SAFETY DATA SHEET

Liquefied Petroleum Gas (LPG)

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	TRUGAS LIMITED
IPA No.	1-106988
PO Box	P.O. Box 2878, Lae, Morobe Province, PNG
Telephone	+ 675 7090 6888
Emergency Phone	+ 675 7090 6888
Other Names	Propane, butane, propene or a combination of these products
Uses	As an energy source in the residential, commercial and automotive markets. A feedstock for the petrochemical industry and as refrigerant.

2. HAZARDS IDENTIFICATION

GHS Classification	Flammable Gases: Category 1 Gases Under Pressure: Liquefied Gas
Pictogram	
Hazard Statements	H220 - Extremely flammable gas.
Signal Word	DANGER
Prevention Response	H280 - Contains gas under pressure; may explode if heated. P210 - Keep away from heat/sparks/open flames/hot sources. No smoking. P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Storage	P381 - Eliminate all ignition sources if safe to do so. P410 + P403 - Protect from sunlight. Store in a well-ventilated space.
Other Hazards	High levels of exposure can lead to asphyxiation and fatal arrhythmia.

3. COMPOSITION / INFORMATION ON INGREDIENTS

		CAS Number
Main Components	LP Gas	68476 – 85 – 7
	Propane (40-99%)	0074 – 98 – 6
	Propene (<60%)	115 – 07 – 1
	n-butane	106 – 97 – 8
	Iso-butane (n-butane.Iso-butane <7.5%)	75 – 28 – 5
Minor Components	Ethane (<5%)	74 – 84 – 0
	1,3-Butadiene (<0.1%)	106 – 99 – 0
Odorant	Ethyl Mercaptan (Approx. 25ppm)	75 – 08 – 1

4. FIRST AID MEASURES

In all cases seek medical attention and see the Super Cold Contact Injuries Hospital Information Sheet for further information and procedures.

Eye

Treatment for cold burns: Immediately flush with room-temperature water or with sterile saline solution. Hold eyelids apart and irrigate for 15 minutes. Seek urgent medical attention.

Inhalation

Remove from area of exposure immediately.

Be aware of possible explosive atmospheres.
If victim is not breathing apply artificial respiration and seek urgent medical attention. Give oxygen if available. Keep warm and rested.

Skin
For cold burns: Immediately soak all clothing over the affected area and flush or soak affected skin with room-temperature to warm water (40°C max.) for a minimum of 15 minutes.
For large burns, immerse the affected area in room-temperature to warm water (40°C max.) for a minimum of 15 minutes.

For hot burns: Immediately soak all clothing over the affected area and flush or soak affected skin with room-temperature water only for a minimum of 15 minutes.
For large burns, immerse the affected area in room-temperature water only for a minimum of 15 minutes.

For hot and cold burns: If required, cover the affected area with clean wet dressing or cloth and keep the dressing or cloth dripping wet with water until medical attention is obtained.

DO NOT attempt to remove any clothing which has adhered to the skin
DO NOT apply any form of direct heat to any affected area.
DO NOT apply any creams or lotions to any affected areas.

Seek immediate medical attention for all burns, hot or cold.

Ingestion
For advice, contact a Poisons Information Centre on +61 13 11 26 (Australia) or a doctor. Ingestion is considered unlikely due to product form.

Symptoms
In high concentrations may cause asphyxiation
Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.
In low concentration may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of coordination.
Direct contact with the liquefied gas or escaping compressed gas may cause cold burns.

Medical Attention & Special Treatment
Treat symptomatically. Severe inhalation over exposure may sensitise the heart to catecholamine induced arrhythmias. Do not administer catecholamines to an overexposed person.

5. FIRE FIGHTING MEASURES
Specific Hazards
Highly flammable.
Heating to decomposition produces acrid smoke and irritating fumes.
Product will add fuel to a fire.
Eliminate all ignition sources including cigarettes, open flames, spark producing switches / tools, heaters, naked lights, pilot lights, mobile phones etc. when handling.

