Appendix A

Material Safety Data Sheets

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: ETHYL MERCAPTAN

TRADE NAMES/SYNONYMS:
MTG MSDS 207; ETHANETHIOL; ETHYL SULFHYDRATE; MERCAPTOETHANE; ETHYL HYDROSULFIDE; ETHYL THIOALCOHOL; THIOETHANOL; THIOETHYL ALCOHOL; LPG ETHYL MERCAPTAN 1010; UN 2363; O-2712; 958-T; 7171-T; C2H6S; MAT09070; RTECS KI9625000

CHEMICAL FAMILY: mercaptans

CREATION DATE: Jan 24 1989
REVISION DATE: Dec 11 2008

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: ETHYL MERCAPTAN
CAS NUMBER: 75-08-1
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=4 REACTIVITY=1

EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: liquid
ODOR: garlic odor
MAJOR HEALTH HAZARDS: central nervous system depression
PHYSICAL HAZARDS: Extremely flammable liquid and vapor. Vapor may cause flash fire. Contact with water or moist air may generate flammable and/or toxic gases.

POTENTIAL HEALTH EFFECTS:
INHALATION:

SHORT TERM EXPOSURE: irritation, cough, lack of sense of taste, changes in body temperature, nausea, vomiting, diarrhea, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, loss of coordination, bluish skin color, lung congestion, heart disorders, kidney damage, liver damage, brain damage, convulsions, unconsciousness, coma
LONG TERM EXPOSURE: no information is available
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: irritation, sore throat, nausea, stomach pain, headache, drowsiness, dizziness, loss of coordination
LONG TERM EXPOSURE: no information is available

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

NOTE TO PHYSICIAN: For inhalation, consider oxygen.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Dike for later disposal. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well

after the fire is out. Stay away from the ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck, evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

FLASH POINT: -54.9 F (-48.3 C) (CC)
LOWER FLAMMABLE LIMIT: 2.8%
UPPER FLAMMABLE LIMIT: 18%
AUTOIGNITION: 570.0 F (298.9 C)
FLAMMABILITY CLASS (OSHA): IA

HAZARDOUS COMBUSTION PRODUCTS:
Thermal decomposition or combustion products: oxides of sulfur, oxides of carbon

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Avoid heat, flames, sparks and other sources of ignition. Store in a cool, dry place. Keep container tightly closed and in a well-ventilated place. Avoid direct sunlight. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances.

HANDLING: When using, do not eat, drink or smoke.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
ETHYL MERCAPTAN:
10 ppm (25 mg/m3) OSHA ceiling
0.5 ppm (1.3 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
0.5 ppm ACGIH TWA
0.5 ppm (1.3 mg/m3) NIOSH recommended ceiling 15 minute(s)

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
5 ppm
Any air-purifying half-mask respirator equipped with organic vapor cartridge(s).
Any supplied-air respirator.
12.5 ppm
Any supplied-air respirator operated in a continuous-flow mode.
Any powered, air-purifying respirator with organic vapor cartridge(s).
25 ppm
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any supplied-air respirator with a tight-fitting facepiece that is operated in a continuous-flow mode.
Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s).
Any self-contained breathing apparatus with a full facepiece.
Any supplied-air respirator with a full facepiece.
500 ppm
Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode.
Emergency or planned entry into unknown concentrations or IDLH conditions -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid
COLOR: colorless
ODOR: garlic odor
MOLECULAR WEIGHT: 62.14

MOLECULAR FORMULA: C2-H6-S
BOILING POINT: 95.2 F (35.1 C)
FREEZING POINT: -234.0 F (-147.8 C)
VAPOR PRESSURE: 442 mmHg @ 20 C
VAPOR DENSITY (air=1): 2.14
SPECIFIC GRAVITY (water=1): 0.8315 @ 25 C
WATER SOLUBILITY: 6.7% @ 20 C (reacts)
PH: Not available
VOLATILITY: Not available
ODOR THRESHOLD: 0.001 ppm
EVAPORATION RATE: Not available
VISCOSITY: 0.3155 cP @ 20 C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: alcohol, ether, naphtha, acetone, dilute alkali

10. STABILITY AND REACTIVITY

REACTIVITY: Contact with water or moist air may form flammable and/or toxic gases or vapors.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

