



Natural Gas Sour

Material Safety Data Sheet

1. Product and Company Identification

Product Name:	Natural Gas, Sour
Synonym:	Natural Gas, Raw Gas
Product use:	Fuel, Petroleum Feedstock
Manufacturer:	ARC Resources Ltd.
Address:	Suite 2100, 440 2 nd Street SW Calgary, AB, T2P 5E9
Emergency Contact:	403-292-0434
Canutec:	(613) 996-6666 or Cellular *666

2. Hazards Identification

EMERGENCY OVERVIEW

Danger!! This product is **extremely flammable** and will be easily ignited by heat, sparks or flames. Contains hydrogen sulphide that is an extremely toxic and flammable gas at low concentrations. Exposures to hydrogen sulphide above 100 ppm are immediately dangerous to life and health (IDLH) and may be fatal. Exposures to hydrogen sulphide between 10 ppm and 100 ppm may produce irritation to the respiratory tract. Explosive mixtures form when vapours mix with air. Vapors may travel to a source of ignition and flash back. Vapours may cause dizziness or asphyxiation and may be irritating if inhaled at high concentrations. Fire may produce irritating and/or toxic gases. At high concentrations, this product can displace air and cause suffocation from lack of oxygen. Direct contact with leaking gas may cause frostbite. Do not extinguish leaking gas flames unless gas source can be shut off. .

POTENTIAL HEALTH EFFECTS/ROUTES OF EXPOSURE

Eyes:	This product is a moderate eye irritant. Direct contact with rapidly escaping gas may cause cryogenic (freezer) burns or frostbite. Vapors may cause irritation to the eyes, conjunctiva, and mucous membranes resulting in redness and tearing.
Skin:	This product is a slight skin irritant. Direct contact with rapidly escaping gas may cause cryogenic (freezer) burns or frostbite. The appearance of injury may be delayed for a few hours, but may cause tissue to become swollen, discolored and extremely painful; permanent damage or death may result without adequate medical treatment.
Ingestion:	Natural gas is extremely unlikely to be swallowed and much more likely to be inhaled.
Inhalation:	Headaches, loss of appetite, drowsiness, nausea and vomiting, loss of consciousness and even death.

Warning: The burning of this product in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, carbon dioxide, sulphur dioxide and inadequate oxygen levels, which may cause irritation of the eyes, nose, throat and respiratory system as well as unconsciousness, suffocation, and even death.



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3. Composition/Information on Ingredients

Ingredient Name	%	CAS No.
Natural Gas	100	8006-14-2
Methane	50-60	74-82-8
Ethane	5-10	74-84-0
Propane	3-7	74-98-6
n-Butane	1-3	106-97-8
iso-Butane	0-1	75-28-5
iso-Pentane	0-1	78-78-4
n-Pentane	0-1	109-66-0
Hydrogen Sulphide	1-30	7783-06-4

Natural Gas is a naturally occurring gaseous hydrocarbon used as a fuel. This product is a commingled stream from multiple petroleum facilities and is a complex mixture consistent with the definition within WHMIS regulation CPR section 2. The listed components are provided as guidance based on the available knowledge of the commingled stream.

4. First Aid Measures

- Eyes:** In case of contact with eyes, immediately flush with clean, low-pressure water for at least 20 minutes. Hold eyelids open to ensure adequate flushing. Seek medical attention immediately.
- Skin:** This material can cause drying and redness of the skin. High-pressure releases may inject gas under the skin and requires immediate medical attention.
- Ingestion:** This product is naturally a gas and is unlikely to be ingested and more likely to be inhaled. Rinse mouth with water. Do not induce vomiting. If conscious, give 1 – 2 glasses of milk or water to drink. Never administer liquids to an unconscious person. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Seek medical attention immediately and monitor for breathing difficulty.
- Inhalation:** Ensure your own safety and use the appropriate respiratory protection to immediately remove the victim to an uncontaminated area. Give CPR or artificial respiration as needed and give oxygen if breathing is difficult. Keep victim at rest and get immediate medical attention.

5. Fire Fighting Measures

FLAMMABLE PROPERTIES

Flammable Gas

HAZARDOUS COMBUSTION PRODUCTS:

Carbon dioxide, carbon monoxide and sulphur dioxide will be produced.



