

Safety Data Sheet

Crude Oil, Sour

Mercuria Energy Trading, Inc.
Mercuria Commodities Canada Corp.

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name Crude Oil, Sour
Synonyms Sour Crude Oil, Heavy Sour Crude Oil, Sour Synthetic Crude Oil, Sour Crude Oil Blend, Sour Petroleum Crude, Sour Field Crude, Sour Desalted Crude

Chemical Family Petroleum Hydrocarbon
Intended Use Refinery Feedstock
MARPOL Annex I Category Crude Oils

Supplier Mercuria Energy Trading, Inc. Mercuria Commodities Canada Corporation
20 E Greenway Plaza, Suite 650 Suite 600, 326 – 11th Avenue S.W.
Houston, TX 77046 USA T2R 0C5 Calgary, AB CAN

Emergency Numbers **Emergency Phone (24 hrs):** 855-297-1501
Mercuria Health, Safety and Environmental: 720-214-6215
National Poison Control: 800-222-1222

2. HAZARDS IDENTIFICATION

GHS Classification

H224 Flammable liquid – Category 1
H304 Aspiration hazard – Category 1
H313 Acute toxicity, dermal – Category 5
H319 Serious eye damage/eye irritation – Category 2
H336 Specific target organ toxicity (single exposure) – Category 3 (central nervous system)
H350 Carcinogenicity – Category 1B
H373 Specific target organ toxicity (repeated exposure) - Category 2 (bone marrow, liver, thymus)
H401 Hazardous to the aquatic environment, acute hazard, Category 2
H411 Hazardous to the aquatic environment, chronic toxicity – Category 2

Hazards Not Otherwise Classified

May contain or release poisonous hydrogen sulfide gas

Label Elements



Signal Words Danger

GHS Hazard Statements

H224 Extremely flammable liquid and vapor
H304 May be fatal if swallowed and enters airways
H313 May be harmful in contact with skin
H319 Causes serious eye irritation
H336 May cause drowsiness or dizziness
H350 May cause cancer
H373 May cause damage to organs through prolonged or repeated exposure
H401 Toxic to aquatic life
H411 Toxic to aquatic life with long lasting effects

GHS Precautionary Statements

P201 Obtain special instructions before use
P202 Do not handle until all safety precautions have been read and understood
P210 Keep away from heat/sparks/open flames/hot surfaces – no smoking

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2. HAZARDS IDENTIFICATION

P233	Keep container tightly closed
P240	Ground/bond container and receiving equipment
P241	Use explosion-proof electrical/ventilating/lighting equipment
P242	Use only non-sparking tools
P243	Take precautionary measures against static discharge
P261	Avoid breathing dust/fume/gas/mist/vapours/spray
P264	Wash thoroughly after handling
P271	Use only outdoors or in a well-ventilated area
P273	Avoid release to the environment
P280	Wear protective gloves / protective clothing / eye protection / face protection
P361, P352,P362	IF ON SKIN OR HAIR: Remove/take off immediately all contaminated clothing. Wash with plenty of soap and water. Take off contaminated clothing and wash before reuse.
P305,P351,P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P313	If eye irritation persists, get medical advice/attention
P301,P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P331	Do NOT induce vomiting
P304,P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P312	Call a POISON CENTER or doctor/physician if you feel unwell
P370,P378	In case of fire: Use dry chemical, carbon dioxide, or foam for extinction
P391	Collect spillage
P405	Store locked up
P403,P233, P235	Store in a well-ventilated place. Keep container tightly closed, Keep cool
P501	Dispose of contents/container to approved facility

3. COMPOSITION / INFORMATION ON INGREDIENTS

Components	CAS Registration No.	Concentration (%)
Crude Oil	8002-05-9	100
Benzene	71-43-2	< 5
n-Butane	106-97-8	1 - 7
Ethyl benzene	100-41-4	< 5
n-Hexane	110-54-3	< 10
Hexane (all isomers)	mixture	2 - 10
Hydrogen Sulfide	7783-06-4	0.001 – 0.5
Methyl cyclohexane	108-87-2	1 – 4
Polynuclear Aromatic Hydrocarbons (PAH)	mixture	< 10
Toluene	108-88-3	< 5
1,2,4 Tri-methyl benzene	95-63-6	< 1 - 2
Xylene, all isomers	1330-20-7	< 1 - 3
Sulfur compounds	mixture	< 1 - 3

