

From: David Stafford <David.Stafford@enbridge.com>
Sent: Friday, February 19, 2021 11:57 AM
To: DonnaH@jeffersoncountywi.gov
Cc: Theresa.Picton@enbridge.com; Steven.Dahnke@enbridge.com
Subject: RE: Ground Water

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Donna,

Our current plan is quarterly monitoring (January, April, July & October) of all site monitoring wells, of which there are currently eight (8). We (our consultant under our direction) sample the groundwater from each well and submit to an accredited laboratory for analysis of volatile organic compounds (VOCs) by EPA method 8260. That includes benzene, toluene, ethylbenzene and xylene (BTEX) which are the most prevalent compounds in the diluent/condensate product. This is all dictated by the Wisconsin Department of Natural Resources (WDNR) in the NR 700 series rules for investigations at remediation sites. This monitoring activity will continue until we receive site closure from the WDNR.

Please let me know if you need anything further.

Thanks,
Dave


Dave Stafford

Manager, US Pipeline Compliance

ENBRIDGE

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Safety. Integrity, Respect

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| NOTICE: This report is required by 49 CFR Part 195. Failure to report can result in a civil penalty not to exceed \$100,000 for each violation for each day that such violation persists except that the maximum civil penalty shall not exceed \$1,000,000 as provided in 49 USC 60122. | | OMB NO: 2137-0047 EXPIRATION DATE: 8/31/2020 | |
|  U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration | Original Report Date: | 09/24/2020 | |
| | No. | 20200262 - 34728 ----- (DOT Use Only) | |
| ACCIDENT REPORT - HAZARDOUS LIQUID PIPELINE SYSTEMS | | | |
| A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a current valid OMB Control Number. The OMB Control Number for this information collection is 2137-0047. All responses to the collection of information are mandatory. Send comments regarding this burden or any other aspect of this collection of information, including suggestions for reducing the burden to: Information Collection Clearance Officer, PHMSA, Office of Pipeline Safety (PHP-30) 1200 New Jersey Avenue, SE, Washington, D.C. 20590. | | | |
| INSTRUCTIONS | | | |
| <i>Important: Please read the separate instructions for completing this form before you begin. They clarify the information requested and provide specific examples. If you do not have a copy of the instructions, you can obtain one from the PHMSA Pipeline Safety Community Web Page at http://www.phmsa.dot.gov/pipeline/library/forms.</i> | | | |
| PART A - KEY REPORT INFORMATION | | | |
| Report Type: (select all that apply) | Original: | Supplemental: | Final: |
| | | Yes | Yes |
| Last Revision Date: | 01/15/2021 | | |
| 1. Operator's OPS-issued Operator Identification Number (OPID): | 32502 | | |
| 2. Name of Operator | ENBRIDGE PIPELINES (SOUTHERN LIGHTS) L.L.C. | | |
| 3. Address of Operator: | | | |
| 3a. Street Address | 5400 WESTHEIMER COURT | | |
| 3b. City | HOUSTON | | |
| 3c. State | Texas | | |
| 3d. Zip Code | 77056 | | |
| 4. Local time (24-hr clock) and date of the Accident: | 05/04/2019 13:30 | | |
| 5. Location of Accident: | | | |
| Latitude / Longitude | 42.910479, -88.874779 | | |
| 6. National Response Center Report Number (if applicable): | 1285561 | | |
| 7. Local time (24-hr clock) and date of initial telephonic report to the National Response Center (if applicable): | 08/25/2020 13:46 | | |
| 8. Commodity released: (select only one, based on predominant volume released) | Refined and/or Petroleum Product (non-HVL) which is a Liquid at Ambient Conditions | | |
| - Specify Commodity Subtype: | Other | | |
| - If "Other" Subtype, Describe: | Diluent | | |
| - If Biofuel/Alternative Fuel and Commodity Subtype is Ethanol Blend, then % Ethanol Blend: | | | |
| - If Biofuel/Alternative Fuel and Commodity Subtype is Biodiesel, then Biodiesel Blend e.g. B2, B20, B100 | | | |
| 9. Estimated volume of commodity released unintentionally (Barrels): | 29.00 | | |
| 10. Estimated volume of intentional and/or controlled release/blowdown (Barrels): | | | |
| 11. Estimated volume of commodity recovered (Barrels): | 29.00 | | |
| 12. Were there fatalities? | No | | |
| - If Yes, specify the number in each category: | | | |
| 12a. Operator employees | | | |
| 12b. Contractor employees working for the Operator | | | |
| 12c. Non-Operator emergency responders | | | |
| 12d. Workers working on the right-of-way, but NOT associated with this Operator | | | |
| 12e. General public | | | |
| 12f. Total fatalities (sum of above) | | | |
| 13. Were there injuries requiring inpatient hospitalization? | No | | |
| - If Yes, specify the number in each category: | | | |
| 13a. Operator employees | | | |
| 13b. Contractor employees working for the Operator | | | |
| 13c. Non-Operator emergency responders | | | |
| 13d. Workers working on the right-of-way, but NOT associated with this Operator | | | |
| 13e. General public | | | |
| 13f. Total injuries (sum of above) | | | |

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| 14. Was the pipeline/facility shut down due to the Accident? | Yes |
| - If No, Explain: | |
| - If Yes, complete Questions 14a and 14b: (use local time, 24-hr clock) | |
| 14a. Local time and date of shutdown: | 05/17/2019 11:45 |
| 14b. Local time pipeline/facility restarted: | 05/17/2019 14:25 |
| - Still shut down? (* Supplemental Report Required) | |
| 15. Did the commodity ignite? | No |
| 16. Did the commodity explode? | No |
| 17. Number of general public evacuated: | 0 |
| 18. Time sequence (use local time, 24-hour clock): | |
| 18a. Local time Operator identified Accident - effective 7- 2014 changed to "Local time Operator identified failure": | 05/17/2019 11:45 |
| 18b. Local time Operator resources arrived on site: | 05/04/2019 13:30 |

