SPILL CONTINGENCY AND EMERGENCY RESPONSE PLAN

Report Prepared for:
GREAT BEAR LAKE LODGE LTD.

Prepared by:
PLUMMER'S ARCTIC LODGES

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Winnipeg, Manitoba

950 Bradford St.
Winnipeg, MB R3H 0N5
T 204.774.5775
www.plummerslodges.com

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V2.0	09-Feb-2012	Chummy Plummer	Bear_SpillPlan 2012-02-09 final V2.0.docx	Updated Contacts
V3.0	04-Mar-2018	Chummy Plummer	Bear_SpillPlan 2018-03-04 final V3.0.docx	Table of contents, 3. Emergency Numbers, 7. Facility Information, Formatting

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1 SPILL CONTINGENCY PLAN

The purpose of this Spill Contingency Plan ("**the SCP**") is to describe measures to be implemented by Great Bear Lake Lodge Ltd. to,

1. prevent oil or hazardous waste discharges from occurring; and
2. prepare Great Bear Lake Lodge Ltd. to respond in a safe, effective, and timely manner to mitigate the impacts of a discharge on the environment, human health, company assets, and public perception.

The SCP has been prepared in accordance with the Government of Northwest Territories, Fuel Spill Contingency Planning and Reporting Regulations (the "**NWT SCPRR**"), promulgated under the Northwest Territories Environmental Protection Act (the "**NWT EPA**"). It is prepared (a) as storage capacity of facility exceeds Schedule A of those Regulations (20,000L, as detailed below under Section 4 – "Compliance") and (b) because it is requirement of Permit S16F-001 and Licence S17L3-001 (renewal of S12L3-002) to meet the INAC Guideline for Spill Contingency Planning (2007).

In addition, the SCP is used as:

- a reference for oil and hazardous materials storage information and facility testing records;
- a tool to communicate practices on preventing and responding to discharges with employees;
- a guide to facility inspections; and
- a resource during spill emergency response.

The SCP provides guidance on key actions that Great Bear Lake Lodge Ltd. is to perform to comply with the NWT SCPRR and industry best practice. Such actions include, but are not limited to:

- completing monthly site inspections when on site and camp is operational (as detailed below under Subsection 10.2 - Inspection, Tests, and Records), using the inspection checklists included;
- performing preventive maintenance of equipment, secondary containment systems, and discharge prevention systems described in the SCP as needed to keep them in proper operating conditions (visual inspection of the bulk fuel storage facilities is to be performed by the Operations Manager daily);
- conducting initial and supplementary employee training as detailed below under Subsection 10.3 – "Training" and document them on the log included;
- reviewing the SCP as required, and updating the SCP to reflect any "administrative changes" that are applicable, such as personnel changes or revisions to contact information, such as phone numbers (administrative changes must be documented, and the SCP must be recertified by Chummy Plummer and the Chief Environmental Protection Officer);
- amending the SCP within one (1) month whenever there is a change in facility design, construction, operation, or maintenance that materially affects the facility's spill potential;
- responding to spill events in a safe and economical manner that limits the impacts of the spill on human health, safety, the environment and surrounding communities to as minimal as is practically achievable; and
- returning impacted land to as close to original condition as is reasonably achievable, as soon as possible following a spill event.

2 SCOPE

The SCP applies to all activities undertaken by Great Bear Lake Lodge Ltd.'s employees, sub-contractors and approved site visitors while fuel is being stored at the site. All such persons are to be aware of the spill response procedures prior to work on the site.

3 SPILL RESPONSE EMERGENCY NUMBERS

The following table lists the emergency numbers that are applicable to spill response.

TABLE 1 Spill Response Emergency Numbers

Name	Position	Contact Number	Organization
NWT/Nunavut 24 Hour Spill Reporting Line	GNWT	867-920-8130 (Collect)	GNWT
CANUTEC	Department of Transportation	613-996-6666 888-226-8832	Dangerous Goods
Harvey Gaukel	NWT Manager Environmental Protection Officer	867-767-9231 Ext. 53184	GNWT
Trevor Bremner	Resource Management Manager	867-587-7206 867-587-6730	Sahtu Region, Department of Lands GNWT
Alex Lynch	Water Resources Officer	867-587-7203 867-587-6651	Sahtu Region, Department of Environment and Natural Resources GNWT
Mike Martin	Hazardous Substance Specialist	867-767-9263 Ext. 53182	GNWT ENR
24 Hour Stanton NT Emergency Evacuation	Medivac	867-669-4115	Health Authority
North Wright	Air Charter Fixed Wing	867-587-2288	Private Air Operator
Air Tindi	Air Charter Fixed Wing	867-669-8200	Private Air Operator
Summit Air	Air Charter Fixed Wing	867-873-4464	Private Air Operator
Great Slave Helicopters	Air Charter Rotary	867-873-2081	Private Air Operator
Fred Bailey	Chief Inspector of Mines	867-669-4430	NWT Workers Compensation Board
	Norman Wells	867-587-3500	GNWT Management Sahtu Region
John Fredericks	Fire Chief	867-766-5501	Yellowknife Fire and Rescue Services

4 COMPLIANCE

4.1 Introduction

The NWT SCPRR, promulgated under the NWT EPA, are the binding regulations with respect to spill contingency planning at facilities located on Commissioners' land within the Northwest Territories ("**NWT**").

Subsection 3.(1) of the NWT SCPRR states that,

"no person shall store contaminants in a facility where the storage capacity of the

facility equals or exceeds the storage capacity shown in Schedule A unless a spill contingency plan has been prepared and filed in accordance with these regulations"

Schedule A, Item No.1 of the NWT SCPRR provides that operations with above ground facilities with liquid storage capacity equal to or greater than 20,000L are required to submit a SCP. The lodge site of Great Bear Lake Lodge Ltd. on Great Bear Lake, NWT (the "**Lodge Site**") has capacity to store in excess of 20,000 litres of fuel; therefore, an SCP is required.

Subsection 3.(2) of the NWT SCPRR states that,

"Where storage capacity of a facility is less than the storage capacity shown in Schedule A and where in the opinion of the Chief Environmental Protection Officer a spill contingency plan is necessary for the protection of the environment, the Chief Environmental Protection Officer may require the owner or person in charge, management or control of a facility to prepare a spill contingency plan."

Indian and Northern Affairs Land Inspectors and Environment and Natural Resources Officers in the Greater Northwest Territories (the "**GNWT**") have requested that Great Bear Lake Lodge Ltd. prepare a SCP due to the proximity of the stored fuel to the water. A SCP is also required by the current water license (S12L3-002; the updated version for the renewal Licence S17L3-001 and LUP S16F-001).

In addition, Schedule B of the NWT SCPRR presents the minimum reportable quantities for various hazardous wastes. The definition of hazardous has been adopted from the Transportation of Dangerous Goods Act (the "**TDGA**"). Spilled products are classified according to the classifications outlined in the TDGA Regulations, Clear Language.

TABLE 2 Schedule B of SCPRR

Transportation of Dangerous Goods Class	Substance	Immediately Reportable Quantities for NWT 24-Hour Spill Report
1	Explosives	Any Amount
2.3	Compressed Gas (Toxic)	
2.4	Compressed Gas (Corrosive)	
6.2	Infectious Substance	
7	Radioactive	
None	Unknown Substance	
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)	
3.1	Flammable Liquid	≥ 100 L
3.2		
3.3		
4.1	Flammable Solid	≥ 25 kg
4.2	Spontaneously Combustible Solid	
4.3	Water Reactant	
5.1	Oxidizing Substance	≥ 50 L or 50 kg

9.1	Miscellaneous Products or Substances Excluding PCB Mixtures	
5.2	Organic Peroxides	≥ 1 L or 1 kg
9.2	Environmentally Hazardous	
6.1	Poisonous Substance	≥ 5 L or 5 kg
8	Corrosive Substance	
9.3	Dangerous Waste	
9.1	PCB Mixture of 5 or More PPM	≥ 0.5 L or 0.5 kg
None	Other Contaminants (e.g., crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, wastewater etc.)	≥ 100 L or 100 kg

4.2 References

The following references were used in the creation of the SCP.

- Industry Standards
  - Steel Tank Institute Standard SP001 – Standard for the Inspection of Aboveground Storage Tanks (STI SP001).
  - American Petroleum Institute Standard 653 – Tank Inspection, Repair, Alteration.

- Important Guidelines
  - INAC Guideline for Spill Contingency Planning (2007).
  - Title 40, Code of US Federal Regulations, Part 112 (40 CFR part 112).
  - Environmental Code of Practice for Aboveground Storage tank Systems Containing Petroleum Products and Allied Petroleum Products, 1994, Canadian Council of Ministers of the Environment.
  - In addition, to ensure all other regulatory requirements have been met and to ensure due diligence the following acts, regulations, codes and guidelines were reviewed.

- Territorial Acts and Regulations
  - NWT Fire Prevention Act
    - Fire Prevention Regulations R.R.N.W.T. 1990
      - National Building Code, 1995: Canadian Commission on Building and Fire Codes, National Research Council of Canada
      - National Fire Code of Canada, 1995: Canadian Commission on Building and Fire Codes, National Research Council of Canada
      - Environmental Code of Practice for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products, 1993: Canadian Council of Ministers of the Environment
      - Installation Code for Oil-Burning Equipment, 2000 B139-00 Canadian Standards Association
  - Transportation of Dangerous Goods Act 1990, R.S.N.W.T., 1998
    - Transportation of Dangerous Goods Act Regulations

- Federal Acts and Regulations
  - Canadian Environmental Protection Act 1999

        - Environmental Emergency Regulations SOR /2003-307
        - Federal Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal Lands or Aboriginal Lands Regulations SOR/97-10
            - Federal Above Ground Storage Tank Technical Guidelines PC1996 – 1233
            - Federal Underground Storage Tank Technical Guidelines
    - Fisheries Act Paragraph 36 (3) and (4) of considerable importance[1]
    - Transportation of Dangerous Goods Act 1992
        - Transportation of Dangerous Goods Act Clear Language Regulations
    - Canadian Shipping Act

- Additional Guidelines and Standards
    - Guidelines for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks, Canadian Council of Ministers of the Environment
    - Environmental Guideline for Contaminated Site Remediation, R.S.N.W.T., 1998
    - CSA – B836 Storage, Handling and Distribution of Aviation Fuels on Airports

- Additional Resources
    - Google Earth 2008
    - Spill Containment and Clean-Up Course, Environment Protection Service Department of Resources, Wildlife and Economic Development Government of the Northwest Territories [2]
    - USEPA Oil Program, Understanding Oil Spills and Oil Spill Response[3]
    - Emergency Response Guidebook 2004, Transport Canada
    - 2nd Edition, The Basics of Oil Spill Cleanup, Lewis Publishers[4]
    - Handbook for Oil Spill Protection Clean Up Priorities EPA – 600 8-81 002[5]
    - Field Guide for Oil Spill Response in Arctic Waters, Emergency Prevention, Preparedness and Response[6]

5 AUTHORITIES HAVING JURISDICTION

The following table defines the authorities that have jurisdiction over various forms of spills, based on the NWT/Nunavut Spills Working Agreement.

[1]Subject to subsection (4), no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.
(4) No person contravenes subsection (3) by depositing or permitting the deposit in any water or place of (a) waste or pollutant of a type, in a quantity and under conditions authorized by regulations applicable to that water or place made by the Governor in Council under any Act other than this Act; or (b) a deleterious substance of a class, in a quantity or concentration and under conditions authorized by or pursuant to regulations applicable to that water or place or to any work or undertaking or class thereof, made by the Governor in Council under subsection (5).

[2] Sections of the 1997 Spill Containment and Clean-Up Course, Environment Protection Service Department of Resources, Wildlife and Economic Development Government of the Northwest Territories2 have been reproduced herein for the purpose of employee education and training
[3] http://www.epa.gov/emergencies/index.htm <accessed February 4, 2008> Note: Sections of the USEPA Oil Program, Understanding Oil Spills and Oil Spill Response have been reproduced herein for the purpose of employee education and training.
[4] Sections of the 2nd Edition, The Basics of Oil Spill Cleanup, have been reproduced herein for the purpose of employee education and training.
[5] Sections of the 2007 Tibbitt to Contwoyto Winter Road Emergency Response/Spill Contingency Plan have been reproduced herein for the purpose of employee education and training.
[6] Sections of the Field Guide for Oil Spill Response in Arctic Waters have been reproduced herein for the purpose of employee education and training.

