



Safety Data Sheet: Liquefied Natural Gas (LNG)

Section 1: Identification

Product Name:	Liquefied Natural Gas
SDS Number:	2015001
Synonyms/Other Means of Identification:	LNG, Liquid Methane, Natural Gas Refrigerated Liquid
Intended Use:	Fuel
Manufacturer:	Philadelphia Gas Works (PGW) 800 W. Montgomery Avenue Philadelphia, Pennsylvania 19122 (215) 684-6774
Emergency Health and Safety Number:	CHEMTREC: (800) 424-9300
Manufacturer Health and Safety Contact:	PGW Safety Manager: (215) 684-6554
Manufacturer Technical Information Contact:	PGW Chemical Services: (215) 787-4850

Section 2: Hazard(s) Identification

Classification/Hazard Category

Flammable Gases – Category 1

Gasses Under Pressure – Refrigerated Liquefied Gas

Note: Under the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS), the lower the hazard category number, the greater the hazard, and the higher the hazard category number, the less severe the hazard.

Pictograms



Signal Word

DANGER

Hazard Statements

Extremely flammable gas. (H220)*

Contains refrigerated gas; may cause cryogenic burns or injury. (H281)*

Precautionary Statements:

Do not use or handle unless all safety precautions have been read and understood. (P202)**
Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources, including internal combustion engines. No smoking. (P210)**
Take action to prevent static discharge, including static discharge from cell phones and other electronic devices. (P243)**
Wear cold insulating gloves, a cold insulating apron, eye protection, and face shield. (P282)**
If exposed to liquid, seek immediate medical attention. (P315)**
Eliminate all ignition sources if safe to do so. (P381)**
Limbs affected by frostbite may be thawed with lukewarm water. Do not rub affected area. See immediate medical attention. (P336)**
Do not extinguish fires from leaking gas unless leak can be stopped safely. (P377)*
Store in a well-ventilated space. (P403)**
Use only non-sparking tools. (P242)**

* Applicable GHS Hazard Code.

** Applicable GHS Precautionary Statement Code.

Supplementary Hazard Information:

High concentrations of LNG vapors may displace oxygen, especially in a confined space.
LNG and its vapors do not exhibit the characteristic odor of natural gas.
Containers of LNG are typically under pressure and temperature controlled conditions; These containers may explode if heated or if temperature control is not maintained.

Section 3: Composition/Information on Ingredients

Liquefied natural gas (LNG) is a cryogenic liquid derived from natural gas by processing. LNG consists primarily of methane and ethane; the table below identifies the components in LNG that may be present in concentrations of 1 percent or more by volume. For health and safety determination purposes, the LNG composition listed in the table below represents the widest range of components observed in the LNG produced and stored by PGW based upon the results of sample analysis conducted between 2010 and 2015. The following constituents may also be present in LNG at concentrations less than 1 percent by volume: iso-butane, normal butane, pentanes, hexanes, heavier hydrocarbons (C6+), and nitrogen.

Component Name	Synonyms	Chemical Formula	CAS Number	Concentration (% Volume)
Methane	Methyl hydride, marsh gas, carbane	CH ₄	74-82-8	67-97
Ethane	N/A	C ₂ H ₆	74-84-0	3-29
Propane	N/A	C ₃ H ₈	74-98-6	0-4

Section 4: First-Aid Measures

Eye Contact: Contact with product may cause frostbite. In case of frostbite or freeze burns, gently soak the eyes with cool to lukewarm water. DO NOT WASH THE EYES WITH HOT WATER (i.e. over 105°F). Open eyelids wide to allow liquid to evaporate. If the person cannot tolerate light, protect the eyes with a bandage or handkerchief. Do not introduce ointment into the eyes without medical advice. Seek immediate medical attention.

Skin Contact: Contact with product may cause frostbite. In case of frostbite or freeze burns, remove contaminated clothing and flush the affected area with cool to lukewarm water. Immediately place frozen area in a circulating warm water bath or in flowing warm water (100 to 105 °F). DO NOT USE HOT WATER (i.e. over 105°F) OR DRY HEAT. Seek immediate medical attention if blistering, tissue freezing, or frostbite has occurred. Under no circumstances should the frozen part be rubbed, either before or after warming.

