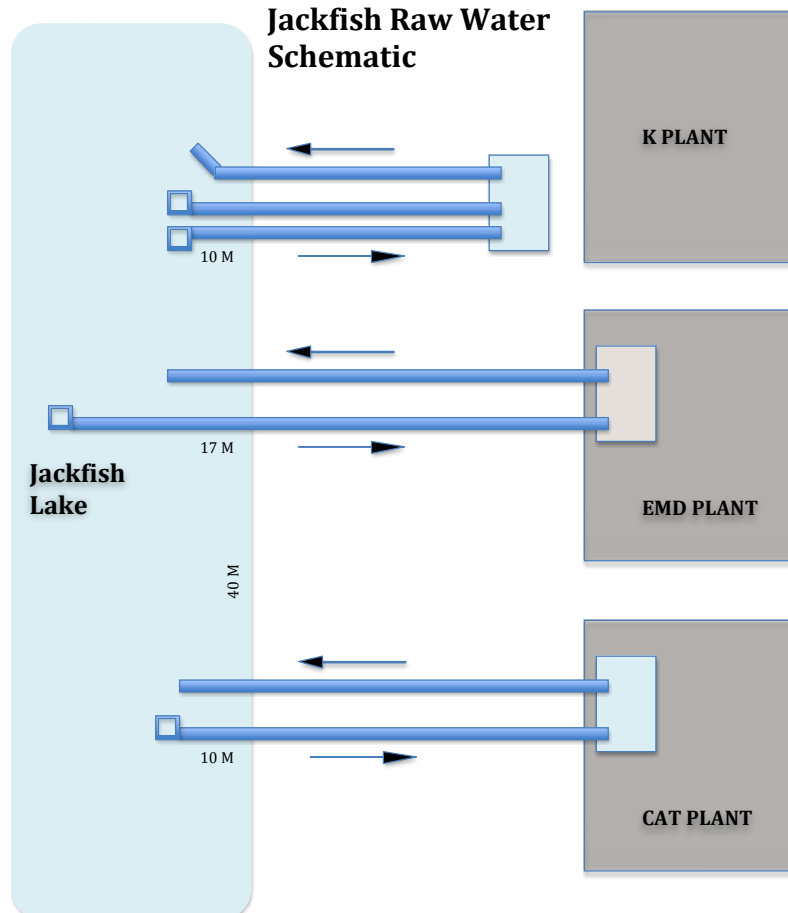


Figure 6: Jackfish Raw Water Schematic

2.5.1 K-Plant Raw Water System

2.5.1.1 Description

The K-Plant raw water system consists of two screened unpressurized intake pipes that allow water from Jackfish Lake to flow into a large covered well enclosed in a pumphouse building (Figure 7, Photo 2). Water can be pumped from the well by any combination of four vertical 2-stage pumps, 2-50 horsepower (HP) and 2-20HP, to the K-Plant powerhouse. In the Powerhouse the raw water flows through sheet and tube heat exchangers for distinct (isolated) Jacket Water, Oil, Fuel, and Turbocharger Air systems. The raw water returns to Jackfish Lake via a common gravity pipe.

K Plant Raw Water Schematic

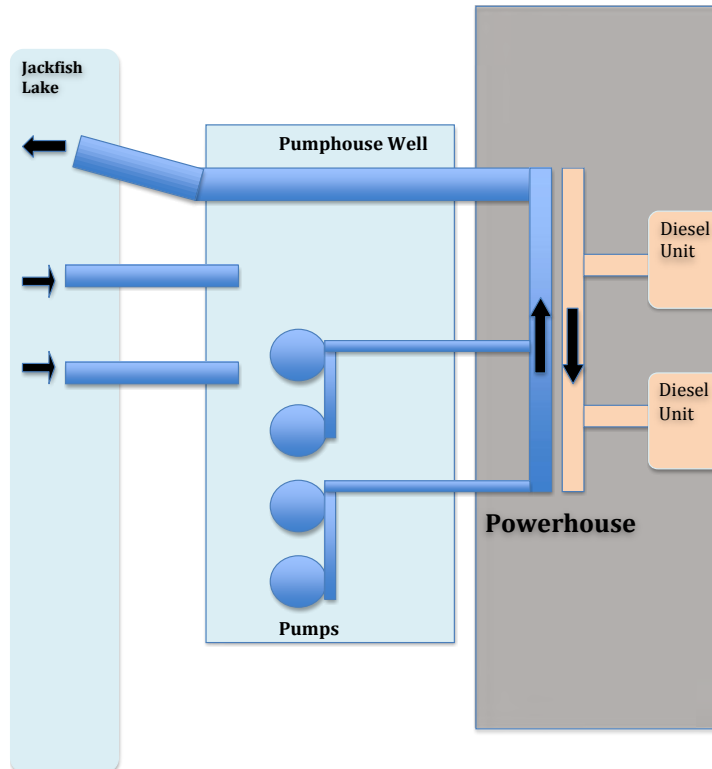


Figure 7: K-Plant Raw Water Schematic



Photo 2: K-Plant Raw Water Pumphouse

2.5.1.2 Normal Operation

The K-Plant raw water system was designed and constructed to supply cooling water to 2 KV-16 Major Generating units. In recent years one unit has been taken out of service so the system is currently overbuilt. Two pumps are normally running continuously to keep the supply and return pipes from freezing in the winter. In summer one pump is running continuously to allow for prompt unit startup in outage conditions. Jacket Water, Oil, and Fuel are not pumped through the heat exchangers (Photo 3) unless the corresponding pumps are manually turned on, generally upon unit startup.



Photo 3: K-Plant Sheet and Tube Oil Heat Exchanger

2.5.2 EMD Plant Raw Water System

2.5.2.1 Description

Unlike the K-Plant the EMD Plant raw water system draws water directly from the lake via a screened and valved, 12-inch intake pipe (Figure 8). From the intake pipe three 30-HP horizontal pumps are installed in parallel to a 12-inch outlet manifold (Photo 4). This system is located in a dry sump below the powerhouse floor. The outlet manifold rises and extends the length of the powerhouse where it is circulated through the main heat exchangers of each of the four generating units. The EMDs are self-contained beyond this heat exchanger so there are no additional heat exchangers on the raw water system. The raw water returns to Jackfish Lake via a common gravity pipe.

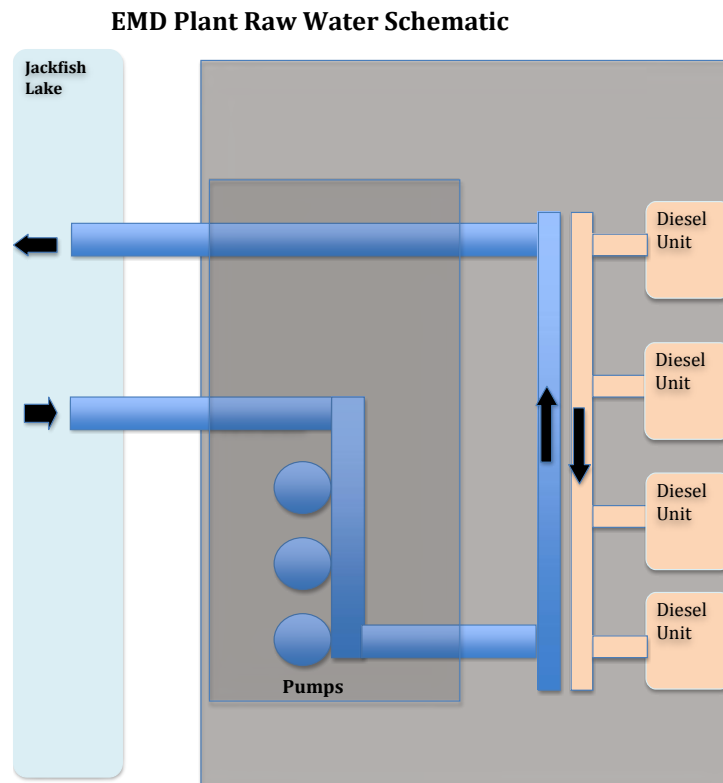


Figure 8: EMD Plant Raw Water Schematic



Photo 4: EMD Plant Raw Water Pumps

2.5.2.2 Normal Operation

For the EMD Plant two raw water pumps are normally running continuously in order to keep the supply and return pipes from freezing in the winter. In summer one pump is running continuously to allow for prompt unit startup in outage conditions. A second pump is started if additional cooling is needed. The third pump is for maintenance of the other pumps.

2.5.3 CAT Plant Raw Water System

2.5.3.1 Description

The CAT Plant has a well system similar to the K-Plant but has the well located inside the powerhouse (Figure 9). The well has a screened 12- inch pipe from Jackfish Lake to the well that can be isolated. There are two 7.5HP and one 15HP single stage horizontal pumps connected to a 12- inch supply manifold (Photo 5). The supply manifold extends across the plant where the two units connect with the respective Jacket Water, Oil, Fuel and Turbocharger heat exchangers. Jacket Water, Oil, and Fuel are not pumped through the heat exchangers unless the corresponding pumps are automatically turned on by the PLC for each unit.

The raw water returns to Jackfish Lake via a 10-inch common gravity pipe.

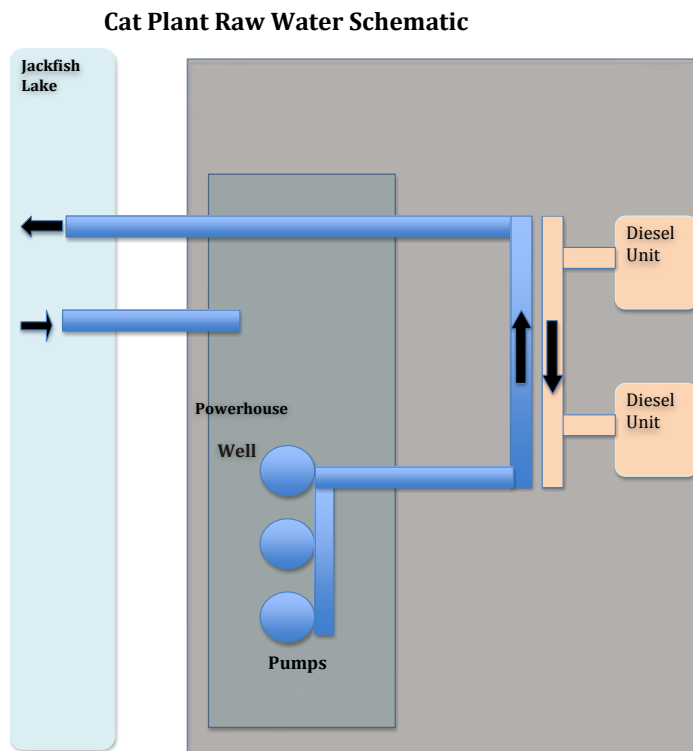


Figure 9: Cat Plant Raw Water Schematic



Photo 5: CAT Plant Raw Water Pumps

2.5.3.2 Normal Operation

The CAT Plant has one raw water pump continuously running to keep the supply and return pipes from freezing in the winter. In summer one pump is running continuously to allow for prompt unit startup in outage conditions. The second pump is automatically started if needed for cooling purposes when both units are running. The third pump is for maintenance of the other pumps

2.6 OTHER SYSTEMS

2.6.1 Heat Recovery System

There are Plate Type Heat Exchangers that capture waste heat off the Jacket Water of the KV-16 Unit 1, EMD Units 5 and 8, and CAT Unit 15 (Photo 6). This system is used as needed to heat the other Diesel Plants as well as the Administration Building and Warehouse.

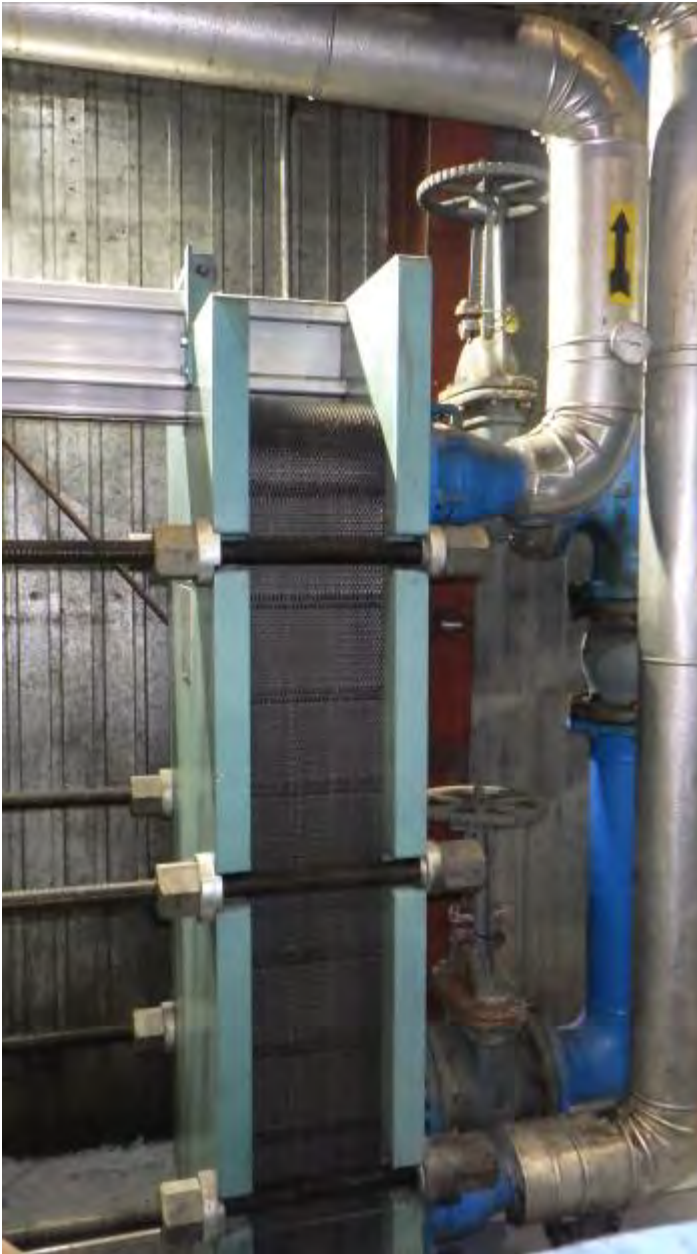


Photo 6: K-Plant Plate Heat Exchanger

2.6.2 Sumps

The K-Plant drains to a sump that has a level alarm and is manually pumped out through an oil/water separator if needed.

The EMD Plant has a lower sump within the raw water pump sump that has a level alarm with an oil/water separator installed in the discharge line (Photo 7). Discharge to a surface container is manual only.



Photo 7: EMD Plant Sump

The CAT Plant drains through an oil/water separator to a water sump that is pumped out through a manual operation.

The sumps within the plants are visually monitored for level as part of standard inspections. When they reach a level that requires discharge they are pumped out through an oil/water separator into a Vacuum Truck and taken to the City of Yellowknife Water Treatment Plant.

No sump water is discharged into the environment.

3 MAINTENANCE

3.1 MAINTENANCE RESPONSIBILITIES

The Electrical Services Manager and Mechanical Service Manager are responsible for the planning and implementation of maintenance. Maintenance of the diesel generating units is planned in coordination with plant and system operation. These Managers report to the Hydro Operations Director. The Plant Operators, Electricians, Mechanics, Millwrights and contractors, depending on the work to be done, perform the maintenance on these facilities. The Maintenance staff are knowledgeable in all facets of power generation, and beyond servicing the Jackfish Facility, supply crucial support to Snare Hydro, Bluefish Hydro, and isolated North Slave communities of Behchokò, Whatì, Gamètì, and Lutsel K'e. Staff also maintain vehicles, heavy equipment, and the Transmission and Distribution system.

3.2 MAINTENANCE PROGRAMS

The diesel generating units have extensive maintenance programs for both electrical and mechanical components predominantly based on engine hours using a Computerized Maintenance Management System. The Mirlees, EMD and Caterpillar engines have both common and unique specialized tools, overhaul schedules, and required skillsets. In addition, there are regular inspections and maintenance performed on plant auxiliaries, heating systems including waste heat, structures, and the many critical substations throughout the system.

4 SURVEILLANCE

4.1 PLANT CHECKS

When the Jackfish Facility and respective plants are in standby operation mode there is a daily visual check by a Plant Operator throughout the plants and grounds for proper operation and abnormalities (Appendix A). Any incidents are documented in the Incident Report (Appendix B).

4.2 HOURLY READINGS

When a diesel unit is in operation, logs sheets are completed hourly by the plant operator (Appendix C). They are specific to a particular unit and, among other details, record the temperature and pressure of the Raw Water System as well as the Jacket Water, Fuel, Oil, and Turbocharger cooling systems (Photo 8). Discrepancies observed are noted and may result in communication to maintenance department or the unit being taken through a controlled shutdown and replaced with alternative generation.



Photo 8: Raw Water Pressure and Temperature Gauges

4.3 WILDLIFE

The Jackfish Facility is surrounded by municipal and industrial developments. As illustrated in Figure 2, the Jackfish Facility is bound by the Yellowknife municipal landfill, Giant Mine, Highway 3, Highway 4, the Yellowknife Airport, the Niven Lake housing development, and Yellowknife city centre. As such, the potential for impacts to wildlife is limited. Continual operation of the Jackfish Facility for over 40 years have confirmed this.

Species at Risk

Species at risk that may interact with the Jackfish Facility (i.e., species with overlapping range that may venture into city limits) include bank swallow, barn swallow, Harris' sparrow, horned grebe, olive-sided flycatcher, rusty blackbird and short-eared owl. No mammal, plant, fish or insect species are anticipated. The most likely impact to these species at risk will be disturbance of nests if they attempt to nest on Jackfish Facility structures. These species are small enough that mortality through electrocution (caused by simultaneous contact with charged and grounded electrical current) is not anticipated.

Potential Wildlife Impacts

Potential impacts to wildlife and wildlife habitat from developments include:

- direct habitat loss
- indirect habitat loss
- wildlife mortality or injury

Direct habitat loss refers to the disturbance and immediate loss of wildlife habitat within the Project physical footprint, for example from new infrastructure. As the Jackfish Facility is contained within a fence and is surrounded by other infrastructure and disturbances, further direct habitat loss due to Jackfish Facility operations is not anticipated.

Indirect habitat loss describes changes to wildlife movement and behavior due to Project activities (such as the noise from landing aircraft, operation of drilling equipment, odours or human presence). Indirect habitat loss can occur even where vegetation and other habitat features remain intact. These changes are typically negative, causing wildlife avoidance, but can also be positive for some species that are attracted to camps. As the Jackfish Facility is contained within a fence, and as it is surrounded by other infrastructure and disturbances, and most activity is contained within a fence or enclosed buildings, further indirect habitat loss is not anticipated.

