Shell Canada Limited
400 - 4th Avenue S.W.
P.O. Box 100, Station M
Calgary, Alberta T2P 2H5
Internet www.shell.ca

11 July 2022

Bijaya Adhikari, Ph.D.
Science and Regulatory Coordinator
Inuvialuit Water Board
P.O. Box 2531, Inuvik, NT X0E 0T0
Tel: (867) 678–8610
Fax: (867) 678–2943
Email: adhikarib@inuvwb.ca

Dear Dr. Adhikari,

RE: NOTIFICATION UNDER WATER BOARD LICENCE N7L1-1834 SHELL CANADA ENERGY, CAMP FAREWELL

Shell Canada Energy, by its Managing Partner, Shell Canada Limited (Shell), is pleased to submit this Notification under Water Board Licence N7L1-1834 for the delineation of soil impacts at Camp Farewell, identified during the 2021 field program, to further assess groundwater and to characterize background conditions in soil, groundwater and surface water.

The attached notification has been prepared by Golder Associates Ltd. (Golder) on our behalf and with our support. Should you have any questions or comments, please do not hesitate to reach out to Kyle Thompson or Christopher Boyd, or the Golder listed within the attached notification document.

Sincerely,

Kyle Thompson
Sr. Program Manager, Legacy Soil & Groundwater Projects
Shell Canada Limited
Office - 1-403-691-3174 ext. 3174
E-mail - Kyle.Thompson@shell.com
400 4th Avenue S.W., P.O. Box 100 Station M,
Calgary, Alberta T2P 2H5, Canada

Christopher Boyd, Ph.D.
Environmental Portfolio Advisor, PCRO
Shell Canada Energy
Office - 1-403-691-2855
E-mail - Christopher.Boyd@shell.com
400 4th Avenue S.W., P.O. Box 100 Station M,
Calgary, Alberta T2P 2H5, Canada

DATE July 11, 2022 **Project No.** 20368099-8006

TO Bijaya Adhikari, PhD., Email: adhikarid@inuvwb.ca
Inuvialuit Water Board, 125 Mackenzie Road, Professional Building Suite 302, P.O. Box 2531 Inuvik, NT, X0E 0T0

FROM Aurélie Bellavance-Godin **EMAIL aurelie.bellavance@wsp.com**

NOTIFICATION UNDER WATER BOARD LICENCE N7L1-1834 SHELL CANADA ENERGY, CAMP FAREWELL

INTRODUCTION

On behalf of Shell Canada Limited (Shell), Golder Associates Ltd. (Golder) is submitting this Notification under Water Board Licence N7L1-1834 for the delineation of soil impacts identified during the 2021 field program, to further assess groundwater and to characterize background conditions in soil, groundwater and surface water at Camp Farewell, in the Inuvialuit Settlement Region (ISR), Northwest Territories (NWT) (the Site).

Throughout the field program, Shell will continue to follow the terms and conditions outlined in Water Licence number N7L1-1834 (2017 term amendment).

Authorization from the Environmental Impact Screening Committee (EISC) for the 2021 and 2022 sampling was obtained in June 2021 (EISC file 05-18-01).

Summary of the 2021 Assessment

The objective of the 2021 program (Golder 2022) was to confirm the previous remediation activities at the Site and to assess the lateral and vertical extent of contamination, if present, on-site. A total of 205 test pits, three hand auger holes and two grab samples (from above and below foam debris found on-site) were completed. Soil samples were analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbon (PHC) Fractions F1 to F4, F3a and F3b, polycyclic aromatic hydrocarbon (PAHs), volatile organic compounds (VOCs), metals, sulphate and/or nitrate. Samples collected from wood piles, and foam and fibreglass debris were analyzed for BTEX, PHC Fractions F1 to F4, PAH, polychlorinated biphenyl, select metals and/or asbestos. Groundwater and surface water samples were collected and analyzed for BTEX, PHC Fractions F1 and F2, PAH, metals and salinity parameters.

2021 Assessment Results

Below is a summary of the results for the 2021 Phase II Environmental Site Assessment (ESA).

- Sand and gravel fill were observed at surface on the Site footprint, extending between 0.2 and 2.7 metres below ground surface (mbgs), the maximum depth investigated. This layer was underlain by peat, sand or permafrost. Permafrost was encountered between 1.4 and 2.7 mbgs on the Site footprint. Outside of the Site footprint, sand or peat were observed at surface extending between 0.3 and 0.7 mbgs, where permafrost was encountered. Coarse-grained soils are predominant at the Site.

- Light non-aqueous phase liquid (LNAPL) was not identified in any of the wells monitored.
- The depth to groundwater for this investigation ranged from 0.42 to 1.91 mbgs.
- Soil samples collected from across the Site exceeded the applied guidelines for one or more PHC parameters. One test pit location, from a burn pit identified during the investigation, exceeded the guideline for naphthalene. Soil samples from eight test pit locations exceeded the applied guidelines for one or more metals. No soil samples exceeded the guidelines for VOCs.
- PHC impacts in soil are not laterally delineated to the north, south, east or west. PHC impacts extend to permafrost. Naphthalene is vertically delineated but has not been laterally delineated in soil to the east. Metal exceedances have not been delineated in all directions or vertically.
- Biogenic interference calculations (BIC) and chromatogram analysis indicated that nine soil samples had PHC Fraction F3 concentrations that were biogenic in origin.
- One wood sample, taken from a pile of wood next to the emergency shack, exceeded the applied soil guideline for PHC Fraction F3 and naphthalene.
- Asbestos was not identified in the fibreglass and foam samples.
- Groundwater samples collected from two locations (former burn pit and south Site boundary) exceeded the applied guidelines for naphthalene, various dissolved salinity and/or metal parameters. Locations P19-2 and P19-6 which had exceeded the guidelines for PHC parameters in 2019 were not sampled in 2021 due to insufficient water.
- Naphthalene impacts in groundwater are not delineated.
- Surface water samples exceeded the guidelines for total aluminum, copper and iron.
- The 2021 investigation confirmed impacted soil is still present on the Site following the remediation efforts completed between 2013 and 2019. Due to the grid sampling approach used, the extents of the impacts are generally well defined on the Site footprint; however, have not been delineated off-site in all directions. Further assessment will provide further refinement of the extents of contamination.

Objective of the 2022 Proposed Scope of Work

The objective of the 2022 proposed work is to:

- delineate soil impacts at the Site identified during the 2021 field program;
- further assess groundwater; and
- characterize background conditions in soil, groundwater and surface water.

Summary of the 2022 Proposed Scope of Work

The proposed work will include:

- Drilling a total of up to 47 boreholes and three hand auger holes as described below:

  - Drilling 34 boreholes and three hand auger holes to permafrost for delineation of BTEX, PHC Fractions F1 to F4, naphthalene and/or various metals. Permafrost is expected to be at depths between 1.5 and 2.7 mbgs on the Site footprint and between approximately 0.3 and 0.7 mbgs outside the footprint;
  - Drilling three boreholes to assess the vertical extent of PHCs within permafrost. These boreholes have been proposed in locations where maximally elevated concentrations were detected of multiple parameters with no vertical delineation;
  - Drilling two boreholes to permafrost to confirm barium results in soil at two locations with barium exceedances (to be analyzed for true total barium);
  - Drilling five boreholes to permafrost for assessment of metal concentrations in background areas;
  - Installing eight monitoring wells (six in borehole locations and two additional locations) to delineate the PHC, naphthalene and metal impacts identified in groundwater historically and to assess groundwater north of the former aboveground storage tank and spill area. One background borehole will be completed as a monitoring well to assess background groundwater chemistry;
  - Additional locations have also been proposed as potential step-outs if needed based on field screening and/or analytical data collected in 2022 (not included in total borehole count);
- Developing all wells on-site (existing and newly installed). If, following development, wells are dry or have insufficient water to sample, consideration will be made to re-install wells;
- Completing one groundwater monitoring event and collecting groundwater samples from the newly installed and existing monitoring wells for laboratory analysis of BTEX, PHC Fractions F1 to F4, PAH, salinity and dissolved metals;
- Collecting surface water samples from four background locations to be analyzed for total metals and dissolved organic carbon;
- Completing a survey of the borehole and monitoring well locations;
- Completing a habitat assessment of the surface water bodies near the Site in support of a human health and ecological risk assessment (HHERA);
- Conducting quality assurance/quality control (QA/QC) sampling; and
- Preparing a report documenting and detailing the methods and results of the investigation activities.

A self-contained barge camp will be mobilized from and back to Inuvik. All waste generated on the barge camp will be disposed of at approved facilities in Inuvik. Camp use of water will not exceed a volume of 50 cubic metres per day. No uptake of surface water is required.

Community Engagement and Consultation

Shell provided letters detailing the proposed activities at the Site and held community meetings in the spring of 2022, if requested by the Hunters and Trappers Committees (HTCs), to describe the planned activities and collect feedback on the approach.

The following organizations were included:

- Inuvik HTC;
- Tuktoyaktuk HTC;
- Aklavik HTC; and
- Aklavik Community Corporation (ACC).

Tuktoyaktuk HTC reviewed the letter provided by Shell during a regular board meeting on March 28, 2022 and had no issues with the proposed activities for the 2022/2023 season. Consultations were held with the Aklavik HTC on April 7, 2022, and with the ACC on June 1 and 10, 2022. Inuvik HTC has not yet provided feedback or requested a consultation.

Project Timeline

The proposed project schedule for the 2022 field program is presented in Table A below. The expected number of weeks to execute the work at Camp Farewell is up to three weeks.

Table A: 2022 Proposed Project Schedule

Project Activity	Estimated Time Frame
Applications and permitting	March to June
Logistics planning	February to July
Community engagement	March to June
Field program	August
Reporting	September to December

Camp Farewell is within the Kendall Island Bird Sanctuary and other sensitive areas as identified in Community Conservation Plans for Aklavik, Inuvik and Tuktoyaktuk (AICCP, IICCP and TCCP 2016). The proposed field program may overlap with traditional harvesting times for some bird, fish and terrestrial species. Waterfowl and shorebird species are expected to be nesting and select mammal and fish species may be undergoing sensitive life history events during the field program (IEG 2018). Mitigation measures will be developed to address potential negative impacts on the environment, wildlife, and resource harvesting. Previous assessment programs at Camp Farewell were conducted between late June and late September (IEG 2016, 2017, 2019, 2020; Golder 2022), which is in alignment with the proposed dates for the 2022 field program.

Personnel and Equipment Requirements

During the field program, local businesses and community members will have the opportunity to supply goods and services. The proposed personnel and equipment list for the 2022 field program are presented in Tables B and C.

Table B: 2022 Proposed Project Personnel

Personnel	Number Required
Site Supervisor	1
Environmental Scientist	2
Camp Master	1
Surveyor	1
Medic	1
Drilling crew	2
Jet-A Fuel Operator	1
Wildlife Monitor	1
Mechanic	1
Catering personnel	1
Housekeeping personnel	1

Table C: 2022 Proposed Equipment list

Equipment	Number Required
Drill rig	1
Fuel truck (Diesel)	1
Fuel Truck (Jet-A)	1
Pick-up truck	1
Loader (IT 28 or equivalent)	1
Barge camp	1
Excavator (200 Series)	1
Spill kit	1
Satellite phone	3
Satellite internet system	1
First aid kit	1

Equipment	Number Required
Miscellaneous environmental field equipment	1
Monitoring well installation and decommissioning supplies	1

Reporting

The updated Emergency Response Plan (ERP), Spill Contingency Plan (SCP) and the barge Waste Management and Disposal Plan (WMP) are provided in Appendix A.

An annual report detailing the results of the 2022 activities (due by March 31, 2023) at Camp Farewell will be submitted to the Inuvialuit Water Board (IWB) in accordance with Water Licence N7L1-1834. The 2019 Reclamation, Closure and Monitoring Plan will be updated with the submission (i.e., as an appendix of the annual report) as appropriate.

CLOSURE

We trust the information provided herein meets your requirements. If you have any questions about the contents of this letter, please contact the undersigned, or Kyle Thompson (1-403-691-3174 ext. 3174; Kyle.Thompson@shell.com) or Christopher Boyd (1-403-691-2855; Christopher.Boyd@shell.com), at your convenience.

Yours truly,

Golder Associates Ltd.

Stephanie Villeneuve
Environmental Scientist, M.Sc.
902-466-1668
stephanie.villeneuve@wsp.com

Lenz Haderlein, M.Sc.
Principal, Project Director
780-509-2427
lenz.haderlein@wsp.com

SV/ABG/LH/kdc

Attachments: References
Statement of Limitations
Appendix A – Emergency Response Plan, Spill Contingency Plan, Waste Management and Disposal Plan

REFERENCES

AICCP (Aklavik Inuvialuit Community Conservation Plan, Akaqvikmiut Nunamikini Nunutailivikautinich). 2016. Prepared by the Aklavic Hunters and Trappers Committee, Aklavik Community Corporation, The Wildlife Management Advisory Council (NWT), The Fisheries Joint Management Committee and the Joint Secretariat. Inuvik, 2016.

EISC (Environmental Impact Screening Committee). 2021. EISC File: 05-18-01, Camp Farewell 2018 Remediation Program, Amendment to a Development - Scope of Work. June 29, 2021.

ICCP (Inuvik Community Conservation Plan, Inuuvium Angalatchivingit Niryutinik). 2016. Prepared by the Inuvik Hunters and Trappers Committee, Inuvik Community Corporation, The Wildlife Management Advisory Council (NWT), The Fisheries Joint Management Committee and the Joint Secretariat. Inuvik, 2016.

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IEG (IEG Consultants Ltd.) 2016. Shell Canada Energy – Camp Farewell – Camp Farewell 2015 Decommissioning and Soil Assessment Program Report. April 2016.

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IEG. 2020. Shell Canada Energy – Camp Farewell Remediation Program – Annual Report 2019 – Water Licence N7L1-1834. April 2020.

TCCP (Tuktoyaktuk Community Conservation Plan, Tuktuuyaqtuum Angalatchivingit Niryutinik). 2016. Prepared by the Tuktoyaktuk Hunters and Trappers Committee, Tuktoyaktuk Community Corporation, The Wildlife Management Advisory Council (NWT), The Fisheries Joint Management Committee and the Joint Secretariat. Inuvik, 2016.

STATEMENT OF LIMITATIONS

This report was prepared for the exclusive use of Shell Canada Energy, and its managing partner Shell Canada Limited (Shell).

Bijaya Adhikari, PhD., Email: adhikarid@inuvwb.ca
Inuvialuit Water Board, 125 Mackenzie Road, Professional Building
Suite 302, P.O. Box 2531 Inuvik, NT, X0E 0T0

Project No. 20368099-8006
July 11, 2022

APPENDIX A

Emergency Response Plan, Spill Contingency Plan, Waste Management and Disposal Plan

GOLDER
MEMBER OF WSP

REPORT

Emergency Response Plan

2022 Environmental Site Assessment - Camp Farewell, Unipkat I-22 and West Channel

Submitted to:

Shell Canada Limited

400 - 4th Avenue SW, P.O. Box 100
Station M, Calgary, Alberta T2P 2H5

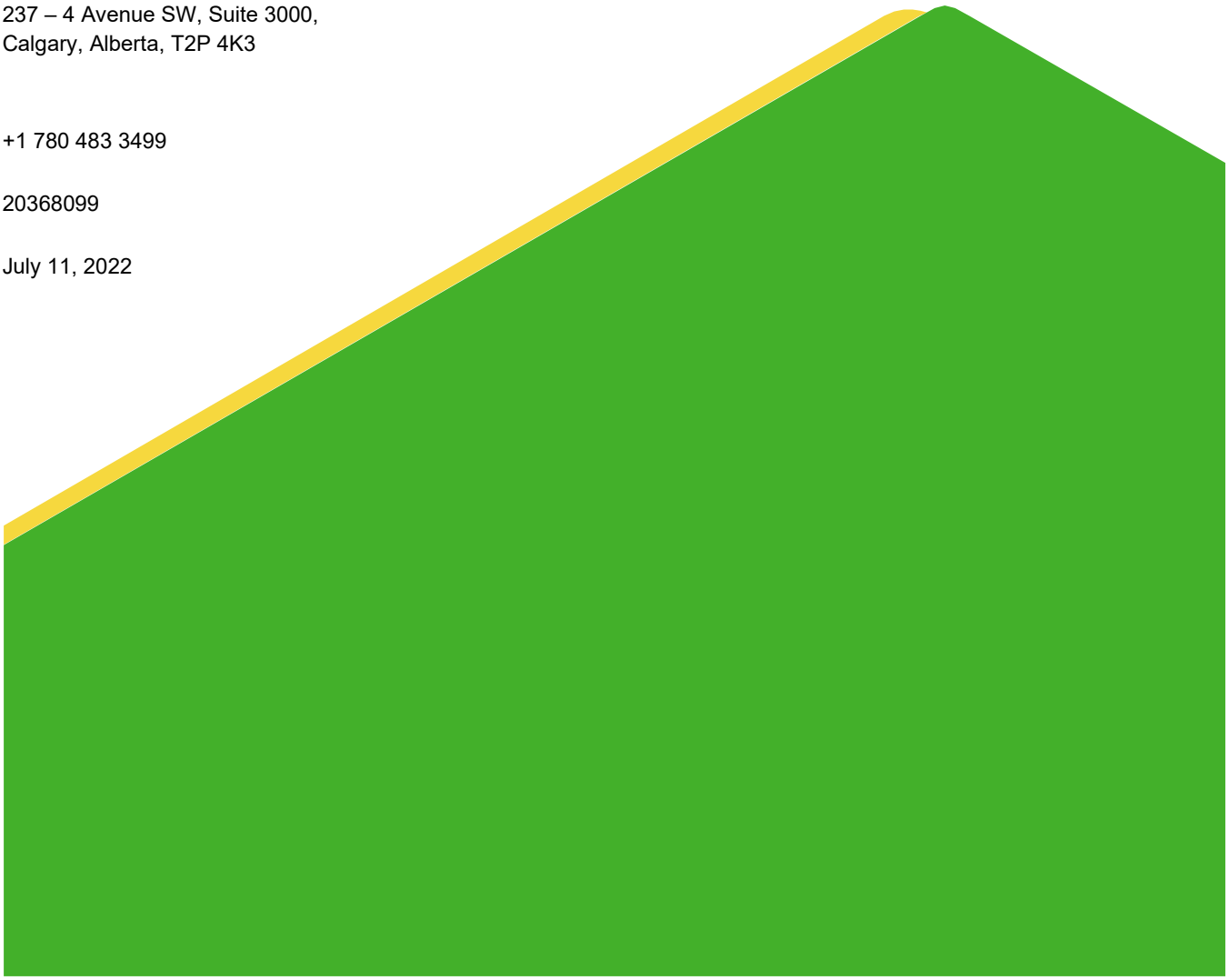
Submitted by:

Golder Associates Ltd.
237 – 4 Avenue SW, Suite 3000,
Calgary, Alberta, T2P 4K3

+1 780 483 3499

20368099

July 11, 2022



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1.0 EMERGENCY RESPONSE PLAN OBJECTIVE

The purpose of this Emergency Response Plan (ERP) is to:

- Provide all project staff (including subcontractors) with a list of identified potential emergencies for the 2022 field program at the Camp Farewell at: 69° 12' 30.0" N latitude and 135° 06' 04.4" W longitude, Unipkat I-22 at 69° 11' 36.07 N latitude and 135° 20' 33.88" W longitude and West Channel at 68°28'33.00"N Latitude and 135°33'25.00"W longitude.
- Assist the project team in determining appropriate responses to potential emergency situations.
- Provide the project team with established procedures and guidelines for emergency response.
- Provide the project team with the tools needed to facilitate a quick and effective response to an emergency.
- Provide emergency response flowcharts and contact information to facilitate a quick and efficient response/evacuation if required.

It is designed to preserve the safety of the crew, minimize the impact of emergencies to environment, property, equipment, and processes, and to restore normal operations as efficiently as possible.

1.1 Emergency Event

An emergency is any event that requires an immediate response to avert damage or threats to:

- the health and safety of our employees and / or our sub-contractors and visitors to the Site;
- the environment;
- the property or equipment;
- the reputation of our company and client.

If an emergency occurs during the project, personnel involved must take the appropriate immediate action to protect their own personal safety, the safety of any other people involved and of the environment.

2.0 EMERGENCY RESPONSE TEAM RESPONSIBILITIES

2.1 Site Supervisor

The Site Supervisor ensures that all personnel on-site know and understand their responsibilities in the event of an emergency on-site as outlined within this plan. They establish the muster points and emergency helicopter landing area on the Site. The role and responsibilities of the Site Supervisor includes, but not limited to the following:

- They are the primary contact for all personnel to report on-site emergencies. They will immediately assess the emergency and ensure that all emergency response procedures are followed according to the plan.
- They will ensure all personnel are made aware of the emergency and will ensure when an injury has occurred that the injured party receives immediate and appropriate care required for their injury.
- They will communicate all incidents as soon as possible to the Golder Project Manager.

- They will liaise with the Site Medic to arrange for off-site medical assistance, if required.
- They will lead the investigation process of all incidents.
- They will lead planned emergency response drills and debrief sessions.
- They will ensure this plan is updated as appropriate and any changes are communicated to on-site personnel.

2.2 Site Medic

The Medic is responsible for inspecting and maintaining first aid equipment and supplies and ensuring adequate number of first aid kits for the number of personnel present at the Site. The Site Medic will provide injury / illness response and immediate care for an injured / ill worker. The Medic will assess and determine if an injured / ill person can be safely treated on-site or requires emergency evacuation (boat or air vac) from Site. The Medic and Site Supervisor will coordinate emergency response actions with off-site medical facilities and air ambulance if necessary. The Site Supervisor shall coordinate emergency Helicopter usage as per the Emergency Helicopter Use Process provided in Appendix A of this ERP. The Site Medic will document all injuries and illnesses in a confidential first aid log which will be kept on-site and initiate care management. Complete Alcohol and Drugs testing will be performed by an approved laboratory in Yellowknife, Northwest Territories.

2.3 On-Site Personnel

All personnel are expected to promptly report all incidents to the Site Supervisor who will ensure the emergency response plan is followed. Personnel are expected to know and understand how to respond in an emergency as per this plan. All personnel must participate in planned emergency response drills. Any medical conditions that could jeopardize the health and well-being of personnel on-site should be disclosed to the Site Medic prior to starting work such as allergies to bees, wasps, prescription medication, etc.

3.0 SITE EMERGENCY NOTIFICATION AND COMMUNICATION

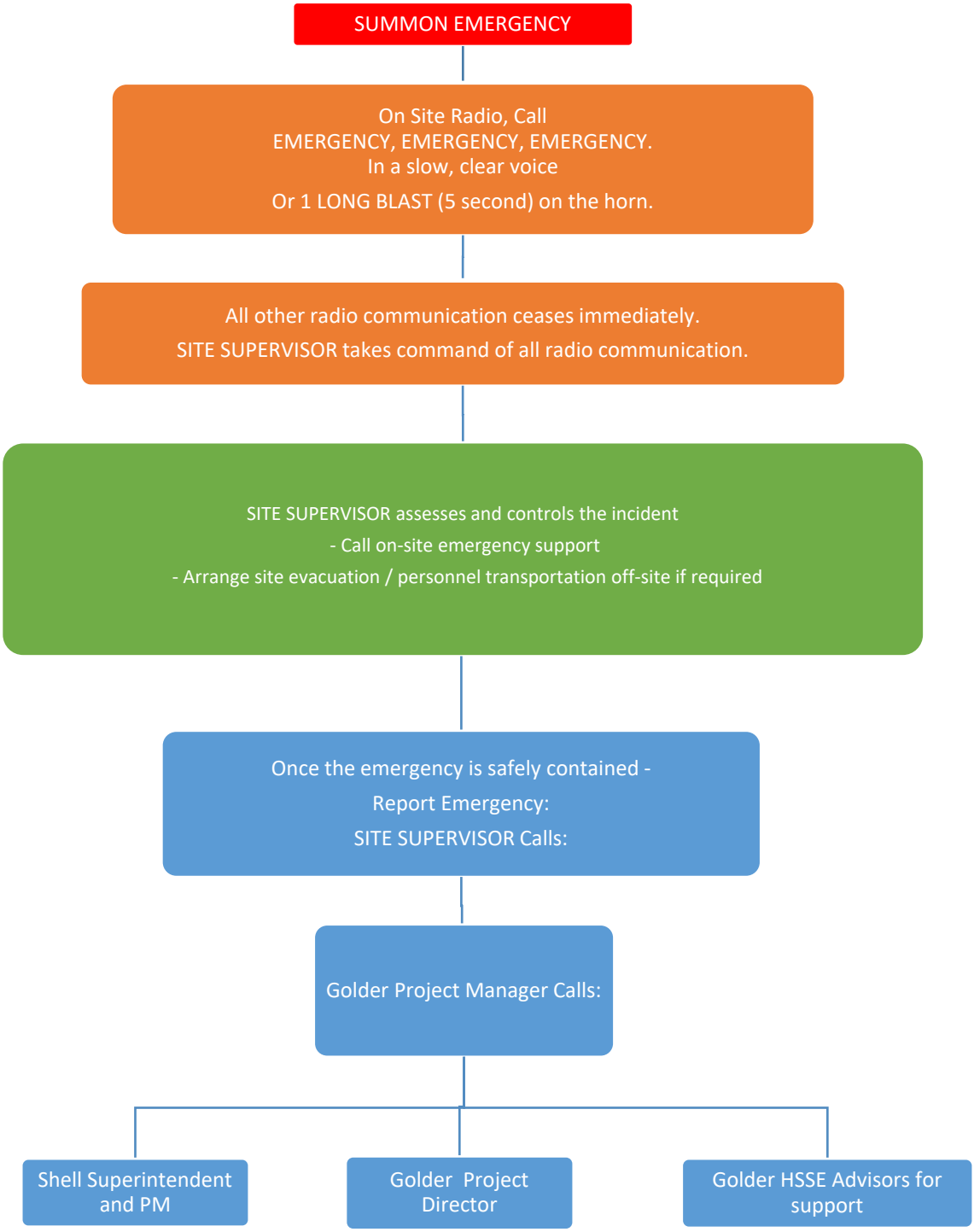
In the event of an emergency (medical and non-medical), the actions initiated by workers should follow the procedures established in this ERP. Once all immediate actions have been taken to protect life, health and safety of workers, the emergency notification and communication protocol will be followed. The emergency notification and communication flowchart are included in Figure 1.

Two-way radios will be used as the primary source of communication while on-site. Satellite Phones will be the primary source for external communication as there is no cell reception on-site. Additionally, there will be a backup Satellite phone, Satellite based land-line and Satellite based emergency communication devices (inReach). All injuries, illnesses, and other incidents (e.g., near losses) will be reported to the Site Supervisor as soon as possible. All injuries and incidents will be documented and investigated as soon as practical. Investigations will be led by the Site Supervisor. The Shell Soil and Groundwater Project Manager (Shell SGW PM) must first be notified by the Golder Project Manager followed by the Shell Project Manager of all incidents following the matrix below (Table 1).