Inhalation (Breathing): Inhalation of large quantities of LNG vapors may cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination. LNG and associated vapor is a simple asphyxiant and may cause loss of consciousness, serious injury, or death by displacing air, thereby resulting in insufficient oxygen to support life. Prompt medical attention is strongly recommended in all cases of inhalation overexposure. Rescue personnel should be equipped with a self-contained breathing apparatus. Remove inhalation victims to fresh air quickly. If inhalation victim is not breathing, ensure that their airways are open and administer cardiopulmonary resuscitation (CPR). If necessary, have a trained person administer air or oxygen once breathing is restored. Seek immediate medical treatment.

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 loss of consciousness, serious injury, or death.

Ingestion (Swallowing): This material is a gas under atmospheric temperature and pressure conditions and ingestion is unlikely. Seek immediate medical attention if material is ingested.

Section 5: Fire-Fighting Measures

Fire Fighting Instructions

LNG vapors are extremely flammable and can be ignited by heat, sparks, flames, static electricity, and other sources of ignition, such as pilot lights, mechanical/electrical equipment, and electronic devices that are not intrinsically safe. Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. Vapors may accumulate in confined spaces.

LNG fires should not be extinguished unless the source of the leak can be stopped safely. In most cases, it is best to eliminate the source of the leak and allow the liquid to burn off. Isolate

the spill or leak area, particularly around the ends of storage vessels, and maintain a safe distance upwind and uphill of the spill or leak area. Let the vessel, tank, or container burn unless the leak can be stopped. LNG is stored under pressure and temperature controlled conditions; containers of LNG exposed to excessive heat or flame may rupture violently and suddenly without warning due to vessel over-pressurization. Fragmentation of the container should be anticipated. Withdraw immediately in the event of a rising sound from a venting safety device. Use water fog and/or deluge to cool equipment, surfaces, and containers exposed to fire and excessive heat. Do not direct water at the source of the leak, pooled LNG, or safety devices; the indiscriminate use of water on surfaces of cryogenic containers and piping can lead to heavy icing, causing excessive loads on structures and the failure of valves, instrumentation, and other control devices. Application of water to pools of LNG will cause the LNG to vaporize more rapidly, generating more gas to feed a fire or create a larger vapor cloud. For large fires, use unmanned hose holders or monitor nozzles to minimize personnel exposure.

Appropriate fire extinguishing media include dry chemical, carbon dioxide, halon, and high expansion foam. While water may be used to cool equipment and structures adjacent to an LNG fire, water is not an appropriate extinguishing media when responding to LNG fires as water can increase the volatilization of the LNG or cause ice formation as described above. Avoid allowing water runoff to contact spilled materials, and do not allow LNG or runoff from firefighting activities to enter drains or water courses as the runoff may create an explosion hazard. Large fires typically require specially trained personnel and equipment to isolate and extinguish the fire. Hazardous combustion products include smoke, carbon monoxide, carbon dioxide, and other products of combustion. Oxides of nitrogen may also form.

LNG storage installations may be equipped with high expansion foam systems that protect LNG storage areas by quickly blanketing liquid LNG in the event of spill, which helps to control vapor release. High expansion foam is also used to extinguish fires; total flooding of the area of spilled LNG with high expansion foam limits the amount of oxygen required to support free combustion and provides a slow, continuous release of foam solution for cooling and vapor suppression. Consult LNG facility personnel regarding available onsite spill control, fire suppression, and firefighting systems.

Refer to Section 8 for Exposure Controls/Personal Protection and refer to Section 9 for flash point and flammability limits (explosive range). Refer to Section 16 for the National Fire Protection Association® 704 Hazard Rating.

