



CONSULTANTS ADVICE

Project:	Maritime Facility - 5-19 Bank Street, Pyrmont NSW 2009	Ref No.:	R200610 (NM170027_D1)
From:	Sandro Razzi – Core Engineering Group	Date:	23 rd May 2017
		Issue:	Rev A

Attention	Company	Email/Fax
To: Haydn Dayes	Urban Growth NSW	hdayes@urbangrowth.nsw.gov.au

RE: SEPP33 Risk Screening – Bank Street Commercial Wharf S75W Application – Pyrmont NSW

DECLARATION

CORE Engineering Group (CORE) in partnership with ACOR MCE Consultants (ACOR) have been engaged by Urban Growth NSW to develop this State Environmental Planning Policy 33 (SEPP 33) risk screening of a proposed development located in Pyrmont, NSW. This report has been prepared in accordance with the scope of services described in the agreed proposal between CORE and Urban Growth NSW. This report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Changes to circumstances or facts after certain information or material has been submitted may impact on the accuracy, completeness or currency of the information or material. This report has been prepared solely for use by the client, we accept no responsibility for its use by other parties without the specific authorization of CORE. We reserve the right to alter, amend, discontinue, vary or otherwise change any information, material or service at any time without subsequent notification. All access to, or use of, the information or material is at the user's risk and we accept no responsibility for the results of any actions taken on the basis of information or material provided, nor for its accuracy, completeness or currency.

Unless otherwise advised, the parties who have undertaken the Review and Endorsement confirm that the information contained in this document adequately describes the conditions of the proposed DG storage and site located at 5-19 Bank Street, Pyrmont NSW.

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1 INTRODUCTION

The proposed development, located at 5-19 Bank Street, Pyrmont, NSW is part of the Proposed Modification #3 of Sydney Heritage Fleet. The proposal is to modify the design of the dry land works (with the proposed buildings contained within the approved building footprint) and a change of use to that approved. This will facilitate the accommodation of harbour cruise businesses within Blackwattle Bay, space for which is limited in Sydney Harbour. Public access to the foreshore will remain a priority. The proposed development includes the storage of twelve (12) off 45 kg liquefied petroleum gas (LPG) cylinders, eighteen (18) off 22 kg carbon dioxide (CO₂) gas cylinders and six (6) off 10 kg CO₂ gas cylinders.

As part of the Secretary's Environmental Assessment Requirements (SEARs), it has been identified that hazardous materials will be stored within the facility and consideration to determine whether the facility may be a 'Potential Hazardous Industry' as defined by the NSW *Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (2011)*.

2 OBJECTIVES

The objective is to carry out a SEPP33 Risk Screening on the Bank Street Commercial Wharf and identify whether the twelve (12) off 45 kg LPG cylinders, eighteen (18) off 22 kg carbon dioxide (CO₂) gas cylinders and six (6) off 10 kg CO₂ gas cylinders in the proposed development would be classified as a potentially hazardous industry under the conditions of SEPP33.

The risk screening provides a broad estimate of possible off-site consequences arising from hazardous materials stored and handled on site. The risk screening will be based on the quantity of hazardous materials stored (Quantity screening) and the number of transport movements in and out of the site (Transport screening).

3 SCOPE

The scope is to conduct a risk screening, as per the guidelines of Applying SEPP33, for the proposed development of the Bank Street Commercial Wharf, located in Pyrmont, NSW.

This document applies the methods in *Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (2011)* for comparison of the screening threshold and whether the hazardous materials stored on site exceed the threshold limits and therefore require a Preliminary Hazard Analysis (PHA).

4 CRITERIA

The review and assessment was carried out based on the criteria of the *NSW Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (2011)*.

5 LIMITATIONS

We have assessed this application based on the information provided by Urban Growth NSW in relation to the storage quantities, locations, and design as part of the proposed alterations to the existing facility. It is Urban Growth NSW's responsibility to ensure that the installation meets the requirements and initiates the controls as required by the relevant legislation, regulations and standards.

The SEPP33 assessment is specific to Proposed Modification #3 of Sydney Heritage Fleet which includes modification on the design of the dry land works. All other proposals under this development is excluded from part of the scope.

If the proposed development is determined to require a PHA, the preparation of a PHA is separate to this document and should be conducted in accordance with the *Hazardous Industry Planning Advisory Paper No.6 – Hazard Analysis (HIPAP No. 6)*.

Note: the report and findings are not a substitute for full compliance with Australian Standards and Codes of Practice, the client shall ensure that they maintain their duty of care and consult the relevant legislation and guidelines.

Should the storage conditions or volumes change, the contents and findings in the report shall be reviewed and the risks associated with any change assessed and controlled.

6 METHODOLOGY

The methodology for the risk screening is to evaluate the proposed development and identify any exceedance in threshold limits as outlined in Applying SEPP33.