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4. FIRST AID MEASURES

Inhalation (Breathing)	Move the exposed person to fresh air. If not breathing, clear airways and give artificial respiration. If breathing is difficult, humidified oxygen should be administered by qualified personnel. Seek medical attention if breathing difficulties continue.
Eye Contact	Flush eyes with water for at least 15 minutes. Hold eyelids apart to ensure complete irrigation of the eye. Remove contact lenses, if worn, after initial flushing. Do not use eye ointment. Seek medical attention.
Skin Contact	Remove contaminated shoes and clothing, and flush affected areas with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, clean affected area thoroughly with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists. Launder or discard contaminated clothing.
Ingestion (Swallowing)	Aspiration hazard. Do not induce vomiting or give anything by mouth because the material can enter the lungs and cause severe lung damage. If spontaneous vomiting is about to occur, place victim's head below knees. If victim is drowsy or unconscious, place on the left side with head down. Do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention
Most Important Symptoms and Effects	Acute: Headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Delayed: Dry skin and possible irritation with repeated or prolonged exposure
Potential Acute Health Effects	Inhalation: Breathing high concentrations may be harmful. Mist or vapor can irritate the throat and lungs. Breathing this material may cause central nervous system depression with symptoms including nausea, headache, dizziness, fatigue, drowsiness or unconsciousness. This material may contain or liberate hydrogen sulfide, a poisonous gas with the smell of rotten eggs. Hydrogen sulfide and other hazardous vapors may evolve and collect in the headspace of storage tanks or other enclosed vessels. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of overexposure include irritation of the eyes, nose, throat and respiratory tract, blurred vision, photophobia (light sensitivity) and pulmonary edema (fluid accumulation in lungs). Severe exposures can result in nausea, vomiting, muscle weakness or convulsions, respiratory failure and death. Eye Contact: This product can cause eye irritation from short-term contact with liquid, mists or vapors. Symptoms include stinging, watering, redness and swelling. Effects may be more serious with repeated or prolonged contact. Hydrogen sulfide vapors may cause moderate to severe eye irritation and photophobia (light sensitivity). Skin Contact: This product is a skin irritant. Contact may cause redness, itching, burning and skin damage. This material may contain polynuclear aromatic hydrocarbons that have been known to produce a phototoxic reaction when contaminated skin is exposed to sunlight. The effect is similar in appearance to an exaggerated sunburn, and is temporary in duration if exposure is discontinued. Continued exposure to sunlight can result in more serious skin problems including pigmentation (discoloration), skin eruptions (pimples) and possible skin cancers. Ingestion: Ingestion may result in nausea, vomiting, diarrhea and restlessness. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema or hemorrhage and even death.
Potential Chronic Health Effects	Chronic effects of overexposure are similar to acute effects including central nervous system (CNS) effects and CNS depression. Effects may also include irritation of the digestive tract, irritation of the respiratory tract, nausea, vomiting and skin dermatitis.

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Notes to Physician

This material may contain or liberate hydrogen sulfide. In high doses, hydrogen sulfide may produce pulmonary edema and respiratory depression or paralysis. The first priority in treatment should be providing adequate ventilation and administering 100% oxygen. If unresponsive to supportive care, nitrites (amyl nitrite by inhalation or sodium nitrite by I.V.) may be an effective antidote, if delivered within the first few minutes of exposure. For adults, the dose is 10 ml of a 3NaNO₂ solution (0.5 gm NaNO₂ in 15 ml water) IV over 2 to 4 minutes. The dosage should be adjusted in children or in the presence of anemia and methemoglobin levels, arterial blood gases, and electrolytes should be monitored.

Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (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 the development of cardiac arrhythmias.

Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis. Inhalation overexposure can produce toxic effects, monitor for respiratory distress. If cough or breathing difficulties develop, evaluate for upper respiratory tract inflammation, bronchitis and pneumonitis.

Skin contact may aggravate an existing dermatitis. High pressure injection injuries may cause necrosis of underlying tissue regardless of superficial appearance.

Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

5. FIRE FIGHTING MEASURES

Flammability Classification OSHA Classification (29 CFR 1910.1200): Flammable Liquid
NFPA Class-1B Flammable Liquid
NFPA Ratings: Health: 3, Flammability: 3, Reactivity: 0

Flash Point < 37.8°C, < 100°F (ASTM D-56)

Flammable Limits Lower Limit: 0.4%
Upper Limit: 15.0%

Autoignition Temperature 260°C, 500°F

Combustion Products Highly dependent on combustion conditions. Fume, smoke, carbon monoxide, carbon dioxide, sulfur and nitrogen oxides, aldehydes and unburned hydrocarbons.

Fire and Explosion Hazards This material is extremely flammable and can be ignited by heat, sparks, flames or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment and electronic devices such as cell phones, computers, calculators and pagers which have not been certified as intrinsically safe). Vapors are heavier than air and can accumulate in low areas. May create vapor/air explosion hazard indoors, in confined

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5. FIRE FIGHTING MEASURES (continued)

spaces, outdoors or in sewers. Vapors may travel considerable distances to a remote source of ignition where they can ignite, flash back or explode. Product can accumulate a static charge that may cause a fire or explosion. A product container, if not properly cooled, can rupture in the heat of a fire.

Extinguishing Media Dry chemical, carbon dioxide or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Fire fighters should wear appropriate thermal protective equipment and self-contained breathing apparatus (SCBA) with full face-piece operated in positive pressure mode. Use approved gas detectors in confined spaces.

