Appendix C Material Safety Data Sheet

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SAFETY DATA SHEET

1400, 332 6TH AVE. SW. Calgary, Alberta, t2p0b2 PHONE: (403) 290-2900 FAX: (403) 263-8915

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT IDENTIFIER:	Natural Gas (Pipeline Quality)	**PRODUCT CODE:**	W247
PRODUCT USE:	Use as fuel or as process feedstock for industrial, residential and commercial purposes.		
SYNONYMS:	Natural Gas (sales gas), primarily methane; Liquified Natural Gas; Dry Natural Gas.		
MANUFACTURER:	TRILOGY ENERGY	**SUPPLIER:**	TRILOGY ENERGY
ADDRESS:	1400, 332 6th Avenue SW, Calgary, Alberta, Canada, T2P 0B2 Telephone: (403) 290-2900 Fax: (403) 263-8915	**ADDRESS:**	1400, 332 6th Avenue SW, Calgary, Alberta, Canada, T2P 0B2 Telephone: (403) 290-2900 Fax: (403) 263-8915
24-HOUR EMERGENCY CONTACT:	Trilogy Energy (403) 290-2900 CANUTEC (613) 996-6666		

GHS Product Identifier

NAV	NAV

SECTION 2 – HAZARD IDENTIFICATION

Emergency Overview

APPEARANCE AND ODOR:	Gas exists under various pressures depending on pipeline systems. Odorless gas in natural state at any concentration. Natural gas sold for fuel purposes under pressure usually has an odorant added to it. This odorant is usually a mercaptan, which has an odor similar to "rotten eggs" or "skunk". The odorant level is such that it is noticeable below the Lower Explosive Limit (LEL) of the natural gas.
HEALTH HAZARDS:	Avoid breathing gas. Avoid contact with skin and clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. The health effects caused by exposure to Natural Gas (pipeline quality) are minimal in concentrations less than the lower explosive limit. At high concentrations, it can displace oxygen and cause asphyxiation. A minimal requirement of 19.5% of oxygen at sea level (148 torr O2, dry air) is recommended.
FIRE AND EXPLOSION HAZARDS:	CAUTION! EXTREMELY FLAMMABLE GAS. MAY CAUSE FLASH FIRE. HIGH PRESSURE GAS. Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst or explode. Keep away from heat, sparks and flame. Do not puncture or incinerate container.

GHS Classification

Health	Environmental	Physical
NAV	NAV	NAV

GHS Label

Symbols:	NAV
Signal Word:	NAV
Hazard Statement: NAV	**Precautionary Statements:** NAV

SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS	CAS No.	% (w or v)
Natural Gas	8006-14-2	100

May Contain small amounts of benzene, carbon dioxide, nitrogen and other inert gases, depending on pipeline specifications.

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

SECTION 4 – FIRST AID MEASURES

INHALATION:	Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
SKIN CONTACT:	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately
EYE CONTACT:	Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention Immediately
INGESTION:	As this product is a gas, refer to the inhalation section.
NOTE TO THE PHYSICIAN:	No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled. Protection of first-aiders: No action shall be taken involving an personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

SECTION 5 - FIRE FIGHTING MEASURES

FIRE OR EXPLOSION HAZARDS:	Class I – Flammable Gas (NFPA). Extremely flammable in presence of open flames, sparks, and heat. Rapid escape of vapor may generate static charge causing ignition. May accumulate in confined spaces. Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Ruptured cylinders may rocket. Evacuate area if pressure relief valves activate, or if containers are discolored due to flames on tanks. Vapors may form explosive mixtures with air.
SUITABLE EXTINGUISHING MEDIA:	Use an extinguishing agent suitable for surrounding fire.
UNSUITABLE EXTINGUISHING MEDIA:	None known.
SPECIAL PROTECTION ACTIONS/EQUIPMENT FOR FIREFIGHTERS:	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Fire-fighters should wear appropriate protective equipment and self –contained breathing apparatus (SCBA) with a full-face piece operated in positive pressure mode.
HAZARDOUS COMBUSTION PRODUCTS:	Carbon oxides (CO, CO_2), sulphur oxides (SO_x), sulphur compounds (H2S), smoke and irritating vapors as products of incomplete combustion.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