TABLE 3 Authorities Having Jurisdiction with Respect to Spill Response

ID	SPILL INCIDENT	LEAD AGENCY
1	Spills on land outside Commissioner's Land (Except for 1a, 1b, 1c)	GNWT
1a	Spills at Federal Facilities not permitted under Federal or Territorial legislation	Environment Protection; Environment Canada
1b	Spills at oil and gas exploration and production facilities	National Energy Board
1c	Spills at National Parks	Environment Protection; Environment Canada
2	Spills on Commissioner's Land (Except for 2a, 2b, 2c and 2d)	Government of the Northwest Territories
2a	Spills at Federal Facilities not permitted under Federal or Territorial legislation	Environment Protection; Environment Canada
2b	Spills at oil and gas exploration and production facilities	National Energy Board
2c	Spills at facilities permitted under federal legislation	GNWT
2d	Those sections of Territorial Highways on ice surfaces	GNWT
3	Spills on Water (Except for 3a, 3b, and 3c)	GNWT
3a	Spills at Federal Facilities not permitted under Federal or Territorial legislation	Environmental Protection; Environment Canada
3b	Spills at oil and gas exploration and production facilities	National Energy Board
3c	Spills from ships and barges	Canadian Coast Guard
4	Spills on lands set aside under the Innuvialuit Land Claim	Innuvialuit Land Administration

6 SCP ADMINISTRATION

6.1 Management Approval and Designated Person

Great Bear Lake Lodge Ltd. is committed to preventing discharges of oil into the environment, and to maintaining the highest standards for spill prevention control and countermeasures through the implementation and regular review and amendment of the SCP. Great Bear Lake Lodge Ltd. will commit the necessary resources to implement the measures described in the SCP. Chummy Plummer is responsible for ensuring the SCP is developed according to regulatory requirements and that the necessary resources to implement the SCP are identified and made available as required. The Lodge Manager is the designated person accountable for oil spill prevention and response at the facility and has the authority to commit the necessary resources to implement the SCP. The following table declares the commitment to the SCP by the Great Bear Lake Lodge Ltd. operator and manager.

TABLE 4 Accountable Personnel

Name	Position	Function	Signature
Chummy Plummer	Owner/Operator	Management	Original Signed
Chuk Coulter	Lodge Manager	Designate	Original Signed

6.2 SCP Plan Enactment

Chummy Plummer, or the lodge manager in the absence of the Chummy Plummer, is responsible for enacting the SCP following contact from a first responder. All Great Bear Lake Lodge Ltd. employees at the Lodge Site are responsible for acting as first responders to a spill event and will be provided with the necessary training. All communications with respect to spill response plan coordination are to be directed towards Management or the site designate (Chummy Plummer or the lodge manager), who will act as the

Emergency Commander (the "**EC**"). Communications with stakeholders not directly involved in the response and who are monitoring the situation to obtain information for third parties are to be handled by the company communications person. Such third parties include, but are not limited to, the media, Aboriginal Governments, non-governmental organizations etc.

6.3 SCP Submittal

Subsection 5.(1) of the NWT SCPRR states that,

> ***"the person responsible for preparing a spill contingency plan shall file the plan with the Chief Environmental Protection Officer before making use of a facility"***

Chummy Plummer is responsible for ensuring that an SCP is developed in accordance with the NWT SCPRR. The SCP shall be submitted by Chummy Plummer to the NWT Chief Environmental Protection Officer (CEO) for review and approval.

S16F-001 and S12L3-002 (Part D, condition 2) "Licensee shall, in consideration of the remote location of development, have spill response equipment, trained personnel and procedures on-site that are capable of responding appropriately to spills on land and to spill into any watercourse or water body".

6.4 SCP Revision

Subsections 6. (1), (2), (3) and (4) of the NWT SCPRR state,

> ***"(1) The Chief Environmental Protection Officer shall review each spill contingency plan after it is filed.***
> ***(2) The Chief Environmental Protection Officer may require the person who filed the spill contingency plan to make changes to it.***
> ***(3) Where the Chief Environmental Protection Officer requires changes under subsection (2), he or she may indicate a reasonable period of time within which the changes must be filed.***
> ***(4) The person who filed a spill contingency plan shall make and file any changes required under subsection (2)."***

Chummy Plummer is responsible for revision and re-certification of the SCP as per the requirements detailed below in Subsection 5.5.3 – "SCP Submittal".

S12L3-002 and S16F-001 both have conditions that require annual review of the SCP.

Revision of the SCP can be triggered by:

- required changes in facility configuration or operation; or
- an annual review of the SCP formally scheduled by Chummy Plummer.

Changes in Facility Configuration and/or Design - Great Bear Lake Lodge Ltd. will periodically review and evaluate the SCP following any change in the facility design, construction, operation, or maintenance that materially affects the facility's potential for an oil discharge, including, but not limited to:

- commissioning of containers;
- reconstruction, replacement, or installation of piping systems;
- construction or demolition that might alter secondary containment structures; or
- changes of product or service, revisions to standard operation, modification of testing/inspection procedures, and use of new or modified industry standards or maintenance procedures. [7]

[7] Amendments to the SCP made in response to such changes of this nature are referred to as technical amendments. Alternatively, non-technical amendments include changing the name or contact information (i.e., telephone numbers) of individuals responsible for the implementation of the SCP and changing the name or contact information of spill response or cleanup contractors.

Great Bear Lake Lodge Ltd. must make and implement necessary revisions to the SCP as soon as possible, but no later than one (1) month after the relevant change occurs.

Scheduled Reviews Annually - Great Bear Lake Lodge Ltd. will review the SCP at least once every year (12 months), independent of facility change. Revisions to the SCP, if needed, will be made as soon as possible, but no later than one month from the completion of the annual SCP review. Chummy Plummer is responsible for ensuring that annual review and any necessary revisions to the SCP are executed.

7 FACILITY INFORMATION

Above Ground Storage Tank Capacity

Hazardous Materials – Oil

The following table describes the Above Ground Storage Tank ("**AST**") that will contain hazardous materials (Oil – Diesel & Gasoline) at the Lodge Site (as set out in Appendices A and B).

TABLE 5 ASTs at Lodge Site

ID	Description	Product	Capacity	Location
A	Horizontal Steel Tank in Berm	P-50	67,000 L 15,000 IG	Bulk Fuel Storage Area Airport (Appendix B)
B	Horizontal Steel Tank in Berm	Gasoline	67,000 L 15,000 IG	Bulk Fuel Storage Area Airport (Appendix B)
C	Horizontal Steel Tank in Berm	Gasoline	67,000 L 15,000 IG	Bulk Fuel Storage Area Airport (Appendix B)
D	Horizontal Steel Tank in Berm	P-50	67,000 L	Bulk Fuel Storage Area Airport (Appendix B)
E	Horizontal Steel Tank in Berm	P-50	9,000 L 2,000 IG	Bulk Fuel Storage Area Airport (Appendix B)
F	Square Steel Tank in Berm	Gasoline	7,800 L 1,700 IG	Boat Gas Fueling Area (Appendix A)
G	Horizontal Steel Tank in Berm	Gasoline	2,100 L 500 IG	Truck Gas Fueling Area (Appendix A)
H	Horizontal Steel Tank in Berm	P-50	4,500 L 1,000 IG	Lodge Heating Fuel Tank (Appendix A)
I	Horizontal Steel Tank in Berm	Jet-A	8,800 L 2,000 IG	Airplane Fueling Area (Appendix A)
J	Round Steel Tank in Berm	Gasoline (2 Stroke mixed)	450 L 100 IG	Boat Gas Fueling Area (Appendix A)
K	Horizontal Steel Tank in Berm	P-50	4,500 L 1,000 IG	Generator Tank (Appendix A)
L	Horizontal Steel Tank in Berm	P-50	9,000 L 2,000 IG	Generator Tank (Appendix A)
M	Horizontal Steel Tank in Berm	P-50	2,200 L 500 IG	Generator Tank (Appendix A)

N	Used Waste Oil and Used Antifreeze Storage	Used Lubricating Oil and Antifreeze	25 L buckets 5 IG buckets	Storage Shed (Appendix B)

Hazardous Waste – Waste Oil
Limited quantities of waste oil will be found on the Lodge Site from a) waste cooking oil from the camp; and b) waste oil generated from equipment maintenance. Waste oils will be collected in buckets and pails and flown to Yellowknife for disposal at approved facility. Waste oil is stored in a building at the airstrip waiting for charter (see Appendix B).

8 CONTAMINANT PROPERTIES

8.1 Automotive Diesel

Diesel is a clear yellowish oily liquid with a mild petroleum odor. Diesel fuel is a complex mixture of aliphatic, olefinic, naphthenic and aromatic hydrocarbons from a variety of chemical processes blended to meet standardized product specifications. Composition varies greatly and includes C9 to C20 hydrocarbons from about 325-675 degrees Fahrenheit vapor fractions. Diesel vapor is heavier than air with a vapor density of 4 (air = 1) and does not form a significant vapor pressure (4 kPa at 380C). The flash point is > 40 degrees Celsius and the LEL and UEL are 0.7 and 6.5%, respectively. Avoid contact with strong oxidants.

8.2 Gasoline

Gasoline is a colorless liquid with characteristic odor. It may be dyed yellow. EXTREMELY FLAMMABLE LIQUID AND VAPOUR. Liquid can accumulate static charge by flow or agitation. Vapor is heavier than air and may spread long distances. Distant ignition and flash back are possible. Liquid can float on water and may spread to distant locations and/or spread fire. POSSIBLE CANCER HAZARD. May cause cancer, based on animal data. Central nervous system depressant. High vapor concentrations may cause headache, nausea, dizziness, drowsiness, unconsciousness and death. Aspiration hazard. Swallowing or vomiting of the liquid may result in aspiration into the lungs". Gasoline has a variable and significant vapour pressure of 400 to 775 mmHg at 20 degrees Celsius and is denser than air with a vapour density range of 2.5 to 3.7 (air =1). The saturation vapor concentration is 100% and evaporation rate is rapid. Gasoline is insoluble in water. The flash point of gasoline ranges from -43 degrees Celsius to -30 degrees Celsius and the LEL and UEL are 0.6% and 8.0%, respectively.

8.3 Jet Fuel

Jet fuels are manufactured by blending gasoline, naphtha, and kerosene in varying proportions. Therefore, jet fuels may contain a carbon range that covers gasoline through kerosene. Jet fuels are used in both military and commercial aircraft. Some examples of jet fuels include Type A, Type A-1, Type B, JP-4, JP-5, and JP-8. The aromatic hydrocarbon content of these fuels' ranges from 20 to 25 percent. The military jet fuel JP- 4 has a wide boiling point range (65 to 290 °C), whereas commercial jet fuels, including JP-5 and Types A and A-1, have a narrower boiling point range (175 to 290 °C) because of safety considerations. JP-8 jet fuel contains hydrocarbons with 9 to 15 carbon atoms per molecule. Type B jet fuel has a boiling point range of 55 to 230 °C and a carbon range of 5 to 13 atoms per molecule. Jet fuels have volatility and flash point intermediate to that of gasoline and diesel.

8.4 Lubricating Oils

Lubricating oils can be distinguished from other crude oil fractions by their high boiling points (greater than 400 °C) and viscosities. Materials suitable for production of lubricating oils are composed principally of hydrocarbons containing 25 to 35 or even 40 carbon atoms per molecule, whereas residual stocks may contain hydrocarbons with 50 to 60 or more (up to 80 or so) carbon atoms per molecule. Because it is difficult to isolate hydrocarbons from the lubricant fraction of petroleum, aliphatic to aromatic hydrocarbon ratios are not well documented for lubricating oils. However, these ratios are expected to be comparable to those of the source crude oil. Lubricating oils do not produce significant vapor pressures at ambient temperatures and have high flash point.

8.5 Properties Affecting Oil Migration on Water

The rate at which an oil spill spreads will determine its effect on the environment. Most oils tend to spread horizontally into a smooth and slippery surface on top of the water, called a slick. Factors which affect the ability of an oil spill to spread include surface tension, specific gravity, and viscosity. Refer to the appended Material Safety Data Sheets ("**MSDS**") for specific information regarding the physical properties of the hazardous materials stored at the facility.

Surface Tension
Surface tension is the measure of attraction between the surface molecules of a liquid. The higher the oil's surface tension, the more likely a spill will remain in place. If the surface tension of the oil is low, the oil will spread even without help from wind and water currents. Because increased temperatures can reduce a liquid's surface tension, oil is more likely to spread in warmer waters than in very cold waters.

Specific Gravity
Specific gravity is the density of a substance compared to the density of water. A substance with specific gravity less than 1 is less dense than water (i.e., will float); a substance with a specific gravity greater than 1 is denser than water (i.e., will sink). Since most oils are less dense than water, they float on top of it. However, the specific gravity of an oil spill can increase if the less dense (more volatile) substances within the oil evaporate. More dense oils may sink and form tar balls or may interact with rocks or sediments on the bottom of the water body. It is essential that all oil spills be mitigated as quick as possible to prevent changes in specific gravity due to weathering which can lead to potentially more difficult remedial situations and greater impacts to the environment (i.e., sinking tar balls).

Viscosity
Viscosity is the measure of a liquid's resistance to flow. The higher the viscosity of the oil, the greater the tendency for it to stay in one place. Honey is an example of a highly *viscous* liquid. Denser oils tend to be more viscous than less dense oils (for example, a heating oil (denser) vs. gasoline or aviation fuel (less dense)).