Table 1: On-Site Incident Communication and Reporting Matrix

Incident type	Monday to Friday	Weekends and Holidays
■ Near Loss ■ Security (theft, trespassing, vandalism) ■ Environmental spill (does not meet regulatory compliance) ■ Property/Equipment Damage ■ Injury No Treatment ■ Injury First Aid	■ Site Supervisor calls Golder PM as soon as the emergency is safely contained ■ Golder PM informs Golder PD and Golder HSSE Advisor within 1 hour of being notified by the Site Supervisor ■ Golder PM calls Shell SGW PM to report within 2 hours of being notified by the Site Supervisor ▪ If no response, leave a voicemail and follow up with an email ▪ Follow-up with call to Shell PM	■ Site Supervisor calls Golder PM as soon as the emergency is safely contained ▪ if no response leave voicemail and follow up with email, cc Golder HSSE Advisor and Golder PD ▪ Call Golder PD ■ Golder PM/PD to call Shell SGW PM to report within 2 hours of being notified by the Site Supervisor ▪ if no response leave voicemail and follow up with email ▪ Follow-up with call to Shell PM ■ Golder PM/PD to ensure incident notification escalates the following business day.
■ Loss Medical Treatment ■ Environmental Spill (regulatory non-compliance) ■ Discharge of Firearm ■ Missing Person ■ Fire/Explosion ■ Site Evacuation	■ Site Supervisor calls Golder PM as soon as the emergency is safely contained. The Site Supervisor will contact the on-site medic in the case of a injury or medical aid incident who will recommend transportation requirements. Should a helicopter be required, the Site Supervisor will notify Blackcomb Helicopters or Canadian Helicopters to coordinate a medical evacuation. Best efforts will be made to contact Shell Aviation to obtain a risk assessment; however, the decision to contact a helicopter will not be delayed due to no contact. ■ Golder PM informs Golder PD and Golder HSSE Advisor within 1 hour of being notified by the Site Supervisor ■ Golder PM calls Shell SGW PM to report within 2 hours of being notified by the Site Supervisor ▪ If no response, leave a voicemail and follow up with an email and subsequent call on the following day ▪ Follow-up with call to Shell PM	

Figure 1: Emergency Notification and Communication Flowchart



3.1 Camp Farewell Emergency Contact List

Camp Farewell Site Location: (69° 12' 30.0" N latitude and 135° 06' 04.4" W longitude)

Unipkat I-22 Site Location: (69°11'36.07"N latitude and 135°20'33.88"W longitude)

West Channel Site Location: (68°28'33.00"N Latitude and 135°33'25.00"W longitude)

Emergency Contacts	Number
Inuvik Hospital	(867) 777-8000
Aklavik Susie Husky Health and Social Services Centre	(867) 867-978-2516 / 867-978-2516 (24-Hr)
Office of the Chief Public Health Officer (COVID-19 Reporting)	(867) 920-8646
Canadian Helicopters **24 Hours Emergency Air Ambulance*	(780) 429-6900
Canadian Helicopters (Inuvik, NT location)[a]	(867) 777-2424
Inuvik RCMP	(867) 777-1111
Inuvik Fire	(867) 777-8611
Canadian Coast Guard Search and Rescue (24 hr)[b]	(800) 267-7270
Coast Guard	(867) 777-2235 or *16 on a cell phone
NT Spill Reporting Line (24 hr)	(867) 920-8130
Environment and Natural Resources - Inuvik Office	(867)-678-6650
Wildlife Emergencies (24 hr)	(867)-678-0289
To Report a Wildfire (24 hr)	(877)-698-3473
WSP Crisis Hotline (from within Canada)	(866)-249-0439
Work Care (consultation for work related injuries/illnesses for Golder)	(888)-449-7787
NT WSCC Incident & Injury Reporting Line	(800)-661-0792
Poison Control Centre	(800)-332-1414

Golder Emergency Contacts	Name	Number
Site Supervisor	Melissa Lord Jon Macphail	Cell: (403) 464-5613 Satellite: TBD Cell: (587)-337-2739
Satellite Phones	Harmanjeet Kaur Carter Wildig/ Simon Stenseth	Satellite: TBD Satellite: TBD
Project Manager	Aurelie Bellavance	Cell: (403) 816-0245
Project Manager Alternate	Peter Tan	Cell: (780) 868-6128
Project Director	Lenz Haderlein	Cell: (780) 619-0932
HSSE Advisor Lead	Lisa Switzer	Cell: (226) 376-2812
HSSE Advisor Alternate	Darren Nippers	Cell: (403) 472-0425
Global Shell Safety Support	Carissa Johnson	Cell: (201) 618 2151

Human Resources	Stephanie Ozowa	Office: (403) 466-6555
Shell Emergency Contacts	**Name**	**Number**
Project Manager	Kyle Thompson	Office: (403) 691-3174 ext. 3174 Cell: (403) 801-6438
Shell Aviation	John Jacobs	Cell: (907) 250-2510 Alternate Cell: (504) 202-7709
Subcontractor Emergency Contacts	**Name**	**Number**
E.G.T Manager	Douglas Saunders	Cell: (867) 678-0045
E.G.T Site Supervisor	TBD	
On-Site EMT	TBD	

Notes:

a) Canadian Helicopters is an unauthorized Shell service provider. Shell Business Leader approval for emergency use is required.
b) Canadian Coast Guard Search and Rescue is connected with the Joint Rescue Coordination Centre Trenton and share Communication and Traffic Services radio systems.

3.2 Muster Points and Helicopter Landing Area

Camp Farewell Project Site Helicopter landing area Coordinates:

69° 12' 30.0" N latitude and 135° 06' 04.4" W longitude in degrees, minutes, and seconds (DMS)

North

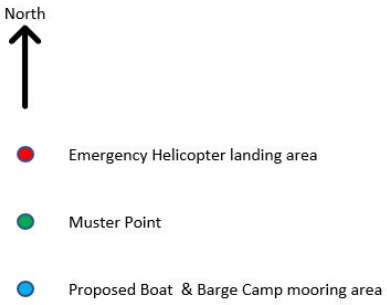
Emergency Helicopter landing area

Muster Point

Boat landing area

Unipkat Project Site Helicopter landing area Coordinates:

69°11'37.83"N latitude and 135°20'38.17"W longitude in degrees, minutes, and seconds (DMS)



West Channel Project Site Helicopter landing area Coordinates:

68°28'31.75"N latitude and 135°33'32.93"W longitude in degrees, minutes, and seconds (DMS)

3.3 WSP Golder Crisis Response Team

A crisis, triggering the activation of the WSP Golder Crisis Response Team, is any event or circumstance which requires an immediate response and damages or threatens in a material way:

- The health and safety of our employees or other people including sub consultants and contractors,
- The properties / assets of our company and / or,
- The reputation of our company.

3.4 Activation of WSP Golder Crisis Response Team

If a crisis occurs, the incident scene must not be disturbed except so far as is necessary to attend to injured persons, prevent further injuries or death and protect the environment that is endangered as a result of the emergency. Follow the documented emergency procedures as outline within this ERP and report the crisis to the Project Manager. The Project Manager is responsible for activating the WSP Crisis Hotline. If the Project Manager cannot be reached, the on-site Safety Representative will place the call through the WSP Crisis Hotline.

The WSP Golder Crisis Response Team may be activated by calling the Crisis Hotline:

- The caller must provide the information outlined below:

  - Hello, my name is (First Name, Last Name), I am (function, Country), and I can be reached at (Phone number). The following incident (type of incident) has occurred on this site (name of site) in (location – City, Province/Territory, Country, etc.). **"Please follow the WSP Crisis Response Plan."**
  - The caller must ensure that the operator has understood the message, the coordinates/location of occurrence and nature of the incident.
- Once activated, the WSP Crisis Response Team will:
  - Communicate with the WSP Golder employee reporting the crisis to clearly identify and confirm the nature and magnitude of the crisis and determine appropriate actions to be taken in the field and in support of the project team,
  - Notify the National Crisis Coordinator and the WSP Canada President,
  - The National Crisis Coordinator in consultation with the President will determine the appropriate level of CRT involvement and will initiate CRT notification as needed.

4.0 EMERGENCY RESPONSE REQUIREMENTS

A First Aid Risk Assessment was completed for this project as required by the Northwest Territory Occupational Health and Safety Regulations to determine the first aid attendants, supplies and equipment, facilities and transportation required to render prompt and appropriate first aid to worker and to render prompt and appropriate transportation for injured workers to the nearest appropriate medical facility or hospital. As per the regulations, the Site is categorized as high-risk in respect to the type of injuries that could occur at the work Site.

As per Part 5 of the Northwest Territory Occupational Health and Safety Regulations, the project must meet these minimum requirements pertaining to First Aid for the Site:

Applicable Schedule	Number of Workers at the Site	Minimum First Aid Kit and First Aid Attendant Level
Schedule D: Minimum First Aid Kit Requirements: High Risk Work Sites	■ 2-25 Workers at Site	■ 1 small Type 3 First Aid Kit

Applicable Schedule	Number of Workers at the Site	Minimum First Aid Kit and First Aid Attendant Level
Schedule H: Minimum First Aid Attendant Requirements	■ 2-10 Workers at Site	■ 1 Advanced First Aid Attendant

Due to the work Site's isolated location, the travel time and modes of transportation (boat or air evac) available to the nearest medical facility and the potential for weather to significantly impair transportation availability, the Site will be equipped with an Advanced Health Care Provider from AMS and equipped with medical equipment.

4.1 First Aid Room

A first aid room is identified and established on board the 802 Camp Barge. The Site Medic is responsible for operating and maintaining the first aid room and equipment. Additional first aid kit – Level 2 will be on board the transport boat.

4.2 Training Requirements

All personnel shall receive an orientation on this ERP by the Site Supervisor on their first visit to Site and prior to starting work. All first aid trained personnel will hold a valid First Aid training certificate. All Site personnel will be trained for the use of fire extinguishers and spill response equipment. The training matrix is in the Site HSSE Management Plan.

5.0 GENERAL SITE EVACUATION

In the event of a Site wide emergency, the First Responder will communicate the nature of the emergency via radio and sound the alarm.

Upon the order to muster:

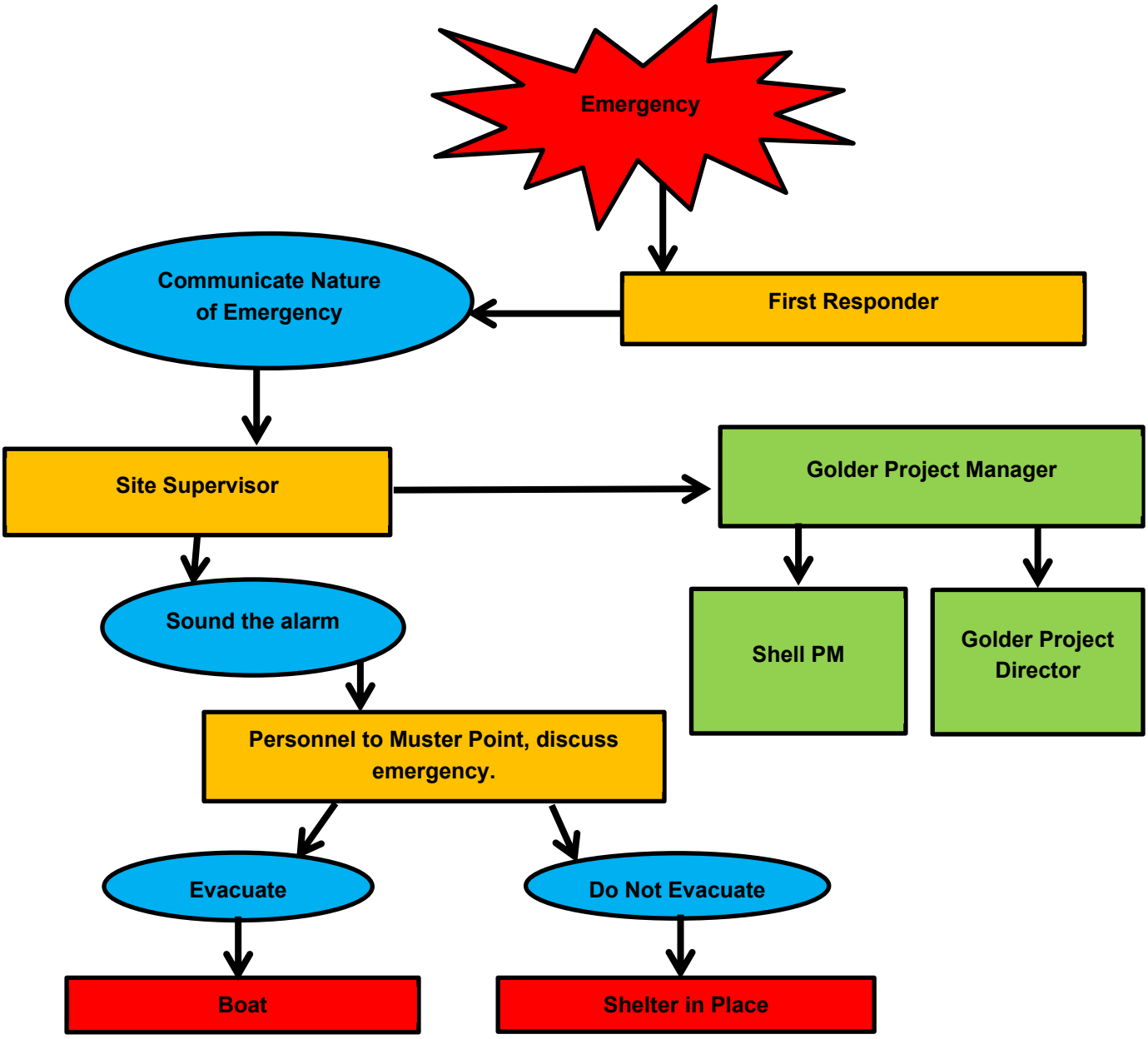
- All personnel will stop working, shut down and secure equipment;
- All personnel will muster at the Muster Point;
- Site Supervisor will cconfirm all personnel are accounted for;
- The Site Supervisor will determine if evacuation from Site or shelter in place is required; and
- The Site Supervisor has the authority to order a Site wide evacuation in the event of a catastrophic or potentially catastrophic emergency to protect the health and safety of personnel. All personnel will be evacuated to Inuvik by boat or air (if deemed necessary).

To initiate a Site wide evacuation, the Site Supervisor will call "evacuate, evacuate, evacuate" over the Site radio.

Upon the order to evacuate:

- Each crew will confirm the order with the Site Supervisor;
- All personnel will stop working, shut down and secure equipment;

- Move to the project evacuation point / muster station (Parking Lot);
- Confirm with the Site Supervisor when all crew members are accounted for;
- Visitors will be ushered by designated Site personnel to the muster station; and
- Follow instructions from the Site Supervisor for safe evacuation from Site.



6.0 SITE SPECIFIC EMERGENCY RESPONSE PROCEDURES

The emergency situations with the greatest likelihood of occurring at or near the project Site have been identified and are listed in this section. In addition to the potential emergencies identified, it is recognized that emergencies are often unexpected and can arise at any time. It is the responsibility of the Site Supervisor, in conjunction with the Site Medic and lead subcontractors to assess conditions on a regular basis and adjust plans as new situations are identified. Any changes and/or additions made to the HSSE Plan and this ERP must be communicated to the Project Manager.

6.1 Fire or Explosion

In the event of fire, first responder will attempt to put out a fire using a fire extinguisher if safe to do so, if not radio for help.

To report a fire in progress:

- Remain calm;
- Sound the alarm/Call “Fire, Fire, Fire” on a radio; and
- Evacuate endangered personnel to Muster Point.

Using a fire extinguisher:

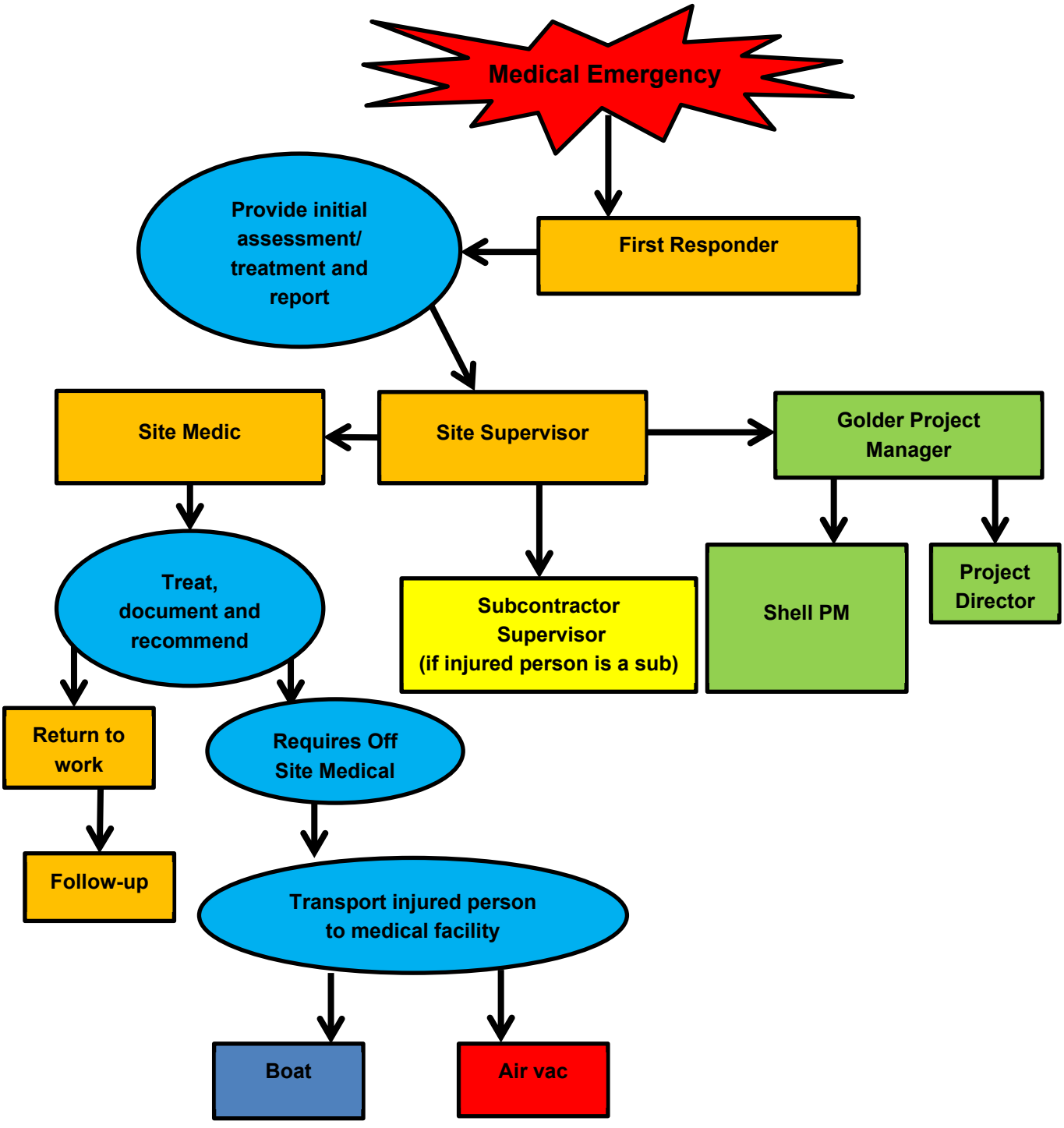
- Before deciding to use a fire extinguisher to fight a fire:
  - Be sure that the fire is small and not spreading;
  - You have the correct type of fire extinguisher for what is burning;
  - Stand with an exit at your back; and
  - Stand several feet from the fire.
- Pull the pin (if necessary, turn the pin to break the zip tie);
- Aim the nozzle at the base of the fir;
- Squeeze the handle slowly;
- Sweep from side to side; and
- Drop the fire extinguisher and evacuate if the fire is spreading.

6.2 First Aid and Medical Assistance

All minor injuries or illnesses (small cuts, lacerations, sprains, strains etc.) shall be reported immediately to the designated Site Medic and documented following the injury loss reporting process. The injured person’s condition will be assessed, and appropriate first aid treatment will be applied if/as required. Care management begins the moment a person is injured and concludes when a worker returns to normal condition and duties. The Site Supervisor will lead care management and work with the injured worker to ensure appropriate mitigations are put in place that allow an injured worker to recover. The injured worker’s conditions will be monitored daily (by the Medic) following the report of an injury.

In the event of a serious or potentially life-threatening injury/illness:

- Call goes out on the radio in a calm clear voice “MEDIC MEDIC MEDIC”.
- All work on-site stops immediately. All crews stand down and maintain radio silence.
- Site Supervisor or alternate takes immediate and sole control of the emergency via radio.
- Medic at the Site responds immediately, mobilizes first aid equipment and responds to the Injured Person (IP).
- Wildlife monitor will assist with affected person(s) carry/move/transport in case it is required.
- Medic to call health care center and determine the appropriate transportation method based on the condition of the affected person(s) when assistance beyond on-site capabilities is required.
- Site Supervisor to confirm transportation via boat to Inuvik and via car/truck to Inuvik Hospital.
- Site Supervisor or designated Golder employee to accompany injured worker to Inuvik Hospital.
- If the injured worker cannot be moved, on direction of the Medic, the Site Supervisor will call Blackcomb Helicopters using an inReach device when they are in the Northwest Territories during a simultaneous operation taking place in August or Canadian Helicopters to arrange Air medical evacuation at **(867) 777-2424** and provide the following details:
  - Your name and location;
  - Patient information (name, age, gender);
  - Brief description of events leading to the injury/illness; and
  - Nature of injuries/illness.
- Helicopters will fly only under Visual Flight Rules (VFR) conditions, by line of sight and visibility, meaning they will not be operational during adverse weather where there is limited visibility (1 mile visibility) and in darkness. Responding Helicopter from Inuvik will require approximately 30 minutes to fly to Site. All helicopters will have stretcher configuration capability and space for medics to provide in-flight care.
- Coast Guard will respond to any emergency called to their attention at any time. Their response time is typically 3-4 hours. This will also be the backup plan in the event where Canadian Helicopters is not available during medical emergencies.


Medical Emergency
First Responder
Provide initial assessment/ treatment and report
Site Medic
Site Supervisor
Golder Project Manager
Treat, document and recommend
Subcontractor Supervisor (if injured person is a sub)
Shell PM
Project Director
Return to work
Requires Off Site Medical
Follow-up
Transport injured person to medical facility
Boat
Air vac

6.3 Missing Crew Member

All personnel will be accounted for at the start and end of the workday. If a worker goes missing, a thorough search of the camp, available transportation vessel and work site will be conducted immediately. If the person cannot be safely located, the Site Supervisor will make an emergency call to the RCMP and report a missing person.

6.4 Person Overboard Emergency

How to respond in the event a person falls overboard from a boat:

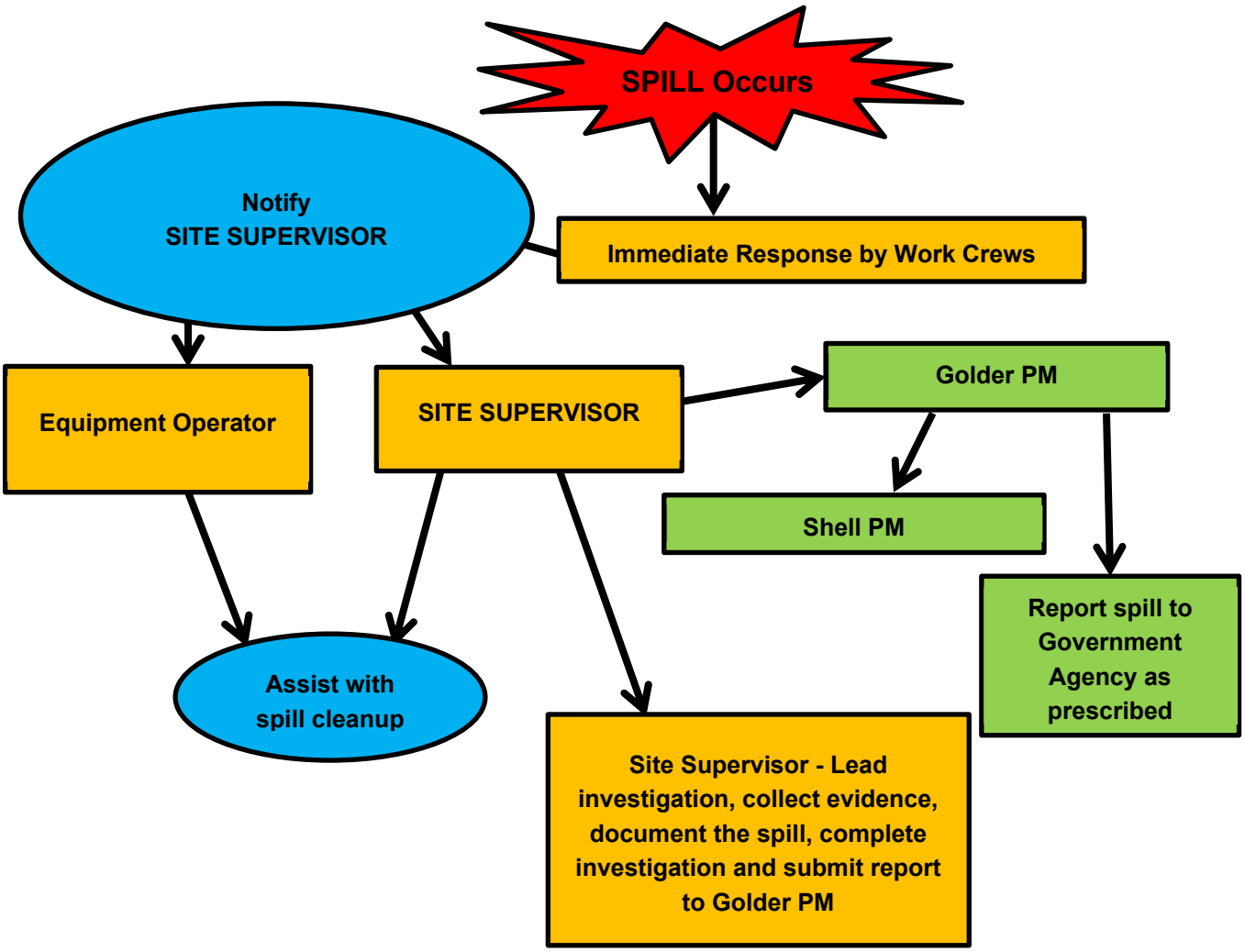
- Remain calm;
- Affix the location and maintain visual contact of the victim's location;
- Throw a lifeline e.g., Life ring and rope; and
- Recover the person overboard and treat them for cold stress.

6.5 Environmental Spill Response Procedures

If there is an environmental release take the following steps:

- Stop work;
- Ensure safety of all personnel in the work area;
- Identify the material released;
- Report spill to Site Supervisor. The Site Supervisor will report the spill, status and any injuries to the Golder Project Manager;
- Contain the spill (using spill kits), stop the flow and control hazards by eliminating all ignition sources, define safety parameters by setting up cones and barricades if needed;
- Monitor the air at the perimeter of the flagged off area, as necessary;
- Clean up the released material to the extent possible;
- Assess and remediate any suspected residual impacts;
- The Project Manager will report to the Shell Superintendent and PM and to the government agency; and
- The Site Supervisor documents the spill. Gathers photos/drawings and evidence for investigation of the incident. Record time and date that it occurred, record type of chemical released, record environment that the spill occurred (water, land air), record size (amount released, area effected) and equipment involved.

  Site-specific Spill Contingency Plans for Camp Farewell, West Channel and Unipkat have been developed as part of the HSSE Management Plan and include detailed guidance for spill response (i.e. on land, on water).



6.6 Communication System Interruptions

The main method of communication on-site will be by using two-way handheld radios operating on the same channel for all crews. Interference is not expected to affect two-way radio usage at the Site. Radios are to be charged each day and communication checks to be tested each morning. Defective or broken radios are to be taken out of service and replaced. Satellite-based Land line (1) Satellite phones (3) and inReach devices (3) necessary for external communication will be tested before work starts on-site and service verified each day. The barge camp will be set up with internet by a communications expert. Should all communication systems fail this would result in the immediate stoppage of work, except for the on-going camp management, until communication services are restored.

Should there be a communication failure of the satellite phones, backup satellite emergency communication devices (inReach) and camp internet, during an emergency requiring an immediate evacuation, a marine vessel will be used to evacuate personnel and / or travel to the nearest community or point of reception to coordinate the emergency evacuation.

Should there be a communication failure during an emergency that can be resolved safely on-site with no evacuation required, the Site Supervisor will shut down work activities, except for the on-going camp operations. The Site Supervisor will troubleshoot the communication failure and should it persist, the Site Supervisor or a designate will travel by marine vessel to the nearest community or point of reception to inform the Golder Project Manager of the emergency and communication issue.

6.7 Severe Weather

Weather in the region can change very drastically in a short amount of time. When working during periods where rapid weather changes or inclement weather can be expected, make sure that workers are appropriately equipped with winter or rain gear, warm clothing and a change of clothing as appropriate.

- The Site Supervisor or designate alternate will obtain frequent weather updates throughout the workday and communicate changes so that crews may be prepared to modify or suspend work when bad weather doesn't allow it to be completed safely.
- High winds are common for the region. Conditions will be assessed by the Site Supervisor and sustained wind speed and wind gusts evaluated using an anemometer. The Site Supervisor will evaluate transportation needs between Site and Inuvik and will make the determination on when to travel. Air evacuation by helicopter cannot be provided when there is less than 1 mile of visibility and during darkness.
- If forecasted bad weather requires the evacuation of workers from the work area, the Site Supervisor will coordinate the safe mobilization of the field crew back to safety as indicated below.
- If weather in the area may prevent emergency evacuation of an injured person, the Site Supervisor, with the consultation of the subcontractor and the project management team may decide to suspend high risk work activities until the weather passes.

The Site Supervisor will communicate weather and potential evacuation status with the crew and, considering the weather forecast, time of day and activities taking place (in terms of risk), one of the following decisions will be made.

- Continue work as normal.
- Suspend high hazard activities and wait for weather to improve.
- Suspend all activities and evacuate the work Site.

6.8 Wildlife Encounter

If Wildlife is observed, report sighting immediately to the Wildlife Monitor so they can determine threat level and response. If a Wildlife Encounter occurs take the following steps.

- Stop Work.
- Work crew to leave equipment and return to safety of camp via identified safe route if path between equipment and camp is clear.
- Confirm with Wildlife Monitor when safe to return to area.

All bear sightings are to be reported to the local Environment and Natural Resources office. Report a wildlife emergency using the 24-hour emergency wildlife number.

6.9 Workplace Harassment and Violence

Strategies for recognizing and dealing with incidents of harassment and violence in the workplace are outlined within Golder's Harassment and Violence in the Workplace Policy. Acts of harassment and violence are defined within this policy. If personnel encounter aggressive behaviour by another individual, they are to:

- Remain calm;
- Monitor their own non-verbal cues;
- Maintain a safe distance from the aggressor and identify your escape route to safe area;
- Do not make threats or promises;
- Remove themselves from the situation immediately;
- If the situation escalates, call for help using radio or verbally; and
- Contact the Site Supervisor when safe to do so and file an incident report.

The Site Supervisor will report the incident to the Project Manager and involve the Golder HSSE Advisor and HR representative. The incident may be reported to the local authorities depending on the nature of the aggressive act, and arrangements will be made to have the person(s) responsible for the aggressive act to be immediately escorted and permanently removed from the Site.

