

MATERIAL SAFETY DATA SHEET

p. 1 of 5

SECTION I: PRODUCT IDENTIFICATION

NORTHWEST NATURAL GAS COMPANY
 220 N.W. 2ND AVENUE
 PORTLAND, OR 97209-3991
 EMERGENCY (24-HOUR) PHONE:
 CHIEF CHEMIST (GENERAL INFO, 8-5, Mon-Fri):

PRODUCT NAME: **NATURAL GAS**
 MSDS DATE: November 7, 2002
 [503]-226-4211, Ext. 4513.
 Same, Ext. 4729.

TRADE NAME: Natural gas.

SYNONYMS: Pipeline gas, natural gas - dry.

SHIPPING NAME:

[DOT] Flammable gas, UN1971 (if liquefied, UN1972).
 [ICC] Flammable gas, RED LABEL, limit 300 lb.
 [IATA] Flammable gas, RED LABEL.

CARGO: Limit 140 KG.

PASSENGER: NOT ACCEPTABLE.

NFPA RATING (Health-Flammability-Reactivity): 1 - 4 - 0 [GAS]. 3 - 4 - 0 [LIQUID].

CHEMICAL FAMILY: Paraffin (saturated) hydrocarbons and inert gases.

CHEMICAL FORMULA: Not applicable. Product is a mixture.

CHEMICAL ABSTRACTS SERVICE (CAS)#: 68410-63-9

SECTION II: COMPONENTS AND HAZARDS

COMPONENT	FORMULA	CAS NO.	VOL% (TYP.)	TLV (PPM)	DOT#
Methane	CH ₄	74-82-8	93.5	N/A	UN1971
Ethane	C ₂ H ₆	74-84-0	3.8	N/A	UN1035
Propane	C ₃ H ₈	74-98-6	1.0	1,000	UN1978
i-Butane	C ₄ H ₁₀	75-28-5	0.1	N/A	UN1969
n-Butane	C ₄ H ₁₀	106-97-8	0.1	800	UN1011
i-Pentane	C ₅ H ₁₂	78-78-4	<0.1	350	UN1265
n-Pentane	C ₅ H ₁₂	109-66-0	<0.1	600	UN1265
n-Hexane	C ₆ H ₁₄	110-54-3	<0.1	50	UN1208
Carbon Dioxide	CO ₂	124-38-9	0.3	10,000 [OSHA]	UN1013
Nitrogen	N ₂	7727-37-9	1.2	N/A	UN1066
t-Butyl Mercaptan	C ₄ H ₁₀ S	75-66-1	< 30 ppm	N/A	UN2347
Methyl Ethyl Sulfide	C ₂ H ₆ S	624-89-5	< 3 ppm	40,250	UN1993
Hydrogen Sulfide	H ₂ S	7783-06-4	< 5 ppm	10	UN1053

AQUATIC TOXICITY: Not applicable. Natural gas and LNG have low water-solubility.

SECTION III: PHYSICAL DATA

FREEZING POINT (760 mm Hg):	-182.6°C (-296.7°F)	
BOILING POINT (760 mm Hg):	-161.5°C (-258.7°F)	
GAS SPECIFIC GRAVITY	(air = 1.000):	0.55 - 0.64
LIQUID SPECIFIC GRAVITY	(H ₂ O = 1.000):	0.42 - 0.46
GAS DENSITY:	[varies slightly w. composition]	0.044 lb/cf
VAPOR PRESSURE:	Gaseous at 60°F, 1 atmosphere.	
SOLUBILITY IN WATER:	Less than 3.5 vol%. LIQUID pH: Not Applicable (not water-based)	
EVAPORATION RATE:	Normally a gas. Liquefied natural gas (LNG) evaporates much faster than diethyl ether.	

APPEARANCE AND ODOR:

GAS is extremely flammable, with no color, odor, or taste. If trace amounts of sulfur compounds are added as odorant, the gas has a characteristic garlic/rotten-egg/skunk odor.
Liquid is clear, colorless, odorless, cryogenic (super-cold) and extremely flammable.