Solubility
Solubility is the ability to dissolve in a liquid. The solute is the substance that is being dissolved and the solvent is the liquid into which the solute is being dissolved. For example, sodium cyanide and sodium hydroxide (both salts) are solutes, while water is a solvent. Solutions differ from mixtures as the solutes are dissolved and cannot be physically separated, while in mixtures such as sand and water, the sand is only suspended in water and settles out or can be filtered by conventional means. Oils are generally sparingly soluble in water.

TABLE 6 Solubility in Water of Hazardous Material at the Lodge Site

Hazardous Material	Solubility in Water	Comments

Diesel Fuel	Practically insoluble	Small components such as benzene are slightly soluble. Less dense than water and will therefore float on water.
Gasoline	Practically insoluble	Small components such as benzene are slightly soluble. Less dense than water and will therefore float on water.
Jet Fuel	Practically insoluble	Small components such as benzene are slightly soluble. Less dense than water and will therefore float on water.

8.6 Migration of Oil on Land

Several factors influence the extent and rate of movement of oil on land. These include the type of oil product spilled, its viscosity, pour point and temperature. Other equally important factors include the presence of snow, types of soils, vegetation and season of the year.

Snow

The nature of the snow cover is dependent upon terrain conditions. In forested areas, such as the taiga, the snow may be quite light, fluffy and deep, whereas on the tundra, wind action may compact the snow and make it hard and dense. This will affect the penetration of spilled oil. Snow is a very effective absorbent for oil having the ability to contain more than 50% oil by volume, depending upon the nature of the snow. Light, fluffy snow will absorb more oil than will hard, dense snow. Hard, dense snow can also act as an effective physical barrier; therefore, it should be used whenever possible for creation of dikes and containing oil spills. Application of water to the snow can create a less permeable, frozen, snow dike. Oil can also flow below the surface of snow for considerable distance without being seen from above.

Soils and Vegetation

The movement of oil through soils and rocks is complex and largely unpredictable. The topography will determine the direction of oil flow and the shape of the spill. Movement downward will depend on the type of overlying soil, vegetation and the presence of impervious layers of clay or permafrost.

Soils and rocks consist of small fragments or grains, which, when compacted together, form small openings or pores. Interconnected pores allow a material to be permeable to fluids such as oil and water. Clay, silt or shale have very small pores which are not extensively interconnected and act as barriers to oil movement. In the treeless tundra, the mineral soil is overlain by 20 to 30 cm of sedges, and lichens. In the taiga, the organic detritus layer may be 30 to 100 cm deep.

Mineral soils generally have a very high absorptive capacity for oil, especially in the late summer when the frost level and water table are low. The organic mat overlying the permafrost in the tundra and taiga regions has a high insulating value and any modification to its thermal properties by oil may cause an increase in thaw depth, possibly leading to thermocarst conditions. One must weigh the damages created by remediation efforts vs. the benefit that a spill cleanup will have on the environment. Following the initial bulk removal of spilled material, the impacts of remediation effort could begin to quickly offset the net benefit gained by removal of additional spilled product.

The extent of vertical oil penetration will be controlled by the absorptive capacity of the ground. Table 6 presents some rough estimates of absorptive capacities for various soils. The absolute values are less important than the relative differences. Note that the finer the soil, the greater the absorptive capacity; the exception being clay and shale which will absorb very little. Tundra will typically absorb 60 L/m3 of crude oil.

TABLE 7 Oil Absorptive Capacities for Various Soil Types

Soil Texture	Oil Absorptive Capacity L/m^3
Stone-coarse gravel	5

Gravel-coarse sand	8
Coarse-medium sand	15
Medium-fine sand	25
Fine sand	40

Low viscosity oils (e.g., gasoline, jet fuel and diesel) will produce the fastest rate and greatest depth of penetration into the soil. In seasonally frozen soil or permafrost, the rate of oil penetration will be very slow and will proceed only through melting caused by the oil as it spreads over the frozen soil. Many soils in NWT permit fast water movement (i.e., saturated marsh and bedrock). This means oil spilled in such areas would be difficult to contain.

If the amount of product spilled is not large, or the water table is low, the oil will be absorbed during its descent, and will leave behind a trail of relatively immobile material in a roughly vertical column. Rainfall may cause further downward movement of the oil and leach out water soluble components. If the main body of the liquid slug reaches the water table, there could be significant pollution. The rate of downward movement depends primarily on product spilled and the permeability of the soil layers.

8.7 Migration of Oil on Water

Oil spreads to a lesser extent and more slowly on land than on water. Oil spilled on or under ice spreads relatively rapidly but does not spread to as thin a slick as on water. On any surface other than water, such as ice or land, a large amount of oil is retained in depressions, cracks, and other surface irregularities. After an oil spill on water, the oil tends to spread into a slick over the water surface. This is especially true of the lighter products such as gasoline, diesel fuel, and light crude oils, which form very thin slicks. Heavier crudes and Bunker C spread to slicks several millimeters thick. Heavy oils may also form tar balls and tar mats and thus may not go through progressive stages of thinning.

Oil spreads horizontally over the water surface even in the complete absence of wind and water currents. This spreading is caused by the force of gravity and the interfacial tension between oil and water. The viscosity of the oil opposes these forces. As time passes, the effect of gravity on the oil diminishes, but the force of the interfacial tension continues to spread the oil. The transition between these forces takes place in the first few hours after the spill occurs. The rates of spreading under ideal conditions are shown in the following figure.

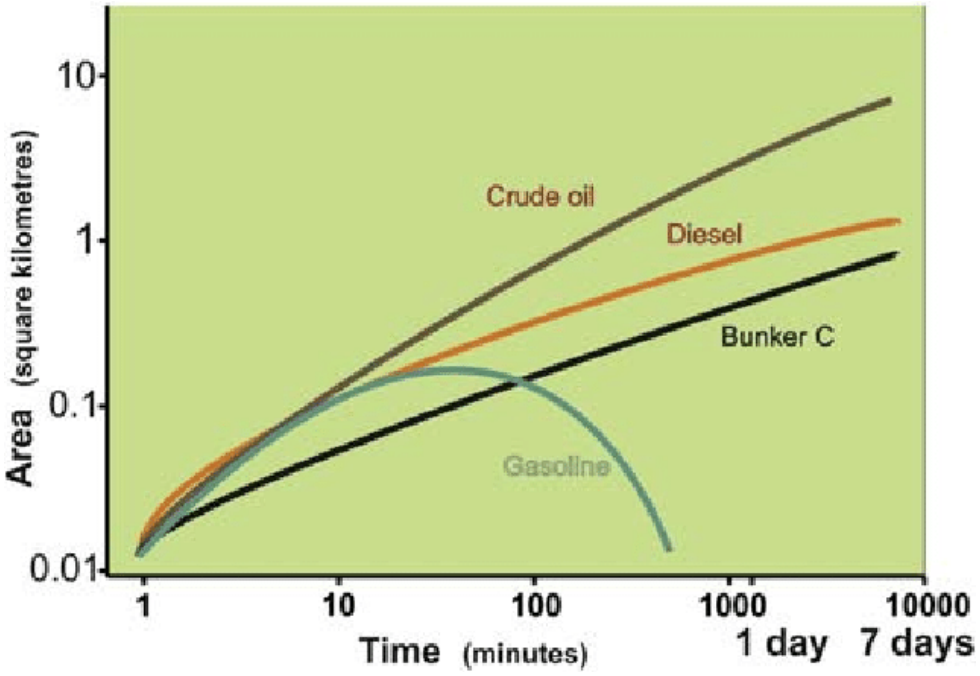


FIGURE 1 Rate of Oil Slick Spreading for Various Oils (Evaporation Effects Included)

As a general rule, an oil slick on water spreads relatively quickly immediately after a spill. The outer edges of a typical slick are usually thinner than the inside of the slick at this stage so that the slick may resemble a "fried egg." After a day or so of spreading, this effect diminishes. Winds and currents also spread the oil out and speed up the process.

Oil slicks will elongate in the direction of the wind and currents, and as spreading progresses, take on many shapes depending on the driving forces. Oil sheens often precede heavier or thicker oil concentrations. If the winds are high (more than 20 km/h), the sheen may separate from thicker slicks and move downwind.

Weathering

The changes that oil undergoes during exposure to the environment of the spill will have drastic effects on the properties of the oil and thus the cleanup of the spill. The following points highlight the key changes that oil will undergo during weathering, with respect to spill response:

- evaporation is usually the most important weathering process as it has the greatest effect on the fate of oil;
- at 15°C and over a two-day period, gasoline evaporates completely, while about 60% of diesel fuel evaporates, about 40% of a light crude, about 20% of a heavy crude, and about 3% of Bunker C; and
- the formation of water-in-oil emulsions is the second most important weathering process because it can drastically change the properties of the oil. For example, liquid oil can become a viscous and heavy mass.

9 DISCHARGE RISK ASSESSMENT

9.1 Potential Discharge Volumes

The following table identifies the types of spills that could occur and the potential volumes of spilled product that could result for various response times.

TABLE 8 Hazardous Materials (Oil) – Potential Spill Scenarios

Location	ID	Spill Type	Rate (L/min)	Duration (Min)	Total Discharge (L)
Bulk Fuel Storage Area	1	Discharge from Tank-Slow Leak	0.1-1	1-1440 (24h)	0.1-1440
	2	Discharge from Tank-Medium Leak	1-10	1-1440 (24h)	1-14,400
	3	Discharge from Tank-Catastrophic Failure	Assume entire contents of tank	Instantaneous	Max=38,000 Min=205
	4	Discharge from Tank-Valve left open	100	1-1440	100 to complete discharge
	5	Discharge from Tank-Overfilling	200	1	200
Site Wide	1	Oil Spilled due to equipment leaks	0.1-1	1-1440	0.1-50
	2	Oil Spilled due to equipment accident	Assume entire contents of reservoir	Instantaneous	50

9.2 Risk Assessment

Table 9, below, presents a spill risk assessment, based on the above calculated potential discharge values, most probable scenarios, spill response measures and site-specific conditions. The risk is evaluated based on the following tables.

TABLE 9 Risk Assessment – Frequency

Frequency Level	Description
1	Seldom. Very low frequency of exposure to the RISK. Task performed once per month or less.
2	Occasionally. Low frequency of exposure to the RISK. Task is performed two or three times per month.
3	Frequently. Regular exposure to the RISK. Task is performed once per week or more.
4	Constant. Constant or continuous exposure to the RISK. Task is performed daily on a constant basis.

TABLE 10 Risk Assessment – Environmental Impact

Severity Level	Description
1	Incidental. Release with incidental or insignificant effects within facility
2	Minor. Release within or outside site with known consequences. Localized effect with mild environmental effects. Requires reporting to regulatory authorities
3	Adverse. Release outside site with known detrimental effects. Requires response from outside agencies (Hazmat units, police and fire departments)
4	Serious. Release outside site with known detrimental effects. Requires an ongoing cleanup requiring significant resources. Regulatory or other charges are possible

TABLE 11 Risk Level Matrix

4	C	B	A	A
3	C	B	B	A
2	D	C	B	B
1	D	D	C	B
	1	2	3	4

Where the vertical numbers represent the environmental impact rating and the horizontal numbers represent the frequency risk rating.

TABLE 12 Risk Assessment – Risk Level

Risk Level	Description
A	High Risk. Exposure is constant and potential severity is very high.
B	Moderate Risk. Exposure is frequent, and an incident could result in serious consequences.
C	Low Risk. Exposure is occasional, and incident may result in minor consequences.
D	Very Low. Risk exposure is limited, and consequence is unlikely.

TABLE 13 Hazardous Material (Oil) Spill Risk Assessment

Location	ID	Spill Type	Frequency	Severity	Risk level
Bulk Fuel Storage Area	1	Discharge from Tank-Slow Leak	2	1	D
	2	Discharge from Tank-Medium Leak	2	2	C
	3	Discharge from Tank-Catastrophic Failure	1	4	C
	4	Discharge from Tank-Valve left open	2	3	B
	5	Discharge from Tank-Overfilling	2	2	C
Site Wide	1	Oil Spilled due to equipment leaks	4	1	B
	2	Oil Spilled due to equipment accident	4	2	B

10 DISCHARGE PREVENTION

10.1 Containment and Diversionary Structures

Bulk Fuel Storage Facility - On-Site Storage
Great Bear Lake Lodge Ltd. uses fuel transfer trucks to move fuel between usage tanks, which reduces opportunities for spills. Each usage tank also has berms in place to function for secondary storage in the event of a fuel spill. Two bulk fuel storage tanks were relocated in the summer of 2017 to the airstrip in a new self-contained berm to come into compliance with the 31m setback from the OHWM. The boat gas fueling area was also moved to ensure compliance with the 31m setback from the OHWM. It is in a self-contained berm.

10.2 Inspections, Tests, and Records

Daily Equipment Checklist
Operators are to inspect their equipment on a daily basis. Minor leaks are to be immediately addressed by the on-site mechanic.

Daily Inspection
A daily inspection of the bulk fuel storage areas is to be undertaken by the lodge manager. The inspector is to note the general conditions of the storage tank, signs of fuel spills, and the condition of any secondary containment. The following table presents the daily inspection checklist. Any item that receives "yes" as an answer must be described and addressed immediately.

