

1. Product and Company Identification

Material name	Natural Gas (Sweet)
Version #	01
Revision date	06-02-2010
CAS #	Mixture
Product use	Fuel.
Synonym(s)	Marsh Gas, compressed methane, sour gas, acid gas, wellhead gas, petroleum gas, raw natural gas
Manufacturer/Supplier	Devon US Operations 20 North Broadway Oklahoma City, OK 73102-8260 Telephone: (405) 235-3611 - Devon Canadian Operations Calgary, AB. T2P 4H2 2000, 400 – 3rd Avenue SW. Telephone: (403) 232-7100
Emergency	Emergency Chemtrec: Within the USA (800) 424-9300 Outside the USA (703) 527-3887 Devon Canada Emergency Phone: (403) 232-7100

2. Hazards Identification

Physical state	Gas.
Appearance	Colorless Gas
Emergency overview	DANGER Flammable gas - may cause flash fire. Contains n-hexane. Prolonged and/or repeated exposures may cause damage to the peripheral nervous system (e.g. fingers, feet, arms etc.). Contains benzene. May cause cancer. May cause heritable genetic damage. Gas reduces oxygen available for breathing. May cause drowsiness, dizziness, loss of consciousness and death.
OSHA regulatory status	This preparation is classified as dangerous according to Directive 1999/45/EC and its amendments. This product is hazardous according to OSHA 29CFR 1910.1200.
Potential health effects	
Routes of exposure	Inhalation.
Eyes	Direct contact with concentrated gas may cause minor irritation. Pressurized gas can cause mechanical injury to the eye.
Skin	Not likely to cause a problem due to high volatility of the product. Contact with rapidly expanding gas may cause burns or frostbite. Human and animal studies show that benzene is absorbed through the skin. However, absorption through the skin is normally low because benzene evaporates rapidly. In most cases, any skin contact would also involve significant inhalation exposure.
Inhalation	Natural Gas contains benzene which may cause cancer and cause blood disorders and also contains n-hexane which may cause peripheral nerve damage.
Ingestion	This material is a gas under normal atmospheric conditions and ingestion is unlikely.
Target organs	Respiratory system. Cardiovascular system. Central nervous system. Blood. Peripheral Nervous System.
Chronic effects	Contains benzene. Human epidemiology studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-producing system and serious blood disorders, including leukemia. Animal tests suggest that prolonged and/or repeated overexposure to benzene may damage the embryo/fetus. The relevance of these animal studies to humans has not been fully established. May cause cancer. Contains n-hexane. Prolonged and/or repeated exposures may cause damage to the peripheral nervous system (e.g. fingers, feet, arms etc.). Possible risk of impaired fertility.

Signs and symptoms Narcosis. Decrease in motor functions.

Potential environmental effects The product contains a substance which is very toxic to aquatic organisms.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Natural gas	8006-14-2	100
Contains:	-	-
Methane	74-82-8	70-85
Carbon dioxide	124-38-9	0-21
Nitrogen	7727-37-9	0-12
Ethane	74-84-0	4-9
Propane	74-98-6	3-8
Butane	106-97-8	< 3
n-Hexane	110-54-3	< 2
Pentane	109-66-0	< 1
Benzene	71-43-2	0-0.2

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

First aid procedures

Eye contact

In case of contact, immediately flush eyes with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. Get medical attention if irritation persists.

Skin contact

Not expected to be absorbed through the skin but may cause slight irritation. High pressure injection through the skin requires immediate medical attention. Treat frostbite area of skin by immersing the affected area in warm water (between 100F/38C and 110F/43C, not exceeding 112F/44C). Keep immersed for 20 to 40 minutes. Seek medical assistance.

Inhalation

Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation. Be aware that symptoms of lung edema (shortness of breath) may develop up to 24 hours after exposure.

Ingestion

This material is a gas under normal atmospheric conditions and ingestion is unlikely.

Notes to physician

Provide general supportive measures and treat symptomatically. Be aware that symptoms of lung edema (shortness of breath) may develop up to 24 hours after exposure.

General advice

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties

Extremely flammable gas. Gas forms mixtures with air which can catch fire and burn with explosive violence. Vapors are heavier than air and invisible mixture spreads easily and may accumulate in low or confined areas, travel considerable distance to source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Extinguishing media

Suitable extinguishing media

Extinguish with carbon dioxide, dry powder or water fog.

