



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name NG Liquids C2+
Version # 01
Revision date 06-02-2010
CAS # Mixture
Product use Feed Stock.
Manufacturer/Supplier Devon US Operations
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Oklahoma City, OK 73102-8260
Telephone: (405) 235-3611
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Devon Canadian Operations
Calgary, AB. T2P 4H2
2000, 400 – 3rd Avenue SW.
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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 Gas under normal atmospheric conditions; liquid under pressure.
Emergency overview DANGER

Extremely flammable gas - may cause flash fire. Contents under pressure. Vapors may cause flash fire or explosion. Will be easily ignited by heat, spark or flames. Containers may explode when heated. May cause eye and respiratory tract irritation. High concentrations: May cause central nervous system effects.

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 May cause eye irritation. 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.

Inhalation May cause respiratory tract irritation. This product is an asphyxiant gas which can cause unconsciousness/death if OXYGEN levels are sufficiently reduced. In high concentrations, vapors are narcotic and may cause headache, fatigue, dizziness and nausea.

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

Target organs Central nervous system.

Chronic effects May cause central nervous system disorder (e.g., narcosis involving a loss of coordination, weakness, fatigue, mental confusion, and blurred vision) and/or damage.

Signs and symptoms Narcosis. Decrease in motor functions.

Potential environmental effects The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Ethane	74-84-0	50-75
Butane	106-97-8	0-40

Propane	74-98-6	0-40
Carbon dioxide	124-38-9	0-10
Pentane	109-66-0	0-10

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

Move injured person into fresh air and keep person calm under observation. If breathing is difficult, give oxygen. Get medical attention if any discomfort occurs.

Ingestion

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

Notes to physician

Provide general supportive measures and treat symptomatically.

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

Specific hazards arising from the chemical

Fire may produce irritating, corrosive and/or toxic gases.

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

Carbon monoxide and carbon dioxide.

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 leak if you can do so without risk. Prevent entry into waterway, sewers 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. 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

Components	Type	Value
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
Pentane (109-66-0)	TWA	600 ppm
Propane (74-98-6)	TWA	1000 ppm

U.S. - OSHA

Components

Components	Type	Value
Butane (106-97-8)	TWA	800 ppm
		1900 mg/m3
Carbon dioxide (124-38-9)	PEL	9000 mg/m3
		5000 ppm
Pentane (109-66-0)	PEL	1000 ppm
		2950 mg/m3
	STEL	750 ppm
		2250 mg/m3
	TWA	600 ppm
		1800 mg/m3
Propane (74-98-6)	PEL	1800 mg/m3
		1000 ppm
	TWA	1000 ppm
		1800 mg/m3

Canada - Alberta

Components

Components	Type	Value
Butane (106-97-8)	TWA	1000 ppm

Components	Type	Value
Carbon dioxide (124-38-9)	STEL	30000 ppm 54000 mg/m3
	TWA	5000 ppm 9000 mg/m3
Ethane (74-84-0)	TWA	1000 ppm
Pentane (109-66-0)	TWA	600 ppm 1770 mg/m3
Propane (74-98-6)	TWA	1000 ppm

Canada - British Columbia

Components	Type	Value
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
Pentane (109-66-0)	TWA	600 ppm
Propane (74-98-6)	TWA	1000 ppm

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	Gas under normal atmospheric conditions; liquid under pressure.
Color	Colorless.
Odor	Odorless.
Odor threshold	Not available.
Physical state	Gas.
Form	Gas under normal atmospheric conditions; liquid under pressure.
pH	Not available.
Melting point	Not available.
Freezing point	Not available.
Boiling point	-127.5 - -197.5 °F (-88.6 - -127.5 °C) (Ethane, 1 atm)
Flash point	-211 - -347.8 °F (-135 - -211 °C) (Ethane)
Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	12.5 (Ethane)
Flammability limits in air, lower, % by volume	3.2 (Ethane)
Vapor pressure	40 mm Hg (Ethane, 65.8°F)
Vapor density	Not available.
Specific gravity	Not available.
Solubility (water)	Slightly soluble
Partition coefficient (n-octanol/water)	No data available.
Auto-ignition temperature	588.2 - 881.6 °F (309 - 472 °C) (Pentane, Ethane)