7.0 HOSPITAL ADDRESSES

Hospital Name	Address	Phone	Level of Care Available
Inuvik Regional Hospital	285-289 MacKenzie Rd, NT	867-777-8000	ER 24/7 / Full Care
Aklavik Susie Husky Health and Social Services Centre	2 Airport Road P.O. Box 114 Aklavik, NT X0E 0A0	867-978-2516 (24 Hr)	TBD

The closest hospital is the Inuvik Regional Hospital. Transportation from Site to the hospital will be completed via emergency boat unless Air Ambulance is required. For planned work at West Channel, Aklavik is the closest medical facility.

Signature Page

Golder Associates Ltd.

Stephanie Villeneuve, M.Sc.
Environmental Scientist

Lenz Haderlein, M.Sc.
Project Director

SV/LH/pt

APPENDIX A

Emergency Helicopter Use Process

Shell Aircraft Limited

Americas Air Transport Team
Shell Exploration and Production Company
Whitney Hancock Center
701 Poydras Street, Suite 2894
New Orleans 70139
Louisiana - USA
Tel:+1 504 425 4580

21 Jun 2022

Subject: Golder HSSE Management Plan Review - Business Unit/Contact: Westley, Karen GSMY-PTS (VP Downstream S&E)

Dear Karen,

An Air Transport review of the Golder HSSE Management Plan for the July 4th-Sep 1st, 2022 NWT & Yukon Remote Well Site Inspection project was completed for SGWS Major Projects- Legacy. The Golder(L2) ERP workflow is attached to this letter for reference, the steps are as follows:

1. Advanced Paramedic (EMT-P) onsite to determine, if a higher level of care is required than can be treated onsite, EMT-P will trigger the need to transport the injured party to a healthcare facility (located in Inuvik, NWT).
    a. The Primary response for transportation to an offsite healthcare facility will be via boat (Emergency Boat supplied by Golder(L2) stationed onsite).
    b. The secondary response will be to call out an unapproved air operator* (Canadian Helicopters [CHL] using an unapproved aircraft type [AS-350 A-Star] single-engine helicopter) which is based in the nearest community to the project site (Inuvik, NWT). The Shell Control Framework and Shell Group Requirements for Aircraft Operations require the use of a Shell-approved operator and approved aircraft type.
        i. *If available, during the period 1 Aug 22 to approximately 23 Aug 22, medevac services will be provided by Blackcomb Helicopters, the approved provider and approved twin-engine aircraft. The departure of this helicopter from the NWT/Yukon region will depend on when their work is completed.
        ii. Section 14 of the Shell HSSE & SP CF – Air Transport Manual

Golder(L2) as the site management contractor has potential air transport exposure, Golder has not been audited by Shell Aircraft and therefore may not subcontract for air transport. All air transport activity with limited exceptions are high risk activities as described in the Control Framework.

There is no medevac aircraft on standby in Inuvik, nor is there access to a "911" public service call-out EMS response by helicopter that is commonly available in more populated areas. The CHL aircraft directly referenced in Emergency Response section of the Golder HSSE Management Plan are not contracted or dedicated to providing a standing service, since they are "as available" while

performing other work. Either the aircraft and/or the pilot will likely not be available when the need for a medevac arises since the pilot could be out of crew day and the aircraft in maintenance when called. There is no way to adequately understand the fatigue management and rest recovery status of the CHL pilots since they aren't contracted or dedicated, and this will significantly affect any possible response. Another concern in this region is potential for adverse weather conditions that aren't suitable for a visual flight rules. It is unlikely that a medevac by helicopter can be executed in under 4 hours because of these considerations except if there are available aircraft and pilots during CHL's normal duty day. To be clear, this is a daytime-only operation. Conducting a medevac flight between sunset and sunrise would not be an option. Due to these risks, best efforts should be made to have a Shell Air Transport Technical Authority provide an informed recommendation to the Shell Business Leader before the decision to launch a medevac flight is made.

Due to the limited exposure of this project, the following detailed actions should be required by the Business Unit and would serve as essentially a bridging document between Golder and Shell for the air transport use in an emergency response during the period when the Blackcomb Helicopters aircraft is not on site.

Action Required:

- In the event that an aircraft is needed per the HSSE Management Plan, Golder will make best efforts to contact Shell and receive Shell Business Leader approval for emergency use of an Unapproved Air Operator and Unapproved Aircraft Type before it is flown (The Business Leader may delegate this authority – Purpose of this letter, requesting temporary assignment to Golder as 'Business Leader' to allow for timely response aligning with Golder EPR).

- Best Efforts will be made to contact Shell Americas Air Transport Team to coordinate with CHL prior to decision to launch any aircraft in an emergency response or Medevac:

Shell Air Transport Technical Authority (TA1/2)		
Primary: John Jacobs – Air Transport TA2	Work Mobile	+1 504-425-3402 +1 907-250-2510
Alternate: Steve Simpson - Air Transport TA1	Work Mobile	+1 504-425-4595 +1 504-256-8998

- A reply email from Golder to acknowledge/accept this requirement must be received before the work begins.

Once acceptance from Golder has been received, this letter will remain on file until the project is complete.

Should you require any further advice or assistance then please do not hesitate to contact our office.

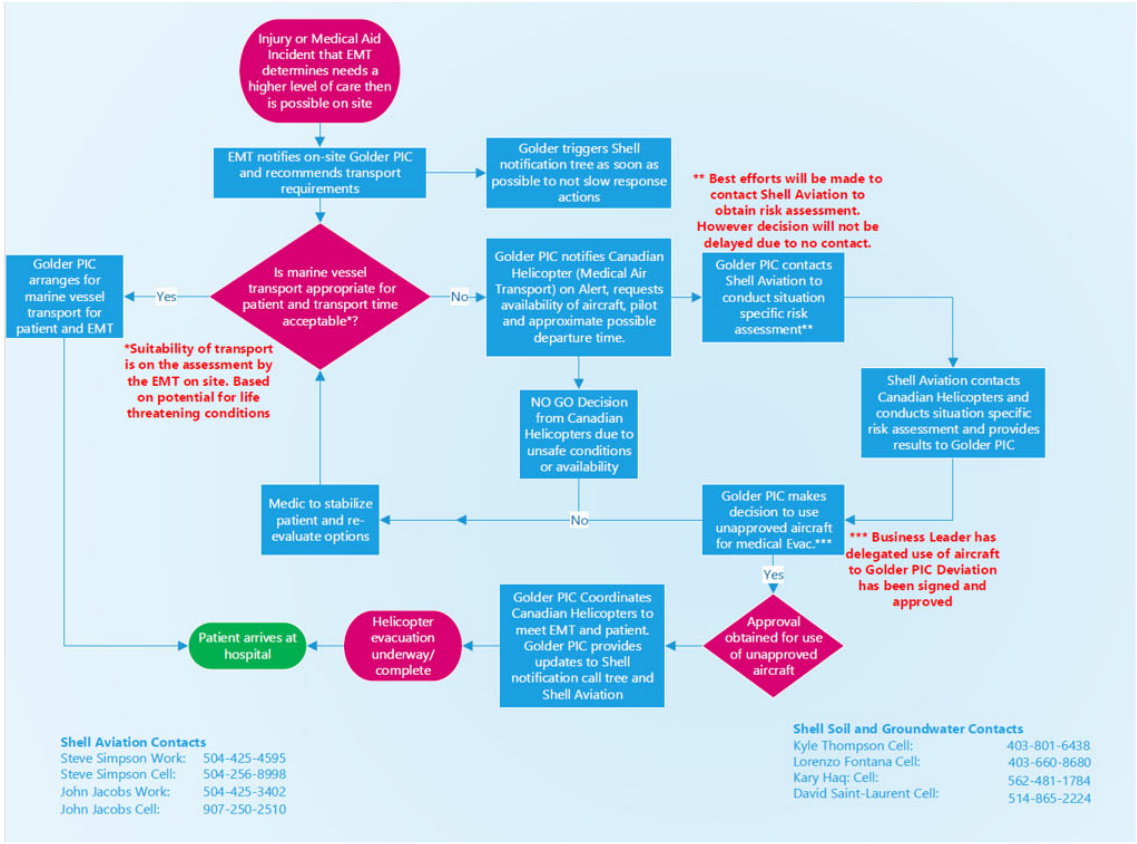
Yours sincerely,

John Jacobs
Air Transport TA2
Canada Aviation Manager
Americas Air Transport Team

Cc: Shell Aircraft, Regional Advisor Francis Schuurman

Key Risks
6) Remote Access and Emergency Response: Helicopter Emergency Response

- Emergency Response Plan includes medivac via helicopter to the Inuvik Regional Hospital.
- Non-Shell Approved Helicopters will fly only under Visual Flight Rules (VFR) conditions, by line of sight and visibility, meaning they will not be operational during adverse weather where there is limited visibility (1 mile visibility) and in darkness.
- Blackcomb Helicopters will be used in place of Canadian Helicopters, when present in the area.



golder.com

REPORT

Spill Contingency Plan

2022 Phase II Environmental Site Assessment - Camp Farewell, Former Staging Site

Submitted to:

Shell Canada Limited
400 - 4th Avenue SW
P.O. Box 100, Station M
Calgary, Alberta T2P 2H5

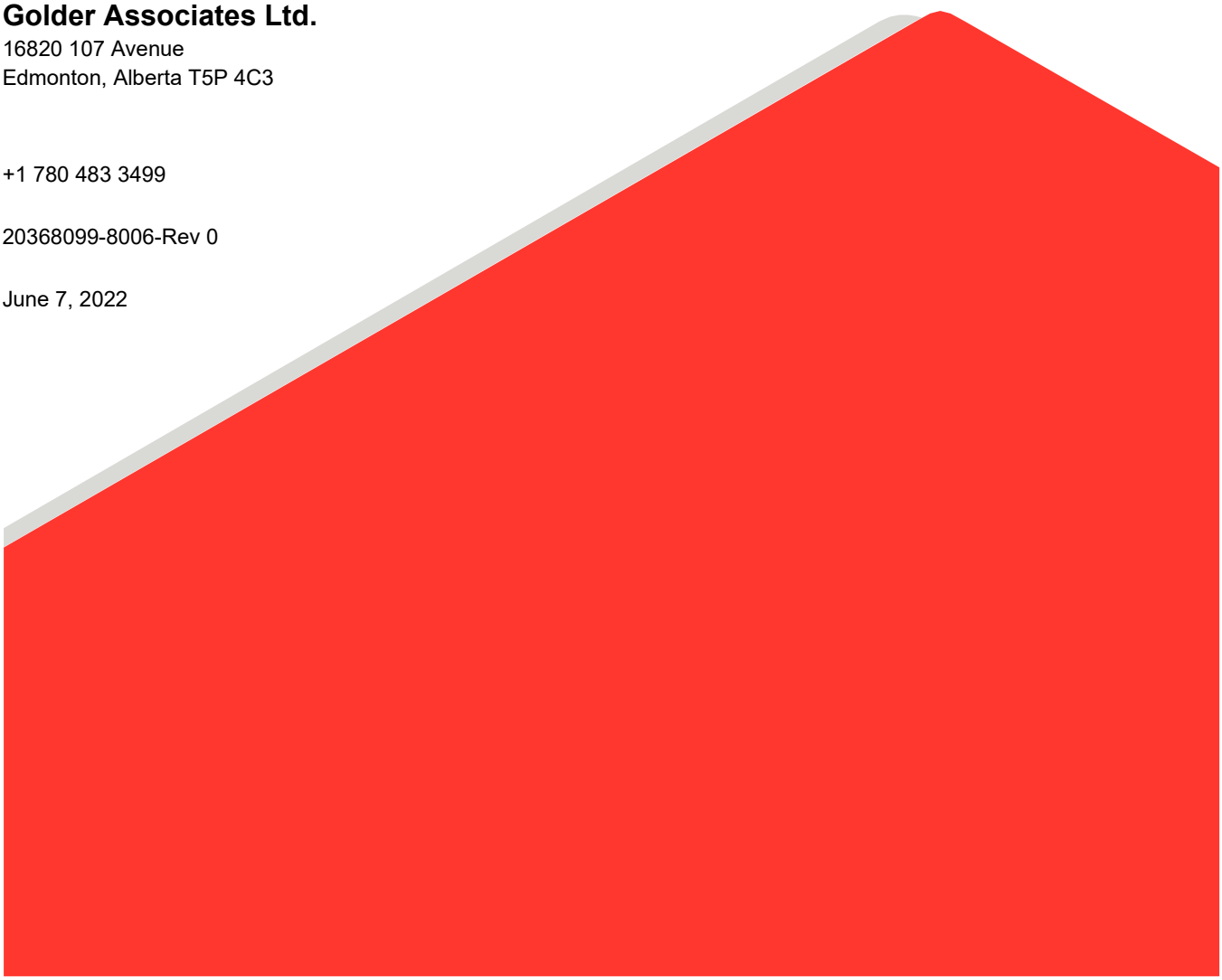
Submitted by:

Golder Associates Ltd.
16820 107 Avenue
Edmonton, Alberta T5P 4C3

+1 780 483 3499

20368099-8006-Rev 0

June 7, 2022



Distribution List

1 Electronic Copy: Shell Canada Limited

1 Electronic Copy: Golder Associates Ltd.

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Safety Data Sheets

1.0 INTRODUCTION AND PROJECT DETAILS

Golder Associates Ltd. (Golder) has prepared this Spill Contingency Plan (the Plan) on behalf of Shell Canada Limited (Shell) for the former Camp Farewell Staging Site (the Site). The purpose of this Plan is to describe the proper responses to several types of spills that may occur during the planned Environmental Site Assessment (ESA) of the Camp Farewell Staging Site (the Project).

The Plan will be effective upon its approval and will be implemented at the beginning of the 2022 phase of the Project (i.e., mid July 2022). It includes the Spill Response Contact List for relevant organizations and agencies in the Northwest Territories (NWT/NT), and the reporting requirements in the event of a chemical, fuel, or waste spill. Paper copies of this Plan will be available on the Site (through the Site Supervisor) and will be posted at several prominent locations. All personnel will have access to paper and digital copies of the Plan. Prior to the commencement of work, the Plan will be distributed to personnel from Shell, Golder, and Tundra Drilling, E. Grubens Transport Ltd. (EGT) and their subcontractors. It will be discussed with the entire crew at daily Health and Safety meetings.

Project details are provided in the following sections.

1.1 Site Location and Description

The Camp Farewell site is located at 69°12’30.0’’N latitude and 135°06’04.4’’W longitude on the Mackenzie River within the Inuvialuit Settlement Region (ISR) on the northeastern bank of the Middle Channel of the Mackenzie River Delta, NWT. The Site is approximately 150 kilometers (km) northwest of Inuvik. The Camp Farewell site will be used as a base camp for staging and accommodation in 2022.

The Site covers a land area of approximately 14 hectares (35 acres) within the Kendall Island Bird Sanctuary.

Camp Farewell was constructed in 1970 to 1971. The Site was operated as a staging and storage location to support Shell’s Mackenzie Delta drilling program. The Site consisted of a self-contained camp, providing electrical and heating services, and facilities for accommodation, meals, fuel storage, equipment handling, water withdrawal, and wastewater storage.

1.2 Project Summary

The objective of the 2022 proposed technical scope of work (SOW) update is to delineate soil impacts at the Site identified during the 2021 field program, to further assess groundwater and to characterize background conditions in soil, groundwater, and surface water. Once the field program is underway, additional scope may be added based on field observations and initial laboratory results. The Project Manager will act as the single point of contact with Shell to communicate additions to the scope as the field program progresses.

The proposed work will include:

- Drilling a total of up to 57 boreholes and three hand auger holes as described below:
  - Drilling 34 boreholes and three hand auger holes to permafrost for delineation of benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbon (PHC) Fractions F1 to F4, polycyclic aromatic hydrocarbon (PAH) and/or metals. Permafrost is expected to be at depths between 1.5 and 2.7 metres below ground surface (mbgs) on the Site footprint and between approximately 0.3 and 0.7 mbgs outside the footprint.

- Drilling three boreholes to assess for potential contamination within permafrost to complete vertical delineation of multiple parameters in soil.
- Drilling two boreholes to permafrost to confirm previously-detected barium results in soil at two locations;
- Drilling five boreholes to permafrost for assessment of metal concentrations in background area soils;
- Thirteen additional locations have also been proposed as potential step-outs if needed based on field screening and/or analytical data collected in 2022;
- Completing seven boreholes as monitoring wells to delineate the PHCs identified in groundwater historically and to assess groundwater north of the former aboveground storage tank and spill area. One background borehole will be completed as a monitoring well to assess background groundwater chemistry;
- Developing all wells (existing and newly installed). If, following development, wells are dry or have insufficient water to sample, consideration will be made to re-install wells. Specifically, during the 2021 field program monitoring wells P06-4, P06-6, P06-7, P19-2 and P19-6 were dry or had insufficient water to sample;
- Completing one round of groundwater monitoring, gauging water levels and collecting groundwater samples from the newly installed and existing monitoring wells for laboratory analysis of BTEX, PHC Fractions F1 to F4, PAH, salinity, and dissolved metals;
- Collecting surface water samples from four background locations to be analyzed for total metals;
- Completing a Real Time Kinematics (RTK) survey of the borehole and monitoring well locations;
- Completing a habitat assessment of the surface water bodies near the Site in support of a human health and ecological risk assessment (HHERA);
- Conducting quality assurance/quality control (QA/QC) sampling; and
- Preparing a report documenting and detailing the methods and results of the investigation activities.

All site personnel will be transported to and from site by boat from Inuvik. All heavy equipment, fuel tanks, water tanks and all site equipment will be transported to and from site using a barge and Tugboat. While onsite, room and board will be provided on a self-sustaining barge-camp. All water, sewage and refuse generated onsite will be stored in their respective receptacles aboard the barge and will be disposed off at approved facilities in Inuvik. For this project, there will be approximately 10 workers onsite.

2.0 POTENTIAL SPILLS AND THEIR ENVIRONMENTAL IMPACTS

2.1 Antifreeze-Coolant, Diesel Fuel, Lube Oils, Grease, and Aviation Fuel

Diesel, coolant, lube oils, grease, and aviation fuel may be harmful to human health, wildlife, and aquatic life. Diesel burns slowly which reduces the risk to the environment during recovery because a burn can be easier to contain.

There will be one 50,000 litre (L) tank of diesel aboard the barge (within the hull) and a fuel truck at the Site. In a worst-case scenario, the hull of the barge is punctured and contents seep through and overflow secondary containment into the surrounding water bodies.

A fuel truck will be staged at least 30 metres (m) from any water body. The fuel truck will contain approximately 2,000 L of diesel that could leak into the surrounding land.

Aviation fuel (Jet-A) will be stored at least 30 m away from any water body. A total of 18,200 L of Jet-A will be stored in a fuel truck on-site that could leak into the surrounding land. Jet-A may be harmful to human health, wildlife, and aquatic life.

Antifreeze or engine coolant products are used in automotive engines and generally consist of ethylene glycol or propylene glycol mixed with distilled water. Coolant will be used in the engines of the vehicles onsite in limited quantities that could leak onto the surrounding land.

2.2 Propane

Propane may be harmful to human health, to wildlife and to the surrounding environment. Propane is extremely volatile and flammable and can possibly impact human health and the surrounding environment if leaks that may result in fires or explosions are not prevented, recognized, or stopped. There will be up to four 2,273 L tanks at the Site at any given time. In a worst-case scenario, all cylinders are punctured or fail, and contents leak into the surrounding environment and ignite, possibly leading to an explosion. This would involve up to 9,092 L of propane. Emergency response drills and daily safety meetings will address this scenario.

2.3 Sewage

Direct exposure to sewage may be harmful to wildlife and humans as it may cause illness.

There are three 4,000 L combined grey and black (sewage) tanks on the barge servicing the camp. There is also a spacer barge with one 45,000 L tank for storage capacity, if required.

In a worst-case scenario 57,000 L of sewage from the barge camp would enter the river.

2.4 Classification of Dangerous Goods

The waste generator (consignor) is responsible for classifying all dangerous goods that are shipped. Goods classified by the manufacturer will be verified by the contractor on-site. Where the composition of the products has been changed, (e.g., mixtures of hazardous waste) the products may need to be reclassified. The carrier is responsible for ensuring that the documentation matches the package. All vehicles transporting dangerous goods into, or out of the Site will have proper placarding on vehicles. Containers will also be labelled according to the requirements laid out by the *Transportation of Dangerous Goods (TDG) Act* and Regulations. The Site contractor is responsible for completing the shipping document. Personnel transporting dangerous goods must complete transportation of dangerous goods training as outlined in the Health, Safety, Security and Environment (HSSE) Management Plan.

Persons ordering and receiving dangerous goods shall ensure that shipping documents are sent by the suppliers where required by the TDG Act and Regulations and shall refuse shipments if not in compliance. Documents must be retained for at least two years.

3.0 SPILL RESPONSE ORGANIZATION

3.1 Regulatory Agencies

The Government of the Northwest Territories (GNWT) Departments of Environment and Natural Resources (ENR) and Lands, and the Office of the Regulator of Oil and Gas Operations (OROGO) are responsible for coordinating regulatory oversight and investigation of hazardous material spills in the NWT. Federal agencies (Crown Indigenous Relations and Northern Affairs Canada [CIRNAC], Environment and Climate Change Canada [ECCC] and Transport Canada) are responsible in accordance with their jurisdiction for spill investigations and cleanup monitoring in the NWT. The Inuvialuit Land Administration (ILA) is responsible for spills on land within Inuvialuit Private Lands. The Inuvialuit Water Board (IWB) is responsible for discharges to inland waters and the Canadian Coast Guard is the lead response agency overseeing spills from ships and barges.

3.2 Spill Reporting Procedures

The spill response thresholds for a wide variety of materials, compounds, and liquids are provided in the Spill Contingency Planning and Reporting Regulations under the NWT *Environmental Protection Act* (1988) and are provided in Appendix A. Additional details are included in Section 9.0.

All spills, regardless of quantity, will be reported to the Golder Site Supervisor, the Shell Project Manager and will be reported in the IWB Annual Report. All spills, regardless of quantity, will be reported to the ILA Representative and the Northwest Territories/Nunavut (NT/NU) Spill Line where the accidental release:

- Is near or into a water body;
- Is near or into a designated sensitive environment or sensitive wildlife habitat;
- Poses an imminent threat to human health or safety; or
- Poses an imminent threat to a listed species at risk or its critical habitat.

If applicable, a detailed report including global positioning system (GPS) location(s) will be submitted to the applicable regulatory agency no later than 30 days after the initial report of any spill occurrence.

Table 1 indicates the current spill response contact list and Figure 1 depicts a flow chart for spill response. The Golder Site Supervisor (and Alternate) will be responsible for activating the Plan.

Table 1: Spill Response Contact List

Organization	Contact	Phone Number
Northwest Territories 24-Hour Spill Report Line	N/A	867-920-8130
Inuvialuit Water Board	Mardy Semmler	867-678-2942
Government of the Northwest Territories Environment Protection Officer, Inuvik	Alicia McRae	867-678-6653
Government of the Northwest Territories Environment and Natural Resources, Inuvik (Water Resources Officer)	Lloyd Gruben	867-678-6676

Organization	Contact	Phone Number
Canadian Coast Guard 24-Hour Spill Reporting Line for Arctic Waters	N/A	1-800-265-0237
Golder Site Supervisor	Melissa Lord	403-464-5613
Golder Project Manager	Aurélie Bellavance	403-816-0245
Golder Project Director	Lenz Haderlein	780-619-0932
Golder Health and Safety Advisor	Lisa Switzer	226-376-2812
Shell Project Manager	Kyle Thompson	403-691-3174 ext. 3174
Shell Media and Public Enquiries	N/A	1-800-661-1600

N/A – not applicable

A variety of communications equipment will be available at the Site for use during the Project. Table 2 summarizes the communications equipment for the Project.

Table 2: Communications Equipment for the Project

Project Component	Company	Equipment (Number)
Summer Field Work	Golder	Satellite phone (2) / cell phone (2) / inReach device (2) / handheld radios (2)
	EGT and Subcontractors	Satellite phone (2) / Satellite-based Land line (1) Cab-mounted radios (2) / cell phones (3) / handheld radios (3)
	Tundra Drilling	Satellite phone (1) / handheld radios (1)
	Total	Satellite phone (6) / cab-mounted radios (2) / cell phones (7) / inReach device (2) / handheld radios (6) / Satellite-based internet available onsite

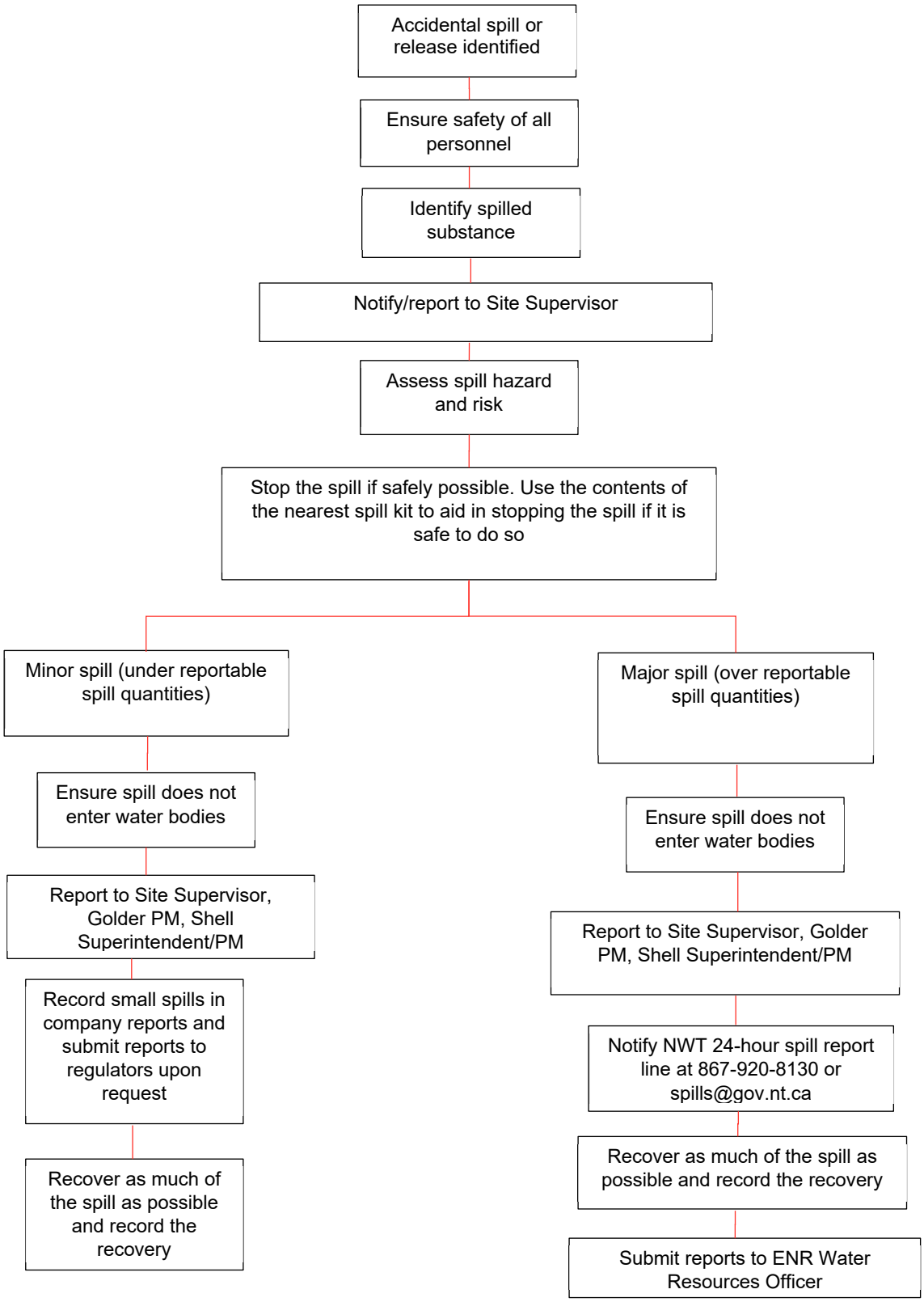

Figure 1: Spill Response Flow Chart

4.0 PREVENTATIVE MEASURES

The following section provides details on the existing preventative measures that are in place for the Project regarding fuel storage, secondary containment, fuel handling procedures, and related activities that have the potential to result in a spill event.

Spill kits will be located wherever fuel is stored or used. Refer further to Section 7.1.1 for details on spill kit contents. Portable drip trays and appropriately sized fuel transfer hoses will be used when refueling motorized equipment, to avoid any leaks/drips onto the land. No heavy equipment will be refueled within 30 m of a water body. Equipment on-site will be refueled in-land using a fuel truck. Established procedures and drip trays will be used during refueling operations to prevent any spills.

The Golder Site Supervisor and designated fuel monitor will conduct daily visual inspections to check for leaks or damage to any fuel storage facilities. Regular maintenance and oil checks of all motorized equipment will also be undertaken to avoid preventable leaks.

