

# Field Emergency Response Plan

Midwest Region Response Zone #3145



Version: Core 10.0 | Annex 10.0  
2022-2023

**Effective 2022-2023   Version: Core 10.0 | Annex 10.0**

**© Enbridge Pipelines Inc.**

This material is protected by copyright and is the exclusive property of Enbridge Pipelines Inc. and its affiliates. No external distribution or transmission of this material is permitted without the prior written consent of Enbridge Pipelines Inc. Applications for the copyright holder's written permission to reproduce any part of this publication should be addressed to the Law Department of Enbridge Pipelines Inc. at Enbridge Center, Suite 330, 10180 - 101 Street, Edmonton, AB T5J 3S4. Enbridge Pipelines Inc. assumes no responsibility for errors or omissions in this document or for direct, incidental or consequential losses or damages that may result from the external use or duplication of this material.





Table of Contents

Page

**INCIDENT COMMAND SYSTEM FORMS ..... 1**

ICS 201-1 Incident Briefing ..... 4

ICS 201-2 Summary of Current Actions ..... 5

ICS 201-3/207 Current Organization Chart ..... 6

ICS 201-4 Resource Summary ..... 7

ICS 201-5 Site Safety and Control Analysis ..... 8

ICS 214a Individual Logs ..... 9

**1.0 Initial Response Actions ..... 1**

1.1 Enbridge First Responder Checklist ..... 1

1.2 Initial Emergency Reporting Contacts ..... 3

1.3 Regional Management/Regional On-Call ..... 4

1.4 Federal Emergency Reporting Contacts ..... 5

1.5 Emergency Definition / Confirmation ..... 6

1.6 Emergency Response Phases ..... 6

1.7 Emergency Shutdown ..... 10

1.8	<i>Responsibilities .....</i>	11
1.9	<i>Response Considerations.....</i>	12
1.10	<i>Emergency Classification and Tiered Response .....</i>	13
1.11	<i>Emergency Classification and Tiered Response Chart.....</i>	14
<b>2.0</b>	<b>notifications overview .....</b>	<b>19</b>
2.1	<i>Emergency Notifications / Activation .....</i>	19
2.2	<i>Incident Observer.....</i>	20
2.3	<i>Control Center Operations.....</i>	21
2.4	<i>Enbridge First Responder / Field Response Team / Initial Incident Commander .....</i>	22
2.5	<i>Regional Management / Regional On-Call .....</i>	23
2.6	<i>Incident Management Team / Incident Support Team.....</i>	25
2.7	<i>Midwest Emergency Notification Chart.....</i>	26
2.8	<i>External Notifications .....</i>	27



**3.0 Incident Reporting.....28**

3.1 *Required Notifications / Emergency Contacts.....28*

3.2 *Incident Management Team List.....32*

3.3 *Regulatory Required Leak Notifications .....36*

3.4 *Emergency Services Contacts – Minnesota .....42*

3.5 *Emergency Services Contacts – North Dakota & Montana .....49*

3.6 *Emergency Services Contacts – Wisconsin .....56*

3.7 *Notification Agreements.....66*

3.8 *Emergency Services Contacts – Miscellaneous Agencies.....68*

3.9 *Emergency Services Contacts – Federal Agencies.....69*

3.10 *TJ Pounder Tanks at Superior Terminal (Tank 28 & 29).....72*

**4.0 Response Zone Description (Information Summary) .....73**

4.1 *Midwest Region.....73*

4.2 *Midwest Region Pipeline Information .....73*

Table 1- Midwest Pipeline Segments-Active .....	74
Table 2- Pipelines Beginning and Ending Stationing-Active .....	76
Table 3- North Dakota Region Deactivated Pipelines/ Out –of-Service Pipelines.....	82
Table 4- Tank Tables.....	83
4.3 Region Overview Map .....	86
<b>5.0 Spill / Site Assessment / Product Information .....</b>	<b>87</b>
5.1 Hazardous Product – Site Assessment.....	87
5.1.1 Crude Oil Leaks .....	88
5.1.2 NGL Leaks.....	89
5.1.3 Refined Products and Condensates .....	90
5.1.4 Natural Gas .....	90
5.2 Site Assessment Checklist .....	91
5.4 On-Water Spill Surveillance .....	92
5.5 Spill Volume Estimation .....	93
5.6 Methods for Estimating Spill Size .....	96
5.7 Spill Volume Estimates Checklist .....	99
5.8 Site Security and Control.....	101

5.9	Setting Up 'On-Site' Work Areas.....	102
5.9.1	Protective Zones .....	103
	Figure 1: Protective Zones .....	104
5.9.2	Isolation Distance.....	105
<b>6.0</b>	<b>Evacuation / Shelter in Place.....</b>	<b>108</b>
6.1	Personnel Evacuation .....	108
6.2	Community Evacuation.....	110
6.3	Shelter in Place .....	111
<b>7.0</b>	<b>Response Operations .....</b>	<b>113</b>
7.1	Enbridge Response Management System .....	113
7.2	Incident Command Structure.....	115
7.3	Incident Management Handbook and Job Aids.....	116
7.4	Incident Command Posts .....	117
<b>8.0</b>	<b>Hazard specific response scenarios and actions.....</b>	<b>119</b>

<b>8.1 Facility Hazards .....</b>	<b>120</b>
8.1.1 Pipeline Release / Line Strike .....	121
8.1.2 Equipment Failure .....	122
8.1.3 Piping Rupture / Leak .....	123
8.1.4 Tank Failure .....	124
8.1.5 Fire or Explosion .....	125
8.1.6 Manifold Failure .....	127
8.1.7 Radioactive Source Emergencies .....	128
8.1.8 Hot Bitumen Incident .....	129
8.1.9 Natural Gas Liquid Incident .....	132
<b>8.2 Natural Hazards .....</b>	<b>136</b>
8.2.1 Wildfire .....	136
8.2.2 Earthquake .....	138
8.2.3 Flooding .....	139
8.2.4 Tornado .....	140
8.2.5 Medical Emergencies .....	141
<b>8.3 Security Hazards .....</b>	<b>142</b>
8.3.1 Security Classification .....	144
8.3.2 Threat Level Escalation Process .....	145
8.3.3 Threat Response Actions .....	145
8.3.4 STRP Threat Level Implementation .....	146



<b>9.0</b>	<b>Environmental Response.....</b>	<b>147</b>
9.1	<i>Wildlife Management.....</i>	<i>148</i>
<b>10.0</b>	<b>Protection, Containment and Recovery .....</b>	<b>149</b>
10.1	<i>Control Points .....</i>	<i>150</i>
10.2	<i>Inland Spill Response Tactics Guide .....</i>	<i>151</i>
10.3	<i>Submerged Oil Content.....</i>	<i>153</i>
10.4	<i>Shoreline and Terrestrial Operations .....</i>	<i>154</i>
10.5	<i>In-Situ Burning .....</i>	<i>156</i>
10.5.1	Evaluation.....	157
10.5.2	Request Process and Approval Procedure .....	159
10.5.3	Plume Dispersion Modeling .....	161
10.5.4	Monitoring .....	162
10.5.5	Product Characteristics and Considerations .....	163
10.5.6	Ignition Considerations and Procedure.....	164
10.6	<i>Bioremediation .....</i>	<i>168</i>
10.6.1	Bioremediation Evaluation.....	169

10.7	<i>Freshwater Biological Disinfection</i> .....	170
10.7.1	Disinfection Procedures .....	173
10.8	<i>Decontamination</i> .....	176
10.8.1	Decontamination Procedures .....	178
10.8.2	Decontamination Corridor Set Up.....	180
	<i>Figure 2: Decon Corridor</i> .....	180
10.8.3	Decontamination Trailers.....	181
10.9	<i>Demobilization</i> .....	183
<b>11.0</b>	<b>Local Spill Response Equipment .....</b>	<b>185</b>
11.1	<i>Midwest Region Response Equipment</i> .....	185
11.2	<i>Enbridge Equipment Locations</i> .....	200
11.3	<i>Spill Response Organizations (External Locations)</i> .....	201
11.4	<i>Emergency Response Time Maps</i> .....	205
11.5	<i>Conversion Table</i> .....	208
<b>12.0</b>	<b>Safety Data Sheets .....</b>	<b>210</b>

## INCIDENT COMMAND SYSTEM FORMS

The Incident Briefing (ICS 201) provides the Incident Commander (and the Command and General Staff) with basic information regarding the incident situation and the resources allocated to the incident. In addition to a briefing document, the ICS 201 Forms also serve as an initial action worksheet. It serves as a permanent record of the initial response to the incident.

The ICS 201 package and the ICS 214a form included in this plan can serve as part of the initial Incident Action Plan (IAP); however, all forms (EM, ICP and ICS) are available to all staff:

- On the Governance Document Library (GDL) in the EM Forms view at:  
<https://esites.enbridge.com/sites/GDL/IMS07/Lists/GD%20Metadata/EM%20Forms.aspx>
- Offline, by clicking the START MENU on any work computers, and choosing the O&M Manuals – Emergency Management

Records will be made and kept as events occur that capture the following information:

- Notification
- Response Actions
- Communications with Non-Company Personnel
- List of All Persons On-Scene
- Costs Incurred

**FIELD EMERGENCY RESPONSE PLAN**

Effective 2022-2023

To be filled out in the reactive phase of a response. Electronic fillable forms are located on the Governance Documents Library, the *Operations & Maintenance Manuals* (OMM), and on the Incident Action Plan (IAP) software.

ICS 201-1	Incident Briefing
ICS 201-2	Summary of Current Actions
ICS 201-3/207	Current Organization
ICS 201-4	Resources Summary
ICS 201-5	Site Safety
ICS 214a	Individual Logs



## Incident Briefing Map/Sketch

ICS 201-1

<b>Incident:</b>	<b>Prepared By:</b>	<b>at:</b>
<b>Period:</b>	<b>Version Name:</b>	





## Summary of Current Actions

ICS 201-2

Incident:		Prepared By:		at:	
Period:		to		Version Name:	
<b>Incident Information</b>					
<b>Initial Incident Objectives</b>					
<b>Summary of Current Actions</b>					
<b>Date/Time</b>		<b>Action Notes</b>			





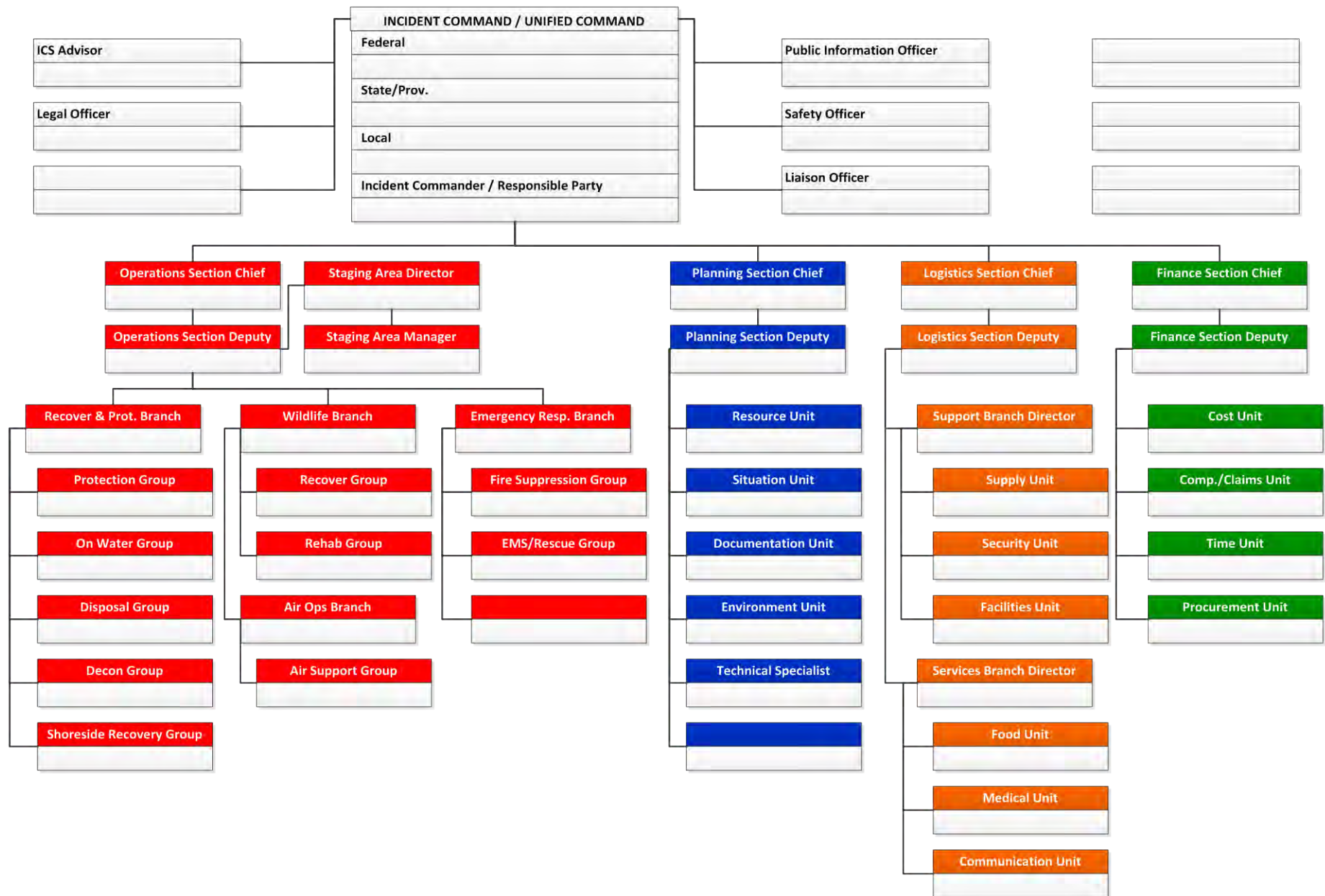
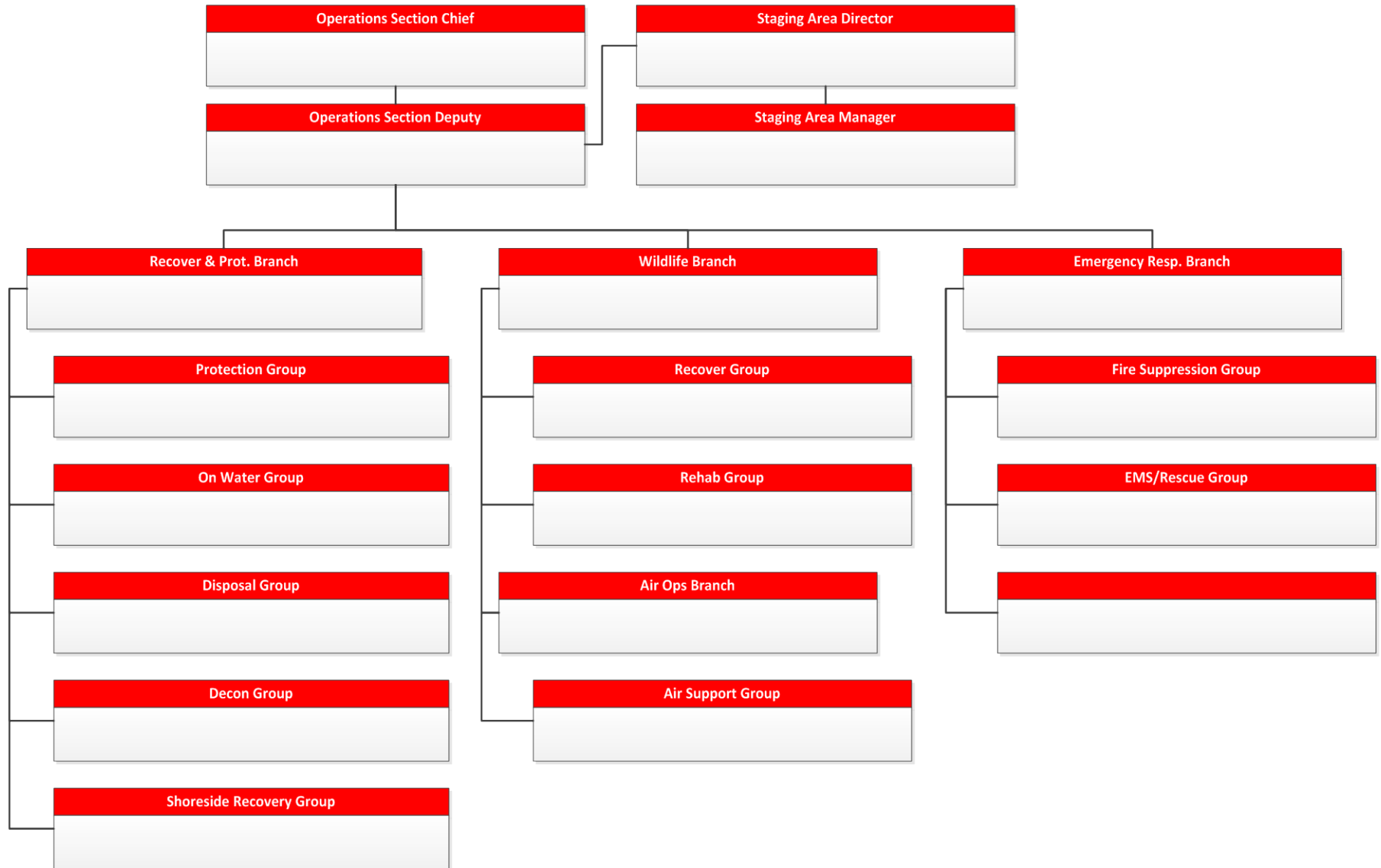


Illustration shows suggested ICS positions. ICS is scalable; the positions are filled according to the needs of the incident. If positions are not filled, the responsibility is assumed by the Section Chief or Incident Commander.



## Operations Section



Page 1 of 1  
VERSION 2: (Revised March 12, 2014)



**Site Safety and Control Analysis****ICS 201-5**

<b>Incident:</b>	<b>Prepared By:</b>	<b>at:</b>
<b>Period:</b>	<b>Version Name:</b>	
<b>Site Control</b>		
1. Is Site Control set up? <input type="checkbox"/> Yes <input type="checkbox"/> No	2. Is there an on-scene command post? <input type="checkbox"/> Yes <input type="checkbox"/> No If so, where?	
3. Have all personnel been accounted for? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know	Injuries: Unaccounted:	Fatalities: Trapped:
4. Are observers involved, or rescue attempts planned? Observers: <input type="checkbox"/> Yes <input type="checkbox"/> No Rescuers: <input type="checkbox"/> Yes <input type="checkbox"/> No	5. Are decon areas setup? <input type="checkbox"/> Yes <input type="checkbox"/> No If so, where?	
<b>Hazard identification, immediate signs of: (if yes, explain in Remarks)</b>		
1. Electrical line(s) down or overhead? <input type="checkbox"/> Yes <input type="checkbox"/> No	2. Unidentified liquid or solid products visible? <input type="checkbox"/> Yes <input type="checkbox"/> No	
3. Wind direction across incident: <input type="checkbox"/> Towards your position Wind Speed: <input type="checkbox"/> Away from your position	4. Is a safe approach possible? <input type="checkbox"/> Yes <input type="checkbox"/> No	
5. Odors or smells? <input type="checkbox"/> Yes <input type="checkbox"/> No	6. Vapors visible? <input type="checkbox"/> Yes <input type="checkbox"/> No	
7. Holes, ditches, fast water, cliffs, etc. nearby? <input type="checkbox"/> Yes <input type="checkbox"/> No	8. Fire, sparks, sources of ignition nearby? <input type="checkbox"/> Yes <input type="checkbox"/> No	
9. Is local traffic a potential problem? <input type="checkbox"/> Yes <input type="checkbox"/> No	10. Product placards, color codes visible? <input type="checkbox"/> Yes <input type="checkbox"/> No	
11. Other Hazards? <input type="checkbox"/> Yes <input type="checkbox"/> No	12. As you approach the scene from the upwind side, do you note a change in the status of any of the above? <input type="checkbox"/> Yes <input type="checkbox"/> No	
13. Remarks:		
<b>Hazard Mitigation: have you determined the necessity for any of the following?</b>		
1. Entry Objectives:		
2. Warning sign(s), barriers, color codes in place? <input type="checkbox"/> Yes <input type="checkbox"/> No		
3. Hazardous material being monitored? <input type="checkbox"/> Yes <input type="checkbox"/> No 3a. Sampling Equipment: 3b. Sampling location(s): 3c. Sampling frequency: 3d. Peak Reading: 3e. Personal exposure monitoring:		
4. Protective gear / level: 4b. Respirators: 4d. Boots:	4a. Gloves: 4c. Clothing: 4e. Chemical cartridge change frequency:	
5. Decon 5a. Instructions: 5b. Decon equipment and materials:		
6. Emergency escape route established? <input type="checkbox"/> Yes <input type="checkbox"/> No Route?		
7. Field responders briefed on hazards? <input type="checkbox"/> Yes <input type="checkbox"/> No		
8. Remarks:		

## Protective Zones: record initial control perimeters (see Figure 1)

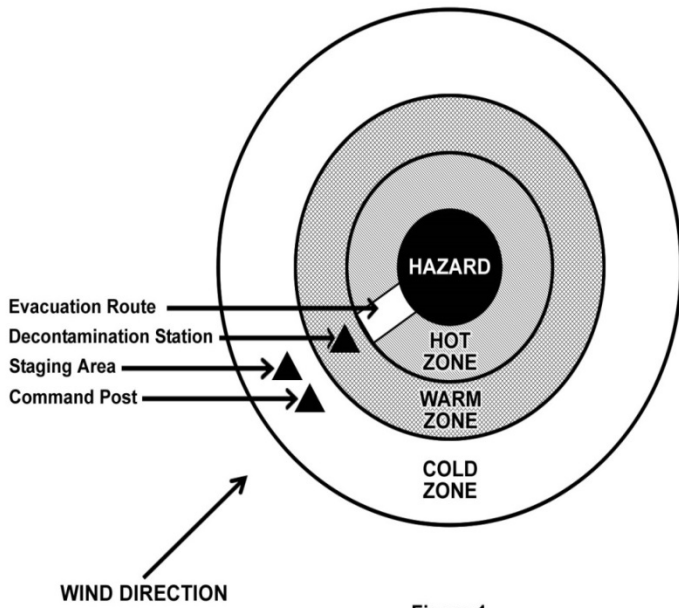


Figure 1  
Protective Zones

1. Is there a Hot Zone established? ☐ Yes ☐ No  
If so, where?

2. Is there a Warm Zone established? ☐ Yes ☐ No  
If so, where?

3. Is there a Cold Zone established? ☐ Yes ☐ No  
If so, where?

4. Remarks: (Include any information on evacuation route etc.)

5. Include any site sketches or photos of the protective zones (if available):



Retention: Retained in the Region Permanently

Page 1 of 1  
VERSION 2: (Revised March 12, 2014)







Retention: Retained in the Region Permanently

Page 1 of 1  
VERSION 2: (Revised March 12, 2014)



## 1.0 INITIAL RESPONSE ACTIONS

The following Initial response checklists are designed to promote safety and guidance for first responders and regional management.

### 1.1 Enbridge First Responder Checklist

To be used by the Enbridge First Responder | Initial Incident Commander for initial response actions.

Safety	
<input type="checkbox"/>	Stop work immediately if ongoing
<input type="checkbox"/>	Conduct Field Level Hazard Assessment
<input type="checkbox"/>	Wear appropriate PPE including a Four Head Gas Monitor
<input type="checkbox"/>	Approach the site from uphill, upwind, or upstream, only if safe to do so. If not safe, DO NOT approach
<input type="checkbox"/>	Eliminate all ignition sources
<input type="checkbox"/>	Assign a Safety Officer as soon as possible
Isolate	
<input type="checkbox"/>	Source Control – contact CCO to shutdown and isolate the system

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

<input type="checkbox"/>	Secure and restrict access to the site
<input type="checkbox"/>	Evacuate unnecessary personnel

## Notifications

<input type="checkbox"/>	Contact Regional Management and People Leader (Regional On-call)
<input type="checkbox"/>	Verify Control Center has been informed
<input type="checkbox"/>	Inform Public Affairs, Communications & Sustainability (PACS) Crisis Communications team

## Documentation

<input type="checkbox"/>	Review Hazard Specific Response Actions and Initial Response within the FERP
<input type="checkbox"/>	Document initial actions on 214a Individual Log (if applicable based on the Incident Classification)
<input type="checkbox"/>	Initiate ICS 201 packet
<input type="checkbox"/>	*ICS forms are required for incidents classified at Level 1-3, not an alert level

## Additional Considerations

<input type="checkbox"/>	Scene size up – estimate volume out to determine emergency level and tiered response actions
<input type="checkbox"/>	If applicable, work with the external first responding agency on scene to ensure a coordinated response

1.2 Initial Emergency Reporting Contacts

Edmonton Control Center	1-800-858-5253 US Regions
Enbridge Media Hotline	1-888-992-0997
Public Information Officer	1-866-761-5400 (leave a voicemail) or email <a href="mailto:ccrt@enbridge.com">ccrt@enbridge.com</a>
Security Reporting	1-844-786-8305

### 1.3 Regional Management/Regional On-Call

To be used by Regional Management/Regional On-Call for initial response actions.

#### Activate Response Plan(S)

<input type="checkbox"/>	Integrated Contingency Plan
<input type="checkbox"/>	Field Emergency Response Plan
<input type="checkbox"/>	Any other relevant company documents ( <i>Incident Management Handbook, Inland Response Tactics Guide, Control Points, OMMs, Safety Procedures etc.</i> )

#### Internal Notifications

<input type="checkbox"/>	Activate Support Services (Safety, Compliance, Public Awareness, Environment, Security, Lands and ROW, and Emergency Management to assist prior to the Incident Command System structure being stood up)
<input type="checkbox"/>	Activate Field Response Team
<input type="checkbox"/>	Activate Incident Management Team, and put potential members on standby notice

**External Notifications**

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Engage Region Compliance to conduct federal regulatory notifications                     |
| <input type="checkbox"/> | Activate Spill Response Contractors (if needed)  |
| <input type="checkbox"/> | Review external stakeholder list in the <i>Notifications</i> section, notify as required |

**Documentation**

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Document initial actions on 214a Individual Log (if applicable based on the Incident Classification) |
| <input type="checkbox"/> | Begin the development of the Incident Action Plan  |

**1.4 Federal Emergency Reporting Contacts****Federal Regulatory Reporting**

1-800-424-8802 National Response Center  
1-819-997-7887 Transportation Safety Board Incident Line

Refer to OMM [Book 1: General Compliance, reference-02-02-12 Unexpected Operational Event Response](#) . Which applies to Regional Management On-Call Personnel in responding to certain unexpected operational events or leak triggers, such as restart of the line following investigation of an alarm that did not require activation of this plan.

## 1.5 Emergency Definition / Confirmation

Not all incidents, will result in an activation of the Emergency Response Plan for Enbridge Liquids Pipelines. An Emergency is defined as an unforeseen combination of circumstances or a disruption of normal operating conditions that poses a potential threat to human life, health, property, and/or the environment if not contained, controlled, or eliminated immediately. Emergency could include but not limited to:

- Death or injury requiring hospitalization
- Explosion or fire
- Leak, rupture, or spill
- Any significant event such as a natural disaster impacting operations that may threaten people, environment, assets, or reputation

Once an emergency has been confirmed, activate the Plan, and implement the appropriate notifications and response actions.

## 1.6 Emergency Response Phases

Emergency response can be divided into three distinct phases: Activation-Operations-Demobilization



Activation	
Control the Incident Site	<p>The incident scene must first be controlled to ensure a safe and effective response to any incident:</p> <ul style="list-style-type: none"><li>• Don't rush in; hazards must first be fully assessed</li><li>• Conduct vapour monitoring and confirm levels (H2S, LEL levels) are safe as approaching the incident site</li><li>• Establish and maintain an isolation perimeter, with hot, warm, and cold zones</li><li>• Establish communications with the Control Centre; request information regarding the situation (e.g., alarms, product, pipeline readings, shutdown actions and other relevant information)</li><li>• Establish an Incident Command Post, either at the incident scene location or, if necessary, at a remote location</li><li>• Establish staging area(s)</li></ul>
Size up the Situation	<p>A site assessment will identify the scope and nature of the incident, as well as any potential hazards to responders:</p> <ul style="list-style-type: none"><li>• Assess whether visual alarms have been activated</li><li>• Recognize and identify any hazardous materials involved</li><li>• Identify source of any releases</li><li>• Potential exposures</li></ul>
Evaluate the Hazards and Risks	<p>An assessment must be conducted to evaluate the level of risk to responders and the public:</p> <ul style="list-style-type: none"><li>• Assess health, physical and chemical hazards</li><li>• Gather technical data (SDSs, etc.)</li><li>• Conduct vapour monitoring</li></ul>

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Activation	
Select and Don Personal Protective Equipment (PPE)	<p>All incident responders must be protected with the appropriate PPE of the identified hazards. PPE includes but not limited to:</p> <ul style="list-style-type: none"><li>• Approved Fire-Resistant Coveralls</li><li>• Hard Hats (where overhead hazards are present)</li><li>• Gloves</li><li>• Rubber Steel-Toed Boots</li><li>• Also:<ul style="list-style-type: none"><li>○ All responders leaving the <i>Hot Zone</i> must go through a decontamination zone (<i>Warm Zone</i>) to ensure that contamination is not spread into the <i>Cold Zone</i>.</li></ul></li></ul>
Operations	
Manage Information and coordinate Resources	<p>It is essential that information flows quickly and freely to all resources to ensure a safe and coordinated response:</p> <ul style="list-style-type: none"><li>• Expand the Incident Command System as needed</li><li>• Ensure that all (internal and external) notifications are made</li><li>• Conduct briefings</li><li>• Confirm all communications to ensure that they are fully understood and implemented</li></ul>
Implement Response Objectives	<p>Once initial objectives have been established, it will be possible to develop, and implement, strategies and tactics to achieve these objectives. These may be:</p> <ul style="list-style-type: none"><li>• Offensive (i.e., emergency rescue, spill source control)</li><li>• Defensive (i.e., protecting the public, spill response)</li><li>• Non-intervention (protecting the public)</li></ul>

Activation	
Manage the Incident	<p>On larger incidents, it will be necessary to operate over a number of Operational Periods. In these cases, it will be necessary to fully-staff the Incident Management Team, especially the Planning Section:</p> <ul style="list-style-type: none"><li>• Establish Incident Objectives for each Operational Period</li><li>• Conduct Tactics and Planning Meetings</li><li>• Develop and approve Incident Action Plans</li><li>• Conduct Operations Briefings</li></ul>
Demobilization	
Terminate the Incident Response	<p>Once the response phase of the emergency is over, the Incident Commander will stand down the Incident Management Team and ensure that all post-incident activities are completed:</p> <ul style="list-style-type: none"><li>• Transition to, the recovery phase of the response</li><li>• Conduct an incident debrief</li><li>• Ensure that all incident documentation is completed</li><li>• Ensure that all equipment, and response management supplies are replenished</li><li>• Transition from Response Phase to Project Phase with adequate documentation and continue any required project phase activities, i.e., site remediation, repair to terminal assets</li></ul>

## 1.7 Emergency Shutdown

Upon verification of an emergency, shut down of assets is required until deemed safe for restart. Ensure the following actions are completed:

- Verify with the Control Center the line is shut down and isolated
- If the exact location of the release is unknown, the immediate supervisor will request an aerial patrol, or if conditions are favorable, a foot patrol, manpower might be used to walk the line

Once a leak site has been located, the following information is to be confirmed:

- Eliminate ignition sources
- Assess if water intakes are at risk
- Assess if public evacuation is required
- Restrict access to site:
  - Request support from law enforcement agencies
- Inform local response agencies and advise of the product characteristics and handling; precautions are described in the Safety Data Sheets
- Notify railroads or utility companies in the area

## 1.8 Responsibilities

Enbridge First Responder/Initial Incident Commander responsibilities:

### Internal Actions

<input type="checkbox"/>	Contact Control Center to isolate the system
<input type="checkbox"/>	Contact Regional Management and People Leader, see Regional Manager On Call Schedule if after hours.
<input type="checkbox"/>	Assume the role of Initial Incident Commander and assign a Safety Officer
<input type="checkbox"/>	Request support from other groups as required (Safety, Compliance, Public Awareness, Environment, Pipeline Integrity, and Emergency Management) to assist prior to the Incident Command System structure being stood up
<input type="checkbox"/>	Activate the Emergency Response Plan(s): <ul style="list-style-type: none"><li>• <i>Integrated Contingency Plan</i></li><li>• <i>Field Emergency Response Plan</i></li><li>• Any other relevant company documents (<i>OMMs: Safety Procedures</i> etc.)</li></ul>
<input type="checkbox"/>	Take measures to reduce to control the impact of the incident
<input type="checkbox"/>	If applicable, lock culverts/sewers, dam ditches, shut down ignition sources and maintain the safety of personnel involved in these activities

External Actions

<input type="checkbox"/>	If applicable, work with the external first responding agency on scene to ensure a coordinated response
<input type="checkbox"/>	If applicable, direct all media to the Public Information Officer, if not on site, see <i>Regional Communications</i> for actions

1.9 Response Considerations

The level of response is dependent upon few factors:

- severity of the release
- the size
- potential environmental, social, and economic impact
- the expected public interest in the event

Where response activities will require Ground Disturbance (defined as any work, operation or activity that results in the penetration of the ground to any depth), ensure that an Emergency One Call notification is placed to the applicable One Call Center and that all Ground Disturbance requirements are met for the duration of the response.

### 1.10 Emergency Classification and Tiered Response

The Response Organization is based on a three-tiered response structure. Not all criteria are required to determine a specific level. However, there may be instances where an aspect of the emergency is so significant, that it would result in an increase in the response level. The Incident Commander or designate is responsible for determining the level of the emergency. The decision to downgrade the emergency level will be made once the situation improves. The decision may be based on monitoring data, control/containment of the situation or reduced risk to the public or environment.

Where appropriate, the Incident Commander will invite the participation of Federal, Provincial/State, and local Agencies to form a Unified Command.

## 1.11 Emergency Classification and Tiered Response Chart

Condition	Alert Event	Level 1	Level 2	Level 3
General criteria	The Company investigates abnormal operating condition detected by the Control Center, or any reported or observed emergency or possible emergency, will be given an emergency status until the report is confirmed or negated	The Company has the capability to manage and control a Level 1 emergency using company resources available within the area. The First Responder will assume the Initial Incident Commander position until a transfer of command occurs.	The Company has the capability to manage and control a Level 2 emergency using company resources and expertise, with some assistance from local contractors. The Regional Director or alternate Qualified Individual will assume the Incident Commander position.	The Company may request assistance from other Industry, Municipal or State/Provincial Agency personnel to support the response to the incident. The Region Director or alternate Qualified Individual will assume the Incident Commander position.



## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Condition	Alert Event	Level 1	Level 2	Level 3
Threat to people / environment	<ul style="list-style-type: none"> <li>• No threat to people</li> <li>• Minimal area impact</li> </ul>	<ul style="list-style-type: none"> <li>• No immediate threat to people</li> <li>• No threat to facility infrastructure, no effects outside company property, very limited effects on pipeline right-of-way</li> <li>• Minimal impact on company property and no impact on public property</li> <li>• Minimal environmental impacts (including wildlife, ecosystems)</li> </ul>	<ul style="list-style-type: none"> <li>• Potential exists for injury/ threat to people</li> <li>• Offsite impact possible</li> <li>• Potential threat to company facility infrastructure, no immediate threat outside company property, moderate effect on pipeline ROW</li> <li>• Moderate environmental impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Fatality/ serious injury or illness and/or ongoing threat to public safety</li> <li>• Ongoing threat to facility infrastructure</li> <li>• High environmental impact</li> <li>• Potential for long-term or significant impact to operations (or no indication of how long impact may last)</li> </ul>
Containment & control	<ul style="list-style-type: none"> <li>• Immediate control at hand</li> <li>• Restricted to site</li> <li>• Low probability of escalation</li> <li>• No immediate impact to operations</li> </ul>	<ul style="list-style-type: none"> <li>• Control of released product pending</li> <li>• Minimal impact to operations</li> <li>• Typically, respond with existing resources</li> <li>• External resources may be required</li> </ul>	<ul style="list-style-type: none"> <li>• Limited or short-term impact to operations</li> <li>• External resources may be required</li> </ul>	<ul style="list-style-type: none"> <li>• External resources required</li> </ul>

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Condition	Alert Event	Level 1	Level 2	Level 3
Response actions	<ul style="list-style-type: none"> <li>• May complete 3<sup>rd</sup> party / regulatory notifications</li> <li>• Handled through normal operating procedures under the direction of the supervisor or senior worker on site               <ul style="list-style-type: none"> <li>○ Pressure drops, pipeline shut in, field dispatched to investigate</li> <li>○ Pressure safety relief valve discharge, field cleanup activities</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Complete 3<sup>rd</sup> party / regulatory notifications</li> <li>• The Incident Command System is activated</li> <li>• Response control at hand and can quickly move to Tier 2 as situation warrants</li> <li>• Local resources/ contractors and response organizations may be required</li> <li>• Response activities under direction of Incident Commander</li> <li>• Response personnel: Initial Incident Commander and Safety officer at a minimum</li> </ul>	<ul style="list-style-type: none"> <li>• Complete 3<sup>rd</sup> party / regulatory notifications</li> <li>• The Incident Command System activated</li> <li>• Actions taken to ensure public safety</li> <li>• Support personnel/equipment from neighboring region activated and awaiting notice of deployment as needed</li> <li>• Broader range of response activities</li> <li>• Local resources/ contractors and response organizations required and sourced</li> </ul>	<ul style="list-style-type: none"> <li>• Complete 3<sup>rd</sup> party / regulatory notifications</li> <li>• Actions taken to ensure public safety</li> <li>• Support personnel/equipment from neighboring region deployed</li> <li>• Immediate multi-agency involvement required; Unified Command established</li> <li>• Local resources/contractors and response organizations required and sourced</li> </ul>

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Condition	Alert Event	Level 1	Level 2	Level 3
Response personnel / team(s)	<ul style="list-style-type: none"> <li>• Field Responder(s)</li> <li>• Regional Management / Regional On-Call</li> </ul>	<ul style="list-style-type: none"> <li>• Field Response Team(s)</li> <li>• Incident Management Team staffed as required               <ul style="list-style-type: none"> <li>○ one position may assume many responsibilities</li> <li>○ at minimum, the Incident Commander and Safety Officer will be staffed</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Field Response Team(s)</li> <li>• Incident Management Team to manage reactive and proactive phases</li> <li>• Incident Support Team activated to support if required</li> <li>• Crisis Management Team notified if emergency warrants</li> </ul>	<ul style="list-style-type: none"> <li>• Field Response Team(s)</li> <li>• Full Incident Management Team activation</li> <li>• Crisis Management Team notified</li> <li>• Incident Support Team</li> <li>• Enbridge Enterprise Emergency Response Team (E3RT) activated to support longer term incidents if required</li> </ul>

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Condition	Alert Event	Level 1	Level 2	Level 3
Documentation	<ul style="list-style-type: none"> <li>If possible, complete ICS 214a Individual Log to capture initial response actions</li> </ul>	<ul style="list-style-type: none"> <li>Complete ICS 214a Individual Log to capture initial response actions</li> <li>Incident Command System 201 packet completed (reactive phase of the response)</li> </ul>	<ul style="list-style-type: none"> <li>Complete ICS 214a Individual Log to capture initial response actions</li> <li>Incident Action Plan required for multiple operational periods (proactive phase)</li> </ul>	<ul style="list-style-type: none"> <li>Complete ICS 214a Individual Log to capture initial response actions</li> <li>Detailed Incident Action Plan created for each operational period</li> </ul>
Note	1.Regulatory classification levels may not align with Enbridge classifications 2.In Eastern Region, 3 <sup>rd</sup> party notifications will be reported for alter level incidents 3.Incident records are required for post incident / lessons learned 4.Scale response actions / levels to meet the needs of the emergency 5.Additional guidance documents may be activated and implemented to meet the needs of emergency			

## 2.0 NOTIFICATIONS OVERVIEW

Immediate actions are required at the onset of an emergency response to limit the extent of a release, minimize the potential hazard to human health and the environment, and coordinate an effective response. It is also important to act decisively to create a professional working atmosphere among Company personnel and stakeholders. This section provides the steps for determining the appropriate initial response and notification actions that should be carried out in the event of a release or other emergency incident.

The internal notification procedures are essentially the same for all emergency incidents although the external notifications will vary depending on the type of incident, type and quantity of material released, and the consequences (injuries, deaths and property damage).

Company personnel have the authority and obligation to terminate any operation in response to an abnormal, threatening or hazardous situation.

### 2.1 Emergency Notifications / Activation

The chart on the following page is an overview of roles and responsibilities of personnel or groups upon initial discovery, including reporting the emergency and activating Emergency Response Teams to address an emergency.

## 2.2 Incident Observer

Any person, who observes or becomes aware of a release, shall immediately report the incident to the Control Center

### Responsibilities

- Trigger could be an odor compliant
- Notification from public on potential loss of containment
- Notification from local response agency
- Control Center alert (Leak detection alarm, volume imbalance)
- Initial discovery by an employee

### Guidance Documents

- *Field Emergency Response Plan*
- *Operations and Maintenance Manuals*
- *Control Center Procedures*

## 2.3 Control Center Operations

Any abnormal operating condition detected by the Control Center, or any reported or observed emergency or possible emergency, will be given an emergency status until the report is confirmed or negated. Follow up investigation and confirmation of a spill, or threat of spill, will be done immediately.

### Responsibilities

- Document incoming call from the incident observer
- Contact Regional on-Call personnel to dispatch company first responder
- If directed by Regional Management, alert external first responder agencies
- Initiate Control Center notifications and procedures to mitigate hazards
- Others identified in the Control Center operations procedures
- The Municipal/Community emergency services will be notified unless directed otherwise by regional personnel

### Guidance Documents

- *Control Center Procedures*
- *Operations and Maintenance Manuals*
- *Integrated Contingency Plan(s)*

## 2.4 Enbridge First Responder / Field Response Team / Initial Incident Commander

Any field responder, who observes or becomes aware of a release, shall immediately report the incident to the Control Center and Regional Management/Regional On-Call.

### Responsibilities

- Call the Control Center to isolate the system
- Assess situation and activate this plan if an incident is confirmed
- Activate the Incident Command System, assume Incident Commander position and designate a Safety Officer.
- Update Regional Management/Regional On-Call regarding the status
- Request Regional Support Services: Compliance, Safety, Public Awareness, Environment, Emergency Management, and other groups as required to review and identify required actions
- Verify the Control Center has been informed / support ongoing communications with the Control Center and Regional On-Call
- Complete proper documentation for assessment of emergency (Safe Work Permit, FLHA, 214a)
- Coordinate on-scene activities
- Set up perimeter control and site access
- Include emergency response agencies as appropriate
- If applicable, direct all media to the Public Information Officer, if not available, provide the media hot line
- Transfer command once the Incident Command System is stood up

### Guidance Documents

- *Field Emergency Response Plan*



**Responsibilities**

- *Incident Management Handbook*
- *Operations and Maintenance Manuals*
- *Inland Spill Response Tactics Guide*
- *Pre-Fire Plans*
- *Integrated Contingency Plan*
- *Control Points (EMap)*
- *Safety Standards*

**2.5 Regional Management / Regional On-Call**

As the scope of the incident requires, Regional Management/Representative/On-Call Representative will:

**Responsibilities**

- Dispatch Enbridge First Responder or follow up with the field if already on site
- Update the Control Center, establish a future communications plan
- Notify Regional Director / Qualified Individual, review resource requirements and activate required roles from the Incident Management Team
- Alert emergency response agencies (Police/Fire/911) if appropriate
- Notify government agencies and complete regulatory reporting in conjunction with Regional Compliance
- Notify Local Emergency Management Agencies if affected area is beyond Enbridge property line, contact Regional On-call Public Information Officer

**Responsibilities**

- Notify Support Services (Safety, Compliance, Public Awareness, Environment, and Emergency Management) in the reactive phase of Incident Command System
- Support an assessment of resource requirements, provide either standby notice or activation of Incident Management Team prior to Incident Commander transition from Enbridge First Responder, engage Pipeline Integrity to support repair, re-start plans if required
- Utilize the Enbridge Alert System (MIR3) if the need arises
- Consider if Enbridge Response Teams, such as the Incident Support Team, E3RT and Crisis Management Team should be activated
- Ensure regulatory notifications have been conducted with support from Compliance
- Call response agencies/oil spill removal agencies (Annex 2) as required; and
- Depending on the circumstances of the emergency, consider requesting aircraft deployment for situational awareness

**Guidance Documents**

- *Field Emergency Response Plan*
- *Incident Management Handbook*
- *Inland Spill Response Tactics Guide*
- *Integrated Contingency Plan*
- *Operations and Maintenance Manuals*



**2.6 Incident Management Team / Incident Support Team**

As the scope of the incident requires, additional Emergency Response Teams will be activated.

**Responsibilities**

- Place Incident Management Team Members on standby as incident assessment and resource requirements are established (can use notification tool).
- Consider activating LP Emergency Management, Enterprise Security as appropriate for the incident. Identify resourcing shortfalls and request support from other Enbridge Incident Management Teams or Incident Support Team

**Guidance Documents**

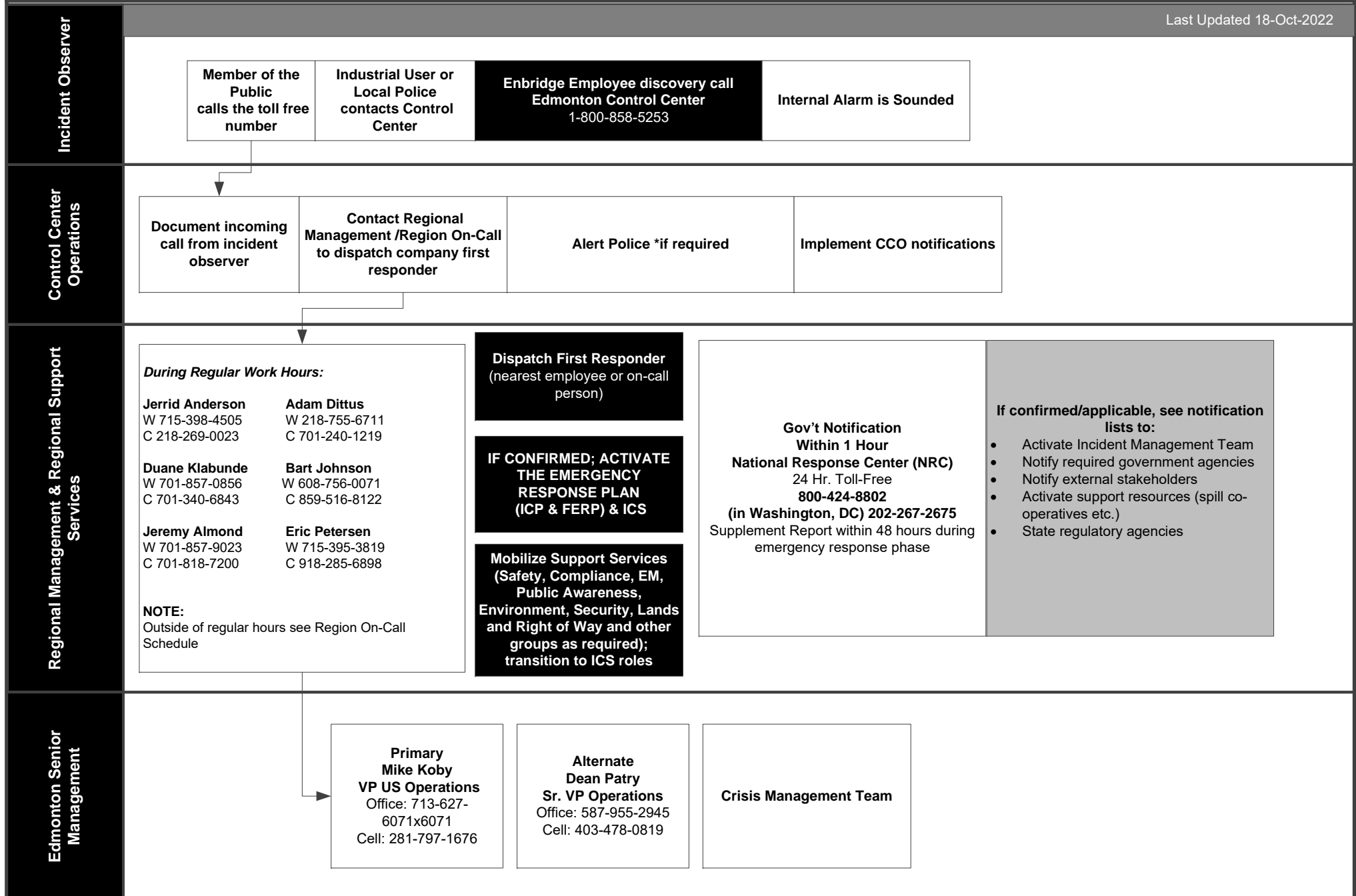
- *Integrated Contingency Plan*
- *Incident Support Plan*
- *Crisis Communication Plan*



# Midwest Region Notification Chart



Last Updated 18-Oct-2022



\* 1. Any party is to continue through the next step if contact cannot be made

\*2. Emergency reports may be received from Police, Public, Employees or Alarms



## 2.8 External Notifications

The Initial Incident Commander/Enbridge First Responder is responsible for assuring that all required notifications/reports are completed in a timely manner for all incidents until a transfer of command to Regional On-Call occurs.

The Control Center, Liaison Officer and On-Call Public Information Officer will confirm that additional required notifications are completed:

- Government Representatives (elected and public service, various jurisdictions)
- Local authorities/Community Leaders
- Regulators
- Landowners
- Response contractors
- Indigenous groups and Tribes
- Stakeholders

All public statements must be pre-approved by the Public Information Officer if appointed, the Legal Officer, and approved by the Incident Commander.

Local fire, police, and emergency medical service officials will be requested to communicate the emergency to those in proximity to the incident. The Liaison Officer role (which may be filled by groups such as Compliance, Community Relations, Stakeholder Relations and Indigenous Relations representatives or Land Agents for the area) will also ensure contact/follow up with local landowners, municipal representatives, government, regulators, Indigenous groups and other groups, holders.





### 3.0 INCIDENT REPORTING

A list of emergency contact information detailing required internal notifications and external agency contacts is located in this section. The following summarizes who should be contacted in an emergency.

#### 3.1 Required Notifications / Emergency Contacts

Any person, who observes or becomes aware of a release, shall immediately report the incident to the Control Center and Regional Management/Regional On-Call. If applicable, direct all media to the Public Information Officer, if the PIO is not available:

Edmonton Control Center	
24-Hour Toll Free	800-858-5253
Local / Long Distance	780-420-5221
Enbridge Media Hotline	
Media Hotline	888-992-0997
Emergency Response Information (ERI) Provider In The Event Of A Rail Incident	
Chemtrec	24 Hr. 800-424-9300

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Enbridge Qualified Individuals			
Director, Midwest Region Operations	Jerrid Anderson	715-398-4505	218-269-0023
Mgr, ND Area	Duane Klabunde	701-857-0856	701-340-6843
Mgr, Fort Atkinson Area	Bart Johnson	608-756-0071	859-516-8122
Other Regional Management/Regional On call			
Mgr, Bemidji Area	Adam Dittus	218-755-6711	701-240-1219
Mgr, Superior Area	Eric Petersen	715-395-3819	918-285-6898
Mgr, Regional Services	Jeremy Almond	701-857-9023	701-818-7200

## External Response Organizations

## Contracted OSRO Of Record

Marine Spill Response Corporation (MSRC)	1-800-645-7745 1-800-259-6772 <i>International Calls</i> 1-732-417-0175
--	--

## Additional Response Resources

Marine Pollution Control Corp. (MPC)	24 Hr. 313-849-2333
Clean Harbors Environmental Services, Inc.	24 Hr. 800-645-8265
SWAT Consulting, Inc	24 Hr 866-610-7928
T & T Marine Salvage, Inc.	24 Hr. 713-534-0700
HazMat Response Inc.	24 Hr. 800-229-5252
GFL Environmental Inc.	24 Hr. 866-579-6900 414-761-9421
Otis Minnesota Services	763-262-7000 218-755-9595 (MN) 701-453-3700 (ND)
Beltrami Industrial Services Inc.	218-751-7537
Charps, LLC	218-776-3080

Williams Fire and Hazard	409-727-2347 409-745-3232
Cooperative Agreements	
Sakakawea Area Spill Response	24 Hr. 866-610-7928

### 3.2 Incident Management Team List

The Region has designated personnel that will be activated based on the needs of the incident response to fill command and general staff roles within the Incident Command System.

ICS Position	Normal Job Title	Name	Office Number	Alt. Number
Command Staff				
Incident Commander (IC)	Director, Midwest Region	Jerrid Anderson	715-398-4505	218-269-0023
Alternate IC	Manager, Fort Atkinson Area	Bart Johnson	920-563-6648	859-516-8122
Alternate IC	Manager ND Area	Duane Klabunde	701-857-0856	701-340-6843
Liaison Officer (LOFR)	Sr. Compliance Adv.	Danny Schall	701-857-0815	701-818-2297
Alternate LOFR	Sr. Advisor Lands & ROW	MayRinda Cain	218-755-6717	218-214-6059
Alternate LOFR	Sr. Advisor Lands & ROW	Todd Ochsner	715-395-3813	715-817-4103
Public Information Officer (PIO)	Community Engagement Advisor	Wendy Pank	701-857-0905	701-340-5451
Alternate PIO	See Crisis Communication On-Call List			
Safety Officer (SOFR)	Sr. Safety Advisor	Niki Harriman	715-395-3845	218-390-2858
Alternate SOFR	Safety Advisor	Jacob Rutledge	218-755-6721	701-500-1755
Alternate SOFR	Safety Advisor	Travis Braaten	701-857-0807	701-818-2691
ICS Technical Specialist	Emergency Response Specialist	Amanda Schooling	701-857-0834	701-240-3048

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

ICS Position	Normal Job Title	Name	Office Number	Alt. Number
Alternate ICS Technical Specialist	Emergency Response Specialist	Gary Kneisl		218-491-3026
<b>Operations Section</b>				
Operations Section Chief (OSC)	Superior PLM Supervisor	Dean Will	715-398-8348	218-930-5228
Alternate OSC	Grand Forks Supervisor	Jeremy Finnie	701-746-7072	701-739-1900
Alternate OSC	Supervisor Pipeline Services	Jay Himango	219-864-3831	989-545-0320
Staging Area Manager (STAM)	Supervisor Pipeline Services	Martin Feil	218-755-6729	218-766-5012
Alternate STAM	Supervisor Minot Operations	Chad Mosser	701-857-0861	701-240-6982
Alternate STAM	Technical Services Coordinator	Eric Beck	715-398-5326	715-817-2928
<b>Planning Section</b>				
Planning Section Chief (PSC)	Manager Regional Services	Jeremy Almond	701-857-9023	701-818-7200
Alternate PSC	Manager Bemidji Area	Adam Dittus	218-755-6711	701-240-1219
Alternate PSC	Manager Superior Area	Eric Petersen	715-395-3819	918-285-6898
Situation Unit Leader (SITL)	Outage Coordinator	Nick Compton	715-395-3818	715-817-8612
Alternate SITL	Regional Training Advisor	Jean Stieg	701-857-0816	701-818-2690
Alternate SITL	Regional Engineer	Kyle Bridell	715-398-4744	715-817-4754

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

ICS Position	Normal Job Title	Name	Office Number	Alt. Number
Environmental Unit Leader (ENVL)	Supervisor Environment	Shane Yokom	218-464-5632	218-269-0369
Alternate ENVL	Advisor Environment	Amber Senn	701-857-9022	701-340-4140
Alternate ENVL	Advisor Environment	Ross Peterson	715-398-4509	218-341-3863
Documentation Unit Leader (DOCL)	Administrative Assistant III	Charlene Boeselager	715-395-3823	218-428-4577
Alternate DOCL	Technical Records Coordinator	Renae Bishop	701-857-9026	701-240-5505
Alternate DOCL	Administrative Assistant III	Kim Solberg	218-776-6115	218-556-4802
Resource Unit Leader (RESL)	Administrative Assistant	Liz Benham	701-857-0937	N/A
Alternate RESL	PLM Project Coordinator	Paul Snobl	218-755-6715	218-689-8906
Alternate RESL	PLM Coordinator	Daniel Hinrichs	715-398-8377	218-269-4702
Logistics Section				
Logistics Section Chief (LSC)	Supervisor Terminal Operations	Jason Peterson	715-398-8364	715-718-1893
Alternate LSC	ND PLM Coordinator	Tim Marchant	701-857-9022	701-578-4215
Alternate LSC	Planner II	Matt Petron	701-857-9035	701-721-0941
Finance Section				
Finance Section Chief (FSC)	Regional Accountant	Megan Michelizzi	715-395-3825	715-817-3759

**FIELD EMERGENCY RESPONSE PLAN**

Effective 2022-2023

ICS Position	Normal Job Title	Name	Office Number	Alt. Number
Alternate FSC	Regional Accountant	Betina Fry	701-857-0818	N/A
Alternate FSC	Administrative Assistant III	Judy Kent	608-756-0071	608-208-2612



### 3.3 Regulatory Required Leak Notifications

Incident reporting requirements for the company are outlined in OMM [Book 1: General Compliance Reference, 02-02-02 Incident Reporting](#). The standard includes verbal and written reporting. Verbal reports include immediate notification to appropriate internal departments, as well as external reporting to federal/provincial/municipal agencies on state and federally regulated lines. The control copy is located on the Governance Documents Library and is accessible to all company personnel, excerpt from Version 30.0 below.

#### Federal Spill Reporting

Required Action	Reporting Criteria	Accountable
Within 1 Hour – Complete NRC Notification National Response Center (NRC) (800) 424-8802	A failure in the pipeline system in which there is an uncontrolled/unplanned release of hazardous liquid from its primary containment (pipe or piping system) including unplanned released during maintenance activities and releases captured in secondary containment (i.e., berms, tubs, vacuum trucks, etc.) that results in: <ul style="list-style-type: none"><li>• unintentional explosion or fire</li><li>• pollution of a body of water (rivers/streams/wetland/reservoir)</li><li>• death of any person</li><li>• hospitalization of any person</li><li>• estimated property damage, exceeding \$50,000 (including repair, cleanup and cost of product)</li></ul>	US Compliance

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Required Action	Reporting Criteria	Accountable
	any other event that the Regional Director or Qualified individual deems significant for other reasons	
Within 48 hours update the NRC of any significant changes	<p>Within 48 hours after the confirmed discovery of an accident the operator must submit a verbal revision or confirmation notification to the NRC [(800)-424-8802 24 hrs with the following information:</p> <ul style="list-style-type: none"> <li>revised estimate of the amount of product released</li> <li>location of the failure</li> <li>time of the failure</li> <li>revised estimate of the number of fatalities and injuries</li> <li>all other significant facts that are known by the operator that are relevant to the cause of the accident or extent of the damages</li> </ul> <p>If there are no changes or revisions to the initial report, the operator must confirm the estimates in its initial report.</p>	US Compliance
Within 30 days, file an accident report to PHMSA	<p>A failure in the pipeline system in which there is an uncontrolled/unplanned release of hazardous liquid, or gas from its primary containment (pipe or piping system) including unplanned released during maintenance activities and releases captured in secondary containment (i.e., berms, tubs, vacuum trucks, etc.) that results in:</p> <ul style="list-style-type: none"> <li>any of the above</li> </ul>	US Compliance

**FIELD EMERGENCY RESPONSE PLAN**

Effective 2022-2023

Required Action	Reporting Criteria	Accountable
	<ul style="list-style-type: none"><li>loss of 5 gallons or more of liquid with an exception for spills under 5 barrels resulting from pipeline maintenance activities that did not result in water pollution, spill is cleaned up promptly, and spill is confined to company property or ROW</li><li>escape of more than 5 gallons of NGL to atmosphere</li></ul>	

## State Spill Notifications

State	Reporting Criteria	Required Action	Contact Details	Agency	Accountable
Minnesota	<p>A pipeline leak or spill:</p> <ul style="list-style-type: none"><li>• Emergency release that causes the death of an individual or causes great bodily harm</li><li>• Any regulatory reportable incident/accident, safety-related condition, or other regulatory reportable event</li><li>• Any substance or material which, if not recovered, may cause pollution of waters of the state</li></ul>	Verbally immediately upon discovery	800-422-0798 (within Minnesota) or 24 hrs 651-649-5451 (Outside Minnesota)	Minnesota Homeland Security and Emergency Management (MN Duty Officer) Minnesota Duty Officer (MN Department of Public Safety, Division of Emergency Mgmt)	Regional Management

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

State	Reporting Criteria	Required Action	Contact Details	Agency	Accountable
Montana	A pipeline leak or spill: <ul style="list-style-type: none"> <li>• greater than or equal to 25 gallons; OR</li> <li>• in any amount that threatens surface or groundwater</li> </ul>	Verbally immediately upon discovery	406-324-4777 24 hrs If no response, contact the Montana Department of Environment Quality Duty Officer at 406-431-0014	Montana Disaster and Emergency Services	Regional Management
North Dakota	<ul style="list-style-type: none"> <li>• any spill which may potentially have an adverse effect to human health or the environment</li> <li>• any incident or spill which may potentially result in pollution of water of the state, either surface water or groundwater</li> <li>• specific minimum quantities for mandatory reporting of</li> </ul>	Verbally immediately upon discovery	833-997-7455 <a href="http://www.spill.nd.gov">http://www.spill.nd.gov</a>	North Dakota Department of Health	Regional Management

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

State	Reporting Criteria	Required Action	Contact Details	Agency	Accountable
	spills have not been established <ul style="list-style-type: none"> <li>all substances are included, not just hazardous materials (i.e., test medium [water] from hydrotest failure)</li> </ul>				
Wisconsin	Any pipeline leak or spill: greater than or equal to 5 gallons, unless immediately contained and cleaned up, and spilled on competent asphalt or cement (an impervious surface); OR in any amount that threatens or contacts surface water or groundwater	Verbally immediately upon discovery	800-943-0003 24 hrs	Wisconsin Department of Natural Resources	Regional Management

### 3.4 Emergency Services Contacts – Minnesota

#### Minnesota

MN State Duty Officer, MN Department of Public Safety  
(24 hrs)  
 800-422-0798 or 651-649-5451

State Emergency Response Committee (SERC)  
 Agency & POC: MN HSEM - Chris Marnell  
 Phone: 651-201-7417  
 Address: 445 Minnesota Street, Suite 223, St. Paul, MN  
 55101

Agency/Office	Phone	Agency/Office	Phone
MN Pollution Control Agency (MPCA) Non- emergency line	651-296-6300 800-657-3864	MN State Patrol (MSP)- St. Paul	651-201-7100
MPCA - Emergency Management	651-757-2161	MSP - Duluth Office	218-302-6127
MPCA - St. Paul Office	651-296-6300	MSP - Virginia Office	218-735-3720
MPCA - Duluth Office	218-723-4660	MSP - Baxter Office	218-316-3030
MPCA - Detroit Lakes Office	218-847-1519	MSP - Thief River Falls Office	218-683-8410
MPCA - Brainerd Office	218-828-2492	MN Department of Health (MDH) - 24 Hour	651-649-5451
MN Homeland Security & Emergency Management (HSEM) - St. Paul	651-201-7400	MDH - Duluth Office	218-302-6166
MN HSEM - Region 2	218-327-4496	MDH - Bemidji Office	218-308-2100
MN HSEM - Region 3	218-766-2301	MN Office of Pipeline Safety - St. Paul	651-201-7230

**FIELD EMERGENCY RESPONSE PLAN**

Effective 2022-2023

**Minnesota**

MN Department of Natural Resources (DNR) - St. Paul	651-296-6157	Minnesota "Gopher State One Call"	651-681-7305
MN DNR - Region 1 (Northwest MN)	218-308-2700	MN OSHA	651-284-5050
MN DNR - Region 2 (Northeast MN)	218-328-8780		



## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC MN Duty Officer would be notified in event of an incident not the LEPC
Kittson County Lines: 1, 2, 4, 13, 65, 67, 93 MP: 801-817	Sheriff: 218-843-3535	Hallock FD: 218-843-2055 Kennedy FD: 218-674-4485	218-843-2113	Hallock: 218-843-3535	Hallock: 218-843-3612	District III: Northwest POC: John Pechin 1-800-422-0798 (MN SDO)
Marshall County Lines: 1, 2, 4, 13, 65, 67, 93 MP: 817-851	Sheriff: 218-745-5411	Argyle FD: 218-201-0065 Warren FD: 218-686-0999 New Folds FD: 218-684-7135	218-745-5841	Argyle: 218-437-6621	Warren: 218-745-4211	District III: Northwest POC: John Pechin 1-800-422-0798 (MN SDO)
Pennington County Lines: 1, 2, 4, 13, 65, 67, 93 MP: 851-871	Sheriff: 218-681-6161	Thief River Falls FD: 218-681-3943 St. Hilaire FD: 218-964-5280	218-681-6161	Thief River Falls (TRF): 218-681-4084	TRF: 218-681-4240	District III: Northwest POC: John Pechin 1-800-422-0798 (MN SDO)
Red Lake County Lines: 1, 2, 4, 13, 65, 67, 81,	Sheriff: 218-253-2996	Plummer FD: 218-465-4231 Red Lake Falls	218-253-2996	Red Lake Falls: 218-253-2996	TRF: 218-681-4240	District III: Northwest POC: John Pechin

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC MN Duty Officer would be notified in event of an incident not the LEPC
93 MP: 871-886. 321-333 (Line 81)		FD: 218-253-2105 Oklee FD: 218-796-5788				1-800-422-0798 (MN SDO)
Polk County Lines: 1, 2, 4, 13, 65, 67, 81, 93 MP: 886-900, 290-321 (Line 81), 333-357 (Line 81)	Sheriff: 218-281-0431 East Grand Forks PD: 218-773-1104	Crookston FD: 218-281-4584 East Grand Forks FD: 218-773-2403	218-281-0431	Crookston: 218-281-0431 Grand Forks (ND): 701-780-5000	Crookston: 218-281-9200 Grand Forks (ND): 701-780- 5000 Fosston: 218-435-1133	District III: Northwest POC: John Pechin 1-800-422-0798 (MN SDO)
Clearwater County Lines: 1, 2, 4, 13, 65, 67, 81, 93 MP: 900-921, 357-365 (Line 81)	Sheriff: 218-694-6226 Clearbrook PD: 218-776-3490	Clearbrook FD: 218-776-3335 Shevlin FD: 218-785-2101 Bagley FD: 218-694-2686 Gonvick FD: 218-280-3347	218-694-6226	Bagley: 218-694-6226	Bagley: 218-694-6501	District III: Northwest POC: John Pechin 1-800-422-0798 (MN SDO)

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC MN Duty Officer would be notified in event of an incident not the LEPC
Beltrami County Lines: 1-4, 13, 67 MP: 921-944	Sheriff: 218-333-9111 Bemidji PD: 218-751-9111	Bemidji FD: 218-751-8001 Solway FD: 218-467-3350	218-333-8386	Bemidji: 218-444-3328	Bemidji: 218-751-5430	District III: Northwest POC: John Pechin 1-800-422-0798 (MN SDO)
Hubbard County Lines: 1, 2, 4, 13, 67, 93 MP: 944-951	Sheriff: 218-732-3331	Park Rapids FD: 218-732-3705	218-732-2588	Park Rapids: 218-732-5255	Park Rapids: 218-237-5464	District III: Northwest POC: John Pechin 1-800-422-0798 (MN SDO)
Cass County Lines: 1, 2, 4, 13, 67, 93 MP: 951-986	Sheriff: 218-547-1424 Cass Lake PD: 218-335-8277	Cass Lake FD: 218-335-6195	218-547-1424	Cass Lake: 218-335-6363	Bemidji: 218-751-5430	District II: Northeast POC: Ryan Blazevec 1-800-422-0798 (MN SDO)
Itasca County Lines: 1, 2, 4, 13, 67, 93 MP: 986-1035	Sheriff: 218-326-3477 Grand Rapids PD: 218-326-3464	Grand Rapids FD: 218-326-7638 Deer River FD: 218-256-1364 Cohasset FD:	218-327-4496	Grand Rapids: 218-326-0020	Grand Rapids: 218-326-3401 Deer River: 218-246-2900	District II: Northeast POC: Ryan Blazevec 1-800-422-0798 (MN SDO)

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC MN Duty Officer would be notified in event of an incident not the LEPC
		218-256-2911 Gonvick FD: 218-280-3347 Warba FD: 218-492- 1445Goodland FD:218-492-1420				
Aitkin County Lines:1, 2, 4, 13, 67, 93 MP: 1035-1036	Sheriff: 218-927-7435	Jacobson FD: 218-752-6631	218-927-7435	McGregor: 218-768-2717	Aitkin: 218-927-2121	District II: Northeast POC: Ryan Blazevic 1-800-422-0798 (MN SDO)
St. Louis County Lines: 1, 2, 4, 13, 67, 93 MP: 1036-1061	Sheriff: 218-726-2340 Floodwood PD: 218-476-2239 Duluth PD: 218-730-5400	Floodwood FD: 218-476-2238 Arrowhead FD: 218-879-6916 Duluth FD: 218-730-4390 Culver Twp FD: 218-879-5053	218-336-4340	Duluth: 507-255-2808	Duluth: 218-786-4000	District II: Northeast POC: Ryan Blazevic 1-800-422-0798 (MN SDO)

