ENVIRONMENTAL PROTECTION PLAN

QIKIQTAALUK ENVIRONMENTAL INC.
LOT 666, PLAN 1673
PARCELS Q AND O
HAZARDOUS WASTE MANAGEMENT, WATER TREATMENT AND SOIL TREATMENT FACILITY

Qikiqtaaluk Environmental Inc.
PO Box 1228
Iqaluit (Nunavut) X0A 0H0

FINAL

August 2015

O/Ref.: QE15-100-13

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LOT 666, PLAN 1673
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HAZARDOUS WASTE MANAGEMENT,
WATER TREATMENT AND
SOIL TREATMENT FACILITY
SOIL TREATMENT

Prepared by: Olivier Simard, B.Sc.
Project Manager – Northern Projects

Verified and approved by: Sylvain Laberge
Project Director – Northern Projects

Qikiqtaaluk environmental
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August 2015

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NOTE TO THE READER

Qikiqtaaluk Environmental Inc. (QE) was established in Iqaluit, Nunavut in 2003. Its activities consist of the management of hazardous and non-hazardous waste, hydrocarbon impacted water treatment and contaminated soil management. QE will pursue its operations and add a soil treatment facility on the property located on Lot 666, Plan 1673, Parcels Q and O (the Site). This Environmental Protection Plan (EPP) describes these activities and how QE intents to safeguard against contaminants from escaping the Site. Monitoring wells, watertight lined cells and storage in marine containers are some of the measures taken by QE to prevent contaminants from escaping from the Site.

Hazardous waste (HW) is collected from various clients in Iqaluit and the surrounding communities. HW consists of, but is not limited to, waste oil, waste fuel, waste gasoline, hydrocarbon contaminated sludge, asbestos containing materials (ACM), lead paint and other lead containing materials, etc. These HWs are often improperly packaged and/or in containers of poor condition. QE's line of business consists of the identification, repackaging, marine transportation and final disposal of this HW. The Site will ultimately be used for that purpose.

Hydrocarbon impacted water is often collected from spills, remediation sites or fuel storage containers during the cleaning process. QE is licensed by the Nunavut Water Board (NWB) to collect, store, treat and discharge this water. The water treatment facility (WTF) consists of a water/oil separator and a series of filters activated by diaphragm pumps. The contaminated and treated water is stored in holding tanks with capacities ranging from 8,000 to 15,000 L. After treatment, confirmatory samples are taken and analyzed for comparison with the discharge criteria included in the NWB Licence. Following receipt of results within criteria, the clean water is then discharged to a dischargelocation authorized in our water license.

QE will treat hydrocarbon contaminated soils using biopile techniques. The contaminated soils are screened to obtain a fine material. This material is then placed on a treatment cell called a biopile. The biopile is comprised of a lined cell with a grid of tubing to inject air into the soils. Amendments are added to the soils to stimulate the bacterial activity that, over time, removes the contaminants from the soils. The soils are covered with a black tarp to maintain higher temperatures and minimize contact water. The rocks obtained from screening are washed to remove adherent soils, inspected and used onsite. QE will also launch a Research and Development project for new technologies that could provide better remediation rates in the Arctic. Monitoring measures put in place by QE consist of on-site monitoring wells to ensure that no contamination escapes.

To facilitate understanding for readers who may need to focus on individual sections of the document, each section was written concisely but is, however, comprehensive enough to be read individually, at the risk of repeating key information within the document.

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LIST OF ABREVIATIONS

AANDC:	Aboriginal Affairs and Northern Development Canada
ACM:	Asbestos containing material
CCME:	Canadian Council of Ministers of the Environment
CEPA:	Canadian Environmental Protection Act
DND:	Department of National Defence
DoE:	Department of Environment
EPP:	Environmental Protection Plan
HCW:	Hydrocarbon contaminated water
HDPE:	High density polyethylene
HW:	Hazardous waste
IMO:	International Marine Organization
MSDS:	Material Safety Data Sheets
NFC:	National Fire Code
NWB:	Nunavut Water Board
PCB:	Polychlorinated Biphenyls
PPE:	Personal Protective Equipment
ppm:	parts per million
SCP:	Spill contingency plan
TDG:	Transport of Dangerous Goods
TDGA:	Transportation of Dangerous Goods Act
TDGR:	Transport of Dangerous Goods Regulation
UN:	United Nations
WTF:	Water treatment facility

ENVIRONMENTAL PROTECTION PLAN OBJECTIVES

The Environmental Protection Plan (EPP) was developed to provide prevention measures for potential environmental impacts associated with the development of Qikiqtaaluk Environmental Inc's (QE) activities. This plan also serves as the basic vehicle for ensuring that efficient and coordinated measures are provided in terms of detection, notification, recording, requests for assistance, containment and countermeasures for hazardous materials spills.

The EPP will be monitored by QE and will be used during daily activities in conjunction with the facility's drawings and specifications.

The EPP defines the following:

- Section 1: Operations regarding hazardous waste management, water treatment and soil treatment;
- Section 2: Environmental and other relevant jurisdictions, including legislation and regulations from federal, territorial and municipal authorities;
- Section 3: Protection measures required to avoid potential environmental impacts;
- Section 4: Emergency plans required to respond to situations which can adversely impact the environment.

The protection measures described within this document shall be implemented by QE to avoid potential adverse environmental impacts. These procedures were developed to take into consideration known and potential situations and conditions. However, if some procedures or protection measures prove to be impractical, imprudent or insufficient in field situations, appropriate modifications will be proposed by QE's Project Manager and approved by the concerned regulatory agency or its representative.

1. OVERVIEW OF THE PROJECT

The Site covers an approximate area of 20,000 m² and bears the legal description Lot 666, Plan 1673, Parcels Q and O (see Appendix A). It is located in the area designated West 40, within the boundaries of the City of Iqaluit. It has an M2 zoning classification, which, according to the City of Iqaluit zoning by-law, allows for heavy industrial activities. The Site is leased from the Iqaluit International Airport (IIA); however, it will soon be transferred to the City of Iqaluit. QE plans to reroute current drainage ditches and restrict public access to the Site through the use of 6 foot-high metal fencing and 3 rows of barbwire at the top of the fence. Surveillance using closed circuit cameras and movement detecting exterior lighting will also be installed.

The Site has for neighbours:

- To the North: An empty industrial lot and an abandoned building;
- To the West: Sylvia Grinnell Territorial Park and empty industrial lots;
- To the South: A DND compound;
- To the East: Industrial lots leased to Hanson Construction Ltd. for cold storage and Wynburg Automotive for automotive repairs.

An office space and warm storage area will be installed in trailers and/or modified marine containers. Heat will be provided by an oil-fired furnace. Heating oil will be delivered to the Site by UQSUQ Corporation, as is standard throughout the City of Iqaluit. Parking spaces and marine containers, to be used for cold storage, will also be part of the Site's infrastructure.

A road will be constructed and the entire Site will be graded to a slight eastern slope to allow rain or melting snow to be drained in the City of Iqaluit's current drainage pathways. Snow piling areas are also included to allow for activities to be carried out all year long.

1.1 Site Activities

The on-site activities will be based to meet CCME and territorial environmental compliance (whichever is more severe). The following sections describe the major activities to be performed and the environmental requirements to be respected. The EPP will be monitored in conjunction with these documents to assess all activities requirements. The major activities include the following:

- Hazardous waste management;
- Water treatment;
- Soil treatment.

1.2 Hazardous Waste Management

QE will implement appropriate waste management procedures for all waste collected during operations.

Non-hazardous solid waste generated as part of the onsite daily activities will be disposed offsite in the City of Iqaluit landfill. Non-hazardous materials expected to be encountered include: packaging materials, building demolition debris, metals, concrete and other debris.

Any hazardous waste generated by QE during daily activities (such as waste fluids and sludge) will be containerized and shipped offsite to authorized facilities.

Hazardous materials will be defined as follows: *wastes or materials that are designated as hazardous under the Nunavut or Federal legislation, or as "dangerous goods" under the TDGA*. The CEPA regulates materials containing PCBs greater than 50 ppm. (As such, soils and materials with PCB concentrations greater than 50 ppm are often referred to as “CEPA”). Specifically identified and/or potentially hazardous materials that QE encounters during daily activities include: PCB contaminated soils (> 50 ppm), demolition debris with PCBs and lead amended paint, batteries, asbestos, fuel tank sludge, solvents, PCB containing liquids, waste fuels and lubricating oils and glycols. The requirements for the disposal of these hazardous materials are presented in Table 1.

TABLE 1:Hazardous Material Requirements for Disposal

Description	Management Procedure

• Liquids containing organic compounds with chlorine concentrations > 1000 ppm;
• Liquids containing organic compounds with heavy metal contamination such as:
  • Cadmium (Cd) > 2 ppm,
  • Chromium (Cr) > 10 ppm,
  • Lead (Pb) > 100 ppm;
• Liquids containing PCB concentrations > 2 ppm and < 50 ppm;
• Batteries;
• Tires.
	Consolidation, containerization, temporary on-site storage and off-site shipment to an authorized treatment/disposal facility.

Asbestos	Double-bagged and temporary on-site storage and off-site shipment to an authorized treatment/disposal facility.
• Fuels; • Lubricating oils; • Solvents and glycols; • Fuel tank sludge.	Consolidation, containerization, temporary on-site storage and off-site shipment to an authorized treatment/disposal facility.
Liquids containing PCBs at > 50 ppm	Consolidation, containerization, temporary on-site storage and off-site shipment to an authorized treatment/disposal facility.

Description	Management Procedure
• Demolition materials with paint containing PCBs at > 50 ppm; • Demolition materials with paint containing lead at >600ppm	Consolidation, containerization, temporary on-site storage and off-site shipment to an authorized treatment/disposal facility.
Soils contaminated with PCBs at > 50 ppm	Containerization, temporary on--site storage and off-site shipment to an authorized treatment/disposal facility.
Biohazard, medical waste	Biohazard packaged in proper Class 8 containers at hospital or health centre. Containers consolidated in a locked marine container prior to shipment.

Workers shall wear suitable PPE and use appropriate materials and equipment for the collection and sorting of hazardous materials.

Activities will take place on a lined area to prevent spills. Contact water will be collected and analyzed before treatment or discharge. Materials awaiting packaging will be covered to limit contact water. Adequate separation and storage will be maintained onsite to avoid product interaction.

1.3 Water Treatment

In August 2014, QE was awarded a NWB Licence #1BR-THI1419 / Type ‘’B’’ to carry out water treatment activities. Under this licence, QE is permitted to collect, store, treat and discharge HCW. HCW is collected by QE from fuel spill clean-up, tank cleaning or liquid waste consolidation activities. The HCW and treated water is stored in 4 different holding tanks, each with capacity ranging from 8,000 to 15,000 L. The tanks will be placed in a bermed area, as stated in the licence conditions, following AANDC review. The bermed area will be designed to contain 30,000 L. More detailed information on WTF activities are included in the NWB licence presented in Appendix B of this EPP.

1.4 Soil Treatment

Biological soil treatment consists of facilitating bacterial activity within contaminated soils in order to remove or reduce contaminants to a standardized concentration. Contaminated soils are placed in a watertight cell, usually made of an HDPE membrane or similar material. Amendments are added to the soils and regular tilling is done.

QE will conduct remediation activities within the City of Iqaluit for soils impacted by hydrocarbons. The contaminated soils collected will be treated to meet the GN DoE *Guideline for Contaminated Site Remediation*.

Table 2 presents the generic contaminated soil remediation criteria that will be used for the soil treatment activities.

TABLE 2: Summary of Tier 1 Criteria (mg/kg) for PHCs in Surface Soils

Land Use	Soil Texture	Fraction 1 (C6-C10)	Fraction 2 (> C10-C16)	Fraction 3 (> C16-C34)	Fraction 4 (> C34)
Agricultural/Wildland	Fine-grained soil	210 (170a)	150	1,300	5600
	Course-grained soil	30b	150	300	2800
Residential/Parkland	Fine-grained soil	210 (170a)	150	1,300	5,600
	Course-grained soil	30b	150	300	2,800
Commercial	Fine-grained soil	320 (170a)	260 (230a)	2,500	6,600
	Course-grained soil	320 (240a)	260	1,700	3,300
Industrial	Fine-grained soil	320 (170a)	260 (230a)	2,500	6,600
	Course-grained soil	320 (240a)	260	1,700	3,300

Work related to the excavation and disposal of contaminated soils will be completed in accordance with the requirements of the GN DoE.

Should other contaminants such as untreatable chemicals or metals exceeding the applicable criteria's be found in some soils, they will be packaged and ship south for final disposal after agreement with the generator.

Any HCWs produced from soil treatment activities will be collected and treated at the adjacent WTF.

2. JURISDICTIONS

2.1 General

QE will respect all applicable federal and/or territorial laws, regulations and requirements. QE will obtain the required permits, approvals and authorizations and will fully comply with said permits and approvals while conducting this work. QE will also work in close collaboration with the GN DoE and all other regulatory authorities to ensure full compliance. This will be applicable to all project phases.

2.2 Federal Jurisdictions

Several federal acts, regulations, and guidelines, which are applicable across Canada, will affect project activities to be conducted at the Site. With respect to the activities QE will undertake at the Site, the most relevant of the federal acts, regulations and guidelines are described as:

- *Canadian Environmental Protection Act*: controls hazardous substances from their production and/or import, to their consumption, storage and/or disposal. This act also includes procedures to handle specified levels of PCB contaminated materials, and requirements for PCB storage facilities;
- *Fisheries Act*: protects fishes and their habitat from pollution and disturbance, and also protects fish movement disturbances. Fisheries and Oceans Canada reviews permit applications or restoration plans submitted by other agencies;
- *Transportation of Dangerous Goods Act* and *Regulations*: describe safety measures for TDG. The act applies to all handling of dangerous goods by any means of transport whether the goods originate from or are destined for anywhere in Canada;
- *Canada Wildlife Act*: ensures that the Government of Canada collaborates in the research and management of wildlife species normally under the responsibility of provinces and/or territories. This is particularly relevant for threatened, endangered and/or vulnerable species, such as polar bears and barn swallows, which seasonally move across various regulatory boundaries;
- *Canada Shipping Act* and *Regulations*: provides safety standards and/or pollution prevention and controls procedures for shipping activities in Canadian waters;
- *Navigable Waters Protection Act*: relates to all facilities required for navigation in Canadian waters;
- *Canada Labour Act* and *Regulations*: is the labour code which governs all federal employees or activities on Canadian owned or controlled lands. Private, provincial or territory employees are always submitted to such jurisdictions. The labour acts govern minimum wages, statutory holidays, and maximum work hours;

- *National Fire Code*: describes the requirements for fire prevention, safety in buildings, firefighting and the maintenance of fire safety equipment including fire extinguishers. Furthermore, the NFC establishes the procedures for the prevention, containment and fighting of fires originating outside buildings. The NFC also defines sets of standards for the storage and handling of dangerous goods, flammable liquids and combustible liquids;

2.3 Nunavut Jurisdictions

In addition to the federal acts and regulations listed in Section 2.2, the Site activities will also comply with the following:

- *Environmental Guideline for Site Remediation* (2002). Government of Nunavut, Department of Environment;
- *Environmental Guideline for Contaminated Site Remediation*, (2003) Government of Nunavut, Department of Environment.

2.4 Other Applicable Jurisdictions

HW to be shipped off-site for disposal will only be sent to licensed disposal facilities and/or waste handlers who comply with the applicable provincial requirements. The Certificates of Authorization for all facilities selected to receive HW originating from the Site will be provided upon request.

2.5 Permits

QE will obtain the necessary permits, authorizations, certificates and approvals related to site operations namely the handling, transport and disposal of hazardous materials. Table 3 presents a partial list of these requirements.

TABLE 3: Applicable Permits and Authorizations for the Site activities

Authorizations or Permits	Regulatory Authorities	Activities	Permitting Agencies	Applicant
Development Permit	Iqaluit Zoning By-Law	Land development	Municipality of Iqaluit #DP15-024	QE
Nunavut Water Board License	NLCA[1]	Treatment of HCW	Nunavut Water Board License #1BR-THI1419	QE
Nunavut Impact Review Board Decision	NLCA[1]	Hazardous Waste Management and Soil Treatment	Nunavut Impact Review Board	QE
Nunavut Planning Commission Decision	NLCA[1]	Whole project	Nunavut Planning Commission	QE
Transportation Permit	TDGA, IATA[2] Dangerous Goods Act	Sea lift and/or air transport of hazardous waste	Transport Canada	QE and Subcontractors
Hazardous Waste Management Facility Registration	Department of Environment	Hazardous Waste Management Facility	Department of Environment NUF#400006	QE
Hazardous Waste Receiver Registration	Department of Environment	Hazardous Waste Management Facility	Department of Environment NUR#300001	QE
Land Lease	Iqaluit International Airport	Land Development	Nunavut Airport Services Ltd.	QE

1. Nunavut Land Claim Agreement
2. International Air Transport Association

3. ENVIRONMENTAL PROTECTION

3.1 Objectives

The procedures and requirements provided hereinafter are intended to protect the environment, ecosystem parameters and human receptors at, and immediately surrounding the Site. It also describes the monitoring measures to be followed from year to year and the procedures to follow if a doubt arises that contamination may have entered the environment.

3.1.1 Hazardous Waste Management Facility

In order to avoid environmental impact, site operations shall require specific procedures and monitoring:

- Workers shall be required to wear suitable PPE while handling HW materials;
- Hazardous materials processing areas shall be developed for hazardous materials management;
- Hazardous materials processing areas shall be located at a minimum distance of 31 m from the nearest water body.
- The movement of heavy machinery, vehicles and equipment between the hazardous materials processing areas and other work site locations shall be controlled to prevent cross contamination;
- The hazardous materials processing area shall be constructed with an impermeable liner covered with 0.3 m of gravel. In the eventuality of a contaminant spill, the liner will act as a barrier preventing contamination from escaping the area;
- Contact water shall be collected and analyzed prior to treatment or discharge;
- Any ignition sources such as smoking, hot work or torch cutting shall be prohibited within a 5 m radius of the hazardous materials processing area;
- Hazardous liquids shall be stored in suitable containers (e.g., 205 L drum, UN-approved 20 L pail with lid, etc.);
- Solid hazardous waste shall be stored in suitable containers such as Quatrex™ bags or marine containers;
- A site-specific SCP has been developed and is attached to this EPP;
- Firefighting equipment shall be made available for immediate access near the hazardous waste processing and storage location;
- Drums containing hazardous materials, including waste fuel, shall be identified and stored in such a way as to prevent spills. The label shall provide health, safety and environmental information;
- For hazardous waste processed or stored on the Site, MSDS shall be made available to personnel;

- Hazardous waste storage facilities shall be inspected a minimum of once a day during business days;
- Emergency spill equipment including fuel pumps, recovery drums, containment booms and other sorbent materials shall be available onsite. QE is responsible for informing the fire department of stored waste so that they may respond appropriately in case of an emergency and for maintaining enough equipment onsite to clean up a 1,000 L spill in the hazardous waste storage area (see the Spill Response Procedure presented in Section 4);
- A detailed inventory will be kept and made available to emergency response crews.

3.1.2 Transportation of Hazardous Materials

- The operators of equipment used to haul waste will be experienced, trained and licensed;
- Hazardous materials shall be shipped off-site, if required, in accordance with the following:
  - provisions from the TDGA, the IMO and the IATA dangerous goods regulations shall be respected,
  - hazardous materials shall be packaged according to requirements specified in the TDGRs,
  - the prescribed documents shall be obtained and accompany any materials classified as hazardous by the TDGA. These documents shall provide the names and addresses of the shipper (generator), consignee (receiver) and all carriers,
- Specific provisions for hazardous materials in quantities larger than 5 kg or 5 L, and for wastes that contain more than 50 ppm PCBs, shall apply as follows:
  - QE shall complete a waste manifest for each shipment. This document shall follow the shipment to its final destination,
  - the origin and destination of the shipment shall be defined. The nature and quantity of dangerous goods shall also be given (shipping name, classification, UN number, packaging group, subsidiary risk, number and kind of packaging, and gross weight),
  - manifests shall be transmitted by the shipper to the initial carrier. When dangerous goods arrive at their final destination, the receiver shall send, within 2 working days, a signed copy of the manifest to the shipper;
- Unknown waste that may require off-site shipment shall be characterized according to regulations to determine whether it must be considered as a transport hazard;
- Hazardous materials to be shipped offsite shall be packaged in accordance with the TDGA, IMO and IATA regulations, which define criteria based on risk;
- Hazardous material containers to be shipped offsite must be provided with prescribed labelling:
  - packages shall be identified according to the hazardous item's class and division. It should be noted that requirements may differ between the IATA, IMO and TDGA regulations. Label or placard designs are unique to each classification,
  - packages shall be labelled on a minimum of 2 sides of the container and the nature of the dangerous goods shall be clearly identified on the label (i.e., shipping name, UN number, classification, packaging group);

- All materials known to exceed the CEPA criteria shall be containerized in selected rigid sided containers that comply with the TDGA and shall be stored at the temporary staging area;
- Fluids (including water) resulting from the cleaning (i.e., decontamination) of equipment and heavy machinery used in the hazardous waste management areas shall be contained, tested and treated, as per regulations;
- Hazardous materials, including hazardous drum contents, shall be treated and disposed of in accordance with regulations;
- Hazardous materials (fluids and solids) shall be removed and placed in storage containers for shipment to an authorized disposal facility.

3.1.3 Water Treatment

Water treatment activities are governed and regulated through QE's NWB License. A copy of this License is provided in Appendix B. The main mitigation and safety measures are:

- Treated water must meet discharge criteria;
- Treated water discharge location must be approved by an AANDC field officer;
- AANDC field officer must be given a minimum 10 days' notice before every discharge event.

For a more detailed comprehension of the WTF, please refer to Appendix A.

