NORTHWEST TERRITORIES
POWER
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SPILL CONTINGENCY PLAN

JACKFISH LAKE
GENERATING FACILITY, NWT
PLANT #120
YEELOWKNIFE, NORTHWEST TERRITORIES

February 2019

Document Maintenance and Control

The Director, Health, Safety & Environment is responsible for the distribution, maintenance and updating of the Spill Contingency Plan. This Spill Contingency Plan will be updated:

i. Annually, taking into account changes in the law, environmental factors, NTPC policies, and Jackfish Lake Generating Facility characteristics; and/or
ii. Following a major spill incident.

Changes in phone numbers, names of individuals, etc. that do not affect the intent of the plan are to be made as required. Plan updates will be issued as per the Spill Contingency Plan distribution list. The Spill Contingency Plan holder is responsible for adding new and/or removing obsolete pages upon receipt of updates. 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	All	NTPC Standard SCP Updated for 2019 Water Licence application	NTPC	Feb. 2019

Distribution List

This document and the most recent revisions are distributed internally to:

i. Health, Safety & Environment Department, Jackfish Lake Generating Facility /NTPC (control copy)
ii. Manager, Plant Operations, Jackfish Lake Generating Facility
iii. Plant Operator, Jackfish Lake Generating 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.

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1 INTRODUCTION

The Northwest Territories Power Corporation (NTPC) has prepared this Spill Contingency Plan (SCP) for the Jackfish Lake Generating Facility (Jackfish Facility) located on Jackfish Lake in Yellowknife, Northwest Territories (NWT). The SCP is also referred to as the Spill Response Plan (SRP) in other documents associated with this application.

This SCP demonstrates that NTPC has appropriate response capabilities and measures in place to effectively address potential spills at the Jackfish Facility. This plan documents NTPC's local and regional spill response capabilities, presenting information on site specifics, resource inventory, health and safety, incident response, and reporting procedures. A copy of this SCP shall be maintained at each plant within the Jackfish Facility and is also available on NTPC Intranet PowerLine (the Powerline) under Divisions> Health, Safety & Environment> Spill Response Plans. Plant Operators receive regular training on the procedures and information contained in this plan.

1.1 COMPANY INFORMATION

Contact information for the Jackfish Facility owner is as follows:

Northwest Territories Power Corporation
4 Capital Drive
Hay River, NWT X0E 1G2
Phone: 874-5200; Fax: 874-5251

Jackfish Facility Mailing Address:
Box 2250,
Yellowknife, NWT X1A 2P7

Jackfish Facility Main Contact:
Robert Sunderland, Manager Plant Operations
Phone: (867) 669-3338; Fax: (867) 669-3316
Email: rsunderland@ntpc.com

1.2 PURPOSE

The purpose of this SCP is to outline response actions for potential spills of hazardous materials of any quantity, including a worst case scenario, at the Jackfish Facility. The plan identifies key response personnel and their roles and responsibilities in the event of a spill, as well as the equipment and other resources available to respond to a spill. It details the spill response

procedures that will minimize potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to a spill. More specifically, the purpose is:

- to comply with NTPC's Environmental Protection Policy (Appendix D);
- to identify the organization, responsibilities, and reporting procedures of the Jackfish Facility response team in the event of a spill;
- to provide readily accessible emergency information to the cleanup crews, management, and government agencies in the event of a spill;
- to comply with federal and territorial regulations and guidelines pertaining to the preparation of contingency plans and notification requirements;
- to promote the safe and effective recovery of spilled materials;
- to minimize the environmental impacts of spills to land or water; and, to provide site information on the facilities and contingencies in place if a spill or malfunction should occur.

This SCP has been prepared in general accordance with the following reference documents:

- Government of Northwest Territories. 1993. Spill Contingency Planning and Reporting Regulations R-068-93. Yellowknife, NWT.
- Government of Northwest Territories. March 2011. Guide to the Spill Contingency Planning and Reporting Regulations. Resources, Wildlife & Economic Development.
- Indian and Northern Affairs Canada (INAC). 2007. Guidelines for Spill Contingency Planning. Yellowknife, NWT: Water Resources Division of INAC.
- Government of Northwest Territories. 1993. Northwest Territories Waters Regulations SOR/93-303. Yellowknife, NWT. Note that the the *Northwest Territories Devolution Act* repealed the *Northwest Territories Waters Act,* reflecting its provisions in the amended *Mackenzie Valley Resource Management Act*. The *Northwest Territories Devolution Act* transferred the Northwest Territories Waters Regulations under the authority of the *Mackenzie Valley Resource Management Act*, and deemed the regulations to remain in force until they are repealed or replaced.
- Canadian Council of Ministers of the Environment (CCME). 2003. Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products. Winnipeg, Manitoba.

1.3 SCOPE

This SCP applies to the accidental and/or uncontrolled release of a contaminant into the environment that has the potential for adverse impact. The SCP applies to all casual, permanent, part-time, full-time employees, and contractors who conduct work or provide services at the Jackfish Facility. This SCP covers activities and operations conducted at the Jackfish Facility.

1.4 SAFETY DATA SHEETS

In the event of a hazardous materials spill, all responders and/or affected parties must be aware of the hazards and properties associated with the spilled product(s). NTPC maintains Safety Data Sheets (SDS) for all controlled products used, stored, and/or handled at NTPC work sites. SDS are maintained up-to-date and are located in binders at each plant, mechanics garage, and office.

NTPC's SDS are also available online at: **https://www.3eonline.com/**

User name: ntpc

Password: msds

This login information is also available on the PowerLine under Division/Health, Safety & Environment/Environment/ Workplace Hazardous Materials Information System (WHMIS).

1.5 GENERAL RESPONSIBILITIES

1.5.1 General

- 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.

1.5.2 Contractor and Subcontractors

- Know the location of the SCP, spill response materials, first aid stations, emergency and safety equipment, SDS, emergency exits, and muster stations.
- Wear appropriate personal protective equipment (PPE).
- Know basic spill prevention requirements.
- Know the spill reporting procedures.
- Report all emergencies and spills to the Plant Operator.
- Comply with all NTPC and Jackfish Facility policies and procedures when performing duties.

1.5.3 Onsite NTPC Employees

- Ensure worksite and personnel safety.
- Know the location of the SCP, spill response materials, first aid stations, emergency and safety equipment, SDS, emergency exits, and muster stations.
- Wear appropriate PPE.
- Know basic spill prevention requirements.
- Know the spill reporting procedures.

- Report all emergencies and spills to the Plant Operator.
- Comply with all NTPC and Jackfish Facility policies and procedures when performing duties.

1.5.4 Plant Operator / On-Scene Coordinator

The Plant Operator has knowledge of the specific procedures that must be followed to work with and/or near hazardous materials in a safe and secure manner. The Plant Operator is also the On-Scene Coordinator and is responsible for:

- ensuring the safety of all personnel and the site;
- ensuring all new site personnel and contractors are oriented and have access to all the required documentation;
- ensuring all NTPC employees and contractors adhere to the requirements of the SCP;
- acting as the On-Scene Coordinator in responding to spills;
- activating and coordinate the SCP and any other required contingency plans in the case of an emergency or spills involving hazardous materials or wastes and direct any cleanup activity until completion or until authority is passed to other personnel;
- notifying NTPC management and local contractors as required; and
- reporting the spill to the NWT 24-HOUR SPILL REPORT LINE.

1.5.5 Manager, Operations and Maintenance

- Ensure that the response initiated at the Jackfish Facility by the Plant Operator is immediate, effective and sustained.

1.5.6 Director, Health, Safety & Environment

- Maintain and complete the annual review of the SCP.
- Ensure that all SCP documentation remains up-to-date and the updated versions are distributed out to the personnel on site, external agencies and organizations.
- Liaise with the Plant Operator and/or Manager, Operations and Maintenance and the appropriate environmental regulatory body to ensure that the response to a spill at the Jackfish Facility is completed in accordance with existing environmental laws and regulations.
- In coordination with the Plant Operator, prepare and submit any formal reports (within the required time frame) to regulators and NTPC management regarding the management of hazardous materials and spill response (Appendix H).

1.5.7 Third Party Contractors and Suppliers

- Ensure worksite and personnel safety.
- Know the location of the SCP, spill response materials, first aid stations, emergency and safety equipment, SDS, emergency exits, and muster stations.

- Wear appropriate PPE.
- Know basic spill prevention requirements.
- Know the spill reporting procedures.
- Report all emergencies and spills to their supervisor and/or the Plant Operator.
- Comply with all NTPC and Jackfish Facility policies and procedures when performing duties.

2 JACKFISH LAKE GENERATING FACILITY

2.1 SITE DESCRIPTION

The Jackfish Facility is located on the north end of Yellowknife on the north shore of Jackfish Lake and is surrounded with a chain-link fence. Access to the Jackfish Facility is through a double gate located on the north side of the property near the Ruston Plant, a man gate and a double gate on the west side of the property, and a man gate and an automatic vehicle gate in the southeast corner of the property (primary access) (Figures 2-1).

The arrangement of buildings from east to west along the south side of the property is as follows: the office building, the Cat Plant, the EMD Plant, the 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 is the substation, three modular genset units (G20, G22 and G23), a 90,000 L horizontal fuel tank, the Ruston Plant (used for material storage), a drum storage berm, the tank farm, and the line yard. Pole storage is located outside the fence north of the Ruston Plant.

Figure 2-1: Jackfish Lake Generating Facility

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

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2.2 LOCATION AND LIST OF HAZARDOUS MATERIALS ON-SITE

2.2.1 Bulk Petroleum Product Storage

Diesel fuel is the main hazardous material used and stored at the Jackfish Facility. The Jackfish Facility handles bulk volumes of diesel fuel for generation. Depending on load requirements at the Jackfish Facility NTPC receives an average 1,000,000 L to 1,500,000 L of diesel fuel trucked annually to the Jackfish Facility. Bulk petroleum product storage tanks are listed in Table 2.1:

Table 2-1: Bulk Petroleum Product Storage Tanks

Storage Tank	General Description	Location
Tank Farm Fuel Storage Tank	1 vertical 1,700,000 L earth-bermed diesel fuel tank	Located on the northwest side of the property inside the tank farm berm
Modular Unit (G20, G22 and G23) Fuel Storage Tank	1 horizontal 90,000 L double-walled diesel fuel storage tank	Located north of the Ruston Plant
Heavy Equipment Fuel Storage Tank	1 horizontal 4,000 L double-walled diesel fuel storage tank	Located south of the Warehouse
Warehouse Heating Fuel Storage Tank	1 horizontal 1,137 L double-walled diesel fuel storage tank	Located south of the Warehouse Plant
Cat Plant Heating Fuel Storage Tank	1 horizontal 1,137 L double-walled diesel fuel storage tank	Located south of the Cat Plant
B1 Office Building Heating Fuel Storage Tank	1 horizontal 1,137 L double-walled diesel fuel storage tank	Located west of the B1 Office Building
Cat Plant Fuel Day Tank	1 horizontal 2,273 L inside diesel fuel day tank	Located inside the Cat Plant
EMD Plant Fuel Day Tank	4 horizontal 1,137 L inside diesel fuel day tanks	Located inside the EMD Plant beneath the gensets
K-Plant Fuel Day Tank	1 horizontal 5,000 L inside diesel fuel day tank	Located inside the K-Plant
Line Shop Fuel Day Tank	1 horizontal 1,137 L inside diesel fuel day tank	Located inside the Line Shop

2.2.2 Onsite Hazardous Product Storage

Next to diesel fuel, lube oil and glycol are the two most abundant hazardous goods stored at the Jackfish Facility. Hazardous product storage area locations are presented in Table 2.2:

Table 2-2: Hazardous Product Storage Areas

Storage Tank/Storage Area	General Description	Location
Tank Farm Fuel Storage Tank	1 vertical 1,700,000 L earth-bermed diesel fuel tank	Located on the northwest side of the property inside the tank farm berm
Modular Units (G20, G22 and G23) Fuel Storage Tank	1 horizontal 90,000 L double-walled diesel fuel storage tank	Located north of the Ruston Plant
Heavy Equipment Fuel Storage Tank	1 horizontal 4,000 L double-walled diesel fuel storage tank	Located south of the Warehouse
Warehouse Heating Fuel Storage Tank	1 horizontal 1,137 L double-walled diesel fuel storage tank	Located south of the Warehouse Plant
Cat Plant Heating Fuel Storage Tank	1 horizontal 1,137 L double-walled diesel fuel storage tank	Located south of the Cat Plant
B1 Office Building Heating Fuel Storage Tank	1 horizontal 1,137 L double-walled diesel fuel storage tank	Located west of the B1 Office Building
Cat Plant Fuel Day Tank	1 horizontal 2,273 L inside diesel fuel day tank	Located inside the Cat Plant
EMD Plant Fuel Day Tank	4 horizontal 1,137 L inside diesel fuel day tanks	Located inside the EMD Plant beneath the gensets
K-Plant Fuel Day Tank	1 horizontal 5,000 L inside diesel fuel day tank	Located inside the K-Plant
Line Shop Fuel Day Tank	1 horizontal 1,137 L inside diesel fuel day tank	Located inside the Line Shop
Cat Plant Lube Oil (Inside)	2 horizontal 2,273 L lube oil tanks	Located inside the Cat Plant
EMD Lube Oil (Inside)	1 horizontal 2,273 L lube oil tank	Located inside the EMD Plant
K-Plant Lube Oil Tank (Inside)	1 horizontal 5,000 L lube oil tank	Located inside the K-Plant
EMD Lube Oil Tank (Outside)	1 horizontal 75,000 L steel-bermed lube oil tank	Located north of the EMD Plant
K-Plant Lube Oil Tank (Outside)	1 horizontal 43,300 L steel-bermed lube oil tank	Located north of the K-Plant
Used Lube Oil Tank	1 horizontal 41,000 L steel-bermed waste lube oil tank	Located north of the Cat Plant
Transformer Storage Platform	Various transformers containing transformer oil	Located in the Line Yard north of the Line Shop
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

To assist in the safe and secure storage of fuels, hazardous materials and hazardous waste, 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 hazardous materials/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 materials shall be segregated by chemical compatibility within the storage area to prevent contact between materials in the event of a release.
- Storage containers will be clearly labelled, visible to all staff and contractors.
- Storage areas shall be located at least 100 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 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 Section 6.1 and Appendix F.

