



SPILL CONTINGENCY PLAN

MEL PROJECT, NUNAVUT

Date: Dec. 23, 2016
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TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION	1
1.1 Corporate Details.....	1
1.2 Term of Spill Contingency Plan.....	1
1.3 Purpose and Scope	1
1.4 North Arrow Minerals Inc. Environmental Policy	1
2. PROJECT AND SITE DESCRIPTION	2
2.1 Project Description.....	2
2.2 Current Permits/Licences.....	2
2.3 List of Hazardous Materials On-Site	2
2.4 Petroleum and Chemical Product Storage and Transport	3
2.5 Petroleum Product Transfer.....	3
2.6 Equipment	3
2.7 Existing Preventative Measures.....	4
2.8 Copies of Spill Contingency Plan	4
3. RESPONSE ORGANIZATION.....	5
3.1 Spill Response Team.....	6
4. REPORTING PROCEDURE	6
5. ACTION PLANS	7
5.1 Initial Action	7
5.2 Spill Response Actions – Diesel Fuel, Hydraulic Oil and Lubricating Oil	8
5.3 Spill Response Actions – Jet A/B Aviation Fuel	9
5.4 Spill Response Actions – Propane.....	10
6. PROCEDURES FOR TRANSFERRING, STORING, AND MANAGING SPILL-RELATED WASTES	11
7. PROCEDURES FOR RESTORING AFFECTED AREAS	11
8. TRAINING	11

LIST OF TABLES

Table 1	List of hazardous materials stored on-site, type of storage container, the storage quantities, and storage locations where known	3
Table 2	Emergency Contacts	7

LIST OF APPENDICES

Appendix 1	NT/NU Spill Report Form and Instructions
Appendix 2	Maps of Property Location and Proposed Land Use and Camp Areas
Appendix 3	MSDS Sheets

1. INTRODUCTION

This Spill Contingency Plan has been prepared specifically for the Mel Project (“Project”) operated by North Arrow Minerals Inc. (“North Arrow”). The plan demonstrates that North Arrow will have appropriate response capabilities and measures in place to effectively address potential spills at its Mel Project site.

1.1 Corporate Details

North Arrow Minerals Inc.
Suite 960 - 789 West Pender Street
Vancouver, BC V6C 1H2

1.2 Term of Spill Contingency Plan

This version of the Spill Contingency Plan shall be in effect from date of acceptance of applicable land use permits. Any future changes and/or amendments will be submitted to Indigenous and Northern Affairs Canada (INAC) and the Nunavut Water Board (NWB).

1.3 Purpose and Scope

The purpose of this Spill Contingency Plan is to provide a plan of action for all spills of hazardous materials that may occur on the Mel Project, NU. This plan identifies key response personnel and their roles and responsibilities in the event of a spill, as well as the equipment and other resources available to respond to a spill. It details spill response procedures that will minimize potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all information required in responding to a spill.

1.4 North Arrow Minerals Inc. Environmental Policy

It is the policy of North Arrow to comply with all existing laws and regulations to help ensure the protection of the environment. North Arrow cooperates with other groups committed to protecting the environment and ensures that employees, government, and the public is informed on the procedures followed to help protect the environment.

North Arrow endeavours to take every reasonable precaution toward ensuring the protection and conservation of the natural environment and the safety and health of all employees and contractors from any potential harmful effects of stored materials and operations.

The plan is presented to all staff during their on-site orientation sessions. All employees and contractors are aware of the locations of the plan on site at the Mel Project and in North Arrow’s offices.

During the orientation meeting, training sessions are scheduled to ensure employees have an understanding of the steps to be undertaken in the event of a spill. All employees and contractors are shown where spill kits are stored, are aware of their contents and are trained in using spill equipment and responding to spills. The company is committed to keeping personnel up to date on the latest technologies and spill response methods.

2. PROJECT AND SITE DESCRIPTION

2.1 Project Description

This Project, located in the Qikiqtani Region of Nunavut, approximately 200 kilometres northeast of Nauyasat, and 150 km south of Hall Beach. It consists of predominately Inuit-Owned and Crown Lands. Year-round access to the property is via plane, equipped with skis or floats, or helicopter. The property is bounded in a general sense by the following minimum and maximum latitudes/longitudes:

Min Lat (degree/minute)	<u>67°25'49.00"</u>	Min Long (degree/minute)	<u>-82°33'58.70"</u>
Max Lat (degree/minute)	<u>67°40'53.76"</u>	Max Long (degree/minute)	<u>-82°2'10.30"</u>

A map illustrating the regional context of the property and the project area is located in Appendix 2.

2.2 Current Permits/Licences

Permit/License No.	Regulatory Body	Type	Expiry
Pending	Nunavut Water Board	Water License Type B	Application Submitted
Pending	QIA	Access to IOL Level 3	Application Submitted

2.3 List of Hazardous Materials On-site

Fuel storage areas at the Mel Project will include the main storage site at the camp. In addition, small fuel caches (6-7 205L drums) will be located adjacent to active drill sites when drilling is underway. All containers of hazardous materials will be marked with North Arrow's name. Petroleum products and hazardous materials that will be considered in this Spill Contingency Plan include:

- Diesel fuel
- Hydraulic oil
- Lubricating oil
- Jet "A/B" fuel
- Propane
- Gasoline
- Antifreeze

Table 1 presents a list of hazardous materials anticipated to be located at the Mel Project site, the type of storage container, the maximum quantities stored, and the general location.

Table 1: *List of hazardous materials stored on-site, type of storage container, the storage quantities, and storage locations where known*

Material	Storage Container	Maximum on-site	Storage Location and Uses
Diesel fuel	205 litre drums	6 (1,230 litres)	Six drums at active drilling sites, remainder in town at fuel storage facility
Jet A/B fuel	205 litre drums	1 (205 litres)	One drum at each active drilling site for emergency purposes
Gasoline	20 litre Jerry Can	1 (20 litres)	Active drilling sites; used for snowmobiles and small generators
Propane	100 lbs tanks	1 (100 lbs tank)	Active drilling sites; used for thawing frozen drilling components
Oil (Engine and 2 stroke)	1 litre container	12 (12 litres)	Active drilling sites; used for engines
Hydraulic Oil	20 litre buckets	2 (20 litres)	Active drilling sites; used for hydraulic drilling machinery
Lubricating Oil	20 litre buckets	2 (20 litres)	Active drilling sites; used for drilling components
Antifreeze	5 litre containers	1 (5 litres)	Active drilling sites; used for cooling drill engine

2.4 Petroleum and Chemical Product Storage and Transport

All fuel will be stored no closer than the regulated distance from the normal high water mark of any water body (>31 metres).

Other petroleum-based materials found on-site in very small quantities will be located in the drill shack. These include lubricants/oils for the maintenance of the drilling equipment. The drill shack will be located over 31 metres from the normal high water mark of any water body when drilling land-based targets.

All fuel, oil and any chemicals are transported to camp and drill sites by plane and/or helicopter.

2.5 Petroleum Product Transfer

Manual and automatic pumps (and aviation fuel filters for jet fuel) are used for the transfer of all petroleum products. Smoking, sparks, or open flames are **prohibited** in fuel storage and fuelling areas at all times. Portable drip trays and appropriately sized fuel transfer hoses with pumps are used when refuelling aircraft or other equipment, to avoid any leaks/drips onto the land.