SMALL SPILL:	Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.	
LARGE SPILL:	Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.	
PERSONAL PRECAUTIONS:	**For non-emergency personnel:**	**For emergency responders:** Accidental releases pose a serious fire or explosion hazard. Immediately contact emergency personnel. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear protective respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
ENVIRONMENTAL PRECAUTIONS:	Ensure emergency procedures to deal with accidental gas release are in place to avoid contamination of the environment. Inform the relevant authorities if this product has caused environmental pollution (sewers, waterways, soil or air).	
METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP:	NAV	

SECTION 7 – HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING:	Put on appropriate personal protective equipment (see section 8). Eating, drinking, and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking, and smoking. Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-spark tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container.
CONDITIONS FOR SAFE STORAGE:	Store in accordance with local regulations. Store in a segregated and approved area. Store in a dry, cool and well-ventilated area, away from incompatible materials (see section 10). Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Ensure the storage containers are grounded/bonded.
INCOMPATIBILITIES:	NAV
SENSITIVITY TO IMPACT:	NAV
SENSITIVITY TO STATIC DISCHARGE:	NAV

SECTION 8 – EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits

Component Name (CAS No.)	**Reference**	**8-HR TWA**		**15-MIN STEL/C**		**Notation/Comments**
		ppm	mg/m^3	ppm	mg/m^3	
Methane	ACGIH TLV (United States).	1000	NAV	NAV	NAV	NAV
Consult local authorities for acceptable exposure limits.						

Exposure Controls

ENGINEERING CONTROLS:	Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.	
ADMINISTRATIVE CONTROLS:	Recommended monitoring procedures: If this product contains ingredients with exposure limits, personal, workspace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or necessity to use respiratory protective equipment. Hygiene measure: wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to workstation location.	
PERSONAL PROTECTIVE EQUIPMENT:	**Respiratory:**	Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator section must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: A NIOSH-approved positive-pressure, air-supplied respirator or self-contained breathing apparatus may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits.
	Skin (hands, etc.):	Chemical-resistant, impervious gloves complying with an approved standard should be worn at all time when handling chemical products if a risk assessment indicates this is necessary. Recommended: wear insulated gloves to prevent frostbite.
	Eyes:	Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
	Body:	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
	Feet:	NAV
	Other:	NAV
OTHER CONSIDERATIONS:	Environmental exposure controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.	

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:	Gas exists under various pressures depending on pipeline systems.	**ODOR & APPEARANCE:**	Odorless gas in natural state at any concentration. Natural Gas sold for fuel purposes under pressure usually had an odorant added to it. This odorant is usually a mercaptan, which had an odor similar to " rotten eggs" or "skunk". The odorant level is such that it is noticeable below the Lower Explosive Limit (LEL) of the natural gas. Colorless.

ODOR THRESHOLD (ppm):	WARNING: Studies have shown that not all persons are sensitive to this skunky smell and may not be able to detect this warning device!	**pH:**	NAV
MELTING POINT/ FREEZING POINT (˚C):	NAV	**INITIAL BOILING POINT (˚C):**	NAV
FLASHPOINT (°C) & METHOD:	Open cup: -188˚C (-306.4˚F) (NFPA) varies with crude sources	**EVAPORATION RATE:**	NAV
FLAMMABILITY (SOLID, GAS):	Class I - Flammable gas (NFPA)	**IF YES, UNDER WHAT CONDITIONS?**	
LOWER FLAMMABLE LIMIT (%):	5% (NFPA)	**UPPER FLAMMABLE LIMIT (%):**	15% (NFPA)
VAPOR PRESSURE (mmHg):	552 kPa @68˚F (4140 mm Hg @ 20˚C	**VAPOR DENSITY (air=1):**	0.554 @ 0˚C (32˚F)
PERCENT VOLATILITY:	100%	**SPECIFIC GRAVITY:**	NAV
SOLUBILITY (in water):	Soluble in water, methanol, diethyl ether, n-octanol, acetone.	**PARTITION COEFFICIENT (N-OCTANOL/WATER):**	NAV
AUTO-IGNITION TEMPERATURE (˚C):	540˚C (1004˚F) (NFPA)	**DECOMPOSITION TEMPERATURE (˚C):**	NAV
VISCOSITY	NAV	**OTHER:**	Pour point: NAV