Wildlife mortality or injury can result from accidents caused during deterrent or removal of problem wildlife to protect worker safety. Considering the physical hazards, possible presence of food attractants, and electrical infrastructure at Jackfish Facility, wildlife injury or mortality is possible and has occurred. This category includes disturbance or destruction of nests, which may occur when birds nest on structures within the Jackfish Facility.

The anticipated impacts to wildlife, and the associated mitigation implemented for each is outlined in Table 4.

Table 4: Mitigation for Anticipated Impacts to Wildlife

Potential Impact	Mitigation	Monitoring
Contamination of terrestrial environment from spills	Spill Contingency Plan outlines mitigation and procedures to reduce risk of spills, and actions to follow in the event of a spill	Daily Safety Inspection (Appendix A) Prevent and respond to all spills as per the Spill Contingency Plan
Attractants from office waste	Food scraps and other household waste from the Administration Building are stored	Daily Safety Inspection

	inside and in wildlife-proof containers when outside	Feeding of wildlife is prohibited Implement the Waste Management Plan
Electrocution of birds from sub-station	Sonic bird scare devices (Phoenix Wailer MkIII, supplemented by Bird-X UltrasonX and Bird-X Super BirdXPeller Pro) Spikes? Other physical deterrents or barriers?	Daily Safety Inspection Isolate electrical hazards where possible
Greenhouse gas and particulate emissions	Diesel generation is an expensive alternative to hydro, and engaged only when there is instantaneous loss of hydro power, shortage of hydro generating capacity, or diminished hydro supply.	Diesel use is documented
Physical hazards	Chain-link fence surrounds the Sub Station Gated entrance to the facilities	Daily Safety Inspection

5 REPORTING

5.1 MONTHLY READINGS AND ANNUAL REPORTING

Every month the hour meters are read and recorded for each raw water pump. The number of hours operated multiplied by the flow capacity of the pump results in the amount of water pumped through the raw water system. The water usage for the pumps and cooling systems is reported to the Mackenzie Valley Land and Water Board in quarterly reports and an annual report all of which are available on the online registry (<https://mvlwb.com/registry>).

5.2 WILDLIFE REPORTING

Results from the daily check of plant and grounds will be documented...

Wildlife incidents refer to a range of possible occurrences at the Project, including:

- human-wildlife interactions that present a risk to either people or animals
- wildlife-caused damage to property or delay in operations
- wildlife deterrent actions
- wildlife injury or mortality
- wildlife found dead, even if from natural causes
- birds nesting on Project infrastructure or equipment

All incidents will be documented using the Incident Report form (Appendix X), and will be reported immediately to the Government of the Northwest Territories Department of Environment and Natural Resources at 867-873-7181.

6 CONTACT NUMBERS

Plant Operator/ System Operator shall report to:	
Manager, Plant Operations- Robert Sunderland	867-669-3338 (O)
	(H)
	867-445-1841 (cell)
Manager, Electrical Services- Robert Burgin	867-669-3308 (O)
	867-766-3328 (H)
	867-444-8424 (cell)
Manager, Mechanical Services- Sergio Catlyn	867-669-3326 (O)
	867-766-3541 (H)
	867-445-3389 (cell)
Director, Hydro Division- Colin Steed	867-669-3326 (O)
	867-920-4574 (H)
	867-446-4712 (cell)
Manager, System Control	867-669-3347 (O)

	(H)
	867-445-6515 (cell)
Director shall report to:	
President & CEO	867-874-5245 (O)
	(H)
	780-719-0612 (cell)
Manager, Corp. Health, Safety & Envi. – Ed Smith	867-874-5327 (O)
	867-874-2491 (H)
	867-875-7737 (cell)
Local Agencies (Yellowknife):	
Fire or Emergency	867-873-2222
Ambulance	867-873-2222
Hospital	867-669-4111
RCMP	867-669-1111
City of Yellowknife	867-920-5600

Appendix A Safety Inspection Form



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

Inspection Details

Location:

Plant:

Inspected by:

Date:

#	Inspection Item	Y	N	NA	Notes
1.0	Housekeeping				
1.1	Are all buildings clean & organized inside?				
1.2	Are all walkways and doorways clear and free of debris?				
1.3	Is the yard clean & organized with no vegetation control required?				
1.4	Is the transformer storage platform solid and well-organized?				
1.5	Is the pole storage rack solid and well-organized?				
1.6	Are garbage cans fire resistant with self-closing lids? Emptied at the end of each day?				
1.7	Are all spills and leaks cleaned up?				
1.8	Are floors clean and tidy and free of slippery substances (e.g., water, oil, grease)?				
1.9	Are floors level and well maintained with no projecting surfaces and no tripping hazards?				
1.10	Are windows clean, both inside and outside, and kept obstruction free?				
2.0	Storage				
2.1	Are tools and materials properly stored in racks, shelves, and bins wherever possible?				
2.2	Are commonly used and heavy items stored between mid-thigh and shoulder height?				
2.3	Are floors around racks, shelves, pallets, etc. clear?				
2.4	Are racks, shelves, pallets, etc. kept in good condition?				
2.5	Are storage areas safe from falling objects?				



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

#	Inspection Item	Y	N	NA	Notes
2.6	Are storage racks, shelves, etc. free of sharp edges?				
2.7	Is there a safe means of accessing high shelves?				
3.0	Tools & Equipment				
3.1	Are tools & equipment maintained in good condition, clean, suitable for intended use?				
3.2	Are all necessary machine guards in place?				
3.3	Are spill pads, drip trays, and crankcase vent containers emptied or replaced as required?				
3.4	Are batteries free of leaks with terminals clean and protective covers in place?				
3.5	Are line & electrical tools available, properly stored, certified, and in good condition?				
3.6	Is rigging & lifting equipment available, properly stored, certified, in good condition?				
3.7	Are compressed gas cylinders undamaged, stored upright, and secured?				
3.8	Are pipes leak-free, colour coded, and properly painted?				
4.0	Personal Protective Equipment (PPE)				
4.1	Is all PPE available onsite (hard hats, safety glasses, rubber gloves, earing protection)?				
4.2	Is all PPE properly stored?				
4.3	Is all PPE clean?				
4.4	Is all PPE in good condition?				
4.5	Is all PPE correctly used?				
5.0	Emergency Equipment				
5.1	Is the Emergency Response Plan available onsite and current?				
5.2	Is the Spill Response Plan available onsite and current?				
5.3	Is the Hazardous Waste Management Plan available onsite and current?				



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

#	Inspection Item	Y	N	NA	Notes
5.4	Are the NWT Safety Act & NWT Occupational Health & Safety Regulations available onsite?				
5.5	Are emergency phone numbers posted and up-to-date?				
5.6	Are emergency lights functional for a 30 second test?				
5.7	Are eyewash stations available and functional with the solution changed every 6 months?				
5.8	Are fire extinguishers available, charged, and inspected monthly?				
5.9	Are fire extinguishers secured on the wall and not free standing?				
5.10	Is access to fire extinguishers free and unobstructed?				
5.11	Are 1st aid kits available, inspected monthly fully stocked? Outdated items replaced?				
5.12	Are exits clearly marked with functional exit signs?				
5.13	Are exits functional and free from obstructions?				
6.0	Chemicals				
6.1	Are Safety Data Sheets (SDS) available and up-to-date within the last 3 years?				
6.2	Are all chemicals properly labelled and stored in proper containers (as per WHMIS)?				
6.3	Are all flammable products stored in proper containers and kept in a flammable cabinet?				
6.4	Are unused or unnecessary substances disposed of in a safe manner?				
6.5	Are all chemical containers and drums leak free?				
7.0	Building				
7.1	Are buildings in good condition on the inside with no repairs required?				
7.2	Are buildings in good condition on the outside with no repairs required?				
7.3	Are floors level and well maintained with no projecting surfaces and no tripping hazards?				



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

#	Inspection Item	Y	N	NA	Notes
7.4	Are windows clean, both inside and outside, and kept obstruction free?				
7.5	Is ventilation equipment clean, obstruction free, well maintained, and fully functional?				
7.6	Is the air temperature comfortable?				
7.7	Are all inside & outside lights functional?				
7.8	Do existing lights provide adequate lighting?				
7.9	Are all necessary warning signs in place with no new or additional signs required?				
7.10	Are all signs and notices in good condition?				
7.11	Are employee facilities (e.g., washrooms, lockers, crew trailers) clean, tidy, maintained, and adequate?				
8.0	Security				
8.1	Are all fences in good condition with barbwire intact?				
8.2	Are all gates and doors kept locked when unattended?				
8.3	Are all doors and locks in working order?				
9.0	Electrical				
9.1	Are ground connections present and in good working condition?				
9.2	Are electrical boxes & breakers properly covered?				
9.3	Are all electrical plugs and switches in good condition?				
9.4	Are all electrical cords in good condition?				
9.5	Are all power tools in good condition?				
9.6	Is all temporary wiring properly routed?				



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

#	Inspection Item	Y	N	NA	Notes
10.0	Work Protection				
10.1	Are sufficient Work Protection tags and forms available onsite?				
10.2	Is the Work Protection Log book available and up-to-date?				
10.3	Are all Single Line Diagrams posted and up-to-date?				
11.0	Hazardous Waste Storage Area				
11.1	Are all wastes properly separated to ensure no mixing of wastes?				
11.2	Are all waste storage containers in good condition with lids securely in place, no leaks?				
11.3	Are all waste containers labelled clearly and accurately?				
11.4	Are spill response materials available onsite (e.g., spill kits, sorbents, hand tools, PPE)?				
11.5	Are all sources of ignition kept away from the waste storage area?				
11.6	Is a fire extinguisher kept close to the waste storage area? Inspected monthly and charged?				
11.7	Does the storage area have proper drainage to prevent leaks or spills from leaving the site?				
11.8	Is the <i>Waste Accumulation Log</i> up-to-date?				
11.9	Is the <i>Waste Storage Inventory Log</i> up-to-date?				

Provide completed form to manager.



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

Corrective Actions (to be assigned by manager and followed up until completed)


Manager:

Signature:

Date:

#	Corrective Action	CMMS #	Resp. Party	Due Date	Completed
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
12					
13					

Appendix B Incident Report Form

 <p>NORTHWEST TERRITORIES POWER CORPORATION <i>Empowering Communities</i></p>	Health & Safety Management System Form: Incident Report	Page 1 of 2
	Monitor: Director, Health, Safety & Environment	Form #: 10.1

Sections A-E to be completed by worker.

Section A – Incident Details			
Date & time of incident:	Date: Time:	Date & time reported:	Date: Time:
Reported by:	Name: Position:	Reported to Manager:	Name: Position:
Incident location:			
Incident description (attach sketch if necessary):			
Section B – Type of Incident			
<input type="checkbox"/> Injury/Illness	<input type="checkbox"/> Property Damage	<input type="checkbox"/> Production Loss	
<input type="checkbox"/> Rules/Procedures	<input type="checkbox"/> Environmental	<input type="checkbox"/> Near Miss	
Section C – Injury			
Injured party:	Name: Position:	Phone: Email:	<input type="checkbox"/> NTPC employee <input type="checkbox"/> Contractor <input type="checkbox"/> Member of the public
Address:			First aid provided: <input type="checkbox"/> Y <input type="checkbox"/> N
			Medical treatment provided: <input type="checkbox"/> Y <input type="checkbox"/> N
Description of injury:			
Section D – Property/Environmental Damage			
Description of damage:			
Section E – Incident Ranking (Reasonable Potential for Harm)			
<input type="checkbox"/> Low (potential First Aid Injury, minor property/environmental damage or production loss)	<input type="checkbox"/> Medium (potential Medical Treatment Injury, medium property/environmental damage or production loss)	<input type="checkbox"/> High (potential Serious Injury or Fatality, major property/environmental damage or production loss)	

Send completed form to your manager and to the HSE Director by email or fax (1-888-458-4627).



Health & Safety Management System Form:
Incident Report

Monitor:
Director, Health, Safety & Environment

Form #:
10.1

Sections F- I to be completed by manager.

Section F – Incident Ranking (Reasonable Potential for Harm)

- | | | |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Low (potential First Aid Injury, minor property/environmental damage or production loss) | <input type="checkbox"/> Medium (potential Medical Treatment Injury, medium property/environmental damage or production loss) | <input type="checkbox"/> High (potential Serious Injury or Fatality, major property/environmental damage or production loss) |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|

Section G – Immediate Actions Taken

Hierarchy of Controls: 1) Elimination 2) Substitution 3) Engineering 4) Administration 5) PPE

Action	Responsible Party	Date Completed

Section H – Further Corrective Actions

Action	Responsible Party	Due Date	* Date Completed
1			
2			
3			
4			
5			
6			

Section I – Management Review

Name: _____ Position: _____ Review date: _____

Comments:

Section J – Health & Safety Department Review

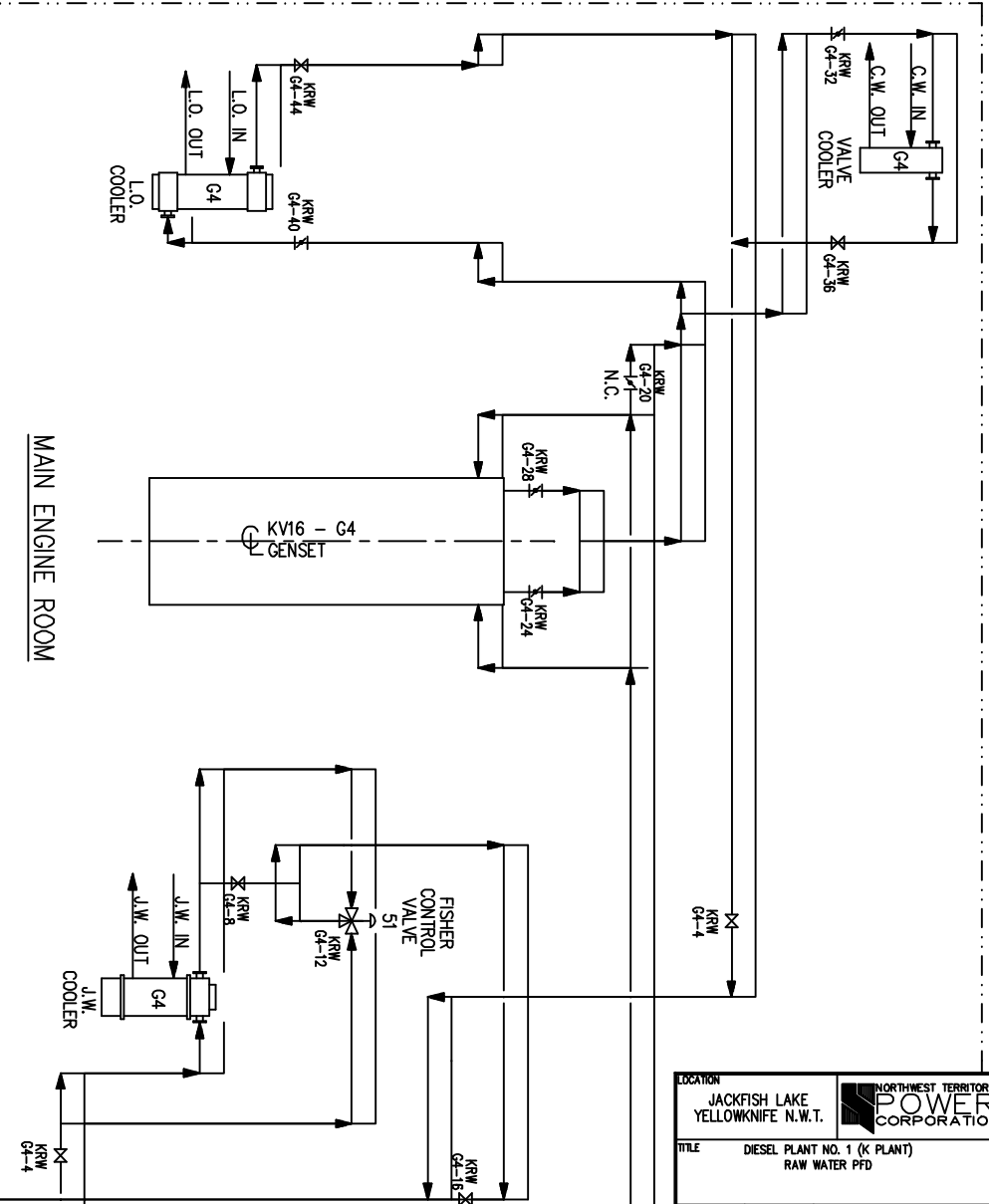
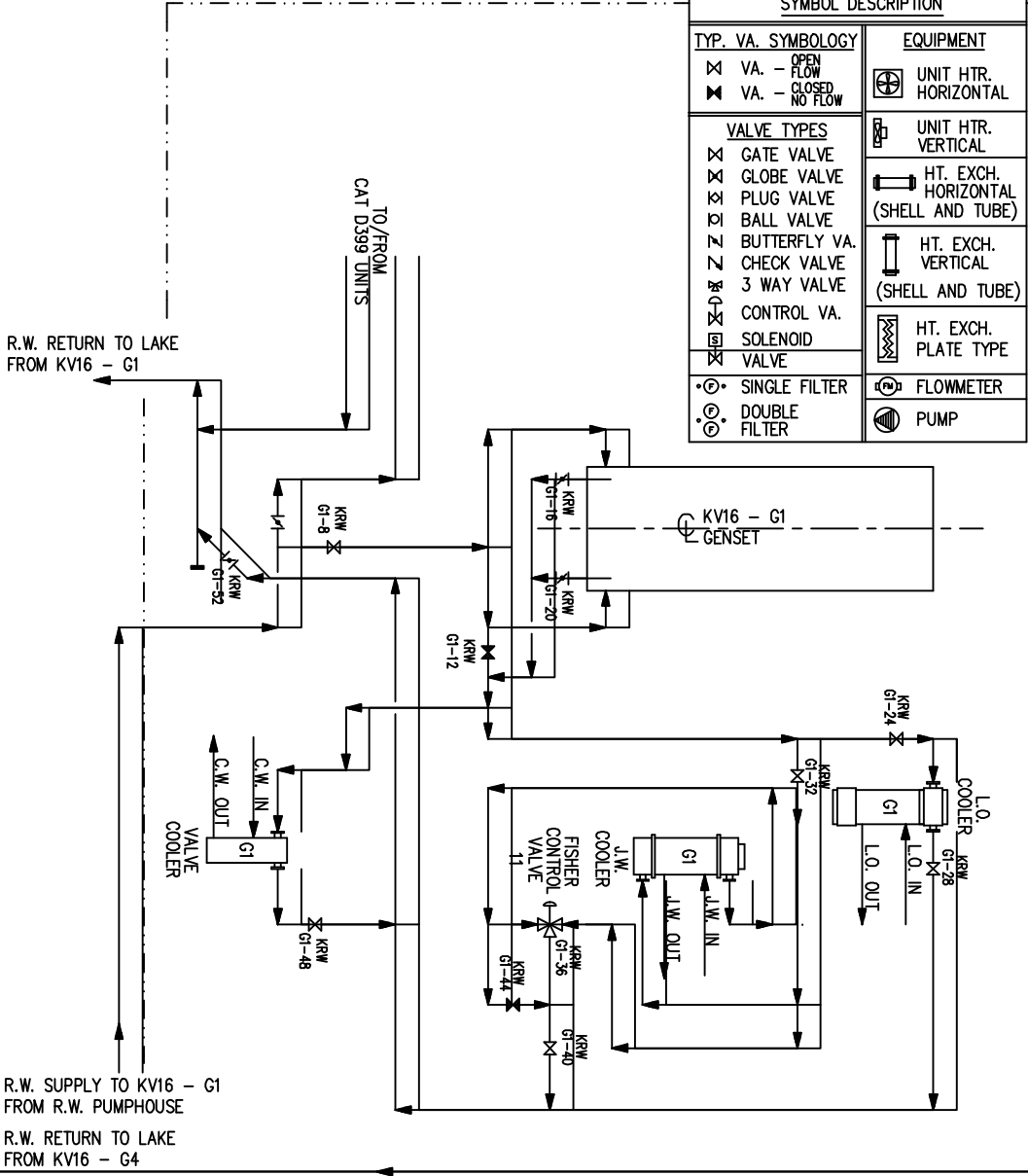
Name: _____ Position: _____ Review date: _____

Comments:

* Inform HSE Director of corrective action completion dates.

