



Paramount
resources ltd.

LIARD WEST AREA, NWT
SPILL CONTINGENCY PLAN
OCTOBER, 2020

2800, 421 7th Avenue SW
Calgary AB, T2P 4K9

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1. INTRODUCTION

Paramount Resource Ltd.'s (Paramount) Spill Contingency Plan provides a plan of action for any foreseeable spill event during construction operations, abandonment, suspension, reclamation, reactivation, monitoring and inspection activities existing or planned in the Fort Liard West project area. It defines the responsibilities of key personnel and outlines the procedures for responding to spills in a way that will minimize potential health and safety hazards, environmental damage, and remediation costs. The plan has been prepared to provide easy access to all the information needed in dealing with a spill and is to be used in conjunction with other Plans and regulatory approvals for the project area.

During the Environmental Impact Assessments for the Fort Liard Pipeline Golder Associates Ltd. (Golder) conducted reconnaissance efforts to establish potential staging areas or control points for watercourses or streams that have a remote chance of being impacted in the event of a spill (detailed maps can be found in Appendix A of this plan). Potential spill scenarios during suspension, abandonment and construction operations usually take place within existing project components and include:

- barge operations;
- fuel storage tank failure;
- fuel transport vehicle rollover;
- water storage tank failure;
- water transport vehicle rollover;
- fluid tank failure;
- cement slurry returns;
- dry bulk cement and additives;
- radiator fluid from rig and vehicular traffic;
- oil changes and rig maintenance;
- camp related spills including sewage and grey water;
- anti-freeze fluid and hydraulic fluid spills; and
- working on ice surfaces

With the exception of materials in transit, all of these scenarios normally are confined to land and will be mitigated by dikes constructed and designed to contain foreseeable spills around any tankage and the peripheral of main facility sites.

For barging operations, if they were to occur, Paramount would rely on the selected contractor to provide the expertise and equipment related to spill with those operations. Through its contractor selection process Paramount will ensure the contractor has all applicable approvals, safety plans and insurance provisions in place prior to operations taking place.

It is the practice of Paramount to initiate clean up activity when, in the opinion of its management, Paramount is clearly associated, or likely to be associated, with the spilled material. As well, Paramount will endeavor:

- to ensure understanding and compliance with applicable governing regulations;
- to conduct activities in a manner consistent with appropriate environmental, health and safety considerations;

- to cooperate with other groups working on protection of the environment;
- to anticipate future pollution control requirements and to take whatever precautions are necessary or proper under the circumstances to avoid operational risk and prevent adverse effects on the environment; and
- to keep government officials and the public informed in the event of a spill.

2. ENVIRONMENTAL SETTING

Paramount's Projects are located within the Taiga Plains Ecozone (Ecological Stratification Working Group 1995), which includes the southwestern corner of the Northwest Territories, northeastern British Columbia, and northern Alberta. They also are part of the Fort Nelson lowland, a subdivision of the Alberta Plateau.

The region is characterized by gently sloping, well-drained, moraine ridges and poorly drained, level to depressional muskeg areas and underlain by sporadic discontinuous permafrost with low ice content (Ecological Stratification Working Group 1995). Typical vegetation cover consists of mature forest cover and dominated by spruces, balsam poplar, white birch, trembling aspen and traces of jack pine.

This ecozone is dominated by the Mackenzie River and its tributaries. The Liard River is an important migratory corridor for fish linking the tributaries of the Liard River main stem to the Mackenzie River system. Main tributaries to the Liard River include the Muskeg, Petitot, Rabbit, Netla and Kotaneelee Rivers.

As indicated in Golder's Environmental Impact Assessment reports, the existing Fort Liard Shiha Pipeline is located south and west of the Petitot River. The pipeline route from the F-36 Battery site to the Maxhamish Compressor Station crosses 6 drainages. None of these smaller drainages are considered capable of supporting sport fish or fish used for domestic consumption.

A barge landing, used for a staging area for construction and drilling operations, is located at Fort Liard for Liard West.

As mentioned in Section 1.0, during the Environmental Impact Assessments for the Fort Liard Pipeline and the Fort Liard Drilling Projects; Golder conducted reconnaissance efforts to establish potential staging areas or control points for the watercourses and streams (drainages).

3. PROJECT AREA

The Liard West gas development project consists of six (6) gas wells (Paramount et al K-29A, 2K-29, 3K-29, F-25A M-25 and 2M-25) on two (2) leases (K-29 and M-25), one (1) water injection well (Paramount et al O-80), and two (2) dehydration plants (K-29 and F-25).

The project area is located across the Liard River from the hamlet of Fort Liard approximately 12 to 29 km along an all-season high-grade road. A 37.2 km pipeline system connects the K-29 site to the Spectra tie-in facility at the decommissioned BP plant site at Pointed Mountain. The M-25 wells are linked into the F-25 plant site via a 1.4 km pipeline lateral. From the F-25 plant site to the F-25 junction along the mainline is another 3.3 km pipeline lateral. Produced water was transported by a series of pipelines from K-29 and F-25 to the O-80 injection well [Figure 1-2].

Currently the development is suspended and deactivated. The most likely activities in the near term are monitoring and inspections which occur via helicopter.

4. STAGING AREAS

Appendix A of this plan contains as built maps of the Fort Liard West project area.

5. TRAINING AND EXERCISES

Paramount routinely trains its staff on various types of emergency situations. Spill response is incorporated into these scenarios.

Paramount currently has a training schedule of mock emergency situations for its Alberta and British Columbia based operations and if the Northwest Territories becomes operational, this schedule will be modified to include the Northwest Territories operations.

Currently, Paramount performs tabletop or logistics exercises once per year and full mock exercises for all critical (sour or environmentally sensitive) areas.

Ongoing maintenance to all Emergency Response Plan and Hazardous Material Spill Contingency Plan components is conducted on an annual basis. The emergency procedures for spill reporting in the NWT that are included as part of Paramount's Emergency Response Plan can be found in Appendix B.

6. RESOURCE INVENTORY

The following is a list of the equipment and manpower usually available on site during suspension/abandonment/reclamation and/or remediation activities.

ON-SITE MANPOWER

- The on-scene commander is Paramount's Construction or Completions (abandonment and suspension operations) Supervisor
- Construction crews consist of equipment operators
- Rig crews Medical Attendant
- Camp Staff and attendants
- Ancillary service personnel on standby (including truck drivers)
- Water Truck Driver
- Vacuum Truck Operator
- Mud Man
- Mud Logger

ON-SITE EQUIPMENT

- 3" fuel transfer pump
- Absorbent blankets (4)
- Non-sparking shovels (5)
- 205 litre open top steel drums (10)
- Plastic Liners (2)
- Front end loader
- Dozer
- Vacuum truck
- Personal Protective Equipment

A detailed Equipment List for the Area "C" Oil Spill Co-operative, located in Fort Nelson, British Columbia, is listed in Appendix C. MSDS sheets of potential spill substances can be found in Appendix D. The disposal of waste resulting from potential spills is covered by the Waste Management Table found in Appendix E

7. WORST CASE SCENARIO

Suspension and/or abandonment operations could take place in the winter or summer months. If activities occur in winter months it would be an ice pad and winter access. This protects the underlying soil and vegetation from mechanical damage and facilitates cleanup of any potential spills.

If suspension and/or abandonment activities took place in summer months the following potential spill was identified, and the associated spill prevention/mitigation procedures are listed:

- **Diesel Fuel/Gasoline**

Diesel Fuel is the primary fuel source on location. Up to 63,000 liters could be on location in one tank at any one time. Fuel will be stored in double walled tanks to minimize the risk of a catastrophic spill. Automatic shut-off nozzles will be used for fueling to minimize the risk of minor spills. Additionally, the well sites are bermed.

Should a spill occur, it would be within the berm, limiting contamination and facilitating clean-up. Spill contingency supplies and equipment as detailed in the Land Use Permit application will be on site in addition to the routine construction equipment (e.g. front-end loader) and road maintenance. In the event of a serious spill, additional equipment would be obtained from the Area "C" Oil Spill Co-operative, located in Fort Nelson, British Columbia.

- **Discussion and Recommendations**

Considering the above, the greatest environmental risk associated with the project is that of a Diesel spill on location. As noted, it is expected that any spill would be confined to the location and completely (or least mostly) confined to the surface of the well site. The "actual loss or damage" would be expected to cleanup and local (onsite) mitigation. Due to the precautions above and the fact that the site will be occupied almost continuously during operations, the risk of a spill or the full volume of diesel on site is considered very unlikely but is used as a worst-case scenario.

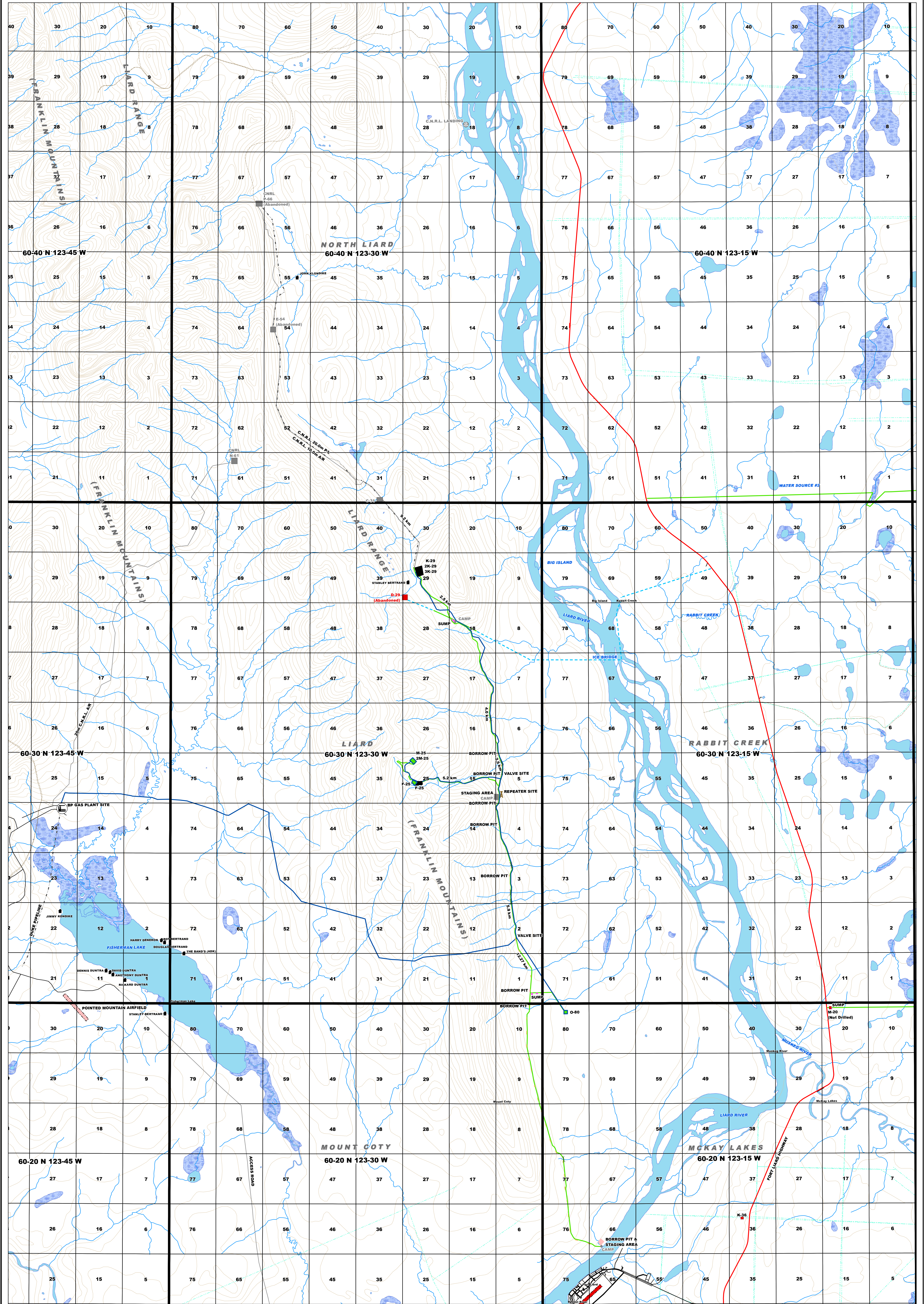
The above assessment addresses the 'most likely event to occur with the highest potential for "actual loss or damage" as a diesel fuel spill. As described, any event (including the "highest potential" event) would be limited to the lease area and clean up would be of short duration.

As noted above the risk of offsite contamination is very low as the fuel storage areas are bermed, with enough capacity to the proposed storage volumes of Diesel, and so only cleanup of Diesel spills on land are considered. Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil can be a natural sorbent due to the non-polarity of diesel compounds binding with soil organic matter, thus spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. As the fuel storage occurs on a location with active operations, any release would be quickly discovered limiting the potential for the diesel to travel downwards within the soil profile.

If released, Diesel can be harmful to humans and wildlife. Diesel contains a mixture of volatile and non-volatile compounds thus vapours are an immediate concern for spill responders. Should a release occur spill responders will be ready to respond with appropriate respirators to allow them to work within the affected areas. Wildlife could be impacted should it come into contact with free diesel liquids and so recovery of free liquids is generally the first spill response activity and is accomplished using vac-trucks.

Following recovery of free fluids impacted soils would be excavated and placed within a lined containment area for temporary storage, prior to disposal at an approved landfill. Following excavation of impacted soils confirmatory samples would be taken from the excavation limits to ensure all impacted soils have been removed. Given the short duration of this scenario it is unlikely groundwater would be impacted.

Appendix A: Project Area Maps



As-Built Map
FORT LIARD WEST
2013
Northwest Territories
NAD 1983 UTM Zone 10N

Legend

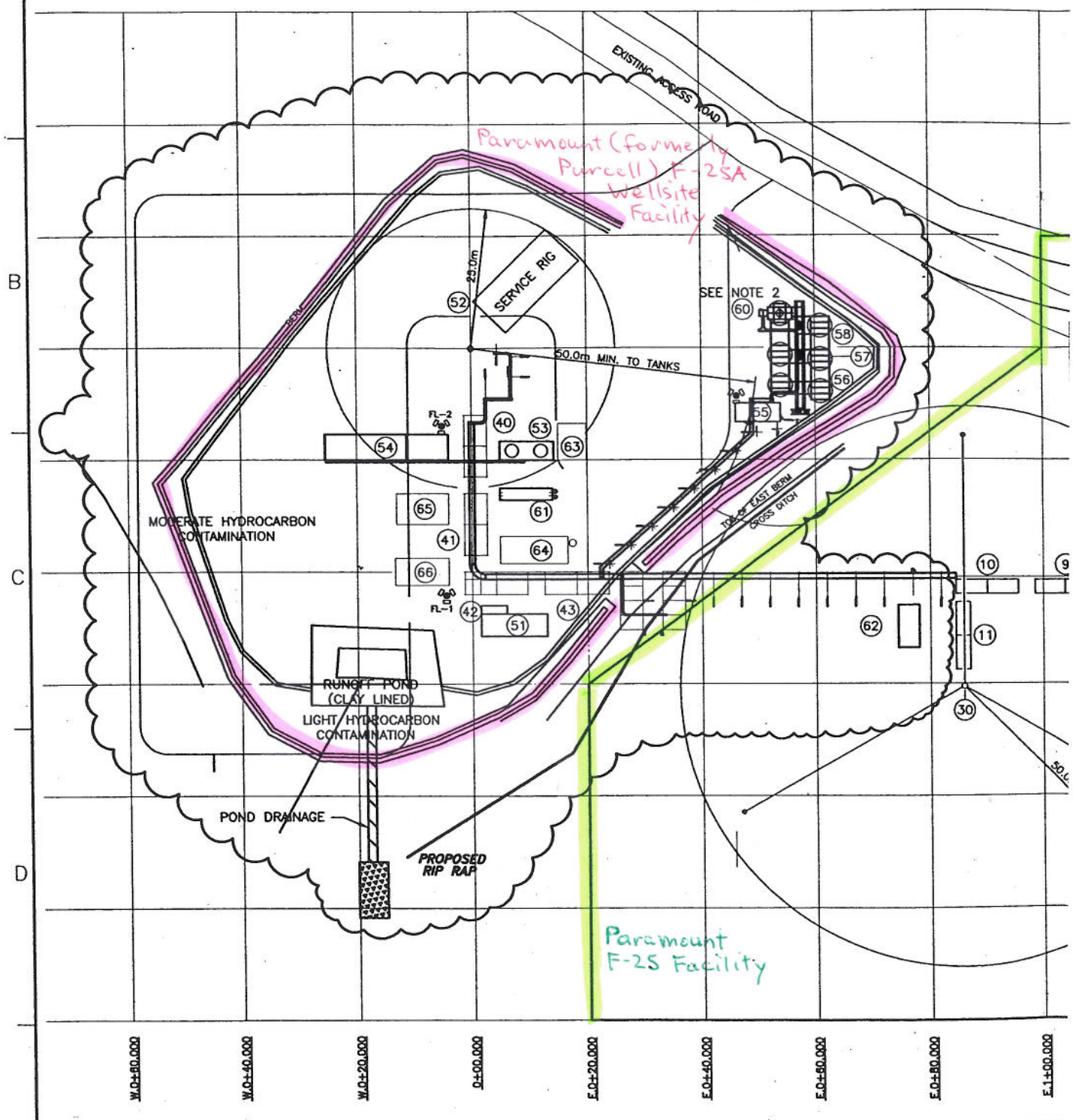
Cabins	Transportation	Leases	Battery	Watercourse
Seismic	Fort Liard Highway	Built	Built	String Bog
Airstrip	Old Paramount Ice Road	Built - Tied-in	Sump	Waterbody
Built	Road	Foreign	Borrow Pit	Wetland
Foreign	Trail	Reclaimed	Built	Contours
Gathering System	Access Built	Gas Plant	Other	
Built	Access Foreign	Camp	Decking Site - Built	
Not Used	Bridge	Built		
Not Built	Barge	Foreign		
Foreign				

OVERVIEW MAP
SCALE 1:1,250,000

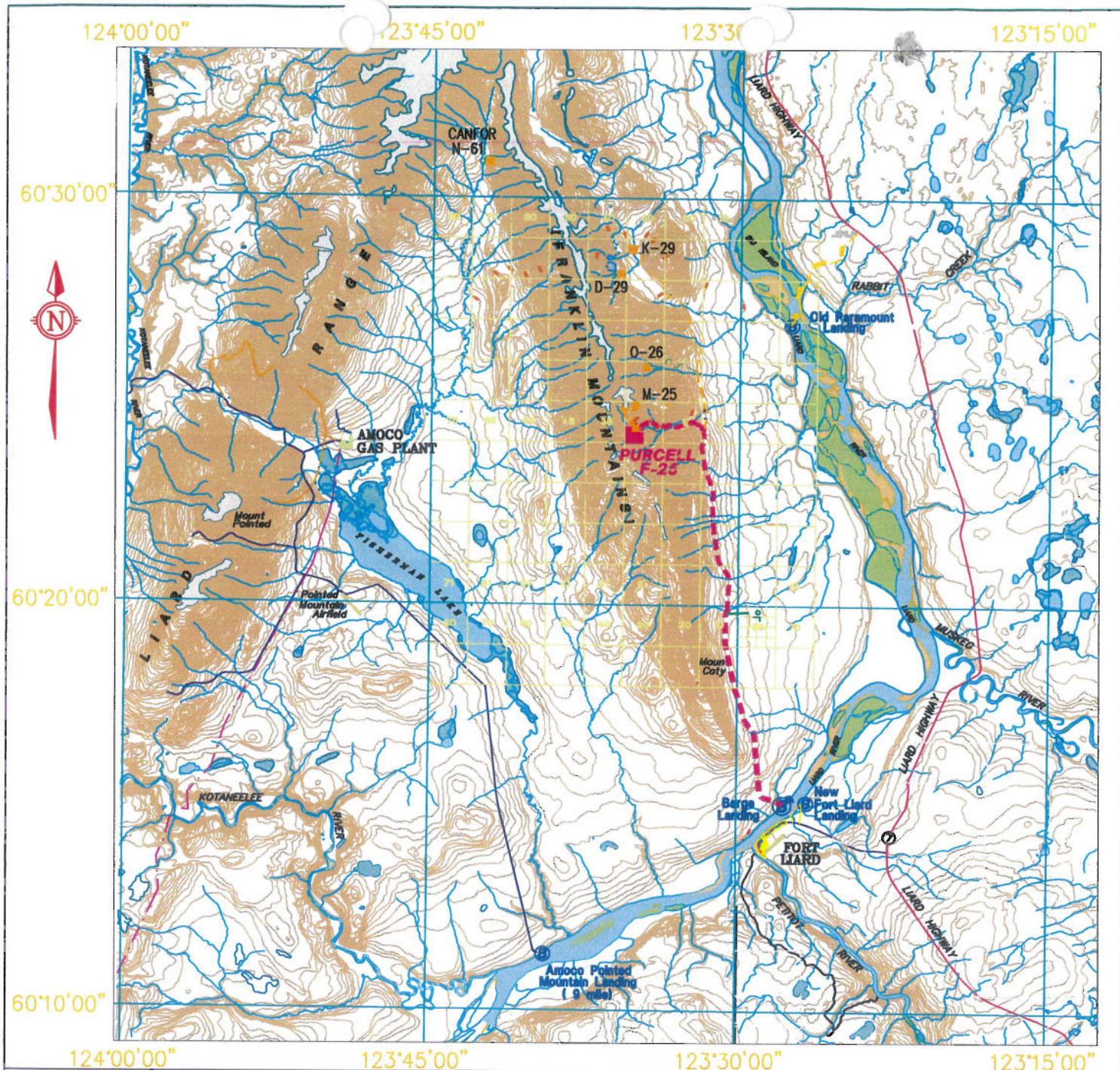
0 0.5 1 2 3 4 5 6 7
Kilometers

1:50,000

Tech: snicholson
Revised: 20 Aug 2013
Job No.: 05-0395G
Filename: Fort Liard_West.mxd
Projection: NAD 1983 UTM Zone 10N



REFERENCE DRAWINGS		REVISIONS					APP'D	NOTES:	SEAL:
NUMBER	TITLE	NO.	BY	DATE	ISSUE				
X-REFERENCE	F:\DRAFTING\DRAWINGS\054-01-01\PIPING-REV3\	0	RS	00/10/30	ISSUED FOR CONSTRUCTION			1. CLOUDED AREAS INDICATE NEW PIPING AND/OR EQUIPMENT FOR PURCELL F-25A FACILITY. 2. TANK FARM LOCATED ON FILL MATERIAL.	
	0540101-BASEPLAN.DWG	1	RS	00/11/03	RE-ISSUED FOR CONSTRUCTION				
FLD-5000-11-03	EQUIPMENT TABLES	2	RS	00/12/11	ISSUED FOR HAZOP REVIEW				
		3	RS	01/01/11	RE-ISSUED FOR CONSTRUCTION				
		4	RS	01/02/01	RE-ISSUED FOR CONSTRUCTION				
		5	SC	01/05/30	AS BUILT PER FIELD MARK UPS				



ACCESS ROAD INFORMATION

AREA OF F-25 WELLSITE = 1.29 ha.