**FIELD EMERGENCY RESPONSE PLAN**

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC MN Duty Officer would be notified in event of an incident not the LEPC
Carlton County Lines: 1, 2, 4, 13, 67, 93 MP: 1061-1084	Sheriff: 218-384-3236 Cloquet PD: 218-879-1247	Cloquet FD: 218-879-6514 Carlton FD: 218-384-4158 Wrenshall FD: 218-384-4670	218-384-9549	Carlton: 218-384-4158	Cloquet: 218-879-4641	District II: Northeast POC: Ryan Blazevic 1-800-422-0798 (MN SDO)

### 3.5 Emergency Services Contacts – North Dakota & Montana

North Dakota & Montana			
<b>ND State Duty Officer</b> 800-472-2121 or 701-328-8100		<b>State Emergency Response Committee (SERC)</b> Agency & POC: NDDES – Darin Hanson Phone: 701-328-8100 Address: Fraine Barracks Lane PO Box 5511 Bismarck, ND 58506	
Agency/Office	Phone	Agency/Office	Phone
ND Department of Environmental Quality (NDDEQ)	701-328-5150	ND Highway Patrol (NDHP) - Bismarck	701-328-2447
ND DEQ - Fargo Office	701-499-5208	NDHP - Eastern Division	701-328-1081
ND DEQ - Towner Office	701-771-7367	NDHP - Western Division	701-328-2467
ND DEQ - Air Quality	701-328-5188	ND Department of Transportation (NDDOT)	701-328-2500
ND Department of Emergency Services (NDDES)- SEOC	701-328-8100 1-800-472-2121	ND Industrial Commission - Oil & Gas Division	701-328-8020
ND Game & Fish Department (NDGFD) - Bismarck	701-328-6300	MT Disaster & Emergency Services Division (1st Call)	406-324-4777
NDGFD - Devils Lake	701-662-3617	MT Department of Environmental Quality - Duty Officer	406-444-2544
NDGFD - Riverdale	701-654-7475	North Dakota "One Call"	701-751-1019
NDGFD - Williston	701-774-4320	Montana "One Call"	406-442-3070
ND Department of Oil and Gas Division	701-328-8020	ND Department of Health	701-328-2372
ND OSHA	701-250-4521	MT OSHA	406-247-7494

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC ND & MT Duty Officer would be notified in event of an incident not the LEPC
Pembina County Lines: 1, 2, 4, 13, 65, 67, 93 MP: 774-801	Sheriff: 701-265-4122	Neché FD: 701-886-7422 Pembina FD: 701-825-6625 Cavalier FD: 701-265-4342 Drayton FD: 701-454-3599	701-265-4849	Cavalier: 701-265-8259	Neché: 701-265-8461 Grand Forks: 701-780-5000	POC: Samantha Diemert 1-701-265-4849 Address: 301 Dakota Street W #8 Cavalier, ND 58220
Grand Forks County Lines: 81 MP: 246-290	Sheriff: 701-780-8280 Grand Forks PD: 701-787-8000	Grand Forks FD: 701-746-2563 Grand Forks (Rural) FD: 701-746-2540 Larimore FD: 701-343-2075	701-780-8217	Grand Forks: 701-780-5000 Larimore: 701-787-8000	Grand Forks: 701-780-5000	POC: Karise Goelz 1-701-780-8217 Address: 122 S. 5th Street #21, Grand Forks, ND 58201
Nelson County Lines: 81 MP: 221-246	Sheriff: 701-247-2474	Aneta FD: 701-740-1732 Dahlen FD: 701-331-1052 Lakota FD: 701-740-7046	701-247-2472	Lakota: 701-351-4227 McVile: 218-779-0960	McVile: 701-322-4328	POC: Angela Herda 1-701-247-2472 Address: 210 B Ave. W #302 Lakota, ND 58344

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC ND & MT Duty Officer would be notified in event of an incident not the LEPC
		McVile FD: 701-247-3139 Michigan FD: 701-270-1864 Pekin FD: 701-789-1398 Petersburg FD: 218-779-9446 Polna FD: 701-391-8340 Devils Lake (Rural) FD: 701-662-4818		Devils Lake: 701-662-8832		
Ramsey County Lines: 81 MP: 180-221	Sheriff: 701-662-0700	Devils Lake FD: 701-662-3913 Devils Lake (Rural) FD: 701-662-4818	701-662-7001	Devils Lake: 701-662-8832	Devils Lake: 701-662-2131	POC: Chris Jaeger 1- 701-662-7001 Address: 524 4th NE Ave Devils Lake, ND 58301
Benson County Lines: 81 MP: 150-180	Sheriff: 701-473-5357	Benson FD: 701-473-2531	701-473-5320	Leeds: 701-466-2619	Devils Lake: 701-662-2131	POC: Scott Todahl 1-701-473-5320 Address: PO Box 184 Minnewaukan, ND 58351



**MIDWEST REGION****FIELD EMERGENCY RESPONSE PLAN**

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC ND & MT Duty Officer would be notified in event of an incident not the LEPC
Pierce County Lines: 81 MP: 131-150	Sheriff: 701-767-5245 Rugby PD: 701-776-6112	Rugby FD: 701-776-5100	701-767-5245	Rugby: 701-208-1413	Rugby: 701-776-5261	POC: Kelsey Siegler 1-701-776-5245 Address: 240 2nd Street SE #9 Rugby, ND 58368
McHenry County Lines: 81 MP: 94-131	Sheriff: 701-328-9921	Crosby FD: 701-328-9921 Towner FD: 701-537-5126 Upham FD: 701-768-2900	701-351-0377	Minot: 701-852-3000 Bottineau: 701-228-2740	Minot: 701-857-5000 Rugby: 701-776-5261	POC: Kelsey Siegler 1-701-351-0377 Address: 407 Main Street S, Towner, ND 58788
Ward County Lines: 26, 81, 82, 87 MP: 22-37 & 40-56 (Line 26), 83-94 (Line 81), 0-8 & 57-81 (Line 82), 0-8 (Line 87)	Sheriff: 701-857-6500 Berthold PD: 701-799-0022 Minot PD: 701-852-0111 Kenmare PD: 701-385-4411 Surrey PD: 701-852-4154	Berthold FD: 701-453-3211 Burlington FD: 701-839-5463 Carpio FD: 701-468-5500 Minot FD: 701-857-4740 Minot (Rural) FD: 701-838-6363 Kenmare FD:	701-857-6534	Berthold: 701-453-3450 Minot: 701-852-3000 Carpio: 701-468-5500 Kenmare:	Minot: 701-857-5000 Kenmare: 701-385-4296	POC: Jennifer Wiechmann 1-701-857-6534 Address: PO Box 5005 Minot, ND 58702

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC ND & MT Duty Officer would be notified in event of an incident not the LEPC
		701-385-4444 Surrey FD: 701-852-3031		701-385-4296		
Mountrail County Lines: 26, 82, 87 MP: 37-40 (Line 26), 8-50 (Line 82), 8-50 (Line 87)	Sheriff: 701-628-2975 New Town PD: 701-627-5222 Stanley PD: 701-628-2677	New Town FD: 701-898-4774 Plaza FD: 701-628-2975 Stanley FD: 701-628-2033	701-628-2975	New Town: 701-627-2992 Stanley: 701-628-2975	Stanley: 701-628-2424	POC: Nathan SeWarren Bogertm 1-701-629-5052 Address: PO Box 309, Stanley, ND 58784
Williams County Lines: 82, 83, 84, 86, 87, 88 MP: 50-54 (Line 82), 0-53 (Line 83), 0-59 (Line 84), 0-52 (Line 86), 50-	Sheriff: 701-577-7700 Ray PD: 701-568-2200 Tioga PD: 701-664-2514 Williston PD: 701-577-1212	Epping FD: 701-559-5561 Tioga FD: 701-664-2538 Williston FD: 701-572-3400	701-577-7707	Williston: 701-577-2400 Grenora: 701-694-6204 Epping: 701-577-1212 Tioga:	Williston: 701-774-7400 Tioga: 701-664-3305	POC: Mike Smith 1-701-577-7707 Address: PO Box 2047 Williston, ND 58501

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC ND & MT Duty Officer would be notified in event of an incident not the LEPC
54 (Line 87), 0-5 (Line 88)				701-577-7700 Williston: 701-572-3400		
McKenzie County Lines: 84 MP: 59-64	Sheriff: 701-444-3654 Watford City PD: 701-842-2280	Alexander FD: 701-444-3654 Watford City FD: 701-444-2934	701-444-7483	Williston: 701-577-2400 Watford City: 701-842-3000	Williston: 701-774-7400 Watford City: 701-842-3000	POC: Karolin Jappe 1-701-580-6936 Address: 201 5 <sup>th</sup> Street NW, Watford City, ND 58854
Burke County Lines: 26 MP: 0-22	Sheriff: 701-377-2311	Bowbells FD: 701-377-2311 Crosby FD: 701-328-9921	701-377-4911	Bowbells: 701-377-2311 Crosby: 701-328-9921	Kenmare: 701-385-4296	POC: Barry Jager 1-701-377-4911 Address: PO Box 250 Bowbells, ND 58721
Bottineau County Lines: 85	Sheriff: 701-228-2740	Maxbass FD: 701-268-3110 Newburg FD: 701-245-6202	701-228-2740	Bottineau: 701-228-2740	Minot: 701-857-5000	POC: Kristy Titus 1-701-228-2740 Address: 314 5 <sup>th</sup> Street W, Bottineau, ND 58318

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC ND & MT Duty Officer would be notified in event of an incident not the LEPC
Renville County Lines: 85	Sheriff: 701-756-6386 Sherwood PD: 701-459-2225	Sherwood FD: 701-459-2400	701-756-6288	Sherwood: 701-459-2400	Minot: 701-857-5000	POC: Kristy Titus 1-701-756-6386 Address: PO Box 68, Mohall, ND 58761
Sheridan County (MT)	Sheriff: 406-765-1200 Sidney PD: 406-433-2210	Plentywood FD: 406-765-1200 Sidney FD: 406-433-2210 Richland County FD: 406-433-2210	406-765-2970 406-433-2220	Plentywood: 406-765-1200 Plentywood: 406-765-3700 Sidney: 406-433-2210	Plentywood: 406-765-3700 Sidney: 406-488-2100	1-406-765-2970 Address: 100 W Laurel Avenue Plentywood MT 59254

### 3.6 Emergency Services Contacts – Wisconsin

Wisconsin			
<u>WI State Duty Officer</u> 1-800-943-0003		<u>State Emergency Response Committee (SERC)</u> Agency & POC: WEM - Greg Engle Phone: 608-242-3210 Address: 2400 Wright Street Madison, WI 53704	
Agency/Office	Phone	Agency/Office	Phone
WI Department of Natural Resources (DNR) - Madison	608-266-2621	WI Division of State Patrol (DSP) - Madison	844-847-1234
WI DNR - Spooner Office	715-635-2101	WI DSP - Northwest Region	715-839-3800
WI DNR - Eau Claire Office	715-839-3700	WI DSP - North Central Region	715-845-1143
WI DNR - Janesville Office	608-743-4800	WI DSP - Southwest Region	608-846-8500
WI Emergency Management (WEM) - Madison	608-242-3000	WI Department of Health Services (DHS) - Madison	608-609-2635
WI WEM - Northwest Region	715-635-8704	WI DHS - Rhinelander Office	715-365-2721
WI WEM - Northeast Region	715-845-9517	WI DHS - Waukesha Office	262-548-7212
WI WEM - West Central Region	715-839-3825	WI DHS - Eau Claire Office	715-797-0452
WI WEM - Southwest Region	262-782-1908	Wisconsin "Diggers Hotline"	262-432-7910
WI OSHA	715-832-9019		

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC WI Duty Officer would be notified in event of an incident not the LEPC
Douglas County Lines: 1, 2, 4, 5, 6A, 13, 14, 61, 67, 9 MP: 1084-1098 (Lines 1-4, 13, 67), 0-40 (Lines 6A, 13, 14, 61), 1098-1123 (Line 5)	Sheriff: 715-395-1371 Superior PD: 715-395-7234	Superior FD: 715-395-1680 Solon Springs FD: 715-378-4111	715-395-7201	Superior: 507-255-2808 Gordon: 715-394-4432	Superior: 715-817-7000	POC: Dave Sletten 1-715-395-1497 Email: slettend@ci.superior.wi.us Address: 1316 N. 14th St. Superior, WI 54880
Bayfield County Lines: 5 MP: 1123-1154	Sheriff: 715-373-6120	Maple FD: 715-363-2520 Iron River FD: 715-372-4394	715-373-6113	Iron River: 715-372-4394	Ashland: 715-685-5500	POC: Megan Quaderer 1-715-373-6113 Email: megan.quaderer@bayfieldcounty.wi.gov Address: 117 E 6 <sup>th</sup> St., Washburn, WI 54891

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC WI Duty Officer would be notified in event of an incident not the LEPC
Ashland County Lines: 5 MP: 1154-1172	Sheriff: 715-685-7640 Ashland PD: 715-682-7062	Ashland FD: 715-682-7052 Bad River FD: 715-292-3234	715-685-7640 x456	Ashland: 715-682-7052	Ashland: 715-685-5500	POC: Dorothy Tank 1-715-685-7640 x456 Email: Dorothy.tank@ashlandcountysheriff.us Address: 220 6th St. E., Ashland, WI 54806
Iron County Lines: 5 MP: 1172-1189	Sheriff: 715-561-3800	Hurley FD: 715-360-7078	715-561-3266	Hurley: 715-561-4444	Ashland: 715-685-5500	POC: Stacy Ofstad 1-715-561-3266 Email: sofstad@ironcountywi.org Address: 300 Taconite St. Hurley, WI 54534
Washburn County Lines: 6A, 13, 14,	Sheriff: 715-468-4700 Minong PD: 715-466-2266	Minong FD: 715-466-2324 Gordon FD: 715-376-2221	715-520-2479	Minong: 715-466-2324 Spooners: 715-635-6179	Hayward: 715-934-4321 Spooners: 715-635-2111	POC: Carol Buck 1-715-468-4730 Email: cbuck@co.washburn.wi

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC WI Duty Officer would be notified in event of an incident not the LEPC
61 MP: 40-59						.us Address: 421 Hwy. 63 Shell Lake, WI 54871
Sawyer County Lines: 6A, 13, 14, 61 MP: 59-84	Sheriff: 715-634-4858 Hayward PD: 715-634-5213	Stone Lake FD: 715-865-2616 Hayward FD: 715-634-1311 LCO FD: 715-634-9800	715-634-2004	Hayward: 715-634-5213	Hayward: 715-934-4321	POC: John Froemel 1-715-634-5213 Email: john.froemel@sawyercounty.gov
Rusk County Lines: 6A, 13, 14, 61 MP: 84-112	Sheriff: 715-532-2189 Ladysmith PD: 715-532-2186	Ladysmith FD: 715-532-2186	715-532-2121	Ladysmith: 715-532-2121	Ladysmith: 715-532-5561	POC: Thomas Hall 1-715-532-2121 Address: 311 Miner Ave. E. Ladysmith, WI 54848
Chippewa County Lines: 6A, 13, 14, 61 MP: 112-115	Sheriff: 715-726-7701 Chippewa Falls PD:	Chippewa Falls FD: 715-723-5710	715-726-7728	Chippewa Falls: 715-723-1811	Chippewa Falls: 715-723-1811	POC: Ross Bauer 1-715-726-7728 Email: rbauer@co.chippewa.wi.us



## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC WI Duty Officer would be notified in event of an incident not the LEPC
	715-723-4424					s Address: 32 E Spruce St., Chippewa Falls, WI 54729
Taylor County Lines: 6A, 13, 14, 61 MP: 115-135	Sheriff: 715-748-2200 Medford PD: 715-748-1447 Gilman PD: 715-447-5700	Gilman FD: 715-447-8707	715-748-2200	Medford: 715-748-2200	Medford: 715-748-8100 Stanley: 715-644-5571	POC: Daniel Gellert 1-715-748-3503 Email: daniel.gellert@co.taylor.wi.us Address: 224 S. 2 <sup>nd</sup> St., Medford, WI 54451
Clark County Lines: 6A, 13, 14, 61 MP: 135-162	Sheriff: 715-743-3157 Neillsville PD: 715-743-3122 Owen PD: 715-229-2161	Neillsville FD: 715-937-0118 Owen FD: 715-229-2652	715-743-5100	Neillsville: 715-743-3101	Neillsville: 715-743-3101 Stanley: 715-644-5571	POC: Jason Thornton 1-715-743-5100 Email: Jason.thornton@co.clark.wi.us Address: 517 Court St. Neillsville, WI 54456
Marathon County Lines: 6A, 13, 14,	Sheriff:	Wausau FD:	715-421-8500	Marshfield: 715-387-4394	Wausau:	POC: Philip Rentmeester 1-715-261-1229

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC WI Duty Officer would be notified in event of an incident not the LEPC
61 MP: 162-168	715-261-1200 Wausau PD: 715-261-7800 Spencer PD: 715-659-5453 Marshfield PD: 715-387-4394	715-261-7900 Spencer FD: 715-659-4030 Marshfield FD: 715-486-2094			715-847-2121 Marshfield: 715-387-1713	Address: 500 Forest St. Wausau, WI 54403
Wood County Lines: 6A, 13, 14, 61 MP: 168-206	Sheriff: 715-421-8700 Pittsville PD: 715-884-2100 Wisconsin Rapids PD: 715-423-4444 Port Edwards PD: 715-887-3030	Pittsville FD: 715-884-6514 Wisconsin Rapids FD: 715-423-6860 Nekoosa FD: 715-886-7893	715-421-8500	Nekoosa: 715-886-7892 Wisconsin Rapids: 715-423-4444 Port Edwards: 715-887-3030	Wisconsin Rapids: 715-423-6060	POC: Sarah Cristensen 1-715-421-8500  Address: 400 Market St. Wisconsin Rapids, WI 54495
Adams County Lines: 6A, 13, 14, 61 MP: 206-237	Sheriff: 608-339-3304 Adams PD: 608-339-6839	Friendship FD: 608-564-7754 Adams FD:	608-339-4248	Nekoosa: 715-886-7892	Friendship: 608-339-3331	POC: Jane Gervais 1-608-339-4248 Email: emmgmt@co.adams.wi.us

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC WI Duty Officer would be notified in event of an incident not the LEPC
		608-339-3011 Grand Marsh FD: 608-339-6100				Address: 401 Adams St., Friendship, WI 53934
Marquette County Lines: 6A, 13, 14, 61 MP: 237-253	Sheriff: 608-297-2115 Montello PD: 608-297-2345 Westfield PD: 608-296-2883 Endeavor PD: 608-587-2486	Montello FD: 608-297-9237 Westfield FD: 608-296-4210 Oxford FD: 608-586-5882 Endeavor FD: 608-587-2790	608-297-3022	Westfield: 608-296-4210 Endeavor: 608-429-9089	Friendship: 608-339-3331 Portage: 608-742-4131	POC: Aaron Williams 1-608-297-3022 Email: awilliams@co.marquette.wi.us Address: 77 West Park St. Montello, WI 53949

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC WI Duty Officer would be notified in event of an incident not the LEPC
Columbia County Lines: 6A, 13, 14, 61 MP: 253-283	Sheriff: 608-742-4166 Portage PD: 608-742-2174 Rio PD: 920-992-3546  Columbus PD: 920-623-5919	Portage FD: 608-742-2172 Wyocena FD: 608-429-3393 Rio FD: 920-992-5655 Pardeeville FD: 608-429-2282 Columbus FD: 920-623-5914	608-742-4166	Endeavor: 608-429-9089 Rio: 920-992-5605 Columbus: 262-335-2911 Pardeeville: 608-429-9089	Portage: 608-742-4131 Columbus: 920-623-2200	POC: Bob Koch 1-608-742-4166 x1308 Address: 711 E.Cook St. Portage, WI 53901

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC WI Duty Officer would be notified in event of an incident not the LEPC
Dane County Lines: 6A, 13, 14, 61 MP: 283-296	Sheriff: 608-284-6800 Marshall PD: 608-655-3533 Madison PD: 608-255-2345 Cambridge PD: 608-423-4328	Marshall FD: 608-655-3322 Madison FD: 608-266-4420 Cambridge FD: 608-423-2014	608-266-4330	Columbus: 262-335-2911 Madison: 608-255-2345 Cambridge: 608-423-3511	Columbus: 920-623-2200 Madison: 608-251-6100 Madison: 608-263-6400 Ft. Atkinson: 920-568-5000	POC: Charles Tubbs 1-608-266-4330 Email: tubbs.charles@countyofdane.com Address: 115 W. Doty St. Madison, WI 53703
Jefferson County Lines: 6A, 13, 14, 61 MP: 296-319	Sheriff: 920-674-7344 Waterloo PD: 920-478-2343 Lake Mills PD: 920-648-2354 Ft. Atkinson PD: 920-563-7777	Waterloo FD: 920-478-2535 Lake Mills FD: 920-648-5117 Ft. Atkinson FD: 920-563-7795	920-674-7450	Columbus: 920-350-0190 Ft. Atkinson: 920-691-0060	Columbus: 920-623-2200 Lake Mills: 920-648-4518 Ft. Atkinson: 920-568-5000	POC: Donna Haugom 1-920-674-7450 Email: donna@jeffersoncountyiwi.gov Address: 411 S. Center Ave. Jefferson, WI 53549

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

County Information	Police/Sheriff Call 911	Fire Call 911	Emergency Management	Ambulance Call 911	Hospital Call 911	LEPC WI Duty Officer would be notified in event of an incident not the LEPC
Rock County Lines: 6A, 13, 14, 61 MP: 319-323 (Line 6A, 14), 319-345 (Line 13, 61)	Sheriff: 608-757-8000 Janesville PD: 608-755-3088 Beloit PD: 608-364-6800	Janesville FD: 608-755-3050 Beloit FD: 608-364-2900	608-758-8440	Janesville: 608-563-4336	Janesville: 608-373-8000 Beloit: 608-364-5011	POC: Shena Kohler 1-608-758-8440 Email: kohler@co.rock.wi.us Address: 3530 N. County Road F Janesville, WI 53547
Walworth County Lines: 6A, 14 MP: 323-345	Sheriff: 262-741-4400	Delevan FD: 262-728-5646	262-741-4616	Delevan: 262-728-9759	Lake Geneva: 262-245-0535	POC: Lieutenant Jason Rowland 1-262-741-4616 Email: jrowland@co.walworth.wi.us Address: 100 W Walworth, Elkhorn, WI 53121

### 3.7 Notification Agreements

Immediate notification agreements are in place for the following Tribal, Federal (National Forest), and Counties. Engage the Legal and Tribal Engagement Team to carry out these notifications.

Tribal Information	Law Enforcement 911	Fire Department 911	Emergency Management/Contact
Fond du Lac Band of Lake Superior Chippewa. Lines: 1, 2, 4, 13, 67, 93	218-878-8040	Cloquet FD: 218-879-6514 Duluth FD: 218-730-4390	Office: 218-878-7502 Mobile: 218-576-8706
Leech Lake Band of Ojibwe. Lines: 1, 2, 13, 67, 93	218-335-8277	Cass Lake FD: 218-335-6195	Office: 218-335-4502 Mobile: 218-766-0280
Lac Courte Oreilles Band of Lake Superior Chippewa. Lines: 6A, 13, 14, 61	715-634-8350	LCO FD: 715-634-9800	715-699-6214
Red Lake Nation. Lines: 1, 2, 4, 13, 65, 67, 81, 93	218-679-3313	Red Lake FD: 218-679-3316	218-679-3341
Red Cliff Band of Lake Superior Chippewa	715-779-3733	715-779-3700	715-779-3650
White Earth Band of Ojibwe	218-983-3281	Bagley FD: 218-694-2686	218-261-1466
Fort Peck Assiniboine & Sioux Tribes	406-768-2300	Fort Peck FD: 406-526-3220	406-768-2300
Spirit Lake Tribe	701-766-4231	Spirit Lake FD: 701-766-4222	701-766-1706
Turtle Mountain Band of Chippewa	701-477-6135	Belcourt FD: 701-477-3185	701-477-2600

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Tribal Information	Law Enforcement 911	Fire Department 911	Emergency Management/Contact
Three Affiliated Tribes	701-627-3610	701-627-2897	701-627-4805
Standing Rock Sioux	701-854-7241	701-854-7537	701-854-8644/701-854-3481
Bad River Band	715-292-7822	715-292-3234	715-699-5939
Chippewa National Forest			
Chequamegon-Nicolette National Forest			
Cranmoor Co-op			715-213-3813
Dane County (WI)			



### 3.8 Emergency Services Contacts – Miscellaneous Agencies

Miscellaneous Contacts	
Agency/Company	Phone
ND - Poison Center	800-222-1222
ND - Williston (Missouri River) Surface Water Intake - Admin	701-577-7104 Williston Water Treatment Plant
ND - Williston (Missouri River) Surface Water Intake - Public Works	701-577-6368
ND - Minot (Souris River) Surface Water Intake - Admin	701-857-4760
ND - Minot (Souris River) Surface Water Intake - Water Treatment Plant (24 Hrs)	701-857-4764
ND - Grand Forks (Red River) Surface Water Intake - Admin	701-746-2595 218-791-2252
ND - Grand Forks (Red River) Surface Water Intake - Water Treatment Plant (24 Hrs)	701-746-2595
ND - East Grand Forks Surface Water Intake - Brian Johnson	218-773-1511
ND - East Grand Forks Surface Water Intake - Admin (24 Hrs)	701-739-0239
ND - Souris Valley Animal Shelter	701-852-6133
ND - Greenway Specialist- Grand Forks	701-738-8746
MN - Duluth Port Captain	218-720-5286
WI - Cranmoor Cranberry Co-op	715-213-3813

### 3.9 Emergency Services Contacts – Federal Agencies

#### Federal Agencies

National Response Center  
800-424-8802 or 202-267-2675

Agency/Office	Phone
US Environmental Protection Agency (US EPA) - Region V (MN & WI)	800-621-8431
US EPA - Region VIII (ND)	800-227-8917
US Coast Guard (USCG) – HQ (Atlantic Region)	410-576-2525
USCG - District 9 (Northern MN & WI)	800-321-4400
USCG - District 8 (ND, Southern MN, & Southern WI)	504-589-6225
USCG - Duluth	218-725-3800 906-635-3233
USCG - Milwaukee	414-747-7190 414-747-7100
US Forest Service (USFS) - HQ	800-832-1355
USFS - Chequamegon-Nicolet National Forest (Rhinelander, WI) - HQ	715-362-1300 715-358-6863 Fire
USFS - Chippewa National Forest (Cass Lake, MN)	218-335-8600
US Fish & Wildlife (USFW)- HQ	800-344-9453

## Federal Agencies

	800-344-9459 National Hotline
USFW - Upper Souris National Wildlife Refuge	701-468-5467
US National Oceanic & Atmospheric Administration (NOAA) - SSC	206-526-6317
NOAA - National Weather Service - Duluth, MN	218-729-6697
NOAA - National Weather Service - Bismarck, ND	701-250-4224
Pipeline & Hazardous Materials Safety Administration (PHMSA) - HQ	202-366-4433
PHMSA - Accident Investigation Division	303-807-8458
Transportation Security Administration (TSA)	866-289-9673
Occupational Safety & Hazards Administration (OSHA) - HQ	800-321-6742 877-470-6742 MN
OSHA - Chicago Region	312-353-2220
Army Corps of Engineers (ACOE) - HQ	800-493-6838
ACOE - ND	701-255-0015
ACOE - Riverdale Garrison Project Office	701-654-7411
National Response Center - NRC	800-424-8802
Department of the Interior - DOI	202-208-3100

**Federal Agencies**

US EPA, Region 8

303-312-6312  
800-227-8917

US EPA, Region 5

312-353-2000  
800-621-8431

**3.10 TJ Pounder Tanks at Superior Terminal (Tank 28 & 29)**

Enbridge operates Tanks 28 & 29 for TJ Pounder. When Enbridge becomes aware that an incident has occurred or exists following actions

1	Enbridge will contact the Superior Refinery; the Refinery will make the notification to Husky Corporate Emergency Management. Enbridge will respond to an incident regarding these tanks. The Refinery will not respond or aid unless requested by Enbridge and authorized by Husky Management.
	<b>Super Refinery Guard</b>   <b>715-398-8220 or 715-398-8221</b>
2	Enbridge will respond in accordance will company policies and procedures including documenting key response actions based in on the incident level.



## **4.0 RESPONSE ZONE DESCRIPTION (INFORMATION SUMMARY)**

### **4.1 Midwest Region**

The Midwest Region response zone consists of five entities: Bakken Pipeline Company LP, Enbridge Energy, Limited Partnership, Enbridge Pipelines (Southern Lights) L.L.C., Enbridge Pipelines (Toledo) Inc. and North Dakota Pipeline Company L.L.C. These five entities include pipelines and facilities listed below transporting crude oil in Montana, North Dakota, Minnesota, Wisconsin.

### **4.2 Midwest Region Pipeline Information**

The Midwest Region includes the lines between the following coordinates in the table below:

Table 1- Midwest Pipeline Segments-Active

Line	Pipeline Section	Begin Lat	Begin Long	End Lat	End Long
1	Gretna, Manitoba to Superior, WI	49.01607	-97.55952	46.68884	-92.05963
2	Gretna, Manitoba to Superior, WI	49.01607	-97.55952	46.68884	-92.05963
93	Gretna, Manitoba to MP 789.5	48.831859	-97.300927	48.836904	-97.907176
93	MP 789.5 to Superior, WI	48.836904	-97.907176	46.595802	-92.29051
4	Gretna, Manitoba to Superior, WI	49.01607	-97.55952	46.68884	-92.05963
4	Fond Du Lac Reservation	46.779529	92.712724	46.679017	-92.566657
5	Superior, WI to Wisconsin-Michigan State Line	46.68884	-92.05963	42.49501	-88.572631
6A	Superior, WI to Wisconsin-Illinois State Line	46.68884	-92.05963	46.49028	-90.21171
So. Lights 13	Wisconsin-Illinois State Line to Superior, WI	42.49211	-88.80441	46.68884	-92.05963
So Lights 13	Superior, WI to Gretna, Manitoba	46.68884	-92.05963	49.01607	-97.55952
14	Superior, WI to Wisconsin-Illinois State Line MP	46.68884	-92.05963	42.49508	-88.57287



## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Line	Pipeline Section	Begin Lat	Begin Long	End Lat	End Long
61	Superior, WI to Wisconsin-Illinois State Line MP	46.68884	-92.05963	42.49211	-88.80447
LSr (65)	Gretna, Manitoba to Clearbrook, MN	49.01607	-97.55952	47.68966	-95.41210
Alberta Clipper 67	Gretna, Manitoba to Superior, WI	49.01607	-97.55952	46.68884	-92.05963
26-102	Canada to Lignite	49.000862	-102.59053	48.878903	-102.545139
26-102	Lignite to Berthold	48.878903	-102.545139	48.324317	-101.752117
81-102	Minot to ND/MN Border	48.240694	-101.25627	47.852500	-96.996667
81-101	ND/MN Border to Clearbrook, MN	47.852500	-96.996667	47.688573	-95.417315
82-102	Berthold to Minot	48.324317	-101.752117	48.240694	-101.256270
82-105	Beaver Lodge to Berthold	48.284622	-102.927513	48.324317	-101.752117
83-105	Grenora to Beaver Lodge	48.603593	-103.951541	48.284622	-102.927513
84-108	Alexander to Beaver Lodge	47.979494	-103.661695	48.284622	-102.927513
86-108	Trenton to Beaver Lodge	48.112149	-103.778247	48.284622	-102.927513
87-105	Beaver Lodge to Berthold	48.283611	-102.918056	48.324317	-101.752117
88-109	Little Muddy to East Fork	48.336098	-103.562497	48.285311	-103.475833

The Midwest Region is comprised of approximately 4414 miles of pipeline, with pipe diameters ranging from 6 to 48 inches (*Table 2*); 69 crude oil pump stations located along the pipeline system and 11 terminal facilities with a total of 79 tanks.

**Table 2- Pipelines Beginning and Ending Stationing-Active**

Line	Pipeline Sections	Begin Stationing	End Stationing	Miles	Pipeline Diameter	Product
1	Gretna, Manitoba to Clearbrook, MN	0	716,232	135.7	20"	Crude Oil & Natural Gas Liquids
1	Clearbrook, MN to Superior, WI	716,232	1,712,883	188.8	18"	Crude Oil & Natural Gas Liquids
2	Gretna, Manitoba to Superior, WI	0	1,712,887	324.	26"	Crude Oil
93	Gretna, Manitoba to MP 789.5	0	831+94	15.76	34"	Crude Oil
93	MP 789.5 to Superior, WI	831+94	1,712,887	339.84	36"	Crude Oil
4	Gretna, Manitoba to Donaldson, MN (MP814)	0	168,408	31.9	36"	Crude Oil
4	Fond Du Lac Reservation	0+00	527+44	10	36"	Crude Oil

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Line	Pipeline Sections	Begin Stationing	End Stationing	Miles	Pipeline Diameter	Product
4	Donaldson, MN to Viking, MN	168,041	213,109	8.5	48"	Crude Oil
4	Donaldson, MN to Viking, MN (MP 834)	213,461	322,423	20.6	36"	Crude Oil
4	Donaldson, MN to Plummer, MN	320,971	393,021	13.6	48"	Crude Oil
4	Viking, MN to Plummer, MN (MP 874)	394,395	527,703	25.2	36"	Crude Oil
4	Viking, MN to Clearbrook, MN	526,404	545,840	3.7	48"	Crude Oil
4	Plummer, MN to Clearbrook, MN (MP 909)	547,141	647,345	19.0	36"	Crude Oil
4	Plummer, MN to Clearbrook, MN	645,406	716,261	13.4	48"	Crude Oil
4	Clearbrook, MN to Cass Lake, MN Loop (MP 940)	716,411	878,927	30.8	36"	Crude Oil
4	Cass Lake, MN Loop (MP939.87 to MP 953.04)	877,981	946,695	13.1	48"	Crude Oil
4	Clearbrook, MN to Deer River, MN Loop (MP 996)	946,641	1,059,570	21.4	36"	Crude Oil

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Line	Pipeline Sections	Begin Stationing	End Stationing	Miles	Pipeline Diameter	Product
4	Deer River, MN Loop (MP 974.73 to MP995.83)	(127,102) *	1,173,196	22.0	48"	Crude Oil
4	Cass Lake, MN to Floodwood, MN Loop (MP1044)	1,173,151	1,306,304	25.2	36"	Crude Oil
4	Floodwood, MN Loop (MP1019.73 to MP1044.33)	1,299,654	(47,009) *	24.6	48"	Crude Oil
4	Deer River, MN to Wrenshall, MN Loop (MP 1080)	1,429,072	1,512,231	15.7	36"	Crude Oil
4	Wrenshall, MN Loop (MP1060.11 to MP1079.91)	1,512,091	1,616,806	20.0	48"	Crude Oil
4	Wrenshall, MN Loop to Superior, WI (MP 1098)	1,616,840	1,712,760	19.8	36"	Crude Oil
13	Gretna, Manitoba to Clearbrook, MN	0	715,074	135.4	18"	Diluent Condensate
13	Clearbrook, MN to Superior, WI	0	1,003,300	190	20"	Diluent Condensate

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Line	Pipeline Sections	Begin Stationing	End Stationing	Miles	Pipeline Diameter	Product
13	Superior, WI to Wisconsin-Illinois State Line	0	1,822,865	345.2	18" / 20"	Diluent Condensate
5	Superior, WI to Wisconsin-Michigan State Line	0	481,627	91.2	30"	Crude Oil & Natural Gas Liquids
6A	Superior, WI to Wisconsin-Illinois State Line	0	1,821,436	345	34"	Crude Oil
14	Superior, WI Wisconsin-Illinois State Line	0	1,822,865	345.2	24"	Crude Oil
61** (WCD)	Superior, WI to Wisconsin-Illinois State Line	0	481,627	345.2	42"	Crude Oil
65	Gretna, Manitoba to Clearbrook, MN	0	721,140	136.6	20"	Crude Oil
67	Gretna, Manitoba to Superior, WI	0	1,723,800	326.7	36"	Crude Oil
26-102	Canada to Lignite	41,400	00	7.8	12.75"	Crude Oil
26-102	Lignite to Berthold	00	298,304	56.7	12.75"	Crude Oil
82-102	Berthold to Minot	298,686	436,067	26.0	16"	Crude Oil
81-102	Minot to MN Border	436,346	1,533,096	207.7	16"	Crude Oil

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Line	Pipeline Sections	Begin Stationing	End Stationing	Miles	Pipeline Diameter	Product
81-101	MN Border to Clearbrook	1,533,096	1,930,149	75.2 (MN)	16"	Crude Oil
82-105	Beaver Lodge to Berthold	00	288,989	54.7	12.75"	Crude Oil
83-105	Glenora to Beaver Lodge	280,022	00	53	10.75"	Crude Oil
84-108	Alexander to Trenton to Beaver Lodge	340,337	00	64.5	8.625"	Crude Oil
86-108	Trenton To Beaver Lodge	273,021	00	51.7	10.75"	Crude Oil
87-105	Beaver Lodge to Berthold	00	293,173	55.5	16"	Crude Oil
88-109	Little Muddy to East Fork	00	30,908	5.9	10.75"	Crude Oil
--	MPL_ (Clearbrook, MN)	---	---	0.30 (MN)	16"	Crude Oil
--	BA_P02A to Beaver Lodge (Tesoro)	---	---	0.10 (ND)	10"	Crude Oil
--	BA_P02A to Beaver Lodge (Tesoro)	---	---	0.10 (ND)	8"	Crude Oil
--	TE_L12A (Truck Lact Facility) to Trenton	---	---	0.80 (ND)	12"	Crude Oil
--	BA_P04A to Beaver Lodge (Crestwood Dakota)	---	---	0.50 (ND)	8"	Crude Oil
--	BA_P05A to Beaver Lodge (TwinEagle Midstream)	---	---	0.40 (ND)	6"	Crude Oil

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Line	Pipeline Sections	Begin Stationing	End Stationing	Miles	Pipeline Diameter	Product
--	TE_P03A to Trenton (Statoil Oil & Gas)	---	---	0.60 (ND)	8"	Crude Oil
--	TE_P04A to Trenton (Hiland Crude)	---	---	0.20 (ND)	8"	Crude Oil
--	AX_P02A to Alexander (Statoil Oil & Gas)	---	---	0.40 (ND)	8"	Crude Oil
--	AX_P03A to Alexander (Targa Badlands)	---	---	0.50 (ND)	8"	Crude Oil
--	BA-276-LTPIP-8011 Beaver Lodge Terminal to Energy Transfer DAPL Facility	---	---	0.70 (ND)	16"	Crude Oil

**Midwest Region total miles of Pipeline = 4256.4 miles**

Table 3- North Dakota Region Deactivated Pipelines/ Out –of-Service Pipelines

Line	Pipeline Sections	Begin Stationing	End Stationing	Miles	Pipeline Diameter	In-Service	Date De-Activated
82-111	Plaza to Stanley	---	---	26	6"	-	2007
83-106	Flat Lake to Grenora	263	155,564	19.6 (MT) Total 29.4	6.625"	1965	2014
83-107	Outlook to Reserve			25.0 (MT)	6"	1969	2007/2008
83-107	Reserve to Grenora	125,309	23	4.7 (ND) 19 (MT) Total 23.7	6.625"	1969	2017
85A-103	Sherwood to Maxbass	335,157	178,356	29.7 (ND)	6.625"	1963	2014
85-103	Maxbass to Minot	178.446	75	33.8 (ND)	10.75"	1962	2015
85-104	Central Farm to Maxbass	131 + 76	9 + 00	15.6 (ND)	6.625"	1962	2015
		700 + 96	690 + 78				
		690 + 78	0 + 00				
Total Miles			93.3 ND	157.2			
			64 MT				



Table 4- Tank Tables

Tank No.	Date Built	Total Volume (Bbls)
<b>Clearbrook</b>		
56	1960	54,000
57	1960	120,000
58	1960	80,000
59	1972	80,000
60	1972	80,000
61	1994	200,000
62	1995	200,000
63	1995	200,000
64	1996	250,000
<b>Total Capacity</b>		<b>1,264,000</b>
<b>Superior</b>		
1	1973	390,000
2	1973	390,000
3	1989	150,000
4	1989	150,000

Tank No.	Date Built	Total Volume (Bbls)
5	1951	150,000
6	1951	150,000
7	1951	150,000
8	1951	150,000
9	1951	150,000
10	1951	150,000
11	1951	150,000
12	1951	150,000
13	1952	217,000
14	1952	217,000
15	1952	217,000
16	1952	217,000
17	1952	217,000
18	1952	217,000
19	1968	217,000
20	1952	217,000
21	1952	217,000
22	1952	217,000

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Tank No.	Date Built	Total Volume (Bbls)
23	1971	217,000
24	1971	217,000
25	1990	217,000
26	1994	217,000
27	1995	217,000
28	1969	217,000
29	1969	217,000
30	2000	250,000
31	2000	250,000
32	2003	180,000
33	2003	180,000
34	2007	390,000
35	2008	250,000
36	2010	250,000
37	2010	250,000
38	2010	250,000
39	2010	250,000
40	2010	250,000

Tank No.	Date Built	Total Volume (Bbls)
41	2014	644,000
42	2014	644,000
43	2015	644,000
44	2015	644,000
45	2015	644,000
<b>Total Capacity:</b>		<b>11,939,000</b>
<b>Reserve</b>		
9601	1987	5,000
<b>Total Capacity:</b>		<b>5,000</b>
<b>Minot</b>		
6004	1962	80,000
6005	1962	80,000
6006	1980	120,000
<b>Total Capacity:</b>		<b>280,000</b>
<b>Grenora</b>		
8003	1981	30,000
8004	2014	40,000
<b>Total Capacity</b>		<b>70,000</b>

## FIELD EMERGENCY RESPONSE PLAN

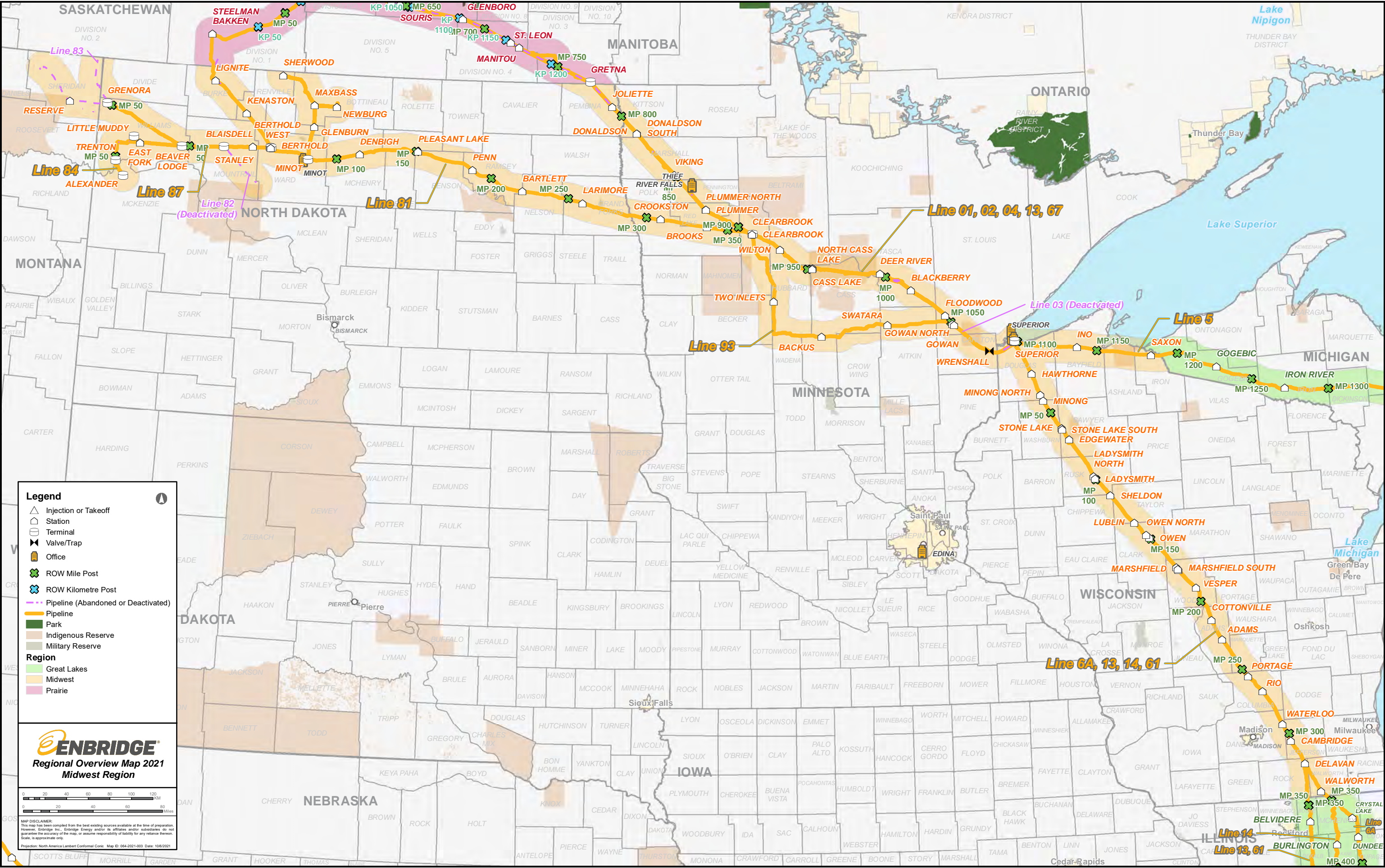
Effective 2022-2023

Tank No.	Date Built	Total Volume (Bbls)
<b>Stanley</b>		
9002	1981	30,000
9004	2010	80,000
9005	2012	80,000
<b>Total Capacity:</b>		<b>190,000</b>
<b>Little Muddy</b>		
9400	2013	30,000
9001	2013	30,000
<b>Total Capacity:</b>		<b>60,000</b>
<b>Beaver Lodge</b>		
9500	1981	100,000
9501	1981	55,000
9502	2009	55,000
9503	2012	150,000
<b>Total Capacity:</b>		<b>360,000</b>
<b>Trenton</b>		
9600	1983	20,000
9602	2007	20,000

Tank No.	Date Built	Total Volume (Bbls)
<b>Total Capacity:</b>		<b>40,000</b>
<b>Alexander</b>		
9700	1983	20,000
9701	2007	55,000
<b>Total Capacity:</b>		<b>75,000</b>
<b>Berthold</b>		
9800	1996	80,000
9801	2012	80,000
9802	2012	80,000
9803	2013	150,000
9804	2013	150,000
9805	2013	150,000
<b>Total Capacity:</b>		<b>690,000</b>
<b>Region Total Capacity</b>		<b>14,973,000</b>











## 5.0 SPILL / SITE ASSESSMENT / PRODUCT INFORMATION

The primary purpose of a site assessment is to evaluate the presence of risk to both incident responders and the public. However, if it is safe to do so, information about the incident should be gathered as quickly as possible in order to evaluate the situation and develop an initial action plan.

When conducting the site assessment, note the following:

- Identify and evaluate the immediate risks to and impacts on the environment, human health, and infrastructure
- Classify the spill according to the following factors:
  - Substance spilled
  - Quantity of the substance spilled
- The location and circumstances of the spill
- Assess:
  - What is to be done to protect the safety of response personnel and the public
  - Whether or not an evacuation is necessary

### 5.1 Hazardous Product – Site Assessment

A description of some conditions that should be watched for during a site inspection of the surface is provided below:

### **5.1.1 Crude Oil Leaks**

Approach up-wind following company guidelines to ensure personal safety.

All leak sites should always be approached upwind, uphill and/or upstream, following company guidelines to ensure personal safety.

- Oil releases will generally be very dark in color and not translucent
- Very defined edges of the oil patch when on soil
- Many crude oils will have a strong odor; those with 'sour' designation will have an H<sub>2</sub>S or 'rotten egg' smell
- If the leak migrates to a water body, the surface will have a shiny, rainbow-like appearance
- Leaks can migrate underground along fissures, faults, and along the pipeline, therefore, may not be observed directly over the line
- Dead and dying vegetation may be present where the leak is older than one day



### 5.1.2 NGL Leaks

All leak sites should always be approached upwind, uphill and/or upstream, following company guidelines to ensure personal safety.

- NGL requires heat to vaporize and, as a result, will have a refrigeration effect on the surrounding environment as it turns from liquid to a vapor
- Any atmospheric water vapor will be condensed producing a fog-like cloud in the area.
- There may be an ice dam built up around the leak
- In windless conditions, NGL vapor is heavier than air and the vapor cloud may be visible close to the ground
- The cloud will also collect in depressions and/or follow low spots of the ground contour
  
- In windy conditions, the cloud will tend to dissipate and to be pushed further away
- NGL liquid has a slight odor of gasoline. Odorant is not added to the material
- Dead and dying vegetation may be present where the leak is older than one day
- Vegetation will be dead or dying

### 5.1.3 Refined Products and Condensates

All leak sites should always be approached upwind, uphill and/or upstream, following company guidelines to ensure personal safety.

- Translucent appearance
- On water, the material will have a similar appearance to crude.
- The odor will be that of whatever product is in the line at the time (i.e., gasoline, diesel, JetB)
- Vegetation will be dead or dying

### 5.1.4 Natural Gas

All leak sites should always be approached upwind, uphill and/or upstream, following company guidelines to ensure personal safety.

- It is lighter than air; therefore, the vapor will rise
- If a rupture takes place at the time of the leak, there will likely be a crater at the leak site along with pieces of pipe strewn throughout the area. If ignition takes place, a large fireball will initially be seen followed by a prolonged burn
- If in water, either bubbles or mist spray will be present. Ignition is also possible in this situation
- Loose soil may result in a dust cloud being present
- Natural gas is not odorized until it gets close to the consuming public. Therefore, it may not have an odor to it

## 5.2 Site Assessment Checklist

### Site Assessment Checklist

<input type="checkbox"/>	Conduct air monitoring (refer to the <a href="#">LP Safety Standards</a> for Gas Monitor Alarm Set Points)
<input type="checkbox"/>	Complete safe work permit
<input type="checkbox"/>	Remove all non-intrinsically safe equipment (radio's etc.)
<input type="checkbox"/>	Maintain regular communications with the control Centre
<input type="checkbox"/>	Obtain information regarding the situation
<input type="checkbox"/>	Establish communications procedures
<input type="checkbox"/>	Don appropriate PPE
<input type="checkbox"/>	Refer to SDS
<input type="checkbox"/>	Determine wind speed and direction
<input type="checkbox"/>	Determine current direction
<input type="checkbox"/>	Approach spill from upwind, uphill and/or upstream, / up current if possible

## 5.4 On-Water Spill Surveillance

The following guidelines should assist in spill surveillance:

- Spill surveillance should begin as soon as possible to aid response personnel with assessing spill size, movement, and potential impact locations
- Cloud shadows, sediment, floating organic matter, submerged sand banks, or wind-induced patterns on the water may resemble an oil slick if viewed from a distance
- It is difficult to adequately observe oil on the water from a boat, dock, or shoreline
- Spill surveillance is best accomplished using helicopters or small planes
- Helicopters are preferred due to their superior visibility and maneuverability characteristics
- If fixed-wing planes are used, high wing types provide better visibility than low-wing types
- Flights should minimize impact to wildlife where possible
- Document all observations in writing and with photographs and/or videotapes
- Describe the approximate oil slick dimensions based on available reference points (i.e., vessel, shoreline features, facilities, etc.).
- Use aircraft or vessel (if safe to do so) to traverse the length and width of the slick while timing each pass.
- Calculate the approximate size and area of the slick by multiplying speed and time
- Record aerial observations on detailed maps
- In the event of reduced visibility, such as dense fog or cloud cover, boats may be used for patrols and documenting the location and movements of the spill
- Boats will only be used if safe conditions are present, including on-scene weather and product characteristics

- Surveillance is also required during spill response operations to gauge effectiveness of response operations, to assist in locating skimmers and to continually assess size, movement, and impact of spill

## 5.5 Spill Volume Estimation

Early along in the response, estimation of spill volume is required to:

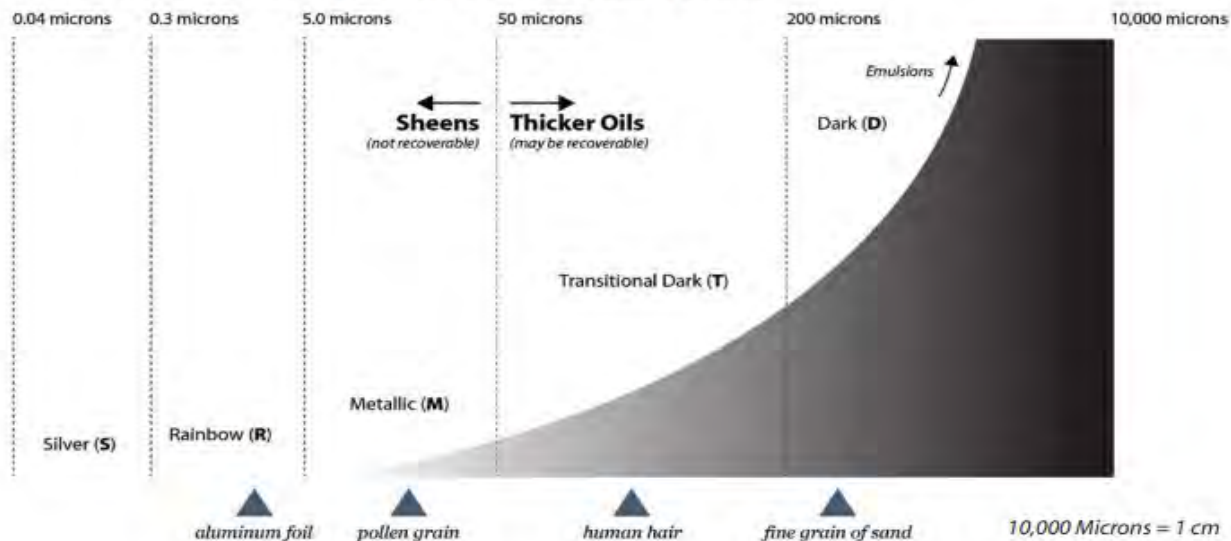
- Report to agencies
- Determine liquid recovery and containment requirements
- Determine disposal and interim storage requirements
- In the event that actual spill volumes are not available, it may be necessary to estimate volume

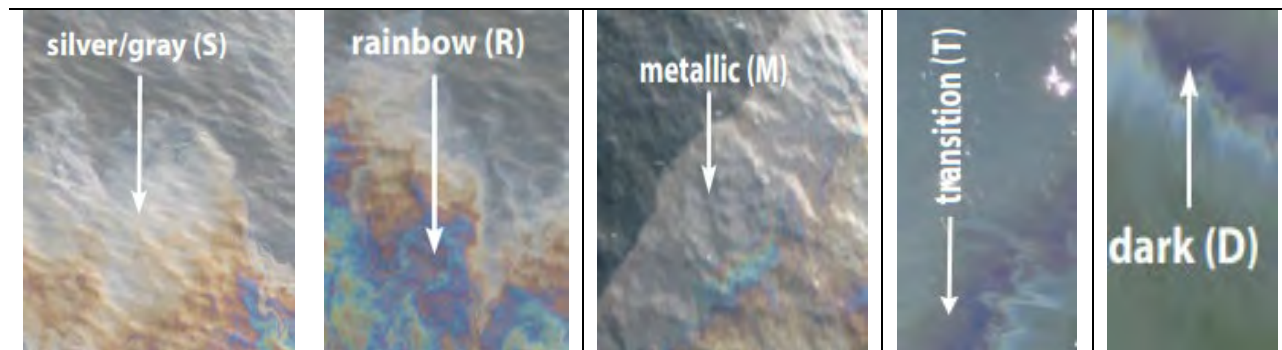
Visual assessment of the surface area and thickness (note that this method may yield unreliable results):

- Interpretation of sheen color varies with different observers
- Appearance of a slick varies depending upon amount of available sunlight, sea-state/turbulence, and viewing angle
- Different products may behave differently, depending upon their properties

Oil volumes can be estimated by multiplying the area of the slick by the average estimated thickness. The following chart applies when the oil is on water. In the case of an impoundment area the spill can be estimated by multiplying the thickness by the area covered.

### Oil Code Color and Relative Thickness Values





\*Graphics are from NOAA's Open Water Oil Identification Job Aid

Volume calculations for surface spill, pipeline calculator and dispersant can be done online by visiting The Response Group website <https://www.responsegroupinc.com/pipeline-volume-calculator>.

## 5.6 Methods for Estimating Spill Size

Inventory Estimate	If available, information provided from the control center can be used to provide an initial estimate of the spill volume. The volume should match the change in a cutoff inventory measurement
Tanks	<p>If the leak source can be isolated to a tank, an initial leak volume estimate can be determined as:</p> <ul style="list-style-type: none"><li>• Volume = change in height of the tank x the volume per inch as found on the tanks strapping table</li></ul> <p>An initial release volume can be calculated as:</p> <ul style="list-style-type: none"><li>• Volume = (mainline flow rate x time to isolate) + volume of drain-up from the release site</li><li>• See OMM Book 3: 06-03-03 Drainup and Linefill for the calculation</li></ul> <p>The volume release estimate can be verified by the mismatch in injection and delivery flow meters of tank volume change. In systems monitored by a leak detection system (LDS), imbalances or estimates reported by the LDS may be useful for estimating spill volumes</p>
Land	<p>The following is a list of possible tools that can assist with determining a spill volume on land</p> <ul style="list-style-type: none"><li>• Transportation Spill to Land Estimation Tool</li><li>• SCADA (Control Center calculation)</li><li>• Tank Data Program</li></ul> <p>In systems monitored by a leak detection system (LDS), imbalances or estimates reported by the LDS may be useful for estimating spill volumes</p>



**FIELD EMERGENCY RESPONSE PLAN**

Effective 2022-2023

**Leak on Land  
– Field  
Measurement**

To estimate the volume of a spill in a field location, the spill is segmented to a summation of area calculations.

The volume of each area is calculated as the length x the width x the depth:

- 1 m<sup>3</sup> = 6.29 bbls - 1 ft<sup>3</sup> = 0.178 bbls
- 1 in = 0.0254 meter - 1inch = 0.0833 ft

Length and width should include any soil staining in addition to areas where free product is observed. Depth estimates should consider the following:

- Estimate depth of free product penetrating surface as well as depth of staining in soil
- Estimate depth of free product sitting on top of the surface at the location where this appears to be deepest
- Depth for free product and staining in soil should be taken at a location nearest to the release point
- Total depth used for volume estimates should include all depth estimates

## Oil Thickness Estimation Chart

Appearance	Approximate Quantity of Oil in Film	
	Inches in Thickness	Gallons/mile <sup>2</sup>
Barley visible	0.000002	25
Silvery	0.000003	50
Trace of Colors	0.000004	100
Bright Colors	0.00001	200
Dull Colors	0.00004	666
Dark Colors	0.0001	1,332
Thickness of light oils: 0.0010 inches to 0.00010 inches		
Thickness of heavy oils: 0.10 inches to 0.010 inches		

## 5.7 Spill Volume Estimates Checklist

The following checklist is used with hard to quantify leak volume identified in the field:

### Volume Estimates Checklist

<input type="checkbox"/>	Leak with hard to quantify volume identified in the field
<input type="checkbox"/>	Is volume estimate available from leak detection system? <ul style="list-style-type: none"><li>• If yes, estimate using imbalances reported by leak detection system</li><li>• If no, estimate using SCADA and metering info</li></ul>
<input type="checkbox"/>	Can volume be estimated using pipeline hydraulic calculations combined with SCADA data <ul style="list-style-type: none"><li>• If yes, estimate using pipeline hydraulic calculations</li><li>• If no, conduct Environmental Assessment</li></ul>
<input type="checkbox"/>	Can the potential for product migration into the subsurface be ruled out? <ul style="list-style-type: none"><li>• If yes, is the release primarily in the form of pooled product on the surface?</li><li>• If no, consult with internal departments (Control Center, Measurement Operations, Environment) to determine potential spill parameters</li></ul>
<input type="checkbox"/>	Can volume be estimated with reasonable uncertainty using operational data? <ul style="list-style-type: none"><li>• If yes, review estimate with Regional Management and internal stakeholders</li><li>• If no, conduct Environmental Site Assessment to facilitate volume estimation</li></ul>
<input type="checkbox"/>	Conduct Environmental Site Assessment to facilitate volume estimation <ul style="list-style-type: none"><li>• Review volume estimate for reasonableness</li></ul>

**Volume Estimates Checklist**

Note	<ul style="list-style-type: none"><li>• Estimates must take uncertainties (such as extent of subsurface contamination, duration of leak, etc.) into account</li><li>• This checklist provides guidance but is not intended to exclude using multiple approaches to estimate spill volume</li><li>• When multiple methods are available to estimate spill volume, they can be complementary and may together provide a better estimate of the possible spill volume than a single method</li><li>• Make initial regulatory notifications as required using best available (qualify as preliminary estimate that requires further assessments)</li><li>• Once more detailed volumes are estimated, conduct follow up notifications to regulatory agencies and other stakeholders, if required</li></ul>
------	---

## 5.8 Site Security and Control

Security is necessary to protect the public and responders, prevent any additional damage due to sabotage, protect the equipment, and eliminate congestion at the work site due to unauthorized personnel. If there is a security incident, notify Enterprise Security.

The priority of all Enbridge personnel in any emergency is protecting the public and responders. The public will be prevented access to an emergency site while there is any danger of explosion, fire, hazardous vapors, or other hazardous condition.

Security measures need to be established early in the incident to provide the following:

- Protect personnel from loss or damage and protect assets
- Ensure the safety of the public
- Establish a perimeter (zone of safety) around the site
- Ensure the public does not interfere with response and clean-up operations
- Ensure access for personnel and equipment to the access point, staging area and Incident Command Post

If applicable, Enterprise Security will carry out the following actions:

- Request the assistance from the authority having jurisdiction and/or fire department to limit highway access to the spill scene by:
  - Setting up roadblocks and beach closures where necessary to secure a safety zone.
  - Providing escort and access for spill response personnel and equipment, as needed.
- Request assistance from local security firms to assist federal, provincial/state and local police departments, and expand area of coverage at the scene.
- Establish a pass system and distribute prepared security passes to those who need to enter the site, as applicable.
- Request the Federal Aviation Administration or Transport Canada to restrict air space over the spill area, as applicable.
- Request the U.S. or Canadian Coast Guard to establish a safety zone in the spill area and that they limit access of all vessels not involved in the spill effort, as applicable.

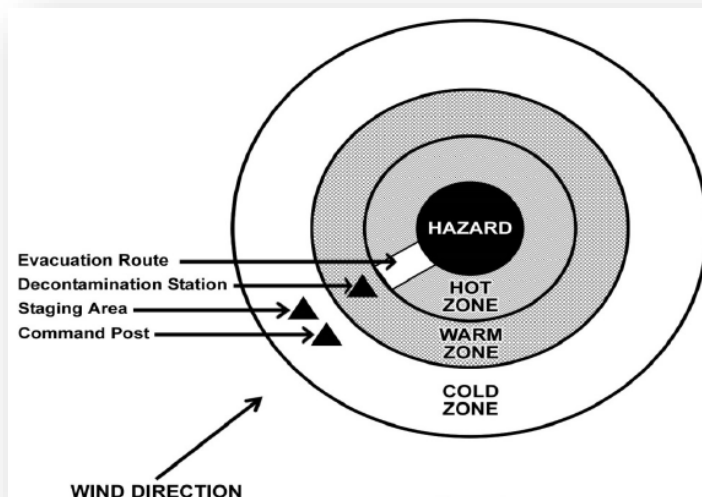
## **5.9 Setting Up 'On-Site' Work Areas**

Set up an Incident Command Post, Staging Areas, and Decontamination Stations as necessary for the circumstances.

### 5.9.1 Protective Zones

Establish initial control perimeters based on the following guidelines:

Protective Zones	To minimize spreading contamination from an emergency site to unaffected areas, the Safety Officer must record protective zones (see Figure 2) on the ICS 201-5 Site Safety and Control Form. Protective zones should identify, the Hot Zone, Warm Zone, Cold Zone
Hot Zone	The hot zone is the release site or site of clean-up operations. Any area that requires respiratory protection must be within the boundary of a designated hot zone. Access to the hot zone is restricted to trained and properly equipped emergency response personnel only. Personnel not involved in emergency operations must be prevented from entering and escorted off the site if necessary
Warm Zone	The warm zone is a transition zone where equipment may be cleaned, and contaminated clothing removed, before leaving the site. Follow the established Decon plan. Appropriate PPE is required. Could initially be consider a containment area
Cold Zone	The cold zone is the largest zone and includes all areas not immediately involved in the emergency. Take all possible efforts to ensure contamination does not spread to this area. Air monitoring delineates the perimeter where air contaminants and combustible vapors cease to be detected. The cold zone must be established outside of this perimeter. Locate the Incident Command Post and staging area (pre-deployment staging area for equipment arriving on site) in the cold zone. For large incidents, ensure that the Incident Command Post is not positioned near the incident



**Figure 1: Protective Zones**



### 5.9.2 Isolation Distance

The following table depicts safe distancing as recommended by the latest edition of the [Emergency Response Guidebook \(ERG\)](#), by the Department of Transportation, and Transport Canada. Reference to the latest edition of the Emergency Response Guidebook is further recommended to confirm safe distancing relative to the site-specific conditions.

Product	Guide No	ID No	Immediate Precautionary Evacuation Measure	Large Spill Evacuation	Evacuation in the Event of a Fire
Condensate (Diluent), Natural Gas, Butane, Ethane, Methane, Propane	115	1971, 1011, 1075, 1035, 1978, 1971, 1075	100 meters (330 feet)	800 meters (½ mile)	1,600 meters (1 mile)
Naphthalene Crude	133	1334	25 meters (75 feet)	100 meters (330 feet)	800 meters (½ mile)
Petroleum Crude Oil, Petroleum products, Pentane, Hexane, Heptane, Octane, Nonane, Decane	128	1270, 1267, 1265, 1268, 1208, 1206, 1262, 1920, 2247	50 meters (150 feet)	300 meters (1,000 feet)	800 meters (½ mile)
Petroleum sour crude oil, flammable, toxic	131	3494	60 meters (200 feet)	800 meters (½ mile)	800 meters (½ mile)

Product	Guide No	ID No	Immediate Precautionary Evacuation Measure	Large Spill Evacuation	Evacuation in the Event of a Fire
Benzene, Toluene, Xylene	130	1114, 1294, 1307	50 meters (150 feet)	300 meters (1,000 feet)	800 meters (½ mile)
Hydrogen Sulfide Gas	117	1053	100 meters (330 feet)	300 meters (1,000 feet)	1,600 meters (1 mile)

Consider the hazards associated with the hazard categories:

Flash Fire and Vapor Cloud Explosion	Should be considered potentially hazards in structurally condensed areas (heavy urban areas) especially under low wind, stable weather conditions
Pool Fires	Should be considered potential hazards in structurally condensed areas (heavy urban areas) especially if wind speed is high and ignition is delayed (product has pooled significantly). These hazards may result in a travelling flame front, damaging overpressure, or exposure to thermal radiation; therefore, responders should use the distances identified for “Evacuation in the Event of a Fire” even if no fire is present. In a full-bore rupture where there is a risk of Flash Fire or Vapor Cloud Explosion, these distances should be doubled.
Vapor Cloud Explosion	<p>These distances should be doubled.</p> <ul style="list-style-type: none"><li>• Additional conditions that should be considered when determining an evacuation zone include weather, full bore rupture, wind speed, overcast/clear sky and day/night</li><li>• These substances may also present a Toxic Inhalation Hazard (TIH) and nighttime distances will defer from above</li></ul>



**6.0 EVACUATION / SHELTER IN PLACE****6.1 Personnel Evacuation**

Evacuation plans are located in the applicable facility. All evacuation directives will be communicated through an audible signal, either through voice by the designated Individual, or by the activation of an alarm system.

The evacuation plans provide guidance in the event of shutdown and evacuation.

- In the event of an incident, the facility operator will stop the flow of product by normal operating procedures
- All facility personnel should evacuate except for any individuals designated to remain on site (refer to the LP Safety Standards for further details)
- The Fire Department will be notified if there is a fire
- Arriving personnel, equipment and fire resources will be met at the main gate or muster point of the facility, unless deemed unsafe to do so
- Tactical deployment of arriving resources will depend on the current situation

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

**Evacuation Checklist**

<input type="checkbox"/>	Immediately stop work activities
<input type="checkbox"/>	Check the wind direction
<input type="checkbox"/>	Move upwind or cross wind
<input type="checkbox"/>	Check the wind again
<input type="checkbox"/>	Conduct a head count to account for all personnel known to be at the facility,
<input type="checkbox"/>	Assist in alerting and escorting personnel, including visitors and contractors to the appropriate muster point
<input type="checkbox"/>	Notify the Control Center
<input type="checkbox"/>	Shut off running equipment if safe to do so
<input type="checkbox"/>	Assist in hazard control activities as requested
<input type="checkbox"/>	Check in at muster point for accountability
<input type="checkbox"/>	Assist in search and rescue of missing persons
<input type="checkbox"/>	Injured personnel will be transported to the nearest emergency medical facility. All other personnel will remain at the evacuation point until the "All Clear" signal is given.
Note:	Evacuation should be carried out in an orderly manner. Personnel should walk, NOT run or panic.