Precautions for Fire Fighters
Highly flammable.
Temperatures in a fire may cause cylinders or pressure vessels to rupture (BLEVE) and pressure relief devices to be activated (venting of LPG vapour to atmosphere, forming, and flammable clouds of air-gas mixture).
Call Fire Brigade. This product will add fuel to a fire.

Cool cylinders and vessels exposed to fire by applying water from a protected location and with water spray directing spray primarily onto the upper surface. Do not approach any LPGas container suspected of being hot.

Extinguishing

Evacuate the area of persons not directly involved in fighting the fire.
Stop flow of gas if safe to do so, such as by closing valves or by activating Emergency Shutdown Systems. If the gas source cannot be isolated, do not extinguish the flame, since re-ignition and explosion could occur.
Await arrival of emergency services.
Drench and cool cylinders or vessels with water spray from protected area at a safe distance.
If it is absolutely necessary to extinguish the flame, use only a dry chemical powder extinguisher.
Do not move cylinders for at least 24 hours. Avoid shock and bumps to cylinders.
Carbon oxides (CO, CO2) fumes may be produced should burning occur especially within an enclosed space (ie causing a deficiency of oxygen). Fumes may be hazardous to personnel.
Fire fighters should wear full protective clothing and be aware of the risk of possible explosion (especially in a confined space, ignition of spilled LPG). Flashback may occur along vapour trail.
Where possible, remove cool cylinders from the path of the fire. Do not re-use a fire-exposed vessel or cylinder – seek advice of supplier.

Hazchem Code

2YE (as defined in ADG7 published in 2007)
2WE (as defined in ADG6 published in 1998)

6. ACCIDENTAL RELEASE MEASURES

Environmental precautions

As this product has a very low flash point any spillage or leak is a fire and / or explosion hazard. If a leak has not ignited, stop gas flow, isolate sources of ignition and evacuate personnel.
Ensure good ventilation.
Liquid leaks generate large volumes of heavier than air flammable vapour which may travel to remote sources of ignition (e.g. along drainage systems).
Where appropriate, use water spray to disperse the gas or vapour and to protect personnel attempting to stop leakage.
Vapour may collect in any confined space.

Personal precautions, protective equipment and emergency procedures

If a tank or cylinder is leaking, eliminate all potential ignition sources, evacuate area of personnel and activate the emergency shutdown system where fitted. If safe to so, hose the leaking tank or cylinder with water using a spray to dissipate the vapour.

For a small cylinder which is leaking, move the cylinder to an open area by carrying upright, evacuate the area of personnel, and spray the cylinder with water to dissipate the vapour.

Never leave or move a leaking cylinder into a confined space (building, shed or vehicle) as vapour will collect in the confined space, creating several hazards.

Methods of containment and cleaning up

Stop the flow of material, if this is without risk. If the leak cannot be stopped and the cylinder can be moved, move the cylinder to a safe and well-ventilated area, and allow to discharge.
Keep area evacuated of all personnel and free from ignition sources until any leaked or spilled liquid has evaporated.
LPG is unlikely to contaminate water or soil.

7. HANDLING AND STORAGE

Precautions for Safe Handling

Avoid inhalation of vapour.
Avoid contact with liquid and cold storage containers.

When handling cylinders wear protective footwear and suitable gloves.
Always ensure that cylinders are within test date, are fit for use and are leak checked prior to use.
LPG liquid leak may cause freezing and visible ice formation around the location of the leak.
Ice formation is to be encouraged as it may reduce the severity of a liquid leak by obstructing the flow before the leak is isolated. (A very fine water mist delivered from a safe distance will promote ice formation around a liquid leak).
Do not fill dented, gouged or rusty containers (refer AS2337.1). Only fill cylinders to 80% fill level (ullage tube via decanting or mass via mechanical filling).
The maximum fill level for vessels is dependent upon their size and location as detailed in AS / NZS 1596.
Avoid contact with eyes.
Class 2.1 Flammable Gas products may only be loaded in the same vehicle or packed in the same freight container with the classes of products as permitted in the ADG Code (see references).
Cylinders shall only be transported in an upright, secure position in accordance with the Australian National Road Transport Commission Load Restraint Guide and shall not be dropped.