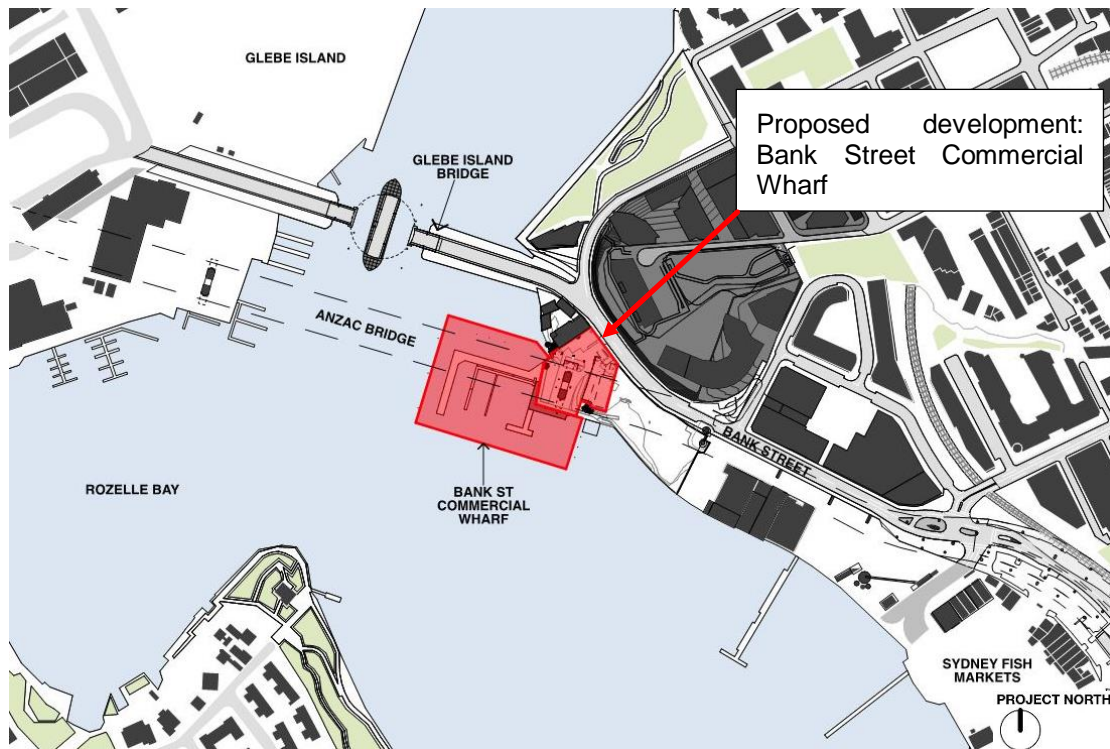
The following steps were undertaken:

- 1 Review of all the hazardous materials proposed to be stored within the facility, their location and quantities.
- 2 Review of the average number of road movements for the hazardous materials to and from the facility.
- 3 Assessment of the quantities and movements identified and comparison to the threshold limits identified in Applying SEPP 33.
- 4 Summarising findings and determining whether a Preliminary Hazard Analysis is required.

Note: All information obtained is provided to the client for verification and acceptance prior to being published.

7 FACILITY LAYOUT

7.1 SITE LOCATION



[Image courtesy of Drawing Number: S75W-01, Drawing title: Context, Project Number: 160316, Project Name: Bank Street Commercial Wharf S75W Application, Date: 11.04.17, by Bennett and Trimble]