SECTION 10 – STABILITY AND REACTIVITY

REACTIVITY AND UNDER WHAT CONDITIONS:	NAV
CHEMICAL STABILITY:	This product is stable.
HAZARDOUS REACTIONS:	Hazardous polymerization: Under normal conditions of storage and use, hazardous polymerization will not occur.
CONDITIONS TO AVOID:	NAV
INCOMPATIBLE MATERIALS:	Reactive with oxidizing agents, combustible materials and halogen compounds.
HAZARDOUS DECOMPOSITION PRODUCTS:	May release CO_x, SO_x, H2S, smoke and irritating vapors when heated to decomposition.

SECTION 11 – TOXICOLOGICAL INFORMATION

HAZARDOUS INGREDIENT (CAS No.)	**LD_{50} (SPECIES & ROUTE)**	**LC_{50} (SPECIFY SPECIES)**	**COMMENTS**
NAV	NAV	NAV	NAV

ROUTE OF ENTRY:									
SKIN CONTACT:	YES	**SKIN ABSORPTION:**	NAV	**EYE CONTACT:**	YES	**INHALATION:**	YES	**INGESTION:**	NAV

EFFECTS OF ACUTE EXPOSURE TO PRODUCT	
ACUTE TOXICITY:	NAV

NAP: Not applicable NAV: Not available

INGESTION:	As this product is a gas, refer to the inhalation section.
INHALATION:	Inhalation of vapors can cause irritation of the respiratory tract and CNS depression with symptoms of nausea, headaches, vomiting, dizziness, fatigue, light-headedness, reduced coordination, unconsciousness and possibly death.
EYE CONTACT:	Contact with rapidly expanding gas may cause burns or frostbite.
SKIN CONTACT:	Contact with rapidly expanding gas may cause burns or frostbite.

EFFECTS OF CHRONIC EXPOSURE

TARGET ORGANS:	NAV		
SUSCEPTIBLE POPULATIONS:	Medical conditions aggravated by over-exposure: Overexposure may lead to cardiac sensitization.		
CARCINOGENICITY:	Not listed as carcinogenic by OSHA, NTP or IARC.	**MUTAGENICITY:**	No known significant effects or critical hazards.
REPRODUCTIVE HAZARD:	No known significant effects or critical hazards.	**TERATOGENICITY:**	No known significant effects or critical hazards.
IRRITANCY:	NAV	**SENSITIZATION:**	
SYNERGISTIC PRODUCTS:	NAV		
DEVELOPMENTAL EFFECTS:	No known significant effects or critical hazards.		
CHRONIC EFFECTS:	No known significant effects or critical hazards.		

SECTION 12 – ECOLOGICAL INFORMATION

HAZARDOUS INGREDIENT	**LD_{50} (SPECIES & ROUTE)**	**LC_{50} (SPECIFY SPECIES)**
NAV	NAV	NAV

PERSISTENCE & DEGRADABILITY:	This product itself and its products of degration are not toxic.
BIO-ACCUMULATIVE POTENTIAL:	NAV
MOBILITY IN SOIL:	NAV
OTHER ADVERSE EFFECTS:	**Environmental effects:** No known significant effects or critical hazards. Aquatic ecotoxicity Conclusion/Summary: Not Available. Biodegradability Conclusion/Summary: Not Available.