5.0 SPILL RESPONSE ACTIONS

5.1 Initial Spill Response Actions

- Ensure safety of all personnel;
- If needed, evacuate or divert workers from the spill area;
- Remove all sources of ignition;
- Stop the spill if safely possible (e.g., shut off pump, replace cap, tip drum upward, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so;
- Minimize vehicular traffic as much as possible at the spill site;
- Mark, flag and flag-off any area that is deemed hazardous to humans or wildlife;
- Monitor the air at the perimeter of the flagged off area, as necessary;
- Use personal protective equipment (PPE) until concentrations are determined to be within acceptable levels;
- Assess spill hazards and risks;
- Identify the leak location along with the type of product/material spilled, the duration and the volume released;
- Evaluate ground and weather conditions to assess the risk to environment (i.e., rain, gravel, sand, water body, muskeg, etc.);
- Contain the spill by using contents of spill kits. Place sorbent materials on the spill or dig a berm/bell hole to contain the spill; and
- Relay information to internal company contacts, government agencies and, if required, the designated communications representative.

5.2 Spill Assessment (Land)

Land spills will spread outward from the initial spill point toward lower-lying areas. Soil infiltration will also occur at varying rates, dependent on the soil type and the nature of the product spilled.

Following the initial hazard assessment and development of a site safety plan, detailed information on the location and effects of the spill on the land will be collected. The spill boundary will be identified with the appropriate equipment, including:

- PPE;
- Gas detection monitors;
- Measuring tape;
- GPS;
- Shovel;
- Excavator, drill or sampling equipment if subsurface contamination is suspected; and
- Camera.

Use a handheld air monitor to assess the potential of flammable vapours in the area. Produce a sketch of the spill and take photographs. Next, identify land uses in areas affected by the spill. Look at whether the spill affects private landowners, public land (green areas, parks), dispositions (pipelines, utilities, roads, facilities, trappers, etc.), or sensitive areas (protected areas, wildlife habitat, archaeological resources etc.).

Based on the land use in the spilled area, evaluate Site for wildlife, and determine the approval requirements for accessing the spill site. Reporting details are provided in Section 9. It is important to note the terrain, soil types, characteristics and conditions, as well as the vegetation types on the Site. Surface runoff patterns, erosion potential, moisture levels and movement of the water table can all impact the severity of the spill and the way in which it can be contained so it is imperative to take note of all of these observations before proceeding with cleanup. When the previous considerations have been addressed, the next course of action is to determine the equipment resources that are required to control the spill. The initial assessment will impact what equipment will be used, how it will be transported to the spill site and how it will improve or create access to the spill.

5.3 Spill Assessment (Water)

Begin by assessing the characteristics of the affected watercourse including width, depth and velocity. Shoreline characteristics and sensitivities also need to be taken into consideration. The degree of impact, degree of sensitivity (ecological, cultural, human use, etc.) and the physical limitations can all affect the way in which a spill will be contained. Note that there are no water bodies at the Site. Therefore, this section focuses on a spill potentially reaching the Mackenzie River.

In the absence of any current or wind, a spill on water bodies will spread out in all directions from the site of the spill until a uniform stable thickness is reached. If wind and/or current are present, the spill will move with the wind or current until it reaches the shoreline.

Wave action in the water body may also affect the spill causing oil-in-water or water-in-oil emulsions to form, making recovery and cleanup efforts more difficult.

The Site Supervisor will attempt to contain the spill to as small an area as possible and the water body near the spill source. Dispersion of the spill over a large area on the water body could cause widespread impacts when the spill reaches the shore. If the spill can be contained on the water body, the spilled material is moved toward shore for recovery.

Containment options for spills on water bodies may include the use a containment boom to surround the spill. If the area that may be impinged by the spilled materials is environmentally sensitive, appropriate shoreline protection measures may be implemented.

5.4 First Aid

First aid measures will vary based on the type of materials involved in the spill. It is recommended that personnel follow all chemical-specific instructions or call the Northwest Territories 24-Hour Spill Reporting Line for assistance. Refer to the chemical-specific safety data sheets (SDS) if skin contact, eye contact, inhalation, or ingestion should occur and follow the first aid procedure on the SDS. Information on poison control for hazardous chemicals ingested can be obtained by calling the Inuvik Regional Hospital at (867) 777-8000 or Tuktoyaktuk Regional Health Services at (867) 977-2321.

6.0 RESPONSE ACTIONS BY SPILL TYPE

6.1 Chemical Spills

The action plan laid out here is generally applicable to any chemical spill that the Project may encounter, but some chemicals may have special handling and disposal requirements. Refer to Workplace Hazardous Materials Information System (WHMIS) labels and SDSs for chemical-specific information.

6.1.1 Initial Action

In the event of a chemical spill, the following measures will be taken immediately:

- Determine the type of chemical;
- Evacuate unnecessary personnel;
- Ventilate area of leak or spill (opening all doors and windows);
- Wear PPE (gloves, safety glasses, impervious material long-sleeved shirt/coat);
- If available, wear respirator/self-contained breathing apparatus (SCBA);
- Remove all other chemicals from the area if safe to do so;
- For small spills, dilute with water, mop or wipe up and place in proper container;
- For large spills, contain by diking (soil/dry sand/kitty litter), absorb with inert material (soil/dry sand/kitty litter) and place in chemical waste container;
- After mopping up chemical, wash area well with soap and water, mopping into spill container and not to the ground;
- Do not use combustible materials (i.e., sawdust or cardboard);
- Contain runoff from spill clean-up; and
- Notify the NWT 24-Hour Spill Report Line at (867) 920-8130 to receive disposal information.

6.1.2 Follow-Up Action

After the spill has been cleaned up, other reporting, disposal, and follow-up activities may be required. The following measures will be taken if applicable:

- Contain chemical, inert absorbent material, and mop up water as directed by Spill Report Line personnel and applicable regulators; dispose of material off-site in Inuvik;
- Arrange for repair or replacement of chemical containers, and equipment, if damaged or leaking; and
- Submit a detailed report on the occurrence to the applicable regulatory agency within 30 days of reporting the spill event.

6.2 Antifreeze-Coolant, Diesel, Lube Oils, Propane, Grease and Aviation Fuel Spills

Petroleum product spills may range from minor spills during operations such as refueling, to constant leakage from tanks or equipment fuel lines in need of repair, to major spills causing contaminated soil/water issues.

Depending on the location of the spill, a petroleum product spill may result in contaminated soil or water. The contaminated material must be cleaned up and removed for disposal along with the spilled petroleum product.

Petroleum and antifreeze product spills can be handled in the same manner. Refer to workplace hazardous materials information system (WHMIS) labels and SDS for chemical-specific information.

6.2.1 Initial Action

In the event of a petroleum or antifreeze product spill, the following measures will be taken immediately:

- Shut off ignition sources, if safe to do so;
- Identify the spilled material and locate the source;
- Stop the spill at the source, if safe to do so;
- Take actions to contain/clean up spilled material;
- Record relevant information for reporting including the quantity of material spilled, product type, location, date, weather, and other relevant information; and
- Notify the NWT 24-Hour Spill Report Line at (867) 920-8130.

6.2.2 Follow-Up Action

After the initial clean-up and reporting procedures, other activities may be required such as reporting and disposal. The following measures will be taken if applicable:

- Collect soil samples for laboratory analysis to determine that spill has been cleaned up;
- Dispose of soil off-site in Inuvik;
- Arrange for repair or replacement of petroleum product containers, and equipment, if damaged or leaking;
- Submit a detailed report on the occurrence to the relevant regulatory agency within 30 days of reporting the event; and

- For large spills, install wells to monitor groundwater for signs of contamination. Determine the level of final clean-up in consultation with an Aboriginal Affairs and Northern Development Canada inspector.

6.3 Sewage

The transfer of sewage from the barge to the Inuvik sewage lagoon at the end of the season will be undertaken in a manner that will prevent spills. In the event of a spill the area of impact will be minimized and then cleaned up.

6.3.1 Preventative Action

- Personnel undertaking sewage transfers in Inuvik will be properly trained and aware of the potential concerns with this activity;
- All hoses and connections will be checked for condition and presence of potential leaks;
- The pump operator will remain at the pump for the duration of the transfer;
- The pump operator will have direct visual contact with the line and the receiving tank or will have constant radio contract with a spotter;
- A spotter will walk the line during the transfer looking for any leaks or signs of potential failure (bulges, etc.);
- If the spotter identifies any concerns, the pump will be shut down and the issue addressed;
- Drip trays or secondary containment will be used to prevent drips from entering the environment;
- Once the transfer is completed, the hoses will be emptied as much as possible. Then they will be carefully removed and handled to keep any remaining contents in the hose; and
- All connections, lids and caps will be made secure.

6.3.2 Initial Action

In the event of a sewage spill, the following measures will be taken immediately:

- Shut off ignition sources if methane gas is present (when safe to do so);
- Identify the spilled material and locate the source;
- Stop the spill at the source, if safe to do so;
- Take actions to contain/clean up spilled material;
- Record relevant information for reporting including the quantity of material spilled, product type, location, date, weather, and other relevant information; and
- If spill volume is above the recordable quantity (as per Appendix A), notify the NWT 24-Hour Spill Report Line at (867) 920-8130.

6.3.3 Follow-Up Action

After the initial clean-up and reporting procedures, other activities may be required such as reporting and disposal. The following measures will be taken if applicable:

- Load material onto barge, if spill did not occur in Inuvik, and dispose of sewage off-site in Inuvik in an appropriate manner; and
- Submit a detailed report (if required) on the occurrence to the applicable regulatory agency within 30 days of reporting the event.

7.0 RESOURCE INVENTORY

The following section provides details on the resources that will be available on the Site to aid in spill response. The procedures for handling, transporting and disposing, in Inuvik, of spill-related wastes are outlined in the Waste Management Plan. The Waste Management Plan will be implemented during all Project activities and its contents will be included in daily Health and Safety meetings with all staff and contractors.

7.1 On-Site Resources

A minimum of five spill kits will be located throughout the Site with contents described below. In addition, earth moving and other equipment is located at the Site at all times to assist with spill response (as listed below). Spill response equipment will be located inside all heavy equipment and vehicles used at the Site. Additional spill response equipment will be located at the fuel transfer location. Spill kits will be replenished throughout the program as required.

7.1.1 Spill Kit Contents

- 4 Tyvek splash suits;
- 4 pairs of chemical master gloves;
- 10 large bags with ties for temporary use;
- 2 oil only booms (5” x 10');
- 2 oil only floating booms (5” x 10');
- 50 oil only mats (16” x 20”);
- 5 sorbent socks;
- 10 sorbent pads;
- 2 large tarps;
- Roll(s) of duct tape;
- 1 utility knife;
- 1 field notebook and pencil;
- 1 rake;
- 1 pick axe;
- 3 aluminum scoop shovels; and
- 1 instruction binder.

7.1.2 Equipment Specific to Chemical Spills

A spill kit will be available at the Site to aid in the event of a chemical spill. The kit will include:

- Heavy-duty gloves;
- Safety glasses;
- Mop/wringer/spill squeegee;
- Shovel/broom/dustpan;
- Chemical spill container with sealable lid; and
- Sand/kitty litter (absorbent, non-flammable material).

Additionally, a 50-gallon Universal Sorbent Spill Kit will be provided, which includes:

- 10 socks (3" x 48");
- 4 socks (3" x 10');
- 50 pads (15" x 17");
- 4 pillows;
- 50 wipers;
- 5 disposal bags and ties;
- 5 tamperproof seals;
- 2 pairs of nitrile gloves; and
- 1 emergency response guidebook.

7.1.3 Equipment Specific to Antifreeze-Coolant, Diesel Fuel, Lube Oils, Propane, Grease and Aviation Fuel Spills

One spill kit will be on-hand at the fuel storage area. The kit will include:

- Chemical-resistant gloves;
- Safety glasses;
- Mop/wringer/spill squeegee;
- Shovel/broom/dustpan;
- Chemical spill container with sealable lid; and
- Sand/kitty litter (absorbent, non-flammable material).

Additionally, a 50-gallon Universal Sorbent Spill Kit will be provided with contents described in Section 7.1.2.

7.1.4 Equipment Specific to Sewage Transfer Spills

Two spill kits will be on-hand in the vicinity of the sewage transfer with one kit near each end of the transfer. The kits will include:

- Heavy-duty gloves;
- Safety glasses;
- Mop/wringer/spill squeegee;
- Shovel/broom/dustpan; and
- Sand/kitty litter (absorbent, non-flammable material).

Additionally, a 50-gallon Universal Sorbent Spill Kit will be provided with contents described in Section 7.1.2.

7.1.5 Earth Moving and Other Equipment

It is anticipated that the following equipment will be available on the Site:

- 1 loader;
- 1 excavator;
- 1 Mobile Augers M5T Drill Rig;
- 1 emergency boat;
- Fuel transfer hoses with pumps; and
- 1 Service truck with toolbox.

7.2 Off-Site Resources

Spill response contact numbers are provided in Table 1.

8.0 SPILL RESPONSE TRAINING

The Project is committed to ensuring that all personnel involved in spill response activities fully understand their roles and the roles of others with whom they may interact during an incident. To meet this commitment and to ensure personnel respond effectively, training activities will include:

8.1 Orientation

- Provide all Site personnel with an orientation of the Project's Spill Contingency Plan and its applicable elements;
- Discuss and clarify bridging between Golder's emergency response procedures and this Project Spill Contingency Plan, where applicable;
- Utilize summary wall charts outlining key responsibilities and lines of communication for quick reference purposes; and
- Devote a portion of scheduled safety and/or staff meetings to discussion of spill response issues on an ongoing basis.

8.2 Spill Response Drills

Golder will conduct a minimum of one monthly spill response drill to ensure the readiness of the project team.

8.3 External Orientation

As appropriate, brief and familiarize all external groups or agencies having a role in this Plan and define their specific responsibilities under the Plan.

8.4 Training Records

The Golder Site Supervisor will be tracking all training requirements and compliance utilizing a spreadsheet. Training records will be reviewed by Golder prior to mobilization.

9.0 REPORTING REQUIREMENTS

As outlined in Section 3.2, all spills, regardless of quantity, will be reported to the Site Supervisor and the Shell Project Manager. Spills to be reported include spills that have already occurred, or potential spills that are about to occur. Spills must be reported if the amount is greater than or equal to the amount listed in the spill response thresholds (Appendix A). The spill response thresholds for a wide variety of materials, compounds, and liquids are provided by the Spill Contingency Planning and Reporting Regulations under the *Environmental Protection Act* (1988) and are provided in Appendix A.

In accordance with the Spill Contingency Planning and Reporting Regulations, any reportable spill will be reported immediately to the 24-Hour Spill Report Line at (867) 920-8130. The following details will be provided (if possible):

- Date and time of spill;
- Location of spill;
- Direction spill is moving;
- Name and phone number of a contact person close to the location of spill;
- Type and quantity of contaminant spilled and cause of spill;
- Whether spill is continuing or has been stopped;
- Description of existing containment;
- Actions taken to contain, recover, clean-up and dispose of the contaminant; and
- Name and phone number of the person reporting the spill and the person in charge or control of contaminants at time of spill.

A detailed report on the occurrence must also be submitted within 30 days of the event. An NT/NU Spill Report Form is included at the back of this Plan (Appendix B).

In the very unlikely event that the public may be affected by a spill, the Golder Project Manager will inform Shell of the nature and size of the spill.

10.0 SAFETY DATA SHEETS

SDS have been provided in Appendix C for the materials outlined in Section 2. It should be noted that the documents in Appendix C still use the previous name “Material Safety Data Sheets” (MSDS) but are referred to by their current official name (SDS). These SDS are presented for informational purposes only and should not be used for WHMIS purposes. SDS from the actual vendors will be acquired and maintained for WHMIS compliance and, if applicable, will replace the sheets in this Plan.

The list of contaminants presented above is not intended to be a comprehensive list of potential contaminants the Project might face but is merely to present the common contaminants that may be encountered on a regular basis.

11.0 STATEMENT OF LIMITATIONS

This report was prepared for the exclusive use of Shell Canada Limited. The report, which specifically includes all tables and figures, is based on data and information provided by Shell as described in this report. However, it is never possible, even with exhaustive sampling and testing, to dismiss the possibility that part of a site may be contaminated and remain undetected.

The services performed as described in this report were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services. Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The content of this report is based on information collected during our investigation, our present understanding of the Site conditions, and our professional judgment in light of such information at the time of this report. This report provides a professional opinion and therefore no warranty is expressed, implied, or made as to the conclusions, advice and recommendations offered in this report. This report does not provide a legal opinion regarding compliance with applicable laws.

With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statues are subject to change. The findings and conclusions of this report are valid only as of the date of this report. If new information is discovered in future work, including excavations, borings, or other studies, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

Signature Page

Golder Associates Ltd.

Aurélie Bellavance, P.Eng., PMP
Project Manager

Lenz Haderlein, M.Sc.
Project Director

AB/LH/pt

APPENDIX A

Spill Response Threshold

Spill Response Threshold

Immediately Reportable Spill Quantities

Substance for NWT 24 hour Spill Line	Immediately Reportable Quantities
Explosives Compressed gas (toxic/corrosive) Infectious substance Sewage and Wastewater (unless otherwise authorized) Radioactive materials Unknown substance	Any amount
Compressed gas (Flammable) Compressed gas (non-corrosive, non-flammable)	Any amount of gas from containers with a capacity grater than 100 L
Flammable liquid	≥100 L
Flammable solid Substances liable to spontaneous combustion Water reactant substances	≥ 25 kilogram (kg)
Oxidizing substances	≥ 50 L or 50 kg
Organic peroxides Environmentally hazardous substances intended for disposal	≥1 L or 1 kg
Toxic substances	≥ 5 L or 5 kg
Corrosive substances Miscellaneous products, substances or organisms	≥ 5 L or 5 kg
Polychlorinated biphenyl (PCB) mixtures of 5 or more parts per million (ppm)	≥ 0.5 L or 0.5 kg
Other contaminants--for example, crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, wastewater.	≥ 100 L or 100 kg
Sour natural gas (i.e., contains H_2S) Sweet natural gas	Uncontrolled release or sustained flow of 10 minutes or more
Flammable liquid Vehicle fluid	≥ 20 L When released on a frozen water body that is being used as a working surface

In addition, all releases of harmful substances, regardless of quantity, are to be reported to the NWT spill line if the release is near or into a water body, is near or into a designated sensitive environment or habitat, poses an imminent threat to human health or safety, or poses an imminent threat to a listed species at risk or its critical habitat.

APPENDIX B

NT/NU Spill Response 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: MM DD YY	Report Time:	☐ Original Spill Report **OR** ☐ Update # _____ to the Original Spill Report	**Report Number:**
B	Occurrence Date: MM DD YY	Occurrence Time:		
C	Land Use Permit Number (if applicable):		Water Licence Number (if applicable):	
D	Geographic Place Name or Distance and Direction from the Named Location:		Region: ☐ NT ☐ Nunavut ☐ Adjacent Jurisdiction or Ocean	
E	Latitude: _____ Degrees _____ Minutes _____ Seconds		Longitude: _____ Degrees _____ Minutes _____ Seconds	
F	Responsible Party or Vessel Name:		Responsible Party Address or Office Location:	
G	Any Contractor Involved:		Contractor Address or Office Location:	
H	Product Spilled: ☐ Potential Spill	Quantity in Litres, Kilograms or Cubic Metres:	U.N. Number:	
I	Spill Source:	Spill Cause:	Area of Contamination in Square Metres:	
J	Factors Affecting Spill or Recovery:	Describe Any Assistance Required:	Hazards to Persons, Property or Environment:	
K	Additional Information, Comments, Actions Proposed or Taken to Contain, Recover or Dispose of Spilled Product and Contaminated Materials:			

L	Reported to Spill Line by:	Position:	Employer:	Location Calling From:	Telephone:
M	Any Alternate Contact:	Position:	Employer:	Alternate Contact Location:	Alternate Telephone:

REPORT LINE USE ONLY

N	Received at Spill Line by:	Position:	Employer:	Location Called:	Report Line Number:

Lead Agency: ☐ EC ☐ CCG/TCMSS ☐ GNWT ☐ GN ☐ ILA ☐ AANDC ☐ NEB ☐ Other: _____

Significance: ☐ Minor ☐ Major ☐ Unknown

File Status: ☐ Open ☐ Closed

Agency:	**Contact Name:**	**Contact Time:**	**Remarks:**
Lead Agency:			
First Support Agency:			
Second Support Agency:			
Third Support Agency:			

APPENDIX C

Safety Data Sheets

SAFETY DATA SHEET
According to the Hazardous Products Regulations
Ethylene Glycol Antifreeze Grade

Version	Revision Date:	SDS Number:	Print Date: 2021-09-29
5.3	2021-09-22	800001009853	Date of last issue: 09.07.2021
			Date of first issue: 21.10.2003

SECTION 1. IDENTIFICATION

Product name : Ethylene Glycol Antifreeze Grade

Product code : U1281, U1293, U1296

Manufacturer or supplier's details

Manufacturer/Supplier : **Shell Chemicals Canada**
PO Box 4280 STN C
CALGARY AB T2T 5Z5
Canada

Telephone : 1-855-697-4355

Telefax : 1-866-213-7508

Emergency telephone number

CHEMTREC (24 hr) : 1-800-424-9300

Recommended use of the chemical and restrictions on use

Recommended use : Chemical intermediate.

Restrictions on use : This product must not be used in applications other than the above without first seeking the advice of the supplier.

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Acute toxicity (Oral) : Category 4

Specific target organ toxicity - repeated exposure : Category 2 (Kidney)

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : PHYSICAL HAZARDS:
Not classified as a physical hazard under GHS criteria.
HEALTH HAZARDS:
H302 Harmful if swallowed.
H373 May cause damage to organs (Kidney) through prolonged

or repeated exposure.
ENVIRONMENTAL HAZARDS:
Not classified as an environmental hazard under GHS criteria.

Precautionary statements : **Prevention:**
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
Response:
P301 + P312 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell.
P330 Rinse mouth.
P314 Get medical advice/ attention if you feel unwell.
Storage:
No precautionary phrases.
Disposal:
P501 Dispose of contents and container to appropriate waste site or reclaimer in accordance with local and national regulations.

Other hazards which do not result in classification
Inhalation of vapours or mists may cause irritation to the respiratory system.
Slightly irritating to respiratory system.
Slightly irritating to the skin.
Slightly irritating to the eye.
Vapours may be irritating to the eye.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Substance name : Ethylene Glycol Antifreeze Grade

Hazardous components

Chemical name	CAS-No.	Concentration (% w/w)
ethanediol	107-21-1	90 - 100
Diethylene glycol	111-46-6	0 - 10

SECTION 4. FIRST-AID MEASURES

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

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

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

In case of eye contact	:	Flush eye with copious quantities of water. Remove contact lenses, if present and easy to do. Continue rinsing. If persistent irritation occurs, obtain medical attention.
If swallowed	:	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. Rinse mouth.
Most important symptoms and effects, both acute and delayed	:	Kidney toxicity may be recognized by blood in the urine or increased or decreased urine flow. Other signs and symptoms can include nausea, vomiting, abdominal cramps, diarrhoea, lumbar pain shortly after ingestion, and possibly narcosis and death. Not considered to be an inhalation hazard under normal conditions of use. Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing. No specific hazards under normal use conditions. Skin irritation signs and symptoms may include a burning sensation, redness, or swelling. Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision. Ingestion may result in nausea, vomiting and/or diarrhoea.
Protection of first-aiders	:	When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.
Notes to physician	:	Call a doctor or poison control center for guidance. Treat symptomatically. May cause significant renal, respiratory, and CNS toxicity. May cause significant acidosis. The preferred treatment is immediate transportation to a medical facility and use of appropriate treatment including possible administration of activated charcoal, gastric lavage and or gastric aspiration. If none of the above are immediately available and a delay of more than one hour is anticipated before such medical attention can be obtained, induction of vomiting may be appropriate using IPECAC syrup (Contraindicated if there are any signs of CNS depression). This should be considered on a case by case basis following specialist advice. Specific other treatments may include ethanol therapy, fomepizole, treatment of acidosis and haemodialysis. Seek specialist advice without delay.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Alcohol-resistant foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires

only.

Unsuitable extinguishing media	:	Do not use water in a jet.
Specific hazards during fire-fighting	:	Material will not burn unless preheated. Carbon monoxide may be evolved if incomplete combustion occurs. Containers exposed to intense heat from fires should be cooled with large quantities of water.
Specific extinguishing methods	:	Standard procedure for chemical fires.
Further information	:	Evacuate the area of all non-essential personnel. Keep adjacent containers cool by spraying with water.
Special protective equipment for firefighters	:	Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Observe all relevant local and international regulations. 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. Avoid contact with skin, eyes and clothing.
Environmental precautions	:	Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers. Use appropriate containment to avoid environmental contamination. Ventilate contaminated area thoroughly.
Methods and materials for containment and cleaning up	:	Contain run-off from residue flush and dispose of properly. Soak up residue with an absorbent such as clay, sand or other suitable material. For small liquid spills (< 1 drum), transfer by mechanical means to a labeled, 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

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

SECTION 7. HANDLING AND STORAGE

General Precautions : Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this 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.
Ensure that all local regulations regarding handling and storage facilities are followed.

Advice on safe handling : Use local exhaust extraction over processing area.
Handle and open container with care in a well-ventilated area.
Do not empty into drains.
When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
Handling Temperature:
Ambient.

Avoidance of contact : Strong oxidising agents.
Strong acids.
Strong bases.

Product Transfer : Keep containers closed when not in use. Do not pressurize drum containers to empty.

Storage

Conditions for safe storage : Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.

Other data : Tanks must be clean, dry and rust-free.
Keep container tightly closed.
Must be stored in a diked (bunded) well- ventilated area, away from sunlight, ignition sources and other sources of heat.
Cleaning, inspection and maintenance of storage tanks is a specialist operation, which requires the implementation of strict procedures and precautions.
Drums should be stacked to a maximum of 3 high.
Storage Temperature:
Ambient.

Packaging material	:	Suitable material: Stainless steel., Mild steel., Carbon steel Unsuitable material: Data not available
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.
Specific use(s)	:	Not applicable Ensure that all local regulations regarding handling and storage facilities are followed.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
ethanediol	107-21-1	TWA (Vapour)	25 ppm	ACGIH
		STEL (Vapour)	50 ppm	ACGIH
		STEL (Inhalable fraction, Aerosol only)	10 mg/m3	ACGIH

Contains no components with occupational exposure limit values.

Biological occupational exposure limits

No biological limit allocated.

Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.
Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.
National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods http://www.cdc.gov/niosh/
Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/
Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances http://www.hse.gov.uk/
Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA) , Germany http://www.dguv.de/inhalt/index.jsp
L'Institut National de Recherche et de Securité, (INRS), France http://www.inrs.fr/accueil

Engineering measures : Adequate ventilation to control airborne concentrations.
Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
Eye washes and showers for emergency use.
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:

General Information:
Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned.
Practice good housekeeping.
Define procedures for safe handling and maintenance of controls.
Educate and train workers in the hazards and control measures relevant to normal activities associated with this product.
Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation.
Drain down system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or subsequent recycle.

Personal protective equipment

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.
If air-filtering respirators are suitable for conditions of use:
Select a filter suitable for the combination of organic gases and vapours and particles [Type A/Type P boiling point >65°C (149°F)].

Hand protection
Remarks : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection. Longer term protection: Nitrile

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

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

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

Thermal hazards : Not applicable

Protective measures : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
The following information, while appropriate for the product is general in nature. The selection of Personal Protective Equipment will vary depending on the conditions of use.

Hygiene measures : Wash hands before eating, drinking, smoking and using the toilet.
Launder contaminated clothing before re-use.

Environmental exposure controls

General advice : Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.
Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.
Information on accidental release measures are to be found in section 6.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Slightly viscous liquid.
Colour	:	colourless
Odour	:	mild
Odour Threshold	:	25 ppm
pH	:	Not applicable
Melting / freezing point	:	-13 °C / 9 °F
Boiling point/boiling range	:	190 - 240 °C / 374 - 464 °F
Flash point	:	121 °C / 250 °F Method: ASTM D-93 / PMCC
Evaporation rate	:	0.01 Method: ASTM D 3539, nBuAc=1
Flammability (solid, gas)	:	Not applicable
Upper explosion limit	:	28 %(V)
Lower explosion limit	:	3.2 %(V)
Vapour pressure	:	< 10 Pa (20 °C / 68 °F)
Relative vapour density	:	Data not available
Relative density	:	1.115 Method: ASTM D4052
Density	:	Typical 1,113 kg/m3 (20 °C / 68 °F)Method: ASTM D4052
Solubility(ies)		
Water solubility	:	completely soluble
Partition coefficient: n-octanol/water	:	log Pow: -1.93 (20 °C / 68 °F) Data not available
Auto-ignition temperature	:	Data not available
Decomposition temperature	:	Data not available
Viscosity		
Viscosity, dynamic	:	Data not available

Viscosity, kinematic	:	26 mm2/s (20 °C / 68 °F) Method: ASTM D445
Explosive properties	:	Not applicable
Oxidizing properties	:	Not applicable
Surface tension	:	Data not available
Conductivity	:	Data not available
Molecular weight	:	62 g/mol

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.
Chemical stability	:	No hazardous reaction is expected when handled and stored according to provisions Oxidises on contact with air.
Possibility of hazardous reactions	:	None known.
Conditions to avoid	:	Extremes of temperature and direct sunlight. Product cannot ignite due to static electricity.
Incompatible materials	:	Strong oxidising agents. Strong acids. Strong bases.
Hazardous decomposition products	:	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.