TABLE 14 Spill Prevention Daily Checklist

Area to Inspect	Y	N	Description and/or Comments
Any signs of leaks on the exterior of tanks			
Any staining on the ground			
Any valves left open or leaking			
Any signs of tampering or theft			
Any signs of leakage on exterior of drums			
Any signs of leaks on the ground surrounding drums			

Monthly Inspection
This inspection record must be completed each month. Provide further description and comments, if necessary, on a separate sheet of paper and attach to this sheet. Any item that receives "yes" as an answer must be described and addressed immediately. Monthly inspections are to be carried out by the lodge manager and are to be signed off by Chummy Plummer.

TABLE 15 Spill Prevention Monthly Checklist

Area to Inspect	Y	N	Description and or Comments
Tank surfaces show signs of leakage			
Tanks are damaged, rusted or deteriorated			
Bolts, rivets or seams are damaged			
Tank supports are deteriorated or buckled			
Tank foundations have eroded or settled			
Vents are obstructed			
Secondary containment is damaged or stained			
Water in secondary containment			

Inspection of Drainage Areas
The following record must be completed when rainwater from bermed areas is drained.

TABLE 16 Record of Berm Drainage

Date	Bermed Area	Oil Present in Water Y/N	Start Time	Finish Time	Signature

10.3 Training

Introduction
Briefings will be developed, scheduled and conducted by the lodge manager for operating personnel at regular intervals to ensure adequate understanding of the SCP. Resources for training will be ensured by the lodge manager. The briefings will also highlight and describe known discharge events or failures, malfunctioning components, and recently implemented precautionary measures and best practices. Personnel will also be instructed in operation and maintenance of equipment to prevent the discharge of oil, and in applicable pollution laws, rules, and regulations. All personnel will have an opportunity during the briefings to share recommendations concerning health, safety, and environmental issues encountered during facility operations. Training will occur prior to work and must be documented in the following table. Refresher training will be undertaken at intervals no longer than one month and can be addressed during weekly safety meetings or as events scheduled by the lodge manager.

TABLE 17 Personnel Training Records

Date	Subjects Covered	Employees in Attendance	Instructor(s)	Employee Signature	Lodge Manager Signature

10.4 Filling Tanks

All tanks are to be monitored during filling to ensure that overtopping does not occur. In the case of large tanks and annual re-supply, the person monitoring the filling of the tanks is to be in constant communication with the person operating the pumping infrastructure.

10.5 Explosion and Fire Prevention

All tanks and filling equipment are to be properly grounded prior to filling to ensure that static electricity does not accumulate and discharge, thus causing an explosion. No smoking is to occur within 20m of any fuel transfer or storage area. No fuel transfer is to be undertaken indoors or in poorly ventilated areas. Operators are to not to be inside equipment during refueling.

11 DISCHARGE RESPONSE

11.1 Spill Reporting

NWT 24 Hour Spill Hotline - (403) 920 – 8130 (can call collect)
Reporting spills to the NWT 24 Hour Spill Hotline is a legislated requirement in NWT and is the primary reporting mechanism. The purposes of reporting a spill through this telephone service are to:

- provide a uniform and consistent approach to spill response in NWT;
- assist field personnel in responding to the spill, in undertaking proper site assessments, and in identifying recovery and disposal methods;
- elicit technical backup from personnel in various government agencies in the NWT and from specialized firms and organizations in Canada;
- dispatch (when needed) personnel and equipment to the spill site;
- provide technical information on material properties, response and site restoration procedures, as required;
- monitor the progress of response and clean-up actions; and
- provide a central clearing house or command post for progress of spill response actions.

Transport Canada – CANUTEC - (613) 996-6666 (call collect)
CANUTEC is a federal spill reporting line that **must** be notified in the case of:

- lost, stolen or misplaced infectious substances;
- an incident involving infectious substances;
- an accidental release from a cylinder that has suffered a catastrophic failure;
- an incident where the shipping documents display **CANUTEC's** telephone number 613-996-6666 as the emergency telephone number; or
- a dangerous goods incident in which a railway vehicle, a ship, an aircraft, an aerodrome or an air cargo facility is involved. CANUTEC is the Canadian Transport Emergency Centre operated by Transport Canada to assist emergency response personnel in handling dangerous goods emergencies. This national bilingual advisory centre was established in 1979 and is part of the Transportation of Dangerous Goods Directorate. It has the mandate to regulate the handling, offering for transport and the transport of dangerous goods by all modes in order to ensure public safety. CANUTEC is one of the major programs instituted by Transport Canada to promote public safety during movement of people and goods in Canada. Taking into consideration the characteristics of the dangerous goods involved and the particular conditions at the emergency site, CANUTEC's professional staff can provide immediate advice on:
    - chemical, physical and toxicological properties and incompatibilities of the dangerous goods;
    - health hazards and first aid;
    - fire, explosion, spill or leak hazards;
    - remedial actions for the protection of life, property and the environment;
    - evacuation distances; and
    - personal protective clothing and decontamination.

CANUTEC staff does not go to the site of an incident. Advice and information are provided by telephone. In some instances, standard information and data can also be transmitted in printed copy to the site. This complements the verbal advice and recommendations given by CANUTEC staff members. CANUTEC can also provide communication links with the appropriate industry, government or medical specialists. The shipper of the dangerous goods involved can also be linked to the site to deal with instructions on cleanup, disposal and/or recovery. Should on site assistance be required, CANUTEC can assist in the activation of industry emergency response plans such as TEAP, the Transportation Emergency Assistance Plan, operated by the Canadian Chemical Producers' Association or on-site assistance from other industry or government specialists.

11.2 First Response

Due to the remote nature of the lodge on Great Bear Lake, all lodge facility employees are responsible to act as first responders. All such employees will be given basic training in first response as professional first responders will not be readily available. The lodge manager is responsible for developing the training for employees based on information contained herein. First responder training will be provided during the initial training of an employee or, if deemed to be required by the lodge manager, at any other time. The first responder to a spill event has specific responsibilities that must be completed in a timely, safe and efficient manner. This will ensure that the SCP is enacted in such a manner to allow the cleanup of the spilled product without endangering people, property or the environment. The actions of the first responder are often the most important in minimizing the spread of a spill. The steps which are to be taken when initially responding to a spill event are presented in Figure **[2] [NTD: Should this not refer to the Figure immediately below?].**

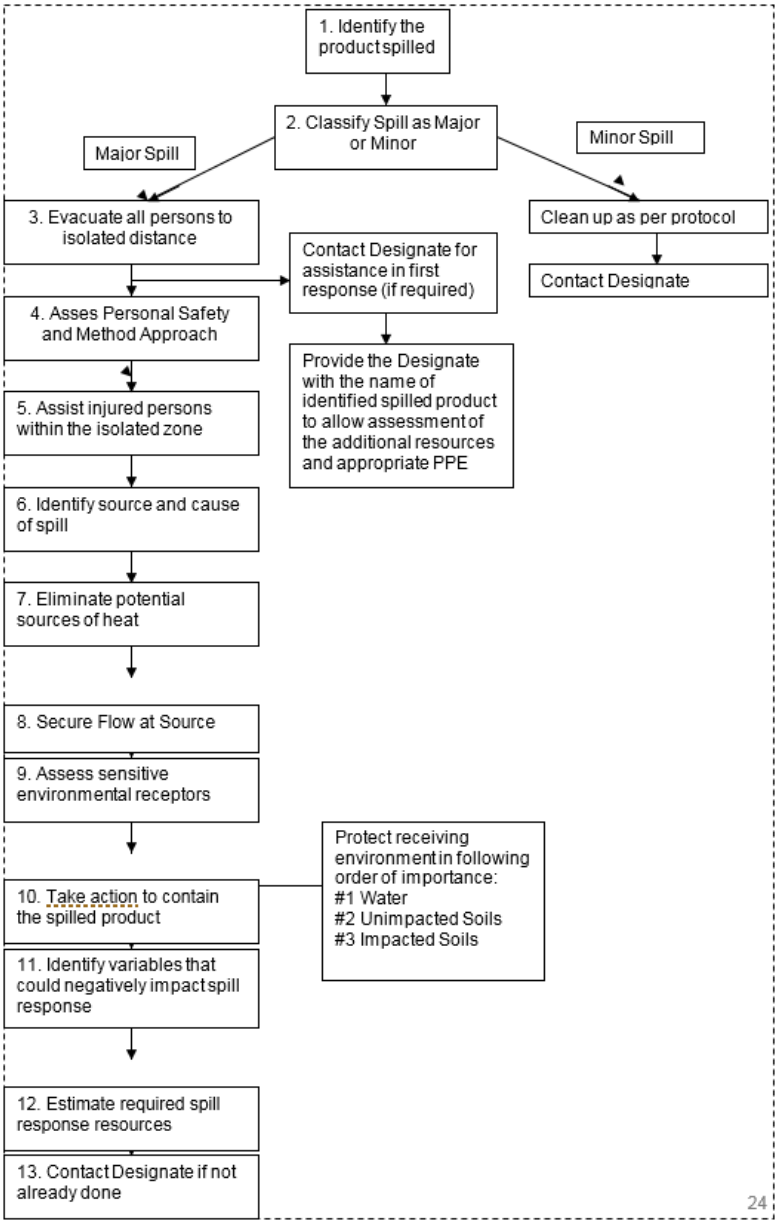


FIGURE 2 Steps to be Taken in Order for First Response to a Spill Event

The above thirteen action items should be completed as quickly as possible. Inability to collect all the information or inability to collect data in a timely manner should not prevent one from contacting the designate to enact the SCP. The longer one takes to assess the initial situation the longer the time the spill has to spread and thus the greater the impact on the receiving environment. Data collection should be balanced with the need to quickly implement the SCP.

The following subsections provide detailed information on how to implement the above listed response steps.

11.2.1 Step 1 – Identify the Product Spilled and Assess the Associated Immediate Health Hazards

Hazardous Materials/Wastes
The hazardous materials most likely to be spilled during operation of the facility or barge include:

- diesel;
- gasoline; and
- waste oils, including:
  - ethylene glycol (anti-freeze);
  - waste engine oil;
  - waste transmission fluid; and
  - solvents.

One can assess which of these products has been spilled by considering:

- the time of the spill (i.e., occurring during the filling of a tank with a specified product);
- the properties of the spill;
- the location of the spill;
- which infrastructure the spill has been released from; and
- information from others that have observed the spill.

CANUTEC ID Number and Name
If possible, the CANUTEC ID and Name should be identified. Such information will aid in determining the method of response and the proper evacuation procedures. The following table lists the CANUTEC ID for key hazardous materials present at the lodges and on board the barge.

TABLE 18 CANUTEC ID Numbers and Names

Name	CANUTEC ID	CANUTEC Guide No.
Unknown Substance	-	111
Diesel Fuel	1202	128
Gasoline/Jet-B	1203	128

Alternate Classification Method for Oils
In addition to reporting the specific type of oil, general classification schemes that reflect the properties of weathered oil can also be used under certain circumstances. Such general classifications can aid in preparing for the spill response based on overall characteristics of the spill and often reflect the properties of the oil following weathering during the period between spill identification and response. Weathered oil can be identified according to the following categories:

- free flowing;
- viscous; and
- semi-solid and tar-like.

Free Flowing
These oils contain volatile components that evaporate readily when the oil is released to the environment. As such, ignition potential is high, and a fire or explosion hazard exists in the spill area. In addition, a personnel exposure hazard (i.e., vapors) may exist because of the vapors. These oils flow easily, spread rapidly and penetrate porous substrate deeply. They usually appear transparent or slightly opaque and easily rinse off surfaces.

Viscous
These oils contain some volatile components but are less likely to create a fire hazard. They are usually opaque, form emulsions readily, have variable soil penetrability and can be removed form surfaces by applying low-pressure water spray

Semi-Solid Tar-Like
These oils are opaque and spread slowly or form tar balls. They have low substrate penetrability, feel sticky and are difficult to remove from contaminated surfaces. Emulsions formed by these oils are very stable.

11.2.2 Step 2 – Classify the Spill as Major or Minor

For the purpose of establishing an appropriate response, the spill must be classified as either minor or major, depending on the volume and characteristics of the material released.

Minor Discharge
A minor discharge is defined as one that poses no significant harm (or threat) to human health and safety or to the environment. Minor discharges are generally those where:

- the quantity of product discharged is small (e.g., may involve less than reportable quantities);
- the discharged material is easily stopped and controlled at the time of the discharge;
- the discharge is localized near the source;
- the discharged material is not likely to reach water (i.e. fully contained in secondary containment);
- there is little risk to human health or safety; and
- there is little risk of fire or explosion.

Minor Discharges can generally be cleaned up by the first responding employees with little or no additional resources other than the readily available spill response supplies and a few additional labourers, if required.

Major Discharge
A major discharge is defined as one that cannot be safely controlled or cleaned up by the first responder(s) and thus requires additional resources from the facility operations or from additional third parties such as contractors, government agencies etc. Such spills have the following properties:

- the discharge is large enough to spread beyond the immediate discharge area;
- the discharged material enters water;
- the discharge requires special equipment or training to clean up;
- the discharged material poses a hazard to human health or safety; or
- there is a danger of fire or explosion.