2.6 Spill Containment Equipment

Equipment available on site to assist in responding to a hazardous materials spill includes various hand held tools including shovels. In addition to these, one spill kit will be situated at each active

drill site with additional spill kits located in Camp and on the helicopter.

Spill kits are located wherever fuel is stored or used. The typical spill kit has a sorbent capacity of 240 litres and the contents include:

- 1 – 360 litre/79 gallon polyethylene over pack drum
- 4 – oil sorbent booms (5" X 10')
- 100 – oil sorbent sheets (16.5" X 20" X 3/8")
- 1 – drain cover (36" X 36" X 1/16")
- 1 – *Caution* tape (3" X 500')
- 1 – 1 lb plugging compound
- 2 – pair Nitrile gloves
- 2 – pair Safety goggles
- 2 – pair Tyvel coveralls
- 1 – instruction booklet
- 10 – printed disposable bags (24" X 48")
- 1 – empty fuel drum

2.7 Existing Preventative Measures

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

All hazardous materials arrive by air as needed throughout periods of active exploration. They are unloaded by airplane and helicopter pilots and North Arrow staff and contractors and carefully placed in the fuel storage and hazardous materials storage areas.

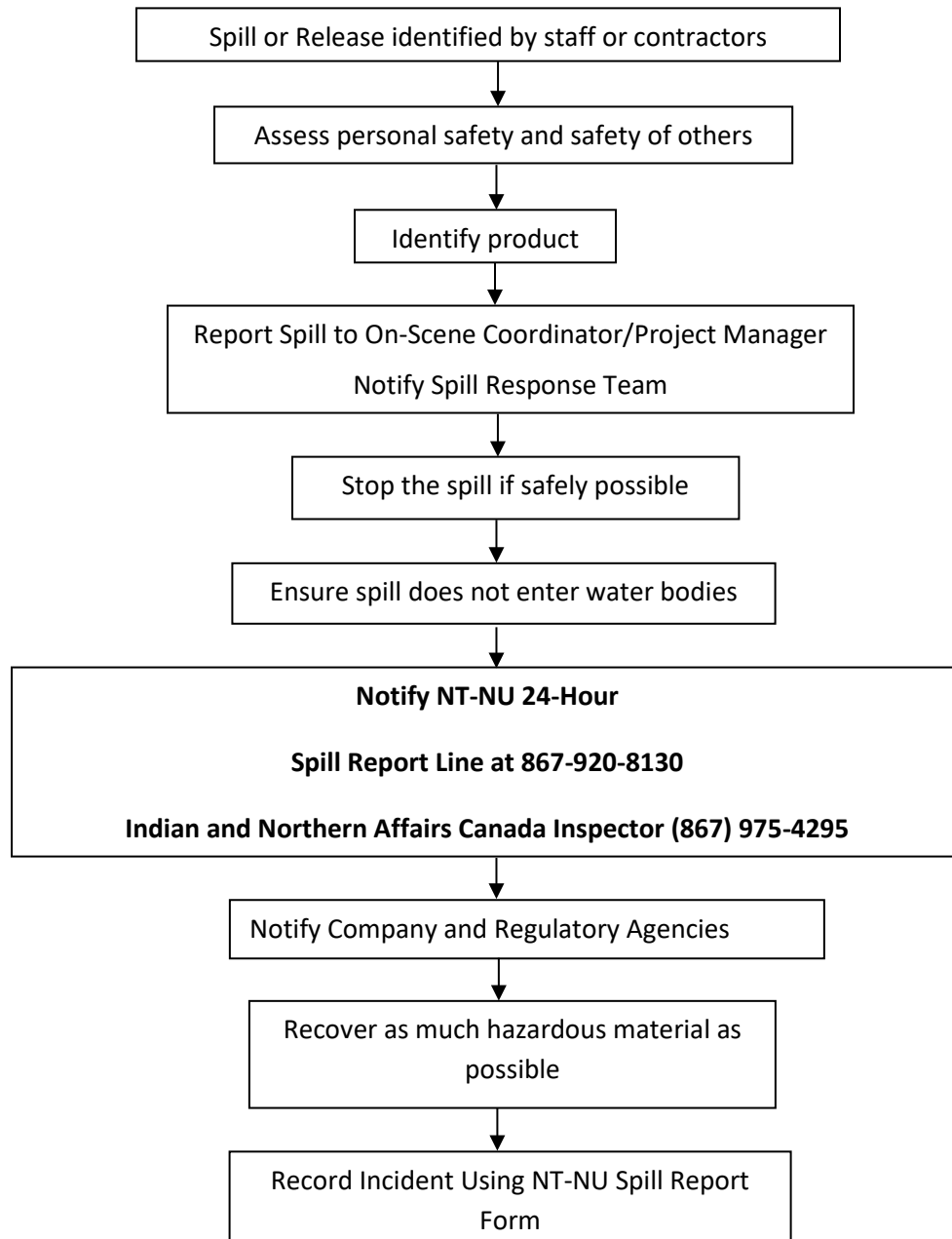
The designated fuel monitor conducts daily visual inspections to check for leaks or damage to the fuel storage containers, as well as for stained or discoloured soils/snow around the fuel storage areas and adjacent equipment. For example, lids/caps are checked for tight seals. A checklist is used to ensure no areas are missed.

2.8 Copies of Spill Contingency Plan

Several copies of the plan are will be kept on-site at the drill at all times, as well as in Camp with the crews. As well, copies will also be located at North Arrow offices.

3.RESPONSE ORGANIZATION

The following is a flow chart to illustrate the sequence of events in the event of a hazardous material spill occurring at the Mel Project.



3.1 Spill Response Team

North Arrow will appoint a qualified “On-Scene Coordinator” and appropriate personnel to make up the Mel Spill Response Team for the Mel Project. The key personnel that make up the Mel Spill Response Team are as follows:

In addition to the On-Scene Coordinator and the Project Manager, approximately 2-3 additional personnel will be available on site to assist in spill response and cleanup activities.

The responsibilities of the On-Scene Coordinator are as follows:

1. Assume complete authority over the spill scene and coordinate all personnel involved.
2. Evaluate spill situation and develop overall plan of action.
3. Activate the spill contingency plan
4. Immediately report the spill to:
NT-NU 24-Hour Spill Report Line (867) 920-8130
Indian and Northern Affairs Canada Field Operations Manager (867) 975-4295
Other regulatory agencies and North Arrow management (see *Table 2 – Emergency Contacts*).
5. Obtain additional manpower, equipment, and material if not available on site for spill response.

The responsibilities of the Project Manager are as follows:

1. Provide regulatory agencies and North Arrow management with information regarding the status of the cleanup activities.
2. Act as a spokesperson on behalf of North Arrow with regulatory agencies as well as the public and media.
3. Prepare and submit a report on the spill incident to regulatory agencies (including the INAC Inspector) within 30 days of the event.

4. REPORTING PROCEDURE

The On-Scene Coordinator must be notified immediately of any spill either by phone, radio, or in person.