3.1.4 Soil Treatment

Hydrocarbon impacted soils will be treated onsite using biological soil treatment techniques. Measures to avoid contaminants escaping are:

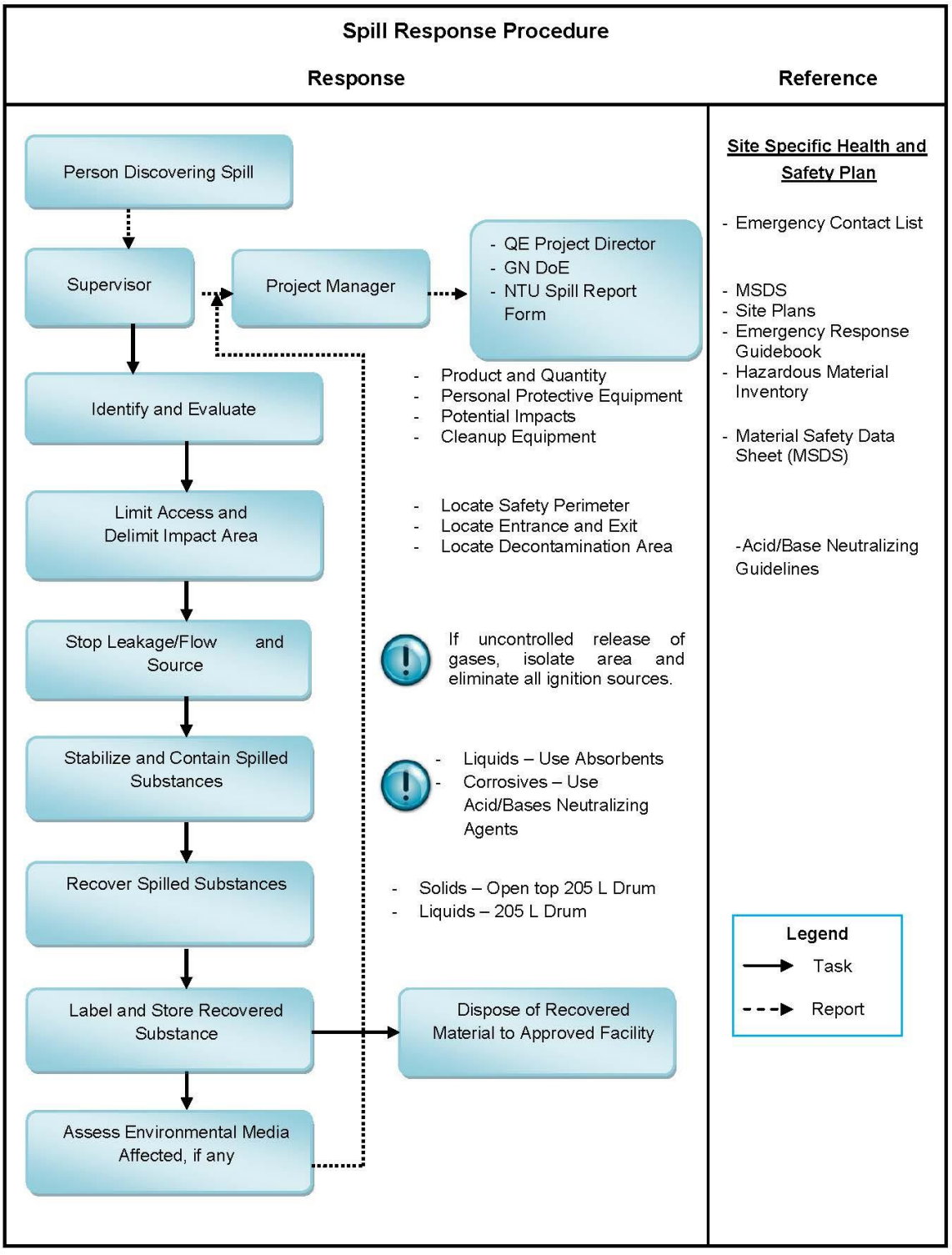
- Containment cell shall be watertight and made of a minimum 30 mil HDPE liner or similar;
- The processing area is composed of a containment cell and also includes a watertight liner covered with 0.3 m of aggregate;
- A lined water collection pond shall be located between the treatment cell and processing area;
- The processing area, water collection pond and treatment cells will be components of the same watertight liner, thus avoiding contaminants to escape while soils are being processed;
- Water accumulating in the collection pond will be analyzed to determine whether it is to be treated or discharged;
- Monitoring wells will be installed around the processing area and treatment cells. Water samples will be collected once a year, in August, and analyzed at a certified laboratory;
- The treatment cell will be covered with a tarp-like fabric to minimize the amount of snowmelt or rainwater to be collected;
- Visual inspection of the cells will occur every business day;

- Upon treatment completion, laboratory results will be transferred to GN DoE to confirm treatment success. Only upon receipt of an approval from the regulatory agency will QE remove the soils from the treatment cell.

Please note that biological soil treatment **does not** represent a deposit of waste, since the contaminated soil is separated from the environment by the watertight liner. Biological soil treatment activities will not use water. Water collected in the collection pond will be used to moisten the soils, as required. **No other source of water will be used.**

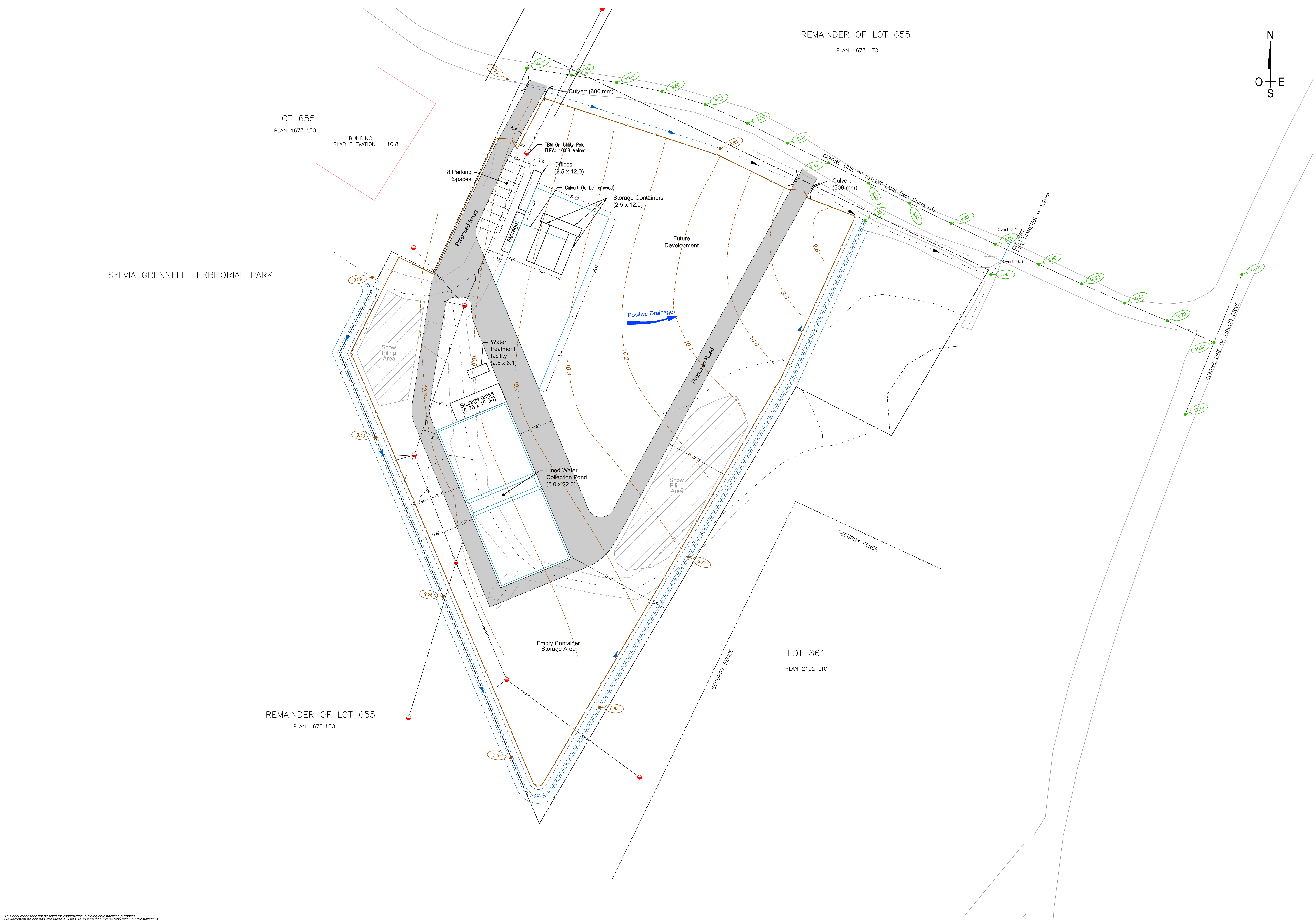
4. SPILL RESPONSE PROCEDURE

Find below the spill response algorithms to be followed by all QE employees upon discovery of a hazardous material spill. A complete Spill Contingency Plan is provided in Appendix C.



APPENDIX A

SITE PLAN



Legend

- Proposed Draining Ground Elevation (m)
- Proposed Draining Ditch Elevation (m)
- Existing Elevation (m)
- Proposed Fence
- Proposed Ditch
- Overhead Electrical Line
- Boundary of Lease (approximate location)

PRELIMINARY

Source :
- *Sub-Arctic Surveys Ltd.; File no. 15-206-QE-JL14-TOPO; July 16, 2015;*
- *Iqaluit - Survey Sketch 001-2015.dwg*

0 5 10 15 20 25m

Figure 1

Site Plan

Presented to:

PROPOSED DEVELOPMENT PLAN

Iqaluit
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Property located at:
Lease parcels O and Q,
Airport lands in Yellowknife, NT

Drawn by:	Verified by:	Approved by:	
J. Bergeron	S. Laberge	S. Laberge	
Date:	Drawing no.:	Geodetic reference:	
2015-08-06	QE15-100-4-05 A	MTM/NAD83	Zone 23

Qikiqtaaluk environmental

This document shall not be used for construction, building or installation purposes.
Ce document ne doit pas être utilisé aux fins de construction (ou de fabrication ou d'installation)

APPENDIX B

NUNAVUT WATER BOARD LICENCE

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File No.: **1BR-THI1419**

August 20, 2014

Greg Johnson, Director
C/o Qikiqtaaluk Environmental Inc.
9935 Ave Catania, Entrance 1, Suite 200
Montreal, QC J4Z 3V4

Email: gjohnson@qenv.ca

RE: NWB Water Licence No. 1BR-THI1419

Dear Mr. Johnson:

Please find attached Licence No. **1BR-THI1419** issued to Qikiqtaaluk Environmental Inc. by the Nunavut Water Board (NWB) pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada* (*Nunavut Land Claims Agreement or NLCA*). The terms and conditions of the attached Licence related to Water use and waste deposit are an integral part of this approval.

If the Licensee contemplates the renewal of this Licence, it is the responsibility of the Licensee to apply to the NWB for its renewal. The past performance of the Licensee, new documentation and information, and issues raised during a public hearing, if the NWB is required to hold one, will be used to determine the terms and conditions of the Licence renewal. Note that if the Licence expires before the NWB issues a new one, then Water use and waste disposal must cease, or the Licensee may be in contravention of the *Nunavut Land Claims Agreement* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. However, the expiry or cancellation of a licence does not relieve the holder from any obligations imposed by the licence. The NWB recommends that an application for the renewal of this Licence be filed at least three (3) months prior to the Licence expiry date.

If the Licensee contemplates or requires an amendment to this licence, the NWB may decide, in the public interest, to hold a public hearing. The Licensee should submit applications for amendment as soon as possible to give the NWB sufficient time to go through the amendment process. The process and timing may vary depending on the scope of the amendment; however, a minimum of sixty (60) days is required from time of acceptance by the NWB. It is the responsibility of the Licensee to ensure that all application materials have been received and are acknowledged by the Manager of Licensing.

The NWB strongly recommends that the Licensee consult the comments received from interested persons on issues identified. This information is attached for your consideration.[1]

Sincerely,

Thomas Kabloona
Nunavut Water Board
Chair

TK/sa/ri

Enclosure: Licence No. **1BR-THI1419**
Comments – AANDC

Cc: Qikiqtani Distribution List

[1] Aboriginal Affairs and Northern Development Canada (AANDC), May 27, 2014.

DECISION

LICENCE NUMBER 1BR-THI1419

This is the decision of the Nunavut Water Board (NWB) with respect to an application, dated March 15, 2014, for a new Water Licence made by:

QIKIQTAALUK ENVIRONMENTAL INC.

to allow for the disposal of waste during the operation of a commercial Hydrocarbon Impacted Water Treatment Facility located within the City of Iqaluit, Nunavut, generally at the following geographical coordinates:

Latitude: (63° 45' 45" N) Longitude: (68° 32' 36" W)
Latitude: (63° 45' 45" N) Longitude: (68° 32' 35" W)
Latitude: (63° 45' 44" N) Longitude: (68° 32' 44" W)
Latitude: (63° 45' 44" N) Longitude: (68° 32' 41" W) (Water Treatment Facility Extents)

DECISION

After having been satisfied that the application was for a location that falls outside of an area with an approved Land Use Plan[2] and exempt from the requirement for screening as described within Schedule 12-1 by the Nunavut Impact Review Board[3] in accordance with Article 12 of the *Nunavut Land Claim Agreement* (*NLCA*), the NWB decided that the application could proceed through the regulatory process. In accordance with s.55.1 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (*Act*) and Article 13 of the *NLCA*, public notice of the application was given and interested persons were invited to make representations to the NWB.

After reviewing the submission of the applicant and considering the representations made by interested persons, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the *NLCA* and of the *Act*, waived the requirement to hold a public hearing, and determined that:

Licence No. 1BR-THI1419 be issued subject to the terms and conditions contained therein. (Motion #: 2014-B1-016)

Signed this 15th day of July 2014 at Gjoa Haven, NU.

Thomas Kabloona
Nunavut Water Board, Chair
TK/sa/ri

[2] Nunavut Planning Commission Land, Use Conformity Determination, July 26 2013.
[3] Nunavut Impact Review Board Screening Exemption Decision, April 28 2014.

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INTRODUCTION

Between September 2013 and March 2014, the Board received, from Qikiqtaaluk Environmental Inc. (the Licensee or Proponent), an application and supporting information (Application) for a Type "B" Licence to construct and operate a proposed Water Treatment Facility (WTF) for the purpose of treating hydrocarbon impacted Water generated from spills occurring within the City of Iqaluit, Nunavut.

The WTF is expected to include the following main components:

- an oil/Water separator;
- particulate filters;
- activated carbon filters;
- patented ultra-sorption filters;
- Water pumps; and
- treated effluent storage reservoirs (from which the effluent will be sampled and analyzed prior being discharge).

The waste generated from the treatment process, including oil, lubricants, sludge, waste filter, and contaminated soil, is expected to be treated and/or disposed of at an approved facility in accordance with applicable regulations.

PROCEDURAL HISTORY

The following is a list of the submissions received by the Board in support of the Application:

September 12, 2013

- General Water Licence Application;
- Abandonment and Remediation Plan, Hydrocarbon Impacted Water Treatment, dated September 2013;
- Qikiqtaaluk Environmental Inc., Certificate of Incorporation, Industry Canada;
- Hydrocarbon Impacted Water Treatment, Cost Estimate in Case of Abandonment for Security;
- Cover letter, dated on September 12, 2013, in English and Inuktitut;
- Layout of Water Treatment Unit (two drawings);
- Spill Contingency Plan Hydrocarbon Impacted Water Treatment, dated September 2013;
- Table of Contents; and
- City of Iqaluit, Topographical Map.

Received on March 17, 2014

Updated Water Licence Application, Hydrocarbon Impacted Water Treatment dated March 15, 2014, containing:

- General Water Licence (Application for a New Water Licence);
- Figure 4: Water Treatment Unit;
- Figure 5: Water Treatment Unit;
- Hydrocarbon Impacted Water Treatment Cost Estimate in Case of Abandonment for Security;
- Industry Canada, Certificate of Incorporation;
- Executive Summary (English), dated September 12, 2013;

- Executive Summary, Inukitut;
- Spill Contingency Plan Hydrocarbon Impacted Water Treatment, dated September 2013;
- Abandonment and Remediation Plan Hydrocarbon Impacted Water, dated September 2013; and
- Supplementary Information Requirements, Re: File No. 1BR-THI---, Type "B" Application by Qikiqtaaluk Environmental Inc. for a Hydrocarbon Impacted Water Treatment Project, dated March 14, 2014.

Following an internal review, the NWB distributed the Application on April 23, 2014 for a thirty (30) day public comment period with a deadline for submissions set for May 23, 2014. Due to administrative matters associated with some of the information provided, the deadline for submission was extended to May 27, 2014. On or before the extended deadline, a submission was received from Aboriginal Affairs and Northern Development Canada (AANDC). In its submission, AANDC provided comments and recommendations with respect to measures that the Proponent could implement to minimize potential impacts of the project on the receiving environment; however, it did not provide any written objections to the potential issuance of a licence.

Apart from the comments received from AANDC, the Board received the NPC Land Use Conformity Determination for the project on September 12, 2013, which states that the Project proposal is located outside the boundaries of the two currently approved land use plans. In addition, the Board received on April 28, 2014, the NIRB determination for the project, which states that the Application is exempt from screening pursuant to Schedule 12-1 of the NLCA.

Copies of the submission received as well as all documents related to this Application can be accessed through the NWB's ftp site using the following link (**Username**: public and **Password**: registry):

ftp://nunavutWaterboard.org/1%20PRUC%20PUBLIC%20REGISTRY/1%20INDUSTRIAL/1B/1BR%20-%20Remediation/1BR-THI----%20Qik%20Env/.

GENERAL CONSIDERATIONS

Term of the Licence

In accordance with the Nunavut Waters and Nunavut Surface Rights Tribunal Act, s. 45, the NWB may issue a licence for a term not exceeding twenty-five (25) years. The Proponent requested in its Application a twenty five (25) year term for the licence. However, the Board has granted a five-year-term licence to the Project, which is generally granted for new licences for this type of an undertaking. AANDC also provided comments within their submission regarding a shorter term and that a five year licence term is recommended to allow an earlier opportunity to reconsider licence terms and conditions. The Board believes that the term granted will provide the Licensee with adequate opportunity to consistently demonstrate its ability to comply with the requirements in the Licence in advance of any future renewal and/or consideration of a longer term licence by the Board.

Annual Report
Under the reporting section of the Licence, Part B, Item 1, the Licensee is required to submit, on an annual basis, a report that describes the Licensee's activities as they relate to waste deposition during the preceding year. The Board makes annual reporting information available to interested persons upon request in addition to making the information available in its public registry. Public access to annual information reporting submitted by all licensees is made available through the NWB's ftp site using the following link (**Username**: public and **Password**: registry): ftp://nunavutwaterboard.org/1%20PRUC%20PUBLIC%20REGISTRY/.

Security
As part of its Application, the Proponent included a financial estimate of $79,340 for potential reclamation activities that might be associated with the proposed project in the document entitled *Hydrocarbon Impacted Water Treatment, Cost Estimate in Case of Abandonment for Security*, received September 12, 2013. AANDC in its submission indicated that it believes that the cost estimate provided by the Proponent is reasonable and should be considered by the Board. While the Board welcomes the information on reclamation security provided by the Proponent, the Board has decided to exclude, at this time, requirements in the licence related to posting of reclamation security for the Project. The Board understands that reclamation security for this type of undertaking has to be examined in a holistic manner and in accordance with the type of undertaking so as to avoid a tiered approach to reclamation security requirements for similar undertakings. The Proponent is, however, required to update the security estimate provide, as needed, to reflect the scope of and operational conditions for the project over time, under Part C, Item 2 in the Licence. In addition, should the Project scope change or further reviews of subsequent applications and information provided through Annual Reports and Inspection Reports warrant the need, and the Board approach to reclamation security broaden, the requirements for providing a total reclamation security for site liability may be required.

Deposit of Waste
Details provided in the Application indicate that, in addition to the treatment of hydrocarbon contaminated Water/snow/ice and the discharge of effluent in accordance with the licence conditions and Effluent quality criteria under Part E, Item 10, the following waste types will potentially be generated by the Water Treatment Facility (WTF): waste fuel and filters; oil, lubricants and liquid sludge; contaminated Water; contaminated soil; and other hydrocarbon contaminated waste. All waste generated will require management in accordance with the terms and conditions in this licence and/or applicable legislations and guidelines for wastes generated and proposed to be removed from site to an approved hazardous waste management facility.

Under Part E, of the Licence, the Licensee is required to manage primary waste and residual waste generated from its undertaking in accordance with applicable regulations including the Government of Nunavut - Department of Environment, *Environmental Guideline for Used Oil and Waste Fuel* (June 2012). Additional conditions have been included under Part E of this Licence to address overall waste management practices.

Spill Contingency Plan
Under Part H, Item 1 of the Licence, the Board has approved the Spill Contingency Plan submitted as additional information with the Application. The Licensee is, however, required

to address and submit, with its 2014 Annual Report, a revised plan as outlined in Item 2, that addresses comments and recommendations provided by AANDC during comment period and any other revisions that may become apparent in carrying out the activities associated with the undertaking.

Abandonment and Restoration Plan

The Board has approved the Interim Abandonment and Restoration (A&R) Plan that was submitted as additional information with the Application under Part I, Item 1 in the Licence. The licensee is required to annually review the Plan and to update the A&R plan on an ongoing basis to reflect any changes in operational conditions and scope of activities associated with the project.

Monitoring

Petroleum products or petroleum hydrocarbons (PHC) is a general term used to describe mixtures of organic compounds found in or derived from substances such as oil, bitumen and coal. These products released to soil and water can lead to contaminants entering into the environment through volatilization, adsorption to solid organic matter, leaching by rainwater and dissolution into groundwater, or through contaminated surface runoff migration to oceans, lakes, rivers and streams.

Accordingly to the Application, treated water previously impacted by petroleum products, will be discharged at the Final Discharge Point, with the effluent Final Discharge Point location yet undetermined.

To ensure that effluent generated from the facility does not exceed specific criteria, the Board has included general Effluent quality limits for the treated effluent, at the point of discharge, under Part E, Item 10. Parameters not included under Part E, Item 10 but relevant to the undertaking must not exceed values set in the Canadian Council of Ministers of Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life.

Furthermore, characterization of effluent, soil and Waters at the Final Point of Discharge, in addition to the information of contaminants levels, would help on determining if the discharged effluent had an impact on the environment and, if contamination is identified, would help to determine those parameters that shall be tracked during the remediation process.

Analysis recommended for soil and water characterization where petroleum hydrocarbon contamination is suspected[4,5] include Total Petroleum Hydrocarbon (TPH), Polycyclic Aromatic Hydrocarbons collectively referred as PHAs, benzene, toluene, ethylbenzene and xylenes collectively referred as BTEX and Canadian Wide Standards for petroleum hydrocarbon in soil fractions, CWS-PHC fractions. These contaminants are usually accompanied by heavy metals such as chromium, copper, lead, manganese, nickel and zinc that are commonly found in used lubricating oil from friction wear on engine parts.

Therefore, under Part J, Item 4 of the Licence, the Board has established a list of additional

4 Federal Guidelines for Landfarming Petroleum Hydrocarbon Contaminated Soils, Federal Contaminated Sites Action Plan (FCSAP), 2013

5 Guideline for the Dismantling and Removal of Petroleum Storage Tank Systems, Manitoba, 2007

parameters that the licensee is required to monitor for the purposes of developing site-specific effluent quality criteria and/or limits given that such criteria and limits may be more reflective of operational conditions for the treatment processes involved and the receiving environment at the final point of discharge.

And, under Part J, Item 6, the Board has included conditions that require the Licensee to submit a Monitoring Plan to the Board for approval, within sixty (60) days following the date of issuance of this Licence. To ensure that monitoring is conducted in accordance with established practices, the Board has included conditions requiring the Licensee to submit a Quality Assurance / Quality Control (QA/QC) Plan along with a cover letter from an accredited laboratory confirming acceptance of the Plan.

Operation and Maintenance Plan

To ensure that documented procedures pertaining to the operation of the facility for the undertaking are developed, the Licensee is required to submit an Operation and Maintenance (O&M) Plan for the WTF, to address the collection, treatment, and discharge of petroleum hydrocarbon impacted snow/ice/water and the handling of wastes generated from the undertaking requiring shipment off-site to an approved hazardous waste handling facility. Part G, Item 4 addresses the requirement to submit an O&M Plan within sixty (60) days from the date of issuance of this licence.

NUNAVUT WATER BOARD
WATER LICENCE

Licence No. 1BR-THI1419

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

QIKIQTAALUK ENVIRONMENTAL INC.

(Licensee)

9935 AVE CATANIA, ENTRANCE 1, SUITE 200, MONTREAL, QC J4Z 3V4

(Mailing Address)

herein after called the Licensee, the right to alter, divert or otherwise use Water or dispose of waste for a period subject to restrictions and conditions contained within this Licence:

Licence Number/Type:	1BR-THI1419 / TYPE "B"
Water Management Area:	FROBISHER BAY WATERSHED (53)
Location:	CITY OF IQALUIT / QIKIQTANI REGION, NUNAVUT
Classification:	INDUSTRIAL – TYPE "B"
Purpose:	DEPOSIT OF WASTE
Quantity of Water use not to Exceed:	USE OF WATER NOT AUTHORIZED
Date of Licence Issuance:	AUGUST 20, 2014
Expiry of Licence:	AUGUST 19, 2019

This Licence issued and recorded at Gjoa Haven, Nunavut, includes and is subject to the annexed conditions.