Major spills are often a serious threat to the occupational health and safety of the first responder. In the event of a major discharge, the following guidelines apply, in the stated order:

- refer to steps outlined in Step 3. *Evacuate Persons from the Immediate Area;*
- once outside the isolation zone, immediately contact the designate for assistance in first response;
- provide the designate with the identification of the spilled product so that he or she can bring additional resources and proper Personal Protection Equipment (PPE); and
- proceed with steps 5 to 12 as outlined herein.

11.2.3 Step 3 - Evacuate Persons from the Immediate Area

The evacuation distance will depend on the product that has been spilled, the type of spill and the environmental conditions of the site. The responder is to note the direction and relative magnitude of the wind speed. All persons should be directed towards and area upwind of the spill.

CANUTEC Evacuation Distances
General Evacuation Distances for Hazardous Materials that do not Readily Produce

Highly Toxic Gases
The following table presents evacuation distances for key hazardous materials that are present at the lodges.

TABLE 19 General Evacuation Distances for Key Hazardous Materials and Wastes (CANUTEC)

Name	CANUTEC ID	CANUTEC GUIDE No.	IMMEDIATE	FIRE	LARGE SPILL
Unknown Substance	-	111	100m (330 ft)	800m (1/2 mile)	-
Diesel Fuel	1202	128	50m (165 ft)	800m (1/2 mile)	300m (1000 ft)
Gasoline/Jet B	1203	128	50m (165 ft)	800m (1/2 mile)	300m (1000 ft)

Initial Isolation and Protective Action Distances for Substances That Can Release Toxic Gas/Vapor
For substances that release vapors that are considered toxic by inhalation, specific evacuation distances are dependent not only on total evacuation distance, but also on the wind direction, size of spill and day or night time conditions. CANUTEC treats such substances separately and provides recommended distances for areas likely to be affected within the first 30 min following a spill. However, the areas of concern can increase with time.

The Initial Isolation Zone (IIZ) defines an area SURROUNDING the incident in which persons may be exposed to dangerous (upwind) and life threatening (downwind) concentrations of material. The Protective Action Zone (PAZ) defines an area DOWNWIND from the incident in which persons may become incapacitated and unable to take protective action and/or incur serious or irreversible health effects. Distances are provided for small and large spills occurring day or night.

Adjusting distances for a specific incident involves many interdependent variables and should be made only by personnel technically qualified to make such adjustments. For this reason, no precise guidance by CANUTEC is provided to aid in adjusting the table distances; however, general guidance follows.

Factors That May Change the Protective Action Distances
The CANUTEC guide for a material clearly indicates under the section EVACUATION – Fire, the evacuation distance required to protect against fragmentation hazard of a large container. Such distances are listed herein in Table **[16] [NTD: Check these cross references]**. If the material becomes involved in a fire, the toxic hazard may become less important than the fire or explosion hazard. If more than one tank, car, cargo tank, portable tank, or large cylinder involved in the incident is leaking, LARGE SPILL distances may need to be increased. For a material with a protective action distance of 11.0+ km (7.0+ miles), the actual distance can be larger in certain atmospheric conditions. If the dangerous goods vapor plume is channeled in a valley or between many tall buildings, distances may be larger than shown due to less mixing of the plume with the atmosphere. Daytime spills in regions with known strong inversions or snow cover, or occurring near sunset, accompanied by a steady wind, may require an increase in protective action distance. When these conditions are present, airborne contaminants mix and disperse more slowly and may travel much farther downwind. In addition, protective action distances may be larger for liquid spills when either the material or outdoor temperature exceeds 30°C (86°F).

Method of Response – Step #1 – Assess

Determine if the incident involves a small or large spill and if day or night conditions exist. Generally, a small spill is one which involves a single, small package (e.g., a drum containing up to approximately 200 liters), a small cylinder, or a small leak from a large package. A large spill is one which involves a spill from a large package, or multiple spills from many small packages. DAY is any time after sunrise and before sunset. NIGHT is any time between sunset and sunrise.

Step #2 – Isolation
Look up the initial ISOLATION distance (refer to Table 16). Direct all persons to move, in a crosswind direction, away from the spill to the distance specified—in meters and feet

Step #3 - Identify the Protective Action Distance
Look up the initial PROTECTIVE ACTION DISTANCE displayed in for a given material, spill size, and whether day or night, provides the downwind distance – in kilometers and miles – for which protective actions should be considered. For practical purposes, the Protective Action Zone (i.e., the area in which people are at risk of harmful exposure) is a square, whose length and width are the same as the downwind distance.

The following table presents general guidance for estimating the magnitude of wind.

TABLE 20 Beaufort Rating Speed (km/h) Descriptions Specifications for use on Land

Beaufort Rating	Speed (Km/h)	Descriptions	Specifications for use on Land
0	<2	Calm	Calm; smoke rises vertically
1	~4	Light Air	Direction of wind shown by smoke drift but not by wind vanes
2	~8	Light Breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind
3	~15	Gentle Breeze	Leaves and small twigs in constant motion; wind extends a light flag
4	~25	Moderate Breeze	Raises dust and loose paper; small branches are moved
5	~35	Fresh Breeze	Small trees in leaf begin to sway; created wavelets form on inland waters
6	~45	Strong Breeze	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty
7	~55	Near Gale	Whole trees in motion; inconvenience felt when walking against the wind
8	~70	Gale	Breaks twigs off trees; generally, impedes progress
9	~80	Severe Gale	Slight structural damage occurs
10	~100	Storm	Trees uprooted; considerable structural damage
11	~110	Violent Storm	Widespread structural damage

Step #4 – Initiate Protective Actions
Initiate Protective Actions to the extent possible, beginning with those closest to the spill site and working away from the site in the downwind direction. When a water reactive toxic vapor producing material is spilled into a river or stream, the source of the toxic gas may move with the current or stretch from the spill point downstream for a substantial distance.

Definitions
Protective Actions
Protective Actions are those steps taken to preserve the health and safety of emergency responders and the public during an incident involving releases of hazardous materials and/or hazardous waste. Initial Isolation and Protective Action Distances predict the size of downwind areas which could be affected by a cloud of toxic gas. People in this area should be evacuated and/or sheltered in-place inside buildings.

Isolate Hazard Area and Deny Entry

"Isolate hazard area and deny entry" means keep everybody away from the area if they are not directly involved in emergency response operations. Unprotected emergency responders should not be allowed to enter the isolation zone. This "isolation" task is done first to establish control over the area of operations. This is the first step for any protective actions that may follow. Refer to for Isolation and Protective Action Distances.

Evacuate

"Evacuate" means move all people from a threatened area to a safer place. To perform an evacuation, there must be enough time for people to be warned, to get ready, and to leave an area. If there is enough time, evacuation is the best protective action. Begin evacuating people nearby and those outdoors in direct view of the scene. When additional help arrives, expand the area to be evacuated downwind and crosswind to at least the extent recommended in the tables presented herein. However, even after people move to the distances recommended, they may not be completely safe from harm. They should not be permitted to congregate at such distances. Send evacuees to a definite place, by a specific route, far enough away so they will not have to be moved again if the wind shifts.

Shelter In-Place

Shelter in-place means people should seek shelter inside a building and remain inside until the danger passes. Sheltering in-place is used when evacuating the public/employee(s) would cause greater risk than staying where they are, or when an evacuation cannot be performed. Direct the people inside to close all doors and windows and to shut off all ventilating, heating and cooling systems. In-place protection may not be the best option if:

- the vapours are flammable;
- it will take a long time for the gas to clear the area; or
- buildings cannot be closed tightly

Vehicles can offer some protection for a short period if the windows are closed and the ventilating systems are shut off. Vehicles are not as effective as buildings for in-place protection. It is vital to maintain communications with competent persons inside the building so that they are advised about changing conditions. Persons protected-in-place should be warned to stay far from windows because of the danger from glass and projected metal fragments in a fire and/or explosion. Every dangerous goods incident is different. Each will have special problems and concerns. Action to protect the public/employee(s) must be selected carefully.

Protective Action Decision Considerations

The choice of protective actions for a given situation depends on a number of factors. For some cases, evacuation may be the best option; in others, sheltering in-place may be the best course. Sometimes, these two actions may be used in combination. In any emergency, officials need to quickly give the public/employees instructions. The public/employees will need continuing information and instructions while being evacuated or sheltered in-place. Proper evaluation of the factors listed below will help to determine the effectiveness of evacuation or in-place protection. The importance of these factors can vary with emergency conditions. In specific emergencies, other factors may need to be identified and considered as well. The following list indicates what kind of information may be needed to make the initial decision.

Hazardous Material

- Degree of health hazard;
- chemical and physical properties;
- amount involved;
- contaminant/control of release; and
- rate of vapour movement.

The Population Threatened

- Location;
- number of people;
- time available to evacuate or shelter in-place;
- ability to control evacuation or shelter in-place;
- building types and availability; and
- special institutions or populations (e.g., lodge, junior mining companies etc.)

Weather Conditions

- Effect on vapour and cloud movement
- potential for change; and
- effect on evacuation or protection in-place.

11.2.4 Step 4 - Assess Personal Safety and Method of Approach to Spill

Protection of First Responder Health and Safety

The protection of the first responder's health and safety is of the highest priority. The first responder is to assess the site of the spill and the surrounding areas for the following variables, prior to entering the direct area of the spill.

- Exposure
    - Method - The methods of exposure to hazardous substances in various physical forms are: Inhalation, dermal exposure, injection and puncture.
    - Physical Form of Contaminant - Exposure can occur by all physical forms of hazardous substances such as gas, vapors, liquids and/or solids (listed in order of most probable increasing risk to health and safety). Table 21 presents the volatility of hazardous materials that are present at the lodges. High volatility indicates that a substance will release vapours quickly and thus toxic or combustible concentrations of vapors can readily accumulate. Notwithstanding, non-volatile substances can still be a hazard if left long enough in confined space for vapors to reach equilibrium vapor pressure. Both volatility and vapor pressure are temperature sensitive. High temperature results in increased equilibrium vapor pressure and rates of volatility. Liquids tend to be more volatile than solids, however, even a solid can release significant gas/vapor under the correct ambient conditions due to sublimation.

TABLE 21 Volatility and Vapour Pressure of Hazardous Material

Hazardous Material	Volatile (Yes/No)	Comments
Diesel Fuel	Yes	Vapors can reach combustible concentration if a confined space is present. Less volatile than gasoline and Jet fuel
Gasoline	Yes	Vapors will quickly reach combustible concentrations, especially in a confined space
Jet Fuel	Yes	Vapors will quickly reach combustible concentrations, especially in a confined space
Ethylene Glycol	No	Vapor pressure=0.08 mmHG

- Explosion
    - Sources of Heat
        - Sources of heat include: the sun, open flames, electricity (most likely source is generator); chemical reaction; friction and/or gas compression. The following section is a brief description of the various sources of heat.

- The Sun - is the ultimate source of all heat. The sun's radiation can heat surfaces or vapors, and if the oxygen is available, combustion will occur. When the ambient air temperature is high or when the sun has heated the product the risk of explosion or exposure is greater as the increase in heat leads to an increase in vapor emission.
- Open Flames - If vapour and oxygen are present in the right mixture near an open flame, combustion will occur.
- Electricity - Most industrial fires are ignited by an electrical heat source. There are four types of electricity that may produce heat sufficient to ignite combustibles or flammable liquids:
    - Electrical Sparking - a sudden one-time discharge of electricity. Sparking will not normally ignite combustible materials, but it can ignite flammable vapors.
    - Electrical Arcing - refers to electrical energy "jumping" between two points.
    - Electrical Resistance - all conductors have a characteristic resistance to the flow of electricity. The electrical energy lost to resistance is transformed to heat and/or light. (Light bulbs, electrical heaters, and stoves all use electrical resistance to function).
    - Static Sparking - may occur when two substances that were joined together are separated. Unless the two substances are grounded or bonded together to prevent a static spark, ignition of flammable liquid vapors may occur.
- Chemical Reaction - Any two (or more) chemicals, when mixed together, may react. Some chemical reactions require an input of heat to occur, but many chemical reactions occur at any temperature, and give off heat. The heat given off in a chemical reaction may cause some vapor to form, or it may heat up vapors already present in the vicinity. The combination of heat, vapor, and oxygen (from the reaction, or in the atmosphere) can result in combustion due to chemical reaction in the absence of any visible external heat source. This is called spontaneous combustion. Chemical reactions with strong oxidizers are especially dangerous, as the oxidizer will release oxygen and thus fire can be supported independent of atmospheric oxygen.
- Friction - Any two surfaces, when rubbed against each other, produce heat due to friction. If there is vapor in the vicinity, and oxygen in the atmosphere, then the heat caused by friction could raise the temperature of the vapors to the fire point and cause a fire.