7.2 SITE PLAN

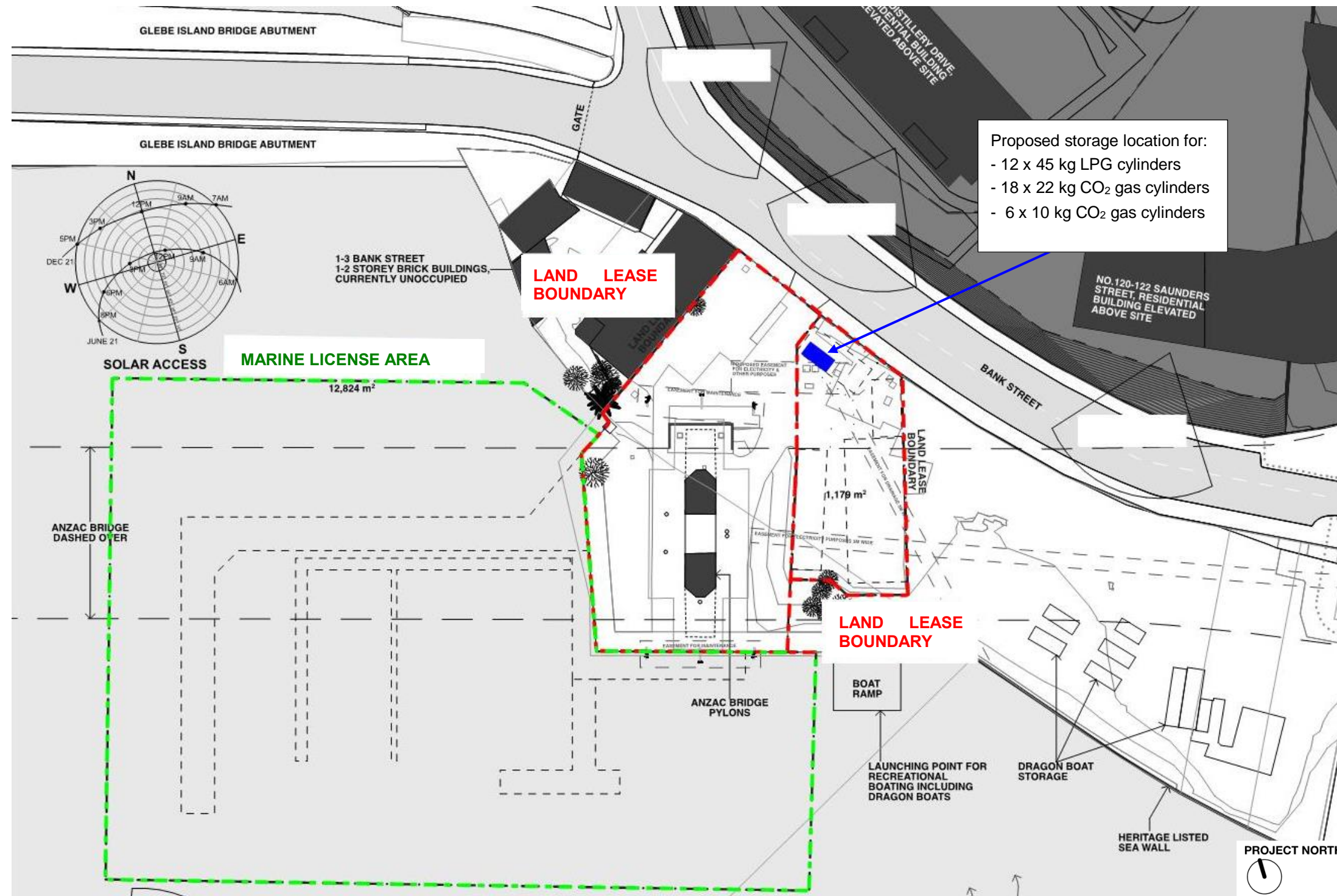


Figure 7-1: Proposed storage location of cylinders

Note: The development is part of the Proposed Modification #3 of Sydney Heritage Fleet. The proposal is to modify the design of the dry land works (with the proposed buildings contained within the approved building footprint) and a change of use to that approved. Proposed Modification #2 of Sydney Heritage Fleet, which sought to enable the construction of the water-based works authorised by the Approval ahead of the dry land works, was lodged separately on 23 November 2016 and approved on 15 March 2017. The development of Proposed Modification #2 is excluded from the scope of SEPP33 risk screening.

8 RISK SCREENING

8.1 PROPOSED STORAGE

Urban Growth NSW have provided a summary of the hazardous materials stored within the Bank Street Commercial Wharf and confirmed that no other hazardous materials are stored in adjacent locations within the land lease boundary.

The hazardous materials to be stored on site fall within the classification of the *Australian Code of Transportation of Dangerous Goods by Road and Rail (ADG7)*. The following table summarises the hazardous materials and locations included in the risk screening based on the information provided:

Table 8-1: Storage Locations and Quantities Included in the Risk Screening

LOCATION	CHEMICAL	STORAGE TYPE ¹	CLASS	PACKING GROUP	MAXIMUM QUANTITY
External	Liquefied Petroleum Gas (LPG)	Storage Vessel: Gas Cylinders	2.1	N/A	540 kg
External	Carbon dioxide (CO ₂)	Storage Vessel: Gas Cylinders	2.2	N/A	456 kg
Total Quantity:					996 kg

Note: Typical Safety Data Sheets have been provided for each product and are located in Appendix A.

*SEPP 33 does not apply to Class 2.2 categorised dangerous goods. Class 2.2 are non-flammable, non-toxic gases and are not considered to be potentially hazardous with respect to off-site risks and is not assessed for storage or transport thresholds.

¹ Storage design to be in accordance with the standards and regulations for the respective products.

8.2 PROPOSED ROAD MOVEMENTS

As advised by Urban Growth NSW, the LPG cylinders are replaced once a month with maximum load of 1 tonne per delivery. The CO₂ gas cylinders are also replaced once a month with maximum load of 1 tonne per delivery.

The following table summarises the usage of the identified hazardous materials to assist in determining the potential road movements expected as part of the operations.

Table 8-2: Typical Usage of hazardous materials

CHEMICAL	CLASS	PACKAGE GROUP	FREQUENCY	CHEMICAL	CLASS
LPG gas cylinders	2.1	N/A	12	0.25 ²	1 tonne ³
CO ₂ gas cylinders	2.2	N/A	12	0.25 ²	1 tonne ³

² As a conservative estimate, the delivery of once a month for the peak period (October to February) is used. It is noted that in the off-peak periods (March to September), the delivery is reduced to one delivery each quarter.

³ As a conservative estimate, the maximum load quantity for LPG and CO₂ cylinder delivery vehicle is based on the capability to replace all 36 gas cylinders (12 gas cylinders x 45 kg + 18 gas cylinders x 22 kg; 6 gas cylinders x 10 kg = 996 kg). The total mass of 996 kg is rounded to 1 tonne.

8.3 THRESHOLDS

The following tables provided are extracts from *Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (2011)*. The risk screening method is applied to LPG cylinders (Class 2.1) only.

As previously identified, SEPP 33 does not apply to Class 2.2 categorised dangerous goods. Class 2.2 are non-flammable, non-toxic gases and are not considered to be potentially hazardous with respect to off-site risks. Therefore, carbon dioxide (CO₂) is not assessed for storage or transport thresholds.

8.3.1 Screening Method for Storage

Table 1: Screening Method to be Used

Class	Method to Use/Minimum Quantity
1.1	Use graph at Figure 5 if greater than 100 kg
1.2-1.3	Table 3
2.1 — pressurised (excluding LPG)	Figure 6 graph if greater than 100 kg
2.1 — liquefied (pressure) (excluding LPG)	Figure 7 graph if greater than 500 kg
LPG (above ground)	table 3
LPG (underground)	table 3
2.3	table 3
3PGI	Figure 8 graph if greater than 2 tonne
3PGII	Figure 9 graph if greater than 5 tonne
3PGIII	Figure 9 graph if greater than 5 tonne
4	table 3
5	table 3
6	table 3
7	table 3
8	table 3

Note: *Classes 1.4, 1.5, 1.6, 2.2, 7 and 9 are excluded from the risk screening. Classes used are those referred to in the Dangerous Goods Code and are explained in appendix 6.*

If Table 1 indicates that a graph is to be used: If the quantity is below the minimum quantity in Table 1, then it is not potentially hazardous and there is no need to use the graph.