PART B - ADDITIONAL LOCATION INFORMATION

| | |
|--|--|
| 1. Was the origin of the Accident onshore? | Yes |
| | <i>If Yes, Complete Questions (2-12)</i> |
| | <i>If No, Complete Questions (13-15)</i> |
| - If Onshore: | |
| 2. State: | Wisconsin |
| 3. Zip Code: | 53538 |
| 4. City: | Fort Atkinson |
| 5. County or Parish: | Jefferson |
| 6. Operator-designated location: | Milepost/Valve Station |
| | Specify: 313.96 |
| 7. Pipeline/Facility name: | Line 13 |
| 8. Segment name/ID: | Blackhawk Island Rd MP 313.96 |
| 9. Was Accident on Federal land, other than the Outer Continental Shelf (OCS)? | No |
| 10. Location of Accident: | Pipeline Right-of-way |
| 11. Area of Accident (as found): | Underground |
| | Specify: Under soil |
| | - If Other, Describe: |
| | Depth-of-Cover (in): 180 |
| 12. Did Accident occur in a crossing? | No |
| - If Yes, specify type below: | |
| - If Bridge crossing – | |
| | Cased/ Uncased: |
| - If Railroad crossing – | |
| | Cased/ Uncased/ Bored/drilled |
| - If Road crossing – | |
| | Cased/ Uncased/ Bored/drilled |
| - If Water crossing – | |
| | Cased/ Uncased |
| | - Name of body of water, if commonly known: |
| | - Approx. water depth (ft) at the point of the Accident: |
| | - Select: |
| - If Offshore: | |
| 13. Approximate water depth (ft) at the point of the Accident: | |
| 14. Origin of Accident: | |
| - In State waters - Specify: | |
| | - State: |
| | - Area: |
| | - Block/Tract #: |
| | - Nearest County/Parish: |
| - On the Outer Continental Shelf (OCS) - Specify: | |
| | - Area: |
| | - Block #: |
| 15. Area of Accident: | |

PART C - ADDITIONAL FACILITY INFORMATION

| | |
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| 1. Is the pipeline or facility: | Interstate |
| 2. Part of system involved in Accident: | Onshore Pipeline, Including Valve Sites |
| - If Onshore Breakout Tank or Storage Vessel, Including Attached Appurtenances, specify: | |
| 3. Item involved in Accident: | Auxiliary Piping (e.g. drain lines) |
| - If Pipe, specify: | |
| 3a. Nominal diameter of pipe (in): | |
| 3b. Wall thickness (in): | |

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| 3c. SMYS (Specified Minimum Yield Strength) of pipe (psi): | |
| 3d. Pipe specification: | |
| 3e. Pipe Seam , specify: | |
| - If Other, Describe: | |
| 3f. Pipe manufacturer: | |
| 3g. Year of manufacture: | |
| 3h. Pipeline coating type at point of Accident, specify: | |
| - If Other, Describe: | |
| - If Weld, including heat-affected zone, specify. If Pipe Girth Weld, 3a through 3h above are required: | |
| - If Other, Describe: | |
| - If Valve, specify: | |
| - If Mainline, specify: | |
| - If Other, Describe: | |
| 3i. Manufactured by: | |
| 3j. Year of manufacture: | |
| - If Tank/Vessel, specify: | |
| - If Other - Describe: | |
| - If Other, describe: | |
| 4. Year item involved in Accident was installed: | 2007 |
| 5. Material involved in Accident: | Carbon Steel |
| - If Material other than Carbon Steel, specify: | |
| 6. Type of Accident Involved: | Leak |
| - If Mechanical Puncture – Specify Approx. size: | |
| in. (axial) by | |
| in. (circumferential) | |
| - If Leak - Select Type: | Connection Failure |
| - If Other, Describe: | |
| - If Rupture - Select Orientation: | |
| - If Other, Describe: | |
| Approx. size: in. (widest opening) by | |
| in. (length circumferentially or axially) | |
| - If Other – Describe: | |
| PART D - ADDITIONAL CONSEQUENCE INFORMATION | |
| 1. Wildlife impact: | No |
| 1a. If Yes, specify all that apply: | |
| - Fish/aquatic | |
| - Birds | |
| - Terrestrial | |
| 2. Soil contamination: | Yes |
| 3. Long term impact assessment performed or planned: | Yes |
| 4. Anticipated remediation: | Yes |
| 4a. If Yes, specify all that apply: | |
| - Surface water | |
| - Groundwater | Yes |
| - Soil | |
| - Vegetation | |
| - Wildlife | |
| 5. Water contamination: | Yes |
| 5a. If Yes, specify all that apply: | |
| - Ocean/Seawater | |
| - Surface | |
| - Groundwater | Yes |
| - Drinking water: (Select one or both) | |
| - Private Well | |
| - Public Water Intake | |
| 5b. Estimated amount released in or reaching water (Barrels): | .40 |
| 5c. Name of body of water, if commonly known: | Groundwater |
| 6. At the location of this Accident, had the pipeline segment or facility been identified as one that "could affect" a High Consequence Area (HCA) as determined in the Operator's Integrity Management Program? | Yes |
| 7. Did the released commodity reach or occur in one or more High Consequence Area (HCA)? | Yes |
| 7a. If Yes, specify HCA type(s): (Select all that apply) | |
| - Commercially Navigable Waterway: | |
| Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program? | |