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste Disposal: The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licence waste disposal contractor. Disposal of this product, solutions and the by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Empty pressure vessels should be returned to the supplier.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION for additional handling information and protection of employees.

SECTION 14 – TRANSPORTATION INFORMATION

	UN PROPER SHIPPING NAME	HAZARD CLASS	UN/NA	PACKING GROUP	LABELS REQUIRED
US DOT:	Compressed Gas Flammable, N.O.S.	2.1	UN1954	NAV	NAV
CANADIAN TDG:	Compressed Gas Flammable, N.O.S. (Methane)	2.1	UN1954	NAV	NAV
INTERNATIONAL:	NAV	NAV	NAV	NAV	NAV
ENVIRONMENTAL HAZARDS:	NAV				
SPECIAL PRECAUTIONS FOR USER:	NAV				

SECTION 15 – REGULATORY INFORMATION

CANADA REGULATIONS:	**WHMIS Classification:**	Class A: Compressed Gas. Class B-1: Flammable Gas. **This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.**
	Canada Inventory	All components are listed or exempted.
U.S. FEDERAL REGULATIONS:	**OSHA/HCS Classification:**	Compressed Gas. Flammable Gas. This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910. 1200).
	TSCA 8B:	All components are listed or exempted.
OTHER:	**Europe Inventory:**	All components are listed or exempted.
	EU Regulations: Risk Phrases	This product is not classified according to EU legislation.

SECTION 16 – OTHER INFORMATION

SDS TRANSCRIBED FROM THE ORIGINAL BY: Golder Associates, Ltd. (#300, 10525 – 170 Street, Edmonton, AB T5P 4W2. Phone: 780-483-3499).	**SDS VERSION No.:** 1.0 **SDS PREPARATION DATE:** December 14, 2013.

LIST OF ABBREVIATIONS & ACRONYMS: NA

DISCLAIMER:

The information contained herein is based on the information available at the indicated date of preparation, and is believed to be accurate. The company makes no warranties, guarantees, or conditions expressed or implied, in respect to the data contained herein; and shall not be liable for any damages, or injury, either direct or consequential, however caused, arising out of the use of information contained on the data sheet. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

LABEL REQUIREMENTS: EXTREMELY FLAMMABLE GAS.MAY CAUSE FLASH FIRE. HIGH PRESSURE GAS.

Hazardous Material Information System (USA):

Health: 1 Flammability: 4 Physical hazard: 0 Personal Protection: K

National Fire Protection association:

Health: 1 Flammability: 4 Instability: 0 Special: NAV

Ethyl Mercaptan

Version 2.0 Revision Date 2013-09-13

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

Product information

Trade name : Ethyl Mercaptan
Material : 1111485, 1024772, 1086422, 1086423, 1021429, 1021431, 1021426, 1021430, 1021425, 1021424, 1024773, 1024771, 1024770, 1021427, 1026776, 1021428, 1104918

Company : Chevron Phillips Chemical Company LP
10001 Six Pines Drive
The Woodlands, TX 77380

Emergency telephone:

Health:
866.442.9628 (North America)
1.832.813.4984 (International)
Transport:
North America: CHEMTREC 800.424.9300 or 703.527.3887
Asia: +800 CHEMCALL (+800 2436 2255)
EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600

Responsible Department : Product Safety and Toxicology Group
E-mail address : MSDS@CPChem.com
Website : www.CPChem.com

SECTION 2: Hazards identification

Emergency Overview

Danger

Form: Liquid **Physical state**: Liquid **Color**: Colorless **Odor**: Repulsive

OSHA Hazards : Combustible liquid and vapor., Skin sensitizer

GHS Classification

: Flammable liquids, Category 1
Acute toxicity, Category 4, Oral
Acute toxicity, Category 4, Inhalation
Aspiration hazard, Category 2
Skin sensitization, Sub-category 1B
Acute aquatic toxicity, Category 1
Chronic aquatic toxicity, Category 1

GHS-Labeling

Symbol(s) :

Signal Word : Danger

Hazard Statements : H224: Extremely flammable liquid and vapor.
H302: Harmful if swallowed.
H305: May be harmful if swallowed and enters airways.
H317: May cause an allergic skin reaction.
H332: Harmful if inhaled.
H410: Very toxic to aquatic life with long lasting effects.