Long duration fires involving crude or residual oil stored in tanks may result in a boil over. The contents of the tank may be expelled beyond the containment dikes or ditches. All personnel should be kept back a safe distance when a boil over is anticipated. Use water spray to cool fire-exposed containers and to protect personnel. Isolate immediate hazard area and keep unauthorized personnel out. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water. Avoid spreading burning liquid with water used for cooling.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Extremely Flammable. Spillage of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof electrical equipment is recommended. Product may contain or release poisonous hydrogen sulfide gas. If the presence of dangerous amounts of H₂S around the spilled product is suspected, additional or special actions may be warranted including access restrictions and the use of protective equipment. Stay upwind and away from spill/release. Isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment as conditions warrant per Exposure Controls/Personal Protection guidelines.

Environmental Precautions Stop the leak if it can be done without risk. Prevent spilled material from entering waterways, sewers, basements or confined areas. Contain release to prevent further contamination of soils, surface water or groundwater. Clean up spill as soon as possible using appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil.

Methods for Containment and Clean Up Immediate cleanup of any spill is recommended. Build dike far ahead of spill for containment and later recovery or disposal of spilled material. Absorb spill with inert material such as sand or vermiculite and place in suitable container for disposal. If spilled on water, remove with appropriate equipment like skimmers, booms or absorbents. In case of soil contamination, remove contaminated soil for remediation or disposal in accordance with applicable regulations.

Reporting Report spills/releases as required, to appropriate local, state and federal authorities. US

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Coast Guard and Environmental Protection Agency regulations require immediate reporting of spills/release that could reach any waterway including intermittent dry creeks. Report spill/release to the National Response Center at (800) 424-8802.

7. HANDLING AND STORAGE

Precautions for Safe Handling

Extremely flammable. May vaporize easily at ambient temperatures. The vapor is heavier than air and may create an explosive mixture of vapor and air. Beware of accumulation in confined spaces and low lying areas.



Use non-sparking tools and explosion-proof equipment. Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. Explosion-proof electrical equipment is recommended and may be required by fire codes.

Warning! Use of this material in spaces without adequate ventilation may result in the generation of hazardous levels of combustion products and/or inadequate oxygen levels for breathing. Odor is an inadequate warning for hazardous conditions.

To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or ground product transfer system. Do not use electronic devices (such as cellular phones, computers, calculators, pagers, etc.) in or around any fueling operation or storage area unless the devices are certified as intrinsically safe. Electrical equipment and fittings should comply with local fire codes.

Precautions for Safe Storage

Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces and all sources of ignition. Post area warnings: 'No Smoking or Open Flame'. Keep away from incompatible material. Outdoor or detached storage of portable containers is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

In a tank, barge or other closed container, the vapor space above materials containing hydrogen sulfide may result in concentrations of H₂S immediately dangerous to life or health. Check atmosphere for oxygen content, H₂S and flammability prior to entry.

Portable containers should never be filled while they are in or on a motor vehicle or marine craft. Static electricity may ignite vapors when filling non-grounded containers or vehicles on trailers. To avoid static buildup, do not use a nozzle lock open device. Use only approved containers. Keep containers tightly closed. Place the container on the ground before filling. Keep the nozzle in contact with the container during filling.

Empty containers retain liquid and vapor residues and can be dangerous. Do NOT pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat, flame, sparks, static electricity or other sources of ignition; they may explode and cause injury or death. Do not attempt to refill or clean containers since residue is difficult to remove. Empty drums should be completely drained, properly closed and returned to the supplier or a qualified drum reconditioner. All containers should be disposed of in an environmentally safe manner in accordance with government regulations.