Table 3: General Screening Threshold Quantities

Class	Screening Threshold	Description
1.2	5 tonne	or are located within 100 m of a residential area
1.3	10 tonne	or are located within 100 m of a residential area
2.1	(LPG only — not including automotive retail outlets ¹) 10 tonne or 16 m ³ if stored above ground 40 tonne or 64 m ³ if stored underground or mounded	
2.3	5 tonne	anhydrous ammonia, kept in the same manner as for liquefied flammable gases and not kept for sale
	1 tonne	chlorine and sulfur dioxide stored as liquefied gas in containers <100 kg
	2.5 tonne	chlorine and sulphur dioxide stored as liquefied gas in containers >100 kg
	100 kg	liquefied gas kept in or on premises
	100 kg	other poisonous gases
4.1	5 tonne	
4.2	1 tonne	
4.3	1 tonne	
5.1	25 tonne	ammonium nitrate — high density fertiliser grade, kept on land zoned rural where rural industry is carried out, if the depot is at least 50 metres from the site boundary
	5 tonne	ammonium nitrate — elsewhere
	2.5 tonne	dry pool chlorine — if at a dedicated pool supply shop, in containers <30 kg
	1 tonne	dry pool chlorine — if at a dedicated pool supply shop, in containers >30 kg
	5 tonne	any other class 5.1
5.2	10 tonne	
6.1	0.5 tonne	packing group I
	2.5 tonne	packing groups II and III
6.2	0.5 tonne	includes clinical waste
7	all	should demonstrate compliance with Australian codes
8	5 tonne	packing group I
	25 tonne	packing group II
	50 tonne	packing group III

Note: The classes used are those referred to in the Australian Dangerous Goods Code and are explained in Appendix 7.

As outlined in Section 8.1, the total expected quantity for LPG storage is 540 kg (0.54 tonne) and is below the screening threshold quantity of 10 tonne. Therefore, the proposed storage quantities of LPG cylinders would not be considered a potentially hazardous industry based on the screening threshold.

8.3.2 Screening Threshold for Transport

Table 2: Transportation Screening Thresholds

Class	Vehicle Movements		Minimum quantity*	
	Cumulative Annual	Peak or Weekly	per load (tonne) Bulk	Packages
1	see note	see note	see note	
2.1	>500	>30	2	5
2.3	>100	>6	1	2
3PGI	>500	>30	1	1
3PGII	>750	>45	3	10
3PGIII	>1000	>60	10	no limit
4.1	>200	>12	1	2
4.2	>100	>3	2	5
4.3	>200	>12	5	10
5	>500	>30	2	5
6.1	all	all	1	3
6.2	see note	see note	see note	
7	see note	see note	see note	
8	>500	>30	2	5
9	>1000	>60	no limit	

Note: Where proposals include materials of class 1, 6.2 or 7, the Department of Planning should be contacted for advice. Classes used are those referred to in the Dangerous Goods Code and are explained in Appendix 7.

* If quantities are below this level, the potential risk is unlikely to be significant unless the number of traffic movements is high.

As outlined in Section 8.2, the delivery for the Class 2.1 LPG cylinders are estimated to be in a 1 tonne load. This is below the minimum quantity per load threshold of 5 tonnes, which makes it not potentially hazardous. In addition, the estimated cumulative delivery of LPG gas is 0.25 times weekly and 12 times annually, which is below the threshold for transportation screening of Class 2.1.

Therefore, the proposed traffic movements are below the screening threshold and does not trigger the definition of a potential hazardous industry.

9 CONCLUSION

As part of the SEPP33 risk screening process for a potentially hazardous industry, the hazardous materials identified for storage (LPG cylinders and CO₂ gas cylinders) are required to be assessed to determine if quantities stored or circumstances of storage require a further Preliminary Hazardous Analysis.

Based on the information provided for the hazardous materials proposed to be stored at the Bank Street Commercial Wharf and using the risk screening methods outlined in Applying SEPP33 for storage quantities and transport movements, the proposed development would not be considered a potentially hazardous industry and therefore does not require a Preliminary Hazard Analysis.

APPENDIX A SAFETY DATA SHEETS

Danger



SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

SDS no : AL623

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses : Industrial and professional. Perform risk assessment prior to use.
 Test gas/Calibration gas.
 Laboratory use.
 Contact supplier for more information on uses.

Uses advised against : Consumer use.

1.3. Details of the supplier of the safety data sheet

Company identification : Air Liquide Australia Limited
 Level 9 / 380 St. Kilda Road
 3004 Melbourne VIC Australia
 +61 3 9697 9888
 ALAEnquiries@AirLiquide.com

1.4. Emergency telephone number

Emergency telephone number : 1800 812 588

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

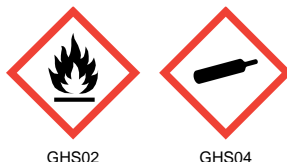
Classification according to WHS Regulation

Physical hazards	Flammable gases, Category 1	H220
	Gases under pressure : Liquefied gas	H280

2.2. Label elements

Classification according to WHS Regulation

Hazard pictograms :



Signal word : Danger

Hazard statements : H220 - Extremely flammable gas.
 H280 - Contains gas under pressure; may explode if heated.

Precautionary statements

- Prevention : P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

- Response : P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so.
- Storage : P403 - Store in a well-ventilated place.

2.3. Other hazards

: None.

SECTION 3: Composition/information on ingredients**3.1. Substance** : Not applicable**3.2. Mixture**

Name	Product identifier	%	Classification according to WHS Regulation
Propane	(CAS No) 74-98-6 (EC no) 200-827-9 (EC index no) 601-003-00-5 (REACH-no) 01-2119486944-21	45 - 55	Flam. Gas 1, H220 Press. Gas (Liq.), H280
Butane n-	(CAS No) 106-97-8 (EC no) 203-448-7 (EC index no) 601-004-00-0 (REACH-no) 01-2119474691-32	45 - 55	Flam. Gas 1, H220 Press. Gas (Liq.), H280

SECTION 4: First aid measures**4.1. Description of first aid measures**

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
- Skin contact : For liquid spillage - flush with water for at least 15 minutes.
- Eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.
Refer to section 11.