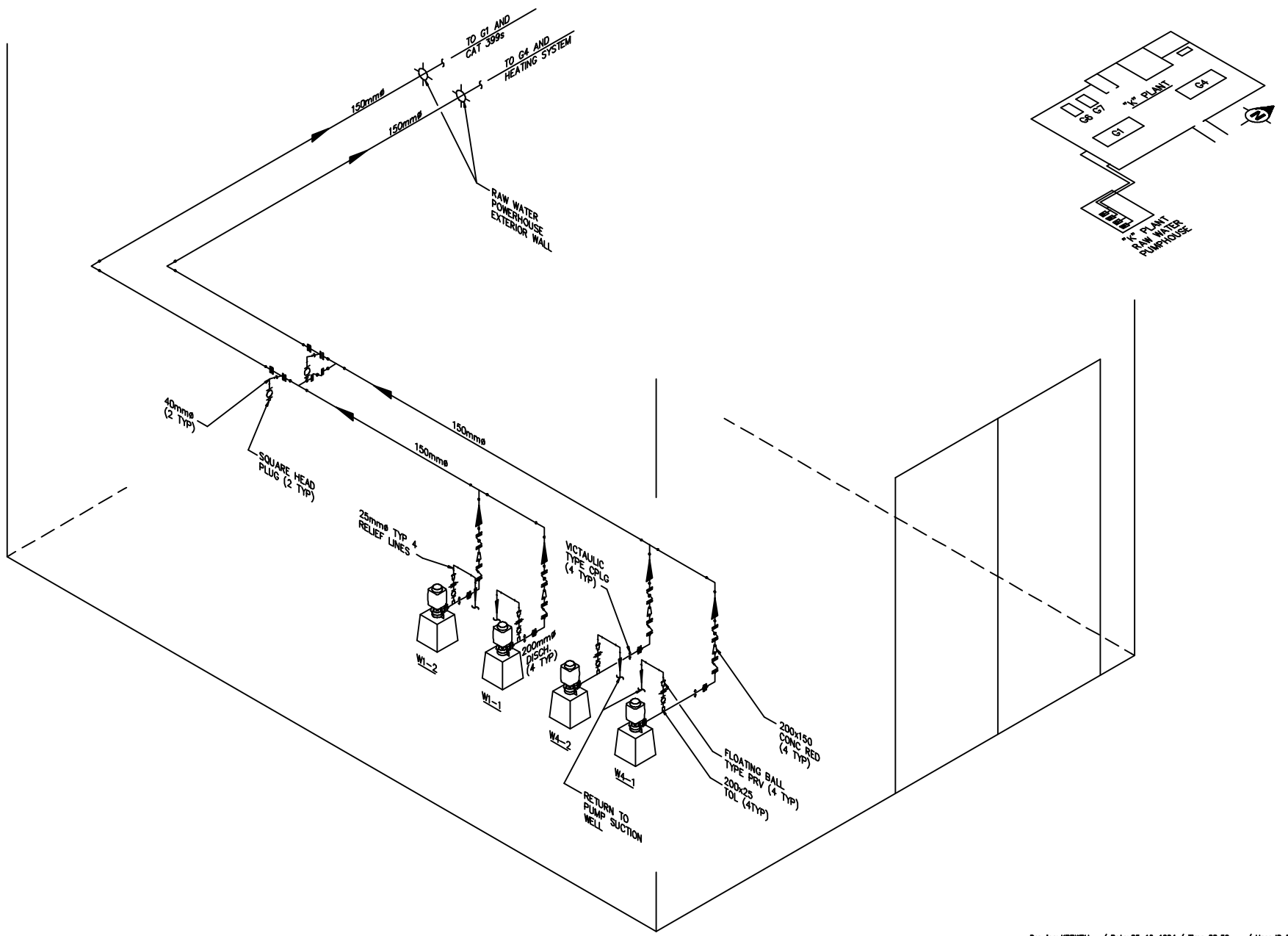
Appendix D Cooling System Drawings

SYMBOL DESCRIPTION	
TYP. VA. SYMBOLY	EQUIPMENT
VA. - OPEN FLOW	UNIT HTR. HORIZONTAL
VA. - CLOSED NO FLOW	UNIT HTR. VERTICAL
VALVE TYPES	
⊗ GATE VALVE	HT. EXCH. HORIZONTAL (SHELL AND TUBE)
⊗ GLOBE VALVE	HT. EXCH. VERTICAL (SHELL AND TUBE)
⊗ PLUG VALVE	HT. EXCH. PLATE TYPE
⊗ BALL VALVE	FLOWMETER
⊗ BUTTERFLY VA.	PUMP
⊗ CHECK VALVE	
⊗ 3 WAY VALVE	
⊗ CONTROL VA.	
⊗ SOLENOID VALVE	
⊗ SINGLE FILTER	
⊗ DOUBLE FILTER	



LOCATION JACKFISH LAKE YELLOWKNIFE N.W.T.		NORTHWEST TERRITORIES POWER CORPORATION	
TITLE DIESEL PLANT NO. 1 (K PLANT) RAW WATER PFD			
SCALE NTS	SHEET 1 OF 1	DRAWING NO. P101-M126328	REV. 0
PLOT SCALE:		AUTOCAD FILE:P101\M126328.DWG	

"K" PLANT - RAW WATER - FLOW SHEET



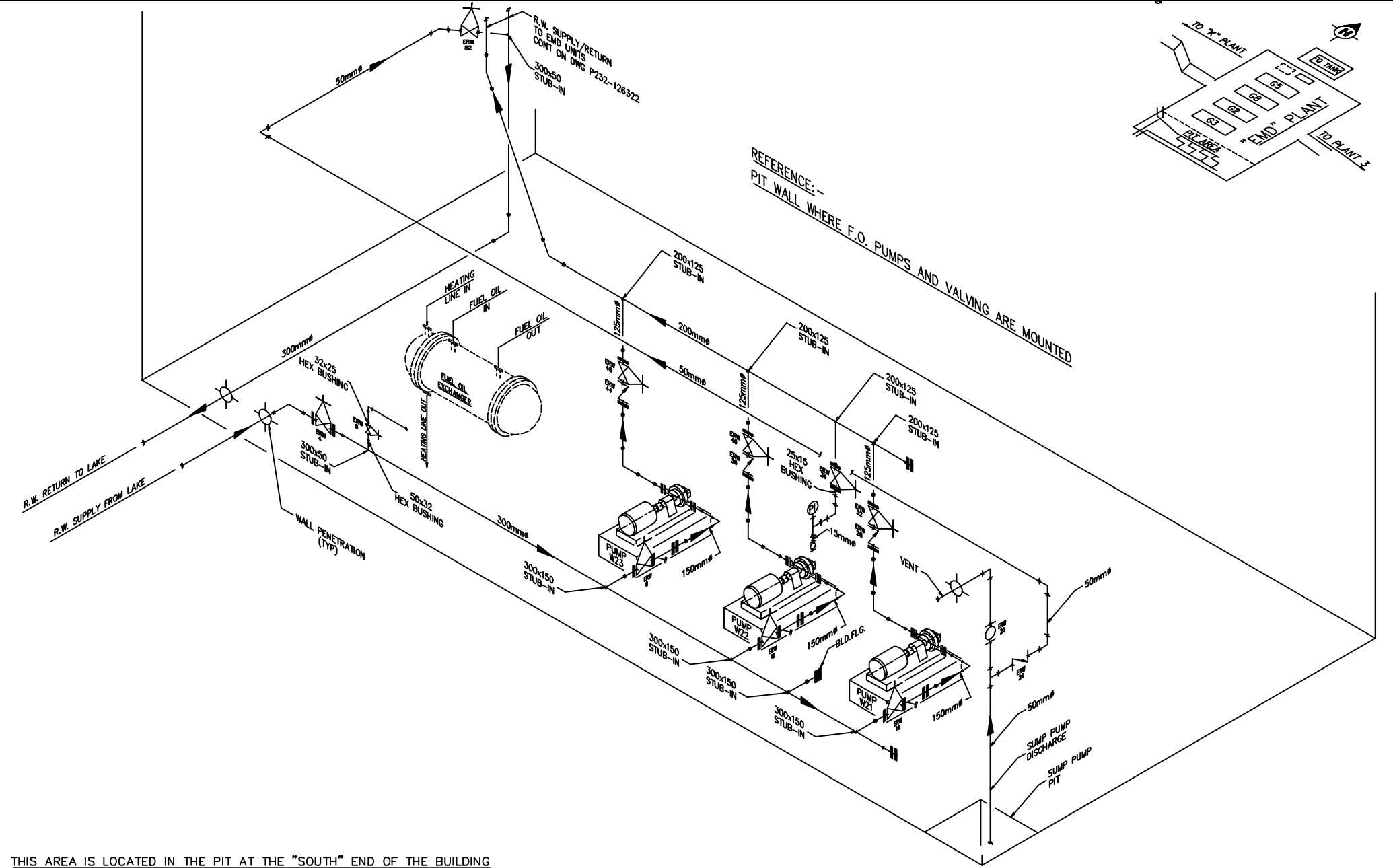
Drawing: KPRWFH / Date: 05-10-1994 / Time: 09:59 / User ID: RL

LOCATION
 JACKFISH LAKE
 YELLOWKNIFE N.W.T.
 PLANT
 01



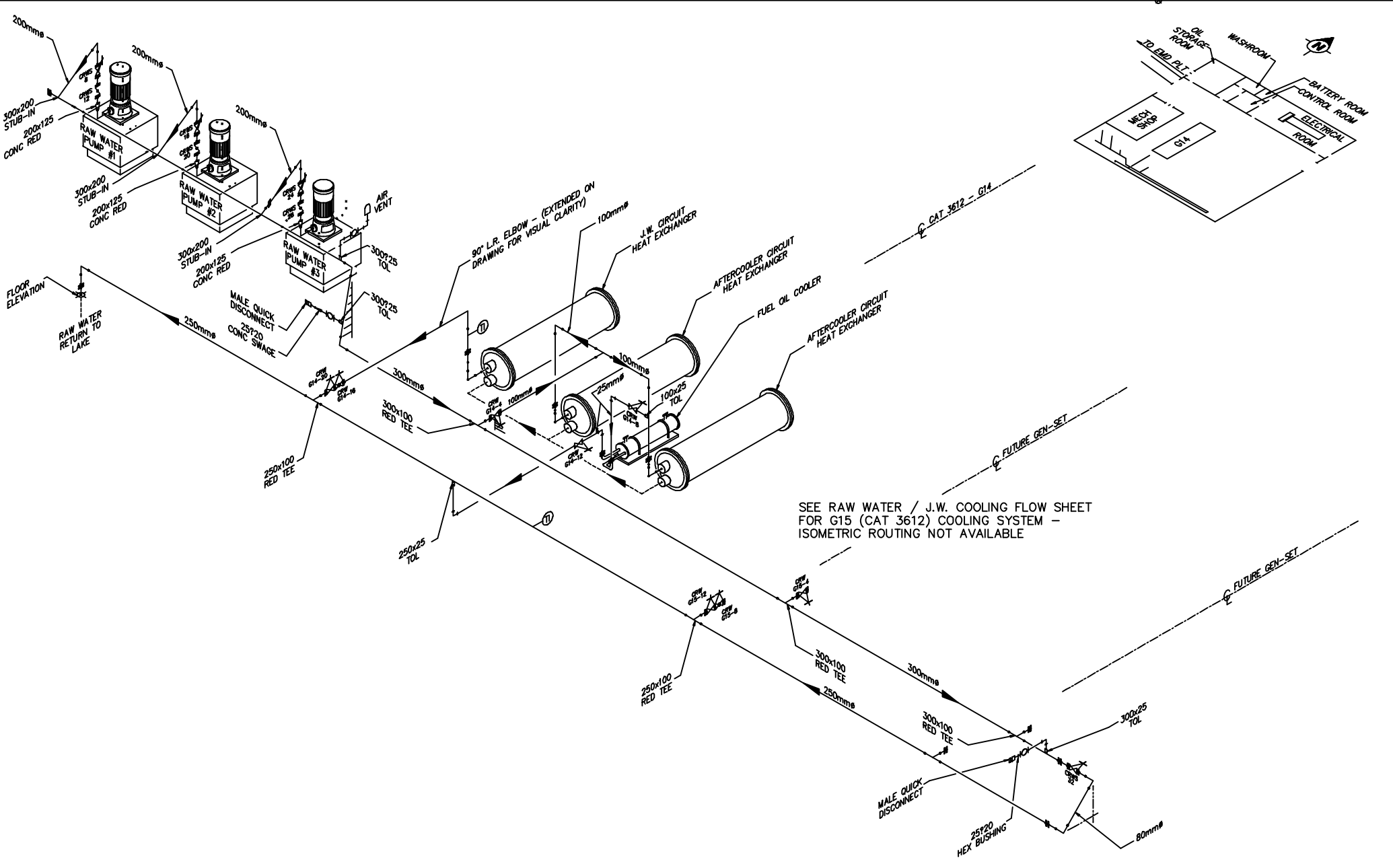
TITLE
 "K" PLANT
 RAW WATER SYSTEM
 RAW WATER PUMP HOUSE
 SYSTEM ISOMETRIC

DRAWING NO.	TITLE	ID	ORIGINAL	REVISED	DATE	BY	CHECKED BY	DESIGNED BY	CIVIL	MED	ELEC	T & D	P & C	STATUS OF DRAWING	DATE	SCALE	SHEET	DRAWING NO.	REV.
REFERENCE DRAWINGS																NTS	1 OF 1	P101-M126325	0



THIS AREA IS LOCATED IN THE PIT AT THE "SOUTH" END OF THE BUILDING

										LOCATION JACKFISH LAKE YELLOWKNIFE N.W.T.			
										PLANT 1974 DIESEL PLANT (EMD)		TITLE RAW WATER SYSTEM PUMP SECTION AND DISCHARGE PIPE ROUTING SYSTEM ISOMETRIC	
										AS BUILT 2000		DATE 12/00	
										REVISION B VALVE NUMBERS REVISED A AS BUILT AS PER FIELD INFO PROVIDED		WORK ORDER 901-6510	
										REVISION ORIGINAL		DATE 04/87	
										CHECKED BY S.E.S.		DESIGNED BY R.L.	
										APPROVED FOR CONSTRUCTION BY (Signature)		STATUS OF DRAWING DATE	
										SCALE NTS		SHEET 1 OF 1	
										DRAWING NO. P232 - 126323		RECD B	



SEE RAW WATER / J.W. COOLING FLOW SHEET FOR G15 (CAT 3612) COOLING SYSTEM - ISOMETRIC ROUTING NOT AVAILABLE

										LOCATION JACKFISH LAKE YELLOWKNIFE N.W.T.		NORTHWEST TERRITORIES POWER CORPORATION	
										PLANT		DIESEL PLANT #3	
										TITLE		RAW WATER SYSTEM PUMPING AND DISTRIBUTION ROUTING SYSTEM ISOMETRIC	
										REVISION		AS BUILT 2000 12/00	
										DRAWING NO.		P231 - 126323	
										DATE		12/00	
										SCALE		1:1	
										SHEET		1 OF 1	
										DRAWING BY		P231 - 126323	
										REVISION LETTER		B	
										REVISION		AS BUILT AS PER FIELD INFO PROVIDED	
										DRAWING NO.		901-6510	
										DATE		04/87	
										DRAWN BY		S.E.S.	
										CHECKED BY		RL	
										DESIGNED BY		12/00	
										APPROVED FOR CONSTRUCTION BY			
										STATUS OF DRAWING			
										DATE			
										SCALE			
										SHEET			
										DRAWING NO.			
										REVISION LETTER			
										REVISION			



NORTHWEST TERRITORIES
POWER
CORPORATION

Empowering Communities

WASTE MANAGEMENT PLAN

**JACKFISH LAKE
GENERATING FACILITY, NWT
PLANT #120
YELLOWKNIFE, NORTHWEST TERRITORIES**

April 2019

DOCUMENT MAINTENANCE AND CONTROL

The Director, Health, Safety & Environment is responsible for the distribution, maintenance and updating of the Waste Management Plan. This document will be reviewed annually and changes in phone numbers, names of individuals, etc. that do not affect the intent of the plan are to be made as required. Additional copies can be provided by the Director, Health, Safety & Environment.