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8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Component	ACGIH Exposure Limits	OSHA Exposure Limits	NIOSH Exposure Limits
Crude Oil	5 mg/m ³ TWA 10 mg/m ³ STEL	5 mg/m ³ TWA	2500 mg/m ³ IDLH
Crude Oil Exposure Limits Above Are Applicable to Oil Mist, If Generated			
Benzene	0.5 ppm TWA 2.5 ppm STEL Skin	1 ppm TWA 5 ppm STEL Skin 25 ppm Ceiling 0.5 ppm Action Level	0.1 ppm TWA 1 ppm STEL Skin 500 ppm IDLH
n-Butane	800 ppm TWA		800 ppm TWA
Ethyl benzene	20 ppm TWA 125 ppm STEL	100 ppm, 435 mg/m ³ PEL 125 ppm STEL	100 ppm, 435 mg/m ³ TWA 125 ppm, 545 mg/m ³ STEL 800 ppm IDLH
n-Hexane	50 ppm TWA Skin	500 ppm, 1800 mg/m ³ PEL	50 ppm, 180 mg/m ³ TWA 1100 ppm IDLH
Hexane (all isomers)	500 ppm TWA 1000 ppm STEL		100 ppm, 350 mg/m ³ TWA 500 ppm, 1800 mg/m ³ Ceiling
Hydrogen Sulfide	1 ppm TWA 5 ppm STEL	20 ppm Ceiling 50 ppm Peak	10 ppm Ceiling 100 ppm IDLH
Methyl cyclohexane	400 ppm TWA	500 ppm TWA	400 ppm TWA 1200 ppm IDLH
Toluene	20 ppm TWA Skin	200 ppm TWA 300 ppm Ceiling 500 ppm Peak-10 min	100 ppm, 375 mg/m ³ TWA 150 ppm, 560 mg/m ³ STEL 500 ppm IDLH
1,2,4 Tri-methyl benzene	25 ppm TWA	25 ppm TWA	25 ppm, 125 mg/m ³ TWA
Xylene, all isomers	100 ppm TWA 150 ppm STEL	100 ppm, 435 mg/m ³ PEL 150 ppm STEL	100 ppm, 435 mg/m ³ TWA 150 ppm, 655 mg/m ³ STEL 900 ppm IDLH
Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional for further information.			
ACGIH - American Conference of Government Industrial Hygienists, OSHA - Occupational Safety and Health Administration, NIOSH - National Institute for Industrial Safety and Health, TWA - Time Weighted Average (8 hour average for ACGIH and OSHA, 10 hour average for NIOSH), STEL - 15 Minute Short Term Exposure Level, Skin - indicates potential for cutaneous absorption of liquid or vapor through the eyes or mucous membranes, Ceiling - Ceiling Level, Peak - Acceptable peak over the ceiling concentration for a specified number of minutes, IDLH - Immediately Dangerous to Life and Health			

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Biological Exposure Indices (BEI)			
Material	Determinant	Sampling Time	BEI Level
Benzene	t,t-muconic acid in creatinine in urine	End of shift	500 µg/g
	s-phenylmercapturic acid in creatinine in urine	End of shift	25 µg/g
Ethyl Benzene	Sum of mandelic acid and phenylglyoxylic acid in creatinine in urine	End of shift at end of work week	0.7 g/g
	Ethyl Benzene in end exhaled air	Not critical	
n-Hexane	2,5-hexanedion without hydrolysis in urine	End of shift at end of work week	0.4 mg/l
Polycyclic Aromatic Hydrocarbons (PAH's)	<i>1-hydroxypyrene in creatinine in urine</i>	End of shift	
Toluene	o-cresol with hydrolysis in creatinine in urine	End of shift	0.3 mg/g
	Toluene in blood	Prior to last shift of work week	0.02 mg/l
	Toluene in urine	End of shift	0.03 mg/l
Xylene	Methyl hippuric acids in creatinine in urine	End of shift	1.5 g/g
ACGIH - American Conference of Government Industrial Hygienists			

Personal Protective Equipment

General Considerations Consider the potential hazards of this material, applicable exposure limits, job activities and other substances in the work place when designing engineering controls and selecting personal protective equipment.

Engineering Controls Use process enclosures, local exhaust ventilation or other engineering controls to maintain airborne levels below the recommended exposure limits. An emergency eye wash station and safety shower should be located near the work station.

Personal Protective Equipment If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, personal protective equipment (PPE) is recommended. A hazard assessment of the work should be conducted by a qualified professional to determine what PPE is required.

Respiratory Protection A respiratory protection program that meets or exceeds OSHA 29 CFR 1910.134 and ANSI Z.88.2 should be followed whenever workplace conditions warrant the use of a respirator. When airborne concentrations are expected to exceed the established exposure limits given in Section 8, use a NIOSH approved air purifying respirator equipped with organic vapor cartridges/canisters. Use a full-face positive-pressure supplied air respirator in circumstances where air-purifying respirators may not provide adequate protection or where there may be the potential for airborne exposure above the exposure limits. If exposure concentration is unknown, IDLH conditions exist or there is a potential for exposure to hydrogen sulfide above exposure limits, use a NIOSH approved self contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode.

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Personal Protective Equipment

Eye Protection Eye protection that meets or exceeds ANSI Z.87.1 is recommended if there is a potential for liquid contact to the eyes. Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing or spraying of this material. A face shield may be necessary depending on conditions of use.

Skin and Body Protection Avoid skin contact. Wear long-sleeved fire-retardant garments while working with flammable and combustible liquids. Additional chemical-resistant protective gear may be required if splashing or spraying conditions exist. This may include an apron, arm covers, impervious gloves, boots and additional facial protection.

Hand Protection Avoid skin contact. Use impervious gloves (e.g., PVC, neoprene, nitrile rubber). Check with glove suppliers to confirm the breakthrough performance of gloves. PVC and neoprene may be suitable for incidental contact. Nitrile rubber should be used for longer term protection when prolonged or frequent contact may occur. Gloves should be worn on clean hands and hands should be washed after removing gloves. Also wash hands with plenty of mild soap and water before eating, drinking, smoking, using toilet facilities or leaving work.

