



PLAINS

Marketing, L.P.

Crude Oil, Sour MSDS

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Crude Oil, Sour
SYNONYMS: Sour Crude
CHEMICAL NAME: Petroleum
CHEMICAL FAMILY: Petroleum Hydrocarbon
PRODUCT USE: Refinery feedstock
SUPPLIER: Plains Marketing Canada L.P. and affiliates
Suite 1400, 607 Eighth Avenue S.W.
Calgary, Alberta, Canada T2P 0A7
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2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient Name	%	CAS #	ACGIH TLV
Crude Oil	100	8002-05-9	Oil mist (if generated) ACGIH TLV-TWA= 5mg/m ³ ACGIH TLV-STEL= 10mg/m ³
Benzene	0.1 to 5	71-43-2	ACGIH TLV-TWA= 0.5 ppm (skin) ACGIH TLV-STEL= 2.5 ppm
Toluene	0.1 to 5	108-88-3	ACGIH TLV-TWA= 50 ppm (skin)
Ethylbenzene	0.1 to 5	100-41-4	ACGIH TLV-TWA= 100 ppm ACGIH TLV-STEL= 125 ppm
Xylene, mixed isomers	0.1 to 5	1330-20-7	ACGIH TLV-TWA= 100 ppm ACGIH TLV-STEL= 150 ppm
Hydrogen Sulphide	0.1 to 5	7783-06-4	ACGIH TLV-TWA= 10 ppm ACGIH TLV-TWA= 15 ppm

Crude oil is a mixture of naturally occurring paraffins; naphthenes; aromatic hydrocarbons and small amounts of sulphur and nitrogen compounds. The composition and properties will vary significantly according to the source of the crude. Crude oil with a sulphur content greater than 0.5 weight percent is considered sour.

This product is a commingled stream from multiple petroleum facilities and is a complex mixture consistent with the definition within WHMIS regulation CPR section 2. The listed components are provided as guidance based on the available knowledge of the commingled stream.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW DANGER!!

EXTREMELY FLAMMABLE- MAY EVOLVE TOXIC AND FLAMMABLE HYDROGEN SULPHIDE GAS
- EYE, SKIN AND MUCOUS MEMBRANE IRRITANT - EFFECTS CENTRAL NERVOUS SYSTEM -
HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD.

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

HYDROGEN SULPHIDE (toxic gas) may be released. High concentration may cause immediate unconsciousness - death may result unless victim is promptly and successfully resuscitated.

Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects. Contains benzene, which can cause blood disease, including leukemia. Benzene and Toluene is readily absorbed through intact skin.

POTENTIAL HEALTH EFFECTSROUTE(S) OF ENTRY

Eyes: Yes Skin: Yes Inhalation: Yes Ingestion: Yes

EYES

MODERATE TO SEVERE IRRITANT. Liquids and vapors may cause irritation to the eyes, conjunctiva, and mucous membranes, causing redness and tearing. Splashing of liquid into the eyes will cause smarting and pain.

SKIN

SLIGHT TO MODERATE IRRITANT. Contact may cause irritation to the skin and mucous membranes upon prolonged and/or repeated skin contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed. Prolonged or repeated contact to petroleum oil with skin may cause defatting of the skin leading to redness, itching, inflammation, cracking, dermatitis (rash), and possible secondary infection. High-pressure skin injections are serious medical emergencies. The appearance of injury may be delayed for a few hours, but may cause tissue to become swollen, discolored and extremely painful.

INGESTION

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluids in the lungs), severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, such as irritation, nausea, vomiting and diarrhea, and central nervous system effects. Acute symptoms of ingestion are most common, including excitation, restlessness, euphoria, nausea, headache, dizziness, drowsiness, blurred vision, reduced coordination, and fatigue. In more severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION

Vapors may cause nose and throat irritation, anesthetic effects and central nervous system (CNS) depression. Inhalation may result in nausea, dizziness, drowsiness, headaches, and other symptoms similar to those listed under "Ingestion". Certain ingredients may produce systemic effects to the blood, liver, kidneys, central nervous system and cardiovascular system. Inhalation of high concentrations can cause rapid CNS depression, cardiac arrhythmia, unconsciousness, coma, and possibly death resulting from respiratory failure.