LENGTH OF EXISTING ACCESS ROAD = 21.97 km

WIDTH = 15.0m

AREA OF EXISTING A/R = 32.96 ha.

LEGEND

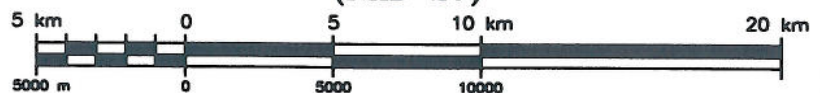
PURCELL EXISTING WELL SHOWN	■
WELLSITES SHOWN THUS	■
00-PROPOSED ACCESS ROADS	—
EXISTING ACCESS ROADS	---
EXISTING BARGE SITE SHOWN	ⓑ
50 FOOT CONTOUR INTERVAL SHOWN	—
AIRSTRIps SHOWN THUS	—
TOWN/CITY	■
PRIMARY HIGHWAY	—
ALL WEATHER EXISTING ROADS	—
WINTER ROADS	---
GAS PIPELINE	---

REVISION TABLE

NO.	DESCRIPTION	DATE	BY

PURCELL ENERGY LTD.

MAP
SHOWING
EXISTING WELLSITE & ACCESS ROAD
PURCELL F-25
UNIT F, SECTION 25
GRID AREA 60°30', 123°30'
NORTHWEST TERRITORIES
(NAD 27)



SCALE 1 : 250 000

COMPILED BY

RON ROBINSON, C.L.S.

CHALLENGER
SURVEYS & SERVICES LTD.

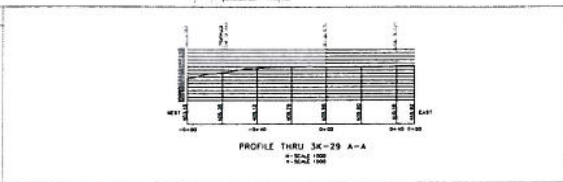
300 0840 FISHER ROAD S.E.
CALGARY, ALBERTA
T2H 0G5
PH (403)-235-8101 FAX (403)-253-1885

ASD 001
00-11007-w1
DATE: MAR. 23/00
B.S.S./B.T.



REVISION TABLE		
NO.	REVISION	DATE
1	ISSUED FOR THE PLAN	10/20/00
2	ISSUED FOR THE PLAN	05/20/01
3	ISSUED FOR THE PLAN	05/20/01
4	ISSUED FOR THE PLAN	05/20/01
5	ISSUED FOR THE PLAN	05/20/01
6	ISSUED FOR THE PLAN	05/20/01
7	ISSUED FOR THE PLAN	05/20/01
8	ISSUED FOR THE PLAN	05/20/01
9	ISSUED FOR THE PLAN	05/20/01
10	ISSUED FOR THE PLAN	05/20/01

LEGEND		
1	ROAD	
2	RAILROAD	
3	WATER	
4	LAND	
5	WATER	
6	LAND	
7	WATER	
8	LAND	
9	WATER	
10	LAND	



CHEVRON CANADA LIMITED

PLAN OF
SITE SURVEY
OF
CHEVRON et al LIARD K-29
UNIT K, SECTION 29
GRID AREA 60°30', 123°30'
NORTHWEST TERRITORIES

SCALE 1 : 500

2001

RON ROBINSON C.L.S.

CHALLENGER

DATE: 10/20/00

BY: [Signature]

FOR: [Signature]

PROJECT: [Signature]

REVISION: [Signature]

DATE: 10/20/00

BY: [Signature]

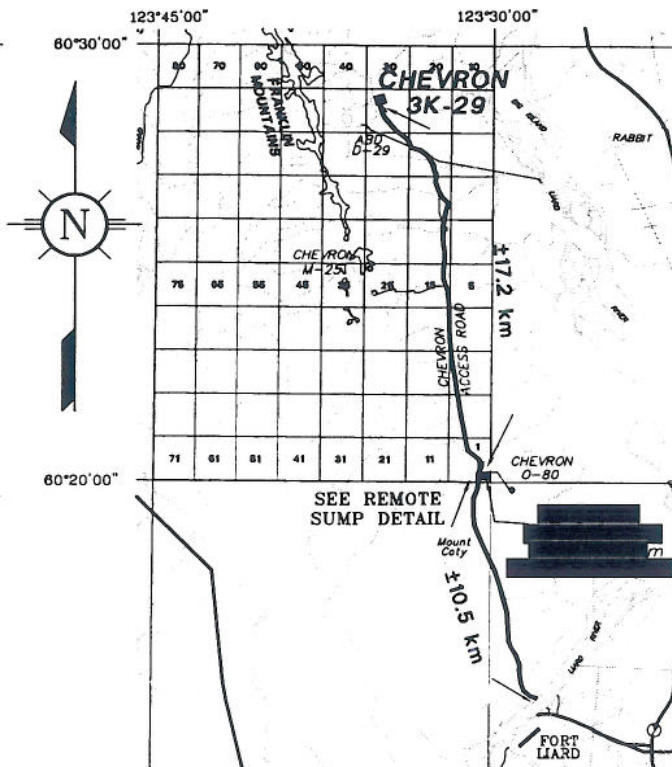
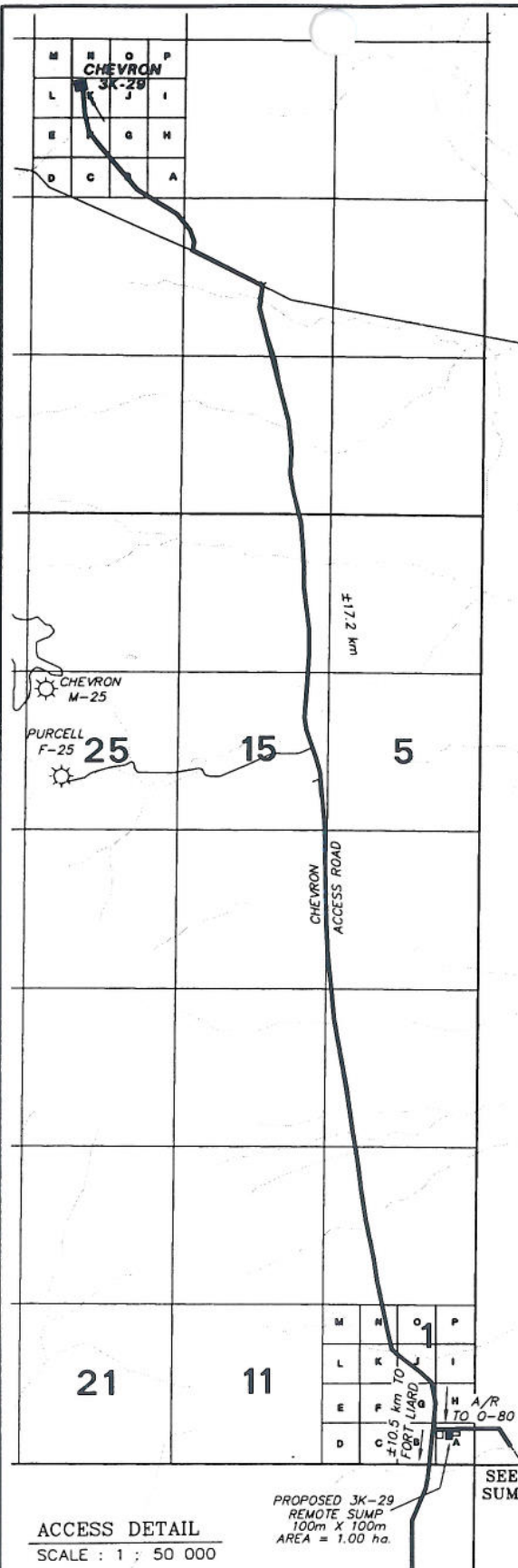
FOR: [Signature]

PROJECT: [Signature]

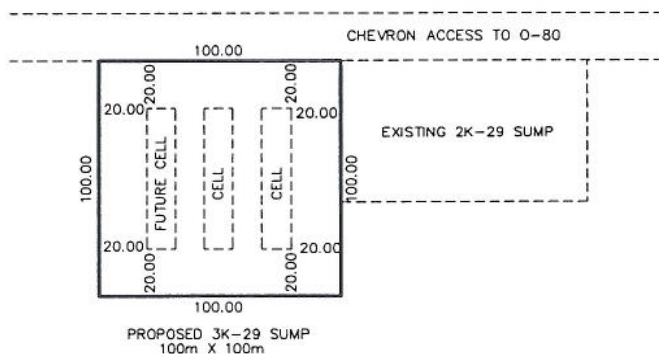
REVISION: [Signature]

CHEVRON CANADA LIMITED

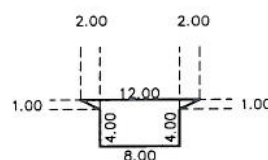
PLAN SHOWING PROPOSED REMOTE SUMP LOCATION FOR CHEVRON LIARD 3K-29 GRID AREA 60°30', 123°30' NORTHWEST TERRITORIES



LOCATION DETAIL
SCALE : 1 : 200 000



REMOTE SUMP DETAIL
SCALE 1:2000



TYPICAL CELL PROFILE
SCALE 1:500

ACCESS DETAIL
SCALE : 1 : 50 000

CHALLENGER
GEOMATICS LTD.

300, 6940 FISHER RD. S.E.
CALGARY, AB T2H 0W3
(PH) 403-253-8101
email: calgary@chalsurv.com

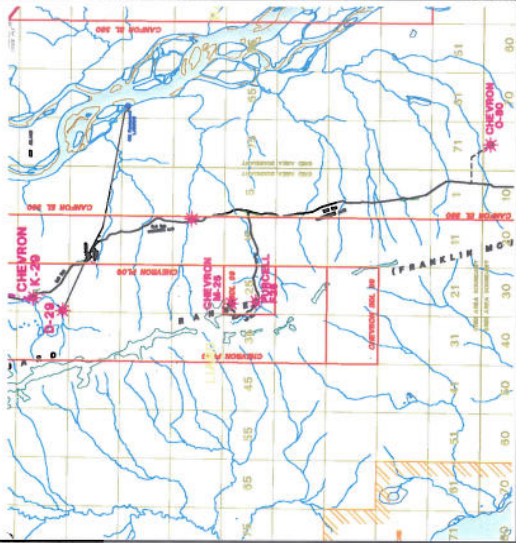
REVISION NOTES:			
No.	DATE	DISCUSSION	By

SCALE:
AS SHOWN

DRAWN:
K.P./R.R.

DATE:
SEPT. 30/03

CALC NO.: 9664
ACAD NO.: 9664_SUMP



LOCATION DETAIL : 1 : 50 000

LEGEND

BURNED PIPES SHOWN THUS

RESULTS SHOWN THAT

STAY AWAY FROM THEM

ORIGINAL CUT/FILL LINE (1999) SHOWN IN RED

NOTE:

REVISION TABLE			
NO.	DESCRIPTION	DATE	BY
1	SHOW ELEVATIONS AND VARIOUS TOP FEATURES FROM OCT. 24, 2003 SURVEY	OCT.27/03	HP
2	SHOW PROPOSED RIG LOCATION FOR 2H-#3	NOV.7/03	HP
3	SHOW 2UT TELL LINE	NOV.12/03	HP
4	MOVE WELL CENTERED FOR 2H-25, ROTATE RIG	NOV.16/03	HP

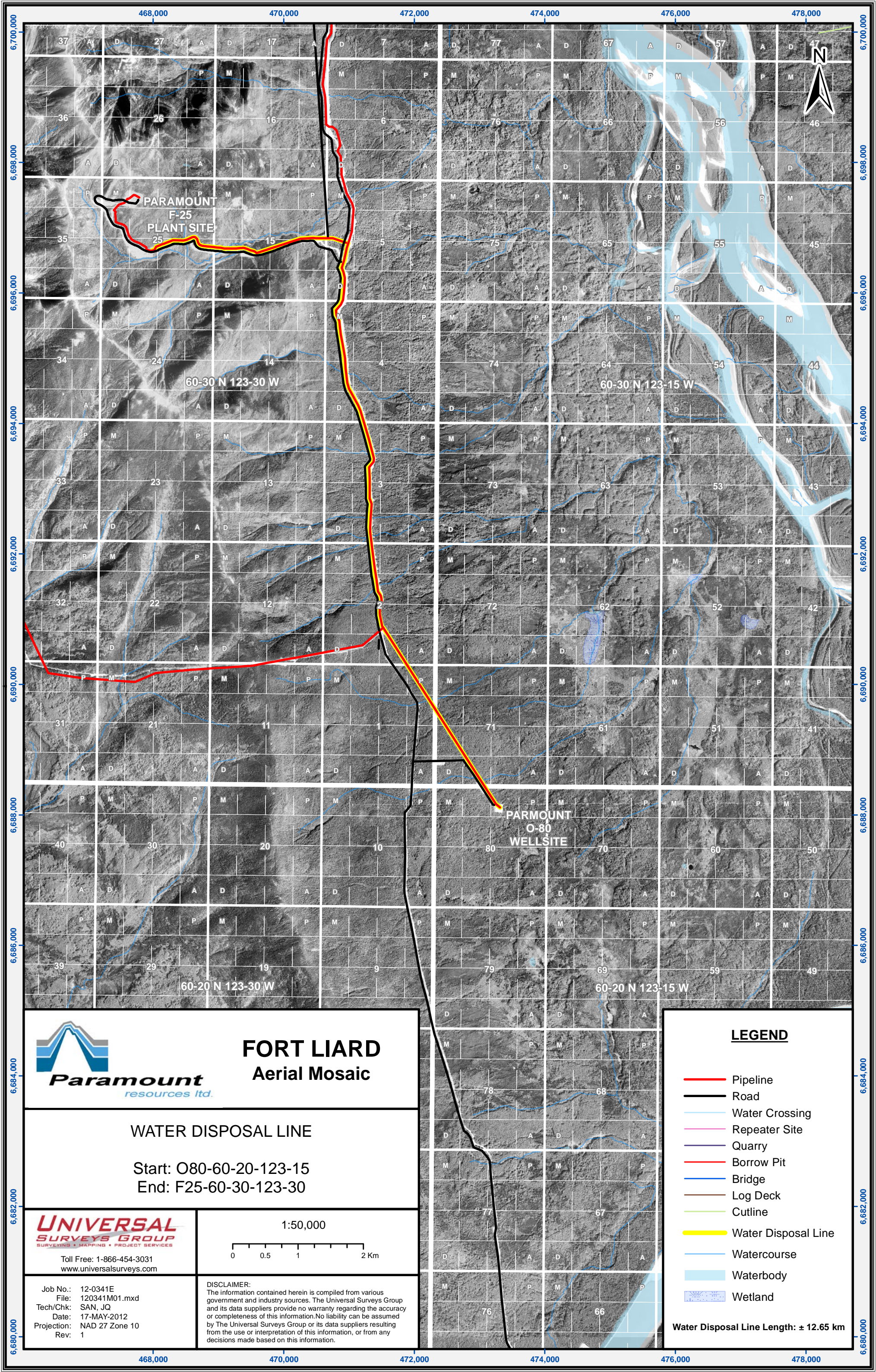
CHEVRON CANADA LIMITED

PLAN OF
SITE SURVEY
OF

CHEVRON M-25 PLANT SITE
IN UNIT M, SECTION 25
GRID AREA 60°30', 123°30'
NORTHWEST TERRITORIES



 CHALLENGER ENGINEERING	PHONE (403) 253-8101 FAX (403) 253-1985 CALGARY	DRAWN : K.P.	SCALE: 1 : 500	DATE : SEPT. 24, 2003	JOB NO. : 11335-M25-SITE



FORT LIARD
Aerial Mosaic

WATER DISPOSAL LINE

Start: O80-60-20-123-15
End: F25-60-30-123-30

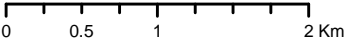


Toll Free: 1-866-454-3031
www.universalsurveys.com

Job No.: 12-0341E
File: 120341M01.mxd
Tech/Chk: SAN, JQ
Date: 17-MAY-2012
Projection: NAD 27 Zone 10
Rev: 1

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1:50,000



LEGEND

- Pipeline
- Road
- Water Crossing
- Repeater Site
- Quarry
- Borrow Pit
- Bridge
- Log Deck
- Cutline
- Water Disposal Line
- Watercourse
- Waterbody
- Wetland

Water Disposal Line Length: ± 12.65 km

Appendix B: ERP Sections Related to NWT Response Specific Instructions

Northwest Territories Petroleum Industry Release Reporting Requirements

All spills exceeding the spill/release quotas listed in the table on the following page **MUST** be reported immediately to the appropriate regulatory agency.