Precautionary Statements : **Prevention:**
P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233: Keep container tightly closed.
P240: Ground/bond container and receiving equipment.
P243: Take precautionary measures against static discharge.
P273: Avoid release to the environment.
P280: Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P303 + P361 + P353: IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P331: Do NOT induce vomiting.
P312: Call a POISON CENTER or doctor/ physician if you feel unwell.
Storage:
P403 + P235: Store in a well-ventilated place. Keep cool.
Disposal:
P501: Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity:

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

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

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

SECTION 3: Composition/information on ingredients

Synonyms : Scentinel® A Gas Odorant
ETSH
Ethanethiol
Ethyl Mercaptan

Molecular formula : C2H6S

Component	CAS-No.	Weight %
Ethyl Mercaptan	75-08-1	99

SECTION 4: First aid measures

General advice : Move out of dangerous area. Consult a physician. Show this material safety data sheet to the doctor in attendance. Symptoms of poisoning may appear several hours later. Do not leave the victim unattended.

If inhaled : Call a physician or poison control center immediately. If unconscious place in recovery position and seek medical advice.

In case of skin contact : If on skin, rinse well with water. If on clothes, remove clothes.

In case of eye contact : Immediately flush eye(s) with plenty of water. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.

If swallowed : Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5: Firefighting measures

Flash point : -48 °C (-54 °F)

Autoignition temperature : 295 °C (563 °F)

Suitable extinguishing media : Alcohol-resistant foam. Carbon dioxide (CO2). Dry chemical.

Unsuitable extinguishing media : High volume water jet.

Specific hazards during fire fighting : Do not allow run-off from fire fighting to enter drains or water courses.

Special protective equipment for fire-fighters : Wear self contained breathing apparatus for fire fighting if necessary.

Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.

Fire and explosion : Do not spray on an open flame or any other incandescent

protection		material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.
Hazardous decomposition products	:	Carbon oxides. Sulfur oxides.

SECTION 6: Accidental release measures

Personal precautions	:	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for cleaning up	:	Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

SECTION 7: Handling and storage

Handling

Advice on safe handling	:	Avoid formation of aerosol. Do not breathe vapors/dust. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations.
Advice on protection against fire and explosion	:	Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

Storage

Requirements for storage areas and containers	:	Prevent unauthorized access. No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

SECTION 8: Exposure controls/personal protection

Ingredients with workplace control parameters

US

Ingredients	Basis	Value	Control parameters	Note
Ethyl Mercaptan	ACGIH	TWA	0.5 ppm,	
	OSHA Z-1	C	10 ppm, 25 mg/m3	(b), (C),
	OSHA Z-1-A	TWA	0.5 ppm, 1 mg/m3	

(b) The value in mg/m3 is approximate.
(C) Ceiling limit is to be determined from breathing-zone air samples.

Immediately Dangerous to Life or Health Concentrations (IDLH)

Substance name	CAS-No.	Control parameters	Update
Ethyl Mercaptan	75-08-1	Immediately Dangerous to Life or Health Concentration Value 500 parts per million	1995-03-01

Engineering measures

Adequate ventilation to control airborned concentrations below the exposure guidelines/limits.

Personal protective equipment

Respiratory protection : Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this material if exposure to harmful levels of airborne material may occur, such as:. Air-Purifying Respirator for Organic Vapors. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.

Hand protection : The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Eye protection : Eye wash bottle with pure water. Tightly fitting safety goggles. Wear face-shield and protective suit for abnormal processing problems.

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate:. Remove and wash contaminated clothing before re-use. Skin should be washed after contact. Flame retardant protective clothing. Workers should wear antistatic footwear.