The following is the spill reporting procedure:

1. Report immediately to the NT-NU 24-Hour Spill Report Line (867) 920-8130
Indian and Northern Affairs Canada Field Operations Manager (867) 975-4295
And other regulatory agencies, and North Arrow management (see *Table 2 – Emergency Contacts*)
2. Complete the NT-NU Spill Report Form and fax the report to the NT-NU 24-Hour Spill Report Line fax (867) 873-6924.

Table 2 – Emergency Contacts

CONTACT	TELEPHONE NUMBER
CIRNAC - Land Use Inspector	(867) 975-4295
North Arrow Minerals Inc.	(604) 668-8355 (Office); (604) 336-4813 (Fax)
NWT/NU 24 hour Spill Response Line	(867) 920-8130 (contact first)
Environment and Climate Change Canada Environmental Enforcement	(867) 669-4730
National Environmental Emergencies Centre	1-866-283-2333
CIRNAC – Water Resource Officers, Kugluktuk and Iqaluit, NU	Kugluktuk (867) 982-4308 Iqaluit (867) 975-4298
CIRNAC/AANDC – Nunavut Regional Office	(867) 975-4275
Custom Helicopters	(204) 338-7953
Yellowknife Fire Department	(867) 873-2222
RCMP, Naujaat	(867) 462-0123
Stanton Regional Hospital – Yellowknife	(867) 920-4111
Health Centre – Naujaat	(867) 462-9916
On-Site Project Geologist	<i>Information to be supplied once phone system is established on the property</i>
Fisheries and Oceans	(867) 979-8007
Nunavut Department of Environment	(867) 975-7700
Robert Eno, Nunavut Department of Environment, Waste Manifests	(867) 975-7748
Manager, Pollution Control and Air Quality, Environmental Protection, Govt of Nunavut	(867) 975-7748; (867) 975-7739 (Fax)

5. ACTION PLANS

5.1 Initial Action

The instructions to be followed by the first person on the spill scene are as follows:

1. Always be alert and consider your safety first.
2. If possible, identify the material that has been spilled. If you are not sure of the material, use caution and consider your safety first.
3. Assess the hazard of people in the vicinity of the spill.
4. If possible, safely try to stop the flow of material to minimize potential for environmental impacts.
5. Immediately report the spill to the On Scene Coordinator.
6. Resume any effective action to contain, mitigate, or terminate the flow of the spilled material.

The following pages include specific instructions to be followed in the response to various types of spills including diesel fuel, hydraulic oil, lubricating oil, gasoline, aviation fuel (Jet “B”), antifreeze, and propane.

5.2 SPILL RESPONSE ACTIONS

DIESEL FUEL, HYDRAULIC OIL, AND LUBRICATING OIL

Take action only if safety permits – stop the source flow if safe to do so and eliminate all ignition sources.

Never smoke when dealing with these types of spills.

On Land

Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill after all vapours have dissipated.

Remove the spill by using absorbent pads or excavating the soil, gravel or snow.

Remove spill splashed on vegetation using particulate absorbent material.

On Muskeg

Do not deploy personnel and equipment on marsh or vegetation.

Remove pooled oil with sorbent pads and/or skimmer.

Flush with low pressure water to herd oil to collection point.

Burn only in localized areas, e.g., trenches, piles or windrows.

Do not burn if root systems can be damaged (low water table).

Minimize damage caused by equipment and excavation.

On Water

Contain spill as close to release point as possible.

Use containment boom to capture spill for recovery after vapours have dissipated.

Use absorbent pads to capture small spills.

Use skimmer for larger spills.

On Ice and Snow

Build a containment berm around spill using snow.

Remove spill using absorbent pads or particulate sorbent material.

The contaminated ice and snow must be scraped and shovelled into plastic buckets with lids, 205 litre drums, and/or polypropylene bags.

Storage and Transfer

All contaminated water, ice, snow, soil, and clean up supplies will be stored in closed, labelled containers. All containers will be stored in a well-ventilated area away from incompatible materials.

Disposal

All contaminated material will be transported to an appropriate disposal facility.

5.3 SPILL RESPONSE ACTIONS GASOLINE AND JET A AVIATION FUEL

Take action only if safety permits – stop the source flow if safe to do so and eliminate all ignition sources.

Never smoke when dealing with these types of spills.

On Land

Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill after all vapours have dissipated.

Remove the spill by using absorbent pads or excavating the soil, gravel or snow.

Remove spill splashed on vegetation using particulate absorbent material.

On Muskeg

Do not deploy personnel and equipment on marsh or vegetation.

Remove pooled gasoline or Jet A with sorbent pads and/or skimmer.

Flush with low pressure water to herd oil to collection point.

On advice from regulatory agencies, burn only in localized areas, e.g., trenches, piles or windrows.

Do not burn if root systems can be damaged (low water table).

Minimize damage caused by equipment and excavation.

On Water

Contain spill as close to release point as possible.

Use containment boom to capture spill for recovery after vapours have dissipated.

Use absorbent pads to capture small spills.

Use skimmer for larger spills.

On Ice and Snow

Build a containment berm around spill using snow.

Remove spill using absorbent pads or particulate sorbent material.

The contaminated ice and snow must be scraped and shovelled into plastic buckets with lids, 205 litre drums, and/or polypropylene bags.

Storage and Transfer

All contaminated water, ice, snow, soil, and clean up supplies will be stored in closed, labelled containers. All containers will be stored in a well-ventilated area away from incompatible materials.

Disposal

All contaminated material will be transported to an appropriate disposal facility.

5.4 SPILL RESPONSE ACTIONS PROPANE

Take action only if safety permits. Gases stored in cylinders can explode when ignited.
Keep vehicles away from area.

Never smoke when dealing with these types of spills.

On Land

Do not attempt to contain the propane release.

On Water

Do not attempt to contain the propane release.

On Ice and Snow

Do not attempt to contain the propane release.

General

It is not possible to contain vapours when released.

Water spray can be used to knock down vapours if there is no chance of ignition.

Small fires can be extinguished with dry chemical or CO₂.

Personnel should withdraw immediately from area unless a small leak is stopped immediately after it has been detected.

If tanks are damaged, gas should be allowed to disperse and no recovery attempt should be made.

Personnel should avoid touching release point on containers since frost forms very rapidly.

Keep away from tank ends.

Storage and Transfer

It is not possible to contain vapours when released.

Disposal

All contaminated material will be transported to an appropriate disposal facility.

6.0 PROCEDURES FOR TRANSFERRING, STORING, AND MANAGING SPILL-RELATED WASTES

In most cases, spill cleanups are initiated at the far end of the spill and contained moving toward the centre of the spill. Sorbent socks and pads are generally used for small spill cleanup. A pump with attached fuel transfer hose can suction spills from leaking containers or large accumulations on land or ice, and direct these larger quantities into empty drums. Hand tools such as cans, shovels, and rakes are also very effective for small spills or hard to reach areas. Heavy equipment can be used if deemed necessary but may be constrained by transportation to site constraints.

Used sorbent materials are to be placed in plastic bags for future disposal at an approved disposal facility. All materials mentioned in this section are available in the spill kits located on at the drill shack and in Chesterfield Inlet at the crew houses. Following cleanup, any tools or equipment used will be properly washed and decontaminated, or replaced if this is not possible.