Agency	Reportable Spills	Report Type	Report To
Office of the Regulator of Oil and Gas Operations (OROGO)	Operators must report all incidents and near-misses to the Regulator as soon as the circumstances permit by calling 1-867-445-8551.	Verbal	(OROGO) 1-867-445-8551
		Written	Operators must submit an investigation report, within 21 days of the day an incident or near-miss occurs, if the incident or near-miss involves: ~ A death ~ An injury that required time off work ~ A fire or explosion ~ A leak ~ An immediate threat to safety or ~ A significant pollution event
The Department of Environment and Natural Resources (ENR)	Reported releases or potential releases of any size that: 1) Are near or in an open water body 2) Are near or in a designated sensitive environment or habitat 3) Pose an imminent threat to human health or safety; or 4) Pose an imminent threat to a listed species at risk or its critical habitat Substances regulated by Environment and Natural Resources if: 1) Release meets or exceeds the reporting threshold in the NWT spill Reporting Requirements column in the Reportable Threshold table on the following page.	Verbal	NWT/Nunavut 24 Hr. Spill Reporting Line 867-920-8130
		Written	Fill out the Spill Report Form found at: http://www.enr.gov.nt.ca/en/files/spill-report-form-northwest-territories-nunavut Submit the completed form via: Fax: 867-873-6924 OR Email: spills@gov.nt.ca
Canadian Environmental Protection Agency (CEPA)	Environmental emergencies if: 1) The emergency involves any of the substances identified in Environment & Climate Change Canada's E2 List of regulated substances. See the website link at the bottom of the following page for more information. Note: CEPA has not identified specific reporting thresholds; however, CEPA has suggested that existing provincial reporting thresholds or TDG reporting thresholds are acceptable for use.	Verbal	NWT/Nunavut 24 Hr. Spill Reporting Line 867-920-8130
		Written	Within 30 days
Transportation of Dangerous Goods (TDG)	Substances regulated by Transportation of Dangerous Goods if: 1) Release meets or exceeds the reporting threshold in the TDG Reporting Requirements column in the Release Reporting Thresholds table on the following page.	Verbal	403-873-7406 (Yellowknife)
		Written	Within 30 days
Canadian Transport Emergency Centre (CANUTEC)	Loss and theft reporting: 1) CANUTEC - all loss or theft of dangerous goods materials 2) Natural Resources Canada Inspector - Class 1 explosive materials only 3) Canadian Nuclear Safety Commission - Class 7 radioactive materials only	Verbal	1) 888-226-8832 or 613-996-6666 2) 613-995-5555 3) 613-995-0479
		Written	Within 30 days
Department of Fisheries and Oceans (DFO)	1) A release of any substance deleterious to fish into a fish bearing water body.	Verbal	Inuvik 867-777-7500 Yellowknife 867-669-4900
National Energy Board (NEB)	Immediately reportable events as defined in the NEB Event Reporting Guidelines December 2017: 1) An incident that harms people or the environment, 2) A rupture, or 3) A toxic plume Note: Immediately reportable incidents must be reported within 3 hours to both the TSB Reporting Hotline and NEB's OERS. If applicable, refer to the Federal Roles & Responsibilities chart in SECTION 5: EXTERNAL AGENCIES and the NEB site section behind the AREA SPECIFIC INFORMATION tab for further	Verbal	Via Transportation Safety Board (TSB) Reporting Hotline 819-997-7887
		Written	NEB Online Event Reporting System (OERS) https://apps.neb-one.gc.ca/ers/home/index
Canadian Nuclear Safety Commission (CNSC)	All radioactive releases must be reported immediately.	Verbal	613-995-0479
		Written	Within 21 days

Note: The Departments of Environment and Natural Resources and Lands, and the Office of the Regulator of Oil and Gas Operations (OROGO) are responsible for coordinating Government of the Northwest Territories regulatory oversight and investigation of hazardous material spills in NWT under their respective jurisdictions.

Note: Spills must be reported promptly to avoid possible prosecution.

Lead Agency Contact Numbers	
Northwest Territories	
The Office of the Oil and Gas Regulator (OROGO)	1-867-445-8551
NWT/Nunavut 24 Hr. Spill Reporting Line	1-867-920-8130
Canada	
CANUTEC	
All Provinces	888-CAN-UTEC (888-226-8832) 613-996-6666
National Energy Board / Transportation Safety Board of Canada	
Incident Reporting Line	819-997-7887

See following page for spill / release quotas.

Northwest Territories Petroleum Industry Release Reporting Requirements

All spills exceeding the spill/release quotas listed in the table on the following page MUST be reported immediately to the appropriate regulatory agency.

Chemical Class	Substance / Example	T.D.G. Reporting Requirements		OROGO / ENR			
		Road, Rail or Marine	Loss or Theft	Reporting Requirements			
Spilled Liquid Substances	Hydraulic Oil	No TDG Reporting Requirements		When released on a frozen water body that is being used as a working surface			
	Methanol	See Class 3 & 6.1					
	Natural Gas	See Class 2.1		Uncontrolled release or sustained flow of 10 minutes or more			
	Crude Oil / Emulsion (Unrefined)	See Class 3		>100 L or 100 kg			
	Produced / Salt Water (Unrefined)	No TDG Reporting Requirements					
	Drilling Fluid or Invert Mud						
	Condensate (Unrefined)	See Class 3					
	Glycol	No TDG Reporting Requirements		No Reporting Requirement			
	Fresh Water			>5L or 5 kg			
	Any fluid with toxic substances			Any amount			
Class 1 Explosives	Ammunition Nitro-glycerine	Any quantity of Packing Group II	Any quantity in Class 1.1, 1.2, and 1,3 Total quantity of 450 kg or more in Class 1.4 (except 1.4S), 1.5, or 1.6	Any amount			
Class 2.1 Flammable Gases	H ₂ S	Any quantity	Total quantity of 450 kg or more	Any amount of gas from containers with a capacity greater than 100L			
	Methane Propane Butane Natural Gas						
Class 2.2 Non-Flammable Gases	Compressed Air		No TDG Reporting Requirements	Any amount of gas from containers with a capacity greater than 100L			
	O ₂ N ₂ CO ₂						
Class 2.3 Toxic Gases (poisonous or corrosive)	H ₂ S SO ₂ Hydrogen Cyanide Nitric Acid Anhydrous Ammonia		Any quantity	Any amount			
Class 3 Flammable Liquids	Gasoline Diesel Methanol Demulsifiers Scale Inhibitors Lube Oil	Any quantity of Packing Group I or II More than 30 L or 30 kg of Packing Group III	Total quantity of 450 kg or more of desensitized explosives Any quantity of UN1261, Nitromethane	>100L			
	Class 4.1 Flammable Solids		Calcium Resinate Naphthalene Crude	Total quantity of 450 kg or more of desensitized explosives Any quantity of UN1357, Urea Nitrate, with not less than 20% water, by mass; UN3370, Urea Nitrate, Wetted, with not less than 10% water by mass	>25 kg		
Class 4.2 Spontaneously Combustible			Activated Carbon Potassium Sulphide Phosphorus	Total quantity of 450 kg or more in Packing Groups I or II			
Class 4.3 Water reactant substances			Molten Sulphur Calcium Carbide Sodium Activated Carbon	Total quantity of 450 kg or more in Packing Groups I or II			
Class 5.1 Oxidizing Substances	Calcium Nitrate Ammonium Nitrate Bleaches		Total quantity of 450 kg or more in Packing Groups I or II Any quantity of UN1485, Potassium Chlorate; UN1486, Potassium Nitrate; UN 1487, Potassium Nitrate and Sodium Nitrate Mixture; UN1489, Potassium Perchlorate; UN1495, Sodium Chlorate; UN1498, Sodium Nitrate; UN1499 Sodium Nitrate and Potassium Nitrate Mixture; UN1511, Urea Hydrogen Peroxide; UN1942 Ammonia Nitrate, with not more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substances; UN2014 Hydrogen Peroxide, Aqueous Solution with not less than 20% but not less than 60% hydrogen peroxide (stabilized as necessary); UN2015, Hydrogen Peroxide, Stabilized; UN2031, Nitric Acid, other than red fuming; UN3149, Hydrogen Peroxide and Peroxyacetic Acid Mixture with acid (s), water and not more than 5% peroxyacetic acid, stabilized	50 kg or 50 L			
				Class 5.2 Organic Peroxides	Methyl Ethyl Ketone Peroxide Succinic Acid Peroxide	Any quantity in Class 5.2, Type B, liquid or solid, temperature controlled	>1L or 1 kg
				Class 6.1 Poisonous Toxic Substances	Arsenic Lead Acetate Mercuric Oxide Methanol Toxic Pesticides	Any quantity of Packing Group I	>5L or 5 kg
Class 6.2 Infectious Substances	Infectious Substances affecting Humans / Animals Sewage and wastewater	Any quantity of Category A or B	Any quantity	Any amount			
Class 7 Radioactive Substances	Uranium Plutonium Naturally Occurring Radioactive Materials (N.O.R.M.)	For packages being transported under exclusive use: (i) 10 mSv/h on the external surface (ii) 2 mSv/h on the surface of the conveyance, and (iii) 0.1 mSv/h at a distance of 2 m from the surface For packages not being transported under exclusive use: (i) 2 mSv/h on the external surface (ii) 0.1 mSv/h at a distance of 1m from the package, (iii) 2 mSv/h on the surface of the conveyance, and (iv) 0.1 mSv/h at a distance of 2m from the surface of the conveyance.	Any quantity	Any amount			
Class 8 Corrosives	Acids Bases Batteries Caustic Amine	Any quantity of Packing Group I or II 30 L or 30 kg of Packing Group III	Total quantity of 450 kg or more in Packing Group I or II Any quantity of UN1796, Nitrating Acid Mixture with more than 50% nitric acid; UN1826, Nitrating Acid Mixture, Spent, with more than 50% nitric acid; UN2032, Nitric Acid, Red Fuming	5 kg or 5 L			
Class 9 Miscellaneous Products, Substances & Organisms, Environmentally Hazardous Substances	P.C.B. Asbestos Polystyrene Beads Gas Plant Filters Benzoic Acid Chromic Acetate Cupric Sulphate	30 L or 30 kg of Packing Group II or III, or without Packing Group	No TDG Reporting Requirements	>5L or 0.5 kg			
Class 9.1 Miscellaneous (except and with PCB mixtures 5 or more ppm)				0.5 L or 100 kg			
Class 9.2 Aquatic Toxic				No Reporting Requirement			
Class 9.3 Wastes (chronic toxic)				Any amount			
Other items in the ENR Spill Reporting Regulation that are applicable but do not fit in the above table format.							
Item	Substance Spilled			Specified Amount			
	Waste or spent chemicals, used or waste oil, vehicle fluids, wastewater			>100L or 100 kg			

For all other reportable substances/quantities, please refer to company SDS sheets for more information.
List of Environment & Climate Change Canada's E2 Regulated Substances: <https://ec.gc.ca/ee-ue/default.asp?lang=En&n=06FCD512-1>

SPILL RESPONSE GUIDELINES

This section provides basic hydrocarbon spill response guidelines. For greater detail, refer to the Western Canada Spill Services (WCSS) manuals, applicable Safety Data Sheets (SDS) and the Emergency Response Assistance Canada (ERAC) Plan. Refer to the Petroleum Industry Release Reporting Requirements chart at the beginning of this section to determine the TDG and Provincial Reporting Requirements for each class of chemicals (as classified by the TDG Hazard Classification System).

Initial Response Actions:

- Determine the Level of Emergency using the Assessment Matrix in SECTION 1 – INITIAL RESPONSE.
- Determine spilled substance. If it can be classified as an LPG release, isolate the area to a minimum distance of 1600 meters (1 mile) and refer to the BLEVE portion of the fire / explosion section.
- Assess spill hazards and risks. Determine what PPE will be required.

Considerations:

- Are there any nearby public (workers, traffic, residents) that would need to be evacuated or diverted from the spill area?
- Is there a fire or explosion hazard? What is the ignition source?
- Is there H2S or other toxins present? Are concentrations safe or is additional PPE needed?
- Are there any areas deemed hazardous? (Mark with flags)
- What are the ground and weather conditions? (Snow, gravel, sand etc.)
- Where is the location of the leak, the type of release and the volume released? Is it reportable? Has it been reported to the regulator?
- How long has the spill been taking place?
- Are air monitoring trailers required?
- Is the spill into a watercourse, watershed or a water body?
- Is the spill contained or migrating? Which direction? How far can it go?
- If the spill is not contained, determine and prioritize the containment points and methods to be used.
- What lands or water bodies may be affected? (Farm, livestock, brush, drinking water, etc.)
- How is it going to be contained and cleaned up?
- How to access the spill site, the source of the spill and recovery points?
- What equipment is required? Is oil spill equipment (oil spill co-op) required?
- Where can spill responders park so as not to interfere with spill equipment? (Minimize vehicular traffic as much as possible at the spill site.)
- Are there any residences in the area? Do they have water wells that could be affected?
- Should the spill site be cordoned off to prevent wildlife / livestock from entering?
- Will a media response be required?

Control/Containment:

- Remove all sources of ignition.
- Stop the spill if safely possible (e.g. shut off pump, replace cap, tip drum upward, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so.
- Assess speed and direction of spill and cause of movement (water, wind and slope).
- Use contents of spill kits to place sorbent materials on the spill, or use shovel to dig to contain spill. Methods may vary depending on the nature of the spill.
- Prioritize and set up containment points.
- Where possible, prevent a spill from entering a watercourse.
- Have a contingency plan ready in case spill worsens beyond control or if the weather or topography impedes containment.
- Avoid excessive walking or driving on the spill area.
- Consider ground disturbance guidelines.
- Surface run off may have to be diverted from the spill site if wet conditions are present.
- Mitigate or eliminate any danger to life, health, the environment or property arising from the spill.
- Ensure the health and safety of the persons responding to the spill.
- Once containment has been achieved, recovery and clean-up operations begin immediately.
- Recover as much product and saturated debris as possible.
- Keep environmental disturbance to a minimum.
- Take steps to rehabilitate any land affected by the spill.
- Take steps to prevent the occurrence of a similar spill.

External Notifications:

- Contact the below spill service, to determine the closest available spill equipment and towing requirements.

SWAT Consulting	866-610-7928
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Follow notification procedures outlined at the beginning of this section.

SPILL CONTROL POINTS

Control points are pre-identified locations on watercourses that allow for the staging and deployment of oil spill containment and recovery equipment in response to oil spills that have occurred upstream of the control point. Control point selection is critical to an effective oil spill response and part of your risk assessment and development of site-specific emergency response plan information. For a detailed list of control points utilize the WCSS website (<http://www.wcss.ab.ca>).

An ideal control point should have:

- quick access to the watercourse in all seasons, using clear ground, a road or a trail
- adequate work space to conduct operations and to store required equipment with minimal need for clearing of brush and vegetation
- sufficient space to deploy containment and recovery equipment quickly with minimal effort or obstructions (i.e. trees, rocks, steep banks, etc.) and minimal environmental impact
- boat launch location(s) for boats assisting in containment and recovery operations.

Selection of control points with public access is preferred.

For control points on private property - landowner approval and necessary permits for emergency access should be obtained in advance.

Designated site specific control points need to be reviewed at least annually. Each control point site should be visited periodically to evaluate suitability and to ensure information is accurate and complete. Old unsuitable control points should be removed and new control points added, as a part of revisions to site specific information, as required. Control point listings should include a site description, site diagram, access description, landowner/occupant phone number, site suitability and any other information related to the site.

ACTION

Where a spill occurs, the person who had possession immediately before the spill shall take all reasonable and practical action. They should have due regard for the safety of the public, themselves, to stop and contain and minimize the effects of the spill.

RECOVERY TECHNIQUES

There are two basic means of stopping the flow of petroleum products floating on a stream or river: a boom or a dam. If the stream or river if relatively large, booms are used. A dam may be constructed across the channel of a small stream with a low flow.

If a stream or river is to be boomed, the appropriate equipment should be obtained from the Local Spill Response Cooperative or mutual aid partners. Decisions must incorporate the following considerations:

- Width of stream or river to be boomed (where possible, the entire river width should be boomed)
- Allowable boom angle based on stream or river current and length of boom required
- Anchoring methods for the booms
- Methods to lay out and deploy a boom

If a dam is to be constructed across the stream, some allowance must be made for the flow of water past the dam. The Western Canadian Spill Services plan provides detailed information about oil spill containment and recovery.

CONTAINMENT AND STORAGE OF PRODUCT

When commercial barriers are not suitable or available, particularly in remote areas, barriers must be improvised. Improvising depends on the materials at hand and the situation in which the spill occurred. In each case, the experience and innovative ability of the personnel at the spill site is needed for the successful containment of the oil spill.

Tank trucks, storage tanks or an earthen pit may be used to store recovered petroleum products. Access must be close enough to the recovery site so that hoses from the pumps can reach a tank truck. Storage tanks must be located on level, stable ground with access available for tank truck use. An earthen pit should only be constructed when tank trucks or storage tanks cannot be used. Earth-moving equipment and appropriate ground disturbance procedures will be required to construct a pit. A plastic lining should be used.

DISPOSAL AND REMEDIAL OPERATIONS

Disposal of the product and site restoration actions will be determined for each site by consultation among operations personnel, the provincial environmental protection agency or other environmental regulators and any external contracted professional environmental consultants.

It is the companies responsibility when reporting a release to the regulatory agency or the Ministry of Environment (as appropriate) to inform any private individuals whose lands may be affected by the release. The company must notify the landowner of any release that occurs off a lease site, migrates off a lease site or occurs on an easement or right-of-way. The company is reminded that landowner cooperation is essential in being able to quickly respond to a release that is not on the normal working area of a lease site.

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND
OTHER HAZARDOUS MATERIALS



Canada



NT-NU 24-HOUR SPILL REPORT LINE

Tel: (867) 920-8130 • Fax: (867) 873-6924 • Email: spills@gov.nt.ca

REPORT LINE USE ONLY

A	Report Date:	MM	DD	YY	Report Time:	<input type="checkbox"/> Original Spill Report OR <input type="checkbox"/> Update # _____ to the Original Spill Report	Report Number:
	Occurrence Date:	MM	DD	YY	Occurrence Time:		
C	Land Use Permit Number (if applicable):				Water Licence Number (if applicable):		
D	Geographic Place Name or Distance and Direction from the Named Location:					Region: <input type="checkbox"/> NT <input type="checkbox"/> Nunavut <input type="checkbox"/> 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: <input type="checkbox"/> Potential Spill		Quantity in Litres, Kilograms or Cubic Metres:		U.N. Number:		
I	Spill Source:		Spill Cause:		Area of Contamination in Square Metres:		
J	Factors Affecting Spill or Recovery:		Describe Any Assistance Required:		Hazards to Persons, Property or Environment:		
K	Additional Information, Comments, Actions Proposed or Taken to Contain, Recover or Dispose of Spilled Product and Contaminated Materials:						
L	Reported to Spill Line by:		Position:	Employer:	Location Calling From:	Telephone:	
M	Any Alternate Contact:		Position:	Employer:	Alternate Contact Location:	Alternate Telephone:	

REPORT LINE USE ONLY

N	Received at Spill Line by:	Position:	Employer:	Location Called:	Report Line Number:
Lead Agency: <input type="checkbox"/> EC <input type="checkbox"/> CCG/TCMSS <input type="checkbox"/> GNWT <input type="checkbox"/> GN <input type="checkbox"/> ILA <input type="checkbox"/> AANDC <input type="checkbox"/> NEB <input type="checkbox"/> Other: _____			Significance: <input type="checkbox"/> Minor <input type="checkbox"/> Major <input type="checkbox"/> Unknown		File Status: <input type="checkbox"/> Open <input type="checkbox"/> Closed
Agency:		Contact Name:	Contact Time:	Remarks:	
Lead Agency:					
First Support Agency:					
Second Support Agency:					
Third Support Agency:					

INCIDENT NOTIFICATION PROTOCOL ¹

	Negligible (1)	Minor (2)	Serious (3)	Major (4)	Critical (5)
Health & Safety	<ul style="list-style-type: none"> No illness or adverse effect. Medical treatment is not necessary. Injury requiring First Aid treatment 	<ul style="list-style-type: none"> Minor illness or adverse effect with limited or no impacts on ability to function Multiple First Aid Injuries Medical Aid Injury 	<ul style="list-style-type: none"> Serious illness or adverse effects with mild to moderate functional impairment Injury requiring modified work Multiple Modified Work Injuries Multiple Medical Aid Injuries 	<ul style="list-style-type: none"> Major illness or chronic exposure resulting in long term effects. Medical treatment for exposure to toxic substance (i.e. H₂S) Lost Time Injury Injury resulting in long term disability or disfigurement Potential Serious Injury or Fatality (SIF) 	<ul style="list-style-type: none"> Critical illness or chronic exposure resulting in fatality or significant life shortening effects. Fatality or fatalities Multiple Lost Time Injuries Life Threatening physical assault or threat
	** Potential Serious Injury or Fatality (SIF) = MAJOR (4)				
Assets	<ul style="list-style-type: none"> Negligible asset loss or damage to facility resulting in costs <\$50K 	<ul style="list-style-type: none"> Minor asset loss or damage to facility resulting in costs >\$50K but <\$250K 	<ul style="list-style-type: none"> Serious asset loss, damage to facility resulting in costs >\$250K but <\$500K 	<ul style="list-style-type: none"> Major asset loss or damage to facility resulting in costs >\$500K but <\$2M Declaration of a Level 1 emergency as defined by the regulator 	<ul style="list-style-type: none"> Critical asset loss or damage to facility resulting in costs >\$2M Declaration of a Level 2 or 3 emergency as defined by the regulator
Environment²	<ul style="list-style-type: none"> Tier 4² Liquid release contained on lease (<2m³) Liquid release extends beyond lease (<0.1m³) Gas release on lease (<30,000 m³) Negligible environmental impact 	<ul style="list-style-type: none"> Tier 3² Liquid release contained on lease (≥ 2m³ but < 10 m³) Liquid release extends beyond lease (≥0.1m³ but < 2m³) Gas release on lease (≥ 30,000 m³ but < 100,000 m³) Gas release off lease (< 30,000 m³) Public, wildlife or worker health/safety are not in jeopardy Response requiring on-site resources Minimal environmental impact 	<ul style="list-style-type: none"> Tier 2² Liquid release contained on lease (≥10m³ but < 100m³) Liquid release extends beyond lease (≥2m³ but < 10m³) Gas release off-lease (≥ 30,000 m³ but < 100,000 m³) Public, wildlife or worker health/safety could be jeopardized Response requiring local resources 	<ul style="list-style-type: none"> Tier 1² Liquid release contained on lease (≥ 100 m³) Liquid release extends beyond lease (≥ 10m³) Gas release on or off lease (≥100,000m³) Response requiring regional resources Single wildlife impact 	<ul style="list-style-type: none"> Tier 1² with Fire / Explosion Liquid release into Waterbody or sensitive habitat Release extends beyond lease – public health/safety are jeopardized. Release impacting a sensitive species Release requiring long term response and remediation effort Multiple wildlife impacted
Reputation	<ul style="list-style-type: none"> Regulatory enforcement action not likely Non-conformance to internal procedures or requirements Individual concern No Media attention 	<ul style="list-style-type: none"> Regulatory enforcement action (fines < \$100K) Short term community concern 	<ul style="list-style-type: none"> Regulatory enforcement action (fines > \$100k but < \$1M) and or criminal charges laid 	<ul style="list-style-type: none"> Regulatory enforcement action (fines > \$1M but <5M) and or criminal charges laid Close regulatory scrutiny of Asset level operations / future proposals Local Media coverage or social media coverage Major interest group concern Short term regional concern 	<ul style="list-style-type: none"> Regulatory enforcement action (fines > \$5M) and or criminal charges laid Negative national publicity Negative impact on market share or investor valuation Major venture / asset operations severely restricted