## 6.2 Community Evacuation

In planning an evacuation, the following must be considered:

- The size and expected duration of the release
- Egress routes
- Current and expected meteorological conditions
- The potential for unexpected ignition

A recommendation to evacuate should be made by a Qualified Individual/Incident Commander based on LEL monitors and or air quality monitoring. If public safety is impacted, carry out the following actions:

- Evacuation of the public should only proceed when it is safe to do so and ONLY in cooperation and coordination with Local Emergency Services as identified under community emergency response plans. The decision to evacuate is a community responsibility
- Support the evacuation and cover the cost of the response
- Evacuation is recommended for incidents in which the plume is visible, and egress can occur in any direction away from the plume
- If the public must be evacuated before external response agencies arrive or if these agencies are not available, the Incident Commander must take all steps necessary to ensure public protection (e.g., assigning Company employees to begin a door-to-door evacuation), then turn over these duties to community agencies as soon as possible

- Provide a clear recommendation to evacuate the public should the Company become aware of an immediate threat to life and safety that may not be under action by first responders
- Enbridge will serve only in an advisory capacity during an evacuation order and may assist with the logistics of an evacuation

### 6.3 Shelter in Place

Sheltering is the primary public protection measure for high vapor pressure products and when the hazard is of limited duration. This creates an indoor buffer to protect affected individuals from higher (more toxic) concentrations that may exist outdoors. The goal is to reduce the movement of air into and out of the building until either the hazard has passed, or other appropriate emergency actions can be taken (such as evacuation).

Sheltering indoors is a viable public protection measure in circumstances when:

- There is insufficient time or warning to safely evacuate the public
- Residents are waiting for evacuation assistance
- The release will be of a limited size and /or duration
- The location of the release has not been identified
- The public would be at a higher risk if evacuated
- Stopping traffic (e.g., on roads, rail lines, bridges), as required



For long-term releases, evacuation is preferred to sheltering if public safety can be assured during the evacuation process. Evacuation is a viable public protection measure in circumstances when:

- The location of the plume is known, and safe egress routes can be assured
- The release will not likely be contained in the near future
- Visibility and road conditions are good
- The residents clearly understand their directions
- Residents should also be evacuated during ongoing emergency flaring or burning if their health and safety could be affected by the operation

A natural gas release may be ignited at the source in order to reduce public exposure to the hazard. If an immediate threat to human life exists and there is not sufficient time to evacuate the hazard area the Incident Commander is authorized to ignite the release.



## 7.0 RESPONSE OPERATIONS

### 7.1 Enbridge Response Management System

Enbridge's Emergency Response is structured to ensure that appropriate resources and support are deployed to suit the complexity and severity of the emergency, from the initial response through the duration of the incident. Both tactical and strategic response and support have been considered. Depending on the scale and scope of the incident, multiple teams will be activated.

#### **Enterprise Crisis Management Team – Strategic (EXTERNAL TO Emergency Management Program)**

As identified in the Enterprise Crisis Management Plan (external to this framework and Emergency Management Program): Responsible for “Actions taken away from the scene to support and assist the Incident Support Team and [Incident Management Team] in planning, business recovery projects and address the implications of the problem and its potential on the Company's viability, operability, and credibility”

#### **LP Incident Support Team - Strategic**

Actions taken at and/or away from the incident scene to support the Incident Management Team, facilitate planning, and manage business recovery projects.

#### **Incident Management Team – Tactical & Strategic (Regional)**

Actions taken at and/or away from the incident scene to support tactical response operations, facilitate planning, and address the immediate concerns of the public and government agencies. Guiding Plan: Integrated Contingency Plan.

**LP Membership – Enbridge Enterprise Emergency Response Team**

At the request of the Regional Director, the LP membership of E3RT will provide LP mentorship to the Incident Management Team, and/or fill substantive roles in the Incident Management Team. LP members would deploy first, followed by the remainder of the E3RT membership for future operational periods.

**Full Membership – Enbridge Enterprise Emergency Response Team**

At the request of the Regional Director, the full membership of this cross-business unit team of individuals, who are specially trained to support significant incidents, will fill roles in the Incident Management Team.

**Field Response Team - Tactical**

Actions taken by responders at an incident scene to directly attack the problem and its consequences.

Guiding Plans: Field Emergency Response Plan, Integrated Contingency Plan, Tactical Response Plan/Control Point Maps, Pre-Fire Plan, and other tools

## 7.2 Incident Command Structure

Enbridge utilizes the Incident Command System for response management:

- Enables a well-managed response and limits the effects of an emergency through the rapid, effective, coordinated response of resources
- Clarifies the roles of personnel involved in emergency response
- Allows for essential information and resources to be organized into a logical structure for planning and implementing the required actions
- Provides a flexible preplanned emergency response organizational structure for any type or size of incident
- The structure of the Incident Command System required depends on the nature and complexity of the emergency, and is based on need

### 7.3 Incident Management Handbook and Job Aids

The Incident Management Handbook incorporates core Incident Command System principals noted above and reflects Enbridge-specific processes and procedures while remaining consistent with NIMS ICS. The handbook consists of:

- Planning cycle process – initial response phase
- Planning cycle process – proactive phases
- Guidance documents – detailed Incident Action Plan

Section specific job aids outline responsibilities for the following response management roles:

- Incident Command Section
- Operations Section
- Planning Section
- Logistics Section
- Finance Section

The [Incident Management Handbook and associated Job Aids](#) for specific sections is located on the Governance Documents Library.

## **7.4 Incident Command Posts**

The Operations Section Chief, Incident Commander, or designate, select the location of the Incident Command Post based on factors such as:

- Wind direction, areas of high ground and site access
- The potential for plume development/migration, explosion and toxic effects of a spill must be taken into account
- Input from the Communications Unit Leader should be sought for advice on radio and information technology connectivity

If a vapor cloud is present or imminent, adapt the location of the Incident Command Post to the specific circumstances of the emergency. For example:

- In isolated areas, it may be more appropriate to set up several miles from the emergency site
- In populated areas, it may be more appropriate to set up close to the emergency site
- Refer to the ER guidebook for guidance on safe distance

The Incident Command Post:

- Must be clearly illuminated and identified by signage at the emergency site entrance (or just inside), visible to all entering the site
- Always attended
- Depending on the security situation in the area, seek advice from the Intel Advisor and/or Security Manager and/or Enterprise Security)
- For evolving incidents, the Incident Command Post may need to be moved to allow for expanding activities. This may include moving to a community center, hotel conference room or other location
- The ICS 208 Site Safety Plan posted on the situation status board
- Will have the following minimum materials, maps, control points, situation status boards, response plans, communications systems



## 8.0 HAZARD SPECIFIC RESPONSE SCENARIOS AND ACTIONS

Enbridge uses an all-hazards approach to mitigate and respond to a variety of hazards and threats. The Field Response Team will consider the impacts to *people, environment, assets*, and the *reputation* of the company as response actions are carried out.

General Initial response actions bellow will be carried out, and following sections is additional guidance for hazard specific response situations. Ensure to document actions as required.

### Initial Response Actions (summary)

<input type="checkbox"/>	<b>S</b> – safety first and always <ul style="list-style-type: none"><li>• Ensure health and safety of self and others at all times</li><li>• Assign a Safety Officer</li></ul>
<input type="checkbox"/>	<b>I</b> – isolate and deny entry <ul style="list-style-type: none"><li>• Stop work</li><li>• Contact the Control Center to shut down and isolate the system</li><li>• Secure and restrict access to the site</li><li>• Evacuate upwind to muster point (on foot)</li></ul>
<input type="checkbox"/>	<b>N</b> – notifications <ul style="list-style-type: none"><li>• Contact Regional Management and People Leader (Regional On-call)</li><li>• Verify the Control Center has been informed</li><li>• Support ongoing communications with Control Center and Regional On-Call</li></ul>

## **8.1 Facility Hazards**

Initial containment actions will focus limiting the environmental impact to the immediate spill area.

The containment of spilled oil will:

- Reduce the spread of slicks and their impacts beyond the property
- Reduce potential impacts to the surrounding environment
- Reduce potential economic impacts
- Maximize the thickness of floating slicks
- Maximize the effectiveness of mechanical counter measures (i.e., skimmers and sorbents)

Selection of the appropriate location and containment and recovery tactic method will depend upon:

- Length of time since the spill occurred
- Amount and type of spilled material
- Area of coverage
- Environmental factors such as wind speed and direction

The following sections outline spill mitigation procedures, and response options for containment and recovery of spilled oil. Refer to the Inland Spill Tactics Guide and Tactical Control Point sheets for detailed information on response tactics.

### 8.1.1 Pipeline Release / Line Strike

In the event of a pipeline release, carry out and document the following actions (if qualified and/or safe to do so):

#### Pipeline Release

<input type="checkbox"/>	If CCO operating procedures did not require immediate shut down, provide consultation and direction on this decision
<input type="checkbox"/>	If shut down was required, confirm with CCO that all potentially affected lines have been shut down
<input type="checkbox"/>	Isolate leaking section of piping
<input type="checkbox"/>	Contain in a safe fashion
<input type="checkbox"/>	Control drain-up of isolated piping
<input type="checkbox"/>	Periodically confirm with CCO that sectionalized pipeline system is holding pressure
<input type="checkbox"/>	If spill in water: Consult Control Point(s) and Environmentally Sensitive Area maps for appropriate response strategies
<input type="checkbox"/>	Consult Inland Spill Response Tactics Guide for recommended equipment and tactics
<input type="checkbox"/>	Gather data for Pipeline Integrity to assess the line
<input type="checkbox"/>	Initiate recovery / repair / clean-up actions with the support of Pipeline Integrity

### 8.1.2 Equipment Failure

In the event of equipment failure, carry out and document the following actions (if qualified and/or safe to do so):

#### Equipment Failure

<input type="checkbox"/>	Shut off the flow and transfer pumps. Close header & tank valves
<input type="checkbox"/>	Evacuate the area as necessary
<input type="checkbox"/>	Drain remaining contents to containment tanks
<input type="checkbox"/>	Secure area if safe to do so
<input type="checkbox"/>	Tighten leaky valve or fitting, if safe
<input type="checkbox"/>	Eliminate sources of vapour cloud ignition by shutting down all engines and motors
<input type="checkbox"/>	Initiate response actions

### 8.1.3 Piping Rupture / Leak

In the event of if piping rupture/ leak, carry out and document the following actions (if qualified and/or safe to do so):

#### Piping Rupture / Leak

<input type="checkbox"/>	Shut off the flow and transfer pumps. Close header & tank valves
<input type="checkbox"/>	Shut down pumps. Close the closest block valves on each side of the rupture
<input type="checkbox"/>	Drain the line back into contained areas (if possible). Alert nearby personnel of potential safety hazards
<input type="checkbox"/>	Shut down source of vapour cloud ignition by shutting down all engines and motors
<input type="checkbox"/>	If piping is leaking and under pressure, relieve pressure by draining into a containment area or back to a tank (if possible). Then repair line according to established procedures

### 8.1.4 Tank Failure

In the event of a tank failure, carry out and document the following actions (if qualified and/or safe to do so):

Tank Failure	
<input type="checkbox"/>	Evacuate nonessential personnel or personnel at high risk
<input type="checkbox"/>	Shut down or divert source of incoming flow to tank
<input type="checkbox"/>	Transfer fluid to another tank with adequate storage capacity (if possible)
<input type="checkbox"/>	Shut down source of vapour cloud ignition by shutting down all engines and motors
<input type="checkbox"/>	Ensure that containment bay discharge valves are closed
<input type="checkbox"/>	Monitor containment area for leaks and potential capacity limitations
<input type="checkbox"/>	Begin cleaning up spilled product as soon as possible

### 8.1.5 Fire or Explosion

In the event of a tank fire/explosion, carry out and document the following actions (if qualified and/or safe to do so), noting: large or fully involved fires are to be fought by professional firefighters or tank fire specialists, refer to [Terminal Pre-Fire Plan](#) on the Governance Document Library for further details.

#### Fire / Explosion

<input type="checkbox"/>	Evacuate nonessential personnel or personnel at risk of injury
<input type="checkbox"/>	Notify local fire and police departments
<input type="checkbox"/>	Attempt to extinguish fire if it is in incipient (early) stage Small Fire: Dry chemical, CO2, water spray or regular foam
<input type="checkbox"/>	Shut down transfer or pumping operation. Attempt to divert or stop flow of product to the hazardous area (if it can be done safely)
<input type="checkbox"/>	Eliminate sources of vapour cloud ignition shutting down all engines and motors
<input type="checkbox"/>	Control fire before taking steps to contain spill
<input type="checkbox"/>	Large Fire – use defensive tactics only: <ul style="list-style-type: none"><li>• Water spray, fog, or regular foam</li><li>• Do not use straight streams</li><li>• Move containers from fire area if you can do so without risk</li></ul>

**Fire / Explosion**

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | <p>Fire involving Tanks or Car/Trailer Loads – use defensive tactics only:</p> <ul style="list-style-type: none"><li>• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles</li><li>• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.</li><li>• ALWAYS stay away from tanks engulfed in fire</li><li>• For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn</li></ul> |
|--------------------------|---|



### 8.1.6 Manifold Failure

In the event of a manifold failure, carry out and document the following actions (if qualified and/or safe to do so):

Manifold Failure	
<input type="checkbox"/>	Evacuate nonessential personnel or personnel at risk of injury
<input type="checkbox"/>	Terminate transfer operations immediately
<input type="checkbox"/>	Isolate the damaged area by closing block valves on both sides of the leak/rupture
<input type="checkbox"/>	Shut down source of vapour cloud ignition by shutting down all engines and motors
<input type="checkbox"/>	Drain fluids back into containment areas (if possible)

### 8.1.7 Radioactive Source Emergencies

In the event of an accident (e.g., fire, explosion), damage or any other incident that may affect the integrity of a radiation source (e.g., nuclear densitometers, either portable or fixed):

#### Radioactive Source Emergencies

<input type="checkbox"/>	Stop all activity in the immediate area
<input type="checkbox"/>	Evacuate the immediate vicinity of the source head and clear personnel within a 6-meter radius perimeter around the source head
<input type="checkbox"/>	Notify local Operations personnel and/or call the 24-hour emergency number shown on the warning sign
<input type="checkbox"/>	Consult Site Safety Plot Plans/Evacuation Plans for the locations of radioactive sources for facilities
<input type="checkbox"/>	Do not allow workers to re-enter the area until a radiation survey is completed by a radiation specialist
<input type="checkbox"/>	If the device has sustained physical damage, contact a radiation specialist to leak test the device
<input type="checkbox"/>	Follow company procedures for required initial notifications
<input type="checkbox"/>	Notify the CNSC 24-hour Duty Officer and inform them of the incident at 613-995-0479 or 1-844-879-0805
<input type="checkbox"/>	Contact Enbridge's Radiation Safety Officer as outlined in Book 1 General Compliance Reference, Subject 02-02-01

### **8.1.8 Hot Bitumen Incident**

In the event of an incident involving the release of hot bitumen, consider the following potential hazards:

- Substance is transported hot, risk of severe burns
- Exposure to fumes may irritate eyes, nose, respiratory tract
- Vapors may form explosive mixture with air and/or travel to source of ignition and flash back
- Vapors will spread along ground and collect in low or confined areas
- Vapors may cause dizziness or suffocation
- When handled hot, bitumen odour may also camouflage the odour of H<sub>2</sub>S
- If water contacts hot bitumen there is a risk of a violent reaction – the water evaporates and expands in volume which leads to spattering
- In a storage tank or truck the pressure can increase and result in a violent eruption of hot bitumen. If closed, the truck tank could explode or rupture
- Runoff from fire control or dilution water may cause pollution

In the event of hot-bitumen incident, carry out and document the following initial safety actions (if qualified and/or safe to do so):

### Initial Safety Actions

<input type="checkbox"/>	As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions
<input type="checkbox"/>	Keep unauthorized personnel away
<input type="checkbox"/>	Stay upwind, uphill and/or upstream For large spills, consider initial downwind EVACUATION for at least 300 meters (1000 feet)
<input type="checkbox"/>	Ventilate closed spaces before entering
<input type="checkbox"/>	Ensure wearing required PPE. PPE should cover all parts of exposed skin to prevent contact with hot bitumen (e.g., full face shield, heat resistant gloves, etc.). <ul style="list-style-type: none"><li>• Should a burn occur, the skin needs to be drenched in cold water for at least 10 minutes for skin burns and at least 5 minutes for eye burns</li><li>• NEVER attempt to remove bitumen from burned areas, the bitumen layer will be firmly attached to the skin and removal should not be attempted unless carried out at a medical facility under supervision of doctor</li></ul> Wear positive pressure self-contained breathing apparatus (SCBA), as required
<input type="checkbox"/>	If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions

In the event of hot bitumen spill, carry out and document the following actions (if qualified and/or safe to do so):

**Spill or Leak**

<input type="checkbox"/>	ELIMINATE all ignition sources (no smoking, flares, sparks, or flames in immediate area)
<input type="checkbox"/>	All equipment used when handling the product must be grounded
<input type="checkbox"/>	Do not touch or walk-through spilled material
<input type="checkbox"/>	Stop leak if you can do it without risk
<input type="checkbox"/>	Spills or leaks will initially consist of molten, hot material and there may be severe risk of burns. The bitumen will cool down and become solid
<input type="checkbox"/>	Prevent entry into waterways, sewers, or confined areas
<input type="checkbox"/>	A vapor-suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces.
<input type="checkbox"/>	Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers
<input type="checkbox"/>	Small Spill: Allow bitumen to cool and solidify. Remove mechanically into containers for disposal or reclamation in accordance with regulation
<input type="checkbox"/>	Large Spill: Prevent from spreading by making a trench or barrier with sand, earth, or other material
<input type="checkbox"/>	Use clean, non-sparking tools to collect absorbed material

Carry out and document the actions listed in the Fire or Explosion section above, in the event of fire involving hot bitumen.

**Caution:** Product has a very low flash point. Use of water spray when fighting fire may be inefficient.

### 8.1.9 Natural Gas Liquid Incident

In the event of an incident involving a natural gas release, remember the following safety precautions:

- Methane vapors rise and disperse in a mushroom cloud formation
- Most NGL vapors are heavier than air
- Time is critical in the decision to ignite large leaks
- NGLs expand 300 times when changing from liquid to vapor

Assess the leak and controlling measures, taking into account:

- Whether the leak will continue to spread if it isn't ignited
- Whether residents are safe or should be evacuated
- What toxic conditions and topography are doing to the vapor cloud
- Whether ignition will cause additional fire hazards
- Whether personnel can ignite the leak safely
- Whether the subsequent fire can be controlled
- Monitor wind direction, speed, and ambient temperatures

**Natural Gas Liquid**

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | <p>Discovery / Investigation</p> <p>For the initial action it is important to remember:</p> <ul style="list-style-type: none"><li>• Don't try to control more area than can be effectively isolated and controlled</li><li>• The more time, distance and shielding between the Enbridge Responder and the released product, the lower the risk</li><li>• Designate an emergency evacuation signal and identify muster points if emergency evacuation is necessary</li></ul>   |
| <input type="checkbox"/> | <p>Management of Release</p> <p>Small Release</p> <ul style="list-style-type: none"><li>• If the released NGL is creating a local safety hazard, the NGL may then be ignited following the procedure for igniting NGL</li><li>• Where available, water fog may be used to break up and disperse small vapor clouds</li><li>• Air movers are also an effective method of providing air circulation in confined areas or in buildings</li><li>• Ensure they are safe (intrinsically safe) to use in that environment</li></ul>  |
| <input type="checkbox"/> | <p>Large Release</p> <ul style="list-style-type: none"><li>• If the NGL release is large or the NGL batch cannot be pumped past the release site, ignite the NGL following the standard procedure</li><li>• If the vapor plume is moving toward a populated area the area will be evacuated</li><li>• If the vapor cloud cannot be ignited and repair procedures must begin, all equipment and vehicles will be located a minimum of 0.5 mi (0.8 km) upwind of the leak site</li><li>• Continuously monitor the perimeter of the vapor cloud to detect any shift in the vapor cloud</li></ul> |

**Natural Gas Liquid**

<input type="checkbox"/>	Isolating the Pipeline Section When NGL is escaping uncontrolled, the affected pipe section will be immediately isolated by closing the appropriate sectionalizing valves
<input type="checkbox"/>	Relieving Pressure Use one of the following methods to relieve pressure at a pipeline section releasing NGL: <ul style="list-style-type: none"><li>• If NGL is present at the blowdown valve, install a pipe discharge line and flare the NGL</li><li>• Transfer the product to a properly rated pressure containment vessel</li><li>• Install a pump complete with a discharge check valve to pump across the downstream sectionalizing valve</li><li>• If elevation does not provide a standing head in the isolated section, a transfer pump connected to the blowdown valve will be needed to fill a properly rated pressure containment vessel</li></ul>
<input type="checkbox"/>	Evacuation/Site Security <ul style="list-style-type: none"><li>• Establish roadblocks if release is near roads</li><li>• Due to the high flammability of NGL and the possibility of a vapor plume forming, it may be necessary to evacuate workers and visitors from the area, and to secure the site to protect the public and property</li></ul>
<input type="checkbox"/>	Digging out a Release Site <ul style="list-style-type: none"><li>• Repair operations involving NGL are difficult, slow, and hazardous</li><li>• Pockets of gas may be trapped in the ground</li><li>• If NGL has been leaking for some time, the condensate portion may have saturated the soil for a considerable distance around the site</li><li>• Before beginning excavation or line repairs, active NGL releases are ignited or left burning</li></ul>



**Natural Gas Liquid**

- Ensure liquid has replaced the NGL at the release site
- Follow appropriate Company standards on pipeline excavation
- Ensure fire extinguishing equipment is immediately at hand
- Consider obtaining external firefighting services and equipment
- If no wind is blowing, use air movers to keep air moving across the worksite and away from workers
- Continuously monitor air using a gas detector; and
- Constantly monitor wind direction

## 8.2 Natural Hazards

The pipeline passes through a variety of landscapes each with their own diverse geographic features and climates. As the pipeline passes through each local environment, it may be exposed to a range of natural and human induced hazards each with the ability to negatively impact operations and personnel. The following section aims to describe hazards that could negatively impact the system and workers in order to provide both hazard context and to outline actions that may be undertaken in order to mitigate and/or respond to such events.

### 8.2.1 Wildfire

In the event of wildfire, carry out and document the following mitigation and response actions (if qualified and/or safe to do so):

#### Wildfire – Mitigation Actions

<input type="checkbox"/>	Continuously manage vegetation in and around facilities
<input type="checkbox"/>	Identify evacuation staging areas in evacuation plans for use during a wildfire event
<input type="checkbox"/>	Set up triggers for evacuation
<input type="checkbox"/>	Ensure air quality is monitored at all manned facilities that are, or may be impacted
<input type="checkbox"/>	Decrease the number of personnel onsite during a wildfire event
<input type="checkbox"/>	Stay tuned to local media for update on the wildfire conditions

Actions that can be taken during a wildfire to mitigate a release include:

#### Wildfire – Response Actions

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Discuss requirement before shutting down the line(s) as the product movement can reduce the heat flux on the system, if appropriate: <ul style="list-style-type: none"><li>• Shut down the line</li><li>• Isolate energized system</li></ul> |
| <input type="checkbox"/> | Continually manage vegetation in and around the facilities and cut it back further if required   |
| <input type="checkbox"/> | Conduct fly-over patrol for fire behavior impact in coordination with local authorities and respecting any NOTAMs (notice to airmen)   |

### 8.2.2 Earthquake

In the event of an earthquake, carry out and document the following mitigation and response actions (if qualified and/or safe to do so):

Earthquake	
<input type="checkbox"/>	Isolate and/ or shut down energized systems to anticipate aftershock and/ or additional tremors
<input type="checkbox"/>	Shut down the lines
<input type="checkbox"/>	Check for secondary hazards
<input type="checkbox"/>	Extinguish small fires, shut of the water supply if broke pipes are leaking, shut off the electricity when damaged wiring threatens to spark fires, shut off the gas if you suspect a leak
<input type="checkbox"/>	Monitor site for evidence of leaks from pipelines and tanks
<input type="checkbox"/>	Access to buildings that have sustained structural damage should be prohibited until they can be assessed by a structural engineer
<input type="checkbox"/>	Evacuate building(s) when any of the above hazards are present or if there is structural damage
<input type="checkbox"/>	Engage Facilities Integrity to support and determine fitness for service ( <a href="#">PI-97 Monitoring Seismic Activity</a> )

### 8.2.3 Flooding

In the event of a flood, carry out and document the following mitigation and response actions (if qualified and/or safe to do so):

Flooding	
<input type="checkbox"/>	Watch for high water, be aware of sudden changing water conditions and/or increased flow rates
<input type="checkbox"/>	Shut down the lines
<input type="checkbox"/>	Isolate the system
<input type="checkbox"/>	Deploy personnel so that they will be in position to shut down, isolate, contain, or perform any other emergency action on an affected pipeline
<input type="checkbox"/>	Perform visual inspection to determine if facilities that are normally above ground (e.g., valves, regulators, relief sets, etc.) have become submerged and are in danger of being struck by vessels or debris and, if possible, mark such facilities with Coast Guard approval and an appropriate buoy
<input type="checkbox"/>	Perform frequent patrols, including appropriate overflights, to evaluate right-of-way conditions at water crossings during flooding and after waters subside. Report any flooding, either localized or systemic, to integrity staff to determine if pipeline crossings may have been damaged or would be in imminent jeopardy from future flooding
<input type="checkbox"/>	Have open communications with local and state officials to address their concerns regarding observed pipeline exposures, localized flooding, ice dams, debris dams, and extensive bank erosion that may affect the integrity of pipeline crossings
<input type="checkbox"/>	Engage Facilities Integrity to support and determine fitness for service ( <a href="#">PI-97 Monitoring Seismic Activity</a> )

### 8.2.4 Tornado

In the event of a tornado, carry out and document the following mitigation and response actions (if qualified and/or safe to do so):

Tornado	
<input type="checkbox"/>	Shut down the line
<input type="checkbox"/>	Isolate the system
<input type="checkbox"/>	If appropriate, use of the emergency shutdown system for the terminals
<input type="checkbox"/>	Check for secondary hazards
<input type="checkbox"/>	Extinguish small fires, shut of the water supply if broke pipes are leaking, shut off the electricity when damage wiring threaten to spark fires, shut off the gas if you suspect a leak.
<input type="checkbox"/>	Evacuate the building when any of the above hazards are present or if there is structural damage.
<input type="checkbox"/>	Engage Facilities Integrity to support and determine fitness for service

### 8.2.5 Medical Emergencies

The basic steps to follow in a medical emergency are as follows:

Medical Emergency	
<input type="checkbox"/>	Don't attempt a rescue from a confined space or a toxic atmosphere unless you have appropriate breathing protection and a backup
<input type="checkbox"/>	Check the person: <ul style="list-style-type: none"><li>• Assess the situation, don't move the person unless leaving them will cause further injury</li><li>• Administer required first aid in the following order:<ul style="list-style-type: none"><li>○ Give artificial respiration (victims of H<sub>2</sub>S exposure require resuscitation within three minutes).</li><li>○ Control bleeding</li><li>○ Treat for physical shock</li><li>○ Treat open wounds, burns and fractures</li><li>○ Arrange for transportation</li></ul></li></ul>
<input type="checkbox"/>	Call for assistance/additional resource, inform Regional Management / Regional On-call of the situation and ask for help
<input type="checkbox"/>	Care for life-threatening conditions first: Reduce the risk of disease transmission by using protective equipment such as disposable gloves and a barrier device
<input type="checkbox"/>	Take charge of the site and organize others to assist

### 8.3 Security Hazards

Security hazards present themselves in a variety of ways including, bomb threat, cyber-attack, active assailant, workplace violence, suspicious packages, suspicious activities, protestors activity, security events. The objective of these actions can be to halt or disrupt normal operations. For these reasons Enbridge has established security protocols contained in the Operations Security Response Plan where security protocols and response actions are detailed.

Enterprise Security focuses on direct and/or impending threats to ongoing operations and in most instances resolves issues without concern. However, in the event that a substantial security incident results in an impact to operations, there is a strong likelihood that the Incident Management Team and Emergency Response Plans will be activated. As outlined, procedures for dealing with specific incidents can be found in the [Operations Security Response Plan](#) (OSRP). Consideration should also be given to completing the [Security Threat Checklist](#) information gathering. Regions will also be required to input initial details of a security incident into Encompass and complete the Incident Learning and Prevention fields.



The [Operations Security Response Plan](#) (OSRP) contains procedures for the following incident types

- General Security Response Procedure Steps
- Response to an Intruder Alarm at an Unattended Facility
- Response to a Person(s) Considered to be a Threat at an Attended Facility
- Bomb Related Response Procedures
  - Response for Bomb Threat from a Telephone Call
  - Response for Receipt or Discovery of Suspicious Mail, Parcels, or Packages
- Cyber Attack Response
- Active Assailant Response
- Workplace Violence Response
- Protest Activity Response

### 8.3.1 Security Classification

The [Operations Security Response Plan \(OSRP\)](#) contains procedures for the Security Threat Response Plan (STRP) which is the process for escalating and deescalating the security threat level for Enbridge facilities.

#### Security Threat Levels

Baseline	Provides guidelines on minimum requirements for facilities. These include access control, fencing, gates, security guards, employee awareness, communications, facility lighting, intrusion detection, closed-circuit video, and general policies/practices
Elevated	Provides direction in the event security measures require elevating. Changes typically include tighter perimeter control, visitor restrictions and increased perimeter checks
Imminent	Provides direction in the event that security measures require elevation based on a credible, imminent threat information. Changes typically include Elevated Security measures plus further personnel and vehicle restrictions, the use of security guards, more frequent and random perimeter checks, work restrictions and potentially operational restrictions. Although most anonymous security threats are hoaxes intended to create an atmosphere of anxiety and panic in order to interrupt normal operational activities, all threats must be taken seriously

### 8.3.2 Threat Level Escalation Process

The process for changing the security threat levels is as follows.

Step	Description
1	The BU/CF, TIS and Enterprise Security monitor the security threat advisory systems and other forms of intelligence.
2	ES and TIS should assess emerging threats and notify the appropriate BU/CF Directors or VPs with recommendations to escalate the STRP level, if warranted.
3	With VP or Director, Operations approval, the Operations Directors should notify Local Management of the effected facilities that the STRP level has changed and instruct them to implement the security measures associated with the new STRP level.
4	Local Management should instruct their staff to implement the appropriate security measures.

### 8.3.3 Threat Response Actions

In the event of a change in the Security Threat Response Plan (STRP) threat level, the security measures listed in the [Operations Security Response Plan \(OSRP\)](#) Appendix D: STRP Security Measures by Threat Level should be implemented.

- Base Level (page 32)
- Elevated Level (page 33)
- Imminent Level (page 35)

### 8.3.4 STRP Threat Level Implementation

Please refer to the [Operations Security Response Plan \(OSRP\)](#) for the most current security response procedures.

- General Security Response Procedure Steps (page 16)
- Response to an Intruder Alarm at an Unattended Facility (page 17)
- Response to a Person(s) Considered to be a Threat at an Attended Facility (page 18)
- Response for Bomb Threat from a Telephone Call (page 18)
- Response for Receipt or Discovery of Suspicious Mail, Parcels, or Packages (page 20)
- Cyber Attack Response (page 21)
- Active Assailant Response (page 21)
- Workplace Violence Response (page 22)
- Protest Activity Response (page 23)

## 9.0 ENVIRONMENTAL RESPONSE

In the event of a release that requires an environmental response, the Environment Unit Leader and Safety Officer will immediately mobilize a preferred consultant if necessary.

As a precaution, ensure the applicable Federal and Provincial/State Environmental Regulatory Agencies have been contacted.

**Air and Groundwater Monitoring:** If the spilled material is not readily identifiable, conduct sampling activities for laboratory analysis. As petroleum products react and change (e.g., weather) when exposed to the environment, the laboratory data may not be representative of "real-time" conditions; rather the data may reflect the chemical characteristics of the spilled material(s) at the time of sample collection depending on the nature and location of the release:

Air Monitoring	Air monitoring will be set up to assess real time hydrocarbon related compound concentrations and background air quality conditions as needed
Groundwater	Groundwater samples will be collected as necessary from onsite public and private wells (residential, public utility, commercial and industrial) within a specified potential receptor zone around the site
Surface Water	Surface water sampling and monitoring procedures will be utilized to assess visible product and/or hydrocarbon sheen that may affect navigable waterways as well as to document background conditions within the waterways.
Sediment	Sediment samples will be collected periodically to provide a baseline evaluation of current conditions and confirm the presence or absence of hydrocarbon impacts

Community Air Monitoring will be completed by a qualified third party based on an assessment that it is required. Oil Sampling Activities: Collect product samples as soon as possible after a spill in order to fingerprint the product.

### **9.1 Wildlife Management**

In the event of a release where impacts to wildlife are present or suspected, consult with the Environment Unit immediately. Environment Unit will mobilize a preferred wildlife response consultant or consultants. A site-specific wildlife management and response plan may be developed for the site. A toll-free number would be set up if required. If set up, report all impacted wildlife sightings to the established toll-free report phone line.

Dead and injured wildlife found during response operations must be collected by trained and authorized personnel and properly documented. An inventory of dead, injured, rehabilitated, and released wildlife needs to be maintained as a component of the U.S. Natural Resources Damage Assessment.

## 10.0 PROTECTION, CONTAINMENT AND RECOVERY

Protection refers to the action of preventing harm and/or suffering from someone or something. Containment and recovery refer to the techniques or methods that can be employed to contain and recover petroleum spills on water or the containment of petroleum spills flowing overland. Recovery of terrestrial spills is often very similar or uses the same techniques as shoreline clean-up. Other techniques, such as ice tactics and open water recovery, are covered in the Inland Spill Response Tactics Guide; the techniques described in the Integrated Contingency Plan are most commonly used.

Consider the following when planning or implementing containment and recovery operations:

- Containment is most effective when conducted near the source of the spill where the oil has not spread over a large area and the contained oil is of sufficient thickness to allow effective recovery and/or clean-up
- Feasibility of containment is generally dependent on the size of the spill, available logistical resources, implementation time, environmental conditions, and the nature of the terrain in the spill area
- Aquatic (water) containment is primarily conducted using oil spill containment booms (this is a key tactic to control the water discharged from upstream impoundments)
- Skimmers are usually the most efficient means of recovery of aquatic spills, although pumps, vacuum systems, and sorbents can also be effective, particularly in smaller waterways
- Terrestrial (land) containment typically involves berms or other physical barriers
- Recovery of free petroleum from the ground surface is best achieved by using pumps, vacuum sources, and/or sorbents

## 10.1 Control Points

Control Points contain detailed site-specific information including recommended tactics for spill response actions to provide the highest probability for properly establishing containment/recovery and to ensure that sensitive resources are protected. The tactics are flexible to accommodate for varying conditions. The types of tactics that may be used can be found in the Inland Spill Response Tactics Guide. The [Control Point viewer](#) is accessible on EMap from company computers and mobile phones.

Control point site sheets contain:	During an incident:
<ul style="list-style-type: none"><li>• Latitude and longitude information</li><li>• Valve information</li><li>• Watercourse information</li><li>• Logistical information</li><li>• Safety concerns</li><li>• Implementation details</li><li>• Environmental areas</li><li>• Closest equipment location and recommended equipment</li><li>• Site images / diagrams</li></ul>	<ul style="list-style-type: none"><li>• Refer to Control point for guidance on protection, containment and recovery locations and strategies</li><li>• Contact an Environment representative for detailed screening of the site during a response</li><li>• If required, assess site for hazards</li><li>• Prepare site prior to beginning tactics (grading/clearing)</li><li>• Seek permission if not already secured for any of the following:<ul style="list-style-type: none"><li>○ highways and secondary roads, bridges, campgrounds, public boat launches, private access points, cut lines or remote access trails</li></ul></li></ul>



## 10.2 Inland Spill Response Tactics Guide

The Inland Spill Response Tactics Guide is a Company document that can be used as a quick reference by Enbridge first-on-scene responders to select and implement containment and recovery tactics with Enbridge-owned oil spill response equipment during the first 72 hours of the response. It illustrates a collection of inland spill tactics that can be applied using obtainable resources to a liquid product release until additional resources and personnel arrive on site. Consult the guide for more details on Inlands Spill Control Tactics for:

- Land with the use for berms and trenches
- Small watercourses with the use of dams, weir, culvert blocks, filter fence, siphon dam, sorbent boom
- Larger watercourse with the use of containment boom, shore seal boom, deflection/exclusion booming
- Open water using current busters, oil boom and arctic brush bucket system
- Cold weather, ice assessments and tactics with the use of oil detection under ice, trenching on ice sheets, and ice slotting

Consult the guide for the following tactical information:

- Purpose (of the tactic)
- Application
- Environmental considerations
- Equipment required
- Operation (description regarding tactic)
- Tips regarding execution

The guide also contains specific response equipment and diagrams for material recovery or alternative removal. [The Inland Spill Response Tactics Guide](#) can be found on the Governance Document Library.

The objective of mechanical recovery is to collect contained and concentrated oil and to transfer the oil to temporary storage for subsequent disposal. Spills that have been contained by a boom, a berm or in slots cut into the ice can be skimmed and pumped into storage containers.

### 10.3 Submerged Oil Content

Enbridge's tariff restricts products on the system to those with a density of no greater than 940 kg/m<sup>3</sup> at 15°C. Most products shipped on the Enbridge system are floating oils, including dilbit and synbit. Enbridge acknowledges that, under certain environmental conditions, some fraction of oil released into a water body may become entrained in the water column, submerge or sink, in freshwater environments. This is the case irrespective of whether the product is diluted bitumen, synthetic crude, or conventional crude oil. This is not an issue that is limited to diluted bitumen.

Enbridge considers the potential for sinking and submerged oil as part of our Emergency Response plans and in the execution of such plans. In the unlikely event of a spill, Enbridge would work with regulatory agencies to determine the appropriate response and remedial actions given the specific circumstances of the event. This would include decisions regarding the short-term emergency response as well as subsequent clean-up of residual amounts of submerged oil. More details regarding the [Submerged Oil Management Program](#) can be found on the Governance Document Library.

## 10.4 Shoreline and Terrestrial Operations

In the event that soils do become oiled or that petroleum contacts and becomes stranded on a shoreline, clean-up operations should be undertaken to minimize the environmental effects of the petroleum. In this case, clean-up operations should be implemented immediately.

- Documentation of the location, degree and/or extent of oil conditions
- Evaluation of all environmental, cultural, economic, and political factors
- Clean-up technique selection
- Mitigation of physical and environmental damage associated with clean-up technique implementation
- Cost-effectiveness

Contractors are capable of being on site and ensuring spill recovery activities are accomplished within the appropriate tiered response times. They will provide sufficient recovery equipment to ensure enough capacity is available to respond to a Worst-Case Discharge.

Non-mechanical response options that could be used in responding to a spill include:

- Chemical treatment
- Bioremediation
- In-situ Burning

When non-mechanical methods can result in reduced human hazard or environmental damage, consideration of their use is appropriate, but will require regulatory approval.

- In Canada, chemical treatments / dispersants are not a commonly used tactic on inland waters and would only be considered after consultation and approval from the Department of Fisheries and Oceans and other applicable regulatory stakeholders.
- In the U.S., the request to use dispersants as a tactic is requested through Unified Command to the appropriate Federal On-Scene Coordinator.

## **10.5 In-Situ Burning**

If mechanical recovery is not best option, In-Situ Burning may be considered with the approval from appropriate regulatory agencies as there are potential safety and air pollution hazards to the surrounding area.

In-situ burning alters the composition of the spilled oil by eliminating anywhere from 90 to 99 percent of the original volume of oil provided it is controlled within a fire-resistant boom or other containment system. A portion of the original oil is released into the atmosphere as particulate and gaseous emissions. Solid or semi-solid residues typically remain following a burn, but are relatively easy to retrieve. They can be further reduced in volume through repeated burns, and ultimately are collected and removed from the environment.

### 10.5.1 Evaluation

The potential for implementing a successful burn depends upon the knowledge and experience of those responsible for the assessment of the spill situation. Review of the spill conditions, together with the spill checklist below, will ensure that the safety issues, the benefits, and the environmental impacts will have been examined carefully. While steps may be taken to move critical equipment into position for a possible burn, there should be no attempt to ignite spilled oil without prior authorization from federal, provincial, state, and local authorities.

Decisions to burn or not to burn oil in areas considered case-by-case are made on the basis of the potential for humans to be exposed to the smoke plume, and pollutants associated with it.

- Regulatory permits and approvals specific to the jurisdiction
- Appropriate monitoring is in place to limit particulate matter (PM-10) exposure to 150 micrograms per cubic meter
- Smoke plume modeling is done to predict which areas might be adversely affected
- Aerial surveys are also conducted prior to initiating a burn to minimize the chance that concentrations of wildlife are in the operational area and affected by the response
- Sampling should be conducted for particulates at sensitive downwind sites prior to the burn (to gather background data) and after the burn has been initiated.
- The following data on particulate levels need to be recorded along with recommendations to the Incident Commander:
  - Oil type, amount, and condition
  - Environmental conditions
  - Availability of personnel and equipment

- Timing
- Human safety
- Danger of fire spreading
- Presence of explosive vapors
- Damage to nearby habitats that may prolong natural recovery



### 10.5.2 Request Process and Approval Procedure

When requesting approval for an in-situ burn, carry out the following actions:

Request Process	
<input type="checkbox"/>	Complete In-Situ Burn Template (location on the Governance Document Library, ER Forms)
<input type="checkbox"/>	The burn must be outside the corporate city limits, except as deemed necessary by the local fire department
<input type="checkbox"/>	Wind direction should move the smoke away from the city and/or populated areas
<input type="checkbox"/>	Burning must be at least 300 feet (91.44 meters) from any adjacent properties
<input type="checkbox"/>	Burning should commence during daylight, typically between the hours of 9:00 am and 5:00 pm
<input type="checkbox"/>	Wind speed should be between 5 mph (8.052 km/h) and 20 mph (32.19 km/h) (IAW SMART recommendations) during the burn period
<input type="checkbox"/>	Burn should not be conducted during persistent atmospheric thermal inversions

Approval for the burn must be obtained from regulatory bodies and other stakeholders. The approval required to conduct a burn will vary in each jurisdiction.

**Approval Procedure**

<input type="checkbox"/>	Document the need to carry out a burn is to be documented in the Incident Action Plan during the Planning Cycle process
<input type="checkbox"/>	Incident Commander reviews and approves the request
<input type="checkbox"/>	The request is presented to the Federal On-Scene Coordinator for approval
<input type="checkbox"/>	The Federal On-Scene Coordinator will submit the burn plan to Federal, State, and local regulatory entities/stakeholders for review and approval
<input type="checkbox"/>	Communicate with the National Response Center 1-800-424-8802

### **10.5.3 Plume Dispersion Modeling**

If necessary, conduct a plume trajectory assessment to determine public health safe distances for the following reasons:

- Regulatory requirements – obtain approval to burn
- Local terrain not (relatively) flat
- Winds exceed 18km/hr (11mph)
- Close proximity of populated areas (safety considerations)
- The presence of unusual meteorological consideration (temperature inversions)
- Wind speed of 35 km/hr (21 mph) is established upper limit at which fire behavior can be predictably managed

### 10.5.4 Monitoring

Due to these potential affects monitoring before, during and after a burn may be required.

- Of these smoke constituents, small particulates less than 10 microns in diameter, known as PM-10, are considered to pose the greatest risk to humans and nearby wildlife
- Monitoring should be conducted when the predicted trajectory of the smoke plume indicates that the smoke may reach population centers, and the concentrations of smoke particulates at ground level may exceed safe levels
- When impacts are not anticipated, monitoring levels will be decided by the federal, provincial, state, and local authorities
- In-situ burning generates a thick black smoke that contains primarily particulates, and various gases (carbon dioxide, carbon monoxides, water vapor, nitrous oxides, and Polycyclic Aromatic Hydrocarbons (PAHs))
- Deploy monitoring teams at designated areas of concern to assess ambient concentrations of particulates before the burn starts
- During the burn, sampling and continuous readings are recorded both in the data logger of the instrument and manually in the recorder data log
- After the burn has ended and the smoke plume has dissipated, the teams remain in place for some time (15-30 minutes) and again sample for and record ambient particulate concentrations

### **10.5.5 Product Characteristics and Considerations**

Consider the following characteristics when conducting a burn:

- Refined product or light to medium crude will burn more efficiently and leave less residue to recover compared to heavier product
- Heavy oil requires longer heating times and a hotter flame to ignite than lighter oils
- Product that is relatively fresh (less than 3 days of exposure to the elements) will burn more efficiently than weathered product
- Burn duration can be estimated based on known burn rates for different product types (e.g., 2.54 mm [1/10 in.] of depth per minute for medium crude)
- Dense wetland vegetation can slow evaporation and prolong the opportunity for conducting an efficient burn
- A layer of water at least 2.5 mm to 10 mm (1 in. to 4 in.) under the burning product will provide protection to vegetation root systems from heat stress
- Burned areas should not be flooded with high water levels shortly after the burn
  - The remaining root systems require oxygen from the air or soil until new vegetation emerges

### 10.5.6 Ignition Considerations and Procedure

After completing all the pre-burn requirements, determine the appropriate time and conditions for igniting the spill:

#### Ignition Considerations and Procedure

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Determine the appropriate time and conditions for igniting the spill: <ul style="list-style-type: none"><li>• Use experienced personnel to oversee the burning activities and monitor the burn plan</li><li>• The area around the spill site should be monitored using an explosive / toxic gas meter to determine any explosive / toxicity hazards</li><li>• The spill should be approached from upwind during all phases of the operation by personnel who are properly equipped and trained to monitor the conditions</li></ul> |
| <input type="checkbox"/> | Continually monitor weather conditions: <ul style="list-style-type: none"><li>• burning should occur only when wind conditions are low</li><li>• weather should be stable</li></ul>  |
| <input type="checkbox"/> | Ignition should not occur until entire area is secured   |
| <input type="checkbox"/> | Ensure there is a sufficient supply of the following on-site (actual numbers will be determined based on the individual spill conditions): <ul style="list-style-type: none"><li>• fire-fighting equipment</li><li>• personnel (workers and emergency staff)</li><li>• water supplies</li></ul>  |

**Ignition Considerations and Procedure**

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | If potential exists for secondary fires, ignition should take place during low burning period, between 9:00am-5:00pm   |
| <input type="checkbox"/> | If the product is heavy oil, or it is severely weathered, it may be advantageous to burn during the heat of the day in order to assist with ignition, if safe to do so   |
| <input type="checkbox"/> | <p>Determine what method of ignition will work the best while still allowing for safe implementation</p> <ul style="list-style-type: none"><li>• Ignition procedures should be designed to allow the response team to be well back of the site when the spill is ignited. Individual companies may have their own ignition procedures based on the type of product and ignition devices available</li><li>• Ensure the oil at point of ignition is between 2-3 mm thick to create a sustained burn. Ignition source should generate sufficient heat long enough to cause the oil to ignite</li><li>• Spills that contain light ends will probably ignite without the assistance of an auxiliary fuel source. A flare shell propelled from a safe distance should be adequate</li><li>• Spills that contain a high percentage of heavy ends may require the use of an auxiliary fuel or ignition promoter</li><li>• Auxiliary fuel usually consists of diesel, kerosene and gasoline but can also be in the form of dry straw, etc.</li><li>• Diesel and kerosene are considered to be the best ignition promoters as the flame temperature is higher</li><li>• Lighter products, such as gasoline, evaporate much faster than diesel which results in faster cooling of the slick</li><li>• Dry straw can be effective, but application must be able to be done in a safe manner</li></ul> |

**Ignition Considerations and Procedure**

- Ignite the outer edge of the spill and allow the fire to burn from the outside in (helps to reduce chances of fluid migration)
- Use multiple ignition points, where possible, to encourage the spreading of flames throughout the spill area and improve burn efficiencies
- Ignition devices may include:
  - flare shells
  - gelled gasoline
  - diesel or kerosene
  - mixtures of gasoline and diesel fuel
  - crude oil
  - organic matter such as peat moss or straw
  - canister igniters
  - aerial ignition devices
  - dry straw
  - propane torches

**Ignite the spill**

- Determine flammability / toxicity around the spill using an explosive / toxic gas meter
- Apply the auxiliary fuel agents (if necessary) to the determined ignition areas
- Approach the ignition points from upwind
- Ensure ignition workers are in a safe zone by continuously monitoring for explosive / toxic mixtures
- Ignite all sites of the spill at the same time, using the selected method



**Ignition Considerations and Procedure**

	<ul style="list-style-type: none"><li>• Allow initial burn to complete without adding any additional fuel.</li></ul>
<input type="checkbox"/>	<p>Monitor the spill site during the burn period to ensure that no hazards exist</p> <ul style="list-style-type: none"><li>• Monitor the weather conditions on a regular basis</li><li>• Be prepared to implement the emergency plan should the conditions change for the worse</li><li>• Ensure the workers are in a safe area</li><li>• Monitor the success of the burning procedures as they are implemented and at completion of the burn</li><li>• For larger spills, burning may continue over an extended period of time, involving night-time conditions</li><li>• Maintain security until the hazards have been totally eliminated</li><li>• Utilize a fire guard crew on the entire perimeter to ensure no secondary fires occur</li><li>• Monitor the site for black smoke</li><li>• Ensure that regulatory agencies, landowner(s), stakeholders, the public, and media are kept informed</li><li>• Ambient air monitoring programs should be implemented as required</li></ul>

## 10.6 Bioremediation

Consider Bioremediation when mechanical disturbance is not warranted or would cause additional damage based on a Net Environmental Benefits Analysis.

- Apply nutrients (fertilizer containing nitrogen and phosphorus) or genetically engineered bacteria to oiled terrestrial or shoreline areas to accelerate the natural biodegradation process
- During this process, micro-organisms (bacteria) oxidize hydrocarbons, ultimately converting them to carbon dioxide and water
- Biodegradation occurs primarily at the oil/water or oil/air interface and is limited by oxygen, moisture, and nutrient availability. It is also sensitive to temperature. The lower the ambient temperature, the lower the rate
- If nutrients are used, they must be supplied in such a way that they will not be washed away by tides or any water runoff

### **10.6.1 Bioremediation Evaluation**

- The Incident Commander will be responsible for providing incident specific information needed to approve the use of bioremediation operations.
- Generally, the physical containment and recovery of oil is preferred to bioremediation
- The decision to use bioremediation treatment should be based on the type of spill, the character of the area impacted
- In some cases, other forms of clean-up may be required in conjunction with nutrient addition to achieve the desired enhancement rate
- Oil spill response chemicals, approval must be obtained from The U.S. Federal On-Scene Coordinator and U.S. State On-Scene Commander or applicable Canadian regulatory stakeholders before the nutrients are applied, and the products must be listed on government product schedules where required to determine authorization/preauthorization requirements for approval
- The U.S. Regional Area Contingency Plan and National Contingency Plan contains options for the authorization of biological agents for use under certain conditions and in certain locations

## 10.7 Freshwater Biological Disinfection

Biological disinfection is the systematic reduction in the probability of spreading invasive biological organisms between freshwater environments.

Determine if equipment needs to undergo disinfection, either prior or post deployment, a full inspection of the equipment is needed:

- Inspection any attached mud, plants, and other organisms
- If debris is found, the equipment must undergo disinfection procedures
- All inspections should be documented on the Enbridge Invasive Species Inspection and Certification Form. Further information on how inspection should be conducted can be found in the Emergency Response Aquatic Invasive Species Inspection Procedures

General guidelines that will assist with the implementation of the plan:

- Use a tagging system to identify infected from disinfected equipment
- Look in cracks/crevices that may otherwise go unnoticed and hide unwanted organisms
- Use rubber waders, gloves, and boots where possible, as neoprene waders and gloves as well as felt soled boots retain moisture and organism such as Rock Snot and whirling disease. Neoprene and felt soles are also harder to disinfect
- Allow equipment to dry completely and for the recommended times between uses
- To help prevent transfer of aquatic invasive species, in addition to the above-mentioned disinfection methods, where possible efforts should be made to designate equipment and personal gear to a single waterbody
- When using chemicals, the appropriate PPE is to be used (e.g., appropriate gloves, safety glasses and clothing) and the SDS are to be reviewed and available

General guidelines for setting up disinfection stations:

- Consider weather conditions
- Proximity to water bodies or means by which water and cleaning solutions could enter water bodies
- Disinfection stations will be constructed with secondary containment to collect wash water. Wash water will be collected and disposed of as per the site-specific waste management plan
- Wherever possible, draining water from equipment (e.g., bilge water) should be done in the waterbody in which work was conducted
- Type and quantity of PPE, clothing, heavy equipment, and vehicles to be disinfected
- Once items are disinfected, they should not encounter infected waters or other material.
- Avoid touching absorbent materials with other absorbent materials during disinfection

### 10.7.1 Disinfection Procedures

Disinfection methods should be matched to best suit the type of equipment being used. Disinfection procedures may vary depending on whether particular organisms are being targeted, as well as what may be most suitable, based on what the equipment is made of, how readily some supplies are, and the feasibility of obtaining large enough quantities of cleaning solutions in the field.

#### Disinfection Procedures:

<input type="checkbox"/>	<p>Use drying as a disinfection process if the following procedure can be followed:</p> <ul style="list-style-type: none"> <li>• Some aquatic invasive species can survive out of water for more than two weeks. It is important to know potential species to which equipment may have been exposed. Equipment should be dried before transporting to another body of water, according to the site-specific species of concern</li> <li>• If targeting adult zebra mussels, 30 days may be required to kill organisms in cool or humid weather</li> <li>• If targeting <i>Didymosphenia geminata</i> (commonly referred to as Didymo or Rock Snot), equipment must be dried completely inside and out, and then for an additional 5 days. Freezing items solid will also kill Didymo cells. Freezing overnight should work in most instances</li> <li>• Porous materials should be soaked in cleaning solutions for a minimum of 30 mins while non-porous materials need to be scrubbed for a minimum of 10 mins. Materials should be dry to the touch both inside and out, and allowed to dry for at least an additional 48 hours prior to entering a different waterway</li> </ul>
<p>Note:</p>	<p>If drying cannot be implemented, an active cleaning method of disinfection will be required to limit the potential of transporting biological organisms from one freshwater environment to another</p>
<input type="checkbox"/>	<p>Soak and scrub non-absorbent items for 10 minutes and absorbent items for 30 minutes (otherwise specified below) in one of the following solutions:</p>

**Disinfection Procedures:**

- 5% solution of dishwashing liquid (500 mL or 2 cups and water added to make 10 liters).
- 2% solution of bleach (200 mL and water added to make 10 liters). 5% solution of salt (500 ml or 2 cups and water added to make 10 liters)
- 5% antiseptic hand cleaner (500 mL or 2 cups and water added to make 10 liters).
- A dilute solution of 7% hydrogen peroxide mixed in a 64 ml (hydrogen peroxide):1litre (water) ratio. Can be applied using spray equipment. Infected equipment should be completely covered with the solution and allowed to sit for approximately 60 minutes before rinsing with clean water.
- Iodophor solution of 100 mg/L for moving equipment out of Viral Hemorrhagic Septicemia (VHS) management zones
- Vinegar Dip (100% vinegar for 20 minutes)
- 1% salt solution in place of the vinegar dip for 24 hours
- Full strength cleaning agents with quaternary ammonium compound alkyl dimethyl benzyl ammonium chloride (ex Parvasol ® and Kennelsol ® or Formula 409® and Fantastic ®)
- These can also be used in a 2:1 water to disinfectant ratio
- Soak all equipment for a minimum of 10 minutes



Consider the following when deciding on the appropriate active cleaning methodology for nonabsorbent items:

- Disinfection with chemicals is not effective against killing spiny water fleas resting eggs
- Disinfection with chlorine or iodophor must be used if fieldwork is conducted within and outside of the VHS management zones



**Disinfection Procedures:**

	<ul style="list-style-type: none"><li>• Water-based solutions should be at least 60°C (140°F) and soaked for at least 20 minutes in hot water kept above 45°C (113°F)</li><li>• For equipment that cannot be submerged, solutions may be applied by either washing with a pressure washer, or with a pressurized garden hose. Pressure washers should reach at least 250 pounds per square inch (psi). Pressure washers may not be appropriate for all equipment</li></ul>
<input type="checkbox"/>	<p>Absorbent items (e.g., felt-soled waders and diving suits) will require longer soaking times than non-absorbent items, to allow thorough saturation. Soak absorbent items in the following solutions:</p> <ul style="list-style-type: none"><li>• At least 40 minutes in hot water kept above 45°C</li><li>• At least 30 minutes in hot water kept above 45°C containing a 5% dishwashing detergent solution</li><li>• For SCUBA gear, the following solution and soak times may also be used:</li><li>• Submerge and wash the suit and equipment (including inside of buoyancy compensator with hot water that is at least 40°C (or 104°F)</li><li>• Submerge/wash suit and equipment in a tub/tote with a salt solution (1/2 cup salt dissolved in 3.4 liters of water), then rinse with clean water</li></ul>
<input type="checkbox"/>	Contain and store materials and solutions used in the disinfection process for appropriate disposal

## **10.8 Decontamination**

All personnel and equipment must go through a decontamination process to ensure spilled material does not contaminate a larger area than needed. An incident specific decontamination plan will be developed to support the Incident Action Plan based on these principles:

Establish a decontamination corridor based on the established work sites outlined in the Site Safety Plan. As workers exit the hot zone, they must go through the decon procedures at stations within the warm zone.

To determine the scope of decontamination stations needed, consider:

- Weather conditions
- Site conditions
- Size of the emergency
- Quantity of PPE
- Amount of tools and equipment
- Sensitive areas
- Natural drainage pattern
- Logistics of decon and waste disposal

To prevent spreading contamination from equipment and tools outside the Warm Zone:

- Remove contaminated soil caught in tires and the undersides of equipment and vehicles as much as possible
- Use pressure washers to clean the outsides and undersides of vehicles, boats (protection from invasive species and contamination) and equipment. When pressure washers are not feasible, use brushes and buckets with a cleaning solution
- Ensure containers for storing contaminated materials are available
- Dispose of all waste generated by cleaning equipment in an acceptable manner
- Build bermed or lined areas to contain runoff or surface water
- Minimize waste generated from cleaning equipment as much as possible but not to the extent that it compromises adequate decontamination
- If large equipment must be moved offsite or from one location to another for more thorough cleaning, inspect the equipment to ensure contamination will not occur during transport and ensure the alternate location is pre-approved by the Incident Commander

### 10.8.1 Decontamination Procedures

All emergency response personnel will be briefed on decon procedures before entering the decon corridor:

Decontamination Procedures	
<input type="checkbox"/>	Clearly identified the area by yellow tape or other highly visible method with clearly identifiable entry and exit points
<input type="checkbox"/>	Established upwind of the Hot Zone or in a location where vapors from the Hot Zone will not significantly impact the corridor
<input type="checkbox"/>	If possible, set up close to services (water, electricity, road access, etc.)
<input type="checkbox"/>	Cover the floor with PVC sheets/10 mil poly to prevent contamination of the soil. The rest of the decon corridor will be lined with non-slip sorbent surface and bordered with sorbent rolls, pylons and barrier tape
<input type="checkbox"/>	Identify decon corridor entry and exit will be located within the Warm Zone
<input type="checkbox"/>	Contained runoff water will be removed either by portable pump or buckets into drums or other suitable containers for subsequent hazardous waste removal
<input type="checkbox"/>	Set up tents or plastic barriers for protection from inclement weather and also for privacy during disrobing, establish separate disrobing tent/ barrier stations per gender
<input type="checkbox"/>	Set up chairs where needed to assist in PPE removal and boots/booties
<input type="checkbox"/>	Set up decon pools for primary wash/rinse and wading pools for secondary wash/rinse
<input type="checkbox"/>	Set up a tool drop just outside the decon corridor entry point (wading pool and/or other suitable containment)
<input type="checkbox"/>	All water used in the Hot Zone will be treated as hazardous waste (minimize water use as much as possible)
<input type="checkbox"/>	Dispose of heavily contaminated PPE, clothing/equipment considered to be a hazardous waste, discard without decontamination as required

## FIELD EMERGENCY RESPONSE PLAN

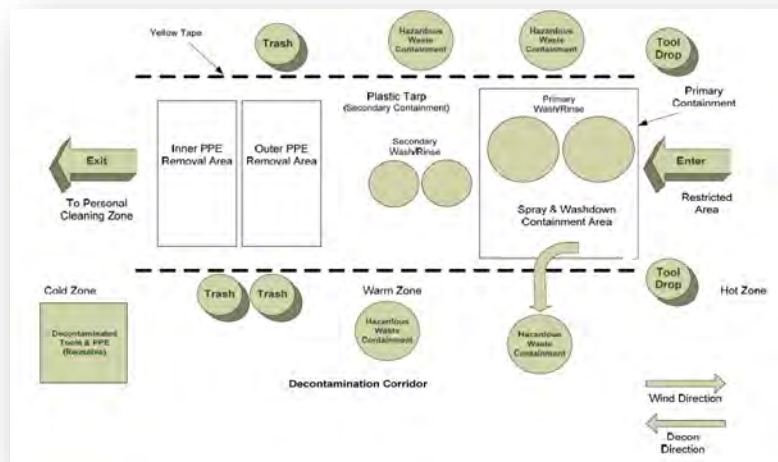
Effective 2022-2023

## Decontamination Procedures

<input type="checkbox"/>	Ensure cleaning solutions have adequate grease cutting properties and be evaluated by the degree of hazard for workers and the environment, (reference the Waste Management Plan). Brushes must be effective in removing contamination, but not damage clothing or PPE or cut/injured personnel
<input type="checkbox"/>	Personnel wipe down will always be done in a downward motion, away from the facial area (goggles should be left on until personnel enter the Cold Zone). Gloves off last
<input type="checkbox"/>	Ensure adequate hazardous waste containment is on hand and set up along the corridor. Once filled, containers will be closed, sealed, and marked as hazardous waste before being removed to a collection area
<input type="checkbox"/>	Collect hazardous waste disposed in plastic (garbage) bags, and stored in a marked waste bin or other protective secondary containment
<input type="checkbox"/>	Collect PPE items that may be reused after decontamination (e.g., rubber suits, rubber boots) and store near the Cold Zone and made available to responders as required
<input type="checkbox"/>	Ensure a supply of fresh respirator cartridges will be available to responders
<input type="checkbox"/>	Collect used contaminated cartridges and store in an identified container
<input type="checkbox"/>	Ensure there is a supply of facial wipes, paper towels and clean water maintained outside the Cold Zone for final, personal cleaning. A shower facility (if possible) should be available at this location
<input type="checkbox"/>	All materials used in the decon corridor will be marked and placed in suitable containment, including inner packaging and outer packaging, as required for further decontamination before final storage
<input type="checkbox"/>	Any tools and equipment that can be decontaminated will be decontaminated to allow future use and to reduce replacement cost
<input type="checkbox"/>	Any tools and equipment considered of no further use will be properly disposed of

### 10.8.2 Decontamination Corridor Set Up

See the diagram below for setting up a decontamination area:



**Figure 2: Decon Corridor**

### 10.8.3 Decontamination Trailers

When using a decon trailer:

- Fill freshwater tanks onsite
- Do not tow the trailer with full water tanks
- A licensed contractor must pump wastewater tanks onsite, and wastewater must be disposed of in an acceptable manner
- Ensure the trailer is located on firm stable surface
- Fill fuel tanks onsite, and maintain a generator onsite, if needed
- Organize electric and water hookups, if available
- Arrange for laundering clothing offsite
- Level the trailer to ensure its components function properly.
- Stock with personal hygiene articles (e.g., soap, shampoo, towels)
- Complete and record trailer maintenance

**Personnel –Decontamination Trailer Procedure**

<input type="checkbox"/>	Follow decontamination procedure
<input type="checkbox"/>	Enter decontamination trailer and remove all other personal clothing
<input type="checkbox"/>	Place clothing into designated area
<input type="checkbox"/>	Shower
<input type="checkbox"/>	Redress in designated area
<input type="checkbox"/>	Exit decontamination area without passing through the undressing area



## 10.9 Demobilization

The decision to downgrade an emergency level(s) is made by the Incident Commander. This decision may be based on monitoring data, control/containment of the situation, or reduced risk to the public or environment.

Before demobilization of the Incident Management Team can occur, the following must be done:

Demobilization Triggers	
<input type="checkbox"/>	Incident has been contained (the threat has been removed)
<input type="checkbox"/>	Incident Command System resources needs have been assessed and scaled back
<input type="checkbox"/>	Containment in place and effective
<input type="checkbox"/>	The visual extent of impact has been identified
<input type="checkbox"/>	Clean up resources are in place
<input type="checkbox"/>	Internal and external stakeholder notification conducted (including Indigenous representatives)
<input type="checkbox"/>	Other plans have been considered and drafted: e.g., monitoring and sampling plan, remediation plan, wildlife mitigation plan, communications plan, and waste management plan
<input type="checkbox"/>	Transition Plan developed and agreed on by Incident Command/Unified Command
<input type="checkbox"/>	Moved from the proactive phase into project phase

The demobilization should consider both the priority of release, and how activities will be transferred fully and effectively to regional operations, project teams, and/or other supporting business departments. Resources no longer required for the response to the incident will be demobilized as rapidly as is feasible. Enbridge staff, contractors and sub-contractors are required to go through the demobilization process.

Employees are required to contact Human Resources (if present) or their incident leader upon safe return to their home residence and provide their preferred contact method prior to departure from their incident response work location so that Human Resources (if present) or their incident leader can follow-up if a callback has not been received.