Special Considerations Workplace monitoring plans should consider the possibility that heavy metals such as mercury may concentrate in process vessels and equipment presenting the possibility of exposure during sampling and maintenance operations. Mercury and other heavy metals may be present in trace quantities in crude oil, raw natural gas and condensates. Storage and processing of these materials can result in these metals, including elemental mercury, accumulating in enclosed vessels and piping, typically at the low point of the processing equipment. Mercury may also concentrate in sludges, sands, scales, waxes and filter media.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Amber to black liquid	Physical Form	Liquid
Odor	Strong hydrocarbon, sulfurous odor possible	Odor Threshold	Not established
pH	Not applicable	Vapor Pressure	< 14 psi (Reid RVP)
Vapor Density	>1 (air = 1)	Boiling Point/Range	30 - 538°C / 86 -1000 °F
Percent Volatile	>50%	Partition Coefficient	2 - 6
Specific Gravity	0.63 - 1.1 @ 15.6 °C / 60°F	Density	5.8 - 8.6 lb/gal @ 15.6 °C / 60°F
Molecular Weight	Not determined	Evaporation Rate	Not established
Flash Point	<100°F/<38°C	Test Method	ASTM D-56
Explosive Limits	0.4% LEL, 15.0% UEL	Autoignition Temperature	260°C / 500°F
Solubility in Water	Slightly soluble in water		

10. STABILITY AND REACTIVITY

Stability Stable under normal anticipated storage and handling temperatures and pressures. Extremely flammable liquid and vapor. Vapor can cause flash fire.

Conditions to Avoid Avoid high temperatures and all possible sources of ignition. Prevent vapor accumulation.

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10. STABILITY AND REACTIVITY

Incompatibility (Materials to Avoid)	Avoid contact with strong oxidizing agents such as strong acids, alkalis, chlorine and other halogens, dichromates or permanganates, which can cause fire or explosion.
Hazardous Decomposition Products	Hazardous decomposition products are not expected to form during normal storage. The use of hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels.
Hazardous Polymerization	Not known to occur

11. TOXICOLOGICAL INFORMATION

Overview This product is an amber to black liquid with a strong hydrocarbon odor, it may also have a sulfurous or rotten egg odor. Hydrogen sulfide, an extremely flammable and very toxic gas may be present. This product is a volatile and extremely flammable liquid that may cause flash fires. Keep away from heat, sparks and flames and other sources of ignition. This product contains benzene, which may cause cancer or be toxic to blood forming organs. It contains polynuclear aromatic hydrocarbons that are confirmed human carcinogens. It contains material that has caused cancer based on animal data. Never siphon this product by mouth. If swallowed, this product may be aspirated into the lungs and cause lung damage or death.

This material may contain benzene, ethyl benzene, naphthalene and polynuclear aromatic hydrocarbons (PAH) at concentrations above 0.1%. Benzene and PAH are considered to be known human carcinogens by OSHA, IARC and NTP. IARC has identified several individual PAH as probably carcinogenic to humans (Group 2A) and ethyl benzene, naphthalene and several individual PAH as possibly carcinogenic to humans (Group 2B) based on laboratory animal studies.

Toxicological Information of the Material

Acute Toxicity	Dermal: Low Toxicity: LD50 > 2000 mg/kg (rabbit) Causes mild skin irritation. Repeated exposure may cause skin dryness or cracking that can lead to dermatitis.
	Inhalation: Hydrogen Sulfide is Extremely Toxic: LC100 = 600 ppm(v), 30 min (man) Product expected to have low degree of toxicity by inhalation: LC 50 > 5 mg/l (vapor) Effect of overexposure may include irritation of the digestive tract, irritation of the respiratory tract, nausea, vomiting, diarrhea and signs of central nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue). Continued inhalation may result in unconsciousness and/or death.
	Ingestion: Product expected to have low degree of toxicity by ingestion: Oral LD50 > 5 g/kg (rat), > 10 g/kg (mice) Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

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Eye Damage / Irritation	Causes serious eye irritation.
Sensitization	Skin: Not expected to be a skin sensitizer. Respiratory: Not expected to be a skin sensitizer.
Specific Target Organ Toxicity	Single Exposure: High concentrations may cause irritation of the skin, eyes, digestive tract, irritation of the respiratory tract, nausea, vomiting, diarrhea and signs of central nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue). Continued inhalation may result in unconsciousness and / or death. Repeated Exposure: May cause damage to organs or organ systems through prolonged or repeated exposure. Laboratory animal studies of dermal and inhalation exposure routes have demonstrated toxicity to the liver, bone marrow, blood, spleen and thymus. <i>Peripheral Nervous System</i> – repeated exposure causes peripheral neuropathy in animals (n-Hexane). <i>Blood forming Organs</i> – repeated exposure affects the bone marrow (Benzene).
Conditions Aggravated by Overexposure	Disorders of the organs or organ systems that may be aggravated by significant exposure to this material or its components include the skin, respiratory system, liver, kidneys, CNS, cardiovascular system and blood-forming system.
Carcinogenicity	May cause cancer. Causes cancer in laboratory animals. Chronic application of crude oil to mouse skin resulted in an increased incidence of skin tumors. The International Agency for Research on Cancer (IARC) concluded in its Crude Oil Monograph that there is limited evidence of carcinogenicity in animals, and that crude oil is not classifiable as to its carcinogenicity in humans (Group 3). It has not been listed as a carcinogen by NTP or OSHA.

