

MSM Milling Expansion



Preliminary Hazard Analysis Report

MSM Milling Pty Ltd

01 May 2024

→ The Power of Commitment



Project name		MSM Milling - Hazard Analysis and Fire Safety Study					
Document title		MSM Milling Expansion Preliminary Hazard Analysis Report					
Project number		12625366					
File name		12625366-GHD-00-00-RPT-RM-00001-S4-2_MSM Milling PHA.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S0	A	M. Collard	L. Gawecki D. Abela	N/A Draft	C. Thomson	N/A Draft	05/03/2024
S0	B	M. Collard	L. Gawecki	N/A Draft	C. Thomson	N/A Draft	19/03/2024
S4	0	M. Collard	L. Gawecki	On original	C. Thomson	On original	26/03/2024
S4	1	M. Collard	L. Gawecki	On original	C. Thomson	On original	29/04/2024
S4	2	D. Abela	L. Gawecki		C. Thomson		01/05/2024

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Executive summary

MSM Milling Pty Ltd (MSM Milling) have proposed an expansion to the Canola Processing Plant located at Dederang Street in Manildra, New South Wales (NSW). The expansion will include new site infrastructure and a solvent extraction plant. For this to be approved during the Development Application stage, an assessment must first be conducted as per State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021 to determine if the solvent extraction plant will be considered a 'potentially hazardous industry'.

GHD Pty Ltd (GHD) was commissioned by MSM Milling to prepare a risk screening and Preliminary Hazard Analysis (PHA) to determine if the proposed development for the new solvent extraction plant ('the proposal') is 'potentially hazardous or offensive' in accordance with the SEPP (Resilience and Hazards). To fulfill this requirement, a summary of Dangerous Goods (DGs) used on-site during construction and operation, a risk screening of DGs, and a Level 2 PHA were completed, as outlined in this report.

This report includes a description of the project, summary of DGs used on-site, identification of DGs expected to be transported, handled and stored on the proposed site, risk screening of DGs as per SEPP (Resilience and Hazards), and an assessment that reviews potential hazards that may arise during the construction, operation and maintenance of the development.

The results of the DGs and transport screening indicate that the proposal does exceed the SEPP (Resilience and Hazards) thresholds. As a result, the proposal is considered to be 'potentially hazardous.'

A Level 2 PHA was conducted as a qualitative desktop study and systematically identified any potential off-site impacts and mitigation measures to eliminate, or control identified hazards. The results of the hazard identification indicated that two (2) hazards have the largest potential for off-site harm. These included the following hazards:

- LPG tank leakage events, and ignition
- Hexane tank leakage events, and ignition leading to hexane / bund fire

The consequence modelling for these scenarios was performed using Det Norske Veritas (DNV) Process Hazards Analysis Software Tool (PHAst) version 8.71 commercial software package [1]. Event tree analysis was then undertaken to determine the frequency of each event and likely impacts to personnel (both injury and fatality), and property damage.

The cumulative off-site fatality risk results comply with the Hazardous Industry Planning Advisory Paper (HIPAP) No. 4 individual risk criteria of 0.5 in a million per annum, and the injury criteria of 50 in a million per annum.

Safeguards, as defined in Table 6.1, were required to control the risk scenarios to an acceptable level. The following recommendations were identified from this study:

- Implementing ongoing maintenance of all equipment associated with the expansion project.
- When finalising the site layout ensure personnel occupied buildings are spaced adequately from the LPG tank, hexane storage and any other dangerous goods.

The hazard identification and analysis demonstrate that the proposal can be designed, constructed, and operated in a manner that will meet the relevant regulations, standards and policies and minimise hazardous impact to the public.

Any changes to the assumptions used in this report should result in a review of the risk screening and PHA process and update as required.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.5 and the assumptions and qualifications contained throughout the report.

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1. Introduction

1.1 Background

MSM Milling Pty Ltd (MSM Milling) have proposed an expansion to the Canola Processing Plant located at Dederang Street in Manildra, New South Wales (NSW). The plant expansion includes three (3) separate Development Applications (DA) which will be built in the following stages:

1. DA1 – Approved

Rail intake upgrade, including:

- Building one (1) large grain silo, with the possibility of a second later
- Building a small, elevated silo
- Installing mechanical equipment such as walkways and conveyors

2. DA2 – Pending approval

New site infrastructure, including:

- Building offices and amenities for staff, carparking area, internal paths and roads, weighbridge, storage and loading facilities for canola oil and canola meal, and electrical equipment

3. DA3 – In progress

Solvent extraction plant (which is the focus of this PHA), including:

- A new canola oil Solvent Extraction Plant housed in a building with processing and mechanical equipment. Outside the building will be a new overhead conveyer and walkway to connect the existing plant to the new plant

MSM Milling have engaged GHD Pty Ltd (GHD) to undertake a risk screening to support DA3 and, if required, the corresponding Preliminary Hazard Analysis (PHA).