3 SPILLS

3.1 WHAT IS A SPILL?

For the purposes of this SCP, a spill is defined as an accidental release of a contaminant into the environment that has the potential for adverse impact.

3.2 MATERIALS & REPORTABLE SPILLS ON SITE

According to the NWT Spill Contingency Planning and Reporting Regulations, where there is a reasonable likelihood of a spill in an amount equal to or greater than the amounts set out in Table 3.1, the spill must be reported to the NWT 24-HOUR SPILL REPORT LINE at 867-920-8130.

The Plant Operator, or their designate, is responsible for reporting spills at the Jackfish Facility. The Plant Operator must be notified immediately of any spill, regardless of quantity to land or water.

As part of NTPC's Environmental Protection Policy, all hazardous material spills over 5 L to ground/floor or any amount to water (including frozen) must be reported to the Plant Operator, Health, Safety and Environment Department and the NWT 24-HOUR SPILL REPORT LINE.

The Jackfish Facility maintains a detailed log of all spills of hazardous materials, including non-reportable spills.

Table 3-1: Immediately Reportable Quantities

Transportation Class	Description of Contaminant	Amount Spilled
1	explosives	any amount
2.1	compressed gas (flammable)	any amount of gas from containers with a capacity greater than 100 L
2.2	compressed gas (non-corrosive, non-flammable)	any amount of gas from containers with a capacity greater than 100 L
2.3	compressed gas (toxic)	any amount
2.4	compressed gas (corrosive)	any amount
3.1, 3.2, 3.3	flammable liquid	>100 L
4.1	flammable solid	25 kg
4.2	spontaneously combustible solids	25 kg
4.3	water reactant solids	25 kg
5.1	oxidizing substances	50 L of 50 kg
5.2	organic peroxides	1 L or 1 kg

Table 3-1: Immediately Reportable Quantities

Transportation Class	Description of Contaminant	Amount Spilled
6.1	poisonous substances	any amount
6.2	infectious substances	any amount
7	radioactive substances	any amount
8	corrosive substances	5 L of 5 kg
9.1 (in part)	miscellaneous substances	50 L or 50 kg
9.2	environmentally hazardous	1 L or 1 kg
9.3	dangerous wastes	5 L of 5 kg
9.1 (in part)	PCB mixtures of 5 ppm or more	0.5 L or 0.5 kg
None	other contaminants	100 L or 100 kg

Notes: L = litre; kg = kilogram; PCB = polychlorinated biphenyls; ppm = parts per million.

3.3 SPILL PREVENTION MEASURES

Planning for an emergency situations is imperative, due to the nature of the materials stored on site as well as location of the site. Along with the preventative measures outlined below, adequate training of staff and contractors is paramount.

The following general preventative measures are in place to minimize the risk and impact of a potential spill or release:

- Prior to starting work at the Jackfish Facility, all employees and contractors are required, as a minimum, to go through an orientation session to familiarize themselves with this SCP, the hazardous materials present at the Jackfish Facility and the Jackfish Facility spill response procedures.
- All site staff are trained on the safe handling, transfers and dispensing of fuels at the Jackfish Facility. Safe practices include, but are not limited to, required PPE, constant attendance during fuelling operations, only fuelling when spill kits are available nearby, and awareness of location of pump shut-offs and emergency shut-offs. Records of training are maintained.
- The tank farm and hazardous materials storage berm are located more than 100 m from Jackfish Lake;
- Whenever possible new hazardous products are stored indoors where spills are not likely to exit from the building.
- Spill kits are provided wherever fuel is stored, used and transferred. The spill kits and their contents are regularly inspected to ensure that adequate supplies are available.
- Fuel and chemical storage areas are provided with secondary containment.
- The Plant Operator conducts daily visual inspections of the Jackfish Facility to check for leaks or damage to the fuel storage containers, as well as for stained or discoloured soils around the fuel and chemical storage areas. Storage areas are kept clear of snow and debris.

NTPC also supports the following general principles for spill prevention:

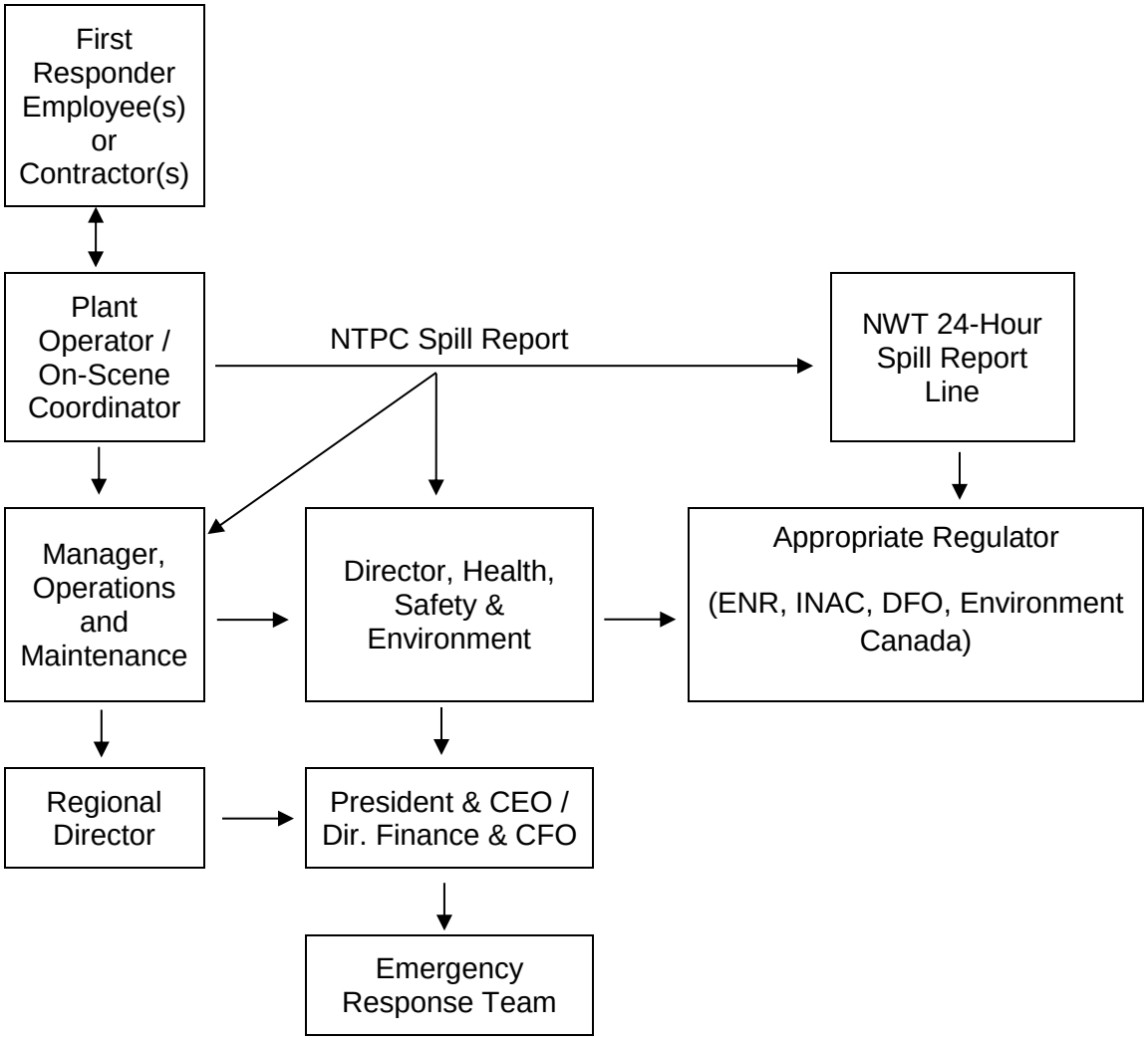
- Train workers in the use of safe work practices and procedures for handling hazardous materials, and spill clean up.
- Encourage workers to take reasonable measures to prevent spills.
- Provide access to up to date SDS for all hazardous materials.
- Conduct inspections of fuel/chemical storage areas.
- Keep drums/containers sealed or closed, except when removing or adding contents.
- Avoid overfilling drums/containers.
- Place drums/containers within a suitable form of secondary containment.
- Keep storage areas secure from unauthorized access.
- Segregate incompatible materials.
- Ensure storage areas are adequately protected from weather and physical damage.
- Provide adequate spill response materials at storage areas.
- Develop and implement good environmental work practises such as the use of oil drip trays and absorbents for servicing vehicles.
- Regularly inspect, clean and maintain.
- Regularly inspect storage areas.

4 RESPONSE ORGANIZATION

4.1 RESPONSE ORGANIZATION

The flowchart depicted in Figure 4-1 identifies the response organization and the chain of command for responding to a spill. In accordance with the action plan described in Section 5, the response organization details the roles and responsibilities of each party involved in the spill and their contact information, including the 24-hr phone numbers for the responsible personnel.

Figure 4-1: Spill Response Organizational Communication Flowchart



4.2 RESPONSE TEAM ROLES AND RESPONSIBILITIES

4.2.1 First Responder

The person who has caused a spill or is the first to observe the spill is the first responder. This includes NTPC employees and contractors working at the Jackfish Facility. The roles and responsibilities of the first responder are as follows:

- to ensure site and personnel safety
- to assess the preliminary severity and source of the spill
- to identify and contain the spill, if it is safe to do so
- to immediately report to and work with the On-Scene Coordinator/Plant Operator
  - contractor employees are to report through their Supervisors, who in turn are required to report to the On-Scene Coordinator/Plant Operator
- to participate in spill response as a member of the cleanup crew if requested by the On-Scene Coordinator/Plant Operator and trained to do so

4.2.2 On-Scene Coordinator / Plant Operator

The On-Scene Coordinator/Plant Operator must be knowledgeable with regard to site operations, initial response actions, and spill response equipment and facilities. Responsibilities of the On-Scene Coordinator/Plant Operator are as follows:

- to ensure that on-site personnel have the appropriate training to respond to any spill;
- to assume complete authority over cleanup personnel and the spill scene, as well as assume responsibility for all mitigation efforts, as required;
- to evaluate the initial situation and assess the magnitude of the problem;
- to report the spill to the NWT 24-HOUR SPILL REPORT LINE at 867.920.8130 as soon as possible;
- to activate the initial response plan;
- to ensure assigned responsibilities are carried out and the activities of spill response team members are coordinated;
- to assess the requirements for people, equipment, materials, and tools to contain the spill in light of what resources are immediately available; urgency will depend on the nature of the spill;
- to assist the Director, Health, Safety and Environment with regulatory and licensing reporting requirements, including gathering relevant information and submitting any formal reports (within the required time frame) to the applicable regulatory agencies and NTPC management detailing the occurrence of a spill; this includes submitting an incident reporting form;
- assist Manager, Communications with providing information to the public, media, and government agencies, as required; and

- to ensure that the spill response team is provided with proper PPE.

4.2.3 On-Site Spill Response Team

The On-Site Spill Response Team consists of the First Responder and specifically trained staff who are on site and ready to aid in the cleanup of a spill. Responsibilities are as follows:

- liaise with On-Scene Coordinator and keep them informed of cleanup activities;
- ensure on-site resources for spill response and cleanup are available;
- assist in obtaining any additional resources not available on site;
- ensure that appropriate PPE is worn properly; and
- conduct cleanup of spills under the direction of the On-Scene Coordinator.

4.2.4 Director, Health, Safety and Environment

In terms of spills, the Director, Health, Safety and Environment is responsible to:

- provide technical advice on the anticipated environmental impacts of the spill;
- advise on the effectiveness of various containment, recoveries, and disposal options, and suggest the most appropriate approach;
- assist Manager, Communications with providing information to the public, media, and government agencies, as required;
- monitor the effectiveness of the cleanup operation and recommend further work, if necessary;
- communicate with the various regulatory agencies as required; and
- complete and fax (867-873-6924) or email (spills@gov.nt.ca) a NWT SPILL REPORT Form to the NWT 24-HOUR SPILL REPORT LINE.

4.2.5 Manager Operations

In the case of a spill that is deemed to be a potential emergency, the Manger Operations is to:

- to alert and assemble key personnel in the on-site spill response team, as deemed appropriate, to handle the situation;
- to develop the overall plan of action for containment and cleanup of the specific incident, as well as direct and implement the plan;
- call the required Director within NTPC (Table 4-1); and
- ensure that the On-Scene Coordinator is provided will adequate resources to deal with the spill / emergency.

4.2.6 President & CEO and the Director of Finance & CFO

In terms of spill response, responsible to:

- determine if an Emergency Response Team (ERT) is required; and
- determine the personnel on the ERT.