Hygiene measures : Avoid contact with skin, eyes and clothing. When using do not eat or drink. When using do not smoke. Wash hands before breaks and immediately after handling the product.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance

Form	:	Liquid
Physical state	:	Liquid
Color	:	Colorless
Odor	:	Repulsive

Safety data

Flash point	:	-48 °C (-54 °F)
Lower explosion limit	:	2.8 %(V)
Upper explosion limit	:	18 %(V)
Oxidizing properties	:	No
Autoignition temperature	:	295 °C (563 °F)
Molecular formula	:	C2H6S
Molecular Weight	:	62.14 g/mol
pH	:	Not applicable
Pour point	:	No data available
Boiling point/boiling range	:	35 °C (95 °F)
Vapor pressure	:	16.20 PSI at 37.8 °C (100.0 °F)
Relative density	:	0.84, 15.6 °C(60.1 °F)
Water solubility	:	Negligible
Partition coefficient: n-octanol/water	:	No data available
Viscosity, kinematic	:	No data available
Relative vapor density	:	2.1 (Air = 1.0)
Evaporation rate	:	1
Percent volatile	:	> 99 %

SECTION 10: Stability and reactivity

Chemical stability	:	This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Possibility of hazardous reactions

Conditions to avoid	:	Heat, flames and sparks.
Materials to avoid	:	May react with oxygen and strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Other data	:	No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

Acute oral toxicity

Ethyl Mercaptan : LD50: 682 mg/kg
Species: rat
Sex: male
Method: Fixed Dose Method

Acute inhalation toxicity

Ethyl Mercaptan : LC50: > 2.52 mg/l
Exposure time: 4 h
Species: rat
Sex: male and female
Test atmosphere: vapor
Method: OECD Test Guideline 403

Acute dermal toxicity

Ethyl Mercaptan : LD50: > 2,000 mg/kg
Species: rat
Sex: male
Method: OECD Test Guideline 402

Ethyl Mercaptan
Skin irritation : Mild skin irritation

Ethyl Mercaptan
Eye irritation : Mild eye irritation

Sensitization

Ethyl Mercaptan : Causes sensitization.
Information given is based on data obtained from similar substances.

Repeated dose toxicity

Ethyl Mercaptan : Species: rat, Male and female
Sex: Male and female
Application Route: Inhalation
Dose: 0, 25, 100, 400 ppm
Exposure time: 13 wks
Number of exposures: 6 hr/d, 5 d/wk
NOEL: 100 ppm

Lowest observable effect level: 400 ppm
Method: OECD Guideline 413
Information given is based on data obtained from similar substances.

Species: rat, Male and female
Sex: Male and female
Application Route: Oral
Dose: 0, 10, 50, 200 mg/kg
Exposure time: 42-53 days
NOEL: 50 mg/kg
Method: OECD Guideline 422
Information given is based on data obtained from similar substances.

Reproductive toxicity

Ethyl Mercaptan : Species: rat
Sex: male and female
Application Route: Oral diet
Dose: 0, 10, 50, 200 mg/kg
Exposure time: 42-53 days
Number of exposures: once daily
Method: OECD Guideline 422
NOAEL Parent: 200 mg/kg
NOAEL F1: 50 mg/kg
Information given is based on data obtained from similar substances.

Developmental Toxicity

Ethyl Mercaptan : Species: rat
Application Route: Inhalation
Dose: 0, 0.037, 0.28, or 0.56 mg/L
Number of exposures: 6 hrs/d
Test period: GD 6-19
Method: OECD Guideline 414
NOAEL Teratogenicity: > 0.56 mg/l
Information given is based on data obtained from similar substances.

Species: rat
Application Route: Inhalation
Dose: 0, 10, 100, 200 ppm
Number of exposures: 6 hrs/d
Test period: GD 6-19
Method: OECD Guideline 414
NOAEL Teratogenicity: > 200 ppm
NOAEL Maternal: > 200 ppm
Information given is based on data obtained from similar substances.

Aspiration toxicity

Ethyl Mercaptan : May be harmful if swallowed and enters airways.