Unsuitable extinguishing media

Not applicable.

Protection of firefighters

Protective equipment and precautions for firefighters

Do not extinguish fires unless gas flow can be stopped safely; explosive re-ignition may occur. Promptly isolate the scene by removing all persons from the vicinity of the incident. No action shall be taken involving any personal risk or without suitable training. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus. Stop flow of material. Use water to keep fire exposed containers cool and to protect personnel effecting shutoff. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect personnel attempting to stop leak. Prevent runoff from fire control or dilution from entering streams, sewers or drinking water supply.

Special protective equipment for fire-fighters

Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with full face-piece operated in positive pressure mode. Use approved gas detectors in confined spaces.

Specific methods

In the event of fire and/or explosion do not breathe fumes. Evacuate area. Check oxygen content before entering area. Water spray should be used to cool containers. Remove pressurized gas cylinders from the immediate vicinity. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Containers can burst violently when heated, due to excess pressure build-up.

Hazardous combustion products

Normal combustion forms carbon dioxide, water vapor and may produce oxides of sulfur. Incomplete combustion can produce carbon monoxide.

6. Accidental Release Measures

Personal precautions

Eliminate all sources of ignition in vicinity of released vapors. Evacuate all non-essential personnel to an area upwind. Stop leak if possible without any risk. Ventilate enclosed areas to prevent formation of toxic, flammable or oxygen deficient atmospheres. Water spray may be used to reduce vapors. Avoid vapor cloud even with proper respiratory protective equipment. Use suitable protective equipment (section 8). Follow all fire-fighting procedures (section 5).

Environmental precautions

Prevent further leakage or spillage if safe to do so. Prevent material from entering drains, sewers or low lying areas. See section 13 for waste disposal information.

Methods for containment

Stop the flow of material, if this is without risk. Prevent entry into waterways, sewer, basements or confined areas.

Methods for cleaning up

Stop the flow of gas. Allow to dissipate with adequate ventilation.

Other information

These gases may be used as an auxiliary fuel or disposed of by burning in a properly designed flare or incinerator in accordance with federal or local requirements.

7. Handling and Storage

Handling

Put on appropriate personal protective equipment (see section 8). Special precautions should be taken when entering or handling equipment in this type of gas service because of possible radioactive contamination. All equipment should be checked for radioactivity or opened to the atmosphere and have forced ventilation applied for at least 4 hours prior to entry or handling. Avoid direct skin contact with any surface. Avoid generation of dust, smoke, fumes, etc. in the work area, or if they cannot be avoided, a tested and certified radionuclide dust respirator should be worn. Smoking, eating, or drinking should be prohibited when working with the equipment. Employees should wash thoroughly with soap and water and discard contaminated clothing after entering or handling the equipment. Workers should wash hands and face before eating, drinking and smoking. Do not breathe gas it contains benzene and n-hexane. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter enclosed areas and confined space 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. Pumping and transferring operations must be electrically grounded and bonded to dissipate static build up.

Storage

Keep away from heat, spark, and open flame. Store storage containers in cool, well-ventilated areas away from direct sunlight, heat or flame. Thoroughly test gas lines for leakage before use, especially in confined spaces. Store away from strong oxidizing materials. Vapors containing benzene may accumulate during storage or transport.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components

Benzene (71-43-2)

Type

STEL

Value

2.5 ppm

TWA

0.5 ppm

Butane (106-97-8)

TWA

1000 ppm

Carbon dioxide (124-38-9)

STEL

30000 ppm

TWA

5000 ppm

Ethane (74-84-0)

TWA

1000 ppm

Components	Type	Value
Methane (74-82-8)	TWA	1000 ppm
Natural gas (8006-14-2)	TWA	1000 ppm
n-Hexane (110-54-3)	TWA	50 ppm
Pentane (109-66-0)	TWA	600 ppm
Propane (74-98-6)	TWA	1000 ppm