WARNING: Irritating and toxic hydrogen sulphide gas may be released. At high concentrations (500 - 1000 ppm), hydrogen sulphide acts as a systemic poison, causing unconsciousness and death. In lower concentrations (50 - 500 ppm), hydrogen sulphide acts as a respiratory irritant, and may cause fluid in the lungs or bronchial pneumonia. The rotten egg odor of hydrogen sulphide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm.

WARNING: The burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS/CARCINOGENICITY

Contains carcinogens according to IARC, NTP, ACGIH and OSHA. Contains benzene; a regulated human carcinogen. Benzene is recognized as having the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash) conditions. Chronic respiratory disease, liver or kidney dysfunction, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES

EYES

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. High-pressure injections are serious medical emergencies - seek immediate medical attention.

INGESTION

DO NOT INDUCE VOMITING BECAUSE OF DANGER OF BREATHING LIQUID INTO LUNGS. Seek immediate medical attention. Rinse mouth with water. Administer 1 to 2 glasses of water or milk to drink. Never administer liquids to an unconscious person. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Seek medical attention. Monitor for breathing difficulty.

INHALATION

Remove person to fresh air. If person is not breathing, ensure an open airway and administer CPR. If necessary, provide additional air or oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: -20°C to 93.3 °C (Flash point are in the flammable range but are highly dependent on crude oil source. This is a commingled stream of crude oils from various producers.

FIRE AND EXPLOSION HAZARDS

EXTREMELY FLAMMABLE. This is a commingled petroleum stream from various locations and producers the actual flammable characteristics are difficult to predict but this product should be considered as an extremely flammable liquid. Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard. Liquids will float on water. Liquid may accumulate static charge.

EXTINGUISHING MEDIA

SMALL FIRES: Any extinguisher suitable for Class B fires - dry chemical, CO₂, water spray, fire foam, or Halon.

LARGE FIRES: Water spray, fog or fire foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Fire fighting activities that may result in potential exposure to high heat, smoke or toxic byproducts of combustion should require approved self-contained breathing apparatus (SCBA) with full-facepiece and full protective firefighting clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. If leak or spill has not ignited, ventilate area and determine if water spray would assist in dispersing gas or vapor to protect personnel attempting to stop leak. Water may be useful in flushing spills away from ignition sources; however, do NOT flush petroleum products down public sewers or other drainage systems.

For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam. Refer to NAERG Guide 128.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE YOUR FACILITY'S SITE SPECIFIC EMERGENCY RESPONSE PLAN if available.

Evacuate nonessential personnel and remove or secure all ignition sources for 300m (1000ft). Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Hydrogen sulphide may be evolved during a release, ensure response personnel are adequately protected - see Section 8 for personal protection.

Carefully contain and stop the source of the spill, if safe to do so. Do not flush down sewer or drainage systems. Protect bodies of water by diking, if possible. The use of fire fighting foam may be useful in certain situations to reduce vapors.

SMALL SPILLS: Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Cleanup crews must be properly trained and must utilize proper protective equipment.

LARGE SPILLS: Dike far ahead of the spill. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas /equipment that require protection. Consideration should be given to environmental clean-up and waste material generation when determining if the use of large volumes of water is appropriate for non-fire emergency situations. Cleanup crews must be properly trained and must utilize proper protective equipment. Notify regulatory authorities. Refer to NAERG Guide 128.

7. HANDLING AND STORAGE

HANDLING PRECAUTIONS

Handle as a flammable liquid. Keep away from heat, sparks, and open flame. No smoking or open flame in storage, use of handling areas. Keep containers closed and clearly labeled. Ground all drums and transfer vessels when handling. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Use only with adequate ventilation. Avoid breathing vapors. Wash thoroughly after handling. Electrical equipment should be approved for classified area. DO NOT siphon by mouth.