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| - High Population Area: | |
| Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program? | |
| - Other Populated Area | Yes |
| Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program? | Yes |
| - Unusually Sensitive Area (USA) - Drinking Water | |
| Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program? | |
| - Unusually Sensitive Area (USA) - Ecological | |
| Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program? | |
| 8. Estimated cost to Operator – effective 12-2012, changed to "Estimated Property Damage": | |
| 8a. Estimated cost of public and non-Operator private property damage paid/reimbursed by the Operator – effective 12-2012, "paid/reimbursed by the Operator" removed | \$ 28,900 |
| 8b. Estimated cost of commodity lost | \$ 1,596 |
| 8c. Estimated cost of Operator's property damage & repairs | \$ 24,170 |
| 8d. Estimated cost of Operator's emergency response | \$ 216 |
| 8e. Estimated cost of Operator's environmental remediation | \$ 166,376 |
| 8f. Estimated other costs | \$ 0 |
| Describe: | |
| 8g. Estimated total costs (sum of above) – effective 12-2012, changed to "Total estimated property damage (sum of above)" | \$ 221,258 |
| PART E - ADDITIONAL OPERATING INFORMATION | |
| 1. Estimated pressure at the point and time of the Accident (psig): | 416.00 |
| 2. Maximum Operating Pressure (MOP) at the point and time of the Accident (psig): | 1,260.00 |
| 3. Describe the pressure on the system or facility relating to the Accident (psig): | Pressure did not exceed MOP |
| 4. Not including pressure reductions required by PHMSA regulations (such as for repairs and pipe movement), was the system or facility relating to the Accident operating under an established pressure restriction with pressure limits below those normally allowed by the MOP? | No |
| - If Yes, Complete 4.a and 4.b below: | |
| 4a. Did the pressure exceed this established pressure restriction? | |
| 4b. Was this pressure restriction mandated by PHMSA or the State? | |
| 5. Was "Onshore Pipeline, Including Valve Sites" OR "Offshore Pipeline, Including Riser and Riser Bend" selected in PART C, Question 2? | Yes |
| - If Yes - (Complete 5a. – 5f below) effective 12-2012, changed to "(Complete 5.a – 5.e below)" | |
| 5a. Type of upstream valve used to initially isolate release source: | Remotely Controlled |
| 5b. Type of downstream valve used to initially isolate release source: | Remotely Controlled |
| 5c. Length of segment isolated between valves (ft): | 142,032 |
| 5d. Is the pipeline configured to accommodate internal inspection tools? | Yes |
| - If No, Which physical features limit tool accommodation? (select all that apply) | |
| - Changes in line pipe diameter | |
| - Presence of unsuitable mainline valves | |
| - Tight or mitered pipe bends | |
| - Other passage restrictions (i.e. unbarred tee's, projecting instrumentation, etc.) | |
| - Extra thick pipe wall (applicable only for magnetic flux leakage internal inspection tools) | |
| - Other - | |
| - If Other, Describe: | |
| 5e. For this pipeline, are there operational factors which significantly complicate the execution of an internal inspection tool run? | No |
| - If Yes, Which operational factors complicate execution? (select all that apply) | |
| - Excessive debris or scale, wax, or other wall buildup | |

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| - Low operating pressure(s) | |
| - Low flow or absence of flow | |
| - Incompatible commodity | |
| - Other - | |
| - If Other, Describe: | |
| 5f. Function of pipeline system: | > 20% SMYS Regulated Trunkline/Transmission |
| 6. Was a Supervisory Control and Data Acquisition (SCADA)-based system in place on the pipeline or facility involved in the Accident? | Yes |
| If Yes - | |
| 6a. Was it operating at the time of the Accident? | Yes |
| 6b. Was it fully functional at the time of the Accident? | Yes |
| 6c. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident? | No |
| 6d. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident? | No |
| 7. Was a CPM leak detection system in place on the pipeline or facility involved in the Accident? | Yes |
| - If Yes: | |
| 7a. Was it operating at the time of the Accident? | Yes |
| 7b. Was it fully functional at the time of the Accident? | Yes |
| 7c. Did CPM leak detection system information (such as alarm (s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident? | No |
| 7d. Did CPM leak detection system information (such as alarm (s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident? | No |
| 8. How was the Accident initially identified for the Operator? | Local Operating Personnel, including contractors |
| - If Other, Specify: | |
| 8a. If "Controller", "Local Operating Personnel", including contractors", "Air Patrol", or "Ground Patrol by Operator or its contractor" is selected in Question 8, specify: | Operator employee |
| 9. Was an investigation initiated into whether or not the controller(s) or control room issues were the cause of or a contributing factor to the Accident? | No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: (provide an explanation for why the Operator did not investigate) |
| - If No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: (provide an explanation for why the operator did not investigate) | Lack of Control Center involvement. Release was identified by field personnel. |
| - If Yes, specify investigation result(s): (select all that apply) | |
| - Investigation reviewed work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue | |
| - Investigation did NOT review work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue | |
| Provide an explanation for why not: | |
| - Investigation identified no control room issues | |
| - Investigation identified no controller issues | |
| - Investigation identified incorrect controller action or controller error | |
| - Investigation identified that fatigue may have affected the controller(s) involved or impacted the involved controller(s) response | |
| - Investigation identified incorrect procedures | |
| - Investigation identified incorrect control room equipment operation | |
| - Investigation identified maintenance activities that affected control room operations, procedures, and/or controller response | |
| - Investigation identified areas other than those above: | |
| Describe: | |
| PART F - DRUG & ALCOHOL TESTING INFORMATION | |
| 1. As a result of this Accident, were any Operator employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations? | No |
| - If Yes: | |
| 1a. Specify how many were tested: | |
| 1b. Specify how many failed: | |