DOCUMENT HISTORY				
Revision #	Revised Section(s)	Description of Revision	Prepared by	Issue Date
1	N/A	NTPC standard WMP updated for Jackfish WL renewal	NTPC	Feb 2019
2	2.2.1 2.5	Fixed errors and added Section 2.5.1 Hazardous Waste Management and Section 2.5.6 Hazardous Waste Disposal	NTPC	April 2019

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Appendix D Hazardous Waste Storage Inventory Log
Appendix E Safety Inspection Report

1 INTRODUCTION

1.1 INTRODUCTION

The Northwest Territories Power Corporation (NTPC) has prepared this Waste Management Plan (WMP) for the Jackfish Lake Generating Facility (Jackfish Facility) located at Jackfish Lake in Yellowknife, Northwest Territories (NWT).

The production of waste material as a result of electricity generation and other activities is a normal result of ongoing activities. NTPC generates/handles waste materials at its power generation facilities and has a responsibility to protect and conserve the environment. Proper management of waste is important for the protection of the health and safety of employees, the community, and the environment. The majority of the non-hazardous and some hazardous waste from the facility is deposited at the City of Yellowknife Solid Waste Facility. Any non-hazardous or hazardous that is not accepted at the City of Yellowknife Solid Waste Facility is disposed of according to industry best practices as outlined below.

1.2 PURPOSE

The purpose of the WMP is to provide a consolidated source of information on the safe and environmentally sound transportation, storage, and handling of the waste used and generated at the Jackfish Facility.

NTPC is committed to preventing, to the greatest extent possible, both inadvertent releases of these substances to the environment and accidents resulting from a mishandling or mishap. NTPC develops programs for employee training, Jackfish Facility inspection, periodic drills to test systems, and procedural review to address deficiencies, accountability, and continuous improvement objectives.

The WMP will form a component of the Environmental Management System. As such, it is a working document that will be reviewed and updated on a regular basis.

Figure 1-1: Jackfish Lake Generating Facility



The WMP is based on the following principles of best management practice for waste:

- Identify and prepare waste inventories.
- Characterize potential environmental hazards posed by those wastes.
- Allocate clear responsibility for management hazardous wastes.
- Describe methods for transport, storage, handling and use.
- Identify means of storage and disposal.
- Prepare contingency and emergency response plans.
- Ensure training for management, workers and contractors whose responsibilities include handling hazardous waste.
- Maintain and review records of hazardous waste generation and incidents in order to anticipate and avoid impacts on personal health and the environment.

1.3 SCOPE

This WMP will cover solid waste, sewage, grey water and hazardous waste produced at the Jackfish Facility to ensure they will be stored, handled, disposed of in compliance with all applicable federal and territorial regulations. The WMP is specific to the Jackfish Facility and is intended to supplement the NTPC Hazardous Waste Management Plan (HWMP) which addresses the specific requirements around disposal of hazardous wastes at NTPC facilities.

The WMP applies to all casual, permanent, part-time, and full-time employees and contractors who conduct work or provide services at the Jackfish Facility. This WMP covers activities and operations conducted at the Jackfish Facility.

1.4 ENVIRONMENTAL PROTECTION POLICY

Policy

NTPC is committed to protecting the environment for existing and future generations by meeting, if not exceeding, environmental regulations. Our environmental principles are based on the fundamental values of responsibility, accountability, and open communication. We will strive for continuous improvement in environmental performance and will manage our operations in an environmentally responsible manner.

Guidelines

NTPC will:

- Comply with all applicable environmental legislation and guidelines;
- Maintain an Environmental Management System;

- Incorporate environmental planning in the design phase of projects;
- Reduce waste and use resources as efficiently as possible;
- Take reasonable measures to prevent and reduce pollution to air, water, and soil;
- Manage hazardous waste in a manner that minimizes risk to the environment;
- Report all hazardous materials spills released to water, regardless of size;
- Report all hazardous materials spills greater than 5 L to ground or floor;
- Policy Review Date: 05/03/2018 Page 2 of 3
- Clean up all hazardous materials spills to meet applicable environmental criteria;
- Promote the efficient use of energy to customers;
- Provide employees with the appropriate training and education to help them fulfill their environmental responsibilities;
- Communicate regularly with indigenous groups, government, regulators, industry, community groups, and the public regarding NTPC activities; and
- Respect the heritages of the people and communities that we serve.

NTPC recognizes that incorporating proper hazardous material management into other environmental management plans and systems leads to risk reduction, improved process control, and cost savings. This WMP will form a component of the Jackfish Facility's Environmental Management System. As such, it is a working document that will be reviewed and updated on a regular basis. At a minimum the WMP will be reviewed and updated annually. Training is provided on the following NTPC policies, procedures, and information sources, which are available at the Jackfish Facility and/or on the NTPC Intranet PowerLine:

- Spill Contingency Plan
- Emergency Response Plan
- Hazardous Waste Management Plan
- Fuel Transfer Safe Work Practice
- Operator Training Manual
- Plant Operating Manual
- Safety Handbook

The WMP is presented to all employees and contractors during their on-site orientation sessions.

1.5 APPLICABLE LEGISLATION/GUIDELINES

This Plan has been developed in accordance with the Guideline for Developing a Waste Management Plan (MVLWB 2011). Both federal and territorial legislation regulate the management of hazardous materials and hazardous wastes in the NWT. Management and safety personnel will provide an overview of the applicable regulations to all employees as part of their orientation and ongoing training. The acts,

regulations and guidelines pertinent to hazardous products that will be used at the Jackfish Facility are listed in Appendix B.

The federal Transportation of Dangerous Goods Act classifies hazardous materials into nine main classes according to an internationally recognized system, as follows:

- Class 1 – Explosives
- Class 2 – Compressed Gases
- Class 3 – Flammable or Combustible Liquids
- Class 4 – Flammable Solids
- Class 5 – Oxidizing Substances
- Class 6 – Poisonous and Infectious Substances
- Class 7 – Nuclear Substances
- Class 8 – Corrosives
- Class 9 – Miscellaneous

The materials addressed in this document are also identified by class.

1.6 RESPONSIBILITIES

All employees will be expected to comply with all applicable precautions and handling procedures with regard to both hazardous and non-hazardous wastes. Employees are also expected to report any concerns to their supervisors, the Plant Operator, the Joint Occupational Health and Safety Committee, or site management. Contractor employees working on the site will be expected to report any concerns to the Plant Operator. All staff are encouraged to bring forward suggestions for improvements that can be incorporated into procedure revisions as appropriate.

Onsite NTPC Employees

- Ensure worksite and personnel safety.
- Ensure wastes are stored in their appropriate designated storage area.
- Know the location of designated storage areas, spill response materials, first aid stations, emergency and safety equipment, Safety Data Sheets (SDS), emergency exits, and muster stations.
- Wear appropriate personal protective equipment.
- Know the handling, storage and spill prevention requirements.
- Comply with all NTPC and Jackfish Facility policies and procedures when performing duties.

Plant Operator

- Ensure the safety of all personnel and the site.

- Ensure all new site personnel and contractors are oriented and have access to all the required documentation.
- Organize inspections of site waste management practices and storage areas, and ensure that appropriate records are maintained.
- Ensure all NTPC employees and contractors adhere to the requirements of the WMP.

Project Manager/Monitors

- Ensure the safety of all project personnel and the project areas.
- Ensure all new construction personnel and contractors are oriented and have access to all the required documentation.
- Organize inspections of site waste management practices and storage areas, and ensure that appropriate records are maintained.
- Ensure all construction employees, contractors and sub-contractors adhere to the requirements of the WMP.

Stores Person (Logistics Officer or Stock Keeper)

- Ensure that all received wastes are stored, transported and disposed of according to the requirements of the WMP and HWMP
- Maintain appropriate records.

Manager, Plant Operations

- Ensure that the Plant Operator has the available resources to effectively implement the WMP.

Director, Health, Safety & Environment

- Maintain and complete the annual review of the WMP.
- Ensure that all WMP documentation remains up-to-date and the updated versions are distributed out to the personnel on site, external agencies and organizations.
- Periodically audit waste management at the Jackfish Facility to support continuous improvement.
- In coordination with the Plant Operator, prepare and submit any formal reports to regulators and NTPC management regarding the management of hazardous materials.

Third Party Contractors and Suppliers

- Ensure worksite and personnel safety.
- Ensure wastes are stored in their appropriate designated storage area.
- Know the location of the designated storage areas, spill response materials, first aid stations, emergency and safety equipment, SDS, emergency exits, and Muster Points.

- Wear appropriate personal protective equipment.
- Know the handling, storage and spill prevention requirements.
- Comply with all NTPC and Jackfish Facility policies and procedures when performing duties.

1.7 MAINTENANCE OF PLAN

The Director, Health, Safety & Environment will maintain the WMP. The Plan will be reviewed annually, but may also be reviewed more frequently as required (e.g., due to a new or amended legislation or the addition/deletion of a waste to/from the Jackfish Facility use).

A record will document all significant changes that have been incorporated in the WMP subsequent to the latest annual review. The record will include the names of the persons who made and approved the change, as well as the date of the approval.

1.8 ACCESS TO ADDITIONAL COPIES

Additional copies of the plan can be obtained by contacting the Director, Health, Safety & Environment at (867) 874-5327.

1.9 SAFETY DATA SHEETS

NTPC maintains SDS for all controlled products that are used, stored, and handled at NTPC work sites.

3E Online, a web-based program, is used to maintain and update the SDS for NTPC. All NTPC employees with computer access can view current SDS for NTPC products by visiting the following website:

<https://www.3eonline.com/>

In order to login to the site, the following username and password must be entered:

Username: ntpc

Password: msds

If employees cannot locate SDS on the website for products in use at NTPC sites, or if obsolete products are noted on the site, please advise the Manager, Logistics via phone or email using the following contact information:

Rod Gray, Phone: (867) 874-5208, rgray@ntpc.com

All NTPC thermal and hydro sites also require current SDS binders (paper copy) to be maintained and kept up-to-date (i.e., updated every three years). It is the responsibility of the employee to request up-to-date SDS binders. To acquire an up-to-date SDS binder please contact the Environmental Analyst at (867) 874-5248.

1.10 GENERAL EMERGENCY RESPONSE

NTPC maintains procedures for responding to emergency situations and accidents, including any specific procedures that are required by environmental legislation. A summary is presented below:

Site Specific Emergency Response Plan

NTPC maintains a Site Specific Emergency Response Plan that documents how to deal with incidents and emergency situations. The most common emergency situations or accidents that can occur at NTPC are spills and fires. For minor spills and fires that are safe to respond to, spill response materials and fire extinguishers are available in all NTPC buildings.

Spill Contingency Plan

In the NWT, under the *Environmental Protection Act*, the Spill Response Planning and Reporting Regulations set the standard for reporting spills of contaminants and preparing Spill Contingency Plans. A Spill Contingency Plan is required if contaminants are stored above ground in excess of 20,000 kg or 20,000 L, or below ground in excess of 4,000 kg or 4,000 L. A copy of the Spill Contingency Plan must be filed with the Chief Environmental Protection Officer. Although NTPC does not have below ground storage facilities, contaminants (e.g., fuel oil) are stored in excess of 20,000 L and therefore Spill Contingency Plans for all NTPC power plant sites have been established and registered with the Chief Environmental Protection Officer.

Emergency Response Assistance Plan

A person who offers for transport or imports a consignment of dangerous goods must have an approved emergency response assistance plan when the quantity of dangerous goods exceeds the Emergency Response Assistance Plan (ERAP) limit (Transportation of Dangerous Goods (TDG) Regulations sections 7.1, 7.4, and column 7 of Schedule 1). The ERAP is to be filed and approved by the Director General.

Currently no dangerous goods offered for transport or imported by NTPC require an ERAP.

Reporting of Spills

The procedures for reporting spills at the Jackfish Facility are presented in the Jackfish Facility Spill Contingency Plan.

A summary of reporting and response requirements for spills of dangerous goods during transport (as defined under TDG Regulations) and spills of hazardous materials (as defined in the NWT Environmental Protection Act and associated regulations) is presented in the NTPC HWMP.

NWT Spill Reporting

The minimum quantities for reporting of spills to the environment are specified in the Spill Contingency Planning and Reporting Regulations. NTPC has adopted a policy of reporting all spills of hazardous materials over 5 L, and spills of any size that reach water, to the 24-Hour Spill Report Line at (867) 920-8130 unless the minimum quantity specified in the regulation is more stringent (i.e. less than 5 L).

1.11 DISTRIBUTION LIST

The WMP and the most recent revisions are distributed internally to:

- i. Health, Safety & Environment Department, Jackfish Facility /NTPC (control copy)
- ii. Manager, Plant Operations, Jackfish Facility
- iii. Plant Operator, Jackfish Facility
- iv. Manager, System Control, Hydro Region
- v. Central Control Room, NTPC
- vi. NTPC Intranet PowerLine

The Director Health, Safety, and Environment is responsible for distribution of the WMP to outside third-party stakeholders.

2 OVERVIEW OF HAZARDOUS WASTE

2.1 INTRODUCTION

The primary and designated storage locations for hazardous wastes are shown on Figure 2.1.

Hazardous waste storage areas include locations and facilities at which spent or unwanted hazardous materials are stored pending off-site transportation for recycling, treatment or disposal.

Figure 2-1: Location of Main Hazardous Waste Storage at the Jackfish Facility



Table 2-1 presents general information on the location of the hazardous waste storage areas. Estimated maximum quantities of hazardous wastes are presented in Table 2.2.

Table 2-1: Hazardous Waste Storage Areas at the Jackfish Facility

Storage Tank/Storage Area	General Description	Location
Used Lube Oil Tank	1 horizontal 41,000 L steel-bermed waste lube oil tank	Located north of the Cat Plant
Hazardous Product Storage Berm	Various hazardous waste products (waste glycol, solvents, oil, etc.) stored in 205 L drums	Hazardous product storage berm located west of the Ruston Plant

2.2 NON-HAZARDOUS WASTE

Hazardous and non-hazardous waste is segregated onsite. Hazardous waste that cannot be recycled/reused is sent to a registered hazardous waste disposal company while non-hazardous waste is either sent to the local landfill for disposal or sent to the local recycling facility.

Sewage/waste water produced onsite is picked up by a local contractor and sent to the local lagoon for treatment.

2.2.1 Non-Hazardous Waste Segregation and Storage Methods

Only approved non-hazardous solid waste materials are sent to the local landfill for disposal. Non-hazardous wastes are segregated at the source and are placed in 1 of 3 front-load dumpster bins located at the Jackfish Facility. These bins are emptied twice per week by a local contractor and hauled to the local landfill for disposal. General classes of wastes **that are inappropriate for disposal in the general waste dumpster bins** include but are not limited to

- Hazardous Wastes.
- Mercury containing materials / waste (e.g., fluorescent lamps, thermometers, thermostats, dental amalgam, batteries).
- Materials / wastes containing heavy metals (e.g., mercury-containing wastes, pressure or chemically treated wood (i.e., Chromated Copper Arsenate or creosote), lead painted materials.
- Asbestos waste.
- Liquid wastes including petroleum hydrocarbons and sewage.
- Radioactive materials such as smoke detectors.
- Potentially explosive materials such as propane tanks, other pressurized vessels, unused or ineffective explosives.

- Other hazardous materials such as organic chemicals (PCBs, pesticides), other toxics (arsenic, cyanide).
- Electronics.
- Batteries.
- Fluorescent light bulbs.
- Tires.
- Oily rags.

The wastes listed are inappropriate for disposal in the general waste dumpster bins and are disposed of as per procedures listed in this plan in other sections. Waste cardboard is collected in a front-load bin and emptied once a week by a local contractor and hauled to the local recycling facility. Waste drink containers are also collected onsite in blue recycle boxes located throughout the site and sent to the local recycling facility.

2.2.2 Human Domestic Waste Handling and Disposal

Sewage/grey water produced onsite is picked up by a local contractor once per month and hauled to the local lagoon for treatment. The Jackfish Facility has 6 locations onsite that require sewage/grey water pickup:

- K-Plant (sewage)
- Warehouse (sewage)
- Line Shop (sewage)
- CAT Plant (sewage and grey water)
- EMD Plant (sewage)
- Administration Building (sewage)

2.3 CONTAMINATED SOILS AND SPILLS

Contaminated soils resulting from the storage and handling of fuels and lubricants will be salvaged at the time such impacts are identified, and either placed directly into end-dump trucks or put into drums, labelled and shipped off-site to an approved disposal facility.

A suitable absorbent will be used to cleanup spillage on impermeable floor surfaces, and will be handled similarly to contaminated soil as described above. Internal and external notification requirements, record keeping and response procedures are detailed in the SCP. If required, the assessment and remediation of contaminated soil will be carried out in accordance with The Environmental Guideline for Contaminated Site Remediation.

2.4 USED PETROLEUM AND OTHER WASTE PRODUCTS

Used oil, solvents or glycol that are no longer suitable for its intended use is classified as a hazardous waste, and drummed and stored as appropriate. The discharge of used oil, solvents or glycol into the environment is prohibited. These substances will be collected by a local specialized waste contractor and will be managed and disposed of in accordance to “*Used Oil and Waste Fuel Management Regulations, the Guideline for the Management of Waste Solvents and the Guideline for the Management of Waste Antifreeze.*”

2.5 HAZARDOUS WASTE

2.5.1 Hazardous Waste Management

NTPC’s Hazardous Waste Management Plan (HWMP) presents detailed information with respect to the management of hazardous wastes at all NTPC facilities, including the Jackfish Facility. The reader is directed to the HWMP for specific information relating to the management of hazardous wastes. General information with respect to the management of hazardous waste is provided below.

Hazardous wastes are typically generated through operations involving the use/clean-up of chemicals or other hazardous materials/substances (waste oils, waste fuels, batteries, solvents, etc.). On becoming wastes, hazardous materials will be stored and/or disposed of in accordance with specific government legislation, regulations and guidelines.

As a waste generator, NTPC is ultimately responsible for ensuring hazardous waste will be properly managed from the time they are generated to final disposal. Waste must be properly identified, labelled, stored, transported, treated and disposed of. Contractors are responsible for handling and disposal of the hazardous wastes they generate through their work, unless alternate arrangements have been made with NTPC in advance.