For most of the containment procedures outlined in Section 5, spilled petroleum products and materials used for containment will be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

7.0 PROCEDURES FOR RESTORING AFFECTED AREAS

Once a spill has been contained, North Arrow will consult with the INAC Inspector assigned to the property to determine the level of cleanup required. The Inspector may require a site-specific study to ensure appropriate cleanup levels are met. Criteria that may be considered include natural biodegradation of oil, replacement of soil and re-vegetation.

8.0 TRAINING

All employees working on the Project will be trained in the safe operation of all machinery and tools to help prevent hazardous material spills. All employees on site will also be required to participate in an orientation session, during which all locations of the spill plan and spill kits will be provided. An overview of the plan will be provided by the On-Scene Coordinator leading the orientation session. Specific training sessions are scheduled for individuals directly involved in handling hazardous materials to ensure they know all steps to be undertaken in handling these materials, as well as the steps involved in the event of a spill, including the proper use of spill kits.

APPENDIX 1

NT/NU Spill Report Form and Instructions



Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE

TEL: (867) 920-8130

FAX: (867) 873-6924

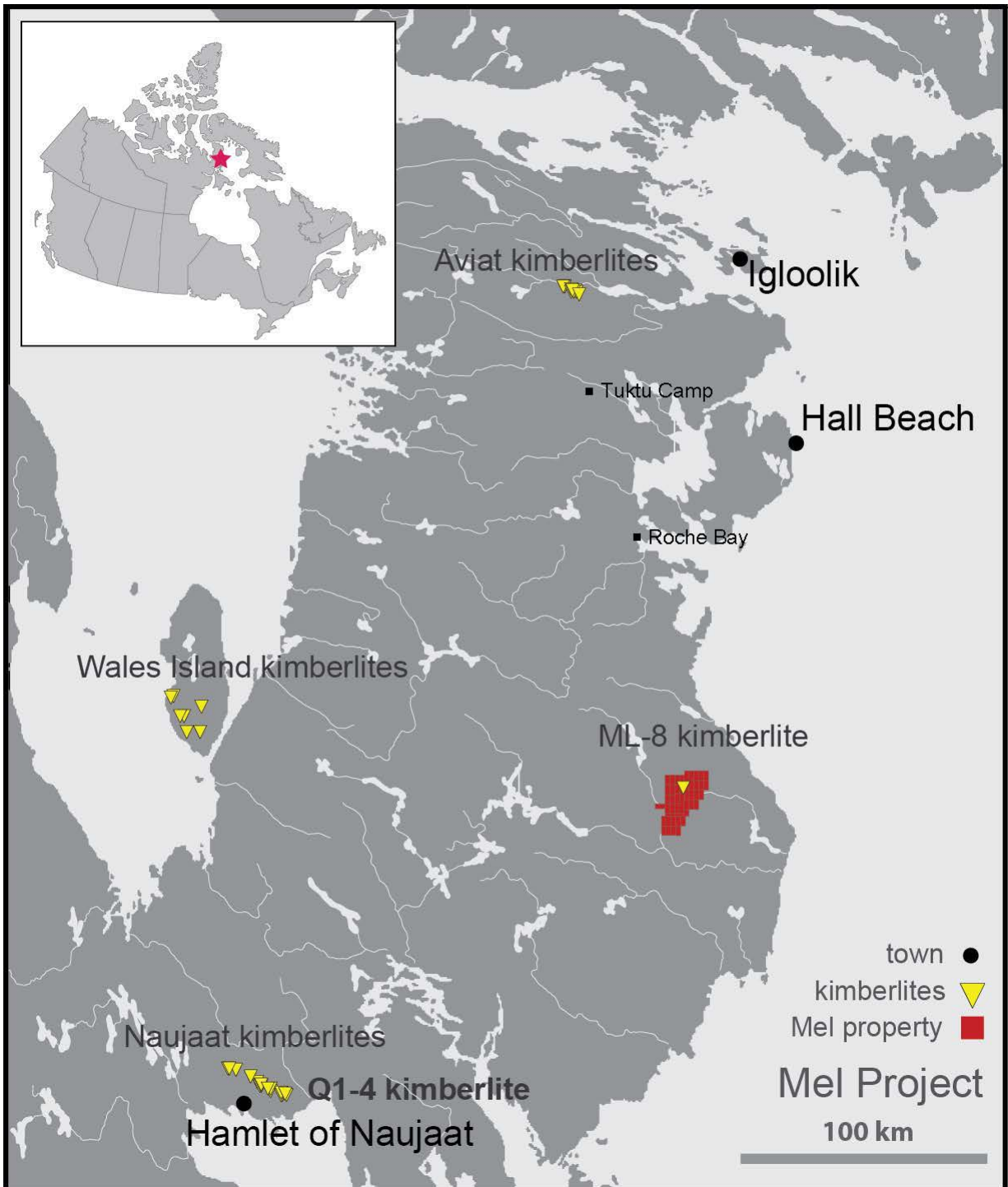
EMAIL: spills@gov.nt.ca

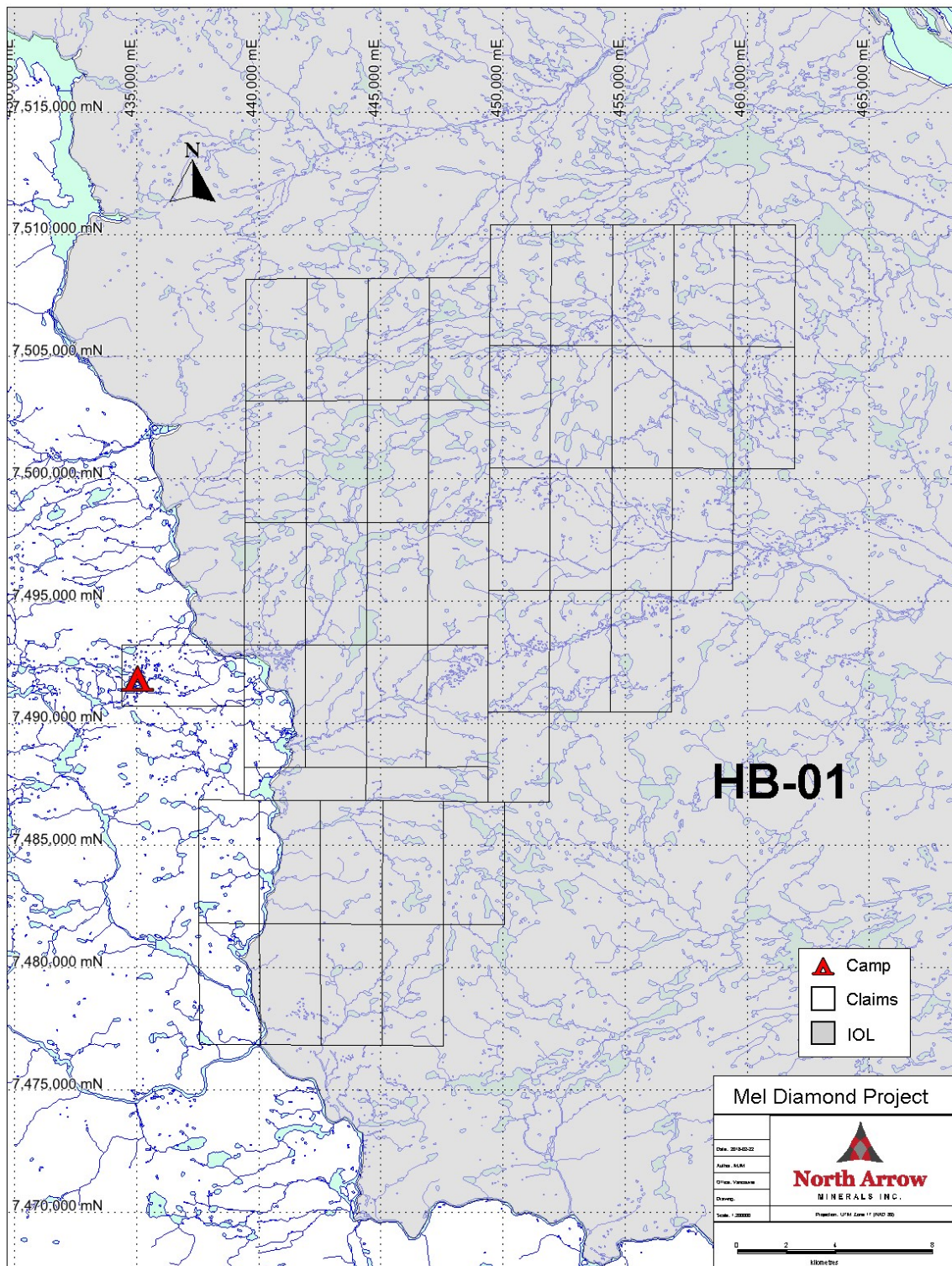
REPORT LINE USE ONLY

A	REPORT DATE: MONTH - DAY - YEAR		REPORT TIME		☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER _____
	OCCURRENCE DATE: MONTH - DAY - YEAR		OCCURRENCE TIME			