## 11.0 LOCAL SPILL RESPONSE EQUIPMENT

## 11.1 Midwest Region Response Equipment

Equipment Details				
Vesper PLM, WI				
Trailer	Response Enclosed	Dual Axle (26' to <30')		
Dam	Water Gate	25'		Qty: 2
Skimmer	Smooth Drum	TDS136		
Skimmer	Grooved Drum	TDS118G		
Tank	Portable	Pop-Up (2000 gal to <4000 gal, 7570L to < 11356L) Qty: 2		
Pump	Three Inch	Trash		
Small Motor	Capstan Winch	Gas	5000W	
Boom	River	Foam	600'	
Boom	Creek	Foam	250'	
Trailer	Response Enclosed	Dual Axle (20' to <26')		
Boom	River	Foam	1200'	
Generator	Gas	5000W		
Boat	Work Boat	Eighteen Foot	Outboard Propeller	80 to < 120 HP
Boat	Landing Craft	Twenty-four Foot	Outboard Propeller	TWIN 120 to < 150 HP

## Equipment Details

<b>Boom Accessory</b>	Boom Vane			
<b>Fort Atkinson, WI PLM</b>				
<b>Boat</b>	Landing Craft	Twenty-six Foot	Outboard Propeller	TWIN 120 to < 150 HP
<b>Boat</b>	Work Boat	Twenty Foot	Outboard Propeller	80 to < 120 HP
<b>Boat</b>	Work Boat	Eighteen Foot	Outboard Propeller	50 to < 60 HP
<b>Boat</b>	Work Boat	Eighteen Foot	Outboard Propeller	50 to < 60 HP
<b>Trailer</b>	Response Enclosed	Dual Axle (20' to <26')		
<b>Boom</b>	River	Foam	1300'	
<b>Boom</b>	Creek	Foam	100'	
<b>Skimmer</b>	Suction	Manta Ray		
<b>Skimmer</b>	Weir			
<b>Tank</b>	Portable	Pop-Up (1000 gal to <2000 gal, 3785L to < 7570L)		
<b>Tank</b>	Portable	Pop-Up (2000 gal to <4000 gal, 7570L to < 11356L)		
<b>Trailer</b>	Response Enclosed	Dual Axle (20' to <26')		
<b>Skimmer</b>	Grooved Drum			Qty: 2
<b>Boat</b>	Jon Boat	Fourteen Foot	Outboard Propeller	5 to <10 HP
<b>Small Motor</b>	Outboard Propeller	5 to <10 HP		
<b>Hydraulic Power Pack</b>	Dual Hydraulics	DieselFuel		

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

## Equipment Details

Boom	Creek	Foam	50'	
Generator	Gas	3000W		
Small Motor	Chainsaw	18Inch		Qty: 2
Small Motor	Ice Auger	Gas		
Small Motor	Blower			
Trailer	Response Enclosed	Dual Axle (20' to <26')		Qty: 4
Boom	River	Foam	500'	
Boom	River	Foam	600'	
Trailer	Response Enclosed	Dual Axle (26' to <30')		
Boom	River	Foam	100'	
Hydraulic Power Pack	Dual Hydraulics	DieselFuel		
Tank	Portable	Pop-Up (2000 gal to <4000 gal, 7570L to < 11356L)		
Skimmer	Smooth Drum	TDS118		

## Bemidji, MN

Boat	Work Boat	Fourteen Foot		
Small Motor	Chainsaw			Qty: 2
Boat	Work Boat	Eighteen Foot	Outboard Propeller	120 to < 150 HP
Boat	Work Boat	Twenty Foot	Outboard Propeller	80 to < 120 HP

## Equipment Details

<b>Boat</b>	Work Boat	Fourteen Foot	Outboard Propeller	20 to < 30 HP
<b>Vehicle</b>	ARGO			
<b>Vehicle</b>	Hydratrek			
<b>Vehicle</b>	UTV			
<b>Vehicle</b>	Snowmobile			
<b>Small Motor</b>	Blower			
<b>Pump</b>	Three Inch	Trash		
<b>Skimmer</b>	Smooth Drum	TDS136		Qty: 2
<b>Skimmer</b>	Smooth Drum	TDS118		Qty: 5
<b>Generator</b>	Gas	3000W		Qty: 2
<b>Dam</b>	Water Gate	25'		
<b>Skimmer</b>	Grooved Drum			
<b>Skimmer</b>	Brush	Minimax		
<b>Skimmer</b>	Weir	Skim Pak1800		
<b>Skimmer</b>	Suction	Manta Ray		
<b>Tank</b>	Portable	Pop-Up (1000 gal to <2000 gal, 3785L to < 7570L)		
<b>Trailer</b>	Response Enclosed	Dual Axle (10' to <16')		Qty: 4
<b>Small Motor</b>	Capstan Winch	Gas		Qty: 2

## Equipment Details

Pump	Two Inch	Trash		Qty: 2
Generator	Gas	1000W		
Trailer	Response Enclosed	Dual Axle (18' to <20')		
Boom	River	Foam	350'	
Boom	River	Foam	200'	
Boom	Lake	Foam	500'	Qty: 2

## Equipment for Line 93 located at Bemidji, MN

Skimmer	Grooved Drum	100 Magnum (4 drum shallow)		Qty: 1
Skimmer	Grooved Drum	200 Magnum (4 drum deep)		Qty: 1
Skimmer	Grooved Drum	TDS136		Qty: 3
Power Units	Big Power Unit	Elastec D22		Qty: 2
Power Units	Small Power Unit	Elastec D10)		Qty: 4
Porta Dams				Qty: 3
Boom	Hard boom	6" skirt		4300 feet
Boom	Absorbant		8"x10'	
Boom	Absorbant		5"x10	6,120 fee
Boom	Mini Boom	Elastec Airmax	8"x8"x50' sections	500 feet
Boom Accessory	Reel			Qty: 1

## Equipment Details

## Deer River, M

Trailer	Response Enclosed	Dual Axle (20' to <26')	Qty: 2
Boom Accessory	Bridle	Tow	
Boom Accessory	Boom Vane		
Boom Accessory	Anchor		
Skimmer	Grooved Drum	TDS118G	
Skimmer	Grooved Drum	TDS136G	
Tank	Portable		

## Clearbrook, MN

Boat	Jon Boat	SixteenFoot	Outboard Propeller	20 to < 30 HP
Trailer	Boat Trailer			
Trailer	Response Enclosed	Dual Axle (20' to <26')		Qty: 2
Trailer	Response Enclosed	Dual Axle (10' to <16')		
Boom	River	Foam	300'	Qty: 2
Pump				Portable
Boat	Work Boat	FourteenFoot	OutboardPropeller	30 to < 40 HP
Boat	Work Boat	TwentyFoot	OutboardPropeller	80 to < 120 HP
Boom Accessory	Anchor			



## Equipment Details

Boom	River	Foam	500'	
Boom Accessory	Boom Vane			
Boom Accessory	Bridle	Tow		
Skimmer	Grooved Drum	TDS136G		Qty: 2
Tank	Portable			
Small Motor	Capstan Winch	Gas		
Small Motor	Chainsaw			Qty: 2

## Grand Forks, ND

Trailer	Boat Trailer			
Boat	Jon Boat	Twelve Foot	Outboard Propeller	5 to <10 HP
Boat	Work Boat	Sixteen Foot	Outboard Propeller	90 HP
Trailer	Response Enclosed			Qty: 2
Hydraulic Power Pack				
Skimmer	Suction	Manta Ray		
Boom Accessory	Boom Vane			
Boom	River	Foam	500'	
Skimmer	Smooth Drum			
Tank	Portable			

## Equipment Details

Vehicle	ATV	Tracked		
Vehicle	Vaccum	UTV Trailer Mounted		
Pump	Three Inch			
Pump	Two Inch			
Generator	Gas	6000W		
Trailer	Response Enclosed			
Small Motor	Chainsaw			Qty: 2
Small Motor	IceAuger	Propane	10"	
Small Motor	IceAuger	Gas	8"	

## Lakota, ND

Boom	Lake	Foam	7400'	
------	------	------	-------	--

## Minot, ND

Boat	Jon Boat	Fourteen Foot	Outboard Propeller	5 to <10 HP
Trailer	Boat Trailer			
Boat	Work Boat	Twenty-two Foot	Outboard Propeller	200HP
Boat	Air Boat	Twenty-two Foot		
Skimmer	Suction	Manta Ray		
Trailer	Utility	Single Axle (10' to >16')		

## Equipment Details

Small Motor	Chainsaw			
Boom	River	Foam	750'	
Boom	River	Pressure Inflatable		1000
Boom Accessory	Bridle	Tow		
Boom	River	Foam	1000'	
Skimmer	Grooved Drum	TDS136G		
Skimmer	Weir	Sea Skater		
Tank	Portable			
Generator	Diesel	>10000W		
Generator	Gas	6000W		Qty: 2
Small Motor	Chainsaw			
Generator	Gas	5000W		
Pump	Three Inch	Trash		Qty: 2
Trailer	Response Enclosed	Triple Axle (18' to <20')		Qty: 3
Trailer	Response Enclosed	Dual Axle (20' to <26')		
Small Motor	Chainsaw			Qty: 4
Small Motor	Ice Auger	Gas		
Vehicle	Skid Steer			

## Equipment Details

## Stanley, ND

Boat	Work Boat	Eighteen Foot	Outboard Propeller	60 to < 80HP
Boat	Jon Boat	Fourteen Foot	Outboard Propeller	5 to < 10HP
Tank	Portable			
Skimmer	Suction	Manta Ray		
Boom	River	Foam	1200'	
Skimmer	Smooth Drum	TDS136		
Trailer	Response Enclosed	Dual Axle (20' to <26')		
Hydraulic Power Pack				
Small Motor	Ice Auger	Gas		
Small Motor	Ice Auger	Propane		
Small Motor	Chainsaw			
Generator				
Pump	Two Inch			
Trailer	Response Enclosed	Triple Axle (18' to <20')		
Pump	Three Inch			

## Superior, WI

Boat	Work Boat	Twenty-nine Foot	Inboard Jet	TWIN 200HP
------	-----------	------------------	-------------	------------

## Equipment Details

<b>Boat</b>	Work Boat	Eighteen Foot	Outboard Propeller	40HP outboard motor
<b>Boat</b>	Work Boat	Twenty Foot	Outboard Propeller	40HP outboard motor
<b>Boom</b>	Lake	Foam	150'	Qty: 3
<b>Boom</b>	Lake	Foam	100'	
<b>Trailer</b>	Utility	Dual Axle (16' to <18')		
<b>Vehicle</b>	ATV			
<b>Trailer</b>	Response Enclosed	Dual Axle (18' to <20')		
<b>Vehicle</b>	ARGO			
<b>Trailer</b>	Flat Deck			
<b>Boom</b>	Hydraulic Reel			
<b>Boom</b>	Lake	Foam	200'	Qty: 2
<b>Skimmer</b>	Weir	SeaSkater		
<b>Trailer</b>	Response Enclosed			
<b>Boom</b>	River	Foam	900'	
<b>Boom Accessory</b>	Bridle	Tow		
<b>Skimmer</b>	Weir	Skim Pak1800		
<b>Trailer</b>	Response Enclosed	Dual Axle (20' to <26')		
<b>Small Motor</b>	Chainsaw			Qty: 3

## Equipment Details

Boom	River	Foam	50' Section Length	150'
Boom	Lake	Foam	50' Section Length	350'
Boom	Lake	Foam	100' Section Length	300'
Pump	Two Inch	Trash		
Pump	Three Inch	Diaphragm		
Skimmer	Smooth Drum	TDS136		Qty: 2
Generator	Gas	3000W		
Boom Accessory	Bridle	Tow		
Trailer	Response Enclosed	Dual Axle (20' to <26')		Qty: 2
Skimmer	Grooved Drum	TDS136G		
Skimmer	Grooved Drum	TDS118G		
<b>Hydraulic Power Pack</b>				
Tank	Portable			
Boom	River	Foam	500'	
Trailer	Flat Deck	Triple Axle Semi		
<b>Thief River, MN</b>				
Boat	Jon Boat	Fourteen Foot	Outboard Propeller	
Boat	Work Boat	Eighteen Foot	Inboard Jet	

## Equipment Details

<b>Boat</b>	Work Boat	Twenty Foot	Outboard Propeller	
<b>Boom</b>	River	Foam	1000'	Qty: 3
<b>Boom</b>	River	Foam	1500'	
<b>Tank</b>	Portable			Qty: 2
<b>Vehicle</b>	ATV			
<b>Vehicle</b>	Snowmobile			
<b>Trailer</b>	Response Enclosed	Dual Axle (16 to <18')		
<b>Skimmer</b>	Smooth Drum	TDS136		Qty: 2
<b>Skimmer</b>	Smooth Drum	Magnum200		
<b>Trailer</b>	Response Enclosed	Dual Axle (20' to <26')		
<b>Boom</b>	River	Self Inflatable	1100'	
<b>Skimmer</b>	Smooth Drum	TDS118		
<b>Small Motor</b>	Chainsaw			Qty: 2
<b>Small Motor</b>	Capstan Winch			
<b>Small Motor</b>	Ice Auger	Battery		Qty: 2
<b>Pump</b>	Three Inch	Trash		
<b>Generator</b>	Gas	6000W		
<b>Generator</b>	Gas	2000W		

## Equipment Details

Boom	River	Foam	650'	
Tank	Portable			
Small Motor	Capstan Winch	Gas		
Williston, ND				
Boat	Work Boat	Twenty-six Foot	Outboard Propeller	80 to < 120 HP
boat	Jon Boat	Fourteen Foot	Outboard Propeller	5 to <10 HP
Skimmer	Suction	Manta Ray		
Trailer	Utility	Single Axle (>10')		
Tank	Portable			
Boom Accessory	Bridle	Handline		
Trailer	Response Enclosed	Dual Axle (20' to <26')		Qty: 3
Boom	River	Foam	50' Section Length	7350'
Boom	River	Foam	50' Section Length	350'
Pump	Three Inch	Trash		
Pump	Two Inch	Trash		
Skimmer	Suction	Manta Ray		
Pump	Three Inch	Trash		
Tank	Portable			



## Equipment Details

Skimmer	Smooth Drum			
Generator	Gas	5000W		
Small Motor	Chainsaw			Qty: 2
Small Motor	Ice Auger			Qty: 2

## 11.2 Enbridge Equipment Locations

Equipment Locations	Address	Latitude	Longitude
Midwest Region Response Units			
Williston Office	14049 Country Lane Williston, ND 58801	48.16231	-103.63137
Stanley, ND	6150 Hwy 8 Stanley, ND	48.30405	-102.37388
Bemidji, MN	1129 Industrial Park Dr. SE Bemidji, MN 56601	47.443089	-94.852656
Minot Terminal	2625 Railway Ave	48.24063	-101.25767
Grand Forks Office	2715 Valley Circle Grand Forks, ND 58203	47.91688	-97.07236
Clearbrook PLM Main Line	17536 470 <sup>th</sup> St.	47.68966	-95.41210
Clearbrook Line 81	17536 470 <sup>th</sup> St; Clearbrook, MN 56634	47.411813	-95.250246
Sheldon	30607 County Highway VV; Sheldon WI 54766	45.165682	-90.572171
Lakota	Broadway Street Bartlett; RR Lakota ND 58344	48.024209	-92.252921
Deer River	30879 Enbridge Ave; Deer River, MN 56636	47.193228	-93.454966
Fort Atkinson PLM	803 Highland Ave; Fort Atkinson, WI 53538	42.92889	-88.83704
Superior, WI	10 Barden Ave; Superior, WI 54880	46.688839	-92.059634
Thief River Falls	1125 3 <sup>rd</sup> St W; Thief River Falls, MN 56701	48.119599	-96.166889
Vesper PLM	4898 Young Rd. Vesper, WI 54489	44.42318	-89.96310

### **11.3 Spill Response Organizations (External Locations)**

The company has response agreements with the local agencies listed below. They will be activated on an as-needed basis and typically only if the incident requires resources to supplement the resources from within the Midwest Region Response Zone.

In the event of a large-scale emergency, Enbridge will activate its response agreement with Marine Spill Response Corporation (MSRC), this is typically only if the incident requires resources beyond those available from Midwest Region Response Zone. MSRC operates a STARs contractor network and provides a broad selection of response services which is centrally coordinated by MSRC. One call activation through MSRC to activate resources.

Equipment Locations	Emergency Phone Number	Address	Latitude	Longitude
Response Resources				
Clean Harbors Environmental Services Inc.	800-645-8265	211 Holiday Ave; Cannon Falls Mn, 55009	44.315477	-92.544607
		N104W13275 Donges Bay Rd, Germantown, WI	43.122182	-88.042821
Marine Pollution Control Corp.	800-521-8232	11320 E Lakewood Blvd. #11; Holland, MI	48.481713	-86.042259
SWAT Consulting, Inc	866-610-7928 269-986-5499	12 Sunrise Estates Rd; Watford City, ND	47.960393	-103.363911
T & T Marine Salvage, Inc.	713-534-0700 (24 Hr) Or 248-978-5842	318 Lake Hazeltine Dr.; Chaska, MN	44.503828	-93.350567
	713-534-0700 (24 Hr) Or 248-978-5842	Lake Express Ferry; 2330 S. Lincoln Memorial Drive; Milwaukee, WI	43.001450	-87.531154
GFL Environmental Services U.S., Inc	414-761-9421	3240 West Elm Road; Franklin WI	42.510598	-87.573012

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Equipment Locations	Emergency Phone Number	Address	Latitude	Longitude
MN Limited	763-262-7000	18640 200 <sup>th</sup> St; Big Lake MN	45.183352	-93.465338
	218-755-9595	1300 30 <sup>th</sup> St Se; Bemidji MN	47.260076	- 94.5058.04
	701-453-3700	8704 282 <sup>nd</sup> Street Berthold, ND	48.331974	-84.590457
Beltrami Industrial Services Inc.	218-751-7537	12297 US-2, Solway, MN	47.305485	-95.032877
Charps, LLC	218-776-3080	453 Tower St. NW Clearbrook, MN	47.699812	-95.431634

Equipment Locations	Address	Emergency Phone Number
Contracted OSRO of Record		
Marine Spill Response Corporation (MSRC)	220 Spill Response Corporation Herndon, Virginia 20170	1-800-645-7745 1-800-259-6772 <i>International Calls</i> 1-732-417-0175

See the *Response Time Map External Response Resource* for a depiction of coverage for the Region.

STARS Network – activated through the MSRC on-call	
SWAT Consulting Inc.	12 Sunrise Estates Road, Watford City, ND
SET Environmental	9730 S. 20th Street, Oak Creek, WI
Clean Harbors Environmental Services	211 Holiday Ave, Cannon Falls, MN
Clean Harbors Environmental Services	N104 W1375 Donges Bay Rd, Germantown, WI
Qualitech	318 Lake Hazeltine Dr., Chaska, MN
JMAC Resources	121 48th Ave SW, Williston, ND
Bay West	5 Empire Drive, ST. Paul, MN
Martin Construction	3685 116th Ave SW, Dickinson, ND
Baranko Brothers Environmental	3048 Hwy 22N, Dickinson, ND
Clean Harbors Environmental Services Inc.	211 Holiday Ave, Cannon Falls, MN
T & T Marine Salvage, Inc.	318 Lake Hazeltine Dr., Chaska, MN
T & T Marine Salvage, Inc.	Lake Express Ferry; 2330 S. Lincoln Memorial Drive, Milwaukee, WI
GFL Environmental Services U.S., Inc	3240 West Elm Road, Franklin, WI
MN Limited	18640 200th St, Big Lake , MN
MN Limited	1300 30th St Se, Bemidji, MN
MN Limited	8704 282nd Street, Berthold, ND
Beltrami Industrial Services Inc	12297 US-2 , Solway , MN
Charps, LLC	453 Tower St. NW, Clearbrook , MN

## 11.4 Emergency Response Time Maps

Drive times depicted in the Regional Emergency Response Time Maps were generated using Environmental Systems Research Institution (ESRI) ArcMap. Times were calculated utilizing actual street speed limits based on a network dataset build from ESRI's Street map Premium North America, which contains street information from 2020. Optimal driving conditions during morning commute hours were used in this response time analysis, actual time is subject to change based on local road, traffic, and weather conditions.

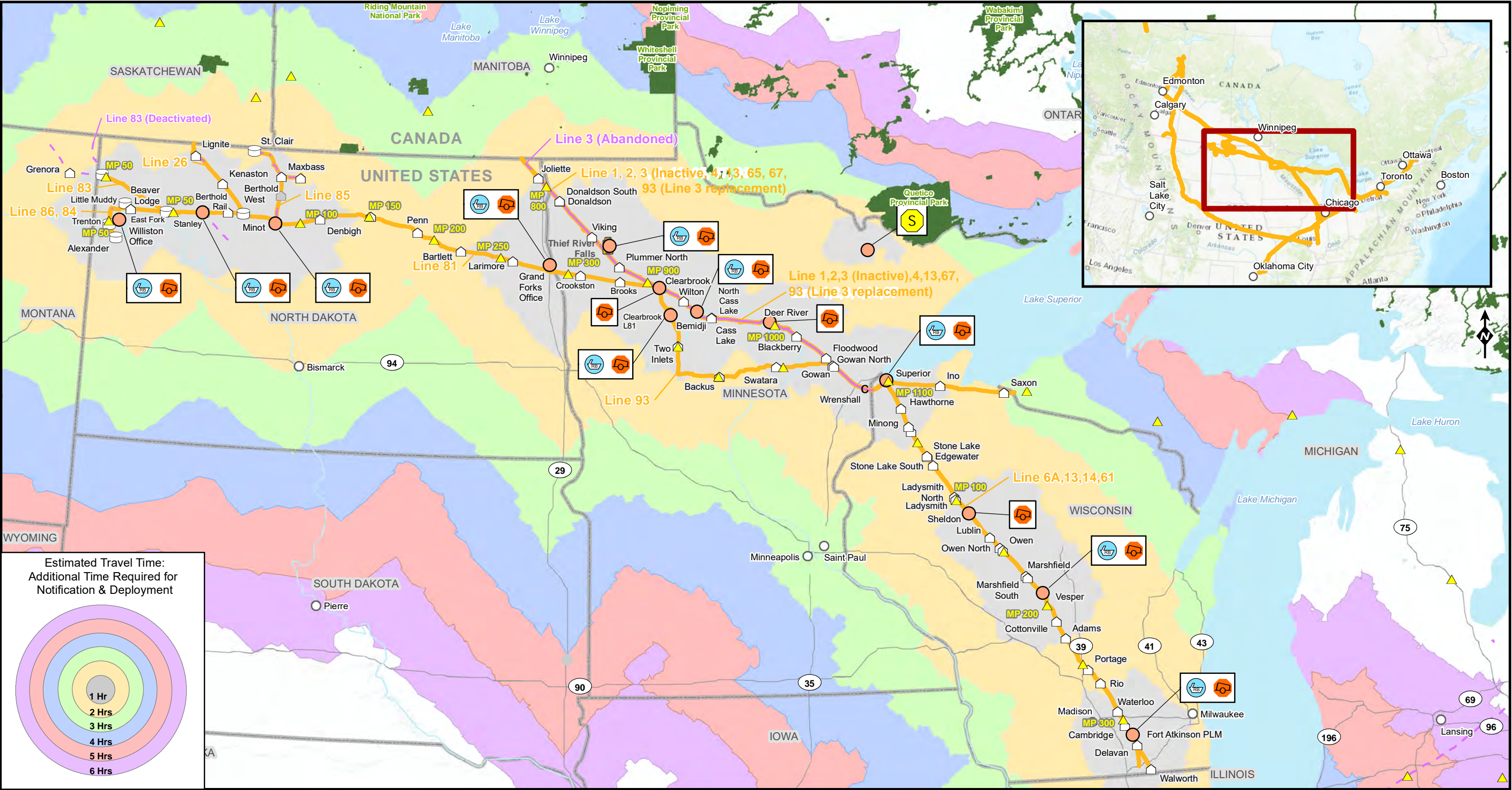
These response time maps are considered a conservative timeframe for travel to site and do not include additional time for deployment. In the event of an incident, reference to individual maps will be necessary.

Manned station and Emergency Response Trailer travel times are calculated in hour increments up to 6 hours. The colored zone changes every hour on the maps. This will show the travel time required from the manned stations and company trailers to areas along the pipeline.

OSRO Emergency Response Trailer location travel times are represented by calculating every hour up to 6 hours based on the above criteria. The colored zone changes every hour on the maps. Response times may vary with the locations of OSRO personnel at the time of an event. This is representative of travel time for the trailers **only**.

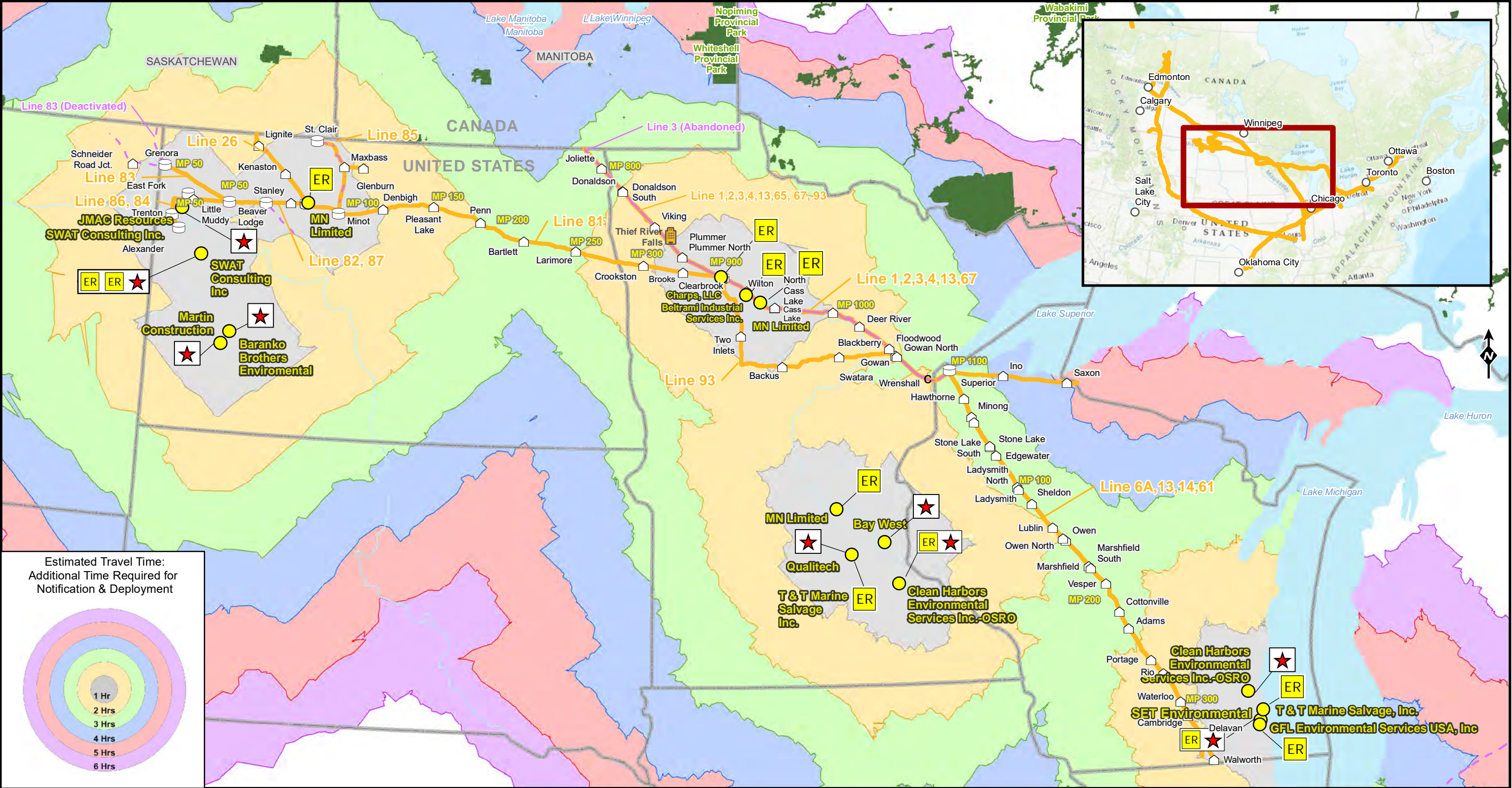












**Assumption/Caveat List**

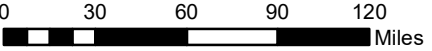
- Driving at the posted speed limit
- Optimal driving road conditions (e.g. ideal weather, no traffic or construction)
- Access to restricted areas not taken into drive time consideration (i.e. Canadian Forces Base, air weapons range)

MAP DISCLAIMER: This map has been compiled from the best existing sources available at the time of preparation. However, Enbridge Inc., Enbridge Energy and/or its affiliates and/or subsidiaries do not guarantee the accuracy of the map, or assume responsibility of liability for any reliance thereon.

Scale, is approximate only.

- |                   |                                    |                      |
|-------------------|------------------------------------|----------------------|
| ○ Cities          | ⬛ Station (Deactivated)            | — Pipeline           |
| C Valve/Trap Site | ★ STARS                            | — Highway            |
| △ Take-Off        | ▲ ROW Mile Post                    | — Major River        |
| ⬜ Station         | ● External Response Resource       | — Major Lake         |
| ⬜ Terminal        | ER External Response Agency        | — Park/Reserve Area  |
| 🏢 Office/PLM      | — Pipeline (Deactivated/Abandoned) | — States or Province |
|                   |                                    | — Country Boundary   |

**External Response Resource Map  
Midwest Region**



Coordinate System: North America Lambert Conformal Conic  
Service Layer Credits: ESRI, USGS, NOAA

Loc: G:\Geomatics projects\Emergency\_Response\ICP\_Annual\_Review\2022  
Date: 11/9/2022  
© 2022, Enbridge Inc.







## 11.5 Conversion Table

Length	English to Metric	Length	Metric to English
1 inch (in)	2.54 centimetres (cm)	1 cm	0.393 in
1 foot (ft)	0.3048 meters (m)	1 m	3.28 ft
1 mile (mi)	1.609 kilometres (km)	1 km	0.621 mi
1 nautical mile (nm)	1.852 kilometres (km)	1 km	0.540 nm
Area			
1 square foot (ft <sup>2</sup> )	929 square centimetres (cm <sup>2</sup> )	1 cm <sup>2</sup>	0.0129 ft <sup>2</sup>
	0.0929 square metres (m <sup>2</sup> )	1 m <sup>2</sup>	10.76 ft <sup>2</sup>
1 acre (ac)	4.047 square metres (m <sup>2</sup> )	1000 m <sup>2</sup>	0.247 ac
1 square mile (mi <sup>2</sup> )	2.59 square kilometres (km <sup>2</sup> )	1 km <sup>2</sup>	0.386 mi <sup>2</sup>
Volume			
1 US Gallon (US gal)	3.785 litres (l)	1 l	0.264 U.S. gal
1 Imperial Gallon (Imp gal)	4.546 litres (l)	1 l	0.220 imp gal
1 Barrel	0.16 cubic metres (m <sup>3</sup> )	1 m <sup>3</sup>	6.29 bbl
	159 litres (l)	1 l	0.00629 bbl
Velocity			
1 mile per hour (mph)	1.609 kilometres/hr (kph)	1 km/h	0.621 mph
1 nautical mile per hour (knot)	1.852 kilometres/hr (kph)	1 km/h	0.54 knot
1 foot per second (fps)	0.3048 metre/second (m/sec)	1 m/sec	3.28 fps
	1.097 kilometres/hr (kph)	1 km/h	0.911 fps

## FIELD EMERGENCY RESPONSE PLAN

Effective 2022-2023

Length	English to Metric	Length	Metric to English
<b>Weight</b>			
1 pound (lb)	0.454 kilogramme (kg)	1 kg	2.205 lb
1 short ton (st)	0.907 tonne (mt)	1 t	1.102 st
1 long ton (lt)	1.016 tonne (mt)	1 t	0.984 lt
Temperature			
$^{\circ}\text{F} = (^{\circ}\text{C} (9) \div 5) + 32$			
<b>Pressure</b>			
1 pound per square inch (psi)	0.0689 bar	1 bar	14.504 psi
	6.89 kilopascals (kPa)	1 kPa	0.145 psi
	0.704 metre (water column) (mwc)	1 m CE	1.42 psi
1 inch mercury (in Hg)	25.4 mm mercury (mm Hg)	1 mm Hg	0.0394 in Hg
1 atmosphere (atm)	1.033 kg/cm <sup>2</sup>	1 kg/cm <sup>2</sup>	0.968 atm
	760 mm mercury (mm Hg)	1 mm Hg	0.00132 atm
<b>Flow</b>			
1 gallon per minute (gpm)	0.227 metre <sup>3</sup> per hour (m <sup>3</sup> /hr)	1 m <sup>3</sup> /h	4.403 gpm
1 cubic foot per minute (cfm)	1.699 cubic meters per hour (m <sup>3</sup> /hr)	1 m <sup>3</sup> /h	0.5886 cfm
1 barrel per day (bpd)	0.1104 litres per minute (lpm)	1 lpm	9.057 bpd
<b>Power</b>			
1 horsepower (hp)	0.746 kilowatt (kw)	1 kw	1.341 hp

## 12.0 SAFETY DATA SHEETS

Common pooled products transported throughout the system have been included for quick reference within the FERP. All Safety Data Sheets for Enbridge can be accessed through the 3E Protect Global Library.

Safety Data Sheets (on elink)	At Enbridge, <a href="#">Safety Data Sheets</a> (on elink) are maintained in the <a href="#">3E Protect SDS Database</a> . If asked for access info, enter the following: <ul style="list-style-type: none"><li>• Login – <i>Enbridge</i></li><li>• Password – <i>SDS</i></li></ul>
Service Desk	If support is needed with the database, contact: <ul style="list-style-type: none"><li>• 1-844-362-6948 or phone ext.7373</li></ul>

### Table of Contents:

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• Light Synthetic</li><li>• Condensate</li><li>• Canadian Heavy Sweet (CHS)</li><li>• Sour</li></ul> | <ul style="list-style-type: none"><li>• Heavy</li><li>• Dilbit</li><li>• Canadian Heavy Synbit (CHY)</li><li>• High Sweet Clearbrook</li></ul> |
|--|--|





# Safety Data Sheet

## Section 1: Identification

### PRODUCT IDENTIFIER

Petroleum Crude Oil—Light Synthetic

### OTHER MEANS OF IDENTIFICATION

**UN-Number** UN1268

**Synonyms** Premium Synthetic (PSY), Hardisty Synthetic Crude (HSC), Synthetic Sweet Blend (SYN).

**Chemical Category** Crude oils—extremely flammable

### RECOMMENDED USE

No information available

### RESTRICTIONS OF USE

No information available

### SUPPLIER INFORMATION

Enbridge Pipelines Inc.  
10201 Jasper Avenue  
Edmonton, Alberta T5J 3N7  
Canada  
TEL: 1-780-420-5210

### EMERGENCY CONTACT INFORMATION

**CHEMTREC** 1-800-424-9300 for US  
703- 527- 3887 outside US

**CANUTEC (Canadian Transportation)** 613-996-6666

## Section 2: Hazards Identification

### CLASSIFICATION

Skin Irritation	Category 2
Eye Irritation	Category 2
Germ Cell Mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 2
Specific Target Organ Systemic Toxicity (Single Exposure)	Category 3
Specific Target Organ Toxicity (Repeated Exposure)	Category 1
Aspiration Toxicity	Category 1
Flammable liquids	Category 1

## LABEL ELEMENTS

### Signal Word

Danger

### Hazard Pictograms



### Hazard Statements

- Causes skin irritation.
- Causes serious eye irritation.
- May cause genetic defects.
- May cause cancer.
- Suspected of damaging fertility or the unborn child.
- May cause respiratory irritation.
- Causes damage to organs through prolonged or repeated exposure.
- May be fatal if swallowed and enters airways.
- Extremely flammable liquid and vapor.
- May cause drowsiness or dizziness.

## PRECAUTIONARY STATEMENTS

### Prevention

- Wash face, hands and any exposed skin thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Use personal protective equipment as required.
- Do not breathe dust/fume/gas/mist/vapors/spray.
- Use only outdoors or in a well-ventilated area.
- Do not eat, drink or smoke when using this product.
- Keep away from heat/sparks/open flames/hot surfaces.
- Keep container tightly closed.
- No smoking.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting/equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- In case of inadequate ventilation wear respiratory protection.

### Response

- IF EXPOSED or concerned: Get medical advice/attention.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- Call a POISON CENTER or doctor/physician if you feel unwell.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- Do NOT induce vomiting.
- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower and soap.
- In case of fire: Use CO<sub>2</sub>, dry chemical, or foam for extinction.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If SKIN irritation occurs: Get medical advice/attention.
- If EYE irritation persists: Get medical advice/attention.

### Storage/Disposal

- Store locked up and keep cool.
- Store in a well-ventilated place. Keep container tightly closed.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

## OTHER INFORMATION

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
- Very toxic to aquatic life with long lasting effects.

## Section 3: Composition/Information on Ingredients

COMPONENT NAME	CAS NUMBER	PERCENTAGE (%)*	NOTES
1,2,4-Trimethylbenzene	95-63-6	0-5	
Benzene	71-43-2	0-5	
Butane	106-97-8	0-5	
Cyclohexane	110-82-7	0-5	
Decane	124-18-5	0-10	
Distillates (petroleum), hydrotreated middle	64742-46-7	0-60	
Ethylbenzene	100-41-4	0-5	
Fuels, diesel, No. 2	68476-34-6	0-30	
Gas Oils, Petroleum, Hydrodesulfurized	64742-79-6	0-100	
Heptane	142-82-5	0-7	
Hexane	110-54-3	0-7	
Methylcyclohexane	108-87-2	0-7	
Naphtha (petroleum), hydrotreated light	64742-49-0	0-7	
Naphtha, (petroleum), heavy, hydrotreated	64742-48-9	0-60	
Octane	111-65-9	0-7	
o-Xylene	95-47-6	0-5	
Petroleum distillate (naphtha)	8002-05-9	0-100	
Toluene	108-88-3	0-5	
Xylene	1330-20-7	0-5	

\*Values do not reflect absolute minimums and maximums; those values may vary from time to time.

## Section 4: First Aid Measures

### DESCRIPTION OF NECESSARY MEASURES

<b>Inhalation</b>	<ul style="list-style-type: none"><li>• IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If irritation persists: Get medical advice/attention.</li></ul>
<b>Skin</b>	<ul style="list-style-type: none"><li>• IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.</li></ul>
<b>Eye</b>	<ul style="list-style-type: none"><li>• IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.</li></ul>
<b>Ingestion</b>	<ul style="list-style-type: none"><li>• Do NOT induce vomiting. Call a physician or poison control center.</li><li>• Aspiration hazard if swallowed—can enter lungs and cause damage.</li></ul>

### MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

**Refer to Section 11 - Toxicological Information**

### INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY

<b>Note to the Physician</b>	<ul style="list-style-type: none"><li>• Aspiration hazard. Symptoms may be delayed.</li><li>• Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.</li><li>• Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.</li></ul>
------------------------------	--

## Section 5: Fire Fighting Measures

### EXTINGUISHING MEDIA

<b>Suitable Extinguishing Media</b>	<ul style="list-style-type: none"><li>• SMALL FIRES: Dry chemical, CO<sub>2</sub>, water spray or regular foam.</li><li>• LARGE FIRE: Water spray, fog or regular foam.</li></ul>
-------------------------------------	---

<b>Unsuitable Extinguishing Media</b>	<ul style="list-style-type: none"><li>• CAUTION: Use of water spray when fighting fire may be inefficient.</li><li>• Do not use straight streams.</li></ul>
---------------------------------------	---

### FIREFIGHTING PROCEDURES

- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: If impossible to extinguish, protect surroundings and allow fire to burn itself out.
- Stay upwind.
- Ventilate closed spaces before entering.
- Fire fighters should wear complete protective clothing including self-contained breathing apparatus.
- FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
- FIRE: When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.
- Move containers from fire area if you can do it without risk.

- LARGE FIRES: Use water spray or fog; do not use straight streams.
- LARGE FIRES: If insufficient water supply: knock down vapors only. If this is impossible, withdraw from area and let fire burn.
- LARGE FIRES: Flood fire area with large quantities of water, while knocking down vapors with water fog.

### SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

- Vapors may travel to source of ignition and flash back.
- Air/vapor mixtures may explode when ignited.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Will be easily ignited by heat, sparks or flames.
- Runoff to sewer may create fire or explosion hazard.
- Vapor explosion hazard indoors, outdoors or in sewers.
- MAY EXPLODE AND THROW FRAGMENTS 1600 meters (1 MILE) OR MORE IF FIRE REACHES CARGO.
- May create vapor/air explosion hazard indoors, outdoors or in sewers.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

### EXPLOSION DATA

<b>Hazardous Combustion Products</b>	<ul style="list-style-type: none"> <li>• Carbon monoxide. Carbon dioxide (CO<sub>2</sub>). Nitrogen oxides (NO<sub>x</sub>). Oxides of sulfur.</li> <li>• Aldehydes, aromatic and other hydrocarbons.</li> </ul>
<b>Sensitivity to Mechanical Impact</b>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<b>Sensitivity to Static Discharge</b>	<ul style="list-style-type: none"> <li>• Yes.</li> </ul>

### PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS

- As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
- Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced firefighters.
- Carbon dioxide can displace oxygen.
- Use caution when applying carbon dioxide in confined spaces.
- Water spray may be useful in minimizing or dispersing vapors.
- Long-duration fires involving diluent stored in tanks may result in a boilover.
- For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear.

## Section 6:

## Accidental Release Measures

### PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

<b>Personal Precautions</b>	<ul style="list-style-type: none"> <li>• Evacuate personnel to safe areas.</li> <li>• Remove all sources of ignition.</li> <li>• Deny entry to unauthorized and unprotected personnel.</li> <li>• Use personal protective equipment.</li> <li>• Avoid contact with skin, eyes and clothing.</li> <li>• Stop leak if you can do it without risk.</li> <li>• Keep people away from and upwind of spill/leak.</li> <li>• Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.</li> <li>• Ventilate enclosed areas.</li> <li>• Do not walk through spilled material.</li> </ul>
<b>Protective Equipment</b>	<ul style="list-style-type: none"> <li>• Wear appropriate breathing apparatus (if applicable) and protective clothing.</li> </ul>

---

**Emergency Procedures**

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area) Keep unauthorized personnel away. Evacuate area. Keep out of low areas. Stop leak if you can do it without risk.
- Report spills to local or federal authorities as appropriate or required.

- 
- Avoid run off to waterways and sewers. Do NOT wash away into sewer. Prevent entry into waterways, sewers, basements or confined areas. Runoff from fire control may cause pollution.

---

**Methods for Containment**

- Stop leak if you can do it without risk.
- Contain and recover liquid when possible.
- A vapor suppressing foam may be used to reduce vapors.
- Dike far ahead of spill; use dry sand to contain the flow of material; contain water spills by booming.
- Use water spray to reduce vapors or divert vapor cloud drift.
- A fine water spray remotely directed to the edge of the spill pool can be used to direct and maintain a hot flare fire which will burn the spilled material in a controlled manner.

---

**Methods for Cleaning Up**

- Clean up spill immediately.
- LARGE SPILLS: DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.
- SMALL LIQUID SPILLS: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.
- Use appropriate Personal Protective Equipment (PPE).
- Use clean non-sparking tools to collect absorbed material.
- Vacuum spilled material.
- Try to work upwind of spill.
- All equipment used when handling the product must be grounded.
- Recover and return free product to proper containers
- Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids.
- Do not place spilled materials back in the original container.
- Do not flush to sewer or allow to enter waterways.

---

## Section 7:

## Handling and Storage

---

**PRECAUTIONS FOR SAFE HANDLING**

---

**Handling**

- All equipment used when handling the product must be grounded. Avoid contact with heat and ignition sources and oxidizers. Do not breathe (dust, vapor or spray mist). Do not use in areas without adequate ventilation. Do not use sparking tools. Keep away from heat, sparks, and flame. No open flames, no sparks and no smoking. Use only with adequate ventilation. Do not use or store near heat or open flame. Keep away from fire, sparks and heated surfaces.
- The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes).
- The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.
- Take precautionary measures against static discharges.
- Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.
- Stay upwind and vent open hatches before unloading.
- Avoid contact with skin, eyes and clothing.
- Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

<b>Handling</b>	<ul style="list-style-type: none"> <li>• Wear personal protective equipment.</li> <li>• Remove and wash contaminated clothing before re-use.</li> <li>• Do not eat, drink or smoke when using this product.</li> <li>• Do not take internally.</li> <li>• Wash thoroughly after handling.</li> <li>• Empty containers pose a potential fire and explosion hazard.</li> </ul>
<b>Storage</b>	<ul style="list-style-type: none"> <li>• Ventilate enclosed areas.</li> <li>• Store in a well-ventilated place.</li> <li>• Keep container tightly closed.</li> <li>• Store locked up.</li> <li>• Avoid shock, impact, friction, and rough handling. Do not use sparking tools.</li> <li>• Store in a cool/low-temperature, well-ventilated place away from heat and ignition sources.</li> <li>• Keep away from sources of ignition.</li> <li>• No Smoking.</li> <li>• Do not enter confined spaces such as tanks or pits without following proper entry procedures.</li> <li>• Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area.</li> <li>• Harmful concentrations of hydrogen sulfide (H<sub>2</sub>S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments.</li> <li>• Keep away from open flames, hot surfaces and sources of ignition.</li> <li>• Keep product and empty container away from heat and sources of ignition.</li> <li>• Storage containers should be grounded and bonded.</li> <li>• Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.</li> <li>• Store away from incompatible materials.</li> </ul>
<b>Incompatible Products</b>	<ul style="list-style-type: none"> <li>• Strong oxidizers such as nitrates, chlorates, peroxides, chlorine.</li> </ul>

## Section 8:

## Exposure Controls/Personal Protection

### CONTROL PARAMETERS: EXPOSURE GUIDELINES

CHEMICAL NAME	ACGIH	OSHA	NIOSH
<b>1,2,4-Trimethylbenzene</b>	–	–	TWA 25 ppm TWA 125 mg/m <sup>3</sup>
<b>Benzene</b>	TLV 0.5 ppm TLV 1.6 mg/m <sup>3</sup> STEL 2.5 ppm STEL 8 mg/m <sup>3</sup>	PEL 1 ppm STEL 5 ppm	TWA 0.1 ppm STEL 1 ppm IDLH 500 ppm
<b>Butane</b>	STEL 1000 ppm	–	TWA 800 ppm TWA 1900 mg/m <sup>3</sup>
<b>Cyclohexane</b>	TLV 100 ppm TLV 334 mg/m <sup>3</sup>	PEL 300 ppm PEL 1050 mg/m <sup>3</sup>	TWA 300 ppm TWA 1050 mg/m <sup>3</sup> IDLH 1300 ppm

<b>Ethylbenzene</b>	TLV 20 ppm TLV 87 mg/m <sup>3</sup>	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 125 ppm STEL 545 mg/m <sup>3</sup> IDLH 800 ppm
<b>Fuels, diesel, No. 2</b>	TLV 100 mg/m <sup>3</sup>	–	–
<b>Heptane</b>	TLV 400 ppm TLV 1640 mg/m <sup>3</sup> STEL 500 ppm STEL 2000 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 85 ppm TWA 350 mg/m <sup>3</sup> Ceiling 440 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 750 ppm
<b>Hexane</b>	TLV 50 ppm TLV 176 mg/m <sup>3</sup>	PEL 500 ppm PEL 1800 mg/m <sup>3</sup>	TWA 50 ppm TWA 180 mg/m <sup>3</sup> IDLH 1100 ppm
<b>Methylcyclohexane</b>	TLV 400 ppm TLV 1610 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 400 ppm TWA 1600 mg/m <sup>3</sup> IDLH 1200 ppm
<b>Octane</b>	TLV 300 ppm TLV 1401 mg/m <sup>3</sup>	PEL 500 ppm PEL 2350 mg/m <sup>3</sup>	TWA 75 ppm TWA 350 mg/m <sup>3</sup> Ceiling 385 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1000 ppm
<b>o-Xylene</b>	TLV 100 ppm STEL 150 ppm	–	TLV 100 ppm STEL 150 ppm
<b>Petroleum distillate (naptha)</b>	–	–	TWA 350 mg/m <sup>3</sup> Ceiling 1800 mg/m <sup>3</sup>
<b>Toluene</b>	TLV 20 ppm TLV 75 mg/m <sup>3</sup>	PEL 200 ppm STEL 300 mg/m <sup>3</sup>	TWA 100 ppm TWA 375 mg/m <sup>3</sup> STEL 150 ppm STEL 560 mg/m <sup>3</sup> IDLH 500 ppm
<b>Xylenes</b>	TLV 100 ppm TLV 434 mg/m <sup>3</sup> STEL 150 ppm STEL 651 mg/m <sup>3</sup>	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 150 ppm STEL 655 mg/m <sup>3</sup> IDLH 900 ppm

#### APPROPRIATE ENGINEERING CONTROLS

- Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. Prevent vapor build up by providing adequate ventilation during and after use. Use only appropriately classified electrical equipment.



## INDIVIDUAL PROTECTION MEASURES

<b>Eye and Face</b>	<ul style="list-style-type: none"><li>Wear face shield and eye protection.</li></ul>
<b>Skin and Body</b>	<ul style="list-style-type: none"><li>The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation.</li><li>Wear protective gloves/protective clothing/eye protection/face protection. Wear long sleeves and/or protective coveralls.</li></ul>
<b>Respiratory</b>	<ul style="list-style-type: none"><li>Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.</li></ul>
<b>General Hygiene Measures</b>	<ul style="list-style-type: none"><li>Handle in accordance with good industrial hygiene and safety practice.</li></ul>

## Section 9:

## Physical and Chemical Properties

### MATERIAL DESCRIPTION

<b>Physical State</b>	Liquid	<b>Odor</b>	Petroleum like odor
<b>Substance Type</b>	Mixture	<b>Odor Threshold</b>	No data available
<b>Appearance</b>	Yellow/green to Brown/black liquid		

### PROPERTIES

<b>pH</b>	No data available	<b>Vapor pressure</b>	No data available
<b>Melting Point/ Freezing Point</b>	No data available	<b>Vapor density</b>	No data available
<b>Boiling Point/ Boiling Range</b>	-18 to 560°C -0.4 to 1040°F	<b>Relative density</b>	No data available
<b>Flash Point</b>	>-35 °C >-31 °F	<b>Water Solubility</b>	Negligible
<b>Evaporation Rate</b>	No data available	<b>Partition coefficient: n-octanol/water</b>	No data available
<b>Flammability (solid, gas)</b>	No data available	<b>Decomposition temperature</b>	No data available
<b>Upper Flammability Limit</b>	No data available	<b>Specific Gravity</b>	No data available
<b>Lower Flammability Limit</b>	No data available		
<b>Viscosity</b>	No data available		

## Section 10:

## Stability and Reactivity

### REACTIVITY

Chlorine Dioxide

### CHEMICAL STABILITY

Stable at 70 °F, 760 mm Hg pressure

<b>POSSIBILITY OF HAZARDOUS REACTIONS</b>	None under normal processing
<b>CONDITIONS TO AVOID</b>	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity
<b>INCOMPATIBLE MATERIALS</b>	Strong oxidizers such as nitrates, chlorates, peroxides, chlorine
<b>HAZARDOUS DECOMPOSITION PRODUCTS</b>	Combustion produces carbon monoxide, aldehydes, sulfur dioxide, aromatic and other hydrocarbons
<b>HAZARDOUS POLYMERIZATION</b>	Will not occur

## Section 11: Toxicological Information

### INFORMATION ON THE LIKELY ROUTES OF EXPOSURE

<b>Inhalation</b>	<ul style="list-style-type: none"> <li>May cause irritation of respiratory tract. May cause drowsiness and dizziness.</li> </ul>
<b>Eye Contact</b>	<ul style="list-style-type: none"> <li>Causes serious eye irritation.</li> </ul>
<b>Skin Contact</b>	<ul style="list-style-type: none"> <li>Causes skin irritation.</li> </ul>
<b>Ingestion</b>	<ul style="list-style-type: none"> <li>Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.</li> <li>Potential for aspiration if swallowed.</li> <li>Aspiration may cause pulmonary edema and pneumonitis.</li> </ul>

### TOXICOLOGICAL DATA

CHEMICAL NAME	LD50 ORAL	LD50 DERMAL	LC50 INHALATION
<b>1,2,4-Trimethylbenzene</b>	5 g/kg (Rat)	–	18000 mg/m <sup>3</sup> (Rat) 4h
<b>Benzene</b>	=1800 mg/kg (Rat)	–	13050 - 14380 ppm (Rat) 4 h
<b>Butane</b>	–	–	658 mg/L (Rat) 4 h
<b>Cyclohexane</b>	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	= 13.9 mg/L (Rat) 4 h
<b>Decane</b>	–	–	>1369 ppm (Rat) h h 72300 mg/m <sup>3</sup> (Rat) 2 h
<b>Ethylbenzene</b>	= 3500 mg/kg (Rat)	= 15400 mg/kg (Rabbit)	= 17.2 mg/L (Rat) 4 h
<b>Heptane</b>	–	= 3000 mg/kg (Rabbit)	= 103 g/m <sup>3</sup> (Rat) 4 h
<b>Hexane</b>	= 25 g/kg (Rat)	= 3000 mg/kg (Rabbit)	= 48000 ppm (Rat) 4 h
<b>Methylcyclohexane</b>	> 3200 mg/kg (Rat)	–	–
<b>Naphtha, (petroleum), heavy, hydrotreated</b>	= >6 g/kg (Rat)	–	= 8500 mg/m <sup>3</sup> (Rat)
<b>Octane</b>	–	–	= 118 g/m <sup>3</sup> (Rat) 4 h = 25260 ppm (Rat) 4 h
<b>o-Xylene</b>	= 3910 mg/kg (Rat)	–	–
<b>Toluene</b>	2.6 to 7.5 g/kg (Rat)	14.1 ml/kg (Rabbit)	–

<b>Xylenes</b>	= 3500 mg/kg (Rat)	> 4350 mg/kg (Rabbit) > 1700 mg/kg (Rabbit)	= 29.08 mg/L (Rat) 4 h = 5000 ppm (Rat) 4 h
----------------	--------------------	--	--

## SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

<b>Benzene</b>	<ul style="list-style-type: none"> <li>Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in humans. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.</li> </ul>
<b>Hexane</b>	<ul style="list-style-type: none"> <li>This product may contain hexane at a level of &gt;1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.</li> </ul>
<b>Xylenes</b>	<ul style="list-style-type: none"> <li>Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and man. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.</li> </ul>
<b>Toluene</b>	<p><b>Carcinogenicity:</b> Exposure of rats and mice to toluene at concentrations ranging from 120-1200 ppm for two years did not demonstrate evidence of carcinogenicity. Toluene has not been listed as a carcinogen by IARC.</p> <p><b>Target Organs:</b> Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.</p> <p><b>Reproductive Toxicity:</b> Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. Decreased fetal body weight and increased skeletal variations in both inhalation and oral studies, but only at doses that were maternally toxic. No fetal toxicity was seen at doses that were not maternally toxic. Decreased sperm counts have been observed in male rats in the absence of a reduction in fertility. Toluene has been reported to cause mental or growth retardation in the children of solvent abusers who directly inhale toluene during pregnancy.</p>
<b>Ethylbenzene</b>	<p><b>Carcinogenicity:</b> Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC.</p> <p><b>Target Organs:</b> In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), lung (alveolar epithelium metaplasia), thyroid (hyperplasia), thyroid (hyperplasia) and pituitary (hyperplasia). In animal models (particularly rats), ethyl benzene affects the auditory function mainly in the cochlear mid-frequency range and ototoxicity was observed after combined exposure to noise and ethyl benzene. There is no evidence of either ethyl benzene-induced hearing losses or ototoxicity with combined exposure to ethyl benzene and noise in workers.</p>

<b>DELAYED AND IMMEDIATE EFFECTS AND ALSO CHRONIC EFFECTS FROM SHORT- AND LONG-TERM EXPOSURE</b>	<b>Sensitization</b>	• No information available				
	<b>Mutagenic Effects</b>	• May cause genetic defects				
	<b>Carcinogenicity</b>	• May cause cancer				
<b>CARCINOGENIC INFORMATION</b>	<b>CHEMICAL NAME</b>	<b>ACGIH</b>	<b>ACGIH SKIN*</b>	<b>IARC</b>	<b>NTP</b>	<b>OSHA</b>
	<b>Benzene</b>	A1	X	Group 1	Known	X
	<b>Fuels, diesel, No. 2</b>	A3	X	–	–	–
	<b>Ethylbenzene</b>	A3	–	Group 2B	Evidence	X
	<b>Hexane</b>	–	X	–	–	–
	<b>Petroleum distillate (naphtha)</b>	–	–	Group 3	–	–
	<b>Toluene</b>	A4	–	Group 3	Evidence	–
	<b>o-Xylene</b>	A4	–	Group 3	Evidence	–
	<b>Xylenes</b>	A4	–	Group 3	Evidence	–
	*ACGIH Skin designation refers to the potential significant contribution of overall exposure by cutaneous route, including mucous membranes and eyes, from airborne exposure to gases, vapor, or liquid OR by direct skin contact.					
<b>REPRODUCTIVE TOXICITY</b>	• Suspected of damaging fertility or the unborn child.					
<b>STOT—SINGLE EXPOSURE</b>	• May cause drowsiness and dizziness.					
<b>STOT—REPEATED EXPOSURE</b>	• Causes damage to organs through prolonged or repeated exposure.					
<b>ASPIRATION HAZARD</b>	May be fatal if swallowed and enters airways Risk of serious damage to the lungs (by aspiration).					

## Section 12: Ecological Information

<b>ECOTOXICITY</b>				
<b>CHEMICAL NAME</b>	<b>TOXICITY TO ALGAE</b>	<b>TOXICITY TO FISH</b>	<b>DAPHNIA MAGNA (WATER FLEA)</b>	<b>OTHER TOXICITY</b>
<b>1,2,4-Trimethylbenzene</b>	–	LC50 96 h: 7.72 mg/L (Pimephales promelas)	EC50 48h: 30 mmol/cu (Daphnia magna)	LC50 24h: 100 mmol/cu Artemia salina (Brine Shrimp)

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Benzene</b>	EC50 72 h: = 29 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 10.7 - 14.7 mg/L flow-through (Pimephales promelas) LC50 96 h: = 5.3 mg/L flow-through (Oncorhynchus mykiss) LC50 96 h: = 22.49 mg/L static (Lepomis macrochirus) LC50 96 h: = 28.6 mg/L static (Poecilia reticulata) LC50 96 h: 22330 - 41160 µg/L static (Pimephales promelas) LC50 96 h: 70000 - 142000 µg/L static (Lepomis macrochirus)	EC50 48 h: 8.76 - 15.6 mg/L Static (Daphnia magna) EC50 48 h: = 10 mg/L (Daphnia magna)	–
<b>Cyclohexane</b>	EC50 72 h: > 500 mg/L (Desmodesmus subspicatus)	LC50 96 h: 3.96 - 5.18 mg/L flow-through (Pimephales promelas) LC50 96 h: 23.03 - 42.07 mg/L static (Pimephales promelas) LC50 96 h: 24.99 - 44.69 mg/L static (Lepomis macrochirus) LC50 96 h: 48.87 - 68.76 mg/L static (Poecilia reticulata)	EC50 24 h: > 400 mg/L (Daphnia magna)	EC50 = 85.5 mg/L 5 min EC50 = 93 mg/L 10 min (Microorganisms)
<b>Decane</b>	EC50 24 h: = 0.043 mg/L (Chlorella vulgaris)	–	EC50 48 h: >90-280 mg/L (Daphnia magna)	–
<b>Distillates (petroleum), hydrotreated middle</b>	–	LC50 96 h: 35 mg/L (Pimephales promelas) LC50 96 h: >10000 mg/L (Pimephales promelas)	–	–
<b>Ethylbenzene</b>	EC50 72 h: = 4.6 mg/L (Pseudokirchneriella subcapitata) EC50 96 h: > 438 mg/L (Pseudokirchneriella subcapitata) EC50 72 h: 2.6 - 11.3 mg/L static (Pseudokirchneriella subcapitata) EC50 96 h: 1.7 - 7.6 mg/L static (Pseudokirchneriella subcapitata) EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 11.0 - 18.0 mg/L static (Oncorhynchus mykiss) LC50 96 h: = 4.2 mg/L semi-static (Oncorhynchus mykiss) LC50 96 h: 7.55 - 11 mg/L flow-through (Pimephales promelas) LC50 96 h: = 32 mg/L static (Lepomis macrochirus) LC50 96 h: 9.1 - 15.6 mg/L static (Pimephales promelas) LC50 96 h: = 9.6 mg/L static (Poecilia reticulata)	EC50 48 h: 1.8 - 2.4 mg/L (Daphnia magna)	EC50 = 9.68 mg/L 30 min EC50 = 96 mg/L 24 h (Microorganisms)
<b>Fuels, diesel, No. 2</b>	–	LC50 96 h: = 35 mg/L (Pimephales promelas)	–	–
<b>Gas Oils, Petroleum, Hydrodesulfurized</b>	LC50 96 h: = 35 mg/L (Pimephales promelas)	–	LC50 96 h: < 1.00 ppm (Diatomus forbesi)	–
<b>Heptane</b>	–	LC50 96 h: = 375.0 mg/L (Cichlid fish)	EC50 24 h: > 10 mg/L (Daphnia magna)	–

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
Hexane	–	LC50 96 h: 2.1 - 2.98 mg/L flow-through (Pimephales promelas)	EC50 24 h: > 1000 mg/L (Daphnia magna)	–
Methylcyclohexane	–	LC50 96hr: 72.0 mg/l (Golden Shiner)	–	–
Naphtha (petroleum), hydrotreated light	–	–	LC50 96 h: = 2.6 mg/L (Chaetogammarus marinus)	–
Naphtha, (petroleum), heavy, hydrotreated	–	LC50 96 h: = 2200 mg/L (Pimephales promelas)	LC50 96 h: = 2.6 mg/L (Chaetogammarus marinus)	–
Octane	–	–	EC50 48 h: = 0.38 mg/L (water flea) EC50 48 h: = 0.02856 mg/L (Daphnia magna)	EC50 = 890 mg/L 30 min (Microorganisms) EC50 <1.67hr: 120 µg/l Mytilus edulis (Common Bay Mussel)
o-Xylene	EC50 24 h: = 55000 ug/L (Chlorella vulgaris)	–	–	LC50 96h: 1.3 ppm Crangon franciscorum (Shrimp)
Petroleum distillate (naphtha)	–	LC50: 258 mg/L Salmo gairdneri 96 h static	EC50 48 h: < 0.26 mg/L Static (Daphnia magna) EC50 24 h: = 36 mg/L (Daphnia magna)	–
Toluene	EC50: >433 mg/L Pseudokirchneriella subcapitata 96 h EC50: 12.5 mg/L Pseudokirchneriella subcapitata 72 h static	LC50: 15.22 - 19.05 mg/L Pimephales promelas 96 h flow-through LC50: 12.6 mg/L Pimephales promelas 96 h static LC50: 5.89 - 7.81 mg/L Oncorhynchus mykiss 96 h flow-through LC50: 14.1 - 17.16 mg/L Oncorhynchus mykiss 96 h static LC50: 5.8 mg/L Oncorhynchus mykiss 96 h semi-static LC50: 11.0-15.0 mg/L Lepomis macrochirus 96 h static LC50: 54 mg/L Oryzias latipes 96 h static LC50: 28.2 mg/L Poecilia reticulata 96 h semi-static LC50: 50.87-70.34 mg/L Poecilia reticulata 96 h static	EC50 48 h: 5.46 - 9.83 mg/L Static (Daphnia magna) EC50 48 h: = 11.5 mg/L (Daphnia magna)	EC50 = 19.7 mg/L 30 min (Microorganisms)

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Xylenes</b>	EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: = 13.4 mg/L flow-through (Pimephales promelas) LC50 96 h: 2.661 - 4.093 mg/L static (Oncorhynchus mykiss) LC50 96 h: 13.5 - 17.3 mg/L (Oncorhynchus mykiss) LC50 96 h: 13.1 - 16.5 mg/L flow-through (Lepomis macrochirus)	EC50 48 h: = 3.82 mg/L (water flea) LC50 48 h: = 0.6 mg/L (Gammarus lacustris)	—

## PERSISTENCE AND DEGRADABILITY

- No information available

## BIOACCUMULATIVE POTENTIAL

CHEMICAL	LOG POW
<b>1,2,4-Trimethylbenzene</b>	3.78
<b>Benzene</b>	1.83
<b>Butane</b>	2.89
<b>Cyclohexane</b>	3.44
<b>Decane</b>	5.1
<b>Ethylbenzene</b>	3.118
<b>Heptane</b>	4.66
<b>Hexane</b>	3.90
<b>Methylcyclohexane</b>	3.61
<b>Octane</b>	5.18
<b>o-Xylene</b>	3.12
<b>Toluene</b>	2.65
<b>Xylene</b>	2.77-3.15

## MOBILITY IN SOIL

CHEMICAL	EXPECTED SOIL MOBILITY
<b>1,2,4-Trimethylbenzene</b>	Low
<b>Benzene</b>	High
<b>Butane</b>	Low
<b>Cyclohexane</b>	Moderate
<b>Decane</b>	Immobile
<b>Ethylbenzene</b>	Low
<b>Heptane</b>	Moderate
<b>Hexane</b>	High

<b>Octane</b>	Immobile
<b>o-Xylene</b>	Very High to Moderate
<b>Petroleum distillate (naptha)</b>	High
<b>Toluene</b>	High to Moderate
<b>Xylene</b>	Very High to Moderate
• No information available	

OTHER ADVERSE EFFECTS

Section 13: Disposal Considerations

WASTE TREATMENT METHODS

<b>Product Waste</b>	<ul style="list-style-type: none"> <li>This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.</li> <li>This product could also contain benzene at &gt;0.5 ppm and could exhibit the characteristic of “toxicity” (D018) as determined by the toxicity characteristic leaching procedure (TCLP).</li> <li>This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s).</li> <li>It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.</li> </ul>
<b>Packaging Waste</b>	<ul style="list-style-type: none"> <li>Container contents should be completely used and containers should be emptied prior to discard.</li> <li>Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations.</li> <li>Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner.</li> <li>To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.</li> </ul>

Section 14: Transport Information

\*\*CHART NAME\*\*

	UN NUMBER	PROPER SHIPPING NAME	TRANSPORT HAZARD CLASS	PACKING GROUP	ENVIRONMENTAL HAZARD
<b>DOT</b>	UN1268	Petroleum Distillate, N.O.S.	3	I	Emergency response guide number: 128
<b>TDG</b>	UN1268	Petroleum Distillate, N.O.S.	3	I	–
<b>IMO/IMDG</b>	UN1268	Petroleum Distillate, N.O.S.	3	I	EmS No. F-E, S-E
<b>IATA/ICAO</b>	UN1268	Petroleum Distillate, N.O.S.	3	I	ERG Code 3L

SPECIAL RECAUTIONS FOR USER

- None



## Section 15: Regulatory Information

### U.S.—CERCLA/SARA HAZARDOUS SUBSTANCES AND THEIR REPORTABLE QUANTITIES

COMPONENT	CAS #	AMOUNT
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Benzene	71-43-2	10 lb final RQ; 4.54 kg final RQ
Butane	106-97-8	Not Listed
Cyclohexane	110-82-7	1000 lb final RQ; 454 kg final RQ
Decane	124-18-5	Not Listed
Distillates (petroleum), hydrotreated middle	64742-46-7	Not Listed
Ethylbenzene	100-41-4	1000 lb final RQ; 454 kg final RQ
Fuels, diesel, No. 2	68476-34-6	Not Listed
Gas Oils, Petroleum, Hydrosulfurized	64742-79-6	Not Listed
Heptane	142-82-5	Not Listed
Hexane	110-54-3	5000 lb final RQ; 2270 kg final RQ
Methylcyclohexane	108-87-2	Not Listed
Naphtha (petroleum), hydrotreated light	64742-49-0	Not Listed
Naphtha, (petroleum), heavy, hydrotreated	64742-48-9	Not Listed
Octane	111-65-9	Not Listed
o-Xylene	95-47-6	1000 lb final RQ; 454 kg final RQ
Petroleum distillate (naphtha)	8002-05-9	Not Listed
Toluene	108-88-3	1000 lb final RQ; 454 kg final RQ
Xylene	1330-20-7	100 lb final RQ; 45.4 kg final RQ

**U.S.—CWA  
(CLEAN WATER ACT)—  
REPORTABLE  
QUANTITIES OF  
DESIGNATED  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	AMOUNT
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Benzene	71-43-2	10 lb RQ
Butane	106-97-8	Not Listed
Cyclohexane	110-82-7	1000 lb RQ
Decane	124-18-5	Not Listed
Distillates (petroleum), hydrotreated middle	64742-46-7	Not Listed
Ethylbenzene	100-41-4	1000 lb RQ
Fuels, diesel, No. 2	68476-34-6	Not Listed
Gas Oils, Petroleum, Hydrodesulfurized	64742-79-6	Not Listed
Heptane	142-82-5	Not Listed
Hexane	110-54-3	Not Listed
Methylcyclohexane	108-87-2	Not Listed
Naphtha (petroleum), hydrotreated light	64742-49-0	Not Listed
Naphtha, (petroleum), heavy, hydrotreated	64742-48-9	Not Listed
Octane	111-65-9	Not Listed
o-Xylene	95-47-6	Not Listed
Petroleum distillate (naphtha)	8002-05-9	Not Listed
Toluene	108-88-3	1000 lb RQ
Xylene	1330-20-7	100 lb RQ

**U.S.—CWA  
(CLEAN WATER ACT)—  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	LISTED
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Benzene	71-43-2	X
Butane	106-97-8	Not Listed
Cyclohexane	110-82-7	X
Decane	124-18-5	Not Listed
Distillates (petroleum), hydrotreated middle	64742-46-7	Not Listed

<b>Ethylbenzene</b>	100-41-4	X
<b>Fuels, diesel, No. 2</b>	68476-34-6	Not Listed
<b>Gas Oils, Petroleum, Hydrodesulfurized</b>	64742-79-6	Not Listed
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Methylcyclohexane</b>	108-87-2	Not Listed
<b>Naphtha (petroleum), hydrotreated light</b>	64742-49-0	Not Listed
<b>Naphtha, (petroleum), heavy, hydrotreated</b>	64742-48-9	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>o-Xylene</b>	95-47-6	X
<b>Petroleum distillate (naphtha)</b>	8002-05-9	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	X

*X= The component is listed*

**U.S.—CWA  
(CLEAN WATER ACT)—  
PRIORITY  
POLLUTANTS**

<b>COMPONENT</b>	<b>CAS #</b>	<b>LISTED</b>
<b>1,2,4-Trimethylbenzene</b>	95-63-6	Not Listed
<b>Benzene</b>	71-43-2	X
<b>Butane</b>	106-97-8	Not Listed
<b>Cyclohexane</b>	110-82-7	Not Listed
<b>Decane</b>	124-18-5	Not Listed
<b>Distillates (petroleum), hydrotreated middle</b>	64742-46-7	Not Listed
<b>Ethylbenzene</b>	100-41-4	X
<b>Fuels, diesel, No. 2</b>	68476-34-6	Not Listed
<b>Gas Oils, Petroleum, Hydrodesulfurized</b>	64742-79-6	Not Listed
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Methylcyclohexane</b>	108-87-2	Not Listed

<b>Naphtha (petroleum), hydrotreated light</b>	64742-49-0	Not Listed
<b>Naphtha, (petroleum), heavy, hydrotreated</b>	64742-48-9	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>o-Xylene</b>	95-47-6	Not Listed
<b>Petroleum distillate (naphtha)</b>	8002-05-9	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	Not Listed

*X= The component is listed*

**CANADA-WHMIS—  
CLASSIFICATIONS  
OF SUBSTANCES**

<b>COMPONENT</b>	<b>CAS #</b>	<b>CLASSIFICATION</b>
<b>1,2,4-Trimethylbenzene</b>	95-63-6	B3
<b>Benzene</b>	71-43-2	B2, D2A, D2B
<b>Butane</b>	106-97-8	A, B1
<b>Cyclohexane</b>	110-82-7	B2, D2B
<b>Decane</b>	124-18-5	B3, D2B
<b>Distillates (petroleum), hydrotreated middle</b>	64742-46-7	Uncontrolled product according to WHMIS classification criteria
<b>Ethylbenzene</b>	100-41-4	B2, D2A, D2B
<b>Fuels, diesel, No. 2</b>	68476-34-6	Not Listed
<b>Gas Oils, Petroleum, Hydrodesulfurized</b>	64742-79-6	Not Listed
<b>Heptane</b>	142-82-5	B2, D2B
<b>Hexane</b>	110-54-3	B2, D2A, D2B
<b>Methylcyclohexane</b>	108-87-2	B2
<b>Naphtha (petroleum), hydrotreated light</b>	64742-49-0	Not Listed
<b>Naphtha, (petroleum), heavy, hydrotreated</b>	64742-48-9	B3
<b>Octane</b>	111-65-9	B2, D2B
<b>o-Xylene</b>	95-47-6	B2, D2B

<b>Petroleum distillate (naphtha)</b>	8002-05-9	B2
<b>Toluene</b>	108-88-3	B2, D2A, D2B
<b>Xylene</b>	1330-20-7	B2, D2A, D2B

X= The component is listed

**CANADA—COUNCIL OF MINISTERS OF THE ENVIRONMENT—WATER QUALITY GUIDELINES FOR FRESHWATER AQUATIC LIFE**

COMPONENT	CAS #	AMOUNT
<b>Ethylbenzene</b>	100-41-4	90 µg/L
<b>Toluene</b>	108-88-3	2.0 µg/L
<b>Benzene</b>	71-43-2	370 µg/L

**CANADA—COUNCIL OF MINISTERS OF THE ENVIRONMENT—WATER QUALITY GUIDELINES FOR MARINE AQUATIC LIFE**

COMPONENT	CAS #	AMOUNT
<b>Ethylbenzene</b>	100-41-4	25 µg/L
<b>Toluene</b>	108-88-3	215 µg/L
<b>Benzene</b>	71-43-2	110 µg/L

**CANADA—ENVIRONMENTAL EMERGENCIES**

COMPONENT	CAS #	LISTED
<b>1,2,4-Trimethylbenzene</b>	95-63-6	Not Listed
<b>Benzene</b>	71-43-2	X
<b>Butane</b>	106-97-8	X
<b>Cyclohexane</b>	110-82-7	X
<b>Decane</b>	124-18-5	Not Listed
<b>Distillates (petroleum), hydrotreated middle</b>	64742-46-7	Not Listed
<b>Ethylbenzene</b>	100-41-4	X
<b>Fuels, diesel, No. 2</b>	68476-34-6	Not Listed
<b>Gas Oils, Petroleum, Hydrodesulfurized</b>	64742-79-6	Not Listed
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Methylcyclohexane</b>	108-87-2	Not Listed
<b>Naphtha (petroleum), hydrotreated light</b>	64742-49-0	Not Listed
<b>Naphtha, (petroleum), heavy, hydrotreated</b>	64742-48-9	Not Listed

<b>Octane</b>	111-65-9	Not Listed
<b>o-Xylene</b>	95-47-6	Not Listed
<b>Petroleum distillate (naphtha)</b>	8002-05-9	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	X

X= The component is listed

## Section 16: Other Information

### NFPA



**Health Hazard:** 2      **Flammability:** 4      **Instability:** 0      **Physical and Chemical Hazards:** X

### HMIS

**Health Hazard:** 2      **Flammability:** 4      **Instability:** 0      **Personal Protection:** X

### ISSUING DATE

5/13/15

### REVISION DATE

06/19/18

### DISCLAIMER

- The information presented herein is based on data considered to be accurate as of the date of preparation of this Safety Data Sheet (SDS). However, SDSs may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

# Safety Data Sheet

## Section 1: Identification

### PRODUCT IDENTIFIER

Petroleum Crude Oil - Condensate

### OTHER MEANS OF IDENTIFICATION

#### UN-Number

UN1268

#### Synonyms

Condensate Blend (CRW), Pembina Condensate (CPM), Southern Lights Diluent (SLD), Fort Saskatchewan Condensate (CFT), Gibson Condensate (CGB), Condensate Gibsons Light Density (CGL), Plains Marketing Condensate (CLN), Pembina Nexus Condensate (CPN), Rangeland Condensate (CRL), Rimbey Condensate (CRM), Petrocanada Condensate (CPC), Suncor N (OSN), Federated Condensate (CFD), Gibson Condensate Hardisty (CGY), Norlite Diluent (NLD)

#### Chemical Category

Crude oils—extremely flammable  
Petroleum Distillate

### RECOMMENDED USE

Refinery feedstock

### RESTRICTIONS OF USE

No information available

### SUPPLIER INFORMATION

Enbridge Pipelines Inc.  
10201 Jasper Avenue  
Edmonton, Alberta T5J 3N7  
Canada  
TEL: 1-780-420-5210

### EMERGENCY CONTACT INFORMATION

#### CHEMTREC

1-800-424-9300 for US  
703-527-3887 outside US

#### CANUTEC (Canadian Transportation)

613-996-6666

## Section 2: Hazards Identification

### CLASSIFICATION

Skin Irritation	Category 2
Eye Irritation	Category 2
Germ Cell Mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 2
Specific Target Organ Systemic Toxicity (Single Exposure)	Category 3
Specific Target Organ Toxicity (Repeated Exposure)	Category 1
Aspiration Toxicity	Category 1
Flammable liquids	Category 1

## LABEL ELEMENTS

### Signal Word

Danger

### Hazard Pictograms



### Hazard Statements

- Causes skin irritation.
- Causes serious eye irritation.
- May cause genetic defects.
- May cause cancer.
- Suspected of damaging fertility or the unborn child.
- May cause respiratory irritation.
- Causes damage to organs through prolonged or repeated exposure.
- May be fatal if swallowed and enters airways.
- Extremely flammable liquid and vapor.
- May cause drowsiness or dizziness.