STORAGE PRECAUTIONS

Store in a well ventilated area. This storage area should comply with NFPA 30. Avoid storage near incompatible materials.

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not eat, drink or smoke in areas of use or storage. Do not use gasoline or solvents (naphtha, kerosene, etc) for washing this product from exposed skin areas. Waterless hand cleansers are effective.

Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor and mist concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified/controlled areas.



EYE/FACE PROTECTION

Faceshield or chemical splash goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Avoid repeated or prolonged skin contact. Gloves constructed of nitrile, neoprene, or PVC are recommended. Chemical protective clothing such as of poly-coated or equivalent recommended based on degree of exposure.

Note: The resistance of specific materials may vary from product to product as well as degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

For hydrogen sulphide hazard (above H₂S permissible exposure limits): SCBA or a supplied air respirator must be used.

If exposure assessment indicates NO reduced oxygen content or hydrogen sulphide hazard (below H₂S exposure limit): NIOSH/MSHA - approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited and should not be considered especially when odor cannot be used to determine respirator effectiveness. Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Refer to CSA Standard "Selection, Use and Care of Respirators" (Z94.4-02) and NIOSH Respirator Decision Logic for additional guidance on respiratory protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

BASIC PHYSICAL PROPERTIES

APPEARANCE

Generally a thick, dark yellow to brown or greenish black liquid.

ODOR

A hydrocarbon odor. If present Hydrogen Sulphide (H₂S) has a rotten egg odor, but should not be used as warning property of toxic levels because H₂S can overwhelm and deaden the sense of smell. Therefore the smell of H₂S should not be used as an indicator of a hazardous condition - a calibrated H₂S meter can be used to determine the concentration of H₂S.

PHYSICAL STATE:	Liquid
BOILING POINT:	-20 to 1100 °C
VAPOR PRESSURE:	varies
VAPOR DENSITY (Air = 1):	3 to 5
SPECIFIC GRAVITY:	0.7 to 0.95 (water - 1.0):
SOLUBILITY (H ₂ O):	Insoluble to slightly soluble
PARTITION COEFFICIENT:	2 to 6

10. STABILITY AND REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID (STABILITY)

Material is stable under normal conditions. Avoid high temperatures, open flames, sparks, welding, smoking and other ignitions sources.

INCOMPATIBLE MATERIALS

Keep away from strong oxidizers, ignition sources and heat.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitroresols that can decompose violently.

HAZARDOUS POLYMERIZATION: Will Not Occur.

11. TOXICOLOGICAL INFORMATION

ACUTE EFFECTS

Potential short-term effects of exposure are: irritation eyes, skin, nose, mucous membrane, respiratory system.

Repeated or prolonged skin exposure to petroleum oils may cause various skin disorders, such as contact or eczematous dermatitis, folliculitis, oil acne, lipid granuloma, melanosis, and rarely precancerous warts on the forearms, backs of hands or scrotum. Contains Benzene and Toluene, which are readily absorbed through intact skin and have Skin Notations by ACGIH.

ACUTE ORAL EFFECTS

Ingredient	CAS No	LD50	LC50
Crude Oil	8002-05-9	Rat oral >5000mg/kg Dermal Toxicity > 2000 mg/kg	Not available
Toluene	108-88-3	Rat oral 5000 mg/kg Rat oral 3500 mg/kg	400 ppm/4hr
Ethyl benzene	100-41-4	Rabbit skin 17,800 mg/kg	Not available
Xylene, mixed isomers	1330-20-7	Mouse oral 1590 mg/kg	Rat inhalation: 6,350 ppm/4 hr
Benzene	71-43-2	Rat oral 3306 mg/kg	Rat ihl 10,000 ppm/7 hr
Hydrogen Sulphide	7783-06-4	Not applicable	Rat inhalation 380 mg/ cu m > 960 min

CHRONIC EFFECTS/CARCINOGENICITY

Product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood forming system (particularly bone marrow), and serious blood disorders, such as leukemia. Benzene is listed by the National Toxicology Program (NTP), International Agency For Research on Cancer (IARC), and ACGIH as carcinogenic in humans.