Thomas Kabloona,
Nunavut Water Board, Chair

PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

Scope

This Licence allows for the deposit of waste from an Industrial undertaking classified as *per* Schedule 1 of the *Regulations* at the Qikiqtaaluk Environmental Inc.'s Hydrocarbon Impacted Water Treatment Facility Project, located in an industrial area within the City of Iqaluit, Qikiqtani Region, Nunavut.

a. This Licence is issued subject to the conditions contained herein with respect to the depositing of waste of any type in any Waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any Waters. Whenever new Regulations are made or existing *Regulations* are amended by the Governor in Council under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be subject to such requirements; and

b. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

1. **Definitions**

"**Act**" means the Nunavut Waters and Nunavut Surface Rights Tribunal Act;

"**Addendum**" means the supplemental text that is added to a full plan or report usually included at the end of the document and is not intended to require a full resubmission of the revised report;

"**Amendment**" means a change to original terms and conditions of this Licence requiring correction, addition or deletion of specific terms and conditions of the Licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

"**Analyst**" means an Analyst designated by the Minister under Section 85 (1) of the Act;

"**Appurtenant Undertaking**" means an undertaking in relation to which a use of Water or a deposit of waste is permitted by a licence issued by the Board;

"**Batch Discharge**" means the controlled discharge of a discrete, contained volume of effluent from the WTF at the Final Discharge Point. The maximum volume of a batch discharge shall not exceed 21,000 m^3 per batch, otherwise as permitted by an Inspector;

"**Board**" means the Nunavut Water Board established under the *Nunavut Land Claims Agreement* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act;*

"**Care and Maintenance**" in respect of operation, means when the Licensee ceases production or commercial operation for an undefined period of time;

"**Construction**" means any activities undertaken to establish and install any or all components of the Water Treatment Facility;

"**Effluent**" means treated liquid waste material from the Water Treatment Facility;

"**Engineer**" means a professional engineer registered to practice in Nunavut in accordance with the *Consolidation of Engineers and Geoscientists Act S. Nu 2008, c.2* and the *Engineering and Geoscience Professions Act S.N.W.T. 2006, c.16 Amended by S.N.W.T. 2009, c.12*;

"**Final Discharge Point"** means the point at which the Licensee releases the treated water or effluent from the WTF;

"Hazardous waste" means waste classified as "hazardous" by Nunavut Territorial or Federal Legislation, or as "dangerous goods" under the Transportation of Dangerous Goods Act at the time of clean-up;

"**High Water Mark**" means the usual or average level to which a body of Water rises at its highest point and remains for sufficient time so as to change the characteristics of the land (ref. Department of Fisheries and Oceans Canada, Operational Statement: Mineral Exploration Activities);

"**ICP Scan**" means the laboratory method for determining trace metals in leachate or Water through Emission Spectroscopy using inductively coupled plasma (including from approximately 22 to 32 elements, depending on the laboratory performing the analysis);

"**Inspector**" means an Inspector designated by the Minister under Section 85 (1) of the *Act*;

"**Licensee**" means the holder of this Licence;

"**Minister**" means the Minister of Aboriginal Affairs and Northern Development Canada;

"**Modification**" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"**Monitoring Program**" means a program established to collect data on surface Water, groundWater, and soil quality to assess impacts to the environment of an appurtenant undertaking;

"**Nunavut Land Claims Agreement (NLCA)**" means the *"Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*",

including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"**Regulations**" means the *Nunavut Waters Regulations* SOR/2013-69 18th April, 2013;

"**Seepage**" means any Water that drains through or escapes from any structure designed to contain, withhold, divert or retain Water or waste;

"**Spill Contingency Plan**" means a Plan developed to deal with unforeseen petroleum and hazardous materials events that may occur during the operations conducted under the Licence;

"**Secondary Containment**" means an impermeable structure, external to and separate from primary containment, which prevents unplanned spills of hazardous materials and provides a minimum capacity of 110% of the original vessel. Where multiple vessels are stored within the containment, it must provide a minimum capacity equal to the sum of the largest vessel and 10% of the aggregate volume of all other vessels located in the containment. This structure shall also provide containment and control of hoses and nozzles;

"**Sump**" is a structure or depression that collects, controls, and filters liquid waste before it is released to the environment. This structure should be designed to prevent erosion while allowing percolation of liquid waste;

"**Waste**" means, as defined in S.4 of the *Act*, any substance that, by itself or in combination with other substances found in Water, would have the effect of altering the quality of any Water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any Water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means;

"**Water**" **or "Waters**" means Waters as defined in section 4 of the Act;

"**Water Treatment Facility (WTF)**" means the Water treatment facility and associated components, including the Water Treatment Unit, piping, pumps and storage tanks used to treat hydrocarbon impacted Water as described in the March 15, 2014 Application and Figure 3, Layout of treatment equipment and waste storage area; Figure 4, Water treatment unit; and Figure 5, Water treatment unit.

2. **Enforcement**
   a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;
   b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*; and

3. For the purpose of enforcing this Licence and with respect to the deposit or discharge of waste by the Licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report on the Appurtenant Undertaking with the Board no later than March 31 of the year following the calendar year being reported, containing the following information:

    a. a summary report of the following activities:
        i. quantity of Petroleum Hydrocarbon Contaminated (PHC) water/snow/ice collected for treatment through the Water Treatment Facility (WTF);
        ii. quantity of collected soil for removal and treatment at an approved facility;
        iii. quantity of waste generated from the undertaking including petroleum, oil, and lubricants (POL), sludge, waste filter media, and any other waste resulting from the treatment of Water at the WTF;
        iv. an inventory of contaminated Water stored at the project site; and
        v. an inventory of treated Water stored at the project site.
    b. a summary of waste disposal activities:
        i. quantity of soil sent for treatment at approved facilities;
        ii. Effluent discharged to the receiving environment from the WTF including location and quality of Effluent discharged;
        iii. a summary of all waste backhauled, including hazardous waste, for disposal at approved facilities under Part E, Items 12, 13 and 14;
    c. a list of any unauthorized discharges and a summary of follow-up actions taken;
    d. a summary of maintenance work performed on the WTF;
    e. any revisions to the plans approved under this licence, including the Spill Contingency Plan and Abandonment and Restoration Plan, as required by Part B, Item 6. Revisions should be submitted in the form of Addenda;
    f. a description of all progressive and or final reclamation work undertaken, including photographic records of site conditions before, during and after completion of operations;
    g. a review of the reclamation cost estimate, as required by Part C, Item 1;
    h. tabular summary of all information requested and results of the Monitoring Program;
    i. an analysis of data collected during the "Monitoring Program" and a brief description of any future studies planned by the Licensee;
    j. a public consultation/participation report describing consultation with local organizations and the residents of the nearby communities; and
    k. any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

2. The Licensee shall notify the NWB of any normal changes in operating plans or conditions associated with this project at least thirty (30) days prior to any such change.

3. The Licensee shall install flow meters or other such devices, or implement suitable methods required for the measuring of Effluent volumes discharged into the receiving environment at the Final Discharge Point as required under Part J, Item 2 to the

satisfaction of the Inspector.

4. The Licensee shall, for all Plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted cannot be undertaken without subsequent written Board approval and direction. The Board may alter or modify a Plan if necessary to achieve the legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the Plan.

5. The Licensee shall, for all Plans submitted under this Licence, implement the Plan as approved by the Board in writing.

6. The Licensee shall review the Plans referred to in this Licence, as required by changes in operation and/or technology, and modify the Plan accordingly. Revisions to the Plans shall be submitted in the form of Addenda to be included with the Annual Report.

7. Every Plan to be carried out pursuant to the terms and conditions of this Licence shall become a part of this Licence, and any additional terms and conditions imposed upon approval of a Plan by the Board become part of this Licence. All terms and conditions of the Licence should be contemplated in the development of a Plan where appropriate.

8. The Licensee shall ensure a copy of this Licence is maintained at the site of operations at all times. Any communication with respect to this Licence shall be made in writing to the attention of:

   (a) **Manager of Licensing:**
   Nunavut Water Board
   P.O. Box 119
   Gjoa Haven, NU X0B 1J0
   Telephone: (867) 360-6338
   Fax: (867) 360-6369
   Email: licensing@nwb-oen.ca

   (b) **Inspector Contact:**
   Water Resources Officer, AANDC
   Nunavut District, Nunavut Region
   P.O. Box 100
   Iqaluit, NU X0A 0H0
   Telephone: (867) 975-4295
   Fax: (867) 979-6445

9. The Licensee shall submit one paper copy and one electronic copy of all reports, studies, and plans to the Board. Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in Inuktitut.

10. The Licensee shall ensure that any document(s) or correspondence submitted by the Licensee to the NWB is received and acknowledged by the Manager of Licensing.

11. This Licence is assignable as provided for in Section 44 of the *Act*.

PART C: CONDITIONS APPLYING TO SECURITY

1. The Licensee shall review, annually, the reclamation cost estimate submitted as part of the Application for this Licence. Any changes made to the estimate should be submitted to the Board for review with the Annual Report required in Part B, Item 1.

2. The Licensee shall provide a revised reclamation/closure cost estimate to the Board for approval in writing, within sixty (60) days of receiving notice, that the estimate provided under Part C, Item 1 was not acceptable to the Board.

PART D: CONDITIONS APPLYING TO WATER USE

1. The Licensee is not authorized to use Water under this Licence.

PART E: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall provide at least fifteen (15) days' notice in writing, to an Inspector prior to any planned discharge of Effluent from the WTF. The notice shall include the volumes proposed for discharge, the analytical results for Water quality of the proposed discharge, location of discharge and an indication of any nearby Water bodies that may be impacted.

2. The Licensee shall confirm, with an Inspector, the suitable location(s) for Final Discharge Point(s) for Effluent from the WTF to be discharge prior to any discharge into the receiving environment.

3. The Licensee shall locate areas designated for waste disposal at a minimum distance of thirty-one (31) metres from the ordinary High Water Mark of any Water body such that the quality, quantity or flow of Water is not impaired, unless otherwise approved by the Board in writing.

4. The Licence shall implement appropriate measures to minimize erosion during any discharge of Effluent from the WTF into the receiving environment.

5. The Licensee shall treat all hydrocarbon-impacted Water/snow/ice at the Water Treatment Facility or as otherwise approved by the Board in writing.

6. The Licensee shall operate and maintain the WTF to the satisfaction of an Inspector and in accordance with acceptable engineering standards and the Operation and Maintenance Plan required under Part G, Item 4.

7. The License shall not combine incompatible waste types for the purpose of storage, shipment, buffering concentration of waste constituents or for any other purposes unless authorized by the Board in writing.

8. The License shall store, transport and treat all Waste generated for the undertaking in accordance with applicable regulations and best management practices and at approved facilities.

9. The Licensee shall maintain the Water treatment facility areas such that generation of dust and ponding of surface Water are minimized.

10. All Effluent discharged from Monitoring Program Station **THI -1** shall not exceed the following Effluent quality limits:

Parameter	Maximum Allowable Concentration of any Grab Sample (mg/L)
pH	6.5 to 9 (pH units)
TSS	50
Oil and Grease	15 and no visible sheen
Total Lead	0.001
Benzene	0.370
Toluene	0.002
Ethyl benzene	0.090

11. The Licensee shall establish and confirm compliance with Effluent quality limits of Part E, Item 10 prior to discharge.

12. If the Effluent referred to in Part E, Item 10 does not meet the discharge criteria, it shall be considered hazardous waste and be disposed off-site at an approved hazardous waste facility or as otherwise approved by the Board in writing.

13. The Licensee shall provide the Board with documented authorization from any community in Nunavut receiving waste from the Qikiqtaaluk Environmental Inc. Water Treatment Facility.

14. The Licensee shall maintain records of all waste stored, transported and final destinations, including details confirming proper disposal of the waste through a waste manifest. Detail related to waste backhauled should be included with the Annual Report in Part B, Item 1 and/or made available to and Inspector upon request.

PART F: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written consent from the Board, carry out Modifications to the Water Supply Facilities and Waste Disposal Facilities provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:

   a. the Licensee has notified the Board in writing of such proposed Modifications at least sixty (60) days prior to beginning the Modifications;
   b. such Modifications do not place the Licensee in contravention of the Licence or

the Act;

c. such Modifications do not change the scope of the project as approved by NIRB Decision;

d. the Board has not, during the sixty (60) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and

e. the Board has not rejected the proposed Modifications.

2. Modifications for which all of the conditions referred to in Part F, Item 1 have not been met can be carried out only with written approval from the Board.

3. The Licensee shall provide as-built plans and drawings of the Modifications referred to in this Licence within ninety (90) days of completion of the Modification. These plans and drawings shall be stamped by an Engineer.

PART G: CONDITIONS APPLYING TO CONSTRUCTION

1. The Licensee shall submit to the Board for review, at least sixty (60) days prior to the commencement of construction of any dams, dykes or structures intended to contain, withhold, divert or retain Water or waste, including facilities or systems for the storage and treatment of hydrocarbon contaminated Water, for-construction design drawings and plans, stamped by an Engineer.

2. The Licensee shall provide to the Board, within ninety (90) days of completion of the construction of any dams, dykes or structures intended to contain, withhold, divert or retains water or waste, including facilities or systems for the storage, treatment and disposal of hydrocarbon contaminated Water and wastes, design drawings and construction reports, including as-built drawings stamped by an Engineer, documentation of field decisions that deviate from original plans, and any data used to support these decisions.

3. The Licensee shall conduct all activities in such a manner as to minimize impacts on surface drainage and immediately undertake and implement corrective measures in the event of any impacts on surface drainage.

4. The Licensee shall submit to the Board for approval within ninety (90) days of Licence issue, an Operation and Maintenance Plan (O&M) that addresses the collection, treatment of petroleum hydrocarbon impacted snow/ice/water, and effluent discharge. The O&M shall include information related but not limited to the following:

   a. effluent quality limits;
   b. effluent quality monitoring requirements;
   c. soil quality monitoring at the discharge point;
   d. secondary containment provisions for waste storage facilities associated with the undertaking;
   e. records confirming acceptance from the approved facility that will be treat petroleum hydrocarbon impacted soils generated from the undertaking;
   f. details pertaining to the annual shipment of recovered petroleum hydrocarbons

and other wastes to an approved hazardous materials disposal facility;
g. a map that references of the project infrastructure;
h. a map that references the treated effluent discharge location(s);
i. as-built design drawings for the secondary containment and petroleum hydrocarbon impacted Water treatment system; and
j. facilities and equipment maintenance and inspection plan.

5. The Licensee shall operate the Water Treatment Facility in accordance with the Plan required under Part G, Item 4 or as otherwise approved by the Board in writing.

PART H: CONDITIONS APPLYING TO SPILL CONTINGENCY PLANNING

1. The Board has approved the Plan entitled "Spill Contingency Plan Hydrocarbon Impacted Water Treatment" dated September 2013 that was submitted as additional information with the Application.

2. The Licensee shall submit for review of the Board, with the 2014 Annual Report, a revision of the Plan referred to in Part H, Item 1, in the format set out by the Consolidation of Spill Contingency Planning and Reporting Regulations R-068-93, to include the following:
   a. a table of contents (index);
   b. name, address and title of person in charge of the undertaking;
   c. name, title and 24hr contact information of person responsible;
   d. date of plan preparation and the effective period of the Plan;
   e. description of the location, facility and capacity (storage capacity and types waste to be treated, and storage capacity of treated product to be released;
   f. sec. 1.3.1 refers to assistance being obtained from the Hamlet, this should reference the local resources if available in Iqaluit;
   g. Under sec. 1.7, a response flow chart to indicate responsibility, contact information of site personnel and initial reporting requirements;
   h. a map of the project area showing all components of the undertaking, of suitable scale to indicate any sensitive Waters subject potential impacts from the undertaking;
   i. a detailed description of the secondary containment systems that will be employed to prevent any spills of petroleum hydrocarbons;
   j. contact information, Nunavut Water Board (867) 360-6338;
   k. a copy of the NT/NU Spill Report Form and Reporting Guide as referenced;
   l. the transport of contaminated materials (filter media, sludge, barreled petroleum hydrocarbons) to port for shipment to an approved hazardous waste management facility; and
   m. transport of treated Waters to the discharge location.

3. The Licensee shall prevent any chemicals, petroleum products or wastes associated with the project from entering Water. All sumps and fuel caches or contaminated Water storage shall be located at a distance of at least thirty one (31) metres from the ordinary high Water mark of any adjacent Water body and inspected on a regular basis.

4. If during the term of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:

   a. employ the approved Spill Contingency Plan;
   b. report the spill immediately to the 24-Hour Spill Line at (867) 920-8130 and to the Inspector at (867) 975-4295; and
   c. for each spill occurrence, submit to the Inspector, no later than thirty (30) days after initially reporting the event, a detailed report that will include the amount and type of spilled product, the GPS location of the spill, and the measures taken to contain and clean up the spill site.

5. The Licensee shall, in addition to Part H, Item 4, regardless of the quantity of releases of harmful substances, report to the NWT/NU Spill Line if the release is near or into a Water body.

6. Spills, overfills, and storm water from product transfer areas shall be contained, and treated by the WTF to remove any residual hydrocarbons prior to being discharged.

7. The oil-water separator at the WTF shall be equipped with a spill containment device at the point of oil removal.

PART I: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION OR TEMPORARY CLOSING

1. The Board has approved the Plan entitled "Abandonment and Remediation Plan Hydrocarbon Impacted Water Treatment" dated September 2013, that was submitted as additional information with the Application.

2. The Licensee shall annually review the approved Plan in Part I, Item 1 and modify the Plan as necessary to reflect changes in personnel, operations and/or technology. Any proposed modifications to the Plan shall be submitted to the Board for review as an addendum to the original Plan.

3. The next annual review of the Plan in Part I, Item 1 shall include or address the following:
   a. a detailed schedule for temporary abandonment as a contingency measure;
   b. a detailed schedule for final abandonment.

4. The Licensee shall complete the restoration work within the time schedule specified in the approved Plan, or as subsequently revised and accepted by the Board in writing.

5. The Licensee shall carry out progressive reclamation for any components of the project no longer required for the Licensee's operations.

6. The Licensee shall notify the Board of its intention to proceed with final abandonment of undertaking at least six (6) months prior to the planned dates of closure.

7. The Licensee shall backfill and restore, all temporary containment sumps, to the pre-existing natural contours of the land.

8. All disturbed areas shall be stabilized and re-vegetated as required, upon completion of work, and restored as practically as possible to a pre-disturbed state.

PART J: CONDITIONS APPLYING TO THE MONITORING PROGRAM

1. The Licensee shall establish and maintain, at a minimum, the following Monitoring Program Stations or as otherwise approved by the Board in writing:

Monitoring Station ID	***Description***	***Frequency***	***Parameters***
THI -1 (Water)	effluent from the WTF to be discharged at the Final Discharge Point	as per part J, Item 4	volume as per Part J, Item 2; Quality as per Part J, Item 4

2. The Licensee shall measure and record in cubic metres, the quantity of Effluent to be discharged from the Water Treatment Facility at monitoring station THI -1.

3. The Licensee shall monitor compliance with respect to Part E, Item 10, by collecting grab samples, representative of the total volume of effluent to be discharged from the Water Treatment Facility at monitoring station THI -1.

4. The Licensee shall sample at Monitoring Station THI-1, at minimum, once prior to each batch discharge event and prior to completion of discharge, and analyze for the following parameters:

pH	Conductivity
Total Suspended Solids	Ammonia Nitrogen
Nitrate – Nitrite	Oil and Grease (visual)
Total Phenols	Sulphate
Total Hardness	Total Alkalinity
Sodium	Potassium
Magnesium	Calcium
Chloride	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel
Total Zinc	Total Phosphorous
Total Aluminum	Total Manganese
Total Cobalt	Total Arsenic

Polycyclic Aromatic Hydrocarbons (PAHs)
Total Petroleum Hydrocarbons (TPH)
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)

5. The Licensee shall determine, prior to discharge and upon agreement with an Inspector at any final discharge location, and record the GPS co-ordinates (in degrees, minutes and seconds of latitude and longitude) where treated effluent is discharged.

6. The Licensee shall submit to the Board for review, within sixty (60) days of issuance of this Licence, and after having confirmed the Final Discharge Point location, a Monitoring Plan. The Monitoring Plan shall include but not be limited to the following:
   a. soil monitoring within the vicinity of the Effluent discharge at the Final Discharge Point;
   b. monitoring of any nearby Water bodies that may be impacted for the effluent discharge at the Final Discharge Point.

7. The Monitoring Plan referred to in Part J Item 6, shall include Water and soil sampling procedures and chemical analysis and be consistent where appropriate with the Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites, Volume 1: Main Report (CCME, 1993), and Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil – Tier 1 Method (CCME, 2001).

8. Modifications/Amendments to the Monitoring Plan referred to in Part J Item 6 may be made only upon written request and approval by the Board in writing.

9. The Licensee shall conduct additional sampling and analysis by the request of an Inspector.

10. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of Standard Methods for the Examination of Water and Wastewater, or by such other methods approved by the Board in writing.

11. All analyses shall be performed in a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.

12. The Licensee shall submit, within three (3) months of Licence approval, to an Analyst for approval, a Quality Assurance/ Quality Control Plan that includes requirements for independent third party sampling and analysis. This Plan shall be developed in accordance with the *1996 Quality Assurance (QA) and Quality Control (QC) Guidelines for Use by Class "A" (INAC)*.

13. If the Analyst does not approve the Plan referred to in Part J, Item 12, the Licensee shall revise the Plan and resubmit to the Analyst for approval within thirty (30) days of notification by the Analyst.

14. The Board shall be notified of the Analyst decision with respect to the QA/QC Plan referred to in Part J Item 12 and 13.

15. The Licensee shall include summaries and an interpretation of all the data and information required by the "Monitoring Program" (required under Part J) in the Annual Report as per Part B, Item 1.

16. The Licensee shall submit to the Board for approval in writing, at least sixty (60) days prior to temporary or permanent suspension of normal site activities, a Post-closure Monitoring Plan that includes information on monitoring requirements of the Water Treatment Facility and site Water management.

APPENDIX C

SITE CONTINGENCY PLAN

24 Hour
Qikiqtaaluk Environmental Inc.
Contact:
867-222-8194

SPILL CONTINGENCY PLAN

HAZARDOUS WASTE MANAGEMENT FACILITY
LOT 666, PLAN 1673, PARCELS Q AND O

Qikiqtaaluk Environmental Inc.
PO Box 1228
Iqaluit (Nunavut) X0A 0H0

Prepared by:

Olivier Simard, B.Sc.
Project Manager – Northern Projects

Verified and approved by:

Sylvain Laberge
Project Director – Northern Projects

Qikiqtaaluk environmental
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August 2015
O/Ref.: QE15-100-13

PREAMBLE

This Emergency and Spill Response Plan for the Hazardous Waste Management Facility in Iqaluit will be in effect upon commencement of operations, and applies to all related activities onsite.

The Plan will be updated and revised, as necessary, if operations are modified or if the type and quantity of stored waste changes.

Formal distribution of the Plan has been made to:

Department of Environment - Environmental Protection Division
PO Box 1000 Station 1300
Iqaluit (Nunavut) X0A 0H0
Tel: 867 975-7700
Fax: 867 975-7742

Aboriginal Affairs and Northern Development Canada
969 Qimugjuk Building, 2nd Floor
PO Box 2200
Iqaluit (Nunavut) X0A 0H0
Tel: 867 975-4517
Fax: 867 979-6445

City of Iqaluit
PO Box 460
Iqaluit (Nunavut) X0A 0H0
Tel: 867 979-5600
Fax: 867 979-5922

Additional copies and updates of this Plan may be obtained from:

Qikiqtaaluk Environmental Inc.
Attn.: Olivier Simard, Project Manager
9935 Catania Avenue – Suite 200
Brossard (Quebec) J4Z 3V4
Tel: 867 222-8194
osimard@qenv.ca

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1. GENERAL

The spill contingency plan (Plan) was developed to assist with implementing measures to protect the environment and minimize impacts from spill events. It provides precise instructions to guide all Qikiqtaaluk Environmental Inc. (QE) personnel in emergency spill response situations. The Plan outlines procedures for responding to spills while minimizing potential health and safety hazards, environmental damage, and clean-up costs.