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| 2. As a result of this Accident, were any Operator contractor employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations? | No |
| - If Yes: | |
| 2a. Specify how many were tested: | |
| 2b. Specify how many failed: | |
| PART G – APPARENT CAUSE | |
| <i>Select only one box from PART G in shaded column on left representing the APPARENT Cause of the Accident, and answer the questions on the right. Describe secondary, contributing or root causes of the Accident in the narrative (PART H).</i> | |
| Apparent Cause: | G6 - Equipment Failure |
| G1 - Corrosion Failure - only one sub-cause can be picked from shaded left-hand column | |
| Corrosion Failure – Sub-Cause: | |
| - If External Corrosion: | |
| 1. Results of visual examination: | |
| - If Other, Describe: | |
| 2. Type of corrosion: <i>(select all that apply)</i> | |
| - Galvanic | |
| - Atmospheric | |
| - Stray Current | |
| - Microbiological | |
| - Selective Seam | |
| - Other: | |
| - If Other, Describe: | |
| 3. The type(s) of corrosion selected in Question 2 is based on the following: <i>(select all that apply)</i> | |
| - Field examination | |
| - Determined by metallurgical analysis | |
| - Other: | |
| - If Other, Describe: | |
| 4. Was the failed item buried under the ground? | |
| - If Yes : | |
| <input type="checkbox"/> 4a. Was failed item considered to be under cathodic protection at the time of the Accident? | |
| If Yes - Year protection started: | |
| 4b. Was shielding, tenting, or disbonding of coating evident at the point of the Accident? | |
| 4c. Has one or more Cathodic Protection Survey been conducted at the point of the Accident? | |
| If "Yes, CP Annual Survey" – Most recent year conducted: | |
| If "Yes, Close Interval Survey" – Most recent year conducted: | |
| If "Yes, Other CP Survey" – Most recent year conducted: | |
| - If No: | |
| 4d. Was the failed item externally coated or painted? | |
| 5. Was there observable damage to the coating or paint in the vicinity of the corrosion? | |
| - If Internal Corrosion: | |
| 6. Results of visual examination: | |
| - Other: | |
| 7. Type of corrosion <i>(select all that apply):</i> - | |
| - Corrosive Commodity | |
| - Water drop-out/Acid | |
| - Microbiological | |
| - Erosion | |
| - Other: | |
| - If Other, Describe: | |
| 8. The cause(s) of corrosion selected in Question 7 is based on the following <i>(select all that apply):</i> - | |
| - Field examination | |
| - Determined by metallurgical analysis | |
| - Other: | |
| - If Other, Describe: | |
| 9. Location of corrosion <i>(select all that apply):</i> - | |
| - Low point in pipe | |
| - Elbow | |
| - Other: | |
| - If Other, Describe: | |
| 10. Was the commodity treated with corrosion inhibitors or biocides? | |

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| 11. Was the interior coated or lined with protective coating? | |
| 12. Were cleaning/dewatering pigs (or other operations) routinely utilized? | |
| 13. Were corrosion coupons routinely utilized? | |
| Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Tank/Vessel. | |
| 14. List the year of the most recent inspections: | |
| 14a. API Std 653 Out-of-Service Inspection | |
| - No Out-of-Service Inspection completed | |
| 14b. API Std 653 In-Service Inspection | |
| - No In-Service Inspection completed | |
| Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld. | |
| 15. Has one or more internal inspection tool collected data at the point of the Accident? | |
| 15a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run: - | |
| - Magnetic Flux Leakage Tool | Most recent year: |
| - Ultrasonic | Most recent year: |
| - Geometry | Most recent year: |
| - Caliper | Most recent year: |
| - Crack | Most recent year: |
| - Hard Spot | Most recent year: |
| - Combination Tool | Most recent year: |
| - Transverse Field/Triaxial | Most recent year: |
| - Other | Most recent year: |
| | Describe: |
| 16. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident? | |
| If Yes - | |
| | Most recent year tested: |
| | Test pressure: |
| 17. Has one or more Direct Assessment been conducted on this segment? | |
| - If Yes, and an investigative dig was conducted at the point of the Accident:: | |
| | Most recent year conducted: |
| - If Yes, but the point of the Accident was not identified as a dig site: | |
| | Most recent year conducted: |
| 18. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002? | |
| 18a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted: | |
| - Radiography | Most recent year conducted: |
| - Guided Wave Ultrasonic | Most recent year conducted: |
| - Handheld Ultrasonic Tool | Most recent year conducted: |
| - Wet Magnetic Particle Test | Most recent year conducted: |
| - Dry Magnetic Particle Test | Most recent year conducted: |
| - Other | Most recent year conducted: |
| | Describe: |
| G2 - Natural Force Damage - only one sub-cause can be picked from shaded left-handed column | |
| Natural Force Damage – Sub-Cause: | |
| - If Earth Movement, NOT due to Heavy Rains/Floods: | |
| 1. Specify: | |
| | - If Other, Describe: |
| - If Heavy Rains/Floods: | |

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| 2. Specify: | |
| | - If Other, Describe: |
| - If Lightning: | |
| 3. Specify: | |
| - If Temperature: | |
| 4. Specify: | |
| | - If Other, Describe: |
| - If Other Natural Force Damage: | |
| 5. Describe: | |
| Complete the following if any Natural Force Damage sub-cause is selected. | |
| 6. Were the natural forces causing the Accident generated in conjunction with an extreme weather event? | |
| 6a. If Yes, specify: <i>(select all that apply)</i> | |
| - Hurricane | |
| - Tropical Storm | |
| - Tornado | |
| - Other | |
| | - If Other, Describe: |
| G3 - Excavation Damage - only one sub-cause can be picked from shaded left-hand column | |
| Excavation Damage – Sub-Cause: | |
| - If Previous Damage due to Excavation Activity: Complete Questions 1-5 ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld. | |
| 1. Has one or more internal inspection tool collected data at the point of the Accident? | |
| 1a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run: - | |
| - Magnetic Flux Leakage | Most recent year conducted: |
| - Ultrasonic | Most recent year conducted: |
| - Geometry | Most recent year conducted: |
| - Caliper | Most recent year conducted: |
| - Crack | Most recent year conducted: |
| - Hard Spot | Most recent year conducted: |
| - Combination Tool | Most recent year conducted: |
| - Transverse Field/Triaxial | Most recent year conducted: |
| - Other | Most recent year conducted: |
| | Describe: |
| 2. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained? | |
| 3. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident? | |
| - If Yes: | Most recent year tested: |
| | Test pressure (psig): |
| 4. Has one or more Direct Assessment been conducted on the pipeline segment? | |
| - If Yes, and an investigative dig was conducted at the point of the Accident: | Most recent year conducted: |
| - If Yes, but the point of the Accident was not identified as a dig site: | Most recent year conducted: |
| 5. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002? | |
| 5a. If Yes, for each examination, conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted: | |
| - Radiography | Most recent year conducted: |
| - Guided Wave Ultrasonic | Most recent year conducted: |
| - Handheld Ultrasonic Tool | Most recent year conducted: |