¹ This document is to be used as a quick reference guide only and is not a controlled document. The contents are excerpted from Paramount Incident Management Governance Document. Any revisions must be made within the Governance document before being reflected here. The intent is to be used for internal incident notification purposes only; emergency response plan is to be used when responding to emergencies. **First determine if this is an Emergency or Incident response – IS THE SITUATION UNDER CONTROL? If not, initiate Emergency Response Plan.**

² For Tier categorization or Regulatory Reportable Thresholds, consult with local Safety or Environmental Advisor and Corporate HSE team

Notification Timing based on Actual¹ Incident Severity

Operations		Drilling/Completions		Engineering Facilities Construction		HSE		Actual Incident Severity				
Notification By:	Notification To:	Notification By:	Notification To:	Notification By:	Notification To:	Notification By:	Notification To:	Negligible	Minor	Serious	Major	Critical
Worker	Supervisor/ Foreman	Worker	Site Supervisor	Worker	Site Supervisor			Immediate ²	Immediate ²	Immediate ²	Immediate ²	Immediate ²
Foreman	Ops Manager & Safety or Environment Advisor	Site Supervisor	Superintendent & Safety or Environment Advisor	Site Supervisor (Inspector)	PM. & Safety or Environment Advisor			Within 24 hrs	Immediate	Immediate	Immediate	Immediate
Ops Manager	Ops Director	Superintendent	D&C Director	PM	Facilities Manager			WDS	Within 24 Hrs	Within 8 Hrs	Immediate	Immediate
						Safety or Environment Advisor	Health & Safety Manager OR Environment Team Leader	NBD	Within 24 Hrs	Immediate	Immediate	Immediate
						Health & Safety Manager OR Environment Team Leader	HSE Director	WDS	Within 24 Hrs	Within 8 Hrs	Immediate	Immediate
Ops Director	Ops VP			Facilities Manager	Eng. VP	HSE Director	EVP Ops	WDS	NBD	Within 8 Hrs	Immediate	Immediate
Ops VP	EVP Ops & CEO	D&C Director	EVP Ops & CEO	Eng. VP	EVP Ops & CEO			WDS		Within 24 Hrs	Within 8 Hrs	Immediate

Notes:

- 1 – Notification requirements based on actual severity (or potential SIF)
- 2 – “Immediate” incident notification occurs after physical response steps to bring the event to a safe state
- WDS – Weekly Data Summary
- NBD – Next Business Day (Mon-Fri)

Initial Internal Notification Requirements

Include the following information when providing initial notifications:

Reporting / Responsible Region:			
Date:		Time:	
Event Type:		Actual Severity:	
Potential SIF:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Location:	
Reason for SIF Classification:		Nearest Municipality:	
		Person Involved:	Name
		Position	Position
<input type="checkbox"/> Employee <input type="checkbox"/> Contractor		Company Name	
Description of incident (What, where, when, how):			
Action Taken:			
Actual and Potential Impacts:			
People:			
Environment:			
Assets / Operational Impact:			
Reputation:			
Regulatory:			
Reported to Government Agency?			
Who:		Contact Number:	
		Time:	
What information was provided:			

Appendix C: Spill Co-op Equipment List



Current Equipment Inventory

<http://emis.wcss.ab.ca/PublicInventoryReport.aspx>

10/24/2016 3:43:57PM

Name Fort Nelson Skid Unit #43
Co op Area C
Zone 6
Equipment Type Co-op Area
Status Active
Usage 0.00

Category	Standard	Quantity	Descripti on	Tag #	Serial #	Model #	Manufacturer
Anchors and Equipment							
Anchor I Beam & chain	1	4					
Chain 1/2"x 20' galvanized - quick link ea. End	1	8					
Anchor, Rake	1	1					
Drive Pin, spade type	1	10					
Drive Pin, straight	20	18					
Anchor, Slater 5'	1	8					
Anchor - Danforth	1	3					
Marker buoy	1	3					
Category	Standard	Quantity	Descripti on	Tag #	Serial #	Model #	Manufacturer
Communications Equipment							
Megaphone	1	1					
Whiteboard	1	1					
Category	Standard	Quantity	Descripti on	Tag #	Serial #	Model #	Manufacturer
Containments Boom and Accessories							
Boom, fast water, 50' ea.c/w ASTM conectors Versat	1	8					
Handline Bridles	1	25					
Towing Bridles	1	4					
Towing Paravanes	1	1					
Handline Ropes (25' - blue)	1	9					
Handline Ropes (50' - yellow)	1	10					
Handline Ropes (100' - green)	1	11					
Handline Ropes (150' - red)	1	4					
Rope, 500'	1	2					
Sarca Anchor	1	1					

Category	Standard	Quantity	Description	Tag #	Serial #	Model #	Manufacturer
Fittings and Camlocks							
Bushings 3"x2"	1	2					
Swedge, 3"x2"	1	0					
Kamlok 2" Female	1	4					
Kamlok, 2" Male	1	2					
Kamlok, 3" Male	1	4					
Kamlok, 3" Female	1	2					
Kamlok, 3"x2"	1	1					
Kamlok, 300B	1	1					
Kamlok, 300D	1	0					
Kamlok, 300F	1	1					
Kamlok Gasket, 2"	1	10					
Kamlok Gasket, 3"	1	10					

Category	Standard	Quantity	Description	Tag #	Serial #	Model #	Manufacturer
Hand Tools							
Axes	1	2					
Brooms (straw)	1	1					
Crowbar, pinch point,	1	1					
Pitch Forks	1	2					
Post pounder, pipe	1	1					
Post Pounder, striking plate	1	1					
Rakes	1	4					
Shovel - Scoop	1	2					
Shovel - Spade	1	4					
Sledge Hammer	1	2					
Squeegees	1	2					
Tool Kit, Westward	1	1					
73 piece							
Pipe Wrench 18"	1	1					
Pipe Wrench 24"	1	1					

Category	Standard	Quantity	Description	Tag #	Serial #	Model #	Manufacturer
Hose and Accessories							
Discharge Hose 3" x 50' c/w Kamlok	1	4					
Hose Float, aluminum	1	1					
Manifold hose c/w valves & camlocks	1	1					
Suction Hose (2" x	1	2					
Suction Hose (3" x	1	11					
Discharge Hose 2"x20	1	2					

Category	Standard	Quantity	Description	Tag #	Serial #	Model #	Manufacturer
Miscellaneous							
Electrical Cord, 100'	1	2					

	30Amp						
	500W lights	1	4				
	Chicken Wire rolls	1	3				
	Flagging tape rolls, 4 color	1	7				
	Garbage Bags, 30 per box	1	1				
	Garbage Cans	1	0				
	Gas Cans 20 litre	1	0				
	Generator - Honda	1	1		ES 6500		Honda
	Light stands	1	2				
	Porta Tank and Liner	1	1	There are 2 liners			
	Sorbent Booms, 4 booms per package	1	2				
	Sorbent Pads, 100 per kkg.	1	4	and a half			
	Sorbent Rolls	1	2				
	Tie Wire rolls	1	1				
	Vehicle reflector kit	1	1				
	pails	1	2				
	Pennant Carlot	1	10				
	Holographic Scare Tape (roll)	1	10				
	Zon Gun	1	1				
Category	Standard	Quantity	Descripti on	Tag #	Serial #	Model #	Manufacturer
Personal Protective Clothing							
	Chest Waders, c/w steel toe	1	7				
	Face shields	1	2				
	Gloves, Leather	1	20				
	Gloves, Oil resistant rubber	1	12				
	Goggles	1	8				
	Hearing protectors,	1	1				
	Rainsuits, Fire retardant - Jacket &	1	6				
	Safety vests, no titles	1	3				
	Safety Vest w/titles	1	8				
Category	Standard	Quantity	Descripti on	Tag #	Serial #	Model #	Manufacturer
Pumps and Power Equipment							
	Trash Pump - Honda 3" c/w ball valve & camlocks	1	1		G300-22458	G200	
	Trash pump 3"	1	1		WABJ-1153982	WT30X	Honda
Category	Standard	Quantity	Descripti on	Tag #	Serial #	Model #	Manufacturer
Safety Equipment							
	Barrier Tape, 1000' per roll	1	2				

	Fire Extinguishers	1	1					
	ABC 30 lbs & mounting bracket							
	First Aid Kits (10	1	1					
	Flashlight, X proof	1	4					
	PFD's	1	10					
	Posts, T type, 6' each	1	15					
	Safety Harness	1	5					
	Signs (hard hat area)	1	9					
	Signs (no smoking)	1	5					
	Traffic Cones	1	6					
	Windsock, large c/w stand	1	1					
	Windsock, small	1	1					
Category	Standard	Quantity	Description	Tag #	Serial #	Model #	Manufacturer	
Signage								
	Equipment ID charts	1		4				
Category	Standard	Quantity	Description	Tag #	Serial #	Model #	Manufacturer	
Skimmers								
	Pedco Skimmer (2')	1		1				

Appendix D: MSDS Sheets

Safety Data Sheet



SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Chevron Hydraulic Oil 5606A

Product Use: Hydraulic Oil
Product Number(s): 247707
Company Identification
Chevron Canada Limited
1050 West Pender
Vancouver, BC V6E 3T4
Canada
www.chevronlubricants.com

Transportation Emergency Response

CHEMTREC: (800) 424-9300 or (703) 527-3887

Health Emergency

Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623

Product Information

email : lubemsds@chevron.com
Product Information: (800) LUBE TEK

SECTION 2 HAZARDS IDENTIFICATION

CLASSIFICATION: Flammable liquid: Category 4. Aspiration toxicant: Category 1. Acute aquatic toxicant: Category 3. Chronic aquatic toxicant: Category 3.



Signal Word: Danger

Physical Hazards: Combustible liquid (H227).

Health Hazards: May be fatal if swallowed and enters airways (H304).

Environmental Hazards: Harmful to aquatic life with long lasting effects (H412).

PRECAUTIONARY STATEMENTS:

Prevention: Keep away from heat, sparks, open flames and other ignition sources. No smoking (P210). Avoid release to the environment (P273). Wear protective gloves/protective clothing/eye protection/face protection (P280).

Response: IF SWALLOWED: Immediately call a POISON CENTER/doctor (P301+P310). Do NOT induce vomiting (P331). In case of fire: Use media specified in the SDS to extinguish (P370+P378).

Storage: Store locked up (P405). Store in a well-ventilated place (P403).

Disposal: Dispose of contents/container in accordance with applicable local/regional/national/international regulations (P501).

SECTION 3 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Distillates, hydrotreated light	64742-47-8	70 - 80 %weight
Highly refined mineral oil (C15 - C50)	Mixture	10 - 20 %weight

Information on ingredients that are considered Controlled Products and/or that appear on the WHMIS Ingredient Disclosure List (IDL) is provided as required by the Canadian Hazardous Products Act (HPA, Sections 13 and 14). Ingredients considered hazardous under the OSHA Hazard Communication Standard, 29 CFR 1910.1200, are also listed. See Section 15 for additional regulatory information.

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.

Skin: Wash skin with water immediately and remove contaminated clothing and shoes. Get medical attention if any symptoms develop. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.

Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.

Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

Most important symptoms and effects, both acute and delayed

IMMEDIATE HEALTH EFFECTS

Eye: Not expected to cause prolonged or significant eye irritation.

Skin: Skin contact may cause drying or defatting of the skin. Contact with the skin is not expected to cause an allergic skin response. Symptoms may include pain, itching, discoloration, swelling, and blistering. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.

Ingestion: Highly toxic; may be fatal if swallowed. Because of its low viscosity, this material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death.

Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

Indication of any immediate medical attention and special treatment needed

Note to Physicians: Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis. In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Unusual Fire Hazards: Leaks/ruptures in high pressure system using materials of this type can create a fire hazard when in the vicinity of ignition sources (eg. open flame, pilot lights, sparks, or electric arcs). See Section 7 for proper handling and storage.

PROTECTION OF FIRE FIGHTERS:

Fire Fighting Instructions: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds

will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in the vicinity of the spill or released vapor. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator.

Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.

Reporting: Report spills to local authorities as appropriate or required.

SECTION 7 HANDLING AND STORAGE

General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.

Precautionary Measures: Liquid evaporates and forms vapor (fumes) which can catch fire and burn with explosive force. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 29C (85F).

DO NOT USE IN HIGH PRESSURE SYSTEMS in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Wash thoroughly after handling.

Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures.

Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

General Storage Information: DO NOT USE OR STORE near heat, sparks, flames, or hot surfaces. USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:

Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT

Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.

Skin Protection: Wear protective clothing to prevent skin contact. Selection of protective clothing may include gloves, apron, boots, and complete facial protection depending on operations conducted.

Suggested materials for protective gloves include: 4H (PE/EVAL), Nitrile Rubber, Silver Shield, Viton.

Respiratory Protection: No respiratory protection is normally required. Air-Purifying Respirator for Organic Vapors.

If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge. Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Country/ Agency	TWA	STEL	Ceiling	Notation
Distillates, hydrotreated light	ACGIH	200 mg/m3	--	--	Skin A3
Highly refined mineral oil (C15 - C50)	ACGIH	5 mg/m3	10 mg/m3	--	--

NOTE ON OCCUPATIONAL EXPOSURE LIMITS: Consult local authorities for acceptable provincial values in Canada. Consult the Canadian Standards Association Standard Z94.4-2011 Selection, Use and Care of Respirators.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Red

Physical State: Liquid

Odor: Petroleum odor

Odor Threshold: No data available
pH: Not Applicable
Vapor Pressure: <0.01 mmHg (Estimated) @ 37.8 °C (100 °F)
Vapor Density (Air = 1): >4
Initial Boiling Point: 207.2°C (405°F)
Solubility: Soluble in hydrocarbons; insoluble in water
Freezing Point: Not Applicable
Melting Point: No data available
Specific Gravity: 0.86 - 0.90 @ 15°C (59°F)
Density: 0.86 kg/l - 0.90 kg/l @ 15°C (59°F)
Viscosity: 13.20 mm²/s @ 40°C (104°F) Minimum
Coefficient of Therm. Expansion / °F: Not Applicable
Evaporation Rate: No data available
Decomposition temperature: No data available
Octanol/Water Partition Coefficient: No data available

FLAMMABLE PROPERTIES:

Flammability (solid, gas): No Data Available

Flashpoint: (Cleveland Open Cup) 80 °C (176 °F) Minimum

Autoignition: No data available

Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

SECTION 10 STABILITY AND REACTIVITY

Reactivity: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Incompatibility With Other Materials: Not applicable

Hazardous Decomposition Products: None known (None expected)

Hazardous Polymerization: Hazardous polymerization will not occur.

Sensitivity to Mechanical Impact: No.

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Serious Eye Damage/Irritation: The eye irritation hazard is based on evaluation of data for product components.

Skin Corrosion/Irritation: The skin irritation hazard is based on evaluation of data for product components.

Skin Sensitization: The skin sensitization hazard is based on evaluation of data for product components.

Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for product components.

Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for product components.

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for product components. For additional information on the acute toxicity of the components, call the technical information center.

Acute Toxicity Estimate: Not Determined

Germ Cell Mutagenicity: The hazard evaluation is based on data for components or a similar material.

Carcinogenicity: The hazard evaluation is based on data for components or a similar material.

Reproductive Toxicity: The hazard evaluation is based on data for components or a similar material.

Specific Target Organ Toxicity - Single Exposure: The hazard evaluation is based on data for components or a similar material.

Specific Target Organ Toxicity - Repeated Exposure: The hazard evaluation is based on data for components or a similar material.

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B).

These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY

This material is expected to be harmful to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

The product has not been tested. The statement has been derived from the properties of the individual components.

MOBILITY

No data available.

PERSISTENCE AND DEGRADABILITY

This material is not expected to be readily biodegradable. The product has not been tested. The statement

has been derived from the properties of the individual components.

POTENTIAL TO BIOACCUMULATE

Bioconcentration Factor: No data available.

Octanol/Water Partition Coefficient: No data available

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods. (See B.C. Reg. GY/92 Waste Management Act; R.R.O. 1990, Reg. 347 General-Waste Management; C.C.S.M.c. W40 The Waste Reduction and Prevention Act; N.S. Reg. 51/95 and N.S. Reg. 179/96 for examples of Provincial legislation.)

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

TC Shipping Description: NOT REGULATED AS DANGEROUS GOODS UNDER TRANSPORT CANADA

IMO/IMDG Shipping Description: NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORTATION UNDER THE IMDG CODE

ICAO/IATA Shipping Description: NOT REGULATED AS DANGEROUS GOODS UNDER THE ICAO TI / IATA DGR CODE

DOT Shipping Description: UN1268, PETROLEUM PRODUCTS, N.O.S., COMBUSTIBLE LIQUID, III ;
ADDITIONAL INFORMATION: NON-BULK PACKAGES ARE NOT REGULATED IN THE USA. SEE
173.150 (F) FOR SPECIAL PROVISIONS FOR VESSEL AND AIRCRAFT

SECTION 15 REGULATORY INFORMATION

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

No components of this material were found on the regulatory lists above.

CHEMICAL INVENTORIES:

All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

SECTION 16 OTHER INFORMATION

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 1-16

Revision Date: FEBRUARY 11, 2016

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
GHS - Globally Harmonized System	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Governmental Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	SDS - Safety Data Sheet
WHMIS - Workplace Hazardous Materials Information System	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration
NCCL - New Chemical Exposure Limit	EPA - Environmental Protection Agency
SCBA - Self-Contained Breathing Apparatus	

Prepared according to WHMIS 2015 by Chevron Energy Technology Company, 6001 Bollinger Canyon Road San Ramon, CA 94583.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

SAFETY DATA SHEET

SECTION 1 IDENTIFICATION

PRODUCT

Product Name: COMMERCIAL PROPANE (ODORIZED)

Product Description: Liquefied Hydrocarbon Gas, Gas or Liquefied Gas

SDS Number: 8515

Intended Use: Fuel gas

COMPANY IDENTIFICATION

Supplier: Imperial Oil Downstream
P.O. Box 2480, Station M
Calgary, ALBERTA T2P 3M9 Canada

24 Hour Emergency Telephone 1-866-232-9563
Transportation Emergency Phone Number 1-866-232-9563
Product Technical Information 1-800-268-3183
Supplier General Contact 1-800-567-3776

SECTION 2 HAZARD IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines.

This product has been classified in accordance with hazard criteria of the Hazardous Products Regulations (HPR) SOR/2015-17 and the SDS contains all the information required by the HPR SOR/2015-17.

CLASSIFICATION:

Flammable Gases — Category 1
Gases Under Pressure — Liquefied Gas
Simple Asphyxiants — Category 1

LABEL:

Pictogram:



Signal Word: Danger

Hazard Statements:

H220: Extremely flammable gas. H280: Contains gas under pressure; may explode if heated.

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May displace oxygen and cause rapid suffocation.

Precautionary Statements:

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P273: Avoid release to the environment. P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. P381: In case of leakage, eliminate all ignition sources. P410 + P403: Protect from sunlight. Store in a well-ventilated place. P501: Dispose of contents and container in accordance with local regulations.

Other hazard information:

Health Hazards Not Otherwise Classified: None as defined under HPR SOR/2015-17.