Hazardous wastes must not be mixed or diluted with any substance or divided into smaller quantities to avoid meeting the definition of a hazardous waste. Incompatible hazardous wastes should be segregated by the TDG class to ensure safety. Open burning of hazardous waste is not acceptable. It is NTPC practice to remove hazardous waste from all sites at least once per year. No NTPC site should maintain quantities of waste for a period of time sufficient to necessitate registration as a storage facility. If hazardous waste is stored for a period of 180 days or more, and the quantities to be stored exceed the quantities set out in the Guideline for Hazardous Waste Management Schedule VI: Registration Volumes for individual waste classes or if the aggregate quantity for all classes of waste stored exceeds 5,000 kg/L, the facility must be registered with the NWT Department of Environment and Natural Resources.

The storage facility can be a building, locker, compound, or area used to store hazardous waste. In cases where hazardous wastes are to be transported off-site for treatment or disposal, NTPC

will only use hazardous waste management facilities registered with the appropriate provincial or territorial authorities having jurisdiction. Prior to selecting and engaging such companies, NTPC will verify their “approved” status as a waste facility with the appropriate provincial or territorial authorities having jurisdiction. A review of their “approved” status will be conducted at least annually. NTPC will employ only registered waste carriers to transport waste to registered waste receivers.

The NWT Department of Environment and Natural Resources monitors the movement of hazardous waste, from the generator to final disposal through use of a tracking document known as a Waste Manifest. Accordingly, a completed Waste Manifest will accompany all movements of hazardous waste from the Jackfish Facility. NTPC is registered with the ENR as a waste generator and our waste generator number is NTG000008.

2.5.2 Hazardous Waste Storage

NTPC is committed to the safe and appropriate storage hazardous wastes. The following sections outline NTPC’s general guidelines for storing hazardous wastes.

2.5.3 General Precautions

General precautions for handling hazardous wastes include:

- No person should handle a substance unless that person is familiar with the hazards.
- No person should use a substance unless that person is familiar with the proper use.
- Hazardous wastes from different classes should never be mixed in the same container.

2.5.4 Waste Storage Drums/Containers

Prior to removal from the site, the sealed waste containers are stored in the Hazardous Product Storage Berm which is located roughly 100 meters (m) from the Jackfish Lake shoreline. In addition, hazardous waste shall be stored in drums/containers according to the following guidelines:

- In the original containers, where possible or in containers manufactured for the purpose of storing the material, or use good quality 16 gauge or lower steel or plastic 205 L drums.
- Containers of hazardous materials shall be returned to their designated storage area at the end of each shift or when no longer in use.
- Reused steel or plastic drums must have an internal volume greater than or equal to 150 L to handle, offer for transport or transport dangerous goods that are liquid and are included in Class 3, 4, 5, 6.1, 8 or 9 (Section 5.12(2), TDGR 2001-286)

- Storage containers shall be in good condition, sealable and not damaged or leaking.
- Drums containing hazardous wastes expected to be in storage for more than six months shall be placed on pallets or on a well-drained storage area to prevent rusting.
- Each container shall be clearly labelled to identify the substance being stored according to the requirements of the Workplace Hazardous Materials Information System (WHMIS) or the *Safety Act* or the relevant Transport Authority, if transport is planned.
- Containers shall be kept secure and closed except when adding or removing product.
- Containers with product shall be kept in the upright position; empty drums can be placed horizontally.
- Containers shall be arranged to prevent damage from falling or dislodging.
- Containers shall be arranged to allow for easy access and inspections.
- Dispensing a container to another shall only be carried out within an area provided with drip / spill containment.

2.5.5 Hazardous Waste Storage Areas

To assist in the safe and secure storage of fuels, hazardous wastes, the following general guidelines for storage areas/facilities will be considered:

- Design of storage areas shall be in compliance with the National Fire Code, where appropriate.
- Drainage into and from storage areas shall be controlled in order to prevent leaks or spills from migrating off-site and to avoid run-off from entering the storage areas.
- Storage areas shall have controlled access. Only authorized and trained personnel shall have access to storage areas.
- Leaking or deteriorated containers shall be removed and their contents transferred to a sound container.
- Storage areas shall be adequately signed indicating that there is to be no smoking, no sparks or flames and wastes are stored therein.
- Storage locations shall be clearly defined and marked to prevent damage of storage drums and containers in the event they are covered by snow.
- Incompatible wastes shall be segregated by chemical compatibility within the storage area to prevent contact between wastes in the event of a release
- Storage areas shall be located at least 30 m from surface water and on a low-permeability area, where possible.
- Storage areas shall be readily accessible for fire fighting and other emergency procedures.
- Storage areas shall be adequately ventilated to prevent the build up of noxious or toxic vapours.

- Secondary containment or an adequate spill collection system shall be installed to allow for the containment of at least 110% of the largest container or tank volume within the contained area, plus 10% of the aggregate capacity of all other containers or tanks.
- Secondary containment shall be kept free of debris, water accumulation and snow.
- Storage areas and associated secondary containment shall be protected from the elements, where possible. In case this is not feasible, the secondary containment's volume shall be large enough to allow for any precipitation (rain, snow, and storm water run-on) that may enter containment systems located outdoors, in addition to the required containment volume for stored materials. In addition, sufficient capacity to handle sprinkler water and other water from fire protection efforts will be provided.
- Storage areas shall be constructed, or provided with barriers, to protect containers from the environment and physical damage.
- Adequate spill and emergency response equipment shall be installed at each storage area (i.e. spill control, fire protection, etc.). A list of spill control equipment is provided in the Spill Contingency Plan.
- The site shall not be used for long-term storage of hazardous waste.

2.5.6 Hazardous Waste Disposal

Hazardous wastes from the Jackfish Facility, including glycol, oil, and fuel, are stored in the Jackfish Lake Waste Berm for temporary staging. Hazardous wastes are then transported by a local contractor to their Hazardous Waste Transfer Facility located in Yellowknife's Kam Lake Industrial Park. This facility is regulated by the GNWT's Department of Environment and Natural Resources.

3 INVENTORY, INSPECTION & RECORDS

3.1 HAZARDOUS WASTE

3.1.1 Inventory Management

Hazardous wastes in storage areas will be inventoried monthly. Inventory records will be maintained on site.

3.1.2 Inspection

The Plant Operator will coordinate the inspection of areas all hazardous waste storage areas. The inspection schedule and procedure to be followed are summarized in Table 5.1. All inspections will be logged with the date and time of inspection, area inspected and the name of the person making the inspection.

Drum / Container Storage Areas

The condition of hazardous waste storage areas will be checked on a regular basis. Observations on their condition will be logged, dated and kept onsite. Drums/containers will be inspected for the presence and legibility of symbols, words or other marks identifying the contents, signs of deterioration or damage such as corrosion, rust, leaks at seams or signs that the drum/container is under pressure such as bulging and swelling, spillage or discoloration on the top or sides of the drum/container. If leaks or deterioration is encountered it will be noted and addressed in a timely manner.

The hazardous wastes area's secondary containment will be inspected and the condition of the secondary containment will be noted. Arrangements will be made for repairs if necessary. If precipitation (water or snow) is present within the secondary containment, it will be removed from the secondary containment area in a timely manner to prevent overflow or damage to the containment system due to large ponding.

The availability of suitable and suitable quantity of spill response materials will be verified during the inspections. Additional spill response materials will be provided as required.

Waste Oil

Inspection of waste oil storage tanks will be in conformance with the requirements of the National Fire Code and the Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum.

Visual inspection of storage tank facility to ensure that there has not been a leak or deterioration of the Jackfish Facility that could result in a leak will be conducted and documented each day the Jackfish Facility is in operation.

Visual inspection of storage tanks, to ensure that there has not been a leak or equipment failure, shall be conducted weekly and documented for the following where applicable:

- foundations, tank walls, roof, and tank attachments;
- dyke capacity, condition of the dyke wall and floor, and water removal systems;
- pumps and product-handling equipment;
- tank gauging equipment;
- mechanical and automatic electronic leak detection equipment;
- dispenser sumps and spill containment devices; and
- overfill protection devices.

Inspection and performance testing in conformance with the manufacturer's requirements and procedures to ensure satisfactory equipment performance and operation of a storage tank facility will be conducted annually and documented where applicable for:

- automatic tank gauges and monitoring systems;
- high-technology sensors;
- electronic or mechanical leak detection equipment;
- corrosion protection equipment;
- pressurized piping emergency valves;
- emergency shut-down devices;
- containment sumps including dispenser, turbine and transition containment devices; and
- overfill protection devices.

Vertical tanks will also undergo periodic testing as per API 653 / API 653-01 as required.

Table 5-1: Inspection of Petroleum and Hazardous Materials Storage Sites

Hazardous Product Storage Berm	Schedule: Monthly by Plant Operator or designate when materials are on site. Procedure: Inspections will be reported annually and filed as above.
Spill Kits	Schedule: Weekly/Monthly as part of inspection schedule as per above by Plant Operator or designate.

Any accidental damage to containment structures will be inspected immediately and appropriate repairs undertaken. The extent of damage will be reported in writing to the Plant Operator or alternate. The report will identify any remedial repairs that may be made, the date of any repairs and the need for any follow-up inspection. The Safety Inspection Report (Hazardous Materials Storage Area Inspection) form can be found in Appendix E.

3.1.3 Records

Records pertaining to storage, use, and loss of fuels and lubricants are required by CCME and the Fire Marshal (under the National Fire Code). The following records will be prepared and maintained for hazardous waste storage areas under the supervision of the Plant Operator:

- Receiver registration number
- Carrier registration number
- Waste generator registration number
- Waste manifests
- Waste accumulation log
- Safety Inspection Report (Hazardous Waste Storage)
- Weekly use summaries
- Inspections and maintenance records
- Any alterations to the systems
- Reports of leaks or losses
- Reports of spill responses
- Records of training

Specific to storage tanks, the following records are also required, where applicable:

- Inventory data;
- Inspections and maintenance records;
- Overfill alarm tests
- Cathodic protection monitoring;
- Precision leak detection tests;
- Maintenance and repairs;
- Construction, alterations, or upgrades;
- As-built drawings; and

- Excavation or nearby construction that could affect the integrity of the storage tank system.

The records will be maintained on-site for at least seven years.

4 TRAINING

4.1 GENERAL

As outlined in the NTPC's Health and Safety Management System, all employees and contractors at the Jackfish Facility will receive the following training:

- Workplace Hazardous Materials Information System
- Emergency and spill response training (see also the SCP and Emergency Response Plan [ERP])
- Operations overview

Employees will receive additional training specific to their area of work and duties, including safe operation practices, safe handling and storage of chemicals, and use of personal protective equipment. This training will be the responsibility of NTPC.

Periodically, NTPC staff will carry out fire or other emergency drills. The drills will test emergency response procedures, and will be scheduled so as not to disrupt work. The results of the drills will be recorded and forwarded to the Plant Operator, Joint Occupational Health and Safety Committee and NTPC. The results may indicate that additional or refresher training is required. Safety committee recommendations will be enacted expeditiously.

4.2 FUEL & LUBRICANTS HANDLERS

Personnel who handle fuel and lubricants will be expected to be conversant with relevant SDS information. As well, these personnel will be given training in the following:

- Transportation of Dangerous Goods (TDG)
- NTPC's fuel handling procedures (outlined in Section 3)
- Spill response and cleanup procedures for petroleum hydrocarbons (see the SCP)
- Emergency response procedures (see the ERP)

The attendants and persons involved in inspections of fuel storage locations will be trained in fuel inventory and inspection procedures to support leak prevention and early detection.

4.3 PLANT EMPLOYEES

Plant employees may receive TDG training, if appropriate. All plant employees will be trained in spill and emergency response procedures. Emergency response procedures for spilled chemical substances are provided in the SCP.

For more information on employee training and safety guidelines, see NTPC's Health and Safety Management System, SCP and ERP.

4.4 THIRD PARTY CONTRACTORS

It is expected that third party contractors receive adequate and comprehensive training to conduct their work tasks from their employer. NTPC intends to review the general qualifications of third party contractors prior to having them work at the site. In addition, the contractor companies may also be requested to confirm the qualifications of specific individuals that they may have working at the site.

Third party contractors working on the site will be expected to participate in, and complete a site specific health and safety training session. The training session is valid for a period of one year, after which time the contractor may be required to complete the training again, or attend a refresher. The training session will outline site specific response procedures that they should be aware of in the course of conducting their work on site. The training session will cover waste management.

5 REFERENCES

MVLWB (Mackenzie Valley Land and Water Board). 2011. Guidelines for Developing a Waste Management Plan. March 31, 2011 Available at:
https://mvlwb.com/sites/default/files/documents/MVLWB-Guidelines-for-Developing-a-Waste-Management-Plan-Mar-31_11-JCWG.pdf Accessed: February 2019.

APPENDIX A
GLOSSARY

A

- **Accredited** (accreditation):

A term used by analytical laboratories. Those that have been tested and evaluated by the Standards Council of Canada and Canadian Standards Association, and that have met certain standards, are assigned an accreditation number. Only Accredited Laboratories may be used to obtain analytical results required for legislative compliance.

B

- **None**

C

- **CAEAL:**

Canadian Association of Environmental Analytical Laboratories. In cooperation with the Standards Council of Canada (see below), this Association governs the standards for and admission to the association of laboratories that have met all CAEAL standards to become accredited (see above).

- **Carrier:**

Any person engaged in the transport of hazardous waste whether or not for hire or reward.

- **Commissioner's Lands:**

Lands in the Northwest Territories that have been transferred by Order-Land in-Council to the Government of the Northwest Territories. This includes highways, block land transfers, and most lands within municipalities.

- **Consignee (Receiver):**

A site or facility that is licensed to accept certain subject wastes for disposal.

- **Consignor (Generator):**

A person who offers a consignment of hazardous waste for transport.

- **Contaminant:**

Any noise, heat, vibration or substance including such other substances as the Minister may prescribe that, where discharged into the environment:

- (a) endangers the health, safety or welfare of persons,
- (b) interferes or is likely to interfere with normal enjoyment of life or property,
- (c) endangers the health of animal life, or
- (d) causes or is likely to cause damage to plant life or property.

D

- **Dangerous Goods**

Any product, substance, or organism included by its nature or by the Transportation of Dangerous Goods Regulations (TDGR) in any of the classes listed in the schedule provided in the *Transportation of Dangerous Goods Act* (TDGA).

E

- **Empty Container**

A container that has been emptied, to the greatest extent possible, using regular handling procedures, the contents of which shall not exceed 1% of the container's original capacity or 2 litres, whichever is less. This does not include containers which previously contained mercury or class 2.3, 5.1, or 6.1 materials of TDGR.

- **Environmental Protection Service (EPS):**

Environmental Protection Service (EPS) of the Department of Environment and Natural Resources (ENR) is the Government of the Northwest Territories agency responsible for initiatives which control the discharge of contaminants and their impact on the natural environment.

F

- None

G

- **Generator**

The owner or person in charge, management, or control of a hazardous waste at the time it is generated, or a facility that generates hazardous waste.

H

- **Hazardous Waste:**

A contaminant which is a dangerous good that is no longer used for its original purpose and is intended for recycling, treatment, disposal, or storage. A hazardous waste does not include a contaminant that is:

- (a) household in origin;
- (b) included in class 1, Explosives or class 7, Radioactive materials of TDGR;
- (c) exempted as a small quantity;
- (d) an empty container; or
- (e) intended for disposal in a sewage system or by landfilling that meet the applicable standards set out in schedules I, III, or IV of the Guideline for Industrial Waste Discharges in the NWT.

- **Hazardous Waste Management Facility:**

A facility which is used for the collection, storage, treatment, recycling, or disposal of hazardous waste.

I

- **Incompatible Waste:**

Hazardous wastes which, when in contact with one another or other substances under normal conditions of storage or transportation, could react to produce heat, gas, fire, explosion, corrosive substances, or toxic substances.

J

- None

K

- None

L

- **Landfilling:**

The deposit of waste on land, as described in the GNWT Department of Municipal and Community Affairs' document Guidelines for the Planning, Design, Operation & Maintenance of Solid Waste Modified Landfill Sites in the NWT.

- **Licensed Waste Disposal Facility:**

A facility or site that is authorized to accept and dispose of predetermined wastes.

- **Long Term Storage:**

The storage of hazardous waste for a period of 180 days or more and in excess of the minimum quantities, not including materials in transit.

M

- **Manifest (Waste Manifest):**

A six-part, colour-coded, and uniquely numbered document issued by the government to licensed waste generators/carriers that must be completed and carried with/filed for shipments of waste (certain exemptions are allowed). The Manifest consists of three Sections (Consignor, Carrier, and Consignee) each of which must be completed by the party in control of the waste at the time the Section is completed.

- **Manage:**

To handle, transport, store, recycle, treat, destroy, or dispose of hazardous waste.

N

- **None**

O

- **None**

P

- **None**

Q

- **None**

R

- **Receiver (Consignee):**

A person to whom a quantity of hazardous waste is being or is intended to be transported to.

S

- **Sewage System:**

A system for the collection, transmission, treatment or disposal of any liquid waste containing animal, vegetable, mineral, human or chemical matter in solution or in suspension.

- **Small Quantity:**

Hazardous waste that is generated in an amount that is less than 5 kilograms per month if a solid or 5 litres per month if a liquid, and where the total quantity accumulated at any one time does not exceed 5 kilograms or 5 litres. This does not apply to wastes that are mercury or in classes 2.3, 5.1, or 6.1 of TDGR. These wastes must be generated in an amount less than 1 kilogram per month if a solid or 1 litre per month if a liquid; and where the total quantity accumulated at any one time does not exceed 1 kilogram or 1 litre.

T

- **Toxicity Characteristic Leaching Procedure (TCLP):**

Laboratory test method developed by the USEPA for determining the leaching potential of contaminants.

- **Transport Authority:**

The regulations controlling the management of hazardous waste under that mode of transport. These include:

- Road and rail - Transportation of Dangerous Goods Act (TDGA) and Regulations (TDGR).

- Air - International Civil Aviation Organization Technical Instructions (ICAO).
- Marine - International Maritime Dangerous Goods Code (IMDG).

- **TDGA/TDGR:**

The Transportation of Dangerous Goods Act and Regulations (Canada).

- **Treatment or Treat:**

The handling or processing of a hazardous waste in such a manner as to change the physical, chemical or biological character or composition of the hazardous waste in order to eliminate or reduce:

- (a) one or more environmental hazards of the waste; and/or
- (b) the volume.

U

- **None**

V

- **None**

W

- **Waste:**

Any material that is to be disposed of by any individual/company that is not considered to be inert.

- **Waste Dangerous Goods:**

Subject wastes that are also regulated by the terms and conditions contained in the Transportation of Dangerous Goods Regulations under the Transportation of Dangerous Goods Act (federal).