4.3 ORGANIZATIONAL COMMUNICATION PLAN

When a spill has been identified, report the spill to the Plant Operator. They are in charge of the Jackfish Facility and of activating the SCP. They will also inform head office for tracking spills in the company database and notify head office in the event of public inquiries. If the Plant Operator cannot be reach contact the Manager, Plan Operations:

Robert Sunderland
Manager, Plant Operations
Box 2250, Yellowknife, NWT, X1A 2P7
867-669-3380 (w)
867-444-0985 (c)

If they cannot be reached, contact the NTPC Central Control Room, 24 hours a day, 365 days a year, as follows:

NTPC 24-Hour Central Control Room
Box 2250, Yellowknife, NWT, X1A 2P7
(867) 669-3370

In the event that it is not safe to attempt a cleanup effort internally, the Plant Operator / On-Scene Coordinator will contact the Director, Health, Safety and Environment and Operations Manager, or the NTPC On-site Representative and the NWT 24-HOUR SPILL REPORT LINE to coordinate cleanup using external resources.

The President & CEO and the Director of Finance & CFO will determine if an ERT is required to deal with the emergency, and if so, who will be on the ERT from the various departments.

It is the job of the Director, Health, Safety & Environment, to contact the appropriate regulator, when necessary; either the Government of the Northwest Territories (GNWT) Department of Environment and Natural Resources, INAC, or Department of Fisheries and Oceans (DFO).

If the Manager, Plant Operations cannot be reached, contact **Central Control Room** in Yellowknife (867-669-3370 phone, 867-669-3385 fax).

If spill response requires assistance or is an emergency, Manager, Plant Operations or Central Control Room must call the appropriate numbers according to region (Table 4-3).

4.4 CALLS THAT MUST BE MADE

***Note**: all phone numbers use **area code 867** unless otherwise specified.*

When a spill of any size is discovered, the Plant Operator notifies both:

- **Manager, Plant Operations** (contact info in Table 4-1); and
- **24-Hr Spill Report Line** (920-8130 phone, 873-6924 fax).

If the Manager, Plant Operations cannot be reached, contact **Central Control Room** in Yellowknife (669-3370 phone, 669-3385 fax).

If spill response requires assistance or is an emergency, Manager, Plant Operations or Central Control Room must call the appropriate numbers according to region (Table 4-3).

Emergency Response Team: For the most serious emergencies (Level-Three Emergency or those involving spills into water) **Senior Leadership** will form the ERT immediately (Table 4-2). Senior Leadership may opt to form this team for lesser emergency levels on a case-by-case basis. Should assistance from regulators or government be required, agencies with some ability to support are provided in Table 4-3.

Table 4-1: NTPC Emergency Response Phone List

Region	Position	Name	Phone (867)	Fax (867)
All Regions Must Contact:	Director, Corporate Health, Safety & Env.	Edward Smith	874-5327 (work) 875-7737 (cell) 874-2491 (home)	874-5286
	President & CEO	Jay Grewal	874-5276 (w) 876-2777 (c)	875-5349
	Director of Finance & CFO	Belinda Whitford	874-5219 (w) 780-991-9838 (c)	874-5251
Hydro Region	Director	Colin Steed	669-3326 (w) 445-4712 (c)	669-3318
	Manager, Operations North Slave (Acting)	Robert Sunderland	669-3380 (w)	669-3316
	Manager, Operations South Slave	Ken Bell	872-7105 (w) 872-8068 (c)	872-7149
	Manager, Electrical Services	Robert Burgin	669-3308 (w) 444-8424 (c)	669-3316
	Manager, System Con and Hydro Planning	Vacant		
Thermal Region	Director	Mike Ocko	777-7714 (w) 678-5667 (c)	777-4318
	Manager, Maintenance Services	Trevor Grant	777-7736 (w) 678-5778 (c)	777-4318

Table 4-2: Core Emergency Response Team Phone List

Position	Name	Phone (867)
President & CEO Director, Finance & CFO Director, Engineering Director, IT Manager, Human Resources Director, Hydro Region Director, Thermal Region Director, Health, Safety & Env.	Jay Grewal Belinda Whitford Scott Spencer D'arcy Delorey Erin Dean Colin Steed Mike Ocko Edward Smith	874-5276 (w), 876-2777 (c) 874-5234 (w), 780-991-9838 (c) 874-5283 (w), 875-7032 (c) 874-5206 (w), 876-0168 (c) 874-5228 (w) 876-0336 (c) 669-3326 (w), 445-4712 (c) 777-7714 (w), 678-5667 (c) 874-5327 (w), 875-7737 (c)
Communications Manager	Doug Pendergast	874-5202 (w), 876-1095 (c)
Treasurer	Cory Strang	874-5217 (w), 875-7676 (c)

Table 4-3: Contact Information for Relevant Government Agencies

Contact	Phone
Department of Fisheries and Oceans	(867) 669-4900
Emergency Measures Organization	(867) 873-7554
GNWT Lands Inspector	(867) 767-9187
Department of Environment and Natural Resources	(867) 873-7654
Indian and Northern Affairs Canada	(867) 669-2764
Public Works - Yellowknife Region	(867) 873-1517
Environment Canada (Emergency) Yellowknife	(867) 669-4725
GNWT Environmental Health Office	(867) 669-8979
Coast Guard – Auxiliary Central & Arctic Region	1-800-267-7270

5 ACTION PLAN

5.1 POTENTIAL DISCHARGE EVENTS – WORST CASE SCENARIOS

In Table 5-1, a list of potential discharge events, with associated discharge volumes and directions is presented for the primary hazardous materials stored on site. The most likely discharge volume is indicated and the spill clean up procedures will focus on the spills of this quantity. A worst case scenario is also presented. Specific discharge rates are not indicated for each fuel types as these would vary from a few minutes to several hours, based on the source of leak or puncture.

Table 5-1: List of Hazardous Materials, Potential Discharge Events, Potential Discharge Volumes (Worst Case Scenario in Brackets) and Direction of Potential Discharge

Material (sources)	Potential Discharge Event	Discharge Volume (worst case)	Direction of Potential Discharge
Diesel Fuel (Aboveground storage tank, power generator, vehicles and equipment)	Overfilling of ASTs at fill port Disconnection or failure of fuel transfer hose during AST filling operations Overfilling of heavy equipment at dispensing area Transfer hose leak while dispensing Leak from fuel tank on vehicles and equipment due to collision / accident	Likely < 1,000 L (max 1,700,000 L if catastrophic failure of diesel AST)	Spills associated with AST will generally be contained within the tank farm berm. General small spills to ground will spread out overland in direction of downward slope with potential for underground infiltration.
New and Used Lubricating Oil (Storage building and storage berm)	Overfilling of ASTs at fill port Disconnection or failure of fuel transfer hose during AST filling operations Minor leaking product container or drum Large puncture, fast leaking container / drum	Likely < 1,000 L (max 75,000 L)	Spills associated with AST will generally be contained within the steel berm. General small spills to ground will spread out overland in direction of downward slope with potential for underground infiltration. Product released in the storage berm will be contained in secondary containment

Table 5-1: List of Hazardous Materials, Potential Discharge Events, Potential Discharge Volumes (Worst Case Scenario in Brackets) and Direction of Potential Discharge

Material (sources)	Potential Discharge Event	Discharge Volume (worst case)	Direction of Potential Discharge
New and used glycol (Hazardous product storage berm)	Minor leaking product container or drum Large puncture, fast leaking container / drum Overfilling of used oil drums All containers / drums in storage area leaking at once (very unlikely)	Likely < 205 L (max 205 L)	General small spills to ground will spread out overland in direction of downward slope with potential for underground infiltration. Product released in the storage berm will be contained in secondary containment
Acetylene (Mechanic Shop)	Leak from open or failed / corroded valve Corrosion of cylinder shell Cylinder puncture / rupture from mechanical damage All cylinders in storage area leaking at once (very unlikely)	Likely < 100 lbs (max 100 lbs)	To the air in the immediate vicinity of leak, moves laterally in same direction as wind, dissipates readily into the open air
Oxygen (Mechanic Shop)	Leak from open or failed / corroded valve Corrosion of cylinder shell Cylinder puncture / rupture from mechanical damage All cylinders in storage area leaking at once (very unlikely)	Likely < 100 lbs (max 100 lbs)	To the air in the immediate vicinity of leak, moves laterally in same direction as wind, dissipates readily into the open air

Notes: ABS = above ground storage tank; lbs = pounds; L = litre; kg = kilogram; < = less than.

5.2 POTENTIAL ENVIRONMENTAL IMPACTS OF SPILL (INCLUDE WORST CASE SCENARIO)

Overall for all hazardous materials discussed below, impacts are lower during winter as snow is a natural sorbent and ice forms a barrier limiting or eliminating soil or water contamination, thus spills can be more readily recovered when identified and reported.

5.2.1 Flammable and Combustible Liquids

Flammable liquids have flash points below 37.8°C, evaporate quickly, and within a short period of time can reach high vapor concentrations in air. Flammable liquids at the Jackfish Facility include, but are not limited to, gasoline and aviation fuel. Although not stored on site, aviation fuel will be present in helicopters landing at the Jackfish Facility. Spills of flammable liquids represent an extreme fire and explosion hazard if vapour concentrations exceed the lower explosion limit. They are generally harmful if inhaled and can also be absorbed through the skin.

Combustible liquids such as diesel fuel have a **flash point above 37.8°C but below 93.3°C** and are not fire hazards at room temperature. The principal hazard from non-flammable, volatile liquid spills is exposure to the vapor by inhalation or skin absorption.

The most common flammable and combustible materials stored and handled on site are liquids such as gasoline, diesel, and waste oils. For the purposes of spill response actions, lubricants and motor oil have been included with the flammable and combustible compounds given their petroleum hydrocarbon based nature. Glycol product and used glycol spills will also be handled as flammable/combustible materials.

Gasoline

Environmental impacts: Gasoline may be harmful to wildlife and aquatic life. It is considered a carcinogen and does not readily biodegradable. Gasoline is quick to volatize. It has a relatively low solubility in water and is less dense than water, and hence can form a layer of non-aqueous phase liquid (NAPL) floating on top of water if released in sufficient quantities. Runoff into water bodies must be avoided.

Worst case scenario: 205 L container failure and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Diesel

Environmental impacts: Diesel may be harmful to wildlife and aquatic life. It is not readily biodegradable. Diesel burns slowly and thus the risk to the environment is reduced during recovery as burn can be more readily contained compared with volatile fuels. It has a relatively low solubility in water and is less dense than water, and hence can form a layer of NAPL floating on top of water if released in sufficient quantities. Runoff into water bodies must be avoided.

Worst case scenario: Aboveground storage tank secondary containment failure or seam/joint failure and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Oil Product, Used Oil and Miscellaneous Oils/Grease

Environmental impacts: Raw oil product, used oils may be harmful to wildlife and aquatic life. They are not readily biodegradable. These compounds generally have a low solubility in water, thereby separating into NAPL. Runoff into water bodies must be avoided.

Worst case scenario: All storage drums punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

5.2.2 Compressed Gases

Compressed gases such as propane and acetylene are stored in relatively small quantities at the Jackfish Facility. However, they are flammable gases and can ignite and explode if exposed to an ignition source. Vapours cannot be contained when released, and it is important that personnel withdraw immediately from any such release. If tanks are damaged, the gas should be allowed to disperse, with no attempt at recovery.

Compressed gas spills/leaks can generally be divided into two categories. The first are those leaks which occur away from the gas cylinder in lines, tubing, or apparatus. These types of leaks can generally be stopped by closing the main cylinder valve, if it is otherwise safe to do so. The second category of leak occurs at the cylinder itself, and cannot be stopped by closing the cylinder valve. In some cases it may not be possible to close a cylinder valve due to age or poor condition, and as such, this situation falls into the second category of gas leak. **All leaking gas cylinders are considered an emergency if the leak cannot be stopped by closing the cylinder valve.** Leaks of oxygen, flammable gas, or toxic gas are especially dangerous.

Acetylene

Environmental impacts: Acetylene is not especially toxic to wildlife, aquatic life or the environment in general. Depending on the manufacturing process it can contain toxic impurities such as traces of phosphine and arsine. Acetylene is extremely volatile and very flammable, thus it represents a health hazard for fire and explosion.

Worst case scenario: All cylinders were punctured or failed simultaneously and contents leaked into the surrounding environment and ignited leading to a fire and/or explosion. This could cause serious environmental impacts in the immediate surroundings. Safety during emergency response to an acetylene spill is of the utmost concern.

Oxygen

Environmental impacts: Oxygen is not considered toxic or harmful to wildlife or aquatic life or the environment in general. Highly concentrated sources of oxygen promote rapid combustion and therefore are fire and explosion hazards in the presence of fuels.

Worst case scenario: All cylinders were punctured or failed simultaneously and contents leaked into the surrounding environment and promoted ignited leading to a fire and/or explosion. This could cause serious environmental impacts in the immediate surroundings. Safety during emergency response to an oxygen spill is of the utmost concern.

5.2.3 Infectious Substances / Sewage

Infectious substances such as biological wastes from the sewage treatment plant are potentially hazardous when inhaled, ingested, and in contact with the eye. Initial preventative measures include wearing appropriate PPE (impermeable gloves, eye protection, and respirators appropriate for the size and type of spill). In the event of a spill on land, the material will be contained by diking or barrier. Liquids spilled in water will be dammed and diverted. Where raw sewage is spilled, the spill material can be sent to the City of Yellowknife sewage lagoon.