B	LAND USE PERMIT NUMBER (IF APPLICABLE)		WATER LICENCE NUMBER (IF APPLICABLE)			
C	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION					REGION
D						☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE			LONGITUDE		
	DEGREES	MINUTES	SECONDS	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		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 EQUIPMENT	
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	
		STATION OPERATOR		YELLOWKNIFE, NT	(867) 920-8130	
LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC			SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN		FILE STATUS ☐ OPEN ☐ CLOSED	
AGENCY		CONTACT NAME	CONTACT TIME	REMARKS		
LEAD AGENCY						
FIRST SUPPORT AGENCY						
SECOND SUPPORT AGENCY						
THIRD SUPPORT AGENCY						

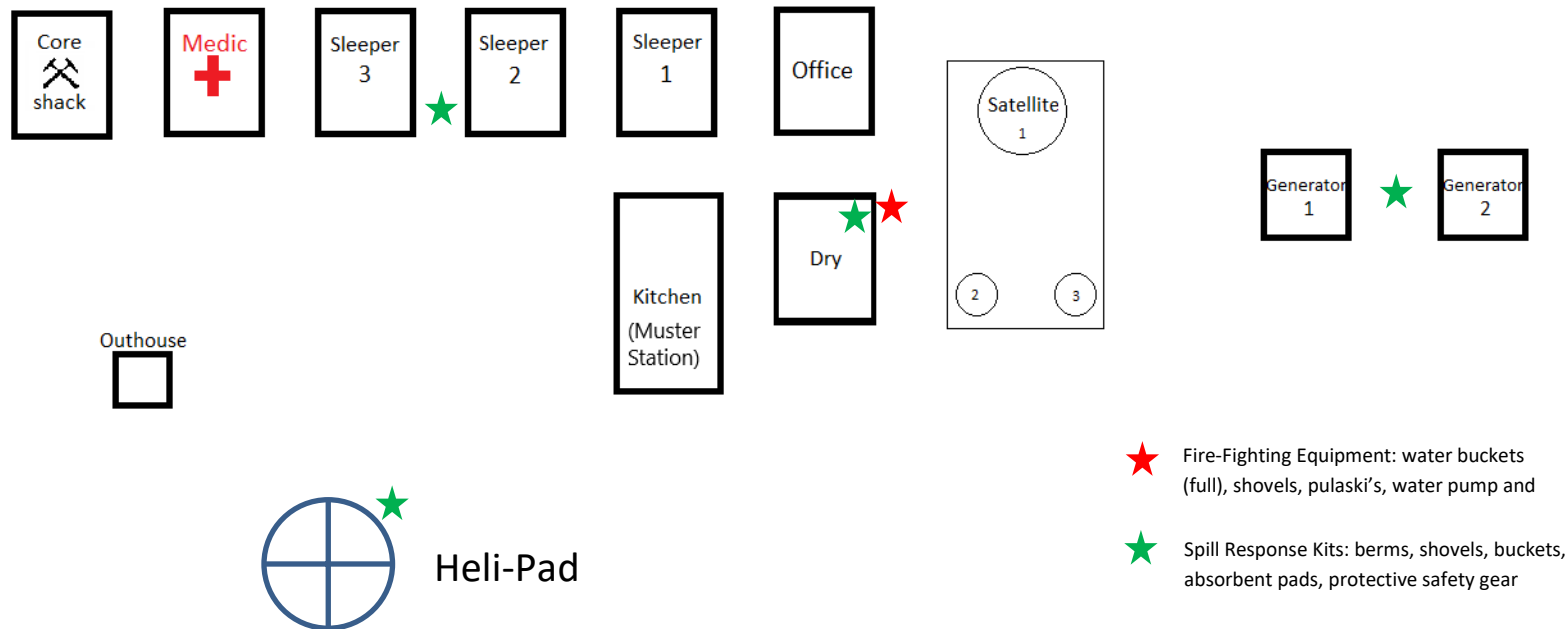
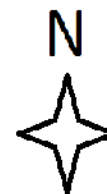
APPENDIX 2

Property Location Maps





Mel Camp



APPENDIX 3

MSDS Sheets

Material Safety Data Sheet

JET A/A-1 AVIATION TURBINE FUEL



1. Product and company identification

Product name	: JET A/A-1 AVIATION TURBINE FUEL
Synonym	: Jet A-1; Jet A-1-DI; Aviation Turbine Kerosene (ATK); JP-8; NATO F-34; Jet F-34; Turbine Fuel, Aviation, Kerosene Type (CAN/CGSB-3.32)
Code	: W213, SAP: 149
Material uses	: Used as aviation turbine fuel. May contain a fuel system icing inhibitor. In the arctic, Jet A-1 may also be used as diesel fuel (if it contains a lubricity additive) and heating oil.
Manufacturer	: PETRO-CANADA P.O. Box 2844 150 – 6th Avenue South-West Calgary, Alberta T2P 3E3
<u>In case of emergency</u>	: Petro-Canada: 403-296-3000 Canutec Transportation: 613-996-6666 Poison Control Centre: Consult local telephone directory for emergency number(s).