Conditions for Safe Storage

Store and use only in equipment / containers designed for use with this product.
Store and dispense only in well ventilated areas away from heat and sources of ignition.
Do not enter storage vessels. If entry to a vessel is necessary, contact the supplier.
Cylinders and vessels must be properly labelled. Do not remove warning labels. LP Gas cylinders shall be stored in accordance with the requirements of the ADG Code, AS 4332 and AS/NZS1596.
Do not store in pits and basements where vapour may collect.
Store cylinders securely in an upright position. Note: forklift cylinders may be stored horizontally.
Store away from incompatible materials particularly oxidizing agents. Check vessels and cylinders are clearly labelled.
Do not contaminate cylinders or vessels with other products.

Other Information

Product spilt on clothing may give rise to delayed evaporation and subsequent fire hazard.
Check for leaks by sound and smell and by locating with soapy water or with approved detection devices.
Use only equipment and pipework designed and approved (where applicable) for LP Gas applications.
Ensure that cylinders cannot be struck by forklift vehicles or by dropped or rolled objects, etc.
Refer to Australian state and territory Dangerous Goods regulations.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Ventilation

Maintain adequate ventilation.
Confined areas (e.g. tanks) should be adequately ventilated and gas tested and must NEVER be entered unless under supervision via a Permit Procedure.

Exposure Standards

Ingredient Name	Occupational Exposure Limits
LP Gas	NOHSC TWA: 1000 ppm 8 hour(s)
Butane	NOHSC TWA: 1900 mg/m3 8 hour(s) TWA: 800 ppm 8 hour(s)
Propane	ACGIH TLV TWA: 1000 ppm 8 hour(s)
Propylene	ACGIH TLV TWA: 500 ppm 8 hour(s)

PPE

For skin protection, wear suitable gloves and overalls to prevent cold burns and frostbite. Wear coverall clothing of the anti-static, low flame spread type. When handling cylinders wear protective footwear.
For eye and face protection, wear safety googles or face shield.

For respiratory protection, where an inhalation risk exists, wear a self-contained breathing apparatus or airline respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

PROPERTY	PROPANE		BUTANE	
Appearance	Colourless Gas		Colourless Gas	
Odour	Characteristic Odour		Characteristic Odour	
Odour Threshold	>5000 ppm		>5000 ppm	
Chemical Formula	C_3H_8		C_4H_{10}	
Molecular Weight	44.1		58.1	
Boiling Point	-42°C		-0.5°C	
Vapour Pressure at 40°C	1530 kPa (max)		520 kPa (max)	
	Liquid at 15^0C	Gas At 101 kPa & 15^0C	Liquid at 15^0C	Gas At 101 kPa & 15^0C
Density (kg/m3)	510	1.86	568	2.47
Relative Density:				
water = 1.0	0.510		0.568	
air = 1.0		1.53		2.00
Litres/tonne	1961	536000	1760	405000
m3/tonne	1.961	536	1.760	405
m3/m3 of liquid	1.000	274	1.000	235
Specific heat of liquid (kJ/kg/0C)	2.512		2.386	
Latent heat of Vapourisation				
(MJ/m3)	232		239	
(MJ/kg = GJ/t)	0.358		0.372	
Heat combustion				
(MJ/m3)	25000	93.3	28800	121.9
(MJ/kg = GJ/t)	50.1	50.1	49.47	49.47
Volume of air (m3) needed to burn 1m3 of gas		23.7		31.0
Flash point		-104^{0}C		-60^{0}C
Ignition temp.		493-549^{0}C		482-538^{0}C
Max. flame temp.		1970^{0}C		1990^{0}C
Flammability	Extremely flammable	Extremely flammable	Extremely flammable	Extremely flammable
Limits of flammability in air (% by vol):				
upper %		9.6		8.6
lower %		2.4		1.9
Other Properties:	Solubility (water): 0.07cm^3 / cm^3			

Other name/numbers:	LPGas Propane Butane IsoButane	UN 1075 UN 1978 UN 1011 UN 1969

10. STABILITY AND REACTIVITY

Reactivity

Reacts violently with oxidizing agents. Incompatible with oxidising agents, acids, heat and ignition sources. Do not use natural rubber flexible hoses. Also incompatible (potentially violently) with oxygen, halogens and metal halides.