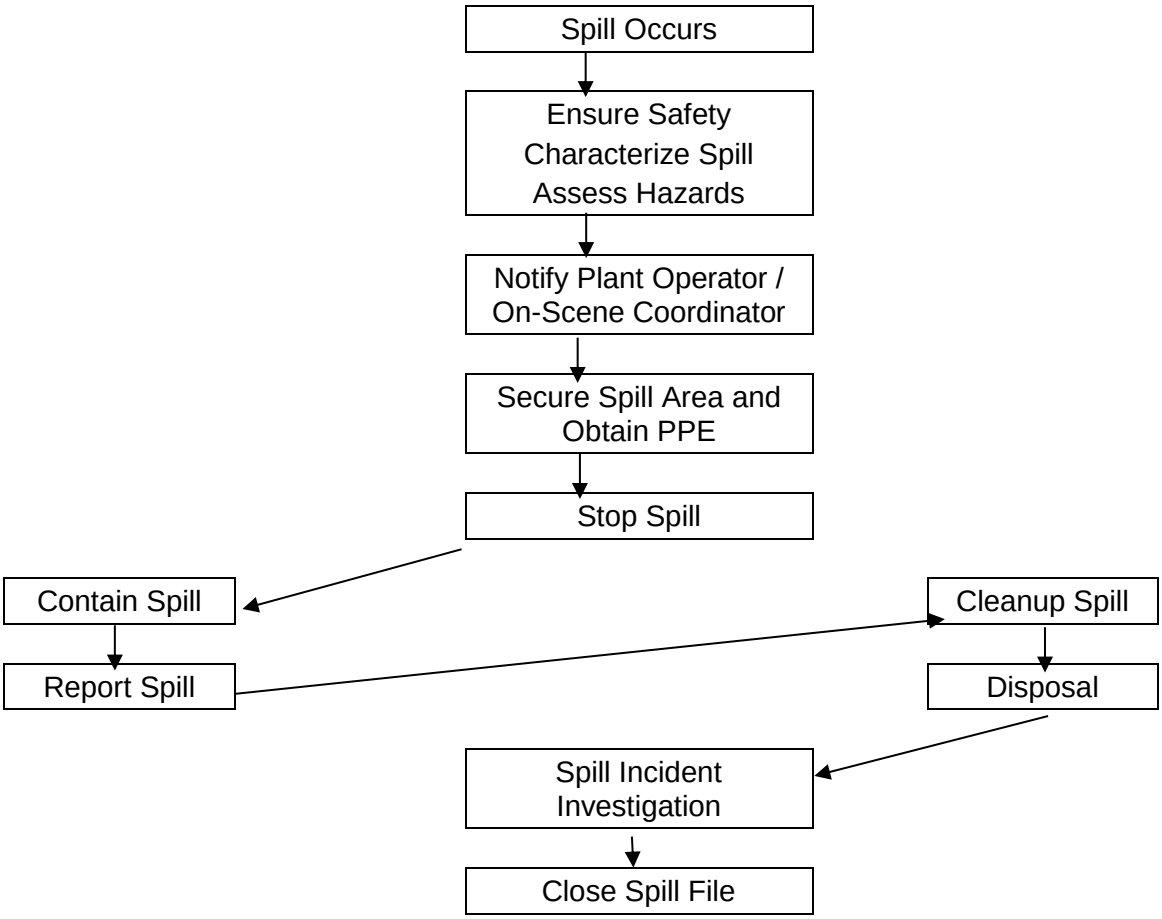
Sewage

Environmental impacts: Microbes in raw sewage can enter the body via the nose, mouth, open wounds or by inhalation of aerosols or dusts. Raw sewage contains biological agents such as bacteria, viruses, fungi and parasites (e.g., tetanos bacterium Clostridium tetani, the parasitic worm Leptospira icterohaemorrhegiae, the Hepatitis A virus, protozoan parasites Giardia and Cryptosporidium, and bacteria E.coli) that can cause serious illness and even death. There is also a risk from contamination with unknown chemicals (such as solvents, fuels, general household cleaning chemicals) discharged with grey water and from toxic, irritant, asphyxiating or flammable gases in confined spaces (e.g., septic tanks). The risk of exposure when handling sewage can be reduced significantly by effective and immediate clean-up and by taking appropriate safety precautions.

5.3 SPILL PROCEDURES

The following flowchart (Figure 5-1) outlines the overall steps to be taken in the event of a spill. The detailed description of what is required at each step is outlined in the Spill Response Procedure (Section 5.3.1).

Figure 5-1: Spill Response Flowchart



Spill Response Procedures

STEP 1 – Ensure safety, identify spill and assess hazards and risks

Initial actions for spills include ensuring personnel and site safety. Ensuring personnel and site safety is the responsibility of all parties, particularly the first responder who has the most knowledge of the spill. Upon the identification that a spill or release has occurred, the first responder shall perform the following:

- Ensure safety of yourself and all personnel.
- Alert all persons in the immediate area that a spill has occurred.
- Characterize Spill:
  - identify the material and its hazard potential (refer to SDS if necessary);
  - identify the source of the spill; and
  - identify the amount and the extent of the spill.
- Assess the spill hazards and risks to persons, property and the environment.

Note: *Where life or property is in danger, there is an emergency.* ***Get help.*** *Contact the local fire department, police or municipal authority.*

STEP 2 – Notify the Plant Operator / On-Scene Coordinator

After the details about the spill are known, the First Responder shall contact the Plant Operator / On-Scene Coordinator who will activate the SCP.

Note: *The Plant Operator / On-Scene Coordinator is to immediately contact the Manager, Plant Operations (or NTPC On-site Representative) and/or Director, Health, Safety & Environment if a spill response exceeds the abilities/capabilities of onsite personnel or equipment and/or if there is a high potential of adverse effects to offsite areas and/or sensitive ecological or human receptors. See Figure 4-1 Organizational Communication Flowchart.*

STEP 3 – Secure Area and Obtain Personal Protective Equipment

Upon determining what the spilled product is and its hazard potential, the On-Scene Coordinator shall perform the following:

- Keep all personnel not directly involved with the spill response away from the spill area.
- Ensure all personnel involved in the spill response are aware of the hazards of the spilled product, spill response and the environment.
- Obtain the required response equipment and PPE for the spill response team members. Personnel will not be able to use the response equipment and PPE until they have been trained on its proper use and limitations.

STEP 4 – Stop Spill

If Safe to do:

- Locate the spill source and stop it/shut it off (e.g., turn off pump, close valve, turn off equipment, turn off-power source).
- Shut off ignition sources.
- Shut off operating equipment.
- Attend to the injured (refer to SDS for first aid response).
- If a spill occurs from the wall of a tank and cannot be stopped, transfer the product from the leaking tank to another storage tank in order to reduce the amount spilled. Use secondary containment (drum or pail) to catch the product and prevent further impact where possible.

STEP 5 - Contain Spill

- Determine the direction and speed the spill is moving. Determine what is causing the spill to move (wind, gravity, water, etc.).
- Determine what will be affected by the spill (environment, property).
- Determine the best location where the spill can be contained with available staff and equipment.
- Determine actions to reduce risk/damage to human health, the environment and property as a result of the spill.
  - Contain the spill. Refer to Appendix E for containment methods. Refer to Section 6 and Appendix F for a list of spill response equipment.
  - First attempt to contain the spill so as to prevent its entry directly into a potable water source, water body or into a ditch or conveyance that eventually discharges in to a water body.
  - **Should the spill reach the water, IMMEDIATELY** shut down the generator and stretch a sorbent boom across at the tailrace narrows, and use sorbent pads and booms to collect product from the water's surface.
- Prepare a contingency plan in case the spill gets out of control of present staff and equipment.

Note: *Do not contain compounds (e.g., gasoline, aviation fuel) if vapours might accumulate and ignite – allow them to volatilise.*

STEP 6 - Report Spill

- Completely fill out a Spill Report Form (Appendix A) and fax to the 24-HOUR SPILL REPORT LINE, Health, Safety & Environment Department, and Manager, Operations as specified on the form. Form also available on PowerLine.
- For large fuel spills follow the Fuel Spill Calculations Procedures (Appendix B) to determine the spill volume.
- Refer to Section 5.3.2 for additional information on spill reporting procedures.
- Contact the INAC Inspector at 669-2768.

STEP 7 - Spill Recovery / Cleanup and Disposal

- Prior to initiating cleanup and disposal procedures, the appropriate regulatory body and the Manager, Safety & Environment must approve the procedures.
- Refer to Sections 5.6 to 5.9 of this SCP for information on product recovery / cleanup, storage, disposal, and site cleanup procedures.
- Upon completion of cleanup fill out a Spill Update Form (Appendix C) and fax as directed on form. Form also available on PowerLine.

STEP 8 – Spill Incident Investigation

- Plant Operator in consultation with Manager, Health, Safety & Environment and Manager Operations to conduct an internal review of the spill cause, effects, and effectiveness of the SCP procedures.
- Investigation findings to be used to develop corrective actions.

STEP 9 - Close Spill File

- The Manager, Health, Safety & Environment will follow up with the appropriate regulatory body to ensure that a satisfactory cleanup and/or remediation of affected areas has been completed.

5.3.1 Spill Reporting Procedures

NTPC policy is to report all spills of fuel or hazardous materials adjacent to or into a water body, regardless of quantity, or spills of hazardous materials over 5 litres unless the minimum quantity specified in the NWT Spill Contingency Planning and Reporting regulation is more stringent (i.e., less than 5 L).

A person reporting a spill shall give as much of the following information as possible:

a) Date and time of spill.
b) Location of spill.

c) Direction the spill is moving.
d) Name and phone number of a contact person close to the location of spill.
e) Type of containment spilled and quantity spilled.
f) Cause of spill.
g) Whether the spill is continuing or has stopped.
h) Description of existing containment.
i) Action taken to contain, recover, clean up and dispose of spilled contaminants.
j) Name, address and phone number of person reporting spill.
k) Name of owner or person in charge, management or control of contaminants at time of spill.

Reporting shall not be delayed because of the lack of knowledge of any of the factors listed. No person shall knowingly make a false report of a spill or potential spill.

It is the responsibility of the Plant Operator to report the spill to the 24-HOUR SPILL REPORT LINE at (867) 920-8130, and they shall perform the following:

1. Fill out the SPILL REPORT Form as completely as possible. The form is available through the PowerLine (Appendix A). If required for a large fuel spill, follow the Fuel Spill Calculation Procedures (Appendix B) to determine the spill volume.
2. Fax or phone in the Spill Report Immediately to the 24-HOUR SPILL REPORT LINE at:

Fax: (867) 873-6924
Phone: (867) 920-8130

***NOTE**: Collect telephone calls can be made by informing the Operator that you wish to report a spill. RCMP communications may be used if other means are not available.*

3. Fax Spill Report to Health, Safety & Environment Department and Manager, Plant Operations. See phone list (Table 4-1) for contact info.

5.4 DECONTAMINATION

Adjacent to, or near the spill zone, decontamination stations will be established. The decontamination stations will be constructed so that personnel will pass through the station prior to leaving the contaminated area. The decontamination stations may be bermed and lined with plastic sheeting. Washing solutions may be placed near the spill site. All solutions in tubs will be clearly marked.

***Note:** Notwithstanding the preceding, all applicable health and safety rules, regulations, and legislation will be adhered to.*

5.5 CONTAINMENT

The following section describes various methods which may be employed to contain a spill to land, water, ice or snow.

5.5.1 Containment of Spills on Land

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, thus spills on soil are generally less serious then spills on water as contaminated soil can be more easily recovered. Generally, spills on land occur during the late spring, summer or fall when snow cover is at a minimum. It is important that all measures be undertaken to avoid spills reaching open water bodies.

The following methods are described in more detail in Appendix E:

- Dykes
- Trenches
- Dams

5.5.2 Containment of Spills to Water

Spills on water such as rivers, streams or lakes are the most serious types of spills as they can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water.

The following methods are described in more detail in Appendix E:

- Booms
- Weirs
- Barriers

5.5.3 Containment of Spills On or Under Ice

Spills on ice are generally the easiest spills to contain due to the predominantly impermeable nature of the ice. For small spills, sorbent materials are used to soak up spilled fuel. Remaining contaminated ice/slush can be scraped and shovelled into a plastic bag or barrel. However, all possible attempts should be made to prevent spills from entering ice covered waters as no easy method exists for containment and recovery of spills if they seep under ice.

The following methods are described in more detail in Appendix E:

- Dykes
- Trenches
- Snow Fence and Sorbent Barrier
- Burning
- Ice Slotting

- Vertical Barriers

5.5.3.1 Containment of Spills On Snow

Snow is a natural sorbent, thus as with spills on soil, spilled fuel can be more easily recovered. Generally, small spills on snow can be easily cleaned up by raking and shovelling the contaminated snow into plastic bags or empty barrels, and storing these at an approved location.

The following methods are described in more detail in Appendix E:

- Dykes

5.5.4 Barrel Containment

If liquid is leaking from a barrel and the leak cannot be plugged nor are there overpack drums on hand, the barrel can be rolled onto its side so that the leaking area is at the highest point, and will therefore no longer leak. A leak may be plugged with wooden wedges wrapped with a cloth or heavy-duty tape, or by placing an inner tube around the barrel overtop of the leak. The inner tube can be tightened by twisting it with a rod or stick. All of these methods are to be used as temporary seals only. The liquid needs to be transferred into a new barrel or storage tank as soon as possible to prevent further contamination.