4.3. Indication of any immediate medical attention and special treatment needed

: None.

SECTION 5: Firefighting measures**5.1. Extinguishing media**

- Suitable extinguishing media : Water spray or fog.
- Unsuitable extinguishing media : Carbon dioxide.
Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

- Specific hazards : Exposure to fire may cause containers to rupture/explode.
- Hazardous combustion products : None.

5.3. Advice for fire-fighters

Specific methods	: Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems. If possible, stop flow of product. Use water spray or fog to knock down fire fumes if possible. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Move containers away from the fire area if this can be done without risk.
Special protective equipment for fire fighters	: In confined space use self-contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.
Hazchemcode	: 2YE

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- : Try to stop release.
- Evacuate area.
- Consider the risk of potentially explosive atmospheres.
- Eliminate ignition sources.
- Ensure adequate air ventilation.
- Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
- Act in accordance with local emergency plan.
- Stay upwind.

6.2. Environmental precautions

- : Try to stop release.

6.3. Methods and material for containment and cleaning up

- : Ventilate area.

6.4. Reference to other sections

- : See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- | | |
|-------------------------|---|
| Safe use of the product | : The substance must be handled in accordance with good industrial hygiene and safety procedures.
Only experienced and properly instructed persons should handle gases under pressure.
Consider pressure relief device(s) in gas installations.
Ensure the complete gas system was (or is regularly) checked for leaks before use.
Do not smoke while handling product.
Protect eyes, face and skin from liquid splashes.
Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment.
Purge air from system before introducing gas.
Take precautionary measures against static discharge.
Keep away from ignition sources (including static discharges).
Consider the use of only non-sparking tools.
Do not breathe gas.
Avoid release of product into atmosphere. |
|-------------------------|---|

Safe handling of the gas receptacle :

- : Refer to supplier's container handling instructions.
- Do not allow backfeed into the container.
- Protect cylinders from physical damage; do not drag, roll, slide or drop.
- When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.
- Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.
- If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.
- Never attempt to repair or modify container valves or safety relief devices.
- Damaged valves should be reported immediately to the supplier.
- Keep container valve outlets clean and free from contaminants particularly oil and water.
- Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
- Close container valve after each use and when empty, even if still connected to equipment.
- Never attempt to transfer gases from one cylinder/container to another.
- Never use direct flame or electrical heating devices to raise the pressure of a container.
- Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.
- Containers should be stored in the vertical position and properly secured to prevent them from falling over.

7.2. Conditions for safe storage, including any incompatibilities

:

- : Observe all regulations and local requirements regarding storage of containers.
- Containers should not be stored in conditions likely to encourage corrosion.
- Container valve guards or caps should be in place.
- Containers should be stored in the vertical position and properly secured to prevent them from falling over.
- Stored containers should be periodically checked for general condition and leakage.
- Keep container below 50°C in a well ventilated place.
- Store containers in location free from fire risk and away from sources of heat and ignition.
- Keep away from combustible materials.
- Segregate from oxidant gases and other oxidants in store.
- All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere.

7.3. Specific end use(s)

: None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

LIQUEFIED PETROLEUM GAS (LPG)		
OEL : Occupational Exposure Limits		
Australia	TWA (mg/m ³)	1800 mg/m ³
	TWA (ppm)	1000 ppm

DNEL (Derived-No Effect Level) : No data available.

PNEC (Predicted No-Effect Concentration) : No data available.

8.2. Exposure controls

8.2.1. Appropriate engineering controls

:

- : Provide adequate general and local exhaust ventilation.
- Systems under pressure should be regularly checked for leakages.
- Ensure exposure is below occupational exposure limits (where available).
- Keep concentrations well below lower explosion limits.
- Gas detectors should be used when flammable gases/vapours may be released.
- Consider work permit system e.g. for maintenance activities.

8.2.2. Individual protection measures, e.g. personal protective equipment

- : A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered:
PPE compliant to the recommended EN/ISO standards should be selected.
- Eye/face protection
 - : Wear safety glasses with side shields.
 - Wear goggles and a face shield when transfilling or breaking transfer connections.
 - Standard EN 166 - Personal eye-protection.
 - Skin protection
 - Hand protection
 - : Wear working gloves when handling gas containers.
 - Standard EN 388 - Protective gloves against mechanical risk.
 - Other
 - : Consider the use of flame resistant anti-static safety clothing.
 - Standard EN ISO 14116 - Limited flame spread materials.
 - Standard EN ISO 1149-5 - Protective clothing: Electrostatic properties.
 - Wear safety shoes while handling containers.
 - Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
 - Respiratory protection
 - : Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres.
 - Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
 - Thermal hazards
 - : Wear cold insulating gloves when transfilling or breaking transfer connections.
 - Standard EN 511 - Cold insulating gloves.

8.2.3. Environmental exposure controls

- : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

- Physical state at 20°C / 101.3kPa : Gas.
- Colour : Mixture contains one or more component(s) which have the following colour(s):
Colourless.

Odour : There may be no odour warning properties, odour is subjective and inadequate to warn of overexposure.

Mixture contains one or more component(s) which have the following odour(s):
Stenchant often added. Sweetish.

Odour threshold : Odour threshold is subjective and inadequate to warn of overexposure.

pH value : Not applicable for gas-mixtures.

Molar mass : Not applicable for gas-mixtures.

Melting point : Not applicable for gas-mixtures.

Boiling point : Not applicable for gas-mixtures.

Flash point : Not applicable for gas-mixtures.

Evaporation rate (ether=1) : Not applicable for gas-mixtures.

Flammability range : Flammability range not available.