SECTION 11. TOXICOLOGICAL INFORMATION

Basis for assessment : Information given is based on product testing.

Information on likely routes of exposure
Skin and eye contact are the primary routes of exposure although exposure may occur through inhalation or following accidental ingestion.

Acute toxicity

Components:

ethanediol:

Acute oral toxicity : LD 50 (Rat, male and female): > 2,000 mg/kg
Method: Acceptable non-standard method.
Remarks: Harmful if swallowed.
There is a marked difference in acute oral toxicity between rodents and man, man being more susceptible than rodents.
The estimated fatal dose for man is 100 milliliters (1/2 cup).
This material has also been shown to be toxic and potentially lethal by ingestion to cats and dogs.

Acute inhalation toxicity : LC 50 (Rat, male and female): > 2.5 mg/l
Exposure time: 6 h
Test atmosphere: Aerosol
Method: Literature data
Remarks: LC50 > 1.0 - <= 5.0 mg/l
LC50 greater than near-saturated vapour concentration.
Based on available data, the classification criteria are not met.

Acute dermal toxicity : LD 50 (Mouse, male and female): > 2,000 mg/kg
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.

Diethylene glycol:

Acute oral toxicity : LD 50 (Rat, male and female): > 5,000 mg/kg
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.
There is a marked difference in acute oral toxicity between rodents and man, man being more susceptible than rodents.
The estimated fatal dose for man is 100 milliliters (1/2 cup).
This material has also been shown to be toxic and potentially lethal by ingestion to cats and dogs.

Acute inhalation toxicity : LC 50 (Rat): > 1 -<= 5 mg/l
Exposure time: 4 h
Test atmosphere: Aerosol
Method: Literature data
Remarks: LC50 greater than near-saturated vapour concentration.
Based on available data, the classification criteria are not met.

Acute dermal toxicity : LD 50 (Rabbit): > 2,000 mg/kg
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.

Skin corrosion/irritation

Components:

ethanediol:
Species: Rabbit
Method: Acceptable non-standard method.

Remarks: Slightly irritating to skin.
Insufficient to classify.

Diethylene glycol:
Species: Rabbit
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.

Serious eye damage/eye irritation

Components:

ethanediol:
Species: Rabbit
Method: Acceptable non-standard method.
Remarks: Slightly irritating to the eye.
Insufficient to classify.

Diethylene glycol:
Species: Rabbit
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation

Components:

ethanediol:
Species: Guinea pig
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.

Diethylene glycol:
Species: Guinea pig
Method: Tested according to Annex V of Directive 67/548/EEC.
Remarks: Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Components:

ethanediol:

Genotoxicity in vitro	:	Method: OECD Test Guideline 471 Remarks: Based on data from similar materials
	:	Method: Acceptable non-standard method. Remarks: Based on data from similar materials
	:	Method: Literature data Remarks: Based on data from similar materials
Genotoxicity in vivo	:	Species: Rat Method: Literature data Remarks: Based on available data, the classification criteria

are not met.

Germ cell mutagenicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Diethylene glycol:
Genotoxicity in vitro : Method: OECD Test Guideline 471
Remarks: Based on available data, the classification criteria are not met.

: Method: OECD Test Guideline 473
Remarks: Based on available data, the classification criteria are not met.

: Method: OECD Test Guideline 479
Remarks: Based on available data, the classification criteria are not met.

Genotoxicity in vivo : Species: Mouse
Method: OECD Test Guideline 474
Remarks: Based on available data, the classification criteria are not met.

Germ cell mutagenicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Carcinogenicity

Components:

ethanediol:
Species: Mouse, (male and female)
Application Route: Oral
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.

Carcinogenicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Diethylene glycol:
Species: Rat, (male and female)
Application Route: Oral
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.
Tumours produced in animals are not considered relevant to humans.

Carcinogenicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

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

OSHA No component of this product present at levels greater than or

equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Components:

ethanediol:

Effects on fertility :
Species: Rat
Sex: male and female
Application Route: Oral

Method: Literature data
Remarks: Based on available data, the classification criteria are not met.

Effects on foetal development : Species: Rat, male and female
Application Route: Oral
Method: Literature data
Remarks: Based on available data, the classification criteria are not met.
Causes foetotoxicity in animals; considered to be secondary to maternal toxicity.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Diethylene glycol:

Effects on fertility :
Species: Mouse
Sex: male and female
Application Route: Oral

Method: Acceptable non-standard method.
Remarks: Based on available data, the classification criteria are not met.

Effects on foetal development : Species: Rabbit, female
Application Route: Oral
Method: OECD Test Guideline 414
Remarks: Based on available data, the classification criteria are not met.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

STOT - single exposure

Components:

ethanediol:
Remarks: Inhalation of vapours or mists may cause irritation to the respiratory system.
Based on available data, the classification criteria are not met.
Ingestion may cause drowsiness and dizziness.

Diethylene glycol:
Remarks: Based on available data, the classification criteria are not met.
Inhalation of vapours or mists may cause irritation to the respiratory system.
Ingestion may cause drowsiness and dizziness.

STOT - repeated exposure

Components:

ethanediol:
Exposure routes: Oral
Target Organs: Kidney
Remarks: May cause damage to organs or organ systems through prolonged or repeated exposure.

Diethylene glycol:
Remarks: Based on available data, the classification criteria are not met.

Repeated dose toxicity

Components:

ethanediol:
Species: Rat, male
Application Route: Oral
Method: Test(s) equivalent or similar to OECD Test Guideline 408
Target Organs: Kidney

Diethylene glycol:
Species: Rat, male and female
Application Route: Oral
Method: Acceptable non-standard method.
Target Organs: No specific target organs noted

Species: Dog, male
Application Route: Dermal
Method: OECD Test Guideline 410
Target Organs: No specific target organs noted

Aspiration toxicity

Components:

ethanediol:
Based on available data, the classification criteria are not met.

Diethylene glycol:
Based on available data, the classification criteria are not met.

Further information

Components:

ethanediol:
Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

Diethylene glycol:
Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

SECTION 12. ECOLOGICAL INFORMATION

Basis for assessment : Information given is based on product testing.

Ecotoxicity

Components:

ethanediol:

Toxicity to fish (Acute toxicity) : LC50 (Pimephales promelas (fathead minnow)): 72,860 mg/l
Exposure time: 96 h
Method: Other guideline method.
Remarks: Practically non toxic:
LC/EC/IC50 > 100 mg/l

Toxicity to crustacean (Acute toxicity) : EC50 (Daphnia magna (Water flea)): > 100 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202
Remarks: Practically non toxic:
LC/EC/IC50 > 100 mg/l

Toxicity to algae/aquatic plants (Acute toxicity) : EC50 (Pseudokirchneriella subcapitata (algae)): 6,500 - 13,000 mg/l
Exposure time: 96 h
Method: Other guideline method.
Remarks: Practically non toxic:
LC/EC/IC50 > 100 mg/l

Toxicity to fish (Chronic toxicity) : NOEC (Pimephales promelas (fathead minnow)): 15,380 mg/l
Exposure time: 7 d
Method: Other guideline method.
Remarks: NOEC/NOEL > 100 mg/l

Toxicity to crustacean(Chronic toxicity) : NOEC (Chironomus sp. (midge)): 8,590 mg/l
Exposure time: 7 d
Method: Other guideline method.
Remarks: NOEC/NOEL > 100 mg/l

Toxicity to bacteria : EC20 (Activated sludge, domestic waste): > 1,995 mg/l
Exposure time: 0.5 h
Method: Other guideline method.
Remarks: Practically non toxic:
LC/EC/IC50 > 100 mg/l

Diethylene glycol:

Toxicity to fish (Acute toxicity)	:	LC50 (Pimephales promelas (fathead minnow)): 75,200 mg/l Exposure time: 96 h Method: Literature data. Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to crustacean (Acute toxicity)	:	EC50 (Daphnia magna (Water flea)): > 10,000 mg/l Exposure time: 24 h Method: Other guideline method. Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	EC50 (Scenedesmus quadricauda (Green algae)): 2,700 mg/l Exposure time: 192 h Method: Information given is based on data obtained from similar substances. Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to fish (Chronic toxicity)	:	NOEC (Pimephales promelas (fathead minnow)): 15,380 mg/l Exposure time: 7 d Method: Other guideline method. Remarks: NOEC/NOEL > 100 mg/l
Toxicity to crustacean(Chronic toxicity)	:	NOEC (Ceriodaphnia dubia (Water flea)): 8,590 mg/l Exposure time: 7 d Method: Other guideline method. Remarks: NOEC/NOEL > 100 mg/l
Toxicity to bacteria	:	EC20 (Activated sludge, domestic waste): > 1,995 mg/l Exposure time: 0.5 h Method: Other guideline method. Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l

Persistence and degradability

Components:

ethanediol:

Biodegradability	:	Biodegradation: 90 - 100 % Exposure time: 10 d Method: OECD Test Guideline 301A Remarks: Readily biodegradable. Not Persistent per IMO criteria. International Oil Pollution Compensation (IOPC) Fund definition: “A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distills at a temperature of 340ºC (645ºF) and (b) at least 95% of which, by volume, distils at a temperature of 370ºC (700ºF) when tested by the ASTM Method D-86/78 or any subsequent revision thereof."

Diethylene glycol:

Biodegradability : Biodegradation: 70 - 80 %
Exposure time: 28 d
Method: OECD Test Guideline 301B
Remarks: Readily biodegradable.
Oxidises rapidly by photo-chemical reactions in air.

Bioaccumulative potential

Partition coefficient: n-octanol/water : log Pow: -1.93 (20 °C)
Remarks: Data not available

Components:

ethanediol:

Bioaccumulation : Remarks: Does not have the potential to bioaccumulate significantly.

Diethylene glycol:

Bioaccumulation : Remarks: Does not bioaccumulate significantly.

Mobility in soil

Components:

ethanediol:

Mobility : Remarks: Disperses in water.
If product enters soil, one or more constituents will be highly mobile and may contaminate groundwater.

Diethylene glycol:

Mobility : Remarks: If the product enters soil, one or more constituents will or may be mobile and may contaminate groundwater.
Dissolves in water.

Other adverse effects

Components:

ethanediol:

Results of PBT and vPvB assessment : The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

Additional ecological information : Does not have ozone depletion potential.

Diethylene glycol:

Results of PBT and vPvB assessment : The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

Additional ecological infor- : Data not available

mation

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : 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.
Remove all packaging for recovery or waste disposal.
Waste product should not be allowed to contaminate soil or ground water, or be disposed of into the environment.
Do not dispose of tank water bottoms by allowing them to drain into the ground. This will result in soil and groundwater contamination.
Do not dispose into the environment, in drains or in water courses
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.

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.

MARPOL - see International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which provides technical aspects at controlling pollutions from ships.

Contaminated packaging : Dispose in accordance with prevailing regulations, preferably to a recognized collector or contractor. The competence of the collector or contractor should be established beforehand.

SECTION 14. TRANSPORT INFORMATION

National Regulations

TDG
Not regulated as a dangerous good

International Regulations

IATA-DGR
Not regulated as a dangerous good

IMDG-Code
Not regulated as a dangerous good

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

Pollution category	:	Z
Ship type	:	3
Product name	:	Ethylene glycol

Special precautions for user

Remarks	:	Special Precautions: Refer to Section 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.
Additional Information	**:**	This product may be transported under nitrogen blanketing. Nitrogen is an odourless and invisible gas. Exposure to nitrogen enriched atmospheres displaces available oxygen which may cause asphyxiation or death. Personnel must observe strict safety precautions when involved with a confined space entry.

SECTION 15. REGULATORY INFORMATION

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

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

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

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

AICS	:	Listed
DSL	:	Listed
IECSC	:	Listed
ENCS	:	Listed
KECI	:	Listed
NZIoC	:	Listed
PICCS	:	Listed
TSCA	:	Listed

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR -

Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

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

Sources of key data used to compile the Safety Data Sheet	:	The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).
Revision Date	:	2021-09-22

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

CA / EN

Shell Diesel

Viva Energy Australia (Shell Licensee)

Chemwatch Hazard Alert Code: **2**

Chemwatch: **20814**
Version No: **3.1.1.1**
Material Safety Data Sheet according to NOHSC and ADG requirements

Issue Date: **11/01/2019**
Print Date: **01/16/2020**
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SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	Shell Diesel
Synonyms	Not Available
Proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (contains diesel)
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Fuel for diesel engines used in both on-road and off-road applications.

Details of the supplier of the safety data sheet

Registered company name	**Viva Energy Australia (Shell Licensee)**
Address	Shell House, 562 Wellington Street Perth WA 6000 Australia
Telephone	+61 8 9338 6600
Fax	+61 1300 556 503
Website	http://www.shell.com.au/
Email	SAA-Aviation-Bulk-Fuels-Orders@shell.com

Emergency telephone number

Association / Organisation	**Viva Energy Australia (Shell Licensee)**
Emergency telephone numbers	1300 735 793
Other emergency telephone numbers	Not Available

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

HAZARDOUS SUBSTANCE. DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

COMBUSTIBLE LIQUID, regulated for storage purposes only

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability	1		
Toxicity	1		
Body Contact	2		
Reactivity	1		
Chronic	2		

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme

Poisons Schedule	S5
Risk Phrases [1]	**R38** Irritating to skin.
	R40(3) Limited evidence of a carcinogenic effect.
	R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
	R65 HARMFUL-May cause lung damage if swallowed.
	R66 Repeated exposure may cause skin dryness and cracking.

Continued...

	R67	Vapours may cause drowsiness and dizziness.
Legend:	*1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI*	

Relevant risk statements are found in section 2

Indication(s) of danger	Xn

SAFETY ADVICE

S02	Keep out of reach of children.
S13	Keep away from food, drink and animal feeding stuffs.
S23	Do not breathe gas/fumes/vapour/spray.
S29	Do not empty into drains.
S35	This material and its container must be disposed of in a safe way.
S36	Wear suitable protective clothing.
S37	Wear suitable gloves.
S40	To clean the floor and all objects contaminated by this material, use water and detergent.
S46	If swallowed, seek medical advice immediately and show this container or label.
S53	Avoid exposure - obtain special instructions before use.
S56	Dispose of this material and its container at hazardous or special waste collection point.
S57	Use appropriate container to avoid environmental contamination.
S61	Avoid release to the environment. Refer to special instructions/Safety data sheets.
S64	If swallowed, rinse mouth with water (only if the person is conscious).

Other hazards

Inhalation, skin contact and/or ingestion may produce health damage*.

Cumulative effects may result following exposure*.

May produce discomfort of the eyes and respiratory tract*.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
68334-30-5	>95	diesel
68990-52-3	0-5	fatty acids, vegetable oil, methyl esters

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: ▸ Wash out immediately with fresh running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin contact occurs: ▸ Immediately remove all contaminated clothing, including footwear. ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation.

Continued...

Inhalation	▸ If fumes or combustion products are inhaled remove from contaminated area. ▸ Lay patient down. Keep warm and rested. ▸ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▸ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▸ Transport to hospital, or doctor.
Ingestion	▸ If swallowed do **NOT** induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice. ▸ Avoid giving milk or oils. ▸ Avoid giving alcohol. ▸ If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

Indication of any immediate medical attention and special treatment needed

For acute or short term repeated exposures to petroleum distillates or related hydrocarbons:

- Primary threat to life, from pure petroleum distillate ingestion and/or inhalation, is respiratory failure.
- Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnoea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO2 50 mm Hg) should be intubated.
- Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
- A chest x-ray should be taken immediately after stabilisation of breathing and circulation to document aspiration and detect the presence of pneumothorax.
- Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitisation to catecholamines. Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
- Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients. [Ellenhorn and Barceloux: Medical Toxicology]

Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours. Treat symptomatically.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▸ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Advice for firefighters

Fire Fighting	▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Wear breathing apparatus plus protective gloves. ▸ Prevent, by any means available, spillage from entering drains or water course. ▸ Use water delivered as a fine spray to control fire and cool adjacent area.
Fire/Explosion Hazard	▸ Combustible. ▸ Slight fire hazard when exposed to heat or flame. ▸ Heating may cause expansion or decomposition leading to violent rupture of containers. ▸ On combustion, may emit toxic fumes of carbon monoxide (CO). Combustion products include: carbon dioxide (CO_2) other pyrolysis products typical of burning organic material.
HAZCHEM	•3Z

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Continued...

Minor Spills

Environmental hazard - contain spillage.
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact with the substance, by using protective equipment.

Major Spills

Environmental hazard - contain spillage.
Chemical Class: aliphatic hydrocarbons
For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
LAND SPILL - SMALL				
cross-linked polymer - particulate	1	shovel	shovel	R, W, SS
cross-linked polymer - pillow	1	throw	pitchfork	R, DGC, RT
wood fiber - pillow	2	throw	pitchfork	R, P, DGC, RT
treated wood fibre- pillow	2	throw	pitchfork	DGC, RT
sorbent clay - particulate	3	shovel	shovel	R, I, P
foamed glass - pillow	3	throw	pitchfork	R, P, DGC, RT
LAND SPILL - MEDIUM				
cross-linked polymer - particulate	1	blower	skiploader	R,W, SS
cross-linked polymer - pillow	2	throw	skiploader	R, DGC, RT
sorbent clay - particulate	3	blower	skiploader	R, I, P
polypropylene - particulate	3	blower	skiploader	W, SS, DGC
expanded mineral - particulate	4	blower	skiploader	R, I, W, P, DGC
polypropylene - mat	4	throw	skiploader	DGC, RT

Legend
DGC: Not effective where ground cover is dense
R; Not reusable
I: Not incinerable
P: Effectiveness reduced when rainy
RT:Not effective where terrain is rugged
SS: Not for use within environmentally sensitive sites
W: Effectiveness reduced when windy
Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;
R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988
Moderate hazard.
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling

- Containers, even those that have been emptied, may contain explosive vapours.
- Do NOT cut, drill, grind, weld or perform similar operations on or near containers.
- **DO NOT** allow clothing wet with material to stay in contact with skin
- Electrostatic discharge may be generated during pumping - this may result in fire.
- Ensure electrical continuity by bonding and grounding (earthing) all equipment.
- Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<=1 m/sec until fill pipe submerged to twice its diameter, then <= 7 m/sec).
- Avoid splash filling.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.

Other information

- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.

Continued...

Conditions for safe storage, including any incompatibilities

Suitable container	▸ Metal can or drum ▸ Packaging as recommended by manufacturer. ▸ Check all containers are clearly labelled and free from leaks.
Storage incompatibility	▸ Avoid reaction with oxidising agents

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
diesel	Diesel fuels; (inlcudes diesel fuel No. 4 (68476-31-3), fuel oil No.2 (68476-30-2), fuel oil residual (68476-33-5)	300 mg/m3	3,300 mg/m3	20,000 mg/m3

Ingredient	Original IDLH	Revised IDLH
diesel	Not Available	Not Available
fatty acids, vegetable oil, methyl esters	Not Available	Not Available

OCCUPATIONAL EXPOSURE BANDING

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
diesel	E	≤ 0.1 ppm
Notes:	*Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.*	

MATERIAL DATA

NOTE H: Special requirements exist in relation to classification and labelling of this substance. This note applies to certain coal- and oil -derived substances and to certain entries for groups of substances in Annex VI. European Union (EU) List of harmonised classification and labelling hazardous substances, Table 3.1, Annex VI, Regulation (EC) No 1272/2008 (CLP) - up to the latest ATP
NOTE N: The classification as a carcinogen need not apply if the full refining history is known and it can be shown that the substance from which it is produced is not a carcinogen. This note applies only to certain complex oil-derived substances in Annex VI.
European Union (EU) List of harmonised classification and labelling hazardous substances, Table 3.1, Annex VI, Regulation (EC) No 1272/2008 (CLP) - up to the latest ATP

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.
Personal protection	
Eye and face protection	▸ Safety glasses with side shields. ▸ Chemical goggles. ▸ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.
Skin protection	See Hand protection below
Hands/feet protection	▸ Wear chemical protective gloves, e.g. PVC. ▸ Wear safety footwear or safety gumboots, e.g. Rubber The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application. The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and.has to be

Continued...

	observed when making a final choice. Personal hygiene is a key element of effective hand care.
Body protection	See Other protection below
Other protection	‣ Overalls. ‣ P.V.C. apron. ‣ Barrier cream.

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:
"Forsberg Clothing Performance Index".
The effect(s) of the following substance(s) are taken into account in the ***computer-generated*** selection:
Shell Diesel

Material	CPI
NITRILE	A

* CPI - Chemwatch Performance Index
A: Best Selection
B: Satisfactory; may degrade after 4 hours continuous immersion
C: Poor to Dangerous Choice for other than short term immersion
NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -
* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

Respiratory protection

Type A Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Half-face Respirator	Full-Face Respirator
up to 10	1000	A-AUS / Class1	-
up to 50	1000	-	A-AUS / Class 1
up to 50	5000	Airline *	-
up to 100	5000	-	A-2
up to 100	10000	-	A-3
100+			Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
- Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Colourless / pale straw / yellow liquid may contain reodorant; floats on water.

Physical state	Liquid	**Relative density (Water = 1)**	0.84 typical @ 15C
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	>220
pH (as supplied)	Not Applicable	**Decomposition temperature**	Not Available
Melting point / freezing point (°C)	Not Available	**Viscosity (cSt)**	2-4.5 @ 40C

Continued...

Initial boiling point and boiling range (°C)	170-390	**Molecular weight (g/mol)**	Not Applicable
Flash point (°C)	63 typical (PMCC)	**Taste**	Not Available
Evaporation rate	Not Available	**Explosive properties**	Not Available
Flammability	Combustible.	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	6	**Surface Tension (dyn/cm or mN/m)**	Not Available
Lower Explosive Limit (%)	1	**Volatile Component (%vol)**	Not Available
Vapour pressure (kPa)	<0.01 @ 20C	**Gas group**	Not Available
Solubility in water	Immiscible	**pH as a solution (1%)**	Not Applicable
Vapour density (Air = 1)	Not Available	**VOC g/L**	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	▸ Unstable in the presence of incompatible materials. ▸ Product is considered stable. ▸ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo. Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system. Inhalation hazard is increased at higher temperatures. High inhaled concentrations of mixed hydrocarbons may produce narcosis characterised by nausea, vomiting and lightheadedness. Inhalation of aerosols may produce severe pulmonary oedema, pneumonitis and pulmonary haemorrhage. Inhalation of petroleum hydrocarbons consisting substantially of low molecular weight species (typically C2-C12) may produce irritation of mucous membranes, incoordination, giddiness, nausea, vertigo, confusion, headache, appetite loss, drowsiness, tremors and anaesthetic stupor. Massive exposures may produce central nervous system depression with sudden collapse and deep coma; fatalities have been recorded. Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal. Acute effects from inhalation of high concentrations of vapour are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterised by headache and dizziness, increased reaction time, fatigue and loss of co-ordination
Ingestion	Swallowing of the liquid may cause aspiration of vomit into the lungs with the risk of haemorrhaging, pulmonary oedema, progressing to chemical pneumonitis; serious consequences may result. Signs and symptoms of chemical (aspiration) pneumonitis may include coughing, gasping, choking, burning of the mouth, difficult breathing, and bluish coloured skin (cyanosis). Accidental ingestion of the material may be damaging to the health of the individual. Ingestion of petroleum hydrocarbons may produce irritation of the pharynx, oesophagus, stomach and small intestine with oedema and mucosal ulceration resulting; symptoms include a burning sensation in the mouth and throat. Large amounts may produce narcosis with nausea and vomiting, weakness or dizziness, slow and shallow respiration, swelling of the abdomen, unconsciousness and convulsions. Myocardial injury may produce arrhythmias, ventricular fibrillation and electrocardiographic changes. Central nervous system depression may also occur.
Skin Contact	The material produces severe skin irritation; evidence exists, or practical experience predicts, that the material either: ▸ produces severe inflammation of the skin in a substantial number of individuals following direct contact, and/or ▸ produces significant and severe inflammation when applied to the healthy intact skin of animals (for up to four hours), such inflammation being present twenty-four hours or more after the end of the exposure period.

Continued...

	▸ Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis. Repeated exposure may cause skin cracking, flaking or drying following normal handling and use. Skin contact with the material may damage the health of the individual; systemic effects may result following absorption. Open cuts, abraded or irritated skin should not be exposed to this material The material may accentuate any pre-existing dermatitis condition Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
Eye	Limited evidence exists, or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals and/or is expected to produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur. Petroleum hydrocarbons may produce pain after direct contact with the eyes. Slight, but transient disturbances of the corneal epithelium may also result. The aromatic fraction may produce irritation and lachrymation.
Chronic	On the basis, primarily, of animal experiments, concern has been expressed that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment. Prolonged or repeated skin contact may cause drying with cracking, irritation and possible dermatitis following. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Prolonged or repeated skin contact with diesel fuel may cause defatting and irritation of follicles with blocked sebaceous glands resulting in pimples and spots appearing on arms and legs. Hyperkeratosis has been described in engine drivers exposed occupationally to diesel fuels. Repeated application to rabbit skin produces mortalities (8 ml/kg). The primary cause of death was depression and anorexia which were induced by dermal irritation followed by infection; systemic intoxication did not appear to be a factor.

Shell Diesel	**TOXICITY**	**IRRITATION**
	Dermal (Rabbit) LD50: >2000 mg/kg[2]	Not Available
	Oral (Rat) LD50: >2000 mg/kg[2]	
diesel	**TOXICITY**	**IRRITATION**
	Dermal (rabbit) LD50: >1800 mg/kg[1]	Eye: no adverse effect observed (not irritating)[1]
	Oral (rat) LD50: >2000 mg/kg[2]	Skin (rabbit): 500 uL/24h SEVERE
		Skin: adverse effect observed (irritating)[1]
fatty acids, vegetable oil, methyl esters	**TOXICITY**	**IRRITATION**
	Oral (rat) LD50: >5000 mg/kg[1]	Not Available
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

Shell Diesel	Inhalation (Rat) LC50: 1-5 mg/l/4h
DIESEL	The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration. For "kerosenes" **Acute toxicity:** Oral LD50s for three kerosenes (Jet A, CAS No. 8008-20-6 and CAS No. 64742-81-0) ranged from > 2 to >20 g/kg The dermal LD50s of the same three kerosenes were all >2.0 g//kg. Inhalation LC50 values in Sprague-Dawley rats for straight run kerosene (CAS No. 8008-20-6) and hydrodesulfurised kerosene (CAS No. 64742-81-0) were reported to be > 5 and > 5.2 mg/l, respectively. No mortalities in rats were reported in rats when exposed for eight hours to saturated vapor of deodorised kerosene (probably a desulfurised kerosene). Six hour exposures of cats to the same material produced an LC50 of >6.4 mg/l When tested in rabbits for skin irritation, straight run kerosene (CAS No. 8008-20-6) produced “moderate” to “severe” irritation. The substance is classified by IARC as Group 3: **NOT** classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity may be inadequate or limited in animal testing.
FATTY ACIDS, VEGETABLE OIL, METHYL ESTERS	Toxicity studies for the same project demonstrated no mortalities and few toxic effects on rats and rabbits with up to 5000 mg/kg of biodiesel. Petroleum diesel showed no mortalities at the same concentration either, however toxic effects such as hair loss and urinary discolouring were noted with concentrations of >2000 mg/l in rabbits. Research contends that exhaust from pure canola oil biodiesel is more lethal for human epithelial cells than that from traditional diesel. Epithelial cells, which are found in the lining of the airways and lungs, provide the body's first line of defence against

Continued...

	viruses and particles capable of invading the body. The research found that the ultrafine size of fuel exhaust particles from refined and blended canola oil could lead to respiratory health problems. Increased use of renewable energy sources raise concerns about health effects of new emissions. 551liper No significant acute toxicological data identified in literature search. Group A aliphatic monoesters (fatty acid esters) According to a classification scheme described by the American Chemistry Council' Aliphatic Esters Panel, Group A substances are simple monoesters derived from a monofunctional alcohol, such as 2-ethylhexyl alcohol (C8-alcohol) or tridecyl alcohol (C13 alcohol) and fatty acids such as palmitic, stearic, oleic or linoleic acid. Metabolism of the parent esters is expected to yield the corresponding fatty acids and alcohols. The fatty acids are naturally occurring and have a low order of toxicity. Group A substances are rather lipophilic (log Kow 10-15) in character due to the large number of carbon numbers in the ester molecule (e.g., 24,26, 31 carbons) and have relatively high boiling points.

Acute Toxicity	✗	**Carcinogenicity**	✓
Skin Irritation/Corrosion	✓	**Reproductivity**	✗
Serious Eye Damage/Irritation	✗	**STOT - Single Exposure**	✓
Respiratory or Skin sensitisation	✗	**STOT - Repeated Exposure**	✗
Mutagenicity	✗	**Aspiration Hazard**	✓

Legend: ✗ *– Data either not available or does not fill the criteria for classification*
✓ *– Data available to make classification*

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Shell Diesel

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
Not Available	Not Available	Not Available	Not Available	Not Available

diesel

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
LC50	96	Fish	3.2mg/L	2
EC50	48	Crustacea	2mg/L	2
EC50	72	Algae or other aquatic plants	1.8mg/L	2

fatty acids, vegetable oil, methyl esters

ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
EC50	48	Crustacea	<0.13mg/L	2
EC50	72	Algae or other aquatic plants	>0.131mg/L	2

Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
diesel	LOW (BCF = 159)

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

Continued...