This Plan is required as part of the implementation of a Hazardous Waste Management Facility (HWMF) in Iqaluit, Nunavut. The following activities will be conducted at the HWMF:

- Receiving and handling (loading-off-loading) of waste materials contained primarily in 205 L drums;
- Consolidation of small containers (cans, bottles, pails, etc.) inside larger containers (drums, waste wranglers) to form lab packs;
- Storage of waste drums and wranglers placed outdoors in the storage yard or in 20 ft marine containers;
- Crushing of fluorescent tubes using specialized equipment;
- Puncturing and drainage of aerosol cans using specialized equipment;
- Placement of drums and wranglers on pallets and securing with strapping, prior to sealift;
- Treatment of oily water through a filtration system;
- Treatment of hydrocarbons contaminated soils through biological techniques.

The HWMF will be located on the West 40 site on Iqaluit Lane, in Iqaluit, more specifically: Lot 666, Plan 1673, Parcels O and Q (coordinates of central point $63^0$44’38.22″ N, $68^0$32’58.59″ W).. A drainage ditch is located along the lot limits of the Site. Drainage ditches flow into the City of Iqaluit’s municipal drainage pathway which, in time, flows toward the ocean, approximately 700 m from the Site. Figure 1 presents a general overview of the Site.

Waste management activities will take place in areas designed to control run-off or contact water, to minimize contaminant dispersion and to contain accidental spills. A large lined water collection pond will be available to accept possible contaminated water from a spill or incident. Surface drainage water will be directed so that it will be possible to control it with sediment barriers, sorbent booms or easily blocked before reaching the drainage ditch.

FIGURE 1 : **Location of the Hazardous Waste Management Facility.**

Source: Google Maps, 2015

The SCP was implemented to ensure that the HWMF respects all applicable laws, regulations and requirements of the federal, territorial and municipal authorities. QE will obtain and comply with all required permits, approvals and authorizations required for the operations. The following applicable regulations and documents constitute an integral part of the spill contingency plan:

- The *Canadian Environmental Protection Act*: controls hazardous substances from their production and/or import, their consumption, storage and/or disposal;
- The federal *Transportation of Dangerous Goods Act* and *Regulations*: ensure the protection of public health and safety, and the environment during the handling and transport of dangerous goods. The Regulations apply to all modes of transportation, by road, by sea, and by air;
- The *Guidelines for Preparation of Hazardous Material Spill Contingency Plans*: describes parameters that should be considered in the development of hazardous materials spill emergency plans. It also defines the information that should be incorporated into a comprehensive contingency plan;
- The CCME[1] *Code of Practice for Used Oil Management*: defines appropriate environmental options for the handling, storage, collection, recycling, transport, re-use and/or disposal of used oils in Canada. It helps regulatory authorities formulate provincial and/or regional strategies for used oil management;
- The *Nunavut Environmental Protection Act*: governs the protection of the environment from contaminants. The act defines offences and penalties as well as the powers of government inspectors;
- The *Nunavut Spill Contingency Planning and Reporting Regulations*: describe the requirements for spill reporting and emergency planning;
- The *Land Transportation Emergency Response Guideline for Petroleum Spills*: developed by the Canadian Petroleum Products Institute outlines the scope, emergency response code of practice, response time guidelines, response equipment and personnel capability requirements.

1. Canadian Council of Ministers of the Environment

2. HAZARDOUS MATERIALS – TRANSPORT AND STORAGE

A variety of hazardous materials will be managed at the HWMF. Storage quantities will be minimal after the last sealift of the season (i.e., October) and will increase throughout the winter season, to reach maximum capacity approximately 8 to 9 months later, before the first sealift of the season (i.e., July).

Table 1 presents the approximate maximum quantities of hazardous waste that will be present at the transfer station before the first sealift of the season.

The material safety data sheets (MSDS) for the potential liquid waste products to be stored onsite are presented in Appendix A.

TABLE 1: Estimated Maximum Waste Storage Capacity

Shipping Name	Description	TDG Class	Maximum storage capacity	Type and number of containers
Waste lubricating oil	Used oil	NA	32,000 L	160 drums or 32 tote tanks or any combination of both
Waste glycol	Waste antifreeze	NA	19,200 L	96 drums or 19 tote tanks or any combination of both
Oily water (and snow)	Water and oil mixture	NA	10,000 L	10,000 L open tank
Batteries, wet, filled with acid	Vehicle batteries	8	6,800 kg	10 battery packs
Batteries, dry, containing potassium hydroxide, solid	Small batteries	8	800 kg	4 drums
Paint and paint related materials	Paints, thinner	3	16,000 kg	15 waste wranglers
Flammable liquids, not otherwise specified (gasoline)	Various petroleum products mixtures	3	32,000 L	160 drums
Oily contaminated solids (rags, absorbents, filters)	Oily solids	NA	7,200 kg	32 drums
Hydrocarbon contaminated soil	Oily soils	NA	3,000 m^3	Covered containment cells
Environmentally hazardous substances, solids, not otherwise specified (mercury)	Crushed fluorescent tubes and light bulbs	9	2,400 kg	11 drums
Propane	Propane tanks	2.1	800 kg	Bulk storage
Butane	Butane tanks	2.1	400 kg	4 waste wranglers
Acetylene	Gas cylinders	2.1	800 kg	Bulk storage
Oxygen	Gas cylinders	2.2 (5.1)	800 kg	Bulk storage
Helium	Gas cylinders	2.2	800 kg	Bulk storage
Argon	Gas cylinders	2.2	800 kg	Bulk storage
Aerosols	Aerosol cans, paint/solvents	2.1	2,000 kg	10 waste wranglers
Aerosols	Aerosol cans, oven cleaner	2.2 (8)	2,000 kg	10 waste wranglers
Organic solids, toxins, N.O.S (medication)	Spent medication	6.1	200 kg	1 drum or 10 pails

Notes: Pails are assumed to be high density polyethylene (HDPE), 20 L capacity
Drums are assumed to be steel, 205 L capacity
Tote tanks are assumed to be HDPE, 1,000 L capacity
Bulk bags are assumed to be 1 yd^3 (approximately 750 L) capacity
Waste wranglers (Quatrex™ bags) are assumed to be 1 yd^3 (approximately 750 L) capacity
Battery packs are assumed to be 0.5 yd^3 (approximately 380 L) capacity

The largest single storage container used for TDG[1] regulated liquid waste, such as Class 3 flammable liquids, is the 205 L open-top steel drum.

The largest single storage container used for non-TDG regulated liquid waste, such as waste oil and antifreeze, is the 1,000 L HDPE tote tank with steel frame and pallet.

Solid waste, which is non-spillable, will be stored in either of:

- 20 L open-top HDPE pails, with lid and gasket;
- 205 L open-top steel drums, with lid and gasket;
- 0.75 m^3 waste wranglers made of woven polypropylene with reinforced sides and 6 mil inner liner;
- 0.75 m^3 bulk bags made of woven polypropylene with a 6 mil inner liner;
- 3.75 m^3 doubled bulk bags made of woven polypropylene with a 6 mil inner liner.

Emergency spill response equipment (i.e., spill kits) will be available at the HWMF. The spill kits will be regularly inspected and maintained. All spill kits will contain the appropriate type, size and quantity of equipment for the volume and type of product present at the storage location, as well as the environment likely to be affected by a spill (i.e., ground).

1. Transport of dangerous goods

3. DUTIES AND RESPONSIBILITIES

As part of the emergency spill response plan, QE is responsible for implementing, through its management team, the following procedures:

- Train Site personnel in spill response procedures and the proper use of response equipment and materials;
- In the event of a spill, mobilize all available Site personnel, equipment and tools, as required;
- Implement all required health and safety procedures at the spill location;
- Eliminate all fire hazards and potential ignition sources near the spill area;
- Control the source of the spill (i.e., reduce or stop product discharge);
- Contain the spilled product using the most appropriate methods and equipment (i.e., dykes, ditches, sorbent materials, containment booms, and other barriers);
- Evaluate the possibility of recovering the spilled materials;
- Obtain, if required, assistance from government agencies such as the Government of Nunavut Department of Environment (GN DoE) and/or Environment Canada;
- Comply with all applicable guidelines and regulations;
- Conduct a preliminary assessment of the environmental impacts;
- Within 24 hours of the event, report the spill to the Government of Nunavut Spill Report Line and submit a written spill report using the appropriate form (see below for the list of information required in the report).

Table 2 presents the management team responsible for overseeing emergency spill response operations and their contact information.

TABLE 2: QE Management Contact Information

Position	Contact
Olivier Simard HWMF Manager	Cell: 867 222-8194 **(24 hrs)**
Sylvain Laberge HWMF Director	Office Tel: 450 466-2223 Cell: 450 427-2484 **(24 hrs)**
On-Duty Environmental Technician Hazmat Specialist	Cell: 867 222-3246 **(24 hrs)**
Harry Flaherty Corporate Contact – President	Office Tel: 867 979-8406 Cell: 867 222-1713

As part of the spill response plan, the On-Duty Environmental Technician, acting as incident commander, is responsible for implementing the following procedures:

- Assume authority over the spill scene and the personnel involved;
- Activate the Spill Response Plan;
- Evaluate the initial situation and assess the magnitude of the spill;
- Develop an overall plan of action;
- Report to the HWMF Manager and provide recommendations regarding resource requirements (additional manpower, equipment, material, etc.) to complete the clean-up effort. The responsibility of the On-Duty Environmental Technician is to mobilize personnel and equipment to implement the clean-up.

The responsibilities of the HWMF Manager, with support from the HWMF Director, include the following:

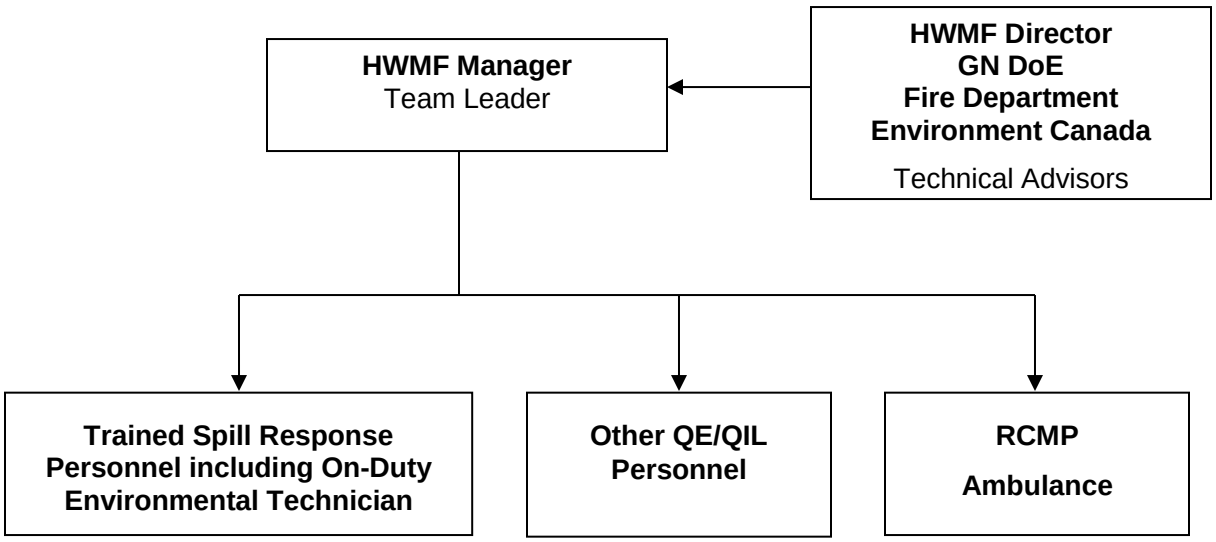
- Report the spill to NT-NU 24 hour Spill Report Line at 867 920-8130;
- Act as a liaison with Management to keep them informed of clean-up activities;
- Obtain additional required resources not available on-site for spill response and clean-up;
- Act as the spokesperson with government agencies as well as the public and the media, as appropriate;
- Document the cause of the spill and effectiveness of the clean-up effort, and implement the appropriate measures to prevent a recurrence of the spill;
- Prepare and submit follow-up documentation required by appropriate regulators.
- Ensure that the spill is cleaned up and all follow-up communications and reports are filed with the GN DoE and Environment Canada offices.

The responsibilities of the HWMF Director include the following:

- Work with the HWMF Manager on regulatory follow-up, as necessary;
- Act as the spokesperson with the government agencies, as well as the public and media, on any significant spill events.

Once a spill event is reported, the HWMF Manager will establish a specific strategy for containing and controlling the spill and to initiate the clean-up activities. The On-Duty Environmental Technician, as well as other external resources such as the Iqaluit Fire Department and GN DoE, may act as technical advisors prior to and during the intervention. The trained Spill Response Team will conduct all emergency spill response operations under the leadership of the HWMF Manager. During the clean-up phase of the intervention, other site personnel (e.g., heavy equipment operators, labourers, etc.) may be involved in the intervention. Figure 2 presents an organizational chart of the Spill Response Team.

FIGURE 2 : **Spill Response Team Organization Chart**



QE will ensure that all contracted marine shipping companies have their own spill contingency plan to respond to spill events during the course of their operations. When shipping hazardous materials to and from the HWMF, transport companies are required to carry out their operations in accordance with federal and international TDGRs[1] (i.e., TDGR-Clear language, IMDG[2], IATA[3]).

During transport, in the event of a of hazardous materials spill exceeding the quantities listed in Part 8.1 (1) of the TDGR, the shipping company will immediately report the incident to the RCMP and Nunavut Emergency Management at 1 800 693-1666 (as stated in Part 8.1 (5), TDGR). The immediate report must include as much of the information listed in Part 8.2 of the TDGR as is known at the time of the report. A follow-up report must be made, in writing, to the Director General within 30 days following the occurrence of the accidental release, the "dangerous goods accident" or the "dangerous goods incident". The follow-up report must include the information listed in Part 8.3 of the TDGR.

If a spill occurs during transport on water or during the transfer of hazardous materials from ship to land, the shipping company will be responsible for implementing the appropriate spill response measures in accordance with their spill contingency plan.

1. Transport of dangerous goods regulations
2. International Maritime Dangerous Goods
3. International Air Transport Association

4. TRAINING AND DRILLS

Site personnel shall be informed that any spill of hazardous liquids or solids, whatever the extent, must be immediately reported to the HWMF Manager.

The HWMF Manager will select a certain number of workers to form the Spill Response Team. Crew members will be trained in emergency spill response procedures and operations. Training will include knowledge of the:

- Properties of the hazardous materials stored onsite;
- Common causes of spills;
- Environmental effects of spills;
- Worker health and safety during emergency interventions;
- PPE[1] and clothing;
- Spill response procedures and techniques on land and snow, and during all 4 seasons;
- Spill response equipment and materials.

Training will also include the analysis of potential spill events that are more likely to occur during waste management operations. Spills are more likely to be caused by:

- Human error during the handling of hazardous waste containers; or
- Rupture of waste containers from accidental damage, deterioration or equipment failure.

Training will include spill response drills and classroom training.

1. Personal protective equipment

5. MATERIALS AND EQUIPMENT

In order to prevent spills and to provide adequate response in the event of a spill, QE will maintain on-site the appropriate types and quantities of response equipment and materials.

To facilitate immediate first response in the event of a fluid release on land, 2 spill kits will be strategically placed in the areas of waste container handling. The contents of the spill kits are listed in Table 3.

TABLE 3:Spill Kit Contents

Spill Kit	Contents	Quantity
Q Ultra 75 Hydrophobic 140 gallon capacity	75 gallon yellow metal overpack drum	1
	12 oz 15” x19” Sorbent pads	100
	3” x 4 ft Sorbent socks	15
	5” x 10 ft Sorbent booms	4
	25 lb granular sorbent	1
	Shovel	1
	30” x 60” x 6 mil disposal bags	5
	Epoxy sticks	2
	Coverall and boot covers	2
	Pair of safety goggles	2
	Pair of gloves	2

In addition to the spill response material listed above, a backhoe excavator and a dump truck are available to aid in spill response and recovery efforts.

6. SPILL RESPONSE PROCEDURES

A spill is defined as the discharge of a hazardous product out of its containment and into the environment. Potentially hazardous to humans, vegetation, and wildlife they vary in severity, depending on several factors including: the nature of the material, the spill quantity, the location and season. Waste petroleum products (waste oil, waste fuels, oil-based paints) are the main group of waste material that may be spilled and therefore spill response procedures will focus on this type of hazardous material.

All Site personnel will be briefed on the procedures to be followed to report a spill and initiate spill response. The first person to notice a spill will take the following steps:

1. Immediately warn other personnel working near the spill area;
2. Evacuate the area if the health and safety of personnel is threatened;
3. Notify the HWMF Manager, who will initiate the spill response operations;
4. In the absence of danger, and before the spill response team arrives on the scene, take any safe and reasonable measures to stop, contain and identify the nature of the spill.

All spill response interventions carried out by the spill response team will follow these general procedures:

- **Source Control:** Reduce or stop the flow of product without endangering anyone. This may involve very simple actions such as sealing a puncture hole with whatever is at hand (e.g., a rag, a piece of wood, tape, etc.), re-positioning a leaking container such that the puncture hole is facing up, or transferring fluid from leaking containers;
- **Control of Free Product:** Prevent or limit the spread of the spilled material. Accumulate/concentrate the spilled product in an area to facilitate recovery. Barriers positioned down-gradient of the spill will slow or stop the progression of the spill. Barriers can consist of absorbent booms, dykes, berms, or trenches dug into the ground;
- **Protection:** Evaluate the potential dangers of the spill so as to protect sensitive ecosystems and natural resources. Block or divert the spilled material away from sensitive receptors. This can also be achieved by using varying types of barriers;
- **Clean Up the Spill:** Recover and containerize as much free product as possible. Recover and containerize/treat contaminated soils, water, and snow;
- **Report the Spill:** Provide basic information such as the date and time of the spill, the type and amount of product discharged, the location and approximate size of the spill, the actions already taken to stop and contain the spill, the meteorological conditions and any perceived threat to human health or the environment. Reporting requirements are presented in Section 8 of the present document.

Specific response procedures for spills on land and snow are presented in the following sections. Because the containers used to store liquids are of relatively small volume (205 L and 1,000 L), and because of the mitigation measures to be implemented to control surface drainage, any spill of liquids will likely not reach any drainage ditches. As such, response to spills on water is not discussed in this Plan.

Procedures will vary depending on the season.

6.1 Spills on Land

Response to spills on land will include the previously detailed general procedures. The main spill control techniques involve the use of 2 types of barriers: dykes and trenches. Barriers should be placed on the downgrade (down slope) from the source of the spill, and as close as possible to the source of the spill. Barriers will slow the progression of the petroleum product and will also serve as containment to allow recovery of the fluids.

Depending on the volume spilled, the site of the spill, as well as available materials, a dyke may be built with soil, booms, lumber, snow, etc. A plastic liner should be placed at the foot of and over the dykes to protect the underlying soils, or other materials, and to facilitate recovery of the fuel. Construct dykes in such a way as to accumulate a thick layer of free product in a single area (V-shaped or U shaped).

Trenches are useful in the presence of permeable soils and when the spilled fluid is migrating below the ground surface. A plastic liner should be placed on the downgrade edge of the trench to protect the underlying soils. Liners should not be placed at the bottom of the trench so as to allow water to continue flowing underneath the layer of floating oil.

The use of large quantities of absorbent materials to recover important volumes of oil should be avoided. Large volumes of free product shall be recovered, as much as possible, by using vacuums and pumps, then containerized. Mixtures of water and oil may be processed through an oil-water separator. Absorbent sheets should be used to soak up residual oil on water, on the ground (soil and rock), and on vegetation. Peat moss may also be sprinkled on vegetation to absorb films of petroleum products.

6.3 Spills on Snow

In general, snow and ice will slow the movement of hydrocarbons. The presence of snow may also hide the oil slick and make it more difficult to follow its progression. Snow is generally a good natural sorbent, as hydrocarbons will have a tendency to be soaked up by snow through capillary action. However, the use of snow as a sorbent material shall be limited as much as possible. Snow and frozen ground will also prevent hydrocarbons from migrating down into soils, or at minimum slow the migration process.

Response to spills on snow and ice will include the previously detailed general procedures. Most response procedures for spills on land may be used for spills on snow and ice. The use of dykes (i.e., compacted snow berms lined with plastic sheeting) will slow the progression of the oil and will also serve as containment to allow recovery of the oil.

Free product shall be recovered by using a vacuum, a pump, or sorbent materials. Contaminated snow and ice will be scraped up manually or using heavy equipment, depending on volumes. The contaminated snow and ice will be placed in containers. Once melted, the oily water will be processed through the Water Treatment Facility.

6.4 Disposal of Spilled Material

Steel drums and wrangler bags will be used to contain used sorbent materials and transport south by sealift to an authorized disposal facility.

7. POTENTIAL SPILL ANALYSIS

In order to prepare for emergency spill response, a potential spill analysis was conducted on various “worst case” scenarios. The exercise serves to identify potential risk areas, as well as determine the fate of spilled products and their environmental effects. Two potential spill scenarios were identified for the HWMF:

- Tote Tank spill; and
- Vandalism Spill.

These 2 spill scenarios are analyzed in detail in the following pages.

Scenario #1: Tote Tank Spill

Description of Incident: The contents of a tote tank containing waste oil spill to the ground during loading of the tote tank from the storage container to a flatbed trailer. Fuel spill by gravity. Spill occurs in the storage yard.

Potential causes: Tote tank drops form a height of 5 ft (1.5 m), human error, accident.

Hazardous products spilled: Waste oil.

Maximum volume spilled: 1,000 L.

Estimated time to spill entire volume: 5 minutes.

Immediate receiving medium: Soil.

Most probable direction of oil slick migration: As the ground flat in the storage yard, the spill should flow in a radial fashion.

Distance and direction to nearest receiving body of water: Drainage ditches along the lot limits.

Estimated emergency spill response time: 5 minutes after spill is noticed.

Spill response procedures: Contain and recover oil spill on the ground using dykes or booms as described in Section 6.1. Prevent the oil from reaching the drainage ditches. Collect free product for temporary storage. Excavate contaminated soils and/or snow, store and manage appropriately.

Scenario #2: Vandalism Spill

Description of incident: Spill to the ground of part of the contents of 4 tote tanks containing waste oil caused by loader forks puncturing tote tanks. Fuel spill by gravity. Spill occurs in the storage yard.

Potential causes: Vandalism by a disgruntled worker.

Hazardous products spilled: Waste oil.

Maximum volume spilled: 2,000 L.

Estimated time to spill entire volume: 10 minutes.

Immediate receiving medium: Soil.

Most probable direction of slick migration: As the ground flat in the storage yard, the spill should flow in a radial fashion.

Distance and direction to nearest receiving body of water: Drainage ditches along the lot limits.

Estimated emergency spill response time: 5 minutes after spill is noticed.

Spill response procedures: Plug 8 puncture holes with rags, absorbent sheets, duct tape, etc. Contain oil spill on the ground and recover using dykes or booms as described in Section 6.1. Prevent the oil from reaching the drainage ditches. Collect free product for temporary storage. Excavate contaminated soils and/or snow, store and manage appropriately.

8. REPORTING REQUIREMENTS

Quantities of spilled hazardous substances requiring reporting are listed in Schedule B of the *Nunavut Spill Contingency and Reporting Regulation*. For example, for all flammable liquids (Class 3), spills of volumes equal to or greater than 100 L (half a drum) require reporting.