Conditions to avoid

Avoid heat, sparks, open flames and other ignition sources

Decomposition Products

Heating to decomposition produces acrid smoke and irritating fumes.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary

Asphyxiant gas. Symptoms of exposure are directly related to displacement of oxygen from air.

Eye

Non irritating. However, direct contact with evaporating liquid may result in severe cold burns with possible permanent damage.

Inhalation

Non irritating – Asphyxiant. Effects are proportional to oxygen displacement.
Low vapour concentrations may cause nausea, dizziness, headaches and drowsiness.
May have a narcotic effect if high concentrations of vapour are inhaled. High vapour concentrations may produce symptoms of oxygen deficiency which, coupled with central nervous system depression, may lead to rapid loss of consciousness.

Abuse

Under normal conditions of use the product is non hazardous, however abuse involving deliberate inhalation of very high concentrations of vapour can produce unconsciousness and / or result in a sudden fatality or brain damage.

Skin

Non irritating. Contact with evaporating liquid or supercold vessels or pipes may result in frost-bite with severe tissue damage.

Ingestion

Due to product form, ingestion is considered highly unlikely.

Toxicity Data

PROPANE (74-98-6)
LC50 (Inhalation) : 50,000 ppm
ISOBUTANE (75-28-5)
LC50 (Inhalation): 57pph/15 min (rat)

12. ECOLOGICAL INFORMATION

Eco Toxicity

Not toxic to flora, fauna or soil organisms.
Will not cause long term adverse effects in the environment and is not dangerous to the ozone layer.

Mobility

Spillages are unlikely to penetrate the soil.
The product is likely to volatise rapidly into the air.

Persistence / Degradability

Unlikely to cause long term adverse effects in the environment.

Bio-accumulative Potential

This material is not expected to bio-accumulate.

Other Ecological Information
Unlikely to cause long term effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Waste Disposal
Cylinders should be returned to the manufacturer or supplier for disposal.
Empty cylinders or vessels may contain some remaining product.
Hazard warning labels are a guide to the safe handling of empty packaging and should not be removed. LPGas cylinders or vessels should NEVER be inadvertently disposed of in any land fill facility without being rendered visually and physically unusable before disposal.
'EMPTY' container warning: 'empty' containers can sometimes retain residue (liquid and / or vapour) and can be dangerous.
DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS AND OTHER SOURCES OF IGNITION THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean.

Legislation
Dispose of in accordance with relevant legislation.

14. TRANSPORT INFORMATION

Transport
Transport of LPGas is controlled in accordance with the requirements of the ADG Code and the Load Restraint Guide.

UN Number
1075

Shipping Name
PETROLEUM GASES, LIQUEFIED

DG Class
2.1

Subsidiary Risk(s)
None Allocated

Packing Group
None Allocated

Hazchem Code
See Section 5

15. REGULATORY INFORMATION

AICS
All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

Poison Schedule
A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

16. OTHER INFORMATION

References
ALPGA (now Gas Energy Australia) Specification for Liquefied Petroleum Gas for Automotive use 2004.
ALPGA (now Gas Energy Australia) Specification for Liquefied Petroleum Gas for Heating use 2004.
ACGIH = American Conference of Governmental Industrial Hygienists
CAS Number = Chemical Abstracts Service Registry Number
HAZCHEM Code = Emergency action code of numbers and letters which gives information to emergency services
ICAO = International Civil Aviation Organisation
IATA = International Air Transport Association
IMDG = International Maritime Organisation Rules

NOHSC = National Occupational Health & Safety Commission, Australia
TWA = Time weighted average
STEL = Short term exposure limit
UN Number = United Nations Number, a four digit number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods
Petroleum and Gas Legislation / Queensland: 2004
Australian Standards as detailed within this document
The Australian Code for the Transport of Dangerous Goods by Road and Rail (commonly known as the ADG Code)
The Load Restraint Guide as prepared by the National Transport Commission