SECTION IV: FIRE AND EXPLOSION DATA

FLASH POINT	-306°F (-188°C)
AUTOIGNITION TEMPERATURE:	1,004°F (540°C)
FLAMMABLE LIMITS IN AIR:	[LEL] 4.8 vol% [UEL] 15.0 vol%
EXTINGUISHING MEDIA:	Class B: [Dry chemical, "Halon", CO ₂].

SPECIAL FIREFIGHTING PROCEDURES: Remove unnecessary personnel. Fire crews should have supplied-air respirators. Try to remove ignition sources. Use non-sparking tools to shut off the gas. Let the fire burn itself out to stop a flammable mix from forming when the flame is extinguished. Natural gas is lighter than air and will vent upward. If the gas cannot be shut off, let it burn and cool the surrounding area with water fog. If natural gas is compressed in cylinders, use water fog to cool them. If LNG has spilled, dike the liquid using non-sparking tools and disperse the vapors with water fog. Keep leaking natural gas, LNG or its vapors out of sewers or other enclosed spaces.

UNUSUAL FIRE/EXPLOSION HAZARD: Extremely flammable. NO SMOKING where natural gas is in use. Keep public away in case of leak/spill. Notify local gas utility (see Section I) immediately, plus local fire department as needed.

SECTION V: HEALTH HAZARD INFORMATION

MIXTURE TLV: Not established by OSHA or ACGIH.

EFFECTS OF ACUTE OVEREXPOSURE:

INHALATION: At high pressures and high concentrations, may cause cardiac sensitization. At high concentrations and in enclosed areas, may displace sufficient oxygen to cause dizziness, headache, lack of muscular coordination, diminished mental alertness, cyanosis, narcosis, dyspnea, or death by asphyxiation.

SKIN CONTACT: Not toxic, non-irritating. At high pressure, gas may be injected under skin, causing pain, possible tissue damage or embolism. Contact with LNG may cause immediate, severe frostbite.

SKIN ABSORPTION: Unlikely: natural gas is lighter than air.

EYE CONTACT: Not toxic, non-irritating. Pressurized gas or an LNG splash may cause physical damage to unprotected eyes.

SWALLOWING: Unlikely exposure route for gaseous or liquid products.

EFFECTS OF CHRONIC EXPOSURE: None.

NOTE TO PHYSICIAN: See "Natural Gas and Its Physiological Action", in *California and Western Medicine*, V. 47, #1. Light hydrocarbons (methane through butanes) are simple asphyxiants that displace O₂. CO₂ has health effects above 0.5 vol%. Nitrogen is inert.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Respiratory conditions such as emphysema may be aggravated by long exposure to high concentrations.

CARCINOGENS: None by NTP, IARC, or ACGIH.

SECTION VI: FIRST AID PROCEDURES

EYE: If physical damage occurs due to high-pressure gas release or an LNG splash, cover BOTH eyes with loose, bulky, sterile dressing and obtain immediate medical treatment.

SKIN: If gas is injected under skin, treat patient for shock and seek immediate medical treatment. If LNG has splashed skin, remove victim from contact, flush affected area with lukewarm water. Apply a loose, sterile, bulky dressing. Get immediate medical help.

INHALATION: Remove victim to fresh air quickly. Restore or support breathing as needed. Use mouth-to-mouth resuscitation or CPR as needed if asphyxiation has occurred. If available, have a trained person administer oxygen. Seek medical help immediately.

SECTION VII: REACTIVITY

STABILITY: Stable when contained and not exposed to oxidizers or heat.

CONDITIONS CAUSING INSTABILITY: Fire or other heat sources, frictional sparks, electrical arcing may cause ignition. Reacts explosively with Cl₂, BF₅, OF₂, NF₃, and ClO₂. On contact with liquid oxygen (LOX) or liquid fluorine (LF₂), LNG will explode.