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FIRE AND EXPLOSION HAZARDS

This product is EXTREMELY FLAMMABLE. DO NOT ATTEMPT TO EXTINGUISH A LEAKING GAS FIRE UNLESS THE LEAK CAN BE STOPPED. Vapors will ignite easily in the presence of any source of ignition over a wide range of concentrations and even at very low temperatures. Containers may explode when heated. Ruptured cylinders may rocket.

EXTINGUISHING MEDIA

Dry chemical, foam or CO₂ using the manufacturer's recommended technique. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers. Consider initial downwind evacuation for at least 800 meters (1/2 mile). Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Do not direct water at source of leak or safety devices as icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fires, use unmanned hose holders or monitor nozzles. If this is impossible, withdraw from area and let fire burn.

FIRE FIGHTING INSTRUCTIONS

Small fires in the early stages may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. An approved self-contained breathing apparatus (SCBA) with full-face piece and full protective firefighting clothing must be worn. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water.

UNUSUAL FIRE & EXPLOSION HAZARDS:

This product is lighter than air and may collect in upper part of buildings. Burning occurs with slightly luminous flame and little noise. Containers of pressurized gasses may explode from heat generated by fires.

6. Accidental Release Measures

ACTIVATE SITE SPECIFIC EMERGENCY RESPONSE PLAN, IF AVAILABLE

Small Spills: Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Remove all ignition sources. Ventilate area of leak. Stop flow of gas. Do not attempt to extinguish a fire unless the leak can be stopped.

Large Spills: Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Isolate spill or leak area immediately for at least 50 to 100 meters (160 to 330 feet) in all directions. Keep unauthorized personnel away and stay upwind. Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Keep out of low areas. The proper use of water spray may effectively disperse product vapours, preventing contact with ignition sources or areas /equipment that require protection. Do not discharge solid water stream pattern into the liquid resulting in splashing. Do not flush down sewer or drainage systems. Protect bodies of water by diking, if possible.

Evacuation: Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

Attention: Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. The application of water and/or fire fighting foam may cause spilled liquids to generate increased amounts of vapours, particularly when the water/foam temperature is warmer than the liquid. However, this effect may be desirable under certain conditions to evaporate a spill quickly. Consideration



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should be given to environmental clean-up and waste material generation when deciding if the use of large volumes of water is appropriate for non-fire emergency situations. Clean-up crews must be properly trained and must utilize proper protective equipment.

7. Handling and Storage

HANDLING PRECAUTIONS

Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Handle as a flammable gas. Keep away from all sources of heat, sparks, open flame or any sources of ignition as well as flammable materials or oxidizers. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Use only with adequate ventilation and avoid breathing vapours. Ground and bond all lines and equipment. Use intrinsically safe electrical equipment.

STORAGE PRECAUTIONS

Outside storage is recommended. Store in a cool, dry and well ventilated area out of sunlight and away from all sources of ignition. Avoid storage in low, confined locations or near incompatible materials such as other flammable materials, oxidizers or materials that support combustion. This storage area should comply with NFPA 30 ("Flammable and Combustible Liquid Code"). The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SPECIAL PRECAUTIONS

Store away from oxidizers such as oxygen, chlorine, bromine and peroxides.

WORK/HYGIENIC PRACTICES

Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Use good personal hygiene practices. Avoid skin exposure and wash hands before eating, drinking, smoking, or using toilet facilities. Do not eat, drink or smoke in areas of use or storage. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapours which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