Decomposition temperature	Not available.
Bulk density	1.05 (Ethane)

10. Chemical Stability & Reactivity Information

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

11. Toxicological Information

Toxicological data

Components	Test Results
Butane (106-97-8)	Acute Inhalation LC50 Rat: 658 mg/l 4 Hours
Pentane (109-66-0)	Acute Inhalation LC50 Rat: 364 mg/l 4 Hours
Propane (74-98-6)	Acute Inhalation LC50 Rat: > 1442.847 mg/l 15 Minutes

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).
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Acute effects	This product is an asphyxiant gas which can cause unconsciousness/death if OXYGEN levels are sufficiently reduced. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.
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Local effects	May cause central nervous system effects.
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Sensitization	Not a skin sensitizer.
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Chronic effects	Prolonged exposure may cause chronic effects.
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Carcinogenicity	No data available.
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Epidemiology	No data available.
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Mutagenicity	No data available.
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Neurological effects	Central and/or peripheral nervous system damage.
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Reproductive effects	No data available.
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Teratogenicity	No data available.
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12. Ecological Information

Ecotoxicological data

Components	Test Results
Pentane (109-66-0)	EC50 Daphnia: 2.3 mg/l 48 Hours LC50 Fish: 3.1 mg/l 96 Hours

Ecotoxicity	The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment. The product contains volatile organic compounds which have a photochemical ozone creation potential.
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Environmental effects	Ecological injuries are not known or expected under normal use.
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Persistence and degradability	No data available.
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Bioaccumulation / Accumulation	No data available.
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Partition coefficient (n-octanol/water)	No data available.
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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

Dispose of this material and its container at hazardous or special waste collection point. Must be incinerated in a suitable incineration plant holding a permit delivered by the competent authorities. Do not allow this material to drain into sewers/water supplies.

14. Transport Information

DOT

Basic shipping requirements:

UN number	UN1075
Proper shipping name	Petroleum gases, liquefied
Hazard class	2.1
Environmental hazards	
Marine pollutant	No
Labels required	2.1
Additional information:	
Special provisions	T50
Packaging exceptions	306
Packaging non bulk	304
Packaging bulk	314, 315
ERG number	115

IATA

Basic shipping requirements:

UN number	1075
Proper shipping name	Petroleum gases, liquefied
Hazard class	2.1

IMDG

Basic shipping requirements:

UN number	1075
Proper shipping name	Petroleum gases, liquefied
Hazard class	2.1
Environmental hazards	
Marine pollutant	No
EmS No.	F-D*, S-U

TDG

Basic shipping requirements:

Proper shipping name	Petroleum gases, liquefied
Hazard class	2.1
UN number	UN1075



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 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)

Ethane 100
Butane 100
Propane 100
Pentane 100

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

Butane (CAS 106-97-8) Listed.
Carbon dioxide (CAS 124-38-9) Listed.
Pentane (CAS 109-66-0) Listed.

US - Massachusetts RTK - Substance: Listed substance

Carbon dioxide (CAS 124-38-9) Listed.
Pentane (CAS 109-66-0) Listed.
Propane (CAS 74-98-6) Listed.

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

Butane (CAS 106-97-8) 500 LBS
Ethane (CAS 74-84-0) 500 LBS
Pentane (CAS 109-66-0) 500 LBS
Propane (CAS 74-98-6) 500 LBS

US - New Jersey RTK - Substances: Listed substance

Carbon dioxide (CAS 124-38-9) Listed.
Propane (CAS 74-98-6) Listed.

US - Pennsylvania RTK - Hazardous Substances: Listed substance

Carbon dioxide (CAS 124-38-9) Listed.
Pentane (CAS 109-66-0) Listed.
Propane (CAS 74-98-6) Listed.

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