Vapour pressure [20°C] : No reliable data available.

Vapour pressure [50°C] : No reliable data available.

Relative density, gas (air=1) : Heavier than air.

Solubility in water : No data available

Partition coefficient n-octanol/water [log Kow] : Not applicable for gas-mixtures.

Auto-ignition temperature : Not known.

Viscosity [20°C] : Not applicable.

Explosive Properties : Not applicable.

Oxidising Properties : Not applicable.

9.2. Other information

Other data : Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity**10.1. Reactivity**

: No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

: Stable under normal conditions.

10.3. Possibility of hazardous reactions: Can form explosive mixture with air.
May react violently with oxidants.**10.4. Conditions to avoid**

: Keep away from heat/sparks/open flames/hot surfaces. – No smoking.

10.5. Incompatible materials

: None.

10.6. Hazardous decomposition products

: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information**11.1. Information on toxicological effects****Acute toxicity** : Classification criteria are not met.
Toxicological effects not expected from this product if occupational exposure limit values are not exceeded.**Propane (74-98-6)**

LC50 inhalation rat (ppm) | 20000 ppm/4h

Skin corrosion/irritation : No known effects from this product.**Serious eye damage/irritation** : No known effects from this product.**Respiratory or skin sensitisation** : No known effects from this product.**Germ cell mutagenicity** : No known effects from this product.**Carcinogenicity** : No known effects from this product.**Toxic for reproduction : Fertility** : No known effects from this product.**Toxic for reproduction : unborn child** : No known effects from this product.**STOT-single exposure** : No known effects from this product.**STOT-repeated exposure** : No known effects from this product.**Aspiration hazard** : Not applicable for gases and gas mixtures.**SECTION 12: Ecological information****12.1. Toxicity**

Assessment : Classification criteria are not met.

12.2. Persistence and degradability

Assessment : No data available.

12.3. Bioaccumulative potential

Assessment : No data available.

12.4. Mobility in soil

Assessment : No data available.

12.5. Results of PBT and vPvB assessment

Assessment : Not classified as PBT or vPvB.

12.6. Other adverse effects

Effect on ozone layer : None.

Effect on the global warming : No known effects from this product.

SECTION 13: Disposal considerations**13.1. Waste treatment methods**

Contact supplier if guidance is required.
Do not discharge into areas where there is a risk of forming an explosive mixture with air.
Waste gas should be flared through a suitable burner with flash back arrestor.
Do not discharge into any place where its accumulation could be dangerous.
Ensure that the emission levels from local regulations or operating permits are not exceeded.
Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org> for more guidance on suitable disposal methods.

List of hazardous waste codes (from Commission Decision 2001/118/EC) : 16 05 04: Gases in pressure containers (including halons) containing dangerous substances.

13.2. Additional information

: None.

SECTION 14: Transport information**14.1. UN number**

UN-No. : 1965

14.2. UN proper shipping name**Transport by road/rail (ADR/RID)** : HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (Butane n-, Propane)**Transport by air (ICAO-TI / IATA-DGR)** : Hydrocarbon gas mixture, liquefied, n.o.s. (Butane n-, Propane)**Transport by sea (IMDG)** : HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (Butane n-, Propane)**14.3. Transport hazard class(es)****Labelling** :

2.1 : Flammable gases

Transport by road/rail (ADG)



LIQUEFIED PETROLEUM GAS (LPG)

SDS Ref.: AL623

Class : 2
Hazchemcode : 2YE
Hazard identification number : 23
Tunnel Restriction : B/D - Tank carriage : Passage forbidden through tunnels of category B, C, D and E. Other carriage : Passage forbidden through tunnels of category D and E

Transport by air (ICAO-TI / IATA-DGR)

Class / Div. (Sub. risk(s)) : 2.1

Transport by sea (IMDG)

Class / Div. (Sub. risk(s)) : 2.1
Emergency Schedule (EmS) - Fire : F-D
Emergency Schedule (EmS) - Spillage : S-U

14.4. Packing group

Transport by road/rail (ADR/RID) : Not applicable
Transport by air (ICAO-TI / IATA-DGR) : Not applicable
Transport by sea (IMDG) : Not applicable

14.5. Environmental hazards

Transport by road/rail (ADR/RID) : None.
Transport by air (ICAO-TI / IATA-DGR) : None.
Transport by sea (IMDG) : None.

14.6. Special precautions for user

Packing Instruction(s)

Transport by road/rail (ADR/RID) : P200
Transport by air (ICAO-TI / IATA-DGR)
 Passenger and Cargo Aircraft : Forbidden
 Cargo Aircraft only : 200
Transport by sea (IMDG) : P200

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment.
Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.
Before transporting product containers:
- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure cylinder valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.

HAZCHEMCODE : 2YE

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

: Not applicable.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**National regulations**

Ensure all national/local regulations are observed.

15.2. Chemical safety assessment

: A CSA does not need to be carried out for this product.

SECTION 16: Other information

Indication of changes : Revised safety data sheet in accordance with commission regulation (EU) No 453/2010.

Training advice : Ensure operators understand the flammability hazard. Receptacle under pressure.

Full text of H-statements

Flam. Gas 1	Flammable gases, Category 1
Press. Gas (Liq.)	Gases under pressure : Liquefied gas
H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated
R12	Extremely flammable
F+	Extremely flammable

DISCLAIMER OF LIABILITY : Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
Details given in this document are believed to be correct at the time of going to press.
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Warning**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

Trade name : Carbon dioxide
SDS no : AL062
Chemical description : Carbon dioxide
CAS No : 124-38-9
EC no : 204-696-9
EC index no : ---
Registration-No. : Listed in Annex IV / V REACH, exempted from registration.
Chemical formula : CO₂

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses : Industrial and professional. Perform risk assessment prior to use.
Test gas/Calibration gas.
Purge gas, diluting gas, inerting gas.
Purging.
Laboratory use.
Shield gas for welding processes.
Use for manufacture of electronic/photovoltaic components.
Contact supplier for more information on uses.