- Environment
    - Wind Direction
        - Do NOT approach downwind – approach from upwind or crosswind.
    - Confined Spaces
        - First responders are NOT to enter a confined space as this is by far the most dangerous environment as hazardous gases (toxic, combustible etc.) can accumulate and oxygen deficient atmospheres may be present. A recent example of an unsafe entry into a confined space, without proper preparation, occurred at the Sullivan Mine in British Colombia. Two paramedics responding to an emergency entered a shed in which an oxygen deficient atmosphere existed. The emergency responders were not wearing external sources of oxygen and were quickly overcome.
    - Topography
        - Topography can affect the dispersion of hazardous materials. Table 18 displays the vapor density with respect to air for hazardous materials at the lodge sites. Vapor density >1 indicates that the vapors will sink to the ground and can accumulate in

depressions. Vapor density <1 indicates that the vapors will rise and disperse into the ambient air. However, vapor hazard should not be assessed solely on vapor density. For example, a highly toxic vapour can still be extremely dangerous if it has a vapor density <1, as this trait does not prevent it from being inhaled or absorbed. Topographical features can focus the flow of hazardous liquids. Flow can be concentrated in valleys, rills, drainage swales, lows between bedrock outcrops, erosion gullies etc.

TABLE 22 Vapour Density (Relative to Air) of Hazardous Material at Lodges

Hazardous Material	Vapor Density Relative to Air	Comments
Diesel Fuel	~4	Will sink
Gasoline	3-4	Will sink
Jet Fuel	3.5-4	Will sink
Ethylene Glycol	~2.14	Will sink

- Method of Egress
  - When approaching any spill, one must always ensure that he or she has a clear and hazard free method of egress. Ensure that the flow and vapor migration of the spill is assessed as a clear route of egress can be cut off if the hazardous material spreads quickly.

11.2.5 Step 5 – Assess Injuries – Basic First Aid (If Safe to do so)

If it is safe to approach persons that have been injured, then the first responder is to assess injuries. However, the first responder is not to approach accident victims if it is not safe to do so. Approaching an injured person in unsafe conditions will only result in additional injuries to the first responder and will create a worse situation. The following basic steps should be be undertaken by the first responder when attempting to assess injured persons:

- assess the area to ensure it is safe to approach the injured person. Refer to step four for assistance in determining the safety of the area; and
- if it is safe to approach the individual, then the first responder is to apply the basic principles of emergency first aid. All persons on the site are to have basic first aid with CPR.

Emergency First Aid Procedures

There are six emergency action principles to follow in order:

- survey the scene;
- check the casualty for unresponsiveness. If the person does not respond, the onsite medic will be required;
- do a primary survey and care for life-threatening problems;
- co a secondary survey, when appropriate, and care for additional problems;
- keep monitoring the casualty's condition for life-threatening problems while waiting for EMS to arrive; and
- help the casualty rest in the most comfortable position and give reassurance. The above listed steps help keep you, the casualty, and other bystanders safe and increase the casualty's chance of survival. Only the site medic is to move the injured person or apply any first aid other than that listed above. The site medic is to immediately request the Lodge manager to issue a request for emergency MEDIVAC if in his or her opinion such measures are required.

11.2.6 Step 6 – Identify the Source of and Cause of the Spill (If Safe to do so)

Source

Spill of hazardous materials at the facility will most likely originate from the following sources:

- above ground storage tanks;

- greases and lubricants stored in various small containers; or
- below ground storage tanks.
-

One should record the location of the spill (preferably in GPS coordinates). Be specific and accurate. The potential for the spill discharging to water should be reported.

Cause of the Spill

General actions that cause spills are as follows:

- natural causes (heavy rains, snow, ice, high winds etc.);
- equipment failure (improper equipment, poor maintenance, and poor condition of existing equipment); and
- human error (carelessness, neglect, deliberate acts).

The following list outlines some of the specific causes of spills which occur at bulk storage facilities:

- spills due to overfilling of the tanks;
- rupture of the tanks;
- leaks in pipes, valves, pumps, fittings and other equipment;
- leaks in containment dikes;
- inadequate secondary containment systems;
- oil flow from diked area through open dike valve;
- piping and tank damage by collision with mobile equipment;
- spills from water draw off tanks;
- spills from tank bottom cleanout and sludge disposal;
- poor maintenance of pipes, valves, pumps, fittings and other equipment;
- spills from line flushing;
- spills from pipe and tank changes;
- spills from underground storage tanks; and
- possible sabotage.

11.2.7 Step 7 – Eliminate Potential Sources of Heat (If Safe to do so)

No persons should carry to the scene any personal source of ignition such as lighters or matches. Radios should be verified that they will not ignite a combustible vapour prior to entry into the isolation zone when combustible vapors are of concern (important for gasoline spill). All storage tanks, including those used in the response are to be grounded. No smoking is permitted within 100m of the scene. Electricity may have to be shut off to the scene. If so the local power company is to be contacted immediately. All operators are to be aware of main power fuses and are to be trained in how to shut off power to sources, if required in an emergency. Sparking tools are to be avoided when responding to a spill.

11.2.8 Step 8 – Secure the Flow at the Source (If Safe to do so)

Once the product has been identified and the dangers and hazards to the response team, public and environment have been assessed, further risk may be minimized by preventing additional loss of material. If the entire contents are already lost, the immediate action is to contain the spill on site. Time is of critical importance in securing a leaking source. The response team should be prepared, upon arrival on site, to quickly assess the situation and be prepared with the necessary tools and equipment to secure the source. The first assessment to be made in proceeding to secure the source is to identify the leak. Potential routes of leakage include, but are not limited to:

- open valves;
- overflow;
- orifice leak (puncture, rupture); or
- vessel failure (fire, explosion).

General procedures for securing the source are presented in the following table.

TABLE 23 General Procedure for Securing the Source of a Spill

Nature of Leak/Failure	Action
Discharge from tank due to overflow	A. Stop Flow into tank by closing supply valves or pump B. If overflow is from fuel expansion, remove some fuel from the tank by transferring to another vessel. Fuel expansion should always be considered when filling tanks as temperature variation between seasons is extreme on Great Bear Lake
Discharge from tanks due to open valve	A. Close the valve upstream from the discharge point B. If no valve is present, transfer contents to another vessel
Discharge due to orifice leak	A. Transfer contents into another vessel B. Patch the rupture C. If leak is from a small vessel (i.e. a barrel) realign to have level of liquid below leak point
Discharge from pipeline rupture	A. Turn off pumps and close upstream valves

11.2.9 Step 9 – Take Action to Contain the Spilled Product (If Safe to do so)

Although the resources may be limited, a first responder may have to contain a spill. The implementation of readily available spill containment kits may be an option to prevent the spread of a spill. Extensive measures to contain the spilled product may have to be provided during the spill response action. A discussion regarding spill containment measures is appended.

11.2.10 Step 10 – Assess Sensitive Receptors (If Safe to do so)

An evaluation of any sensitive downstream receptors that may be impacted by the spill is to be recorded. For example, if the spill is to migrate to a water body that is a source of drinking water then the municipality will have to be notified immediately and additional emergency planning will be required. In addition, if the spill is to migrate to sensitive fishing resources, additional resources may be required. Evaluating the risk of impacting sensitive downstream receptors will allow decisions regarding the need for additional resources and the manner in which the resources will be allocated to mitigate the spill (i.e., one downstream resource may be protected at the expense of another).

11.2.11 Step 11 – Identify Environmental Variables That Could Affect Spill Response (If Safe to do so)

A spill is profoundly affected by climatic conditions. Important variables include, but are not limited to:

- wind speed and direction;
- air temperature;
- snowfall and/or snow present on ground;
- type of snow (i.e., compactness, depth, moist or dry);
- presence or absence of ice on water bodies and the condition and thickness of ice;
- if open water is present, degree of wave action;
- frozen ground or thawed active layer; and
- if thawed active layer then degree of saturation of soils (i.e., wet, moist or dry).

Often numbers cannot be estimated for many of the above listed environmental variables. Best estimates are an acceptable alternative to numerical measurements. However, thickness of ice should only be reported if absolutely known. If no ice thickness measurements are known, assume the ice is thin and cannot be traveled upon.

11.2.12 Step 12 – Estimate the Required Spill Response Resources (If Safe to do so)

An estimate of the resources required to contain the spill should be provided. Order of magnitude will suffice; however detailed information is preferred.

11.2.13 Step 13 – Contact the Designate (If not Already Contacted) To:

A first responder should:

- initiate the Spill Contingency Plan;
- report the spill; and
- coordinate and monitor the spill response.

Initiate the Spill Contingency Plan
The designate is to immediately initiate the spill response plan by contacting and engaging the necessary resources to contain, recover and remediate a spill as per the SCP.

Spill Reporting – Reporting Triggers
Three key spill criteria exist with respect with the responsibility to report spills to regulatory agencies. They are:

- Territorial – Northwest Territories Spill Contingency Planning and Reporting Regulations (NWT SCPRR);
- Federal – Transport Canada CANUTEC

Reporting - Territorial – NWT SCPRR
NWT 24 Hour Spill Report Line - (867) 920 – 8130 (the "**Spill Line**") (can call collect)

Subsection 9. (1) and (2) of the NWT SCRR states that,

> ***"9. (1) The owner or person in charge, management or control of contaminants at the time a spill occurs shall immediately report the spill where the spill is of an amount equal to or greater than the amount set out in Schedule B. (2) Where there is a reasonable likelihood of a spill in an amount equal to or greater than the amount set out in Schedule B, the owner or person in charge, management or control of the contaminants shall immediately report the potential spill."***

Schedule B classifies contaminants based on the hazardous property classifications of the Transportation of Dangerous Goods Act (TDGA). The fuels stored at the facility are considered to be Class 3 – Flammable Liquids under the TDGA. Schedule B states that Spills of Class 3 liquids equal to or greater than 100L are reportable. Finally, Section 10 of the GNSCR states,

> ***"10. A person reporting a spill shall contact the 24-Hour Spill Report Line by calling (867) 920 – 8130."***

The following section describes how Great Bear Lake Lodge Ltd. will report spills in accordance with the NWT SCPRR.

Spills Less Than 100 L
All spills of oil less than 100L are to be reported to the lodge manager. All spills will be internally logged according to company policy.

Spills Greater Than 100 L

Overview - In NWT, all spills of Class 3 hazardous materials in excess of 100L must be reported. The Spill Line is dedicated for this service. The purposes of reporting a spill through the Spill Line are to:

- provide a uniform and consistent approach to spill response in NWT;
- assist field personnel in responding to the spill, in undertaking proper site assessments, and in identifying recovery and disposal methods;
- elicit technical backup from personnel in various government agencies in the Territories and from specialized firms and organizations in Canada;
- dispatch (when needed) personnel and equipment to the spill site;
- provide technical information on material properties, response and site restoration procedures, as required;
- monitor the progress of response and clean-up actions; and
- provide a central clearing house or command post for progress of spill response actions.

Reporting Procedure

The procedure for reporting a spill to the Spill Line is:

- fill out the spill report form as completely as possible before contacting the Spill Line. If incomplete information is available, the Spill Line should be contacted regardless;
- Report the spill immediately to the Spill Line. Collect telephone calls can be made by informing the operator that you wish to report a spill; and
- where facsimile machines are available, follow up immediately by sending a faxed copy of the spill report (867) 873-6924.

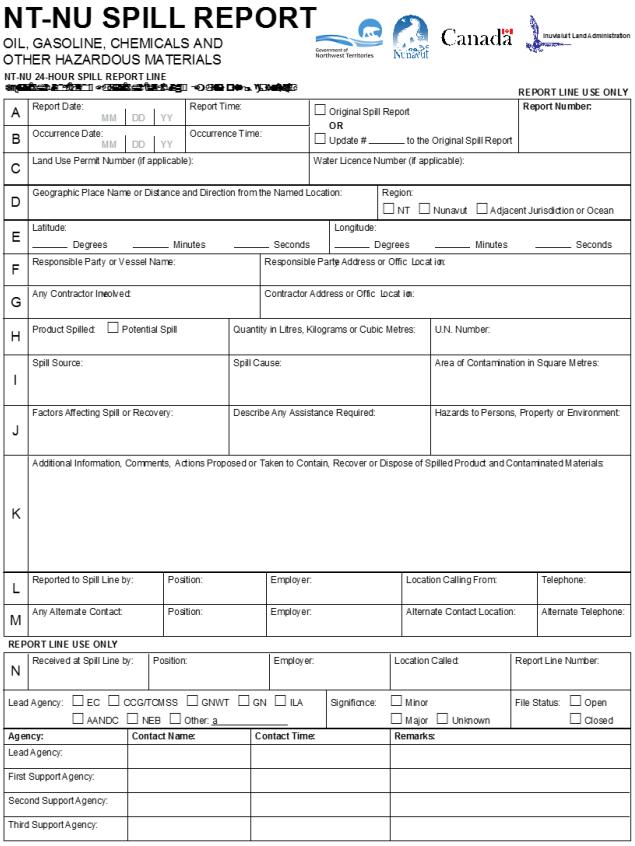
Required Information

The reporting of spills in NWT requires the reporting of specific information. A spill report form is available for these purposes and a sample copy is provided as Figure 3**.** In addition, the following reporting regime satisfies the requirements of paragraphs 11(1) (a) to (k). The information specifically needed when reporting a spill is detailed immediately below.