Exposure Limits

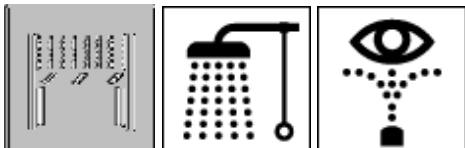
Ingredient Name	CAS No.	Exposure Limits
Natural Gas	8006-14-2	ACGIH TLV-TWA = 1,000 ppm
Methane	74-82-8	ACGIH TLV-TWA = 1,000 ppm (Alkane C1-C4)
Ethane	74-84-0	ACGIH TLV-TWA = 1,000 ppm (Alkane C1-C4)
Propane	74-98-6	ACGIH TLV-TWA = 1,000 ppm (Alkane C1-C4)
n-Butane	106-97-8	ACGIH TLV-TWA = 1,000 ppm (Alkane C1-C4)
iso-Butane	75-28-5	ACGIH TLV-TWA = 1,000 ppm (Alkane C1-C4)
iso-Pentane	78-78-4	ACGIH TLV-TWA = 600 ppm
n-Pentane	109-66-0	ACGIH TLV-TWA = 600 ppm
Hydrogen Sulphide	7783-06-4	ACGIH TLV-TWA = 1 ppm ACGIH TLV-STEL = 5 ppm Alberta OEL 10 ppm 8 hour TWA,



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		15 ppm Ceiling BC EL 10 ppm Ceiling Saskatchewan 10 ppm 8 hour TWA, 15 ppm Ceiling
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8. Exposure Controls / Personal Protection



ENGINEERING CONTROLS

Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Ensure adequate ventilation to keep vapour and gas concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Ventilation system and other equipment must be intrinsically safe. Quick drench facilities and/or eyewash fountains should be provided within the immediate work area for emergency use when there is any possibility of exposure to liquids that are extremely cold or rapidly evaporating.



in emergencies



PERSONAL PROTECTIVE EQUIPMENT

Eye/Face Protection: Wear safety glasses with side shields, chemical goggles or a full-face shield to avoid burns or tissue damage from frostbite.

Skin Protection: Avoid skin contact. Wear fire retardant clothing and insulated chemical resistant gloves in order to prevent the potential of frostbite or cryogenic burns.

Respiratory Protection: This product is a known asphyxiant and air supplied respirators are required if there is a potential for decreased oxygen concentrations. Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece must be worn if the concentration exceeds the OEL (Occupational Exposure Limit) of hydrogen sulphide or LELs. When assessing the proper type of respiratory protection, also consider the occupational exposure limits applicable to individual ingredients. Refer to CSA Standard "Selection, Use and Care of Respirators" (Z94.4-02) and NIOSH Respirator Decision Logic for additional guidance on respiratory protection.

9. Physical and Chemical Properties

Appearance and state:	Colourless gas
Odour:	A foul rotten egg odour.
Odour Threshold:	0.05 ppm (Hydrogen Sulphide)



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Flash Point:	-156°C (Tagliabue CC) Flammable Gas
Auto Ignition:	537°C (999°F)
Lower Explosive Limit (%):	5%
Upper Explosive Limit (%):	15%
Boiling Point:	-161.4°C
Melting Point:	-182.6°C
Vapour Pressure:	47000 mmHg @ 25 °C
Vapour Density (Air = 1):	0.554
Specific Gravity:	0.7168
Solubility (H ₂ O):	Slightly soluble
Percent Volatiles:	100%
Evaporation Rate:	Not Applicable gas
Octanol/Water Coefficient:	log Kow = 1.09

10. Stability and Reactivity

STABILITY

Stable

CONDITIONS TO AVOID (STABILITY)

Material is stable under normal conditions but will rapidly volatilize. Avoid high temperatures, open flames, sparks, welding, smoking and other ignitions sources.

INCOMPATIBLE MATERIALS

Avoid contact with strong oxidizers, ignition sources and heat.

HAZARDOUS DECOMPOSITION PRODUCTS

Irritating or toxic substances may be emitted upon thermal decomposition. Decomposition products include carbon dioxide and carbon monoxide.

HAZARDOUS POLYMERIZATION

Will Not Occur.

11. Toxicological Information

Chemical Name	CAS No.	LD50	LC50
Natural Gas	8006-14-2	Not applicable	Not available
Methane	74-82-8	Not applicable	Not available
Ethane	74-84-0	Not applicable	Not available
Propane	74-98-6	Not applicable	Not available
Ethane	74-84-0	Not applicable	Not available
n-Butane	106-97-8	Not applicable	658mg/l rat
iso-Butane	75-28-5	Not applicable	Not available
n-Pentane	109-66-0	Mouse (ivn): 446 mg/kg	Rat: 364 gm/m ³ (4Hr)
Hydrogen Sulphide	7783-06-4	Not applicable	Rat inhalation 380 mg/ cu m > 960 min