After the initial field emergency response to the spill event, the spill will be reported to the 24-hour Spill Report Line:

24-Hour Spill Report Line
Tel. 867 920-8130
or
Fax: 867 920-8127

Failure to report a spill can lead to fines. It is the responsibility of the HWMF Manager to prepare the proper reports and transmit them to the regulatory authorities. Table 4 presents an additional contact list for spill reporting.

TABLE 4:Contact List for Spill Reporting

Department	Contact Person	E-mail	Telephone
GN-DOE	Alex Brisco	mbrisco@gov.nu.ca	867 975-7726
Fire Department (General) Fire Department (Emergency)			867 979-5655 867 979-4422
RCMP - Iqaluit			867 979-0123
Ambulance			867 979-4422

Afterwards, the spill event will be reported in writing using the standard Spill Report Form presented in Appendix B.

The written report will include the following information:

- Date and time of the incident;
- Location or map coordinates and direction of spill movement, if not at steady state;
- Party responsible for the spill;
- Type and estimated quantities of spilled contaminant(s);
- Specific cause of the incident;
- Status of the spill, indicating if spilled materials are still moving or now at steady state;
- Approximate surface area of the contaminated zone;

- Factors affecting spill or recovery, such as temperature, wind, etc.;
- Status on containment actions, indicating whether:
  - naturally,
  - booms, dykes or other,
  - no containment has been implemented;
- Corrective action taken, or proposed, to clean, contain or dispose of the spilled material;
- Whether assistance is required, and in what form;
- Whether the spill poses a hazard to persons or property (i.e., fire, drinking water);
- Comments and recommendations;
- The name, position and employer of the person reporting the spill; and,
- The name, position and department of the person to whom the spill is reported.

In the event of a spill involving the marine carrier delivering waste, QE will ensure that the subcontractor reports any spill event under its responsibility.

APPENDIX A

MSDS OF LIQUID HAZARDOUS WASTE STORED ONSITE

- Industrial Hydraulic Oil
- Jet A-1
- Propylene
- Varsol
- Antifreeze
- Diesel
- Engine oil
- Gasoline
- Wet batteries (acid-lead)

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	**INDUSTRIAL HYDRAULIC OIL**
Version #	02
Issue date	07-31-2012
Revision date	07-31-2012
Supersedes date	07-31-2012
CAS #	Mixture
Product code	184
Product use	Hydraulic oil.
Synonym(s)	ISO GRADES 22, 32, 46, 68, 100, 150, MV22, HVI 36
Manufacturer information	
Manufacturer Address	Consumers' Co-operative Refineries Limited P.O. Box 260; 9th Avenue North Regina, SK S4P 3A1 Canada
Telephone	(306) 721-5353
Supplier Address	Federated Co-operatives Limited P.O. Box 1050, 401 - 22nd Street East Saskatoon SK S7K 3M9 Canada
Telephone	(306) 244-3447
24 Hour Emergency Telephone	(613) 996-6666 - Canutec

2. Hazards Identification

Physical state	Liquid.
Appearance	Oily liquid.
Emergency overview	Low hazard for usual industrial or commercial handling by trained personnel.
OSHA regulatory status	This product is not hazardous according to OSHA 29CFR 1910.1200.
Potential health effects	
Routes of exposure	Eye contact. Skin contact. Ingestion. Inhalation.
Eyes	Direct contact with eyes may cause temporary irritation.
Skin	Prolonged skin contact may cause temporary irritation.
Inhalation	May cause respiratory tract irritation.
Ingestion	Under normal conditions of intended use, this material does not pose a risk to health.
Chronic effects	No data available.
Potential environmental effects	No special environmental precautions required.

3. Composition / Information on Ingredients

The manufacturer lists no ingredients as hazardous according to OSHA 29 CFR 1910.1200.

4. First Aid Measures

First aid procedures

Eye contact	Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 20 minutes, occasionally lifting the upper and lower eyelids. Get medical attention if symptoms occur.
Skin contact	In case of contact, flush skin with plenty of water for at least 20 minutes, while removing contaminated shoes and clothes. Wash contaminated skin with soap and water. Wash contaminated clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops and persists.
Inhalation	If fumes or combustion products are inhaled move victim to fresh air. Get medical attention if any discomfort occurs.

Ingestion	Do not induce vomiting. Never give anything by mouth to an unconscious person. Get medical attention if any discomfort occurs.
Notes to physician	Treat symptomatically.
General advice	If you feel unwell, seek medical advice (show the label where possible).

5. Fire Fighting Measures

Extinguishing media	
Suitable extinguishing media	Extinguish with water spray, carbon dioxide, dry chemical or material appropriate for the surrounding fire.
Unsuitable extinguishing media	None.
Protection of firefighters	
Specific hazards arising from the chemical	By heating and fire, toxic vapors/gases may be formed.
Fire fighting equipment/instructions	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
Hazardous combustion products	No data available.

6. Accidental Release Measures

Personal precautions	In case of spills, beware of slippery floors and surfaces. Wear suitable protective clothing and gloves.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground. Prevent spreading over a wide area (e.g. by containment or oil barriers).
Methods for containment	Collect and dispose of spillage as indicated in Section 13 of the MSDS.
Methods for cleaning up	Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Other information	Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handling	Observe good industrial hygiene practices. Use appropriate Personal Protective Equipment.
Storage	Store in original tightly closed container. Keep in a cool, well-ventilated place.

8. Exposure Controls / Personal Protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Engineering controls	General ventilation is normally adequate.
Personal protective equipment	
Eye / face protection	Wear approved safety glasses or goggles.
Skin protection	Wear appropriate clothing to prevent repeated or prolonged skin contact. Wear protective gloves. Neoprene or nitrile gloves are recommended.
Respiratory protection	No personal respiratory protective equipment normally required.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practices.

9. Physical & Chemical Properties

Appearance	Oily liquid.
Physical state	Liquid.
Form	Liquid.
Color	Brown.
Odor	Mild.
Odor threshold	Not available.
pH	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Boiling point	Not available.

Melting point/Freezing point	14 °F (-10 °C)
Solubility (water)	Partially soluble in cold and hot water.
Specific gravity	0.86
Flash point	> 296.6 °F (> 147 °C) Open Cup
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Auto-ignition temperature	775.4 °F (413 °C)

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	No data available.
Incompatible materials	None known.
Hazardous decomposition products	None expected under normal conditions of use.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Sensitization	No data available.
Acute effects	No data available.
Local effects	None known.
Chronic effects	Chronic effects are not expected when this product is used as intended.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Mutagenicity	Not expected to be mutagenic.
Neurological effects	No data available.
Reproductive effects	Contains no ingredient listed as toxic to reproduction.
Teratogenicity	Not classified.

12. Ecological Information

Ecotoxicity	No data on possible environmental effects have been found.
Environmental effects	The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulation / Accumulation	Not available.

13. Disposal Considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose in accordance with all applicable regulations.
Waste from residues / unused products	Dispose of waste and residues in accordance with local authority requirements.
Contaminated packaging	Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport Information

DOT

Not regulated as a hazardous material by DOT.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

TDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations

This product is not hazardous according to OSHA 29CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
Section 302 extremely hazardous substance (40 CFR 355, Appendix A)	No
Section 311/312 (40 CFR 370)	No
Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)	Not controlled
WHMIS status	Non-controlled

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s)

State regulations

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania RTK - Hazardous Substances

Not regulated.

16. Other Information

Further information

HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings

Health: 0
Flammability: 1
Physical hazard: 0

NFPA ratings

Health: 0
Flammability: 1
Instability: 0

Disclaimer

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

Material Safety Data Sheet

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Material Name	:	**JET A-1**
Recommended Uses	:	Fuel for aviation turbine engines fitted to aircraft.
Other names	:	FUEL, AVIATION, TURBINE ENGINE
Product Code	:	002C0364
Manufacturer/Supplier	:	**The Shell Company of Australia Limited** (ABN 46 004 610 459) 8 Redfern Road Hawthorn East Victoria 3123 Australia
Telephone	:	+61 (0)3 9666 5444
Fax	:	+61 (0)3 8823 4800
Emergency Telephone Number	:	1800 651 818 (within Australia only) +61 3 9663 2130 (International)

2. HAZARDS IDENTIFICATION

HAZARDOUS SUBSTANCE. DANGEROUS GOODS.
Classified as hazardous according to the criteria of NOHSC, and as Dangerous Goods according to the Australian Dangerous Goods Code.

Symbol(s)	:	Xn Harmful. N Dangerous for the environment.
R-phrase(s)	:	R10 Flammable. R38 Irritating to skin. R65 Harmful: may cause lung damage if swallowed. R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S-phrase(s)	:	S2 Keep out of the reach of children. S29 Do not empty into drains. S23 Do not breathe vapour. S24 Avoid contact with skin. S61 Avoid release to the environment. Refer to special instructions/Safety data sheets. S62 If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.
Health Hazards	:	Slightly irritating to respiratory system. Breathing of high vapour concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache and nausea. Irritating to skin. Harmful: may cause lung damage if swallowed.
Signs and Symptoms	:	If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure. Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters. Breathing

		of high vapour concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death.
Safety Hazards	:	Liquid evaporates quickly and can ignite leading to a flash fire, or an explosion in a confined space. Vapour in the headspace of tanks and containers may ignite and explode at temperatures exceeding auto-ignition temperature, where vapour concentrations are within the flammability range. Flammable. Electrostatic charges may be generated during handling. Electrostatic discharge may cause fire. May ignite on surfaces at temperatures above auto-ignition temperature.
Environmental Hazards	:	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Additional Information	:	This product is intended for use in closed systems only.
SUSDP Schedule	:	S5. When packed in containers having capacity of less than 20 litres.
SUSDP Schedule		Not scheduled. When packed in containers having capacity of greater than 20 litres.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Preparation description : Complex mixture of hydrocarbons consisting of paraffins, cycloparaffins, aromatic and olefinic hydrocarbons with carbon numbers predominantly in the C9 to C16 range. May also contain several additives at <0.1% v/v each.

Hazardous Components

Chemical Identity	CAS	EINECS	Symbol(s)	R-phrase(s)	Conc.
Kerosine (petroleum), hydrodesulphurised	64742-81-0	265-184-9	Xi, Xn, N	R10; R38; R65; R51/53	0.00 - 100.00 %
Kerosine	8008-20-6	232-366-4	Xi, Xn, N	R10; R38; R65; R51/53	0.00 - 100.00 %

Additional Information : Refer to chapter 16 for full text of EC R-phrases.
Total aromatic hydrocarbons present are typically in the range of 10-20%v/v.

4. FIRST AID MEASURES

Inhalation	:	Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.
Skin Contact	:	Remove contaminated clothing. Immediately flush skin with large amounts of water for at least 15 minutes, and follow by washing with soap and water if available. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.
Eye Contact	:	Flush eyes with water while holding eyelids open. Rest eyes for 30 minutes. If redness, burning, blurred vision, or swelling persist, transport to the nearest medical facility for additional

treatment.

Ingestion	:	If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.
Advice to Physician	:	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Specific Hazards	:	Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Oxides of sulphur. Unidentified organic and inorganic compounds. Will float and can be reignited on surface water. Flammable vapours may be present even at temperatures below the flash point. The vapour is heavier than air, spreads along the ground and distant ignition is possible.
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.
Protective Equipment for Firefighters	:	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.
Additional Advice	:	Keep adjacent containers cool by spraying with water. If possible remove containers from the danger zone. If the fire cannot be extinguished the only course of action is to evacuate immediately.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe all relevant local and international regulations. Evacuate the area of all non-essential personnel. Ventilate contaminated area thoroughly.

Protective measures	:	May ignite on surfaces at temperatures above auto-ignition temperature. Do not breathe fumes, vapour. Do not operate electrical equipment. Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment (of product and fire fighting water) to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment.
Clean Up Methods	:	For small liquid spills (< 1 drum), transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove

contaminated soil and dispose of safely.
For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely. Shovel into a suitable clearly marked container for disposal or reclamation in accordance with local regulations.

Additional Advice : Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. Local authorities should be advised if significant spillages cannot be contained. Maritime spillages should be dealt with using a Shipboard Oil Pollution Emergency Plan (SOPEP), as required by MARPOL Annex 1 Regulation 26.

7. HANDLING AND STORAGE

General Precautions : Avoid breathing vapours or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. 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. Air-dry contaminated clothing in a well-ventilated area before laundering. Contaminated leather articles including shoes cannot be decontaminated and should be destroyed to prevent reuse. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Prevent spillages. Never siphon by mouth. For comprehensive advice on handling, product transfer, storage and tank cleaning refer to the product supplier.
Maintenance and Fuelling Activities - Avoid inhalation of vapours and contact with skin.

Handling : Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Avoid inhaling vapour and/or mists. Avoid prolonged or repeated contact with skin. When using do not eat or drink. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. The vapour is heavier than air, spreads along the ground and distant ignition is possible. Earth all equipment. Electrostatic charges may be generated during handling. Electrostatic discharge may cause fire.

Storage : Drum and small container storage: Drums should be stacked to a maximum of 3 high. Use properly labelled and closeable containers. Take suitable precautions when opening sealed containers, as pressure can build up during storage. Tank storage: Tanks must be specifically designed for use with this product. Bulk storage tanks should be diked (bunded). Locate tanks away from heat and other sources of ignition. The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Vapours from tanks should not be released to

atmosphere. Breathing losses during storage should be controlled by a suitable vapour treatment system.

Product Transfer : Avoid splash filling. Wait 2 minutes after tank filling (for tanks such as those on road tanker vehicles) before opening hatches or manholes. Wait 30 minutes after tank filling (for large storage tanks) before opening hatches or manholes. Keep containers closed when not in use. Do not use compressed air for filling, discharging or handling. Conditions, such as filling empty Filter Water Separator vessels, that lead to the formation of hydrocarbon mists are also particularly hazardous. Contamination resulting from product transfer may give rise to light hydrocarbon vapour in the headspace of tanks that have previously contained gasoline. This vapour may explode if there is a source of ignition. Partly filled containers present a greater hazard than those that are full, therefore handling, transfer and sampling activities need special care.

Recommended Materials : For containers, or container linings use carbon steel and low alloy steel. Aluminium may also be used for applications where it does not present an unnecessary fire hazard. For container linings the following may also be used: Unplastisized polyvinyl chloride (U-PVC), Fluoropolymers (PTFE), Polyvinylidenefluoride (PVDF), Polyetheretherketone (PEEK), Polyamide (PA-11). For seals and gaskets use: Fluoroelastomer (FKM), Viton A, and Viton B, Nitrile butadiene (NBR), Buna-N. For coating (paint) materials use: High build, amine adduct-cured epoxy.

Unsuitable Materials : For containers or container linings, examples of materials to avoid are: Polyethylene (PE, HDPE), Polypropylene (PP), Polymethyl methacrylate (PMMA), Acrylonnitrile butadiene styrene (ABS). For seals and gaskets, examples of materials to avoid are: Natural rubber (NR), Ethylene Propylene (EPDM, Polychloroprene (CR) - Neoprene, Butyl (IIR), Chlorosulphonated polyethylene (CSM), e.g. Hypalon.

Container Advice : Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.

Additional Information : In the interests of air safety, aviation fuels are subject to strict quality requirements and product integrity is of paramount importance. For one source of information on international standards for the quality assurance of aviation fuels, see www.jointinspectiongroup.org. Ensure that all local regulations regarding handling and storage facilities are followed.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Additional Information : In the absence of a national exposure limit, the American Conference of Governmental Industrial Hygienists (ACGIH) recommends the following values for Kerosine: TWA - 200 mg/m3 Critical effects based on Skin, Irritation and Central Nervous System.

Exposure Controls : 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: Use sealed systems as far as possible. Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Local exhaust ventilation is recommended. Eye washes and showers for emergency use.

Personal Protective Equipment : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers. AS/NZS 1337: Eye protectors for industrial applications. AS/NZS 2161: Occupational protective gloves - Selection, use and maintenance. AS/NZS 1715: Selection, use and maintenance of respiratory protective devices. AS/NZS 1716: Respiratory protective devices.

Respiratory Protection : 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 unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. All respiratory protection equipment and use must be in accordance with local regulations.

Hand Protection : 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. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced.
Select gloves tested to a relevant standard (e.g. Europe EN374, US F739). When prolonged or frequent repeated contact occurs, Nitrile gloves may be suitable. (Breakthrough time of > 240 minutes.) For incidental contact/splash protection Neoprene, PVC gloves may be suitable.

Eye Protection : Chemical splash goggles (chemical monogoggles). Approved to EU Standard EN166.

Protective Clothing : Chemical resistant gloves/gauntlets, boots, and apron (where risk of splashing).

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.

Environmental Exposure Controls : Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Pale straw. Liquid.
Odour : Hydrocarbon

pH	:	Data not available
Initial Boiling Point and Boiling Range	:	150 - 300 °C / 302 - 572 °F
Freezing Point	:	< -47 °C / -53 °F
Flash point	:	> 38 °C / 100 °F
Lower / upper Flammability or Explosion limits	:	1 - 6 %(V)
Auto-ignition temperature	:	> 220 °C / 428 °F
Vapour pressure	:	< 1 hPa at 20 °C / 68 °F
Specific gravity	:	Data not available
Density	:	775 - 840 kg/m3 at 15 °C / 59 °F
Water solubility	:	Negligible.
Solubility in other solvents	:	Data not available
n-octanol/water partition coefficient (log Pow)	:	2 - 6
Kinematic viscosity	:	1 - 2 mm2/s at 40 °C / 104 °F
Vapour density (air=1)	:	> 5

10. STABILITY AND REACTIVITY

Stability	:	Stable under normal conditions of use.
Conditions to Avoid	:	Avoid heat, sparks, open flames and other ignition sources.
Materials to Avoid	:	Strong oxidising agents.
Hazardous Decomposition Products	:	Hazardous decomposition products are not expected to form during normal storage. Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases including carbon monoxide, carbon dioxide, sulphur oxides and unidentified organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	:	Information given is based on product data, a knowledge of the components and the toxicology of similar products.
Acute Oral Toxicity	:	Low toxicity:LD50 >2000 mg/kg, Rat Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.
Acute Dermal Toxicity	:	Low toxicity:LD50 >2000 mg/kg, Rabbit
Acute Inhalation Toxicity	:	Low toxicity: LC50 >5 mg/l / 4 h, Rat High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.
Skin Irritation	:	Irritating to skin.
Eye Irritation	:	Slightly irritating.
Respiratory Irritation	:	Slightly irritating.
Sensitisation	:	Not a skin sensitiser.
Repeated Dose Toxicity	:	Kidney: caused kidney effects in male rats which are not considered relevant to humans
Mutagenicity	:	Not considered a mutagenic hazard.
Carcinogenicity	:	Not classified as a carcinogen.

		Repeated skin contact has resulted in irritation and skin cancer in animals.
Reproductive and Developmental Toxicity	:	Not classified as a developmental toxicant.

12. ECOLOGICAL INFORMATION

Fuels are typically made from blending several refinery streams. Ecotoxicological studies have been carried out on a variety of hydrocarbon blends and streams but not those containing additives. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity	:	Toxic:LL/EL/IL50 1-10 mg/l(to aquatic organisms)(LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract).
Mobility	:	Floats on water. Contains volatile constituents. Evaporates within a day from water or soil surfaces. Large volumes may penetrate soil and could contaminate groundwater.
Persistence/degradability	:	Major constituents are expected to be inherently biodegradable. The volatile constituents will oxidize rapidly by photochemical reactions in air.
Bioaccumulation	:	Contains constituents with the potential to bioaccumulate.
Other Adverse Effects	:	Films formed on water may affect oxygen transfer and damage organisms.

13. DISPOSAL CONSIDERATIONS

Material Disposal	:	Recover or recycle if possible. 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 dispose into the environment, in drains or in water courses. Do not dispose of tank water bottoms by allowing them to drain into the ground. This will result in soil and groundwater contamination. Waste arising from a spillage or tank cleaning should be disposed of in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Container Disposal	:	Send to drum recoverer or metal reclaimer. Drain container thoroughly. After draining, vent in a safe place away from sparks and fire. Residues may cause an explosion hazard if heated above the flash point. Do not puncture, cut or weld uncleaned drums. Do not pollute the soil, water or environment with the waste container. Comply with any local recovery or waste disposal regulations.
Local Legislation	:	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.

14. TRANSPORT INFORMATION

Material Safety Data Sheet

ADG

UN number	1863
Proper shipping name	FUEL, AVIATION, TURBINE ENGINE
Class	3
Packing group	III
Hazchem Code	3Y

IMDG

Identification number	UN 1863
Proper shipping name	FUEL, AVIATION, TURBINE ENGINE
Class / Division	3
Packing group	III
Marine pollutant:	Yes

IATA (Country variations may apply)

UN No.	:	1863
Proper shipping name	:	Fuel, aviation, turbine engine
Class / Division	:	3
Packing group	:	III

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

SUSDP Schedule	:	S5. When packed in containers having capacity of less than 20 litres. Not scheduled. When packed in containers having capacity of greater than 20 litres.
AICS	:	All components are listed or exempt
Classification triggering components	:	Contains kerosine.
Other Information	:	National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011] List of Designated Hazardous Substances [NOHSC:10005]. Approved Criteria for Classifying Hazardous Substances [NOHSC:1008]. Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003]. Australian Dangerous Goods Code. Standard Uniform Scheduling of Drugs and Poisons.

16. OTHER INFORMATION

Additional Information	:	This document contains important information to ensure the safe storage, handling and use of this product. The information

Material Safety Data Sheet

in this document should be brought to the attention of the person in your organisation responsible for advising on safety matters.

R-phrase(s)

R10	Flammable.
R38	Irritating to skin.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R65	Harmful: may cause lung damage if swallowed.

MSDS Version Number : 1.2

MSDS Effective Date : 08.04.2010

MSDS Revisions : A vertical bar (|) in the left margin indicates an amendment from the previous version.

MSDS Regulation :

Uses and Restrictions : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.
This product is not to be used as a solvent or cleaning agent; for lighting or brightening fires; as a skin cleanser.
Not to be used as a fuel for automotive vehicles.
Not to be used to prevent waxing in diesel fuel.

MSDS Distribution : The information in this document should be made available to all who may handle the product.

Disclaimer : This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

Material Safety Data Sheet

WHMIS (Pictograms)	WHMIS (Classification)	Personal protective equipment
	Not controlled under WHMIS (Canada).	

Section 1. Product and Company Identification

Product name / Trade name	Propylene Glycol Heavy Duty Antifreeze/Coolant	**Associated Product's Item Code**	15-634
Synonym	Not available.	**CAS #**	Mixture.
Chemical family	Solvent.	**Validation date**	Feb. 23 2009
Chemical formula	Not applicable.	**Print date**	Feb. 23 2009
Manufacturer	Recochem Inc. 850 Montee de Liesse Montreal, Quebec H4T 1P4 (514) 341-3550 www.recochem.com	**In case of emergency**	Recochem Inc. Communications and Regulatory Affairs Department (905) 878-5544
Material uses	Consumer products: Antifreeze.		

Section 2. Hazards identification

Emergency Overview	SUSPECT CANCER HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE CANCER. Avoid exposure - obtain special instructions before use. Do not breathe vapor or mist. Contains material which may cause cancer. Risk of cancer depends on duration and level of exposure.
Potential Acute Health Effects	**See section 11 for more detailed information on health effects and symptoms.** Slightly hazardous by the following route of exposure: of eye contact (irritant), of ingestion.
Note to Physician	Not available.

Section 3. Composition, information on ingredients

Canada

Name	CAS number	%
propane-1,2-diol	57-55-6	95 - 99
Sodium tetraborate pentahydrate	12179-04-3	0.1 - 1
Sodium nitrite	7632-00-0	0.1 - 1
sodium Tolyltriazole 50%	64665-57-2	0.1 - 1

There are no ingredients or 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.