Benzene	ACGIH NTP IARC GHS/CLP	Group A1 confirmed human carcinogen Known to be a human carcinogen IARC 1 – Carcinogenic to humans Carcinogenicity category 1A
Ethyl Benzene	ACGIH IARC GHS/CLP	Group A3 confirmed animal carcinogen with unknown relevance to humans IARC 2B – Possibly carcinogenic to humans No carcinogenicity classification
n-Hexane	ACGIH GHS/CLP	Group A4 not classifiable as a human carcinogen No carcinogenicity classification
Toluene	ACGIH IARC GHS/CLP	Group A4 not classifiable as a human carcinogen IARC 3 – Not classifiable as to carcinogenicity to humans No carcinogenicity classification
Tri-methyl benzene, all isomers	GHS/CLP	No carcinogenicity classification
Xylene	ACGIH IARC GHS/CLP	Group A4 not classifiable as a human carcinogen IARC 3 – Not classifiable as to carcinogenicity to humans No carcinogenicity classification

ACGIH - American Conference of Government Industrial Hygienists, IARC- International Agency for Research on Cancer, NTP – National toxicology Program, GHS/CLP GHS, Globally Harmonized System on Classification, Labeling and Packaging

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Germ Cell Mutagenicity	Inadequate information available, not expected to be mutagenic.
Reproductive and Developmental Toxicity	Inadequate information available. Dermal exposure to crude oil during pregnancy resulted in limited evidence of developmental toxicity in laboratory animals. Decreased fetal weight and increased resorptions were noted at maternally toxic doses. No significant effects on pup growth or other developmental landmarks were observed postnatally.
Additional Information	<p>Hydrogen Sulfide (H₂S). This material may contain or liberate H₂S, a poisonous gas with the smell of rotten eggs. Odor is not a reliable indicator of exposure because olfactory fatigue causes the smell to disappear.</p> <p>H₂S has a broad range of effects depending on the airborne concentration and length of exposure:</p> <ul style="list-style-type: none">10 ppm: eye and respiratory tract irritation100 ppm: coughing, headache, dizziness, nausea, eye irritation, loss of sense of smell in minutes200 ppm: potential for pulmonary edema after 20 minutes500 ppm: loss of consciousness after short exposures, potential for respiratory arrest1000 ppm and greater: Immediate loss of consciousness coupled with respiratory paralysis may lead rapidly to death. Prompt cardiopulmonary resuscitation with artificial respiration may be required. <p>Polycyclic Aromatic Compounds (PAHs): This material may contain varying concentrations of PAHs that have been known to produce a phototoxic reaction when contaminated skin is exposed to sunlight. The effect is similar in appearance to a sunburn and is temporary if exposure is discontinued. Continued exposure to sunlight can result in more serious skin problems including pigmentation (discoloration), skin eruptions and possible skin cancers.</p>

Toxicological Information of Components

Benzene 71-43-2

Target Organs: Prolonged or repeated exposures to benzene vapors has been linked to bone marrow toxicity which can result in blood disorders such as leukopenia, thrombocytopenia, and aplastic anemia. All of these diseases can be fatal. May cause myelodysplastic syndrome

Developmental: Exposure to benzene during pregnancy demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased body weight and increased skeletal variations in rodents. Alterations in hematopoiesis have been observed in the fetuses and offspring of pregnant mice.

Mutagenicity: Benzene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells, and DNA damage in mammalian cells in vitro.

Ethyl Benzene 100-41-4

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), thyroid (hyperplasia) and pituitary (hyperplasia).

n-Hexane 110-54-3

Target Organs: Excessive exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a

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year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone. Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) has resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Mutagenicity: May impair fertility at doses that produce other toxic effects.

Hydrogen Sulfide 7783-06-4

Hydrogen sulfide concentrations will vary significantly depending on the source and sulfur content of the crude. Sweet crudes may contain toxicologically significant levels of hydrogen sulfide in the vapor spaces of bulk storage tanks and transport compartments. Concentrations of H₂S as low as 10 ppm over an 8 hour work shift may cause eye or throat irritation. Prolonged breathing of 50-100 ppm H₂S vapors can produce significant eye and respiratory irritation. Sour crudes commonly contain extremely high concentrations of H₂S in the vapor spaces of bulk storage vessels. Exposure to 250-600 ppm for 15-30 minutes can produce headache, dizziness, nervousness, staggering gait, nausea and pulmonary edema or bronchial pneumonia. Concentrations >1,000 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. Complete and rapid recovery is generally seen in acute cases of H₂S poisonings where the victim has quickly been moved to fresh air, and had breathing restored. 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 108-88-3

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. Solvent abuse and noise interaction in the work environment may cause hearing loss. Abuse of vapors has been associated with organ damage and death.