5.6 RECOVERY / CLEANUP

In most cases, spill recovery / cleanup is initiated at the far end of the spill and contained moving toward the center of the spill. Fuel recovery methods generally include direct suction, mechanical removal, and the use of sorbent material. A water spray mist may be used to herd the fuel to an area for collection.

All materials mentioned in this section are available in the spill kits located at the Jackfish Facility. Following cleanup, any tools or equipment used will be properly washed and decontaminated, or replaced if this is not possible.

5.6.1 Direct Suction Equipment and Techniques

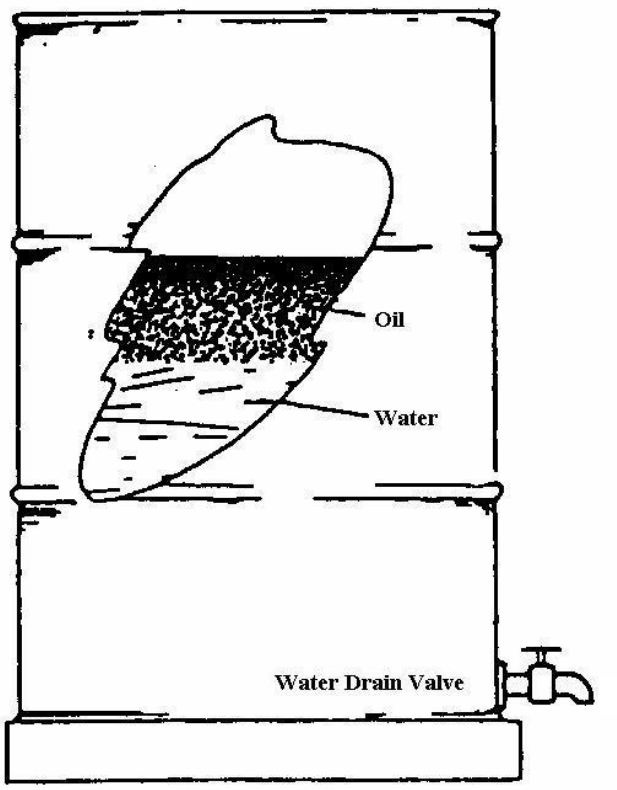
Direct suction methods include the use of vacuum trucks, portable pumps, or shop vacuums. Vacuum cleaners or portable pumps can be used to directly recover materials from damaged containers or from thick slicks on water.

Shop vacuums are suitable for small spills if a power source is available. Commercial skimmers are available for attachment to vacuum sources. These skimmers serve to skim floating product from the water surface while reducing the amount of water recovered. Suction screens may be required to prevent hose plugging by floating debris and to prevent pump damage.

Care should also be taken to prevent the uptake of water in order to minimize both the final volume of material that requires disposal and to prevent emulsification of oil and water. Once removed from the water body, however, water and oil can be separated using gravity separation. Valving on vacuum trucks can be used for water/oil separation, or a drum separator may be readily constructed using a 205-litre (45-gallon) drum and plumbing hardware (Figure 5-2). Any contact water is to be containerized and tested prior to being returned to the environment.

> ***CAUTION**: All containers used for the recovery of fuel must be grounded due to the potential for static-electricity build-up and fire.*

Figure 5-2: Improvised Oil-Water Separator Drum



5.6.2 Manual and Mechanical Recovery

Manual recovery by use of hand tools (e.g., cans, buckets, shovels, rakes) is an effective means of recovering fuel from small spills or from areas that are inaccessible to larger equipment. This is often the only method available, and in some cases is preferred as it causes the least amount of damage to an area.

Mechanical recovery using heavy construction equipment can be used in some cases for recovery and loading of material for disposal. Caution must be used when operating such equipment around a spill site. In some instances, more damage can be caused from the operation of the equipment than from the spilled product. Escaping petroleum vapours may also be present and pose the danger of explosion and fire.

5.6.3 Sorbent Material

Sorbent materials are commonly used for final cleanup and recovery of small amounts of oil or to remove oil in places that are inaccessible to other means of recovery. They are effective in recovering thin as well as thick layers of oil, however large volumes of sorbent are often required. Used sorbent materials are to be placed in drums for future disposal.

The types of sorbent materials available at the Jackfish Facility and generally available for spill response are listed in Section 6.1 and Appendix F.

Snow and soil can be used as effective sorbent materials. Once mixed, the oil in snow or soil mixture can be shovelled or picked up using construction equipment and taken to a suitable treatment site.

5.7 STORAGE

Storage is required:

- if a suitable location for disposal cannot be found;
- if climatic conditions do not permit disposal at the time of cleanup;
- if the selection of a disposal option requires further assessment; or
- if transportation to a treatment/disposal facility is dependent on the availability of a suitable transport vehicle.

Storage options generally consist of pails, drums, tanks, berms, or pits. The specific type of storage needed is dependent on the volume of recovered material, the degree of contamination of the water and/or soil, the properties of the spilled product, and the duration of storage required.

5.7.1 Vehicle Storage

Vehicles suited for the storage of recovered fuel are tank trucks, vacuum trucks, dump trucks, flat bed trucks, sled-mounted tanks, and transport trailers. Tank trucks may be used to separate oil and water by emptying the water from the bottom of the tank. Tank trucks typically hold up to 20 m^3, while vacuum trucks typically hold around 16 m^3.

Flat bed trucks and transport trailers are suitable for carrying tanks and drums braced on pallets.

5.7.2 Open-Topped Tanks

Open-topped tanks such as plastic-lined swimming pools with capacities up to 20 m^3 may be quickly assembled on firm, level ground. They may be fed by several hoses at once and can store both liquids and solids. These should be used only for short-term storage when storing fuel.

5.7.3 Drums

Tanks and drums may be used for temporary storage of fuel.

5.8 DISPOSAL

Disposal or destruction of recovered fuel is needed to eliminate the risk of further contamination from the recovered fuel. **No decision, except under emergency conditions, should be made until approval has been obtained from the Manager, Safety & Environment and appropriate government agencies.** The 24-HOUR SPILL REPORT LINE should be used to initiate such requests and a follow-up report should describe the disposal methods used.

5.8.1 Salvage and Recycle

Recovered diesel and lubricating oil may be reused directly as a low-grade heating fuel in waste oil furnaces.

5.8.2 Fuel Burning

Open burning of spilled oil products is not an acceptable disposal method. Open burning is prohibited except in the case of an extreme emergency. Only appropriate government regulators can authorize controlled or open burning of spilled products. This option will only be considered in extreme emergencies (i.e., when humans or environmental receptors are in grave danger of extensive contamination) and following consultations between the Manager, Health, Safety & Environment and the lead agency Inspector.

5.9 SITE RESTORATION

For spills of reportable sizes, once a spill has been contained, the Manager, Health, Safety and Environment will consult with the lead agency Inspector assigned to the file to determine the level of cleanup required. The Inspector may require a site specific study to ensure appropriate clean up levels are met. Methods that may be considered include natural biodegradation of oil and replacement of soil and re-vegetation (see below for further details).

Upon completion of spill cleanup efforts, the Plant Operator will conduct an internal review of the spill cause, effects and SCP procedures and then fill out the Spill Update Form (Appendix C) and

fax it as directed on form to the Manager, Health, Safety and Environment and Manager, Operations. The Spill Update Form also available on the PowerLine.

5.9.1 Natural Assimilation (Biodegradation) and Revegetation

Oil can be degraded naturally by microorganisms under proper temperature and nutrient conditions. Tilling the affected soil to increase exposure of the soil organisms and oil to oxygen can also be beneficial. The utilization of natural assimilation to treat, in whole or in part, soils affected by spilled oils requires the approval of government agencies.

5.9.2 Replacement of Soil

In some cases, it is necessary to replace contaminated soil with clean soil. This can include grass or sod on the upper layer of soil. Before contaminated material is removed, regulatory agencies must be contacted regarding acceptable disposal sites. Spills that take place on tundra receive special attention due to the presence of sensitive soils and plants. Replacing contaminated tundra may be more detrimental to the area than allowing the contamination to naturally degrade.

Shovels, front-end loaders, backhoes, and dozers may be used to excavate contaminated soil.

6 RESOURCE INVENTORY

The Jackfish Facility maintains numerous resources to support spill response including on and off-site resources.

6.1 ON-SITE RESOURCES

Spill materials and/or spill kits are located throughout the Jackfish Facility at all designated hazardous materials and waste storage areas. Further details on the types of spill material and spill kits that may be present at the Jackfish Facility is presented in Appendix F. The locations of specialized and/or larger spill kits are as follows:

- 1 large spill kit located in the CAT plant
- 1 large spill kit located in the EMD Plant
- 1 large spill kit located in the K Plant
- 1 large spill kit located outside next to the tank farm
- 1 large water spill kit locker located outside south of the EMD Plant

If additional response material is required, booms, extra sorbent pads, pumps and shovels/racks can be found in the Warehouse. In addition, a CAT IT38 loader is located at the Jackfish Facility. Equipment that is available in Yellowknife is listed in Table 6-1.

6.2 OFF-SITE RESOURCES

Depending on the severity of the spill, heavy equipment is available from local contractors for emergency spill cleanup. Contact information and equipment available is as follows:

Table 6-1: Heavy Equipment Owners Contact Information

Name	Phone Number	Available Equipment
City of Yellowknife	(867) 920-5600	Fire Truck
Camco Construction Ltd.	(867) 873-8522	Front End Loader Dump Truck Backhoe Bull Dozer Grader Snow Plow Vacuum Truck Digger truck with Auger

Table 6-1: Heavy Equipment Owners Contact Information

Name	Phone Number	Available Equipment
RTL Robinson Enterprises Ltd.	(867) 873-6271	Front End Loader Dump Truck Backhoe Bull Dozer Grader Snow Plow Vacuum Truck Digger truck with Auger

7 TRAINING PROGRAM

NTPC conducts site orientations that include SCP and spill response equipment awareness. Both employees and contractors must complete the NTPC Site Orientation upon entering the Jackfish Facility for the first time and prior to conducting work. The NTPC Plant Operator provides the site orientation, which provides an overview of this SCP, the locations of spill response equipment, and the procedures to report and respond to a spill incident. Records of site orientations are maintained.

For key NTPC employees responsible to coordinate a response to spill events, NTPC provides an SCP awareness course. In addition to the information provided during the site orientation, spill responders are given a detailed review of this SCP; introduced to step-by-step methods to identify, assess, and respond to spill situations; participate in a review of hazardous materials located on-site and the associated risks; learn how to use absorbent and other spill response equipment; and learn how to properly dispose of contaminated spill response equipment. A mock spill exercise may be performed to familiarize on-site spill responders with the equipment available and the steps to take during typical spills situations that may occur at the Jackfish Facility.

All contractors are required to have basic first aid and WHMIS training before being allowed to work at the Jackfish Facility. All Jackfish Facility employees and supervisors are also required to have WHMIS and first aid training. Persons involved in the handling and shipping of hazardous materials are required to be trained in the Transportation of Dangerous Goods Regulation requirements and must have a valid Transportation of Dangerous Goods Regulation certificate.

An up-to-date training matrix is kept by the NTPC Training Coordinator and contains records of all environmental, health and safety training completed by employees.

8 PUBLIC RELATIONS

8.1 GENERAL POLICY ON PUBLIC RELATIONS

If questioned by the public or the media about a spill, refer them to Director, Hydro Operations.

Environmental incidents such as spills often attract local interest and media attention. Employees should not make any statements on behalf of the Corporation to the media or to the public. It is the responsibility of the Regional Director and/or the NTPC Manager, Communications to address the media and thereby the public.

Respond fully to any request from local authorities or emergency workers that will help to control the spill and its damage; however refer all other requests for information to the Director, Hydro Operations. This may include questions from reporters, environmental agencies, or people and property owners affected by a spill. When probing questions are asked, it is important that the response is polite and professional; for example:

> *"I'm sorry; I don't have the authority to answer that question. Please contact my Regional Director. His/her phone number is _____."*

Employees should avoid guessing at an answer or making promises that are out of their control, as this can cause problems later for both the employee and the Corporation. No speculation should be made with regard to who is at fault, why the spill occurred, spill volume, when cleanup will be completed, or any other issue. It is the responsibility of the company representative at the site to keep the Director, Hydro Operations informed so that media questions directed to the Corporation can be answered.