Section 6: Accidental Release Measures

In case of an accidental release, activate your facility's spill contingency plan, if available. Evacuate non-essential personnel and secure all ignition sources. Do not allow road flares, smoking, cell phones, or other sources of ignition in the hazardous area. Internal combustion engines generate sparks that would serve to ignite LNG vapors, so do not drive vehicles through the vapor dispersion area, and do not attempt to start vehicles that are within the vapor dispersion area. Do not touch spilled liquid (frostbite/freeze burn hazard!), and avoid contact

with any surface cooled by LNG vapor or liquid. Evaluate wind direction and speed to determine the direction of product travel. The vapor cloud may be white, but the color will dissipate as the cloud disperses; however, the fire and explosion hazard is still present! Stay upwind and uphill, if possible, and avoid low lying areas. Test the area for hazardous atmospheres before re-entering.

Stop the source of the release, if safe to do so. Do not flush the product down the sewer or drainage systems as it may create an explosion hazard in these confined spaces. LNG will not contaminate soil if spilled as it readily evaporates. Ventilate confined areas and check for hazardous atmospheres before entering. Notify relevant authorities in accordance with all applicable requirements.

Refer to Section 8 for Exposure Controls/Personal Protection.

Section 7: Handling and Storage

When handling LNG, wear all appropriate personal protective equipment as described in Section 8 to avoid contact of material with eyes, skin, or clothing. Handle only with adequate ventilation, and do not breathe LNG vapors. Eliminate all sources of ignition, such as flames, sparks (including from internal combustion engines), or high temperatures when working in areas where vapors may be present. Ground and bond all lines to avoid static discharge buildup when transferring product (i.e. truck loading/unloading). Use non-sparking tools when working around LNG transfer lines and equipment. Be sure that all electrical equipment used in the area is UL listed Class I, Division I, Group D hazardous locations. Do not use cell phones in an area where LNG is stored or transferred. Polyester clothing may cause static discharge and must not be worn at LNG locations. Avoid cold burns from transfer lines or process equipment.

Store LNG only in specifically designed, cryogenic containers in a cool, dry, isolated, well-ventilated area away from heat and sources of ignition. Do not store LNG adjacent to oxidizers or other incompatible materials as listed in Section 10.

Section 8: Exposure Controls/Personal Protection

Component Name and CAS Number	ACGIH TLV	OSHA PEL	NIOSH IDLH	Notes
Methane 74-82-8	TWA: 1,000 ppm	N/A	N/A	Simple Asphyxiant
Ethane 74-84-0	TWA: 1,000 ppm	N/A	N/A	Simple Asphyxiant
Propane 74-98-6	TWA: 1,000 ppm	TWA: 1,000 ppm	N/A	Simple Asphyxiant

Notes

- ACGIH: American Conference of Industrial Hygienists
- OSHA: Occupational Safety and Health Administration
- NIOSH: National Institute for Occupational Safety and Health
- TLV: Threshold Limit Value
- PEL: Permissible Exposure Level
- TWA: Time Weighted Average
- IDLH: Immediately Dangerous to Life and Health
- ppm: Parts per million

Engineering Controls: Provide adequate ventilation to keep gas and vapor concentrations below occupational exposure and flammability limits (less than 20% of the lower explosive level) and maintain sufficient oxygen levels. In confined spaces, local and general ventilation should be provided. Follow appropriate confined space entry procedures. Use explosion proof general ventilation and lighting in classified/controlled areas. Be sure explosion proof flashlights and equipment are used.

Eye/Face Protection: The use of eye protection (such as splash goggles) that meets or exceeds ANSI Z.87.1 is recommended when there is a potential for liquid to contact the eye. Depending upon the conditions of use, a face shield may also be necessary.

Skin/Hand Protection: Wear thermal insulating gloves and a face shield when working with materials that present thermal hazards (hot or cold). Ensure that the protective equipment is rated for the temperature of the material to be handled. Flame retardant clothing is recommended in any situation where LNG vapors may ignite accidentally.

Respiratory Protection: A NIOSH approved, self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or positive pressure mode should be used in situations of oxygen deficiency (oxygen content less than 19.5 percent), unknown exposure concentrations, or situations that are immediately dangerous to life or health (IDLH).