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	▸ Containers may still present a chemical hazard/ danger when empty. ▸ Return to supplier for reuse/ recycling if possible. Otherwise: ▸ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill. ▸ Where possible retain label warnings and SDS and observe all notices pertaining to the product. ▸ Recycle wherever possible or consult manufacturer for recycling options. ▸ Consult State Land Waste Authority for disposal. ▸ Bury or incinerate residue at an approved site. ▸ Recycle containers if possible, or dispose of in an authorised landfill.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	
HAZCHEM	•3Z

Land transport (ADG)

UN number	3082
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (contains diesel)
Transport hazard class(es)	Class: 9 Subrisk: Not Applicable
Packing group	III
Environmental hazard	Not Applicable
Special precautions for user	Special provisions: 274 331 335 375 AU01 Limited quantity: 5 L

Environmentally Hazardous Substances meeting the descriptions of UN 3077 or UN 3082
are not subject to this Code when transported by road or rail in;
(a) packagings;
(b) IBCs; or
(c) any other receptacle not exceeding 500 kg(L).
- Australian Special Provisions (SP AU01) - ADG Code 7th Ed.

Air transport (ICAO-IATA / DGR)

UN number	3082
UN proper shipping name	Environmentally hazardous substance, liquid, n.o.s. * (contains diesel)
Transport hazard class(es)	ICAO/IATA Class: 9 ICAO / IATA Subrisk: Not Applicable ERG Code: 9L
Packing group	III
Environmental hazard	Environmentally hazardous
Special precautions for user	Special provisions: A97 A158 A197 Cargo Only Packing Instructions: 964

Continued...

Cargo Only Maximum Qty / Pack	450 L
Passenger and Cargo Packing Instructions	964
Passenger and Cargo Maximum Qty / Pack	450 L
Passenger and Cargo Limited Quantity Packing Instructions	Y964
Passenger and Cargo Limited Maximum Qty / Pack	30 kg G

Sea transport (IMDG-Code / GGVSee)

UN number	3082
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (contains diesel)
Transport hazard class(es)	IMDG Class: 9 IMDG Subrisk: Not Applicable
Packing group	III
Environmental hazard	Marine Pollutant
Special precautions for user	EMS Number: F-A , S-F Special provisions: 274 335 969 Limited Quantities: 5 L

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

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

DIESEL IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Dangerous Goods Code (ADG Code) - Dangerous Goods List
Australia Dangerous Goods Code (ADG Code) - List of Emergency Action Codes
Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
Australia Inventory of Chemical Substances (AICS)
Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5
International Air Transport Association (IATA) Dangerous Goods Regulations
International Maritime Dangerous Goods Requirements (IMDG Code)
United Nations Recommendations on the Transport of Dangerous Goods Model Regulations

FATTY ACIDS, VEGETABLE OIL, METHYL ESTERS IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Inventory of Chemical Substances (AICS)

National Inventory Status

National Inventory	Status
Australia - AICS	Yes
Canada - DSL	Yes
Canada - NDSL	No (diesel; fatty acids, vegetable oil, methyl esters)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (fatty acids, vegetable oil, methyl esters)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	No (fatty acids, vegetable oil, methyl esters)
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	No (fatty acids, vegetable oil, methyl esters)
Vietnam - NCI	Yes
Russia - ARIPS	No (fatty acids, vegetable oil, methyl esters)

Continued...

Legend:	*Yes = All CAS declared ingredients are on the inventory* *No = One or more of the CAS listed ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)*

SECTION 16 OTHER INFORMATION

Revision Date	11/01/2019
Initial Date	10/02/2018

SDS Version Summary

Version	Issue Date	Sections Updated
2.1.1.1	10/07/2011	Classification
3.1.1.1	11/01/2019	One-off system update. NOTE: This may or may not change the GHS classification

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
PC—STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit。
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

SECTION 1. IDENTIFICATION

Product name : Shell Tellus S2 V 68

Product code : 001D7751

Manufacturer or supplier's details

Manufacturer/Supplier : **Shell Oil Products US**
P.O. Box 4427
Houston TX 77210-4427
USA

SDS Request : (+1) 877-276-7285

Customer Service :

Emergency telephone number

Spill Information : 877-504-9351

Health Information : 877-242-7400

Recommended use of the chemical and restrictions on use

Recommended use : Hydraulic oil

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Not a hazardous substance or mixture.

GHS Label element

Hazard pictograms : No Hazard Symbol required

Signal word : No signal word

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

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

Other hazards which do not result in classification

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

Used oil may contain harmful impurities.
High-pressure injection under the skin may cause serious damage including local necrosis.
Not classified as flammable but will burn.

The classification of this material is based on OSHA HCS 2012 criteria.

Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

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

* contains one or more of the following CAS-numbers: 64742-53-6, 64742-54-7, 64742-55-8, 64742-56-9, 64742-65-0, 68037-01-4, 72623-86-0, 72623-87-1, 8042-47-5, 848301-69-9.

Hazardous components

Chemical Name	Synonyms	CAS-No.	Concentration (%)
Interchangeable low viscosity base oil (<20,5 cSt @40°C) *		Not Assigned	0 - 90

SECTION 4. FIRST-AID MEASURES

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

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

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

When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop.
Obtain medical attention even in the absence of apparent wounds.

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

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

Most important symptoms : Oil acne/folliculitis signs and symptoms may include formation

and effects, both acute and delayed		of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea. Local necrosis is evidenced by delayed onset of pain and tissue damage a few hours following injection.
Protection of first-aiders	:	When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.
Immediate medical attention, special treatment	:	Treat symptomatically. High pressure injection injuries require prompt surgical intervention an d possibly steroid therapy, to minimise tissue damage and loss of function. Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. Prompt surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetics, and wide exploration is essential.

SECTION 5. FIRE-FIGHTING MEASURES

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

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Avoid contact with skin and eyes.

Environmental precautions	:	Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.
Additional advice	:	For guidance on selection of personal protective equipment see Chapter 8 of this Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Safety Data Sheet.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Precautions for safe handling	:	Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.
Avoidance of contact	:	Strong oxidising agents.
Product Transfer	:	This material has the potential to be a static accumulator. Proper grounding and bonding procedures should be used during all bulk transfer operations.

Storage

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

Packaging material	:	Suitable material: For containers or container linings, use mild steel or high density polyethylene. Unsuitable material: PVC.
Container Advice	:	Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Oil mist, mineral	Not Assigned	TWA ((inhalable fraction))	5 mg/m3	US. ACGIH Threshold Limit Values
		(Mist)	5 mg/m3	OSHA_TRANS

Biological occupational exposure limits

No biological limit allocated.

Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.
Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.
National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods http://www.cdc.gov/niosh/
Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/
Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances http://www.hse.gov.uk/
Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA) , Germany http://www.dguv.de/inhalt/index.jsp
L'Institut National de Recherche et de Securité, (INRS), France http://www.inrs.fr/accueil

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

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

General Information:
Define procedures for safe handling and maintenance of controls.
Educate and train workers in the hazards and control measures relevant to normal activities associated with this product.

Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation.
Drain down system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or subsequent recycle.
Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned.
Practice good housekeeping.

Personal protective equipment

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

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

Eye protection	:	If material is handled such that it could be splashed into eyes, protective eyewear is recommended.
Skin and body protection	:	Skin protection is not ordinarily required beyond standard work clothes. It is good practice to wear chemical resistant gloves.
Protective measures	:	Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Environmental exposure controls

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

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid at room temperature.
Colour	:	amber
Odour	:	Slight hydrocarbon
Odour Threshold	:	Data not available
pH	:	Not applicable
pour point	:	-30 °C / -22 °FMethod: ISO 3016
Initial boiling point and boiling range	:	> 280 °C / 536 °Festimated value(s)
Flash point	:	225 °C / 437 °F Method: ISO 2592
Evaporation rate	:	Data not available
Flammability (solid, gas)	:	Data not available
Upper explosion limit	:	Typical 10 %(V)
Lower explosion limit	:	Typical 1 %(V)
Vapour pressure	:	< 0.5 Pa (20 °C / 68 °F) estimated value(s)
Relative vapour density	:	> 1estimated value(s)

Relative density	:	0.877 (15 °C / 59 °F)
Density	:	877 kg/m3 (15.0 °C / 59.0 °F) Method: ISO 12185
Solubility(ies)		
Water solubility	:	negligible
Solubility in other solvents	:	Data not available
Partition coefficient: n-octanol/water	:	Pow: > 6(based on information on similar products)
Auto-ignition temperature	:	> 320 °C / 608 °F
Viscosity		
Viscosity, dynamic	:	Data not available
Viscosity, kinematic	:	68 mm2/s (40.0 °C / 104.0 °F) Method: ASTM D445
		10.5 mm2/s (100 °C / 212 °F) Method: ASTM D445
Conductivity	:	This material is not expected to be a static accumulator.
Decomposition temperature	:	Data not available

SECTION 10. STABILITY AND REACTIVITY

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

SECTION 11. TOXICOLOGICAL INFORMATION

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

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

Acute toxicity

Product:

Acute oral toxicity : LD50 (rat): > 5,000 mg/kg
Remarks: Expected to be of low toxicity:

Acute inhalation toxicity : Remarks: Not considered to be an inhalation hazard under normal conditions of use.

Acute dermal toxicity : LD50 (Rabbit): > 5,000 mg/kg
Remarks: Expected to be of low toxicity:

Skin corrosion/irritation

Product:

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

Serious eye damage/eye irritation

Product:

Remarks: Expected to be slightly irritating.

Respiratory or skin sensitisation

Product:

Remarks: Not expected to be a skin sensitiser.

Germ cell mutagenicity

Product:

: Remarks: Not considered a mutagenic hazard.

Carcinogenicity

Product:

Remarks: Not expected to be carcinogenic.

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

IARC No component of this product present at levels greater than or

equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

OSHA No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

NTP No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Product:

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

STOT - single exposure

Product:
Remarks: Not expected to be a hazard.

STOT - repeated exposure

Product:
Remarks: Not expected to be a hazard.

Aspiration toxicity

Product:
Not considered an aspiration hazard.

Further information

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

Remarks: High pressure injection of product into the skin may lead to local necrosis if the product is not surgically removed.

Remarks: Slightly irritating to respiratory system.

SECTION 12. ECOLOGICAL INFORMATION

Basis for assessment	:	Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).(LL/EL/IL50 expressed as the nominal amount of product required to prepare aqueous test extract).

Ecotoxicity

Product:

Toxicity to fish (Acute toxicity)	:	Remarks: Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to daphnia and other aquatic invertebrates (Acute toxicity)	:	Remarks: Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to algae (Acute toxicity)	:	Remarks: Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to fish (Chronic toxicity)	:	Remarks: Data not available
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	Remarks: Data not available
Toxicity to bacteria (Acute toxicity)	:	Remarks: Data not available

Persistence and degradability

Product:

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

Bioaccumulative potential

Product:

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

Mobility in soil

Product:

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

Remarks: Floats on water.

Other adverse effects

no data available

Product:

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

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

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

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

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

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

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

SECTION 14. TRANSPORT INFORMATION

National Regulations

US Department of Transportation Classification (49 CFR Parts 171-180)

Not regulated as a dangerous good

International Regulation

IATA-DGR
Not regulated as a dangerous good

IMDG-Code
Not regulated as a dangerous good

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

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

Special precautions for user

Remarks : Special Precautions: Refer to Chapter 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.

Additional Information **:** MARPOL Annex 1 rules apply for bulk shipments by sea.

SECTION 15. REGULATORY INFORMATION

OSHA Hazards : No OSHA Hazards

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
methyl methacrylate	80-62-6	1000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

CERCLA Reportable Quantity

Calculated RQ exceeds reasonably attainable upper limit., Shell classifies this material as an "oil" under the CERCLA Petroleum Exclusion, therefore releases to the environment are not reportable under CERCLA., The components with RQs are given for information.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 302 : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Water Act

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

methyl methacrylate 80-62-6 0.0975 %

Pennsylvania Right To Know

methyl methacrylate 80-62-6

California Prop 65 This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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

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

SECTION 16. OTHER INFORMATION

Further information

NFPA Rating (Health, Fire, Reactivity) 0, 1, 0

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

Abbreviations and Acronyms : The standard abbreviations and acronyms used in this document can be looked up in reference literature (e.g. scientific dictionaries) and/or websites.

ACGIH = American Conference of Governmental Industrial Hygienists
ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road
AICS = Australian Inventory of Chemical Substances
ASTM = American Society for Testing and Materials
BEL = Biological exposure limits
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
CAS = Chemical Abstracts Service
CEFIC = European Chemical Industry Council
CLP = Classification Packaging and Labelling
COC = Cleveland Open-Cup
DIN = Deutsches Institut fur Normung
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
DSL = Canada Domestic Substance List
EC = European Commission
EC50 = Effective Concentration fifty
ECETOC = European Center on Ecotoxicology and Toxicology Of Chemicals
ECHA = European Chemicals Agency
EINECS = The European Inventory of Existing Commercial Chemical Substances
EL50 = Effective Loading fifty
ENCS = Japanese Existing and New Chemical Substances Inventory
EWC = European Waste Code
GHS = Globally Harmonised System of Classification and Labelling of Chemicals
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Inhibitory Concentration fifty
IL50 = Inhibitory Level fifty
IMDG = International Maritime Dangerous Goods
INV = Chinese Chemicals Inventory
IP346 = Institute of Petroleum test method N° 346 for the

determination of polycyclic aromatics DMSO-extractables
KECI = Korea Existing Chemicals Inventory
LC50 = Lethal Concentration fifty
LD50 = Lethal Dose fifty per cent.
LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading
LL50 = Lethal Loading fifty
MARPOL = International Convention for the Prevention of Pollution From Ships
NOEC/NOEL = No Observed Effect Concentration / No Observed Effect Level
OE_HPV = Occupational Exposure - High Production Volume
PBT = Persistent, Bioaccumulative and Toxic
PICCS = Philippine Inventory of Chemicals and Chemical Substances
PNEC = Predicted No Effect Concentration
REACH = Registration Evaluation And Authorisation Of Chemicals
RID = Regulations Relating to International Carriage of Dangerous Goods by Rail
SKIN_DES = Skin Designation
STEL = Short term exposure limit
TRA = Targeted Risk Assessment
TSCA = US Toxic Substances Control Act
TWA = Time-Weighted Average
vPvB = very Persistent and very Bioaccumulative

Revision Date : 08/27/2015

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.

SAFETY DATA SHEET
According to the Hazardous Products Regulations

DPK JET A-1 / ULSD CP-48 Canada

Version	Revision Date:	SDS Number:	Print Date: 2021-11-17
1.0	2021-11-16	800010054217	Date of last issue: -
			Date of first issue: 16.11.2021

SECTION 1. IDENTIFICATION

Product name : DPK JET A-1 / ULSD CP-48 Canada

Product code : 002D7488

Manufacturer or supplier's details

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

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

Emergency telephone number : CHEMTREC (24 hr): 1 (703) 527-3887 or 1 (800) 424-9300 (US)

Recommended use of the chemical and restrictions on use

Recommended use : Fuel for aviation turbine engines fitted to aircraft.

Restrictions on use :
This product must not be used in applications other than those listed 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.

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids : Category 3

Skin irritation : Category 2

Aspiration hazard : Category 1

Specific target organ toxicity - single exposure (Inhalation) : Category 3 (Narcotic effects)

Long-term (chronic) aquatic hazard : Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : PHYSICAL HAZARDS:
H226 Flammable liquid and vapour.
HEALTH HAZARDS:
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H336 May cause drowsiness or dizziness.
ENVIRONMENTAL HAZARDS:
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements : **Prevention:**
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P240 Ground and bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting equipment.
P242 Use non-sparking tools.
P243 Take action to prevent static discharges.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P302 + P352 IF ON SKIN: Wash with plenty of water and soap.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312 Call a POISON CENTER/doctor if you feel unwell.
P321 Specific treatment (see supplemental first aid instructions on this label).
P331 Do NOT induce vomiting.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.

P370 + P378 In case of fire: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide to extinguish.
P391 Collect spillage.
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.

Other hazards which do not result in classification
Hydrogen sulphide (H2S), an extremely flammable and toxic gas, and other hazardous vapours may evolve and collect in the headspace of storage tanks, transport vessels and other enclosed containers.
Slightly irritating to respiratory system.
May ignite on surfaces at temperatures above auto-ignition temperature.
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.
This material is a static accumulator.
Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.
If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.
This product is intended for use in closed systems only.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Substance name : DPK JET A-1 / ULSD CP-48 Canada

Chemical nature : 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 name	CAS-No.	Concentration (% w/w)
Kerosine (petroleum)	8008-20-6	>= 0 - <= 100
kerosine (petroleum), hydrodesulfurized	64742-81-0	>= 0 - <= 100

Further information

Contains:

Chemical name	Identification number	Concentration (% w/w)
Cumene	98-82-8	>= 0 - <= 1
Ethylbenzene	100-41-4	>= 0 - <= 2
Naphthalene	91-20-3	>= 0 - <= 1

Trimethylbenzene (all isomers)	25551-13-7	>= 0 - <= 1
Xylene, mixed isomers	1330-20-7	>= 0 - <= 2

SECTION 4. FIRST-AID MEASURES

General advice	:	Not expected to be a health hazard when used under normal conditions. Vapourisation of H2S that has been trapped in clothing can be dangerous to rescuers. Maintain respiratory protection to avoid contamination from the victim to rescuer. Mechanical ventilation should be used to resuscitate if at all possible.
If inhaled	:	Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.
In case of 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. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop. Obtain medical attention even in the absence of apparent wounds.
In case of eye contact	:	Flush eye with copious quantities of water. Remove contact lenses, if present and easy to do. Continue rinsing. If persistent irritation occurs, obtain medical attention.
If swallowed	:	Call emergency number for your location / facility. 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. If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.
Most important symptoms and effects, both acute and delayed	:	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. Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters. Local necrosis is evidenced by delayed onset of pain and tissue damage a few hours following injection.

Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision.
If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever.
If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.
Auditory system effects may include temporary hearing loss and/or ringing in the ears.

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

Notes to physician : Treat symptomatically.
Call a doctor or poison control center for guidance.
IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT!
High pressure injection injuries require prompt surgical intervention and possibly steroid therapy, to minimise tissue damage and loss of function.
Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. Prompt surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetics, and wide exploration is essential.
Potential for chemical pneumonitis.
Do not induce vomiting.

Hydrogen sulphide (H2S) - CNS asphyxiant. May cause rhinitis, bronchitis and occasionally pulmonary oedema after severe exposure. CONSIDER: Oxygen therapy. Consult a Poison Control Center for guidance.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable extinguishing media : Do not use direct water jets on the burning product as they could cause a steam explosion and spread of the fire.
Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Specific hazards during fire-fighting : Clear fire area of all non-emergency personnel.
Hazardous combustion products may include:

		A complex mixture of airborne solid and liquid particulates and gases (smoke). Unidentified organic and inorganic compounds. Carbon monoxide may be evolved if incomplete combustion occurs. 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.
Specific extinguishing methods	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Further information	:	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. Prevent fire extinguishing water from contaminating surface water or the ground water system.
Special protective equipment for firefighters	:	Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Do not breathe fumes, vapour. Do not operate electrical equipment. Attempt to disperse vapour or to direct its flow to a safe location for example using fog sprays. Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area and evacuate all personnel. Attempt to disperse the gas 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. Monitor area with combustible gas meter.
Environmental precautions	:	Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers. Do not allow contact with soil, surface or ground water.
Methods and materials for containment and cleaning up	:	Take precautionary measures against static discharges. For small liquid spills (< 1 drum), transfer by mechanical means to a labeled, 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
Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers.
Ventilate contaminated area thoroughly.
If contamination of site occurs remediation may require specialist advice.

Additional advice : For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.
Notify authorities if any exposure to the general public or the environment occurs or is likely to occur.
For guidance on disposal of spilled material see Section 13 of this Safety Data Sheet.
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.

SECTION 7. HANDLING AND STORAGE

General Precautions : Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this 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.
Prevent spillages.
Never siphon by mouth.
For comprehensive advice on handling, product transfer, storage and tank cleaning refer to the product supplier.
Ensure that all local regulations regarding handling and storage facilities are followed.

Maintenance and Fuelling Activities - Avoid inhalation of vapours and contact with skin.

Advice on safe handling	:	Ensure that all local regulations regarding handling and storage facilities are followed. 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. Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur. Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges. These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements. These activities may lead to static discharge e.g. spark formation. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. “Product Name” designates a trade-mark of Shell Brands International AG. Used under license. The inherent toxic and olfactory (sense of smell) fatiguing properties of hydrogen sulphide require that air monitoring alarms be used if concentrations are expected to reach harmful levels such as in enclosed spaces, heated transport vessels and spill or leak situations. If the air concentration exceeds 10 ppm, the area should be evacuated unless respiratory protection is in use.
Avoidance of contact	:	Strong oxidising agents.
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. Refer to guidance under Handling section.

Storage

Other data : Drum and small container storage:
Drums should be stacked to a maximum of 3 high.
Use properly labeled and closable 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.
Electrostatic charges will be generated during pumping.
Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk.
The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable.
Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.

Packaging material : Suitable material: 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 material: 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.

Specific use(s) : Not applicable.

See additional references that provide safe handling practices for liquids that are determined to be static accumulators: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity).
IEC/TS 60079-32-1: Electrostatic hazards, guidance

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Kerosine (petroleum)	8008-20-6	TWA	100 mg/m3	NIOSH REL
		TWA	200 mg/m3 (total hydrocarbon vapor)	ACGIH
kerosine (petroleum), hydrodesulfurized	64742-81-0	TWA	525 mg/m3	CA ON OEL
		TWA	200 mg/m3 (total hydrocarbon vapor)	ACGIH
Ethylbenzene	100-41-4	TWA	20 ppm	ACGIH
		TWA	100 ppm 435 mg/m3	NIOSH REL
		ST	125 ppm 545 mg/m3	NIOSH REL
		TWA	100 ppm 435 mg/m3	OSHA Z-1
Xylene, mixed isomers	1330-20-7	TWA	100 ppm 435 mg/m3	OSHA Z-1
		TWA	100 ppm	ACGIH
		STEL	150 ppm	ACGIH
		STEL	150 ppm 655 mg/m3	OSHA P0
		TWA	100 ppm 435 mg/m3	OSHA P0
Cumene	98-82-8	TWA	50 ppm 245 mg/m3	OSHA Z-1
		TWA	5 ppm	ACGIH
Naphthalene	91-20-3	TWA	10 ppm 50 mg/m3	NIOSH REL
		ST	15 ppm 75 mg/m3	NIOSH REL
		TWA	10 ppm	OSHA Z-1

			50 mg/m3	
		TWA	10 ppm	ACGIH
Trimethylbenzene (all isomers)	25551-13-7	TWA	25 ppm	ACGIH

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Ethylbenzene	100-41-4	Sum of mandelic acid and phenyl glyoxylic acid	Urine	End of shift (As soon as possible after exposure ceases)	0.15 g/g creatinine	ACGIH BEI
Xylene, mixed isomers	1330-20-7	Methylhippuric acids	Urine	End of shift (As soon as possible after exposure ceases)	1.5 g/g creatinine	ACGIH BEI

Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.
Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.
National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods http://www.cdc.gov/niosh/
Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/
Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances http://www.hse.gov.uk/
Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA) , Germany http://www.dguv.de/inhalt/index.jsp
L'Institut National de Recherche et de Securité, (INRS), France http://www.inrs.fr/accueil

Engineering measures : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances.
Appropriate measures include:
Use sealed systems as far as possible.
Firewater monitors and deluge systems are recommended.
Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.
Local exhaust ventilation is recommended.
Eye washes and showers for emergency use.

General Information:

Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned.
Practice good housekeeping.
Define procedures for safe handling and maintenance of controls.
Educate and train workers in the hazards and control measures relevant to normal activities associated with this product.
Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation.
Drain down system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Do not ingest. If swallowed, then seek immediate medical assistance

Personal protective equipment

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.

Select a filter suitable for the combination of organic gases and vapours and particles [Type A/Type P boiling point >65°C (149°F)].

Hand protection
Remarks : 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, dexterity. Always seek advice from glove sup-

pliers. Contaminated gloves should be replaced. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material.
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 : Wear goggles for use against liquids and gas.
If a local risk assessment deems it so then chemical splash goggles may not be required and safety glasses may provide adequate eye protection.

Skin and body protection : Wear antistatic and flame-retardant clothing, if a local risk assessment deems it so.
Skin protection is not required under normal conditions of use.
For prolonged or repeated exposures use impervious clothing over parts of the body subject to exposure.
If repeated and/or prolonged skin exposure to the substance is likely, then wear suitable gloves tested to relevant Standard, and provide employee skin care programmes.

Thermal hazards : Not applicable

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

Hygiene measures : Wash hands before eating, drinking, smoking and using the toilet.
Launder contaminated clothing before re-use.
Do not ingest. If swallowed, then seek immediate medical assistance.

Environmental exposure controls

General advice : Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.
Minimise release to the environment. An environmental as-

sessment must be made to ensure compliance with local environmental legislation.
Information on accidental release measures are to be found in section 6.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	Colourless to light coloured
Odour	:	Hydrocarbon
Odour Threshold	:	Data not available
pH	:	Not applicable
Melting point/freezing point	:	<= -48 °C / <= -54 °F
Boiling point/boiling range	:	150 - 300 °C / 302 - 572 °F Method: Unspecified
Flash point	:	43 - 62 °C / 109 - 144 °F Method: Unspecified
Evaporation rate	:	Data not available
Flammability (solid, gas)	:	Not applicable
Upper explosion limit	:	Data not available Typical 5 %(V)
Lower explosion limit	:	Data not available Typical 0.7 %(V)
Vapour pressure	:	1 - 3.7 kPa (38.0 °C / 100.4 °F) Method: Unspecified 1.6 - 7 kPa (50.0 °C / 122.0 °F) Method: Unspecified
Relative vapour density	:	Data not available
Relative density	:	Data not available
Density	:	775 - 840 kg/m3 (15.0 °C / 59.0 °F)Method: Unspecified
Solubility(ies)		

Water solubility	:	negligible
Solubility in other solvents	:	Data not available
Auto-ignition temperature	:	> 220 °C / 428 °F
Decomposition temperature	:	Data not available
Viscosity		
Viscosity, kinematic	:	Method: Unspecified Not applicable 1.3 - 2.5 mm2/s (40.0 °C / 104.0 °F) Method: Unspecified Method: Unspecified Not applicable
Explosive properties	:	Classification Code: Not classified
Oxidizing properties	:	Not applicable
Conductivity	:	Low conductivity: < 100 pS/m, The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive 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, and anti-static additives can greatly influence the conductivity of a liquid

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Oxidises on contact with air. The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.
Chemical stability	:	No hazardous reaction is expected when handled and stored according to provisions Stable under normal conditions of use.
Possibility of hazardous reactions	:	Reacts with strong oxidising agents.
Conditions to avoid	:	Avoid heat, sparks, open flames and other ignition sources. In certain circumstances product can ignite due to static electricity.

Incompatible materials	:	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.

SECTION 11. TOXICOLOGICAL INFORMATION

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

Information on likely routes of exposure
Exposure may occur via inhalation, ingestion, skin absorption, skin or eye contact, and accidental ingestion.

Acute toxicity

Product:

Acute oral toxicity	:	LD50 Oral (Rat): > 5,000 mg/kg Remarks: Low toxicity:
Acute inhalation toxicity	:	LC 50 (Rat): > 5 mg/l Exposure time: 4 h Remarks: Low toxicity: Remarks: High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.
Acute dermal toxicity	:	LD50 Dermal (Rabbit): > 2,000 mg/kg Remarks: Low toxicity:
Acute toxicity (other routes of administration)	:	Remarks: Inhalation of vapours or mists may cause irritation to the respiratory system.

Components:

Kerosine (petroleum):

Acute oral toxicity	:	LD 50 (Rat): > 5,000 mg/kg

Remarks: Low toxicity:

Acute inhalation toxicity : LC 50 (Rat): > 5 mg/l
Exposure time: 4 h
Remarks: Low toxicity:

Acute dermal toxicity : LD 50 (Rabbit): > 2,000 mg/kg
Remarks: Low toxicity:

kerosine (petroleum), hydrodesulfurized:
Acute oral toxicity : LD 50 (Rat): > 5,000 mg/kg
Remarks: Low toxicity:

Acute inhalation toxicity : LC 50 (Rat): > 5 mg/l
Exposure time: 4 h
Remarks: Low toxicity:

Acute dermal toxicity : LD 50 (Rabbit): > 2,000 mg/kg
Remarks: Low toxicity:

Skin corrosion/irritation

Product:
Remarks: Irritating to skin.

Components:
Kerosine (petroleum):
Remarks: Irritating to skin.

kerosine (petroleum), hydrodesulfurized:
Remarks: Irritating to skin.

Serious eye damage/eye irritation

Product:
Remarks: Slightly irritating to the eye.
Based on available data, the classification criteria are not met.

Components:
Kerosine (petroleum):
Remarks: Slightly irritating to the eye.
Based on available data, the classification criteria are not met.

kerosine (petroleum), hydrodesulfurized:
Remarks: Slightly irritating to the eye.
Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation

Product:

Remarks: Not a sensitiser.
Based on available data, the classification criteria are not met.