U.S. - OSHA

Components	Type	Value
Benzene (71-43-2)	Ceiling	25 ppm
	STEL	5 ppm
	TWA	1 ppm
Butane (106-97-8)	TWA	1900 mg/m3
		800 ppm
Carbon dioxide (124-38-9)	PEL	5000 ppm
		9000 mg/m3
n-Hexane (110-54-3)	PEL	500 ppm
		1800 mg/m3
	TWA	50 ppm
Pentane (109-66-0)		180 mg/m3
	PEL	1000 ppm
		2950 mg/m3
	STEL	2250 mg/m3
	TWA	750 ppm
Propane (74-98-6)		600 ppm
	PEL	1800 mg/m3
		1800 mg/m3
	TWA	1000 ppm
		1800 mg/m3

Canada - Alberta

Components	Type	Value
Benzene (71-43-2)	STEL	2.5 ppm
		8 mg/m3
	TWA	1.6 mg/m3
Butane (106-97-8)		0.5 ppm
	TWA	1000 ppm
Carbon dioxide (124-38-9)	STEL	54000 mg/m3
		30000 ppm
	TWA	9000 mg/m3
		5000 ppm
Ethane (74-84-0)	TWA	1000 ppm
		176 mg/m3
n-Hexane (110-54-3)	TWA	50 ppm
		176 mg/m3
Pentane (109-66-0)	TWA	600 ppm
Propane (74-98-6)		1770 mg/m3
	TWA	1000 ppm

Canada - British Columbia

Components	Type	Value
Benzene (71-43-2)	STEL	2.5 ppm
	TWA	0.5 ppm
Butane (106-97-8)	STEL	750 ppm
	TWA	600 ppm
Carbon dioxide (124-38-9)	STEL	15000 ppm
	TWA	5000 ppm
Ethane (74-84-0)	TWA	1000 ppm
Methane (74-82-8)	TWA	1000 ppm
Natural gas (8006-14-2)	TWA	1000 ppm
n-Hexane (110-54-3)	TWA	20 ppm
Pentane (109-66-0)	TWA	600 ppm

Components	Type	Value
Propane (74-98-6)	TWA	1000 ppm
Additional exposure data	OSHA: The acceptable max. peak above the ceiling concentration for an 8-hour shift is: 50 ppm. The acceptable duration of the peak above the ceiling concentration is: 10 minutes once, only if no other measureable exposure occurs	
Engineering controls	Explosion proof exhaust ventilation should be used. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Provide adequate ventilation and minimize the risk of inhalation of gas.	
Personal protective equipment		
Eye / face protection	If eye contact is likely, safety glasses with side shields or chemical type goggles should be worn.	
Skin protection	No special requirements under ordinary conditions of use.	
Respiratory protection	Wear approved respiratory protection when working with this material unless ventilation is adequate to keep airborne concentrations below recommended exposure standards.	
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Observe any medical surveillance requirements.	

9. Physical & Chemical Properties

Appearance	Colorless Gas
Color	Colorless.
Odor	Odorless.
Odor threshold	Not available.
Physical state	Gas.
Form	Gas.
pH	Not available.
Melting point	Not available.
Freezing point	Not available.
Boiling point	-258.7 °F (-161.5 °C)
Flash point	-304.6 °F (-187 °C)
Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	15
Flammability limits in air, lower, % by volume	5
Vapor pressure	5.33 kPa
Vapor density	0.55
Specific gravity	Not available.
Solubility (water)	Insoluble.
Partition coefficient (n-octanol/water)	No data available.
Auto-ignition temperature	1004 °F (540 °C)
Decomposition temperature	Not available.

10. Chemical Stability & Reactivity Information

Chemical stability	Stable at normal conditions.
Conditions to avoid	Heat, flames and sparks.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Carbon Dioxide. Carbon monoxide. Sulfur oxides.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Components

Butane (106-97-8)
Pentane (109-66-0)
Benzene (71-43-2)

Test Results

Acute Inhalation LC50 Rat: 658 mg/l 4 Hours
Acute Inhalation LC50 Rat: 364 mg/l 4 Hours
Acute Inhalation LC50 Mouse: 9980 mg/l
Acute Inhalation LC50 Rat: 10000 mg/l 7 Hours
Acute Oral LD50 Mouse: 4700 mg/kg
Acute Oral LD50 Rat: 3306 mg/kg
Acute Other LD50 Mouse: 340 mg/kg
Acute Other LD50 Mouse: 0.000001 ml/kg
Acute Other LD50 Rat: 2.89 mg/kg
Acute Inhalation LC50 Rat: > 1442.847 mg/l 15 Minutes