1.3. Details of the supplier of the safety data sheet

Company identification : Air Liquide Australia Limited
Level 9 / 380 St. Kilda Road
3004 Melbourne VIC Australia
+61 3 9697 9888
ALAEquiries@AirLiquide.com

1.4. Emergency telephone number

Emergency telephone number : 1800 812 588

SECTION 2: Hazards identification**2.1. Classification of the substance or mixture****Classification according to WHS Regulation**

Physical hazards Gases under pressure : Liquefied gas H280

2.2. Label elements**Classification according to WHS Regulation**

Hazard pictograms



GHS04

Signal word

: Warning

Hazard statements

: H280 - Contains gas under pressure; may explode if heated.

Precautionary statements

- Storage : P403 - Store in a well-ventilated place.

2.3. Other hazards

: Asphyxiant in high concentrations.
Contact with liquid may cause cold burns/frostbite.

SECTION 3: Composition/information on ingredients

3.1. Substance

Name	Product identifier	%	Classification according to WHS Regulation
Carbon dioxide	(CAS No) 124-38-9 (EC no) 204-696-9 (EC index no) --- (Registration-No.) *1	100	Press. Gas (Liq.), H280

Contains no other components or impurities which will influence the classification of the product.

*1: Listed in Annex IV / V REACH, exempted from registration.

*2: Registration deadline not expired.

*3: Registration not required: Substance manufactured or imported < 1t/y.

Full text of R-phrases see section 16. Full text of H-statements see section 16.

3.2. Mixture : Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
- Skin contact : In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.
- Eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.
Low concentrations of CO2 cause increased respiration and headache.

4.3. Indication of any immediate medical attention and special treatment needed

: None.

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media : Water spray or fog.
- Unsuitable extinguishing media : Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

- Specific hazards : Exposure to fire may cause containers to rupture/explode.
- Hazardous combustion products : None.

5.3. Advice for fire-fighters

- Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
If possible, stop flow of product.
Use water spray or fog to knock down fire fumes if possible.
Move containers away from the fire area if this can be done without risk.
- Special protective equipment for fire fighters : Use self-contained breathing apparatus.
Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.
- Hazchemcode : 2T

SECTION 6: Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures**

- : Try to stop release.
Evacuate area.
Monitor concentration of released product.
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Ensure adequate air ventilation.
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
Act in accordance with local emergency plan.
Stay upwind.

6.2. Environmental precautions

- : Try to stop release.

6.3. Methods and material for containment and cleaning up

- : Ventilate area.

6.4. Reference to other sections

- : See also sections 8 and 13.

SECTION 7: Handling and storage**7.1. Precautions for safe handling**

- Safe use of the product** : The substance must be handled in accordance with good industrial hygiene and safety procedures.
Only experienced and properly instructed persons should handle gases under pressure.
Consider pressure relief device(s) in gas installations.
Ensure the complete gas system was (or is regularly) checked for leaks before use.
Do not smoke while handling product.
Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
Avoid suck back of water, acid and alkalis.
Do not breathe gas.
Avoid release of product into atmosphere.
- Safe handling of the gas receptacle** : Refer to supplier's container handling instructions.
Do not allow backfeed into the container.
Protect cylinders from physical damage; do not drag, roll, slide or drop.
When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.
Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.
If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.
Never attempt to repair or modify container valves or safety relief devices.
Damaged valves should be reported immediately to the supplier.
Keep container valve outlets clean and free from contaminants particularly oil and water.
Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
Close container valve after each use and when empty, even if still connected to equipment.
Never attempt to transfer gases from one cylinder/container to another.
Never use direct flame or electrical heating devices to raise the pressure of a container.
Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.

7.2. Conditions for safe storage, including any incompatibilities

- : Observe all regulations and local requirements regarding storage of containers.
Containers should not be stored in conditions likely to encourage corrosion.
Container valve guards or caps should be in place.
Containers should be stored in the vertical position and properly secured to prevent them from falling over.
Stored containers should be periodically checked for general condition and leakage.
Keep container below 50°C in a well ventilated place.
Store containers in location free from fire risk and away from sources of heat and ignition.
Keep away from combustible materials.

7.3. Specific end use(s)

- : None.

SECTION 8: Exposure controls/personal protection**8.1. Control parameters**

OEL (Occupational Exposure Limits) : No data available.

DNEL (Derived-No Effect Level) : No data available.

PNEC (Predicted No-Effect Concentration) : No data available.

8.2. Exposure controls**8.2.1. Appropriate engineering controls**

- : Provide adequate general and local exhaust ventilation.
Systems under pressure should be regularly checked for leakages.
Ensure exposure is below occupational exposure limits (where available).
Oxygen detectors should be used when asphyxiating gases may be released.
Consider work permit system e.g. for maintenance activities.

8.2.2. Individual protection measures, e.g. personal protective equipment



- : A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered:
PPE compliant to the recommended EN/ISO standards should be selected.
- Eye/face protection : Wear safety glasses with side shields.
Wear safety glasses with side shields or goggles when transfilling or breaking transfer connections.
Standard EN 166 - Personal eye-protection.
 - Skin protection
 - Hand protection : Wear working gloves when handling gas containers.
Standard EN 388 - Protective gloves against mechanical risk.
 - Other : Wear safety shoes while handling containers.
Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
 - Respiratory protection : Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres.
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
 - Thermal hazards : None necessary.
- 8.2.3. Environmental exposure controls**
- : None necessary.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

- Physical state at 20°C / 101.3kPa : Gas.
- Colour : Colourless.