## PRECAUTIONARY STATEMENTS

### Prevention

- Wash face, hands and any exposed skin thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Use personal protective equipment as required.
- Do not breathe dust/fume/gas/mist/vapors/spray.
- Use only outdoors or in a well-ventilated area.
- Do not eat, drink or smoke when using this product.
- Keep away from heat/sparks/open flames/hot surfaces.
- Keep container tightly closed.
- No smoking.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting/equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- In case of inadequate ventilation wear respiratory protection.

### Response

- IF EXPOSED or concerned: Get medical advice/attention.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- Call a POISON CENTER or doctor/physician if you feel unwell.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- Do NOT induce vomiting.
- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower and soap.
- In case of fire: Use CO<sub>2</sub>, dry chemical, or foam for extinction.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If SKIN irritation occurs: Get medical advice/attention.
- If EYE irritation persists: Get medical advice/attention.

### Storage/Disposal

- Store locked up and keep cool.
- Store in a well-ventilated place. Keep container tightly closed.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

## OTHER INFORMATION

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
- Very toxic to aquatic life with long lasting effects.



## Section 3: Composition/Information on Ingredients

COMPONENT NAME	CAS NUMBER	PERCENTAGE (%)*	NOTES
1,2,4-Trimethylbenzene	95-63-6	0-5	
2-Methylbutane (In Liquid form)	78-78-4	0-10	
Benzene	71-43-2	0-10	
Benzene, trimethyl-	25551-13-7	0-1	
Butane	106-97-8	0-7	
Cyclohexane	110-82-7	0-5	
Cyclopentane	287-92-3	0-5	
Decane	124-18-5	0-7	
Ethane	74-84-0	0-60	
Ethylbenzene	100-41-4	0-5	
Heptane	142-82-5	0-20	
Hexane	110-54-3	0-30	
Hydrogen Sulfide	7783-06-4	0-1	
Isobutane	75-28-5	0-5	
Methylcyclohexane	108-87-2	0-10	
Methylcyclopentane	96-37-7	0-6	
Naphtha (oil sand), Hydrotreated	128683-33-0	0-100	
Natural gas condensate	68919-39-1	0-100	
Natural gas condensates (petroleum)	64741-47-5	0-100	
Nonane	111-84-2	0-10	
Octane	111-65-9	0-15	
Pentane	109-66-0	0-70	
Propane	74-98-6	0-60	
Toluene	108-88-3	0-10	
Xylene	1330-20-7	0-10	

\*Values do not reflect absolute minimums and maximums; those values may vary from time to time.

## Section 4: First Aid Measures

### DESCRIPTION OF NECESSARY MEASURES

<b>Inhalation</b>	<ul style="list-style-type: none"><li>• IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If irritation persists: Get medical advice/attention.</li></ul>
<b>Skin</b>	<ul style="list-style-type: none"><li>• IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.</li></ul>
<b>Eye</b>	<ul style="list-style-type: none"><li>• IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.</li></ul>
<b>Ingestion</b>	<ul style="list-style-type: none"><li>• Do NOT induce vomiting. Call a physician or poison control center.</li><li>• Aspiration hazard if swallowed—can enter lungs and cause damage.</li></ul>

### MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

**Refer to Section 11 - Toxicological Information**

### INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY

<b>Note to the Physician</b>	<ul style="list-style-type: none"><li>• Aspiration hazard. Symptoms may be delayed.</li><li>• Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.</li><li>• Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.</li></ul>
------------------------------	--

## Section 5: Fire Fighting Measures

### EXTINGUISHING MEDIA

<b>Suitable Extinguishing Media</b>	<ul style="list-style-type: none"><li>• SMALL FIRES: Dry chemical, CO<sub>2</sub>, water spray or regular foam.</li><li>• LARGE FIRE: Water spray, fog or regular foam.</li></ul>
-------------------------------------	---

<b>Unsuitable Extinguishing Media</b>	<ul style="list-style-type: none"><li>• CAUTION: Use of water spray when fighting fire may be inefficient.</li><li>• Do not use straight streams.</li></ul>
---------------------------------------	---

### FIREFIGHTING PROCEDURES

- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: If impossible to extinguish, protect surroundings and allow fire to burn itself out.
- Stay upwind.
- Ventilate closed spaces before entering.
- Fire fighters should wear complete protective clothing including self-contained breathing apparatus.
- FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
- FIRE: When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.
- Move containers from fire area if you can do it without risk.

- LARGE FIRES: Use water spray or fog; do not use straight streams.
- LARGE FIRES: If insufficient water supply: knock down vapors only. If this is impossible, withdraw from area and let fire burn.
- LARGE FIRES: Flood fire area with large quantities of water, while knocking down vapors with water fog.

## SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

- Vapors may travel to source of ignition and flash back.
- Air/vapor mixtures may explode when ignited.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Will be easily ignited by heat, sparks or flames.
- Runoff to sewer may create fire or explosion hazard.
- Vapor explosion hazard indoors, outdoors or in sewers.
- MAY EXPLODE AND THROW FRAGMENTS 1600 meters (1 MILE) OR MORE IF FIRE REACHES CARGO.
- May create vapor/air explosion hazard indoors, outdoors or in sewers.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

## EXPLOSION DATA

<b>Hazardous Combustion Products</b>	<ul style="list-style-type: none"> <li>• Carbon monoxide. Carbon dioxide (CO<sub>2</sub>). Nitrogen oxides (NO<sub>x</sub>). Oxides of sulfur.</li> <li>• Aldehydes, aromatic and other hydrocarbons.</li> </ul>
<b>Sensitivity to Mechanical Impact</b>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<b>Sensitivity to Static Discharge</b>	<ul style="list-style-type: none"> <li>• Yes.</li> </ul>

## PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS

- As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
- Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced firefighters.
- Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.
- Water spray may be useful in minimizing or dispersing vapors.
- Long-duration fires involving diluent stored in tanks may result in a boilover.
- For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear.

## Section 6:

## Accidental Release Measures

### PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

<b>Personal Precautions</b>	<ul style="list-style-type: none"> <li>• Evacuate personnel to safe areas.</li> <li>• Remove all sources of ignition.</li> <li>• Deny entry to unauthorized and unprotected personnel.</li> <li>• Use personal protective equipment.</li> <li>• Avoid contact with skin, eyes and clothing.</li> <li>• Stop leak if you can do it without risk.</li> <li>• Keep people away from and upwind of spill/leak.</li> <li>• Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.</li> <li>• Ventilate enclosed areas.</li> <li>• Do not walk through spilled material.</li> </ul>
<b>Protective Equipment</b>	<ul style="list-style-type: none"> <li>• Wear appropriate breathing apparatus (if applicable) and protective clothing.</li> </ul>

---

**Emergency Procedures**

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area) Keep unauthorized personnel away. Evacuate area. Keep out of low areas. Stop leak if you can do it without risk.
- Report spills to local or federal authorities as appropriate or required.

- 
- Avoid run off to waterways and sewers. Do NOT wash away into sewer. Prevent entry into waterways, sewers, basements or confined areas. Runoff from fire control may cause pollution.

---

**Methods for Containment**

- Stop leak if you can do it without risk.
- Contain and recover liquid when possible.
- A vapor suppressing foam may be used to reduce vapors.
- Dike far ahead of spill; use dry sand to contain the flow of material; contain water spills by booming.
- Use water spray to reduce vapors or divert vapor cloud drift.
- A fine water spray remotely directed to the edge of the spill pool can be used to direct and maintain a hot flare fire which will burn the spilled material in a controlled manner.

---

**Methods for Cleaning Up**

- Clean up spill immediately.
- LARGE SPILLS: DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.
- SMALL LIQUID SPILLS: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.
- Use appropriate Personal Protective Equipment (PPE).
- Use clean non-sparking tools to collect absorbed material.
- Vacuum spilled material.
- Try to work upwind of spill.
- All equipment used when handling the product must be grounded.
- Recover and return free product to proper containers
- Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids.
- Do not place spilled materials back in the original container.
- Do not flush to sewer or allow to enter waterways.

---

## Section 7:

## Handling and Storage

---

**PRECAUTIONS FOR SAFE HANDLING**

---

**Handling**

- All equipment used when handling the product must be grounded. Avoid contact with heat and ignition sources and oxidizers. Do not breathe (dust, vapor or spray mist). Do not use in areas without adequate ventilation. Do not use sparking tools. Keep away from heat, sparks, and flame. No open flames, no sparks and no smoking. Use only with adequate ventilation. Do not use or store near heat or open flame. Keep away from fire, sparks and heated surfaces.
- The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes).
- The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.
- Take precautionary measures against static discharges.

<b>CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES</b>	<b>Handling</b>	<ul style="list-style-type: none"> <li>• Do not cut drill, grind or weld on empty containers since they may contain explosive residues.</li> <li>• Stay upwind and vent open hatches before uploading.</li> <li>• Avoid contact with skin, eyes and clothing.</li> <li>• Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.</li> <li>• Wear personal protective equipment.</li> <li>• Remove and wash contaminated clothing before re-use.</li> <li>• Do not eat, drink or smoke when using this product.</li> <li>• Do not take internally.</li> <li>• Wash thoroughly after handling.</li> <li>• Empty containers pose a potential fire and explosion hazard.</li> </ul>
	<b>Storage</b>	<ul style="list-style-type: none"> <li>• Ventilate enclosed areas.</li> <li>• Store in a well-ventilated place.</li> <li>• Keep container tightly closed.</li> <li>• Store locked up.</li> <li>• Avoid shock, impact, friction, and rough handling. Do not use sparking tools.</li> <li>• Store in a cool/low-temperature, well-ventilated place away from heat and ignition sources.</li> <li>• Keep away from sources of ignition.</li> <li>• No Smoking.</li> <li>• Do not enter confined spaces such as tanks or pits without following proper entry procedures.</li> <li>• Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area.</li> <li>• Harmful concentrations of hydrogen sulfide (H<sub>2</sub>S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments.</li> <li>• Keep away from open flames, hot surfaces and sources of ignition.</li> <li>• Keep product and empty container away from heat and sources of ignition.</li> <li>• Storage containers should be grounded and bonded.</li> <li>• Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.</li> <li>• Store away from incompatible materials.</li> </ul>
	<b>Incompatible Products</b>	<ul style="list-style-type: none"> <li>• Strong oxidizers such as nitrates, chlorates, peroxides, chlorine.</li> </ul>

## Section 8: Exposure Controls/Personal Protection

### CONTROL PARAMETERS: EXPOSURE GUIDELINES

CHEMICAL NAME	ACGIH	OSHA	NIOSH
1,2,4-Trimethylbenzene	—	—	TWA 25 ppm TWA 125 mg/m <sup>3</sup>
2-Methylbutane (In Liquid form)	TLV 1000 ppm	—	—
Benzene	TLV 0.5 ppm TLV 1.6 mg/m <sup>3</sup> STEL 2.5 ppm STEL 8 mg/m <sup>3</sup>	PEL 1 ppm STEL 5 ppm	TWA 0.1 ppm STEL 1 ppm IDLH 500 ppm
Benzene, trimethyl-	TLV 25 ppm	—	—

<b>Butane</b>	STEL 1000 ppm	–	TWA 800 ppm TWA 1900 mg/m <sup>3</sup>
<b>Cyclohexane</b>	TLV 100 ppm TLV 334 mg/m <sup>3</sup>	PEL 300 ppm PEL 1050 mg/m <sup>3</sup>	TWA 300 ppm TWA 1050 mg/m <sup>3</sup> IDLH 1300 ppm
<b>Cyclopentane</b>	TLV 600 ppm	–	TWA 600 ppm TWA 1720 mg/m <sup>3</sup>
<b>Ethane</b>	TLV 1000 ppm	–	–
<b>Ethylbenzene</b>	TLV 20 ppm TLV 87 mg/m <sup>3</sup>	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 125 ppm STEL 545 mg/m <sup>3</sup> IDLH 800 ppm
<b>Heptane</b>	TLV 400 ppm TLV 1640 mg/m <sup>3</sup> STEL 500 ppm STEL 2000 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 85 ppm TWA 350 mg/m <sup>3</sup> Ceiling 440 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 750 ppm
<b>Hexane</b>	TLV 50 ppm TLV 176 mg/m <sup>3</sup>	PEL 500 ppm PEL 1800 mg/m <sup>3</sup>	TWA 50 ppm TWA 180 mg/m <sup>3</sup> IDLH 1100 ppm
<b>Hydrogen sulfide</b>	TLV 1 ppm TLV 1.4 mg/m <sup>3</sup> STEL 5 ppm STEL 7 mg/m <sup>3</sup>	Ceiling 20 ppm	Ceiling 10 ppm Ceiling 15 mg/m <sup>3</sup> IDLH 100 ppm
<b>Isobutane</b>	TWA 1000 ppm		
<b>Methylcyclohexane</b>	TLV 400 ppm TLV 1610 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 400 ppm TWA 1600 mg/m <sup>3</sup> IDLH 1200 ppm
<b>Nonane</b>	TLV 200 ppm TLV 1050 mg/m <sup>3</sup>	–	TWA 200 ppm TWA 1050 mg/m <sup>3</sup>
<b>Octane</b>	TLV 300 ppm TLV 1401 mg/m <sup>3</sup>	PEL 500 ppm PEL 2350 mg/m <sup>3</sup>	TWA 75 ppm TWA 350 mg/m <sup>3</sup> Ceiling 385 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1000 ppm
<b>Pentane</b>	TLV 600 ppm TLV 1770 mg/m <sup>3</sup>	PEL 1000 ppm PEL 2950 mg/m <sup>3</sup>	TWA 120 ppm TWA 350 mg/m <sup>3</sup> Ceiling 610 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1500 ppm

<b>Propane</b>	TLV 1000 ppm (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	TWA 1000 ppm TWA 1800 mg/m <sup>3</sup>	TWA 1000 ppm TWA 1800 mg/m <sup>3</sup>
<b>Toluene</b>	TLV 20 ppm TLV 75 mg/m <sup>3</sup>	PEL 200 ppm STEL 300 mg/m <sup>3</sup>	TWA 100 ppm TWA 375 mg/m <sup>3</sup> STEL 150 ppm STEL 560 mg/m <sup>3</sup> IDLH 500 ppm
<b>Xylenes</b>	TLV 100 ppm TLV 434 mg/m <sup>3</sup> STEL 150 ppm STEL 651 mg/m <sup>3</sup>	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 150 ppm STEL 655 mg/m <sup>3</sup> IDLH 900 ppm

#### APPROPRIATE ENGINEERING CONTROLS

- Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. Prevent vapor build up by providing adequate ventilation during and after use. Use only appropriately classified electrical equipment.

#### INDIVIDUAL PROTECTION MEASURES

<b>Eye and Face</b>	<ul style="list-style-type: none"> <li>• Wear face shield and eye protection.</li> </ul>
<b>Skin and Body</b>	<ul style="list-style-type: none"> <li>• The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation.</li> <li>• Wear protective gloves/protective clothing/eye protection/face protection. Wear long sleeves and/or protective coveralls.</li> </ul>
<b>Respiratory</b>	<ul style="list-style-type: none"> <li>• Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.</li> </ul>
<b>General Hygiene Measures</b>	<ul style="list-style-type: none"> <li>• Handle in accordance with good industrial hygiene and safety practice.</li> </ul>

## Section 9:

## Physical and Chemical Properties

#### MATERIAL DESCRIPTION

<b>Physical State</b>	Liquid	<b>Odor</b>	Petroleum like odor
<b>Substance Type</b>	Mixture	<b>Odor Threshold</b>	No data available
<b>Appearance</b>	Yellow/green to Brown/black liquid		

#### PROPERTIES

<b>pH</b>	No data available	<b>Vapor Pressure</b>	No data available
<b>Melting Point/ Freezing Point</b>	No data available	<b>Vapor Density</b>	>1 Air=1
<b>Boiling Point/ Boiling Range</b>	-30 to 538°C -22 to 1000.4°F	<b>Relative Density</b>	No data available

<b>Flash Point</b>	>-40 °C >-40 °F	<b>Water Solubility</b>	Negligible
<b>Evaporation Rate</b>	No data available	<b>Partition Coefficient: n-octanol/water</b>	No data available
<b>Flammability (solid, gas)</b>	No data available	<b>Autoignition Temperature</b>	No data available
<b>Upper Flammability Limit</b>	No data available	<b>Decomposition Temperature</b>	No data available
<b>Lower Flammability Limit</b>	No data available	<b>Specific Gravity</b>	No data available
<b>Viscosity</b>	No data available		

## Section 10: Stability and Reactivity

<b>REACTIVITY</b>	Chlorine Dioxide
<b>CHEMICAL STABILITY</b>	Stable at 70 °F, 760 mm Hg pressure
<b>POSSIBILITY OF HAZARDOUS REACTIONS</b>	None under normal processing
<b>CONDITIONS TO AVOID</b>	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity
<b>INCOMPATIBLE MATERIALS</b>	Strong oxidizers such as nitrates, chlorates, peroxides, chlorine
<b>HAZARDOUS DECOMPOSITION PRODUCTS</b>	Combustion produces carbon monoxide, aldehydes, sulfur dioxide, aromatic and other hydrocarbons
<b>HAZARDOUS POLYMERIZATION</b>	Will not occur

## Section 11: Toxicological Information

<b>INFORMATION ON THE LIKELY ROUTES OF EXPOSURE</b>	<b>Inhalation</b>	<ul style="list-style-type: none"> <li>May cause irritation of respiratory tract. May cause drowsiness and dizziness.</li> </ul>
	<b>Eye Contact</b>	<ul style="list-style-type: none"> <li>Causes serious eye irritation.</li> </ul>
	<b>Skin Contact</b>	<ul style="list-style-type: none"> <li>Causes skin irritation.</li> </ul>
	<b>Ingestion</b>	<ul style="list-style-type: none"> <li>Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.</li> <li>Potential for aspiration if swallowed.</li> <li>Aspiration may cause pulmonary edema and pneumonitis.</li> </ul>



## TOXICOLOGICAL DATA

CHEMICAL NAME	LD50 ORAL	LD50 DERMAL	LC50 INHALATION
<b>1,2,4-Trimethylbenzene</b>	5 g/kg (Rat)	–	18000 mg/m <sup>3</sup> (Rat) 4 h
<b>2-Methylbutane (In Liquid form)</b>	–	–	= 150,000 mg/m <sup>3</sup> (Rat) 2 h
<b>Benzene</b>	1800 mg/kg (Rat)	–	13050 - 14380 ppm (Rat) 4 h
<b>Benzene, trimethyl-</b>	8970 mg/kg (Rat)	–	–
<b>Butane</b>	–	–	658 mg/L (Rat) 4 h
<b>Cyclohexane</b>	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	= 13.9 mg/L (Rat) 4 h
<b>Cyclopentane</b>	11400 mg/kg (Rat)	–	72 g/m <sup>3</sup> (Mouse)
<b>Decane</b>	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rat)	–
<b>Ethylbenzene</b>	= 3500 mg/kg (Rat)	= 15400 mg/kg (Rabbit)	= 17.2 mg/L (Rat) 4 h
<b>Heptane</b>	–	= 3000 mg/kg (Rabbit)	= 103 g/m <sup>3</sup> (Rat) 4 h
<b>Hexane</b>	= 25 g/kg (Rat)	= 3000 mg/kg (Rabbit)	= 48000 ppm (Rat) 4 h
<b>Hydrogen sulfide</b>	–	–	= 444 ppm (Rat)
<b>Isobutane</b>	–	–	= 658,000 mg/m <sup>3</sup> (Rat) 4 h
<b>Methylcyclohexane</b>	> 3200 mg/kg (Rat)	–	–
<b>Natural gas condensates (petroleum)</b>	–	–	= 600 mg/m <sup>3</sup> (Rat)
<b>Nonane</b>	–	–	= 3200 ppm (Rat) 4 h
<b>Octane</b>	–	–	= 118 g/m <sup>3</sup> (Rat) 4 h = 25260 ppm (Rat) 4 h
<b>Pentane</b>	>2000 mg/kg (Rat)	–	364 g/cu (Rat) 4 h
<b>Propane</b>	–	–	>800000 ppm (Rat) 15 min
<b>Hydrogen sulfide</b>	–	–	= 444 ppm (Rat)
<b>Toluene</b>	2.6 to 7.5 g/kg (Rat)	14.1 ml/kg (Rabbit)	–
<b>Xylenes</b>	= 3500 mg/kg (Rat)	> 4350 mg/kg (Rabbit) > 1700 mg/kg (Rabbit)	= 29.08 mg/L (Rat) 4 h = 5000 ppm (Rat) 4 h

## SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

<b>Benzene</b>	<ul style="list-style-type: none"> <li>Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in humans. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.</li> </ul>
----------------	---

---

**Ethylbenzene**

**Carcinogenicity:** Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC.

**Target Organs:** In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), lung (alveolar epithelium metaplasia), thyroid (hyperplasia), thyroid (hyperplasia) and pituitary (hyperplasia). In animal models (particularly rats), ethyl benzene affects the auditory function mainly in the cochlear mid-frequency range and ototoxicity was observed after combined exposure to noise and ethyl benzene. There is no evidence of either ethyl benzene-induced hearing losses or ototoxicity with combined exposure to ethyl benzene and noise in workers.

---

**Hexane**

- This product may contain hexane at a level of >1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.
- 

**Hydrogen Sulfide Gas (H<sub>2</sub>S)**

- Toxic by inhalation. Prolonged breathing of 50-100 ppm H<sub>2</sub>S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of >1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H<sub>2</sub>S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H<sub>2</sub>S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H<sub>2</sub>S, respectively. Over the years a number of acute cases of H<sub>2</sub>S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.
- 

**Toluene**

**Carcinogenicity:** Exposure of rats and mice to toluene at concentrations ranging from 120-1200 ppm for two years did not demonstrate evidence of carcinogenicity. Toluene has not been listed as a carcinogen by IARC.

**Target Organs:** Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.

**Reproductive Toxicity:** Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. Decreased fetal body weight and increased skeletal variations in both inhalation and oral studies, but only at doses that were maternally toxic. No fetal toxicity was seen at doses that were not maternally toxic.

Decreased sperm counts have been observed in male rats in the absence of a reduction in fertility. Toluene has been reported to cause mental or growth retardation in the children of solvent abusers who directly inhale toluene during pregnancy.

---

**Xylenes**

- Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and man. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.

<b>DELAYED AND IMMEDIATE EFFECTS AND ALSO CHRONIC EFFECTS FROM SHORT- AND LONG-TERM EXPOSURE</b>	<b>Sensitization</b>	• No information available				
	<b>Mutagenic Effects</b>	• May cause genetic defects				
	<b>Carcinogenicity</b>	• May cause cancer				
<b>CARCINOGENIC INFORMATION</b>	<b>CHEMICAL NAME</b>	<b>ACGIH</b>	<b>ACGIH SKIN*</b>	<b>IARC</b>	<b>NTP</b>	<b>OSHA</b>
	<b>Benzene</b>	A1	X	Group 1	Known	X
	<b>Ethylbenzene</b>	A3	–	Group 2B	Evidence	X
	<b>Hexane</b>	–	X	–	–	–
	<b>Toluene</b>	A4	–	Group 3	Evidence	–
	<b>Xylenes</b>	A4	–	Group 3	Evidence	–
*ACGIH Skin designation refers to the potential significant contribution of overall exposure by cutaneous route, including mucous membranes and eyes, from airborne exposure to gases, vapor, or liquid OR by direct skin contact.						
<b>REPRODUCTIVE TOXICITY</b>	• Suspected of damaging fertility or the unborn child.					
<b>STOT—SINGLE EXPOSURE</b>	• May cause drowsiness and dizziness.					
<b>STOT—REPEATED EXPOSURE</b>	• Causes damage to organs through prolonged or repeated exposure.					
<b>ASPIRATION HAZARD</b>	May be fatal if swallowed and enters airways Risk of serious damage to the lungs (by aspiration).					

## Section 12: Ecological Information

<b>ECOTOXICITY</b>				
<b>CHEMICAL NAME</b>	<b>TOXICITY TO ALGAE</b>	<b>TOXICITY TO FISH</b>	<b>DAPHNIA MAGNA (WATER FLEA)</b>	<b>OTHER TOXICITY</b>
<b>1,2,4-Trimethylbenzene</b>	–	LC50 96 h: 7.72 mg/L (Pimephales promelas)	EC50 48h: 30 mmol/cu (Daphnia magna)	LC50 24h: 100 mmol/cu Artemia salina (Brine Shrimp)
<b>2-Methylbutane (In Liquid form)</b>			EC50 48 h: = 2.3 mg/L (Daphnia magna)	

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Benzene</b>	EC50 72 h: = 29 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 10.7 - 14.7 mg/L flow-through (Pimephales promelas) LC50 96 h: = 5.3 mg/L flow-through (Oncorhynchus mykiss) LC50 96 h: = 22.49 mg/L static (Lepomis macrochirus) LC50 96 h: = 28.6 mg/L static (Poecilia reticulata) LC50 96 h: 22330 - 41160 µg/L static (Pimephales promelas) LC50 96 h: 70000 - 142000 µg/L static (Lepomis macrochirus)	EC50 48 h: 8.76 - 15.6 mg/L Static (Daphnia magna) EC50 48 h: = 10 mg/L (Daphnia magna)	–
<b>Benzene, trimethyl-</b>	–	–	–	LC50 24h: 7000 ug/L Palaemonetes pugio (Daggerblade grass shrimp)
<b>Cyclohexane</b>	EC50 72 h: > 500 mg/L (Desmodesmus subspicatus)	LC50 96 h: 3.96 - 5.18 mg/L flow-through (Pimephales promelas) LC50 96 h: 23.03 - 42.07 mg/L static (Pimephales promelas) LC50 96 h: 24.99 - 44.69 mg/L static (Lepomis macrochirus) LC50 96 h: 48.87 - 68.76 mg/L static (Poecilia reticulata)	EC50 24 h: > 400 mg/L (Daphnia magna)	EC50 = 85.5 mg/L 5 min EC50 = 93 mg/L 10 min (Microorganisms)
<b>Cyclopentane</b>			EC50 48 h: 150 nmol/cu m (Daphnia magna)	LC50 24h: 280 mmol/cu m Artemia salina (Brine Shrimp)
<b>Decane</b>	EC50 24 h: = 0.043 mg/L (Chlorella vulgaris)	–	EC50 48 h: = 0.029 mg/L (Daphnia magna)	–
<b>Ethylbenzene</b>	EC50 72 h: = 4.6 mg/L (Pseudokirchneriella subcapitata) EC50 96 h: > 438 mg/L (Pseudokirchneriella subcapitata) EC50 72 h: 2.6 - 11.3 mg/L static (Pseudokirchneriella subcapitata) EC50 96 h: 1.7 - 7.6 mg/L static (Pseudokirchneriella subcapitata) EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 11.0 - 18.0 mg/L static (Oncorhynchus mykiss) LC50 96 h: = 4.2 mg/L semi-static (Oncorhynchus mykiss) LC50 96 h: 7.55 - 11 mg/L flow-through (Pimephales promelas) LC50 96 h: = 32 mg/L static (Lepomis macrochirus) LC50 96 h: 9.1 - 15.6 mg/L static (Pimephales promelas) LC50 96 h: = 9.6 mg/L static (Poecilia reticulata)	EC50 48 h: 1.8 - 2.4 mg/L (Daphnia magna)	EC50 = 9.68 mg/L 30 min EC50 = 96mg/L 24 h (Microorganisms)
<b>Heptane</b>	–	LC50 96 h: = 375.0 mg/L (Cichlid fish)	EC50 24 h: > 10 mg/L (Daphnia magna)	–
<b>Hexane</b>	–	LC50 96 h: 2.1 - 2.98 mg/L flow-through (Pimephales promelas)	EC50 24 h: > 1000 mg/L (Daphnia magna)	–

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
Hydrogen sulfide	–	LC50 96h: 49 µg/l Oncorhynchus mykiss (Rainbow Trout) eggs LC50 24h: 1059.7 µg/l Pimephales promelas (Fathead Minnow)	EC50 48h: 62 µg/l Gammarus pseudolimnaeus (Scud)	–
MethylCyclohexane	–	LC50 96hr: 72.0 mg/l (Golden Shiner)	–	–
Natural gas condensates (petroleum)	–	LC50 96 h: = 119 mg/L static (Alburnus alburnus) LC50 96 h: = 82 mg/L static (Cyprinodon variegatus)	EC50 24 h: = 170 mg/L (Daphnia magna)	–
Octane	–	–	EC50 48 h: = 0.38 mg/L (water flea) EC50 48 h: = 0.02856 mg/L (Daphnia magna)	EC50 = 890 mg/L 30 min (Microorganisms) EC50 <1.67hr: 120 µg/l Mytilus edulis (Common Bay Mussel)
Pentane	–	–	EC50 48h: 135 mmol/cu	LC50 24h: 165 mmol/cu Artemia salina (Brine Shrimp)
Toluene	EC50: >433 mg/L Pseudokirchneriella subcapitata 96 h EC50: 12.5 mg/L Pseudokirchneriella subcapitata 72 h static	LC50: 15.22 - 19.05 mg/L Pimephales promelas 96 h flow-through LC50: 12.6 mg/L Pimephales promelas 96 h static LC50: 5.89 - 7.81 mg/L Oncorhynchus mykiss 96 h flow-through LC50: 14.1 - 17.16 mg/L Oncorhynchus mykiss 96 h static LC50: 5.8 mg/L Oncorhynchus mykiss 96 h semi-static LC50: 11.0-15.0 mg/L Lepomis macrochirus 96 h static LC50: 54 mg/L Oryzias latipes 96 h static LC50: 28.2 mg/L Poecilia reticulata 96 h semi-static LC50: 50.87-70.34 mg/L Poecilia reticulata 96 h static	EC50 48 h: 5.46 - 9.83 mg/L Static (Daphnia magna) EC50 48 h: = 11.5 mg/L (Daphnia magna)	EC50 = 19.7 mg/L 30 min (Microorganisms)

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Xylenes</b>	EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: = 13.4 mg/L flow-through (Pimephales promelas) LC50 96 h: 2.661 - 4.093 mg/L static (Oncorhynchus mykiss) LC50 96 h: 13.5 - 17.3 mg/L (Oncorhynchus mykiss) LC50 96 h: 13.1 - 16.5 mg/L flow-through (Lepomis macrochirus)	EC50 48 h: = 3.82 mg/L (water flea) LC50 48 h: = 0.6 mg/L (Gammarus lacustris)	-

## PERSISTENCE AND DEGRADABILITY

- No information available

## BIOACCUMULATIVE POTENTIAL

CHEMICAL	LOG POW
<b>1,2,4-Trimethylbenzene</b>	3.78
<b>2-Methylbutane (In Liquid form)</b>	2.72
<b>Benzene</b>	1.83
<b>Butane</b>	2.89
<b>Cyclohexane</b>	3.44
<b>Cyclopentane</b>	3.00
<b>Decane</b>	5.1
<b>Ethane</b>	1.81
<b>Ethylbenzene</b>	3.118
<b>Heptane</b>	4.66
<b>Hexane</b>	3.90
<b>Hydrogen Sulfide</b>	0.45
<b>Isobutane</b>	2.76
<b>Methylcyclohexane</b>	3.61
<b>Methylcyclopentane</b>	3.37
<b>Nonane</b>	5.65
<b>Octane</b>	5.18
<b>Pentane</b>	3.39
<b>Propane</b>	2.36
<b>Toluene</b>	2.65
<b>Xylene</b>	2.77-3.15

---

**MOBILITY IN SOIL**

CHEMICAL	EXPECTED SOIL MOBILITY
1,2,4-Trimethylbenzene	Low
2-Methylbutane (In Liquid form)	Low
Benzene	High
Benzene, trimethyl-	Moderate to High
Butane	Low
Cyclohexane	Moderate
Cyclopentane	Moderate
Decane	Immobile
Ethane	Very High
Ethylbenzene	Low
Heptane	Moderate
Hexane	High
Isobutane	Very High
Methylcyclopentane	Low
Nonane	Immobile
Octane	Immobile
Pentane	High
Propane	Moderate
Toluene	High to Moderate
Xylene	Very High to Moderate

---

**OTHER ADVERSE  
EFFECTS**

- No information available

Section 13:

Disposal Considerations

WASTE TREATMENT METHODS	Product Waste	<ul style="list-style-type: none"><li>• This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.</li><li>• This product could also contain benzene at &gt;0.5 ppm and could exhibit the characteristic of “toxicity” (D018) as determined by the toxicity characteristic leaching procedure (TCLP).</li><li>• This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s).</li><li>• It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.</li></ul>
	Packaging Waste	<ul style="list-style-type: none"><li>• Container contents should be completely used and containers should be emptied prior to discard.</li><li>• Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations.</li><li>• Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner.</li><li>• To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.</li></ul>

Section 14:

Transport Information

**CHART NAME**	UN NUMBER	PROPER SHIPPING NAME	TRANSPORT HAZARD CLASS	PACKING GROUP	ENVIRONMENTAL HAZARD	
	DOT	UN1268	Petroleum Distillate, N.O.S.	3	I	Emergency response guide number: 128
	TDG	UN1268	Petroleum Distillate, N.O.S.	3	I	–
	IMO/IMDG	UN1268	Petroleum Distillate, N.O.S.	3	I	–
	IATA/ICAO	UN1268	Petroleum Distillate, N.O.S.	3	I	–
SPECIAL RECAUTIONS FOR USER	• None					



## Section 15: Regulatory Information

### U.S.—CERCLA/SARA HAZARDOUS SUBSTANCES AND THEIR REPORTABLE QUANTITIES

COMPONENT	CAS #	AMOUNT
1,2,4-Trimethylbenzene	95-63-6	Not Listed
2-Methylbutane (In Liquid form)	78-78-4	Not Listed
Benzene	71-43-2	10 lb final RQ; 4.54 kg final RQ
Benzene, trimethyl-	25551-13-7	Not Listed
Butane	106-97-8	Not Listed
Cyclohexane	110-82-7	1000 lb final RQ; 454 kg final RQ
Cyclopentane	287-92-3	Not Listed
Decane	124-18-5	Not Listed
Ethane	74-84-0	Not Listed
Ethylbenzene	100-41-4	1000 lb final RQ; 454 kg final RQ
Heptane	142-82-5	Not Listed
Hexane	110-54-3	5000 lb final RQ; 2270 kg final RQ
Hydrogen Sulfide	7783-06-4	100 lb final RQ; 45.4 kg final RQ
Isobutane	75-28-5	Not Listed
Methylcyclohexane	108-87-2	Not Listed
Methylcyclopentane	96-37-7	Not Listed
Natural gas condensate	68919-39-1	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Nonane	111-84-2	Not Listed
Octane	111-65-9	Not Listed
Pentane	109-66-0	Not Listed
Propane	74-98-6	Not Listed
Toluene	108-88-3	1000 lb final RQ; 454 kg final RQ
Xylene	1330-20-7	100 lb final RQ; 45.4 kg final RQ

**U.S.—CWA  
(CLEAN WATER ACT)—  
REPORTABLE  
QUANTITIES OF  
DESIGNATED  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	AMOUNT
<b>1,2,4-Trimethylbenzene</b>	95-63-6	Not Listed
<b>2-Methylbutane (In Liquid form)</b>	78-78-4	Not Listed
<b>Benzene</b>	71-43-2	10 lb RQ
<b>Benzene, trimethyl-</b>	25551-13-7	Not Listed
<b>Butane</b>	106-97-8	Not Listed
<b>Cyclohexane</b>	110-82-7	1000 lb RQ
<b>Cyclopentane</b>	287-92-3	Not Listed
<b>Decane</b>	124-18-5	Not Listed
<b>Ethane</b>	74-84-0	Not Listed
<b>Ethylbenzene</b>	100-41-4	1000 lb RQ
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Hydrogen Sulfide</b>	7783-06-4	100 lb RQ
<b>Isobutane</b>	75-28-5	Not Listed
<b>Methylcyclohexane</b>	108-87-2	Not Listed
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Natural gas condensate</b>	68919-39-1	Not Listed
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Nonane</b>	111-84-2	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>Pentane</b>	109-66-0	Not Listed
<b>Propane</b>	74-98-6	Not Listed
<b>Toluene</b>	108-88-3	1000 lb RQ
<b>Xylene</b>	1330-20-7	100 lb RQ

**U.S.—CWA  
(CLEAN WATER ACT)—  
RECOMMENDED  
WATER QUALITY  
CRITERIA—CCC FOR  
FRESHWATER LIFE**

COMPONENT	CAS #	AMOUNT
Hydrogen Sulfide	7783-06-4	2.0 µg/L CCC

**U.S.—CWA  
(CLEAN WATER ACT)—  
RECOMMENDED  
WATER QUALITY  
CRITERIA—CCC FOR  
SALTWATER LIFE**

COMPONENT	CAS #	AMOUNT
HydrogenSulfide	7783-06-4	2.0 µg/L CCC

**U.S.—CWA  
(CLEAN WATER ACT)—  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	LISTED
1,2,4-Trimethylbenzene	95-63-6	Not Listed
2-Methylbutane (In Liquid form)	78-78-4	Not Listed
Benzene	71-43-2	X
Benzene, trimethyl-	25551-13-7	Not Listed
Butane	106-97-8	Not Listed
Cyclohexane	110-82-7	X
Cyclopentane	287-92-3	Not Listed
Decane	124-18-5	Not Listed
Ethane	74-84-0	Not Listed
Ethylbenzene	100-41-4	X
Heptane	142-82-5	Not Listed
Hexane	110-54-3	Not Listed
Hydrogen Sulfide	7783-06-4	X
Isobutane	75-28-5	Not Listed
Methylcyclohexane	108-87-2	Not Listed
Methylcyclopentane	96-37-7	Not Listed
Natural gas condensate	68919-39-1	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Nonane	111-84-2	Not Listed
Octane	111-65-9	Not Listed
Pentane	109-66-0	Not Listed

<b>Propane</b>	74-98-6	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	X

*X= The component is listed*

**U.S.—CWA  
(CLEAN WATER ACT)—  
PRIORITY POLLUTANTS**

<b>COMPONENT</b>	<b>CAS #</b>	<b>LISTED</b>
<b>1,2,4-Trimethylbenzene</b>	95-63-6	Not Listed
<b>2-Methylbutane (In Liquid form)</b>	78-78-4	Not Listed
<b>Benzene</b>	71-43-2	X
<b>Benzene, trimethyl-</b>	25551-13-7	Not Listed
<b>Butane</b>	106-97-8	Not Listed
<b>Cyclohexane</b>	110-82-7	Not Listed
<b>Cyclopentane</b>	287-92-3	Not Listed
<b>Decane</b>	124-18-5	Not Listed
<b>Ethane</b>	74-84-0	Not Listed
<b>Ethylbenzene</b>	100-41-4	X
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Hydrogen Sulfide</b>	7783-06-4	Not Listed
<b>Isobutane</b>	75-28-5	Not Listed
<b>Methylcyclohexane</b>	108-87-2	Not Listed
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Natural gas condensate</b>	68919-39-1	Not Listed
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Nonane</b>	111-84-2	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>Pentane</b>	109-66-0	Not Listed
<b>Propane</b>	74-98-6	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	Not Listed

*X= The component is listed*

COMPONENT	CAS #	CLASSIFICATION
<b>1,2,4-Trimethylbenzene</b>	95-63-6	B3
<b>2-Methylbutane (In Liquid form)</b>	78-78-4	B2
<b>Benzene</b>	71-43-2	B2, D2A, D2B
<b>Benzene, trimethyl-</b>	25551-13-7	B3
<b>Butane</b>	106-97-8	A, B1
<b>Cyclohexane</b>	110-82-7	B2, D2B
<b>Cyclopentane</b>	287-92-3	B2
<b>Decane</b>	124-18-5	B3, D2B
<b>Ethane</b>	74-84-0	A, B1
<b>Ethylbenzene</b>	100-41-4	B2, D2A, D2B
<b>Heptane</b>	142-82-5	B2, D2B
<b>Hexane</b>	110-54-3	B2, D2A, D2B
<b>Hydrogen Sulfide</b>	7783-06-4	A, B1, D1A, D2B
<b>Isobutane</b>	75-28-5	A, B1 (listed under Methyl-2 propane)
<b>Methylcyclohexane</b>	108-87-2	B2
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Natural gas condensate</b>	68919-39-1	Not Listed
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Nonane</b>	111-84-2	B2, D2B
<b>Octane</b>	111-65-9	B2, D2B
<b>Pentane</b>	109-66-0	B2
<b>Propane</b>	74-98-6	A, B1
<b>Toluene</b>	108-88-3	B2, D2A, D2B
<b>Xylene</b>	1330-20-7	B2, D2A, D2B

X= The component is listed

COMPONENT	CAS #	AMOUNT
Ethylbenzene	100-41-4	90 µg/L
Toluene	108-88-3	2.0 µg/L
Benzene	71-43-2	370 µg/L
COMPONENT	CAS #	AMOUNT
Ethylbenzene	100-41-4	25 µg/L
Toluene	108-88-3	215 µg/L
Benzene	71-43-2	110 µg/L
COMPONENT	CAS #	LISTED
1,2,4-Trimethylbenzene	95-63-6	Not Listed
2-Methylbutane (In Liquid form)	78-78-4	X
Benzene	71-43-2	X
Benzene, trimethyl-	25551-13-7	Not Listed
Butane	106-97-8	X
Cyclohexane	110-82-7	X
Cyclopentane	287-92-3	Not Listed
Decane	124-18-5	Not Listed
Ethane	74-84-0	X
Ethylbenzene	100-41-4	X
Heptane	142-82-5	Not Listed
Hexane	110-54-3	Not Listed
Hydrogen Sulfide	7783-06-4	X
Isobutane	75-28-5	X
Methylcyclohexane	108-87-2	Not Listed
Methylcyclopentane	96-37-7	Not Listed
Natural gas condensate	68919-39-1	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Nonane	111-84-2	Not Listed
Octane	111-65-9	Not Listed

<b>Pentane</b>	109-66-0	X
<b>Propane</b>	74-98-6	X
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	X

X= The component is listed

## Section 16: Other Information

### NFPA



**Health Hazard:** 3      **Flammability:** 4      **Instability:** 0      **Physical and Chemical Hazards:** X

### HMIS

**Health Hazard:** 3      **Flammability:** 4      **Instability:** 0      **Personal Protection:** X

### ISSUING DATE

5/8/15

### REVISION DATE

9/5/17

### DISCLAIMER

- The information presented herein is based on data considered to be accurate as of the date of preparation of this Safety Data Sheet (SDS). However, SDSs may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

# Safety Data Sheet

## Section 1: Identification

### PRODUCT IDENTIFIER

Petroleum Crude Oil—Canadian Heavy Sweet (CHS)

### OTHER MEANS OF IDENTIFICATION

UN-Number

UN1267

Synonyms

CHS, Mix of Heavy and Sweet Blend

Chemical Category

Crude oils—extremely flammable

### RECOMMENDED USE

No information available

### RESTRICTIONS OF USE

No information available

### SUPPLIER INFORMATION

Enbridge Pipelines Inc.  
10201 Jasper Avenue  
Edmonton, Alberta T5J3N7  
Canada  
TEL: 1-780-420-5210

### EMERGENCY CONTACT INFORMATION

CHEMTREC

1-800-424-9300 for US  
703-527-3887 outside US

CANUTEC (Canadian  
Transportation)

613-996-6666

## Section 2: Hazards Identification

### CLASSIFICATION

Skin Irritation

Category 3

Eye Irritation

Category 2

Germ Cell Mutagenicity

Category 1B

Carcinogenicity

Category 1A

Reproductive Toxicity

Category 2

Specific Target Organ Systemic Toxicity (Single Exposure)

Category 3

Specific Target Organ Toxicity (Repeated Exposure)

Category 1

Aspiration Toxicity

Category 1

Flammable liquids

Category 1





- Causes skin irritation.
- Causes serious eye irritation.
- May cause genetic defects.
- May cause cancer.
- Suspected of damaging fertility or the unborn child.
- May cause respiratory irritation.
- Causes damage to organs through prolonged or repeated exposure.
- May be fatal if swallowed and enters airways.
- Extremely flammable liquid and vapor.
- May cause drowsiness or dizziness.

PRECAUTIONARY  
STATEMENTS

- Wash face, hands and any exposed skin thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Use personal protective equipment as required.
- Do not breathe dust/fume/gas/mist/vapors/spray.
- Use only outdoors or in a well-ventilated area.
- Do not eat, drink or smoke when using this product.
- Keep away from heat/sparks/open flames/hot surfaces.
- Keep container tightly closed.
- No smoking.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting/equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- In case of inadequate ventilation wear respiratory protection.

- IF EXPOSED or concerned: Get medical advice/attention.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- Call a POISON CENTER or doctor/physician if you feel unwell.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- Do NOT induce vomiting.
- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower and soap.
- In case of fire: Use CO<sub>2</sub>, dry chemical, or foam for extinction.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If SKIN irritation occurs: Get medical advice/attention.
- If EYE irritation persists: Get medical advice/attention.

- Store locked up and keep cool.
- Store in a well-ventilated place. Keep container tightly closed.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

OTHER  
INFORMATION

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
- Very toxic to aquatic life with long lasting effects.

## Section 3: Composition/Information on Ingredients

COMPONENT NAME	CAS NUMBER	PERCENTAGE (%)*	NOTES
Natural Gas Condensates (petroleum)	64741-47-5	45-100	
Petroleum Distillates (naptha)	8002-05-9	45-100	
Asphalt	8052-42-4	70-80	
Natural Gas Condensate	68919-39-1	0-25	
Ethane	74-84-0	0-15	
Propane	74-98-6	0-15	
Pentane	109-66-0	0-15	
2-Methylbutane	78-78-4	0-10	
Butane	106-97-8	0-10	
Heptane	142-82-5	0-10	
Hexane	110-54-3	0-10	
Octane	111-65-9	0-10	
Nonane	111-84-2	0-5	
Isobutane	75-28-5	0-5	
Decane	124-18-5	0-5	
Benzene	71-43-2	0-2	
Xylene	1330-20-7	0-2	
Toluene	108-88-3	0-2	
Ethylbenzene	100-41-4	0-2	
Methylcyclohexane	108-87-2	0-2	
Methylcyclopentane	96-37-7	0-2	
Cyclohexane	110-82-7	0-1	
Cyclopentane	287-92-3	0-1	
1,2,4-Trimethylbenzene	95-63-6	0-1	
Hydrogen Sulfide	7783-06-4	0-1	

\*Values do not reflect absolute minimums and maximums; those values may vary from time to time.

# Section 4: First Aid Measures

DESCRIPTION  
OF NECESSARY  
MEASURES

Inhalation	<ul style="list-style-type: none"><li>• IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If irritation persists: Get medical advice/attention.</li></ul>
Skin	<ul style="list-style-type: none"><li>• IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.</li></ul>

Eye	<ul style="list-style-type: none"> <li>• IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.</li> </ul>
Ingestion	<ul style="list-style-type: none"> <li>• Do NOT induce vomiting. Call a physician or poison control center.</li> <li>• Aspiration hazard if swallowed—can enter lungs and cause damage.</li> </ul>
<b>MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED</b>	Refer to Section 11 - Toxicological Information
<b>INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY</b>	<p>Note to the Physician</p> <ul style="list-style-type: none"> <li>• Aspiration hazard. Symptoms may be delayed.</li> <li>• Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.</li> <li>• Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.</li> </ul>

## Section 5: Fire Fighting Measures

<b>EXTINGUISHING MEDIA</b>	<p>Suitable Extinguishing Media</p> <ul style="list-style-type: none"> <li>• SMALL FIRES: Dry chemical, CO<sub>2</sub>, water spray or regular foam.</li> <li>• LARGE FIRE: Water spray, fog or regular foam.</li> </ul>
	<p>Unsuitable Extinguishing Media</p> <ul style="list-style-type: none"> <li>• CAUTION: Use of water spray when fighting fire may be inefficient.</li> <li>• Do not use straight streams.</li> </ul>
<b>FIRE FIGHTING PROCEDURES</b>	<ul style="list-style-type: none"> <li>• FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.</li> <li>• FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: If impossible to extinguish, protect surroundings and allow fire to burn itself out.</li> <li>• Stay upwind.</li> <li>• Ventilate closed spaces before entering.</li> <li>• Fire fighters should wear complete protective clothing including self-contained breathing apparatus.</li> <li>• FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.</li> <li>• FIRE: When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.</li> <li>• Move containers from fire area if you can do it without risk.</li> <li>• LARGE FIRES: Use water spray or fog; do not use straight streams.</li> <li>• LARGE FIRES: If insufficient water supply: knock down vapors only. If this is impossible, withdraw from area and let fire burn.</li> <li>• LARGE FIRES: Flood fire area with large quantities of water, while knocking down vapors with water fog.</li> </ul>

### SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

- Vapors may travel to source of ignition and flash back.
- Air/vapor mixtures may explode when ignited.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Will be easily ignited by heat, sparks or flames.
- Runoff to sewer may create fire or explosion hazard.
- Vapor explosion hazard indoors, outdoors or in sewers.
- MAY EXPLODE AND THROW FRAGMENTS 1600 meters (1 MILE) OR MORE IF FIRE REACHES CARGO.
- May create vapor/air explosion hazard indoors, outdoors or in sewers.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

### EXPLOSION DATA

- |                               |   |
|-------------------------------|---|
| Hazardous Combustion Products | <ul style="list-style-type: none"><li>• Carbon monoxide. Carbon dioxide (CO<sub>2</sub>). Nitrogen oxides (NO<sub>x</sub>). Oxides of sulfur.</li><li>• Aldehydes, aromatic and other hydrocarbons.</li></ul> |
|-------------------------------|---|

- |                                  |   |
|----------------------------------|---|
| Sensitivity to Mechanical Impact | <ul style="list-style-type: none"><li>• None.</li></ul> |
|----------------------------------|---|

- |                                 |  |
|---------------------------------|--|
| Sensitivity to Static Discharge | <ul style="list-style-type: none"><li>• Yes.</li></ul> |
|---------------------------------|--|

### PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS

- As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
- Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced firefighters.
- Carbon dioxide can displace oxygen.
- Use caution when applying carbon dioxide in confined spaces.
- Water spray may be useful in minimizing or dispersing vapors.
- Long-duration fires involving diluent stored in tanks may result in a boilover.
- For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear.

## Section 6: Accidental Release Measures

### PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

- |            |             |   |
|------------|-------------|---|
| Personal   | Precautions | <ul style="list-style-type: none"><li>• Evacuate personnel to safe areas.</li><li>• Remove all sources of ignition.</li><li>• Deny entry to unauthorized and unprotected personnel.</li><li>• Use personal protective equipment.</li><li>• Avoid contact with skin, eyes and clothing.</li><li>• Stop leak if you can do it without risk.</li><li>• Keep people away from and upwind of spill/leak.</li><li>• Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.</li><li>• Ventilate enclosed areas.</li><li>• Do not walk through spilled material.</li></ul> |
| Protective | Equipment   | <ul style="list-style-type: none"><li>• Wear appropriate breathing apparatus (if applicable) and protective clothing.</li></ul>   |
| Emergency  | Procedures  | <ul style="list-style-type: none"><li>• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area) Keep unauthorized personnel away. Evacuate area. Keep out of low areas. Stop leak if you can do it without risk.</li><li>• Report spills to local or federal authorities as appropriate or required.</li></ul>  |

---

## ENVIRONMENTAL PRECAUTIONS

---

- Avoid runoff to waterways and sewers. Do NOT wash away into sewer. Prevent entry into waterways, sewers, basements or confined areas. Runoff from fire control may cause pollution.
- 

## METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP

- |                         |  |
|-------------------------|--|
| Methods for Containment | <ul style="list-style-type: none"><li>• Stop leak if you can do it without risk.</li><li>• Contain and recover liquid when possible.</li><li>• A vapor suppressing foam may be used to reduce vapors.</li><li>• Dike far ahead of spill; use dry sand to contain the flow of material; contain water spills by booming.</li><li>• Use water spray to reduce vapors or divert vapor cloud drift.</li><li>• A fine water spray remotely directed to the edge of the spill pool can be used to direct and maintain a hot flare fire which will burn the spilled material in a controlled manner.</li></ul>  |
| Methods for Cleaning Up | <ul style="list-style-type: none"><li>• Clean up spill immediately.</li><li>• LARGE SPILLS: DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.</li><li>• SMALL LIQUID SPILLS: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.</li><li>• Use appropriate Personal Protective Equipment (PPE).</li><li>• Use clean non-sparking tools to collect absorbed material.</li><li>• Vacuum spilled material.</li><li>• Try to work upwind of spill.</li><li>• All equipment used when handling the product must be grounded.</li><li>• Recover and return free product to proper containers</li><li>• Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids.</li><li>• Do not place spilled materials back in the original container.</li><li>• Do not flush to sewer or allow to enter waterways.</li></ul> |
- 

---

# Section 7: Handling and Storage

---

## PRECAUTIONS FOR SAFE HANDLING

- |          |   |
|----------|---|
| Handling | <ul style="list-style-type: none"><li>• All equipment used when handling the product must be grounded. Avoid contact with heat and ignition sources and oxidizers. Do not breathe (dust, vapor or spray mist). Do not use in areas without adequate ventilation. Do not use sparking tools. Keep away from heat, sparks, and flame. No open flames, no sparks and no smoking. Use only with adequate ventilation. Do not use or store near heat or open flame. Keep away from fire, sparks and heated surfaces.</li><li>• The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes).</li><li>• The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.</li><li>• Take precautionary measures against static discharges.</li></ul> |
|----------|---|
-

Handling	<ul style="list-style-type: none"> <li>• Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.</li> <li>• Stay upwind and vent open hatches before uploading.</li> <li>• Avoid contact with skin, eyes and clothing.</li> <li>• Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.</li> <li>• Wear personal protective equipment.</li> <li>• Remove and wash contaminated clothing before re-use.</li> <li>• Do not eat, drink or smoke when using this product.</li> <li>• Do not take internally.</li> <li>• Wash thoroughly after handling.</li> <li>• Empty containers pose a potential fire and explosion hazard.</li> </ul>
Storage	<ul style="list-style-type: none"> <li>• Ventilate enclosed areas.</li> <li>• Store in a well-ventilated place.</li> <li>• Keep container tightly closed.</li> <li>• Store locked up.</li> <li>• Avoid shock, impact, friction, and rough handling. Do not use sparking tools.</li> <li>• Store in a cool/low-temperature, well-ventilated place away from heat and ignition sources.</li> <li>• Keep away from sources of ignition.</li> <li>• No Smoking.</li> <li>• Do not enter confined spaces such as tanks or pits without following proper entry procedures.</li> <li>• Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area.</li> <li>• Harmful concentrations of hydrogen sulfide (<math>H_2S</math>) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments.</li> <li>• Keep away from open flames, hot surfaces and sources of ignition.</li> <li>• Keep product and empty container away from heat and sources of ignition.</li> <li>• Storage containers should be grounded and bonded.</li> <li>• Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.</li> <li>• Store away from incompatible materials.</li> </ul>
Incompatible Products	<ul style="list-style-type: none"> <li>• Strong oxidizers such as nitrates, chlorates, peroxides, chlorine.</li> </ul>

## Section 8: Exposure Controls/Personal Protection

### CONTROL PARAMETERS: EXPOSURE GUIDELINES

CHEMICAL NAME	ACGIH	OSHA	NIOSH
Petroleum distillate (naphtha)	–	–	TWA 350 mg/m <sup>3</sup> IDLH 1100 ppm Ceiling 1800 mg/m <sup>3</sup>
Asphalt	TLV 0.5 mg/m <sup>3</sup>		Ceiling 5 mg/m <sup>3</sup>
Ethane	TLV 1000 ppm (listed under Aliphatic hydrocarbon gases: Alkane C1-C4)	–	

Propane	TLV1000ppm (listed under Aliphatic hydrocarbon gases: Alkane C1-C4)	TWA1000 ppm TWA 1800 mg/m <sup>3</sup>	TWA1000ppm TWA 1800 mg/m <sup>3</sup>
Pentane	TLV600ppm TLV1770mg/m <sup>3</sup>	PEL 1000ppm PEL 2950 mg/m <sup>3</sup>	TWA120ppm TWA350mg/m <sup>3</sup> Ceiling610ppm Ceiling1800mg/m <sup>3</sup> IDLH1500ppm
2-Methylbutane	TWA600ppm	–	–
Butane	STEL1000ppm		TWA800PPM TWA 1900 mg/m <sup>3</sup>
Heptane	TLV400ppm TLV 1640mg/m <sup>3</sup> STEL 500ppm STEL2000mg/m <sup>3</sup>	PEL 500ppm PEL2000mg/m <sup>3</sup>	TWA 85 ppm TWA350mg/m <sup>3</sup> Ceiling 440 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 750 ppm
Hexane	TLV50ppm TLV176mg/m <sup>3</sup>	PEL 500ppm PEL 1800 mg/m <sup>3</sup>	TWA 50ppm TWA 180 mg/m <sup>3</sup> IDLH 1100 ppm
Octane	TLV300ppm TLV 1401 mg/m <sup>3</sup>	PEL 500ppm PEL 2350 mg/m <sup>3</sup>	TWA 75ppm TWA350mg/m <sup>3</sup> Ceiling385ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1000 ppm
Nonane	TLV200ppm TLV 1050mg/m <sup>3</sup>	–	TWA200ppm TWA 1050 mg/m <sup>3</sup>
Isobutane	TWA 1000 ppm	–	–
Decane	–	–	–
Benzene	TLV0.5ppm TLV1.6mg/m <sup>3</sup> STEL2.5ppm STEL 8mg/m <sup>3</sup>	PEL 1 ppm STEL 5ppm	TWA 0.1ppm STEL 1 ppm IDLH 500ppm
Xylenes	TLV100ppm TLV434mg/m <sup>3</sup> STEL 150 ppm STEL651mg/m <sup>3</sup>	PEL 100ppm PEL 435mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 150 ppm STEL 655 mg/m <sup>3</sup> IDLH 900 ppm



Toluene	TLV20ppm TLV 75mg/m <sup>3</sup>	PEL 200ppm STEL 300mg/m <sup>3</sup>	TWA 100ppm TWA 375 mg/m <sup>3</sup> STEL 150 ppm STEL 560 mg/m <sup>3</sup> IDLH 500ppm
Ethylbenzene	TLV20ppm TLV 87 mg/m <sup>3</sup>	PEL 100ppm PEL 435mg/m <sup>3</sup>	TWA 100ppm TWA 435 mg/m <sup>3</sup> STEL 125ppm STEL 545mg/m <sup>3</sup> IDLH 800ppm
MethylCyclohexane	TLV400ppm TLV 1610 mg/m <sup>3</sup>	PEL 500ppm PEL 2000mg/m <sup>3</sup>	TWA400ppm TWA 1600mg/m <sup>3</sup> IDLH 1200ppm
Cyclohexane	TLV100ppm TLV334mg/m <sup>3</sup>	PEL 300ppm PEL 1050 mg/m <sup>3</sup>	TWA300ppm TWA 1050 mg/m <sup>3</sup> IDLH 1300ppm
Cyclopentane	TLV600ppm	–	TWA600ppm TWA 1720mg/m <sup>3</sup>
1,2,4-Trimethylbenzene	TWA 25 ppm	-	TWA 25 ppm TWA 125 mg/m <sup>3</sup>
Hydrogen sulfide	TLV1ppm TLV1.4mg/m <sup>3</sup> STEL 5ppm STEL 7 mg/m <sup>3</sup>	Ceiling 20ppm	Ceiling 10ppm Ceiling 15 mg/m <sup>3</sup> IDLH 100ppm

## APPROPRIATE ENGINEERING CONTROLS

- Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. Prevent vapor build up by providing adequate ventilation during and after use. Use only appropriately classified electrical equipment.

## INDIVIDUAL PROTECTION MEASURES

- |                          |  |
|--------------------------|--|
| Eye and Face             | • Wear face shield and eye protection.   |
| Skin and Body            | <ul style="list-style-type: none"> <li>• The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation.</li> <li>• Wear protective gloves/protective clothing/eye protection/face protection. Wear long sleeves and/or protective coveralls.</li> </ul> |
| Respiratory              | • Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.   |
| General Hygiene Measures | • Handle in accordance with good industrial hygiene and safety practice.   |

# Section 9: Physical and Chemical Properties

## MATERIAL DESCRIPTION

Physical State	Liquid	Odor	Petroleum like odor
Substance Type	Mixture	Odor Threshold	No data available
Appearance	Brown/black Liquid		

## PROPERTIES

pH	No data available	Vapor pressure	95 kPa @ 37.8°C
Melting Point/ Freezing Point	No data available	Vapor density	>1 Air=1
Boiling Point/ Boiling Range	-20 to 722°C -4 to 1331°F	Relative density	No data available
Flash Point	-40 to 260°C -40 to 500°F	Water Solubility	Negligible
Evaporation Rate	No data available	Partition coefficient: n-octanol/water	No data available
Flammability (solid, gas)	No data available	Autoignition temperature	No data available
Upper Flammability Limit	No data available	Decomposition temperature	No data available

Lower Flammability Limit	No data available	Specific Gravity	0.90-0.925
Viscosity	< 145 cSt @ 10°C		

## Section 10: Stability and Reactivity

REACTIVITY	Chlorine Dioxide
CHEMICAL STABILITY	Stable at 70 °F, 760 mm Hg pressure
POSSIBILITY OF HAZARDOUS REACTIONS	None under normal processing
CONDITIONS TO AVOID	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity
INCOMPATIBLE MATERIALS	Strong oxidizers such as nitrates, chlorates, peroxides, chlorine
HAZARDOUS DECOMPOSITION PRODUCTS	Combustion produces carbon monoxide, aldehydes, sulfur dioxide, aromatic and other hydrocarbons
HAZARDOUS POLYMERIZATION	Will not occur

## Section 11: Toxicological Information

INFORMATION ON THE LIKELY ROUTES OF EXPOSURE	Inhalation	• May cause irritation of respiratory tract. May cause drowsiness and dizziness.		
	Eye Contact	• Causes serious eye irritation.		
	Skin Contact	• Causes skin irritation.		
	Ingestion	<ul style="list-style-type: none"> <li>• Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.</li> <li>• Potential for aspiration if swallowed.</li> <li>• Aspiration may cause pulmonary edema and pneumonitis.</li> </ul>		
TOXICOLOGICAL DATA	CHEMICAL NAME	LD50 ORAL	LD50 DERMAL	LC50 INHALATION
	Natural gas condensates (petroleum)	-	-	>600 mg/m <sup>3</sup> (Rat)
	Asphalt	>5000 mg/kg (Rat)	-	>94.4 mg/m <sup>3</sup> (Rat)
	Propane	-	-	>800000 ppm (Rat) 15 min
	Pentane	>2000 mg/kg (Rat)	-	364 g/cu (Rat) 4 h
	2-Methylbutane	-	-	= 150,000 mg/m <sup>3</sup> (Rat) 2 h
	Butane	-	-	658 mg/L (Rat) 4 h
	Heptane	-	= 3000 mg/kg (Rabbit)	= 103 g/m <sup>3</sup> (Rat) 4 h
	Hexane	= 25 g/kg (Rat)	= 3000 mg/kg (Rabbit)	= 48000 ppm (Rat) 4 h

Octane	–	–	= 118g/m <sup>3</sup> (Rat)4h = 25260 ppm (Rat)4h
Nonane	–	–	= 3200 ppm ( Rat ) 4 h
Decane	>5000mg/kg	>2000mg/kg ( Rat	–
Benzene	1800 mg/kg (Rat)	–	13050- 14380ppm (Rat)4h
Xylenes	= 3500mg/kg ( Rat)	>4350mg/kg (Rabbit) > 1700mg/kg (Rabbit)	= 29.08mg/L (Rat)4h = 5000ppm ( Rat )4h
Toluene	2.6to7.5g/kg (Rat )	14.1 ml/kg (Rabbit)	–
Ethylbenzene	=3500mg/kg (Rat)	= 15400 mg/kg ( Rabbit )	=17.2mg/L ( Rat )4h
MethylCyclohexane	>3200mg/kg (Rat)	–	–
Cyclohexane	>5000mg/kg ( Rat )	>2000mg/kg(Rabbit)	=13.9 mg/L ( Rat )4h
Cyclopentane	11400 mg/kg(Rat)	–	72g/m <sup>3</sup> (Mouse)
1,2,4-Trimethylbenzene	5g/kg (Rat)	–	18000 mg/m <sup>3</sup> (Rat)4h
Hydrogen sulfide	–	–	=444ppm(Rat)

#### SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

Benzene	<ul style="list-style-type: none"> <li>Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in humans. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.</li> </ul>
Hydrogen Sulfide Gas (H <sub>2</sub> S)	<ul style="list-style-type: none"> <li>Toxic by inhalation. Prolonged breathing of 50-100 ppm H<sub>2</sub>S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of &gt;1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H<sub>2</sub>S, 6 hrs/day, 5 days/ week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H<sub>2</sub>S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H<sub>2</sub>S, respectively. Over the years a number of acute cases of H<sub>2</sub>S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.</li> </ul>
Hexane	<ul style="list-style-type: none"> <li>This product may contain hexane at a level of &gt;1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.</li> </ul>
Xylenes	<ul style="list-style-type: none"> <li>Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver,</li> </ul>

---

kidneys, lungs, spleen, heart and adrenals, Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and man. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.