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| - Wet Magnetic Particle Test | |
| Most recent year conducted: | |
| - Dry Magnetic Particle Test | |
| Most recent year conducted: | |
| - Other | |
| Most recent year conducted: | |
| Describe: | |
| Complete the following if Excavation Damage by Third Party is selected as the sub-cause. | |
| 6. Did the operator get prior notification of the excavation activity? | |
| 6a. If Yes, Notification received from: <i>(select all that apply)</i> - | |
| - One-Call System | |
| - Excavator | |
| - Contractor | |
| - Landowner | |
| Complete the following mandatory CGA-DIRT Program questions if any Excavation Damage sub-cause is selected. | |
| 7. Do you want PHMSA to upload the following information to CGA-DIRT (www.cga-dirt.com)? | |
| 8. Right-of-Way where event occurred: <i>(select all that apply)</i> - | |
| - Public | |
| - If "Public", Specify: | |
| - Private | |
| - If "Private", Specify: | |
| - Pipeline Property/Easement | |
| - Power/Transmission Line | |
| - Railroad | |
| - Dedicated Public Utility Easement | |
| - Federal Land | |
| - Data not collected | |
| - Unknown/Other | |
| 9. Type of excavator: | |
| 10. Type of excavation equipment: | |
| 11. Type of work performed: | |
| 12. Was the One-Call Center notified? | |
| 12a. If Yes, specify ticket number: | |
| 12b. If this is a State where more than a single One-Call Center exists, list the name of the One-Call Center notified: | |
| 13. Type of Locator: | |
| 14. Were facility locate marks visible in the area of excavation? | |
| 15. Were facilities marked correctly? | |
| 16. Did the damage cause an interruption in service? | |
| 16a. If Yes, specify duration of the interruption (hours) | |
| 17. Description of the CGA-DIRT Root Cause <i>(select only the one predominant first level CGA-DIRT Root Cause and then, where available as a choice, the one predominant second level CGA-DIRT Root Cause as well):</i> | |
| Root Cause: | |
| - If One-Call Notification Practices Not Sufficient, specify: | |
| - If Locating Practices Not Sufficient, specify: | |
| - If Excavation Practices Not Sufficient, specify: | |
| - If Other/None of the Above, explain: | |
| G4 - Other Outside Force Damage - only one sub-cause can be selected from the shaded left-hand column | |
| Other Outside Force Damage – Sub-Cause: | |
| - If Damage by Car, Truck, or Other Motorized Vehicle/Equipment NOT Engaged in Excavation: | |
| 1. Vehicle/Equipment operated by: | |
| - If Damage by Boats, Barges, Drilling Rigs, or Other Maritime Equipment or Vessels Set Adrift or Which Have Otherwise Lost Their Mooring: | |
| 2. Select one or more of the following IF an extreme weather event was a factor: | |
| - Hurricane | |
| - Tropical Storm | |
| - Tornado | |
| - Heavy Rains/Flood | |
| - Other | |
| - If Other, Describe: | |
| - If Previous Mechanical Damage NOT Related to Excavation: Complete Questions 3-7 ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld. | |
| 3. Has one or more internal inspection tool collected data at the point of the Accident? | |
| 3a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run: | |

| | | |
|---|-----------------------------|----------------------------------|
| - Magnetic Flux Leakage | Most recent year conducted: | |
| - Ultrasonic | Most recent year conducted: | |
| - Geometry | Most recent year conducted: | |
| - Caliper | Most recent year conducted: | |
| - Crack | Most recent year conducted: | |
| - Hard Spot | Most recent year conducted: | |
| - Combination Tool | Most recent year conducted: | |
| - Transverse Field/Triaxial | Most recent year conducted: | |
| - Other | Most recent year conducted: | |
| Describe: | | |
| 4. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained? | | |
| 5. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident? | | |
| - If Yes: | | |
| Most recent year tested: | | |
| Test pressure (psig): | | |
| 6. Has one or more Direct Assessment been conducted on the pipeline segment? | | |
| - If Yes, and an investigative dig was conducted at the point of the Accident: | | |
| Most recent year conducted: | | |
| - If Yes, but the point of the Accident was not identified as a dig site: | | |
| Most recent year conducted: | | |
| 7. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002? | | |
| 7a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted: | | |
| - Radiography | Most recent year conducted: | |
| - Guided Wave Ultrasonic | Most recent year conducted: | |
| - Handheld Ultrasonic Tool | Most recent year conducted: | |
| - Wet Magnetic Particle Test | Most recent year conducted: | |
| - Dry Magnetic Particle Test | Most recent year conducted: | |
| - Other | Most recent year conducted: | |
| Describe: | | |
| - If Intentional Damage: | | |
| 8. Specify: | | |
| | | - If Other, Describe: |
| - If Other Outside Force Damage: | | |
| 9. Describe: | | |
| G5 - Material Failure of Pipe or Weld - only one sub-cause can be selected from the shaded left-hand column | | |
| Use this section to report material failures ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is "Pipe" or "Weld." | | |
| Material Failure of Pipe or Weld – Sub-Cause: | | |
| 1. The sub-cause shown above is based on the following: <i>(select all that apply)</i> | | |
| - Field Examination | | |
| - Determined by Metallurgical Analysis | | |
| - Other Analysis | | |
| | | - If "Other Analysis", Describe: |
| - Sub-cause is Tentative or Suspected; Still Under Investigation (Supplemental Report required) | | |
| - If Construction, Installation, or Fabrication-related: | | |
| 2. List contributing factors: <i>(select all that apply)</i> | | |