2. Hazards identification

Physical state	: Clear liquid.
Odour	: Kerosene-like.
WHMIS (Canada)	:   Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). Class D-2A: Material causing other toxic effects (Very toxic). The WHMIS classification of Jet A/A-1 is B3. The WHMIS classification of Jet A/A-1-DI, JP-8, Jet F-34 and NATO F-34, which all contain FSII (Diethylene Glycol Monomethyl Ether), is B3, D2A.
OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview	: CAUTION! COMBUSTIBLE LIQUID AND VAPOUR. MAY CAUSE EYE AND SKIN IRRITATION. POSSIBLE BIRTH DEFECT HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE BIRTH DEFECTS, BASED ON ANIMAL DATA. Combustible liquid. Slightly irritating to the eyes and skin. Keep away from heat, sparks and flame. Avoid exposure - obtain special instructions before use. Do not breathe vapour or mist. Avoid contact with eyes, skin and clothing. Contains material which may cause birth defects, based on animal data. Avoid exposure during pregnancy. Use only with adequate ventilation. Wash thoroughly after handling.
Routes of entry	: Dermal contact. Eye contact. Inhalation. Ingestion.
<u>Potential acute health effects</u>	
Inhalation	: Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.
Ingestion	: Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract.
Skin	: Slightly irritating to the skin.
Eyes	: Slightly irritating to the eyes.
<u>Potential chronic health effects</u>	
Chronic effects	: No known significant effects or critical hazards.

Date of issue : 5/24/2012.

Internet: www.petro-canada.ca/msds

Page: 1/8

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2. Hazards identification

Carcinogenicity	: No known significant effects or critical hazards.
Mutagenicity	: No known significant effects or critical hazards.
Teratogenicity	: Contains material which may cause birth defects, based on animal data.
Developmental effects	: No known significant effects or critical hazards.
Fertility effects	: No known significant effects or critical hazards.
Medical conditions aggravated by over-exposure	: Repeated skin exposure can produce local skin destruction or dermatitis.

See toxicological information (Section 11)

3. Composition/information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>%</u>
Complex mixture of petroleum hydrocarbons (C9-C16)*(Kerosene)	8008-20-6	99.9
Fuel System Icing Inhibitor (FSII) (if added**): (Diethylene Glycol Monomethyl Ether)	111-77-3	0.1 - 0.15
Anti-static, antioxidant and metal deactivator additives	Not applicable	<0.1

*Aromatic content is 25% maximum (benzene: nil).

**Please note that Jet A-1-DI, JP-8, Jet F-34 and NATO F-34 all contain Fuel System Icing Inhibitor.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First-aid measures

Eye contact	: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
Skin contact	: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
Inhalation	: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
Ingestion	: Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Protection of first-aiders	: No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.
Notes to physician	: No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire-fighting measures

Flammability of the product	: Class II - combustible liquid (NFPA).
Extinguishing media	
Suitable	: Use dry chemical, CO ₂ , water spray (fog) or foam.
Not suitable	: Do not use water jet.
Special exposure hazards	: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Date of issue : 5/24/2012.

Internet: www.petro-canada.ca/msds

Page: 2/8

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7. Handling and storage

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. Ensure the storage containers are grounded/bonded.

8. Exposure controls/personal protection

Ingredient	Exposure limits
Kerosene	ACGIH TLV (United States). Absorbed through skin. TWA: 200 mg/m ³ 8 hour(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: A NIOSH-approved air-purifying respirator with an organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Recommended: polyvinyl alcohol (PVA), Viton®. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

11 . Toxicological information

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Kerosene	A3	3	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	UN1863	FUEL, AVIATION, TURBINE ENGINE	3	III		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

16 . Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

2. Hazards identification

- Developmental effects** : No known significant effects or critical hazards.
- Fertility effects** : No known significant effects or critical hazards.
- Medical conditions aggravated by over-exposure** : Avoid prolonged or repeated skin contact to diesel fuels which can lead to dermal irritation and may be associated with an increased risk of skin cancer.

See toxicological information (Section 11)

3. Composition/information on ingredients

Name	CAS number	%
Hydrotreated Renewable Diesel/ Fuels, diesel/ Fuel Oil No. 1/ Fuel Oil No. 2	64742-81-0/ 68334-30-5/ 8008-20-6/ 68476-30-2	95 - 100
Alkanes, C10 – 20 Branched and Linear (R100)	928771-01-1	10 - 20
Fatty acids methyl esters	61788-61-2 / 67784-80-9 / 73891-99-3	0 - 5

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First-aid measures

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.
- Notes to physician** : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire-fighting measures

- Flammability of the product** : Combustible liquid
- Extinguishing media**
- Suitable** : Use dry chemical, CO₂, water spray (fog) or foam.
- Not suitable** : Do not use water jet.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Products of combustion** : Carbon oxides (CO, CO₂), nitrogen oxides (NO_x), sulphur oxides (SO_x), sulphur compounds (H₂S), smoke and irritating vapours as products of incomplete combustion.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Date of issue : 6/28/2013.

Internet: www.petro-canada.ca/msds

Page: 2/8

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8 . Exposure controls/personal protection

Ingredient	Exposure limits
Fuels, diesel	ACGIH TLV (United States). Absorbed through skin. TWA: 100 mg/m ³ , (Inhalable fraction and vapour) 8 hour(s).
Fuel oil No. 2	ACGIH TLV (United States). Absorbed through skin. TWA: 100 mg/m ³ , (Inhalable fraction and vapour) 8 hour(s).
Hydrotreated Renewable Diesel	ACGIH TLV (United States). Absorbed through skin. TWA: 200 mg/m ³ 8 hour(s).
Fuel oil No. 1	ACGIH TLV (United States). Absorbed through skin. TWA: 200 mg/m ³ 8 hour(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory

: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

Hands

: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: nitrile, neoprene, polyvinyl alcohol (PVA), Viton®. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

Eyes

: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin

: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls

: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. Physical and chemical properties

Physical state	: Bright oily liquid.
Flash point	: Diesel fuel and other distillate fuels: Closed cup: $\geq 40^{\circ}\text{C}$ ($\geq 104^{\circ}\text{F}$) Marine Diesel/MDO/Naval Distillate: Closed Cup: $\geq 60^{\circ}\text{C}$ ($\geq 140^{\circ}\text{F}$) Mining Diesel: Closed Cup: $\geq 52^{\circ}\text{C}$ ($\geq 126^{\circ}\text{F}$)
Auto-ignition temperature	: 225°C (437°F)
Flammable limits	: Lower: 0.7% Upper: 6%
Colour	: Clear to yellow (This product may be dyed red for taxation purposes).
Odour	: Mild petroleum oil like.
Odour threshold	: Not available.
pH	: Not available.
Boiling/condensation point	: 150 to 371°C (302 to 699.8°F)
Melting/freezing point	: Not available.
Relative density	: 0.80 to 0.88 kg/L @ 15°C (59°F)
Vapour pressure	: 1 kPa (7.5 mm Hg) @ 20°C (68°F).
Vapour density	: 4.5 [Air = 1]
Volatility	: Not available.
Evaporation rate	: Not available.
Viscosity	: Diesel fuel: 1.3 - 4.1 cSt @ 40°C (104°F) Marine Diesel Fuel: 1.3 - 4.4 cSt @ 40°C (104°F)
Pour point	: Not available.
Solubility	: Insoluble in cold water, soluble in non-polar hydrocarbon solvents.

10. Stability and reactivity

Chemical stability	: The product is stable.
Hazardous polymerisation	: Under normal conditions of storage and use, hazardous polymerisation will not occur.
Materials to avoid	: Reactive with oxidising agents and acids.
Hazardous decomposition products	: May release COx, NOx, SOx, H ₂ S, smoke and irritating vapours when heated to decomposition.

11. Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Fuels, diesel	LD50 Dermal	Mouse	24500 mg/kg	-
	LD50 Oral	Rat	7500 mg/kg	-
Fuel oil No. 2	LD50 Oral	Rat	12000 mg/kg	-
Fuel oil No. 1	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation	Rat	>5000 mg/m ³	4 hours
	Vapour			
Hydrotreated Renewable Diesel	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation	Rat	>5200 mg/m ³	4 hours
	Vapour			

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Date of issue : 6/28/2013.

Internet: www.petro-canada.ca/msds

Page: 5/8

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14 . Transport information

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Combustible liquid
Irritating material

Canada

WHMIS (Canada) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.
United States inventory : All components are listed or exempted.
(TSCA 8b)
Europe inventory : All components are listed or exempted.

16 . Other information

Label requirements : COMBUSTIBLE LIQUID AND VAPOUR. CAUSES EYE AND SKIN IRRITATION.

Hazardous Material
Information System (U.S.A.) :

Health	2
Flammability	2
Physical hazards	0
Personal protection	H

National Fire Protection
Association (U.S.A.) :



References : Available upon request.
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Date of printing : 4/14/2014.

Date of issue : 28 June 2013

Date of previous issue : No previous validation.

Responsible name : Product Safety - DSR

Indicates information that has changed from previously issued version.

For Copy of (M)SDS : Internet: www.petro-canada.ca/msds

Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228

For Product Safety Information: (905) 804-4752

Notice to reader

16 . Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

PROPANE



1. Product and company identification

Product name	: PROPANE
Synonym	: Propane HD-5, Propane commercial, Liquified Petroleum Gas (LPG), C3H8, CGSB Propane Grade 1, CGSB Propane Grade 2, odourized propane, stench propane, automotive propane.
Code	: W222
Material uses	: Propane is used as a fuel gas, refrigerant and as a raw material for organic synthesis. It is also used as a laboratory gas. The grade determines the propane content. It is supplied as pressurized liquid in tanks.
Manufacturer	: PETRO-CANADA P.O. Box 2844 150 – 6th Avenue South-West Calgary, Alberta T2P 3E3
<u>In case of emergency</u>	: Petro-Canada: 403-296-3000 Canutec Transportation: 613-996-6666 Poison Control Centre: Consult local telephone directory for emergency number(s).

2. Hazards identification

Physical state	: Gas at room temperature; liquid when stored under pressure.
Odour	: Propane is an odourless gas. Odourized propane will contain up to 28 g Ethyl Mercaptan per 1000 L of propane.
WHMIS (Canada)	:  Class A: Compressed gas. Class B-1: Flammable gas.
OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview	: CAUTION! EXTREMELY FLAMMABLE GAS. MAY CAUSE FLASH FIRE. HIGH PRESSURE GAS. Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst or explode. Keep away from heat, sparks and flame. Do not puncture or incinerate container. Avoid breathing gas. Avoid contact with skin and clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. At high concentrations, this product can displace oxygen and cause asphyxiation therefore a minimum requirement of 19.5 % oxygen at sea level is recommended.
Routes of entry	: Dermal contact. Eye contact. Inhalation.
<u>Potential acute health effects</u>	
Inhalation	: Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.
Ingestion	: As this product is a gas, refer to the inhalation section.
Skin	: Contact with rapidly expanding gas may cause burns or frostbite.
Eyes	: Contact with rapidly expanding gas may cause burns or frostbite.
<u>Potential chronic health effects</u>	
Chronic effects	: No known significant effects or critical hazards.
Carcinogenicity	: Not listed as carcinogenic by OSHA, NTP or IARC.
Mutagenicity	: No known significant effects or critical hazards.
Teratogenicity	: No known significant effects or critical hazards.

Date of issue : 3/30/2012.

Internet: www.petro-canada.ca/msds

Page: 1/7

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2. Hazards identification

- Developmental effects** : No known significant effects or critical hazards.
- Fertility effects** : No known significant effects or critical hazards.
- Medical conditions aggravated by over-exposure** : Overexposure may lead to cardiac sensitization.

See toxicological information (Section 11)

3. Composition/information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>%</u>
Propane	74-98-6	90 - 100
Propene	115-07-1	1 - 5
Butane	106-97-8	1 - 5
Ethane	74-84-0	1 - 2.5

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First-aid measures

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : As this product is a gas, refer to the inhalation section.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.
- Notes to physician** : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire-fighting measures

- Flammability of the product** : Class I - flammable gas (NFPA).
- Extinguishing media**
- Suitable** : Use an extinguishing agent suitable for the surrounding fire.
- Not suitable** : None known.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance.
- Products of combustion** : Carbon oxides (CO, CO₂), smoke and irritating vapours as products of incomplete combustion.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

5 . Fire-fighting measures

Special remarks on fire hazards : Extremely flammable in presence of open flames, sparks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. Rapid escape of vapour may generate static charge causing ignition. May accumulate in confined spaces.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Containers may explode in heat of fire. Vapour explosion hazard indoors, outdoors or in sewers. Propane may form explosive mixtures with air.

6 . Accidental release measures

Personal precautions : Accidental releases pose a serious fire or explosion hazard. Immediately contact emergency personnel. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Ensure all equipment is grounded/bonded.

SPECIAL PRECAUTIONS: Sludges and tank scale from petroleum storage tanks, trucks, rail cars, and filters/screens may contain naturally occurring radioactive material ("NORM") in the form of radon 226 and it's progeny including lead 210. Similarly, equipment used for the transfer of petroleum product such as pipelines, pumps and compressors, may have detectable levels of radioactive lead on inner surfaces. Workers involved in cleaning, descaling, repair or other maintenance on inner surfaces of such equipment should avoid breathing and ingesting of dust generated from such activities. Similarly, gas freeing of pipelines, pumps, vessels and compressors may put workers at risk of inhalation of radon gas. Suitable codes of practice should be developed for these activities, detailing appropriate occupational hygiene, personal protective equipment and disposal practices.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Ensure the storage containers are grounded/bonded.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Propane	ACGIH TLV (United States). TWA: 1000 ppm 8 hour(s).
Propene	ACGIH TLV (United States). TWA: 500 ppm 8 hour(s).
Butane	ACGIH TLV (United States). TWA: 1000 ppm 8 hour(s).
Ethane	ACGIH TLV (United States). TWA: 1000 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory

: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: NIOSH-approved self-contained breathing apparatus.

Hands

: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: Wear insulated gloves to prevent frostbite.

Eyes

: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin

: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls

: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Gas at room temperature; liquid when stored under pressure.

Flash point : Closed cup: -104°C (-155.2°F)

Auto-ignition temperature : 450°C (842°F) (NFPA)

Flammable limits : Lower: 2.1% (NFPA)
Upper: 9.5% (NFPA)

Colour : Colourless.

Odour : Propane is an odourless gas. Odourized propane will contain up to 28 g Ethyl Mercaptan per 1000 L of propane.

Odour threshold : Not available.

Date of issue : 3/30/2012.