Propane (74-98-6)

Toxicological information

This product may contain detectable but varying quantities of the naturally occurring radioactive substance radon 222. The amount in the gas itself is not hazardous, but since radon rapidly decays ($t_{1/2} = 3.82$ days) to form other radioactive elements including lead 210, polonium 210, and bismuth 210, equipment may be radioactive. The radon daughters are solids and therefore may attach to dust particles or form films and sludges in equipment. Inhalation, ingestion or skin contact with radon daughters can lead to the deposition of radioactive material in the lungs, bone, blood forming organs, intestinal tract, kidney and colon. Occupational exposure to radon and radon daughters has been associated with an increased risk of lung cancer in underground uranium miners. Follow the special precautions listed in handling and storage section of this document (see section 7).

Acute effects

Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Local effects

May cause central nervous system effects.

Sensitization

Not a skin sensitizer.

Chronic effects

Contains benzene. Human epidemiology studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-producing system and serious blood disorders, including leukemia. Animal tests suggest that prolonged and/or repeated overexposure to benzene may damage the embryo/fetus. The relevance of these animal studies to humans has not been fully established. Contains n-hexane. Prolonged and/or repeated exposures may cause damage to the peripheral nervous system (e.g. fingers, feet, arms etc.).

Carcinogenicity

May also contain benzene, a known human carcinogen, which may cause leukemia.

ACGIH Carcinogens

Benzene (CAS 71-43-2) A1 Confirmed human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity

Benzene (CAS 71-43-2) 1 Carcinogenic to humans.

US NTP Report on Carcinogens: Known carcinogen

Benzene (CAS 71-43-2) Known carcinogen.

US OSHA Specifically Regulated Substances: Cancer hazard

Benzene (CAS 71-43-2) Cancer hazard.

Mutagenicity

May cause heritable genetic damage.

Neurological effects

Central and/or peripheral nervous system damage.

Reproductive effects

Possible risk of impaired fertility.

Teratogenicity

No data available.

12. Ecological Information

Ecotoxicological data

Components

Pentane (109-66-0)

n-Hexane (110-54-3)

Benzene (71-43-2)

Test Results

EC50 Daphnia: 2.3 mg/l 48 Hours
LC50 Fish: 3.1 mg/l 96 Hours
LC50 Fathead minnow (Pimephales promelas): 2.101 - 2.981 mg/l 96 hours
EC50 Water flea (Daphnia magna): 8.76 - 15.6 mg/l 48 hours
EC50 Water flea (Daphnia magna): 8.76 - 15.6 mg/l 48 Hours

Components	Test Results
Benzene (71-43-2)	LC50 Rainbow trout,donaldson trout (Oncorhynchus mykiss): 5 mg/l 96 Hours
Ecotoxicity	The product contains a substance which is very toxic to aquatic organisms. The product is a volatile organic compound which has a photochemical ozone creation potential.
Persistence and degradability	No data available.
Bioaccumulation / Accumulation	No data available.
Partition coefficient (n-octanol/water)	No data available.
Mobility in environmental media	The product is a volatile substance, which may spread in the atmosphere.

13. Disposal Considerations

Waste codes	D001: Waste Flammable material with a flash point <140 °F
Disposal instructions	This material and its container must be disposed of as hazardous waste. Do not dispose of waste into sewer. This product, in its present state, when discarded or disposed of, is not a hazardous waste according to Federal regulations (40 CFR 261.4 (b)(4)). Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste.

14. Transport Information

DOT

Basic shipping requirements:

UN number	UN1971
Proper shipping name	Natural gas, compressed
Hazard class	2.1
Subsidiary hazard class	6.1
Labels required	2.1

Additional information:

Packaging exceptions	306
Packaging non bulk	302
Packaging bulk	302
ERG number	115

IATA

Basic shipping requirements:

UN number	1971
Proper shipping name	Natural gas, compressed
Hazard class	2.1
Subsidiary hazard class	6.1

IMDG

Basic shipping requirements:

UN number	1971
Proper shipping name	Natural gas, compressed
Hazard class	2.1
Subsidiary hazard class	6.1
EmS No.	F-D, S-U

TDG

Basic shipping requirements:

Proper shipping name	Natural gas, compressed
Hazard class	2.1
Subsidiary hazard class	6.1
UN number	UN1971



DOT



IATA



IMDG



TDG

15. Regulatory Information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

All components are on the U.S. EPA TSCA Inventory List.