Physical Hazards Not Otherwise Classified: None as defined under HPR SOR/2015-17.

PHYSICAL / CHEMICAL HAZARDS

Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. Frostbite hazard - rapidly expanding gas or liquid may cause frostbite. Material can accumulate static charges which may cause an ignition. Material can release vapours that readily form flammable mixtures. Vapour accumulation could flash and/or explode if ignited.

HEALTH HAZARDS

High-pressure injection under skin may cause serious damage. Continued exposure to odorised gas may reduce or eliminate ability to smell the odorant. People with impaired ability to detect odour due to colds, allergies, injuries etc must be especially cautious. Odour must not be used exclusively as a safety measure. Proper respiratory protection and fire/explosion precautions should be utilised when odour is first detected. Exposure to concentrations above 10% of the LEL may cause a general central nervous system (CNS) depression typical of anesthetic gases or intoxicants. Excessive exposure may result in eye, skin, or respiratory irritation.

ENVIRONMENTAL HAZARDS

Expected to be harmful to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

NFPA Hazard ID:	Health: 1	Flammability: 4	Reactivity: 0
HMIS Hazard ID:	Health: 1	Flammability: 4	Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

Hazardous Substance(s) or Complex Substance(s) in Hazardous product

Name	CAS#	Concentration*	GHS Hazard Codes
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Product Name: COMMERCIAL PROPANE (ODORIZED)
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ALKANES, C4	68513-65-5	0 - 2.5%	H220
ETHANE	74-84-0	0 - 5%	H220, H280, H402
ETHYL MERCAPTAN	75-08-1	0.5%	H225, H332, H400(M factor 1), H410(M factor 1)
ISOBUTANE	75-28-5	0 - 2.5%	H220, H280
PROPANE	74-98-6	90 - 99%	H220, H280
PROPYLENE	115-07-1	1 - 10%	H220, H280, H402

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 4 FIRST-AID MEASURES

INHALATION

Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device.

SKIN CONTACT

If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury. If frostbite occurs, immerse involved area in water at body temperature. Keep immersed for 20 to 40 minutes. Seek medical assistance.

EYE CONTACT

Flush thoroughly with water for at least 15 minutes. Get medical assistance.

INGESTION

Not Applicable

NOTE TO PHYSICIAN

This material, or a component, may be associated with cardiac sensitization following very high exposures (well above occupational exposure limits) or with concurrent exposure to high stress levels or heart-stimulating substances like epinephrine. Administration of such substances should be avoided.

SECTION 5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Inappropriate Extinguishing Media: Straight streams of water

FIRE FIGHTING

Fire Fighting Instructions: Allow the fire to burn under controlled conditions. Stop leak if you can do so without risk. Evacuate area. If a leak or spill has not ignited, use water spray to disperse the vapours and to protect personnel attempting to stop a leak. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Fire-fighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Flammable Gas. Vapour is flammable and heavier than air. Vapour may travel across the ground and reach remote ignition sources, causing a flashback fire danger. Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: -103°C (-153°F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 2.4 UEL: 9.5

Autoignition Temperature: 432°C (810°F)

SECTION 6

ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required, due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: half-face or full-face respirator with filter(s) for organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of the spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that provide chemical resistance and, when necessary, heat-resistance and/or thermal insulation are recommended. Note: gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Small spills: normal work clothes are usually adequate. Large spills: full body suit of chemical and thermal resistant material is recommended. Chemical goggles and face shield are recommended if contact with liquefied gas is possible.

SPILL MANAGEMENT

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning. Allow liquid to evaporate from the surface. All equipment used when handling the product must be grounded. Do not direct water at spill or source of leak. Do not touch or walk through spilled material. If possible, turn leaking containers so that gas escapes rather than liquid. Isolate area until gas has dispersed. Prevent spreading of vapour through sewers, ventilation systems and confined areas. Use water spray to reduce vapour or divert vapour cloud drift. Avoid allowing water run-off to contact spilled material.

Water Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Allow liquid to evaporate from the surface. See Land Spill section of the SDS for advice on gases.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction

and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent exposure to ignition sources, for example use non-sparking tools and explosion-proof equipment. Ethyl mercaptan is added to gas as an odorant to aid in the detection of the gas in case of leak or accidental discharge. Since ethyl mercaptan is reactive, a reduction in its effectiveness may occur during transport and storage of the odorised gas. Therefore, odour must not be used exclusively as a safety measure. Handle gas with strict adherence to established safety procedures. Use proper bonding and/or earthing procedures. However, bonding and earthing may not eliminate the hazard from static accumulation. Material can accumulate static charges which may cause an electrical spark (ignition source).

Static Accumulator: This material is a static accumulator.

STORAGE

Ample fire water supply should be available. A fixed sprinkler/deluge system is recommended. The type of container used to store the material may affect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Outside or detached storage preferred. Storage containers should be earthed and bonded.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Substance Name	Form	Limit/Standard			Note	Source
ETHYL MERCAPTAN		TWA	0.5 ppm			ACGIH
ISOBUTANE		STEL	1000 ppm			ACGIH
PROPYLENE		TWA	500 ppm			ACGIH

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Use explosion-proof ventilation equipment to stay below exposure limits.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use

with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapour warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

Thermally protective, chemical resistant gloves are recommended. If contact with forearms is likely, wear gauntlet-style gloves.

Eye Protection: Face shield is recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

Thermally protective and chemical resistant apron and long sleeves are recommended when volume of material is significant.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practise good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9

PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Gas
Form: Liquefied
Colour: Colourless
Odour: Mercaptan
Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

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Relative Density (at 15 °C): 0.51
Flammability (Solid, Gas): Flammable - Category 1
Flash Point [Method]: -103°C (-153°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 2.4 UEL: 9.5
Autoignition Temperature: 432°C (810°F)
Boiling Point / Range: -42°C (-44°F)
Decomposition Temperature: N/D
Vapour Density (Air = 1): 1.5 at 101 kPa
Vapour Pressure: 850 kPa (6375 mm Hg) at 20°C
Evaporation Rate (n-butyl acetate = 1): > 1
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): N/A
Solubility in Water: Negligible
Viscosity: [N/D at 40°C] | 0.5 cSt (0.5 mm²/sec) at 15°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: >-187°C (-305°F)

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Avoid heat, sparks, open flames and other ignition sources.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

INFORMATION ON TOXICOLOGICAL EFFECTS

Hazard Class	Conclusion / Remarks
Inhalation	
Acute Toxicity: (Rat) 15 minute(s) LC50 1443 mg/l	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 403
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Acute Toxicity: No end point data for material.	Not applicable.
Skin	
Acute Toxicity: No end point data for material.	Not applicable.
Skin Corrosion/Irritation: No end point data for material.	Negligible irritation to skin at ambient temperatures.

Product Name: COMMERCIAL PROPANE (ODORIZED)
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Eye	
Serious Eye Damage/Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes.
Sensitisation	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: No end point data for material.	Not expected to be a skin sensitizer.
Aspiration: No end point data for material.	Not expected to be an aspiration hazard. Based on physico-chemical properties of the material.
Germ Cell Mutagenicity: Data available.	Not expected to be a germ cell mutagen. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 471 473 474
Carcinogenicity: No end point data for material.	Not expected to cause cancer.
Reproductive Toxicity: Data available.	Not expected to be a reproductive toxicant. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 422
Lactation: No end point data for material.	Not expected to cause harm to breast-fed children.
Specific Target Organ Toxicity (STOT)	
Single Exposure: No end point data for material.	Not expected to cause organ damage from a single exposure.
Repeated Exposure: Data available.	Not expected to cause organ damage from prolonged or repeated exposure. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 412 413 422

TOXICITY FOR SUBSTANCES

NAME	ACUTE TOXICITY
ETHYL MERCAPTAN	Dermal Lethality: LD50 > 2000 mg/kg (Rat); Inhalation Lethality: 4 hour(s) LC50 > 2.52 mg/l (Vapour) (Rat); Oral Lethality: LD 50 682 mg/kg (Rat)

OTHER INFORMATION

For the product itself:

May cause central nervous system disorder (e.g., narcosis involving a loss of coordination, weakness, fatigue, mental confusion and blurred vision) and/or damage. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite (cold burn). Exposure to this material, or one of its components, in situations where there is the potential for high levels, such as in confined spaces or with abuse, may result in abnormal heart rhythm (arrhythmia). High-level exposure to hydrocarbons (above occupational exposure limits) may initiate arrhythmia in a worker that is undergoing stress or is taking a heart-stimulating substance such as epinephrine, a nasal decongestant, or an asthma or cardiovascular drug. Simple asphyxiant: Acts by displacing oxygen in the lungs thereby diminishing the supply of oxygen available to the blood and tissues. Symptoms include shortness of breath, rapid heart rate, incoordination, lethargy, headaches, nausea, vomiting, and disorientation. Continued lack of oxygen may result in convulsions, loss of consciousness and death. Since exercise increases the tissue need for oxygen, symptoms will occur more quickly during exertion in an oxygen-deficient environment. Oxygen in enclosed spaces should be maintained at 21 percent by volume.

CMR Status: None.

Chemical Name	CAS Number	List Citations
ISOBUTANE	75-28-5	4
PROPYLENE	115-07-1	4

--REGULATORY LISTS SEARCHED--

1 = IARC 1
2 = IARC 2A

3 = IARC 2B
4 = ACGIH ALL

5 = ACGIH A1
6 = ACGIH A2

SECTION 12	ECOLOGICAL INFORMATION
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The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Expected to be harmful to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

MOBILITY

Material -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be inherently biodegradable

Atmospheric Oxidation:

Material -- Expected to degrade at a moderate rate in air

BIOACCUMULATION POTENTIAL

Material -- Potential to bioaccumulate is low.

SECTION 13	DISPOSAL CONSIDERATIONS
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Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14

TRANSPORT INFORMATION

LAND (TDG)

Proper Shipping Name: LIQUEFIED PETROLEUM GASES
Hazard Class & Division: 2.1
UN Number: 1075
Packing Group: (N/A)

LAND (DOT)

Proper Shipping Name: PETROLEUM GASES, LIQUEFIED
Hazard Class & Division: 2.1
ID Number: 1075
Packing Group: (N/A)
ERG Number: 115
Label(s): 2.1
Transport Document Name: UN1075, PETROLEUM GASES, LIQUEFIED, 2.1

SEA (IMDG)

Proper Shipping Name: PETROLEUM GASES, LIQUEFIED
Hazard Class & Division: 2.1
EMS Number: F-D, S-U
UN Number: 1075
Packing Group: (N/A)
Marine Pollutant: No
Label(s): 2.1
Transport Document Name: UN1075, PETROLEUM GASES, LIQUEFIED, 2.1 (-103°C c.c.)

AIR (IATA)

Proper Shipping Name: PETROLEUM GASES, LIQUEFIED
Hazard Class & Division: 2.1
UN Number: 1075
Packing Group: (N/A)
Label(s) / Mark(s): 2.1
Transportation Limitations: CARGO AIRCRAFT ONLY
Transport Document Name: UN1075, PETROLEUM GASES, LIQUEFIED, 2.1

SECTION 15

REGULATORY INFORMATION

WHMIS Classification: Class A: Compressed Gas Class B, Division 1: Flammable Gases



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CEPA: All components of this product are either on the Domestic Substance List (DSL) or are exempt.

Listed or exempt from listing/notification on the following chemical inventories: AICS, DSL, ENCS, IECSC, KECI, PICCS, TSCA

The Following Ingredients are Cited on the Lists Below:

Chemical Name	CAS Number	List Citations
ISOBUTANE	75-28-5	6
PROPANE	74-98-6	6
PROPYLENE	115-07-1	6

--REGULATORY LISTS SEARCHED--

1 = TSCA 4
2 = TSCA 5a2

3 = TSCA 5e
4 = TSCA 6

5 = TSCA 12b
6 = NPRI

SECTION 16	OTHER INFORMATION
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N/D = Not determined, N/A = Not applicable

KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):

H220: Extremely flammable gas; Flammable Gas, Cat 1
H225: Highly flammable liquid and vapor; Flammable Liquid, Cat 2
H280: Contains gas under pressure; may explode if heated; Pressurized Gas
H332: Harmful if inhaled; Acute Tox Inh, Cat 4
H400: Very toxic to aquatic life; Acute Env Tox, Cat 1
H402: Harmful to aquatic life; Acute Env Tox, Cat 3
H410: Very toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 1

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Updates made in accordance with implementation of GHS requirements.

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DGN: 5007473 (1010550)

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SAFETY DATA SHEET

DIESEL FUEL

000003000395



Version 4.2

Revision Date 2018/09/12

Print Date 2018/09/12

SECTION 1. IDENTIFICATION

Product name : DIESEL FUEL

Synonyms : Seasonal Diesel, #1 Diesel, #2 Heating Oil, #1 Heating Oil, D50, Arctic Diesel, Farm Diesel, Marine Diesel, Low Sulphur Diesel, LSD, Ultra Low Sulphur Diesel, ULSD, Mining Diesel, Naval Distillate, Dyed Diesel, Marked Diesel, Coloured Diesel, Furnace special, Biodiesel blend, B1, B2, B5, Diesel Low Cloud (LC), Marine Gas Oil, Marine Gas Oil Dyed.

Product code : 102907, 102762, 102763, 102755, 102302, 102744, 101801, 100678, 100677, 101802, 100107, 100668, 100658, 100911, 100663, 100652, 100460, 100065, 101796, 101793, 101795, 101792, 101794, 101791, 100768, 100643, 100642, 100103, 101798, 101800, 101797, 101788, 101789, 101787, 102531, 100734, 100733, 100640, 100997, 100995, 100732, 100731, 100994

Manufacturer or supplier's details
Petro-Canada
P.O. Box 2844, 150 - 6th Avenue South-West
Calgary Alberta T2P 3E3
Canada

Emergency telephone number
Suncor Energy: +1 403-296-3000;
Canutec Transportation: 1-888-226-8832 (toll-free) or 613-996-6666;
Poison Control Centre: Consult local telephone directory for emergency number(s).

Recommended use of the chemical and restrictions on use

Recommended use : Diesel fuels are distillate fuels suitable for use in high and medium speed internal combustion engines of the compression ignition type. Mining diesels, marine diesels, MDO and naval distillates may have a higher flash point requirement.

Prepared by : Product Safety: +1 905-804-4752

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance	Bright oily liquid.
Colour	Clear to yellow (This product may be dyed red for taxation purposes)
Odour	Mild petroleum oil like.

GHS Classification

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Flammable liquids	: Category 3
Acute toxicity (Inhalation)	: Category 4
Skin irritation	: Category 2
Carcinogenicity	: Category 2
Specific target organ toxicity - single exposure	: Category 3 (Central nervous system)
Specific target organ toxicity - repeated exposure	: Category 2 (Liver, thymus, Bone)
Aspiration hazard	: Category 1

GHS label elements

Hazard pictograms



Signal word : Danger

Hazard statements : Flammable liquid and vapour.
May be fatal if swallowed and enters airways.
Causes skin irritation.
Harmful if inhaled.
May cause drowsiness or dizziness.
Suspected of causing cancer.
May cause damage to organs (Liver, thymus, Bone) through prolonged or repeated exposure.

Precautionary statements : **Prevention:**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Keep container tightly closed.
Ground and bond container and receiving equipment.
Use explosion-proof electrical/ ventilating/ lighting equipment.
Use non-sparking tools.
Take action to prevent static discharges.
Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
Wash skin thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
IF SWALLOWED: Immediately call a POISON CENTER/doctor.
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.

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IF exposed or concerned: Get medical advice/ attention.
Do NOT induce vomiting.
If skin irritation occurs: Get medical advice/ attention.
Take off contaminated clothing and wash it before reuse.
In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Storage:

Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal:

Dispose of contents/ container to an approved waste disposal plant.

Potential Health Effects

Primary Routes of Entry

: Eye contact
Ingestion
Inhalation
Skin contact
Skin Absorption

Target Organs

: Skin
Eyes
Respiratory Tract

Inhalation

: May cause respiratory tract irritation.
Inhalation may cause central nervous system effects.
Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.

Skin

: Causes skin irritation.

Eyes

: Causes eye irritation.

Ingestion

: Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.
Aspiration hazard if swallowed - can enter lungs and cause damage.

Aggravated Medical Condition

: None known.

Other hazards

None known.

IARC

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH

Confirmed animal carcinogen with unknown relevance to humans

Fuel Oil No. 1

8008-20-6

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SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

Chemical name	CAS-No.	Concentration
fuels, diesel	68334-30-5	70 - 100 %
kerosine (petroleum)	8008-20-6	
kerosine (petroleum), hydrodesulfurized	64742-81-0	
Alkanes, C10-20-branched and linear	928771-01-1	0 - 25 %
Soybean oil, Methyl ester	67784-80-9	0 - 5 %
Rape oil, Methyl ester	73891-99-3	
Fatty acids, tallow, Methyl esters	61788-61-2	

SECTION 4. FIRST AID MEASURES

- If inhaled : Move to fresh air.
Artificial respiration and/or oxygen may be necessary.
Seek medical advice.
- In case of 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 recognized skin cleanser.
Wash clothing before reuse.
Seek medical advice.
- In case of eye contact : Remove contact lenses.
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Obtain medical attention.
- If swallowed : Rinse mouth with water.
DO NOT induce vomiting unless directed to do so by a physician or poison control center.
Never give anything by mouth to an unconscious person.
Seek medical advice.
- Most important symptoms and effects, both acute and delayed : None known.
- Protection of first-aiders : First Aid responders should pay attention to self-protection and use the recommended protective clothing
It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

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SECTION 5. FIREFIGHTING MEASURES

- | | |
|---|---|
| Suitable extinguishing media | : Dry chemical
Carbon dioxide (CO ₂)
Water fog.
Foam |
| Unsuitable extinguishing media | : Do NOT use water jet. |
| Specific hazards during fire-fighting | : Cool closed containers exposed to fire with water spray. |
| Hazardous combustion products | : Carbon oxides (CO, CO ₂), nitrogen oxides (NO _x), sulphur oxides (SO _x), sulphur compounds (H ₂ S), smoke and irritating vapours as products of incomplete combustion. |
| Further information | : Prevent fire extinguishing water from contaminating surface water or the ground water system. |
| Special protective equipment for firefighters | : Wear self-contained breathing apparatus for firefighting if necessary. |

SECTION 6. ACCIDENTAL RELEASE MEASURES

- | | |
|---|---|
| Personal precautions, protective equipment and emergency procedures | : Use personal protective equipment.
Ensure adequate ventilation.
Evacuate personnel to safe areas.
Material can create slippery conditions. |
| Environmental precautions | : If the product contaminates rivers and lakes or drains inform respective authorities. |
| Methods and materials for containment and cleaning up | : Prevent further leakage or spillage if safe to do so.
Remove all sources of ignition.
Soak up with inert absorbent material.
Non-sparking tools should be used.
Ensure adequate ventilation.
Contact the proper local authorities. |

SECTION 7. HANDLING AND STORAGE

- | | |
|-------------------------|--|
| Advice on safe handling | : For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.
Use only with adequate ventilation.
In case of insufficient ventilation, wear suitable respiratory equipment.
Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity.
Avoid contact with skin, eyes and clothing.
Do not ingest. |
|-------------------------|--|

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Keep away from heat and sources of ignition.
Keep container closed when not in use.

Conditions for safe storage : Store in original container.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Keep in a dry, cool and well-ventilated place.
Keep in properly labelled containers.
To maintain product quality, do not store in heat or direct sunlight.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
kerosine (petroleum), hydrodesulfurized	64742-81-0	TWA	200 mg/m ³ (As total hydrocarbon vapour)	ACGIH
		TWA	200 mg/m ³ (As total hydrocarbon vapour)	ACGIH
kerosine (petroleum)	8008-20-6	TWA	200 mg/m ³ (total hydrocarbon vapor)	CA BC OEL
		TWA	200 mg/m ³ (total hydrocarbon vapor)	CA AB OEL
		TWA	200 mg/m ³ (total hydrocarbon vapor)	ACGIH

Engineering measures : Use only in well-ventilated areas.
Ensure that eyewash station and safety shower are proximal to the work-station location.

Personal protective equipment

Respiratory protection : Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. 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.

Filter type : 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.