| | |
|---|-----------------------------|
| - Fatigue or Vibration-related | |
| Specify: | |
| - If Other, Describe: | |
| - Mechanical Stress: | |
| - Other | |
| - If Other, Describe: | |
| - If Environmental Cracking-related: | |
| 3. Specify: | |
| - If Other - Describe: | |
| Complete the following if any Material Failure of Pipe or Weld sub-cause is selected. | |
| 4. Additional factors: <i>(select all that apply)</i> : | |
| - Dent | |
| - Gouge | |
| - Pipe Bend | |
| - Arc Burn | |
| - Crack | |
| - Lack of Fusion | |
| - Lamination | |
| - Buckle | |
| - Wrinkle | |
| - Misalignment | |
| - Burnt Steel | |
| - Other: | |
| - If Other, Describe: | |
| 5. Has one or more internal inspection tool collected data at the point of the Accident? | |
| 5a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run: | |
| - Magnetic Flux Leakage | Most recent year run: |
| - Ultrasonic | Most recent year run: |
| - Geometry | Most recent year run: |
| - Caliper | Most recent year run: |
| - Crack | Most recent year run: |
| - Hard Spot | Most recent year run: |
| - Combination Tool | Most recent year run: |
| - Transverse Field/Triaxial | Most recent year run: |
| - Other | Most recent year run: |
| Describe: | |
| 6. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident? | |
| - If Yes: | |
| Most recent year tested: | |
| Test pressure (psig): | |
| 7. Has one or more Direct Assessment been conducted on the pipeline segment? | |
| - If Yes, and an investigative dig was conducted at the point of the Accident - | |
| Most recent year conducted: | |
| - If Yes, but the point of the Accident was not identified as a dig site - | |
| Most recent year conducted: | |
| 8. Has one or more non-destructive examination(s) been conducted at the point of the Accident since January 1, 2002? | |
| 8a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted: - | |
| - Radiography | Most recent year conducted: |
| - Guided Wave Ultrasonic | Most recent year conducted: |
| - Handheld Ultrasonic Tool | Most recent year conducted: |
| - Wet Magnetic Particle Test | Most recent year conducted: |

| | |
|--|--------------------------------------|
| - Dry Magnetic Particle Test | |
| Most recent year conducted: | |
| - Other | |
| Most recent year conducted: | |
| Describe: | |
| G6 – Equipment Failure - only one sub-cause can be selected from the shaded left-hand column | |
| Equipment Failure – Sub-Cause: | Threaded Connection/Coupling Failure |
| - If Malfunction of Control/Relief Equipment: | |
| 1. Specify: <i>(select all that apply)</i> - | |
| - Control Valve | |
| - Instrumentation | |
| - SCADA | |
| - Communications | |
| - Block Valve | |
| - Check Valve | |
| - Relief Valve | |
| - Power Failure | |
| - Stopple/Control Fitting | |
| - ESD System Failure | |
| - Other | |
| - If Other – Describe: | |
| - If Pump or Pump-related Equipment: | |
| 2. Specify: | |
| - If Other – Describe: | |
| - If Threaded Connection/Coupling Failure: | |
| 3. Specify: | |
| Threaded Fitting | |
| - If Other – Describe: | |
| - If Non-threaded Connection Failure: | |
| 4. Specify: | |
| - If Other – Describe: | |
| - If Other Equipment Failure: | |
| 5. Describe: | |
| Complete the following if any Equipment Failure sub-cause is selected. | |
| 6. Additional factors that contributed to the equipment failure: <i>(select all that apply)</i> | |
| - Excessive vibration | |
| - Overpressurization | |
| - No support or loss of support | |
| - Manufacturing defect | |
| - Loss of electricity | |
| - Improper installation | |
| - Mismatched items (different manufacturer for tubing and tubing fittings) | |
| - Dissimilar metals | |
| - Breakdown of soft goods due to compatibility issues with transported commodity | |
| - Valve vault or valve can contributed to the release | |
| - Alarm/status failure | |
| - Misalignment | |
| - Thermal stress | |
| - Other | Yes |
| - If Other, Describe: | Normal wear and tear |
| G7 - Incorrect Operation - only one sub-cause can be selected from the shaded left-hand column | |
| Incorrect Operation – Sub-Cause: | |
| - If Tank, Vessel, or Sump/Separator Allowed or Caused to Overfill or Overflow | |
| 1. Specify: | |
| - If Other, Describe: | |
| - If Other Incorrect Operation | |
| 2. Describe: | |
| Complete the following if any Incorrect Operation sub-cause is selected. | |

| | |
|--|--|
| 3. Was this Accident related to (select all that apply): - | |
| - Inadequate procedure | |
| - No procedure established | |
| - Failure to follow procedure | |
| - Other: | |
| - If Other, Describe: | |
| 4. What category type was the activity that caused the Accident? | |
| 5. Was the task(s) that led to the Accident identified as a covered task in your Operator Qualification Program? | |
| 5a. If Yes, were the individuals performing the task(s) qualified for the task(s)? | |