INCOMPATIBILITIES: acids, oxidizing materials, combustible materials

HAZARDOUS DECOMPOSITION:
Thermal decomposition or combustion products: oxides of sulfur, oxides of carbon

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

ETHYL MERCAPTAN:
IRRITATION DATA: 500 mg/24 hour(s) skin-rabbit mild; 84 mg eyes-rabbit; 100 mg/24 hour(s) eyes-rabbit moderate
TOXICITY DATA: 4420 ppm/4 hour(s) inhalation-rat LC50; 682 mg/kg oral-rat LD50
ACUTE TOXICITY LEVEL:
Moderately Toxic: inhalation, ingestion
TARGET ORGANS: central nervous system

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 20000 ug/L 0.033 hour(s) (Behavior) Aholehole (Kuhlia sandvicensis)

INVERTEBRATE TOXICITY: 170 ug/L 48 hour(s) LC50 (Mortality) Water flea (Daphnia magna)

FATE AND TRANSPORT:
KOW: 1202.26 (log = 3.08) (estimated from water solubility)

KOC: 22 (log = 1.34) estimated

HENRY'S LAW CONSTANT: 4.5 E -3

BIOCONCENTRATION: 1.17 (estimated from water solubility)

ENVIRONMENTAL SUMMARY: Leaches through the soil or the sediment at a very rapid rate. Accumulates very little in the bodies of living organisms. Highly volatile from water.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. D003. Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Ethyl mercaptan
ID NUMBER: UN2363
HAZARD CLASS OR DIVISION: 3
PACKING GROUP: I
LABELING REQUIREMENTS: 3
QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: Forbidden
CARGO AIRCRAFT ONLY: 30 L
MARINE POLLUTANT: ETHYL MERCAPTAN

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Ethyl mercaptan
UN NUMBER: UN2363
CLASS: 3
PACKING GROUP/CATEGORY: I

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart C): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):
ACUTE: Yes
CHRONIC: No
FIRE: Yes
REACTIVE: Yes
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29 CFR 1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: B2.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Listed on DSL.

16. OTHER INFORMATION

MATHESON TRI-GAS, INC. MAKES NO EXPRESS OR IMPLIED WARRANTIES, GUARANTEES OR REPRESENTATIONS REGARDING THE PRODUCT OR THE INFORMATION HEREIN, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE. MATHESON TRI-GAS, INC. SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE,

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safety & public awareness

Material Safety Data Sheet

Northern Natural Gas Company
1111 S. 103rd St.
Omaha, NE 68124-1000

24 Hr. Company Contact: . . . . . .Operations Communication Center - (888) 367-6671
Emergency Contact: . . . . . Chemtrec - (800) 424-9300

SECTION #1 - IDENTIFICATION

Product:	Natural Gas
CAS Number:	74-82-8
Chemical Family:	Aliphatic Hydrocarbon, Alkane Series
Synonyms:	Methane, Fuel Gas, Marsh Gas

SECTION #2 - HAZARDOUS CHEMICAL COMPONENTS

%	Material	CAS#	Exposure Limit
> 90	Methane	74-82-8	Simple asphyxiant (ACGIH)
< 5	Ethane	74-84-0	Simple asphyxiant (ACGIH)
< 1	Propane	74-98-6	1000 ppm PEL (OSHA)
–	–	–	Simple asphyxiant (ACGIH)

This product is hazardous according to OSHA, 29 CFR 1910.1200. This product normally contains no hazardous components, other than methane, as defined in OSHA 29 CFR §1910.1200 (i.e., greater than 1%). This product may contain small amounts of heavier hydrocarbons. This product and/or components present at concentrations greater than 0.1% are not carcinogenic according to OSHA, IARC, or NTP. Components of this product are normally within the ranges listed above, however, depending on the geographical source, gas composition may vary.

SECTION #3 - PHYSICAL DATA

Boiling Point:	-259 F, 162 C
Vapor Pressure:	N/A - Gas
Gas Density (Air = 1)	0.6
Specific Gravity:	N/A - Gas
Solubility (H_2O):	Very slightly soluble
Evaporation Rate:	Gas at normal ambient conditions
Appearance:	Colorless gas at normal temperature
Odor:	Odorless. If the local utility company has added an odorant, then an unpleasant smell resembling that of rotten eggs or garlic, is present.