Toluene	<p>Carcinogenicity: Exposure of rats and mice to toluene at concentrations ranging from 120-1200 ppm for two years did not demonstrate evidence of carcinogenicity. Toluene has not been listed as a carcinogen by IARC.</p> <p>Target Organs: Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.</p> <p>Reproductive Toxicity: Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. Decreased fetal body weight and increased skeletal variations in both inhalation and oral studies, but only at doses that were maternally toxic. No fetal toxicity was seen at doses that were not maternally toxic.</p> <p>Decreased sperm counts have been observed in male rats in the absence of a reduction in fertility. Toluene has been reported to cause mental or growth retardation in the children of solvent abusers who directly inhale toluene during pregnancy.</p>				
Ethylbenzene	<p>Carcinogenicity: Rats and mice exposed to 0, 75, 250, or 750 ppm methylbenzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethylbenzene has been listed as a possible human carcinogen by IARC.</p> <p>Target Organs: In rats and mice exposed to 0, 75, 250, or 750 ppm methylbenzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), lung (alveolar epithelium metaplasia), thyroid (hyperplasia), thyroid (hyperplasia) and pituitary (hyperplasia). In animal models (particularly rats), ethylbenzene affects the auditory function mainly in the cochlear mid-frequency range and ototoxicity was observed after combined exposure to noise and ethylbenzene. There is no evidence of either ethylbenzene-induced hearing losses or ototoxicity with combined exposure to ethylbenzene and noise in workers.</p>				
Sensitization	• No information available				
Mutagenic Effects	• May cause genetic defects				
Carcinogenicity	• May cause cancer				
CHEMICAL NAME	ACGIH	ACGIH SKIN*	IARC	NTP	OSHA
Petroleum distillate (naphtha)	A2	–	Group 3		–
Asphalt	A4	–	Group 2B	Reasonably Anticipated	–
Hexane	–	X	–	–	–
Benzene	A1	X	Group 1	Known	X
Xylenes	A4	–	Group 3	Evidence	
Toluene	A4	–	Group 3	Evidence	–
Ethylbenzene	A3	–	Group 2B	Evidence	X

REPRODUCTIVE TOXICITY	• Suspected of damaging fertility or the unborn child.
STOT—SINGLE EXPOSURE	• May cause drowsiness and dizziness.
STOT—REPEATED EXPOSURE	• Causes damage to organs through prolonged or repeated exposure.
ASPIRATION HAZARD	May be fatal if swallowed and enters airways. Risk of serious damage to the lungs (by aspiration).

## Section 12: Ecological Information

### ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
Petroleum distillate (naphtha)	–	LC50: 258 mg/L Salmogairdneri 96 h static	EC50 48 h: <0.26 mg/L Static (Daphnia magna) EC50 24 h: =36 mg/L (Daphnia magna)	–
Natural gas condensates (petroleum)	–	LC50 96 h: =119 mg/L static (Alburnus alburnus) LC50 96 h: =82 mg/L static (Cyprinodon variegatus)	EC50 24 h: =170 mg/L (Daphnia magna)	–
Butane	–	–	–	–
Pentane	–	LC50 96 h: =11.59 mg/L (Pimephales promelas) LC50 96 h: =9.87 mg/L (Oncorhynchus mykiss) LC50 96 h: =9.99 mg/L (Lepomis macrochirus)	EC50 48 h: 135 mmol/cu	LC50 24 h: 165 mmol/cu Artemia salina (Brine Shrimp)
Octane	–	–	EC50 48 h: =0.38 mg/L (water flea) EC50 48 h: =0.02856 mg/L (Daphnia magna)	EC50 =890 mg/L 30 min (Microorganisms) EC50 <1.67 hr: 120 µg/l Mytilus edulis (Common Bay Mussel)
Heptane	–	LC50 96 h: =375.0 mg/L (Cichlid fish)	EC50 24 h: >10 mg/L (Daphnia magna)	–
2-Methylbutane			EC50 48 h: =2.3 mg/L (Daphnia magna)	
Hexane	–	LC50 96 h: 2.1-2.98 mg/L flow-through (Pimephales promelas)	EC50 24 h: >1000 mg/L (Daphnia magna)	–
Decane	EC50 24 h: =0.043 mg/L (Chlorella vulgaris)	–	EC50 48 h: =0.029 mg/L (Daphnia magna)	–

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
Benzene	EC5072h: =29mg/L (Pseudokirchneriella subcapitata)	LC5096h: 10.7 - 14.7mg/L flow-through (Pimephales promelas) LC5096h: =5.3mg/L flow-through (Oncorhynchus mykiss) LC5096h: =22.49mg/L static (Lepomis macrochirus) LC5096h: =28.6mg/L static (Poecilia reticulata) LC5096h: 22330 - 41160 µg/L static (Pimephales promelas) LC5096h: 70000 - 142000 µg/L static (Lepomis macrochirus)	EC5048h: 8.76 - 15.6 mg/L Static (Daphnia magna) EC5048h: = 10mg/L (Daphnia magna)	-
Cyclohexane	EC50 72 h: > 500 mg/L (Desmodesmus subspicatus)	LC50 96 h: 3.96 - 5.18 mg/L flow-through (Pimephales promelas) LC50 96 h: 23.03 - 42.07 mg/L static (Pimephales promelas) LC50 96 h: 24.99 - 44.69 mg/L static (Lepomis macrochirus) LC50 96 h: 48.87 - 68.76 mg/L static (Poecilia reticulata)	EC50 24 h: > 400 mg/L (Daphnia magna)	EC50 = 85.5 mg/L 5 min EC50 = 93 mg/L 10 min (Microorganisms)
Cyclopentane			EC50 48 h: 150 nmol/cu m (Daphnia magna)	LC50 24h: 280 mmol/cu m Artemia salina (Brine Shrimp)
MethylCyclohexane		LC50 96hr: 72.0 mg/l (Golden Shiner)		
Xylenes	EC5072h: =11mg/L (Pseudokirchneriella subcapitata)	LC5096h: = 13.4mg/L flow-through (Pimephales promelas) LC50 96 h: 2.661 - 4.093 mg/L static (Oncorhynchus mykiss) LC5096h: 13.5 - 17.3mg/L (Oncorhynchus mykiss) LC5096h: 13.1 - 16.5 mg/L flow-through (Lepomis macrochirus)	EC5048h: =3.82mg/L (water flea) LC5048h: =0.6mg/L (Gammarus lacustris)	-
Toluene	EC50: >433mg/L Pseudokirchneriella subcapitata 96h EC50: 12.5 mg/L Pseudokirchneriella subcapitata 72h static	LC50: 15.22 - 19.05 mg/L Pimephales promelas 96 h flow-through LC50: 12.6mg/L Pimephales promelas 96 h static LC50: 5.89 - 7.81 mg/L Oncorhynchus mykiss 96 h flow-through LC50: 14.1 - 17.16mg/L Oncorhynchus mykiss 96 h static LC50: 5.8 mg/L Oncorhynchus mykiss 96 h semi-static LC50: 11.0 - 15.0 mg/L Lepomis macrochirus 96 h static	EC5048h: 5.46 - 9.83mg/L Static (Daphnia magna) EC5048h: = 11.5mg/L (Daphnia magna)	EC50 = 19.7 mg/L 30 min (Microorganisms)



ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
		LC50: 54 mg/L Oryzias latipes 96 h static LC50: 28.2 mg/L Poecilia reticulata 96 h semi-static LC50: 50.87-70.34 mg/L Poecilia reticulata 96 h static		

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
Ethylbenzene	EC50 72h: =4.6 mg/L (Pseudokirchneriella subcapitata) EC50 96h: >438 mg/L (Pseudokirchneriella subcapitata) EC50 72h: 2.6-11.3 mg/L static (Pseudokirchneriella subcapitata) EC50 96h: 1.7-7.6 mg/L static (Pseudokirchneriella subcapitata) EC50 72h: =11 mg/L (Pseudokirchneriella subcapitata)	LC50 96h: 11.0-18.0 mg/L static (Oncorhynchus mykiss) LC50 96h: =4.2 mg/L semi-static (Oncorhynchus mykiss) LC50 96h: 7.55-11 mg/L flow-through (Pimephales promelas) LC50 96h: =32 mg/L static (Lepomis macrochirus) LC50 96h: 9.1-15.6 mg/L static (Pimephales promelas) LC50 96h: =9.6 mg/L static (Poecilia reticulata)	EC50 48h: 1.8-2.4 mg/L (Daphnia magna)	EC50 =9.68 mg/L 30 min EC50 =96 mg/L 24 h (Microorganisms)
1,2,4-Trimethylbenzene	–	LC50 96h: 7.72 mg/L (Pimephales promelas)	EC50 48h: 30 mmol/cu (Daphnia magna)	LC50 24h: 100 mmol/cu Artemia salina (Brine Shrimp)
Hydrogen sulfide	–	LC50 96h: 49 µg/l Oncorhynchus mykiss (Rainbow Trout) eggs LC50 24h: 1059.7 µg/l Pimephales promelas (Fathead Minnow)	EC50 48h: 62 µg/l Gammarus pseudolimnaeus (Scud)	–

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
---------------	-------------------	------------------	-------------------------------	----------------

## PERSISTENCE AND DEGRADABILITY

## BIOACCUMULATIVE POTENTIAL

• No information available

CHEMICAL	LOG POW
Asphalt	6.006
Butane	2.89
Benzene	1.83
YCyclohexane	3.44
Cyclopentane	3.00
Decane	5.1
Ethane	1.81
Ethylbenzene	3.118
Pentane	3.39
Octane	5.18
Heptane	4.66
2-Methylbutane	2.72
Methylcyclohexane	3.61
Methylcyclopentane	3.37
Nonane	5.65
Propane	2.36
Toluene	2.65
Xylene	2.77-3.15
Isobutane	2.76
Hexane	3.90

1,2,4-Trimethylbenzene	3.78
Hydrogen Sulfide	0.45
CHEMICAL	EXPECTED SOIL MOBILITY
Petroleum distillate (naphtha)	High
Butane	Low
Cyclohexane	Moderate
Cyclopentane	Moderate
Ethane	Very High
Methylcyclopentane	Low
Propane	Moderate
Pentane	High
Octane	Immobile
Nonane	Immobile
Heptane	Moderate
2-Methylbutane	Low
Isobutane	Very High
Hexane	High
Decane	Immobile
Benzene	High
Xylene	Very High to Moderate
Toluene	High to Moderate
Ethylbenzene	Low
1,2,4-Trimethylbenzene	Low

• No information available

## Section 13: Disposal Considerations

### WASTE TREATMENT METHODS

Product Waste

- This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by USEPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

---

• T	uld also contain benzene at >0.5 ppm and could exhibit the characteristic of “toxicity”
h	(D018) as determined by the toxicity characteristic leaching procedure (TCLP).
i	• This material could become a hazardous waste if mixed or contaminated with a hazardous
s	waste or other substance(s).
	• It is the responsibility of the user to consult federal, state and local waste regulations to
p	determine appropriate disposal options.
r	
o	
d	
u	
c	
t	
c	
o	

---

- Container contents should be completely used and containers should be emptied prior to discard.
- Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations.
- Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner.
- To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

## Section 14: Transport Information

**\*\*CHART NAME\*\***

	UN NUMBER	PROPER SHIPPING NAME	TRANSPORT HAZARD CLASS	PACKING GROUP	ENVIRONMENTAL HAZARD
DOT	UN1267	Petroleum Crude Oil	3	I	Emergency response guide number: 128
TDG	UN1267	Petroleum Crude Oil	3	I	Marine Pollutant
IMO/IMDG	UN1267	Petroleum Crude Oil	3	I	Marine Pollutant
IATA/ICAO	UN1267	Petroleum Crude Oil	3	I	ERG Code 3L

**SPECIAL RECAUTIONS  
FOR USER**

- None

## Section 15: Regulatory Information

**U.S.—CERCLA/SARA  
HAZARDOUS  
SUBSTANCES AND  
THEIR REPORTABLE  
QUANTITIES**

COMPONENT	CAS #	AMOUNT
Petroleum distillate (naphtha)	8002-05-9	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Asphalt	8052-42-4	Not Listed
Butane	106-97-8	Not Listed
Cyclohexane	110-82-7	1000 lb final RQ; 454 kg final RQ
Cyclopentane	287-92-3	Not Listed
Ethane	74-84-0	Not Listed
Methylcyclopentane	96-37-7	Not Listed
Methylcyclohexane	108-87-2	Not Listed
Propane	74-98-6	Not Listed

---

Pentane	109-66-0	Not Listed
Octane	111-65-9	Not Listed
Nonane	111-84-2	Not Listed
Heptane	142-82-5	Not Listed
2-Methylbutane	78-78-4	Not Listed

---

Isobutane	75-28-5	NotListed
Hexane	110-54-3	5000lb final RQ; 2270 kg final RQ
Decane	124-18-5	NotListed
Benzene	71-43-2	10 lb final RQ; 4.54 kg final RQ
Xylene	1330-20-7	100lb final RQ; 45.4 kg final RQ
Toluene	108-88-3	1000lb final RQ; 454 kg final RQ
Ethylbenzene	100-41-4	1000lb final RQ; 454 kg final RQ
1,2,4-Trimethylbenzene	95-63-6	NotListed
Hydrogen Sulfide	7783-06-4	100lb final RQ; 45.4 kg final RQ

U.S.—CWA  
(CLEAN WATER ACT)—  
REPORTABLE  
QUANTITIES OF  
DESIGNATED  
HAZARDOUS  
SUBSTANCES

COMPONENT	CAS #	AMOUNT
Petroleum distillate (naphtha)	8002-05-9	NotListed
Natural gas condensates (petroleum)	64741-47-5	NotListed
Asphalt	8052-42-4	NotListed
Butane	106-97-8	NotListed
Cyclohexane	110-82-7	1000lb RQ
Cyclopentane	287-92-3	Not Listed
Ethane	74-84-0	Not Listed
Methylcyclohexane	108-87-2	Not Listed
Methylcyclopentane	96-37-7	Not Listed
Natural Gas Condensate	68919-39-1	Not Listed
Propane	74-98-6	Not Listed
Pentane	109-66-0	NotListed
Octane	111-65-9	NotListed
Nonane	111-84-2	NotListed
Heptane	142-82-5	NotListed
2-Methylbutane	78-78-4	NotListed
Isobutane	75-28-5	NotListed
Hexane	110-54-3	NotListed
Decane	124-18-5	NotListed
Benzene	71-43-2	10 lb RQ



---

Xylene	1330-20-7	100lb RQ
Toluene	108-88-3	1000lb RQ
Ethylbenzene	100-41-4	1000lb RQ
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Hydrogen Sulfide	7783-06-4	100lb RQ

---

U.S.—CWA  
(CLEAN WATER ACT)—  
RECOMMENDED  
WATER QUALITY  
CRITERIA—CCC FOR  
FRESHWATER LIFE

COMPONENT	CAS #	AMOUNT
Hydrogen Sulfide	7783-06-4	2.0 µg/LCCC

U.S.—CWA  
(CLEAN WATER ACT)—  
RECOMMENDED  
WATER QUALITY  
CRITERIA—CCC FOR  
SALTWATER LIFE

COMPONENT	CAS #	AMOUNT
HydrogenSulfide	7783-06-4	2.0 µg/LCCC

U.S.—CWA  
(CLEAN WATER ACT)—  
HAZARDOUS  
SUBSTANCES

COMPONENT	CAS #	LISTED
Petroleum distillate (naphtha)	8002-05-9	NotListed
Natural gas condensates (petroleum)	64741-47-5	NotListed
Asphalt	8052-42-4	NotListed
Butane	106-97-8	NotListed
Cyclohexane	110-82-7	X
Cyclopentane	287-92-3	Not Listed
Ethane	74-84-0	Not Listed
Methylcyclohexane	108-87-2	Not Listed
Methylcyclopentane	96-37-7	Not Listed
Natural Gas Condensate	68919-39-1	Not Listed
Pentane	109-66-0	NotListed
Propane	74-98-6	NotListed
Octane	111-65-9	NotListed
Nonane	111-84-2	NotListed
Heptane	142-82-5	NotListed
2-Methylbutane	78-78-4	NotListed
Isobutane	75-28-5	NotListed
Hexane	110-54-3	NotListed
Decane	124-18-5	NotListed
Benzene	71-43-2	X
Xylene	1330-20-7	X
Toluene	108-88-3	X

---

Ethylbenzene	100-41-4	X
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Hydrogen Sulfide	7783-06-4	X

---

*X= The component is listed*

U.S.—CWA  
(CLEAN WATER ACT)—  
PRIORITY POLLUTANTS

COMPONENT	CAS #	LISTED
Petroleum distillate (naphtha)	8002-05-9	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Asphalt	8052-42-4	Not Listed
Butane	106-97-8	Not Listed
Cyclohexane	110-82-7	Not Listed
Cyclopentane	287-92-3	Not Listed
Methylcyclohexane	108-87-2	Not Listed
Methylcyclopentane	96-37-7	Not Listed
Natural Gas Condensate	68919-39-1	Not Listed
Propane	74-98-6	Not Listed
Ethane	74-84-0	Not Listed
Pentane	109-66-0	Not Listed
Octane	111-65-9	Not Listed
Nonane	111-84-2	Not Listed
Heptane	142-82-5	Not Listed
2-Methylbutane	78-78-4	Not Listed
Isobutane	75-28-5	Not Listed
Hexane	110-54-3	Not Listed
Decane	124-18-5	Not Listed
Benzene	71-43-2	X
Xylene	1330-20-7	Not Listed
Toluene	108-88-3	X
Ethylbenzene	100-41-4	X
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Hydrogen Sulfide	7783-06-4	Not Listed

COMPONENT	CAS #	CLASSIFICATION
1,2,4-Trimethylbenzene	95-63-6	B3
2-Methylbutane (In Liquid form)	78-78-4	B2
Asphalt	8052-42-4	Not Listed
Benzene	71-43-2	B2, D2A, D2B
Butane	106-97-8	A, B1
Cyclohexane	110-82-7	B2, D2B
Cyclopentane	287-92-3	B2
Decane	124-18-5	B3, D2B
Ethane	74-84-0	A, B1
Ethylbenzene	100-41-4	B2, D2A, D2B
Heptane	142-82-5	B2, D2B
Hexane	110-54-3	B2, D2A, D2B
Hydrogen Sulfide	7783-06-4	A, B1, D1A, D2B
Isobutane	75-28-5	A, B1 (listed under Methyl-2 propane)
Methylcyclohexane	108-87-2	B2
Methylcyclopentane	96-37-7	Not Listed
Natural Gas Condensate	68919-39-1	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Nonane	111-84-2	B2, D2B
Octane	111-65-9	B2, D2B
Pentane	109-66-0	B2
Petroleum	8002-05-9	B2
Propane	74-98-6	A, B1

Toluene	108-88-3	B2, D2A, D2B
Xylene	1330-20-7	B2, D2A, D2B

X= The component is listed

CANADA—COUNCIL  
OF MINISTERS OF  
THE ENVIRONMENT—  
WATER QUALITY  
GUIDELINES FOR  
FRESHWATER  
AQUATIC LIFE

COMPONENT	CAS #	AMOUNT
Ethylbenzene	100-41-4	90 µg/L
Toluene	108-88-3	2.0 µg/L
Benzene	71-43-2	370 µg/L

CANADA—COUNCIL  
OF MINISTERS OF  
THE ENVIRONMENT—  
WATER QUALITY  
GUIDELINES FOR  
MARINE AQUATIC LIFE

COMPONENT	CAS #	AMOUNT
Ethylbenzene	100-41-4	25 µg/L
Toluene	108-88-3	215 µg/L
Benzene	71-43-2	110 µg/L

CANADA—  
ENVIRONMENTAL  
EMERGENCIES

COMPONENT	CAS #	LISTED
Petroleum distillate (naphtha)	8002-05-9	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Asphalt	8052-42-4	Not Listed
Butane	106-97-8	X
Cyclohexane	110-82-7	X
Cyclopentane	287-92-3	Not Listed
Pentane	109-66-0	X
Ethane	74-84-0	X
Methylcyclohexane	108-87-2	Not Listed
Methylcyclopentane	96-37-7	Not Listed
Natural Gas Condensate	68919-39-1	Not Listed

Octane	111-65-9	Not Listed
Nonane	111-84-2	Not Listed
Heptane	142-82-5	Not Listed
2-Methylbutane	78-78-4	X
Isobutane	75-28-5	X
Hexane	110-54-3	Not Listed
Decane	124-18-5	Not Listed
Benzene	71-43-2	X
Xylene	1330-20-7	X
Propane	74-98-6	X
Toluene	108-88-3	X
Ethylbenzene	100-41-4	X
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Hydrogen Sulfide	7783-06-4	X

X= The component is listed

## Section 16: Other Information

### NFPA



Health Hazard: 2      Flammability: 4      Instability: 0      Physical and Chemical Hazards: X

### HMIS

Health Hazard: 2      Flammability: 4      Instability: 0      Personal Protection: X

### ISSUING DATE

09/19/16

### REVISION DATE

09/19/16

### DISCLAIMER

- The information presented herein is based on data considered to be accurate as of the date of preparation of this Safety Data Sheet (SDS). However, SDSs may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

# Safety Data Sheet

## Section 1: Identification

### PRODUCT IDENTIFIER

Petroleum Crude Oil—Sour

### OTHER MEANS OF IDENTIFICATION

**UN-Number** UN1267

**Synonyms** Medium Sour Blend (MSB), Central Alberta Pipeline (CAL 1), Pembina Light Sour (PLS 1), Gibsons Light Sour (GLS 1), Pembina Low Sour (PLO 1), Gibson Sour (MGS 2), Kinder Morgan High Sour (KHE 2), Pembina High Sour (PHO 2), Peace Pipe Sour (SPR 2), Rangeland Sour (RSO 2), Gibsons High Sour (GHE 2), Hardisty Light (MBL 3), Manitoba Medium (MM 4), Wespur Midale (MSM 4), Tundra Light Sour (MLS), Moose Jaw Tops (MJT), Midale (M), Light Sour Blend (LSB)

**Chemical Category** Crude oils—extremely flammable

### RECOMMENDED USE

No information available

### RESTRICTIONS OF USE

No information available

### SUPPLIER INFORMATION

Enbridge Pipelines Inc.  
10201 Jasper Avenue  
Edmonton, Alberta T5J 3N7  
Canada  
TEL: 1-780-420-5210

### EMERGENCY CONTACT INFORMATION

**CHEMTREC** 1-800-424-9300 for US  
703- 527- 3887 outside US

**CANUTEC (Canadian Transportation)** 613-996-6666

## Section 2: Hazards Identification

### CLASSIFICATION

Skin Irritation	Category 2
Eye Irritation	Category 2
Germ Cell Mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 2
Specific Target Organ Systemic Toxicity (Single Exposure)	Category 3
Specific Target Organ Toxicity (Repeated Exposure)	Category 1
Aspiration Toxicity	Category 1
Flammable liquids	Category 1



## LABEL ELEMENTS

### Signal Word

Danger

### Hazard Pictograms



### Hazard Statements

- Causes skin irritation.
- Causes serious eye irritation.
- May cause genetic defects.
- May cause cancer.
- Suspected of damaging fertility or the unborn child.
- May cause respiratory irritation.
- Causes damage to organs through prolonged or repeated exposure.
- May be fatal if swallowed and enters airways.
- Extremely flammable liquid and vapor.
- May cause drowsiness or dizziness.

## PRECAUTIONARY STATEMENTS

### Prevention

- Wash face, hands and any exposed skin thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Use personal protective equipment as required.
- Do not breathe dust/fume/gas/mist/vapors/spray.
- Use only outdoors or in a well-ventilated area.
- Do not eat, drink or smoke when using this product.
- Keep away from heat/sparks/open flames/hot surfaces.
- Keep container tightly closed.
- No smoking.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting/equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- In case of inadequate ventilation wear respiratory protection.

### Response

- IF EXPOSED or concerned: Get medical advice/attention.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- Call a POISON CENTER or doctor/physician if you feel unwell.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- Do NOT induce vomiting.
- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower and soap.
- In case of fire: Use CO<sub>2</sub>, dry chemical, or foam for extinction.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If SKIN irritation occurs: Get medical advice/attention.
- If EYE irritation persists: Get medical advice/attention.

### Storage/Disposal

- Store locked up and keep cool.
- Store in a well-ventilated place. Keep container tightly closed.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

## OTHER INFORMATION

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
- Very toxic to aquatic life with long lasting effects.

## Section 3: Composition/Information on Ingredients

COMPONENT NAME	CAS NUMBER	PERCENTAGE (%)*	NOTES
2-Methylbutane (In Liquid form)	78-78-4	0-4	
Benzene	71-43-2	0-5	
Butane	106-97-8	0-5	
Cyclohexane	110-82-7	0-5	
Ethylbenzene	100-41-4	0-2	
Heptane	142-82-5	0-10	
Hexane	110-54-3	0-8	
Hydrogen Sulfide	7783-06-4	0-5	
Isobutane	75-28-5	0-5	
Methylcyclohexane	108-87-2	0-3	
Methylcyclopentane	96-37-7	0-3	
Naphthalene	91-20-3	0-1	
Natural gas condensates (petroleum)	64741-47-5	0-25	
Octane	111-65-9	0-10	
Pentane	109-66-0	0-3	
Petroleum	8002-05-9	0-100	
Sulfur	7704-34-9	0.5-2	
Toluene	108-88-3	0-5	
Xylene	1330-20-7	0-3	

\*Values do not reflect absolute minimums and maximums; those values may vary from time to time.

## Section 4: First Aid Measures

### DESCRIPTION OF NECESSARY MEASURES

<b>Inhalation</b>	<ul style="list-style-type: none"><li>• IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If irritation persists: Get medical advice/attention.</li></ul>
<b>Skin</b>	<ul style="list-style-type: none"><li>• IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.</li></ul>
<b>Eye</b>	<ul style="list-style-type: none"><li>• IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.</li></ul>
<b>Ingestion</b>	<ul style="list-style-type: none"><li>• Do NOT induce vomiting. Call a physician or poison control center.</li><li>• Aspiration hazard if swallowed—can enter lungs and cause damage.</li></ul>

### MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

**Refer to Section 11 - Toxicological Information**

### INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY

<b>Note to the Physician</b>	<ul style="list-style-type: none"><li>• Aspiration hazard. Symptoms may be delayed.</li><li>• Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.</li><li>• Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.</li></ul>
------------------------------	--

## Section 5: Fire Fighting Measures

### EXTINGUISHING MEDIA

<b>Suitable Extinguishing Media</b>	<ul style="list-style-type: none"><li>• SMALL FIRES: Dry chemical, CO<sub>2</sub>, water spray or regular foam.</li><li>• LARGE FIRE: Water spray, fog or regular foam.</li></ul>
-------------------------------------	---

<b>Unsuitable Extinguishing Media</b>	<ul style="list-style-type: none"><li>• CAUTION: Use of water spray when fighting fire may be inefficient.</li><li>• Do not use straight streams.</li></ul>
---------------------------------------	---

### FIREFIGHTING PROCEDURES

- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: If impossible to extinguish, protect surroundings and allow fire to burn itself out.
- Stay upwind.
- Ventilate closed spaces before entering.
- Fire fighters should wear complete protective clothing including self-contained breathing apparatus.
- FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
- FIRE: When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.
- Move containers from fire area if you can do it without risk.

- LARGE FIRES: Use water spray or fog; do not use straight streams.
- LARGE FIRES: If insufficient water supply: knock down vapors only. If this is impossible, withdraw from area and let fire burn.
- LARGE FIRES: Flood fire area with large quantities of water, while knocking down vapors with water fog.

## SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

- Vapors may travel to source of ignition and flash back.
- Air/vapor mixtures may explode when ignited.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Will be easily ignited by heat, sparks or flames.
- Runoff to sewer may create fire or explosion hazard.
- Vapor explosion hazard indoors, outdoors or in sewers.
- MAY EXPLODE AND THROW FRAGMENTS 1600 meters (1 MILE) OR MORE IF FIRE REACHES CARGO.
- May create vapor/air explosion hazard indoors, outdoors or in sewers.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

## EXPLOSION DATA

<b>Hazardous Combustion Products</b>	<ul style="list-style-type: none"> <li>• Carbon monoxide. Carbon dioxide (CO<sub>2</sub>). Nitrogen oxides (NO<sub>x</sub>). Oxides of sulfur.</li> <li>• Aldehydes, aromatic and other hydrocarbons.</li> </ul>
<b>Sensitivity to Mechanical Impact</b>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<b>Sensitivity to Static Discharge</b>	<ul style="list-style-type: none"> <li>• Yes.</li> </ul>

## PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS

- As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
- Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced firefighters.
- Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.
- Water spray may be useful in minimizing or dispersing vapors.
- Long-duration fires involving diluent stored in tanks may result in a boilover.
- For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear.

## Section 6:

## Accidental Release Measures

### PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

<b>Personal Precautions</b>	<ul style="list-style-type: none"> <li>• Evacuate personnel to safe areas.</li> <li>• Remove all sources of ignition.</li> <li>• Deny entry to unauthorized and unprotected personnel.</li> <li>• Use personal protective equipment.</li> <li>• Avoid contact with skin, eyes and clothing.</li> <li>• Stop leak if you can do it without risk.</li> <li>• Keep people away from and upwind of spill/leak.</li> <li>• Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.</li> <li>• Ventilate enclosed areas.</li> <li>• Do not walk through spilled material.</li> </ul>
<b>Protective Equipment</b>	<ul style="list-style-type: none"> <li>• Wear appropriate breathing apparatus (if applicable) and protective clothing.</li> </ul>

---

**Emergency Procedures**

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area) Keep unauthorized personnel away. Evacuate area. Keep out of low areas. Stop leak if you can do it without risk.
- Report spills to local or federal authorities as appropriate or required.

- 
- Avoid run off to waterways and sewers. Do NOT wash away into sewer. Prevent entry into waterways, sewers, basements or confined areas. Runoff from fire control may cause pollution.

---

**Methods for Containment**

- Stop leak if you can do it without risk.
- Contain and recover liquid when possible.
- A vapor suppressing foam may be used to reduce vapors.
- Dike far ahead of spill; use dry sand to contain the flow of material; contain water spills by booming.
- Use water spray to reduce vapors or divert vapor cloud drift.
- A fine water spray remotely directed to the edge of the spill pool can be used to direct and maintain a hot flare fire which will burn the spilled material in a controlled manner.

---

**Methods for Cleaning Up**

- Clean up spill immediately.
- LARGE SPILLS: DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.
- SMALL LIQUID SPILLS: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.
- Use appropriate Personal Protective Equipment (PPE).
- Use clean non-sparking tools to collect absorbed material.
- Vacuum spilled material.
- Try to work upwind of spill.
- All equipment used when handling the product must be grounded.
- Recover and return free product to proper containers
- Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids.
- Do not place spilled materials back in the original container.
- Do not flush to sewer or allow to enter waterways.

---

## Section 7:

## Handling and Storage

---

**PRECAUTIONS FOR  
SAFE HANDLING**

---

**Handling**

- All equipment used when handling the product must be grounded. Avoid contact with heat and ignition sources and oxidizers. Do not breathe (dust, vapor or spray mist). Do not use in areas without adequate ventilation. Do not use sparking tools. Keep away from heat, sparks, and flame. No open flames, no sparks and no smoking. Use only with adequate ventilation. Do not use or store near heat or open flame. Keep away from fire, sparks and heated surfaces.
  - The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes).
  - The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.
  - Take precautionary measures against static discharges.
-

<b>Handling</b>	<ul style="list-style-type: none"> <li>• Do not cut drill, grind or weld on empty containers since they may contain explosive residues.</li> <li>• Stay upwind and vent open hatches before uploading.</li> <li>• Avoid contact with skin, eyes and clothing.</li> <li>• Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.</li> <li>• Wear personal protective equipment.</li> <li>• Remove and wash contaminated clothing before re-use.</li> <li>• Do not eat, drink or smoke when using this product.</li> <li>• Do not take internally.</li> <li>• Wash thoroughly after handling.</li> <li>• Empty containers pose a potential fire and explosion hazard.</li> </ul>
-----------------	---

**CONDITIONS FOR  
SAFE STORAGE,  
INCLUDING ANY  
INCOMPATIBILITIES**

<b>Storage</b>	<ul style="list-style-type: none"> <li>• Ventilate enclosed areas.</li> <li>• Store in a well-ventilated place.</li> <li>• Keep container tightly closed.</li> <li>• Store locked up.</li> <li>• Avoid shock, impact, friction, and rough handling. Do not use sparking tools.</li> <li>• Store in a cool/low-temperature, well-ventilated place away from heat and ignition sources.</li> <li>• Keep away from sources of ignition.</li> <li>• No Smoking.</li> <li>• Do not enter confined spaces such as tanks or pits without following proper entry procedures.</li> <li>• Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area.</li> <li>• Harmful concentrations of hydrogen sulfide (H<sub>2</sub>S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments.</li> <li>• Keep away from open flames, hot surfaces and sources of ignition.</li> <li>• Keep product and empty container away from heat and sources of ignition.</li> <li>• Storage containers should be grounded and bonded.</li> <li>• Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.</li> <li>• Store away from incompatible materials.</li> </ul>
----------------	--

<b>Incompatible Products</b>	<ul style="list-style-type: none"> <li>• Strong oxidizers such as nitrates, chlorates, peroxides, chlorine.</li> </ul>
------------------------------	--

## Section 8: Exposure Controls/Personal Protection

**CONTROL  
PARAMETERS:  
EXPOSURE  
GUIDELINES**

CHEMICAL NAME	ACGIH	OSHA	NIOSH
<b>2-Methylbutane (In Liquid form)</b>	TWA 600 ppm	—	—
<b>Benzene</b>	TLV 0.5 ppm TLV 1.6 mg/m <sup>3</sup> STEL 2.5 ppm STEL 8 mg/m <sup>3</sup>	PEL 1 ppm STEL 5 ppm	TWA 0.1 ppm STEL 1 ppm IDLH 500 ppm
<b>Butane</b>	STEL 1000 ppm	—	TWA 800 ppm TWA 1900 mg/m <sup>3</sup>

<b>Cyclohexane</b>	TLV 100 ppm TLV 334 mg/m <sup>3</sup>	PEL 300 ppm PEL 1050 mg/m <sup>3</sup>	TWA 300 ppm TWA 1050 mg/m <sup>3</sup> IDLH 1300 ppm
<b>Ethylbenzene</b>	TLV 20 ppm TLV 87 mg/m <sup>3</sup>	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 125 ppm STEL 545 mg/m <sup>3</sup> IDLH 800 ppm
<b>Heptane</b>	TLV 400 ppm TLV 1640 mg/m <sup>3</sup> STEL 500 ppm STEL 2000 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 85 ppm TWA 350 mg/m <sup>3</sup> Ceiling 440 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 750 ppm
<b>Hexane</b>	TLV 50 ppm TLV 176 mg/m <sup>3</sup>	PEL 500 ppm PEL 1800 mg/m <sup>3</sup>	TWA 50 ppm TWA 180 mg/m <sup>3</sup> IDLH 1100 ppm
<b>Hydrogen sulfide</b>	TLV 1 ppm TLV 1.4 mg/m <sup>3</sup> STEL 5 ppm STEL 7 mg/m <sup>3</sup>	Ceiling 20 ppm	Ceiling 10 ppm Ceiling 15 mg/m <sup>3</sup> IDLH 100 ppm
<b>Isobutane</b>	TWA 1000 ppm	–	–
<b>Methylcyclohexane</b>	TLV 400 ppm TLV 1610 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 400 ppm TWA 1600 mg/m <sup>3</sup> IDLH 1200 ppm
<b>Naphthalene</b>	TLV 10 ppm STEL 15 ppm	PEL 10 ppm PEL 50 mg/m <sup>3</sup>	TWA 10 ppm TWA 50 mg/m <sup>3</sup> STEL 15 ppm STEL 75 mg/m <sup>3</sup>
<b>Octane</b>	TLV 300 ppm TLV 1401 mg/m <sup>3</sup>	PEL 500 ppm PEL 2350 mg/m <sup>3</sup>	TWA 75 ppm TWA 350 mg/m <sup>3</sup> Ceiling 385 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1000 ppm
<b>Pentane</b>	TLV 600 ppm TLV 1770 mg/m <sup>3</sup>	PEL 1000 ppm PEL 2950 mg/m <sup>3</sup>	TWA 120 ppm TWA 350 mg/m <sup>3</sup> Ceiling 610 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1500 ppm
<b>Toluene</b>	TLV 20 ppm TLV 75 mg/m <sup>3</sup>	PEL 200 ppm STEL 300 mg/m <sup>3</sup>	TWA 100 ppm TWA 375 mg/m <sup>3</sup> STEL 150 ppm STEL 560 mg/m <sup>3</sup> IDLH 500 ppm

<b>Xylenes</b>	TLV 100 ppm	PEL 100 ppm	TWA 100 ppm
	TLV 434 mg/m <sup>3</sup>	PEL 435 mg/m <sup>3</sup>	TWA 435 mg/m <sup>3</sup>
	STEL 150 ppm		STEL 150 ppm
	STEL 651 mg/m <sup>3</sup>		STEL 655 mg/m <sup>3</sup> IDLH 900 ppm
<b>APPROPRIATE ENGINEERING CONTROLS</b>	<ul style="list-style-type: none"> <li>Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. Prevent vapor build up by providing adequate ventilation during and after use. Use only appropriately classified electrical equipment.</li> </ul>		
<b>INDIVIDUAL PROTECTION MEASURES</b>	<b>Eye and Face</b>	<ul style="list-style-type: none"> <li>Wear face shield and eye protection.</li> </ul>	
	<b>Skin and Body</b>	<ul style="list-style-type: none"> <li>The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation.</li> <li>Wear protective gloves/protective clothing/eye protection/face protection. Wear long sleeves and/or protective coveralls.</li> </ul>	
	<b>Respiratory</b>	<ul style="list-style-type: none"> <li>Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.</li> </ul>	
	<b>General Hygiene Measures</b>	<ul style="list-style-type: none"> <li>Handle in accordance with good industrial hygiene and safety practice.</li> </ul>	

## Section 9: Physical and Chemical Properties

<b>MATERIAL DESCRIPTION</b>	<b>Physical State</b>	Liquid	<b>Odor</b>	Petroleum like odor
	<b>Substance Type</b>	Mixture	<b>Odor Threshold</b>	No data available
	<b>Appearance</b>	Yellow/green to Brown/black liquid		
<b>PROPERTIES</b>	<b>pH</b>	No data available	<b>Vapor Pressure</b>	No data available
	<b>Melting Point/ Freezing Point</b>	No data available	<b>Vapor Density</b>	>1 Air=1
	<b>Boiling Point/ Boiling Range</b>	-20 to 550°C -4 to 1022°F	<b>Relative Density</b>	No data available
	<b>Flash Point</b>	-40 to 100 °C -40 to 212 °F	<b>Water Solubility</b>	Negligible
	<b>Evaporation Rate</b>	No data available	<b>Partition Coefficient: n-octanol/water</b>	No data available
	<b>Flammability (solid, gas)</b>	No data available	<b>Autoignition Temperature</b>	No data available
	<b>Upper Flammability Limit</b>	No data available	<b>Decomposition Temperature</b>	No data available



<b>Lower Flammability Limit</b>	No data available	<b>Specific Gravity</b>	0.84 to 0.88
<b>Viscosity</b>	No data available		

## Section 10: Stability and Reactivity

<b>REACTIVITY</b>	Chlorine Dioxide
<b>CHEMICAL STABILITY</b>	Stable at 70 °F, 760 mm Hg pressure
<b>POSSIBILITY OF HAZARDOUS REACTIONS</b>	None under normal processing
<b>CONDITIONS TO AVOID</b>	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity
<b>INCOMPATIBLE MATERIALS</b>	Strong oxidizers such as nitrates, chlorates, peroxides, chlorine
<b>HAZARDOUS DECOMPOSITION PRODUCTS</b>	Combustion produces carbon monoxide, aldehydes, sulfur dioxide, aromatic and other hydrocarbons
<b>HAZARDOUS POLYMERIZATION</b>	Will not occur

## Section 11: Toxicological Information

<b>INFORMATION ON THE LIKELY ROUTES OF EXPOSURE</b>	<b>Inhalation</b>	• May cause irritation of respiratory tract. May cause drowsiness and dizziness.		
	<b>Eye Contact</b>	• Causes serious eye irritation.		
	<b>Skin Contact</b>	• Causes skin irritation.		
	<b>Ingestion</b>	<ul style="list-style-type: none"> <li>• Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.</li> <li>• Potential for aspiration if swallowed.</li> <li>• Aspiration may cause pulmonary edema and pneumonitis.</li> </ul>		
<b>TOXICOLOGICAL DATA</b>	<b>CHEMICAL NAME</b>	<b>LD50 ORAL</b>	<b>LD50 DERMAL</b>	<b>LC50 INHALATION</b>
	2-Methylbutane (In Liquid form)	–	–	= 150,000 mg/m <sup>3</sup> (Rat) 2 h
	Benzene	1800 mg/kg (Rat)	–	13050 - 14380 ppm (Rat) 4 h
	Butane	–	–	658 mg/L (Rat) 4 h
	Cyclohexane	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	= 13.9 mg/L (Rat) 4 h
	Ethylbenzene	= 3500 mg/kg (Rat)	= 15400 mg/kg (Rabbit)	= 17.2 mg/L (Rat) 4 h
	Heptane	–	= 3000 mg/kg (Rabbit)	= 103 g/m <sup>3</sup> (Rat) 4 h
	Hexane	= 25 g/kg (Rat)	= 3000 mg/kg (Rabbit)	= 48000 ppm (Rat) 4 h

<b>Hydrogen sulfide</b>	–	–	= 444 ppm (Rat)
<b>Isobutane</b>	–	–	= 658,000 mg/m <sup>3</sup> (Rat) 4 h
<b>Methylcyclohexane</b>	> 3200 mg/kg (Rat)	–	–
<b>Naphthalene</b>	490 mg/kg (Rat)	0.05 ml (Rabbit) 24 h	–
<b>Natural gas condensates (petroleum)</b>	–	–	= 600 mg/m <sup>3</sup> (Rat)
<b>Octane</b>	–	–	= 118 g/m <sup>3</sup> (Rat) 4 h = 25260 ppm (Rat) 4 h
<b>Pentane</b>	>2000 mg/kg (Rat)	–	364 g/cu (Rat) 4 h
<b>Petroleum</b>	>4300 mg/kg (Rat)	500 mg (Rabbit) 24 h	–
<b>Sulfur</b>	–	–	1660 mg/m <sup>3</sup> (Mammal)
<b>Toluene</b>	2.6 to 7.5 g/kg (Rat)	14.1 ml/kg (Rabbit)	–
<b>Xylenes</b>	= 3500 mg/kg (Rat)	> 4350 mg/kg (Rabbit) > 1700 mg/kg (Rabbit)	= 29.08 mg/L (Rat) 4 h = 5000 ppm (Rat) 4 h

#### SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

<b>Benzene</b>	<ul style="list-style-type: none"> <li>Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in humans. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.</li> </ul>
<b>Hydrogen Sulfide Gas (H<sub>2</sub>S)</b>	<ul style="list-style-type: none"> <li>Toxic by inhalation. Prolonged breathing of 50-100 ppm H<sub>2</sub>S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of &gt;1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H<sub>2</sub>S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H<sub>2</sub>S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H<sub>2</sub>S, respectively. Over the years a number of acute cases of H<sub>2</sub>S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.</li> </ul>
<b>Hexane</b>	<ul style="list-style-type: none"> <li>This product may contain hexane at a level of &gt;1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.</li> </ul>

<b>Xylenes</b>	<ul style="list-style-type: none"> <li>Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and man. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.</li> </ul>
<b>Toluene</b>	<p><b>Carcinogenicity:</b> Exposure of rats and mice to toluene at concentrations ranging from 120-1200 ppm for two years did not demonstrate evidence of carcinogenicity. Toluene has not been listed as a carcinogen by IARC.</p> <p><b>Target Organs:</b> Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.</p> <p><b>Reproductive Toxicity:</b> Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. Decreased fetal body weight and increased skeletal variations in both inhalation and oral studies, but only at doses that were maternally toxic. No fetal toxicity was seen at doses that were not maternally toxic. Decreased sperm counts have been observed in male rats in the absence of a reduction in fertility. Toluene has been reported to cause mental or growth retardation in the children of solvent abusers who directly inhale toluene during pregnancy.</p>
<b>Ethylbenzene</b>	<p><b>Carcinogenicity:</b> Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC.</p> <p><b>Target Organs:</b> In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), lung (alveolar epithelium metaplasia), thyroid (hyperplasia), thyroid (hyperplasia) and pituitary (hyperplasia). In animal models (particularly rats), ethyl benzene affects the auditory function mainly in the cochlear mid-frequency range and ototoxicity was observed after combined exposure to noise and ethyl benzene. There is no evidence of either ethyl benzene-induced hearing losses or ototoxicity with combined exposure to ethyl benzene and noise in workers.</p>
<b>Naphthalene</b>	<p>Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The US National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has been identified as a carcinogen by IARC and NTP.</p>

**DELAYED AND IMMEDIATE EFFECTS AND ALSO CHRONIC EFFECTS FROM SHORT- AND LONG-TERM EXPOSURE**

<b>Sensitization</b>	<ul style="list-style-type: none"> <li>No information available</li> </ul>
<b>Mutagenic Effects</b>	<ul style="list-style-type: none"> <li>May cause genetic defects</li> </ul>
<b>Carcinogenicity</b>	<ul style="list-style-type: none"> <li>May cause cancer</li> </ul>

## CARCINOGENIC INFORMATION

CHEMICAL NAME	ACGIH	ACGIH SKIN*	IARC	NTP	OSHA
<b>Benzene</b>	A1	X	Group 1	Known	X
<b>Ethylbenzene</b>	A3	–	Group 2B	Evidence	X
<b>Hexane</b>	–	X	–	–	–
<b>Naphthalene</b>	A4	X	2B	Evidence	
<b>Petroleum</b>	–		Group 3	Evidence	
<b>Toluene</b>	A4	–	Group 3	Evidence	–
<b>Xylenes</b>	A4	–	Group 3	Evidence	–

\*ACGIH Skin designation refers to the potential significant contribution of overall exposure by cutaneous route, including mucous membranes and eyes, from airborne exposure to gases, vapor, or liquid OR by direct skin contact.

## REPRODUCTIVE TOXICITY

- Suspected of damaging fertility or the unborn child.

## STOT—SINGLE EXPOSURE

- May cause drowsiness and dizziness.

## STOT—REPEATED EXPOSURE

- Causes damage to organs through prolonged or repeated exposure.

## ASPIRATION HAZARD

May be fatal if swallowed and enters airways Risk of serious damage to the lungs (by aspiration).

# Section 12: Ecological Information

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>2-Methylbutane (In Liquid form)</b>			EC50 48 h: = 2.3 mg/L (Daphnia magna)	
<b>Benzene</b>	EC50 72 h: = 29 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 10.7 - 14.7 mg/L flow-through (Pimephales promelas) LC50 96 h: = 5.3 mg/L flow-through (Oncorhynchus mykiss) LC50 96 h: = 22.49 mg/L static (Lepomis macrochirus) LC50 96 h: = 28.6 mg/L static (Poecilia reticulata) LC50 96 h: 22330 - 41160 µg/L static (Pimephales promelas) LC50 96 h: 70000 - 142000 µg/L static (Lepomis macrochirus)	EC50 48 h: 8.76 - 15.6 mg/L Static (Daphnia magna) EC50 48 h: = 10 mg/L (Daphnia magna)	–

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Cyclohexane</b>	EC50 72 h: > 500 mg/L (Desmodesmus subspicatus)	LC50 96 h: 3.96 - 5.18 mg/L flow-through (Pimephales promelas) LC50 96 h: 23.03 - 42.07 mg/L static (Pimephales promelas) LC50 96 h: 24.99 - 44.69 mg/L static (Lepomis macrochirus) LC50 96 h: 48.87 - 68.76 mg/L static (Poecilia reticulata)	EC50 24 h: > 400 mg/L (Daphnia magna)	EC50 = 85.5 mg/L 5 min EC50 = 93 mg/L 10 min (Microorganisms)
<b>Ethylbenzene</b>	EC50 72 h: = 4.6 mg/L (Pseudokirchneriella subcapitata) EC50 96 h: > 438 mg/L (Pseudokirchneriella subcapitata) EC50 72 h: 2.6 - 11.3 mg/L static (Pseudokirchneriella subcapitata) EC50 96 h: 1.7 - 7.6 mg/L static (Pseudokirchneriella subcapitata) EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 11.0 - 18.0 mg/L static (Oncorhynchus mykiss) LC50 96 h: = 4.2 mg/L semi-static (Oncorhynchus mykiss) LC50 96 h: 7.55 - 11 mg/L flow-through (Pimephales promelas) LC50 96 h: = 32 mg/L static (Lepomis macrochirus) LC50 96 h: 9.1 - 15.6 mg/L static (Pimephales promelas) LC50 96 h: = 9.6 mg/L static (Poecilia reticulata)	EC50 48 h: 1.8 - 2.4 mg/L (Daphnia magna)	EC50 = 9.68 mg/L 30 min EC50 = 96 mg/L 24 h (Microorganisms)
<b>Heptane</b>	–	LC50 96 h: = 375.0 mg/L (Cichlid fish)	EC50 24 h: > 10 mg/L (Daphnia magna)	–
<b>Hexane</b>	–	LC50 96 h: 2.1 - 2.98 mg/L flow-through (Pimephales promelas)	EC50 24 h: > 1000 mg/L (Daphnia magna)	–
<b>Hydrogen sulfide</b>	–	LC50 96h: 49 µg/l Oncorhynchus mykiss (Rainbow Trout) eggs LC50 24h: 1059.7 µg/l Pimephales promelas (Fathead Minnow)	EC50 48h: 62 µg/l Gammarus pseudolimnaeus (Scud)	–
<b>Methylcyclohexane</b>	–	LC50 96h: 72.0 mg/l (Golden Shiner)	–	–
<b>Naphthalene</b>	EC50 24 h: = 33000 ug/L (Chlorella vulgaris)	LC50 96 h: = 1.4 mg/L (Oncorhynchus gorboscha)	EC50 48 h: 1600 ug/L (Daphnia magna)	–
<b>Natural gas condensates (petroleum)</b>	–	LC50 96 h: = 119 mg/L static (Alburnus alburnus) LC50 96 h: = 82 mg/L static (Cyprinodon variegatus)	EC50 24 h: = 170 mg/L (Daphnia magna)	–

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Octane</b>	–	–	EC50 48 h: = 0.38 mg/L (water flea) EC50 48 h: = 0.02856 mg/L (Daphnia magna)	EC50 = 890 mg/L 30 min (Microorganisms) EC50 <1.67hr: 120 µg/l Mytilus edulis (Common Bay Mussel)
<b>Pentane</b>	–	–	EC50 48h: 135 mmol/cu	LC50 24h: 165 mmol/cu Artemia salina (Brine Shrimp)
<b>Sulfur</b>	–	LC50 96h: <14000 ug/l (Lepomis macrochirus)	EC50 48 h: = >5000000 ug/L (Daphnia magna)	–
<b>Toluene</b>	EC50: >433 mg/L Pseudokirchneriella subcapitata 96 h EC50: 12.5 mg/L Pseudokirchneriella subcapitata 72 h static	LC50: 15.22 - 19.05 mg/L Pimephales promelas 96 h flow-through LC50: 12.6 mg/L Pimephales promelas 96 h static LC50: 5.89 - 7.81 mg/L Oncorhynchus mykiss 96 h flow-through LC50: 14.1 - 17.16 mg/L Oncorhynchus mykiss 96 h static LC50: 5.8 mg/L Oncorhynchus mykiss 96 h semi-static LC50: 11.0-15.0 mg/L Lepomis macrochirus 96 h static LC50: 54 mg/L Oryzias latipes 96 h static LC50: 28.2 mg/L Poecilia reticulata 96 h semi-static LC50: 50.87-70.34 mg/L Poecilia reticulata 96 h static	EC50 48 h: 5.46 - 9.83 mg/L Static (Daphnia magna) EC50 48 h: = 11.5 mg/L (Daphnia magna)	EC50 = 19.7 mg/L 30 min (Microorganisms)
<b>Xylenes</b>	EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: = 13.4 mg/L flow-through (Pimephales promelas) LC50 96 h: 2.661 - 4.093 mg/L static (Oncorhynchus mykiss) LC50 96 h: 13.5 - 17.3 mg/L (Oncorhynchus mykiss) LC50 96 h: 13.1 - 16.5 mg/L flow-through (Lepomis macrochirus)	EC50 48 h: = 3.82 mg/L (water flea) LC50 48 h: = 0.6 mg/L (Gammarus lacustris)	–

## PERSISTENCE AND DEGRADABILITY

- No information available

---

**BIOACCUMULATIVE  
POTENTIAL**

CHEMICAL	LOG POW
2-Methylbutane (In Liquid form)	2.72
Benzene	1.83
Butane	2.89
Cyclohexane	3.44
Ethylbenzene	3.118
Heptane	3.90
Hexane	3.90
Hydrogen Sulfide	0.45
Isobutane	2.76
Methylcyclohexane	3.61
Methylcyclopentane	3.37
Naphthalene	3.30
Octane	5.18
Pentane	3.39
Toluene	2.65
Xylene	2.77-3.15

---

**MOBILITY IN SOIL**

CHEMICAL	EXPECTED SOIL MOBILITY
2-Methylbutane (In Liquid form)	Low
Benzene	High
Butane	Low
Cyclohexane	Moderate
Ethylbenzene	Low
Heptane	Moderate
Hexane	High
Isobutane	Very High
Methylcyclopentane	Low
Naphthalene	High to None
Octane	Immobile
Pentane	High

<b>Toluene</b>	High to Moderate
<b>Xylene</b>	Very High to Moderate
• No information available	

OTHER ADVERSE EFFECTS

Section 13:

Disposal Considerations

WASTE TREATMENT METHODS

<b>Product Waste</b>	<ul style="list-style-type: none"> <li>This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.</li> <li>This product could also contain benzene at &gt;0.5 ppm and could exhibit the characteristic of “toxicity” (D018) as determined by the toxicity characteristic leaching procedure (TCLP).</li> <li>This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s).</li> <li>It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.</li> </ul>
<b>Packaging Waste</b>	<ul style="list-style-type: none"> <li>Container contents should be completely used and containers should be emptied prior to discard.</li> <li>Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations.</li> <li>Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner.</li> <li>To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.</li> </ul>

Section 14:

Transport Information

\*\*CHART NAME\*\*

	UN NUMBER	PROPER SHIPPING NAME	TRANSPORT HAZARD CLASS	PACKING GROUP	ENVIRONMENTAL HAZARD
DOT	UN1267	Petroleum Crude Oil	3	I	Emergency response guide number: 128



<b>TDG</b>	UN1267	Petroleum Crude Oil	3		Marine Pollutant
<b>IMO/IMDG</b>	UN1267	Petroleum Crude Oil	3		Marine Pollutant
<b>IATA/ICAO</b>	UN1267	Petroleum Crude Oil	3		ERG Code 3L

• None

## SPECIAL RECAUTIONS FOR USER

## Section 15: Regulatory Information

### U.S.—CERCLA/SARA HAZARDOUS SUBSTANCES AND THEIR REPORTABLE QUANTITIES

COMPONENT	CAS #	AMOUNT
<b>2-Methylbutane (In Liquid form)</b>	78-78-4	Not Listed
<b>Benzene</b>	71-43-2	10 lb final RQ; 4.54 kg final RQ
<b>Butane</b>	106-97-8	Not Listed
<b>Cyclohexane</b>	110-82-7	1000 lb final RQ; 454 kg final RQ
<b>Ethylbenzene</b>	100-41-4	1000 lb final RQ; 454 kg final RQ
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	5000 lb final RQ; 2270 kg final RQ
<b>Hydrogen Sulfide</b>	7783-06-4	100 lb final RQ; 45.4 kg final RQ
<b>Isobutane</b>	75-28-5	Not Listed
<b>Methylcyclohexane</b>	108-87-2	Not Listed
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Naphthalene</b>	91-20-3	100 lb final RQ; 45.4 kg final RQ
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>Pentane</b>	109-66-0	Not Listed
<b>Petroleum</b>	8002-05-9	Not Listed
<b>Toluene</b>	108-88-3	1000 lb final RQ; 454 kg final RQ
<b>Xylene</b>	1330-20-7	100 lb final RQ; 45.4 kg final RQ

**U.S.—CWA  
(CLEAN WATER ACT)—  
REPORTABLE  
QUANTITIES OF  
DESIGNATED  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	AMOUNT
<b>2-Methylbutane (In Liquid form)</b>	78-78-4	Not Listed
<b>Benzene</b>	71-43-2	10 lb RQ
<b>Butane</b>	106-97-8	Not Listed
<b>Cyclohexane</b>	110-82-7	1000 lb RQ
<b>Ethylbenzene</b>	100-41-4	1000 lb RQ
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Hydrogen Sulfide</b>	7783-06-4	100 lb RQ
<b>Isobutane</b>	75-28-5	Not Listed
<b>Methylcyclohexane</b>	108-87-2	Not Listed
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Naphthalene</b>	91-20-3	100 lb RQ
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>Pentane</b>	109-66-0	Not Listed
<b>Petroleum</b>	8002-05-9	Not Listed
<b>Toluene</b>	108-88-3	1000 lb RQ
<b>Xylene</b>	1330-20-7	100 lb RQ

**U.S.—CWA  
(CLEAN WATER ACT)—  
RECOMMENDED  
WATER QUALITY  
CRITERIA—CCC FOR  
FRESHWATER LIFE**

COMPONENT	CAS #	AMOUNT
<b>Hydrogen Sulfide</b>	7783-06-4	2.0 µg/L CCC

**U.S.—CWA  
(CLEAN WATER ACT)—  
RECOMMENDED  
WATER QUALITY  
CRITERIA—CCC FOR  
SALTWATER LIFE**

COMPONENT	CAS #	AMOUNT
<b>Hydrogen Sulfide</b>	7783-06-4	2.0 µg/L CCC

**U.S.—CWA  
(CLEAN WATER ACT)—  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	LISTED
<b>2-Methylbutane (In Liquid form)</b>	78-78-4	Not Listed
<b>Benzene</b>	71-43-2	X
<b>Butane</b>	106-97-8	Not Listed
<b>Cyclohexane</b>	110-82-7	X
<b>Ethylbenzene</b>	100-41-4	X
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Hydrogen Sulfide</b>	7783-06-4	X
<b>Isobutane</b>	75-28-5	Not Listed
<b>Methylcyclohexane</b>	108-87-2	Not Listed
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Naphthalene</b>	91-20-3	X
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>Pentane</b>	109-66-0	Not Listed
<b>Petroleum</b>	8002-05-9	Not Listed
<b>Sulfur</b>	7704-34-9	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	X

*X= The component is listed*

**U.S.—CWA  
(CLEAN WATER ACT)—  
PRIORITY POLLUTANTS**

COMPONENT	CAS #	LISTED
<b>2-Methylbutane (In Liquid form)</b>	78-78-4	Not Listed
<b>Benzene</b>	71-43-2	X
<b>Butane</b>	106-97-8	Not Listed
<b>Cyclohexane</b>	110-82-7	Not Listed
<b>Ethylbenzene</b>	100-41-4	X
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Hydrogen Sulfide</b>	7783-06-4	Not Listed
<b>Isobutane</b>	75-28-5	Not Listed

<b>Methylcyclohexane</b>	108-87-2	Not Listed
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Naphthalene</b>	91-20-3	X
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>Pentane</b>	109-66-0	Not Listed
<b>Petroleum</b>	8002-05-9	Not Listed
<b>Sulfur</b>	7704-34-9	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	Not Listed

*X= The component is listed*

**CANADA-CEPA,  
1999**

<b>COMPONENT</b>	<b>CAS #</b>	<b>DSL STATUS</b>
<b>2-Methylbutane (In Liquid form)</b>	78-78-4	Listed
<b>Benzene</b>	71-43-2	Listed
<b>Butane</b>	106-97-8	Listed
<b>Cyclohexane</b>	110-82-7	Listed
<b>Ethylbenzene</b>	100-41-4	Listed
<b>Heptane</b>	142-82-5	Listed
<b>Hexane</b>	110-54-3	Listed
<b>Hydrogen Sulfide</b>	7783-06-4	Listed
<b>Isobutane</b>	75-28-5	Listed
<b>Methylcyclohexane</b>	108-87-2	Listed
<b>Methylcyclopentane</b>	96-37-7	Listed
<b>Naphthalene</b>	91-20-3	Listed
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Listed
<b>Octane</b>	111-65-9	Listed
<b>Pentane</b>	109-66-0	Listed
<b>Petroleum</b>	8002-05-9	Listed
<b>Sulfur</b>	7704-34-9	Listed

<b>Toluene</b>	108-88-3	Listed
<b>Xylene</b>	1330-20-7	Listed

**CANADA—COUNCIL  
OF MINISTERS OF  
THE ENVIRONMENT—  
WATER QUALITY  
GUIDELINES FOR  
FRESHWATER  
AQUATIC LIFE**

<b>COMPONENT</b>	<b>CAS #</b>	<b>AMOUNT</b>
<b>Ethylbenzene</b>	100-41-4	90 µg/L
<b>Toluene</b>	108-88-3	2.0 µg/L
<b>Benzene</b>	71-43-2	370 µg/L
<b>Naphthalene</b>	91-20-3	1.1 µg/L (listed under Polycyclic aromatic hydrocarbons (PAHs))

**CANADA—COUNCIL  
OF MINISTERS OF  
THE ENVIRONMENT—  
WATER QUALITY  
GUIDELINES FOR  
MARINE AQUATIC LIFE**

<b>COMPONENT</b>	<b>CAS #</b>	<b>AMOUNT</b>
<b>Ethylbenzene</b>	100-41-4	25 µg/L
<b>Toluene</b>	108-88-3	215 µg/L
<b>Benzene</b>	71-43-2	110 µg/L
<b>Naphthalene</b>	91-20-3	1.4 µg/L (listed under Polycyclic aromatic hydrocarbons (PAHs))

**CANADA—  
ENVIRONMENTAL  
EMERGENCIES**

<b>COMPONENT</b>	<b>CAS #</b>	<b>LISTED</b>
<b>2-Methylbutane (In Liquid form)</b>	78-78-4	X
<b>Benzene</b>	71-43-2	X
<b>Butane</b>	106-97-8	X
<b>Cyclohexane</b>	110-82-7	X
<b>Ethylbenzene</b>	100-41-4	X
<b>Heptane</b>	142-82-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Hydrogen Sulfide</b>	7783-06-4	X
<b>Isobutane</b>	75-28-5	X
<b>Methylcyclohexane</b>	108-87-2	Not Listed
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Naphthalene</b>	91-20-3	X
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>Pentane</b>	109-66-0	X
<b>Petroleum</b>	8002-05-9	Not Listed

<b>Sulfur</b>	7704-34-9	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	X

X= The component is listed

## Section 16: Other Information

### NFPA



**Health Hazard:** 3      **Flammability:** 4      **Instability:** 0      **Physical and Chemical Hazards:** X

### HMIS

**Health Hazard:** 3      **Flammability:** 4      **Instability:** 0      **Personal Protection:** X

### ISSUING DATE

5/7/15

### REVISION DATE

01/18/2019

### DISCLAIMER

- The information presented herein is based on data considered to be accurate as of the date of preparation of this Safety Data Sheet (SDS). However, SDSs may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

# Safety Data Sheet

## Section 1: Identification

### PRODUCT IDENTIFIER

Petroleum Crude Oil—Heavy

### OTHER MEANS OF IDENTIFICATION

**UN-Number** UN1267

**Synonyms** Premium Conventional Heavy (PCH), Conventional Heavy (CHV), Canadian Heavy Sweet (CHS), Canadian Blended Heavy (CBH)

**Chemical Category** Crude oils—extremely flammable

### RECOMMENDED USE

No information available

### RESTRICTIONS OF USE

No information available

### SUPPLIER INFORMATION

Enbridge Pipelines Inc.  
10201 Jasper Avenue  
Edmonton, Alberta T5J 3N7  
Canada  
TEL: 1-780-420-5210

### EMERGENCY CONTACT INFORMATION

**CHEMTREC** 1-800-424-9300 for US  
703-527-3887 outside US

**CANUTEC (Canadian Transportation)** 613-996-6666

## Section 2: Hazards Identification

### CLASSIFICATION

Skin Irritation	Category 2
Eye Irritation	Category 2
Germ Cell Mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 2
Specific Target Organ Systemic Toxicity (Single Exposure)	Category 3
Specific Target Organ Toxicity (Repeated Exposure)	Category 1
Aspiration Toxicity	Category 1
Flammable liquids	Category 1

## LABEL ELEMENTS

### Signal Word

Danger

### Hazard Pictograms



### Hazard Statements

- Causes skin irritation.
- Causes serious eye irritation.
- May cause genetic defects.
- May cause cancer.
- Suspected of damaging fertility or the unborn child.
- May cause respiratory irritation.
- Causes damage to organs through prolonged or repeated exposure.
- May be fatal if swallowed and enters airways.
- Extremely flammable liquid and vapor.
- May cause drowsiness or dizziness.

## PRECAUTIONARY STATEMENTS

### Prevention

- Wash face, hands and any exposed skin thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Use personal protective equipment as required.
- Do not breathe dust/fume/gas/mist/vapors/spray.
- Use only outdoors or in a well-ventilated area.
- Do not eat, drink or smoke when using this product.
- Keep away from heat/sparks/open flames/hot surfaces.
- Keep container tightly closed.
- No smoking.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting/equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- In case of inadequate ventilation wear respiratory protection.

### Response

- IF EXPOSED or concerned: Get medical advice/attention.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- Call a POISON CENTER or doctor/physician if you feel unwell.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- Do NOT induce vomiting.
- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower and soap.
- In case of fire: Use CO<sub>2</sub>, dry chemical, or foam for extinction.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If SKIN irritation occurs: Get medical advice/attention.
- If EYE irritation persists: Get medical advice/attention.

### Storage/Disposal

- Store locked up and keep cool.
- Store in a well-ventilated place. Keep container tightly closed.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

## OTHER INFORMATION

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
- Very toxic to aquatic life with long lasting effects.



Section 3:

Composition/Information on Ingredients

Component Name	CAS Number	Percentage (%)*	Notes
Petroleum distillate (naphtha)	8002-05-9	60-100	
Natural Gas Condensates (petroleum)	64741-47-5	60-100	
Asphalt	8052-42-4	50-90	
Butane	106-97-8	0-10	
Pentane	109-66-0	0-7	
Octane	111-65-9	0-5	
Nonane	111-84-2	0-5	
Heptane	142-82-5	0-5	
2-Methylbutane	78-78-4	0-5	
Isobutane	75-28-5	0-5	
Hexane	110-54-3	0-5	
Decane	124-18-5	0-5	
Benzene	71-43-2	0-2	
Xylene	1330-20-7	0-1	
Toluene	108-88-3	0-1	
Ethylbenzene	100-41-4	0-1	
1,2,4-Trimethylbenzene	95-63-6	0-1	
Hydrogen Sulfide	7783-06-4	0-1	

\*Values do not reflect absolute minimums and maximums; those values may vary from time to time.

Section 4:

First Aid Measures

Description of Necessary Measures	Inhalation	• IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If irritation persists: Get medical advice/attention.
	Skin	• IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.

<b>Eye</b>	<ul style="list-style-type: none"> <li>• IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.</li> </ul>
<b>Ingestion</b>	<ul style="list-style-type: none"> <li>• Do NOT induce vomiting. Call a physician or poison control center.</li> <li>• Aspiration hazard if swallowed—can enter lungs and cause damage.</li> </ul>
<b>Refer to Section 11 - Toxicological Information</b>	
<b>Note to the Physician</b>	<ul style="list-style-type: none"> <li>• Aspiration hazard. Symptoms may be delayed.</li> <li>• Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.</li> <li>• Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.</li> </ul>

**MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED**

**INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY**

## Section 5: Fire Fighting Measures

**EXTINGUISHING MEDIA**

<b>Suitable Extinguishing Media</b>	<ul style="list-style-type: none"> <li>• SMALL FIRES: Dry chemical, CO<sub>2</sub>, water spray or regular foam.</li> <li>• LARGE FIRE: Water spray, fog or regular foam.</li> </ul>
<b>Unsuitable Extinguishing Media</b>	<ul style="list-style-type: none"> <li>• CAUTION: Use of water spray when fighting fire may be inefficient.</li> <li>• Do not use straight streams.</li> </ul>

**FIREFIGHTING PROCEDURES**

- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: If impossible to extinguish, protect surroundings and allow fire to burn itself out.
- Stay upwind.
- Ventilate closed spaces before entering.
- Fire fighters should wear complete protective clothing including self-contained breathing apparatus.
- FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
- FIRE: When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.
- Move containers from fire area if you can do it without risk.
- LARGE FIRES: Use water spray or fog; do not use straight streams.
- LARGE FIRES: If insufficient water supply: knock down vapors only. If this is impossible, withdraw from area and let fire burn.
- LARGE FIRES: Flood fire area with large quantities of water, while knocking down vapors with water fog.

### SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

- Vapors may travel to source of ignition and flash back.
- Air/vapor mixtures may explode when ignited.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Will be easily ignited by heat, sparks or flames.
- Runoff to sewer may create fire or explosion hazard.
- Vapor explosion hazard indoors, outdoors or in sewers.
- MAY EXPLODE AND THROW FRAGMENTS 1600 meters (1 MILE) OR MORE IF FIRE REACHES CARGO.
- May create vapor/air explosion hazard indoors, outdoors or in sewers.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

### EXPLOSION DATA

- |                                      |   |
|--------------------------------------|---|
| <b>Hazardous Combustion Products</b> | <ul style="list-style-type: none"><li>• Carbon monoxide. Carbon dioxide (CO<sub>2</sub>). Nitrogen oxides (NO<sub>x</sub>). Oxides of sulfur.</li><li>• Aldehydes, aromatic and other hydrocarbons.</li></ul> |
|--------------------------------------|---|

- |   |   |
|---|---|
| <b>Sensitivity to Mechanical Impact</b> | <ul style="list-style-type: none"><li>• None.</li></ul> |
|---|---|

- |  |  |
|--|--|
| <b>Sensitivity to Static Discharge</b> | <ul style="list-style-type: none"><li>• Yes.</li></ul> |
|--|--|

### PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS

- As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
- Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced firefighters.
- Carbon dioxide can displace oxygen.
- Use caution when applying carbon dioxide in confined spaces.
- Water spray may be useful in minimizing or dispersing vapors.
- Long-duration fires involving diluent stored in tanks may result in a boilover.
- For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear.