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Hand protection	
Material	: neoprene, nitrile, polyvinyl alcohol (PVA), Viton(R). 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.
Remarks	: 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.
Eye protection	: Wear face-shield and protective suit for abnormal processing problems.
Skin and body protection	: Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.
Protective measures	: Wash contaminated clothing before re-use.
Hygiene measures	: Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash face, hands and any exposed skin thoroughly after handling.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Bright oily liquid.
Colour	: Clear to yellow (This product may be dyed red for taxation purposes)
Odour	: Mild petroleum oil like.
Odour Threshold	: No data available
pH	: No data available
Pour point	: No data available
Boiling point/boiling range	: 150 - 371 °C (302 - 700 °F)
Flash point	: > 40 °C (104 °F) Method: closed cup
Auto-Ignition Temperature	: 225 °C (437 °F)
Evaporation rate	: No data available
Flammability	: Flammable in presence of open flames, sparks and heat. Va-

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	pours are heavier than air and may travel considerable distance to sources of ignition and flash back. This product can accumulate static charge and ignite.
Upper explosion limit	: 6 %(V)
Lower explosion limit	: 0.7 %(V)
Vapour pressure	: 7.5 mmHg (20 °C / 68 °F)
Relative vapour density	: 4.5
Relative density	: 0.8 - 0.88
Solubility(ies)	
Water solubility	: insoluble
Partition coefficient: n-octanol/water	: No data available
Viscosity	
Viscosity, kinematic	: 1.3 - 4.1 cSt (40 °C / 104 °F)
Explosive properties	: Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Runoff to sewer may create fire or explosion hazard.

SECTION 10. STABILITY AND REACTIVITY

Possibility of hazardous reactions	: Hazardous polymerisation does not occur. Stable under normal conditions.
Conditions to avoid	: Extremes of temperature and direct sunlight.
Incompatible materials	: Reactive with oxidising agents and acids.
Hazardous decomposition products	: May release COx, NOx, SOx, H2S, smoke and irritating vapours when heated to decomposition.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Eye contact
Ingestion
Inhalation
Skin contact
Skin Absorption

Acute toxicity

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Product:

Acute oral toxicity : Remarks: No data available

Acute inhalation toxicity : Remarks: No data available

Acute dermal toxicity : Assessment: The substance or mixture has no acute dermal toxicity
Remarks: No data available

Components:

fuels, diesel:

Acute oral toxicity : LD50 (Rat): 7,500 mg/kg,

Acute dermal toxicity : LD50 (Mouse): 24,500 mg/kg,

kerosine (petroleum):

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg,

Acute inhalation toxicity : LC50 (Rat): > 5 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist

Acute dermal toxicity : LD50 (Rabbit): > 2,000 mg/kg,

kerosine (petroleum), hydrodesulfurized:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg,

Acute inhalation toxicity : LC50 (Rat): > 5.2 mg/l
Exposure time: 4 hrs
Test atmosphere: dust/mist

Acute dermal toxicity : LD50 (Rabbit): > 2,000 mg/kg,

Skin corrosion/irritation

Product:

Remarks: No data available

Serious eye damage/eye irritation

Product:

Remarks: No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

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No data available

Reproductive toxicity

No data available

STOT - single exposure

No data available

STOT - repeated exposure

No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Toxicity to fish :
Remarks: No data available

Toxicity to daphnia and other :
aquatic invertebrates Remarks: No data available

Toxicity to algae :
Remarks: No data available

Toxicity to bacteria : Remarks: No data available

Persistence and degradability

Product:

Biodegradability : Remarks: No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : The product should not be allowed to enter drains, water courses or the soil.
Offer surplus and non-recyclable solutions to a licensed disposal company.
Waste must be classified and labelled prior to recycling or disposal.
Send to a licensed waste management company.

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Dispose of as hazardous waste in compliance with local and national regulations.
Dispose of product residue in accordance with the instructions of the person responsible for waste disposal.

Contaminated packaging : Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No. : UN 1202
Proper shipping name : Diesel fuel
Class : 3
Packing group : III
Labels : Class 3 - Flammable Liquid
Packing instruction (cargo aircraft) : 366

IMDG-Code

UN number : UN 1202
Proper shipping name : DIESEL FUEL

Class : 3
Packing group : III
Labels : 3
EmS Code : F-E, S-E
Marine pollutant : no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

National Regulations

TDG

UN number : UN 1202
Proper shipping name : DIESEL FUEL

Class : 3
Packing group : III
Labels : 3
ERG Code : 128
Marine pollutant : no

SECTION 15. REGULATORY INFORMATION

This product has been classified according to the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all of the information required by the HPR.

The components of this product are reported in the following inventories:

DSL : On the inventory, or in compliance with the inventory

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TSCA

All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.

EINECS

On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION

For Copy of SDS

: Internet: www.petro-canada.ca/msds
Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228
For Product Safety Information: 1 905-804-4752

Prepared by

: Product Safety: +1 905-804-4752

Revision Date

: 2018/09/12

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.



SAFETY DATA SHEET

SDS00349
ETHYLENE GLYCOL

Preparation Date: 26/Jan/2018

Version: 2

1. IDENTIFICATION

Product identifier

Product Name ETHYLENE GLYCOL

Other means of identification

Product Code(s) SDS00349

Synonyms none

Recommended use of the chemical and restrictions on use

Recommended Use Used as antifreeze, heat transfer fluid, solvent, and raw material in polyester fiber manufacturing.

Restricted Uses No information available

Initial Supplier Identifier

Univar Canada Ltd.
9800 Van Horne Way
Richmond, BC V6X 1W5
Telephone: 1-866-686-4827

Emergency telephone number

24 Hour Emergency Phone Number (CANUTEC): 1-888-226-8832 (1-888-CAN-UTEC)

2. HAZARD IDENTIFICATION

Hazardous Classification of the substance or mixture

Acute toxicity - Oral	Category 4
Specific target organ toxicity (repeated exposure)	Category 2

Label elements

Hazard pictograms



Signal Word: Warning

Hazard statements

Harmful if swallowed

May cause damage to organs through prolonged or repeated exposure

Precautionary Statements

Prevention

Wash face, hands and any exposed skin thoroughly after handling

Do not eat, drink or smoke when using this product

Do not breathe dust/fume/gas/mist/vapors/spray

Response

Specific treatment (see first aid instructions on label)

IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell

Rinse mouth

Storage

Store locked up

Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Unknown acute toxicity

No information available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Chemical Name	CAS No	Weight-%	Synonyms
Ethylene Glycol	107-21-1	90 - 100%	Ethylene Glycol

4. FIRST AID

Description of first aid measures

General advice

Show this safety data sheet to the doctor in attendance.

Inhalation

Remove to fresh air.

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact

IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

Ingestion

Do NOT induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Call a physician.

Most important symptoms and effects, both acute and delayed:

Corneal injury is unlikely. At room temperature, exposure to vapor is minimal due to low volatility. With good ventilation, single exposure is not expected to cause adverse effects. If material is heated or areas are poorly ventilated, vapor/mist may accumulate and cause respiratory irritation and symptoms such as headache and nausea. Repeated skin exposure to large quantities may result in absorption of harmful amounts. Massive contact with damaged skin or if material sufficiently hot to burn skin may result in absorption of potential lethal amounts. Vapors or mists may cause eye irritation. May cause slight eye irritation. May be fatal if swallowed. Cardiac failure, pulmonary edema, and severe kidney damage may develop. Prolonged contact may cause skin irritation with local redness. Oral toxicity is expected to be moderate in humans due to ethylene glycol even though tests with animals show a lower degree of toxicity. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. Swallowing may result in severe effects, even death. The lethal dose in adult humans for ethylene glycol is approximately 3 ounces (100 ml) (1/3 cup). May cause nausea or vomiting. May cause abdominal discomfort or diarrhea. Brief contact is essentially non-irritating to skin.

Indication of any immediate medical attention and special treatment needed:**Note to physicians**

It is estimated that the oral dose to adults is of the order of 1.0 ml/kg. Ethylene glycol is metabolized by alcohol dehydrogenase to various metabolites including glyceraldehydes, glycolic acid and oxalic acid which cause an elevated anion-gap metabolic acidosis and renal tubular injury. The signs and symptoms in ethylene glycol poisoning are those of metabolic acidosis, CNS depression and kidney injury. Urinalysis may show albuminuria, hematuria and oxaluria. Clinical chemistry may reveal anion-gap metabolic acidosis and uremia. The currently recommended medical management of ethylene glycol poisoning includes elimination of ethylene glycol and metabolites, correction of metabolic acidosis and prevention of kidney injury. It is essential to have immediate and follow up urinalysis and clinical chemistry. There should be particular emphasis on acid-base balance and renal function tests. A continuous infusion of 5% sodium bicarbonate with frequent monitoring of electrolytes and fluid balance is used to achieve correction of metabolic acidosis and forced diuresis. As a competitive substrate for alcohol dehydrogenase, ethanol is antidotal. Given in the early stages of intoxication, it blocks the formulation of nephrotoxic metabolites. A therapeutically effective blood concentration of ethanol is in the range 100 - 150 mg/dl and should be achieved by a rapid loading dose and maintained by intravenous infusion. For severe and /or deteriorating cases, hemodialysis may be required. Dialysis should be considered for patients who are symptomatic, have severe metabolic acidosis, a blood ethylene glycol concentration greater than 25 mg/dl, or compromise of renal functions.

A more effective intravenous antidote for physician use is 4-methylpyrazole, a potent inhibitor of alcohol dehydrogenases which effectively blocks the formation of toxic metabolites of ethylene glycol. It has been used to decrease the metabolic consequences of ethylene glycol poisoning before metabolic acidosis coma, seizures and renal failure have occurred. A generally recommended protocol is a loading dose of 15 mg/kg followed by 10 mg/kg every 12 hours for 4 doses and the 15 mg/kg every 12 hours until the ethylene glycol concentrations are below 20 mg/100ml. Slow intravenous infusion is required. Since 4-methylpyrazole is dialyzable, increased dosage may be necessary during hemodialysis. Additional therapeutic measures may include the administration of cofactors involved in the metabolism of ethylene glycol. Thiamine (100 mg) and pyridoxine (50 mg) should be given every six hours.

Pulmonary edema with hypoxemia has been described in a number of patients following poisoning with ethylene glycol. The mechanism of production has not been elucidated, but it appears to be non-cardiogenic in origin in several cases. Respiratory support with mechanical ventilation and positive end expiratory pressure may be required. There may be cranial nerve involvement in the late stages of toxicity from swallowed ethylene glycol. In particular, effects have been reported involving the seventh, eighth and ninth cranial nerves, presenting with bilateral facial paralysis, diminished hearing, and dysphagia.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Water fog or fine spray, carbon dioxide, dry chemical, foam. Alcohol resistant foams (ATC type) are preferred if available. General purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively. Do not use direct water stream, which will spread fire.

Specific hazards arising from the substance or mixture

Use water spray to cool fire-exposed containers and structures. Isolate and restrict area access. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Container may rupture from gas generation in a fire situation. Fight fire from a safe distance and from a protected location. Do not direct a solid stream of water or foam into hot, burning pools; this may cause frothing and increase fire intensity. Consider use of unmanned hose holder or monitor nozzles.

Hazardous combustion products

Hazardous decomposition products depend upon temperature, air supply, and the presence of other materials. Hazardous decomposition products may include and are not limited to : aldehydes, ketones, organic acids.

Special protective equipment for fire-fighters

Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation.

Environmental precautions

See Section 12 for additional Ecological Information.

Methods and materials for containment and cleaning up

Prevent further leakage or spillage if safe to do so.

7. HANDLING AND STORAGE

Precautions for safe handling

For industrial use only. Handle and open containers with care. Avoid contact with eyes, skin and clothing. Do not ingest. Avoid inhalation of chemical. Empty containers may contain hazardous product residues. Keep the containers closed when not in use. Protect against physical damage. Use appropriate personnel protective equipment. Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperature possibly resulting in spontaneous combustion. Do not consume food, drink or smoke while handling this material.

Conditions for safe storage, including any incompatibilities

Avoid storage with incompatible materials. Keep containers tightly closed. Keep in a cool, well-ventilated place. Do not store near food, foodstuffs, drugs or potable water supplies.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters**Exposure Limits**

Chemical Name	Alberta OEL	British Columbia OEL	Ontario	Quebec OEL	Exposure Limit - ACGIH	Immediately Dangerous to Life or Health - IDLH
Ethylene Glycol 107-21-1	Ceiling: 100 mg/m ³	TWA: 10 mg/m ³ STEL: 20 mg/m ³ Ceiling: 100 mg/m ³ Ceiling: 50 ppm	CEV: 100 mg/m ³	Ceiling: 50 ppm Ceiling: 127 mg/m ³	50 ppm STEL 10 mg/m ³ STEL 25 ppm TLV-TWA	Not available

Consult local authorities for recommended exposure limits

Appropriate engineering controls

Engineering controls

General (mechanical) room ventilation is expected to be satisfactory. Local ventilation recommended where mechanical ventilation is ineffective in controlling airborne concentrations below the recommended occupational exposure limit.

Individual protection measures, such as personal protective equipment

Eye/face protection

Chemical goggles; also wear a face shield if splashing hazard exists.

Hand protection

Use gloves chemically resistant to this material, examples of preferred glove barrier materials include: Butyl rubber gloves. Nitrile gloves. Neoprene gloves. Polyvinyl alcohol gloves. Ethyl Vinyl Alcohol Laminate (EVAL). Natural rubber gloves. Polyvinylchloride (PVC) gloves. Polyethylene gloves. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials as well as the instructions/specifications provided by the glove supplier.

Skin and body protection

Skin contact should be prevented through the use of suitable protective clothing, gloves and footwear, selected for conditions of use and exposure potential. Consideration must be given both to durability as well as permeation resistance. Chemical apron. Boots. When handling hot material, protect skin from thermal burns as well as from skin absorption.

Respiratory protection

Atmospheric levels should be maintained below the exposure guideline. For most conditions, no respiratory protection is needed; however, if handling at elevated temperatures without sufficient ventilation, use an approved air-purifying respirator.

General hygiene considerations

Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance

Physical state	Liquid
Color	Colorless
Odor	Sweet
Odor threshold	No information available

PROPERTIES

Values

Remarks • Method

pH	9
Melting point / freezing point	-13 °C / 9 °F
Initial boiling point/boiling range	No data available

None known

Flash point	111 °C / 232 °F	Closed cup.
Evaporation rate	0.01	
Flammability (solid, gas)	No data available	None known
Flammability Limit in Air		
Upper flammability limit:	15.3	
Lower flammability limit:	3.2	
Vapor pressure	0.06 mmHg @ 20°C	
Relative vapor density	2.1	
Specific Gravity	1.115 @ 20°C	
Water solubility	1000 (RBT)	
Solubility in other solvents	No data available	
Partition coefficient	No data available	
Autoignition temperature	427 °C / 801 °F	
Decomposition temperature	No data available	None known
Kinematic viscosity	Dynamic Viscosity: 19.83 mPa.s @ 20°C	
Dynamic viscosity	No data available	None known
Explosive properties	No information available.	
Oxidizing properties	No information available.	
Molecular weight	62 g/mol	
VOC Percentage Volatility	No information available	
Liquid Density	No information available	
Bulk density	No information available	

10. STABILITY AND REACTIVITY

Reactivity/Chemical Stability

Stable

Possibility of hazardous reactions

No additional remark.

Hazardous polymerization

Will not occur.

Conditions to avoid

Avoid excessive heat, open flames and all ignition sources. Product can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible materials

Strong oxidizers. Strong acids and bases.

Hazardous decomposition products

Hazardous decomposition products depend upon temperature, air supply, and the presence of other materials. Hazardous decomposition products may include and are not limited to : aldehydes, ketones, organic acids.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation

At room temperature, exposure to vapor is minimal due to low volatility. With good ventilation, single exposure is not expected to cause adverse effects. If material is heated or areas are poorly ventilated, vapor/mist may accumulate and cause respiratory irritation and symptoms such as headache and nausea.

Eye contact

Corneal injury is unlikely. Vapors or mists may cause eye irritation. May cause slight eye irritation.

Skin contact

Repeated skin exposure to large quantities may result in absorption of harmful amounts. Massive contact with damaged skin or if material sufficiently hot to burn skin may result in absorption of potential lethal amounts. Prolonged contact may cause skin irritation with local redness. Brief contact is essentially non-irritating to skin.

Ingestion

May be fatal if swallowed. Cardiac failure, pulmonary edema, and severe kidney damage may develop. Oral toxicity is expected to be moderate in humans due to ethylene glycol even though tests with animals show a lower degree of toxicity. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. Swallowing may result in severe effects, even death. The lethal dose in adult humans for ethylene glycol is approximately 3 ounces (100 ml) (1/3 cup). May cause nausea or vomiting. May cause abdominal discomfort or diarrhea.

Information on toxicological effects

Symptoms

Repeated skin contact with ethylene glycol may, in a very small proportion of cases, cause sensitization with the development of allergic contact dermatitis. The incidence is significantly less than 1% with the undiluted material. Repeated inhalation of ethylene glycol may produce signs of central nervous system involvement, particularly dizziness and nystagmus (involuntary eye movement). Exposure may place individuals with existing heart problems at added risk of potential cardiac irregularities and heart failure. In animals, effects have been reported on the following organs: Kidney, liver.

Numerical measures of toxicity

Acute toxicity

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral)	505.00 mg/kg
ATEmix (dermal)	10,707.00 mg/kg

Unknown acute toxicity No information available

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Ethylene Glycol 107-21-1	= 4700 mg/kg (Rat)	= 10600 mg/kg (Rat)	Not available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation

Repeated skin exposure to large quantities may result in absorption of harmful amounts. Massive contact with damaged skin or if material sufficiently hot to burn skin may result in absorption of potential lethal amounts. Prolonged contact may cause skin irritation with local redness. Brief contact is essentially non-irritating to skin.

Serious eye damage/eye irritation

Corneal injury is unlikely. Vapors or mists may cause eye irritation. May cause slight eye irritation.

Respiratory or skin sensitization

No information available.

Germ cell mutagenicity

No information available.

Carcinogenicity

No information available.

Chemical Name	ACGIH	IARC	NTP	OSHA
Ethylene Glycol 107-21-1	Not available	Not available	Not available	Not available

Reproductive toxicity

Based on animal studies, ingestion of very large amounts of ethylene glycol appears to be the major and possibly only route of exposure to produce birth defects. Exposures by inhalation or skin contact, the primary routes of occupational exposure, had minimal effect on the fetus, in animal studies. Ingestion of large amounts of ethylene glycol has been shown to interfere with reproduction in animals. Specifically, growth retardation and decreased litter size in rats and mice and decreased mating frequency in mice were observed. Ethylene glycol has been shown to produce dose-related teratogenic effects in rats and mice when given by gavage or in drinking water at high concentrations or doses. The no-effect doses for developmental toxicity for ethylene glycol given by gavage over the period of organogenesis has been shown to be 150 mg/kg/day for the mouse and 500 mg/kg/day for the rat. Also, in a preliminary study to assess the effects of exposure of pregnant rats and mice to aerosols at concentrations of 150, 1000 and 2500 mg/m³ for 6 hours a day throughout the period of organogenesis, teratogenic effects were produced at the highest concentration, but only in mice. The conditions of these latter experiments did not allow a conclusion as to whether the developmental toxicity was mediated by inhalation of aerosol, percutaneous absorption of ethylene glycol from contaminated skin, or swallowing of ethylene glycol as a result of grooming the wetted coat. In a further study, comparing effects from high aerosol concentration by whole-body or nose-only exposure, it was shown that nose-only exposure resulted in maternal toxicity (1000 and 2500 mg/m³) and developmental toxicity with minimal evidence of teratogenicity (2500 mg/m³). The no-effects concentration (based on maternal toxicity) was 500 mg/m³. In a further study in mice, no teratogenic effects could be produced when ethylene glycol was applied to the skin of pregnant mice over the period of organogenesis. The above observations suggest that ethylene glycol is to be regarded as an animal teratogen. There is currently no available information to suggest that ethylene glycol has caused birth defects in humans. Cutaneous application of ethylene glycol is ineffective in producing developmental toxicity. Exposure to high aerosol concentrations is only minimally effective in producing developmental toxicity.

Specific target organ systemic toxicity - single exposure

No information available.

Specific target organ systemic toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure if swallowed.

Aspiration hazard

No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Chemical Name	Ecotoxicity - Freshwater Algae Data	Ecotoxicity - Fish Species Data	Toxicity to microorganisms	Crustacea
Ethylene Glycol 107-21-1	6500 - 13000 mg/L EC50 Pseudokirchneriella subcapitata 96 h	41000 mg/L LC50 (Oncorhynchus mykiss) 96 h 14 - 18 mL/L LC50 (Oncorhynchus mykiss) 96 h static 27540 mg/L LC50 (Lepomis macrochirus) 96 h static 40761 mg/L LC50 (Oncorhynchus mykiss) 96 h static 40000 - 60000 mg/L LC50 (Pimephales promelas) 96 h static 16000 mg/L LC50 (Poecilia reticulata) 96 h static	Not available	EC50: =46300mg/L (48h, Daphnia magna)

Persistence and degradability No information available.

Bioaccumulation No information available.