Continued on next page

Section 4. First aid measures

Eye contact	Immediately flush eyes with plenty of water for at least 60 minutes, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.
Skin contact	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Inhalation	Move exposed person to fresh air. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Get medical attention if symptoms occur. 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.
Ingestion	Wash out mouth with water. Remove dentures if any. Move exposed person to fresh air. Keep person warm and at rest. 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. Get medical attention if symptoms occur. 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 collar, tie, belt or waistband.
Notes to physician	No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Section 5. Fire fighting measures

Products of combustion	Decomposition products may include the following materials: carbon oxides
Fire-fighting media and instructions	Use an extinguishing agent suitable for the surrounding fire.
Fire Hazards	When heated to decomposition it emits acrid smoke and irritating fumes.
Explosion Hazards	Not available.

Section 6. Accidental release measures

Small spill and leak	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill and leak	Stop leak if without risk. Move containers from spill area. 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

Handling	Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
Storage	Store in accordance with local regulations. 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. 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.

Continued on next page

Section 8. Exposure controls, personal protection

Engineering controls No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.

Personal protection

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

Body 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.

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

Hands Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
>8 hours (breakthrough time): nitrile rubber

Product name	**Exposure limits**
Canada	
propane-1,2-diol	**CA Ontario Provincial (Canada, 3/2007).** TWAEV: 50 ppm 8 hour(s). Form: total vapour and aerosol TWAEV: 155 mg/m³ 8 hour(s). Form: total vapour and aerosol TWAEV: 10 mg/m³ 8 hour(s). Form: aerosol
Sodium tetraborate pentahydrate	**ACGIH (Canada, 2003).** TWA: 1 mg/m³ 8 hour(s). **CA British Columbia Provincial (Canada, 7/2007).** TWA: 2 mg/m³ 8 hour(s). Form: Inhalable STEL: 6 mg/m³ 15 minute(s). Form: Inhalable **CA Ontario Provincial (Canada, 3/2007).** TWAEV: 2 mg/m³ 8 hour(s). Form: The notation “inhalable” following the name of an agent in this Schedule means that size fraction of the airborne particulate deposited anywhere in the respiratory tract and collected during air sampling with a particle size-selective device that, (a) meets the American Conference of Governmental Industrial Hygienists (ACGIH) particle size-selective criteria; and (b) has the cut point of 100 microns at 50 per cent collective efficiency. STEV: 6 mg/m³ 15 minute(s). Form: The notation “inhalable” following the name of an agent in this Schedule means that size fraction of the airborne particulate deposited anywhere in the respiratory tract and collected during air sampling with a particle size-selective device that, (a) meets the American Conference of Governmental Industrial Hygienists (ACGIH) particle size-selective criteria; and (b) has the cut point of 100 microns at 50 per cent collective efficiency.
United States	
propane-1,2-diol	**AIHA WEEL (United States, 1/2007).** TWA: 10 mg/m³ 8 hour(s).

Continued on next page

Section 9. Physical and chemical properties

Physical State and Appearance	Liquid. (Clear viscous liquid.)	**Odour**	Odorless.
Molecular weight		**Taste**	Tasteless.
pH	6 to 8	**Colour**	Green.
Boiling/condensation point	197°C (386.6°F)	**Volatility**	Not available.
Melting/freezing point	-13°C (8.6°F)	**Evaporation rate**	0.005 (Butyl acetate. = 1)
Relative density	1.048 to 1.058	**Odour Threshold**	Not available.
Vapour Pressure	0.009 kPa (0.07 mm Hg) (at 20°C)	**Viscosity**	not available
Vapour Density	2.62 (Air = 1)	**Solubility**	Easily soluble in the following materials: cold water, methanol.
VOC Content	Not available.	**Other Properties**	Not available.

The product is:	May be combustible at high temperature.
Auto-ignition temperature	Not available.
Flash Point	Closed cup: >93.3°C (>199.9°F)
Flammable limits	Not applicable
Fire hazards in the presence of various substances	May be combustible in situations where enough water has evapourated off.

Section 10. Stability and reactivity

Stability	The product is stable. Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions of instability	Not available.
Incompatibility with various substances	Slightly reactive to reactive with OXIDIZING AGENTS, acids.
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological Information

Canada

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure

Continued on next page

propane-1,2-diol	LD50 Dermal	Rabbit	20800 mg/kg	-
	LD50 Dermal	Rabbit	20800 mg/kg	-
	LD50 Intramuscular	Rat	14 g/kg	-
	LD50 Intramuscular	Rat	20000 mg/kg	-
	LD50 Intraperitoneal	Rat	6660 mg/kg	-
	LD50 Intravenous	Rat	6800 mg/kg	-
	LD50 Intravenous	Rat	6423 mg/kg	-
	LD50 Oral	Rat	20 g/kg	-
	LD50 Subcutaneous	Rat	28000 mg/kg	-
	LD50 Subcutaneous	Rat	22500 mg/kg	-
	TDLo Intraperitoneal	Rat	19500 mg/kg	-
Sodium nitrite	LD50 Oral	Rat	85 mg/kg	-

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Can cause gastrointestinal disturbances.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Sodium nitrite	-	2A	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

Section 12. Ecological information

For accidental discharges into the environment, see Section 6:"Accidental Release Measures" for suggested instructions.

Environmental effects : This product shows a low bioaccumulation potential.

Canada

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure

Continued on next page

propane-1,2-diol	-	Acute EC50 >10000000 ug/L Fresh water	Daphnia - Daphnia magna	48 hours
	-	Acute LC50 15052 to 17561 mg/L Fresh water	Daphnia - Ceriodaphnia dubia	48 hours
	-	Acute LC50 5122 to 6011 mg/L Fresh water	Daphnia - Ceriodaphnia dubia	48 hours
	-	Acute LC50 4919 mg/L Fresh water	Daphnia - Ceriodaphnia dubia	48 hours
	-	Acute LC50 44 to 47 ml/L Fresh water	Fish - Oncorhynchus mykiss	96 hours
	-	Acute LC50 34060 to 39339 mg/L Fresh water	Fish - Pimephales promelas	96 hours
	-	Acute LC50 1020000 ug/L Fresh water	Daphnia - Ceriodaphnia dubia	48 hours
	-	Acute LC50 710000 ug/L Fresh water	Fish - Pimephales promelas	96 hours
	-	Acute LC50 >62000000 ug/L Fresh water	Fish - Pimephales promelas	96 hours
	-	Acute LC50 55770000 ug/L Fresh water	Fish - Pimephales promelas	96 hours
	-	Acute LC50 18340000 ug/L Fresh water	Daphnia - Ceriodaphnia dubia	48 hours
	-	Chronic NOEC 660000 ug/L Fresh water	Daphnia - Ceriodaphnia dubia	48 hours
	-	Chronic NOEC 13020000 ug/L Fresh water	Daphnia - Ceriodaphnia dubia	48 hours
Sodium nitrite	-	Acute LC50 110 to 130 ug/L Fresh water	Fish - Oncorhynchus mykiss	96 hours
	-	Acute LC50 83 ug/L Fresh water	Fish - Ictalurus punctatus	96 hours
	-	Acute LC50 48 ug/L Fresh water	Fish - Ictalurus punctatus	96 hours
	-	Acute LC50 2.5 mg/L Fresh water	Fish - Labeo rohita	96 hours
	-	Acute LC50 0.79 to 1 mg/L Fresh water	Fish - Oncorhynchus mykiss	96 hours

Conclusion/Summary : Not available.

Biodegradability

Continued on next page

Conclusion/Summary : Not available.

Section 13. Disposal considerations

Waste information The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

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

Section 14. Transport information

Canada TDG Classification	
Class	- Not a TDG-controlled material.
Subsidiary class	-
Proper Shipping Name (Canada) TDG	-
UN number	Not regulated.
Packing Group	-
Special provisions	Not available.

IMDG Classification	
Class	- Not controlled under IMDG.
Subsidiary class	-
Proper Shipping Name IMDG	-
UN number	Not regulated.
Packing Group	-
Marine pollutant	Not a pollutant.
Special provisions	-

United States DOT (Classification)	
Class	- Not a DOT controlled material (United States).
Subsidiary class	-
Proper Shipping Name (United States) DOT	-
UN number	Not regulated.
Packing Group	-
Special provisions	Not available.

Continued on next page

International Air Transport Association (IATA)	For air shipment classification and associated regulations, please refer to the latest edition of IATA Dangerous Goods Regulations.

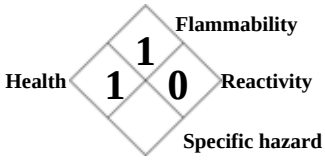
Section 15. Regulatory information

WHMIS Classification (Canada)	Not controlled under WHMIS (Canada).
Canada Domestic Substances List (DSL) Status	This product and/ or all of its components are on the DSL.
HCS Classification (U.S.A.)	Not regulated.
U.S.A. Regulatory Lists	This product and/ or all of its components are on the TSCA inventory list.

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

Health	1
Flammability	1
Reactivity	0
Personal protection	B

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



Section 16. Other information

Validated and verified by Compliance and Technical Information Manager on Feb. 23 2009 **ph.# 905-878-5544.** **Printed** Feb. 23 2009

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.

MSDS are available at www.recochem.com

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **VARSOL™ DX 3139 SOLVENT**
Product Description: Aliphatic Hydrocarbon
MSDS Number: 4079
Product Code: 201560B05620
Intended Use: Solvent

COMPANY IDENTIFICATION

Supplier: **IMPERIAL OIL CHEMICAL**
240 4th Avenue S.W.
CALGARY, ALBERTA. T2P 3M9 Canada
24 Hour Environmental / Health Emergency Telephone 1-866-232-9563
Transportation Emergency Phone Number 1-866-232-9563
Product Technical Information 1-800-663-4109

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*	Acute Toxicity
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8	50 - 80%	None
STODDARD SOLVENT	8052-41-3	20 - 50%	None

Hazardous Constituent(s) Contained in Complex Substance(s)

Name	CAS#	Concentration*	Acute Toxicity
ETHYL BENZENE	100-41-4	0.1 - < 0.25%	Inhalation Lethality: LC50 17.8 mg/l (Rat); Oral Lethality: LD50 3.5 g/kg (Rat)
NAPHTHALENE	91-20-3	0.1 - < 0.25%	Inhalation Lethality: LC50 > 0.4 mg/l (Rat); Oral Lethality: LD50 710 mg/kg (Mouse); Oral Lethality: LD50 533 mg/kg (Mouse)
NONANE	111-84-2	1 - < 5%	None
PSEUDOCUMENE (1,2,4-TRIMETHYLBENZENE)	95-63-6	< 2%	None
XYLENES	1330-20-7	< 0.3%	None

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

SECTION 3 HAZARDS IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

PHYSICAL/CHEMICAL EFFECTS

Combustible. Material can release vapours that readily form flammable mixtures. Vapour accumulation could

flash and/or explode if ignited. Material can accumulate static charges which may cause an ignition.

HEALTH EFFECTS

May cause cancer. May cause harm to the unborn child. If swallowed, may be aspirated and cause lung damage. May be irritating to the eyes, nose, throat, and lungs. Repeated exposure may cause skin dryness or cracking. May cause central nervous system depression.

NFPA Hazard ID:	Health:	1	Flammability:	2	Reactivity:	0
HMIS Hazard ID:	Health:	1*	Flammability:	2	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 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

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

Inappropriate Extinguishing Media: Straight streams of water

FIRE FIGHTING

Fire Fighting Instructions: FLAMMABLE. Evacuate area. 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: 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: Smoke, Fume, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: 42°C (108°F) [ASTM D-56]
Flammable Limits (Approximate volume % in air): LEL: 0.8 UEL: 5.6
Autoignition Temperature: 261°C (502°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 and, when applicable, H2S, or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of 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 are resistant to aromatic hydrocarbons are recommended. Note: gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

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. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapour-suppressing foam may be used to reduce vapour. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapour, but may not prevent ignition in enclosed spaces. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do so without risk. Eliminate sources of ignition. Warn other shipping. If the Flash Point exceeds the Ambient Temperature by 10 deg C or more, use containment booms and remove from the surface by skimming or with suitable absorbents when conditions permit. If the Flash Point does not exceed the Ambient Air Temperature by at least 10C, use booms as a barrier to protect shorelines and allow material to evaporate. Seek the advice of a specialist before using dispersants.

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

Large Spills: Dyke far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid all personal contact. Potentially toxic/irritating fumes/vapour may be evolved from heated or agitated material. Use only with adequate ventilation. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Loading/Unloading Temperature: [Ambient]

Transport Temperature: [Ambient]
Transport Pressure: [Ambient]

Static Accumulator: This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100x10E-12 Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.

STORAGE

The container choice, for example storage vessel, may effect 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. Storage containers should be earthed and bonded. Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.
Storage Temperature: [Ambient]
Storage Pressure: [Ambient]

Suitable Containers/Packing: Tank Cars; Tank Trucks; Barges; Drums
Suitable Materials and Coatings (Chemical Compatibility): Carbon Steel; Stainless Steel; Cast Iron; Copper Bronze; Inorganic Zinc Coatings; Polyamide Epoxy; Polyethylene
Unsuitable Materials and Coatings: Butyl Rubber; Natural Rubber

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Substance Name	Form	Limit/Standard			Note	Source
ETHYL BENZENE		TWA	20 ppm			ACGIH
NAPHTHALENE		TWA	10 ppm		Skin	ACGIH
NONANE		TWA	200 ppm			ACGIH
PRODUCT	Vapour.	RCP - TWA	102 ppm	600 mg/m3	Total Hydrocarbons	Supplier

PSEUDOCUMENE (1,2,4-TRIMETHYLBENZENE)		TWA	25 ppm			ACGIH
STODDARD SOLVENT		TWA	100 ppm			ACGIH
XYLENES		STEL	150 ppm			ACGIH
XYLENES		TWA	100 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:

Adequate ventilation should be provided so that exposure limits are not exceeded. Use explosion-proof ventilation equipment.

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:

Half-face filter respirator

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:

Chemical resistant gloves are recommended.

Eye Protection: If contact is likely, safety glasses with side shields are 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:

Chemical/oil resistant clothing is recommended.

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: Liquid
Form: Clear
Colour: Colourless
Odour: Mild Petroleum/Solvent
Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15.6 °C): 0.779
Density: 779 kg/m³ (6.5 lbs/gal, 0.78 kg/dm³)
Flash Point [Method]: 42°C (108°F) [ASTM D-56]
Flammable Limits (Approximate volume % in air): LEL: 0.8 UEL: 5.6
Autoignition Temperature: 261°C (502°F)
Boiling Point / Range: 161°C (322°F) - 198°C (388°F)
Vapour Density (Air = 1): 4.9 at 101 kPa
Vapour Pressure: 0.262 kPa (1.97 mm Hg) at 20ºC
Evaporation Rate (n-butyl acetate = 1): 0.19
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): N/D
Solubility in Water: Negligible
Viscosity: 1.08 cSt (1.08 mm2/sec) at 40ºC | 1.27 cSt (1.27 mm2/sec) at 25°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: <-77°C (-107°F)
Melting Point: N/A
Pour Point: -59°C (-74°F)
Molecular Weight: 143
Hygroscopic: No
Coefficient of Thermal Expansion: 0.00076 V/V/DEG C
Decomposition Temperature: N/D

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.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Mildly irritating to skin with prolonged exposure. Based on assessment of the components.
Eye	
Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

For the product itself:

Vapour/aerosol concentrations above recommended exposure levels are irritating to the eyes and respiratory tract, may cause headaches, dizziness, anaesthesia, drowsiness, unconsciousness and other central nervous system effects including death. Prolonged and/or repeated skin contact with low viscosity materials may defat the skin resulting in possible irritation and dermatitis. Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.

Contains:

NAPHTHALENE: Exposure to high concentrations of naphthalene may cause destruction of red blood cells, anemia, and cataracts. Naphthalene caused cancer in laboratory animal studies, but the relevance of these findings to humans is uncertain.

ETHYLBENZENE: Caused cancer in laboratory animal studies. The relevance of these findings to humans is uncertain.

XYLENES: High exposures to xylenes in some animal studies have been reported to cause health effects on the developing embryo/fetus. These effects were often at levels toxic to the mother. The significance of these findings to humans has not been determined.

CMR Status:

Chemical Name	CAS Number	List Citations
ETHYL BENZENE	100-41-4	3, 4
NAPHTHALENE	91-20-3	3, 4
NONANE	111-84-2	4
PSEUDOCUMENE (1,2,4-TRIMETHYLBENZENE)	95-63-6	4
STODDARD SOLVENT	8052-41-3	4
XYLENES	1330-20-7	4

--REGULATORY LISTS SEARCHED--

1 = IARC 1	3 = IARC 2B	5 = ACGIH A1
2 = IARC 2A	4 = ACGIH ALL	6 = ACGIH A2

SECTION 12 ECOLOGICAL INFORMATION

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

ECOTOXICITY

Material -- Expected to be toxic 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 readily biodegradable.

Hydrolysis:

Material -- Transformation due to hydrolysis not expected to be significant.

Photolysis:

Material -- Transformation due to photolysis not expected to be significant.

Atmospheric Oxidation:

Material -- Expected to degrade rapidly in air

OTHER ECOLOGICAL INFORMATION

VOC (EPA Method 24): 6.501 lbs/gal

SECTION 13 DISPOSAL CONSIDERATIONS

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: PETROLEUM DISTILLATES, N.O.S
Hazard Class & Division: 3
UN Number: 1268
Packing Group: III
Marine Pollutant: Yes

Footnote: Marine Pollutant designation is applicable only if shipped over water.

LAND (DOT)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S (Stoddard solvent)
Hazard Class & Division: 3
ID Number: 1268
Packing Group: III
Marine Pollutant: Yes
ERG Number: 128
Label(s): 3
Transport Document Name: UN1268, PETROLEUM DISTILLATES, N.O.S. (Stoddard solvent), 3, PG III, MARINE POLLUTANT

SEA (IMDG)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S (Stoddard solvent)
Hazard Class & Division: 3
EMS Number: F-E, S-E
UN Number: 1268
Packing Group: III
Marine Pollutant: Yes
Label(s): 3
Transport Document Name: UN1268, PETROLEUM DISTILLATES, N.O.S. (Stoddard solvent), 3, PG III, (42°C c.c.), MARINE POLLUTANT

AIR (IATA)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S
Hazard Class & Division: 3
UN Number: 1268
Packing Group: III
Label(s) / Mark(s): 3
Transport Document Name: UN1268, PETROLEUM DISTILLATES, N.O.S., 3, PG III

SECTION 15 REGULATORY INFORMATION

WHMIS Classification: Class B, Division 3: Combustible Liquids

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

CEPA: All components of this material are either on the Canadian Domestic Substances List (DSL), exempt, or have been notified under CEPA.

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
NONANE	111-84-2	1, 5
PSEUDOCUMENE (1,2,4-TRIMETHYLBENZENE)	95-63-6	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

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes: Not Applicable

PRECAUTIONARY LABEL TEXT:
WHMIS Classification: Class B, Division 3: Combustible Liquids

HEALTH HAZARDS
May cause cancer. May cause harm to the unborn child. If swallowed, may be aspirated and cause lung damage.
PHYSICAL HAZARDS
Combustible. Material can accumulate static charges which may cause an ignition.

PRECAUTIONS
Avoid all personal contact. Potentially toxic/irritating fumes/vapour may be evolved from heated or agitated material. Use only with adequate ventilation. Use proper bonding and/or earthing procedures.However, bonding and earthing may not eliminate the hazard from static accumulation.

FIRST AID
Inhalation: Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

Eye: Flush thoroughly with water. If irritation occurs, get medical assistance.

Oral: Seek immediate medical attention. Do not induce vomiting.

Skin: Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing

before reuse.

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

SPILL/LEAK
Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. Prevent entry into waterways, sewer, basements or confined areas. A vapour-suppressing foam may be used to reduce vapour. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do so without risk. Eliminate sources of ignition. Warn other shipping. Report spills as required to appropriate authorities. If the Flash Point exceeds the Ambient Temperature by 10 deg C or more, use containment booms and remove from the surface by skimming or with suitable absorbents when conditions permit. If the Flash Point does not exceed the Ambient Air Temperature by at least 10C, use booms as a barrier to protect shorelines and allow material to evaporate. Seek the advice of a specialist before using dispersants.

DGN: 5004216 (1013968)

Prepared by: Imperial Oil Limited, Solvents

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **HEAVY DUTY ANTIFREEZE 60/40 PREMIX**
Product Description: Glycol
MSDS Number: 8514
Product Code: 35101010A0H7
Intended Use: Antifreeze/coolant

COMPANY IDENTIFICATION

Supplier: **Imperial Oil Products Division**
240 4th Avenue
Calgary, ALBERTA. T2P 3M9 Canada

24 Hour Environmental / Health 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 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*	Acute Toxicity
ETHYLENE GLYCOL	107-21-1	55 - 65%	Dermal Lethality: LD50 9.53 g/kg (Rabbit); Inhalation Lethality: LC50 4300 ppm (Rat); Oral Lethality: LD50 4.70 g/kg (Rat)

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

SECTION 3 HAZARDS IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

HEALTH EFFECTS

May cause harm to the unborn child. Ingestion may cause serious adverse effects and may be fatal. May cause kidney failure and central nervous system effects. Prolonged exposure to elevated concentrations of mist or liquid may cause irritation of the skin, eyes, and respiratory tract. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	1	Flammability:	1	Reactivity: 0
HMIS Hazard ID:	Health:	2*	Flammability:	1	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 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. 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.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention.

NOTE TO PHYSICIAN

This product contains ethylene glycol and/or diethylene glycol which, if ingested, are metabolized to toxic metabolites by the enzyme alcohol dehydrogenase, for which ethanol and 4-methylpyrazole {U.S. drug name Fomepizole, trade name Antizol} are antagonists. Administration of oral or intravenous ethanol or intravenous 4-methylpyrazole may arrest further metabolism of this material and thereby ameliorate the toxicity. Use of ethanol or 4-methylpyrazole does not affect toxic metabolites that are already present and is not a substitute for hemodialysis.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

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

Inappropriate Extinguishing Media: Straight streams of water or standard foam

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. 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: Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: 116°C (240°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 3.2 UEL: 15.3
Autoignition Temperature: 40°C (104°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.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do so without risk. Do not touch or walk through spilled material. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do so without risk. Consult an expert. Warn other shipping. Material will sink. Remove material, as much as possible, using mechanical equipment.

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

Remove debris in path of spill and remove contaminated debris from shoreline and water surface. Dispose of according to local regulations. Large Spills: Dyke far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid breathing mists or vapour. Avoid contact with skin. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers. Keep away from incompatible materials.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Substance Name	Form	Limit/Standard			Note	Source
ETHYLENE GLYCOL	Aerosol.	Ceiling	100 mg/m3			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:

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

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 protection is ordinarily required under normal 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:

If prolonged or repeated contact is likely, chemical-resistant gloves are recommended. If contact with forearms is likely, wear gauntlet-style gloves.

Eye Protection: If contact is likely, safety glasses with side shields are 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:

If prolonged or repeated contact is likely, chemical, and oil resistant clothing is recommended.