SECTION #4 - FIRE FIGHTING & EXPLOSION DATA

Flash Point:	306 F, 187.8 C
Auto Ignition:	1004 F, 540 C
Flammable Limits in Air:	5% (lower) 15% (upper)
Unusual Fire and Explosion Hazards:	This gas is extremely flammable and forms flammable mixtures with air. It will burn in the open or be explosive in confined spaces. Its vapors are lighter than air and will disperse. A hazard of re-ignition or explosion exists if flame is extinguished without stopping the gas flow.
Extinguishing Media:	Stop the flow of gas. Dry chemical, CO_2, or halon. Water can be used to cool the fire but may not extinguish the fire.
Special Fire Fighting Instructions:	Evacuate area upwind of source. Stop gas flow and extinguish fire. If gas source cannot be shut off immediately, equipment and surfaces exposed to the fire should be cooled with water to prevent overheating and explosions. Control fire until gas supply can be shut off.

SECTION #5 - HEALTH HAZARD DATA

Exposure Limits:	See Section # 2.
Effects of Single Overexposure:	
Swallowing:	This product is a gas at normal temperature/pressure. No potential for ingestion expected. Solid and liquefied forms of this material and pressurized gas can cause freeze burns.
Skin Absorption:	This material is not expected to be absorbed through the skin. Solid and liquefied forms of this material and pressurized gas can cause freeze burns.
Inhalation:	Exposure may produce rapid breathing, headache, dizziness, visual disturbances, muscular weakness, tremors, narcosis, unconsciousness, and death, depending on the concentration and duration of exposure.
Skin Contact:	Non-irritating, but liquid forms of this material and pressurized gas can cause frostbite, blisters and redness.
Eye Contact:	This gas is non-irritating; but direct contact with liquefied/pressurized gas or frost particles may produce severe and possible permanent eye damage from freeze burns.
Effects of Repeated Overexposure:	
Medical Conditions Aggravated by Overexposure:	Personnel with pre-existing chronic respiratory diseases should avoid exposure to this material.
Emergency and First Aid Procedures:	
Swallowing:	This product is a gas at normal temperature/pressure and not expected to present a swallowing hazard.
Skin:	Frozen tissues should be flooded or soaked with warm water. DO NOT USE HOT WATER. Cryogenic burns that result in blistering or deeper tissue freezing should be promptly seen by a doctor.
Inhalation:	Immediately move personnel to area of fresh air. For respiratory distress, give air, oxygen, or administer CPR (Cardiopulmonary Resuscitation) if necessary. Obtain medical attention if breathing difficulties continue.
Eyes:	Methane gas is not expected to present an eye irritation hazard. If contacted by liquid/solid, immediately flush the eye(s) gently with warm water for at least 15 minutes. Seek medical attention if pain or redness persists.

SECTION #6 - REACTIVITY & POLYMERIZATION

Stability:	Stable
Conditions to Avoid:	High heat, open flames and other sources of ignition. Explosive reactions can occur between natural gas and oxidizing agents. Spontaneous ignition with chlorine dioxide.
Incompatibility (materials to avoid):	Barium peroxide, chlorine dioxide and strong oxidizing agents.
Hazardous Combustion or Decomposition Products:	Combustion may produce carbon monoxide, carbon dioxide and other harmful substances.
Hazardous Polymerization:	None

SECTION #7 - SPILL, LEAK, & DISPOSAL PROCEDURES

Steps to be Taken in the Event of Spills, Leaks, or Release:	Eliminate all potential sources of ignition. Handling equipment and tools must be grounded to prevent sparking. Evacuate all non-essential personnel to an area upwind. Equip responders with proper protection equipment (as specified in Section # 8) and advise of hazards. Stop sources of release with non-sparking tools before attempting to put out any fire. Ventilate enclosed areas to prevent formation of flammable or oxygen-deficient atmospheres. Water spray may be used to cool equipment or reduce gas accumulation.
Waste Disposal Procedures:	Disposal of containerized gas may be disposal of a hazardous waste. Disposal should be made in accordance with all applicable federal, state, and local laws and regulations.