TENDENCY TO POLYMERIZE: None.

CORROSIVENESS: None.

HAZARDOUS DECOMPOSITION PRODUCTS: CO, CO₂, partially-oxidized combustion products of hydrocarbons (aldehydes, acids, "soot").

SECTION VIII: DISPOSAL/LEAK PROCEDURE

If leak is from a gas line, notify appropriate safety personnel. Evacuate the area. Provide explosion-proof ventilation. Use non-sparking tools to shut off the gas flow ahead of the leak. If the leak is on the Gas Company side of the gas meter, call Northwest Natural Gas immediately at 503-226-4211, Ext.4513.

If leak is on a compressed-natural-gas cylinder, cautiously remove the cylinder to an isolated outside area or to an explosion-proof hood. Vent the gas at a slow, controlled rate. When empty, tag the defective cylinder and return it to the supplier.

If leak is from an LNG container, put on proper protective clothing and dike the liquid with dirt or other nonflammable absorbent. Use water fog to disperse the vapor cloud. Keep LNG or its vapors out of sewers or other enclosed spaces.

SECTION IX: SPECIAL PRECAUTIONS

Flame-retardant clothing, including leather or cotton gauntlet gloves, must be worn in any situation where pressurized natural gas or LNG vapors may ignite accidentally.

Wear goggles or a faceshield when working with any pressurized gases or LNG.

Use an explosion-proof oxygen [O₂] tester, NOT a combustible-gas detector, to check the atmosphere of any area that may be deficient in oxygen. If the oxygen reading is below 19%, use a SUPPLIED-AIR RESPIRATOR with a properly fitting face mask. Use the same type of respirator in trenches over four feet deep when a gas-air mix exists below the gas line. Using only a cartridge respirator in low-oxygen conditions may lead to asphyxiation.

Ground all equipment and houselines used in natural gas service to prevent the buildup of static and possible sparks. Where feasible, use non-sparking tools to work on and around natural gas lines and equipment.

Natural gas may be present in mains, services, houselines, or customers' equipment at pressures ranging from less than 1 psi to over 720 psi. Open and close gas valves slowly to avoid pressure surges that might cause personal injury or damage equipment.

Provide sufficient local exhaust to prevent gas buildup to 20% of LEL. Pressure-test natural gas houselines with inert gas before putting them into service for the first time, and again when taking them permanently out of service.

At least 48 hours prior to excavating in an area where gas lines are known or suspected to be, call Northwest Natural Gas [503-226-4211, Ext. 4513] for location and marking at the site. NOTE: Many communities have a one-call service that alerts all underground utilities (gas, power, telephone, TV cable, water, or sewer) to mark their lines. Check your telephone book for the local number.

If a gas line is damaged, IMMEDIATELY report the incident to Northwest Natural Gas [503-226-4211, Ext. 4513]. If the gas line is broken, evacuate the area and also call the local fire department. If a gas line has been bent or pulled out of alignment, other gas lines in the vicinity may have been damaged even if the pulled line looks intact.

If only the gas line's coating is damaged, it must still be inspected and properly repaired by the gas company before reburial, to prevent corrosion and possible leakage.

SECTION X: OTHER

ADDITIONAL REGULATORY CONCERNS:

CPSC: None

FDA: None

SARA: Title III, Sections 302, 304, 311, 312, and 313.

TSCA: None

USDA: None

OTHER FEDERAL: Department of Transportation, Office of Pipeline Safety, CFR Title 49,
Parts 191-192, with all revisions.

OTHER STATE: None in either Oregon or Washington.

DISCLAIMER: The data contained in this MSDS are believed to be accurate, but are not so warranted, whether or not they originated at Northwest Natural Gas Company. Recipients of this MSDS are advised to confirm ahead of time that the data are current and suitable to their needs.

SIGNED: _____
(W. T. Amies)

TITLE: CHIEF CHEMIST

DATE: 11/07/02