Spill Contingency Plan

Cambridge Bay Soil and Water Treatment Facility
Kitikmeot Environmental Ltd.



SPILL CONTINGENCY PLAN

FINAL

Cambridge Bay Soil and Water Treatment Facility
V.2.3
4300CBSTF

May 2026

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EXECUTIVE SUMMARY

REVISION HISTORY

DATE	DOCUMENT VERSION	SUMMARY OF CHANGES MADE	AUTHOR	APPROVER
Nov. 2016	Ver. 1	Initial Draft	JF	JF
January 2017	Ver. 1	Initial Final Issue	JF	JF
December 2022	Ver. 2.1	Ownership Change, Contacts Update	KHF	KO
May 2026	Ver.2.3	Section 1.0 Operator contact updated Section 3.1 edited to reflect actual infrastructure on site. Appendix A contact info update	MG	MG

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For further information, please contact:

Kitikmeot Environmental Ltd.
regulatory@kblenv.com
780.452.7779

1.0 INTRODUCTION

Kitikmeot Environmental Ltd. (KEL) operates a soil and water treatment facility located adjacent to the Hamlet of Cambridge Bay sewage lagoon.

Coordinates for the Facility are:

69^0 07' 40.52" N 105^0 02' 35.29"W

The site is accessible by road, from an access road off Natik Street.

Facility operations and maintenance contacts:

Corporate Office:

Kitikmeot Environmental Ltd.
30 Mitik Street
Cambridge Bay, NU
X0B 0C0

Operator Contacts:

Mike Gamache
Project Manager N60 Facilities
KBL Environmental Ltd.
mgamache@kbl.ca
403.370.2800 (cell)
Primary Contact

Jeff Flett
Operations Manager
KBL Environmental Ltd.
jflett@kbl.ca
587.646.4556
Secondary Contact

The effective date for this *Spill Contingency Plan* (the Plan) is January 1, 2023. The Plan will be effective for the duration of the lease and the life of the facility, a period of five (5) years, after which it will be reviewed for renewal.

2.0 ENVIRONMENTAL POLICY

Our commitment to the protection of the environment needs to be demonstrated in how we conduct our day-to-day business operations. The highest standards of care are to be taken by all employees to minimize the environmental impact of all operations. The company management team has the responsibility to take a leadership role and develop policies and procedures that minimize environmental effects. Employees have the responsibility to bring to the attention of their immediate supervisor those procedures and incidents which may impair the environment. Our policy is to:

1) Comply with all applicable government regulations.
2) Consider the environmental effects of our operations.
3) Provide staff with all the necessary information, training and equipment.
4) Develop processes, policies and procedures that minimize the occurrence and consequences of environmental incidents.

Our corporate environmental goal is to minimize the environmental impact of our operations.

Table 1. Spill Response Regulations and Guidelines

Jurisdictional Authority	Regulation or Guideline
Federal	*Canadian Environmental Protection Act* (1999) *Environmental Emergency Regulations* (2003) *Transportation of Dangerous Goods Act* (1992) *Transportation of Dangerous Goods Regulations* (2012) *Canadian Hazardous Products Act* (1985) *Controlled Products Regulation* (1987) *Canada Labour Code* (1985) *Canada Occupational Safety and Health Regulation* (1986)
Territorial	*Environmental Protection Act* (1988) *Guidelines for Spill Contingency Planning (2007)*

3.0 PROJECT OBJECTIVES AND SCOPE OF WORK

The purpose of this document is to outline the activities at the facility and outline contingency plans and response actions to be taken in the event of a spill or unplanned release to the environment. The scope of this Plan includes operation and maintenance of the Cambridge Bay soil and water treatment facility (CBSWTF). This procedure applies to all employees and contractors at the CBSWTF.

Spills are defined as an unplanned or unlawful release of pollutants into the natural environment originating from a structure, vehicle, or other container. Spills must be reported immediately to government of the Nunavut when they cause or are likely to cause any of the following:

a) impairment to the quality of the natural environment (air, water or land);
b) injury or damage to property or animal life;
c) adverse health effects;
d) public safety risk;
e) making property, plant or animal life unfit for use;
f) loss of enjoyment of normal use of property; or
g) Interference with the normal conduct of business.

KEL will manage any spill response responsibly and will comply with all licenses, permits and applicable territorial and federal laws and regulations related to spill response specific to CBSWTF operation. Table 1 lists regulations and guidelines that will be applied and referenced for the CBSWTF.

3.1. Project Description

The purpose of this project is to continue to operate a permanent soil and water treatment facility in Cambridge Bay, Nunavut. Following bioremediation, treated soil meeting landfill criteria is reused as Alternative Daily Cover (ADC) at the town landfill or re-purposed. Soil not meeting reuse criteria is transported off site for disposal at a suitable facility. Water will be treated using an onsite water treatment plant and once treated will be analyzed and discharged as per territorial regulations.

The Facility includes: one engineered cell consisting of three sub-cells: one cell 50 m x 40 m, for receipt, storage and treatment of petroleum hydrocarbon-contaminated soil; one cell designed for storage of up to 170 m3 of petroleum hydrocarbon-contaminated snow and water; one cell 19 m x 14 m designed for storage of hazardous waste awaiting shipment and; one small shed for storage of supplies, documentation and health and safety equipment.

3.2. Description of Onsite Materials

Materials destined for the Cambridge Bay facility include petroleum hydrocarbon-contaminated soil and snow/water. Hazardous materials that may be stored for disposal include used oil, grease and spill cleanup materials awaiting containerization. Runoff water from the soil storage area could also present a spill risk. Vehicles will be used on site for access and to transport materials. Accordingly, materials that pose a risk for onsite spills are: contaminated soil/snow/water, diesel, gasoline, glycols, lube oil and waste spill cleanup materials. Detailed spill response considerations are presented in the appendices for these materials.

4.0 SPILL RESPONSE PROCEDURE

KEL's approach to effective spill response includes 12 steps and is presented below.

STEP 1	**PREPARATION**
STEP 2	**IDENTIFICATION**
STEP 3	**PROTECT**
STEP 4	**CONTAIN AND RETAIN**
STEP 5	**EVACUATE**
STEP 6	**RESEARCH AND RECONNAISSANCE**
STEP 7	**NOTIFICATION**
STEP 8	**RECOVERY AND CLEANUP**
STEP 9	**PACKING AND DISPOSAL**
STEP 10	**DOCUMENT AND RECORD**
STEP 11	**INVESTIGATE**
STEP 12	**REPORT**

STEP 1: PREPARATION

1) Managers must ensure that suitable personal protective equipment (PPE) is available to all personnel potentially responsible for performing clean-up.
2) Managers shall ensure spill kits must be located at all worksites and/or in the service vehicles that handle liquid waste and/or product.
3) Employees shall ensure that they are competent in the use of personal protective equipment (PPE) and in initial spill response.
4) Employees shall ensure that they have been fit-tested if respirator use is necessary.
5) Employees shall ensure that all hazardous chemicals are handled, stored, transferred, transported and disposed of in a safe manner.
6) Prepare for conditions to be encountered (Spill on land, water, ice/snow).

STEP 2: IDENTIFICATION

1) NEVER RUSH IN.
2) Warn others in the immediate area.
3) Try to remotely identify the spilled product or waste with a view to assessing potential hazards and adverse effects.