- Report Date and Time
    - The written report should be prepared as soon as possible after the spill event to ensure completeness.
- Date and Time of Spill (If known)
    - Reporting the time of spill will determine the measures and approaches which may be used for response; the greater the period of time, the less that can be done to contain and control the spilled material.
- Original Report or up to Date
    - If you know, indicate if the report is an original report or an updated report. If it is an updated report, the update number should be identified.
- Location and Direction (If moving)
    - Record the location of the spill (preferably in GPS coordinates). Be specific and accurate. The potential for the spill discharging to water should be reported.
- Party Responsible for Spill
    - The party who allowed or caused the spill to occur is to be reported along with the OM contact information.
- Product(s) Spilled and Estimated Quantities (Mass (kg)/Volume (m3 or L))
    - The material spilled should be positively identified. Product names should be reported correctly, ensure correct spelling. If the material is not known, assistance should be requested. An estimate of the spill quantity should be made, providing metric volumes or weights if possible. Identification of container type (tank, drum, etc.) will assist in providing an initial estimate of the magnitude of the spill.
- Cause of Spill

    - Identify the general incident category (tank rupture, tank overfill, pipeline rupture, etc.) causing the spill.
- Is the Spill Terminated? (Y/N)
    - Is the spilled material continuing to leak from the source? A yes or no response is required.
- If the Spill is Continuing
    - Calculate and provide the estimated rate. If the spill is of a continuing nature, assistance can be provided to identify options for securing the source.
- Is Further Spillage Possible? (Y/N)
    - A yes or no response is required.
- Extent of Contamination (Area = m2)
    - Estimate the land or water area covered by the spill. This will assist in determining the potential environmental effects and types of measures needed to contain the spill.
- Factors Affecting Spill or Recovery
    - Factors such as manpower and equipment availability, temperature, wind, snow, ice, terrain, buildings, etc. will require consideration when undertaking an effective spill response program. Record and report such conditions as they pertain to the spill area.
- Containment (Natural Depressions, Dikes, etc.)
    - Is containment by natural or artificial means? Provide information on how the spill has been contained so that assessments may be made regarding the need for further actions
- Action, If Any, Taken
    - Provide information on the actions that have already taken place to contain, recover, clean up or dispose of spill material.
- Do you require assistance? (Y/N)
    - A yes or no response required. If yes, provide information on additional manpower and equipment needs, fire response, medical aid, safety equipment requirements, etc.

For the purpose of this spill protocol, an “immediate reportable spill” to the Spill Line is defined as a release of substance that poses an imminent environmental or human health hazard or meets or exceeds the volumes in Schedule 1. All other releases can be handled as part of ongoing operations and maintenance and do not need to be immediately reported but should be immediately cleaned up. Spill quantities that trigger the requirement to report to the authorities are the same as the GNWT criteria.



NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE [redacted]

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: a_____			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:			

FIGURE 3 Spill Response Form

Reporting - Federal – Transport Canada CANUTEC - (613) 996-6666 (call collect)

CANUTEC is a federal spill reporting line that must be notified in the case of:

- lost, stolen or misplaced infectious substances;
- an incident involving infectious substances;
- an accidental release from a cylinder that has suffered a catastrophic failure;
- an incident where the shipping documents display CANUTEC's telephone number 613-996-6666 as the emergency telephone number; or
- a dangerous goods incident in which a railway vehicle, a ship, an aircraft, an aerodrome or an air cargo facility is involved.

CANUTEC is the Canadian Transport Emergency Centre operated by Transport Canada to assist emergency response personnel in handling dangerous goods emergencies. This national bilingual advisory centre was established in 1979 and is part of the Transportation of Dangerous Goods Directorate. It has the mandate to regulate the handling, offering for transport and the transport of dangerous goods by all modes in order to ensure public safety. CANUTEC is one of the major programs instituted by Transport Canada to promote public safety during movement of people and goods in Canada

All communications are to be directed to the Operations Manager, who is responsible for coordinating and monitoring the spill response. The Operations Manager is responsible to ensure that the Spill Headquarters are erected (if required) and properly fitted with staff, communications, office space and other additional resources. The exact location of a Spill Headquarters and contracts to ensure its delivery will be put in place following

contract award. **[NTD: This section doesn't really make sense. Where does the requirement for an HQ come from? Does the Operations Manager mean the 'lodge manager', or someone external?]**

11.3 Site Specific Spill Response Plans

Priority of Protection - The site-specific spill response plans set out below have been constructed to protect resources in the order provided.

- Priority 1 Protection of Human Health
  - Avoiding or limiting exposure to the spilled product and associated vapors and any related fires/explosions is the first priority of the spill response plans. No spill response is to be undertaken without the proper response methods and personal protective equipment.
- Priority 2 Protection of Water Resources
  - Once employee health and safety has been assured, water resources must be protected. The highest priority is to protect water quality of Great Bear Lake.
- Priority 3 Protection of Peatland and Wetlands
  - Following water resources, unimpacted peatland and wetlands are to be protected.
- Priority 4 Protection of Site Soils
  - The last resource to be protected during spill response is the site soils such as waste rock, roads, packed soils etc.

Designate
Chummy Plummer, or in absence, the lodge manager, are the spill response designate.

Spill Response Equipment Inventory
The following table presents basic emergency and spill response equipment that Great Bear Lake Lodge Ltd. will always provide, adjacent to fuel storage. The exact number of spill kits is dependent upon the volume of hazardous materials that is stored.

TABLE 24 Emergency and Spill Response Equipment

Item	Site Kits	Description
Oil Selective Pads	175	16"x20"
Oil Selective Boom	2	8"x10'
Temporary Disposal Bags	8	80 L
Disposable Coveralls	2	Large
4oz repair putty	1	Repair leaks
Oil Selective Socks	10	3"x4'
Granular Sorbent	10	36lb bags
Gloves	2 pair	Chemi pro
Safety Goggles	2 pair	Clear
Containment Drum	1	325 Litre poly
Shovel	2	steel shovel

11.3.1 Spill Response – Hazardous Materials (Oil)

Discharge from Tank – Slow Leak

- **Discussion**

- A slow leak from any containment of oils is not a high-risk situation. However, such a leak could indicate a more serious structural problem with the containment. As such, all slow leaks MUST be reported immediately to the designate. The designate is to ensure that an investigation into the cause of the leak is undertaken and the root cause is identified. Potential reasons for minor leaks include, but are not limited to:
    - corrosion around weak structural areas of the tank such as valves, flanges, welds, riveted seams, entrances etc.;
    - general corrosion of the tank (a very serious problem that will lead to tank failure in the near future);
    - a valve not properly closed;
    - minor overfilling; and
    - changes in volumes of the contents of the tank due to changes in ambient temperature.

- **Environmental Impact**
    - Due to the frequency of inspection, the total volume spilled as a result of the minor leak is not expected to be significant. Spills are most likely to affect the immediately surrounding soils. Volumes will most likely be less than reportable quantities. No impact to water is likely.

- **Spill Response Method**
    - Following first response the contents that have been spilled are to be cleaned up using standard available spill response equipment. The impacted material is to be collected by hand and placed in a hazmat drum. The drum is to be labeled as per TDGA and WHMIS regulations and placed into the on-site hazardous waste storage facility. Do not overfill the barrels. The lodge manager will assess the cleanup and determine if the efforts are satisfactory.

- **Occupational Health and Safety**
    - Minor spills of oils will not pose a major threat to worker safety. However basic safety measures must be observed. No smoking or other source of ignition is to be on the worker or within 20 m of the area.

11.3.2 Discharge from Tank – Medium Leak

- **Discussion**
    - A medium leak from any containment of oils is an immediately high-risk situation. Such a leak can indicate a soon to occur failure of the tank containment. Medium leaks can be caused by:
        - advanced corrosion around weak structural areas of the tank such as valves, flanges, welds, riveted seams, entrances etc.;
        - advanced general corrosion of the tank (a very serious problem that will lead to tank failure in the near future);
        - a valve left open;
        - significant overfilling; or
        - changes in volumes of the contents of the tank due to changes in ambient temperature.

      Such volume changes are most significant when volatile fuels such as gasoline are filled in the winter and are stored over summer. In the winter the vapor pressure in the void inside the tank will be lower than that in the summer. When the temperature increases in the summer, the vapor will expand and can cause major tank rupture. Medium leaks can be identified by:
        - significant staining from a point source on the exterior of a tank;
        - widespread general staining on the exterior of the tank;
        - significant staining on the ground;
        - odor near a tank;

- unidentified volume losses;
- ruptures in transfer piping;
- vehicular impact with the storage tanks; or
- fire or explosion.

- **Environmental Impact**
  - Medium leaks represent a significant risk to the environment. Diesel, Gas and Jet-B fuels will rapidly and vertically penetrate the soil profile. A portion of the fuels will be adsorbed by the soil matrix. However, if the leak is not identified immediately, there is a significant risk that the adsorptive capacity of the soil will be exhausted, and the fuels will leach into the subsurface, travel along the bedrock or permafrost at the bottom of the active layer or along a less permeable substrate. Such leaching can eventually discharge to a surrounding water body.

Spill Response Method
Initiate first responder protocol including contacting the lodge manager. The lodge manager is to immediately report to the site of the spill with the following equipment:

- half mask air purifying respirators fitted with hydrocarbon vapor/P100 particulate cartridges,
- first aid kit; and
- fire extinguisher.

The specific response will depend upon:

- the amount of product that has been spilled;
- if the product is continuing to leak; and
- the immediate health risks associated with the leak.

The following section describes three specific response scenarios for the differing conditions that could arise from a medium sized leak.

Scenario #1
Conditions
The following conditions apply to medium leak Scenario #1:

- the leak was noticed and reported quickly;
- minor amounts of product have spilled;
- product is no longer leaking;
- exposure to vapors and risk of fire and/or explosion is insignificant; and
- tank failure is not likely to occur.

Response
For such a spill the response will be similar to that of a minor spill. However, some excavation may be required to remove soils that have been impacted at depth.

Occupational Health and Safety
Refer to Minor Spill Response Method.

Scenario #2
Conditions
The following conditions apply to medium leak Scenario #2:

- the leak was noticed and reported quickly;
- minor amounts of product have spilled;
- the product continues to leak, cannot be easily repaired by first responder;
- product is leaking from a large above ground storage tank and as such significant release of product could result (i.e., high risk to water resources);

- product is leaking from a large below ground storage tank and as such significant release of product could result;
- exposure to vapors and risk of fire and/or explosion is significant as free product is continually being released and thus vapors are being replenished, decreasing ambient air dilution effects; and
- failure of the tank could occur.

Response

Initial Investigation

The lodge manager is to immediately report to the site of the scene. The following items are to be mobilized along with the manager:

- half mask air purifying respirators fitted with hydrocarbon vapour/P100 particulate cartridges,
- first aid kit; and
- fire extinguisher.

Any vehicle used by the lodge manager is to be parked outside the isolation zone. This is to ensure that the vehicle, which is an ignition source, does not ignite any vapors that are present and adjacent to the leak at ignitable concentrations. The manager is to don the respirator and ensure that no sources of ignition are on their person. The leak is to then be assessed to determine if it can be stopped.

Leak Can be Fixed Prior to Significant Loss of Product

If the leak can be fixed, then the necessary measures are to be immediately implemented to fix the leak. Once the leak has been stopped and the site is safe, the impact of the leak is then to be assessed by the lodge manager. The impacted matrix is to be immediately removed to prevent the long-term leaching of product into the surrounding environment. The exact method of product disposal is to be determined in the field by Chummy Plummer.

Leak Can Not be Fixed Prior to the Significant Loss of Product

If the leak cannot be fixed, then a temporary containment tank is to be immediately mobilized to the site of the leak to allow removal of the product from the compromised tank. Great Bear Lake Lodge Ltd. will have an 15,000 L tank on-site to allow for reception of fuel. Fire pumps could be required if the potential for fire and/or explosion exists. Spill kits can be used to create surface dikes to contain the fuel. If the leak is considerable an excavator or backhoe can be mobilized to the site to excavate an interception ditch or to excavate below ground fuel tanks. Water resources must be protected at all times. Once the product flow has ceased the impacted matrix is to be immediately excavated and removed to prevent additional subsurface product migration. The Lodge Manager is to determine when sufficient soils have been excavated. The area is then to be backfilled with clean borrow and compacted.

Scenario #3

Conditions

The following conditions apply to medium leak Scenario #3:

- the leak was not detected immediately, and significant product has escaped from the fuel tank into the surrounding environment.
- the extent of sub-surface plume is not known;
- the product may or may not continue to leak. The leak may or may not be easily repaired by first responder;
- product is leaking from a large above ground storage tank and as such significant release of product could result (i.e., high risk to water resources); and
- failure of the tank could occur.