- **Waste Data Sheets:**

The pages in Tab 5 of this manual that describe the legislated requirements for managing the various wastes in accordance with the Transportation of Dangerous Goods Regulations, if applicable.

X

- **None**

Y

- **None**

Z

- **None**

APPENDIX B
LEGISLATIVE REQUIREMENTS

Federal Legislation

A summary of the relevant federal legislation and applicable sections that cover the collection, handling, transportation, and disposal of hazardous wastes in Canada is presented in Table B1.

Table B1: Summary of Federal Legislation

FEDERAL LEGISLATION		
Legislation	Hazardous Waste	Relevant Details in Legislation
Federal Transportation of Dangerous Goods Act	Waste Dangerous Goods	<ul style="list-style-type: none"> - Section 3 - Application of Act The Act applies to the Transportation of all dangerous goods in Canada. Dangerous goods are the following: <ul style="list-style-type: none"> Class 1 - Explosives Class 2 - Compressed gases Class 3 - Flammable or combustible liquids Class 4 - Flammable solids Class 5 - Oxidizing substances Class 6 - Poisonous and infectious substances Class 7 - Nuclear substances Class 8 - Corrosives Class 9 - Miscellaneous - Section 5 - Safety Requirements, Standards and Marks No person shall handle, offer for transport, transport, or import dangerous goods unless they comply with all safety requirements, have the means of containment and transport for the material, and can display the prescribed safety marks - Section 7 - Emergency Response Assistance Plans The person offering for transport or importing certain dangerous goods must have a Minister-approved ERAP prior to transport. - Section 8 - Means of Containment Containment must display all the necessary safety marks prior to being sold, delivered, distributed, imported, or otherwise transported. - Section 15 - Monitoring Compliance An inspector can inspect any vehicle transporting dangerous goods to ensure compliance to this Act. - Section 18 - Duty to Respond If there is an accidental release of a dangerous good in excess of the prescribed amount as outlined in the TDG Regulations, the person in charge of the material at the time of discharge has the responsibility to immediately report the incident to the 24-Hour Spill Report Line at (867) 920-8130. The person responsible for making the report shall take all reasonable emergency measures to reduce or eliminate any danger to public safety that may occur as a result of the release.

Table B1: Summary of Federal Legislation

FEDERAL LEGISLATION		
Legislation	Hazardous Waste	Relevant Details in Legislation
Federal Transportation of Dangerous Goods Regulations SOR/DORS/2001-286	Waste Dangerous Goods	<ul style="list-style-type: none"> - Part 2 – Classification The consignor is responsible for determining the classification of dangerous goods. Classification includes, as applicable, the shipping name, primary class, compatibility group, subsidiary class, UN number, packing group and risk group of dangerous goods. - Part 3 – Documentation Before allowing a carrier to take possession of dangerous goods for transport, the consignor must prepare and give to that carrier a shipping document or, if the carrier agrees, an electronic copy of the shipping document. The information required on a shipping document must be easy to identify and legible. Information that must be included on a shipping document is outlined in Part 3.5 of the Regulations. - Part 4 – Dangerous Goods Safety Marks A person must not offer for transport, transport or import a means of containment that contains dangerous goods unless each dangerous goods safety mark required by this Part is displayed in accordance with this section. - Part 5 – Containment A person must not handle, offer for transport, transport or import dangerous goods in a means of containment unless the means of containment is required or permitted by this Part to be used for the transportation of the dangerous goods. - Part 6 – Training A person who handles, offers for transport or transports dangerous goods must either be adequately trained and hold a training certificate in accordance with this Part or perform those activities in the presence and under the direct supervision of a person who is adequately trained and who holds a training certificate in accordance with this Part. Adequate training is described in Part 6.2 of the Regulation. - Part 7 – Emergency Response Assistance Plan It is the responsibility of the person offering for transport or importing dangerous goods for which an ERAP is required to establish such a plan and to have that plan approved by Transport Canada. - Part 8 – Accidental Release and Imminent Accidental Release Report Requirements In the event of an accidental release of dangerous goods from a means of containment, a person who has possession of the dangerous goods at the time of the accidental release must make an immediate report if the accidental release consists of a quantity of dangerous goods or an emission of radiation that is greater than a determined quantity or emission level. If an immediate report was required to be made for an accidental release, a follow-up report must be made by the employer of the person who had possession of the dangerous goods at the time of the accidental release within 30 days of the initial report.

Table B1: Summary of Federal Legislation

FEDERAL LEGISLATION		
Legislation	Hazardous Waste	Relevant Details in Legislation
Federal Transportation of Dangerous Goods Regulations SOR/DORS/2001-286	Waste Dangerous Goods	<ul style="list-style-type: none"> - Schedule 1 – Classes 1 to 9 Schedule 1 is a chart of all dangerous goods indicating UN numbers, Shipping Names and descriptions and other important information that must be addressed when handling or shipping dangerous goods. - Schedule 2 – Special Provisions This schedule provides extra requirements for certain dangerous goods that are not provided in Schedule 1. - Schedule 3 – Alphabetical Index This schedule is provided to quickly determine the UN number and class of a dangerous good using an alphabetized list.
National Fire Code	Waste Oily Rags	<ul style="list-style-type: none"> - Waste oily rags are to be kept in non-combustible receptacles with a melting point of no less than 650oC without openings on the sides or bottom. The container must have a self-closing tightly fitting cover.
Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations	Waste diesel fuel and waste lube oil	<p>The owner or operator of the storage tank system must ensure that:</p> <ul style="list-style-type: none"> - all liquids and sludge are removed and disposed of; - if a tank is being withdrawn from service, the tank is purged of vapours to less than 10% of the lower flammability limit and the presence of vapours is checked with a combustible gas meter; and - the withdrawal is done in such a way that there will be no immediate or long-term harmful effect on the environment and it will not constitute a danger to human life or health.
Canadian Environmental Protection Act – National Strategy for the Management of Post-Use Preservative Treated Industrial Wood	Preservative treated wood (e.g., creosote treated power poles)	<p>The preferable option for treated wood poles is reuse as posts, braces, stubs or anchors.</p> <p>The following uses of treated wood are prohibited:</p> <ul style="list-style-type: none"> - Fuel (e.g., open-burning, furnace, etc.) - Construction material in water (e.g., docks, walls, etc.) - Construction material with which people come into direct and frequent contact (e.g., playgrounds, garden, etc.) <p>Post-use treated wood is not classified as a hazardous waste and can be sent to Class I or II landfills for disposal. The landfill Operator shall be made aware of the waste type so that the treated wood is buried and not open burned.</p>

Northwest Territories Legislation/Guidelines

A summary of the relevant legislation and guidelines and applicable sections that cover the collection, handling, transportation and disposal of wastes in the Northwest Territories (NWT) enacted under the NWT Environmental Protection Act is presented in Table B2.

The Department of Environment and Natural Resources (ENR) is the NWT government agency responsible for initiatives which control the discharge of contaminants and their impact on the natural environment, including the disposal of hazardous wastes.

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Environmental Protection Act (EPA)	All hazardous wastes (i.e. contaminants that can enter the environment)	<ul style="list-style-type: none"> - Section 4 - Environmental Protection 4 (1) The chief Environmental Protection Officer may require that the storage facility have on hand at all times the equipment and the material necessary to alleviate the effect of any discharge of contaminants that may be specified in the order. - Section 5 - Discharge of Contaminants 5 (1) - No person shall discharge or permit the discharge of a contaminant into the natural environment without a permit. If there is a discharge to the environment, the person in charge of the contaminant prior to the discharge must: Report the discharge to the 24-Hour Spill Line (867) 920-8130; Stop the discharge if possible; and Make a reasonable effort to notify everyone who may be adversely affected by the discharge. - Section 9 - Unsightly Land If the inspector believes that the land is unsightly when compared to lands used for a similar purpose, the Chief Environmental Protection Officer may issue a written order to improve condition of the land.
Guideline for Industrial Waste Discharges in the NWT	Various Wastes	<ul style="list-style-type: none"> - Addresses discharge of effluent and process residuals from industrial operations. - Covers only waste for which there is not already a guideline or regulation in place. - Provides standards for discharge to municipal landfills and sewage systems.
Guideline for Ozone Depleting Substances (ODSs)	CFCs, HCFCs and Halons (used in heat pumps, air conditioning equipment, refrigeration equipment, motor vehicle air conditioners, and portable fire extinguishers)	<ul style="list-style-type: none"> - ODSs are found in certain air conditioners, refrigeration devices, and fire extinguishers. - A waste manifest must accompany waste ODS if moved for storage, recycling or disposal. - ODS should be removed from equipment by a certified technician prior to equipment disposal. - Any release of ODS from a compressed gas vessel (Class 2, TDG) with a capacity greater than 100 L must be reported to the 24 Hour Spill Report Line (867) 920-8130. - A release of 5 L or more of an ODS classified as a poisonous substance (Class 6, TDG) must be reported to the 24 Hour Spill Report Line (867) 920-8130. - Any ODS-containing equipment that requires disposal should be serviced by a technician to remove the CFCs or HCFCs and marked with the date of service, the certified technician and company name, and an indication that the equipment no longer contains refrigerant. After servicing the equipment can be recycled or landfilled. - If it is a remote community and a technician is not available, contact ENR for a plan to manage ODS equipment in remote areas at (867) 873-7654.

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Guideline for the General Management of Hazardous Waste in the NWT	All hazardous wastes	<ul style="list-style-type: none"> - Complements existing acts and regulations regarding hazardous wastes. - Should be consulted in conjunction with applicable specific hazardous waste guidelines - The generator is responsible for the identification, labelling, and storage of the hazardous waste from the time of generation to the time of disposal (from the “cradle to the grave”). - Generators, carriers, and receivers must all be registered with ENR. The office of the Fire Marshal has authority over the storage of flammable, combustible, and hazardous materials under the National Fire Code. - Storage of Hazardous Waste: <ul style="list-style-type: none"> a) Stored in original containers or other containers manufactured for the purpose of storing hazardous waste. Containers must be sound, sealable and not damaged or leaking. b) Clearly labelled according to Workplace Hazardous Materials Information System if transport is planned. c) Bulked into 16 gauge or equivalent metal or plastic drums, as appropriate. d) Containers should be sealed or closed at all times unless in use. - Requirements for storage facilities: <ul style="list-style-type: none"> a) Drainage into and from the site is controlled to prevent spills from leaving the site. b) Incompatible wastes are segregated by chemical compatibility to ensure safety. c) A secure area with controlled access to trained persons only. d) Regular inspections of containers are performed and recorded. e) A record is maintained of the type and amount of waste being stored. f) Emergency response equipment is available on site. g) If the site stores over 1,000 L/kg of any one waste class or a total of over 5,000 L/kg of all waste classes combined for over 180 days, the site must be registered with ENR. <ul style="list-style-type: none"> - The company name, address, phone number and contact person including position, the location and description of the Jackfish Facility, the expected types, quantities, and method of hazardous waste storage, and the required approvals to occupy the land for the purpose of hazardous waste storage must be provided to the EPA and the local fire chief for emergency planning purposes. h) Storage site must meet local zoning and by-law requirements.

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Guideline for the General Management of Hazardous Waste in the NWT	All hazardous wastes	<ul style="list-style-type: none"> - A completed Waste Manifest must accompany all shipments of hazardous waste. Waste Manifests are available from ENR. - Transportation is regulated by TDGR by road, International Civil Aviation Organization (ICAO) by air, and International Maritime Dangerous Goods Code (IMDG) by water. - Treated hazardous waste may be directed to a landfill or to a municipal sewage system if it meets the <u>Guideline for Industrial Waste Discharges in the NWT</u> and the municipal authority and facility water license are consulted. - Hazardous waste containers must be triple rinsed and punctured so they are rendered unusable or returned to distributor for recycling. <p><i>* Waste oil being transported from generator to receiver in the NWT does not require manifesting (e.g., by waste oil burners under the NTPC Waste Oil Agreement).</i></p>
Guideline for the Management of Waste Antifreeze	Antifreeze (ethylene glycol, propylene glycol)	<ul style="list-style-type: none"> - Waste Antifreeze is a contaminant under the NWT EPA and must be managed as a hazardous waste. - It shall not be landfilled or poured down any drain as it is toxic by ingestion and can easily contaminate the environment. - Both ethylene glycol (used in cooling systems) and propylene glycol (used in heating systems) are considered hazardous despite toxicity differences. - Waste Antifreeze has the potential to contain heavy metals, which are toxic in the natural environment. - Waste antifreeze can be recycled by registered companies or on-site using special equipment. Additives and filters can also be used to extend the life of antifreeze. - Store waste antifreeze as described in the <u>Guideline for the General Management of Hazardous Waste in the NWT</u>. - When transporting waste antifreeze use the following shipping information: <ul style="list-style-type: none"> WASTE TOXIC LIQUID, ORGANIC, N.O.S. (Waste Propylene/Ethylene Glycol) Class: 6.1 PIN: UN2810 Packing Group: I, II or III Special Provisions: 16 for I, 16 or 23 for II and III - The type of glycol must also be added to the shipping name (propylene or ethylene). - Transport the containers to a registered recycling or disposal facility. Do not landfill antifreeze, especially in landfills, which employ a permafrost protective barrier. Do not pour antifreeze into sewers or drains because it can destroy the bacteria that treat sewage.

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Guideline for the Management of Waste Asbestos	Fibrous asbestos	<ul style="list-style-type: none"> - Waste asbestos is a contaminant under the NWT EPA and must be managed as a hazardous waste. - Store waste asbestos as described in the <u>Guideline for the General Management of Hazardous Waste in the NWT</u>. - When transporting waste asbestos use the following shipping information: ASBESTOS WHITE / BLUE / BROWN PIN: UN2590 / UN2212 / UN2212 Classification: 9 Packing Group: III / II / II - The removal of asbestos materials requires a thorough understanding of potential hazards and measures available to prevent worker, public and environmental exposure to asbestos fibres. - The <u>Asbestos Safety Regulations</u> require that employers conducting an asbestos removal project provide proper training to workers likely to come in contact with asbestos. - Asbestos can be landfilled if 0.5 m of cover is placed on the waste immediately. It must be buried where it will not be disturbed and mapped for future reference. - An asbestos abatement expert can be contracted to remove the material.

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Guideline for the Management of Waste Batteries	<p>Batteries (lead acid, potassium hydroxide, nickel cadmium)</p> <p>*Does not include dry cell batteries</p>	<ul style="list-style-type: none"> - Waste batteries are a contaminant under the NWT EPA and must be managed as a hazardous waste. - Store waste batteries as described in the <u>Guideline for the General Management of Hazardous Waste in the NWT</u>. - Transport of waste batteries (ensure no leakage): <ul style="list-style-type: none"> - in sealed, upright drums with adsorbent material, cardboard, or plywood between battery layers, or - on a good, solid pallet lined with a large piece of polyethylene plastic (if pallet is rough or has protruding nails cover it with plywood first to protect the plastic); place cardboard or plywood between battery layers, fold the poly over top of the package to seal it, and secure with banding. - When transporting waste batteries use the applicable shipping information as follows: <p style="margin-left: 20px;">WASTE BATTERIES, DRY, CONTAINING POTASSIUM HYDROXIDE SOLID, electric storage PIN: UN3028 Classification: 8 Packing Group: III</p> <p style="margin-left: 20px;">WASTE BATTERIES, WET, FILLED WITH ACID, electric storage PIN: UN2794 Classification: 8 Packing Group: III Explosive Limit: 5</p> <p style="margin-left: 20px;">WASTE BATTERIES, WET, FILLED WITH ALKALI, electric storage PIN: UN2795 Classification: 8 Packing Group: III Explosive Limit: 5</p> <p style="margin-left: 20px;">WASTE BATTERIES, WET, NON-SPILLABLE, electric storage PIN: UN2800 Classification: 8 Packing Group: III Special Provisions: 39 Explosive Limit: 5</p> - Batteries should be shipped to a registered recycler or disposal facility.

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Guideline for the Management of Waste Lead and Lead Paint	Lead paint	<ul style="list-style-type: none"> - Leaded paint is a contaminant under the NWT EPA and must be managed as a hazardous waste. - Products containing lead in excess of 600 ppm (0.06%) are considered hazardous waste. - Painted steel structures should be sampled for confirmation of lead amended paint and lead concentration prior to sandblasting or other maintenance activities. - Regardless of removal method, total containment of the leaded paint and abrasive debris or paint strippers is required under the EPA. - Store lead compounds in leak proof containers to prevent release into the environment. - When transporting waste lead paint use the following shipping information: WASTE LEAD COMPOUND, SOLUBLE, N.O.S. (Waste Lead Paint) or (Sandblasting Residue) PIN: UN2291 Classification: 6.1 Packing Group: III Special Provisions: 24 Explosive Limit: 5 - Leaded paint and sandblast residue should be transported to a registered hazardous waste disposal facility or a lead or metals foundry.

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Guideline for the Management of Waste Paint	Alkyd paint (oil based paint) Latex paint (water based paint)	<ul style="list-style-type: none"> - Waste paint is a contaminant under the NWT EPA and must be managed as a hazardous waste. - Paint: includes lacquer, enamel, stain, shellac, varnish, polish, liquid filler, and liquid lacquer base. - Paint related material: includes paint thinning or reducing compounds. - Latex paint wastes are not a hazardous waste and can be disposed of into most sewage systems and landfills – municipal approval may be required. - Specialty paints are a mix between a base and a hardener (e.g. epoxy coatings). Consult individual SDSs for disposal instructions. - Store waste latex and alkyd paint separately as described in the <u>Guideline for the General Management of Hazardous Waste in the NWT</u>. - When transporting most waste paint (flammable liquids) use the following shipping information: WASTE PAINT (or Waste Paint Related Materials) PIN: UN1263 Classification: 3 Packing Group I, II or III Special Provision 59 for I, 59 or 83 for II and III - When transporting certain specialty paints (corrosive) use the following shipping information: WASTE PAINT (or Waste Paint Related Materials) PIN: UN3066 Classification: 8 Packing Group II or III Special Provision 59 - Less than 5 L of alkyd paint can be allowed to fully dry and be taken to landfill. - Fully dried latex paint may be taken to landfill in any quantity. - Liquid paint should be shipped to a registered recycling or disposal facility.