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant the use of a respirator.

Section 9: Physical and Chemical Properties

- Appearance: LNG is a colorless liquid. Cold gas may freeze water vapor in the air, creating a visible white cloud. The visible cloud is useful for determining wind direction and product dispersion, but it does not define the boundary of the combustible gas. Combustible vapors may exist outside of the visible cloud.
- State: liquid (refrigerated gas)
- Odor: LNG is odorless; it does not exhibit the characteristic odor of natural gas.
- Odor Threshold: N/A*; LNG is odorless.
- pH: N/A
- Melting Point/Freezing Point: No data available
- Boiling Point: -259°F (-162 °C)

- Flash Point: < -306 °F (< -188 °C)
- Evaporation Rate (n-butyl acetate = 1): >1
- Flammability: Liquid LNG is not flammable, but its vapors are flammable.
- Lower Explosive Limit (volume % in air): As low as 4.0% depending upon LNG composition; the higher the ethane content, the lower the lower explosive limit.
- Upper Explosive Limit (volume % in air): As high as 15.0% depending upon LNG composition; the higher the methane content, the higher the upper explosive limit.
- Vapor Pressure: Approximately 700 psia at -110°F
- Vapor Density: 0.0435 – 0.0481 lb/ft³ at 14.7 psia and 60 °F
- Relative Vapor Density: 0.57-0.60 at 14.7 psia and 60 °F; 1.5 at 14.7 psia and <-160 °F (Air = 1.0); NOTE: The vapor density is heavier than air when the vapor temperature is less than -160 °F; this phenomenon will occur when the LNG vapors are initially released from the LNG liquid).
- Liquid Density: 3.5-4.0 lbs/gallon at -260 °F (H₂O = 8.33 lbs/gallon at 60 °F)
- Relative Density/Specific Gravity: 0.43 at -260 °F (H₂O = 1)
- Solubility in Water: Negligible, below 0.1%
- Partition Coefficient (n-octanol/water): No data available
- Auto-Ignition Temperature: 999°F (537 °C)
- Decomposition Temperature: Not applicable
- Viscosity: No data available
- Heat of Vaporization: 220 BTU/lb
- Percent Volatile: 100
- Expansion Volume: Approximately 625 to 1

*N/A indicates Not Applicable.

Section 10: Stability and Reactivity

Reactivity: When LNG vapors mix with appropriate amounts of oxidizing agents, including air and oxygen, in the presence of an ignition source, an uncontrolled explosive reaction can occur.

Chemical Stability: LNG is stable under controlled conditions of use.

Possibility of Hazardous Reactions: Not applicable.

Conditions to Avoid: LNG vapors are extremely flammable and explosive; avoid heat, sparks, open flames, and all possible sources of ignition. Heat will increase pressure in the storage tank.

Materials to Avoid (Incompatible Materials): LNG vapors will form explosive mixtures with air or oxygen and will also burn or explode in the presence of strong oxidizing agents such as chlorine, chlorine dioxide, bromine pentafluoride, oxygen difluoride, liquid oxygen, and nitrogen trifluoride. LNG will spontaneously ignite when mixed with chlorine dioxide. Also avoid contact with acids, aluminum chloride, and halogens.

Hazardous Decomposition Products: Thermal decomposition products may include carbon monoxide, carbon dioxide, smoke, and other toxic combustion products.

Hazardous Polymerization: Not known to occur.

Section 11: Toxicological Information

Inhalation: LNG vapors are not toxic; however, if LNG vapors escape and accumulate in a confined area or if large amounts of LNG vapor are released as a result of a spill or leak, the LNG vapors may displace air from the area and cause loss of consciousness, serious injury, or death.

Skin Absorption: Contact with liquefied or pressurized gas will cause severe frostbite, but otherwise, this product is not expected to cause skin irritation.

Serious Eye Damage/Irritation: Contact with the liquefied or pressurized gas may cause eye damage and swelling. Otherwise, this product is not expected to cause eye irritation.