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Benzene (CAS 71-43-2)	0.1 %
n-Hexane (CAS 110-54-3)	1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

Benzene (CAS 71-43-2)	Listed.
n-Hexane (CAS 110-54-3)	Listed.

US TSCA Section 12(b) Export Notification: Export Notification requirement/De minimis concentration

Pentane (CAS 109-66-0)	1.0 % One-Time Export Notification only.
------------------------	--

CERCLA (Superfund) reportable quantity (lbs)

- Natural gas 100
- Methane 100
- Ethane 100
- Propane 100
- Butane 100
- n-Hexane 100
- Pentane 100
- Benzene 10

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - Yes Fire Hazard - Yes Pressure Hazard - No Reactivity Hazard - No
--------------------------	---

Section 302 extremely hazardous substance	No
--	----

Section 311 hazardous chemical	No
---------------------------------------	----

Drug Enforcement Agency (DEA)	Not controlled
--------------------------------------	----------------

Canadian regulations	This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.
-----------------------------	---

WHMIS status	Controlled
---------------------	------------

WHMIS classification	A - Compressed Gas B1 - Flammable/Combustible
-----------------------------	--

WHMIS labeling



State regulations

This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - California Hazardous Substances (Director's): Listed substance

Benzene (CAS 71-43-2)	Listed.
Butane (CAS 106-97-8)	Listed.
Carbon dioxide (CAS 124-38-9)	Listed.
n-Hexane (CAS 110-54-3)	Listed.
Pentane (CAS 109-66-0)	Listed.

US - Massachusetts RTK - Substance: Listed substance

Benzene (CAS 71-43-2)	Listed.
Carbon dioxide (CAS 124-38-9)	Listed.
Methane (CAS 74-82-8)	Listed.
Natural gas (CAS 8006-14-2)	Listed.
n-Hexane (CAS 110-54-3)	Listed.
Nitrogen (CAS 7727-37-9)	Listed.
Pentane (CAS 109-66-0)	Listed.
Propane (CAS 74-98-6)	Listed.

US - New Jersey Community RTK (EHS Survey): Reportable threshold

Benzene (CAS 71-43-2)	500 LBS
Butane (CAS 106-97-8)	500 LBS
Ethane (CAS 74-84-0)	500 LBS
Methane (CAS 74-82-8)	500 LBS
n-Hexane (CAS 110-54-3)	500 LBS
Pentane (CAS 109-66-0)	500 LBS
Propane (CAS 74-98-6)	500 LBS

US - New Jersey RTK - Substances: Listed substance

Benzene (CAS 71-43-2)	Listed.
Carbon dioxide (CAS 124-38-9)	Listed.
Methane (CAS 74-82-8)	Listed.
Natural gas (CAS 8006-14-2)	Listed.
Nitrogen (CAS 7727-37-9)	Listed.
Propane (CAS 74-98-6)	Listed.

US - Pennsylvania RTK - Hazardous Substances: Listed substance

Benzene (CAS 71-43-2)	Listed.
Carbon dioxide (CAS 124-38-9)	Listed.
Methane (CAS 74-82-8)	Listed.
Natural gas (CAS 8006-14-2)	Listed.
n-Hexane (CAS 110-54-3)	Listed.
Nitrogen (CAS 7727-37-9)	Listed.
Pentane (CAS 109-66-0)	Listed.
Propane (CAS 74-98-6)	Listed.

US - Pennsylvania RTK - Hazardous Substances: Special hazard

Benzene (CAS 71-43-2)	Special hazard.
-----------------------	-----------------

16. Other Information

Further information

HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings

Health: 1*
Flammability: 4
Physical hazard: 0

NFPA ratings

Health: 1
Flammability: 4
Instability: 0

Disclaimer

This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

Issue date

06-02-2010