SECTION # 8 - SPECIAL PROTECTION MEASURES

Ventilation:	Local exhaust and general room ventilation may both be essential in work areas to prevent accumulation of explosive mixtures. If mechanical ventilation is used, electrical equipment must meet National Electric Code requirements.
Eye Protection:	Use chemical-type goggles and face shields when handling liquefied gases. Safety glasses and/or face shields are recommended when handling high-pressure cylinders and piping systems or whenever gases are discharged.

Skin Protection:	Use of fire retardant clothing (FRC) is advised when an ignitable mixture may be present due to leaks or other releases. If there is a potential for contact with high concentrations of compressed gas, use insulated, impervious plastic or neoprene-coated canvas gloves and protective gear (apron, face shield, etc.) to protect hands and other skin areas.
Respiratory Protection:	For excessive gas concentrations, use only NIOSH/MSHA approved, self-contained breathing apparatus.
Work/Hygiene Practices:	Emergency eye wash fountains and safety showers for first aid treatment of potential freeze burns should be available in the vicinity of any significant exposure from compressed gas release. Personnel should not enter areas where the atmosphere is below 19.5 vol. % oxygen without special procedures/equipment. Respirator use should comply with OSHA 29 CFR 1910.134 or equivalent.

SECTION #9 - SPECIAL PRECAUTIONS - STORAGE & HANDLING

Storage and Handling Conditions:	Store and use cylinders and tanks in well-ventilated areas, away from heat and sources of ignition. No smoking near storage or use. Follow standard procedures for handling cylinders, tanks, and loading/unloading. See NFPA #58 and API 2510. Fixed storage containers must be grounded and bonded during transfer of product.
Naturally Occurring Radioactive Material (NORM):	This product may contain Naturally Occurring Radioactive Material (NORM) and customers should be aware of the potential for NORM within their processing system. The actual concentration of NORM in the product is dependent on the geographical source of the natural gas and storage time prior to its delivery. Process equipment (e.g., lines, filters, pumps and reaction units) may accumulate radioactive daughters and emit gamma radiation during operation. Equipment emitting gamma radiation may be presumed to be internally contaminated with alpha-emitting decay products that may be a hazard if inhaled or ingested. Consult applicable NORM regulations for worker protection guidelines and handling requirements before initiating maintenance operations that require opening contaminated equipment.

SECTION #10 - SHIPPING INFORMATION

Proper Shipping Name:	Methane, Compressed
Hazard Class:	2.1
DOT Identification Number:	UN1971
DOT Shipping Label:	Flammable Gas (red)

SECTION #11 - REGULATORY INFORMATION

Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to state and federal reporting requirements. Consult those regulations applicable to your facility or operation.

Federal Clean Water Act:

Any spill or release of liquid oils associated with this product into "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802). Also contact appropriate state and local regulatory agencies as required.

CERCLA Section 103:

The Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) requires notification to the National Response Center of a release of quantities of Hazardous Substances equal to or greater than the reportable quantities in 40 CFR §302.4. The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts natural gas, natural gas liquids and any indigenous components of such (e.g., benzene) from the CERCLA Section 103 reporting requirements.

EPCRA Section 304:

The Emergency Planning and Community Right-to-Know Act (EPCRA) requires emergency planning based on Threshold Planning Quantities and release reporting based on reportable quantities in 40 CFR §355. There are no known components present in this product that would require reporting under this statute.

EPCRA Sections 311/312:

The Emergency Planning and Community Right-to-Know Act (EPCRA) requires notification and annual reporting of materials for which maintenance of an MSDS is required. This product is classified under the following hazard categories: Immediate (acute) Health Hazard and Fire Hazard.

EPCRA Section 313:

The Emergency Planning and Community Right-to-Know Act (EPCRA) requires submission of annual reports of the release of toxic chemicals that appear in 40 CFR §372. This product contains no chemicals subject to reporting requirements under this statute.

Toxic Substances Control (TSCA) Status:

The ingredients of this product are on the TSCA inventory.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

This information relates only to the material designed and may not be valid for such material used in combination with other materials or in any process. Such information is to the best of this Company's knowledge believed accurate and reliable as of the date indicated. However, no representation, warranty or guarantee is made as to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

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