STEP 3: PROTECT

1) NEVER RUSH IN.
2) Eliminate all avoidable sources of ignition.
3) Stay upwind of vapors. Stay out of low areas.
4) Ensure that the released product and the associated potential hazards have been identified and mitigated before approaching the release.
5) Use appropriate personal protective equipment.
6) Don't touch or walk through spilled product.

STEP 4: CONTAIN AND RETAIN

1) Act quickly. Only attempt to stop the product flow if it is safe to do so.
2) Set containers upright (e.g. drums, pails).
3) Close valves, shut off pumps, plug leaks.
4) Carry out emergency repairs.
5) Prevent entry into waterways, sewers, or confined areas by blocking drains, culverts, ditches, and other escape points.
6) Contain spill with sorbents, earth, sand, or other non-combustible materials, *if safe to do so and in accordance with direction from authorities if available.*

NOTE: Hydrocarbon vapors are heavier than air and will settle in low-lying places and places sheltered from the wind.

STEP 5: EVACUATE

1) Clear the area of non-essential or untrained personnel.
2) Isolate the immediate area and consider a more extensive downwind evacuation based on product information.
3) Limit or prevent access to site/area.

STEP 6: RESEARCH AND RECONNAISSANCE

1) Quickly and accurately gather spill details that need to be communicated to response personnel and authorities. This information will generally include:
   - the name, telephone and address of the person who is reporting the spill;
   - the name and telephone of the person(s) or parties who caused the spill;
   - the location (LSD, coordinates, street address or other), time, duration and rate of release of the substance spilled;
   - the type, quantity and concentration of the substance spilled;
   - the cause and effect of the spill including risks to human health and safety;
   - a description of the spill location and of the area surrounding the spill including the location of the nearest water body, dwelling and town or city;
   - the details of further action contemplated or required;
   - the names of agencies on the scene;
   - the names of other persons or agencies advised concerning the spill;
   - equipment involved;
   - affected area(s);
   - situation under control or escalating;
   - initial proposed tactics to contain/control spill; and
   - assistance required.

NOTE: Do not delay your call for help because you do not have complete information.

STEP 7: NOTIFICATION

1) Incident date and time period of release.
2) Release information (composition of material, duration, amount, etc.).
3) Circumstances surrounding the release (e.g. leaking tank, etc.).
4) Status of corrective actions (clean up, remediation, steps to prevent reoccurrence etc.).
5) Employee shall follow company and client notification procedures.
6) The area manager/supervisor (in consultation with a Health, Safety and Environment (HSE) Advisor) will call the applicable regulatory bodies.
7) Notification must be made as soon as reasonably practicable to do so to the 24-hour Spill Report Line by calling (867) 920-8130. Use the NT-NU Interactive spill form for reporting (form is provided in appendix). Contact information is also located on the top right corner of the form.

8) Notification must be made as soon as reasonably practicable to do so to the Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) Manager of Field Operations 867-975-4295.

NOTE: If in doubt about reportable quantities, adverse effects or reporting responsibilities, contact the HSE Advisor. Release reporting quantities are listed in appendices.

STEP 8: RECOVERY AND CLEANUP

The use of sorbent material or other appropriate technique should be used to recover fluid hydrocarbon product. For large quantities of pooled product, the trained employees shall pump to appropriate storage device (ensure equipment is non-sparking and adequately grounded and bonded). Recovered product can be stored in empty drums, tank trucks, port-a-tanks, or vacuum trucks. Contaminated soil should be placed into a secure area that is contained (lined and covered). Remedial action will be site specific and will depend on the type and quantity of the substance released. The location of the spill, time of year and surrounding area will also be considered when planning remedial action.

In some situations, the regulators may request that the remediation plan be filed for its review. Area management is responsible for developing and implementing the remediation plan. A remediation plan will typically include:

- a field investigation and environmental sampling to determine the magnitude and definition of the release area;
- decontamination or mitigation of all on-lease and off-lease adverse effects;
- review and selection of appropriate remediation methods based on remediation regulations and standards;
- consultation with personnel from operations;
- coordination of field remediation activities; and
- monitoring and re-sampling to assess effectiveness of the remediation plan.

STEP 9: PACKAGING AND DISPOSAL

1) Collect used sorbent material using clean, non-sparking tools.
2) Place waste materials in leak-proof sealed containers or appropriate 6-mil bags.
3) Store waste containers temporarily in a secure location. Used petroleum hydrocarbon sorbent material represents a severe fire hazard (particularly gasoline soaked sorbents). Used sorbent materials should be kept in a well-ventilated area away from heat sources, direct sunlight, and wet weather.
4) Wear appropriate personal protective equipment (PPE).

STEP 10: DOCUMENT AND RECORD

Employee, area manager, manager and HSE Advisor are to:

1) Initiate incident investigation process (obtain statements, pictures, analysis, etc.).
2) Complete and initial Incident Report form.
3) Determine and implement remedial corrective action to control repeat incidents.

STEP 11: INVESTIGATE

1) The area management, and in severe cases the HSE Advisor, shall investigate the cause of the spill.
2) The area management, HSE Advisor and the employee shall develop recommendations for corrective and preventive action.
3) The area management and employee shall implement corrective and preventive actions.

STEP 12: REPORT

1) The follow-up report must contain all the details that were included in the immediate report with any additional follow up information. Written report requirements are to be determined in consultation with applicable authority based on spill circumstances and quantities.
2) Most provincial bodies require a written report within seven days of the incident. All seven-day written reports must be reviewed by legal council (if for external distribution) and the HSE Advisor before they are submitted to the Regulators.
3) Notification of spill and reporting to be submitted to Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) Manager of Field Operations 867-975-4295.

5.0 SPECIFIC SPILL CONTAINMENT METHODS FOR LAND, WATER, ICE AND SNOW

Spills that occur on land are often more easily recovered due to soil acting as a natural sorbent. If contaminants are migrating down slope or towards a receptor, a dyke can be built to block the path of flow and contain the spill. The contaminant can then be recovered using sorbents and mechanical processes. Trenches can also be used to contain the flow of a spill. Various types of equipment can be used to dig the trench depending on the size needed. Once trenched, material can be recovered using sorbents or a pump. Care must be taken to ensure that spills are contained and do not reach more sensitive receptors or water.

Spills that occur on water are more mobile and can affect water quality and aquatic life. If a spill occurs in water, release booms to surround and circle the spill. Multiple booms can be used, and are designed to float and only absorb fuels rather than water. Weirs or barriers can be used to prevent migration further downstream if a spill occurs in a moving body of water. As water passes below, spilled fuel will float on the surface and can be recovered with sorbents.

If a spill occurs on ice, it can be recovered quickly using sorbents due to the impermeable nature of ice. Small spills can be soaked into sorbents and remaining contamination can be scraped or shoveled of the ice. Dykes can be created using surrounding snow to contain the spill on the ice if needed, followed by recovery by pumping or use of sorbents.

Snow is considered a natural sorbent, and small spills can generally be cleaned easily by shoveling or loading snow into barrels (or similar) and disposing at an approved location. If needed, snow can be compacted to create a dyke down slope of a spill which can be used to contain and pool the material which is then recoverable using sorbents.

