



## Material Safety Data Sheet

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### 1. Product and Company Identification

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

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### 2. Hazards Identification

#### EMERGENCY OVERVIEW

**Danger!!** This product is extremely flammable and will be easily ignited by heat, sparks or flames. Explosive mixtures form when vapours mix with air. Vapors may travel to a source of ignition and flash back. Vapors may cause dizziness or asphyxiation and may be irritating if inhaled at high concentrations. Fire may produce irritating and/or toxic gases.

#### POTENTIAL HEALTH EFFECTS/ROUTES OF EXPOSURE

**Eyes:** This product can be a moderate to severe irritant to the eyes. 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 can be a slight to moderate irritant of the skin. 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:** Vapors may cause nose and throat irritation, anesthetic effects and central nervous system (CNS) depression. Inhalation may result in dizziness, drowsiness, headaches, dizziness, mood disturbances, numbness of the extremities, sleepiness, mental confusion, poor judgment and coordination. An increased pulse rate may also occur. Hyperventilation may develop.

**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, carbon dioxide resulting in oxygen deficiency that may result in unconsciousness, suffocation, and even death.



### 3. Composition/Information on Ingredients

Ingredient Name	%	CAS No.
Natural Gas	100	8006-14-2
Methane	80-97	74-82-8
Ethane	0-9	74-84-0
Propane	0-6	74-98-6
n-Butane	0-2	106-97-8
iso-Butane	0-1	75-28-5

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.
- 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 and/or carbon monoxide will be produced upon combustion.

#### 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 CO<sub>2</sub> may be used according to 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). Cool containers with large quantities of water until well after the fire has been put out. Do not direct



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the water stream at the source of the 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. Fight fires from maximum distance and for massive fires, use unmanned hose holders or monitor nozzles. If this is not possible, withdraw from the area and let the 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. When fighting fires may result in potential exposure to high heat, smoke or toxic byproducts of combustion, an approved self-contained breathing apparatus (SCBA) with full-face piece and full turnout gear must be worn. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with large quantities of water.

### **UNUSUAL FIRE & EXPLOSION HAZARDS:**

This product is lighter than air and vapours may collect in the upper part of buildings. Burning occurs with a slightly luminous flame and very little noise. Pressurized containers of gas may explode due to heat generated by fires.

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## 7. Handling and Storage

### **ACTIVATE SITE SPECIFIC EMERGENCY RESPONSE PLAN, IF AVAILABLE**

**Small Spills:** 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:** 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. 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 dyking, 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 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.

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## 7. Handling and Storage

### **HANDLING PRECAUTIONS**

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 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

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.

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## 8. Exposure Controls / Personal Protection

### ENGINEERING CONTROLS



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 electrical equipment must be approved for flammable areas. Quick drench facilities and/or eyewash stations 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.

### PERSONAL PROTECTIVE EQUIPMENT



in emergencies



**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. Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are unknown, or any other circumstance exist where an air-purifying respirator may not provide adequate protection. 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.



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### Exposure Limits

Ingredient Name	CAS No.	Exposure Limits
Natural Gas	8006-14-2	ACGIH TLV-TWA 1,000 ppm (Alkane C1-C4)
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)

### 9. Physical and Chemical Properties

Appearance and state:	Colourless gas
Odour:	Slight hydrocarbon that may not be detected by all. An odorant can be added with a foul rotten egg odour.
Odour Threshold:	500 ppm with odorant
Flash Point:	-156°C (Tagliabue CC)
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:	4500 – 4600 kPa
Vapour Density (Air = 1):	0.554
Specific Gravity:	0.71 – 0.74
Solubility (H <sub>2</sub> 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)

Avoid high temperatures, open flames, sparks, welding, smoking and other ignitions sources.

#### INCOMPATIBLE MATERIALS

Avoid contact with strong oxidizers such as peroxides, chlorines, nitrates or perchlorates.

#### HAZARDOUS DECOMPOSITION PRODUCTS

Thermal decomposition will produce 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
n-Butane	106-97-8	Not applicable	658mg/l rat
iso-Butane	75-28-5	Not applicable	Not available

### POTENTIAL HEALTH EFFECTS

**Acute effects:** At very high concentrations, this product is a simple asphyxiant and may displace air resulting in suffocation, CNS depression, dizziness, confusion, asphyxia, drowsiness, narcosis, headache, muscle weakness, numb extremities and even unconsciousness or chemical pneumonia (aspiration of liquid). If rapidly escaping gas comes in contact with skin this product may result in frostbite and dermatitis.

**Chronic effects:** In prolonged periods of high concentrations, this product is a simple asphyxiant and may displace oxygen primarily resulting in chronic hypoxia including effects such as decreased night vision, increased respiration, decreased alertness, fatigue, tunnel vision and headache.

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

**Mutagenicity:** Not mutagenic.

**Reproductive effects:** Not known to cause reproductive effects.

**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

Vent to a safe location and ensure dissipation of gas is below the LEL or incinerate through a flaring system. Preferred waste management priorities are reprocess or incinerate with heat recovery.

## 14. Transport Information

This material 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:** Natural Gas, compressed  
**PRIMARY TDG CLASS:** 2.1  
**SECONDARY TDG CLASS:** Not Applicable  
**TDG IDENTIFICATION NUMBER:** UN1971  
**PACKING GROUP:** Not Applicable  
**ERG #:** 115

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## 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**

### CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)

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

### **Risk Phrases: 12**

Extremely flammable.

### **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.

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## 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.