APPENDIX A

NWT SPILL REPORT FORM

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
Tel: (867) 920-8130 • Fax: (867) 873-6924 • Email: spills@gov.nt.ca

REPORT LINE USE ONLY

A	Report Date: MM DD YY	Report Time:	☐ Original Spill Report **OR** ☐ Update # _____ to the Original Spill Report	**Report Number:**
B	Occurrence Date: MM DD YY	Occurrence Time:		
C	Land Use Permit Number (if applicable):		Water Licence Number (if applicable):	
D	Geographic Place Name or Distance and Direction from the Named Location:		Region: ☐ NT ☐ Nunavut ☐ Adjacent Jurisdiction or Ocean	
E	Latitude: _____ Degrees _____ Minutes _____ Seconds		Longitude: _____ Degrees _____ Minutes _____ Seconds	
F	Responsible Party or Vessel Name:		Responsible Party Address or Office Location:	
G	Any Contractor Involved:		Contractor Address or Office Location:	
H	Product Spilled: ☐ Potential Spill	Quantity in Litres, Kilograms or Cubic Metres:	U.N. Number:	
I	Spill Source:	Spill Cause:	Area of Contamination in Square Metres:	
J	Factors Affecting Spill or Recovery:	Describe Any Assistance Required:	Hazards to Persons, Property or Environment:	
K	Additional Information, Comments, Actions Proposed or Taken to Contain, Recover or Dispose of Spilled Product and Contaminated Materials:			

L	Reported to Spill Line by:	Position:	Employer:	Location Calling From:	Telephone:
M	Any Alternate Contact:	Position:	Employer:	Alternate Contact Location:	Alternate Telephone:

REPORT LINE USE ONLY

N	Received at Spill Line by:	Position:	Employer:	Location Called:	Report Line Number:

Lead Agency: ☐ EC ☐ CCG/TCMSS ☐ GNWT ☐ GN ☐ ILA ☐ AANDC ☐ NEB ☐ Other: _____

Significance: ☐ Minor ☐ Major ☐ Unknown

File Status: ☐ Open ☐ Closed

Agency:	**Contact Name:**	**Contact Time:**	**Remarks:**
Lead Agency:			
First Support Agency:			
Second Support Agency:			
Third Support Agency:			

APPENDIX B

FUEL SPILL CALCULATION PROCEDURES

FUEL SPILL RESPONSE PROCEDURE

In the even of a fuel spill the following steps must be taken:

1. Assess hazards
2. Shut off source of spill
3. Contain spill
4. Calculate amount of fuel spilled
5. Report Spill
6. Spill cleanup and disposal
7. Debriefing

FUEL SPILL CALCULATIONS

Once the source of the spill is shut off and the initial spill containment is underway it is essential to determine the exact amount of fuel spilled. To do so, the following information must be gathered:

1. Gauge the tank with the fuel spill and record the reading
2. Record the fuel temperature
3. Record the generator kWh readings for each engine in the plant
4. Obtain a copy of the last *Month End Thermal Generation Report* (Month End Report)

FUEL DIFFERENCE CALCULATION

1. Record last month's fuel storage volume (Month End Report pages 4-6, line 7)
   - e.g., 33,737 L

2. Add any fuel received between last month end and the fuel spill
   - e.g., no fuel was received (0 L)

3. Conduct a tank dip and record the depth of fuel
   - e.g., 98 cm

4. From the tank dip chart for that specific tank determine the volume of fuel in the tank
   - e.g., 22,708 L

5. Using the recorded fuel temperature obtain the multiplier from the Temperature Compensation Chart
   - e.g., -28^0C = 1.0383

6. Obtain the amount of temperature compensated fuel in storage
   - e.g., (22,708 L x 1.0383) = 23,578 L

7. Subtract temperature compensated fuel volume from last month end volume to calculate **Fuel Used Since Last Month End**
   - e.g., (33,737 L – 23,578 L) = 10,159 L
   - This means that the fuel used and spilled since last month end totals 10,159 L

FUEL USED IN GENERATION (Table 1 below corresponds with the following steps)

1. Take the present kWh meter readings for each generator from the kWh meter in the generator switchgear
   - e.g.,G1 (17,748,000 kWh), G2 (10,110 kWh), G3 (10,820 kWh)

2. Record the previous meter readings from each generator from Month End Report
   - e.g., G1 (17,735,465 kWh), G2 (10,087 kWh), G3 (10,809 kWh)

3. Subtract the difference between present and last month end readings for each generator
   - e.g., G1 (12,535 kWh), G2 (23 kWh), G3 (11 kWh)

4. Obtain meter multipliers from the meters or the Month End Report
   - e.g., G1(x 1), G2(x 600), and G3 (x 600).

5. Obtain actual kWh generated by each unit in the plant using the multiplier
   - e.g., G1 (12,535), G2 (13,800), G3 (6,600)

6. Add the actual generation for all units to get the total generation from end of last month to present
   - e.g., 32,935 kWh

7. Obtain the fuel efficiency from the Month End Report
   - e.g., 3.47 kWh/L

8. Calculate fuel used to generate 32,935 kWh by applying fuel efficiency to total generation
   - e.g., (32,935 kWh / 3.47 kWh/L) = 9,491 L

9. Calculate the **Actual Spill Volume** (fuel used since last month end minus fuel used to generate during this period)
   - e.g., (10,159 L – 9,491 L) = 668 L

Table 1: Calculation Example – Fuel Used in Generation

Unit	G1	G2	G3
1. Present meter reading (kWh)	17,748,000	10,110	10,820
2. Previous meter reading (kWh)	17,735,465	10,087	10,809
3. Difference (kWh)	12,535	23	11
4. Multiplier	1	600	600
5. Actual kWh per generator	12,535	13,800	6,600
6. Total kWh generated	G1 +G2 + G3		32,935
7. Fuel efficiency (kWh/L)			3.47
8. Fuel used in generation (L)	32,935 kWh / 3.47 kWh/L		9,491 L
9. Total fuel spilled (L)	10,159 L – 9491 L		668 L

APPENDIX C

SPILL UPDATE FORM

NORTHWEST TERRITORIES POWER CORPORATION

Spill Update

Submit

Report Update to Supervisor & Environment Dept. Refer to *Policy EV-05, Hazardous Materials Spill Reporting* for more information	**Environment Dept.** Phone: (867) 874-5327 Fax: 1-888-371-9433

1 Report Date	2 NWT Spill Number and/or Date and Time of Incident

3 Stage of Cleanup	Cleanup Not Required ☐	Cleanup Continuing ☐ Expected Completion Date:	Cleanup Completed ☐ Date Completed:

4 Initial Action Plan: Describe each step.

	Y	N	Brief Description
Step 1: Identify product and hazards	☐	☐	
Step 2: Shut off source of spill	☐	☐	
Step 3: a) Spill containment	☐	☐	
b) Report spill	☐	☐	Supervisor ☐ Env. Dept. ☐ NWT 24-hr Spill Report Line ☐
Step 4: Spill cleanup and disposal	☐	☐	
Step 5: Debriefing	☐	☐	

Cleanup Personnel:

Reported by:	Position:	Location:	Telephone No:
Spill Update reported to (please check boxes):	Environmental Department ☐	Supervisor (enter details below) ☐	
Reported to:	Position:	Location:	Telephone No:

* Place additional comments and notes on page 2.

** Ensure to note any potential impacts to sensitive human or ecological receptors, and any impacts to offsite areas.

Spill Update

Additional Comments

APPENDIX D

ENVIRONMENTAL PROTECTION POLICY

Policy Name: **Environmental Protection**

Policy Number: EV-01

Policy Monitor: Director Health, Safety & Environment

Policy Approver: President & CEO

Approval Date: March 05, 2018

Purpose

The purpose of this policy is to outline the approach to environmental management at the Northwest Territories Power Corporation (NTPC) and to demonstrate NTPC's commitment to environmental protection.

Policy Statement

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;

- 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.

Roles and Responsibilities

- Everyone has a responsibility to protect the environment.
- NTPC is responsible for the implementation of the Environmental Protection Policy and for providing an environmentally responsible workplace.
- Management is responsible for the implementation of the Environmental Management System and for the environmental performance of NTPC employees.
- Employees are responsible to comply with all environmental rules and regulations and to continually practice environmental protection while performing their duties.
- The Environment Department is responsible to maintain the Environmental Protection Policy and the Environmental Management System with input from employees and other stakeholders.

Policy Name: **Environmental Protection**

Policy Number: EV-01

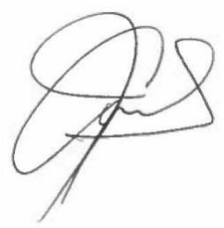
Policy Monitor: Director Health, Safety & Environment

Policy Approver: President & CEO

Approval Date: March 05, 2018

Policy History

Date	Revision #	Description of Change
June 18, 1993	0	New policy
Sept 11, 1997	1	Wording revision
April 10, 2001	2	Wording revision
November 26, 2006	3	Wording revision
March 17, 2010	4	Whole document revision
November 15, 2012	5	Template changed
December 13, 2017	6	Annual review
February 15, 2018	7	Policy revision

President & CEO Signature:  Date: March 05, 2018

APPENDIX E

SPILL CONTAINMENT METHODS

- **Containment of Spills on Land**
- **Containment of Spills on Water**
- **Containment of Spills on and Under Ice**
- **Containment of Spills on Snow**

Specific Spill Containment Methods For Land, Water, Ice And Snow

The following section describes various methods which may be employed to contain a spill to land, water, ice or snow.

Containment of Spills on Land

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, thus spills on soil are generally less serious then spills on water as contaminated soil can be more easily recovered. Generally spills on land occur during the late spring, summer or fall when snow cover is at a minimum. It is important that all measures be undertaken to avoid spills reaching open water bodies.

Dykes

Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled fuel. A dyke needs to be built up to a size that will ensure the containment of the maximum quantity of fuel that may reach it. A plastic tarp can be placed on and at the base of the dyke such that fuel can pool up and the subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly a dyke may not be necessary and sorbents can be used to soak up fuels before they migrate away from the source of the spill.

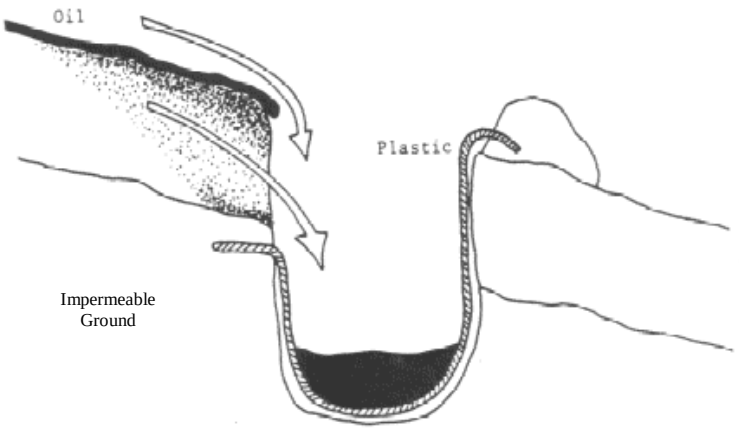
Trenches

Trenches can be dug out to contain spills as long as the top layer of soil is thawed. Backhoes, loaders, shovels, or pick axes can be used depending on the size of the trench required. It is recommended that the trench be dug to the bedrock or permafrost, which will then provide containment layer for the spilled fuel. Fuel can then be recovered using a pump or sorbent materials. Care must be given when working in or near trenches as fumes can build up, causing fire and respiratory hazards. Ensure proper PPE is worn and ignition sources are removed from the area.

If water is present in the excavated trenches, it should be assumed that groundwater contamination may result and eventually be discharged into surface waters. A waterproof liner should be placed on the bottom and sides of the trench.

Shallow trenches placed downslope of the spill will be effective in trapping fuel travelling both on the surface and below the surface (E-1). Sorbent pads, socks, and booms should be placed in the trench to collect spilled product.

Figure E-1: Trench



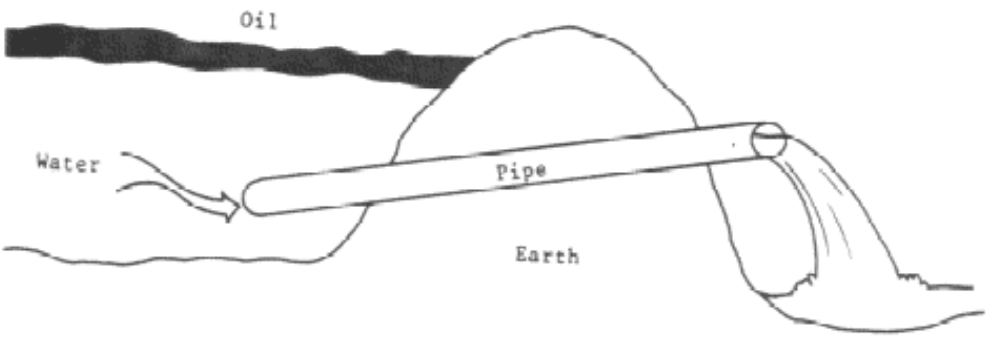
Dams

Dams constructed across ditches can be used to contain a spill and stop its flow. A dam may be built with earth, wood, sandbags, and/or snow. The dam should be lined with plastic sheeting to make it impermeable to the spilled product. In freezing conditions water may be sprayed on a dam to form ice, thereby making the dam impermeable.

Care should be taken to ensure that a dam is large enough to contain the entire spill; insufficient capacity may result in overtopping failure.

For ditches with flowing water or for small streams, it may be necessary to allow water flow to continue while retaining the lighter-than-water liquids (i.e., hydrocarbons). This can be achieved by building water bypass dams: an earth dam is built stopping the flow of water and oil in the ditch; a pipe is then installed below the water level and passing through the dam. This allows the water to continue flowing while the dam retains the lighter-than-water products (Figure E-2).

Figure E-2: Water Bypass Dam



Containment of Spills to Water

Spills on water such as rivers, streams or lakes are the most serious types of spills as they can negatively impact water quality and aquatic life. All measures need to be undertaken to contain spills on open water.

Booms

Booms are commonly used to contain a spill of floating liquid or debris, to deflect or divert material to a defined area so that it may be recovered, and to protect sensitive areas from contamination (Figure E-3). Booms are designed to float and have absorbent materials built into them to absorb fuels at the edge of the boom.

Boom deployment is important, as the angle of the boom in relation to the speed of the water affects how well the oil may be contained. The faster the stream, the more angled the boom must be (Figure E-4).

Several booms arranged in parallel may be necessary to contain all of the product. These should be spaced to allow product, which may escape the first boom, to float to the surface and be contained by the next boom. In addition, the use of several booms permits one boom to be removed at a time for cleaning.