Internet: www.petro-canada.ca/msds

Page: 4/7

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9 . Physical and chemical properties

pH	: Not available.
Boiling/condensation point	: -42°C (-43.6°F)
Melting/freezing point	: Not available.
Relative density	: Not available.
Vapour pressure	: 1434.9 kPa (10763 mm Hg) @ 38°C (100°F)
Vapour density	: 1.56 [Air = 1]
Volatility	: Volatile.
Evaporation rate	: Not available.
Viscosity	: Not available.
Pour point	: Not available.
Solubility	: Not available.

10 . Stability and reactivity

Chemical stability	: The product is stable.
Hazardous polymerisation	: Under normal conditions of storage and use, hazardous polymerisation will not occur.
Materials to avoid	: Reactive with oxidising agents and halogenated compounds.
Hazardous decomposition products	: May release COx, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Butane	LC50 Inhalation Gas.	Rat	658000 mg/m³	4 hours

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Propene	A4	3	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Empty pressure vessels should be returned to the supplier. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	UN1978	PROPANE	2.1	-		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Compressed gas
Flammable gas

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16 . Other information

Label requirements : EXTREMELY FLAMMABLE GAS. MAY CAUSE FLASH FIRE. HIGH PRESSURE GAS.

**Hazardous Material
Information System (U.S.A.)** :

Health	2
Flammability	4
Physical hazards	2
Personal protection	K

**National Fire Protection
Association (U.S.A.)** :



References : Available upon request.
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Date of printing : 10/24/2013.

Date of issue : 30 March 2012

Date of previous issue : 3/31/2009.

Responsible name : Product Safety - DSR

✓ Indicates information that has changed from previously issued version.

For Copy of (M)SDS : Internet: www.petro-canada.ca/msds

Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228

For Product Safety Information: (905) 804-4752

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



Safety Data Sheet

R.D.O. 302 E.S. (Nonsoluble & Soluble)

SECTION 1. IDENTIFICATION

Product Identifier R.D.O. 302 E.S. (Nonsoluble & Soluble)
Recommended Use Drilling Lubricant (vegetable oil base).
Manufacturer Control Chemical (1989) Corporation, 7016 30 Street S.E., Calgary, AB, T2C 1N9, 403-720-7044, www.matex-ccc.com
Emergency Phone No. Control Chemical (1989) Corporation, 403-720-7044, 24 Hours
Date of Preparation November 20, 2015

SECTION 2. HAZARD IDENTIFICATION

Classification

Not classified under any hazard class.

Label Elements

Not applicable

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Contains no hazardous ingredients. Mixture:

Chemical Name	CAS No.	%	Other Identifiers
Contains no hazardous ingredients		100	

SECTION 4. FIRST-AID MEASURES

First-aid Measures

Skin Contact

Wash gently and thoroughly with lukewarm, gently flowing water and mild soap for 5 minutes.

Eye Contact

Rinse the contaminated eye(s) with lukewarm, gently flowing water for 5 minutes, while holding the eyelid(s) open. If eye irritation persists, get medical advice or attention.

Ingestion

Rinse mouth with water. Do not induce vomiting, contact physician.

First-aid Comments

Flush eyes with water. Wash skin with soap and water. In case of ingestion, do not induce vomiting. Call a physician immediately.

Most Important Symptoms and Effects, Acute and Delayed

If on skin: prolonged exposure may cause irritation in some individuals.

SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media

Foam, Carbon dioxide, Dry chemical and Water Spray.

Product Identifier: R.D.O. 302 E.S. (Nonsoluble & Soluble)
SDS No.: 005
Date of Preparation: November 20, 2015

Page 01 of 04

Unsuitable Extinguishing Media

Not applicable.

Specific Hazards Arising from the Product

Toxic fumes may evolve on burning.

Special Protective Equipment and Precautions for Fire-fighters

No special precautions are necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES**Personal Precautions, Protective Equipment, and Emergency Procedures**

No special precautions are necessary.

Environmental Precautions

No special precautions are necessary.

Methods and Materials for Containment and Cleaning Up

Spills should be contained and cleaned up properly.

Other Information

Product is environmentally safe.

SECTION 7. HANDLING AND STORAGE**Precautions for Safe Handling**

None. Not sensitive to static discharge. Not sensitive to mechanical impact.

Conditions for Safe Storage

No special requirements for storage area.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**Control Parameters**

Not available.

Individual Protection Measures**Eye/Face Protection**

Not required but it is good practice to wear safety glasses or chemical safety goggles.

Skin Protection

Gloves suggested for proper hygiene practice. Not required.

Respiratory Protection

Not normally required if product is used as directed.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**Basic Physical and Chemical Properties**

Appearance	Dark brown liquid.
Odour	Oily
pH	7.0 - 7.3
Melting Point/Freezing Point	-30 °C (-22 °F) (melting)
Initial Boiling Point/Range	> 300 °C (572 °F)
Flash Point	> 279 °C (534 °F)
Evaporation Rate	Not available
Upper/Lower Flammability or Explosive Limit	Not available (upper); Not available (lower)
Vapour Pressure	Not available

Product Identifier: R.D.O. 302 E.S. (Nonsoluble & Soluble)
SDS No.: 005
Date of Preparation: November 20, 2015

Page 02 of 04

Vapour Density (air = 1) Not available
Relative Density (water = 1) 0.907
Auto-ignition Temperature Not available

SECTION 10. STABILITY AND REACTIVITY

Reactivity

None known.

Chemical Stability

Normally stable.

Possibility of Hazardous Reactions

None known.

Conditions to Avoid

None known.

Incompatible Materials

Oxidizing agents (e.g. peroxides).

Hazardous Decomposition Products

Carbon and oxides of sulphur on burning.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Chemical Name	LC50	LD50 (oral)	LD50 (dermal)
Contains no hazardous ingredients		> 5,000 mg/kg	

LC50: No information was located.

Skin Corrosion/Irritation

There is limited evidence of mild irritation.

Serious Eye Damage/Irritation

Not an eye irritant.

Carcinogenicity

Not known to cause cancer.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Not harmful to aquatic life, based on acute toxicity tests.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal Methods

Dispose of in accordance with all applicable Federal/Provincial and Local regulations.

SECTION 14. TRANSPORT INFORMATION

Not regulated under Canadian TDG regulations. Not regulated under US DOT Regulations. Not regulated under IATA Regulations.

Special Precautions Not applicable

Transport in Bulk According to Annex II of MARPOL 73/78 and the IBC Code

Product Identifier: R.D.O. 302 E.S. (Nonsoluble & Soluble)
SDS No.: 005
Date of Preparation: November 20, 2015

Page 03 of 04

Not applicable

SECTION 15. REGULATORY INFORMATION

Safety, Health and Environmental Regulations

This section is not required by WHMIS. This section is not required by OSHA HCS 2012.

SECTION 16. OTHER INFORMATION

NFPA Rating Health - 0 Flammability - 0 Instability - 0

SDS Prepared By Control Chemical (1989) Corporation

Phone No. 403-720-7044

Date of Preparation November 20, 2015

Disclaimer To the best of our knowledge the information contained herein is accurate. However neither the above named supplier, nor any of it's subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein

Product Identifier: R.D.O. 302 E.S. (Nonsoluble & Soluble)

SDS No.: 005

Page 04 of 04

Date of Preparation: November 20, 2015

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