Odour : No odour warning properties.

Odour threshold : Odour threshold is subjective and inadequate to warn of overexposure.

pH value : Not applicable.

Molar mass : 44 g/mol

Melting point : -78.5 °C

Boiling point : -56.6 °C (s)

Flash point : Not applicable for gases and gas mixtures.

Critical temperature [°C] : 30 °C

Evaporation rate (ether=1) : Not applicable for gases and gas mixtures.

Flammability range : Non flammable.

Vapour pressure [20°C] : 57.3 bar(a)

Vapour pressure [50°C] : Not applicable.

Relative density, gas (air=1) : 1.52

Relative density, liquid (water=1) : 0.82

Solubility in water : 2000 mg/l Completely soluble.

Partition coefficient n-octanol/water [log Kow] : 0.83

Auto-ignition temperature : Not applicable.

Viscosity [20°C] : Not applicable.

Explosive Properties : Not applicable.

Oxidising Properties : None.

9.2. Other information

Other data : Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

: No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

: Stable under normal conditions.

10.3. Possibility of hazardous reactions

: None.

10.4. Conditions to avoid

: None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

: None.
For additional information on compatibility refer to ISO 11114.

10.6. Hazardous decomposition products

: None.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : In high concentrations cause rapid circulatory insufficiency. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness.
Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. 5% CO₂ has been found to act synergistically to increase the toxicity of certain other gases (CO, NO₂). CO₂ has been shown to enhance the production of carboxy- or met-hemoglobin by these gases possibly due to carbon dioxide's stimulatory effects on the respiratory and circulatory systems.

Skin corrosion/irritation : No known effects from this product.

Serious eye damage/irritation : No known effects from this product.

Respiratory or skin sensitisation : No known effects from this product.

Germ cell mutagenicity : No known effects from this product.

Carcinogenicity : No known effects from this product.

Toxic for reproduction : Fertility : No known effects from this product.

Toxic for reproduction : unborn child : No known effects from this product.

STOT-single exposure : No known effects from this product.

STOT-repeated exposure : No known effects from this product.

Aspiration hazard : Not applicable for gases and gas mixtures.

SECTION 12: Ecological information

12.1. Toxicity

Assessment : No ecological damage caused by this product.

12.2. Persistence and degradability

Assessment : No ecological damage caused by this product.

12.3. Bioaccumulative potential

Assessment : No ecological damage caused by this product.

12.4. Mobility in soil

Assessment : No ecological damage caused by this product.

12.5. Results of PBT and vPvB assessment

Assessment : Not classified as PBT or vPvB.

12.6. Other adverse effects

Effect on ozone layer : None.

Global warming potential [CO₂=1] : 1

Effect on the global warming : When discharged in large quantities may contribute to the greenhouse effect.
Contains greenhouse gas(es) not covered by Regulation (EC) 842/2006.

SECTION 13: Disposal considerations**13.1. Waste treatment methods**

May be vented to atmosphere in a well ventilated place.
Discharge to atmosphere in large quantities should be avoided.
Do not discharge into any place where its accumulation could be dangerous.

List of hazardous waste codes (from Commission Decision 2001/118/EC) : 16 05 05: Gases in pressure containers other than those mentioned in 16 05 04.

13.2. Additional information

: None.

SECTION 14: Transport information**14.1. UN number**

UN-No. : 1013

14.2. UN proper shipping name

Transport by road/rail (ADG) : CARBON DIOXIDE

Transport by air (ICAO-TI / IATA-DGR) : CARBON DIOXIDE

Transport by sea (IMDG) : CARBON DIOXIDE

14.3. Transport hazard class(es)

Labelling :



2.2 : Non-flammable, non-toxic gases

Transport by road/rail (ADG)

Class : 2

Hazchemcode 2T

Hazard identification number : 20

Tunnel Restriction : C/E - Tank carriage : Passage forbidden through tunnels of category C, D and E. Other carriage : Passage forbidden through tunnels of category E

Transport by air (ICAO-TI / IATA-DGR)

Class / Div. (Sub. risk(s)) : 2.2

Transport by sea (IMDG)

Class / Div. (Sub. risk(s)) : 2.2

Emergency Schedule (EmS) - Fire : F-C

Emergency Schedule (EmS) - Spillage : S-V

14.4. Packing group

Transport by road/rail (ADR/RID) : Not applicable

Transport by air (ICAO-TI / IATA-DGR) : Not applicable

Transport by sea (IMDG) : Not applicable

14.5. Environmental hazards

Transport by road/rail (ADR/RID) : None.

Transport by air (ICAO-TI / IATA-DGR) : None.

Transport by sea (IMDG) : None.

14.6. Special precautions for user**Packing Instruction(s)**

Transport by road/rail (ADR/RID) : P200

Transport by air (ICAO-TI / IATA-DGR)

Passenger and Cargo Aircraft : 200

Cargo Aircraft only : 200

Transport by sea (IMDG) : P200

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment.
Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.
Before transporting product containers:
- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure cylinder valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.

HAZCHEMCODE : 2T

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

: Not applicable.

SECTION 15: Regulatory information**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****National regulations**

Ensure all national/local regulations are observed.

**15.2. Chemical safety assessment**

: A CSA does not need to be carried out for this product.

SECTION 16: Other information

Indication of changes : Revised safety data sheet in accordance with commission regulation (EU) No 453/2010.

Training advice : The hazard of asphyxiation is often overlooked and must be stressed during operator training.

Full text of H-statements

Press. Gas (Liq.)	Gases under pressure : Liquefied gas
H280	Contains gas under pressure; may explode if heated

DISCLAIMER OF LIABILITY

: Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
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