6.0 SPILL CONTAINMENT FOR CONTAMINATED SOIL

If contaminated soil destined for, or contained within, the soil storage area of the facility has an unexpected release to the environment, it can be contained and cleaned up by ensuring that all soil is recovered and placed into the soil storage area. If a berm of the soil storage area is over topped by soil, care shall be taken to move all soil back within the confines of the cell ensuring not to damage the berm. Soil in the facility is to be placed a safe distance from the berms to ensure that over topping does not occur, as outlined in the Operations and Maintenance Plan (KEL, 2026).

7.0 SPILL RESPONSE EQUIPMENT

A 68 L spill kit is located on site. This spill kit contains the following:

- 50 oil sorbent pads
- 4 small pillows
- 2 large pillows
- 4 - 4 inch socks
- 1 plug N pattie (instant leak-stop)
- 1 pair of nitrile gloves
- 1 pair of splash goggles
- 1 disposable respirator

In addition, spare nitrile gloves, as well as snow and soil shovels will be stored onsite. In the event that heavy equipment is required, the licensee has ready, local access to mobile equipment including a pumper truck, a loader and excavator.

8.0 REFERENCES

ACGIH Threshold Limit Values and Biological Exposure Indices (ACGIH) 2016

Association of American Railroads T.T.C.I. Bureau of Explosives Action Guides (BOE) 2006

Cambridge Bay Soil and Water Treatment Facility Operations and Maintenance Plan (KEL 2026)

Canada Labour Code R.S.C., 1985, c. L-2

Canada Occupational Safety and Health Regulation. 1986. SOR/86-304

Canadian Environmental Protection Act (CEPA). S.C. 1999, c.33

Canadian Hazardous Products Act R.S.C., 1985, C. H-3

Controlled Products Regulation. 1987. SOR/88-66

Environmental Emergency Regulations SOR/2003-307

Environmental Protection Act. R.S.N.W.T. 1988, c.E-7

General Safety Regulations (Nu) 1990 cS-1

Guidelines for Spill Contingency Planning, Water Resources Division (CIRNAC) 2007

NIOSH Pocket Guide to Chemical Hazards (NPG) 2005-149

Occupational Health and Safety Act, RSA 2000, cO-2

Occupational Health and Safety Code 2009 Order, Alta Reg 87/2009

Occupational Health and Safety Regulation, Alta Reg 62/2003

Spill Contingency Planning Reporting Regulations R-068-93

Transportation of Dangerous Goods Act (TDGA). S.C. 1992, c.34

Transportation of Dangerous Goods Regulations. SOR/2012-245

APPENDIX A

Emergency Contact Information

NU 24 hour Spill Reporting Line 1.867.920.8130

KITIKMEOT ENVIRONMENTAL LTD.

30 Mitik Street

Cambridge Bay, NU

X0B 0C0

TEL: 867.983.2200

NAME	POSITION	OFFICE	CELL
Mike Gamache	Project Manager	403.370.2800	403.370.2800
Mike Erikson	Vice President	780.452.7779	780.270.1194
Jeff Flett	Operations Manager	604.866.3300	587.646.4556

HSE COR SERVICES TELE-REPORTING 24 HOURS

Near Miss and/or Incident Reporting

Toll Free

877.473.3375

Edmonton 780.628.2772

Calgary 403.668.9152

APPENDIX B

NT-NU Spill Reporting Form

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE TEL: (867) 920-8130 FAX: (867) 873-6924 `EMAIL: spills@gov.nt.ca

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	£ ORIGINAL SPILL REPORT, OR	REPORT NUMBER
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME		
C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION	REGION		
E	LATITUDE	LONGITUDE		
F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION		
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION		
	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)	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	
	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	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLED	REPORT LINE NUMBER

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS

NU-NT Spill Reporting form is also available on line at:
http://env.gov.nu.ca/sites/default/files/NT%20NU%20Spill%20Report%20Form.pdf

KEL

APPENDIX C

Release Reporting Limits for NU

CLASS	DIVISION	AMOUNT	UNITS	COMMENTS
1	Explosives	All		
2.1	Compressed gas, flammable	=> 100	L	Container Capacity
2.2	Compressed gas, non-corrosive, non-flammable	=> 100	L	Container Capacity
2.3	Compressed gas, toxic	All		
2.4	Corrosive gas, corrosive	All		
3	Flammable liquid	=> 100	L	
4	Flammable solid	=> 25	kg	
4.2	Spontaneously combustible solids	=> 25	kg	
4.3	Water reactant solids	=> 25	kg	
5.1	Oxidizer	=> 50	kg or L	
5.2	Organic peroxide	=> 1	kg or L	
6.1	Poisonous substance	=> 5	kg or L	
6.2	Infectious substance	All		
7	Radioactive	All		
8	Corrosive substance	=> 5	kg or L	
9.1	Hazardous substance	=> 50	kg or L	(No PCBs)
9.1	Hazardous substance	=> 0.5	kg or L	(PCB mixtures 5ppm or more
9.2	Environmental hazard	=> 1	kg	
9.3	Dangerous waste	=> 5	kg or L	
None	Other contaminants	=> 100	Kg or L	(eg. Lube oil)

APPENDIX D

Definitions / Descriptors

Adverse Effect or Impact	Impairment of or damage to the environment, human health or safety or property.
Corrective Action	Long term or permanent solutions which address each root (basic) cause of an incident.
Emergency	An unforeseen or imminent event which requires prompt co-ordination of resources, special communications and heightened lines of authority, to protect the health, safety, or welfare of people, and to limit damage to property, company operations and the environment.
Employee(s)	All permanent (full time and part time) and contract employees at Company work sites.
Environment	Components of the earth which includes: • air, land and water, • all layers of the atmosphere, • all organic and inorganic matter and living organisms, and • the interacting natural systems that include components referred to above
Hazard	A condition or practice that has the potential to cause loss.
Hazardous Material	Means a substance or mixture of substances that exhibits characteristics of flammability, corrosively, reactivity or toxicity, including, without limitation, any substance that is designated as a hazardous substance within the meaning of the applicable regulations.
HSE	Health, Safety & Environment

Incident	An unplanned event that results in undesirable consequences or an unplanned event which, under slightly different circumstances, could have resulted in undesirable consequences (Near Miss).
NEB	National Energy Board
Occupational Exposure Limit (OEL)	The regulated exposure limit established in the Occupational Health and Safety legislation.
Personal Protective Equipment (PPE)	Equipment designed and worn to protect employees from exposure to work site hazards (i.e. fall protection, ear plugs, muffs, safety goggles, flame resistant clothing).
Potential Hazard	A condition or practice that has the potential to cause loss.
ppm	Parts per million
Release	Includes to spill, discharge, dispose of, spray, inject, inoculate, abandon, deposit, leak, seep, pour, emit, empty, throw, dump, place and exhaust.
Risk	The chance of loss. The combination of the expected probability (i.e. frequency of events/year) and severity (i.e. consequences/event) of an incident.
Waste	An unwanted substance (by the generator) or mixture of substances that results from the construction, operation, or reclamation of a facility.
Waterway	• The bed and shore of a river, stream, lake, creek, lagoon, swamp, marsh or other natural body of water, or • A canal, ditch, reservoir or other man-made surface feature, whether it contains or conveys water continuously or intermittently.