Skin Corrosion/Irritation: Contact with liquefied or pressurized gas will cause severe frostbite, but otherwise, this product is not expected to cause skin irritation.

Skin Sensitization: Skin contact should be avoided, and sensitization as a result of skin contact is not expected.

Signs and Symptoms: Light hydrocarbon gases are simple asphyxiants and can cause anesthetic effects at high concentrations. Symptoms of overexposure, which are reversible if exposure is stopped, include shortness of breath, drowsiness, headaches, confusion, decreased coordination, visual disturbances, and vomiting. Continued exposure can lead to hypoxia (inadequate oxygen), rapid breathing, cyanosis (bluish discoloration of the skin), numbness of the extremities, unconsciousness, and death.

Carcinogenicity: LNG is not expected to cause cancer. This substance is not listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or OSHA.

Section 12: Ecological Information

Ecotoxicity: Petroleum gases are volatile and rapid evaporation is expected from both land and water.

Persistence and Degradability: Not expected to remain on land surface or water for any period.

Bioaccumulative Potential: No data available.

Mobility in Soil: No data available.

Other Adverse Effects: No data available.

Section 13: Disposal Considerations

It is preferable to dispose of product by burning in a properly designed flare. Venting of vapor directly to the atmosphere is not recommended. LNG is not typically managed as a waste, but if cylinders of LNG are to be disposed, the disposal of this material should comply with all applicable federal, state, and local regulations.

Section 14: Transport Information

Transport in accordance with United States Department of Transportation (DOT) regulations governing the transportation of hazardous materials.

UN Number: UN1972

UN Proper Shipping Name: Natural gas, refrigerated liquid

Transport Hazard Class: 2.1

Packing Group: N/A*

Environmental Hazards: Refer to Section 15 for reportable quantities.

Special Precautions: Refer to Emergency Response Guide 115. Refer to 49 CFR 173.318 for additional information relating to the transportation of LNG.



DOT Shipping Label: Flammable Gas

Placard: Flammable Gas/1972

*N/A indicates not applicable; LNG is not authorized to be transported in non-bulk packages under DOT regulations.

Section 15: Regulatory Information

CERCLA/SARA – Section 302 Extremely Hazardous Substances and TPQs (in pounds):

This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA – Section 311/312 (Title III Hazard Categories)

Acute Health:	Yes
Chronic Health:	No
Fire Hazard:	Yes
Pressure Hazard:	Yes
Reactive Hazard:	No

CERCLA/SARA – Section 313 and 40 CFR 372:

This material does not contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

EPA (CERCLA) Reportable Quantity (in pounds):

EPA’s Petroleum Exclusion applies to this material (refer to CERCLA 101(14)).

California Proposition 65:

This material does not contain any chemicals which are known to the State of California to cause cancer, birth defects, or other reproductive harm at concentrations that trigger the warning requirements of California Proposition 65.

International Hazard Classification

WHMIS Hazard Class:

- A – Compressed Gas
- B1 – Flammable Gases

National Chemical Inventories

All components are either listed on the TSCA Inventory, or are not regulated under TSCA.

United States Export Control Classification Number: EAR99

Abbreviations

- CERCLA: Comprehensive Environmental Response Compensation and Liability Act
- EPA: Environmental Protection Agency
- SARA: Superfund Amendments Reauthorization Act
- TPQ: Threshold Planning Quantity
- TSCA: Toxic Substances Control Act
- WHMIS: Workplace Hazardous Materials Information System

Section 16: Other Information

National Fire Protection Association (NFPA)® 704 Hazard Rating

Health: 3 Flammability: 4 Instability: 0
(0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)



Hazardous Material Identification System (HMIS)® Hazard Rating

Health: 3 Flammability: 4 Physical Hazard: 3
(0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)



Date of Issue: 06/01/2015

Status: Final

Previous Issue Date: 03/05/1998

Revised Sections or Basis for Revision: Compliance with the OSHA Hazard Communication Standard (29 CFR 1910.1200(g)) revised in 2012

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