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Guideline for the Management of Waste Solvents	Alcohol or petroleum based liquids capable of dissolving another substance (e.g. Varsol, paint thinner)	<ul style="list-style-type: none"> - Waste solvents are a contaminant under the NWT EPA and must be managed as a hazardous waste. - Store waste solvents separately as described in the Guideline for the <u>General Management of Hazardous Waste in the NWT</u>. - Bulk drums must be grounded to avoid sparks. - When transporting waste solvents use the following shipping information (with Varsol as an example): <p style="margin-left: 40px;">WASTE PETROLEUM DISTILLATES, N.O.S. (Waste Varsol) PIN: UN1268 Classification: 3 Packing Group: I, II, III Special Provisions: 16</p> <ul style="list-style-type: none"> - Bulk containers should be shipped to a registered recycling or disposal facility.
Used Oil and Waste Fuel Management Regulations	<p>Fuel (diesel fuel, gasoline, aviation fuel, kerosene, naphtha)</p> <p>Oil (transmission fluid, hydraulic fluid, crankcase oil, gear lube oil, lube oil)</p> <p>Grease</p>	<ul style="list-style-type: none"> - Used oil and waste fuel are contaminants under the NWT EPA and must be managed as hazardous waste. - Used oil has the potential to contain heavy metals that are toxic in the natural environment. - Used oil and waste fuel should be bulked in containers as described in the Guideline for the General Management of Hazardous Waste in the NWT. - Used oil and waste fuel should be shipped to a registered recycler. - Waste oil can be burned in a CSA approved oil heating furnace, and can be shipped without a waste manifest in the NWT in this special case. - When transporting waste fuel use the following shipping information: <p style="margin-left: 40px;">WASTE FLAMMABLE LIQUID, N.O.S. (Waste Fuel Oil) PIN: UN1993 Classification: 3 Packing Group: I, II, III Special Provisions: 16</p> <ul style="list-style-type: none"> - When transporting waste oil use the following shipping information: <p style="margin-left: 40px;">WASTE OIL (Waste Lube Oil) PIN: NA Classification: NA Packing Group: NA</p>

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
	Used oil filters	<ul style="list-style-type: none"> - Used oil filters must be punctured/crushed and drained of their contents for 24 hours prior to disposal. - Used oil filters do not have to be managed as hazardous waste if properly drained. - All used oil in filters must be drained for 24-hrs into bulk used oil containers. The filters can then be recycled by a registered facility or sent to landfill. - Used oil filters can be crushed using a filter crusher, where available, and then recycled or sent to landfill. - When transporting waste oil filters use the following shipping information: WASTE FILTERS (Fuel Oil or Lube Oil) PIN: NA Classification: NA Packing Group: NA
	Oily Rags	<ul style="list-style-type: none"> - Oily rags or sorbents must be drummed and disposed of at a registered facility. - Some landfarms accept oily rags. - When transporting waste oily rags/sorbents use the following shipping information: WASTE OILY RAGS PIN: NA Classification: NA Packing Group: NA
Environmental Guideline for Contaminated Site Remediation	Contaminated Soil	<ul style="list-style-type: none"> - When transporting hydrocarbon impacted soil with a flashpoint that is unknown or below 610C use the following shipping information: WASTE SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S. (Gasoline or Diesel, as appropriate) PIN: UN3175 Classification: 4.1 Packing Group: II Special Provisions: 16, 56 - When transporting glycol impacted soil or hydrocarbon impacted soil with a flashpoint higher than 610C use the following shipping information: WASTE SOIL (Gasoline, glycol, diesel or oil) PIN: NA Classification: NA Packing Group: NA Special Provisions: NA - All contaminated soil should be analyzed for flashpoint prior to transport so that it can be transported as waste soil rather than Class 4.1.

Table B2: Summary of Northwest Territories Legislation/Guidelines

NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
NWT Disposal Guideline for Fluorescent Lamp Tubes	Waste fluorescent tubes	<ul style="list-style-type: none"> - Fluorescent tubes are a contaminant under the NWT EPA and must be managed as a hazardous waste. - Fluorescent tubes contain mercury phosphor powder and traces of lead and cadmium. Compliance with the <u>Canada Wide Standards for Mercury</u> is necessary. - Waste fluorescent tubes should be shipped to a registered recycling/disposal service. - If tubes are not broken and are packaged in their original shipping box, transport as a hazardous waste is not necessary. It is recommended to obtain boxes from the manufacturer if not already on hand. - If tubes are broken compliance with the <u>Guideline for the General Management of Hazardous Waste in the NWT and TDG Regulations</u> is required. - As an alternative to shipping waste bulbs for disposal the ENR Environmental Protection Service (EPS) owns a fluorescent bulb crusher which crushes the bulbs and separates the glass from the contaminants. Contact the EPS for more information.
	Waste mercury vapour bulbs	<ul style="list-style-type: none"> - Mercury vapour lights are a contaminant under the NWT EPA and must be managed as a hazardous waste. - Mercury vapour bulbs contain mercury. Compliance with the <u>Canada Wide Standards for Mercury</u> is necessary. - Waste mercury vapour lights should be shipped to a registered recycling/disposal facility. - If bulbs are not broken and are packaged in their original shipping box, transport as a hazardous waste is not necessary. It is recommended to obtain boxes from the manufacturer if not already on hand. - If tubes are broken compliance with the <u>Guideline for the General Management of Hazardous Waste in the NWT and TDG Regulations</u> is required.

Table B2: Summary of Northwest Territories Legislation/Guidelines


NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Spill Contingency and Reporting Regulations (under EPA)	All spills	<ul style="list-style-type: none"> - Section 3 - Spill Contingency Plan A spill contingency plan must be implemented and filed with the Chief Environmental Protection Officer for facilities with above ground storage of 20,000 L or 20,000 kg or with a below ground storage of 4,000 L or 4,000 kg. If the Jackfish Facility has less than the above storage, a spill contingency plan should be in place, but does not have to be filed with the Officer. - Section 4 The owner or operator of the Jackfish Facility is responsible for the spill contingency plan. It must include: <ul style="list-style-type: none"> a) the name, address and job title of the person in charge of the Jackfish Facility b) the name, job titles and 24-hour phone number of the person in charge of activating the spill contingency plan c) a description of the Jackfish Facility including location, size and storage capacity d) a description of the type and amount of contaminants stored at the Jackfish Facility e) a site map of the location described in (c) f) the steps to be taken to report, contain, cleanup and dispose of contaminants in case of spill g) inventory and location of available response and cleanup equipment h) the date the plan was prepared. When a review is completed the plan shall be updated and the Officer shall be alerted. - Section 9 Spills shall be reported when the amount spilled is equal to or exceeds that described in schedule B. Report spills to the 24-Hour Spill Report Line at (867) 920-8130. The following details should be provided regarding the spill: date and time of spill, spill location, direction spill is moving, name and number of contact person close to spill, type and amount of contaminant spilled, cause of spill, whether spill is continuing or has been stopped, description of existing containment, action taken to contain, recover, cleanup and dispose of spilled material, name, address and phone number of person reporting spill, and name of person in charge of contaminants at time of spill.
Consolidation of Pesticide Act Chapter P-2 Pesticide Regulations	Pesticides	<ul style="list-style-type: none"> - Section 4 - Consolidation of Pesticide Act 1988 No person shall dispose of a pesticide or a container that contained a pesticide in any way except at a site or in the manner that is prescribed in regulations. - Pesticide Regulations: report spills to the 24-Hour Spill Report Line (867) 920-8130.

Table B2: Summary of Northwest Territories Legislation/Guidelines


NORTHWEST TERRITORIES LEGISLATION/GUIDELINES		
Legislation/Guideline	Hazardous Waste	Relevant Details in Legislation
Guideline for Industrial Waste Discharge in the NWT	Ash	<ul style="list-style-type: none"> - Each 205 L drum of ash collected from an incinerator must be sampled independently and sent to a registered laboratory for analysis before it can be discarded at a sanitary landfill or registered disposal facility. - Residues of incinerator ash must pass the leachate extraction test described in the Guideline for Industrial Waste Discharges in the NWT, Schedule IV before it can be sent to a sanitary landfill. - Ash residues that fail the leachate extraction test must be handled as a Hazardous Waste accordingly and sent to a registered disposal facility.
PCB Regulations under the <i>Canadian Environmental Protection Act, 1999</i>	Streetlight ballasts (capacitors) manufactured before 1979	<ul style="list-style-type: none"> - Many capacitors found inside fluorescent streetlight ballasts manufactured before 1979 contain high levels of PCB (Polychlorinated Biphenyls). - Check the date code on the ballasts to determine the year it was manufactured. - If the ballast was manufactured before 1979 the ballast must be shipped as a hazardous waste to a registered treatment facility for disposal. <p style="margin-left: 40px;">POLYCHLORINATED BIPHENYLS (PCB) PIN: UN2315 Classification: 9 Packing Group: III</p>

Notes: EPA = Environmental Protection Agency; ENR = Environment and Natural Resources Department (Government of Northwest Territories); PCB = polychlorinated biphenyls.


APPENDIX C
WASTE ACCUMULATION LOG

 <p>NORTHWEST TERRITORIES POWER CORPORATION <i>Empowering Communities</i></p>	<p>Safe Work Practice: Fuel and Bulk Product Transfer</p>	Page 1 of 3
	<p>Monitor: Director, Health Safety and Environment</p>	SWP No.: 2.04

1 Purpose	To outline the safety requirements for conducting fuel and bulk product transfers.
2 Application	Applies to all NTPC workers and contractors who are involved in fuel and bulk product transfers, custody transfers and the loading or unloading of tanker trucks, barges and ships used for the movement of these products.
3 Definitions	<p>Worker An NTPC employee or any employee of a contractor or subcontractor working on an NTPC owned project or site.</p> <p>Static Electricity Static is the electricity produced on dissimilar materials through physical contact and separation. A spark generated by it can ignite flammable vapour. A static electrical charge can build up during refuelling when the fuel moves through a pipe.</p>
4 References	<ul style="list-style-type: none"> • Nil
5 Equipment	<ul style="list-style-type: none"> • Spill Kit • Fire Extinguisher • Approved grounding devices • Hoses and hardware
6 PPE	<ul style="list-style-type: none"> • High-visibility vest • Work gloves • CSA-approved safety glasses • CSA-approved foot protection
7 Training	<ul style="list-style-type: none"> • On-the-job training • Spill Response Training
8 Work Practice	<ul style="list-style-type: none"> • Before the start of any work a Tailboard Meeting shall be conducted with all individuals involved in the transfer process and documented on Form 2.3: Tailboard Meeting. • The Worker responsible for the transfer process shall notify the person in charge of the site (e.g., Plant Operator, Plant Superintendent, Manager, etc.) to receive approval to begin the transfer. The Worker shall also notify the person in charge of the site after the transfer is complete. The date, start time and end time of the transfer shall be recorded in the Plant Log Book. • The Worker responsible for the transfer process shall remain onsite throughout the process.

 <p>NORTHWEST TERRITORIES POWER CORPORATION <i>Empowering Communities</i></p>	<p>Safe Work Practice: Fuel and Bulk Product Transfer</p>	Page 2 of 3
	<p>Monitor: Director, Health Safety and Environment</p>	SWP No.: 2.04

	<ul style="list-style-type: none"> • The Worker shall immediately shut down the transfer process in the event of a system failure, fault, leak, spill or fire. • In the event that the Worker responsible for the transfer process must leave the immediate transfer area, the transfer process shall be stopped and the transfer point shall be locked. • If the Worker responsible for the transfer process leaves the site during a transfer without stopping the transfer and locking the transfer point, the Worker shall be subject to discipline up to and including dismissal. • Transfer points shall be locked at all times except during the transfer process. • Prior to refuelling the refuelling system must be inspected to ensure it is properly grounded and bonded. Grounding devices shall be installed to safeguard against the build-up of static electricity. • Emergency equipment including fire extinguishers and spill kits shall be available throughout the transfer process and shall be inspected prior to each transfer. • The local transfer procedure specific to the site and product shall be followed. This includes: <ul style="list-style-type: none"> ○ Properly calculating the amount of fuel to be transferred and documenting the volume on Form 2.3: Tailboard Meeting ○ Flow rates ○ Emergency shutdown procedures ○ Emergency and spill response procedures • After completion of the fuel transfer all hoses shall be disconnected, drained into an appropriate container and securely blanked.
9 Documentation	<ul style="list-style-type: none"> • Plant Log Book • Form 2.3: Tailboard Meeting

 <p>NORTHWEST TERRITORIES POWER CORPORATION <i>Empowering Communities</i></p>	Safe Work Practice: Fuel and Bulk Product Transfer	Page 3 of 3
	Monitor: Director, Health Safety and Environment	SWP No.: 2.04

Development		
Name	Position	Date
Prepared by: Paul Pascoe	Pozniak Safety Associates	July 15, 2014
Reviewed by: Joshua Clark	Environmental Analyst	July 30, 2014
Approved by: Eddie Smith	Director Health, Safety & Environment	Aug 15, 2014

Revision History					
#	Revised Sections	Description of Revisions	Revised by (name, position)	Approved by (name, position)	Issue Date
01					
02					
03					
04					
05					
06					
07					

APPENDIX D
WASTE STORAGE INVENTORY LOG



WASTE STORAGE INVENTORY

Year		Drum ID (plant - unique drum # - year, e.g., 120-01-10)		# of Drums		
Plant				Full	Empty	Initials
Month	Oil	Shipped				
		Stored				
		Glycol	Shipped			
			Stored			
		Other (Specify)	Shipped			
			Stored			
	Oil	Shipped				
		Stored				
		Glycol	Shipped			
			Stored			
		Other (Specify)	Shipped			
			Stored			
	Oil	Shipped				
		Stored				
		Glycol	Shipped			
			Stored			
		Other (Specify)	Shipped			
			Stored			
	Oil	Shipped				
		Stored				
		Glycol	Shipped			
			Stored			
		Other (Specify)	Shipped			
			Stored			

APPENDIX E
SAFETY INSPECTION REPORT



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

Inspection Details

Location:

Plant:

Inspected by:

Date:

#	Inspection Item	Y/N/NA	Notes
1.0	Housekeeping		
1.1	Are all buildings clean & organized inside?		
1.2	Is the yard clean & organized with no vegetation control required?		
1.3	Is the transformer storage platform: solid and well-organized?		
1.4	Is the pole storage rack solid and well-organized?		
1.5	Are garbage cans fire resistant with self-closing lids? Are they emptied at the end of each day?		
1.6	Are all spills and leaks cleaned up?		
1.7	Are floors clean and tidy and free of slippery substances (e.g., water, oil, grease)?		
1.8	Are floors level and well maintained with no projecting surfaces and no tripping hazards?		
1.9	Are windows clean, both inside and outside, and kept obstruction free?		
1.10	Is ventilation equipment clean, obstruction free, well maintained, functions correctly?		
2.0	Storage		
2.1	Are tools and materials properly stored in racks, shelves, and bins wherever possible?		
2.2	Are commonly used and heavy items stored between mid-thigh and shoulder height?		
2.3	Are floors around racks, shelves, pallets, etc. clear?		
2.4	Are racks, shelves, pallets, etc. kept in good condition?		
2.5	Are storage areas safe from falling objects?		

#	Inspection Item	Y/N/NA	Notes
2.6	Are storage racks, shelves, etc. free of sharp edges?		
2.7	Is there a safe means of accessing high shelves?		
3.0	Tools & Equipment		
3.1	Are tools & equipment maintained in good condition, clean, and suitable for intended use?		
3.2	Are all necessary machine guards in place?		
3.3	Are spill pads, drip trays, and crankcase vent containers emptied or replaced as required?		
3.4	Are batteries free of leaks with terminals clean and protective covers in place?		
3.5	Are line & electrical tools available, properly stored, certified, and in good condition?		
3.6	Is rigging & lifting equipment available, properly stored, certified, and in good condition?		
3.7	Are compressed gas cylinders undamaged, stored upright, and secured?		
3.8	Are pipes leak-free, colour coded, and properly painted?		
4.0	Personal Protective Equipment (PPE)		
4.1	Is all PPE available onsite?		
4.2	Is all PPE properly stored?		
4.3	Is all PPE clean?		
4.4	Is all PPE in good condition?		
4.5	Is all PPE correctly used?		
5.0	Emergency Equipment		
5.1	Is the Emergency Response Plan available onsite and current?		
5.2	Is the Spill Response Plan available onsite and current?		
5.3	Is the Hazardous Waste Management Plan available onsite and current?		

#	Inspection Item	Y/N/NA	Notes
5.4	Are the NWT Safety Act and General Regulations available onsite?		
5.5	Are emergency phone numbers posted and up-to-date?		
5.6	Are emergency lights functional for a 30 second test?		
5.7	Are eyewash stations available and functional with the solution changed every 6 months?		
5.8	Are fire extinguishers available, charged, and inspected monthly?		
5.9	Are fire extinguishers secured on the wall and not free standing?		
5.10	Is access to fire extinguishers free and unobstructed?		
5.11	Are first aid kits available, fully stocked, and inspected monthly?		
5.12	Are exits clearly marked with exit signs?		
5.13	Are exits functional and free from obstructions?		
6.0	Chemicals		
6.1	Are MSDS available and up-to-date within the last 3 years?		
6.2	Are all chemicals properly labelled and stored in proper containers (WHMIS)?		
6.3	Are all flammable products stored in proper containers in kept in a flammable cabinet?		
6.4	Are unused or unnecessary substances disposed of in a safe manner?		
6.5	Are all chemical containers and drums leak free?		
7.0	Building		
7.1	Are buildings in good condition on the inside with no repairs required?		
7.2	Are buildings in good condition on the outside with no repairs required?		
7.3	Are floors level and well maintained with no projecting surfaces and no tripping hazards?		



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

#	Inspection Item	Y/N/NA	Notes
7.4	Are windows clean, both inside and outside, and kept obstruction free?		
7.5	Is ventilation equipment clean, obstruction free, well maintained, functions correctly?		
7.6	Is the air temperature comfortable?		
7.7	Are all inside & outside lights functional?		
7.8	Do existing lights provide adequate lighting?		
7.9	Are all necessary warning signs in place with no new or additional signs required?		
7.10	Are signs and notices in good condition?		
7.11	Are employee facilities (e.g., washrooms, lockers, crew trailers) clean, tidy, maintained, and adequate?		
8.0	Security		
8.1	Are all fences in good condition with barbwire intact?		
8.2	Are all gates and doors kept locked when unattended?		
8.3	Are all locks in working order?		
9.0	Electrical		
9.1	Are ground connections present and in good working condition?		
9.2	Are electrical boxes & breakers properly covered?		
9.3	Are all plugs and switches in good condition?		
9.4	Are all cords in good condition?		
9.5	Are all power tools in good condition?		
9.6	Is all temporary wiring properly routed?		