APPENDIX E1

Response Plan for Diesel

General Information

Diesel fuels (No. 2, 4, 5, and 6) are commonly light brown liquids (not as waste products) which have an odour like kerosene. Common uses are as a general purpose fuel. They are essentially insoluble in water and lighter, so they may be expected to form a floating slick.

The flash point range of 38-54°C indicates that some degree of preheating is necessary before the product can be ignited.

Diesel oils do not react with water or many other common materials and are stable in normal transportation.

Toxicity via of potential routes of exposure is low to moderate.

Chemical/Physical Data (Diesel # 2)

PROPERTY	DETAILS
Solubility in Water	Essentially insoluble
Specific Gravity (Liquid)	0.87 to 1.05
Boiling Point	160 to 358°C (321 to 676°F)
Vapour Pressure	2.12 to 26.4 mmHg at 21°C
Flash Point	38 to 54°C (100 to 130°F)
Stability	Under normal conditions
Corrosiveness	Non-corrosive
Reactivity with Water	No reaction.
Reactivity with Other Chemicals	Reacts with oxidizing materials.

Identification

UN/NA Designation	UN1202
CAS Number	68476-03-02 (Fuel oil no. 2), 68476-31-3 (Fuel oil no. 4), 68476-33-5 (Fuel oil no. 6)

Potential Hazards

General Hazards

Threshold Odour Concentrations	0.11ppm
Unusual Hazards	None
TLV/15-Minute Exposure Limit (STEL)	Not established for the NWT, Alberta, or the Federal Government
TLV/8-Hour Occupational Exposure Limit (OEL)	NWT →Not Established AB →100 mg/m^3 (AB OHS Code Schedule 1, Table 2) Federal→100 mg/m^3 (ACGIH TLVs and BEIs)*
Ceiling Occupational Exposure Limit	Not Established for NWT, Alberta, or the Federal Government
Immediately Dangerous to Life or Health (IDLH)	Not Established

*ACGIH Threshold Limit Values and Biological Exposure Indices as per the Canadian Labour Code Part II, Canadian Occupational Health and Safety Regulations Part 10.19 1(a), 2(a) (b))

Health Hazards

Public Health Hazards: Low, but exposures should be avoided.

Hazards of Skin or Eye Contact: Minor

Hazards of Inhalation: Prolonged exposure to high concentrations in air may cause headache, drowsiness, irritation of eyes and nose, and lung irritation. Such concentrations are likely in the immediate vicinity of the spilled product. Other symptoms may include fatigue, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death, depending on the concentration and duration of the exposure.

Hazards of Ingestion: Ingestion may result in irritation of the gastrointestinal tract, nausea, vomiting, cramping, and possible depression of the central nervous system. Aspiration into the lungs during vomiting may result in severe lung irritation with coughing, gagging, difficult breathing, substernal stress, rapidly developing pulmonary edema, and possibly delayed bronchopneumonia and pneumonitis with possibly more severe consequences.

Fire Hazards

Lower Flammable Limit: 0.6%

Upper Flammable Limit: 7.5%

Behaviour in Fire: Vapours are heavier than air and may travel considerable distances to a source of ignition and flash back. Containers may violently rupture in fire.

Personal Protective Equipment

Protective Clothing Required

Responders should be equipped with equipment that prevents repeated or prolonged skin contact with the spilled product. This may include rubber boots, gloves, face shields, splash-proof safety goggles, and other impervious and resistant clothing.

Compatible materials may include neoprene, nitrile rubber, chlorinated polyethylene, polyurethane, polyvinyl alcohol, Viton, and nitrile butadiene.

Respiratory Protection

For *unknown concentrations* or concentrations *above the respiratory protection factor required to keep exposures below the occupational exposure limits* responders should be equipped with a positive pressure-demand self-contained breathing apparatus (SCBA).

For lesser concentrations an air purifying respirator with an organic vapour cartridge.

Spill Responses

Land

***Methods that may be used for spills on ice with consideration of site-specific conditions.**

Technique-Absorption*

Spreading of spilled product may be controlled by absorbing liquid with sand, earth, clay, fly ash, cement powder, or other compatible substances.

Consequence:

- Once used the sorbent materials pose the same hazards as the spilled product.
- Their use adds to the overall volume of contaminated material.

Mitigation:

- Deplete accumulated liquid pools with pumps or vacuum trucks if possible before applying sorbents.
- Remove contaminated sorbents to safe storage by mechanical means.

Technique-Pumping/Vacuum Suction*

Remove accumulated pool with the use of a rubber lined vacuum truck or other equipment designed for this purpose.

Any equipment used should be clean of any residual chemicals that could react with the diesel.

Consequence:

- Equipment that is incompatible with the spilled product may become damaged or develop leaks.

Mitigation:

- Use equipment compatible with diesel.

Technique-Containment Dikes*

Diesel may be contained by building dikes using soil, sand, or other materials.

Consequence:

- Contained diesel may percolate into soil or seep through dike material.
- This may result in loss of contained product and spread of contamination.

Mitigation:

- Remove or neutralize contained product as soon as possible to prevent spread of contamination.
- Be alert to conditions such as fire hose runoff or rainwater that may overfill impoundments.
- Where possible, line collection area with compatible impervious materials.

Technique-Mechanical Removal*

Contaminated soil and spilled product may be removed by shovels, motorized graders and scrapers, loaders, bulldozers, and draglines.

Consequence:

- Removal equipment may become contaminated and present a hazard to later users.
- Incompatible equipment may be damaged or corroded.
- Improper storage of removed materials may result in future spread of contamination.
- Any flammable vapours or gases present in the area may be ignited by motorized removal equipment.

Mitigation:

- Decontaminate all equipment after use.
- Use equipment that is compatible with diesel.
- Store contaminated materials in a safe and secure location.
- Continually monitor for the presence of flammable vapours.
- Consult qualified experts for advice where necessary.

Technique-Excavation

A trench or ditch may be excavated to contain leaking product.

Consequence:

- There may be increased potential for ground water contamination in some cases.

Mitigation:

- Remove contained products as soon as possible to prevent spread of contamination.
- Use surface dikes or barriers where groundwater contamination is possible or line collection basin impervious material.

Water

*Methods that may be used for spills on ice with consideration of site-specific conditions.

Technique-Absorption*

Straw, hay, peat, or commercial sorbent materials compatible with the product may be used to absorb spilled product from water surface, preferably after the spill has been contained.

Consequence:

- Once used, the sorbent materials pose the same hazard as the spilled product.
- Their use adds to the overall volume of contaminated material.
- Fire hazards pose risk to response personnel and equipment.
- Deployment and recovery (water) can be difficult.

Mitigation:

- Proceed with caution.
- Decontaminate equipment after use.
- Store and dispose of waste materials in proper and safe manner.
- Use compatible equipment.
- Eliminate ignition sources.

Technique-Booms or Barriers*

Booms or barriers of compatible matter may be deployed. Alternatively, mesh or nets may be strung across stream (flow) and anchored every 6-8 feet. Straw or peat placed on upstream side of mesh should absorb and retard spreading of spilled product

Consequence:

- Leakage may occur under or through barrier if high waves or current are present or if not properly deployed.
- Incompatible materials may be damaged by spilled product.
- Booms, barrier materials, and equipment may be contaminated.
- Fire hazards pose a risk to personnel and equipment.