## Section 6:

## Accidental Release Measures

### PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

- |                             |   |
|-----------------------------|---|
| <b>Personal Precautions</b> | <ul style="list-style-type: none"><li>• Evacuate personnel to safe areas.</li><li>• Remove all sources of ignition.</li><li>• Deny entry to unauthorized and unprotected personnel.</li><li>• Use personal protective equipment.</li><li>• Avoid contact with skin, eyes and clothing.</li><li>• Stop leak if you can do it without risk.</li><li>• Keep people away from and upwind of spill/leak.</li><li>• Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.</li><li>• Ventilate enclosed areas.</li><li>• Do not walk through spilled material.</li></ul> |
|-----------------------------|---|

- |                             |   |
|-----------------------------|---|
| <b>Protective Equipment</b> | <ul style="list-style-type: none"><li>• Wear appropriate breathing apparatus (if applicable) and protective clothing.</li></ul> |
|-----------------------------|---|

- |                             |  |
|-----------------------------|--|
| <b>Emergency Procedures</b> | <ul style="list-style-type: none"><li>• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area) Keep unauthorized personnel away. Evacuate area. Keep out of low areas. Stop leak if you can do it without risk.</li><li>• Report spills to local or federal authorities as appropriate or required.</li></ul> |
|-----------------------------|--|

---

## ENVIRONMENTAL PRECAUTIONS

---

- Avoid run off to waterways and sewers. Do NOT wash away into sewer. Prevent entry into waterways, sewers, basements or confined areas. Runoff from fire control may cause pollution.
- 

## METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP

### Methods for Containment

- Stop leak if you can do it without risk.
  - Contain and recover liquid when possible.
  - A vapor suppressing foam may be used to reduce vapors.
  - Dike far ahead of spill; use dry sand to contain the flow of material; contain water spills by booming.
  - Use water spray to reduce vapors or divert vapor cloud drift.
  - A fine water spray remotely directed to the edge of the spill pool can be used to direct and maintain a hot flare fire which will burn the spilled material in a controlled manner.
- 

### Methods for Cleaning Up

- Clean up spill immediately.
  - LARGE SPILLS: DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.
  - SMALL LIQUID SPILLS: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.
  - Use appropriate Personal Protective Equipment (PPE).
  - Use clean non-sparking tools to collect absorbed material.
  - Vacuum spilled material.
  - Try to work upwind of spill.
  - All equipment used when handling the product must be grounded.
  - Recover and return free product to proper containers
  - Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids.
  - Do not place spilled materials back in the original container.
  - Do not flush to sewer or allow to enter waterways.
- 

---

## Section 7:

## Handling and Storage

---

### PRECAUTIONS FOR SAFE HANDLING

#### Handling

- All equipment used when handling the product must be grounded. Avoid contact with heat and ignition sources and oxidizers. Do not breathe (dust, vapor or spray mist). Do not use in areas without adequate ventilation. Do not use sparking tools. Keep away from heat, sparks, and flame. No open flames, no sparks and no smoking. Use only with adequate ventilation. Do not use or store near heat or open flame. Keep away from fire, sparks and heated surfaces.
  - The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes).
  - The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.
  - Take precautionary measures against static discharges.
-

<b>Handling</b>	<ul style="list-style-type: none"> <li>• Do not cut drill, grind or weld on empty containers since they may contain explosive residues.</li> <li>• Stay upwind and vent open hatches before uploading.</li> <li>• Avoid contact with skin, eyes and clothing.</li> <li>• Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.</li> <li>• Wear personal protective equipment.</li> <li>• Remove and wash contaminated clothing before re-use.</li> <li>• Do not eat, drink or smoke when using this product.</li> <li>• Do not take internally.</li> <li>• Wash thoroughly after handling.</li> <li>• Empty containers pose a potential fire and explosion hazard.</li> </ul>
<b>Storage</b>	<ul style="list-style-type: none"> <li>• Ventilate enclosed areas.</li> <li>• Store in a well-ventilated place.</li> <li>• Keep container tightly closed.</li> <li>• Store locked up.</li> <li>• Avoid shock, impact, friction, and rough handling. Do not use sparking tools.</li> <li>• Store in a cool/low-temperature, well-ventilated place away from heat and ignition sources.</li> <li>• Keep away from sources of ignition.</li> <li>• No Smoking.</li> <li>• Do not enter confined spaces such as tanks or pits without following proper entry procedures.</li> <li>• Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area.</li> <li>• Harmful concentrations of hydrogen sulfide (H<sub>2</sub>S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments.</li> <li>• Keep away from open flames, hot surfaces and sources of ignition.</li> <li>• Keep product and empty container away from heat and sources of ignition.</li> <li>• Storage containers should be grounded and bonded.</li> <li>• Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.</li> <li>• Store away from incompatible materials.</li> </ul>
<b>Incompatible Products</b>	<ul style="list-style-type: none"> <li>• Strong oxidizers such as nitrates, chlorates, peroxides, chlorine.</li> </ul>

## Section 8:

## Exposure Controls/Personal Protection

### CONTROL PARAMETERS: EXPOSURE GUIDELINES

CHEMICAL NAME	ACGIH	OSHA	NIOSH
Petroleum distillate (naphtha)	—	—	TWA 350 mg/m <sup>3</sup> IDLH 1100 ppm Ceiling 1800 mg/m <sup>3</sup>
Asphalt	TLV 0.5 mg/m <sup>3</sup>		Ceiling 5 mg/m <sup>3</sup>
Butane	STEL 1000 ppm	—	TWA 800 ppm TWA 1900 mg/m <sup>3</sup>

<b>Pentane</b>	TLV 600 ppm TLV 1770 mg/m <sup>3</sup>	PEL 1000 ppm PEL 2950 mg/m <sup>3</sup>	TWA 120 ppm TWA 350 mg/m <sup>3</sup> Ceiling 610 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1500 ppm
<b>Octane</b>	TLV 300 ppm TLV 1401 mg/m <sup>3</sup>	PEL 500 ppm PEL 2350 mg/m <sup>3</sup>	TWA 75 ppm TWA 350 mg/m <sup>3</sup> Ceiling 385 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1000 ppm
<b>Nonane</b>	TLV 200 ppm TLV 1050 mg/m <sup>3</sup>	–	TWA 200 ppm TWA 1050 mg/m <sup>3</sup>
<b>Heptane</b>	TLV 400 ppm TLV 1640 mg/m <sup>3</sup> STEL 500 ppm STEL 2000 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 85 ppm TWA 350 mg/m <sup>3</sup> Ceiling 440 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 750 ppm
<b>2-Methylbutane</b>	TWA 600 ppm	–	–
<b>Isobutane</b>	TWA 1000 ppm	–	–
<b>Hexane</b>	TLV 50 ppm TLV 176 mg/m <sup>3</sup>	PEL 500 ppm PEL 1800 mg/m <sup>3</sup>	TWA 50 ppm TWA 180 mg/m <sup>3</sup> IDLH 1100 ppm
<b>Decane</b>	–	–	–
<b>Benzene</b>	TLV 0.5 ppm TLV 1.6 mg/m <sup>3</sup> STEL 2.5 ppm STEL 8 mg/m <sup>3</sup>	PEL 1 ppm STEL 5 ppm	TWA 0.1 ppm STEL 1 ppm IDLH 500 ppm
<b>Xylenes</b>	TLV 100 ppm TLV 434 mg/m <sup>3</sup> STEL 150 ppm STEL 651 mg/m <sup>3</sup>	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 150 ppm STEL 655 mg/m <sup>3</sup> IDLH 900 ppm
<b>Toluene</b>	TLV 20 ppm TLV 75 mg/m <sup>3</sup>	PEL 200 ppm STEL 300 mg/m <sup>3</sup>	TWA 100 ppm TWA 375 mg/m <sup>3</sup> STEL 150 ppm STEL 560 mg/m <sup>3</sup> IDLH 500 ppm
<b>Ethylbenzene</b>	TLV 20 ppm TLV 87 mg/m <sup>3</sup>	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 125 ppm STEL 545 mg/m <sup>3</sup> IDLH 800 ppm

<b>1,2,4-Trimethylbenzene</b>	TWA 25 ppm	–	TWA 25 ppm TWA 125 mg/m <sup>3</sup>
<b>Hydrogen sulfide</b>	TLV 1 ppm TLV 1.4 mg/m <sup>3</sup> STEL 5 ppm STEL 7 mg/m <sup>3</sup>	Ceiling 20 ppm	Ceiling 10 ppm Ceiling 15 mg/m <sup>3</sup> IDLH 100 ppm
<b>APPROPRIATE ENGINEERING CONTROLS</b>	<ul style="list-style-type: none"> <li>Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. Prevent vapor build up by providing adequate ventilation during and after use. Use only appropriately classified electrical equipment.</li> </ul>		
<b>INDIVIDUAL PROTECTION MEASURES</b>	<b>Eye and Face</b>	<ul style="list-style-type: none"> <li>Wear face shield and eye protection.</li> </ul>	
	<b>Skin and Body</b>	<ul style="list-style-type: none"> <li>The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation.</li> <li>Wear protective gloves/protective clothing/eye protection/face protection. Wear long sleeves and/or protective coveralls.</li> </ul>	
	<b>Respiratory</b>	<ul style="list-style-type: none"> <li>Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.</li> </ul>	
	<b>General Hygiene Measures</b>	<ul style="list-style-type: none"> <li>Handle in accordance with good industrial hygiene and safety practice.</li> </ul>	

## Section 9: Physical and Chemical Properties

<b>MATERIAL DESCRIPTION</b>	<b>Physical State</b>	Liquid	<b>Odor</b>	Petroleum like odor
	<b>Substance Type</b>	Mixture	<b>Odor Threshold</b>	No data available
	<b>Appearance</b>	Brown		
<b>PROPERTIES</b>	<b>pH</b>	No data available	<b>Vapor pressure</b>	No data available
	<b>Melting Point/Freezing Point</b>	No data available	<b>Vapor density</b>	2.5 to 5.0 Air=1
	<b>Boiling Point/Boiling Range</b>	34 to 260°C 93.2 to 500°F	<b>Relative density</b>	No data available
	<b>Flash Point</b>	-40 to 260 °C -40 to 500 °F	<b>Water Solubility</b>	Negligible
	<b>Evaporation Rate</b>	No data available	<b>Partition coefficient: n-octanol/water</b>	No data available
	<b>Flammability (solid, gas)</b>	No data available	<b>Autoignition temperature</b>	No data available
	<b>Upper Flammability Limit</b>	No data available	<b>Decomposition temperature</b>	No data available

<b>Lower Flammability Limit</b>	No data available	<b>Specific Gravity</b>	0.65-0.98
<b>Viscosity</b>	No data available		

## Section 10: Stability and Reactivity

<b>REACTIVITY</b>	Chlorine Dioxide
<b>CHEMICAL STABILITY</b>	Stable at 70 °F, 760 mm Hg pressure
<b>POSSIBILITY OF HAZARDOUS REACTIONS</b>	None under normal processing
<b>CONDITIONS TO AVOID</b>	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity
<b>INCOMPATIBLE MATERIALS</b>	Strong oxidizers such as nitrates, chlorates, peroxides, chlorine
<b>HAZARDOUS DECOMPOSITION PRODUCTS</b>	Combustion produces carbon monoxide, aldehydes, sulfur dioxide, aromatic and other hydrocarbons
<b>HAZARDOUS POLYMERIZATION</b>	Will not occur

## Section 11: Toxicological Information

<b>INFORMATION ON THE LIKELY ROUTES OF EXPOSURE</b>	<b>Inhalation</b>	• May cause irritation of respiratory tract. May cause drowsiness and dizziness.		
	<b>Eye Contact</b>	• Causes serious eye irritation.		
	<b>Skin Contact</b>	• Causes skin irritation.		
	<b>Ingestion</b>	<ul style="list-style-type: none"> <li>• Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.</li> <li>• Potential for aspiration if swallowed.</li> <li>• Aspiration may cause pulmonary edema and pneumonitis.</li> </ul>		
<b>TOXICOLOGICAL DATA</b>	<b>CHEMICAL NAME</b>	<b>LD50 ORAL</b>	<b>LD50 DERMAL</b>	<b>LC50 INHALATION</b>
	Asphalt	>5000 mg/kg (Rat)	—	>94.4 mg/m <sup>3</sup> (Rat)
	Butane	—	—	658 mg/L (Rat) 4 h
	Pentane	>2000 mg/kg (Rat)	—	364 g/cu (Rat) 4 h
	Octane	—	—	= 118 g/m <sup>3</sup> (Rat) 4 h = 25260 ppm (Rat) 4 h
	Nonane	—	—	= 3200 ppm (Rat) 4 h
	Heptane	—	= 3000 mg/kg (Rabbit)	= 103 g/m <sup>3</sup> (Rat) 4 h
	2-Methylbutane	—	—	= 150,000 mg/m <sup>3</sup> (Rat) 2 h



<b>Isobutane</b>	–	–	= 658,000 mg/m <sup>3</sup> (Rat) 4 h
<b>Hexane</b>	= 25 g/kg (Rat)	= 3000 mg/kg (Rabbit)	= 48000 ppm (Rat) 4 h
<b>Decane</b>	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	–
<b>Benzene</b>	1800 mg/kg (Rat)	–	13050 - 14380 ppm (Rat) 4 h
<b>Xylenes</b>	= 3500 mg/kg (Rat)	> 4350 mg/kg (Rabbit) > 1700 mg/kg (Rabbit)	= 29.08 mg/L (Rat) 4 h = 5000 ppm (Rat) 4 h
<b>Toluene</b>	2.6 to 7.5 g/kg (Rat)	14.1 ml/kg (Rabbit)	–
<b>Ethylbenzene</b>	= 3500 mg/kg (Rat)	= 15400 mg/kg (Rabbit)	= 17.2 mg/L (Rat) 4 h
<b>1,2,4-Trimethylbenzene</b>	5 g/kg (Rat)	–	18000 mg/m <sup>3</sup> (Rat) 4h
<b>Hydrogen sulfide</b>	–	–	= 444 ppm (Rat)

## SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

<b>Benzene</b>	<ul style="list-style-type: none"> <li>Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in humans. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.</li> </ul>
<b>Hydrogen Sulfide Gas (H<sub>2</sub>S)</b>	<ul style="list-style-type: none"> <li>Toxic by inhalation. Prolonged breathing of 50-100 ppm H<sub>2</sub>S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of &gt;1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H<sub>2</sub>S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H<sub>2</sub>S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H<sub>2</sub>S, respectively. Over the years a number of acute cases of H<sub>2</sub>S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.</li> </ul>
<b>Hexane</b>	<ul style="list-style-type: none"> <li>This product may contain hexane at a level of &gt;1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.</li> </ul>
<b>Xylenes</b>	<ul style="list-style-type: none"> <li>Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and man. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.</li> </ul>

**Toluene**

**Carcinogenicity:** Exposure of rats and mice to toluene at concentrations ranging from 120-1200 ppm for two years did not demonstrate evidence of carcinogenicity. Toluene has not been listed as a carcinogen by IARC.

**Target Organs:** Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.

**Reproductive Toxicity:** Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. Decreased fetal body weight and increased skeletal variations in both inhalation and oral studies, but only at doses that were maternally toxic. No fetal toxicity was seen at doses that were not maternally toxic.

Decreased sperm counts have been observed in male rats in the absence of a reduction in fertility. Toluene has been reported to cause mental or growth retardation in the children of solvent abusers who directly inhale toluene during pregnancy.

**Ethylbenzene**

**Carcinogenicity:** Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC.

**Target Organs:** In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), lung (alveolar epithelium metaplasia), thyroid (hyperplasia), thyroid (hyperplasia) and pituitary (hyperplasia). In animal models (particularly rats), ethyl benzene affects the auditory function mainly in the cochlear mid-frequency range and ototoxicity was observed after combined exposure to noise and ethyl benzene. There is no evidence of either ethyl benzene-induced hearing losses or ototoxicity with combined exposure to ethyl benzene and noise in workers.

**Sensitization** • No information available

**Mutagenic Effects** • May cause genetic defects

**Carcinogenicity** • May cause cancer

CHEMICAL NAME	ACGIH	ACGIH SKIN*	IARC	NTP	OSHA
Petroleum distillate (naphtha)	A2	–	Group 3		–
Asphalt	A4	–	Group 2B	Reasonably Anticipated	–
Hexane	–	X	–	–	–
Benzene	A1	X	Group 1	Known	X
Xylenes	A4	–	Group 3	Evidence	
Toluene	A4	–	Group 3	Evidence	–
Ethylbenzene	A3	–	Group 2B	Evidence	X

\*ACGIH Skin designation refers to the potential significant contribution of overall exposure by cutaneous route, including mucous membranes and eyes, from airborne exposure to gases, vapor, or liquid OR by direct skin contact.

DELAYED AND IMMEDIATE EFFECTS AND ALSO CHRONIC EFFECTS FROM SHORT- AND LONG-TERM EXPOSURE

CARCINOGENIC INFORMATION

<b>REPRODUCTIVE TOXICITY</b>	<ul style="list-style-type: none"> <li>• Suspected of damaging fertility or the unborn child.</li> </ul>
<b>STOT—SINGLE EXPOSURE</b>	<ul style="list-style-type: none"> <li>• May cause drowsiness and dizziness.</li> </ul>
<b>STOT—REPEATED EXPOSURE</b>	<ul style="list-style-type: none"> <li>• Causes damage to organs through prolonged or repeated exposure.</li> </ul>
<b>ASPIRATION HAZARD</b>	May be fatal if swallowed and enters airways Risk of serious damage to the lungs (by aspiration).

## Section 12: Ecological Information

### ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Petroleum distillate (naphtha)</b>	–	LC50: 258 mg/L Salmo gairdneri 96 h static	EC50 48 h: < 0.26 mg/L Static (Daphnia magna) EC50 24 h: = 36 mg/L (Daphnia magna)	–
<b>Natural gas condensates (petroleum)</b>	–	LC50 96 h: = 119 mg/L static (Alburnus alburnus) LC50 96 h: = 82 mg/L static (Cyprinodon variegatus)	EC50 24 h: = 170 mg/L (Daphnia magna)	–
<b>Butane</b>	–	–	–	–
<b>Pentane</b>	–	LC50 96 h: = 11.59 mg/L (Pimephales promelas) LC50 96 h: = 9.87 mg/L (Oncorhynchus mykiss) LC50 96 h: = 9.99 mg/L (Lepomis macrochirus)	EC50 48 h: 135 mmol/cu	LC50 24 h: 165 mmol/cu Artemia salina (Brine Shrimp)
<b>Octane</b>	–	–	EC50 48 h: = 0.38 mg/L (water flea) EC50 48 h: = 0.02856 mg/L (Daphnia magna)	EC50 = 890 mg/L 30 min (Microorganisms) EC50 <1.67hr: 120 µg/l Mytilus edulis (Common Bay Mussel)
<b>Heptane</b>	–	LC50 96 h: = 375.0 mg/L (Cichlid fish)	EC50 24 h: > 10 mg/L (Daphnia magna)	–
<b>2-Methylbutane</b>			EC50 48 h: = 2.3 mg/L (Daphnia magna)	
<b>Hexane</b>	–	LC50 96 h: 2.1 - 2.98 mg/L flow-through (Pimephales promelas)	EC50 24 h: > 1000 mg/L (Daphnia magna)	–
<b>Decane</b>	EC50 24 h: = 0.043 mg/L (Chlorella vulgaris)	–	EC50 48 h: = 0.029 mg/L (Daphnia magna)	–

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Benzene</b>	EC50 72 h: = 29 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 10.7 - 14.7 mg/L flow-through (Pimephales promelas) LC50 96 h: = 5.3 mg/L flow-through (Oncorhynchus mykiss) LC50 96 h: = 22.49 mg/L static (Lepomis macrochirus) LC50 96 h: = 28.6 mg/L static (Poecilia reticulata) LC50 96 h: 22330 - 41160 µg/L static (Pimephales promelas) LC50 96 h: 70000 - 142000 µg/L static (Lepomis macrochirus)	EC50 48 h: 8.76 - 15.6 mg/L Static (Daphnia magna) EC50 48 h: = 10 mg/L (Daphnia magna)	-
<b>Xylenes</b>	EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: = 13.4 mg/L flow-through (Pimephales promelas) LC50 96 h: 2.661 - 4.093 mg/L static (Oncorhynchus mykiss) LC50 96 h: 13.5 - 17.3 mg/L (Oncorhynchus mykiss) LC50 96 h: 13.1 - 16.5 mg/L flow-through (Lepomis macrochirus)	EC50 48 h: = 3.82 mg/L (water flea) LC50 48 h: = 0.6 mg/L (Gammarus lacustris)	-
<b>Toluene</b>	EC50: >433 mg/L Pseudokirchneriella subcapitata 96 h EC50: 12.5 mg/L Pseudokirchneriella subcapitata 72 h static	LC50: 15.22 - 19.05 mg/L Pimephales promelas 96 h flow-through LC50: 12.6 mg/L Pimephales promelas 96 h static LC50: 5.89 - 7.81 mg/L Oncorhynchus mykiss 96 h flow-through LC50: 14.1 - 17.16 mg/L Oncorhynchus mykiss 96 h static LC50: 5.8 mg/L Oncorhynchus mykiss 96 h semi-static LC50: 11.0-15.0 mg/L Lepomis macrochirus 96 h static LC50: 54 mg/L Oryzias latipes 96 h static LC50: 28.2 mg/L Poecilia reticulata 96 h semi-static LC50: 50.87-70.34 mg/L Poecilia reticulata 96 h static	EC50 48 h: 5.46 - 9.83 mg/L Static (Daphnia magna) EC50 48 h: = 11.5 mg/L (Daphnia magna)	EC50 = 19.7 mg/L 30 min (Microorganisms)

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Ethylbenzene</b>	EC50 72 h: = 4.6 mg/L (Pseudokirchneriella subcapitata) EC50 96 h: > 438 mg/L (Pseudokirchneriella subcapitata) EC50 72 h: 2.6 - 11.3 mg/L static (Pseudokirchneriella subcapitata) EC50 96 h: 1.7 - 7.6 mg/L static (Pseudokirchneriella subcapitata) EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 11.0 - 18.0 mg/L static (Oncorhynchus mykiss) LC50 96 h: = 4.2 mg/L semi-static (Oncorhynchus mykiss) LC50 96 h: 7.55 - 11 mg/L flow-through (Pimephales promelas) LC50 96 h: = 32 mg/L static (Lepomis macrochirus) LC50 96 h: 9.1 - 15.6 mg/L static (Pimephales promelas) LC50 96 h: = 9.6 mg/L static (Poecilia reticulata)	EC50 48 h: 1.8 - 2.4 mg/L (Daphnia magna)	EC50 = 9.68 mg/L 30 min EC50 = 96mg/L 24 h (Microorganisms)
<b>1,2,4-Trimethylbenzene</b>	–	LC50 96 h: 7.72 mg/L (Pimephales promelas)	EC50 48h: 30 mmol/cu (Daphnia magna)	LC50 24h: 100 mmol/cu Artemia salina (Brine Shrimp)
<b>Hydrogen sulfide</b>	–	LC50 96h: 49 µg/l Oncorhynchus mykiss (Rainbow Trout) eggs LC50 24h: 1059.7 µg/l Pimephales promelas (Fathead Minnow)	EC50 48h: 62 µg/l Gammarus pseudolimnaeus (Scud)	–

## PERSISTENCE AND DEGRADABILITY

- No information available

## BIOACCUMULATIVE POTENTIAL

CHEMICAL	LOG POW
<b>Asphalt</b>	6.006
<b>Butane</b>	2.89
<b>Pentane</b>	3.39
<b>Octane</b>	5.18
<b>Heptane</b>	4.66
<b>2-Methylbutane</b>	2.72
<b>Isobutane</b>	2.76
<b>Hexane</b>	3.90
<b>Decane</b>	5.1
<b>Benzene</b>	1.83
<b>Xylene</b>	2.77-3.15
<b>Toluene</b>	2.65
<b>Ethylbenzene</b>	3.118

<b>1,2,4-Trimethylbenzene</b>	3.78
<b>Hydrogen Sulfide</b>	0.45
<b>CHEMICAL</b>	<b>EXPECTED SOIL MOBILITY</b>
<b>Petroleum distillate (naphtha)</b>	High
<b>Butane</b>	Low
<b>Pentane</b>	High
<b>Octane</b>	Immobile
<b>Nonane</b>	Immobile
<b>Heptane</b>	Moderate
<b>2-Methylbutane</b>	Low
<b>Isobutane</b>	Very High
<b>Hexane</b>	High
<b>Decane</b>	Immobile
<b>Benzene</b>	High
<b>Xylene</b>	Very High to Moderate
<b>Toluene</b>	High to Moderate
<b>Ethylbenzene</b>	Low
<b>1,2,4-Trimethylbenzene</b>	Low

• No information available

## Section 13: Disposal Considerations

### WASTE TREATMENT METHODS

#### Product Waste

- This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.
- This product could also contain benzene at >0.5 ppm and could exhibit the characteristic of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP).
- This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s).
- It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.

**Packaging Waste**

- Container contents should be completely used and containers should be emptied prior to discard.
- Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations.
- Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner.
- To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

## Section 14: Transport Information

**\*\*CHART NAME\*\***

	UN NUMBER	PROPER SHIPPING NAME	TRANSPORT HAZARD CLASS	PACKING GROUP	ENVIRONMENTAL HAZARD
DOT	UN1267	Petroleum Crude Oil	3	I	Emergency response guide number: 128
TDG	UN1267	Petroleum Crude Oil	3	I	Marine Pollutant
IMO/IMDG	UN1267	Petroleum Crude Oil	3	I	Marine Pollutant
IATA/ICAO	UN1267	Petroleum Crude Oil	3	I	ERG Code 3L

**SPECIAL RECAUTIONS  
FOR USER**

- None

## Section 15: Regulatory Information

**U.S.—CERCLA/SARA  
HAZARDOUS  
SUBSTANCES AND  
THEIR REPORTABLE  
QUANTITIES**

COMPONENT	CAS #	AMOUNT
Petroleum distillate (naphtha)	8002-05-9	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Asphalt	8052-42-4	Not Listed
Butane	106-97-8	Not Listed
Pentane	109-66-0	Not Listed
Octane	111-65-9	Not Listed
Nonane	111-84-2	Not Listed
Heptane	142-82-5	Not Listed
2-Methylbutane	78-78-4	Not Listed

<b>Isobutane</b>	75-28-5	Not Listed
<b>Hexane</b>	110-54-3	5000 lb final RQ; 2270 kg final RQ
<b>Decane</b>	124-18-5	Not Listed
<b>Benzene</b>	71-43-2	10 lb final RQ; 4.54 kg final RQ
<b>Xylene</b>	1330-20-7	100 lb final RQ; 45.4 kg final RQ
<b>Toluene</b>	108-88-3	1000 lb final RQ; 454 kg final RQ
<b>Ethylbenzene</b>	100-41-4	1000 lb final RQ; 454 kg final RQ
<b>1,2,4-Trimethylbenzene</b>	95-63-6	Not Listed
<b>Hydrogen Sulfide</b>	7783-06-4	100 lb final RQ; 45.4 kg final RQ

**U.S.—CWA  
(CLEAN WATER ACT)—  
REPORTABLE  
QUANTITIES OF  
DESIGNATED  
HAZARDOUS  
SUBSTANCES**

<b>COMPONENT</b>	<b>CAS #</b>	<b>AMOUNT</b>
<b>Petroleum distillate (naphtha)</b>	8002-05-9	Not Listed
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Asphalt</b>	8052-42-4	Not Listed
<b>Butane</b>	106-97-8	Not Listed
<b>Pentane</b>	109-66-0	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>Nonane</b>	111-84-2	Not Listed
<b>Heptane</b>	142-82-5	Not Listed
<b>2-Methylbutane</b>	78-78-4	Not Listed
<b>Isobutane</b>	75-28-5	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>Decane</b>	124-18-5	Not Listed
<b>Benzene</b>	71-43-2	10 lb RQ
<b>Xylene</b>	1330-20-7	100 lb RQ
<b>Toluene</b>	108-88-3	1000 lb RQ
<b>Ethylbenzene</b>	100-41-4	1000 lb RQ
<b>1,2,4-Trimethylbenzene</b>	95-63-6	Not Listed
<b>Hydrogen Sulfide</b>	7783-06-4	100 lb RQ



**U.S.—CWA  
(CLEAN WATER ACT)—  
RECOMMENDED  
WATER QUALITY  
CRITERIA—CCC FOR  
FRESHWATER LIFE**

COMPONENT	CAS #	AMOUNT
Hydrogen Sulfide	7783-06-4	2.0 µg/L CCC

**U.S.—CWA  
(CLEAN WATER ACT)—  
RECOMMENDED  
WATER QUALITY  
CRITERIA—CCC FOR  
SALTWATER LIFE**

COMPONENT	CAS #	AMOUNT
HydrogenSulfide	7783-06-4	2.0 µg/L CCC

**U.S.—CWA  
(CLEAN WATER ACT)—  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	LISTED
Petroleum distillate (naphtha)	8002-05-9	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Asphalt	8052-42-4	Not Listed
Butane	106-97-8	Not Listed
Pentane	109-66-0	Not Listed
Octane	111-65-9	Not Listed
Nonane	111-84-2	Not Listed
Heptane	142-82-5	Not Listed
2-Methylbutane	78-78-4	Not Listed
Isobutane	75-28-5	Not Listed
Hexane	110-54-3	Not Listed
Decane	124-18-5	Not Listed
Benzene	71-43-2	X
Xylene	1330-20-7	X
Toluene	108-88-3	X
Ethylbenzene	100-41-4	X
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Hydrogen Sulfide	7783-06-4	X

X= The component is listed

**U.S.—CWA  
(CLEAN WATER ACT)—  
PRIORITY POLLUTANTS**

COMPONENT	CAS #	LISTED
Petroleum distillate (naphtha)	8002-05-9	Not Listed
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Asphalt	8052-42-4	Not Listed
Butane	106-97-8	Not Listed
Pentane	109-66-0	Not Listed
Octane	111-65-9	Not Listed
Nonane	111-84-2	Not Listed
Heptane	142-82-5	Not Listed
2-Methylbutane	78-78-4	Not Listed
Isobutane	75-28-5	Not Listed
Hexane	110-54-3	Not Listed
Decane	124-18-5	Not Listed
Benzene	71-43-2	X
Xylene	1330-20-7	Not Listed
Toluene	108-88-3	X
Ethylbenzene	100-41-4	X
1,2,4-Trimethylbenzene	95-63-6	Not Listed
Hydrogen Sulfide	7783-06-4	Not Listed
<i>X= The component is listed</i>		

**CANADA-WHMIS—  
CLASSIFICATIONS  
OF SUBSTANCES**

COMPONENT	CAS #	CLASSIFICATION
Petroleum distillate (naphtha)	8002-05-9	B2
Natural gas condensates (petroleum)	64741-47-5	Not Listed
Asphalt	8052-42-4	Not Listed
Butane	106-97-8	A, B1
Pentane	109-66-0	B2

<b>Octane</b>	111-65-9	B2, D2B
<b>Nonane</b>	111-84-2	B2, D2B
<b>Heptane</b>	142-82-5	B2, D2B
<b>2-Methylbutane</b>	78-78-4	B2
<b>Isobutane</b>	75-28-5	A, B1 (listed under Methyl-2 propane)
<b>Hexane</b>	110-54-3	B2, D2A, D2B
<b>Decane</b>	124-18-5	B3, D2B
<b>Benzene</b>	71-43-2	B2, D2A, D2B
<b>Xylene</b>	1330-20-7	B2, D2A, D2B
<b>Toluene</b>	108-88-3	B2, D2A, D2B
<b>Ethylbenzene</b>	100-41-4	B2, D2A, D2B
<b>1,2,4-Trimethylbenzene</b>	95-63-6	B3
<b>Hydrogen Sulfide</b>	7783-06-4	A, B1, D1A, D2B

X= The component is listed

**CANADA—COUNCIL  
OF MINISTERS OF  
THE ENVIRONMENT—  
WATER QUALITY  
GUIDELINES FOR  
FRESHWATER  
AQUATIC LIFE**

<b>COMPONENT</b>	<b>CAS #</b>	<b>AMOUNT</b>
<b>Ethylbenzene</b>	100-41-4	90 µg/L
<b>Toluene</b>	108-88-3	2.0 µg/L
<b>Benzene</b>	71-43-2	370 µg/L

**CANADA—COUNCIL  
OF MINISTERS OF  
THE ENVIRONMENT—  
WATER QUALITY  
GUIDELINES FOR  
MARINE AQUATIC LIFE**

<b>COMPONENT</b>	<b>CAS #</b>	<b>AMOUNT</b>
<b>Ethylbenzene</b>	100-41-4	25 µg/L
<b>Toluene</b>	108-88-3	215 µg/L
<b>Benzene</b>	71-43-2	110 µg/L

**CANADA—  
ENVIRONMENTAL  
EMERGENCIES**

<b>COMPONENT</b>	<b>CAS #</b>	<b>LISTED</b>
<b>Petroleum distillate (naphtha)</b>	8002-05-9	Not Listed
<b>Natural gas condensates (petroleum)</b>	64741-47-5	Not Listed
<b>Asphalt</b>	8052-42-4	Not Listed
<b>Butane</b>	106-97-8	X
<b>Pentane</b>	109-66-0	X

<b>Octane</b>	111-65-9	Not Listed
<b>Nonane</b>	111-84-2	Not Listed
<b>Heptane</b>	142-82-5	Not Listed
<b>2-Methylbutane</b>	78-78-4	X
<b>Isobutane</b>	75-28-5	X
<b>Hexane</b>	110-54-3	Not Listed
<b>Decane</b>	124-18-5	Not Listed
<b>Benzene</b>	71-43-2	X
<b>Xylene</b>	1330-20-7	X
<b>Toluene</b>	108-88-3	X
<b>Ethylbenzene</b>	100-41-4	X
<b>1,2,4-Trimethylbenzene</b>	95-63-6	Not Listed
<b>Hydrogen Sulfide</b>	7783-06-4	X

X= The component is listed

## Section 16:

## Other Information

### NFPA



**Health Hazard:** 2

**Flammability:** 4

**Instability:** 0

**Physical and  
Chemical Hazards:** X

### HMIS

**Health Hazard:** 2

**Flammability:** 4

**Instability:** 0

**Personal Protection:** X

### ISSUING DATE

5/4/15

### REVISION DATE

5/4/15

### DISCLAIMER

- The information presented herein is based on data considered to be accurate as of the date of preparation of this Safety Data Sheet (SDS). However, SDSs may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

# Safety Data Sheet

## Section 1: Identification

### PRODUCT IDENTIFIER

Petroleum Crude Oil—Dilbit

### OTHER MEANS OF IDENTIFICATION

**UN-Number** UN1993

**Synonyms** Dilbit Kearn, Diluted Kearn Bitumen, Kearn Blend, Kearn Dilbit, Kearn Lake Dilbit (KDB), Canadian Blended Dilbit (CBT)

**Chemical Category** Crude oils—extremely flammable  
Bitumen Products

### RECOMMENDED USE

Feedstock

### RESTRICTIONS OF USE

No information available

### SUPPLIER INFORMATION

Enbridge Pipelines Inc.  
10201 Jasper Avenue  
Edmonton, Alberta T5J 3N7  
Canada  
TEL: 1-780-420-5210

### EMERGENCY CONTACT INFORMATION

**CHEMTREC** 1-800-424-9300 for US  
703-527-3887 outside US

**CANUTEC (Canadian Transportation)** 613-996-6666

## Section 2: Hazards Identification

### CLASSIFICATION

Skin Irritation	Category 2
Eye Irritation	Category 2
Germ Cell Mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 2
Specific Target Organ Systemic Toxicity (Single Exposure)	Category 3
Specific Target Organ Toxicity (Repeated Exposure)	Category 1
Aspiration Toxicity	Category 1
Flammable liquids	Category 1

## LABEL ELEMENTS

### Signal Word

Danger

### Hazard Pictograms



### Hazard Statements

- Causes skin irritation.
- Causes serious eye irritation.
- May cause genetic defects.
- May cause cancer.
- Suspected of damaging fertility or the unborn child.
- May cause respiratory irritation.
- Causes damage to organs through prolonged or repeated exposure.
- May be fatal if swallowed and enters airways.
- Extremely flammable liquid and vapor.

## PRECAUTIONARY STATEMENTS

### Prevention

- Wash face, hands and any exposed skin thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Use personal protective equipment as required.
- Do not breathe dust/fume/gas/mist/vapors/spray.
- Use only outdoors or in a well-ventilated area.
- Do not eat, drink or smoke when using this product.
- Keep away from heat/sparks/open flames/hot surfaces.
- Keep container tightly closed.
- No smoking.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting/equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- In case of inadequate ventilation wear respiratory protection.

### Response

- IF EXPOSED or concerned: Get medical advice/attention.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- Call a POISON CENTER or doctor/physician if you feel unwell.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- Do NOT induce vomiting.
- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower and soap.
- In case of fire: Use CO<sub>2</sub> dry chemical, or foam for extinction.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If SKIN irritation occurs: Get medical advice/attention.
- If EYE irritation persists: Get medical advice/attention.

### Storage/Disposal

- Store locked up and keep cool.
- Store in a well-ventilated place. Keep container tightly closed.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

## OTHER INFORMATION

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
- Very toxic to aquatic life with long lasting effects.

## Section 3: Composition/Information on Ingredients

COMPONENT NAME	CAS NUMBER	PERCENTAGE (%)*	NOTES
Benzene	71-43-2	0-1.2	
Bitumen	8052-42-4	0-85	
Hexane	110-54-3	0-3.5	
Natural Gas Condensate	68919-39-1	15-40	
Sulfur	7704-34-9	0-3.5	

\*Values do not reflect absolute minimums and maximums; those values may vary from time to time. All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

## Section 4: First Aid Measures

### DESCRIPTION OF NECESSARY MEASURES

#### Inhalation

- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If irritation persists: Get medical advice/attention.

#### Skin

- IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.

#### Eye

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

#### Ingestion

- Do NOT induce vomiting. Call a physician or poison control center.
- Aspiration hazard if swallowed—can enter lungs and cause damage.

### MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

Refer to Section 11 -  
Toxicological Information

### INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY

#### Note to the Physician

- Aspiration hazard. Symptoms may be delayed.
- Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.
- Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.

## Section 5:

# Fire Fighting Measures

### EXTINGUISHING MEDIA

#### Suitable Extinguishing Media

- SMALL FIRES: Dry chemical, CO<sub>2</sub>, water spray or regular foam.
- LARGE FIRE: Water spray, fog or regular foam.

#### Unsuitable Extinguishing Media

- CAUTION: Use of water spray when fighting fire may be inefficient.
- Do not use straight streams.

### FIREFIGHTING PROCEDURES

- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: If impossible to extinguish, protect surroundings and allow fire to burn itself out.
- Stay upwind.
- Ventilate closed spaces before entering.
- Fire fighters should wear complete protective clothing including self-contained breathing apparatus.
- FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
- FIRE: When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.
- Move containers from fire area if you can do it without risk.
- LARGE FIRES: Use water spray or fog; do not use straight streams.
- LARGE FIRES: If insufficient water supply: knock down vapors only. If this is impossible, withdraw from area and let fire burn.
- LARGE FIRES: Flood fire area with large quantities of water, while knocking down vapors with water fog.

### SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

- Vapors may travel to source of ignition and flash back.
- Air/vapor mixtures may explode when ignited.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Will be easily ignited by heat, sparks or flames.
- Runoff to sewer may create fire or explosion hazard.
- Vapor explosion hazard indoors, outdoors or in sewers.
- MAY EXPLODE AND THROW FRAGMENTS 1600 meters (1 MILE) OR MORE IF FIRE REACHES CARGO.
- May create vapor/air explosion hazard indoors, outdoors or in sewers.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

### EXPLOSION DATA

#### Hazardous Combustion Products

- Carbon monoxide, Carbon dioxide (CO<sub>2</sub>), Nitrogen oxides (NO<sub>x</sub>), Oxides of sulfur, Hydrogen Sulfide.
- Aldehydes, aromatic and other hydrocarbons.

#### Sensitivity to Mechanical Impact

- None.

#### Sensitivity to Static Discharge

- Yes.



---

## PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS

- As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
- Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced firefighters.
- Carbon dioxide can displace oxygen.
- Use caution when applying carbon dioxide in confined spaces.
- Water spray may be useful in minimizing or dispersing vapors.
- Long-duration fires involving diluent stored in tanks may result in a boilover.
- For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear.

---

## Section 6:

## Accidental Release Measures

---

### PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

---

#### Personal Precautions

- Evacuate personnel to safe areas.
- Remove all sources of ignition.
- Deny entry to unauthorized and unprotected personnel.
- Use personal protective equipment.
- Avoid contact with skin, eyes and clothing.
- Stop leak if you can do it without risk.
- Keep people away from and upwind of spill/leak.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Ventilate enclosed areas.
- Do not walk through spilled material.

---

#### Protective Equipment

- Wear appropriate breathing apparatus (if applicable) and protective clothing.

---

#### Emergency Procedures

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area) Keep unauthorized personnel away. Evacuate area. Keep out of low areas. Stop leak if you can do it without risk.
- Report spills to local or federal authorities as appropriate or required.

---

### ENVIRONMENTAL PRECAUTIONS

- Avoid run off to waterways and sewers. Do NOT wash away into sewer. Prevent entry into waterways, sewers, basements or confined areas. Runoff from fire control may cause pollution.

---

### METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP

---

#### Methods for Containment

- Stop leak if you can do it without risk.
  - Contain and recover liquid when possible.
  - A vapor suppressing foam may be used to reduce vapors.
  - Dike far ahead of spill; use dry sand to contain the flow of material; contain water spills by booming.
  - Use water spray to reduce vapors or divert vapor cloud drift.
  - A fine water spray remotely directed to the edge of the spill pool can be used to direct and maintain a hot flare fire which will burn the spilled material in a controlled manner.
-

---

### Methods for Cleaning Up

- Clean up spill immediately.
- LARGE SPILLS: DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.
- SMALL LIQUID SPILLS: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.
- Use appropriate Personal Protective Equipment (PPE).
- Use clean non-sparking tools to collect absorbed material.
- Vacuum spilled material.
- Try to work upwind of spill.
- All equipment used when handling the product must be grounded.
- Recover and return free product to proper containers
- Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids.
- Do not place spilled materials back in the original container.
- Do not flush to sewer or allow to enter waterways.

---

## Section 7:

## Handling and Storage

---

### PRECAUTIONS FOR SAFE HANDLING

#### Handling

- This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100x10E-12 Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.
- Hydrogen sulfide (H<sub>2</sub>S) may be given off when this material is heated.
- All equipment used when handling the product must be grounded. Avoid contact with heat and ignition sources and oxidizers. Do not breathe (dust, vapor or spray mist). Do not use in areas without adequate ventilation. Do not use sparking tools. Keep away from heat, sparks, and flame. No open flames, no sparks and no smoking. Use only with adequate ventilation. Do not use or store near heat or open flame. Keep away from fire, sparks and heated surfaces.
- The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes).
- The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.
- Take precautionary measures against static discharges.

---

#### Handling

- Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.
  - Stay upwind and vent open hatches before uploading.
  - Avoid contact with skin, eyes and clothing.
  - Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.
  - Wear personal protective equipment.
  - Remove and wash contaminated clothing before re-use.
  - Do not eat, drink or smoke when using this product.
  - Do not take internally.
  - Wash thoroughly after handling.
  - Empty containers pose a potential fire and explosion hazard.
-

**CONDITIONS FOR  
SAFE STORAGE,  
INCLUDING ANY  
INCOMPATIBILITIES**

<b>Storage</b>	<ul style="list-style-type: none"><li>• Ventilate enclosed areas.</li><li>• Store in a well-ventilated place.</li><li>• Keep container tightly closed.</li><li>• Store locked up.</li><li>• Avoid shock, impact, friction, and rough handling. Do not use sparking tools.</li><li>• Store in a cool/low-temperature, well-ventilated place away from heat and ignition sources.</li><li>• Keep away from sources of ignition.</li><li>• No Smoking.</li><li>• Do not enter confined spaces such as tanks or pits without following proper entry procedures.</li><li>• Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area.</li><li>• Harmful concentrations of hydrogen sulfide (H<sub>2</sub>S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments.</li><li>• Keep away from open flames, hot surfaces and sources of ignition.</li><li>• Keep product and empty container away from heat and sources of ignition.</li><li>• Storage containers should be grounded and bonded.</li><li>• Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.</li><li>• Store away from incompatible materials.</li></ul>
<b>Incompatible Products</b>	<ul style="list-style-type: none"><li>• Strong oxidizers such as nitrates, chlorates, peroxides, chlorine.</li></ul>

Section 8:

**Exposure Controls/Personal Protection**

**CONTROL  
PARAMETERS:  
EXPOSURE  
GUIDELINES**

CHEMICAL NAME	ACGIH	OSHA	NIOSH
<b>Benzene</b>	TLV 0.5 ppm TLV 1.6 mg/m <sup>3</sup> STEL 2.5 ppm STEL 8 mg/m <sup>3</sup>	PEL 1 ppm STEL 5 ppm	TWA 0.1 ppm STEL 1 ppm IDLH 500 ppm
<b>Bitumen</b>	TLV 0.5 mg/m <sup>3</sup>	–	Ceiling 5 mg/m <sup>3</sup>
<b>Hexane</b>	TLV 50 ppm TLV 176 mg/m <sup>3</sup>	PEL 500 ppm PEL 1800 mg/m <sup>3</sup>	TWA 50 ppm TWA 180 mg/m <sup>3</sup> IDLH 1100 ppm

**APPROPRIATE  
ENGINEERING  
CONTROLS**

- Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. Prevent vapor build up by providing adequate ventilation during and after use. Use only appropriately classified electrical equipment.

**INDIVIDUAL  
PROTECTION  
MEASURES**

<b>Eye and Face</b>	<ul style="list-style-type: none"><li>• Wear face shield and eye protection.</li></ul>
<b>Skin and Body</b>	<ul style="list-style-type: none"><li>• The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation.</li><li>• Wear protective gloves/protective clothing/eye protection/face protection. Wear long sleeves and/or protective coveralls.</li></ul>

<b>Respiratory</b>	<ul style="list-style-type: none"> <li>Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.</li> </ul>
<b>General Hygiene Measures</b>	<ul style="list-style-type: none"> <li>Handle in accordance with good industrial hygiene and safety practice.</li> </ul>

## Section 9: Physical and Chemical Properties

### MATERIAL DESCRIPTION

<b>Physical State</b>	Liquid	<b>Odor</b>	Petroleum/solvent like odor
<b>Substance Type</b>	Mixture	<b>Odor Threshold</b>	No data available
<b>Appearance</b>	Black		

### PROPERTIES

<b>pH</b>	No data available	<b>Vapor pressure</b>	12 to 21 kPa @ 24 °C (75.2 °F)
<b>Melting Point/Freezing Point</b>	No data available	<b>Vapor density</b>	No data available
<b>Boiling Point/Boiling Range</b>	68 to 1049 °F 20 to 565 °C	<b>Density</b>	900 to 1200 kg/m <sup>3</sup> @ 15.5 °C (59.9 °F)
<b>Flash Point</b>	<-0.4 to 60.8 °F <-18 to 16 °C (Closed Cup)	<b>Water Solubility</b>	No data available
<b>Evaporation Rate</b>	No data available	<b>Partition coefficient: n-octanol/water</b>	No data available
<b>Flammability (solid, gas)</b>	No data available	<b>Autoignition temperature</b>	No data available
<b>Upper Flammability Limit</b>	No data available	<b>Decomposition temperature</b>	No data available
<b>Lower Flammability Limit</b>	No data available	<b>Specific Gravity</b>	0.94
<b>Viscosity</b>	52 to 96 Centistoke (cSt, cS) or mm <sup>2</sup> /sec @ 38 °C (100.4 °F)		

Section 10:

Stability and Reactivity

REACTIVITY	Chlorine Dioxide
CHEMICAL STABILITY	Stable at 70 °F, 760 mm Hg pressure
POSSIBILITY OF HAZARDOUS REACTIONS	None under normal processing
CONDITIONS TO AVOID	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity
INCOMPATIBLE MATERIALS	Strong oxidizers such as nitrates, chlorates, peroxides
HAZARDOUS DECOMPOSITION PRODUCTS	Combustion produces carbon monoxide, aldehydes, hydrogen sulfide, sulfur dioxide, aromatic and other hydrocarbons
HAZARDOUS POLYMERIZATION	Will not occur

Section 11:

Toxicological Information

INFORMATION ON THE LIKELY ROUTES OF EXPOSURE	Inhalation	• May cause irritation of respiratory tract. May cause drowsiness and dizziness.		
	Eye Contact	• Causes serious eye irritation.		
	Skin Contact	• Causes skin irritation.		
	Ingestion	• Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. • Potential for aspiration if swallowed. • Aspiration may cause pulmonary edema and pneumonitis.		
TOXICOLOGICAL DATA	CHEMICAL NAME	LD50 ORAL	LD50 DERMAL	LC50 INHALATION
	Benzene	1800 mg/kg (Rat)	–	13050 - 14380 ppm (Rat) 4 h
	Bitumen	>5000 mg/kg (Rat)	–	>94.4 mg/m³ (Rat)
	Hexane	= 25 g/kg (Rat)	= 3000 mg/kg (Rabbit)	= 48000 ppm (Rat) 4 h
	Sulfur	–	–	1660 mg/m³ (Mammal)
SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS	Benzene	• Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in humans. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.		

Hexane	<ul style="list-style-type: none"><li>This product may contain hexane at a level of &gt;1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.</li></ul>				
Hydrogen Sulfide Gas (H <sub>2</sub> S)	<ul style="list-style-type: none"><li>Toxic by inhalation. Prolonged breathing of 50-100 ppm H<sub>2</sub>S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of &gt;1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H<sub>2</sub>S, 6 hrs/day, 5 days/ week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H<sub>2</sub>S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H<sub>2</sub>S, respectively. Over the years a number of acute cases of H<sub>2</sub>S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.</li></ul>				
Sensitization	<ul style="list-style-type: none"><li>No information available</li></ul>				
Mutagenic Effects	<ul style="list-style-type: none"><li>May cause genetic defects</li></ul>				
Carcinogenicity	<ul style="list-style-type: none"><li>May cause cancer</li></ul>				
CHEMICAL NAME	ACGIH	ACGIH SKIN*	IARC	NTP	OSHA
Benzene	A1	X	Group 1	Known	X
Bitumen	A4	–	–	–	–
Hexane	–	X	–	–	–
<i>*ACGIH Skin designation refers to the potential significant contribution of overall exposure by cutaneous route, including mucous membranes and eyes, from airborne exposure to gases, vapor, or liquid OR by direct skin contact.</i>					
<ul style="list-style-type: none"><li>Suspected of damaging fertility or the unborn child.</li></ul>					
<ul style="list-style-type: none"><li>May cause drowsiness and dizziness.</li></ul>					
<ul style="list-style-type: none"><li>Causes damage to organs through prolonged or repeated exposure.</li></ul>					
May be fatal if swallowed and enters airways Risk of serious damage to the lungs (by aspiration).					

Section 12:

Ecological Information

ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
Benzene	EC50 72 h: = 29 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 10.7 - 14.7 mg/L flow-through (Pimephales promelas) LC50 96 h: = 5.3 mg/L flow-through (Oncorhynchus mykiss) LC50 96 h: = 22.49 mg/L static (Lepomis macrochirus) LC50 96 h: = 28.6 mg/L static (Poecilia reticulata) LC50 96 h: 22330 - 41160 µg/L static (Pimephales promelas) LC50 96 h: 70000 - 142000 µg/L static (Lepomis macrochirus)	EC50 48 h: 8.76 - 15.6 mg/L Static (Daphnia magna) EC50 48 h: = 10 mg/L (Daphnia magna)	–
Hexane	–	LC50 96 h: 2.1 - 2.98 mg/L flow-through (Pimephales promelas)	EC50 24 h: > 1000 mg/L (Daphnia magna)	–
Sulfur	–	LC50 96h: <14000 ug/l (Lepomis macrochirus)	EC50 48 h: = >5000000 ug/L (Daphnia magna)	–

PERSISTENCE AND DEGRADABILITY

- Low molecular wt. component—Expected to be inherently biodegradable
- High molecular wt. component—Expected to be persistent.

BIOACCUMULATIVE POTENTIAL

CHEMICAL	LOG POW
Benzene	1.83
Hexane	3.90

MOBILITY IN SOIL

CHEMICAL	EXPECTED SOIL MOBILITY
Benzene	High
Hexane	High

OTHER ADVERSE EFFECTS

- VOC (EPA Method 24): 2.353 lbs/gal

Section 13:

Disposal Considerations

WASTE TREATMENT METHODS	Product Waste	<ul style="list-style-type: none"><li>• This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.</li><li>• This product could also contain benzene at &gt;0.5 ppm and could exhibit the characteristic of “toxicity” (D018) as determined by the toxicity characteristic leaching procedure (TCLP).</li><li>• This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s).</li><li>• It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.</li></ul>
	Packaging Waste	<ul style="list-style-type: none"><li>• Container contents should be completely used and containers should be emptied prior to discard.</li><li>• Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations.</li><li>• Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner.</li><li>• To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.</li></ul>

Section 14:

Transport Information

**CHART NAME**	UN NUMBER	PROPER SHIPPING NAME	TRANSPORT HAZARD CLASS	PACKING GROUP	ENVIRONMENTAL HAZARD	
	DOT	UN1993	FLAMMABLE LIQUIDS, N.O.S.	3	I	Emergency response guide number: 128
	TDG	UN1993	FLAMMABLE LIQUIDS, N.O.S.	3	I	Special Provision: 16
	IMO/IMDG	UN1993	FLAMMABLE LIQUIDS, N.O.S.	3	I	EMS No. F-E, S-E
	IATA/ICAO	UN1993	FORBIDDEN	–	–	–
SPECIAL RECAUTIONS FOR USER	• None specified					

Section 15:

Regulatory Information

U.S.—CERCLA/SARA HAZARDOUS SUBSTANCES AND THEIR REPORTABLE QUANTITIES	COMPONENT	CAS #	AMOUNT
	Benzene	71-43-2	10 lb final RQ; 4.54 kg final RQ
	Hexane	110-54-3	5000 lb final RQ; 2270 kg final RQ



**U.S.—CWA  
(CLEAN WATER ACT)—  
REPORTABLE  
QUANTITIES OF  
DESIGNATED  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	AMOUNT
Benzene	71-43-2	10 lb RQ

**U.S.—CWA  
(CLEAN WATER ACT)—  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	LISTED
Benzene	71-43-2	X
Bitumen	8052-42-4	Not Listed
Hexane	110-54-3	Not Listed
Natural gas condensates (petroleum)	68919-39-1	Not Listed
Sulfur	7704-34-9	Not Listed
<i>X= The component is listed</i>		

**U.S.—CWA  
(CLEAN WATER ACT)—  
PRIORITY POLLUTANTS**

COMPONENT	CAS #	LISTED
Benzene	71-43-2	X
Bitumen	8052-42-4	Not Listed
Hexane	110-54-3	Not Listed
Natural gas condensates (petroleum)	68919-39-1	Not Listed
Sulfur	7704-34-9	Not Listed
<i>X= The component is listed</i>		

**CANADA-WHMIS—  
CLASSIFICATIONS  
OF SUBSTANCES**

COMPONENT	CAS #	CLASSIFICATION
Benzene	71-43-2	B2, D2A, D2B
Bitumen	8052-42-4	Not Listed
Hexane	110-54-3	B2, D2A, D2B
Natural gas condensates (petroleum)	68919-39-1	Not Listed
Sulfur	7704-34-9	B4
<i>X= The component is listed</i>		

COMPONENT	CAS #	AMOUNT
Benzene	71-43-2	370 µg/L

COMPONENT	CAS #	AMOUNT
Benzene	71-43-2	110 µg/L

COMPONENT	CAS #	LISTED
Benzene	71-43-2	X
Bitumen	8052-42-4	Not Listed
Hexane	110-54-3	Not Listed
Natural gas condensates (petroleum)	68919-39-1	Not Listed
Sulfur	7704-34-9	Not Listed

X= The component is listed

## Section 16: Other Information

### NFPA



Health Hazard: 2	Flammability: 3	Instability: 0	Physical and Chemical Hazards: X
------------------	-----------------	----------------	-------------------------------------

### HMIS

Health Hazard: 2	Flammability: 3	Instability: 0	Personal Protection: X
------------------	-----------------	----------------	------------------------

### ISSUING DATE

4/19/15

### REVISION DATE

4/19/15

### DISCLAIMER

- The information presented herein is based on data considered to be accurate as of the date of preparation of this Safety Data Sheet (SDS). However, SDSs may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

# Safety Data Sheet



## Section 1: Identification

<b>Product Identifier:</b>	Petroleum Crude Oil— Canadian Heavy Synbit (CHY)
<b>Other means of identification:</b>	<div><div><u>UN-Number</u></div><div><u>Synonyms</u></div><div><u>Chemical Category</u></div></div> <div>UN1267 Synbit, Light Synthetic, Premium Synthetic (PSY), Hardisty Synthetic Crude (HSC), Synthetic Sweet Blend (SYN), Statoil Cheecham Synbit (SCS), Surmont Heavy Blend (SHB), Christina SynBit (CSB), MacKay River Heavy (MKH), Long Lake Heavy Synbit Blend (PSH). Crude Oils - Extremely Flammable</div>
<b>Recommended Use:</b>	No information available
<b>Restrictions of Use:</b>	No information available
<b>Supplier Information:</b>	Enbridge Pipelines Inc. 10201 Jasper Avenue Edmonton, Alberta T5J 3N7 Canada TEL: 1-780-420-5210
<b>Emergency Contact Information:</b>	<u>CHEMTREC</u> 1-800-424-9300 for US/ 703-527-3887 outside US <u>CANUTEC (Canadian Transportation)</u> (613) 996-6666

## Section 2: Hazards Identification

<b>Classification:</b>	<u>Category</u>
Skin Irritation	2
Eye Irritation	2A
Germ Cell Mutagenicity	1B
Carcinogenicity	1A
Reproductive Toxicity	2
Specific Target Organ Systemic Toxicity (Single Exposure)	3
Specific Target Organ Toxicity (Repeated Exposure)	1
Aspiration Toxicity	1
Flammable liquids	1

**Label Elements:**Signal Word**Danger**Hazard Statements

- Causes skin irritation.
- Causes serious eye irritation.
- May cause drowsiness or dizziness.
- May cause genetic defects.
- May cause cancer.
- Suspected of damaging fertility or the unborn child.
- Causes damage to organs through prolonged or repeated exposure.
- May be fatal if swallowed and enters airways.
- Extremely flammable liquid and vapor.
- May cause respiratory irritation.

**Precautionary Statements:**Prevention

- Wash face, hands and any exposed skin thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection/respiratory protection.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Do not breathe dust/fume/gas/mist/vapors/spray.
- Use only outdoors or in a well-ventilated area.
- Do not eat, drink or smoke when using this product.
- Keep away from heat/sparks/open flames/hot surfaces – No Smoking.
- Keep container tightly closed.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting/equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Avoid contact during pregnancy and while nursing.

Response

- IF EXPOSED or concerned: Get medical advice/attention.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- Call a POISON CENTER or doctor/physician if you feel unwell.
- Get medical advice/attention if you feel unwell.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- IF ON SKIN (or hair): Immediately remove/take off all contaminated clothing. Rinse skin with water/shower and soap.
- In case of fire: Use CO<sub>2</sub>, dry chemical, or foam for extinction.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- Wash contaminated clothing before reuse.
- Do NOT induce vomiting.

- If SKIN irritation occurs: Get medical advice/attention.
- If EYE irritation persists: Get medical advice/attention.

**Storage/Disposal**

- Store locked up.
- Store in a well-ventilated place. Keep container tightly closed.
- Keep cool.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

**Other Information:**

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
- Very toxic to aquatic life with long lasting effects.

<b>Section 3: Composition/Information on Ingredients</b>
--

Component Name	CAS Number	Percentage (%)*	Notes
1,2,4-Trimethylbenzene	95-63-6	0 - 1.3	
1-Propanethiol	107-03-9	0 - 0.9	
2-Butanethiol	513-53-1	0 - 0.9	
2-Propanethiol	75-33-2	0 - 0.9	
Benzene	71-43-2	0 - 1.3	
Bitumen	8052-42-4	0 - 73.6	
Bitumen	128683-24-9	0 - 73.6	
Butane	106-97-8	0 - 1.5	
Cyclohexane	110-82-7	0 - 1.3	
Decane	124-18-5	0 - 0.8	
Distillates (petroleum), hydrotreated middle	64742-46-7	0 - 4.8	
Distillates, petroleum, petroleum residues vacuum	68955-27-1	0 - 27.6	
Ethanethiol	75-08-1	0 - 0.1	
Ethylbenzene	100-41-4	0 - 5	
Fuels, diesel, No. 2	68476-34-6	0 - 16.2	
Gas oil, blend	64741-44-2	0 - 1.2	
Gas Oils, Petroleum, Hydrodesulfurized	64742-79-6	0 - 8	
Heavy straight-run (petroleum) naphtha	64741-41-9	0 - 4.6	
Heptane	142-82-5	0 - 2.9	
Hexane	110-54-3	0 - 5.2	
Hydrocarbon Diluent	—	0 - 46	
Hydrogen Sulfide	7783-06-4	0 - 0.1	
Methanethiol	74-93-1	0 - 0.9	
Methylcyclohexane	108-87-2	0 - 1.5	
Methylcyclopentane	96-37-7	0 - 0.9	
Naphtha (oil sand), hydrotreated	128683-33-0	0 - 13.8	
Naphtha (petroleum), hydrotreated light	64742-49-0	0 - 28.2	
Naphtha, (petroleum), heavy, hydrotreated	64742-48-9	0 - 4.8	
Naphthalene	91-20-3	0 - 4.6	
Natural Gas Condensates (petroleum)	64741-47-5	0 - 27.6	
n-Butanethiol	109-79-5	0 - 0.9	
Octane	111-65-9	0 - 2.9	
o-Xylene	95-47-6	0 - 0.4	

Pentane	109-66-0	0 - 1.4	
Petroleum distillate (naphtha)	8002-05-9	0 - 63.2	
p-Xylene	106-42-3	0 - 0.9	
Residues (petroleum), vacuum	64741-56-6	0 – 46	
Sulfur	7704-34-9	0 - 3.2	
Toluene	108-88-3	0 - 1.3	
Xylene	1330-20-7	0 - 1.3	

\*Values do not reflect absolute minimums and maximums; those values may vary from time to time.

## Section 4: First Aid Measures

### Description of necessary measures:

#### Inhalation

- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If irritation persists: Get medical advice/attention.

#### Skin

- IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.

#### Eye

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

#### Ingestion

- Do NOT induce vomiting. Call a physician or poison control center.
- Aspiration hazard if swallowed - can enter lungs and cause damage.

### Most important symptoms and effects, both acute and delayed:

Refer to Section 11 - Toxicological Information

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

#### Note to the Physician

- Aspiration hazard. Symptoms may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.

## Section 5: Fire Fighting Measures

### Extinguishing Media:

#### Suitable Extinguishing Media

- SMALL FIRES: Dry chemical, CO2, water spray or regular foam.
- LARGE FIRE: Water spray, fog or regular foam.

#### Unsuitable Extinguishing Media

- CAUTION: Use of water spray when fighting fire may be inefficient.
- Do not use straight streams.

**Firefighting Procedures:**

- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: If impossible to extinguish, protect surroundings and allow fire to burn itself out.
- Stay upwind.
- Ventilate closed spaces before entering.
- Fire fighters should wear complete protective clothing including self-contained breathing apparatus.
- FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
- FIRE: When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.
- Move containers from fire area if you can do it without risk.
- LARGE FIRES: Use water spray or fog; do not use straight streams.
- LARGE FIRES: If insufficient water supply: knock down vapors only. If this is impossible, withdraw from area and let fire burn.
- LARGE FIRES: Flood fire area with large quantities of water, while knocking down vapors with water fog.

**Special hazards arising from the substance or mixture:**

- Vapors may travel to source of ignition and flash back.
- Air/vapor mixtures may explode when ignited.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Will be easily ignited by heat, sparks or flames.
- Runoff to sewer may create fire or explosion hazard.
- Vapor explosion hazard indoors, outdoors or in sewers.
- May explode and throw fragments 1600 meters (1 mile) or more if fire reaches cargo.
- May create vapor/air explosion hazard indoors, outdoors or in sewers.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

**Hazardous Combustion Products**

- Carbon monoxide, Carbon dioxide (CO<sub>2</sub>), Nitrogen oxides (NO<sub>x</sub>), Oxides of sulfur (SO<sub>x</sub>).
- Aldehydes, aromatic and other hydrocarbons.

**Explosion Data:****Sensitivity to Mechanical Impact**

- None

**Sensitivity to Static Discharge**

- Yes

**Protective Equipment and Precautions for Firefighters**

- As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

- Water spray is recommended to cool or protect exposed materials or structures.
- Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.
- Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.
- Water spray may be useful in minimizing or dispersing vapors.
- Long-duration fires involving diluent stored in tanks may result in a boilover.
- For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear.

## Section 6: Accidental Release Measures

### Personal precautions, protective equipment and emergency procedures:

#### Personal Precautions

- Evacuate personnel to safe areas.
- Remove all sources of ignition.
- Deny entry to unauthorized and unprotected personnel.
- Use personal protective equipment.
- Avoid contact with skin, eyes and clothing.
- Stop leak if you can do it without risk.
- Keep people away from and upwind of spill/leak.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Ventilate enclosed areas.
- Do not walk through spilled material.

#### Protective Equipment

- Wear appropriate breathing apparatus (if applicable) and protective clothing.

#### Emergency Procedures

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorized personnel away. Evacuate area. Keep out of low areas. Stop leak if you can do it without risk.
- Report spills to local or federal authorities as appropriate or required.

### Environmental Precautions:

- Avoid run off to waterways and sewers. Do NOT wash away into sewer. Prevent entry into waterways, sewers, basements or confined areas. Runoff from fire control may cause pollution.

### Methods and material for containment and cleaning up:

#### Methods for Containment

- Stop leak if you can do it without risk.
- Contain and recover liquid when possible.
- A vapor suppressing foam may be used to reduce vapors.
- Dike far ahead of spill; use dry sand to contain the flow of material; contain water spills by booming.
- Use water spray to reduce vapors or divert vapor cloud drift.



- A fine water spray remotely directed to the edge of the spill pool can be used to direct and maintain a hot flare fire which will burn the spilled material in a controlled manner

#### Methods for Cleaning Up

- Clean up spill immediately.
- LARGE SPILLS: DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.
- SMALL LIQUID SPILLS: Use a non-combustible material like sand to soak up the product and place into a container for later disposal.
- Use appropriate Personal Protective Equipment (PPE).
- Use clean non-sparking tools to collect absorbed material.
- Vacuum spilled material with intrinsically safe equipment.
- Try to work upwind of spill.
- All equipment used when handling the product must be grounded.
- Recover and return free product to proper containers.
- Use suitable absorbent materials such as sands, soil, or clay to clean up residual liquids.
- Do not place spilled materials back in the original container.
- Do not flush to sewer or allow to enter waterways.

## Section 7: Handling and Storage

### **Precautions for safe handling:**

#### Handling

- All equipment used when handling the product must be grounded. Avoid contact with heat and ignition sources and oxidizers. Do not breathe (dust, vapor or spray mist). Do not use in areas without adequate ventilation. Do not use sparking tools. Keep away from heat, sparks, and flame. No open flames, no sparks and no smoking. Use only with adequate ventilation. Do not use or store near heat or open flame. Keep away from fire, sparks and heated surfaces.
- The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes).
- The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.
- Take precautionary measures against static discharges.
- Do not cut drill, grind or weld on empty containers since they may contain explosive residues.
- Stay upwind and vent open hatches before uploading.
- Avoid contact with skin, eyes and clothing.
- Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.
- Wear personal protective equipment.
- Remove and wash contaminated clothing before re-use.
- Do not eat, drink or smoke when using this product.
- Do not take internally.
- Wash thoroughly after handling.
- Empty containers pose a potential fire and explosion hazard.

**Conditions for safe storage, including any incompatibilities:**Storage

- Ventilate enclosed areas. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Avoid shock, impact, friction, and rough handling. Do not use sparking tools. Store in a cool/low-temperature, well-ventilated place away from heat and ignition sources. Keep away from sources of ignition - No Smoking.
- Do not enter confined spaces such as tanks or pits without following proper entry procedures.
- Harmful concentrations of hydrogen sulfide (H<sub>2</sub>S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments.
- Keep away from open flames, hot surfaces and sources of ignition.
- Keep product and empty container away from heat and sources of ignition.
- Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.
- Store away from incompatible materials.

Incompatible Products

- Strong oxidizers such as nitrates, chlorates, peroxides.