Booms may be either commercially made or homemade. Commercially made booms are designed to float and keep product from escaping under the boom. Homemade booms may be constructed from logs, railroad ties, power poles, trees, lumber, inflated fire hose, or Styrofoam. These may be used to deflect floating material to shore or to keep floating material within a contained area. Individual sections are connected together by rope, chain, or wire. A seal around the joints to prevent leakage can be made by wrapping with plastic sheets or burlap.

Wooden or other floating booms can be used to contain the spilled fluid itself or the sorbent containing the product. They can also be used upstream of sorbent booms to improve the efficiency and longevity of the sorbent material.

Fuel contained within the boom will need to be recovered using sorbent materials or pumps and placed into barrels or bags for disposal.

Figure E-3: Boom Usage

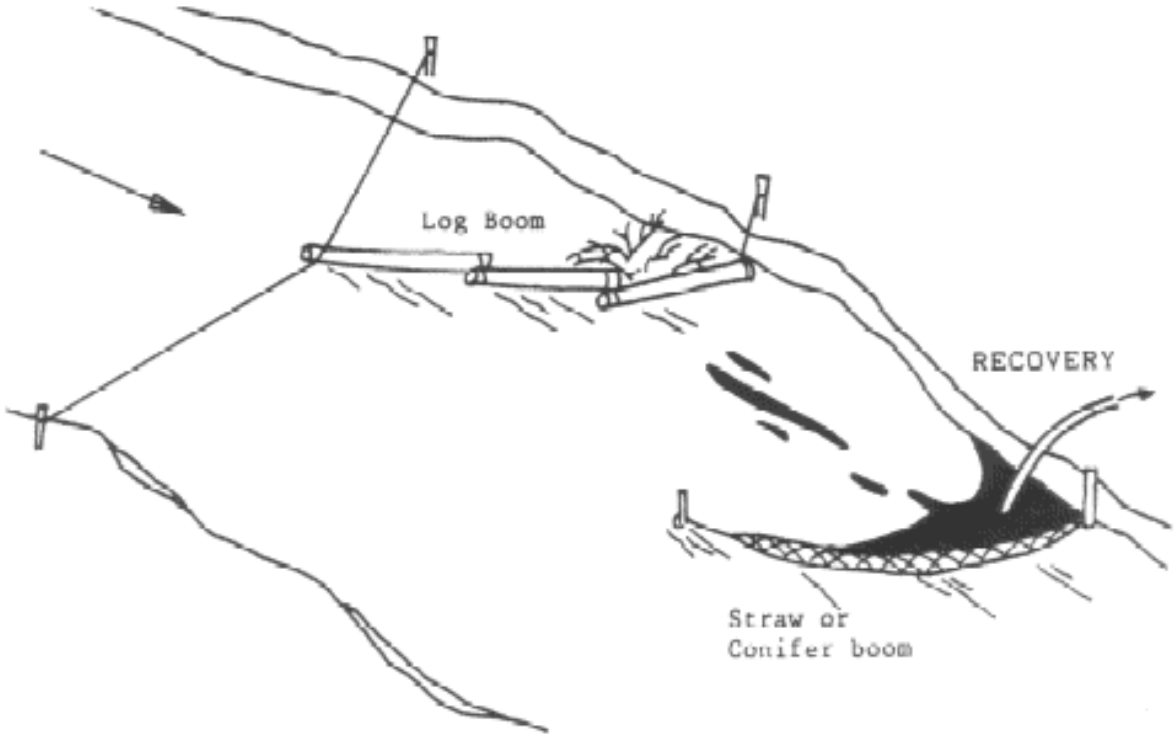
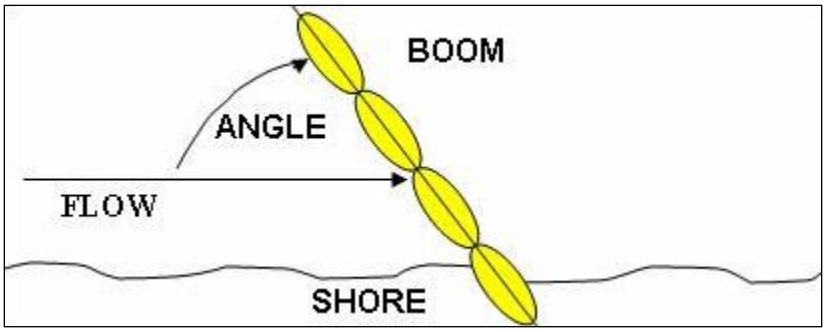


Figure E-4: Boom Deployment

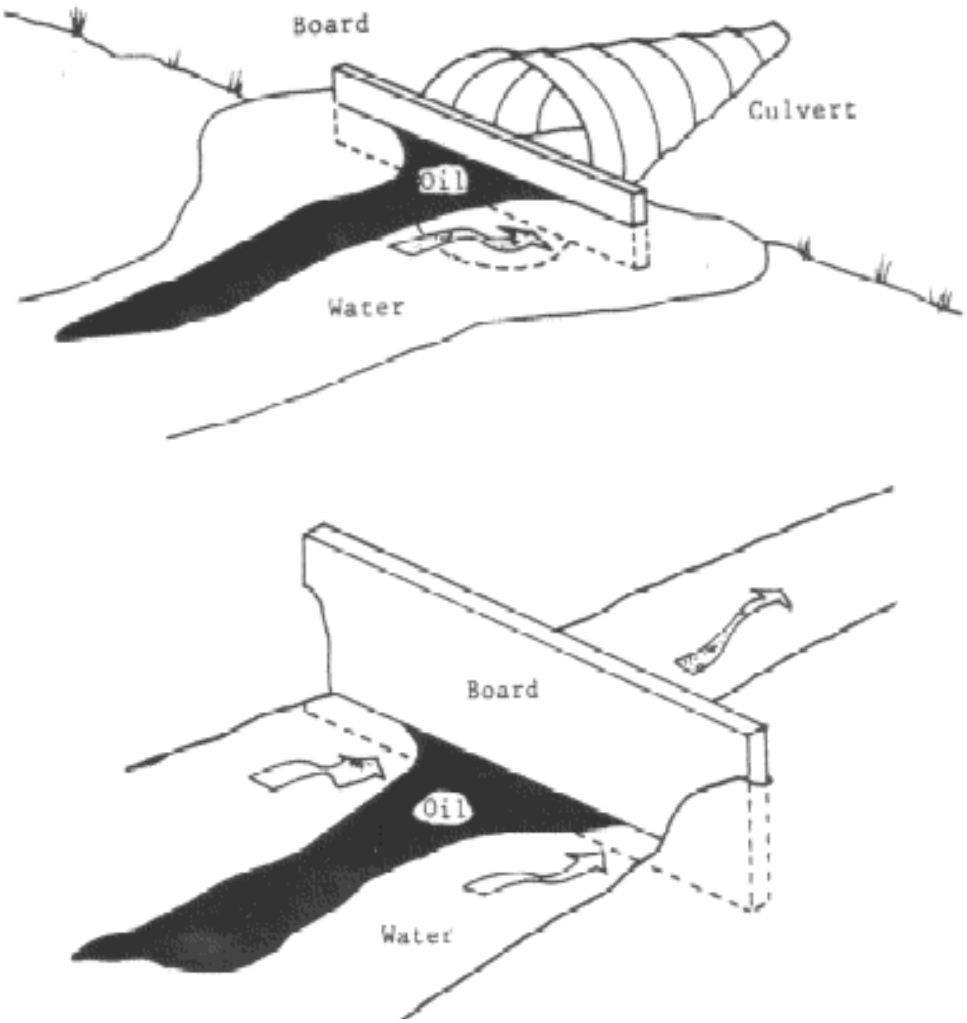


Weirs

Weirs can be used to contain spills in streams, ditches, at culvert entrances and to prevent further migration downstream.

Materials commonly used such as plywood, lumber, and sheet metal may be placed into and across the width of the stream/ditch/culvert such that water can still flow under the weir. Spilled fuel will float on the water surface and be contained at the foot of the weir (Figure E-5). It can then be removed using sorbents, booms or pumps and placed into barrels or plastic bags.

Figure E-5: Weirs



Barriers

In some situations, barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb the spilled product. Sorbents will need to be replaced as soon as they are saturated. Water will be allowed to flow through. This is very similar to the weir option discussed above.

Note that in some cases, it may be appropriate to burn fuel or to let volatile fuels such as gasoline evaporate after containment on the water surface. This should only be undertaken in consultation with and after approval from the INAC or lead agency inspector.

Containment of Spills On and Under Ice

Spills on ice are generally the easiest spills to contain due to the predominantly impermeable nature of the ice. For small spills, sorbent materials are used to soak up spilled fuel. Remaining contaminated ice/slush can be scraped and shovelled into a plastic bag or barrel. However, all possible attempts should be made to prevent spills from entering ice covered waters as no easy method exists for containment and recovery of spills if they seep under ice.

Dykes

Dykes can be used to contain fuel spills on ice. By collecting surrounding snow, compacting it and mounding it to form a dyke down slope of the spill, a barrier is created thus helping to contain the spill. If the quantity of spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel can then be pumped into barrels or collected with sorbent materials.

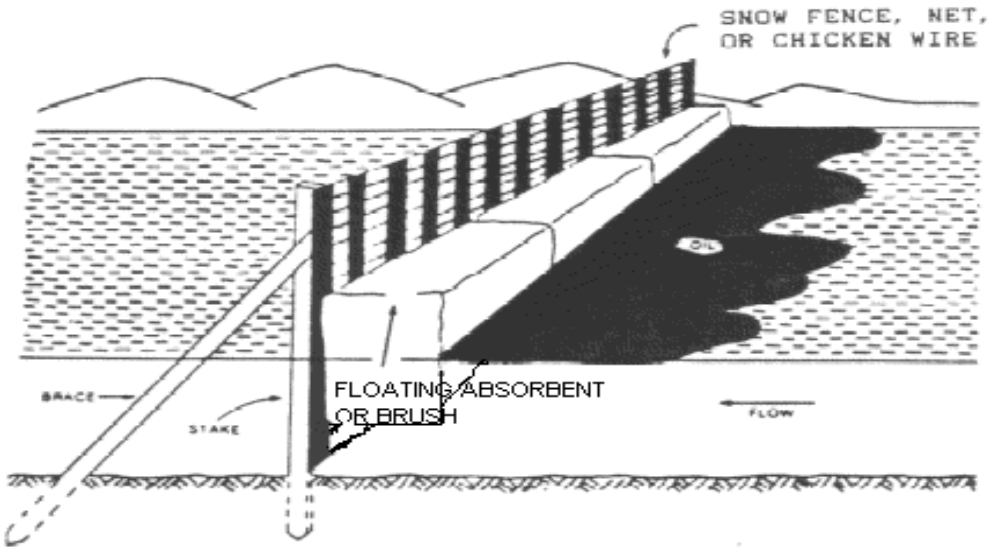
Trenches

For significant spills on ice, trenches can be cut into the ice surrounding and/or down slope of the spill such that fuel is allowed to pool in the trench. It can then be removed via pump into barrels, collected with sorbent materials, or mixed with snow and shovelled into barrels or bags.

Snow Fence and Sorbent Barrier

Snow fence and sorbent barriers may be used in streams (less than 1 m deep) with soft beds into which stakes can be driven. This method is limited to summer conditions. A snow fence barrier is installed to span the width of the stream, anchored at both ends, and stakes are driven into the stream bottom at 1 to 2 m intervals along the fence. Commercial sorbents are placed on the upstream side of the fence and are held against it by the current. Sorbents will float against the upstream side of the barrier, but must be replaced before they become soaked with product and sink. The barrier should be angled against the current for shore side collection. Multiple snow fence barriers can provide backup against potential losses from upstream barriers. Net or chicken wire barriers can be constructed in the same way, and are more practical for stronger currents, as water can flow through them more easily (Figure E-6).

Figure E-6: Barrier and Sorbent



Burning

Burning should only be considered if other approaches are not feasible, and is only to be undertaken with the permission of the INAC or lead agency inspector.

Ice Slotting

For spills under the ice in rivers or streams when current speeds are slow (i.e., less than 0.5 m/s), ice slotting may be used. A trench is cut into the ice using a chain saw or trenching machine at an angle to the current, to deflect and concentrate product that passes through the area (Figure E-7, E-8). Because of thick ice encountered during the winter, cutting and removal of ice blocks is often difficult. Loaders or backhoes may be needed to lift blocks out of the slot, or to push blocks down. Product that accumulates in the ice slot may be pumped out, adsorbed, or burned in place.