Mitigation:

- Proceed with caution.
- Stage barriers in series where necessary.
- Recover spilled product as soon as possible.
- Decontaminate equipment after use.
- Store and dispose of waste materials in proper and safe manner.
- Use compatible equipment.
- Eliminate ignition sources.

References

Association of American Railroads T.T.C.I. Bureau of Explosives Action Guides

ACGIH Threshold Limit Values and Biological Exposure Indices

Alberta Occupational Health and Safety Act, Regulation, and Code (2009)

NWT General Safety Regulations (1990)

NIOSH Pocket Guide to Chemical Hazards

APPENDIX E2

Response Plan for Ethylene Glycol

General Information

Ethylene glycol is a commonly used colourless syrup or liquid with little or no odour (not as a waste product). It is used in numerous industry and consumer products. It is fully soluble in water and slightly heavier, so it can be expected to sink and mix frequently. The melting point is 13.5-126° C for the relatively pure product indicating that it may solidify at low ambient temperatures. A flash point range of 111.1 -121.1°C indicates that considerable preheating is necessary to ignite the pure material or to reach materials at which will become flammable vapours.

Glycol does not react with water or many other common materials. There is an increased risk of vigorous reaction, fire and/or explosion in the presence of strong oxidizing agents. The substance is otherwise reactive with a variety of other chemical substances. It is not corrosive to common metals (except to aluminum at elevated temperatures) but may deteriorate some forms of plastics, rubber, and coatings.

The toxic hazard of the product at room temperatures is generally low by all routes in acute exposures. Ethylene glycol is reported to emit acrid smoke and irritating fumes when heated to decomposition.

The waste product may contain lead to which continued exposure at high levels can have adverse affects on humans. To prevent exposures, practice proper hand washing, avoid hand to mouth contact when handling, and wear the appropriate personal protective equipment.

Chemical/Physical Data

PROPERTY	DETAILS
Solubility in Water	Soluble in all proportions
Specific Gravity (Liquid)	1.11-1.13 at 20° C (68° F)
Boiling Point	197.6°C (387°F) at 1 atm
Vapour Pressure	0.06 mm Hg at 20°C (68.5°F)
Flash Point	111.1 to 121.1°C (232 to 250°F)
Melting Point:	13.5 to 12 6°C (7.7 to 9.3°F)
Stability	Stable
Corrosiveness	Not corrosive to most metals under normal conditions. May be corrosive to aluminum at temperatures above 212°F. May deteriorate some forms of plastics, rubber, and
Reactivity with Water	No reaction.
Reactivity with Other Chemicals	Increased risk of vigorous reaction, fire and/or explosion in presence of strong oxidizing agents, either immediately or when mixture is heated depending on specific oxidizer. May violently decompose in presence of perchloric acid. Mixture with acids such asoleum, 96% sulfuric acid, or chlorosulfonic acid causes temperature and pressure to rise in closed containers.

Identification

UN/NA Designation	UN3082
CAS	107-21-1
Physical State as Released	Liquid
Odour Characteristics	Odourless or with slight odour

Potential Hazards

General Hazards

Threshold Odour Concentrations	Not Established
Unusual Hazards	Highly corrosive oxidizing mineral acid. May char and possibly ignite combustible materials. Reacts violently with water when concentrated. Contact with metals may generate hydrogen gas.
TLV/15-Minute Exposure Limit (STEL)	NWT →Particulate-20 mg/m^3 *(NWT General Safety Regulations Schedule A, Table 2)* AB →Not Established Federal→Particulate-20 mg/m^3 (ACGIH TLVs and BEIs)*
TLV/8-Hour Occupational Exposure Limit (OEL)	NWT →Particulate-10 mg/m^3 *(NWT General Safety Regulations Schedule A, Table 2)* AB →Not Established Federal→Particulate-10.0 mg/m^3 (ACGIH TLVs and BEIs)*
Ceiling Occupational Exposure Limit	NWT →Vapour-127.0 mg/m^3 *(NWT General Safety Regulations Schedule A, Table 2)* AB →100 mg/m^3 *(AB OHS Code Schedule 1, Table 2)* Federal→Aerosol-100.0 mg/m^3 Vapour-127.0 mg/m^3 (ACGIH TLVs and BEIs)*
Immediately Dangerous to Life or Health (IDLH)	Not Established

*ACGIH Threshold Limit Values and Biological Exposure Indices as per the Canadian Labour Code Part II, Canadian Occupational Health and Safety Regulations Part 10.19 1(a), 2(a) (b))

Health Hazards

Public Health Hazards: The major threat from ethylene glycol has been associated with ingestion.

Hazards of Skin or Eye Contact: Contact of the eyes with liquid ethylene glycol may cause mild or moderate discomfort, redness, and irritation but no significant corneal injury unless the product is sufficiently hot to cause a thermal burn. Long-term exposure to vapours and mists may cause temporary eye irritation. Contact lenses should not be worn when working with chemicals because they may contribute to the severity of an eye injury.

Hazards of Inhalation: Due to its low vapour pressure, toxic concentrations of ethylene glycol in air are unlikely to occur at normal room temperatures and below. Nevertheless, vapours generated at moderate to high ambient temperatures may be irritating. In experiments, humans could not tolerate levels above 56 ppm or greater due to throat irritation that produced a burning sensation and coughing. Inhalation of vapours from hot liquid or of mists of ethylene glycol generated at any temperature are reported to cause headache, nausea, vomiting, dizziness, giddiness, rapid and involuntary eye movements, eye lacrimation, coughing, general anaesthesia, respiratory system stimulation, unspecified effects on the lungs, and possible kidney and liver injury.

Hazards of Ingestion: The toxicity of ethylene glycol by ingestion is comparatively low but the product is easily and widely available and has been the cause of many cases of fatal or near-fatal poisonings. Symptoms of ingestion are include nausea, vomiting, abdominal pain or discomfort, dizziness, drowsiness, malaise, blurring of vision, rapid and involuntary eye movements, irritability, lumbar pain, intoxication, stupor, reduced urination and resultant fluid retention, weakness in facial muscles, diminished hearing, difficulty in swallowing, unconsciousness, coma, and convulsions.

Personal Protective Equipment

Protective Clothing Required

Responders should be equipped with equipment that prevents the possibility of skin or eye contact with the spilled product. This may include rubber boots, gloves, face shields, splash-proof safety goggles, and other impervious and resistant clothing.

Clothing providing thermal protection may be required where hot liquid is to be handled.

Compatible materials include butyl rubber, neoprene, nitrile rubber+ polyvinyl chloride, Viton, and Saranex.

Respiratory Protection

For *unknown concentrations*, or concentrations *above the respiratory protection factor required to keep exposures below the occupational exposure limits*, responders should be equipped with a positive pressure-demand self-contained breathing apparatus (SCBA).

For lesser concentrations, an air purifying acid gas cartridge respirator with a full face piece and an organic cartridge may be appropriate.

Spill Responses

Land

***Methods that may be used for spills on ice with consideration of site-specific conditions.**

Technique-Absorption*

Spreading of spilled product may be controlled by absorbing liquid with sand, earth, clay, fly ash, cement powder, or other compatible substances.