CMR effects

Ethyl Mercaptan : Carcinogenicity: Not available

Mutagenicity: Not mutagenic in Ames Test.
Teratogenicity: Animal testing did not show any effects on fetal development.
Reproductive toxicity: Animal testing did not show any effects on fertility.

Ethyl Mercaptan
Further information : Solvents may degrease the skin.

SECTION 12: Ecological information

Toxicity to fish

Ethyl Mercaptan : 2.4 mg/l
Exposure time: 96 h
Species: Oncorhynchus mykiss (rainbow trout)
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates

Ethyl Mercaptan : EC50: < 0.1 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
static test Method: OECD Test Guideline 202

Toxicity to algae

Ethyl Mercaptan : EC50: 3 mg/l
Exposure time: 72 h
Species: Pseudokirchneriella subcapitata (green algae)
Method: OECD Test Guideline 201

Elimination information (persistence and degradability)

Bioaccumulation : This material is not expected to bioaccumulate.

Biodegradability : This material is not expected to be readily biodegradable.

Results of PBT assessment

Ethyl Mercaptan : Non-classified PBT substance, Non-classified vPvB substance

Additional ecological information : An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

The information in this MSDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product	:	The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

SECTION 14: Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the MSDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)
UN2363, ETHYL MERCAPTAN, 3, I, MARINE POLLUTANT, (ETHYL MERCAPTAN)

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)
UN2363, ETHYL MERCAPTAN, 3, I, (-48 °C), MARINE POLLUTANT, (ETHYL MERCAPTAN)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)
UN2363, ETHYL MERCAPTAN, 3, I

ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))
UN2363, ETHYL MERCAPTAN, 3, I, (D/E), ENVIRONMENTALLY HAZARDOUS

RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))
UN2363, ETHYL MERCAPTAN, 3, I, ENVIRONMENTALLY HAZARDOUS

ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)
UN2363, ETHYL MERCAPTAN, 3, I, ENVIRONMENTALLY HAZARDOUS

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

SECTION 15: Regulatory information

National legislation

SARA 311/312 Hazards	:	Acute Health Hazard Fire Hazard
CERCLA Reportable Quantity	:	This material does not contain any components with a CERCLA RQ.
SARA 302 Reportable Quantity	:	This material does not contain any components with a SARA 302 RQ.
SARA 302 Threshold Planning Quantity	:	SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 304 Reportable Quantity	:	This material does not contain any components with a section 304 EHS RQ.
SARA 313 Ingredients	:	SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

Ozone-Depletion Potential	:	This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 12 (40 CFR 61).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

US State Regulations

Pennsylvania Right To Know
: Ethyl Mercaptan - 75-08-1

New Jersey Right To Know
: Ethyl Mercaptan - 75-08-1

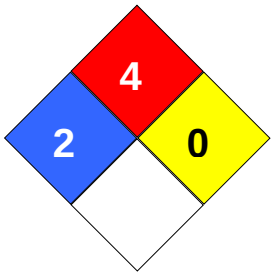
California Prop. 65 Ingredients : This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

Notification status

Europe REACH	:	On the inventory, or in compliance with the inventory
United States of America TSCA	:	On the inventory, or in compliance with the inventory
Canada DSL	:	On the inventory, or in compliance with the inventory
Australia AICS	:	On the inventory, or in compliance with the inventory
New Zealand NZIoC	:	On the inventory, or in compliance with the inventory
Japan ENCS	:	On the inventory, or in compliance with the inventory
Korea KECI	:	On the inventory, or in compliance with the inventory
Philippines PICCS	:	On the inventory, or in compliance with the inventory
China IECSC	:	On the inventory, or in compliance with the inventory

SECTION 16: Other information

NFPA Classification : Health Hazard: 2
Fire Hazard: 4
Reactivity Hazard: 0



Further information

Legacy MSDS Number : 10555

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this MSDS pertains only to the product as shipped.

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

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%

AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%		