Components:

Kerosine (petroleum):
Remarks: Not a sensitiser.
Based on available data, the classification criteria are not met.

kerosine (petroleum), hydrodesulfurized:
Remarks: Not a sensitiser.
Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Product:

Genotoxicity in vivo	:	Remarks: Non mutagenic Based on available data, the classification criteria are not met.
Germ cell mutagenicity - Assessment	:	This product does not meet the criteria for classification in categories 1A/1B.

Components:

Kerosine (petroleum):

Genotoxicity in vivo	:	Remarks: Non mutagenic Based on available data, the classification criteria are not met.

kerosine (petroleum), hydrodesulfurized:

Genotoxicity in vivo	:	Remarks: Non mutagenic Based on available data, the classification criteria are not met.

Carcinogenicity

Product:

Remarks: Not classified as a carcinogen.

Remarks: Repeated skin contact has resulted in irritation and skin cancer in animals.

Carcinogenicity - Assessment	:	This product does not meet the criteria for classification in categories 1A/1B.

Components:

Kerosine (petroleum):
Remarks: Not classified as a carcinogen.

Remarks: Repeated skin contact has resulted in irritation and skin cancer in animals.

kerosine (petroleum), hydrodesulfurized:
Remarks: Not classified as a carcinogen.

Remarks: Repeated skin contact has resulted in irritation and skin cancer in animals.

IARC	Group 2B: Possibly carcinogenic to humans	
	Ethylbenzene	100-41-4
	Cumene	98-82-8
	Naphthalene	91-20-3
OSHA	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.	
NTP	Reasonably anticipated to be a human carcinogen	
	Cumene	98-82-8
	Naphthalene	91-20-3

Reproductive toxicity

Product:

Effects on fertility : Remarks: Not a developmental toxicant.
Based on available data, the classification criteria are not met.
Does not impair fertility.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Components:

Kerosine (petroleum):
Effects on fertility :

Remarks: Not a developmental toxicant.
Based on available data, the classification criteria are not met.
Does not impair fertility.

kerosine (petroleum), hydrodesulfurized:
Effects on fertility :

Remarks: Not a developmental toxicant.
Based on available data, the classification criteria are not met.
Does not impair fertility.

STOT - single exposure

Product:

Remarks: High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness.

Components:

Kerosine (petroleum):
Remarks: High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness.
Inhalation of vapours or mists may cause irritation to the respiratory system.

kerosine (petroleum), hydrodesulfurized:
Remarks: High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness.
Inhalation of vapours or mists may cause irritation to the respiratory system.

STOT - repeated exposure

Product:

Remarks: Kidney: caused kidney effects in male rats which are not considered relevant to humans

Components:

Kerosine (petroleum):
Remarks: Kidney: caused kidney effects in male rats which are not considered relevant to humans

kerosine (petroleum), hydrodesulfurized:
Remarks: Kidney: caused kidney effects in male rats which are not considered relevant to humans

Aspiration toxicity

Product:

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Components:

Kerosine (petroleum):
Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

kerosine (petroleum), hydrodesulfurized:
Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Further information

Product:

Remarks: H2S has a broad range of effects dependent on the airborne concentration and length of exposure: 0.02 ppm odour threshold, smell of rotten eggs; 10 ppm eye and respiratory tract irritation; 100 ppm coughing, headache, dizziness, nausea, eye irritation, loss of sense of smell in minutes; 200 ppm potential for pulmonary oedema after >20-30 minutes; 500 ppm loss of consciousness after short exposures, potential for respiratory arrest; >1000ppm immediate loss of consciousness, may lead rapidly to death, prompt cardiopulmonary resuscitation may be required. Do not depend on sense of smell for warning. H2S causes rapid olfactory fatigue (deadens sense of smell). There is no evidence that H2S will accumulate in the body tissue after repeated exposure.

Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

Components:

Kerosine (petroleum):
Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

kerosine (petroleum), hydrodesulfurized:
Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

SECTION 12. ECOLOGICAL INFORMATION

Basis for assessment	:	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.Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Ecotoxicity

Product:

Toxicity to fish (Acute toxicity)	:	Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to crustacean (Acute toxicity)	:	Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to fish (Chronic tox-	:	Remarks: NOEC/NOEL > 0.01 - <=0.1 mg/l

icity)

Toxicity to crustacean (Chronic toxicity)	:	Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l
Toxicity to microorganisms (Acute toxicity)	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l

Components:

Kerosine (petroleum):

Toxicity to fish (Acute toxicity)	:	Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to crustacean (Acute toxicity)	:	Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to fish (Chronic toxicity)	:	Remarks: NOEC/NOEL > 0.01 - <=0.1 mg/l
Toxicity to crustacean(Chronic toxicity)	:	Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l
Toxicity to bacteria	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l

kerosine (petroleum), hydrodesulfurized:

Toxicity to fish (Acute toxicity)	:	Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to crustacean (Acute toxicity)	:	Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to fish (Chronic toxicity)	:	Remarks: NOEC/NOEL > 0.01 - <=0.1 mg/l
Toxicity to crustacean(Chronic toxicity)	:	Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l
Toxicity to bacteria	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l

Persistence and degradability

Product:

Biodegradability	:	Remarks: Major constituents are inherently biodegradable. The volatile constituents will oxidize rapidly by photochemical reactions in air.

Based on available data, the classification criteria are not met.
Not Persistent per IMO criteria.
International Oil Pollution Compensation (IOPC) Fund definition: “A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distills at a temperature of 340ºC (645ºF) and (b) at least 95% of which, by volume, distils at a temperature of 370ºC (700ºF) when tested by the ASTM Method D-86/78 or any subsequent revision thereof."

Components:

Kerosine (petroleum):

Biodegradability : Remarks: Major constituents are inherently biodegradable, but contains components that may persist in the environment.
The volatile constituents will oxidize rapidly by photochemical reactions in air.
Based on available data, the classification criteria are not met.
Not Persistent per IMO criteria.
International Oil Pollution Compensation (IOPC) Fund definition: “A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distills at a temperature of 340ºC (645ºF) and (b) at least 95% of which, by volume, distils at a temperature of 370ºC (700ºF) when tested by the ASTM Method D-86/78 or any subsequent revision thereof."

kerosine (petroleum), hydrodesulfurized:

Biodegradability : Remarks: Major constituents are inherently biodegradable, but contains components that may persist in the environment.
The volatile constituents will oxidize rapidly by photochemical reactions in air.
Based on available data, the classification criteria are not met.
Not Persistent per IMO criteria.
International Oil Pollution Compensation (IOPC) Fund definition: “A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distills at a temperature of 340ºC (645ºF) and (b) at least 95% of which, by volume, distils at a temperature of 370ºC (700ºF) when tested by the ASTM Method D-86/78 or any subsequent revision thereof."

Bioaccumulative potential

Product:

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

Components:

Kerosine (petroleum):

Bioaccumulation : Remarks: Contains constituents with the potential to bioaccu-

mulate.

kerosine (petroleum), hydrodesulfurized:
Bioaccumulation : Remarks: Contains constituents with the potential to bioaccumulate.

Mobility in soil

Product:
Mobility : Remarks: Large volumes may penetrate soil and could contaminate groundwater.
Evaporates within a day from water or soil surfaces.
Contains volatile components.
Floats on water.

Components:
Kerosine (petroleum):
Mobility : Remarks: Evaporates within a day from water or soil surfaces.
Large volumes may penetrate soil and could contaminate groundwater.
Contains volatile components.
Floats on water.

kerosine (petroleum), hydrodesulfurized:
Mobility : Remarks: Evaporates within a day from water or soil surfaces.
Large volumes may penetrate soil and could contaminate groundwater.
Contains volatile components.
Floats on water.

Other adverse effects

Product:
Additional ecological information : Films formed on water may affect oxygen transfer and damage organisms.

Components:
Kerosine (petroleum):
Results of PBT and vPvB assessment : This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

Additional ecological information : Films formed on water may affect oxygen transfer and damage organisms.

kerosine (petroleum), hydrodesulfurized:
Results of PBT and vPvB assessment : This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

Additional ecological infor- : Films formed on water may affect oxygen transfer and dam-

mation | age organisms.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : 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.
MARPOL - see International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which provides technical aspects at controlling pollutions from ships.

Contaminated packaging : 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
Remarks : 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.

SECTION 14. TRANSPORT INFORMATION

TDG

UN number : 1863
Proper shipping name : FUEL, AVIATION, TURBINE ENGINE
Class : 3
Packing group : III
Labels : 3

Marine pollutant : no

International Regulations

IATA-DGR

UN/ID No.	:	UN 1863
Proper shipping name	:	FUEL, AVIATION, TURBINE ENGINE
Class	:	3
Packing group	:	III
Labels	:	3

IMDG-Code

UN number	:	UN 1863
Proper shipping name	:	FUEL, AVIATION, TURBINE ENGINE
Class	:	3
Packing group	:	III
Labels	:	3
Marine pollutant	:	yes

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

Not applicable for product as supplied. MARPOL Annex 1 rules apply for bulk shipments by sea.

Special precautions for user

Remarks : Special Precautions: Refer to Section 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.

SECTION 15. REGULATORY INFORMATION

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

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

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

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

DSL : All components listed.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR -

Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

This product is intended for use in closed systems only.
A vertical bar (|) in the left margin indicates an amendment from the previous version.

Sources of key data used to compile the Safety Data Sheet : The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).

Revision Date : 2021-11-16

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

CA / EN

SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name **Castrol Multipurpose Grease**

Product code 467223-AE04

SDS no. 467223

Product type Grease

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/ mixture Grease for industrial applications
For specific application advice see appropriate Technical Data Sheet or consult our company representative.

1.3 Details of the supplier of the safety data sheet

Supplier

Castrol India Ltd.,
Technopolis Knowledge Park Office,
P. O. Box No. 19411
Mahakali Caves Road
Chakala, Andheri (E)
Mumbai - 400 093
India

Telephone Number: +91 22 6698 4100
Fax Number: +91 22 66984543

E-mail address MSDSadvice@bp.com

1.4 Emergency telephone number

EMERGENCY TELEPHONE NUMBER Carechem: +65 3158 1195 (24/7)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition Mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]
Not classified.

See sections 11 and 12 for more detailed information on health effects and symptoms and environmental hazards.

2.2 Label elements

Signal word No signal word.

Hazard statements No known significant effects or critical hazards.

Precautionary statements

Prevention Not applicable.

Response Not applicable.

Storage Not applicable.

Disposal Not applicable.

Supplemental label elements Not applicable.

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles Not applicable.

Special packaging requirements

SECTION 2: Hazards identification

Containers to be fitted with child-resistant fastenings Not applicable.

Tactile warning of danger Not applicable.

2.3 Other hazards

Results of PBT and vPvB assessment Product does not meet the criteria for PBT or vPvB according to Regulation (EC) No. 1907/2006, Annex XIII.

Other hazards which do not result in classification Defatting to the skin.
Note: High Pressure Applications
Injections through the skin resulting from contact with the product at high pressure constitute a major medical emergency.
See 'Notes to physician' under First-Aid Measures, Section 4 of this Safety Data Sheet.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Product definition Mixture

Highly refined base oil (IP 346 DMSO extract < 3%). Thickening agent. Proprietary performance additives.

This product does not contain any hazardous ingredients at or above regulated thresholds.

SECTION 4: First aid measures

4.1 Description of first aid measures

Eye contact In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Check for and remove any contact lenses. Get medical attention.

Skin contact Wash skin thoroughly with soap and water or use recognised skin cleanser. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention if irritation develops.

Inhalation If inhaled, remove to fresh air. Get medical attention if symptoms occur.

Ingestion Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Protection of first-aiders No action shall be taken involving any personal risk or without suitable training.

4.2 Most important symptoms and effects, both acute and delayed

See Section 11 for more detailed information on health effects and symptoms.

Potential acute health effects

Inhalation Vapour inhalation under ambient conditions is not normally a problem due to low vapour pressure.

Ingestion No known significant effects or critical hazards.

Skin contact Defatting to the skin. May cause skin dryness and irritation.

Eye contact No known significant effects or critical hazards.

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

Inhalation Inhalation of oil mist or vapours at elevated temperatures may cause respiratory irritation.

Ingestion Ingestion of large quantities may cause nausea and diarrhoea.

Skin contact Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis.

Eye contact Potential risk of transient stinging or redness if accidental eye contact occurs.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treatment should in general be symptomatic and directed to relieving any effects.
Note: High Pressure Applications
Injections through the skin resulting from contact with the product at high pressure constitute a major medical emergency. Injuries may not appear serious at first but within a few hours tissue becomes swollen, discoloured and extremely painful with extensive subcutaneous necrosis. Surgical exploration should be undertaken without delay. Thorough and extensive debridement of the wound and underlying tissue is necessary to minimise tissue loss and prevent or limit permanent damage. Note that high pressure may force the product considerable distances along tissue planes.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

In case of fire, use water fog, alcohol resistant foam, dry chemical or carbon dioxide extinguisher or spray.

Unsuitable extinguishing media

Do not use water jet. The use of a water jet may cause the fire to spread by splashing the burning product.

5.2 Special hazards arising from the substance or mixture

Hazards from the substance or mixture

In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous combustion products

Combustion products may include the following:
carbon oxides (CO, CO_2) (carbon monoxide, carbon dioxide)

5.3 Advice for firefighters

Special precautions for fire-fighters

No action shall be taken involving any personal risk or without suitable training. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire.

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. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Floors may be slippery; use care to avoid falling. Put on appropriate personal protective equipment.

For emergency responders

If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

6.2 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).

6.3 Methods and material for containment and cleaning up

Small spill

Stop leak if without risk. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill

Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. 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. If emergency personnel are unavailable, contain spilt material. Suction or scoop the spill into appropriate disposal or recycling vessels, then cover spill area with oil absorbent. Dispose of via a licensed waste disposal contractor.

6.4 Reference to other sections

See Section 1 for emergency contact information.
See Section 5 for firefighting measures.
See Section 8 for information on appropriate personal protective equipment.
See Section 12 for environmental precautions.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Protective measures

Put on appropriate personal protective equipment.

Advice on general occupational hygiene

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Wash thoroughly after handling. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

SECTION 7: Handling and storage

7.2 Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep away from heat and direct sunlight. 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. Store and use only in equipment/ containers designed for use with this product. Do not store in unlabelled containers.

Not suitable

Prolonged exposure to elevated temperature

7.3 Specific end use(s)

Recommendations

See section 1.2 and Exposure scenarios in annex, if applicable.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits

Product/ingredient name	Exposure limit values

No exposure limit value known.

Whilst specific OELs for certain components may be shown in this section, other components may be present in any mist, vapour or dust produced. Therefore, the specific OELs may not be applicable to the product as a whole and are provided for guidance only.

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. Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

Derived No Effect Level

No DNELs/DMELs available.

Predicted No Effect Concentration

No PNECs available

8.2 Exposure controls

Appropriate engineering controls

Provide exhaust ventilation or other engineering controls to keep the relevant airborne concentrations below their respective occupational exposure limits.
All activities involving chemicals should be assessed for their risks to health, to ensure exposures are adequately controlled. Personal protective equipment should only be considered after other forms of control measures (e.g. engineering controls) have been suitably evaluated. Personal protective equipment should conform to appropriate standards, be suitable for use, be kept in good condition and properly maintained.
Your supplier of personal protective equipment should be consulted for advice on selection and appropriate standards. For further information contact your national organisation for standards.
The final choice of protective equipment will depend upon a risk assessment. It is important to ensure that all items of personal protective equipment are compatible.

Individual protection measures

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. Ensure that eyewash stations and safety showers are close to the workstation location.

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment.
For protection against metal working fluids, respiratory protection that is classified as “resistant to oil” (class R) or oil proof (class P) should be selected where appropriate. Depending on the level of airborne contaminants, an air-purifying, half-mask respirator (with HEPA filter) including disposable (P- or R-series) (for oil mists less than 50mg/m3), or any powered, air-purifying respirator equipped with hood or helmet and HEPA filter (for oil mists less than 125 mg/m3). Where organic vapours are a potential hazard during metalworking operations, a combination particulate and organic vapour filter may be necessary.
The correct choice of respiratory protection depends upon the chemicals being handled, the conditions of work and use, and the condition of the respiratory equipment. Safety procedures should be developed for each intended application. Respiratory protection equipment should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Eye/face protection

Safety glasses with side shields.

SECTION 8: Exposure controls/personal protection

Skin protection

Hand protection

General Information:

Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. The correct choice of protective gloves depends upon the chemicals being handled, and the conditions of work and use. Most gloves provide protection for only a limited time before they must be discarded and replaced (even the best chemically resistant gloves will break down after repeated chemical exposures).

Gloves should be chosen in consultation with the supplier / manufacturer and taking account of a full assessment of the working conditions.

Recommended: Nitrile gloves.
Breakthrough time:

Breakthrough time data are generated by glove manufacturers under laboratory test conditions and represent how long a glove can be expected to provide effective permeation resistance. It is important when following breakthrough time recommendations that actual workplace conditions are taken into account. Always consult with your glove supplier for up-to-date technical information on breakthrough times for the recommended glove type.
Our recommendations on the selection of gloves are as follows:

Continuous contact:

Gloves with a minimum breakthrough time of 240 minutes, or >480 minutes if suitable gloves can be obtained.
If suitable gloves are not available to offer that level of protection, gloves with shorter breakthrough times may be acceptable as long as appropriate glove maintenance and replacement regimes are determined and adhered to.

Short-term / splash protection:

Recommended breakthrough times as above.
It is recognised that for short-term, transient exposures, gloves with shorter breakthrough times may commonly be used. Therefore, appropriate maintenance and replacement regimes must be determined and rigorously followed.

Glove Thickness:

For general applications, we recommend gloves with a thickness typically greater than 0.35 mm.

It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.
Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers' technical data should always be taken into account to ensure selection of the most appropriate glove for the task.

Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:

- Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of.

- Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential.

Skin and body

Use of protective clothing is good industrial practice.
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.
Cotton or polyester/cotton overalls will only provide protection against light superficial contamination that will not soak through to the skin. Overalls should be laundered on a regular basis. When the risk of skin exposure is high (e.g. when cleaning up spillages or if there is a risk of splashing) then chemical resistant aprons and/or impervious chemical suits and boots will be required.

SECTION 8: Exposure controls/personal protection

Refer to standards:

Respiratory protection: EN 529
Gloves: EN 420, EN 374
Eye protection: EN 166
Filtering half-mask: EN 149
Filtering half-mask with valve: EN 405
Half-mask: EN 140 plus filter
Full-face mask: EN 136 plus filter
Particulate filters: EN 143
Gas/combined filters: EN 14387

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.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical state	Grease
Colour	Yellow. [Light]
Odour	Not available.
Odour threshold	Not available.
pH	Not available.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Closed cup: 200°C (392°F) [Pensky-Martens.]
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	Not available.
Vapour pressure	Not available.
Vapour density	Not available.
Relative density	Not available.
Density	930 kg/m³ (0.93 g/cm³) at 20°C
Solubility(ies)	insoluble in water.
Partition coefficient: n-octanol/water	>3
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Explosive properties	Not available.
Oxidising properties	Not available.

9.2 Other information

No additional information.

SECTION 10: Stability and reactivity

10.1 Reactivity

No specific test data available for this product. Refer to Conditions to avoid and Incompatible materials for additional information.

10.2 Chemical stability

The product is stable.

10.3 Possibility of hazardous reactions

Under normal conditions of storage and use, hazardous reactions will not occur.
Under normal conditions of storage and use, hazardous polymerisation will not occur.

10.4 Conditions to avoid

Avoid all possible sources of ignition (spark or flame).

10.5 Incompatible materials

Reactive or incompatible with the following materials: oxidising materials.

SECTION 10: Stability and reactivity

10.6 Hazardous decomposition products Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity estimates

Route	ATE value
Not available.	

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

Potential acute health effects

Inhalation Vapour inhalation under ambient conditions is not normally a problem due to low vapour pressure.

Ingestion No known significant effects or critical hazards.

Skin contact Defatting to the skin. May cause skin dryness and irritation.

Eye contact No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation No specific data.

Ingestion No specific data.

Skin contact Adverse symptoms may include the following:
irritation
dryness
cracking

Eye contact No specific data.

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

Inhalation Inhalation of oil mist or vapours at elevated temperatures may cause respiratory irritation.

Ingestion Ingestion of large quantities may cause nausea and diarrhoea.

Skin contact Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis.

Eye contact Potential risk of transient stinging or redness if accidental eye contact occurs.

Potential chronic health effects

General No known significant effects or critical hazards.

Carcinogenicity No known significant effects or critical hazards.

Mutagenicity No known significant effects or critical hazards.

Developmental effects No known significant effects or critical hazards.

Fertility effects No known significant effects or critical hazards.

SECTION 12: Ecological information

12.1 Toxicity

Environmental hazards Not classified as dangerous

12.2 Persistence and degradability

Expected to be biodegradable.

12.3 Bioaccumulative potential

This product is not expected to bioaccumulate through food chains in the environment.

12.4 Mobility in soil

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

Mobility Spillages are unlikely to penetrate the soil.

12.5 Results of PBT and vPvB assessment

Product does not meet the criteria for PBT or vPvB according to Regulation (EC) No. 1907/2006, Annex XIII.

12.6 Other adverse effects

Other ecological information This product is unlikely to disperse in water.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Methods of disposal Where possible, arrange for product to be recycled. Dispose of via an authorised person/ licensed waste disposal contractor in accordance with local regulations.

Hazardous waste Yes.

European waste catalogue (EWC)

Waste code	Waste designation
12 01 12*	spent waxes and fats

However, deviation from the intended use and/or the presence of any potential contaminants may require an alternative waste disposal code to be assigned by the end user.

Packaging

Methods of disposal Where possible, arrange for product to be recycled. Dispose of via an authorised person/ licensed waste disposal contractor in accordance with local regulations.

Special precautions This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

References Commission 2014/955/EU
Directive 2008/98/EC

SECTION 14: Transport information

	ADR/RID	ADN	IMDG	IATA
14.1 UN number	Not regulated.	Not regulated.	Not regulated.	Not regulated.
14.2 UN proper shipping name	-	-	-	-
14.3 Transport hazard class(es)	-	-	-	-
14.4 Packing group	-	-	-	-
14.5 Environmental hazards	No.	No.	No.	No.
Additional information	-	-	-	-

14.6 Special precautions for user Not available.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code Not available.

SECTION 15: Regulatory information

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

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisation

Annex XIV

None of the components are listed.

Substances of very high concern

None of the components are listed.

Other regulations

REACH Status For the REACH status of this product please consult your company contact, as identified in Section 1.

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

SECTION 15: Regulatory information

Australia inventory (AICS)	All components are listed or exempted.
Canada inventory	All components are listed or exempted.
China inventory (IECSC)	All components are listed or exempted.
Japan inventory (ENCS)	All components are listed or exempted.
Korea inventory (KECI)	All components are listed or exempted.
Philippines inventory (PICCS)	All components are listed or exempted.
Taiwan Chemical Substances Inventory (TCSI)	All components are listed or exempted.

Ozone depleting substances (1005/2009/EU)

Not listed.

Prior Informed Consent (PIC) (649/2012/EU)

Not listed.

Seveso Directive

This product is not controlled under the Seveso Directive.

15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out for one or more of substances within this mixture. A Chemical Safety Assessment has not been carried out for the mixture itself.

SECTION 16: Other information

Abbreviations and acronyms

ADN = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
CAS = Chemical Abstracts Service
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
CSA = Chemical Safety Assessment
CSR = Chemical Safety Report
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EINECS = European Inventory of Existing Commercial chemical Substances
ES = Exposure Scenario
EUH statement = CLP-specific Hazard statement
EWC = European Waste Catalogue
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
OECD = Organisation for Economic Co-operation and Development
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation [Regulation (EC) No. 1907/2006]
RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail
RRN = REACH Registration Number
SADT = Self-Accelerating Decomposition Temperature
SVHC = Substances of Very High Concern
STOT-RE = Specific Target Organ Toxicity - Repeated Exposure
STOT-SE = Specific Target Organ Toxicity - Single Exposure
TWA = Time weighted average
UN = United Nations
UVCB = Complex hydrocarbon substance
VOC = Volatile Organic Compound
vPvB = Very Persistent and Very Bioaccumulative
Varies = may contain one or more of the following 101316-69-2 / RRN 01-2119486948-13, 101316-70-5, 101316-71-6, 101316-72-7 / RRN 01-2119489969-06, 64741-88-4 / RRN

SECTION 16: Other information

01-2119488706-23, 64741-89-5 / RRN 01-2119487067-30, 64741-95-3 / RRN 01-2119487081-40, 64741-96-4/ RRN 01-2119483621-38, 64741-97-5 / RRN 01-2119480374-36, 64742-01-4 / RRN 01-2119488707-21, 64742-44-5 / RRN 01-2119985177-24, 64742-45-6, 64742-52-5 / RRN 01-2119467170-45, 64742-53-6 / RRN 01-2119480375-34, 64742-54-7 / RRN 01-2119484627-25, 64742-55-8 / RRN 01-2119487077-29, 64742-56-9 / RRN 01-2119480132-48, 64742-57-0 / RRN 01-2119489287-22, 64742-58-1, 64742-62-7 / RRN 01-2119480472-38, 64742-63-8, 64742-64-9, 64742-65-0 / RRN 01-2119471299-27, 64742-70-7 / RRN 01-2119487080-42, 72623-85-9 / RRN 01-2119555262-43, 72623-86-0 / RRN 01-2119474878-16, 72623-87-1 / RRN 01-2119474889-13, 74869-22-0 / RRN 01-2119495601-36, 90669-74-2 / RRN 01-2119970171-43

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
Not classified.	

Full text of abbreviated H statements Not applicable.

Full text of classifications [CLP/GHS] Not applicable.

History

Date of issue/ Date of revision 10/10/2018.

Date of previous issue 10/10/2018.

Prepared by Product Stewardship Group

Indicates information that has changed from previously issued version.

Notice to reader

All reasonably practicable steps have been taken to ensure this data sheet and the health, safety and environmental information contained in it is accurate as of the date specified below. No warranty or representation, express or implied is made as to the accuracy or completeness of the data and information in this data sheet.

The data and advice given apply when the product is sold for the stated application or applications. You should not use the product other than for the stated application or applications without seeking advice from BP Group.

It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. The BP Group shall not be responsible for any damage or injury resulting from use, other than the stated product use of the material, from any failure to adhere to recommendations, or from any hazards inherent in the nature of the material. Purchasers of the product for supply to a third party for use at work, have a duty to take all necessary steps to ensure that any person handling or using the product is provided with the information in this sheet. Employers have a duty to tell employees and others who may be affected of any hazards described in this sheet and of any precautions that should be taken. You can contact the BP Group to ensure that this document is the most current available. Alteration of this document is strictly prohibited.

SAFETY DATA SHEET

Propane

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier : Propane

Chemical name : propane

Other means of identification : Propyl hydride; n-Propane; Dimethyl methane; Bottled gas; propane in gaseous state; propane liquefied, n-Propane; Dimethylmethane; Freon 290; Liquefied petroleum gas; Lpg; Propyl hydride; R 290; C3H8; UN 1075; UN 1978; A-108; Hydrocarbon propellant.

Product type : Liquefied gas

Product use : Synthetic/Analytical chemistry.

Synonym : Propyl hydride; n-Propane; Dimethyl methane; Bottled gas; propane in gaseous state; propane liquefied, n-Propane; Dimethylmethane; Freon 290; Liquefied petroleum gas; Lpg; Propyl hydride; R 290; C3H8; UN 1075; UN 1978; A-108; Hydrocarbon propellant.

SDS # : 001045

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

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

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.
May form explosive mixtures with air.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leakage, eliminate all ignition sources.

Storage : Protect from sunlight. Store in a well-ventilated place.

Section 2. Hazards identification

Disposal : Not applicable.

Hazards not otherwise classified : Liquid can cause burns similar to frostbite.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : propane

Other means of identification : Propyl hydride; n-Propane; Dimethyl methane; Bottled gas; propane in gaseous state; propane liquefied, n-Propane; Dimethylmethane; Freon 290; Liquefied petroleum gas; Lpg; Propyl hydride; R 290; C3H8; UN 1075; UN 1978; A-108; Hydrocarbon propellant.

Product code : 001045

CAS number/other identifiers

CAS number : 74-98-6

Ingredient name	%	CAS number
Propane	100	74-98-6

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

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

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

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Wash contaminated skin with soap and water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if adverse health effects persist or are severe. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. 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. As this product rapidly becomes a gas when released, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Section 4. First aid measures

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:, frostbite

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:, frostbite

Ingestion : Adverse symptoms may include the following:, frostbite

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

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

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

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. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

Section 6. Accidental release measures

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

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

Methods and materials for containment and cleaning up

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

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

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Propane	**NIOSH REL (United States, 10/2016).** TWA: 1800 mg/m³ 10 hours. TWA: 1000 ppm 10 hours. **OSHA PEL (United States, 5/2018).** TWA: 1800 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 1800 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. **ACGIH TLV (United States, 3/2019). Oxygen Depletion [Asphyxiant]. Explosive potential.**

Section 8. Exposure controls/personal protection

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

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

Individual protection measures

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

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Thermal hazards : If there is a risk of contact with the liquid, all protective equipment worn should be suitable for use with extremely low temperature materials.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas.