Consequence:

- Once used the sorbent materials pose the same hazards as the spilled product.
- Their use adds to the overall volume of contaminated material.

Mitigation:

- Deplete accumulated liquid pools with pumps or vacuum trucks if possible before applying sorbents.
- Remove contaminated sorbents to safe storage by mechanical means.
- Where necessary neutralize sorbents under guidance of qualified expert.

Technique-Containment Dikes*

This product may be contained by building dikes using soil, sand, or other non-combustible materials.

Consequence:

- The contained product may percolate into soil or seep through dike material.
- This may result in loss of contained product and spread of contamination.

Mitigation:

- Remove or neutralize contained product as soon as possible to prevent spread of contamination.
- Be alert to conditions such as fire hose runoff or rainwater that may overfill impoundments.
- Where possible, line collection area with compatible impervious materials.

Technique-Pumping/Vacuum Suction*

Spilled material contained in dike areas may be recovered using compatible hoses, pumps, and vacuum trucks. All product transfer equipment should be properly bonded and grounded.

Consequence:

- Equipment that is not compatible with the spilled product may become damaged and present a safety hazard for response personnel.
- Mechanical equipment will become contaminated with removed products.

Mitigation:

- Use equipment constructed of materials compatible with the spilled product.

- Decontaminate equipment after removing product.

Technique-Mechanical Removal*

Contaminated soil and spilled product may be removed by shovels, motorized graders and scrapers, loaders, and bulldozers.

Consequence:

- Removal equipment may become contaminated and present a hazard to later users.
- Incompatible equipment may be damaged or corroded.
- Improper storage of removed materials may result in future spread of contamination.

Mitigation:

- Decontaminate all equipment after use.
- Use equipment that is compatible with the product.
- *Apply this technique only to remove the final traces of spilled product.*

Technique-Excavation

A trench or ditch may be excavated to contain leaking product.

Consequence:

- There may be increased potential for ground water contamination in some cases.
- This may result in loss of confined product and spread of contamination.

Mitigation:

- Remove contained products as soon as possible to prevent spread of contamination.
- Water sprays may be used to reduce vapours, except in enclosed areas where runoff may accumulate and overflow impoundments.
- Be alert to conditions such as increasing spill volume with runoff or rainwater which may overfill dike areas.
- If possible, confinement areas should be lined with suitable, impervious material to prevent penetration into soil.
- Use surface dikes or barriers where groundwater contamination is possible or line collection basin impervious material.

Water

***Methods that may be used for spills on ice with consideration of site-specific conditions.**

Technique-Confinement Dams

Water with dissolved chemical may be confined (or diverted or impoundment area) by damming upper and/or lower bounds to limit volume of water affected and spread of contaminations. Clean water can be diverted around contaminated impoundments by excavation of diversion channels.

Consequence:

- Earthen dams may become saturated with water and seep through or collapse.
- Additional water may cause overflow of dammed area or water body boundaries.

Mitigation:

- Reinforce or modify dams as necessary.
- Be alert to conditions that may lead to overflow or dam collapse.
- Remove contaminated water to impoundment or storage area for later treatment or disposal.

References

Association of American Railroads T.T.C.I. Bureau of Explosives Action Guides
ACGIH Threshold Limit Values and Biological Exposure Indices
Alberta Occupational Health and Safety Act, Regulation, and Code (2009)
NWT General Safety Regulations (1990)
NIOSH Pocket Guide to Chemical Hazards

APPENDIX E3

Response Plan for Gasoline

General Information

Gasoline is a volatile colourless to amber liquid hydrocarbon (not as a waste product). It is most commonly used as fuel but also has uses as a diluents and solvent in industry. Essentially insoluble in water and lighter, gasoline will float to form a surface slick. The flash point may be as low as -45.6°C and this indicates that the product is easily ignited under all ambient conditions. Gasoline vapours are heavier than air, may travel a considerable distance to a source of ignition and flashback, and may persist in pits, hollows, and depressions. Containers of liquid may rupture violently if exposed to fire or excessive heat for sufficient time duration.

Gasoline does not react with water or many other common materials and is stable in normal transportation. It is a relatively noncorrosive substance. It is primarily incompatible with oxidizing materials that may cause its ignition.

Toxicity ranges from low to high depending on the route of entry.

Downwind evacuation should be considered if significant quantities of gasoline are leaking but not on fire. If a fire becomes uncontrollable or a container is exposed to direct flame, evacuate for a radius of 500 metres for protection from flying debris.

Chemical/Physical Data

PROPERTY	DETAILS
Solubility in Water	Practically insoluble, 100 to 600ppm
Specific Gravity (Liquid)	0.73 at 20° C (68° F)
Boiling Point	60.0 to 199°C (140 to 390°F) at 1 atm
Vapour Pressure	190 mm Hg (3.67 psi) at 20°C (68.5°F)
Flash Point	-38.9 to -45.6°C (-38 to -50°F)
Stability	Stable
Corrosiveness	Non-corrosive but may deteriorate some forms of plastics, rubbers, or coatings.
Reactivity with Water	No reaction.
Reactivity with Other Chemicals	Reacts with oxidizing materials.

Identification

UN/NA Designation	UN1203
	8006-61-09

Potential Hazards

General Hazards

Threshold Odour Concentrations	0.25ppm
Unusual Hazards	Volatile flammable liquid with heavier than air vapours that may travel to a source of ignition or persist in low areas. May contain lead components or other toxic additives
TLV/15-Minute Exposure Limit (STEL)	NWT →500 ppm *(NWT General Safety Regulations Schedule A, Table 2)* AB →500 ppm *(AB OHS Code Schedule 1, Table 2)* Federal→500 ppm (ACGIH TLVs and BEIs)*
TLV/8-Hour Occupational Exposure Limit (OEL)	NWT →300 ppm *(NWT General Safety Regulations Schedule A, Table 2)* AB →300 ppm *(AB OHS Code Schedule 1, Table 2)* Federal→300 ppm (ACGIH TLVs and BEIs)*
Ceiling Occupational Exposure Limit	Not Established for NWT, Alberta, or the Federal Government
Immediately Dangerous to Life or Health (IDLH)	Not Established

*ACGIH Threshold Limit Values and Biological Exposure Indices as per the Canadian Labour Code Part II, Canadian Occupational Health and Safety Regulations Part 10.19 1(a), 2(a) (b)

Health Hazards

Public Health Hazards: Major hazard is exposure to the significant vapour concentrations that may be present in air after major spills. Ingestion and physical contact should be avoided.

Hazards of Skin or Eye Contact: Contact with eyes may result in pain, but only slight and temporary injury.

Hazards of Inhalation: Vapours act as a central nervous system depressant and may be irritating. Low concentrations in air may cause flushing of the face, staggering gait, headache, dizziness, slurred speech, and mental confusion. High levels may cause convulsions, unconsciousness, coma, pulmonary edema, and possibly death from respiratory failure or asphyxiation. There also may be damage to the pancreas, liver, kidneys, and spleen.

Hazards of Ingestion: Ingestion may result in irritation of the mouth, throat and stomach, irregular heartbeat, stimulation and later depression of the central nervous system. Aspiration into the lungs during vomiting may result in severe lung irritation with coughing, gagging, difficult breathing, substernal stress, rapidly developing pulmonary edema, and possibly delayed bronchopneumonia and pneumonitis with severe consequences.