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: Liquid
Colour: Violet
Odour: Characteristic
Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density: > 1
Flash Point [Method]: 116°C (240°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 3.2 UEL: 15.3
Autoignition Temperature: 40°C (104°F)
Boiling Point / Range: N/D
Vapour Density (Air = 1): 2.1 at 101 kPa
Vapour Pressure: 0.008 kPa (0.06 mm Hg) at 20ºC
Evaporation Rate (n-butyl acetate = 1): 0.01
pH: 9 - 11
Log Pow (n-Octanol/Water Partition Coefficient): < 2
Solubility in Water: Complete
Viscosity: [N/D at 40°C]
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/D
Pour Point: -52°C (-62°F)

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers, Acids, Alkalies

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

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks

Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: Data available.	Negligible hazard at ambient/normal handling temperatures. Based on test data for structurally similar materials.
Ingestion	
Toxicity (Rat): LDLo 100 ml	Moderately toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

Contains:

ETHYLENE GLYCOL (EG): Repeated high oral exposure has caused kidney damage, neurological effects, degeneration of the liver and changes in blood chemistry and circulating blood cells in laboratory animals. Repeated overexposure has the potential to cause similar toxic effects in humans. EG causes developmental and reproductive effects at high dose levels in laboratory animals. The relevance of these findings to humans is uncertain. However, as a precaution, avoid exposure during pregnancy.

Additional information is available by request.

CMR Status: None.

Chemical Name	CAS Number	List Citations
ETHYLENE GLYCOL	107-21-1	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

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

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Material -- Expected to remain in water or migrate through soil.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be readily biodegradable.

Atmospheric Oxidation:
Material -- Expected to degrade rapidly in air

BIOACCUMULATION POTENTIAL
Material -- Potential to bioaccumulate is low.

SECTION 13 DISPOSAL CONSIDERATIONS

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
Even though this product is readily biodegradable, it must not be indiscriminately discarded into the environment. 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): Not Regulated for Land Transport

LAND (DOT)
Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (Ethylene Glycol)
Hazard Class & Division: 9
ID Number: 3082
Packing Group: III
Product RQ: 7692.31 LBS - ETHYLENE GLYCOL
ERG Number: 171
Label(s): 9
Transport Document Name: UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (Ethylene Glycol), 9, PG III, RQ

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

WHMIS Classification: Class D, Division 2, Subdivision A: Very Toxic Material

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

CEPA: All components of this material are either on the Canadian Domestic Substances List (DSL), exempt, or have been notified under CEPA.

Complies with the following national/regional chemical inventory requirements: AICS, DSL, EINECS, ENCS, IECSC, KECI, PICCS, TSCA

The Following Ingredients are Cited on the Lists Below: None.

Chemical Name	CAS Number	List Citations
ETHYLENE GLYCOL	107-21-1	6

--REGULATORY LISTS SEARCHED--

1 = TSCA 4	3 = TSCA 5e	5 = TSCA 12b
2 = TSCA 5a2	4 = TSCA 6	6 = NPRI

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:
Section 04: First Aid Eye - Header was modified.
Section 04: First Aid Ingestion - Header was modified.
Section 06: Protective Measures was modified.
Section 06: Notification Procedures - Header was modified.
Section 11: Acute Toxicity Table Header was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Colour was modified.
Section 11: Inhalation - Header was modified.
Section 09: Evaporation Rate - Header was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 09: Vapour Pressure - Header was modified.
Section 09: Vapour Pressure was modified.
Hazard Identification: Health Hazards was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 06: Accidental Release-Spill Management-Land was modified.
Section 06: Accidental Release- Spill Management- Water was modified.
Section 09: Flash Point C(F) was modified.

Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Hazard Identification: Hazards Note was modified.
Composition: Component table was modified.
Section 16: Health Hazards was modified.
Section 16: Health Hazards - Header was modified.
Section 16: CA Prepared by - Header was modified.
Section 08: Exposure Limits Table was modified.
Section 16: Land Spill was modified.
Section 16: First Aid Inhalation - Header was modified.
Section 16: Precautionary Label Text - Header was modified.
Section 09: Oxidizing Properties was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 11: Tox List Cited Table was modified.
Section 13: Regulatory Disposal Information - Header was modified.
Section 14: Product RQ - Header was added.
Section 14: Product RQ was added.
Section 15: Canadian List Citations Table was added.
Section 15: Chemical Name - Header was added.
Section 15: CAS Number - Header was added.
Section 15: List Citations -Header was added.
Section 01: Product Code was added.
Section 01: Product Code - Header was added.

PRECAUTIONARY LABEL TEXT:
WHMIS Classification: Class D, Division 2, Subdivision A: Very Toxic Material

HEALTH HAZARDS
May cause harm to the unborn child.
PRECAUTIONS
Avoid breathing mists or vapour. Avoid contact with skin.

FIRST AID
Inhalation: Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

Eye: Flush thoroughly with water. If irritation occurs, get medical assistance.

Oral: Seek immediate medical attention.

Skin: Wash contact areas with soap and water. 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.

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

SPILL/LEAK
Land Spill: Stop leak if you can do so without risk. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Recover by pumping or with suitable absorbent. Do not touch or walk through spilled material.

Water Spill: Stop leak if you can do so without risk. Report spills as required to appropriate authorities. Material will sink.

DGN: 5007472 (1011905)

Prepared by: Imperial Oil Limited, IH and Product Safety

Material Safety Data Sheet

DIESEL FUEL

PETRO-CANADA

1 . Product and company identification

Product name : DIESEL FUEL

Synonym : Seasonal Diesel, #1 Diesel, #2 Heating Oil, #1 Heating Oil, D50, D60, P40, P50, 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).

Code : W104, W293

Material uses : 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.

Manufacturer : PETRO-CANADA
P.O. Box 2844
150 – 6th Avenue South-West
Calgary, Alberta
T2P 3E3

In case of emergency : Petro-Canada: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

2 . Hazards identification

Physical state : Bright oily liquid.

Odour : Mild petroleum oil like.

WHMIS (Canada) :

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

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : WARNING!

COMBUSTIBLE LIQUID AND VAPOUR. CAUSES EYE AND SKIN IRRITATION.

Combustible liquid. Severely irritating to the skin. Irritating to eyes. Keep away from heat, sparks and flame. Do not get in eyes. Avoid breathing vapour or mist. Avoid contact with skin and clothing. Use only with adequate ventilation. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

Ingestion : Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract.

Skin : Severely irritating to the skin.

Eyes : Irritating to eyes.

Potential chronic health effects

Chronic effects : No known significant effects or critical hazards.

Carcinogenicity : Diesel engine exhaust particulate is probably carcinogenic to humans (IARC Group 2A).

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

2 . Hazards identification

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Medical conditions aggravated by over-exposure : Avoid prolonged or repeated skin contact to diesel fuels which can lead to dermal irritation and may be associated with an increased risk of skin cancer.

See toxicological information (Section 11)

3 . Composition/information on ingredients

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

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

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

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

5 . Fire-fighting measures

Flammability of the product : Combustible liquid

Extinguishing media

Suitable : Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : Do not use water jet.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), sulphur compounds (H2S), smoke and irritating vapours as products of incomplete combustion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

5 . Fire-fighting measures

Special remarks on fire hazards : Flammable in presence of open flames, sparks and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. This product can accumulate static charge and ignite.

Special remarks on explosion hazards : 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.

6 . Accidental release measures

Personal precautions : 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 spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Avoid dispersal of spilt 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 for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. 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. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the 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). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. 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 non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

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

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Fuels, diesel	**ACGIH TLV (United States). Absorbed through skin.** TWA: 100 mg/m³, (Inhalable fraction and vapour) 8 hour(s).
Fuel oil No. 2	**ACGIH TLV (United States). Absorbed through skin.** TWA: 100 mg/m³, (Inhalable fraction and vapour) 8 hour(s).
Hydrotreated Renewable Diesel	**ACGIH TLV (United States). Absorbed through skin.** TWA: 200 mg/m³ 8 hour(s).
Fuel oil No. 1	**ACGIH TLV (United States). Absorbed through skin.** TWA: 200 mg/m³ 8 hour(s).

Consult local authorities for acceptable exposure limits.

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

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

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

Personal protection

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

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

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

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

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

9 . Physical and chemical properties

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

10 . Stability and reactivity

Chemical stability	:	The product is stable.
Hazardous polymerisation	:	Under normal conditions of storage and use, hazardous polymerisation will not occur.
Materials to avoid	:	Reactive with oxidising agents and acids.
Hazardous decomposition products	:	May release COx, NOx, SOx, H_2S, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Fuels, diesel	LD50 Dermal	Mouse	24500 mg/kg	-
	LD50 Oral	Rat	7500 mg/kg	-
Fuel oil No. 2	LD50 Oral	Rat	12000 mg/kg	-
Fuel oil No. 1	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation Vapour	Rat	>5000 mg/m³	4 hours
Hydrotreated Renewable Diesel	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation Vapour	Rat	>5200 mg/m³	4 hours

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

11 . Toxicological information

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Diesel engine exhaust particulate is probably carcinogenic to humans (IARC Group 2A).

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Fuels, diesel	A3	3	-	-	-	-
Fuel oil No. 1	A3	3	-	-	-	-
Fuel oil No. 2	A3	3	-	-	-	-
Hydrotreated Renewable Diesel	A3	3	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

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

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

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

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	UN1202	DIESEL FUEL	3	III		-
DOT Classification	Not available.	Not available.	Not available.	-		-

14 . Transport information

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Combustible liquid
Irritating material

Canada

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

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

International regulations

Canada inventory : All components are listed or exempted.

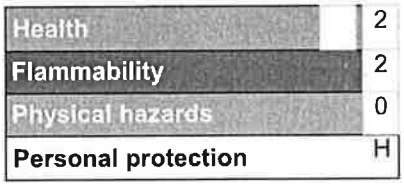
United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16 . Other information

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

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



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

References : Available upon request.
™ Trademark of Suncor Energy Inc. Used under licence.

Date of printing : **6/28/2013.**

Date of issue : 28 June 2013

Date of previous issue : 6/28/2013.

Responsible name : **Sécurité de produit - KKB**

▼ Indicates information that has changed from previously issued version.

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

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

For Product Safety Information: (905) 804-4752

Notice to reader

16 . Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: (see Section 16 for Synonyms) **MOBIL DELVAC 1300 SUPER 15W40**
Product Description: Base Oil and Additives
MSDS Number: 12560
Product Code: 201520403510
Intended Use: Engine oil

COMPANY IDENTIFICATION

Supplier: **Imperial Oil Products Division**
240 4th Avenue
Calgary, ALBERTA. T2P 3M9 Canada

24 Hour Environmental / Health 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 COMPOSITION / INFORMATION ON INGREDIENTS

No Reportable Hazardous Substance(s) or Complex Substance(s).

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines see Section 15.

HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	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 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use

adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. 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.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

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

Inappropriate Extinguishing Media: Straight streams of water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. 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.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulphur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: 236°C (457°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D

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. 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: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of 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 are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do so without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do so without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

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

Large Spills: Dyke far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid contact with used product. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or earthing procedures. However, bonding and earthing may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Do not store in open or unlabelled containers. Keep away from incompatible materials.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits/standards for materials that can be formed when handling this product: When mists/aerosols can occur the following is recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction).

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

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:
No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are 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:
No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

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: Liquid
Colour: Amber
Odour: Characteristic
Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.873
Flash Point [Method]: 236°C (457°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: N/D
Vapour Density (Air = 1): N/D
Vapour Pressure: < 0.013 kPa (0.1 mm Hg) at 20ºC
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5
Solubility in Water: Negligible
Viscosity: [N/D at 40°C] | 15 cSt (15 mm2/sec) at 100°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -27°C (-17°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

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

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.

Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

For the product itself:

Diesel engine oils: Not carcinogenic in animals tests. Used and unused diesel engine oils did not produce any carcinogenic effects in chronic mouse skin painting studies. Oils that are used in gasoline engines may become hazardous and display the following properties: Carcinogenic in animal tests. Caused mutations in vitro. Possible allergen and photoallergen. Contains polycyclic aromatic compounds (PAC) from combustion products of gasoline and/or thermal degradation products.

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitising in test animals.

Additional information is available by request.

CMR Status: None.

--REGULATORY LISTS SEARCHED--

1 = IARC 1	3 = IARC 2B	5 = ACGIH A1
2 = IARC 2A	4 = ACGIH ALL	6 = ACGIH A2

SECTION 12 ECOLOGICAL INFORMATION

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

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

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): Not Regulated for Land Transport

LAND (DOT): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

WHMIS Classification: Not controlled

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

CEPA: All components of this material are either on the Canadian Domestic Substances List (DSL), exempt, or have been notified under CEPA.

Complies with the following national/regional chemical inventory requirements: DSL, TSCA

The Following Ingredients are Cited on the Lists Below:

Chemical Name	CAS Number	List Citations
ZINC DITHIOPHOSPHATE	68649-42-3	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

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:
Section 09: Phys/Chem Properties Note was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 09: Vapour Pressure was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09 Viscosity was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 08: Exposure limits/standards was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 16: Synonyms was added.
Section 16: Synonyms - Header was added.
Section 01: Product Name - Header was added.
Section 01: Product Code was added.
Section 01: Product Code - Header was added.

SYNONYMS: XD-3 EXTRA CJ-4 ENGINE OIL 15W-40

WHMIS Classification: Not controlled

DGN: 5010580 (1011991)

Prepared by: Imperial Oil Limited, IH and Product Safety

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	GASOLINE, UNLEADED
Synonyms	:	Regular, Unleaded Gasoline (US Grade), Mid-Grade, Plus, Super, WinterGas, SummerGas, Supreme, SuperClean, SuperClean WinterGas, RegularClean, PlusClean, Premium, marked or dyed gasoline, TQRUL, transitional quality regular unleaded, BOB, Blendstock for Oxygenate Blending, Conventional Gasoline, RUL, MUL, SUL, PUL.
Product code	:	100126, 101823, 100507, 101811, 101814, 100141, 101813, 101810, 101812, 100063, 101822, 100138, 101821, 100064, 101820, 101819, 100506, 101818, 101816, 101817, 100488
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; Poison Control Centre: Consult local telephone directory for emergency number(s).

Recommended use of the chemical and restrictions on use

Recommended use	:	Unleaded gasoline is used in spark ignition engines including motor vehicles, inboard and outboard boat engines, small engines such as chain saws and lawn mowers, and recreational vehicles.
Prepared by	:	Product Safety: +1 905-804-4752

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance	Clear liquid.
Colour	Clear to slightly yellow or green, undyed liquid. May be dyed red for taxation purposes.
Odour	Gasoline

GHS Classification

Flammable liquids	:	Category 1
Skin irritation	:	Category 2
Germ cell mutagenicity	:	Category 1B

Carcinogenicity	:	Category 1A
Reproductive toxicity	:	Category 2
Specific target organ toxicity - single exposure	:	Category 3 (Central nervous system)
Specific target organ toxicity - repeated exposure	:	Category 1
Aspiration hazard	:	Category 1

GHS Label element

Hazard pictograms :

Signal word : Danger

Hazard statements :
H224 Extremely flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H336 May cause drowsiness or dizziness.
H340 May cause genetic defects.
H350 May cause cancer.
H361 Suspected of damaging fertility or the unborn child.
H372 Causes damage to organs through prolonged or repeated exposure.

Precautionary statements :
Prevention:
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ eye protection/ face protection.
P281 Use personal protective equipment as required.
Response:
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a

POISON CENTER or doctor/ physician if you feel unwell.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P331 Do NOT induce vomiting.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Potential Health Effects

Primary Routes of Entry	:	Eye contact Ingestion Inhalation Skin contact
Target Organs	:	Blood Immune system
Inhalation	:	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	:	May irritate skin.
Eyes	:	May irritate eyes.
Ingestion	:	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea. Aspiration hazard if swallowed - can enter lungs and cause damage.
Chronic Exposure	:	Chronic exposure to benzene may result in increased risk of leukemia and other blood disorders.
Aggravated Medical Condition	:	None known.

Carcinogenicity:

IARC	Group 1: Carcinogenic to humans	
	Benzene	71-43-2
ACGIH	Confirmed human carcinogen	
	Benzene	71-43-2

	Confirmed animal carcinogen with unknown relevance to humans	
	Ethanol	64-17-5
	Gasoline, natural	8006-61-9
OSHA	OSHA specifically regulated carcinogen	
	Benzene	71-43-2
NTP	Known to be human carcinogen	
	Benzene	71-43-2

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Pure substance/mixture : Mixture

Hazardous components

Chemical Name	CAS-No.	Concentration (%)
gasoline, natural	8006-61-9	95 - 100 %
toluene	108-88-3	1 - 40 %
benzene	71-43-2	0.5 - 1.5 %
ethanol	64-17-5	0.1 - 0.3 %

SECTION 4. FIRST AID MEASURES

If inhaled : Artificial respiration and/or oxygen may be necessary.
Move to fresh air.
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	:	First aider needs to protect himself.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Dry chemical Carbon dioxide (CO2) Water fog. Foam
Unsuitable extinguishing media	:	Do NOT use water jet.
Specific hazards during firefighting	:	Cool closed containers exposed to fire with water spray.
Hazardous combustion products	:	Carbon oxides (CO, CO2), nitrogen oxides (NOx), polynuclear aromatic hydrocarbons, phenols, aldehydes, ketones, smoke and irritating vapours as products of incomplete combustion.
Further information	:	Prevent fire extinguishing water from contaminating surface water or the ground water system.

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.
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
		TWA	300 ppm 900 mg/m3	OSHA P0
		STEL	500 ppm 1,500 mg/m3	OSHA P0
		TWA	500 ppm 2,000 mg/m3	OSHA Z-1
toluene	108-88-3	TWA	20 ppm	ACGIH
		TWA	100 ppm 375 mg/m3	NIOSH REL
		ST	150 ppm 560 mg/m3	NIOSH REL
		TWA	200 ppm	OSHA Z-2
		CEIL	300 ppm	OSHA Z-2
		Peak	500 ppm	OSHA Z-2
		TWA	100 ppm 375 mg/m3	OSHA P0
		STEL	150 ppm 560 mg/m3	OSHA P0
benzene	71-43-2	TWA	0.5 ppm	ACGIH
		STEL	2.5 ppm	ACGIH
		TWA	0.1 ppm	NIOSH REL
		ST	1 ppm	NIOSH REL
		TWA	10 ppm	OSHA Z-2
		CEIL	25 ppm	OSHA Z-2
		Peak	50 ppm	OSHA Z-2
		PEL	1 ppm	OSHA CARC
		STEL	5 ppm	OSHA CARC
ethanol	64-17-5	TWA	1,000 ppm 1,900 mg/m3	NIOSH REL
		TWA	1,000 ppm 1,900 mg/m3	OSHA Z-1

		TWA	1,000 ppm 1,900 mg/m3	OSHA P0
		STEL	1,000 ppm	ACGIH

Biological occupational exposure limits

Component	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Toluene	108-88-3	Toluene	In blood	Prior to last shift of workweek	0.02 mg/l	ACGIH BEI
Toluene		Toluene	Urine	End of shift (As soon as possible after exposure ceases)	0.03 mg/l	ACGIH BEI

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 : A NIOSH-approved air-purifying respirator with an organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

Hand protection

Material : 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	:	Clear liquid.
Colour	:	Clear to slightly yellow or green, undyed liquid. May be dyed red for taxation purposes.
Odour	:	Gasoline
Odour Threshold	:	No data available
pH	:	No data available
Pour point	:	No data available
Boiling point/boiling range	:	25 - 225 °C (77 - 437 °F)
Flash point	:	-50 - -38 °C (-58 - -36 °F) Method: Tagliabue.
Auto-Ignition Temperature	:	257 °C (495 °F)
Evaporation rate	:	No data available
Flammability	:	Extremely flammable in presence of open flames, sparks, shocks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. Rapid escape of vapour may generate static charge causing ignition. May accumulate in confined spaces.
Upper explosion limit	:	7.6 %(V)
Lower explosion limit	:	1.3 %(V)
Vapour pressure	:	< 802.5 mmHg (20 °C / 68 °F)
Relative vapour density	:	3
Relative density	:	0.685 - 0.8
Solubility(ies)		

Water solubility	:	insoluble
Partition coefficient: n-octanol/water	:	No data available
Viscosity		
Explosive properties	:	Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Containers may explode in heat of fire. Vapours may form explosive mixtures with air.

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, acids and interhalogens.
Hazardous decomposition products	:	May release COx, NOx, phenols, polycyclic aromatic hydrocarbons, aldehydes, ketones, smoke and irritating vapours when heated to decomposition.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	Eye contact Ingestion Inhalation Skin contact

Acute toxicity

Product:

Acute oral toxicity	Remarks: No data available
Acute inhalation toxicity	Remarks: No data available
Acute dermal toxicity	Remarks: No data available

Components:

toluene:

Acute oral toxicity	LD50 (Rat): 5,580 mg/kg
Acute inhalation toxicity	LC50 (Rat): 7585 ppm Exposure time: 4 h Test atmosphere: dust/mist
Acute dermal toxicity	LD50 (Rabbit): 12,125 mg/kg

benzene:

Acute oral toxicity	LD50 (Rat): 2,990 mg/kg
Acute inhalation toxicity	LC50 (Rat): 13700 ppm Exposure time: 4 h Test atmosphere: dust/mist
Acute dermal toxicity	LD50 (Rabbit): > 8,240 mg/kg

ethanol:

Acute oral toxicity	LD50 (Rat): 7,060 mg/kg
Acute inhalation toxicity	LC50 (Rat): > 32380 ppm Exposure time: 4 h Test atmosphere: vapour

Skin corrosion/irritation

Product:

Remarks: No data available

Components:

toluene:

Result: Moderate skin irritant

benzene:

Result: Moderate skin irritant

ethanol:

Result: Skin irritation

Serious eye damage/eye irritation

Product:

Remarks: No data available

Components:

toluene:

Result: Mild eye irritation

benzene:

Result: Moderate eye irritation

ethanol:

Result: Eye irritation

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

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. 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 Regulation

IATA-DGR

UN/ID No.	:	1203
Proper shipping name	:	Gasoline
Class	:	3
Packing group	:	II
Labels	:	3
Packing instruction (cargo aircraft)	:	364

IMDG-Code

UN number	:	1203
Proper shipping name	:	GASOLINE
Class	:	3
Packing group	:	II
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

Not applicable for product as supplied.

49 CFR

UN/ID/NA number	:	1203
Proper shipping name	:	Gasoline
Class	:	3
Packing group	:	II
Labels	:	3
ERG Code	:	128
Marine pollutant	:	no

Special precautions for user

Not applicable

SECTION 15. REGULATORY INFORMATION

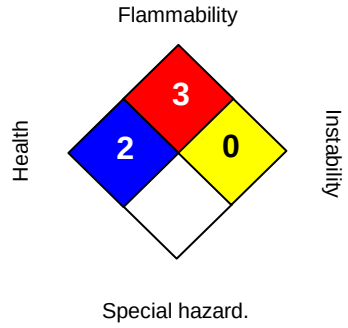
The components of this product are reported in the following inventories:

DSL	On the inventory, or in compliance with the inventory
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

Further information

NFPA:



HMIS III:

HEALTH	2*
FLAMMABILITY	3
PHYSICAL HAZARD	0
PERSONAL PROTECTION	H

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

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

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

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.