Developmental: Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased fetal body weight and increased skeletal variations in both inhalation and oral studies. Toluene causes foetotoxicity at doses that are maternally toxic. Many case studies involving abuse during pregnancy indicate that toluene can cause birth defects, growth retardation and learning difficulties.

Xylenes 1330-20-7

Target Organs: A six week inhalation study with xylene produced hearing loss in rats.

Developmental: Both mixed xylenes and the individual isomers produced limited evidence of developmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, skeletal variations and resorptions.

12. ECOLOGICAL INFORMATION

Toxicity

This material is expected to be toxic to aquatic organisms. A range of measurements of aquatic toxicity has been obtained in laboratory studies of crude oils. Variability in results may be related in part to the source of the crude oil, or it may reflect different approaches to testing. However, those studies using dispersions of whole oil, employing water soluble fractions, and water accommodated fractions have generally given LC50 or EC50 values in the range 10 to 100 mg/l or greater when expressed in terms of oil loading rate. These values are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions.

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Classification H411, Chronic Category 2

LL/LE/IL50 – 10 to 100 mg/l (fish, aquatic invertebrates, algae, microorganisms)

Coating action of oil can kill birds, plankton, aquatic life, algae and fish.

Persistence and Degradability

Most crude oils are not regarded as readily biodegradable. Most of the nonvolatile constituents are inherently biodegradable. Some of the highest molecular weight components are persistent in water. The individual hydrocarbon components of this material are differentially soluble in water with aromatic hydrocarbons tending to be more water soluble than aliphatic hydrocarbons. If spilled, the lighter components of crude oil will generally evaporate but depending on local environmental conditions (temperature, wind, soil type, mixing or wave action in water, etc), photo-oxidation and biodegradation, the remainder may become dispersed in the water column or absorbed to soil or sediment. Because of their differential solubility, the occurrence of hydrocarbons in groundwater will be at different proportions than the parent material. Under anaerobic conditions, such as in anoxic sediments, rates of biodegradation are negligible.

Persistence per IOPC Fund Definition

Persistent

Bioaccumulative Potential

Contains components with the potential to bioaccumulate. The octanol water coefficient values measured for the hydrocarbon components of this material range from less than 2 to greater than 6, and therefore would be considered as having the potential to bioaccumulate. Based upon spill investigation analysis, oils containing polynuclear aromatic hydrocarbon compounds similar to this material were shown to bioaccumulate in tissues of various aquatic organisms.

Mobility

Air: Contains volatile components. Lighter components will volatilize in the air. In air, these volatile hydrocarbons undergo photodegradation by reaction with hydroxyl radicals with half-lives varying from 0.5 days for n-dodecane to 6.5 days for benzene.

Water: Spreads out as a film on the surface of water. Significant proportion of spill will remain after one day. Lower molecular weight aromatic hydrocarbons and some polar compounds have low but significant water solubility. Some higher molecular weight compounds are removed by emulsification and these also slowly biodegrade while others sink and are absorbed into the sediment. Heavier fractions agglomerate to form tars, some of which sink.

Soil: Some constituents may be mobile and contaminate groundwater.

Other Adverse Effects

Films form on water and may affect oxygen transfer and damage organisms.

13. DISPOSAL CONSIDERATIONS

Recover or recycle if possible. It is the responsibility of the generator to determine the toxicity and physical properties of the material generated so as to properly classify the waste and ensure disposal methods comply with applicable regulations.

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This material, if discarded as produced, is not a RCRA "listed" hazardous waste. However, it should be fully characterized for ignitability (D001), reactivity (D003) and benzene (D018) prior to disposal (40 CFR 261). Use which results in chemical or physical change or contamination may subject it to regulation as a hazardous waste. Along with properly characterizing all waste materials, consult state and local regulations regarding the proper disposal of this material.

Do not dispose of tank water bottoms by draining onto the ground. This will result in soil and groundwater contamination. Waste arising from spillage or tank cleaning should be disposed of in accordance with applicable regulations.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate 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 qualified drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

14. TRANSPORTATION INFORMATION

United States
Department of
Transportation
(US DOT)

Transportation of
Dangerous Goods
(TDG) Canada

Shipping Description: Petroleum Sour Crude Oil, 3, UN3494, PG-I
Shipping Name: Petroleum Sour Crude Oil
Hazard Class and Division: 3
ID Number: UN3494
Packing Group: I
Label: Flammable Liquid (Toxic)
Placard: Flammable, Toxic / 3494
Emergency Response Guide: 131
Marine Pollutant: Yes



International Maritime
Dangerous Goods Code
(IMDG)

Shipping Description: Petroleum Sour Crude Oil, 3, UN3494, PG-I
Shipping Name: Petroleum Sour Crude Oil
Hazard Class and Division: 3
UN Number: 3494
Label: Flammable Liquid (Toxic)
EMS Guide: F-E, S-E
Marine Pollutant: Yes