Fire Hazards

Lower Flammable Limit: 1.2-1.4%

Upper Flammable Limit: 7.1-7.6%

Behaviour in Fire: Flammable liquid. This product will generate large quantities of flammable vapour upon release. Vapours are heavier than air and may travel considerable distances to a source of ignition and flash back. Containers may violently rupture in fire.

Personal Protective Equipment

Protective Clothing Required

Responders should be equipped with equipment that prevents repeated or prolonged skin contact with the spilled product. This may include rubber boots, gloves, face shields, splash-proof safety goggles, and other impervious and resistant clothing.

Compatible materials may include neoprene, nitrile rubber, chlorinated polyethylene, polyurethane, polyvinyl alcohol, Viton, and nitrile butadiene.

Respiratory Protection

For *unknown concentrations* or concentrations *above the respiratory protection factor required to keep exposures below the occupational exposure limits* responders should be equipped with a positive pressure-demand self-contained breathing apparatus (SCBA).

For *lesser concentrations* an air purifying respirator with an organic vapour canister.

Spill Responses

Land

***Methods that may be used for spills on ice with consideration of site-specific conditions.**

Technique-Absorption*

Spreading of spilled product may be controlled by absorbing liquid with sand, earth, clay, fly ash, cement powder, or other compatible substances.

Consequence:

- Once used the sorbent materials pose the same hazards as the spilled product.
- Their use adds to the overall volume of contaminated material.

Mitigation:

- Deplete accumulated liquid pools with pumps or vacuum trucks if possible before applying sorbents.
- Remove contaminated sorbents to safe storage by mechanical means.

Technique-Pumping/Vacuum Suction*

Remove accumulated pool with the use of a rubber lined vacuum truck or other equipment designed for this purpose. Any equipment used should be clean of any residual chemicals that could react with the gasoline.

Consequence:

- Equipment that is incompatible with the spilled product may become damaged or develop leaks.

Mitigation:

- Use equipment compatible with gasoline.

Technique-Containment Dikes*

Contained gasoline may be contained by building dikes using soil, sand, or other materials.

Consequence:

- Contained gasoline may percolate into soil or seep through dike material.
- This may result in loss of contained product and spread of contamination.

Mitigation:

- Remove or neutralize contained product as soon as possible to prevent spread of contamination.
- Be alert to conditions such as fire hose runoff or rainwater that may overfill impoundments.
- Where possible, line collection area with compatible impervious materials.

Technique-Mechanical Removal*

Contaminated soil and spilled product may be removed by shovels, motorized graders and scrapers, loaders, bulldozers, and draglines.

Consequence:

- Removal equipment may become contaminated and present a hazard to later users.
- Incompatible equipment may be damaged or corroded.
- Improper storage of removed materials may result in future spread of contamination.
- Any flammable vapours or gases present in the area may be ignited by motorized removal equipment.

Mitigation:

- Decontaminate all equipment after use.
- Use equipment that is compatible with gasoline.
- Store contaminated materials in a safe and secure location.
- Do not operate motorized equipment in potentially flammable atmospheres.
- Continually monitor for the presence of flammable vapours.
- Consult qualified experts for advice where necessary.

Technique-Excavation

A trench or ditch may be excavated to contain leaking product.

Consequence:

- There may be increased potential for ground water contamination in some cases.

Mitigation:

- Remove contained products as soon as possible to prevent spread of contamination.
- Use surface dikes or barriers where groundwater contamination is possible or line collection basin impervious material.

<u>Water</u>

***Methods that may be used for spills on ice with consideration of site-specific conditions.**

Technique-Absorption*

Straw, hay, peat, or commercial sorbent materials compatible with gasoline may be used to absorb spilled product from water surface, preferably after the spill has been contained.

Consequence:

- Once used, the sorbent materials pose the same hazard as the spilled product.
- Their use adds to the overall volume of contaminated material.
- Fire hazards pose risk to response personnel and equipment.
- Deployment and recovery (water) can be difficult.

Mitigation:

- Proceed with caution.
- Decontaminate equipment after use.
- Store and dispose of waste materials in proper and safe manner.
- Use compatible equipment.
- Eliminate ignition sources.

Technique-Booms or Barriers*

Booms or barriers of compatible matter may be deployed. Alternatively, mesh or nets may be strung across stream (flow) and anchored every 6-8 feet. Straw or peat placed on upstream side of mesh should absorb and retard spreading of spilled product

Consequence:

- Leakage may occur under or through barrier if high waves or current are present or if not properly deployed.
- Incompatible materials may be damaged by spilled product.
- Booms, barrier materials, and equipment may be contaminated.
- Fire hazards pose a risk to personnel and equipment.

Mitigation:

- Proceed with caution.
- Stage barriers in series where necessary.
- Recover spilled product as soon as possible.
- Decontaminate equipment after use.
- Store and dispose of waste materials in proper and safe manner.
- Use compatible equipment.
- Eliminate ignition sources.

Technique-Water By-Pass Dams*

Streams may be provided with a by-pass dam. This is a dam made of compacted earth, clay, or other material with open tubes or pipes passing through under water. Upstream ends of pipes or tubes should be well below the layer of floating contaminant. Downstream ends should be at a higher elevation but still below the floating layer. Valves may be installed on downstream ends to control water flow.

Consequence:

- Earthen dams may become saturated with water and seep through or collapse.
- An insufficient number of by-pass tubes or pipes or additional water may cause overflow.

Mitigation:

- Use sufficient number and capacity of tubes or pipes.
- Be alert to conditions that may lead to dam overflow or collapse. Remove spilled product as soon as possible.

Technique-Diversion*

Where other means are unavailable, floating slicks may be temporarily herded, diverted, or controlled using water hose streams, small boat propeller wash or chemical surface tension modifiers knows as spill herders.

Consequence:

- Hose streams and propeller washes have limited applicability and effectiveness.
- The latter may cause undesired mixing of spilled product and water due to extreme agitation.
- Chemical spill herders should not be used until approval is obtained from authorized environmental officials.

Mitigation:

- Use other means if available.

Technique-Surface Skimming*

Oil spill skimming devices may be deployed to recover floating gasoline.

Consequence:

- Incompatible equipment may be damaged.
- Equipment may be contaminated and pose hazard to future users.
- Fire hazard may pose risk to response personnel and equipment.

Mitigation:

- Decontaminate equipment after use.
- Use compatible equipment.
- Store recovered product in safe and secure location.

References

Association of American Railroads T.T.C.I. Bureau of Explosives Action Guides
ACGIH Threshold Limit Values and Biological Exposure Indices
Alberta Occupational Health and Safety Act, Regulation, and Code (2009)
NWT General Safety Regulations (1990)
NIOSH Pocket Guide to Chemical Hazards

APPENDIX E4

Response Plan for Lube Oil

General Information

Lube oil is a petroleum product that varies in color and barely soluble in water causing a floating surface slick if spilt. Flammability of petroleum products can vary widely having a flash point range from -43 to 200°C. The liquid may evaporate at low temperatures. Petroleum vapours are more volatile and may persist in low areas, and may travel some distance to a source of ignition flashback.

It will not react with water or other common materials and is stable in normal transportation.

Toxicity by potential routes of exposure is generally considered low to moderate.