Color : Colorless.

Odor : Odorless.BUT MAY HAVE SKUNK ODOR ADDED.

Odor threshold : Not available.

pH : Not available.

Melting point : -187.6°C (-305.7°F)

Boiling point : -42.1°C (-43.8°F)

Section 9. Physical and chemical properties

Critical temperature : 96.55°C (205.8°F)

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

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 1.8%
Upper: 8.4%

Vapor pressure : 109 (psig)

Vapor density : 1.6 (Air = 1)

Specific Volume (ft ^{3}/lb) : 8.6206

Gas Density (lb/ft ^{3}) : 0.116 (25°C / 77 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.0244 g/l

Partition coefficient: n-octanol/water : 1.09

Auto-ignition temperature : 287°C (548.6°F)

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 44.11 g/mole

Aerosol product

Heat of combustion : -46012932 J/kg

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow gas to accumulate in low or confined areas.

Incompatible materials : Oxidizers

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:, frostbite

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:, frostbite

Ingestion : Adverse symptoms may include the following:, frostbite

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

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Section 11. Toxicological information

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Propane	1.09	-	low

Mobility in soil

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

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

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1978	UN1978	UN1978	UN1978	UN1978
UN proper shipping name	PROPANE SEE ALSO PETROLEUM GASES, LIQUEFIED	PROPANE	PROPANE SEE ALSO PETROLEUM GASES, LIQUEFIED (propane)	PROPANE	PROPANE
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Limited quantity**
Yes.

Packaging instruction
Passenger aircraft
Quantity limitation: Forbidden.

Cargo aircraft
Quantity limitation: 150 kg

Special provisions
19, T50

For domestic transportation only, UN1075 may be substituted for the UN number shown as long as the substitution is consistent on package markings, shipping papers, and emergency response information. See 49 CFR 172.102 Special Provision 19.
Containers of NON-ODORIZED liquefied petroleum gas must be marked either NON-ODORIZED or NOT ODORIZED as of September 30, 2006. [49 CFR 172.301(f), 326(d), 330(c) and 338(e)]

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
Explosive Limit and Limited Quantity Index 0.125
ERAP Index 3000
Passenger Carrying Vessel Index 65
Passenger Carrying Road or Rail Index Forbidden
Special provisions 29, 42

IATA : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: 150 kg.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 14. Transport information

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

Clean Air Act (CAA) 112 regulated flammable substances: propane

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

This product does not require a Safe Harbor warning under California Prop. 65.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

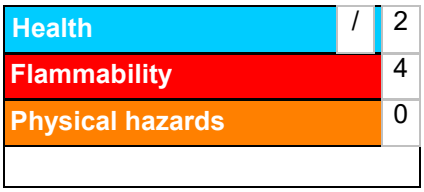
Europe : This material is listed or exempted.

Section 15. Regulatory information

Japan	:	**Japan inventory (ENCS)**: This material is listed or exempted. **Japan inventory (ISHL)**: This material is listed or exempted.
New Zealand	:	This material is listed or exempted.
Philippines	:	This material is listed or exempted.
Republic of Korea	:	This material is listed or exempted.
Taiwan	:	This material is listed or exempted.
Thailand	:	Not determined.
Turkey	:	This material is listed or exempted.
United States	:	This material is active or exempted.
Viet Nam	:	This material is listed or exempted.

Section 16. Other information

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



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE GASES - Category 1 GASES UNDER PRESSURE - Liquefied gas	Expert judgment Expert judgment

History

Date of printing	:	11/15/2020
Date of issue/Date of revision	:	11/15/2020
Date of previous issue	:	10/5/2020
Version	:	1.02

Section 16. Other information

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Other special considerations : The information below is given to call attention to the issue of “Naturally occurring radioactive materials”. Although Radon-222 levels in the product represented by this MSDS do not present any direct Radon exposure hazard, customers should be aware of the potential for Radon daughter build up within their processing systems, whatever the source of their product streams. Radon-222 is a naturally occurring radioactive gas which can be a contaminant in natural gas. During subsequent processing , Radon tends to be concentrated in Liquefied Petroleum Gas streams and in product streams having a similar boiling point range. Industry experience has shown that this product may contain small amounts of Radon-222 and its radioactive decay products, called Radon “daughters”. The actual concentration of Radon-222 and radioactive daughters in the delivered product is dependent on the geographical source of the natural gas and storage time prior to delivery. Process equipment (i.e. lines, filters, pumps and reaction units) may accumulate significant levels of radioactive daughters and show a gamma radiation reading during operation. A potential external radiation hazard exists at or near any pipe valve or vessel containing a Radon enriched stream, or containing internal deposits of radioactive material due to the transmission of gamma radiation through its wall. Field studies reported in the literature have not shown any conditions that subject workers to cumulative exposures in excess of general population limits. Equipment emitting gamma radiation should be presumed to be internally contaminated with alpha emitting decay products which may be a hazard if inhaled or ingested. Protective equipment such as coveralls, gloves, and respirator (NIOSH/MHSA approved for high efficiency particulates and radionuclides, or supplied air) should be worn by personnel entering a vessel or working on contaminated process equipment to prevent skin contamination, ingestion, or inhalation of any residues containing alpha radiation. Airborne contamination may be minimized by handling scale and/or contaminated materials in a wet state.

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.

golder.com

REPORT

Waste Management Plan

Technical Scope of Work - West Channel, Camp Farewell and Unipkat I-22

Submitted to:

Shell Canada Limited

400 - 4th Avenue SW, P.O. Box 100, Station M
Calgary, Alberta T2P 4C3

Submitted by:

Golder Associates Ltd.
2800, 700 - 2nd Street SW, Calgary, Alberta, T2P 2W2, Canada

+1 403 299 5600

20360899

June 3, 2022

Distribution List

1 electronic copy: Shell Canada Limited

1 electronic copy: Golder Associates Ltd.

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FIGURES

APPENDIX

1.0 NAME AND CONTACT OF THE LICENSEE

Licensee:

Shell Canada Energy

400 4th Ave SW, P.O. Box 100 Station M,

Calgary, Alberta T2P 2H5

Key Contact:

Christopher Boyd

Environmental Project Manager

Telephone: 403-691-2855

Email: Christopher.Boyd@shell.com

2.0 GEOGRAPHIC OUTLINE OF THE AREA COVERED BY THE WMP

West Channel, a former staging and storage location to support Shell's local seismic exploration activities, is approximately 37 kilometres (km) northwest of Aklavik on Inuvialuit private land in the Mackenzie Delta. Camp Farewell, a former staging and storage location to support Shell's Mackenzie Delta drilling program, is approximately 150 km northwest of Inuvik, Northwest Territories (NWT) in the Inuvialuit Settlement Region (ISR) on crown land within the Kendall Migratory Bird Sanctuary. Unipkat I-22, an exploratory natural gas well initially drilling in the 1970s, is approximately 115 km northwest of Inuvik, NT on ISR public land in the Mackenzie Delta on the north bank of the Arvoknar Channel. The proposed Site setups are provided in Figures 1 to 3.

The work being completed at West Channel and Unipkat I-22 do not require a water licence as there will be no direct use of water or disposal of waste at these sites.

3.0 DESCRIPTION OF THE OPERATION AND FACILITIES COVERED BY THE WASTE MANAGEMENT PLAN

3.1 Introduction and Project Details

Golder Associates Ltd. (Golder) is Principal Contractor to Shell Canada Limited (Shell) to complete environmental services at the West Channel, Camp Farewell and Unipkat I-22 sites in the NWT. This Waste Management Plan (WMP) has been prepared by Golder for the project and describes Golder's approach for waste management. Camp Farewell is operating under Inuvialuit Water Board (IWB) Water Licence NL71-1834 which requires a plan to address waste generated by the barge during the project activities, as per Part D, Item 16 of the licence.

The duration of the 2022 West Channel, Camp Farewell and Unipkat I-22 environmental site assessment programs is approximately 60 days. On-site personnel will be accommodated in a barge camp that will be anchored at the West Channel and Camp Farewell sites for the duration of the activities. It is anticipated that approximately 10 personnel will be stationed on the barge at any given time. The barge camp being utilized for the Project can accommodate up to 80 people and consists of living quarters with kitchen, dining room, washrooms, laundry and recreational rooms.

The barge camp will be anchored to an existing bollard as well as to two deadman anchors at the barge landing area.

3.2 Objectives

The objective of the WMP is to be in compliance with Parts D and F of IWB licence NL71-1834, and it will apply to personnel involved in the generation, treatment, handling, transport and disposal of waste materials for the 2022 Camp Farewell project. The work being completed at Unipkat I-22 will be conducted as day trips from the barge at Camp Farewell and any waste generated will be removed from Unipkat I-22 for disposal via the barge camp at Camp Farewell. The waste management plan for work being completed at West Channel will be consistent with the proposed plan for Camp Farewell, as described in this WMP.

This WMP characterizes the waste present on-site and the most effective ways to dispose of the waste generated during the 2022 summer program. On-site personnel will be accommodated in a barge camp that will be anchored at the West Channel and Camp Farewell sites for the duration of the work.

4.0 DESCRIPTION OF TREATMENT AND DISPOSAL TECHNOLOGY AND FACILITIES

No waste generated by barge camp operations, drilling or groundwater sampling activities will be treated or disposed of at the Site. Waste generated will be removed for off-site disposal as described in following sections.

At Camp Farewell, the former sewage lagoon was excavated and backfilled in 2013. Other Site infrastructure was decommissioned between 2014 and 2019, except for an emergency shelter, which has been left for use by the local community.

5.0 TYPES AND ESTIMATED QUANTITY OF WASTES TO BE GENERATED OR MANAGED

5.1 Waste Definitions

Golder and its contractors are responsible for ensuring that all existing and generated wastes are properly identified, characterized and classified as hazardous or non- hazardous and to develop safe and efficient handling strategies that assure regulatory compliance. The WMP will be distributed to all personnel and regular tailgate meetings will stress the importance of Shell's waste management principles and the duties associated with waste segregation.

The following sections provide definitions on the different types of waste, and estimated quantity, that may be encountered while carrying out the project. Waste is defined as a product or substance that is no longer of any use to the project and is intended for disposal.

5.1.1 Solid Waste

Solid waste generated from the operation of the barge camp during the project is expected to include kitchen waste and general refuse (domestic waste). Domestic waste will be stored in garbage bins on the barge, which, once full, will be transferred to a metal container unit on the barge. This unit will be secured to prevent odours from attracting wildlife. Based on previous field programs at the site, it is estimated that the daily volume of domestic waste generated by the barge camp will be approximately 1 cubic metres per day (m^3/day). During the project, when the metal container unit becomes full, garbage will be removed and transported by boat to Inuvik where it will be disposed of at the Inuvik landfill.

5.1.2 Wastewater

Wastewater generated from the operation of the barge camp is expected to include grey water and sewage from the camp kitchen, laundry room and washrooms. Grey water and sewage will be stored in three combined grey and black (sewage) 4,000-litre (L) holding tanks on the barge. There is also a spacer barge with one 45,000-L tank for storage capacity, if required. Based on previous field programs at the site, it is estimated that the daily volume of wastewater generated by the barge camp will be approximately 4 m^3/day. Upon completion of the project, wastewater will be transported to Inuvik and disposed of at the Town of Inuvik sewage lagoon.

Purge water removed from groundwater monitoring wells during sampling will temporarily be stored in resealable waste drums on-site until the end of the program, then it will be removed for off-site disposal at the Town of Inuvik disposal facility.

5.1.3 Hazardous Waste

Hazardous waste generated from drilling activities such as waste oil, oil and fuel filters are expected throughout the project. All hazardous waste will be properly packed in approved transport containers and shipped to a licensed disposal site. E. Gruben's Transport Ltd. (EGT) will be responsible for the disposal of any hazardous waste generated during the Project.

5.1.4 Anticipated Waste

During the 2022 project duration, the following waste is anticipated to be generated during the Project:

- domestic non-hazardous waste (paper, food, tin cans, plastic packaging, metal and non-recyclable glass jars);
- commercial non-hazardous waste (plastic packaging, flagging tape, stakes and similar items);
- grey water, purge water and sewage waste;
- recyclable beverage containers; and
- grease, used oil, filters, rags, used spill containment kits and other equipment fluids.

6.0 ACTIONS TO BE TAKEN TO REDUCE, COLLECT, STORE, TREAT, REUSE, RECYCLE AND DISPOSE OF WASTES

This WMP incorporates the basic principles of waste management, which include source reduction, reuse, recycling/recovery, treatment and disposal. The project is committed to conducting operations within the accepted environmental standards of the construction industry and IWB licence NL71-1834. Management of waste is an important consideration of Shell's operations. Where possible, every effort is made to minimize waste production by incorporating the principles of waste: Reduction, Reuse, Recycle and Recover.

- Source reduction includes the elimination or reduction of the volume or toxicity of waste by adopting practical methods such as using alternative materials or processes. This principle can be achieved by material elimination, inventory control and management, material substitution, process modification and improved housekeeping, maintenance and training.
- Reuse is achieved by using a product more than once for the same application or different purposes. Reusing materials such as certain food and beverage containers, pallets, etc., can reduce the amount of waste generated.

- Recycling/recovery of products that typically have one use is an excellent method of reducing the volume of waste generated at a worksite, sorting products so they can be managed in bulk eliminates the need for additional handling and allows for different products to be managed by efficient recycling processes.
- Disposal of waste is considered the final option for waste management. When disposing of waste, the type of waste, volume, location and final containment must be considered. The waste disposal options available to this Project include licensed off-site solid waste sites and municipal sewage lagoons.

7.0 TREATMENT, EFFLUENT AND WASTE QUALITY STANDARDS TO BE ACHIEVED

No waste generated by barge camp operations, drilling or groundwater sampling activities will be treated or released on the barge or the Site.

8.0 FINAL WASTE DISPOSAL OR REUSE METHODS AND LOCATIONS

8.1 Non-Hazardous Commercial and Domestic Waste

Non-hazardous industrial and domestic waste will consist of paper, food, tin cans, plastic packaging, metal and non-recyclable glass jars. Waste will be stored onboard the barge camp and will be periodically transported and disposed of at a licensed landfill facility. Other non-hazardous commercial waste is expected to be composed of plastic packaging, flagging tape, stakes and similar items. All waste and debris will be collected daily and stored temporarily in wildlife proof containers and regularly transported to an approved landfill (e.g., the Town of Inuvik Solid Waste Disposal Facility). Shell received approval from the Town of Inuvik to accept non-hazardous solid waste (Appendix A).

8.2 Grey Water and Sewage Waste

Grey water and sewage waste will be stored onboard the barge camp and will be transferred to the Town of Inuvik sewage lagoon at the end of each season or once the Project is completed. Shell received approval from the Town of Inuvik to accept domestic sewage water (Appendix A).

8.3 Recyclables

All personnel will be made aware of the recycling program and notes will be posted in the camp. Recyclable beverage containers will be collected in clearly labelled containers. Recyclables will be collected and transported to the bottle depot in the community of Inuvik.

8.4 Hazardous Waste

The Government of Northwest Territories Environment and Natural Resources, Environmental Protection Section developed a Guideline for the General Management of Hazardous Waste in the NWT, which outlines the registration and tracking of generators, carriers and receivers of hazardous waste in the NWT. Golder's subcontractor, EGT, will be responsible for any hazardous waste generated during the project and will provide a copy to Golder.

9.0 OPERATOR QUALIFICATIONS AND TRAINING

On-site personnel will receive basic waste management training as part of their orientation. Personnel managing waste will be certified in Workplace Hazardous Material Information System and Transportation of Dangerous Goods.

10.0 REPORTING

An annual report detailing the waste types, volumes and final disposals of the 2022 Project at Camp Farewell will be submitted to the IWB by March 31, 2023, in accordance with Water Licence N7L1-1834.

Figure 1: West Channel 2022 Proposed Camp Layout

Legend

- Proposed Barge Camp Location - to be confirmed by boat captain in the field
- Proposed Spacer Barge Location - to be confirmed by boat captain in the field
- Proposed Emergency Boat Location - to be confirmed by boat captain in the field
- Proposed After Hour Recreation Area – to be confirmed based on barge location in the field
- Estimated Muster Point – to be confirmed based on water level and docking location

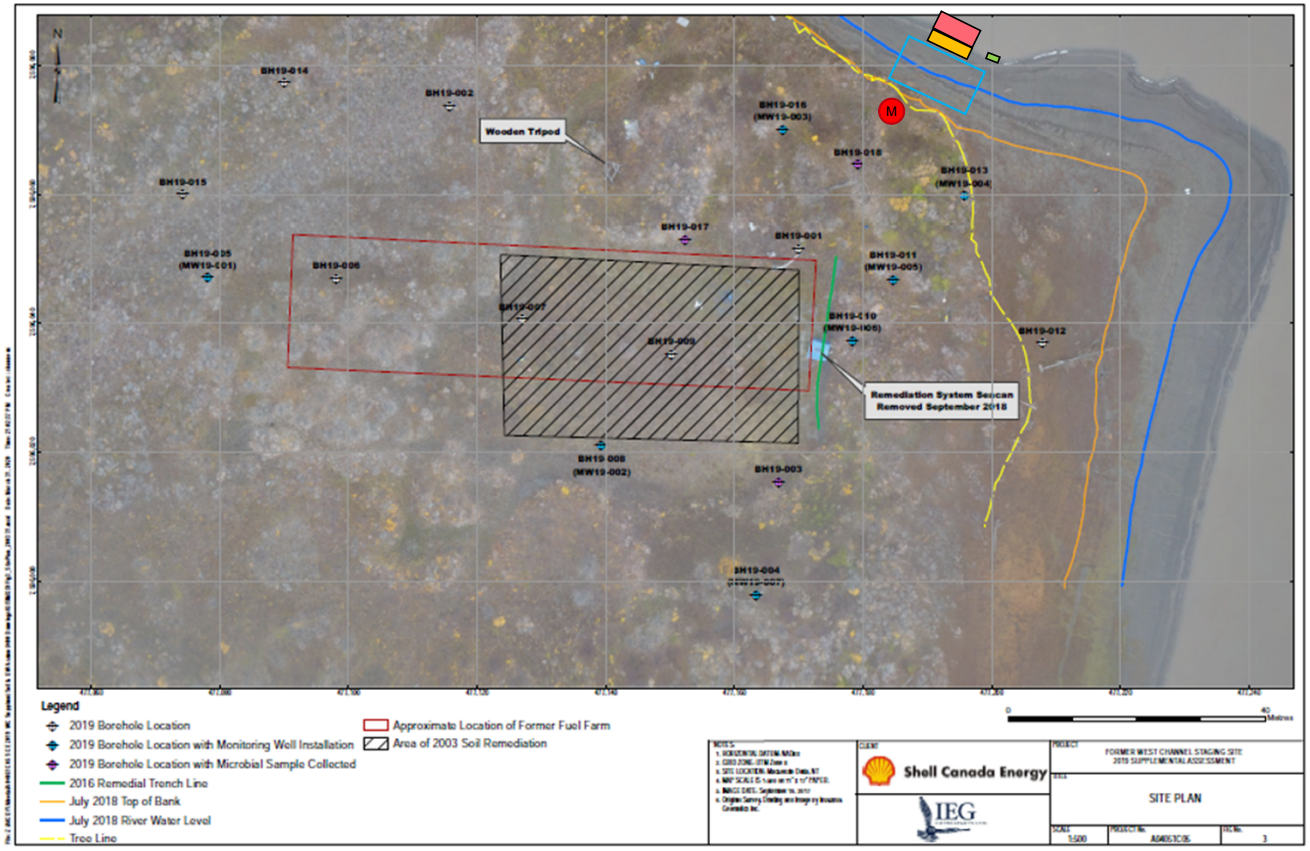


Figure 2: Camp Farewell 2022 Proposed Camp Layout

Legend

- Barge Camp
- Spacer Barge
- Emergency Boat
- Proposed After Hour Recreation Area
- Emergency Shack
- Estimated Muster Point
- Emergency Helicopter Landing Area
- Helicopter Refueling Area

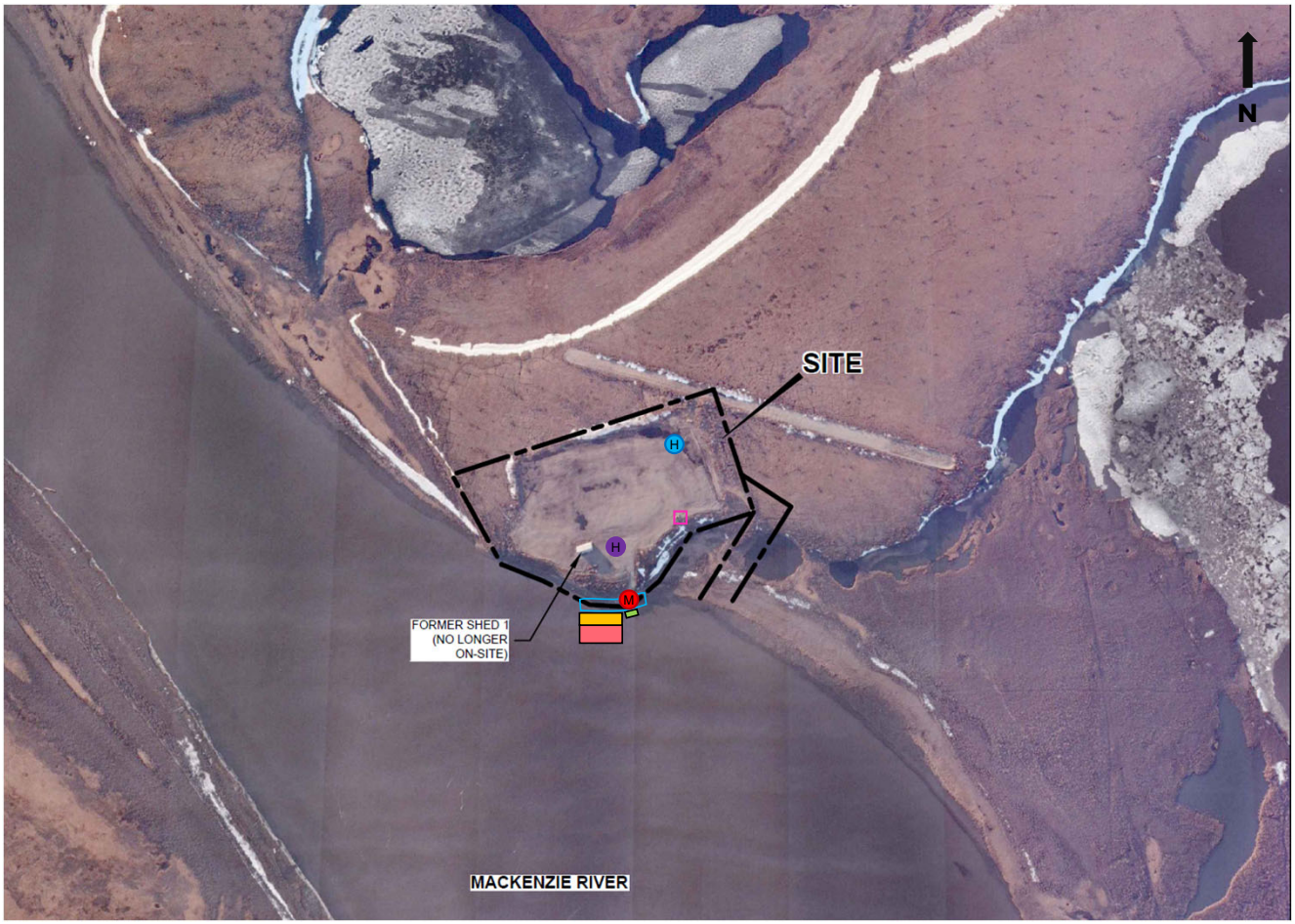
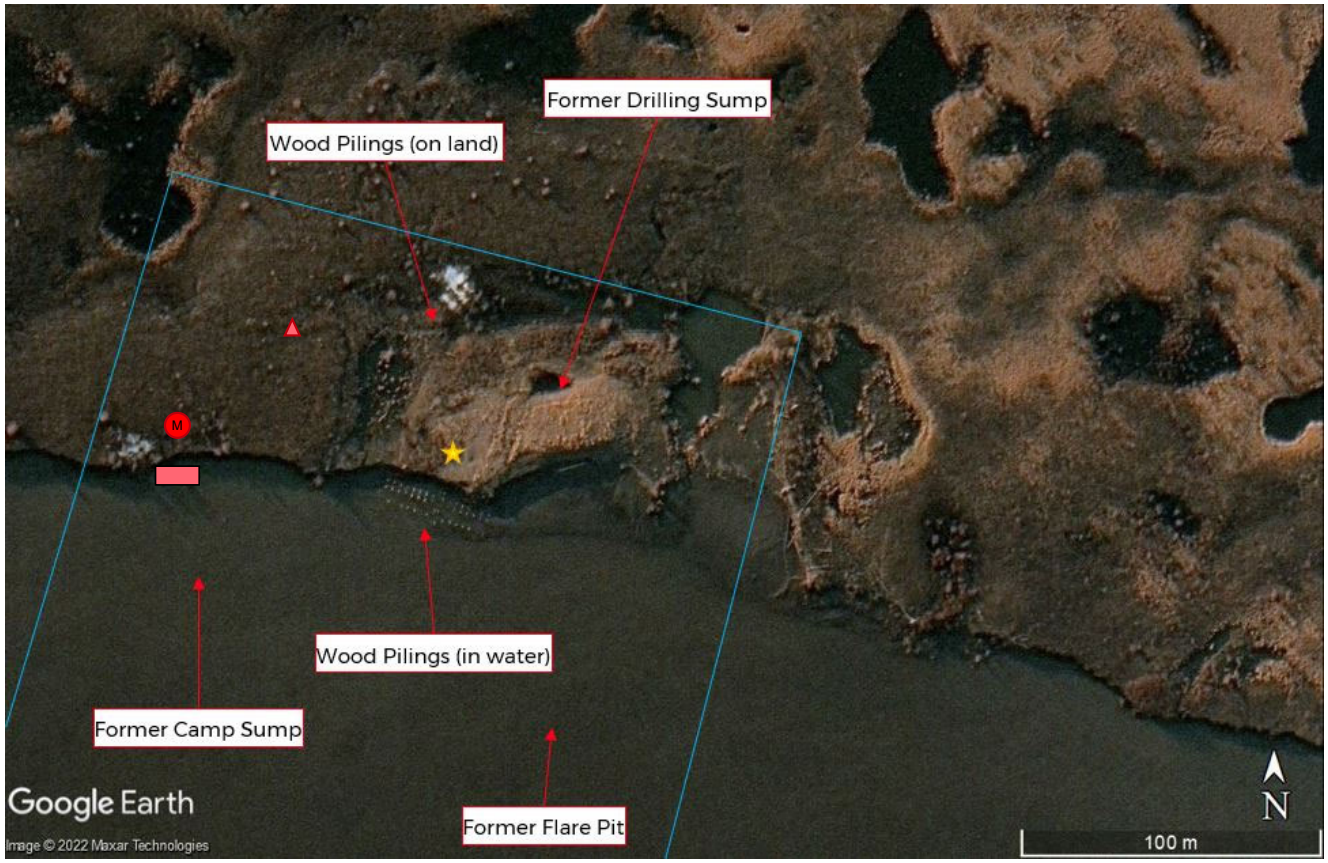


Figure 3: Unipkat I-22 2022 Proposed Access

Legend

- Well Centre (approximate)
- Lease Boundary (approximate)
- Proposed spill response kit and fuel storage (additional spill kit to be moved adjacent to immediate work areas) – to be confirmed in the field
- Proposed Docking Location – to be confirmed by boat captain in the field
- Estimated Muster Point – to be confirmed based on water level and docking location



APPENDIX A

Town of Inuvik Waste Acceptance Letter

TOWN OF INUVIK
2 FIRTH ST, PO BOX 1160
INUVIK NT X0E 0T0

P 867.777.8600
F 867.777.8601
WWW.INUVIK.CA

May 30, 2022

WSP Golder
201 Brownlow Avenue
Suite 26
Dartmouth, NS B3B 1W2

Attention: Ms. Stephanie Villeneuve

Re: Use of Sewage and Solid Waste Dumping Facilities for Camp Farewell Water License (N7L1-1834)

Ms. Villeneuve:

Please be advised that the Town of Inuvik acknowledges that Golder Associates may use the above-mentioned facilities in conjunction with the Camp Farewell Water License (N7L1-1834). As part of this approval Golder Associates or any contractor working on their behalf has acknowledged that there will be a fee for use of these facilities. In addition, they shall inform the Town of Inuvik Director of Public Services when they are to make use of the sewage dumping facility and report the volume of sewage brought in from this project.

The Town will accept in principle the above-mentioned products provided they follow the guidelines and fees as set out in the various Town of Inuvik by-laws. All the waste must be domestic use type only. None of it shall contain any drilling or industrial type waste.

We are required as part of our water license to account for these types of additional wastes entering our sewage lagoon and solid waste site, respectively.

If you have any questions or concerns, please do not hesitate to contact me. Thank-you in advance for your cooperation.

Regards

Town of Inuvik

Grant Hood
Senior Administrative Officer

CC: Rick Campbell – Town of Inuvik – Director of Public Services

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