**Section 8: Exposure Controls/Personal Protection****Control Parameters:**Exposure Guidelines

Chemical Name	ACGIH	OSHA	NIOSH
1,2,4-Trimethylbenzene	-	-	TWA 25 ppm TWA 125 mg/m <sup>3</sup>
1-Propanethiol	-	-	Ceiling 0.5 ppm Ceiling 1.6 mg/m <sup>3</sup>
2-Butanethiol	TLV 0.5 mg/m <sup>3</sup>	PEL 10 ppm PEL 35 mg/m <sup>3</sup>	Ceiling 0.5 ppm Ceiling 1.8 mg/m <sup>3</sup>
Benzene	TLV 0.5 ppm TLV 1.6 mg/m <sup>3</sup> STEL 2.5 ppm STEL 8 mg/m <sup>3</sup>	PEL 1 ppm STEL 5 ppm	TWA 0.1 ppm STEL 1 ppm IDLH 500 ppm
Bitumen	TLV 0.5 mg/m <sup>3</sup>	-	Ceiling 5 mg/m <sup>3</sup>
Butane	TLV 1000 ppm	-	TWA 800 ppm TWA 1900 mg/m <sup>3</sup>
Cyclohexane	TLV 100 ppm TLV 334 mg/m <sup>3</sup>	PEL 300 ppm PEL 1050 mg/m <sup>3</sup>	TWA 300 ppm TWA 1050 mg/m <sup>3</sup> IDLH 1300 ppm
Ethanethiol	TLV 0.5 ppm	Ceiling 10 ppm Ceiling 25 mg/m <sup>3</sup>	Ceiling 0.5 ppm Ceiling 1.3 mg/m <sup>3</sup>
Ethylbenzene	TLV 20 ppm TLV 87 mg/m <sup>3</sup>	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 125 ppm STEL 545 mg/m <sup>3</sup> IDLH 800 ppm
Fuels, diesel, No. 2	TLV 100 mg/m <sup>3</sup>	-	-

Heptane	TLV 400 ppm TLV 1640 mg/m <sup>3</sup> STEL 500 ppm STEL 2000 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 85 ppm TWA 350 mg/m <sup>3</sup> Ceiling 440 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 750 ppm
Hexane	TLV 50 ppm TLV 176 mg/m <sup>3</sup>	PEL 500 ppm PEL 1800 mg/m <sup>3</sup>	TWA 50 ppm TWA 180 mg/m <sup>3</sup> IDLH 1100 ppm
Hydrogen Sulfide	TLV 1 ppm TLV 1.4 mg/m <sup>3</sup> STEL 5 ppm STEL 7 mg/m <sup>3</sup>	Ceiling 20 ppm	Ceiling 10 ppm Ceiling 15 mg/m <sup>3</sup> IDLH 100 ppm
Methanethiol	TLV 0.5 ppm	Ceiling 10 ppm Ceiling 20 mg/m <sup>3</sup>	Ceiling 0.5 ppm Ceiling 1 mg/m <sup>3</sup>
Methylcyclohexane	TLV 400 ppm TLV 1610 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 400 ppm TWA 1600 mg/m <sup>3</sup> IDLH 1200 ppm
Naphthalene	TLV 10 ppm STEL 15 ppm	PEL 10 ppm PEL 50 mg/m <sup>3</sup>	TWA 10 ppm TWA 50 mg/m <sup>3</sup> STEL 15 ppm STEL 75 mg/m <sup>3</sup>
Octane	TLV 300 ppm TLV 1401 mg/m <sup>3</sup>	PEL 500 ppm PEL 2350 mg/m <sup>3</sup>	TWA 75 ppm TWA 350 mg/m <sup>3</sup> Ceiling 385 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1000 ppm
o-Xylene	STEL: 150 ppm TWA: 100 ppm	TWA: 100 ppm TWA: 435 mg/m <sup>3</sup> (vacated) TWA: 100 ppm (vacated) TWA: 435 mg/m <sup>3</sup> (vacated) STEL: 150 ppm (vacated) STEL: 655 mg/m <sup>3</sup>	IDLH: 900 ppm TWA: 100 ppm TWA: 435 mg/m <sup>3</sup> STEL: 150 ppm STEL: 655 mg/m <sup>3</sup>
Pentane	TLV 600 ppm TLV 1770 mg/m <sup>3</sup>	PEL 1000 ppm PEL 2950 mg/m <sup>3</sup>	TWA 120 ppm TWA 350 mg/m <sup>3</sup> Ceiling 610 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1500 ppm
Petroleum distillate (naphtha)	-	(vacated) TWA: 400 ppm (vacated) TWA: 1600 mg/m <sup>3</sup>	IDLH: 1100 ppm Ceiling: 1800 mg/m <sup>3</sup> 15 min TWA: 350 mg/m <sup>3</sup>
p-Xylene	TLV 100 ppm TLV 434 mg/m <sup>3</sup> STEL 150 ppm STEL 651 mg/m <sup>3</sup>	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 150 ppm STEL 655 mg/m <sup>3</sup> IDLH 900 ppm
Toluene	TLV 20 ppm TLV 75 mg/m <sup>3</sup>	PEL 200 ppm STEL 300 mg/m <sup>3</sup>	TWA 100 ppm TWA 375 mg/m <sup>3</sup> STEL 150 ppm STEL 560 mg/m <sup>3</sup> IDLH 500 ppm
Xylene	TLV 100 ppm TLV 434 mg/m <sup>3</sup> STEL 150 ppm	PEL 100 ppm PEL 435 mg/m <sup>3</sup>	TWA 100 ppm TWA 435 mg/m <sup>3</sup> STEL 150 ppm

	STEL 651 mg/m <sup>3</sup>		STEL 655 mg/m <sup>3</sup> IDLH 900 ppm
--	----------------------------	--	--

**Appropriate Engineering Controls:**

- Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. Prevent vapor build up by providing adequate ventilation during and after use. Use only appropriately classified electrical equipment.

**Individual Protection Measures:**Eye and Face

- Wear face shield and eye protection.

Skin and Body

- The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation.
- Wear protective gloves/protective clothing/eye protection/face protection. Wear long sleeves and/or protective coveralls.

Respiratory

- Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

General Hygiene Measures

- Handle in accordance with good industrial hygiene and safety practice.

## Section 9: Physical and Chemical Properties

**Material Description:**

<u>Physical State</u>	Liquid	<u>Appearance</u>	Yellow/green to Brown/black liquid
<u>Substance Type</u>	Mixture	<u>Odor</u>	Petroleum like odor
<u>Odor Threshold</u>	No data available		

**Properties:**

<u>pH</u>	No data available	<u>Vapor pressure</u>	No data available
<u>Melting point/freezing point</u>	No data available	<u>Vapor density</u>	No data available
<u>Initial Boiling point/range</u>	-18 to 565°C -0.4 to 1049°F	<u>Relative density</u>	No data available
<u>Flash point</u>	> -43 °C > -45.4 °F	<u>Water Solubility</u>	Insoluble in H <sub>2</sub> O
<u>Evaporation rate</u>	No data available	<u>Partition coefficient: n-octanol/water</u>	No data available
<u>Flammability (solid, gas)</u>	No data available	<u>Autoignition temperature</u>	No data available
<u>Upper flammability limit</u>	No data available	<u>Decomposition temperature</u>	No data available
<u>Lower flammability limit</u>	No data available	<u>Specific Gravity</u>	No data available
<u>Viscosity</u>	No data available	<u>API Gravity</u>	No data available

## Section 10: Stability and Reactivity

**Reactivity:**

- Chlorine Dioxide

**Chemical Stability:**

- Stable at 70 °F, 760 mm Hg pressure.

**Possibility of Hazardous Reactions:**

- None under normal processing.

**Conditions to Avoid:**

- Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity.

**Incompatible Materials:**

- Strong oxidizing agents and halogens.

**Hazardous Decomposition Products:**

- Combustion produces carbon monoxide, aldehydes, sulfur dioxide, aromatic, nitrogen oxides, and other hydrocarbons.

**Hazardous Polymerization**

- Will not occur

## Section 11: Toxicological Information

**Information on the likely routes of exposure:**Inhalation

- May cause irritation of respiratory tract. May cause drowsiness and dizziness.

Eye Contact

- Causes serious eye irritation.

Skin Contact

- Causes skin irritation

Ingestion

- Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.
- Potential for aspiration if swallowed.
- Aspiration may cause pulmonary edema and pneumonitis.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
1,2,4-Trimethylbenzene	5 g/kg (Rat)	-	18000 mg/m <sup>3</sup> (Rat) 4h
1-Propanethiol	=1790 mg/kg (Rat)	-	-
2-Propanethiol	-	-	130 g/m <sup>3</sup> (Mouse) 1h
Benzene	=1800 mg/kg (Rat)	-	13050 - 14380 ppm (Rat ) 4 h
Bitumen	>5000 mg/kg (Rat)	-	>94.4 mg/m <sup>3</sup> (Rat )
Butane	-	-	658 mg/L (Rat ) 4 h

Cyclohexane	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	= 13.9 mg/L (Rat) 4 h
Decane	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rat)	-
Ethanthiol	=682 mg/kg (Rat)	500 mg (Rabbit) 24h	4420 ppm (Rat) 4h
Ethylbenzene	= 3500 mg/kg (Rat)	= 15400 mg/kg (Rabbit)	= 17.2 mg/L (Rat) 4 h
Gas oil, blend	-	=500 mg (Rabbit)	= 1700 mg/m <sup>3</sup> (Rat) 4 h
Heptane	-	= 3000 mg/kg (Rabbit)	= 103 g/m <sup>3</sup> (Rat) 4 h
Hexane	= 25 g/kg (Rat)	= 3000 mg/kg (Rabbit)	= 48000 ppm (Rat) 4 h
Hydrogen sulfide	-	-	= 444 ppm (Rat)
Methylcyclohexane	> 3200 mg/kg (Rat)	-	-
Naphthalene	490 mg/kg (Rat)	0.05 ml (Rabbit) 24 h	
Natural gas condensates (petroleum)	-	-	=600 mg/m <sup>3</sup> (Rat)
Octane	-	-	= 118 g/m <sup>3</sup> (Rat) 4 h = 25260 ppm (Rat) 4 h
Pentane	>2000 mg/kg (Rat)	-	364 g/cu (Rat) 4 h
Petroleum	>4300 mg/kg (Rat)	500 mg (Rabbit) 24 h	-
p-Xylene	=3910 mg/kg (Rat)	-	4550 ppm (Rat) 4h
Sulfur	-	-	1660 mg/m <sup>3</sup> (Mammal)
Toluene	2.6 to 7.5 g/kg (Rat)	14.1 ml/kg (Rabbit)	-
Xylene	= 3500 mg/kg (Rat)	> 4350 mg/kg (Rabbit) > 1700 mg/kg (Rabbit)	= 29.08 mg/L (Rat) 4 h = 5000 ppm (Rat) 4 h

### Symptoms related to the physical, chemical and toxicological characteristics:

#### Benzene

- Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in humans. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.

#### Hydrogen Sulfide gas (H<sub>2</sub>S)

- Toxic by inhalation. Prolonged breathing of 50-100 ppm H<sub>2</sub>S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of >1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H<sub>2</sub>S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H<sub>2</sub>S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H<sub>2</sub>S, respectively. Over the years, a number of acute cases of H<sub>2</sub>S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.

#### Hexane

- This product may contain hexane at a level of >1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.

### Xylenes

- Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and humans. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.

### Toluene

- **Carcinogenicity:** Exposure of rats and mice to toluene at concentrations ranging from 120-1200 ppm for two years did not demonstrate evidence of carcinogenicity. Toluene has not been listed as a carcinogen by IARC.  
**Target Organs:** Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.  
**Reproductive Toxicity:** Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. Decreased fetal body weight and increased skeletal variations in both inhalation and oral studies, but only at doses that were maternally toxic. No fetal toxicity was seen at doses that were not maternally toxic. Decreased sperm counts have been observed in male rats in the absence of a reduction in fertility. Toluene has been reported to cause mental or growth retardation in the children of solvent abusers who directly inhale toluene during pregnancy.

### Ethylbenzene

- **Carcinogenicity:** Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC.  
**Target Organs:** In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), lung (alveolar epithelium metaplasia), thyroid (hyperplasia), thyroid (hyperplasia) and pituitary (hyperplasia). In animal models (particularly rats), ethyl benzene affects the auditory function mainly in the cochlear mid-frequency range and ototoxicity was observed after combined exposure to noise and ethyl benzene. There is no evidence of either ethyl benzene-induced hearing losses or ototoxicity with combined exposure to ethyl benzene and noise in workers.

### Naphthalene

- Naphthalene has been evaluated in two-year inhalation studies in both rats and mice. The US National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has been identified as a carcinogen by IARC and NTP.

**Delayed and immediate effects and also chronic effects from short- and long-term exposure:**Sensitization

- No information available.

Mutagenic Effects

- May cause genetic defects.

Carcinogenicity

- May cause cancer.

Chemical Name	ACGIH	ACGIH Skin*	IARC	NTP	OSHA
Benzene	A1	X	Group 1	Known	X
Bitumen	A4				
Ethylbenzene	A3		Group 2B	Evidence	X
Fuels, diesel, No. 2	A3	X			
Hexane		X			
Naphthalene	A4	X	Group 2B	Anticipated	
Toluene	A4		Group 3	Evidence	
Xylene	A4		Group 3	Evidence	

\*ACGIH Skin designation refers to the potential significant contribution of overall exposure by cutaneous route, including mucous membranes and eyes, from airborne exposure to gases, vapor, or liquid OR by direct skin contact

**Reproductive Toxicity:**

- Suspected of damaging fertility or the unborn child.

**STOT - single exposure:**

- May cause drowsiness and dizziness.

**STOT - repeated exposure:**

- Causes damage to organs through prolonged or repeated exposure.

**Aspiration Hazard:**

- May be fatal if swallowed and enters airways.
- Risk of serious damage to the lungs (by aspiration).

## Section 12: Ecological Information

**Ecotoxicity**

Chemical Name	Toxicity to Algae	Toxicity to Fish	Daphnia Magna (Water Flea)	Other Toxicity
1,2,4-Trimethylbenzene	-	LC50 96 h: 7.72 mg/L (Pimephales promelas)	EC50 48h: 30 mmol/cu (Daphnia magna)	LC50 24h: 100 mmol/cu Artemia salina (Brine Shrimp)
1-Propanethiol	-	-	LC 48h: 60 ug/L (Daphnia magna)	-



Benzene	EC50 72 h: = 29 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 10.7 - 14.7 mg/L flow-through (Pimephales promelas) LC50 96 h: = 5.3 mg/L flow-through (Oncorhynchus mykiss) LC50 96 h: = 22.49 mg/L static (Lepomis macrochirus) LC50 96 h: = 28.6 mg/L static (Poecilia reticulata) LC50 96 h: 22330 - 41160 µg/L static (Pimephales promelas) LC50 96 h: 70000 - 142000 µg/L static (Lepomis macrochirus)	EC50 48 h: 8.76 - 15.6 mg/L Static (Daphnia magna) EC50 48 h: = 10 mg/L (Daphnia magna)	-
Cyclohexane	EC50 72 h: > 500 mg/L (Desmodesmus subspicatus)	LC50 96 h: 3.96 - 5.18 mg/L flow-through (Pimephales promelas) LC50 96 h: 23.03 - 42.07 mg/L static (Pimephales promelas) LC50 96 h: 24.99 - 44.69 mg/L static (Lepomis macrochirus) LC50 96 h: 48.87 - 68.76 mg/L static (Poecilia reticulata)	EC50 24 h: > 400 mg/L (Daphnia magna)	EC50 = 85.5 mg/L 5 min EC50 = 93 mg/L 10 min (Microorganisms)
Decane	EC50 24 h: = 0.043 mg/L (Chlorella vulgaris)	-	-	EC50 48 h: = 0.029 mg/L (Daphnia magna)
Ethanethiol	-	-	EC50 48 h: >90-280 mg/L (Daphnia magna)	-
Ethylbenzene	EC50 72 h: = 4.6 mg/L (Pseudokirchneriella subcapitata) EC50 96 h: > 438 mg/L (Pseudokirchneriella subcapitata) EC50 72 h: 2.6 - 11.3 mg/L static (Pseudokirchneriella subcapitata) EC50 96 h: 1.7 - 7.6 mg/L static (Pseudokirchneriella subcapitata) EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 11.0 - 18.0 mg/L static (Oncorhynchus mykiss) LC50 96 h: = 4.2 mg/L semi-static (Oncorhynchus mykiss) LC50 96 h: 7.55 - 11 mg/L flow-through (Pimephales promelas) LC50 96 h: = 32 mg/L static (Lepomis macrochirus) LC50 96 h: 9.1 - 15.6 mg/L static (Pimephales promelas) LC50 96 h: = 9.6 mg/L static (Poecilia reticulata)	EC50 48 h: 1.8 - 2.4 mg/L (Daphnia magna)	EC50 = 9.68 mg/L 30 min EC50 = 96 mg/L 24 h (Microorganisms)
Heptane	-	LC50 96 h: = 375.0 mg/L (Cichlid fish)	EC50 24 h: > 10 mg/L (Daphnia magna)	-
Hexane	-	LC50 96 h: 2.1 - 2.98 mg/L flow-through (Pimephales promelas)	EC50 24 h: > 1000 mg/L (Daphnia magna)	-

Hydrogen sulfide	-	LC50 96h: 49 ug/l (Oncorhynchus mykiss (Rainbow Trout) eggs LC50 24h: 1059.7 ug/l Pimephales promelas (Fathead Minnow)	EC50 48h: 62 ug/l Gammarus pseudolimnaeus (Scud)	-
Methanethiol	-	-	-	LC50: 0.55-0.9 mg/L (Salmonides)
Methylcyclohexane	-	LC50 96hr: 72.0 mg/L (Golden Shiner)	-	-
Naphthalene	EC50 24 h: = 33000 ug/L (Chlorella vulgaris)	LC50 96 h: = 1.4 mg/L (Oncorhynchus gorbuscha)	EC50 48 h: 1600 ug/L (Daphnia magna)	-
n-Butanethiol	EC50 96 h: = 1068.3- 5478.24 mg/l (Scenedesmus subspicatus)	LC50 96 h: = 1100-3600 mg/L (Ictalurus punctatus)	-	-
Octane	-	-	EC50 48 h: = 0.38 mg/L (water flea) EC50 48 h: = 0.02856 mg/L (Daphnia magna)	EC50 = 890 mg/L 30 min (Microorganisms) EC50 <1.67hr: 120 ug/l Mytilus edulis (Common Bay Mussel)
Pentane	-	-	EC50 48h: 135 mmol/cu	LC50 24h: 165 mmol/cu Artemia salina (Brine Shrimp)
p-Xylene	EC50 3h: 430 mmol/cu (Chlamydomonas angulosa)	LC50 96h: 2600 ug/l (Oncorhynchus mykiss)	-	-
Sulfur	-	LC50 96h: <14000 ug/l (Lepomis macrochirus)	EC50 48 h: = >5000000 ug/L (Daphnia magna)	-
Toluene	EC50: >433 mg/L Pseudokirchneriella subcapitata 96 h EC50: 12.5 mg/L Pseudokirchneriella subcapitata 72 h static	LC50: 15.22-19.05 mg/L Pimephales promelas 96 h flow-through LC50: 12.6 mg/L Pimephales promelas 96 h static LC50: 5.89-7.81 mg/L Oncorhynchus mykiss 96 h flow-through LC50: 14.1-17.16 mg/L Oncorhynchus mykiss 96 h static LC50: 5.8 mg/L Oncorhynchus mykiss 96 h semi-static LC50: 11.0-15.0 mg/L Lepomis macrochirus 96 h static LC50: 54 mg/L Oryzias latipes 96 h static	EC50 48 h: 5.46 - 9.83 mg/L Static (Daphnia magna) EC50 48 h: = 11.5 mg/L (Daphnia magna)	EC50 = 19.7 mg/L 30 min (Microorganisms)

		LC50: 28.2 mg/L Poecilia reticulata 96 h semi-static LC50: 50.87-70.34 mg/L Poecilia reticulata 96 h static		
Xylene	EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: = 13.4 mg/L flow-through (Pimephales promelas) LC50 96 h: 2.661 - 4.093 mg/L static (Oncorhynchus mykiss) LC50 96 h: 13.5 - 17.3 mg/L (Oncorhynchus mykiss) LC50 96 h: 13.1 - 16.5 mg/L flow-through (Lepomis macrochirus)	EC50 48 h: = 3.82 mg/L (water flea) LC50 48 h: = 0.6 mg/L (Gammarus lacustris)	

**Persistence and Degradability:**

- No information available.

**Bioaccumulative potential:**

Chemical Name	Log Pow
1,2,4-Trimethylbenzene	3.78
1-Propanethiol	1.81
2-butanethiol	2.18
2-Propanethiol	1.7
Benzene	1.83
Butane	2.89
Cyclohexane	3.44
Decane	5.1
Ethanethiol	1.27
Ethylbenzene	3.118
Gas oil, blend	3.3-7.06
Heptane	4.66
Hexane	3.90
Methanethiol	0.78
Methylcyclohexane	3.61
Methylcyclopentane	3.37
Naphthalene	3.30
n-Butanethiol	2.28
Octane	5.18
Pentane	3.39
p-Xylene	3.15
Toluene	2.65
Xylene	2.77-3.15
o-Xylene	3.12

**Mobility in soil:**

Chemical Name	Expected Soil Mobility
1,2,4-Trimethylbenzene	Low

1-Propanethiol	Moderate
2-butanethiol	High
2-Propanethiol	Very High
Benzene	High
Butane	Low
Cyclohexane	Moderate
Decane	Immobile
Ethanethiol	Very High
Ethylbenzene	Low
Gas oil, blend	Low
Heptane	Moderate
Hexane	High
Methanethiol	Very High
Methylcyclopentane	Low
Naphthalene	High to None
n-Butanethiol	Moderate
Octane	Immobile
Pentane	High
p-Xylene	Moderate to Low
Toluene	High to Moderate
Xylene	Very high to Moderate
o-Xylene	Very high to Moderate

**Other adverse effects:**

- No information available.

## Section 13: Disposal Considerations

**Waste Treatment Methods:**Product Waste

- This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.
- This product could also contain benzene at >0.5 ppm and could exhibit the characteristic of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP).
- This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s).
- It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.

Packaging Waste

- Container contents should be completely used and containers should be emptied prior to discard.
- Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations.
- Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner.

- To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

### Section 14: Transport Information

	UN Number	Proper Shipping Name	Transport Hazard Class	Packing Group	Notes
<b>DOT</b>	UN 1267	Petroleum crude oil	3	I	Emergency response guide number: 128
<b>TDG</b>	UN 1267	Petroleum crude oil	3	I	-
<b>IMO/IMDG</b>	UN 1267	Petroleum crude oil	3	I	EmS No. F-E, S-E
<b>IATA/ICAO</b>	UN 1267	Petroleum crude oil	3	I	3L

#### Special precautions for user:

- None specified.

### Section 15: Regulatory Information

#### U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities:

Component	CAS #	Amount
Benzene	71-43-2	10 lb final RQ; 4.54 kg final RQ
Cyclohexane	110-82-7	1000 lb final RQ; 454 kg final RQ
Ethylbenzene	100-41-4	1000 lb final RQ; 454 kg final RQ
Hexane	110-54-3	5000 lb final RQ; 2270 kg final RQ
Hydrogen sulfide	7783-06-4	100 lb final RQ; 45.4 kg final RQ
Methanethiol	74-93-1	100 lb final RQ; 45.4 kg final RQ
Naphthalene	91-20-3	100 lb final RQ; 45.4 kg final RQ
p-Xylene	106-42-3	100 lb final RQ; 45.4 kg final RQ
Toluene	108-88-3	1000 lb final RQ; 454 kg final RQ
Xylene	1330-20-7	100 lb final RQ; 45.4 kg final RQ
o-Xylene	95-47-6	1000 lb final RQ; 454 kg final RQ

#### U.S. - CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances

Component	CAS #	Amount
Benzene	71-43-2	10 lb RQ
Cyclohexane	110-82-7	1000 lb RQ
Ethylbenzene	100-41-4	1000 lb RQ
Hydrogen sulfide	7783-06-4	100 lb RQ
Methanethiol	74-93-1	100 lb RQ
Naphthalene	91-20-3	100 lb RQ
Toluene	108-88-3	1000 lb RQ
Xylene	1330-20-7	100 lb RQ

**U.S. - CWA (Clean Water Act) - Recommended Water Quality Criteria - CCC for Freshwater Life**

Component	CAS #	Amount
Hydrogen sulfide	7783-06-4	2.0 µg/L CCC

**U.S. - CWA (Clean Water Act) - Recommended Water Quality Criteria - CCC for Saltwater Life**

Component	CAS #	Amount
Hydrogen sulfide	7783-06-4	2.0 µg/L CCC

**U.S. - CWA (Clean Water Act) - Hazardous Substances**

Component	CAS #	Listed
Benzene	71-43-2	Yes
Cyclohexane	110-82-7	Yes
Ethylbenzene	100-41-4	Yes
Hydrogen sulfide	7783-06-4	Yes
Methanethiol	74-93-1	Yes
Naphthalene	91-20-3	Yes
p-Xylene	106-42-3	Yes
Toluene	108-88-3	Yes
Xylene	1330-20-7	Yes
o-Xylene	95-47-6	Yes

**U.S. - CWA (Clean Water Act) - Priority Pollutants**

Component	CAS #	Listed
Benzene	71-43-2	Yes
Ethylbenzene	100-41-4	Yes
Naphthalene	91-20-3	Yes
Toluene	108-88-3	Yes

**Canada - WHMIS - Classifications of Substances**

Component	CAS #	Classification
1,2,4-Trimethylbenzene	95-63-6	B3
Benzene	71-43-2	B2, D2A, D2B
Butane	106-97-8	A, B1
Cyclohexane	110-82-7	B2, D2B
Decane	124-18-5	B3, D2B
Distillates (petroleum), hydrotreated middle	64742-46-7	Uncontrolled product according to WHMIS classification criteria
Ethanethiol	75-08-1	B2
Ethylbenzene	100-41-4	B2, D2A, D2B
Heptane	142-82-5	B2, D2B
Hexane	110-54-3	B2, D2A, D2B
Hydrogen sulfide	7783-06-4	A, B1, D1A, D2B
Methanethiol	74-93-1	A, B1, D1A
Methylcyclohexane	108-87-2	B2

Naphthalene	91-20-3	B4, D2A
n-Butanethiol	109-79-5	B2, D1B
Octane	111-65-9	B2, D2B
Pentane	109-66-0	B2
Petroleum	8002-05-9	B2
p-Xylene	106-42-3	B2, D2A, D2B
Sulfur	7704-34-9	B4
Toluene	108-88-3	B2, D2A, D2B
Xylene	1330-20-7	B2, D2A, D2B
o-Xylene	95-47-6	B2, D2B

#### Canada - Council of Ministers of the Environment - Water Quality Guidelines for Freshwater Aquatic Life

Component	CAS #	Amount
Ethylbenzene	100-41-4	90 µg/L
Toluene	108-88-3	2.0 µg/L
Benzene	71-43-2	370 µg/L
Naphthalene	91-20-3	1.1 µg/L

#### Canada - Council of Ministers of the Environment - Water Quality Guidelines for Marine Aquatic Life

Component	CAS #	Amount
Ethylbenzene	100-41-4	25 µg/L
Toluene	108-88-3	215 µg/L
Benzene	71-43-2	110 µg/L
Naphthalene	91-20-3	1.4 µg/L

#### Canada - Environmental Emergencies

Component	CAS #	Listed
Benzene	71-43-2	Yes
Butane	106-97-8	Yes
Cyclohexane	110-82-7	Yes
Ethanethiol	75-08-1	Yes
Ethylbenzene	100-41-4	Yes
Hydrogen sulfide	7783-06-4	Yes
Methanethiol	74-93-1	Yes
Naphthalene	91-20-3	Yes
Pentane	109-66-0	Yes
Toluene	108-88-3	Yes
Xylene	1330-20-7	Yes

**Section 16: Other Information****NFPA:**

Health Hazard:	2	Flammability:	4	Instability:	1	Physical and Chemical Hazards:	x
----------------	---	---------------	---	--------------	---	--------------------------------	---

**HMIS:**

Health Hazard:	2	Flammability:	4	Instability:	0	Personal Protection:	x
----------------	---	---------------	---	--------------	---	----------------------	---

**Issuing Date:**

3/30/18

**Revision Date:**

3/30/18

**Disclaimer:**

- The information presented herein is based on data considered to be accurate as of the date of preparation of this Safety Data Sheet (SDS). However, SDS's may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.



# Safety Data Sheet

## Section 1: Identification

### PRODUCT IDENTIFIER

High Sweet Clearbrook

### OTHER MEANS OF IDENTIFICATION

**UN-Number** UN1267

**Synonyms** Bakken Crude Oil; High Sweet Clearbrook (UHC); Hydrocarbons of Petroleum; North Dakota Sweet (NSW)

### RECOMMENDED USE

No information available

### RESTRICTIONS OF USE

No information available

### SUPPLIER INFORMATION

Enbridge Pipelines Inc. 10201 Jasper Avenue Edmonton, Alberta T5J 3N7 Canada TEL: 1-780-420- 5210

### EMERGENCY CONTACT INFORMATION

**CHEMTREC** 1-800-424-9300 for US  
703- 527- 3887 outside US

**CANUTEC (Canadian Transportation)** 613-996-6666

## Section 2: Hazards Identification

### CLASSIFICATION

Skin Corrosion/Irritation	Category 2
Eye Irritation	Category 2
Germ Cell Mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 2
Specific Target Organ Systemic Toxicity (Single Exposure)	Category 3
Specific Target Organ Toxicity (Repeated Exposure)	Category 1
Aspiration Toxicity	Category 1
Flammable liquids	Category 1

### LABEL ELEMENTS

**Signal Word** Danger

### Hazard Pictograms



---

**Hazard Statements**

- Causes skin irritation.
- Causes serious eye irritation.
- May cause genetic defects.
- May cause cancer.
- Suspected of damaging fertility or the unborn child.
- May cause respiratory irritation.
- Causes damage to organs through prolonged or repeated exposure.
- May be fatal if swallowed and enters airways.
- Extremely flammable liquid and vapor.

---

**PRECAUTIONARY  
STATEMENTS**

---

**Prevention**

- Wash face, hands and any exposed skin thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Use personal protective equipment as required.
- Do not breathe dust/fume/gas/mist/vapors/spray.
- Use only outdoors or in a well-ventilated area.
- Do not eat, drink or smoke when using this product.
- Keep away from heat/sparks/open flames/hot surfaces.
- No smoking.
- Keep container tightly closed.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting/equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- In case of inadequate ventilation wear respiratory protection.

---

**Response**

- IF exposed or concerned: Get medical advice/attention.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- Call a POISON CENTER or doctor/physician if you feel unwell.
- Get medical advice/attention if you feel unwell.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- In case of fire: Use CO<sub>2</sub>, dry chemical, or foam for extinction.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- Do NOT induce vomiting.

---

**Storage/Disposal**

- Store locked up.
- Store in a well-ventilated place. Keep container tightly closed.
- Keep cool.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

---

**OTHER  
INFORMATION**

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
- Very toxic to aquatic life with long lasting effects.

## Section 3: Composition/Information on Ingredients

COMPONENT NAME	CAS NUMBER	PERCENTAGE (%)*	NOTES
Petroleum Hydrocarbons	68919-39-1	100	
Trans-1,2-dimethylcyclopentane	28729-52-4	1.8	
2-Methylhexane	591-76-4	1.0	
2-Methylpentane	107-83-5	1.8	
3-Methylhexane	589-34-4	1.6	
3-Methylpentane	96-14-0	1.3	
2-Methylheptane	592-27-8	1.4	
Benzene	71-43-2	0.4	
Cyclohexane	110-82-7	1.0	
i-Pentane	109-66-0	1.8	
MethylCyclohexane	108-87-2	2.3	
Methylcyclopentane	96-37-7	2.2	
n-Butane	106-97-8	1.9	
n-Heptane	142-82-5	3.4	
n-Hexane	110-54-3	3.4	
n-Pentane	109-66-0	3.4	
n-Octane	111-65-9	3.0	
n-Nonane	111-84-2	2.2	
n-Decane	124-18-5	2.0	
n-Undecane	1120-21-4	1.7	
n-Dodecane	112-40-3	1.5	
n-Tridecane	629-50-5	1.3	
Toluene	108-88-3	0.9	
Hydrogen sulfide	7783-06-4	<0.00001	
Ethylbenzene	100-41-4	0.6	
Xylenes	1330-20-7	0-5	

\*Values do not reflect absolute minimums and maximums; those values may vary from time to time.

## Section 4: First Aid Measures

### DESCRIPTION OF NECESSARY MEASURES

<b>Inhalation</b>	<ul style="list-style-type: none"><li>• IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If irritation persists: Get medical advice/attention.</li></ul>
<b>Skin</b>	<ul style="list-style-type: none"><li>• IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.</li></ul>
<b>Eye</b>	<ul style="list-style-type: none"><li>• IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.</li></ul>
<b>Ingestion</b>	<ul style="list-style-type: none"><li>• Do NOT induce vomiting. Call a physician or poison control center.</li><li>• Aspiration hazard if swallowed - can enter lungs and cause damage.</li></ul>

### MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

Refer to Section 11 - Toxicological Information

### INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY

<b>Note to the Physician</b>	<ul style="list-style-type: none"><li>• Aspiration hazard. Symptoms may be delayed.</li><li>• Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.</li><li>• Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.</li></ul>
------------------------------	--

## Section 5: Fire Fighting Measures

### EXTINGUISHING MEDIA

<b>Suitable Extinguishing Media</b>	<ul style="list-style-type: none"><li>• SMALL FIRES: Dry chemical, CO<sub>2</sub>, water spray or regular foam.</li><li>• LARGE FIRE: Water spray, fog or regular foam.</li></ul>
-------------------------------------	---

<b>Unsuitable Extinguishing Media</b>	<ul style="list-style-type: none"><li>• CAUTION: Use of water spray when fighting fire may be inefficient.</li><li>• Do not use straight streams.</li></ul>
---------------------------------------	---

### FIREFIGHTING PROCEDURES

- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: If impossible to extinguish, protect surroundings and allow fire to burn itself out.
- Stay upwind.
- Ventilate closed spaces before entering.
- Fire fighters should wear complete protective clothing including self-contained breathing apparatus.
- FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

- FIRE: When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.
- Move containers from fire area if you can do it without risk.
- LARGE FIRES: Use water spray or fog; do not use straight streams.
- LARGE FIRES: If insufficient water supply: knock down vapors only. If this is impossible, withdraw from area and let fire burn.
- LARGE FIRES: Flood fire area with large quantities of water, while knocking down vapors with water fog.

### SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

- Vapors may travel to source of ignition and flash back.
- Air/vapor mixtures may explode when ignited.
- Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars etc.).
- Will be easily ignited by heat, sparks or flames.
- Runoff to sewer may create fire or explosion hazard.
- Vapor explosion hazard indoors, outdoors or in sewers.
- MAY EXPLODE AND THROW FRAGMENTS 1600 meters (1 MILE) OR MORE IF FIRE REACHES CARGO.
- May create vapor/air explosion hazard indoors, outdoors or in sewers.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

### EXPLOSION DATA

**Hazardous Combustion Products**

- Carbon monoxide. Carbon dioxide (CO<sub>2</sub>). Nitrogen oxides (NO<sub>x</sub>). Oxides of sulfur.
- Aldehydes, aromatic and other hydrocarbons.

**Sensitivity to Mechanical Impact**

- None.

**Sensitivity to Static Discharge**

- Yes.

### PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS

- As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.
- Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced firefighters.
- Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.
- Water spray may be useful in minimizing or dispersing vapors.
- Long-duration fires involving diluent stored in tanks may result in a boilover.
- For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear.

## Section 6:

## Accidental Release Measures

### PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

- Personal Precautions**
- Evacuate personnel to safe areas.
  - Remove all sources of ignition.
  - Deny entry to unauthorized and unprotected personnel.
  - Use personal protective equipment.
  - Avoid contact with skin, eyes and clothing.
  - Stop leak if you can do it without risk.
  - Keep people away from and upwind of spill/leak.
  - Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

- Ventilate enclosed areas.
- Do not walk through spilled material.

#### Protective Equipment

- Wear appropriate breathing apparatus (if applicable) and protective clothing.

#### Emergency Procedures

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area) Keep unauthorized personnel away. Evacuate area. Keep out of low areas. Stop leak if you can do it without risk.
- Report spills to local or federal authorities as appropriate or required.

- Avoid run off to waterways and sewers. Do NOT wash away into sewer. Prevent entry into waterways, sewers, basements or confined areas. Runoff from fire control may cause pollution.

#### Methods for Containment

- Stop leak if you can do it without risk.
- Contain and recover liquid when possible.
- A vapor suppressing foam may be used to reduce vapors.
- Dike far ahead of spill; use dry sand to contain the flow of material; contain water spills by booming.
- Use water spray to reduce vapors or divert vapor cloud drift.
- A fine water spray remotely directed to the edge of the spill pool can be used to direct and maintain a hot flare fire which will burn the spilled material in a controlled manner.

#### Methods for Cleaning Up

- Clean up spill immediately.
- LARGE SPILLS: DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.
- SMALL LIQUID SPILLS: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.
- Use appropriate Personal Protective Equipment (PPE).
- Use clean non-sparking tools to collect absorbed material.
- Vacuum spilled material.
- Try to work upwind of spill.
- All equipment used when handling the product must be grounded.
- Recover and return free product to proper containers
- Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids.
- Do not place spilled materials back in the original container.
- Do not flush to sewer or allow to enter waterways.

## ENVIRONMENTAL PRECAUTIONS

## METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP

## Section 7: Handling and Storage

### PRECAUTIONS FOR SAFE HANDLING

#### Handling

- All equipment used when handling the product must be grounded. Avoid contact with heat and ignition sources and oxidizers. Do not breathe (dust, vapor or spray mist). Do not use in areas without adequate ventilation. Do not use sparking tools. Keep away from heat, sparks, and flame. No open flames, no sparks and no smoking. Use only with adequate ventilation. Do not use or store near heat or open flame. Keep away from fire, sparks and heated surfaces.
- The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes).

- The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.
- Take precautionary measures against static discharges.

Handling	<ul style="list-style-type: none"><li>• Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.</li><li>• Stay upwind and vent open hatches before uploading.</li><li>• Avoid contact with skin, eyes and clothing.</li><li>• Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.</li><li>• Wear personal protective equipment.</li><li>• Remove and wash contaminated clothing before re-use.</li><li>• Do not eat, drink or smoke when using this product.</li><li>• Do not take internally.</li><li>• Wash thoroughly after handling.</li><li>• Empty containers pose a potential fire and explosion hazard.</li></ul>
----------	---

CONDITIONS FOR  
SAFE STORAGE,  
INCLUDING ANY  
INCOMPATIBILITIES

Storage	<ul style="list-style-type: none"><li>• Ventilate enclosed areas.</li><li>• Store in a well-ventilated place.</li><li>• Keep container tightly closed.</li><li>• Store locked up.</li><li>• Avoid shock, impact, friction, and rough handling. Do not use sparking tools.</li><li>• Store in a cool/low-temperature, well-ventilated place away from heat and ignition sources.</li><li>• Keep away from sources of ignition.</li><li>• No Smoking.</li><li>• Do not enter confined spaces such as tanks or pits without following proper entry procedures.</li><li>• Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area.</li><li>• Harmful concentrations of hydrogen sulfide (H<sub>2</sub>S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments.</li><li>• Keep away from open flames, hot surfaces and sources of ignition.</li><li>• Keep product and empty container away from heat and sources of ignition.</li><li>• Storage containers should be grounded and bonded.</li><li>• Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.</li><li>• Store away from incompatible materials.</li></ul>
---------	---

Incompatible Products	<ul style="list-style-type: none"><li>• Strong oxidizers such as nitrates, chlorates, peroxides.</li></ul>
-----------------------	--

Section 8: Exposure Controls/Personal Protection

CONTROL  
PARAMETERS:  
EXPOSURE  
GUIDELINES

CHEMICAL NAME	ACGIH	OSHA	NIOSH
2-Methylpentane	-	-	TWA 100 ppm TWA 350 mg/m <sup>3</sup> Ceiling 510 ppm Ceiling 1800 mg/m <sup>3</sup>

<b>3-Methylpentane</b>	-	-	TWA 100 ppm TWO 350 mg/m <sup>3</sup> Ceiling 510 ppm Ceiling 1800 mg/m <sup>3</sup>
<b>Benzene</b>	TLV 0.5 ppm TLV 1.6 mg/m <sup>3</sup> STEL 2.5 ppm STEL 8 mg/m <sup>3</sup>	PEL 1 ppm STEL 5 ppm	TWA 0.1 ppm STEL 1 ppm IDLH 500 ppm
<b>Cyclohexane</b>	TLV 100 ppm TLV 334 mg/m <sup>3</sup>	PEL 300 ppm PEL 1050 mg/m <sup>3</sup>	TWA 300 ppm TWA 1050 mg/m <sup>3</sup> IDLH 1300 ppm
<b>i-Pentane</b>	TLV 600 ppm TLV 1770 mg/m <sup>3</sup>	PEL 1000 ppm PEL 2950 mg/m <sup>3</sup>	TWA 120 ppm TWA 350 mg/m <sup>3</sup> Ceiling 610 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1500 ppm
<b>MethylCyclohexane</b>	TLV 400 ppm TLV 1610 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 400 ppm TWA 1600 mg/m <sup>3</sup> IDLH 1200 ppm
<b>n-Butane</b>	TLV 1000 ppm	-	TWA 800 ppm TWA 1900 mg/m <sup>3</sup>
<b>n-Heptane</b>	TLV 400 ppm TLV 1640 mg/m <sup>3</sup> STEL 500 ppm STEL 2000 mg/m <sup>3</sup>	PEL 500 ppm PEL 2000 mg/m <sup>3</sup>	TWA 85 ppm TWA 350 mg/m <sup>3</sup> Ceiling 440 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 750 ppm
<b>n-Hexane</b>	TLV 50 ppm TLV 176 mg/m <sup>3</sup>	PEL 500 ppm PEL 1800 mg/m <sup>3</sup>	TWA 50 ppm TWA 180 mg/m <sup>3</sup> IDLH 1100 ppm
<b>n-Pentane</b>	TLV 600 ppm TLV 1770 mg/m <sup>3</sup>	PEL 1000 ppm PEL 2950 mg/m <sup>3</sup>	TWA 120 ppm TWA 350 mg/m <sup>3</sup> Ceiling 610 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1500 ppm
<b>n-Octane</b>	TLV 300 ppm TLV 1401 mg/m <sup>3</sup>	PEL 500 ppm PEL 2350 mg/m <sup>3</sup>	TWA 75 ppm TWA 350 mg/m <sup>3</sup> Ceiling 385 ppm Ceiling 1800 mg/m <sup>3</sup> IDLH 1000 ppm
<b>n-Nonane</b>	TLV 200 ppm TLV 1050 mg/m <sup>3</sup>	-	TWA 200 ppm TWA 1050 mg/m <sup>3</sup>



<b>Toluene</b>	TLV 20 ppm	PEL 200 ppm	TWA 100 ppm
	TLV 75 mg/m <sup>3</sup>	STEL 300 mg/m <sup>3</sup>	TWA 375 mg/m <sup>3</sup> STEL 150 ppm STEL 560 mg/m <sup>3</sup> IDLH 500 ppm
<b>Hydrogen sulfide</b>	TLV 1 ppm	Ceiling 20 ppm	Ceiling 10 ppm
	TLV 1.4 mg/m <sup>3</sup>		Ceiling 15 mg/m <sup>3</sup>
	STEL 5 ppm		IDLH 100 ppm
	STEL 7 mg/m <sup>3</sup>		
<b>Ethylbenzene</b>	TLV 20 ppm	PEL 100 ppm	TWA 100 ppm
	TLV 87 mg/m <sup>3</sup>	PEL 435 mg/m <sup>3</sup>	TWA 435 mg/m <sup>3</sup> STEL 125 ppm STEL 545 mg/m <sup>3</sup> IDLH 800 ppm
<b>Xylenes</b>	TLV 100 ppm	PEL 100 ppm	TWA 100 ppm
	TLV 434 mg/m <sup>3</sup>	PEL 435 mg/m <sup>3</sup>	TWA 435 mg/m <sup>3</sup>
	STEL 150 ppm		STEL 150 ppm
	STEL 651 mg/m <sup>3</sup>		STEL 655 mg/m <sup>3</sup> IDLH 900 ppm

#### APPROPRIATE ENGINEERING CONTROLS

- Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. Prevent vapor build up by providing adequate ventilation during and after use. Use only appropriately classified electrical equipment.

#### INDIVIDUAL PROTECTION MEASURES

<b>Eye and Face</b>	<ul style="list-style-type: none"> <li>• Wear face shield and eye protection.</li> </ul>
<b>Skin and Body</b>	<ul style="list-style-type: none"> <li>• The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation.</li> <li>• Wear protective gloves/protective clothing/eye protection/face protection. Wear long sleeves and/or protective coveralls.</li> </ul>
<b>Respiratory</b>	<ul style="list-style-type: none"> <li>• Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.</li> </ul>
<b>General Hygiene Measures</b>	<ul style="list-style-type: none"> <li>• Handle in accordance with good industrial hygiene and safety practice.</li> </ul>

## Section 9:

## Physical and Chemical Properties

#### MATERIAL DESCRIPTION

<b>Physical State</b>	Liquid	<b>Odor</b>	Rotten egg, petroleum-like odor
<b>Substance Type</b>	Mixture	<b>Odor Threshold</b>	No data available
<b>Appearance</b>	Clear to brown liquid		

PROPERTIES	pH	No data available	Vapor pressure	72.3 to 101.35 kPa @ 37.8°C (100.4°F)
	Melting Point/ Freezing Point	No data available	Vapor density	1.0 to 3.9 Air=1
	Boiling Point/ Boiling Range	82.6 to 1330 °F 28.1 to 721.1 °C	Relative density	41.2 to 42.6
	Flash Point	-38 to -36 °F -38.8 to -37.7 °C	Water Solubility	Negligible
	Evaporation Rate	(Ethyl Ether =1) >1	Partition coefficient: n-octanol/water	No data available
	Flammability (solid, gas)	No data available	Autoignition temperature	No data available
	Upper Flammability Limit	No data available	Decomposition temperature	No data available
	Lower Flammability Limit	No data available	Specific Gravity	0.82
	Viscosity	5.43 mm <sup>2</sup> /s		

## Section 10: Stability and Reactivity

REACTIVITY	No data available
CHEMICAL STABILITY	Stable at 70 °F, 760 mm Hg pressure
POSSIBILITY OF HAZARDOUS REACTIONS	None under normal processing
CONDITIONS TO AVOID	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity
INCOMPATIBLE MATERIALS	Strong oxidizers such as nitrates, chlorates, peroxides
HAZARDOUS DECOMPOSITION PRODUCTS	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons
HAZARDOUS POLYMERIZATION	Will not occur

## Section 11: Toxicological Information

INFORMATION ON THE LIKELY ROUTES OF EXPOSURE	Inhalation	• May cause irritation of respiratory tract. May cause drowsiness and dizziness.
	Eye Contact	• Causes serious eye irritation.
	Skin Contact	• Causes skin irritation.

<b>Ingestion</b>	<ul style="list-style-type: none"> <li>• Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.</li> <li>• Potential for aspiration if swallowed.</li> <li>• Aspiration may cause pulmonary edema and pneumonitis.</li> </ul>
------------------	--

## TOXICOLOGICAL DATA

CHEMICAL NAME	LD50 ORAL	LD50 DERMAL	LC50 INHALATION
<b>Benzene</b>	1800 mg/kg ( Rat )	-	13050 - 14380 ppm ( Rat ) 4 h
<b>Cyclohexane</b>	> 5000 mg/kg ( Rat )	> 2000 mg/kg ( Rabbit )	= 13.9 mg/L ( Rat ) 4 h
<b>i-Pentane</b>	>2000 mg/kg ( Rat )	-	364 g/cu ( Rat ) 4 h
<b>MethylCyclohexane</b>	> 3200 mg/kg ( Rat )	-	-
<b>n-Butane</b>	-	-	658 mg/L ( Rat ) 4 h
<b>n-Heptane</b>	-	= 3000 mg/kg ( Rabbit )	= 103 g/m <sup>3</sup> ( Rat ) 4 h
<b>n-Hexane</b>	= 25 g/kg ( Rat )	= 3000 mg/kg ( Rabbit )	= 48000 ppm ( Rat ) 4 h
<b>n-Pentane</b>	>2000 mg/kg ( Rat )	-	364 g/cu ( Rat ) 4 h
<b>n-Octane</b>	-	-	= 118 g/m <sup>3</sup> ( Rat ) 4 h = 25260 ppm ( Rat ) 4 h
<b>n-Nonane</b>	-	-	= 3200 ppm ( Rat ) 4 h
<b>n-Decane</b>	> 5000 mg/kg ( Rat )	> 2000 mg/kg ( Rat )	-
<b>Toluene</b>	2.6 to 7.5 g/kg ( Rat )	14.1 ml/kg ( Rabbit )	-
<b>Hydrogen sulfide</b>	-	-	= 444 ppm ( Rat )
<b>Ethylbenzene</b>	= 3500 mg/kg ( Rat )	= 15400 mg/kg ( Rabbit )	= 17.2 mg/L ( Rat ) 4 h
<b>Xylenes</b>	= 3500 mg/kg ( Rat )	> 4350 mg/kg ( Rabbit ) > 1700 mg/kg ( Rabbit )	= 29.08 mg/L ( Rat ) 4 h = 5000 ppm ( Rat ) 4 h

## SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

<b>Benzene</b>	<ul style="list-style-type: none"> <li>• Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in man. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.</li> </ul>
----------------	--

	<b>Hydrogen Sulfide Gas (H<sub>2</sub>S)</b>	<ul style="list-style-type: none"> <li>Toxic by inhalation. Prolonged breathing of 50-100 ppm H<sub>2</sub>S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of &gt;1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H<sub>2</sub>S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H<sub>2</sub>S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H<sub>2</sub>S, respectively. Over the years a number of acute cases of H<sub>2</sub>S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.</li> </ul>			
	<b>Hexane</b>	<ul style="list-style-type: none"> <li>This product may contain hexane at a level of &gt;1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.</li> </ul>			
	<b>Xylenes</b>	<ul style="list-style-type: none"> <li>Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals, Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and man. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.</li> </ul>			
	<b>Sensitization</b>	<ul style="list-style-type: none"> <li>No information available</li> </ul>			
	<b>Mutagenic Effects</b>	<ul style="list-style-type: none"> <li>May cause genetic defects</li> </ul>			
<b>DELAYED AND IMMEDIATE EFFECTS AND ALSO CHRONIC EFFECTS FROM SHORT- AND LONG-TERM EXPOSURE</b>	<b>Carcinogenicity</b>	<ul style="list-style-type: none"> <li>May cause cancer</li> </ul>			
	<b>CHEMICAL NAME</b>	<b>ACGIH</b>	<b>IARC</b>	<b>NTP</b>	<b>OSHA</b>
	<b>Benzene</b>	A1	Group 1	Known	X
	<b>Toluene</b>	A4	Group 3	Evidence	-
	<b>Ethylbenzene</b>	A3	Group 2B	Evidence	X
	<b>Xylenes</b>	A4	Group 3	Evidence	-
<b>REPRODUCTIVE TOXICITY</b>	<ul style="list-style-type: none"> <li>Suspected of damaging fertility or the unborn child.</li> </ul>				
<b>STOT - SINGLE EXPOSURE</b>	<ul style="list-style-type: none"> <li>No information available.</li> </ul>				
<b>STOT - REPEATED EXPOSURE</b>	<ul style="list-style-type: none"> <li>Causes damage to organs through prolonged or repeated exposure.</li> </ul>				
<b>ASPIRATION HAZARD</b>	May be fatal if swallowed and enters airways Risk of serious damage to the lungs (by aspiration).				

## Section 12: Ecological Information

### ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Benzene</b>	EC50 72 h: = 29 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: 10.7 - 14.7 mg/L flow-through (Pimephales promelas) LC50 96 h: = 5.3 mg/L flow-through (Oncorhynchus mykiss) LC50 96 h: = 22.49 mg/L static (Lepomis macrochirus) LC50 96 h: = 28.6 mg/L static (Poecilia reticulata) LC50 96 h: 22330 - 41160 µg/L static (Pimephales promelas) LC50 96 h: 70000 - 142000 µg/L static (Lepomis macrochirus)	EC50 48 h: 8.76 - 15.6 mg/L Static (Daphnia magna) EC50 48 h: = 10 mg/L (Daphnia magna)	-
<b>Cyclohexane</b>	EC50 72 h: > 500 mg/L (Desmodesmus subspicatus)	LC50 96 h: 3.96 - 5.18 mg/L flow-through (Pimephales promelas) LC50 96 h: 23.03 - 42.07 mg/L static (Pimephales promelas) LC50 96 h: 24.99 - 44.69 mg/L static (Lepomis macrochirus) LC50 96 h: 48.87 - 68.76 mg/L static (Poecilia reticulata)	EC50 24 h: > 400 mg/L (Daphnia magna)	EC50 = 85.5 mg/L 5 min EC50 = 93 mg/L 10 min (Microorganisms)
<b>Pentane</b>	-	-	EC50 48h: 135 mmol/cu	LC50 24h: 165 mmol/cu Artemia salina (Brine Shrimp)
<b>MethylCyclohexane</b>	-	LC50 96hr: 72.0 mg/l (Golden Shiner)	-	-
<b>n-Heptane</b>	-	LC50 96 h: = 375.0 mg/L (Cichlid fish)	EC50 24 h: > 10 mg/L (Daphnia magna)	-
<b>n-Hexane</b>	-	LC50 96 h: 2.1 - 2.98 mg/L flow-through (Pimephales promelas)	EC50 24 h: > 1000 mg/L (Daphnia magna)	-
<b>n-Octane</b>	-	-	EC50 48 h: = 0.38 mg/L (water flea) EC50 48 h: = 0.02856 mg/L (Daphnia magna)	EC50 = 890 mg/L 30 min (Microorganisms) EC50 <1.67hr: 120 µg/l Mytilus edulis (Common Bay Mussel)
<b>n-Undecane</b>	-	-	-	-
<b>n-Dodecane</b>	-	-	-	-
<b>n-Tridecane</b>	-	-	-	-

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Toluene</b>	EC50: >433 mg/L <i>Pseudokirchneriella subcapitata</i> 96 h EC50: 12.5 mg/L <i>Pseudokirchneriella subcapitata</i> 72 h static	LC50: 15.22 - 19.05 mg/L <i>Pimephales promelas</i> 96 h flow-through LC50: 12.6 mg/L <i>Pimephales promelas</i> 96 h static LC50: 5.89 - 7.81 mg/L <i>Oncorhynchus mykiss</i> 96 h flow-through LC50: 14.1 - 17.16 mg/L <i>Oncorhynchus mykiss</i> 96 h static LC50: 5.8 mg/L <i>Oncorhynchus mykiss</i> 96 h semi-static LC50: 11.0-15.0 mg/L <i>Lepomis macrochirus</i> 96 h static LC50: 54 mg/L <i>Oryzias latipes</i> 96 h static LC50: 28.2 mg/L <i>Poecilia reticulata</i> 96 h semi-static LC50: 50.87-70.34 mg/L <i>Poecilia reticulata</i> 96 h static	EC50 48 h: 5.46 - 9.83 mg/L Static ( <i>Daphnia magna</i> ) EC50 48 h: = 11.5 mg/L ( <i>Daphnia magna</i> )	EC50 = 19.7 mg/L 30 min (Microorganisms)
<b>Hydrogen sulfide</b>		LC50 96h: 49 µg/l <i>Oncorhynchus mykiss</i> (Rainbow Trout) eggs LC50 24h: 1059.7 µg/l <i>Pimephales promelas</i> (Fathead Minnow)	EC50 48h: 62 µg/l <i>Gammarus pseudolimnaeus</i> (Scud)	
<b>Ethylbenzene</b>	EC50 72 h: = 4.6 mg/L ( <i>Pseudokirchneriella subcapitata</i> ) EC50 96 h: > 438 mg/L ( <i>Pseudokirchneriella subcapitata</i> ) EC50 72 h: 2.6 - 11.3 mg/L static ( <i>Pseudokirchneriella subcapitata</i> ) EC50 96 h: 1.7 - 7.6 mg/L static ( <i>Pseudokirchneriella subcapitata</i> ) EC50 72 h: = 11 mg/L ( <i>Pseudokirchneriella subcapitata</i> )	LC50 96 h: 11.0 - 18.0 mg/L static ( <i>Oncorhynchus mykiss</i> ) LC50 96 h: = 4.2 mg/L semi-static ( <i>Oncorhynchus mykiss</i> ) LC50 96 h: 7.55 - 11 mg/L flow-through ( <i>Pimephales promelas</i> ) LC50 96 h: = 32 mg/L static ( <i>Lepomis macrochirus</i> ) LC50 96 h: 9.1 - 15.6 mg/L static ( <i>Pimephales promelas</i> ) LC50 96 h: = 9.6 mg/L static ( <i>Poecilia reticulata</i> )	EC50 48 h: 1.8 - 2.4 mg/L ( <i>Daphnia magna</i> )	EC50 = 9.68 mg/L 30 min EC50 = 96mg/L 24 h (Microorganisms)

## ECOTOXICITY

CHEMICAL NAME	TOXICITY TO ALGAE	TOXICITY TO FISH	DAPHNIA MAGNA (WATER FLEA)	OTHER TOXICITY
<b>Xylenes</b>	EC50 72 h: = 11 mg/L (Pseudokirchneriella subcapitata)	LC50 96 h: = 13.4 mg/L flow-through (Pimephales promelas)	EC50 48 h: = 3.82 mg/L (water flea)	-
		LC50 96 h: 2.661 - 4.093 mg/L static (Oncorhynchus mykiss)	LC50 48 h: = 0.6 mg/L (Gammarus lacustris)	
		LC50 96 h: 13.5 - 17.3 mg/L (Oncorhynchus mykiss)		
		LC50 96 h: 13.1 - 16.5 mg/L flow-through (Lepomis macrochirus)		
		LC50 96 h: = 19 mg/L (Lepomis macrochirus)		
		LC50 96 h: 7.711 - 9.591 mg/L static (Lepomis macrochirus)		
		LC50 96 h: 23.53 - 29.97 mg/L static (Pimephales promelas)		
		LC50 96 h: = 780 mg/L semi-static (Cyprinus carpio)		
		LC50 96 h: > 780 mg/L (Cyprinus carpio)		
		LC50 96 h: 30.26 - 40.75 mg/L static (Poecilia reticulata)		

## PERSISTENCE AND DEGRADABILITY

- No information available

## BIOACCUMULATIVE POTENTIAL

CHEMICAL	LOG POW
<b>Benzene</b>	1.83
<b>Cyclohexane</b>	3.44
<b>Butane</b>	2.89
<b>Octane</b>	5.18
<b>Heptane</b>	4.66
<b>Decane</b>	5.1
<b>Xylene, mixed isomers</b>	2.77 - 3.15
<b>Toluene</b>	2.65
<b>Ethylbenzene</b>	3.118

## MOBILITY IN SOIL

CHEMICAL	EXPECTED SOIL MOBILITY
<b>2-Methylpentane</b>	Low
<b>3-Methylpentane</b>	Slight
<b>Benzene</b>	High

<b>Cyclohexane</b>	Moderate
<b>Pentane</b>	High
<b>MethylCyclohexane</b>	Low
<b>Butane</b>	Low
<b>Heptane</b>	Moderate
<b>Hexane</b>	High
<b>Octane</b>	Immobile
<b>Nonane</b>	Immobile
<b>Decane</b>	Immobile
<b>Undecane</b>	Immobile
<b>Dodecane</b>	Immobile
<b>Tridecane</b>	Immobile
<b>Toluene</b>	High to Moderate
<b>Ethylbenzene</b>	Low
<b>Xylenes</b>	Very high to Moderate

## OTHER ADVERSE EFFECTS

- No information available

# Section 13: Disposal Considerations

## WASTE TREATMENT METHODS

### Product Waste

- This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.
- This product could also contain benzene at >0.5 ppm and could exhibit the characteristic of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP).
- This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s).
- It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.



**Packaging Waste**

- Container contents should be completely used and containers should be emptied prior to discard.
- Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations.
- Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner.
- To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

## Section 14: Transport Information

**\*\*CHART NAME\*\***

	UN NUMBER	PROPER SHIPPING NAME	TRANSPORT HAZARD CLASS	PACKING GROUP	ENVIRONMENTAL HAZARD
DOT	UN1267	Petroleum crude oil	3	I	Emergency response guide number: 128
TDG	UN1267	Petroleum crude oil	3	I	-
IMO/IMDG	UN1267	Petroleum crude oil	3	I	EmS No. F-E, S-E
IATA/ICA	UN1267	Petroleum crude oil	3	I	-

**SPECIAL RECAUTIONS  
FOR USER**

- None

## Section 15: Regulatory Information

**U.S. - CERCLA/  
SARA - HAZARDOUS  
SUBSTANCES AND  
THEIR REPORTABLE  
QUANTITIES**

COMPONENT	CAS #	AMOUNT
Hydrogen Sulfide	7783-06-4	100 lb final RQ; 45.4 kg final RQ
Ethylbenzene	100-41-4	1000 lb final RQ; 454 kg final RQ
Toluene	108-88-3	1000 lb final RQ; 454 kg final RQ
Xylene	1330-20-7	100 lb final RQ; 45.4 kg final RQ
Benzene	71-43-2	10 lb final RQ; 4.54 kg final RQ
Hexane	110-54-3	5000 lb final RQ; 2270 kg final RQ

**U.S. - CWA  
(CLEAN WATER  
ACT) - REPORTABLE  
QUANTITIES OF  
DESIGNATED  
HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	AMOUNT
Hydrogen Sulfide	7783-06-4	100 lb RQ
Ethylbenzene	100-41-4	1000 lb RQ
Toluene	108-88-3	1000 lb RQ
Xylene	1330-20-7	100 lb RQ
Benzene	71-43-2	10 lb RQ

**U.S. - CWA (CLEAN  
WATER ACT)  
- RECOMMENDED  
WATER QUALITY  
CRITERIA - CCC FOR  
FRESHWATER LIFE**

COMPONENT	CAS #	AMOUNT
Hydrogen Sulfide	7783-06-4	2.0 µg/L CCC

**U.S. - CWA (CLEAN  
WATER ACT)  
- RECOMMENDED  
WATER QUALITY  
CRITERIA - CCC FOR  
SALTWATER LIFE**

COMPONENT	CAS #	AMOUNT
HydrogenSulfide	7783-06-4	2.0 µg/L CCC

**U.S. - CWA (CLEAN  
WATER ACT)  
- HAZARDOUS  
SUBSTANCES**

COMPONENT	CAS #	LISTED
Hydrogen Sulfide	7783-06-4	X
MethylCyclohexane	108-87-2	Not Listed
3- Methylhexane	589-34-4	Not Listed
Hexane, 2-methyl-	591-76-4	Not Listed
Dimethylcyclopentane	28729-52-4	Not Listed
Methylcyclopentane	96-37-7	Not Listed
Pentane	109-66-0	Not Listed
Decane	124-18-5	Not Listed
Octane	111-65-9	Not Listed
Dodecane	112-40-3	Not Listed
Ethylbenzene	100-41-4	X
Heptane	142-82-5	Not Listed
Toluene	108-88-3	X
Xylene	1330-20-7	X
Benzene	71-43-2	X

<b>Butane</b>	106-97-8	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>2-Methylpentane</b>	107-83-5	Not Listed
<b>3-Methylpentane</b>	96-14-0	Not Listed
<b>Tridecane</b>	629-50-5	Not Listed
<b>Undecane</b>	1120-21-4	Not Listed
<b>2-Methylheptane</b>	592-27-8	Not Listed

*X= The component is listed*

**U.S. - CWA (CLEAN  
WATER ACT)  
- HAZARDOUS  
SUBSTANCES**

<b>COMPONENT</b>	<b>CAS #</b>	<b>LISTED</b>
<b>Hydrogen Sulfide</b>	7783-06-4	Not Listed
<b>MethylCyclohexane</b>	108-87-2	Not Listed
<b>3- Methylhexane</b>	589-34-4	Not Listed
<b>Hexane, 2-methyl-</b>	591-76-4	Not Listed
<b>Dimethylcyclopentane</b>	28729-52-4	Not Listed
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Pentane</b>	109-66-0	Not Listed
<b>Pentane</b>	109-66-0	Not Listed
<b>Decane</b>	124-18-5	Not Listed
<b>Octane</b>	111-65-9	Not Listed
<b>Dodecane</b>	112-40-3	Not Listed
<b>Ethylbenzene</b>	100-41-4	X
<b>Heptane</b>	142-82-5	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	Not Listed
<b>Benzene</b>	71-43-2	X
<b>Butane</b>	106-97-8	Not Listed
<b>Hexane</b>	110-54-3	Not Listed
<b>2-Methylpentane</b>	107-83-5	Not Listed
<b>3-Methylpentane</b>	96-14-0	Not Listed

<b>Tridecane</b>	629-50-5	Not Listed
<b>Undecane</b>	1120-21-4	Not Listed
<b>2-Methylheptane</b>	592-27-8	Not Listed

X= The component is listed

## US-STATE-RIGHT-TO-KNOW

CHEMICAL	NEW JERSEY	MASSACHUSETTS	PENNSYLVANIA	ILLINOIS	RHODE ISLAND
Nonane	X	X	X	-	X
Decane	X	-	X	-	X
Hexane	X	X	X	X	X
MethylCyclohexane	X	X	X	-	X
Octane	X	X	X	-	X
n-Heptane	X	X	X	-	X
Butane	X	X	X	-	X
Ethylbenzene	X	X	X	X	X
Toluene	X	X	X	X	X
Cyclohexane	X	X	X	-	X
Xylene, mixed isomers	X	X	X	X	X
Benzene	X	X	X	X	X

## CANADA-WHMIS-CLASSIFICATIONS OF SUBSTANCES

COMPONENT	CAS #	CLASSIFICATION
2-Methylhexane	591-76-4	B2
2-Methylpentane	107-83-5	B2
3-Methylhexane	589-34-4	B2
3-Methylpentane	96-14-0	B2
Benzene	71-43-2	B2, D2A, D2B
MethylCyclohexane	108-87-2	B2
Methylcyclopentane	96-37-7	-
n-Butane	106-97-8	A, B1
n-Heptane	142-82-5	B2, D2B
n-Hexane	110-54-3	B2, D2A, D2B

<b>n-Pentane</b>	109-66-0	B2
<b>n-Octane</b>	111-65-9	B2, D2B
<b>n-Decane</b>	124-18-5	B3, D2B
<b>n-Undecane</b>	1120-21-4	B3, D2B
<b>n-Dodecane</b>	112-40-3	B3
<b>n-Tridecane</b>	629-50-5	B3
<b>Toluene</b>	108-88-3	B2, D2A, D2B
<b>Hydrogen sulfide</b>	7783-06-4	A, B1, D1A, D2B
<b>Ethylbenzene</b>	100-41-4	B2, D2A, D2B
<b>Xylenes</b>	1330-20-7	B2, D2A, D2B

X= The component is listed

**CANADA - COUNCIL  
OF MINISTERS OF  
THE ENVIRONMENT  
- WATER QUALITY  
GUIDELINES FOR  
FRESHWATER  
AQUATIC LIFE**

COMPONENT	CAS #	AMOUNT
<b>Ethylbenzene</b>	100-41-4	90 µg/L
<b>Toluene</b>	108-88-3	2.0 µg/L
<b>Benzene</b>	71-43-2	370 µg/L

**CANADA - COUNCIL  
OF MINISTERS OF  
THE ENVIRONMENT  
- WATER QUALITY  
GUIDELINES FOR  
MARINE AQUATIC LIFE**

COMPONENT	CAS #	AMOUNT
<b>Ethylbenzene</b>	100-41-4	25 µg/L
<b>Toluene</b>	108-88-3	215 µg/L
<b>Benzene</b>	71-43-2	110 µg/L

**CANADA -  
ENVIRONMENTAL  
EMERGENCIES**

COMPONENT	CAS #	LISTED
<b>Hydrogen sulfide</b>	7783-06-4	X
<b>MethylCyclohexane</b>	108-87-2	Not Listed
<b>3-Methylhexane</b>	589-34-4	Not Listed
<b>Hexane, 2-methyl-</b>	591-76-4	Not Listed
<b>Dimethylcyclopentane</b>	28729-52-4	Not Listed
<b>Methylcyclopentane</b>	96-37-7	Not Listed
<b>Pentane</b>	109-66-0	X
<b>Decane</b>	124-18-5	Not Listed
<b>Octane</b>	111-65-9	Not Listed

<b>Dodecane</b>	112-40-3	Not Listed
<b>Ethylbenzene</b>	100-41-4	X
<b>Heptane</b>	142-82-5	Not Listed
<b>Toluene</b>	108-88-3	X
<b>Xylene</b>	1330-20-7	X
<b>Benzene</b>	71-43-2	X
<b>Butane</b>	106-97-8	X
<b>Hexane</b>	110-54-3	Not Listed
<b>2-Methylpentane</b>	107-83-5	Not Listed
<b>3-Methylpentane</b>	96-14-0	Not Listed
<b>Tridecane</b>	629-50-5	Not Listed
<b>Undecane</b>	1120-21-4	Not Listed
<b>2-Methylheptane</b>	592-27-8	Not Listed
<b>Petroleum Hydrocarbons</b>	68919-39-1	Not Listed

X= The component is listed

## Section 16:

## Other Information

### NFPA



**Health Hazard:** 2

**Flammability:** 3

**Instability:** 1

**Physical and Chemical Hazards:** X

### HMIS

**Health Hazard:** 2

**Flammability:** 4

**Instability:** 0

**Personal Protection:** X

### ISSUING DATE

3/2/15

### REVISION DATE

06/18/2018

### DISCLAIMER

- The information presented herein is based on data considered to be accurate as of the date of preparation of this Safety Data Sheet (SDS). However, SDS's may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.