European Agreements
Concerning the
International Carriage by
Rail (RID) and by Road
(ADR)

Shipping Name: Petroleum Sour Crude Oil
Hazard Class: 3
Packing Group: I
Label: Flammable Liquid (Toxic)
Danger Number: 33
UN Number: 3494

International Civil
Aviation Organization
(ICAO) / International Air
Transport Association
(IATA)

Shipping Name: Petroleum Sour Crude Oil
UN/ID Number: UN3494
Hazard Class/Division: 3
Packing Group: I
Labels: Flammable Liquid (Toxic)
Emergency Response Guide: 3H

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15. REGULATORY INFORMATION

United States Federal Regulatory Information

EPA TSCA Inventory This product and/or its components are listed on the Toxic Substances Control Act (TSCA) Inventory

EPA SARA 302/304 Emergency Planning and Notification This material contains the following chemicals subject to reporting under the Superfund Amendments and Reauthorization Act of 1986 (SARA): Material contains hydrogen sulfide, considered an extremely hazardous substance. TPQ– 500 lb, EPCRA RQ – 100 lb

EPA SARA 311/312 (Title III Hazard Categories)
Acute Health: Yes
Chronic Health: Yes
Fire Hazard: Yes
Pressure Hazard: No
Reactive Hazard: No

EPA SARA Toxic Chemical Notification and Release Reporting (40 CFR 372) and CERCLA Reportable Quantities (40 CFR 302.4)

Component	CAS Number	Concentration	RQ
Benzene	71-43-2	< 5 %	10 lb
Ethyl Benzene	100-41-4	< 5 %	1000 lb
n-Hexane	110-54-3	< 10 %	5000 lb
Polynuclear Aromatic Hydrocarbons	mixtures	<10 %	1 lb
Toluene	108-88-3	< 5 %	1000 lb
1,2,4 Trimethyl Benzene	95-63-6	< 2 %	not listed
Xylene, all isomers	1330-20-7	< 3 %	100 lb

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CERCLA Section 101(14) excludes crude oil and crude oil fractions, including hazardous constituents of petroleum, from the definition of hazardous substances. The petroleum exclusion applies to this product.

EPA CWA and OPA This product is classified as an oil under Section 311 of the Clean Water Act (CWA) and Oil Pollution Act of 1990 (OPA), subject to spill reporting requirements.

Canadian Regulatory Information

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

Workplace Hazardous Materials Information System (WHMIS) Hazard Class
 B2 - Flammable Liquid
 D1A – Material Causing Immediate and Serious Toxic Effects - Very Toxic Material
 D2A: Material Causing Other Toxic Effects Very Toxic
 D2B - Material Causing Other Toxic Effects - Toxic Material

European Union Regulatory Information

Labeling Product is dangerous as defined by the European Union Dangerous Substances / Preparations Directives
 Contains: Benzene

Symbol **F+** Extremely Flammable
T Toxic

Risk Phrases R12-45--65-52/53
 Extremely flammable. May cause cancer. Irritating to skin. Harmful: may cause lung damage if swallowed. Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases S23-36-28-53-62
 Do not breathe vapor. Wear suitable protective clothing. After contact with skin, wash immediately. Avoid exposure - obtain special instructions before use. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

California Proposition 65

This product may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects, or other reproductive harm and which may be subject to the warning requirements of California Proposition 65. Chemicals known to the State of California to cause cancer, birth defects or other reproductive harm are created by the combustion of this product.

Carcinogens: Benzene, Ethyl Benzene, Naphthalene, various Polynuclear Aromatic Hydrocarbons

Developmental Toxicity: Benzene, Toluene

Male Reproductive Toxicity: Benzene

Carcinogen Identification by International Agency for Research on Cancer

Group 1	Carcinogenic to Humans	Benzene, Coal Tar Pitch Volatiles (per 29 CFR 1910.1200.1002, OSHA has defined coal tar pitch volatiles to include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood and other organic matter
Group 2A	Probably Carcinogenic to Humans	Several Individual Polycyclic Aromatic Hydrocarbons

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	Group 2B	Possibly Carcinogenic to Humans	Ethyl Benzene, Several Individual Polycyclic Aromatic Hydrocarbons
	Group 3	Not Classifiable	Crude Oil, Toluene, Xylenes

16. OTHER INFORMATION

Prepared By METI HSE

The information in this Safety Data Sheet (SDS) is based on data considered to be accurate and obtained from sources which we believe are reliable. **However, the information is provided without any warranty, express or implied, regarding its correctness; and it should not be relied upon as a commercial specification of manufacturer or seller.** This information should be used to make an independent determination of the methods to safeguard workers and the environment.

The conditions or methods of handling, storage, use and disposal of the material are beyond our control and may be beyond our knowledge. **For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the material.**

The SDS was prepared and is to be used only for this material. If the material is used as a component in another product, this SDS information may not be applicable.