Component Information

Chemical Name	Partition coefficient
Ethylene Glycol 107-21-1	-1.93

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of all wastes must be done in accordance with municipal, provincial and federal regulations. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.

Do not reuse empty containers.

14. TRANSPORT INFORMATION

TDG (Canada):

UN Number	Not applicable
Shipping name	Not regulated
Class	Not applicable
Packing Group	Not applicable
Marine pollutant	Not available.

DOT (U.S.)

UN Number	Not applicable
Shipping name	Not regulated
Class	Not applicable
Packing Group	Not applicable
Marine pollutant	Not available

15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

U.S. Regulatory Rules

Chemical Name	CERCLA/SARA - Section 302:	SARA (311, 312) Hazard Class:	CERCLA/SARA - Section 313:
Ethylene Glycol - 107-21-1	Not Listed	Listed	Listed

International Inventories

TSCA	Complies
DSL/NDSL	Complies

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

<u>NFPA:</u>	Health hazards 1	Flammability 1	Instability 0	Physical and chemical properties -
<u>HMIS Health Rating:</u>	Health hazards 2	Flammability 1	Physical hazards 0	Personal protection X

Legend Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
Ceiling	Maximum limit value	*	Skin designation

Prepared By: The Environment, Health and Safety Department of Univar Canada Ltd.

Preparation Date: 26/Jan/2018

Revision Date: 26/Jan/2018

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End of Safety Data Sheet

Section 1. Identification

Product identifier : Methanol

Product code : Q01347

Relevant identified uses of the substance or mixture

Identified uses
Industrial applications

Supplier's details : QUADRA CHEMICALS LTD.
3901 F.X Tessier
Vaudreuil-Dorion, QC
CANADA J7V 5V5
1-800-665-6553

Emergency telephone number (with hours of operation) : **TRANSPORTATION EMERGENCY - 24HRS/DAY - 7 DAYS/WEEK IN CANADA - CALL 1-800-567-7455**

Section 2. Hazard identification

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 2
ACUTE TOXICITY (oral) - Category 3
ACUTE TOXICITY (dermal) - Category 3
ACUTE TOXICITY (inhalation) - Category 3
EYE IRRITATION - Category 2A
TOXIC TO REPRODUCTION (Unborn child) - Category 1
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (central nervous system (CNS), optic nerve) - Category 1

GHS label elements

Hazard pictograms :    

Signal word : Danger

Hazard statements : Highly flammable liquid and vapor.
Toxic if swallowed, in contact with skin or if inhaled.
Causes serious eye irritation.
May damage the unborn child.
Causes damage to organs. (central nervous system (CNS), optic nerve)

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only outdoors or in a well-ventilated area. Do not breathe vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Section 2. Hazard identification

- Response** : IF exposed or concerned: Call a POISON CENTER or physician. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. IF ON SKIN: Take off immediately all contaminated clothing and wash it before reuse. Wash with plenty of soap and water. Call a POISON CENTER or physician if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.
- Storage** : Store locked up.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Ingredient name	% (w/w)	CAS number
methanol	99.85 - 100	67-56-1

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.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First-aid measures

Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention. If necessary, call a poison center or physician.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Skin contact** : Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. If necessary, call a poison center or physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a

Section 4. First-aid measures

collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Toxic if inhaled.
- Skin contact** : Toxic in contact with skin.
- Ingestion** : Toxic if swallowed.

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering
redness
- Inhalation** : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations
- Skin contact** : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations
- Ingestion** : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- 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.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Section 5. Fire-fighting measures

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
- Special protective actions for fire-fighters** : 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.
- 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.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-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. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Section 7. Handling and storage

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. 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 only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : 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. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : 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. Store locked up. 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 unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
methanol	ACGIH TLV (United States, 3/2017). Absorbed through skin. TWA: 200 ppm 8 hours. TWA: 262 mg/m ³ 8 hours. STEL: 250 ppm 15 minutes. STEL: 328 mg/m ³ 15 minutes.

- Appropriate engineering controls** : 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, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
- 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.

Individual protection measures

Section 8. Exposure controls/personal protection

- 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.
- Eye/face protection** : 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, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Hand protection** : 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. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : 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. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

- Physical state** : Liquid. [Clear.]
- Color** : Colourless.
- Odor** : Alcohol-like.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : -97.8°C (-144°F)
- Boiling point** : 64.7°C (148.5°F)
- Flash point** : Closed cup: 11°C (51.8°F)
- Evaporation rate** : 4.1 (n-butyl acetate = 1)
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Lower: 5.5%
Upper: 36.5%
- Vapor pressure** : 12.8 kPa (96 mm Hg) [room temperature]
- Vapor density** : 1.1 [Air = 1]
- Relative density** : 0.791 to 0.793 [@ 20°C]
- Density** : 0.792 g/cm³
- Solubility** : Soluble in the following materials: cold water.
- Dispersibility properties** : Not available.

Section 9. Physical and chemical properties

Partition coefficient: n-octanol/water	: Not available.
Auto-ignition temperature	: 464°C (867.2°F)
Decomposition temperature	: Not available.
Viscosity	: Dynamic (room temperature): 0.8 mPa·s (0.8 cP)
Volatility	: 100% (v/v)

Section 10. Stability and reactivity

Reactivity	: No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Incompatible materials	: oxidizing materials metals acids alkalis
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
methanol	LC50 Inhalation Vapor	Rat	189950 mg/m ³	1 hours
	LD50 Dermal	Rabbit	15800 mg/kg	-
	LD50 Oral	Rat	5600 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
methanol	Eyes - Moderate irritant	Rabbit	-	24 hours 100 milligrams	-
	Eyes - Moderate irritant	Rabbit	-	40 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Section 11. Toxicological information

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
methanol	Category 1	Not determined	central nervous system (CNS) and optic nerve

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye irritation.
Inhalation : Toxic if inhaled.
Skin contact : Toxic in contact with skin.
Ingestion : Toxic if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
 pain or irritation
 watering
 redness

Inhalation : Adverse symptoms may include the following:
 reduced fetal weight
 increase in fetal deaths
 skeletal malformations

Skin contact : Adverse symptoms may include the following:
 reduced fetal weight
 increase in fetal deaths
 skeletal malformations

Ingestion : Adverse symptoms may include the following:
 reduced fetal weight
 increase in fetal deaths
 skeletal malformations

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Section 11. Toxicological information

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General : No known significant effects or critical hazards.

Teratogenicity : May damage the unborn child.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	100 mg/kg
Dermal	300 mg/kg
Inhalation (vapors)	3 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
methanol	Acute EC50 16.912 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Acute LC50 2500000 µg/l Marine water	Crustaceans - Crangon crangon - Adult	48 hours
	Acute LC50 3289 mg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 290 mg/l Fresh water	Fish - Danio rerio - Egg	96 hours
	Chronic NOEC 9.96 mg/l Marine water	Algae - Ulva pertusa	96 hours
	EC50 >10000 mg/l	Daphnia	48 days
	IC50 22000 mg/l	Algae - Pseudokirchneriella subcapitata	72 hours
Methanol	LC50 15400 to 29400 mg/l	Fish	96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Methanol	-	-	Readily

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
methanol	-0.77	<10	low

Mobility in soil



Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. 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. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. 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 spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	TDG Classification
UN number	1230
UN proper shipping name	METHANOL
Transport hazard class(es)	3 (6.1)  
Packing group	II
Additional information	Not available.

Section 15. Regulatory information

Canada inventory : All components are listed or exempted.

Section 16. Other information

History

Date of issue/Date of revision : 8 February 2018

Prepared by : Regulatory Affairs

Key to abbreviations : ATE = Acute Toxicity Estimate
 BCF = Bioconcentration Factor
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals
 LogPow = logarithm of the octanol/water partition coefficient
 UN = United Nations
 HPR = Hazardous Products Regulations

Procedure used to derive the classification

Section 16. Other information

Classification	Justification
FLAMMABLE LIQUIDS - Category 2 ACUTE TOXICITY (oral) - Category 3 ACUTE TOXICITY (dermal) - Category 3 ACUTE TOXICITY (inhalation) - Category 3 EYE IRRITATION - Category 2A TOXIC TO REPRODUCTION (Unborn child) - Category 1 SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (central nervous system (CNS), optic nerve) - Category 1	On basis of test data Calculation method Calculation method Calculation method Calculation method Calculation method Calculation method

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.

Potassium Chloride

SECTION 1. IDENTIFICATION

Product Identifier Potassium Chloride
Other Means of Identification None
Other Identification KCl
Product Family Salt
Recommended Use Drilling Fluid Additive.
Restrictions on Use None known.
Supplier Identifier Secure Energy Services
Suite 3600, 205 - 5 Avenue SW, Calgary, Alberta, T2P 2V7, www.secure-energy.com
Emergency Phone No. CANUTEC, (613) 996-6666, 24/7
Date of Preparation April 12, 2017

SECTION 2. HAZARD IDENTIFICATION

Classification

Not classified under any hazard class.

Label Elements

Not applicable

Other Hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	%	Other Identifiers	Other Names
Potassium chloride	7447-40-7	100	None	KCl

Notes

Concentrations are expressed in % weight/weight.

SECTION 4. FIRST-AID MEASURES

First-aid Measures

Inhalation

If symptoms are experienced, remove source of contamination or move victim to fresh air. Obtain medical advice.

Skin Contact

No health effects expected. Flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, repeat flushing. Obtain medical advice.

Eye Contact

If irritation occurs, flush the contaminated eye(s) with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice.

Ingestion

If irritation or discomfort occur, obtain medical advice.

First-aid Comments

Get medical advice or attention if you feel unwell or are concerned.

Most Important Symptoms and Effects, Acute and Delayed

Mild irritation to skin, eyes, respiratory tract (dust).

Immediate Medical Attention and Special Treatment**Target Organs**

Eyes, skin.

Special Instructions

Not applicable.

Medical Conditions Aggravated by Exposure

Eye conditions, skin conditions.

SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing Media**Suitable Extinguishing Media**

Does not burn or support combustion. Use extinguishing media suitable for surrounding fire.

Unsuitable Extinguishing Media

Not applicable.

Specific Hazards Arising from the Product

Closed containers may rupture violently when heated releasing contents.

During a fire, corrosive and toxic hydrogen chloride and/or chlorine gases, dipotassium oxide and other toxic and irritating fumes and gases may be formed by thermal decomposition.

Special Protective Equipment and Precautions for Fire-fighters

Evacuate area and fight fire from a safe distance or a protected location. Approach fire from upwind to avoid hazardous vapours and toxic decomposition products.

Closed containers may rupture violently when exposed to the heat of the fire. If possible, isolate materials not yet involved in the fire, and move containers from the fire area if this can be done without risk, and protect personnel. Otherwise, apply water in flooding quantities to keep fire-exposed containers, tanks or car/trailer loads cool and absorb heat to help prevent rupture. Water spray may also be used to knock down corrosive fumes which may be produced in a fire. Apply water from the side and from a safe distance until well after the fire is out. Dike fire control water for appropriate disposal.

Tanks or drums should not be approached directly after they have been involved in a fire, until they have been completely cooled down.

Potassium has very low toxicity although hazardous decomposition products are possible in a fire. Firefighters may enter the area if positive pressure self-contained breathing apparatus (NIOSH approved or equivalent) and full Bunker Gear is worn.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures

Ensure clean-up is conducted by trained personnel. Wear adequate personal protective equipment. Ventilate area. Use the personal protective equipment recommended in Section 8 of this safety data sheet.

Environmental Precautions

It is good practice to prevent releases into the environment.

Methods and Materials for Containment and Cleaning Up

Use vacuum equipped with HEPA filter(s). Alternatively, dampen spilled material with water. Shovel into clean, dry, labelled containers. Cover containers. Flush area with water.

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Other Information

Report spills to local health, safety and environmental authorities, as required.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling

This material is essentially non-hazardous. Avoid generating dusts. Avoid the release of dusts into the workplace air. Keep containers closed when not in use. Good housekeeping is important to prevent accumulations of dust. Do not use with incompatible materials.

Conditions for Safe Storage

Store in suitable, labelled containers. Protect from damage. It is good practice to keep storage containers closed when not in use. Store away from incompatible materials. Comply with all applicable health and safety regulations, fire and building codes.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

Chemical Name	ACGIH TLV®		OSHA PEL		AIHA WEEL	
	TWA	STEL	TWA	Ceiling	8-hr TWA	TWA
Potassium chloride	Not established	Not established	Not established	Not established	Not established	Not established

Appropriate Engineering Controls

The hazard potential of this material is relatively low. General (dilution) ventilation is usually sufficient. When there is large-scale use of this material (eg. bagging operation), engineering methods to control hazardous conditions may be necessary. Use local exhaust ventilation and process enclosure to control airborne dust. A dust collecting system attached to the ventilation system may also be necessary.

Supply sufficient replacement air to make up for air removed by exhaust systems. Provide eyewash and safety shower if contact or splash hazard exists.

Individual Protection Measures

Eye/Face Protection

No specific requirement, but it is good practice to wear chemical safety goggles.

Skin Protection

No specific requirement, but it is good practice to prevent skin contact.

Respiratory Protection

Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Basic Physical and Chemical Properties

Appearance	Colourless - white crystalline powder. Particle Size: Not available
Odour	Odourless
Odour Threshold	Not applicable
pH	~ 7 (saturated solution)
Melting Point/Freezing Point	771 °C (1420 °F) (melting); 771 °C (1420 °F) (freezing)
Initial Boiling Point/Range	1407 °C (2565 °F)
Flash Point	Not applicable
Evaporation Rate	Not applicable
Flammability (solid, gas)	Will not burn.

Upper/Lower Flammability or Explosive Limit	Not applicable (upper); Not applicable (lower)
Vapour Pressure	Very low.
Vapour Density (air = 1)	Not applicable
Relative Density (water = 1)	1.98 - 1.99
Solubility	34.2 g/100 mL (Very soluble) in water; Mildly soluble in alcohols (e.g. ethanol).
Partition Coefficient, n-Octanol/Water (Log Kow)	Not applicable
Auto-ignition Temperature	Not applicable
Decomposition Temperature	Not available
Viscosity	Not applicable (kinematic); Not applicable (dynamic)
Other Information	
Physical State	Solid
Molecular Formula	K-Cl
Molecular Weight	74.55
Bulk Density	Not available
Surface Tension	Not applicable
Critical Temperature	Not applicable
Electrical Conductivity	Not available
Vapour Pressure at 50 deg C	Not available
Saturated Vapour Concentration	Not available

SECTION 10. STABILITY AND REACTIVITY

Reactivity

Not reactive under normal conditions of use.

Chemical Stability

Normally stable.

Possibility of Hazardous Reactions

None expected under normal conditions of storage and use.

Conditions to Avoid

Generation of dust. Incompatible materials.

Incompatible Materials

PEROXYACETIC ACID and ACETIC ACID - addition of potassium chloride to aqueous solutions containing 40% peroxyacetic acid and 1% acetic acid lead to a violently exothermic decomposition reaction, with the evolution of chlorine gas.

POTASSIUM PERMANGANATE and SULFURIC ACID - mixture may explode.

BROMINE TRIFLUORIDE - rapidly attacks potassium chloride.

Hazardous Decomposition Products

Corrosive and toxic hydrogen chloride and/or chlorine gases and dipotassium oxide may be formed by thermal decomposition or in a fire.

SECTION 11. TOXICOLOGICAL INFORMATION

Likely Routes of Exposure

Skin contact; eye contact; inhalation.

Acute Toxicity

Chemical Name	LC50	LD50 (oral)	LD50 (dermal)
Potassium chloride	Not available	2430 mg/kg (rat)	Not available

Skin Corrosion/Irritation

Potassium chloride is probably a non-irritant to mild irritant. This conclusion is based on limited human information for potassium chloride and comparison to sodium chloride.

Serious Eye Damage/Irritation

Potassium chloride is probably a non-irritant to very mild irritant based on comparison to sodium chloride. Unconfirmed animal information for potassium chloride shows mild irritation. No human information was located.

STOT (Specific Target Organ Toxicity) - Single Exposure

Inhalation

Potassium chloride does not form a vapour. Exposure to dust or mists from solutions may be slightly irritating to the nose and throat, but is not expected to cause significant harmful effects. No human or animal information was located.

Skin Absorption

Potassium chloride is not expected to be absorbed through the skin.

Ingestion

Potassium chloride is not toxic if ingested based on animal toxicity values. Harmful effects in humans are rare because a large single dose results in nausea and vomiting and because potassium chloride is readily excreted in the urine. An estimated oral lethal dose in humans is 500-5000 mg/kg. Ingestion is not a typical route of occupational exposure.

Aspiration Hazard

Not known to be an aspiration hazard.

STOT (Specific Target Organ Toxicity) - Repeated Exposure

Potassium chloride generally has very low toxicity and is not expected to cause long-term health effects following occupational exposure.

Respiratory and/or Skin Sensitization

Not a skin sensitizer. Not a respiratory sensitizer.

Carcinogenicity

Chemical Name	IARC	ACGIH®	NTP	OSHA
Potassium chloride	Not Listed	Not designated	Not Listed	Not Listed

Reproductive Toxicity

Development of Offspring

Potassium chloride is not known to cause developmental toxicity. No human information was located.

Sexual Function and Fertility

Potassium chloride is not known to cause reproductive toxicity. No human or animal information was located.

Effects on or via Lactation

No information was located.
No information was located.

Germ Cell Mutagenicity

Potassium chloride is not known to be mutagenic. No studies in humans or live animals were located. The positive results obtained in short-term tests are believed to result from an osmotic effect rather than from mutagenicity.

Interactive Effects

No information was located.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

No information was located.

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Acute Aquatic Toxicity

Chemical Name	LC50 Fish	EC50 Crustacea	ErC50 Aquatic Plants	ErC50 Algae
Potassium chloride	880 mg/L (Pimephales promelas (fathead minnow); 96-hour; fresh water; static)	29 mg/L (Daphnia magna (water flea); 96-hour; fresh water; static)	Not available	Not available

Persistence and Degradability

No information was located.

Bioaccumulative Potential

No information was located.

Mobility in Soil

No information was located.

Other Adverse Effects

There is no information available.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal Methods

Contact local environmental authorities for approved disposal or recycling methods in your jurisdiction. The required hazard evaluation of the waste and compliance with the applicable hazardous waste laws are the responsibility of the user. Store product for disposal as described under Storage in Section 7 of this safety data sheet. Dispose of or recycle empty containers through an approved waste management facility.

SECTION 14. TRANSPORT INFORMATION

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

Environmental Hazards Not applicable

Special Precautions Not applicable

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

Not applicable

SECTION 15. REGULATORY INFORMATION

Safety, Health and Environmental Regulations

Canada

Domestic Substances List (DSL) / Non-Domestic Substances List (NDSL)

All ingredients are listed on the DSL/NDSL.

USA

Toxic Substances Control Act (TSCA) Section 8(b)

All ingredients are listed on the TSCA Inventory.

Additional USA Regulatory Lists

SARA Title III - Section 302: Not listed. SARA Title III - Section 311/312: Not listed. SARA Title III - Section 313: Not listed. Massachusetts Right To Know: Not listed. Pennsylvania Right To Know: Listed. New Jersey Right To Know: Listed. California Proposition 65: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Product Identifier: Potassium Chloride - Ver. 1
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SECTION 16. OTHER INFORMATION

SDS Prepared By	Safety Committee
Phone No.	403-264-1588
Date of Preparation	April 12, 2017
Date of Last Revision	April 12, 2017
Revision Indicators	Not applicable.
Key to Abbreviations	ACGIH® = American Conference of Governmental Industrial Hygienists AIHA® = AIHA® Guideline Foundation DSL = Domestic Substances List HSDB® = Hazardous Substances Data Bank IARC = International Agency for Research on Cancer IDLH = Immediately Dangerous to Life and Health NDSL = Non-Domestic Substances List NFPA = National Fire Protection Association NIOSH = National Institute for Occupational Safety and Health NTP = National Toxicology Program OSHA = US Occupational Safety and Health Administration PEL = Permissible Exposure Limit REL = Recommended Exposure Limit RTECS® = Registry of Toxic Effects of Chemical Substances STEL = Short Term Exposure Limit TSCA = Toxic Substances Control Act TWA = Time Weighted Average
References	CHEMINFO database. Canadian Centre for Occupational Health and Safety (CCOHS). HSDB® database. US National Library of Medicine. Available from Canadian Centre for Occupational Health and Safety (CCOHS). Registry of Toxic Effects of Chemical Substances (RTECS®) database. Dassault Systèmes/BIOVIA ("BIOVIA"). Available from Canadian Centre for Occupational Health and Safety (CCOHS).
Disclaimer	<p>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.</p> <p>Secure Energy Services expressly disclaims all expressed or implied warranties of merchantability and fitness for a particular purpose with respect to the product provided.</p>

SAFETY DATA SHEET

According to the Hazardous Products Regulations

Quaker State Automatic Transmission Fluid

Version	Revision Date:	SDS Number:	Print Date: 2016-04-28
1.4	2016-04-06	800001003748	Date of last issue: 08.03.2013
			Date of first issue: 08.03.2013

SECTION 1. IDENTIFICATION

Product name : Quaker State Automatic Transmission Fluid

Product code : 001B0927

Manufacturer or supplier's details

Manufacturer/Supplier : **Shell Canada Products**
400 - 4th Avenue S.W
Calgary AB T2P 0J4
Canada

Telephone : (+1) 8006611600
Telefax : (+1) 4033848345

Emergency telephone number : CHEMTREC (24 hr): 1 (703) 527-3887 or 1 (800) 424-9300 (US)
CANUTEC (24 hr): (+1) 613-996-6666; Toll Free: 1-888-CAN-UTEC (226-8832)

Recommended use of the chemical and restrictions on use

Recommended use : Transmission oil.