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

#	Inspection Item	Y/N/NA	Notes
10.0	Work Protection		
10.1	Are sufficient Work Protection tags and forms available onsite?		
10.2	Is the Work Protection Log book available and up-to-date?		
10.3	Are all Single Line Diagrams posted and up-to-date?		
11.0	Hazardous Waste Storage Area		
11.1	Are all wastes properly separated to ensure no mixing of wastes?		
11.2	Are all waste storage containers in good condition with lids securely in place and no leaks?		
11.3	Are all waste containers labelled clearly and accurately?		
11.4	Are spill response materials available onsite (e.g., spill kits, sorbents, hand tools, PPE)?		
11.5	Are all sources of ignition kept away from the waste storage area?		
11.6	Is a fire extinguisher kept close to the waste storage area? Is it inspected monthly and charged?		
11.7	Does the storage area have proper drainage to prevent leaks or spills from leaving the site?		
11.8	Is the <i>Waste Accumulation Log</i> up-to-date?		
11.9	Is the <i>Waste Storage Inventory Log</i> up-to-date?		

Provide completed form to manager.



Health & Safety Management System Form:
Safety Inspection Report

Monitor:
Director, Health, Safety & Environment

Form #:
9.2

Corrective Actions (to be assigned by manager and followed up until completed)

Manager:

Signature:

Date:

#	Corrective Action	Responsible Party	Due Date	Completed
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
12				
13				

DRAFT CONDITIONS ANNEXED TO AND FORMING PART OF WATER LICENCE NUMBER MV2019L1-00**

Part A: Scope and Definitions

1) Scope

- a) This Licence entitles the Northwest Territories Power Corporation to use water from Jackfish Lake (Stock Lake) for cooling systems at the Jackfish Lake Generating Facility located in Yellowknife, Northwest Territories at Latitude 62° 28' 10" North and Longitude 114° 23' 00" West.
- b) This Licence is issued subject to the conditions contained herein with respect to the taking of water.
- c) Compliance with terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2) Definitions

Act means the *Waters Act*.

Aquatic Effects Monitoring Program means a monitoring program designed to determine the short- and long-term effects in the Receiving Environment resulting from the Jackfish Facility; to evaluate the accuracy of anticipated effects; to assess the effectiveness of planned impact mitigation measures; and to identify additional impact mitigation measures to reduce or eliminate environmental effects.

Analyst means an Analyst designated by the Minister under Section 65(1) of the Act.

Board means the Mackenzie Valley Land and Water Board established by Section 99(1) of the *Mackenzie Valley Resource Management Act*.

Construction means any activities undertaken to construct or build any components of, or associated with, the development of the Jackfish Facility.

Discharge means the direct or indirect release of any water.

Jackfish Facility means the Jackfish Lake Generating Station intakes, outlets, and pumps as described in Cooling System Detailed Blueprints submitted with the application.

Inspector means an Inspector designated by the Minister under Section 65(1) of the Act.

Licensee means the holder of this Licence.

Minister means a duly appointed member of the Executive Council who is responsible for the Act or the

department responsible for administering that Act.

Modification means a change, other than an expansion, that does not alter the purpose or function of a structure.

Receiving Environment means, for the purpose of this Licence, the natural aquatic environment that receives any discharge from the Jackfish Facility.

Regulations means Regulations promulgated pursuant to Section 63 of the Act.

Spill Contingency Plan means a document, developed in accordance with Indian and Northern Affairs Canada's April 2007 Guidelines for Spill Contingency Planning, which describes the set of procedures to be implemented to minimize the effects of a spill.

Surveillance Network Program (SNP) means the monitoring requirements detailed in Annex A of this Licence.

Unauthorized Discharge means a release or Discharge of any water or Waste not authorized under this Licence.

Waste means Waste as defined by Section 1 of the Act.

Waste Management Plan means a document, developed in accordance with the Board's March 2011, or subsequent editions, *Guidelines for Developing a Waste Management Plan*, that describes the methods of Waste management from Waste generation to final disposal.

Waters means any waters defined by Section 1 of the Act.

Part B: GENERAL CONDITIONS

- 1) The Licensee shall ensure a copy of the Licence is maintained on site at all times.
- 2) All information submitted to the Board for this Licence must be submitted in a form acceptable to the Board.
- 3) The Licensee shall comply with the Surveillance Network Program annexed to this Licence, and any amendment to the said Surveillance Network Program as may be made from time to time, pursuant to the conditions of this Licence.
- 4) The attached Surveillance Network Program and compliance dates specified in the Licence may be amended at the discretion of the Board.
- 5) The Licensee shall post and maintain signs to identify the stations listed in the attached Surveillance Network Program. All postings shall be located and maintained to the satisfaction of an Inspector.
- 6) The Licensee shall file an Annual Report with the Board not later than March 31st of the year following the calendar year reported which shall be in accordance with Schedule 1.

- 7) The Licensee shall adhere to the approved **Engagement Plan** prepared in accordance with the Mackenzie Valley Land and Water Board's June 2013, or subsequent editions, *Engagement Guidelines for Applicants and Holders of Water Licences and Land Use Permits*, and shall annually review the Plan and make any necessary revisions to reflect changes in operations, or as directed by the Board. Revisions to the plan shall be submitted to the Board for approval.

Part C: CONDITIONS APPLYING TO SECURITY REQUIREMENTS

- 1) The Licensee shall maintain the current security deposit of \$50,000 pursuant to Section 35(1) of the Act. The Licensee shall also post any further amounts required by the Board during the term of this Licence.
- 2) The Licensee shall be liable for any and all costs related to the abandonment and restoration of the Jackfish Facility over and above the total amount of the security deposit posted under Part C, item 1.

PART D: CONDITIONS APPLYING TO OPERATION

- 1) Jackfish Lake (Stock Lake) is the source water for the cooling systems.
- 2) The daily quantity of water used shall not exceed 50,000 cubic metres.
- 3) The Licensee shall install and maintain a guard on all water intakes to prevent entrainment of fish in accordance with the *Fisheries Act* and any other applicable legislation.

PART E: CONDITIONS APPLYING TO MODIFICATIONS

- 1) The Licensee may, without written consent from the Board, carry out Modifications to the Jackfish Facility provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:
 - a) the Licensee has notified the Board in writing of such proposed modifications at least sixty (60) days prior to beginning the modifications;
 - b) such modifications do not place the Licensee in contravention of either the Licence or the Act;
 - c) the Board has not, during the sixty (60) days following the notification of the proposed modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
 - d) the Board has not rejected the proposed modifications.
- 2) Modifications for which all the conditions referred to in Part E, Item 1, have not been met, can be carried out only with the written consent of the Board.

- 3) The Licensee shall provide to the Board as-built plans and drawings of the modifications referred to in Part E, Item 1 within ninety (90) days of their completion.

Part F: CONDITIONS APPLYING TO WATER AND WASTE MANAGEMENT

- 1) Within sixty (60) days following issuance of this Licence, the Licensee shall submit a **Waste Management Plan** to the Board for approval, in accordance with the Mackenzie Valley Land and Water Board's March 2011, or subsequent editions, *Guidelines for the Development of a Waste Management Plan*.

PART G: CONDITIONS APPLYING TO CONTINGENCY PLANNING

- 1) The Licensee shall, within ninety (90) days of issuance of this Licence, submit to the Board for approval a **Spill Contingency Plan** in accordance with the Indian and Northern Affairs Canada's *Guidelines for Spill Contingency Planning, 2007* or subsequent versions, and shall be submitted to the Board for approval.
- 2) If, during the period of this Licence, an unauthorized discharge of Waste occurs, or if such a discharge is foreseeable, the Licensee shall:
 - a) employ the Spill Contingency Plan;
 - b) report the incident immediately via the 24 Hour Spill Reporting Line at (867) 920-8130 in accordance with the instructions contained in the Spill Report Form NWT 1752/0593 or subsequent editions;
 - c) Report each spill and Unauthorized Discharge to the Board and an Inspector within 24 hours; and
 - d) submit to an Inspector a detailed report on each occurrence Discharge, including descriptions of root causes, response actions and any changes to procedures to prevent similar occurrences in the future, not later than thirty (30) days after initially reporting the event.
- 3) The Licensee shall annually review the Spill Contingency Plan and modify it to reflect any changes in operation and technology. Any proposed modifications shall be submitted to the Board for approval.
- 4) All spills and unauthorized discharges of Waste shall be reclaimed to the satisfaction of the Inspector.

PART H: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

- 1) The Licensee shall, within ninety (90) days of issuance of this Licence, submit to the Board for

approval a **Conceptual Abandonment and Restoration Plan**. All revisions to the Conceptual Abandonment and Restoration Plan shall be submitted to the Board for approval.

- 2) The Licensee shall submit to the Board for approval a **Final Abandonment and Restoration Plan** at least eighteen (18) months prior to abandoning the Jackfish Facility.
- 3) The Licensee shall complete the restoration work within the time schedule specified in the Final Abandonment and Restoration Plan, or as subsequently approved by the Board.

PART I: CONDITIONS APPLYING TO AQUATIC EFFECTS MONITORING PROGRAM

- 1) Within ninety (90) days following issuance of this Licence, the Licensee shall submit an **Aquatic Effects Monitoring Program (AEMP) Design Plan** to the Board for approval. The Licensee shall submit a revised AEMP Design Plan to the Board for approval by December 1, 2023, and every three years thereafter or as directed by the Board.
- 2) The Licensee shall implement the AEMP as and when approved by the Board.
- 3) The Licensee shall submit a revised AEMP as directed by the Board.

SCHEDULE 1

Attached to Water Licence MV2019L1-00**

ANNUAL WATER LICENCE REPORT

The **Annual Water Licence Report** shall include, but not be limited to, the following:

1) **Measuring and Reporting on Water**

- a) A record of annual and monthly water use flows recorded at the Surveillance Network Program locations;
- b) A record of water temperatures recorded at the Surveillance Network Program locations; and
- c) Any other details on water use, construction or operating procedures requested by the Board on or before November 1st of the year being reported.

2) **Management Plans and Activities**

- a) A summary of engagement activities conducted in accordance with the approved **Engagement Plan**, undertaken during the previous calendar year, including a brief description of activities planned for the forthcoming year;
- b) A summary of **Modification** activities and major maintenance work carried out on the Jackfish Facility, as it relates to water use in accordance with Part E of this Licence, undertaken during the previous calendar year;
- c) A summary of activities conducted in accordance with the approved **Waste Management Plan**, undertaken during the previous calendar year, including a summary of updates or changes to the process or facilities required for the management of water and wastewater;
- d) A summary of activities conducted in accordance with the approved **Spill Contingency Plan**, undertaken during the previous calendar year, including:
 - i) A list and description for all Unauthorized Discharges that occurred during the previous calendar year including the date, NWT spill number, volume, location, summary of the circumstances and follow-up actions taken;
 - ii) status (i.e., open or closed), in accordance with the reporting requirements in Part G, item 2 of this Licence; and
 - iii) An outline of any spill training and communications exercises carried out during the previous calendar year.

ANNEX A: SURVEILLANCE NETWORK PROGRAM

LICENSEE: Northwest Territories Power Corporation

LICENCE NUMBER: MV2019L1-00**

EFFECTIVE DATE OF LICENCE:

EFFECTIVE DATE OF SURVEILLANCE NETWORK PROGRAM (SNP):

Part A – Surveillance Network Program Description and Monitoring Requirements

1) The location of sampling sites and specific monitoring requirements are as follows:

a) **Surveillance Network Program (SNP) 00xx-1:**

Description:	SNP 00xx-1a,b,c,d – Intakes to the K (2 intakes), EMD (1 intake), and CAT (1 intake) plants
Location:	SNP 00xx-1a - K plant intake 1 SNP 00xx-1b - K plant intake 2 SNP 00xx-1c - EMD plant intake SNP 00xx-1d - CAT plant intake
Sampling Frequency:	Continuous in-situ measurements during periods of discharge to Jackfish Lake
Sampling Parameters:	Water Temperature

b) Surveillance Network Program (SNP) 00xx-2:

Description:	SNP 00xx-2a,b,c - Discharges from the K, EMD and CAT plants, respectively
Location:	SNP 00xx-2a - K plant discharge SNP 00xx-2b - EMD plant discharge SNP 00xx-2c - CAT plant discharge
Sampling Frequency:	Continuous in-situ measurements during periods of discharge to Jackfish Lake
Sampling Parameters:	Water Temperature Flow

Part B – Volume, Flow and Temperature Measurement Requirements

- 1) All flow, volume and temperature measurements shall be measured and recorded continuously (i.e., using electronic data storage chips or equivalent) during periods of discharges and reported on a quarterly basis:
 - a) The daily, monthly, and annual quantities of cooling water circulated from Surveillance Network Program Station Numbers 00xx-1a, 00xx-1b, 00xx-1c, and 00xx-1d shall be measured and recorded in cubic metres; and
 - b) The water temperature at Surveillance Network Program Station Numbers 00xx-1a, 00xx-1b, 00xx-1c, 00xx-1d, 00xx-2a, 00xx-2b, and 00xx-2c shall be measured and recorded in degrees Celsius.

Part C – Reports

- 1) The Licensee shall, within sixty (60) days of the end of each quarter being reported, submit to the Board a quarterly report, in electronic and printed formats acceptable to the Board, including all the data and information required under the Surveillance Network Program, including the results of the approved QA/QC program and any interpretive comments and calculations.



April 2, 2019

Jen Potten
Regulatory Coordinator
Mackenzie Valley Land and Water Board
7th Floor – 4910 50th Avenue
P.O. Box 2130
Yellowknife, NT
X1A 2P6

Dear Ms. Potten,

**Re: Northwest Territories Power Corporation (NTPC)
Type A Water Licence Renewal Application – MV2019L1-0001
Power Generation at Jackfish Lake and Associated Activities
Request for Comments**

The Department of Environment and Natural Resources (ENR), Government of the Northwest Territories has reviewed the renewal application at reference based on its mandated responsibilities under the *Environmental Protection Act*, the *Forest Management Act*, the *Forest Protection Act*, the *Species at Risk (NWT) Act*, the *Waters Act* and the *Wildlife Act* and provides the following comments and recommendations for the consideration of the Board.

Topic 1: Water Quantity

Comment(s):

The Water Licence application references 50,000 m³/day of water usage. Can NTPC confirm this amount is accurate? Are generators running in any given day to supplement the City's power or it is only during peak loads? Does water use change with the number of generators going?

Recommendation(s):

1) ENR requests that NTPC clarify the following points:

- Daily water usage;
- The frequency of generator use (daily vs peak loads); and
- Any change to water use based on fluctuations in generator use.

Topic 2: Water Source

Comment(s):

Under Part D of the draft Water Licence, there is no water source listed. ENR understands the source of cooling water to be Jackfish Lake.

Recommendation(s):

- 1) ENR recommends that Jackfish Lake be identified as the water source within the Water Licence.

Topic 3: Baseline Data

Comment(s):

Section 4 of Water Licence Questionnaire (WLQ) says baseline information is limited to the existing reports collected in 2018. Given that the operation has been active prior to 2018, this data should be characterized as ambient data as opposed to baseline.

Recommendation(s):

- 1) ENR recommends that any reference to environmental data in Jackfish Lake observed after the commencement of operations at Jackfish Lake should be referenced as ambient data (existing conditions) as opposed to baseline conditions (pre-development).

Topic 4: Sump Discharge

Comment(s):

Section 2.6.2 of the Operations and Maintenance Manual references various sumps that are pumped out through an oil/water separator. It isn't clear if this water is monitored or sampled or where it is discharged. Currently there is SNP sampling occurring at the intakes and discharge. If this sump discharge is combined with other discharge water it may be sampled; however, sampling parameters are currently limited to temperature and flow. Other parameters will have to be considered if this water is discharged to land or into Jackfish Lake.

Recommendation(s):

- 1) ENR recommends that NTPC clarify the discharge location or other management techniques used to manage sump water from within the plants.
- 2) If sump water is discharged into the environment, NTPC should provide the discharge location and the SNP should be updated to monitor for potential contaminants related to this waste stream, such as total petroleum hydrocarbons.

Topic 5: AEMP**Comment(s):**

Part I of the draft Water Licence notes that an AEMP Design should be submitted 90 days following issuance and then updated every 3 years. Part I 2-3 following the submission of the design plan mentions that the Licensee shall implement the “AEMP *Response Plan* as and when approved by the Board” (emphasis added). ENR believes this to mean the “AEMP” itself will be implemented as opposed to a “Response Plan”. The requirement for responses plans will be outlined as required within the AEMP.

Recommendation(s):

- 1) ENR recommends that the condition in the draft Water Licence related to “AEMP Response Plan” should be corrected to the AEMP.
- 2) It is recommended that a response framework including the requirement for response plans should be included within the AEMP itself.

Topic 6: Monitoring**Comment(s):**

ENR notes that while the 2018 Monitoring Program was informative, it is a snapshot in time. As such, ENR supports the inclusion of an AEMP as outlined in the draft Water Licence; however, the AEMP should be scoped appropriately to reflect the scope of the project and the size of the receiving environment.

Recommendation(s):

- 1) ENR supports the inclusion of an Aquatic Effects Monitoring Program for the Jackfish Lake Generating Station. The AEMP should be scoped appropriately.
- 2) ENR will provide additional comments on the program through any review of the AEMP as may be requested by the Board.

Topic 7: Security

Comment(s):

Part C of the Water Licence includes a requirement for 50k in security. Given that NTPC is a Crown Corporation, ENR does not believe that a security posting is necessary.

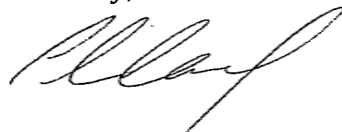
Recommendation(s):

- 1) ENR recommends that security not be required for the Water Licence.

Comments and recommendations were provided by ENR technical experts in the Water Management and Monitoring Division and the North Slave Region and were coordinated and collated by the Environmental Assessment and Monitoring Section (EAM), Environmental Stewardship and Climate Change Division.

Should you have any questions or concerns, please do not hesitate to contact Patrick Clancy, Environmental Regulatory Analyst at (867) 767-9233 Ext: 53096 or email patrick.clancy@gov.nt.ca.

Sincerely,



Patrick Clancy
Environmental Regulatory Analyst
Environmental Assessment and Monitoring Section
Environmental Stewardship and Climate Change Division
Department of Environment and Natural Resources
Government of the Northwest Territories