Product contains polynuclear aromatic hydrocarbons (PAHs). Animal studies have shown that prolonged and/or repeated exposure to certain PAHs may cause cancer of the skin, lung and other organs.

Other potential chronic effects of exposure are: irritation eyes, skin, nose, mucous membrane, respiratory system; reproductive pregnancy loss, dizziness, anorexia, vomiting, abdominal pain; dermatitis, excitement, confusion, euphoria, drowsiness, incoordination, staggered gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis; lassitude (weakness, exhaustion), headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; liver, kidney damage, bone marrow depression; [potential occupational

carcinogen], apnea, coma, convulsions; conjunctivitis, eye pain, photophobia (abnormal visual intolerance to light), corneal vesiculation; irritability, insomnia; gastrointestinal disturbance narcosis, coma.

Similar products produced skin cancer and skin tumors in laboratory animals following repeated applications. Crude oils may contain some PAH's, which have been shown to be carcinogenic after repeated or prolonged skin contact in laboratory animals. Studies by API and others have shown that some crude oils produced skin cancer or skin tumors in laboratory animals following repeated applications without washing or removal between applications. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation. Potential risks to humans can be minimized by observing good work practices and personal hygiene procedures.

MUTAGENICITY (GENETIC EFFECTS)

Some crude oils and crude oil fractions have been positive in mutagenic assay tests.

12. ECOLOGICAL INFORMATION

Keep out of sewage, drainage and waterways. Report spills and releases, as applicable, under federal, provincial and local regulations.

13. DISPOSAL CONSIDERATIONS

Maximize product recovery for reuse or recycling. Contaminated materials may be classified as a hazardous waste due to the low flash point and benzene. Empty containers can have residues that are subject to hazardous waste disposal requirements. Dispose of waste in accordance with all applicable federal, provincial, and/or local regulations.

14. TRANSPORT INFORMATION

PROPER SHIPPING NAME:	Petroleum Crude Oil
TDG CLASS:	3
TDG IDENTIFICATION NUMBER:	UN1267
TDG SHIPPING LABEL:	Flammable Liquid
SHIPPING DESCRIPTION:	Petroleum Crude Oil, 3, UN1267, PGII

15. REGULATORY INFORMATION

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)



Workplace Hazardous Materials Information Systems (WHMIS): This product has been classified in accordance with the hazard criteria of the CPR (Controlled Product Regulations), and the MSDS contains all of the information required by the CPR.

Class B, Division 2 (Flammable Liquid)

D1A - Very Toxic Material Causing Immediate and Serious Toxic Effects

Class D, Division 2, Subdivision A (Very toxic by other means)

Class D, Division 2, Subdivision B (Toxic by other means)

This substance is listed on the Canadian Domestic Substances List (DSL).

16. OTHER INFORMATION

Issued by: Health and Safety Department, Plains Marketing Canada L.P. Telephone 403-261-7466
Technical Development by Deerfoot Consulting Inc. Telephone 403-720-3700

NFPA HAZARD RATING -	HEALTH:	3	High
	FIRE:	3	High
	REACTIVITY:	0	Negligible

Acronyms:

ANSI	=	American National Standards Institute
ACGIH	=	American Conference of Governmental Industrial Hygienists
API	=	American Petroleum Institute
CSA	=	Canadian Standards Association
HMIS	=	Hazardous Materials Information System
MSHA	=	Mine Safety and Health Administration
NAERG	=	North American Emergency Response Guide
NFPA	=	National Fire Protection Association
NIOSH	=	National Institute of Occupational Safety and Health
NTP	=	National Toxicology Program
OSHA	=	U.S. Occupational Safety & Health Administration
PAH	=	Poly-Aromatic Hydrocarbons
ppm	=	parts per million (volume/volume)
SCBA	=	Self-Contained Breathing Apparatus
STEL	=	Short Term Exposure Limit
TLV	=	Threshold Limit Value
TWA	=	Time Weighted Average
WHMIS	=	Workplace Hazardous Materials Information System - Canadian

Disclaimer of Expressed and Implied Warranties

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