G8 - Other Accident Cause - only one **sub-cause** can be selected from the shaded left-hand column

Other Accident Cause – Sub-Cause:

- If Miscellaneous:

1. Describe:

- If Unknown:

2. Specify:

PART H - NARRATIVE DESCRIPTION OF THE ACCIDENT

On April 26, 2019, while completing a routine site visit, an odor was noticed at Enbridge's valve site, MP 313. Four gas meter readings were not detected and there was no visible product. A few days later, probing in the area was completed, vapors not being detected. On May 4, 2019 a consultant was hired to conduct hand auger soil borings to collect soil and vapor samples four feet below grade. Groundwater was not encountered but data indicated vapors that were likely from diluent, suggesting a Line 13 valve issue. On May 15, 2019 excavation began at the Line 13 valve, exposing the service piping 17 feet. On May 17, 2019 a loose elbow on the body bleed piping was identified as the source of the release. A temporary repair was made until a Line 13 outage could be scheduled. On June 2, 2019 the elbow was replaced and the vertical portion of the service piping reduced in length and rethreaded.

At the end of May 2019, a plan was developed to perform addition work based on lab reports confirming impacted soils that remained in the excavation. This plan was carried out in October/November 2019, at which time samples exceeded state criteria. Additional plans were developed to complete a soil boring near the SW sidewall to the water table to determine soil impacts and if groundwater was impacted. The plan was to execute the soil bore in March 2020 at which time the project, which was transitioned to the Remediation group, was put on hold due to the COVID pandemic. The soil bore took place in July 2020. The results confirmed impact to groundwater, and proper notifications to the Wisconsin DNR were made. Environment worked with their contractor to determine the next steps for remediation. On August 25, 2020, it was determined that the cost for additional remediation work would exceed the \$50K threshold and require an NRC Notification. The initial NRC Notification was completed on August 25, 2020 at 1:46 PM CDT (Report #1285661) and the 48-hour update was completed on August 27, 2020 at 11:46 AM CDT (Report #1285729).

Contractors have been hired to assist with the remediation of the site to define the extent of groundwater impacts. Twenty-six soil borings have been completed to an approximate depth of 30 feet below ground surface, groundwater generally encountered in the 20-25 feet depth range. Lab results from soil samples were non-detect. Groundwater samples have contaminants detected at multiple locations and benzene was detected within 200 feet of the valve site. There has been no verification of private well contamination. Eight monitoring wells were installed across the site to perform quarterly groundwater monitoring. The remediation work is being completed under the guidance of the WDNR Remediation and Redevelopment Program. Approximately 130.18 tons of contaminated soil and slurry have been disposed of at an approved landfill site.

Contractors completed the full site investigation during the third quarter 2020. The investigation included a newly acquired data set of 29 soil samples and 36 groundwater samples. Based on the new samples/testing, a new volume calculation of 29 barrels of product out has been determined.

Further groundwater monitoring is planned to determine trends in groundwater concentrations over time and to assess the potential need for further remedial action. Analytical results indicate the site investigation did not encounter soil impacts outside the fenced area of the Valve Site and are largely constrained to a relatively small area beneath the release source. Enbridge is working with the WDNR and will be submitting a Site Investigation Report (SIR) to them in Q1 2021. A Remedial Actions Options Report (ROAR) and a Response Action Plan (RAP) will be prepared and submitted to WDNR by the end of Q3 2021.

PART I - PREPARER AND AUTHORIZED SIGNATURE

| | |
|------------------------------------|-----------------------------------|
| Preparer's Name | Stacy Soine |
| Preparer's Title | Sr Compliance Analyst |
| Preparer's Telephone Number | 218-206-5872 |
| Preparer's E-mail Address | stacy.soine@enbridge.com |
| Preparer's Facsimile Number | |
| Authorized Signer Name | Steve Dahnke |
| Authorized Signer Title | Supervisor US Pipeline Compliance |
| Authorized Signer Telephone Number | 715-718-1236 |
| Authorized Signer Email | steven.dahnke@enbridge.com |
| Date | 01/15/2021 |

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 CO₂, 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

| | |
|-------------------|--|
| Inhalation | <ul style="list-style-type: none">• 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 | <ul style="list-style-type: none">• 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 | <ul style="list-style-type: none">• 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 | <ul style="list-style-type: none">• 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 | <ul style="list-style-type: none">• 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 | <ul style="list-style-type: none">• SMALL FIRES: Dry chemical, CO₂, water spray or regular foam.• LARGE FIRE: Water spray, fog or regular foam. |
|-------------------------------------|---|

| | |
|---------------------------------------|---|
| Unsuitable Extinguishing Media | <ul style="list-style-type: none">• 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 (CO₂). Nitrogen oxides (NOx). 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.

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.

- Handling**
- 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.
 - 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.
 - Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area.
 - Harmful concentrations of hydrogen sulfide (H₂S) 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.
 - Storage containers should be grounded and bonded.
 - 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, chlorine.