POTENTIAL HEALTH EFFECTS

Acute effects: Effects vary with concentration of hydrogen sulphide and may include mild eye, nose and throat irritation at 100 ppm to sudden unconsciousness and even death at approximately 500 ppm +. Memory loss, nausea and vomiting, paralysis of facial muscles or nerve tissue damage may occur after exposures up to 500 ppm. At high concentrations, this product is a



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simple asphyxiant and may displace oxygen primarily when present in enclosed spaces resulting in chronic hypoxia including effects such as decreased night vision, increased respiration, decreased alertness, fatigue, tunnel vision and headache. High concentrations may also irritate eyes, skin, respiratory system, central nervous system, and peripheral nervous system

Chronic effects: Chronic exposure to hydrogen sulphide of 50 ppm or greater may include bronchitis and inflammation of the mucous membranes of the respiratory system. At 250 ppm hydrogen sulphide, chronic effects may include bronchial pneumonia and pulmonary edema. At high concentrations, this product is a simple asphyxiant and may displace oxygen primarily when present in enclosed spaces resulting in chronic hypoxia including effects such as decreased night vision, increased respiration, decreased alertness, fatigue, tunnel vision and headache. High concentrations may also irritate eyes, skin, respiratory system, central nervous system, and peripheral nervous system

Sensitization: Methane, ethane, propane and butane are considered cardiac sensitizers.

Mutagenicity: Not mutagenic.

Reproductive effects: Not known to cause reproductive effects, however, spontaneous abortion is possible for women exposed to pentane during pregnancy.

Carcinogenicity: Ingredients are not identified as carcinogens by IARC, NTP or ACGIH.

Target organs: CNS (central nervous system), heart.

12. Ecological Information

This product is volatile and disperses rapidly. It is not toxic to aquatic organisms and does not concentrate in the food chain. However, keep out of sewage, drainage and waterways. Report spills and releases, as applicable, under provincial and local regulations.

13. Disposal Considerations

Preferred waste management priorities are recycle, reprocess or incinerate with heat recovery.

14. Transport Information

This material normally remains in plant or is transported via pipeline and does not enter the public transportation system. i.e. rail, highway, air or water. If the material will be entering the public transportation system, for movement of samples the following information will apply.

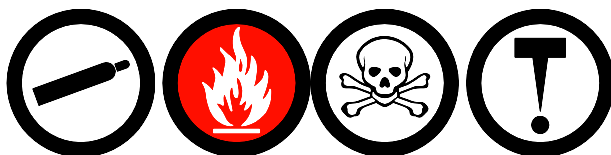
PROPER SHIPPING NAME:	Compressed Gases, Toxic, Flammable N.O.S
PRIMARY TDG CLASS:	2.3
SECONDARY TDG CLASS:	2.1
TDG IDENTIFICATION NUMBER:	UN1953
PACKING GROUP:	Not Applicable
ERG#	115



15. Regulatory Information

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

Workplace Hazardous Materials Information Systems (WHMIS): This product has been classified in accordance with the hazard criteria of the CPR (Controlled Product Regulations), and the MSDS contains all of the information required by the CPR. This material is classified as:



Class A – Compressed Gas

Class B1 – Flammable Gas

Class D1A – Materials Causing Immediate Toxic Effects

Class D2B – Materials Causing Other Toxic Effects

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)

All components of this product are listed on the Canadian DSL Inventory.

Risk Phrases: 12-23/24-26-36/37/38-51-53-45-61

Extremely flammable. Toxic by inhalation and in contact with skin. Irritating to eyes, respiratory system and skin. Very toxic by inhalation.

Safety Phrases: 9-16-20/21-33-36/37/39-45

Keep away from sources of ignition - No smoking. When using do not eat, drink or smoke.

Wear suitable protective clothing, gloves and eye/face protection. Take precautionary measures against static discharges. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

16. Other Information

Prepared for:	ARC Resources Safety Department
Preparation information:	403.503.8600
Prepared by:	Deerfoot Consulting Inc.

Disclaimer of Expressed and Implied Warranties

The information presented in the Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. However, neither ARC Resources, Deerfoot Consulting Inc nor any of their subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use.