MATERIAL SAFETY DATA SHEET: **Sulfuric Acid**

SECTION I

MSDS NUMBER:	24-G
MSDS CODE:	G
SYNONYMS:	Chemical Family - inorganic acid
MANUFACTURED FOR:	Fisher Scientific
DIVISION:	Chemical Division
EPA REGISTRATION NUMBER:	N/A
VENDOR:	N/A
EMERGENCY PHONE:	(201) 796-7100
OTHER CALLS:	Same As Above
ADDRESS:	1 Reagent Lane, Fair Lawn, NJ 07410
MSDS PREPARED BY:	Fisher Scientific
DATE PREPARED:	11/28/84
DATE LAST REVISED:	1/28/94

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

TRADE NAME: INGREDIENT NAME	CAS	OSHA PEL	ACGIH TLV	OTHER	%
Sulfuric Acid	7664-93-9	See Below	See Below	RQ = 1000 pounds	> 70
Water	N/A	N/A	N/A	N/A	0 - 30

Molecular Formula: H_2-S-O_4 **Molecular Weight**: 98.07

EXPOSURE LIMITS: 1 mg/m^3 OSHA TWA; 1 mg/m^3 ACGIH TWA; 3 mg/m^3 ACGIH STEL; 1 mg/m^3 NIOSH recommended TWA; 1 mg/m^3 DFG MAK TWA; 2 mg/m^3 DFG MAK 5 minute peak, momentary value, 8 times/shift. Measurement method: Silica gel tube; sodium bicarbonate/sodium carbonate; ion chromatography (NIOSH Vol. III #7903, Inorganic Acids)

SECTION III - CHEMICAL CHARACTERISTICS

BOILING POINT	MELTING POINT	FREEZING POINT	SPECIFIC GRAVITY (H_20 = 1)	PERCENT VOLATILE BY VOLUME	THEORETICAL VOC CONTENT (PERCENT OF WEIGHT)
626ºF (330ºC)	50ºF (10ºC)	Unavailable	1.84	Unavailable	Unavailable

WEIGHT PER GALLON	pH:	VAPOR PRESSURE	VAPOR DENSITY	DENSITY	EVAPORATION RATE BASIS (N-BUAC) = 1
15.32 lbs./gal.	< 3	< 0.001 @ 20ºC	3.4	Unknown	Unknown

SOLUBILITY IN WATER: Soluble SOLVENT SOLUBILITY: Decomposes in Alcohol	REACTIVITY IN WATER: Violent exothermic reaction
APPEARANCE AND ODOR:	Odorless, clear, colorless dense hygroscopic oily liquid with a marked acid taste when pure..

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	METHOD	FLAMMABLE LIMITS IN AIR (%)	AUTOIGNITION TEMPERATURE
N/A	N/A	N/A	N/A

NFPA CODES			***HMIS CODES:***		
	HEALTH	3		HEALTH	3
	FLAMMABILITY	0		FLAMMABILITY	0
	REACTIVITY	2		REACTIVITY	2
	OTHER	N/A		PROTECTION	X

EXTINGUISHER MEDIA: Dry chemical or carbon dioxide (1990 Emergency Response Guidebook, DOT p. 5800.5); For larger fires, flood area with water from a distance (2990 Emergency Response Guidebook, DOT p. 5800.5)

SPECIAL FIRE FIGHTING PROCEDURES: Do not get water inside container. Do not get solid stream of water on spilled material. Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks (19990 Emergency Response Guidebook, DOT p. 5800.5 Guide page 39). Use agent suitable for type of fire; using flooding amounts of water as a fog. Cool containers with flooding amounts of water, apply from as far a distance as possible. Avoid breathing corrosive vapors, keep upwind.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Negligible fire hazard when exposed to heat or flame. Oxidizer: Oxidizers decompose, especially when heated, to yield oxygen or other gases which will increase the burning rate of combustible matter. Contact with easily oxidizable, organic, or other combustible materials may result in ignition, violent combustion or explosion.

SECTION V - REACTIVITY DATA

IS THIS CHEMICAL STABLE UNDER NORMAL CONDITIONS OF HANDLING/STORAGE (Y/N)? N
CONDITIONS TO AVOID (REGARDING STABILITY): Sulfuric Acid will have a violent exothermic reaction with water.
INCOMPATIBILITY (MATERIALS TO AVOID): See below
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may release toxic oxides of sulfur. @ 340ºC it decomposes into sulfur trioxide and water.
HAZARDOUS POLYMERIZATION POSSIBLE (Y/N)? Y
CONDITIONS TO AVOID (REGARDING POLYMERIZATION): Hazardous polymerization has not been reported to occur under normal temperatures and pressures, but will occur upon contact with certain materials. For materials to avoid, check list of incompatibilities below.

INCOMPATIBILITIES

MATERIALS TO AVOID	CHEMICAL REACTION
Acetaldehyde	**Violently polymerized by concentrated acid.**
Acetic Anhydride	**Temperature and pressure increase in closed container.**
Acetone & Nitric Acid	**Violent decomposition.**
Acetone & Potassium Dichromate	**Ignition**
Acetone Cyanhydrin	**Pressure increase with possible explosive rupture of vessel.**
Acetonitrile	**Violent exotherm on heating; sulfur trioxide reduces initiation temperature.**
Acrolein	**Temperature and pressure increase in closed container.**
Acrylonitrile	**Vigorous exothermic polymerization.**
Alcohol	**Exothermic reaction and contraction of volume.**
Alcohol and Hydrogen Peroxide	**Possible explosion.**
Allyl Alcohol	**Temperature and pressure increase in closed container.**
Allyl Chloride	**Violent polymerization.**
Alkyl Nitrates	**May cause violent reaction.**
2-Aminoethanol	**Temperature and pressure increase in closed container.**
Ammonium Hydroxide	**Temperature and pressure increase in closed container.**
Ammonium Iron (III) Sulfate Dodecahydrate	**Violent, exothermic reaction on heating.**
Ammonium Triperchromate	**Fire or explosion hazard.**
Aniline	**Temperature and pressure increase in closed container.**
Bases	**Violent reaction**
Benzyl Alcohol	**May decompose explosively at about 180ºC**
Bromates & Metals	**Possible ignition.**
Bromine Pentafluoride	**Violent reaction with possible ignition.**
Tert-Butyl-M-Xylene	**Violent interaction.**
N-Butyraldehyde	**Temperature and pressure increase in closed container.**
Carbides	**Hazardous mixture.**
Cesium Acetylide	**Ignition on contact.**
1-Chloro-2, 3-Epoxypropane	**Violent interaction.**
4-Chloronitrobenzene and Sulfur Trioxide	**Possible explosive reaction.**
Chlorates	**All Chlorates, when brought in contact with sulfuric acid may give off explosive chlorine dioxide gas. A violent explosion usual.**
Chlorates & Metal	**Possible ignition**
Chlorine Trifluoride	**Violent reaction.**
Chlorosulfonic Acid	**Temperature and pressure increase in closed container.**
Chromates	**Fire and explosion hazard.**
Coatings	**Attacked**
Combustible Materials (Finely Divided)	**May ignite.**
Copper	**Evolution of sulfur dioxide**
Cuprous Nitride	**Violent reaction**
2-Cyano-4-Nitrobenzenediazonium Hydrogen Sulfate	**Exothermic reaction**
2-Cyano-2-Propanol	**Violent reaction with increase in pressure.**
Cyclopentadiene	**Violent or explosive reaction.**
Cyclopentanone Oxime	**Violent reaction.**
l,3-Diazidobenzene	**Ignition followed by explosive reaction.**
Diethylamine	**Exothermic reaction**
Diisobutylene	**Temperature and pressure increase in closed container**
Dimethylbenzylcarbinol & Hydrogen peroxide	**Explodes**
Dimethoxyanthraquinone	**Exothermic reaction above 150ºC**
4-Dimethylaminobenzaldehyde	**Exothermic reaction.**
2,5-Dinitro-3-Methylbenzoic Acid & Sodium Azide	**Explosive reaction**
1,5-Dinitronaphthalene & Sulfur	**Exothermic reaction**
Epichlorohydrin	**Violent reaction**
Ethoxylated nonylphenol	**Possible ignition**
Ethanol & Hydrogen Peroxide	**Possible explosion**
Ethylene Cyanohydrin	**Violent reaction**
Ethylene Diamine	**Temperature and pressure increase in closed container.**

MATERIALS TO AVOID	CHEMICAL REACTION
Ethylene Glycol	**Temperature and pressure increase in closed container.**
Ethylenimine	**Temperature and pressure increases in closed container**
Fulminates	**Extremely hazardous mixture**
Hexalithium Disilicide	**Incandescent reaction**
Hydrogen Peroxide (>50%)	**Explosive reaction after evaporation**
Hydrofluoric Acid	**Temperature and pressure increase in closed container.**
Indane & Nitric Acid	**Possible explosion**
Iodine Heptafluoride	**The acid becomes effervescent**
Iron	**possible explosion due to hydrogen gas from the acid-metal reaction.**
Isoprene	**Temperature and pressure increase in closed container.**
Lithium Silicide	**Incandescent reaction.**
Mercury Nitride	**Explosion on contact**
Mesityl Oxide	**Temperature and pressure increase in closed container.**
Metals	**May liberate flammable hydrogen gas.**
Metals (powdered)	**Extremely hazardous mixture.**
Metal Acetylides	**Ignition reaction.**
Metal Chlorates	**Violent explosion unless properly cooled.**
Metal perchlorates	**Formation of explosive perchloric acid.**
4-Methylpyridine	**Exothermic reaction.**
Nitramide	**May decompose explosively on contact.**
Nitrates	**Incompatible**
Nitric Acid & Glycerides	**Explosion**
Nitric Acid & Organic Material	**May cause violent reaction.**
Nitric Acid & Toluene	**Possible violent reaction or explosion.**
Nitroaryl Bases and Derivatives	**May cause violent reaction or explosion.**
Nitrobenzene	**Exothermic Reaction at elevated temperatures.**
3-Nitrobenzenesulfonic Acid	**Exothermic reaction.**
Nitromethane	**Formation of explosive mixture.**
N-Nitromethylamine	**Explosive decomposition.**
4-Nitrotoluene	**Explosive at 80ºC**
Organics	**Violent exothermic reaction.**
Pentasilver Trihydroxydiamidophosphate	**Explosion on contact.**
perchlorates	**Possible explosion.**
Perchloric Acid	**Formation of dangerous anhydrous perchloric acid.**
Permanganates	**Formation of permanganic acid.**
Permanganates & Benzene	**Possible explosion.**
1-Phenyl-2-Methyl-Propyl Alcohol & Hydrogen Peroxide	**Possible Explosion**
Phosphorus (white or yellow)	**Ignition in contact with boiling acid.**
Phosphorus isocyanate	**Violent reaction.**
Phosphorus Trioxide	**Violent oxidation with possible ignition.**
Picrates	**Extremely hazardous mixture.**
Plastics	**Attached**
Polysilylene	**Explosion on contact.**
Potassium	**Explosive interaction**
Potassium tert-Butoxide	**Ignition**
Potassium Chlorate	**Possible fire and explosion**
Potassium Permanganate	**Possible explosion in the presence of moisture**
Potassium Permanganate & Potassium Chloride	**Violent explosion**
Propiolactone (Beta)	**Temperature and pressure increase in closed container.**
Propylene Oxide	**Temperature and pressure increase in closed container.**
3-Propynol	**Possible explosion unless adequately cooled.**
Pyridine	**Temperature and pressure increase in closed container.**
Reducing Agents	**Reacts**
Rubber	**Attached**
Rubidium Acetylide	**Ignition on contact.**
Silver Permanganate (moist)	**Explosive reaction.**
Silver Peroxochromate	**Explosive reaction.**
Sodium	**Explosive reaction with aqueous acid.**
Sodium Carbonate	**Violent reaction.**
Sodium Chlorate	**Possible fire or explosion.**
Sodium Hydroxide	**Temperature and pressure increase in closed container.**
Sodium Tetrahydroborate	**Violent, exothermic reaction.**
Sodium Thiocyanate	**Violent Exothermic with evolution of carbonyl sulfide.**
Steel	**Possible explosion due to hydrogen gas from the acid-metal reaction.**
Styrene Monomer	**Temperature and pressure increase in closed container.**

MATERIALS TO AVOID	CHEMICAL REACTION
Sucrose	**Formation of carbon monoxide**
Tetramethylbenzenes	**Violent reaction in closed containers.**
1,2,4,5-Tetrazine	**Violent decomposition on contact.**
Thallium (I) Azididithiocarbonate	**May explode on contact.**
1,3,5-Trinitrosohexahydro-1,3,5-Triazine	**Explosive decomposition on contact.**
Vinyl Acetate	**Temperature and pressure increase in closed container.**
Zinc Chlorate	**Likely to cause fires and explosions.**
Zinc Iodine	**Violent interaction.**

SECTION VI - HEALTH HAZARDS

ROUTES OF ENTRY: Inhalation, skin, eye and ingestion..
SIGNS AND SYMPTOMS OF ACUTE OVEREXPOSURE:

INHALATION -Corrosive/highly toxic. 80 mg/m^3 Immediately Dangerous to Life or Health. Inhalation of mists may cause mucous membrane irritation principally affecting the respiratory tract epithelium. Low concentrations, 0.35 - 5 mg/m^3, may cause increased pulmonary air flow resistance and subsequent shallower and more rapid breathing. Hot concentrated mists may cause rapid loss of consciousness with possible damage to lung tipsier. Vapors may cause nasal secretions, sneezing, a burning or tickling sensation in the nose and throat and retrosternal region, followed by cough, respiratory distress, tracheobronchitis, chemical pneumonitis and possible spasm of the vocal chords. High concentrations may produce bloody nasal secretions and sputum, hematemesis gastritis, and pulmonary edema. A single overexposure may lead to laryngeal, tracheobronchial and pulmonary edema. One individual sprayed in the face with sulfuric acid liquid experienced delayed symptoms of pulmonary fibrosis, residual bronchitis, and pulmonary emphysema. Vapors from dilute solutions may irritate mucous membranes. The lethal dose reported in rats is 510 mg/m^3 (2 hours).

SKIN -Contact with concentrated sulfuric acid may cause severe second and third degree burns with necrosis due to its affinity for water and subsequent severe dehydrating action, and its exothermic reaction with moisture. Possible charring may occur leading to shock and collapse depending on the amount of tissue involved. The resulting wounds may be long in healing and may cause extensive scarring that may result in functional inhibition. Contact with dilute solutions may cause skin irritation.

EYE - Exposure to the vapors may cause a burning or stinging sensation in the eyes with lacrimation, blurred vision and conjunctival congestion. Splashes of acid in the eyes may produce deep corneal ulceration, kerato-conjunctivitis and palpebral lesions with severe sequelae. Irreparable corneal damage and blindness as well as scarring of the eyelids may occur. Severe sulfuric acid eye burns have included glaucoma and cataract as complications in the most severe cases. Contact with diluted acid may produce more transient effects from which recovery may be complete.

INGESTION - Ingestion may cause burning pain in the mouth, throat, esophagus and abdomen, a sour taste and nausea followed by vomiting and diarrhea of charred black stomach contents. Dehydration and carbonization of tissue may occur with eschars on the lips and mouth. Brownish or yellowish stains may be found around the mouth, intense thirst, difficult swallowing, acidemia, stomatitis, rapid and weak pulse, shallow breathing, shock and possible convulsions and death may occur. Albumin, blood and casts in urine, anuria, esophageal and delayed gastric stenosis has been reported. Possible perforation of the gastrointestinal tract may result in peritonitis.

CHRONIC OVEREXPOSURE:**:**

INHALATION - Repeated exposure to the mist may cause inflammation of the upper respiratory tract, chronic bronchitis and etching of the dental enamel. The central and lateral incisors are primarily affected. Repeated excessive exposure over long periods of time have resulted in bronchitic symptoms, rhinorrhea, frequent respiratory tract infections, emphysema, stomatitis and digestive disturbances. Chronic inhalation may cause alkaline depletion of the body producing an acidosis which affects the nervous system and produces agitation, hesitant gait and generalized weakness. An epidemiological study of workers at a refinery and chemical plant suggests an increased risk of laryngeal cancer from exposure to high concentrations of sulfuric acid. Reproductive effects have been reported in animals.

SKIN CONTACT - Repeated contact with low concentrations may cause skin desiccation and ulceration of the hands, and panaris or chronic purulent inflammation around the nails. Repeated contact with dilute solutions may cause dermatitis.

EYE CONTACT - Repeated exposure may result in lacrimation and chronic conjunctivitis.

INGESTION - No data available.

CHEMICAL LISTED AS A CARCINOGEN OR POTENTIAL CARCINOGEN?:

- NATIONAL TOXICOLOGY PROGRAM (Y/N): N
- IARC MONOGRAPHS (Y/N): N
- OSHA (Y/N): N

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: None known.
TOXICITY: **Irritation Data** - 250 ug eye-rabbit severe; 5 mg/30 seconds rinsed eye-rabbit severe.

Toxicity Data - 3 mg/m^3 24 weeks inhalation-human TCLo; 510 mg/m^3 2 hours inhalation-rat LC50; 320 mg/m^3 2 hours inhalation-mouse LC50; 18 mg/m^3 inhalation-guinea pig LC50; >2 g/kg skin-rabbit LD50 2140 mg/Kg (Olin MSDS); oral-rat LD50; 135 mg/kg oral-man LDL0 (Kennecott MSDS); 135 mg/Kg unreported-man LDLo; mutagenic data (RTECS); reproductive effects data (RTECS).

Carcinogen Status - None. Human sufficient evidence (IARC Group-1 for occupational exposure to strong-inorganic-acid mists containing sulfuric acid). Occupational exposure to strong-inorganic acid mists containing sulfuric acid has produced an excess risk of nasal sinus, laryngeal, and lung cancer,

Local Effects - Corrosive - inhalation, skin, eye and ingestion.

Acute Toxicity Level - Highly toxic by inhalation; moderately toxic by ingestion; slightly toxic by dermal absorption.

Target Effects - No data available.

EMERGENCY AND FIRST AID PROCEDURES

EMERGENCY PHONE NUMBER OF MANUFACTURER: (201) 796-7100

1. INHALATION: Remove from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Maintain airway and blood pressure and administer oxygen if available. Keep affected person warm and at rest. Treat symptomatically and supportively. Administration of oxygen should be performed by qualified personnel. Get medical attention immediately.
2. EYE CONTACT: Wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids, until no evidence of chemical remains (at least 15 - 20 minutes). Continue irrigating with normal saline until the pH has returned to normal (30 - 60 minutes). Cover with sterile bandages. Get medical attention immediately.
3. SKIN CONTACT: Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15 - 20 minutes). In case of chemical burns, cover area with sterile, dry dressing. Bandage securely, but not too tightly. Get medical attention immediately.
4. INGESTION: Do not use gastric lavage or emesis. Dilute the acid immediately by drinking large quantities of water or milk. If vomiting persists, administer fluids repeatedly. Ingested acid must be diluted approximately 100 fold to render it harmless to tissues. Maintain airway and treat shock (Dreisbach, Handbook of Poisoning, 12th ed.). Get medical attention immediately. If vomiting occurs, keep head below hips to help prevent aspiration.

ANTIDOTE: No specific antidote. Treat symptomatically and supportively.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

HAZARD CLASS: 8
U.S. DOT ID : Corrosive liquid, n.o.s.
UN/NA NUMBER: 1760

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Store in cool, dry well-ventilated location. Separate from combustibles and other reactive materials. Separate from carbides, chlorates, fulminates, nitrates, picrates, and powdered metals. (NFPA 49, Hazardous Chemicals Data, 1991). Store in a tightly closed container. Avoid direct sunlight. Store away from incompatible substances. Threshold Planning Quantity (TPQ): The Superfund Amendments and Reauthorization Act (SARA) Section 302 requires that each facility where any extremely hazardous substance is present in a quantity equal to or greater than the TPQ established for that substance notify the State Emergency Response Commission for the state in which it is located. Section 303 of SARA requires these facilities to participate in Local Emergency Response Planning Committees (40 CFR 355.30).
OTHER PRECAUTIONS: Conditions to Avoid - May ignite other combustible materials (wood, paper, oil, etc.). Violent reaction with water. Flammable, poisonous gases may accumulate in confined spaces. Runoff to sewer may create fire or explosion hazard.
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: **Soil spill** - Dig holding area such as lagoon, pond or pit for containment. Dike flow of spilled material using soil or sandbags or foamed barriers such as polyurethane or concrete. Use cement powder or fly ash to absorb liquid mass. Neutralize spill with slaked lime, sodium bicarbonate or crushed limestone. **Air spill** - Apply water to knock down and reduce vapors. Knock-down water is corrosive and toxic and should be diked for containment and later disposal. **Water spill** - Neutralize with agricultural like, slaked lime, crushed limestone, or sodium bicarbonate. **Occupational spill** - Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch spilled material. Do not get water inside container. Stop leak if you can do it without risk. Use water spray to reduce vapors. Do not put water on leak or spill area. Clean up only under the supervision of an expert. Dike spill for later disposal. Do not apply water unless directed to do so. Keep unnecessary people away. Isolate hazard area and deny entry. Ventilate closed spaces before entering.
WASTE DISPOSAL METHODS: Disposal must be in accordance with standards applicable to generators of hazardous waste, 40 CFR 262. EPA Hazardous Waste Number D002. 100 pound CERCLA Section 103 Reportable Quantity.

★*ADDITIONAL INFORMATION*★

Observe all federal, state and local regulations when storing or disposing of this substance.

Additional US DOT Information:
Packing Group - II
Labeling - Corrosive
Packaging Authorizations - Exceptions: None, Non-bulk Packaging - 49 CFR 173.202;
Bulk Packaging - 49 CFR 173.242
Quantity Limitations (49 CFR 172.101) - Passenger Aircraft or Railroad - 1 liter
Cargo Aircraft Only - 30 liters

Reportable Quantity: 1000 pounds

The Superfund Amendments and Reauthorization Act (SARA) Section 304 requires that a release equal to or greater than the reportable quantity for this substance be immediately reported to the local Emergency Response Commission (40 CFR 355.40). If the release of this substance is reportable under CERCLA Section 103, the National Response Center must be notified immediately at (800) 424-8802 or (202) 426-2675 in the metropolitan Washington, D.C. area (40 CFR 302.6).

SECTION VIII - CONTROL MEASURES

RESPIRATORY PROTECTION: The following respirators and maximum use concentrations are recommendations by the U.S. Department of Health and Human Services, NIOSH Pocket Guide to Chemical Hazards; NIOSH criteria documents or by the U.S. Department of Labor, 29 CFR 1910 Subpart Z.

The specific respirator selected must be based on contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA).

25 mg/m^3 - Any powered air-purifying respirator with an acid gas cartridge(s) and having a high efficiency particulate filter.
Any supplied-air respirator operated in a continuos flow mode.
50 mg/m^3 - Any chemical cartridge respirator with a full facepiece and acid gas cartridge(s) in combination with a high-efficiency particulate filter.
Any self-contained breathing apparatus with a full facepiece.
Any supplied-air respirator with a full facepiece.
Any air-purifying full facepiece respirator (gas mask) with a chin-style or front or back-mounted acid gas canister having a high-efficiency particulate filter.
80 mg/m^3 - Any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode.
Escape - Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted acid gas canister having a high efficiency particulate filter.
Any appropriate escape-type self-contained breathing apparatus.
FOR FIRE FIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

VENTILATION REQUIREMENTS: Provide local exhaust or process enclosure ventilation to meet published exposure limits.
LOCAL EXHAUST: Local exhaust is needed.
MECHANICAL: Process enclosure ventilation.
SPECIAL: N/A
OTHER: N/A
PROTECTIVE GLOVES: Employee must wear appropriate protective gloves to prevent contact with this substance.
EYE PROTECTION: Employee must wear splash-proof or dust-resistant safety goggles and a faceshield to prevent contact with this substance.
OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Wear appropriate protective clothing to avoid any possibility of skin contact with liquids containing more than 1% of sulfuric acid. Avoid repeated or prolonged skin contact with liquids containing 1% or less sulfuric acid. Where there is a possibility that an employee's eyes and/or skin may be exposed to this substance, the employer should provide an eye wash fountain and quick drench shower within the immediate work area for emergency use.
WORK/HYGIENIC PRACTICES: Use good work hygienic practices.

N/A = Not Applicable

AUTHORIZED - FISHER SCIENTIFIC, INC.
CREATION DATE: 11/28/84 REVISION DATE: 01/28/94

APPENDIX B

STANDARD NUNAVUT SPILL REPORT FORM

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

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

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER ____-_____
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME		

C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION	REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS

F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION	
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION	
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT
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 STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC

SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN

FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			