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Not a hazardous substance or mixture.

GHS label elements

Hazard pictograms : No Hazard Symbol required

Signal word : No signal word

Hazard statements : PHYSICAL HAZARDS:
Not classified as a physical hazard under GHS criteria.
HEALTH HAZARDS:
Not classified as a health hazard under GHS criteria.
ENVIRONMENTAL HAZARDS:
Not classified as an environmental hazard under GHS criteria.

Precautionary statements : **Prevention:**
No precautionary phrases.
Response:
No precautionary phrases.

SAFETY DATA SHEET

According to the Hazardous Products Regulations

Quaker State Automatic Transmission Fluid

Version
1.4

Revision Date:
2016-04-06

SDS Number:
800001003748

Print Date: 2016-04-28
Date of last issue: 08.03.2013
Date of first issue: 08.03.2013

Storage:

No precautionary phrases.

Disposal:

No precautionary phrases.

Other hazards which do not result in classification

Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.

Used oil may contain harmful impurities.

Not classified as flammable but will burn.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance name : Quaker State Automatic Transmission Fluid

Chemical nature : Highly refined mineral oils and additives.
The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

Hazardous components

Chemical name	CAS-No.	Concentration (% w/w)
Alkyl methacrylates copolymer	Not Assigned	1 - 3
Interchangeable low viscosity base oil (<20,5 cSt @40°C) *	Not Assigned	0 - 90

SECTION 4. FIRST-AID MEASURES

General advice : Not expected to be a health hazard when used under normal conditions.

If inhaled : No treatment necessary under normal conditions of use.
If symptoms persist, obtain medical advice.

In case of skin contact : Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available.
If persistent irritation occurs, obtain medical attention.

In case of eye contact : Flush eye with copious quantities of water.
If persistent irritation occurs, obtain medical attention.

If swallowed : In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.

Most important symptoms and effects, both acute and delayed : Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas.
Ingestion may result in nausea, vomiting and/or diarrhoea.

Protection of first-aiders : When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the

SAFETY DATA SHEET

According to the Hazardous Products Regulations

Quaker State Automatic Transmission Fluid

Version	Revision Date:	SDS Number:	Print Date: 2016-04-28
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			Date of first issue: 08.03.2013

incident, injury and surroundings.

Notes to physician : Treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

- | | |
|---|--|
| Suitable extinguishing media | : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only. |
| Unsuitable extinguishing media | : Do not use water in a jet. |
| Specific hazards during fire-fighting | : Hazardous combustion products may include:
A complex mixture of airborne solid and liquid particulates and gases (smoke).
Carbon monoxide may be evolved if incomplete combustion occurs.
Unidentified organic and inorganic compounds. |
| Specific extinguishing methods | : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. |
| Special protective equipment for firefighters | : Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469). |

SECTION 6. ACCIDENTAL RELEASE MEASURES

- | | |
|---|---|
| Personal precautions, protective equipment and emergency procedures | : Avoid contact with skin and eyes. |
| Environmental precautions | : Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

Local authorities should be advised if significant spillages cannot be contained. |
| Methods and materials for containment and cleaning up | : Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material.
Reclaim liquid directly or in an absorbent.
Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly. |

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Additional advice : For guidance on selection of personal protective equipment see Chapter 8 of this Safety Data Sheet.
For guidance on disposal of spilled material see Chapter 13 of this Safety Data Sheet.

SECTION 7. HANDLING AND STORAGE

General Precautions : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols.
Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

Advice on safe handling : Avoid prolonged or repeated contact with skin.
Avoid inhaling vapour and/or mists.
When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.

Avoidance of contact : Strong oxidising agents.

Product Transfer : This material has the potential to be a static accumulator.
Proper grounding and bonding procedures should be used during all bulk transfer operations.

Storage

Other data : Keep container tightly closed and in a cool, well-ventilated place.
Use properly labeled and closable containers.

Store at ambient temperature.

Packaging material : Suitable material: For containers or container linings, use mild steel or high density polyethylene.
Unsuitable material: PVC.

Container Advice : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of	Control parameters / Permissible	Basis
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		exposure)	concentration	
Oil mist, mineral	Not Assigned	TWA ((inhalable fraction))	5 mg/m ³	US. ACGIH Threshold Limit Values

Biological occupational exposure limits

No biological limit allocated.

Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.

Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.

Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.

National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods <http://www.cdc.gov/niosh/>

Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods <http://www.osha.gov/>

Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances <http://www.hse.gov.uk/>

Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany <http://www.dguv.de/inhalt/index.jsp>

L'Institut National de Recherche et de Sécurité, (INRS), France <http://www.inrs.fr/accueil>

Engineering measures

: The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include:
Adequate ventilation to control airborne concentrations.

Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

General Information:

Define procedures for safe handling and maintenance of controls.

Educate and train workers in the hazards and control measures relevant to normal activities associated with this product.

Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation.

Drain down system prior to equipment break-in or maintenance.

Retain drain downs in sealed storage pending disposal or subsequent recycle.

Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and

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protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

Personal protective equipment

Respiratory protection : No respiratory protection is ordinarily required under normal conditions of use.
In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material.
If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation.
Check with respiratory protective equipment suppliers.
Where air-filtering respirators are suitable, select an appropriate combination of mask and filter.
Select a filter suitable for the combination of organic gases and vapours [Type A/Type P boiling point >65°C (149°F)].

Hand protection
Remarks

: Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection. PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same, but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Glove thickness should be typically greater than 0.35 mm depending on the glove make and model.

Eye protection : If material is handled such that it could be splashed into eyes, protective eyewear is recommended.

Skin and body protection : Skin protection is not ordinarily required beyond standard work clothes.
It is good practice to wear chemical resistant gloves.

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Thermal hazards : Not applicable

Protective measures : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Environmental exposure controls

General advice : Take appropriate measures to fulfill the requirements of relevant environmental protection legislation. Avoid contamination of the environment by following advice given in Chapter 6. If necessary, prevent undissolved material from being discharged to waste water. Waste water should be treated in a municipal or industrial waste water treatment plant before discharge to surface water.
Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Liquid at room temperature.

Colour : red

Odour : Slight hydrocarbon

Odour Threshold : Data not available

pH : Not applicable

pour point : -48 °C / -54 °F
Method: ISO 3016

Initial boiling point and boiling range : > 280 °C / 536 °F
estimated value(s)

Flash point : 180 °C / 356 °F
Method: ISO 2592

Evaporation rate : Data not available

Flammability (solid, gas) : Data not available

Upper explosion limit : Typical 10 %(V)

Lower explosion limit : Typical 1 %(V)

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Vapour pressure	: < 0.5 Pa (20 °C / 68 °F) estimated value(s)
Relative vapour density	: > 1 estimated value(s)
Relative density	: 0.864 (15 °C / 59 °F)
Density	: 864 kg/m ³ (15.0 °C / 59.0 °F) Method: ISO 12185
Solubility(ies)	
Water solubility	: negligible
Solubility in other solvents	: Data not available
Partition coefficient: n-octanol/water	: Pow: > 6 (based on information on similar products)
Auto-ignition temperature	: > 320 °C / 608 °F
Viscosity	
Viscosity, dynamic	: Data not available
Viscosity, kinematic	: 7.3 mm ² /s (100 °C / 212 °F) Method: ISO 3104
	33.8 mm ² /s (40.0 °C / 104.0 °F) Method: ISO 3104
Explosive properties	: Not classified
Oxidizing properties	: Data not available
Conductivity	: This material is not expected to be a static accumulator.
Decomposition temperature	: Data not available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.
Chemical stability	: Stable.
Possibility of hazardous reactions	: Reacts with strong oxidising agents.
Conditions to avoid	: Extremes of temperature and direct sunlight.
Incompatible materials	: Strong oxidising agents.

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Hazardous decomposition products	: Hazardous decomposition products are not expected to form during normal storage.
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SECTION 11. TOXICOLOGICAL INFORMATION

Basis for assessment	: Information given is based on data on the components and the toxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
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Information on likely routes of exposure

Skin and eye contact are the primary routes of exposure although exposure may occur following accidental ingestion.

Acute toxicity

Product:

Acute oral toxicity	: LD50 (rat): > 5,000 mg/kg Remarks: Expected to be of low toxicity:
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Acute inhalation toxicity	: Remarks: Not considered to be an inhalation hazard under normal conditions of use.
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Acute dermal toxicity	: LD50 (Rabbit): > 5,000 mg/kg Remarks: Expected to be of low toxicity:
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Skin corrosion/irritation

Product:

Remarks: Expected to be slightly irritating.
Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.

Serious eye damage/eye irritation

Product:

Remarks: Expected to be slightly irritating.

Respiratory or skin sensitisation

Product:

Remarks: Not expected to be a skin sensitiser.

Germ cell mutagenicity

Product:

Genotoxicity in vivo	: Remarks: Not considered a mutagenic hazard.
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Carcinogenicity

Product:

Remarks: Not expected to be carcinogenic.

Remarks: Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies.
Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC).

Reproductive toxicity

Product:

Effects on fertility :
Remarks: Not expected to impair fertility.
Not expected to be a developmental toxicant.

STOT - single exposure

Product:

Remarks: Not expected to be a hazard.

STOT - repeated exposure

Product:

Remarks: Not expected to be a hazard.

Aspiration toxicity

Product:

Not considered an aspiration hazard.

Further information

Product:

Remarks: Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal.
ALL used oil should be handled with caution and skin contact avoided as far as possible.

Remarks: Slightly irritating to respiratory system.

SECTION 12. ECOLOGICAL INFORMATION

Basis for assessment : Ecotoxicological data have not been determined specifically for this product.
Information given is based on a knowledge of the components and the ecotoxicology of similar products.

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Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s). (LL/EL/IL50 expressed as the nominal amount of product required to prepare aqueous test extract).

Ecotoxicity

Product:

Toxicity to fish (Acute toxicity) : Remarks: Expected to be practically non toxic:
LL/EL/IL50 > 100 mg/l

Toxicity to crustacean (Acute toxicity) : Remarks: Expected to be practically non toxic:
LL/EL/IL50 > 100 mg/l

Toxicity to algae/aquatic plants (Acute toxicity) : Remarks: Expected to be practically non toxic:
LL/EL/IL50 > 100 mg/l

Toxicity to fish (Chronic toxicity) : Remarks: Data not available

Toxicity to crustacean (Chronic toxicity) : Remarks: Data not available

Toxicity to microorganisms (Acute toxicity) : Remarks: Data not available

Persistence and degradability

Product:

Biodegradability : Remarks: Expected to be not readily biodegradable.
Major constituents are expected to be inherently biodegradable, but contains components that may persist in the environment.

Bioaccumulative potential

Product:

Bioaccumulation : Remarks: Contains components with the potential to bioaccumulate.

Partition coefficient: n-octanol/water : Pow: > 6
Remarks: (based on information on similar products)

Mobility in soil

Product:

Mobility : Remarks: Liquid under most environmental conditions.
If it enters soil, it will adsorb to soil particles and will not be mobile.

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Remarks: Floats on water.

Other adverse effects

Product:

Additional ecological information

: Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

Poorly soluble mixture.
May cause physical fouling of aquatic organisms.

Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues

: Waste product should not be allowed to contaminate soil or ground water, or be disposed of into the environment. Waste, spills or used product is dangerous waste.

Disposal should be in accordance with applicable regional, national, and local laws and regulations. Local regulations may be more stringent than regional or national requirements and must be complied with.

Contaminated packaging

: Dispose in accordance with prevailing regulations, preferably to a recognized collector or contractor. The competence of the collector or contractor should be established beforehand. Disposal should be in accordance with applicable regional, national, and local laws and regulations.

SECTION 14. TRANSPORT INFORMATION

National Regulations

TDG

Not regulated as a dangerous good

International Regulation

IATA-DGR

Not regulated as a dangerous good

IMDG-Code

Not regulated as a dangerous good

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Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Pollution category	: Not applicable
Ship type	: Not applicable
Product name	: Not applicable
Special precautions	: Not applicable

Special precautions for user

Remarks	: Special Precautions: Refer to Chapter 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.
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Additional Information	: MARPOL Annex 1 rules apply for bulk shipments by sea.
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SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all the information required by the HPR.

The components of this product are reported in the following inventories:

EINECS	: All components listed or polymer exempt.
TSCA	: All components listed.
DSL	: All components listed.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; CPR - Controlled Products Regulations; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC -

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No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

A vertical bar (|) in the left margin indicates an amendment from the previous version.
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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

CA / EN

Appendix E: Waste Management Table

Table 5 Paramount Resources Ltd. NWT Abandonment Waste Stream and Waste Management Plan.

Because of the small volume of various wastes which may be generated during this activity, a combination waste bin will be provided, and a specialized waste management contractor will handle disposal of the contents at the end of the project

Waste	Storage	NWT Classification	BC Classification	AB Classification	AER Code	Shipping Name	Class	UN #	Packing Group	Disposal
Aerosol Cans (flammable)	Waste Bin-HAZ	HAZ	HAZ	DOW	WSTCGS	AEROSOLS, flammable	2.1	UN1950	-	Turnkey management of HAZ waste provided by contractor
Aerosol Cans (non-flammable)	Waste Bin-HAZ	HAZ	HAZ	DOW	EMTCON	AEROSOLS, non - flammable	2.2	UN1950	-	Turnkey management of HAZ waste provided by contractor
Barrels, Pails (Completely Empty)	Waste Bin	Non-HAZ	Non-HAZ	Non-DOW	EMTCON	-	-	-	-	Turnkey management of non-HAZ waste provided by contractor
Batteries (Dry Cell)	General Recyclable – Various [see <i>Guideline for the Management of Waste Batteries</i> (GNWT, 1998) for recommendation]	Non-HAZ	Non-HAZ	Non-DOW	BATT	-	-	-	-	Turnkey management of non-HAZ waste provided by contractor
Batteries (Dry Cell)		HAZ	HAZ	DOW	BATT	Batteries, dry, containing potassium hydroxide solid, electric storage	8	UN3028	III	Turnkey management of non-HAZ waste provided by contractor
Boiler Blowdown Water (contaminated with HAZ material - dependent on boiler chemicals)	Steel Tank	HAZ	HAZ	DOW	BLBDWT	Environmentally hazardous substance, liquid, N.O.S.	9	UN3082	III	Service rig contractor to arrange transport & disposal at licenced facility in BC or AB
Boiler Blowdown Water (non-contaminated with HAZ material)	Steel Tank	Non-HAZ	Non-HAZ	Non-DOW	BLBDWT	-	-	-	-	Service rig contractor to arrange transport & disposal at licenced facility in BC or AB
Cardboard	Stockpile	Non-HAZ	Non-HAZ	Non-DOW	-	-	-	-	-	Incinerate daily
Cement Returns	Retarded or diluted in steel tank	Non-HAZ	Non-HAZ	Non-DOW	Cement	-	-	-	-	Transport & disposal at licenced facility in BC or AB
Chemicals (inorganic)	Original Containers	HAZ	HAZ	DOW	INOCHM	Dependent on specific waste characteristics (consult TDG Regulations)			Contact Chemical Waste Exchange	
Construction and Demolition Material (uncontaminated)	Stockpile	Non-HAZ	Non-HAZ	Non-DOW	CONMAT	-	-	-	-	Turnkey management of non-HAZ waste provided by contractor
Contaminated Debris and Soil (Chemical/Solvent/Oil/Produced Water)	Contact Paramount Environmental Dept				SOILCH SOILCO SOILPW	Dependent on specific waste characteristics (consult TDG Regulations)			Contact Paramount Environmental Dept for approved landfill location	
Corrosion Inhibitor/Oxygen Scavenger Solutions	Original Containers	HAZ	HAZ	DOW	CORINH	Dependent on specific waste characteristics (consult TDG Regulations)			Turnkey management of HAZ waste provided by contractor	
Filters – Lube Oil	Waste Bin-HAZ	HAZ (depending on flash point and BTEX content)	HAZ (depending on flash point and BTEX content)	DOW (depending on flash point and BTEX content)	FILLUB	Environmentally Hazardous Substance, Solid N.O.S. (lead)	9	UN3077	III	Turnkey management of HAZ waste provided by contractor
Filters – Reverse Osmosis (Granular Activated Carbon, Silica Sand)	Waste Bin- non HAZ	Non-HAZ	Non-HAZ	Non-DOW	FILWTT	Filters (Media) - Water Treatment	-	-	-	Turnkey management of non-HAZ waste provided by contractor

Waste	Storage	NWT Classification	BC Classification	AB Classification	AER Code	Shipping Name	Class	UN #	Packing Group	Disposal
Grease Cartridges (Completely Empty)	Waste Bin- non HAZ	Non-HAZ	Non-HAZ	Non-DOW	EMTCON	-	-	-	-	Turnkey management of non-HAZ waste provided by contractor
Hydraulic and Transmission Oil	Waste Bin- non HAZ				HYDOIL	-	-	-	-	Turnkey management of non-HAZ waste provided by contractor
Kitchen Waste	Temporary Waste Receptacle	Non-HAZ	Non-HAZ	Non-DOW	-	-	-	-	-	Incinerate daily
Incinerator (kitchen waste)	General & Industrial non- HAZ Waste	Non-HAZ	Non-HAZ	Non-DOW	INCASH	-	-	-	-	Turnkey management of non-HAZ waste (ash) provided by contractor
Lead Based Products (Pipe Dope/Greases)	Waste Bin-HAZ	HAZ	HAZ	DOW	LDDOPE	Dependent on specific waste characteristics (consult TDG Regulations)				Turnkey management of HAZ waste provided by contractor
Lubricating Oil (Hydrocarbon and Synthetic)	Above ground disposal tanks; L&P Disposal Receptacles	Non-HAZ (unless containing heavy metals such as Vanadium or Lead	Non-HAZ (unless containing heavy metals such as Vanadium or Lead	Non-HAZ (unless containing heavy metals such as Vanadium or Lead	LUBOIL	-	-	-	-	Turnkey management of HAZ waste provided by contractor
Metal (Scrap) (uncontaminated)	Industrial Recyclable – Scrap Metal	Non-HAZ	Non-HAZ	Non-DOW	SMETAL	-	-	-	-	Recycle location - TBD
Mud Sacks – Completion/Abandonment	Waste Bin- non HAZ	Non-HAZ	Non-HAZ	Non-DOW	EMTCON	-	-	-	-	Turnkey management of non-HAZ waste provided by contractor
Pipe Dope Containers/Brushes (Completely Empty & Dry)	Waste Bin- non HAZ	Non-HAZ	Non-HAZ	Non-DOW	EMTCON	-	-	-	-	Turnkey management of non-HAZ waste provided by contractor
Sewage (Temporary Camps)	Sewage Sump or Storage Tank	Non-HAZ	Non-HAZ	Non-DOW	-	-	-	-	-	Transport & disposal at licenced facility in BC or AB
Thread Protectors – Casing/Tubing	Waste Bin- non HAZ	Non-HAZ	Non-HAZ	Non-DOW	THPROT	-	-	-	-	Turnkey management of non-HAZ waste provided by contractor
Water - Contaminated Produced (Including Brine Solutions)	Storage Tank				WATER					Transport & disposal at licenced facility in BC or AB
Wash Fluids - Water	Steel Tank	Testing Required			WSHWTE	Environmentally Hazardous Substance	9	UN3082	III	Transport & disposal at licenced facility in BC or AB
Water - Grey (Temporary Camp)	Sewage Sump or Grey water holding tank	Non-HAZ	Non-HAZ	Non-DOW	-	-	-	-	-	Transport & disposal at licenced facility in BC or AB

DOW: Dangerous Oilfield Waste HAZ: Hazardous

Packing Group: A group in which dangerous goods are included based on the inherent danger of the dangerous goods.

Packing Group I indicates great danger

Packing Group II indicates medium danger

Packing Group III indicates minor danger