Response

The key aspect of response scenario #3 is that significant product has escaped and that the extent of the subsurface plume is not known. As such:

- the lodge manager is to immediately ensure the mobilization of an excavator or backhoe, a dozer and fire pumps to the site. Additional temporary tanks are required if the leak continues and product remains in the tank;
- the lodge manager is to immediately assess the safety of the site and is then to determine the extent of the spill. The primary delineation goals are to protect water resources and prevent further sub-surface migration of product. For such an assessment, the following steps are to be taken:
    - the local receiving bodies of water are to be visually inspected for any presence of hydrocarbons; and
    - if hydrocarbons have reached a water source, adsorbent booms are to be immediately deployed and aqueous oil recovery is to be initiated to prevent further oil slick development.

If hydrocarbons are not present, any product remaining in the tank is to be transferred to secondary storage tanks if safe to do so. Free product pooled in local topographical low points can also be collected into temporary containment. Once the oil slick (if present) has been contained and the extents of impacted soils have been determined, the impacted matrix is to be immediately excavated and removed to prevent additional subsurface product migration. Chummy Plummer is to determine when sufficient soils have been excavated. Confirmatory samples from the base and edges of the excavation are to be taken and submitted to a Canadian Association for Laboratory Accreditation (CALA) and CCME certified laboratory for Fraction F1 to F4 analysis. The area is then to be backfilled and compacted.

Occupational Health and Safety

- Following first response the immediate area is to be evacuated by all persons except for the lodge manager who will assess the situation – a medium leak could quickly lead to catastrophic failure, thus rapidly increasing the health and safety risk of the situation;
- persons assisting the lodge manager are only to approach the site of the spill following request by the lodge manager;
- no sources of ignition are to be present on persons responding to the spill or within 100m of the spill;
- no sparking tools or electrically powered tools are to be used to attempt to seal the leak;
- the lodge manager is to wear oil resistant gloves and half mask respirators fitted with hydrocarbon vapour/P100 particulate cartridges; and
- the lodge manager and those assisting are to bring a fire extinguisher with them when investigating the leak.

11.3.3 Discharge from Tank – Catastrophic Failure

Discussion

A catastrophic failure can result from:

- further weakening of an orifice minor or major leak (during a spill response);
- failure at a location on the tank with advanced corrosion or other structural instability that is not leaking;
- impact from a vehicle or other moving object; or
- fire and/or explosion.

Environmental Impact

A major structural failure of an oil storage tank represents the greatest risk to environmental health with respect to spills that could occur at the lodges. A portion of the spilled fuels will be adsorbed by the soil matrix. However, as the contents of the tank are most likely to be released instantaneously, the absorptive capacity of the soil will quickly be exceeded. As such the majority of oil is expected to form a subsurface plume if the tank is situated underground, whereas above ground tanks would be expected to migrate towards receiving water bodies overland.

Spill Response Method

Initiate first responder protocol including contacting the lodge manager and evacuating the area as per CANUTEC recommendations. The lodge manager is to mobilize the following:

- 2 x half mask air purifying respirators fitted with hydrocarbon vapor/P100 particulate cartridges,
- 1 x first aid kit; and
- 1 x fire extinguisher.

Any vehicle used by the responders is to be parked outside the immediate isolation zone limits. This is to ensure that the vehicle, which is an ignition source, does not ignite any vapors. The lodge manager and the trained person assisting are to don the respirators and ensure that no sources of ignition are on their person. The following steps are then to be taken by the lodge manager and the person trained to assist:

- the lodge manager is to immediately ensure the mobilization of an excavator or backhoe, dozer, fire pumps and any available secondary storage tanks. In addition, temporary storage tanks are required if the leak continues and product remains in the tank;
- the assistant is to immediately ensure the isolation zone. The excavator or backhoe and a dozer are to immediately, at the edge of the isolation zone, install ditches and dikes to protect the surrounding water bodies. The excavator or backhoe is to dig an interceptor trench to bedrock (if possible). The dozer is to construct a dike. The interceptor ditch is to collect any subsurface product and the dike is to contain any overland flow. The interceptor ditch and dikes are to be placed between the leak and water resources, in the most likely migration paths. The material excavated from the ditch can be used to construct the dike. If available, the ditch and dike are to be lined with an impermeable liner. Notwithstanding, the dike is to be compacted as best as possible (dependent upon available material). The dikes and ditches are to be placed as close as possible to the water body without impacting the shoreline and water quality with suspended solids and entering areas with saturated soils that cannot support the loading of the heavy equipment. Empty 45-gallon drums and any other means of free product containment are to be mobilized to the ditch location, so any free product can be pumped and containerized. The trenches and dikes are to be monitored until either the leak has been contained or the contents of the tank have emptied or are below the level of the leak. Any hydrocarbons that report to the ditch or collect behind the dike are to be immediately removed. Any product remaining in the tank is to be transferred to secondary storage tanks if safe to do so. Free product pooled in local topographical low points can also be collected into temporary containment. Water resources are to be inspected by the lodge manager following the assessment of safety. The method is as follows:
    - the local receiving bodies of water are to be visually inspected for any presence of hydrocarbons; and
    - if hydrocarbons have reached a water source, adsorbent booms are to be immediately deployed and aqueous oil recovery is to be initiated to prevent further oil slick development.
- Once the oil slick (if present) has been contained and the trenches and dikes have been constructed the lodge manager is to determine the extents of impacted soils. Once the extent of the impact has been determined, the impacted matrix is to be immediately excavated and removed to prevent additional subsurface product migration. Confirmatory samples from the base and edges of the excavation are to be taken and submitted to a CALA and CCME certified laboratory for Fraction F1 to F4 analysis. The area is then to be backfilled and compacted.

Occupational Health and Safety

- Following first response the immediate area is to be evacuated by all persons with the exception of the lodge manager who will assess the situation;
- persons assisting the lodge manager are only to approach the site of the spill following request by the lodge manager;
- no sources of ignition are to be present on persons responding to the spill or within 100m of the spill;
- no sparking tools or electrically powered tools are to be used to attempt to seal the leak;

- the lodge manager and those assisting are to wear oil resistant gloves and half mask respirators fitted with hydrocarbon vapour/P100 particulate cartridges.
- the lodge manager and those assisting are to bring a fire extinguisher with them when investigating the leak.

11.3.4 Discharge from Tank – Overfilling

The on-site tanks will be filled only once, following the mobilization of fuel to the site by the barge. The filling of the tanks will be performed by the operations manager under the direct supervision of the lodge manager. If the tanks are overfilled, then the operator is to immediately close the refueling valve. The impacted soil is then to be collected and placed into on-site temporary storage tanks.

11.3.5 Discharge from Distribution Pipe Failure During Refueling

The operator is to immediately close the main valve leaving the refueling tank. Next, the Lodge manager is to immediately be contacted. The operator is to remain at the site of the spill to ensure that no other person uses the refueling equipment. The Lodge manager is then to lock out the refueling station. The mechanic is then to replace the broken pipe. Impacted soil is to be placed in 45-gallon drums for future on-site remediation. If present, snow is to be collected, placed into temporary tanks and the resulting impacted water is to be treated on-site.

11.3.6 Discharge from Operator During Filling – Overfilling Equipment Tank

Refer to “Discharge from Tank – Minor Spill”.

11.3.7 Oil Spilled due to Equipment Leak at Site

The equipment is to be inspected daily before operation. Any leaks are to be immediately reported to the lodge manager. The leak is then to be repaired by the on-site mechanic. If the mechanic is not immediately available a collection pan is to be placed under the equipment and the contents are to be monitored to ensure that the pan does not overfill. Any impacted soils are to be collected and placed in temporary storage for subsequent remediation. Leaking equipment is not to be used.

11.3.8 Oil Spilled Due to Equipment Accident at Site

Equipment accidents can involve one or more pieces of equipment. The priority during response to equipment accidents is to ensure that the operators are safe and if required administered the proper medical services. The first responder is to immediately contact the lodge manager. Along with the First Response protocols, the First Responder is to report if fire response is required and the degree of the accident. The lodge manager is to contact all trained personnel and they are to report to the scene. If a fire has occurred or could potentially occur, the fire pumps along with fire extinguishers are to immediately report to the scene. The priority in this situation is to ensure that the equipment operator is provided the necessary first aid. However, if the equipment is not safe to approach due to fire or explosion or chemical hazard, no one should risk their own well-being until the fire has been suppressed or proper PPE is available, respectively. Following confirmation from the lodge manager that the scene is safe to approach, spill response is to be initiated. Additional heavy equipment may be required to remove the damaged equipment to allow spill response to occur. The source of the spill may need to be secured and contents of the equipment reservoirs may need to be transferred to temporary storage. Following the securing of the source, the impacted matrix is to be collected and placed in temporary storage for subsequent remediation. Berms can be deployed to contain free product and protect water resources.

11.3.9 Discharge of Sewage

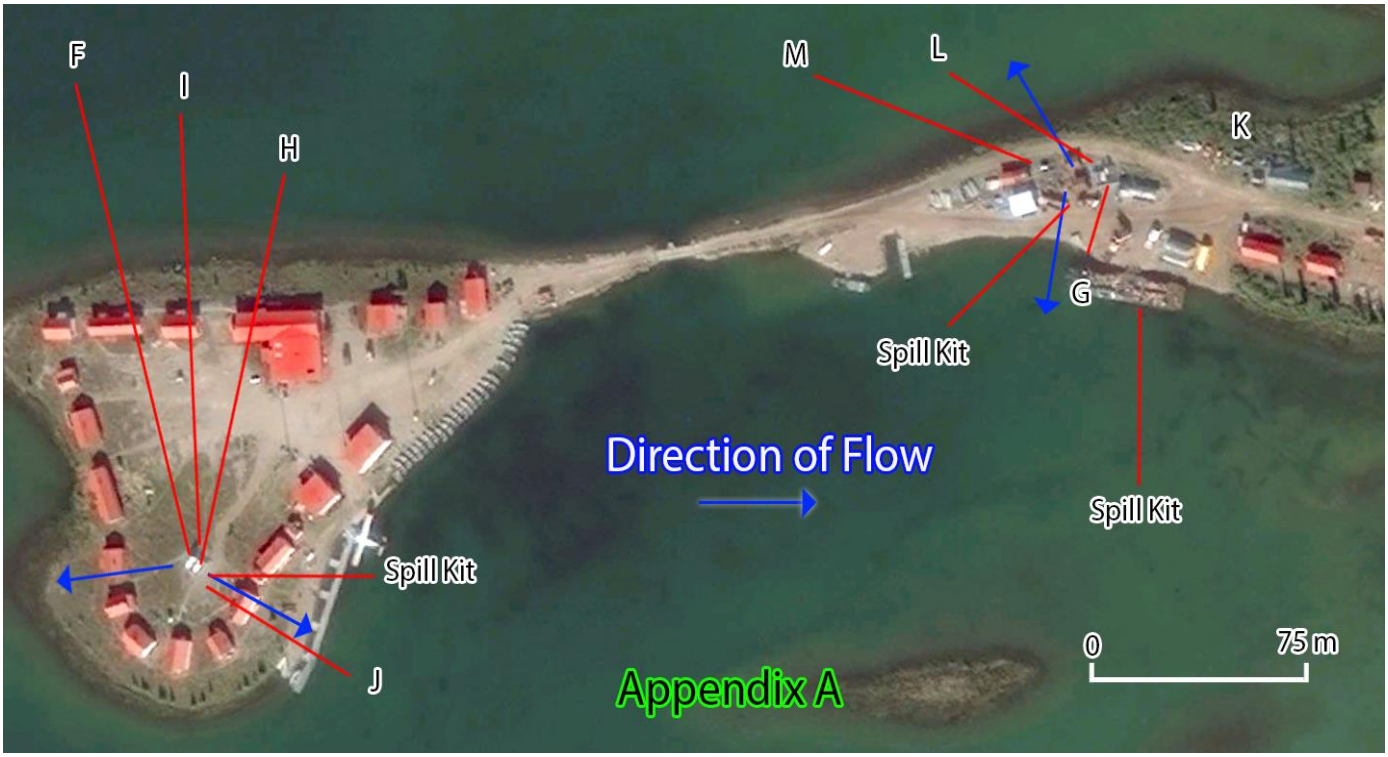
The area is to be made off limits. The contents of the spill are to be then cleaned up by assigned employees using the backhoe or other suitable equipment. The materials are to be placed in the sewage lagoon. Employees are not to directly contact the sewage and are to wear a Tyvek suit, rubber gloves and a half mask respirator fitted with P-100 particulate cartridges. The Tyvek suit, rubber gloves and filters are to be bagged and burned in the incinerator immediately following the removal of PPE.

11.4 Post Spill Response Investigation

Following a spill response effort (identification - initial response - spill contingency plan - remediation), Chummy Plummer is responsible to ensure that an investigation is undertaken to identify:

- root cause of the spill;
- the efficiency of the initial response with respect to protection of the environment;
- the efficiency of the SCP with respect to protection of the environment;
- the efficiency of the remedial measures implemented post recovery;
- efficiency in the coordination of resources and personnel;
- health and safety;
- public perception and readiness; and
- lessons learned.

12 APPENDIX A - FUEL TANKS STORAGE SITES (LODGE AREA)



13 APPENDIX B – FUEL TANKS STORAGE SITES (AIRPORT)