The waste product may contain lead to which continued exposure to high levels can have adverse affects on humans. To reduce exposures, practice proper hand washing, avoid hand to mouth contact while handling the product, and wear the appropriate personal protective equipment.

Chemical/Physical Data (Petroleum Crude Oil)

PROPERTY	DETAILS
Solubility in Water	Essentially insoluble
Specific Gravity (Liquid)	Varies, 0.75 – 0.99
Boiling Point	Varies, 1000+°C (538+°F)
Vapour Pressure	Varies widely with composition, 40 mmHg for petroleum distillates
Flash Point	-43 to 200°C (-45 to392°F)
Stability	Under normal conditions
Corrosiveness	Relatively non-corrosive
Reactivity with Water	No reaction.
Reactivity with Other Chemicals	Reacts with oxidizing materials. Avoid Chlorine, fluorine.

Identification

UN/NA Designation	N/A
CAS Number	N/A

Potential Hazards

General Hazards-Lead

Threshold Odour Concentrations	Varies
Unusual Hazards	No
TLV/15-Minute Exposure Limit (STEL)	NWT →0.45 mg/m^3 Not established for Alberta or the Federal Government
TLV/8-Hour Occupational Exposure Limit (OEL)	NWT →0.15 mg/m^3 *(NWT General Safety Regulations Schedule A, Table 2)* AB →.05 mg/m^3 *(AB OHS Code Schedule 1, Table 2)* Federal→0.05 mg/m^3 (ACGIH TLVs and BEIs)*
Ceiling Occupational Exposure Limit	Not Established for NWT, Alberta, or the Federal Government
Immediately Dangerous to Life or Health (IDLH)	Not Established

*ACGIH Threshold Limit Values and Biological Exposure Indices as per the Canadian Labour Code Part II, Canadian Occupational Health and Safety Regulations Part 10.19 1(a), 2(a) (b)

Health Hazards (Lube Oil)

Public Health Hazards: Generally low but all major exposures should be avoided.

Hazards of Skin or Eye Contact: Minor

Hazards of Inhalation: May cause nasal and respiratory irritation, dizziness, drowsiness, headache, and nausea.

Hazards of Ingestion: Ingestion may result in nasal and respiratory irritation, dizziness, drowsiness, headache, and nausea.

Fire Hazards

Lower Flammable Limit: 0.9%

Upper Flammable Limit: 7.0%

Behaviour in Fire: Vapours are heavier than air and may travel distances to a source of ignition and flash back. Containers may violently rupture in fire.

Personal Protective Equipment

Protective Clothing Required

Responders should be equipped with equipment that prevents repeated or prolonged skin contact with the spilled product. This may include rubber boots, gloves, face shields, splash-proof safety goggles, and other impervious and resistant clothing.

Compatible materials may include neoprene, nitrile rubber, chlorinated polyethylene, polyurethane, polyvinyl alcohol, Viton, and nitrile butadiene.

Respiratory Protection (Lube oil)

For *unknown concentrations* or concentrations *above the respiratory protection factor required to keep exposures below the occupational exposure limits* responders should be equipped with a positive pressure-demand self-contained breathing apparatus (SCBA).

For *lesser concentrations* an air purifying respirator with an organic vapour cartridge.

Spill Responses

Land

***Methods that may be used for spills on ice with consideration of site-specific conditions.**

Technique-Absorption*

Spreading of spilled product may be controlled by absorbing liquid with sand, earth, clay, fly ash, cement powder, or other compatible substances.

Consequence:

- Once used the sorbent materials pose the same hazards as the spilled product.
- Their use adds to the overall volume of contaminated material.

Mitigation:

- Deplete accumulated liquid pools with pumps or vacuum trucks if possible before applying sorbents.
- Remove contaminated sorbents to safe storage by mechanical means.

Technique-Pumping/Vacuum Suction*

Remove accumulated pool with the use of a rubber lined vacuum truck or other equipment designed for this purpose. Any product transfer equipment should be properly bonded and grounded.

Consequence:

- Equipment that is incompatible with the spilled product may become damaged or develop leaks.

Mitigation:

- Use equipment compatible with the product.

Technique-Containment Dikes*

Product may be contained by building dikes using soil, sand, or other materials.

Consequence:

- Contained product may percolate into soil or seep through dike material.
- This may result in loss of contained product and spread of contamination.

Mitigation:

- Remove or neutralize contained product as soon as possible to prevent spread of contamination.
- Be alert to conditions such as fire hose runoff or rainwater that may overfill impoundments.
- Where possible, line collection area with compatible impervious materials.

Technique-Mechanical Removal*

Contaminated soil and spilled product may be removed by shovels, motorized graders and scrapers, loaders, bulldozers, and draglines.

Consequence:

- Removal equipment may become contaminated and present a hazard to later users.
- Incompatible equipment may be damaged or corroded.
- Improper storage of removed materials may result in future spread of contamination.
- Any flammable vapours or gases present in the area may be ignited by motorized removal equipment.

Mitigation:

- Decontaminate all equipment after use.
- Use equipment that is compatible with this product.
- Store contaminated materials in a safe and secure location.
- Continually monitor for the presence of flammable vapours.
- Consult qualified experts for advice where necessary.

Technique-Excavation

A trench or ditch may be excavated to contain leaking product.

Consequence:

- There may be increased potential for ground water contamination in some cases.

Mitigation:

- Remove contained products as soon as possible to prevent spread of contamination.
- Use surface dikes or barriers where groundwater contamination is possible or line collection basin impervious material.

Water

***Methods that may be used for spills on ice with consideration of site-specific conditions.**

Technique-Absorption*

Straw, hay, peat, or commercial sorbent materials compatible with the product may be used to absorb spilled product from water surface, preferably after the spill has been contained.

Consequence:

- Once used, the sorbent materials pose the same hazard as the spilled product.
- Their use adds to the overall volume of contaminated material.
- Fire hazards pose risk to response personnel and equipment.
- Deployment and recovery (water) can be difficult.

Mitigation:

- Proceed with caution.
- Decontaminate equipment after use.
- Store and dispose of waste materials in proper and safe manner.
- Use compatible equipment.
- Eliminate ignition sources.

Technique-Booms or Barriers*

Booms or barriers of compatible matter may be deployed. Alternatively, mesh or nets may be strung across stream (flow) and anchored every 6-8 feet. Straw or peat placed on upstream side of mesh should absorb and retard spreading of spilled product.

Consequence:

- Leakage may occur under or through barrier if high waves or current are present or if not properly deployed.
- Incompatible materials may be damaged by spilled product.
- Booms, barrier materials, and equipment may be contaminated.
- Fire hazards pose a risk to personnel and equipment.

Mitigation:

- Proceed with caution.
- Stage barriers in series where necessary.
- Recover spilled product as soon as possible.
- Decontaminate equipment after use.
- Store and dispose of waste materials in proper and safe manner.



- Use compatible equipment.
- Eliminate ignition sources.

References

Association of American Railroads T.T.C.I. Bureau of Explosives Action Guides

ACGIH Threshold Limit Values and Biological Exposure Indices

Alberta Occupational Health and Safety Act, Regulation, and Code (2009)

NWT General Safety Regulations (1990)

NIOSH Pocket Guide to Chemical Hazards