Figure E-7: Ice Slot

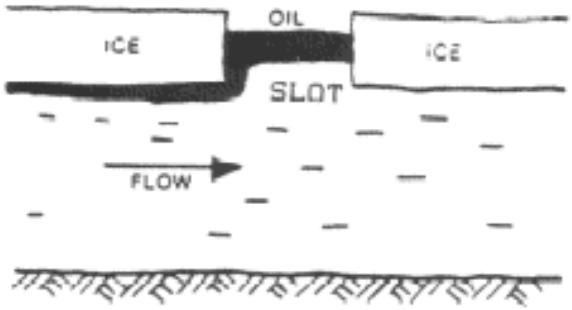
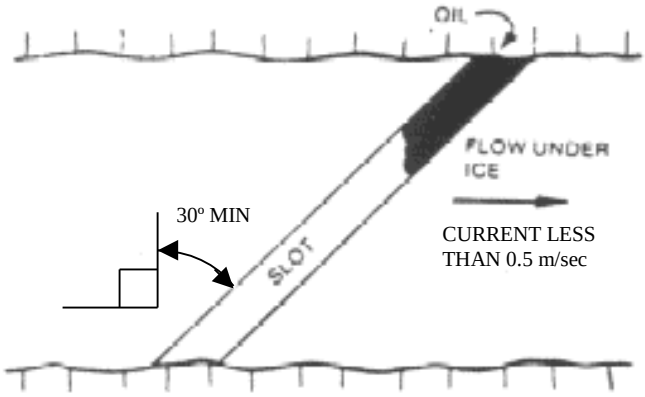


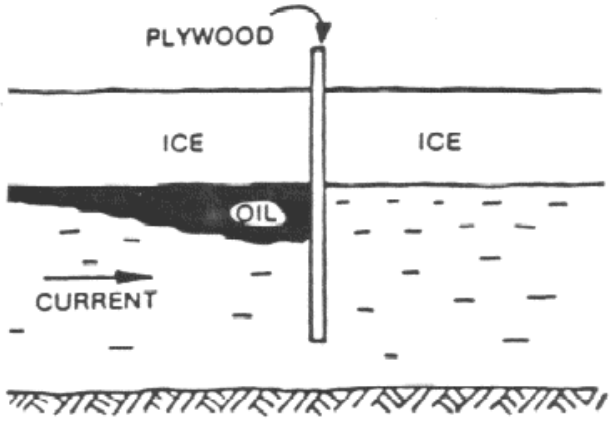
Figure E-8: Angled Ice Slot



Vertical Barriers

If the spill goes under the ice in deep, slow moving water, vertical barriers such as plywood may be used to deflect product (Figure E-9). The ice must be strong enough to support the necessary personnel and equipment. Vertical barriers are put in place by cutting trenches in the ice at an angle to current flow, inserting the plywood barriers, and allowing them to freeze in place. The location of the spilled product may be monitored by drilling observation holes with an ice-auger.

Figure E-9: Vertical Barriers



Containment of Spills on Snow

Snow is a natural sorbent, thus as with spills on soil, spilled fuel can be more easily recovered. Generally, small spills on snow can be easily cleaned up by raking and shovelling the contaminated snow into plastic bags or empty barrels, and storing these at an approved location.

Dykes

Dykes can be used to contain fuel spills on snow. By compacting snow down slope from the spill, and mounding it to form a dyke, a barrier or berm is created thus helping to contain the spill. If the quantity of the spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel/snow mixture can then be shovelled into barrels or bags, or collected with sorbent materials.

APPENDIX F

SPILL KITS

SPILL KITS AND EQUIPMENT

NTPC employs two types of sorbent for spill response.

- **Universal Sorbents:** These sorbents pick up most liquids including fuel, oil, glycol, and water. They are used for general spill cleanup on dry land and will sink if placed on water, as they adsorb the water (hydrophilic). For this reason universal sorbents are not to be used on hydrocarbon spills into water.
- **Oil Only Sorbents:** These sorbents only pick up hydrocarbons, such as fuel or lube oil. These sorbents float, as they do not pick up water (hydrophobic), and are to be used for any hydrocarbon spill into water.

Higher quality sorbents will wick up, contain, and retain spilled product much faster and more effectively than low quality sorbent, due to a finer weave of material. Low quality sorbent pads are used around the Jackfish Facility to clean up drips while higher quality sorbents, found in the spill kits, are used for larger spills.

All plants are equipped with universal sorbent pads for day to day use and the cleanup of spills. For any large or significant spills, spill kits are available for containment and cleanup. Spill kits can be stored both indoors and outdoors and are generally contained in one of the following (Figure F-1):

- **Overpack Drum:** A yellow plastic drum designed to contain a leaking drum or used/unused spill material.
- **Steel Salvage Drum:** A 205 L steel drum with removable top used to contain used/unused spill material, impacted soil or snow, etc.
- **Spill Kit Locker**: A plastic bin used for spill kit material storage.

Figure F-1: Typical Spill Kits

Spill kits generally contain the following spill response materials:

- **Sorbent Booms:** When a spill occurs into water, floating booms are placed around the spill perimeter to provide containment. Typically a 5 or 8 inch diameter plastic net tube filled with sorbent material, booms prevent the spill from spreading and/or moving downstream to contaminate other areas (Figure F-2).

Figure F-2: Sorbent Booms

Booms can be clipped together for extra length. The ends should be clipped together so that they overlap, leaving no space at the joint. This ensures that no spilled product leaks out past the boom, and the boom effectively contains and adsorbs the spilled product (Figure F-3).

- **Sorbent Socks:** Socks are identical to booms in construction; however, they do not clip together. They are generally used for small scale, localized spills.
- **Sorbent Pads**: Individual pads used on drips or leaks.

- **Sorbent Rolls:** A continuous roll of sorbent pads.
- **Printed Disposal Bags**: Soiled absorbent material is put into printed disposal bags which are then tied off for disposal.
- **Instruction Book:** The spill kit instruction book provides information regarding spill kit equipment.
- **Personal Protective Equipment:** Used to augment Jackfish Facility equipment and supplies. Includes rubber gloves, safety goggles, and protective coveralls.

Figure F-3: Boom Deployment

APPENDIX G

ACRONYMS

ACRONYMS

AST	Aboveground Storage Tank
CCME	Canadian Council of Ministers of the Environment
CEO	Chief Executive Officer
CFO	Chief Financial Officer
DFO	Department of Fisheries and Oceans
EMD	
ENR	GNWT Department of Environment and Natural Resources
ERT	Emergency Response Team
GNWT	Government of the Northwest Territories
INAC	Indian and Northern Affairs Canada
IT	Information Technology
Jackfish Facility	Jackfish Lake Generating Facility
NAPL	non-aqueous phase liquid
NTPC	Northwest Territories Power Corporation
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NWT	Northwest Territories
PPE	personal protective equipment
SCP	Spill Contingency Plan
SDS	Safety Data Sheets
the Powerline	the NTCP Intranet Powerline
RCMP	Royal Canadian Mounted Police
WHMIS	Workplace Hazardous Materials Information System

APPENDIX H

HAZARDOUS MATERIALS MANAGEMENT

1 INTRODUCTION

The Northwest Territories Power Corporation (NTPC) has prepared this Hazardous Materials Management Plan (HMMP) for the Jackfish Standby Diesel Generating Facility (the Facility) located at Jackfish Lake in Yellowknife, Northwest Territories (NWT).

The use of hazardous materials as a result of electricity generation and other activities is a normal result of ongoing activities. NTPC generates/handles hazardous materials at its power generation facilities and has a responsibility to protect and conserve the environment. Proper management of hazardous materials is important for the protection of the health and safety of employees, the community, and the environment.

2 HAZARDOUS MATERIALS

2.1 PRODUCT DESCRIPTION

One product –diesel fuel – will be used in relatively large quantities at the Facility. Detailed procedures have been developed to ensure that diesel is handled and used with no adverse effect on people or the environment. The other hazardous materials used on site are present in relatively small quantities. Products such as gasoline, glycol, compressed gases, lubricants, and cutting oils are widely used in the North. These products meet vital needs for power generation, heating and vehicle operation.

The transportation, storage and handling of these petroleum and related products are strictly regulated by both federal and territorial legislation. NTPC will ensure that all such requirements are met. Standard procedures are discussed in Section 2 of this document. NTPC will emphasize the need for regular inspections of all storage and distribution facilities on site to assure mechanical soundness and to prevent leaks or any other uncontained release of fuel products.

Material categories, site handling and storage requirements, and PPE recommended by manufacturers in SDS are summarized in Tables 2.1 to 2.3 (also see the SCP). The primary hazardous material and waste storages areas at the Facility are detailed in the SCP.

Table 2-1: Fuel Products – Hazard Classes & Potential Impacts

Material	TDGA Class	Potential Environmental Impact
Diesel	3	Water & soil contamination
Gasoline	3	Water & soil contamination
Lube Oil / Motor Oil	Not regulated	Water & soil contamination
Glycol	Not regulated	Toxic by ingestion, could potentially be consumed by wildlife
Propane	2	Fire/explosion
Acetylene	2	Fire/explosion
Oxygen	2	Fire/explosion
Nitrogen	2	Fire/explosion

Note: TDGA = *Transportation of Dangerous Goods Act*.

Table 2-2: Fuel Products – Safe Handling Procedures

Product	Handling Procedures
Diesel	Do not get in eyes, on skin or on clothing. Avoid breathing vapours, mist, fume or dust. Do not swallow. May be aspirated into lungs. Wear PPE and/or garments if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Eliminate all ignition sources. Store in a well-ventilated area. Store in a closed container. Bond and ground during transfer.
Gasoline	See diesel procedures above.
Lube Oil / Motor Oil	Wear protective clothing and impervious gloves when working with used motor oils. To be handled generally consistent with other petroleum hydrocarbons.
Glycol	Ensure adequate ventilation. Wear protective gloves and chemical safety goggles. Keep in tightly closed containers.
Propane	Secure cylinders to a wall, rack or other solid structure in an upright position. Keep valves closed and protective cap in place on cylinder when not in use. Do not handle with oily hands. Protect from heat. Protect against electrostatic charges. Pressurized container: protect from sunlight, store in a cool location and do not expose to temperatures exceeding 50°C. Empty containers may have product residue. Do not pressurize, cut, heat or weld empty containers. Store in a cool, dry and well-ventilated building. Eliminate all ignition sources. Keep product out of direct sunlight and away from incompatible or combustible materials.
Acetylene	See propane procedures above.
Oxygen	See propane procedures above.
Nitrogen	See propane procedures above.

Table 2-3: Fuel Products – Personal Protective Equipment

Product	Personal Protective Equipment		
	Eyes	Skin	Respiration
Diesel	Chemical goggles	Neoprene or nitrile gloves, protective garments	Under normal handling, none usually required.
Gasoline	Chemical goggles	Neoprene or nitrile gloves, protective garments	Under normal handling, none usually required. Ensure adequate ventilation.
Lube Oil / Motor Oil	Chemical goggles	Neoprene or nitrile gloves, protective garments.	Under normal handling, none usually required.
Glycol	Chemical goggles	Neoprene or nitrile gloves, protective garments	Under normal handling, none usually required.
Propane	Chemical goggles	Neoprene or nitrile gloves, protective garments. Insulated gloves suitable for low temperatures where liquid propane is involved.	Under normal handling, none usually required.
Acetylene	Chemical goggles	Neoprene or nitrile gloves, protective garments.	Respirator – see MSDS.
Oxygen	Chemical goggles	Neoprene or nitrile gloves, protective garments.	Respirator – see MSDS.
Nitrogen	Chemical goggles	Neoprene or nitrile gloves, protective garments.	Respirator – see MSDS.

2.2 DELIVERY TO SITE

With the exception of diesel fuel and lubricating oil, most hazardous products will be delivered to site and stored in the original packaging container from the manufacturer/supplier. These types of containers include a variety of sealed drums (205 L), pails, cans, tubes and boxes.

Upon arriving on site the fuel is delivered to a designated storage area and then transferred to the diesel aboveground storage tanks by the GNWT's Fuel Services Division. The small quantities of hazardous materials contained within their original packaging will be delivered directly to their designated storage area by the Plant Operator.

All fuel transfer and storage facilities will be designed and operated in accordance with the National Fire Code, the Canadian Council of Ministers for the Environment (CCME, 2003) Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum, and the (CCME, 2008) Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

Appropriate measures will be in place to minimize impacts to surface water, groundwater and soils from potential vehicle accidents when transporting hazardous materials across the site. Details of spill responses are presented in the SCP. The following general precautions will be taken:

- A maximum speed of 30km/h at the Facility for loaded and empty vehicles will be established based on the road design.
- Trucks will carry at least 10 m^2 of polyethylene material, a spark-proof shovel and oil absorbent blankets or squares.
- Trucks will be equipped with a reliable radio.
- NTPC commits to being prepared to respond to spills resulting from vehicle accidents in a timely and efficient manner.

2.3 FUEL TRANSFER PROCEDURES

During bulk transfer of diesel fuel NTPC's Fuel Transfer Safe Work Practice (Appendix I) will be followed.

3 INVENTORY, INSPECTION & RECORDS

3.1 FUELS & LUBRICANTS

3.1.1 Inventory Management

Fuels, lubricants and other petroleum products (including wastes, see WMP for details) 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 all fuel and lubricant storage sites areas. The inspection schedule and procedure to be followed are summarized in Table 3.1. 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 materials 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 materials 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.

Petroleum Storage Tanks and Tank Storage Facilities

Inspection of petroleum storage tanks and petroleum storage tank facilities will be in conformance with the requirements of the National Fire Code and the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum.

Visual inspection of storage tank facilitieto ensure that there has not been a leak or deterioration of the facility that could result in a leak will be conducted and documented each day the 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 3-1: Inspection of Petroleum and Hazardous Materials Storage Sites

Outside storage tanks	Schedule: Weekly by the Plant Operator or designate; Procedure: Repair leaks and report promptly. Inspections will be reported annually and filed with the Plant Operator or designate.
Inside day tank	Schedule: Weekly by the Plant Operator or designate; Procedure: Repair leaks and report promptly. Inspections will be reported annually and filed with the Plant Operator or designate.
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 F.

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 fuel and hazardous materials 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.

APPENDIX I

SAFE WORK PRACTICES