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 ³ |
| 2-Methylbutane (In Liquid form) | TLV 1000 ppm | – | – |
| Benzene | TLV 0.5 ppm TLV 1.6 mg/m ³ STEL 2.5 ppm STEL 8 mg/m ³ | PEL 1 ppm STEL 5 ppm | TWA 0.1 ppm STEL 1 ppm IDLH 500 ppm |
| Benzene, trimethyl- | TLV 25 ppm | – | – |

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

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

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

PROPERTIES

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

| | | | |
|----------------------------------|--------------------|---|-------------------|
| Flash Point | >-40 °C >-40 °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 | No data available |
| Viscosity | 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 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 | <ul style="list-style-type: none"> • May cause irritation of respiratory tract. May cause drowsiness and dizziness. |
| | Eye Contact | <ul style="list-style-type: none"> • Causes serious eye irritation. |
| | Skin Contact | <ul style="list-style-type: none"> • Causes skin irritation. |
| | Ingestion | <ul style="list-style-type: none"> • 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 |
|--|-----------------------|--|---|
| 1,2,4-Trimethylbenzene | 5 g/kg (Rat) | – | 18000 mg/m ³ (Rat) 4h |
| 2-Methylbutane (In Liquid form) | – | – | = 150,000 mg/m ³ (Rat) 2h |
| Benzene | 1800 mg/kg (Rat) | – | 13050 - 14380 ppm (Rat) 4h |
| Benzene, trimethyl- | 8970 mg/kg (Rat) | – | – |
| Butane | – | – | 658 mg/L (Rat) 4h |
| Cyclohexane | > 5000 mg/kg (Rat) | > 2000 mg/kg (Rabbit) | = 13.9 mg/L (Rat) 4h |
| Cyclopentane | 11400 mg/kg (Rat) | – | 72 g/m ³ (Mouse) |
| Decane | > 5000 mg/kg (Rat) | > 2000 mg/kg (Rat) | – |
| Ethylbenzene | = 3500 mg/kg (Rat) | = 15400 mg/kg (Rabbit) | = 17.2 mg/L (Rat) 4h |
| Heptane | – | = 3000 mg/kg (Rabbit) | = 103 g/m ³ (Rat) 4h |
| Hexane | = 25 g/kg (Rat) | = 3000 mg/kg (Rabbit) | = 48000 ppm (Rat) 4h |
| Hydrogen sulfide | – | – | = 444 ppm (Rat) |
| Isobutane | – | – | = 658,000 mg/m ³ (Rat) 4h |
| Methylcyclohexane | > 3200 mg/kg (Rat) | – | – |
| Natural gas condensates (petroleum) | – | – | = 600 mg/m ³ (Rat) |
| Nonane | – | – | = 3200 ppm (Rat) 4h |
| Octane | – | – | = 118 g/m ³ (Rat) 4h = 25260 ppm (Rat) 4h |
| Pentane | >2000 mg/kg (Rat) | – | 364 g/cu (Rat) 4h |
| Propane | – | – | >800000 ppm (Rat) 15 min |
| Hydrogen sulfide | – | – | = 444 ppm (Rat) |
| Toluene | 2.6 to 7.5 g/kg (Rat) | 14.1 ml/kg (Rabbit) | – |
| Xylenes | = 3500 mg/kg (Rat) | > 4350 mg/kg (Rabbit) > 1700 mg/kg (Rabbit) | = 29.08 mg/L (Rat) 4h = 5000 ppm (Rat) 4h |

SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

| | |
|----------------|---|
| Benzene | <ul style="list-style-type: none"> 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. |
|----------------|---|

| | |
|--|---|
| Ethylbenzene | <p>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.</p> <p>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.</p> |
| Hexane | <ul style="list-style-type: none"> 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 (H₂S) | <ul style="list-style-type: none"> Toxic by inhalation. Prolonged breathing of 50-100 ppm H₂S 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 H₂S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H₂S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H₂S, respectively. Over the years a number of acute cases of H₂S 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 | <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. 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> |
| Xylenes | <ul style="list-style-type: none"> 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. |

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

CARCINOGENIC INFORMATION

| CHEMICAL NAME | ACGIH | ACGIH SKIN* | IARC | NTP | OSHA |
|---------------|-------|-------------|----------|----------|------|
| Benzene | A1 | X | Group 1 | Known | X |
| Ethylbenzene | A3 | – | Group 2B | Evidence | X |
| Hexane | – | X | – | – | – |
| Toluene | A4 | – | Group 3 | Evidence | – |
| Xylenes | 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) |
| 2-Methylbutane (In Liquid form) | | | EC50 48 h: = 2.3 mg/L (Daphnia magna) | |

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) | – |
| Benzene, trimethyl- | – | – | – | LC50 24h: 7000 ug/L Palaemonetes pugio (Daggerblade grass shrimp) |
| 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) |
| Decane | EC50 24 h: = 0.043 mg/L (Chlorella vulgaris) | – | EC50 48 h: = 0.029 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) | – |

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 96h: 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 |
|----------------|--|--|---|----------------|
| Xylenes | 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 |
|----------|---------|
|----------|---------|

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

- 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 | 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 |
|--|--------------|---------------|
| 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 RQ |
| Benzene, trimethyl- | 25551-13-7 | Not Listed |
| Butane | 106-97-8 | Not Listed |
| Cyclohexane | 110-82-7 | 1000 lb 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 RQ |
| Heptane | 142-82-5 | Not Listed |
| Hexane | 110-54-3 | Not Listed |
| Hydrogen Sulfide | 7783-06-4 | 100 lb 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 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 |
|-----------------|-----------|--------------|
| 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 |

| | | |
|----------------|-----------|------------|
| Propane | 74-98-6 | Not Listed |
| Toluene | 108-88-3 | X |
| Xylene | 1330-20-7 | X |

X= The component is listed

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

| 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 | Not Listed |
| 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 | Not Listed |
| 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 | X |
| Xylene | 1330-20-7 | Not Listed |

X= The component is listed

| COMPONENT | CAS # | CLASSIFICATION |
|--|--------------|---------------------------------------|
| 1,2,4-Trimethylbenzene | 95-63-6 | B3 |
| 2-Methylbutane (In Liquid form) | 78-78-4 | B2 |
| Benzene | 71-43-2 | B2, D2A, D2B |
| Benzene, trimethyl- | 25551-13-7 | B3 |
| 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 |
| 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 |
|--|------------|------------|
| 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 |

| | | |
|----------------|-----------|---|
| Pentane | 109-66-0 | X |
| Propane | 74-98-6 | X |
| Toluene | 108-88-3 | X |
| Xylene | 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.