1.2 Purpose of this report

GHD was commissioned by MSM Milling to prepare a risk screening and Preliminary Hazard Analysis (PHA) to determine if the proposed development for the new solvent extraction plant ('the proposal') is 'potentially hazardous or offensive' in accordance with the State Environmental Planning Policy (SEPP) (Resilience and Hazards) [2], formerly named *SEPP No. 33 - Hazardous and Offensive Development*.

This report assesses the potential hazards and risks of the project under the SEPP (Resilience and Hazards).

This report provides sufficient information and assessment of risks to demonstrate that the project will prevent, or mitigate the identified impacts, including human health, the environment and property, associated with the proposal and that the residual risk levels are acceptable in relation to the surrounding land use.

As such, this report focuses on the impact of potential hazards associated with the use of dangerous goods (DGs) and hazardous substances that may arise during the construction and operation of the project. Specifically, this report:

- Describes the existing environment with respect to the project;
- Screens the quantities of DGs expected to be used during construction and operation of the project;
- Assesses the impacts of construction and operation of the project specific to DGs and other hazardous substances;
- Determines if the proposal is deemed a 'potentially hazardous or offensive industry'; and
- Recommends measures to mitigate any impacts identified.

1.3 Planning and development requirements

SEPP (Resilience and Hazards) presents a systematic approach to planning and assessing proposals for 'potentially hazardous or offensive' developments for the proposed industry or storage.

For development proposals classified as a 'potentially hazardous or offensive industry' the policy establishes a comprehensive test by way of a PHA to determine the risk to people, property, and the environment at the proposed location and in the presence of controls.

This report is to provide sufficient information and assessment of risks to show that the project satisfies the risk management requirements of the Council and the NSW Department of Planning and Environment and show the project will prevent or mitigate any identified impacts, including human health, the environment and property. By demonstrating that the residual risk levels are acceptable in relation to the surrounding land use, and that risk will be appropriately managed, the requirements under the SEPP (Resilience and Hazards) and the planning development will be met.

1.4 Scope

The scope of this report includes the new solvent extraction plant and the existing plant operations.

The following was excluded from this scope of work:

- Analysis of likely weather patterns has not been completed by GHD, and instead weather data was used for three general weather categories (wind speeds and Pasquill stability classes).

1.5 Limitations

This report has been prepared by GHD for MSM Milling and may only be used and relied on by MSM Milling for the purpose agreed between GHD and MSM Milling as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than MSM Milling arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 1.6 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by MSM Milling Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

It must be recognised that consequence modelling is only a tool to assist decision making and not a substitute for suitably experienced and competent engineering input. The results of consequence modelling are only representative of the potential consequences which may exist to the extent that the input data, assumptions and rule sets are representative of reality. The uncertainties in modelling inputs, and therefore in the results, can be significant, and the conclusions of modelling work are sensitive to variations in the inputs or modelling assumptions. This is an unavoidable limitation of the technique. This study is reliant on the ability of the PHAST software to correctly model the data and settings for this exercise. GHD have not conducted an independent verification of the software and disclaims any responsibility for the performance of the PHAST program.

1.6 Assumptions

The following assumptions have been made in the preparation of this report:

- The location of the MSM Milling expansion, as assessed in this report, is shown in the site plan in Appendix A.
- DG quantities provided are true and correct at the time of the screening.
- The chemical data (UN number, dangerous goods classification) was based on available Safety Data Sheets (SDS) and are referenced in Appendix B.
- All plant and equipment items are installed and operated in accordance with appropriate Australian Standards, codes, and guidelines.
- DGs are stored in accordance with the Australian Dangerous Goods Code (ADG Code), relevant standards and guidelines, even if not a licensable quantity.
- All equipment and systems are designed to be inherently safe.
- All equipment is maintained and operated as designed.
- Other DGs brought to site (not stored on-site) during construction and for routine work are minimal and are therefore not included in the assessment.
- Approximately 76 personnel will be on-site during production, a conservative estimate of personnel on-site 24/7 is 12.
- The existing plant has been operational since 2007 and underwent the necessary approval process and regulatory requirements at the time before construction. However, as the expansion is potentially hazardous it should consider hazards from the existing facility, and recent and pending approvals.

Additional assumptions are detailed in Section 7.3.

Any changes to the assumptions used in this report should result in a review of the screening process and update as required.

2. Site description

2.1 Overview

MSM Milling, located in Manildra in regional NSW, converts canola seeds sourced directly from local farmers into canola oil meal and stockfeed products. Their current operations involve mechanical oilseed crushing, refining, packaging, and stockfeed manufacturing.

The proposed development will be located at the same site in Dederang Street in Manildra, NSW, as per the site plan in Figure 2.1 and Appendix A.

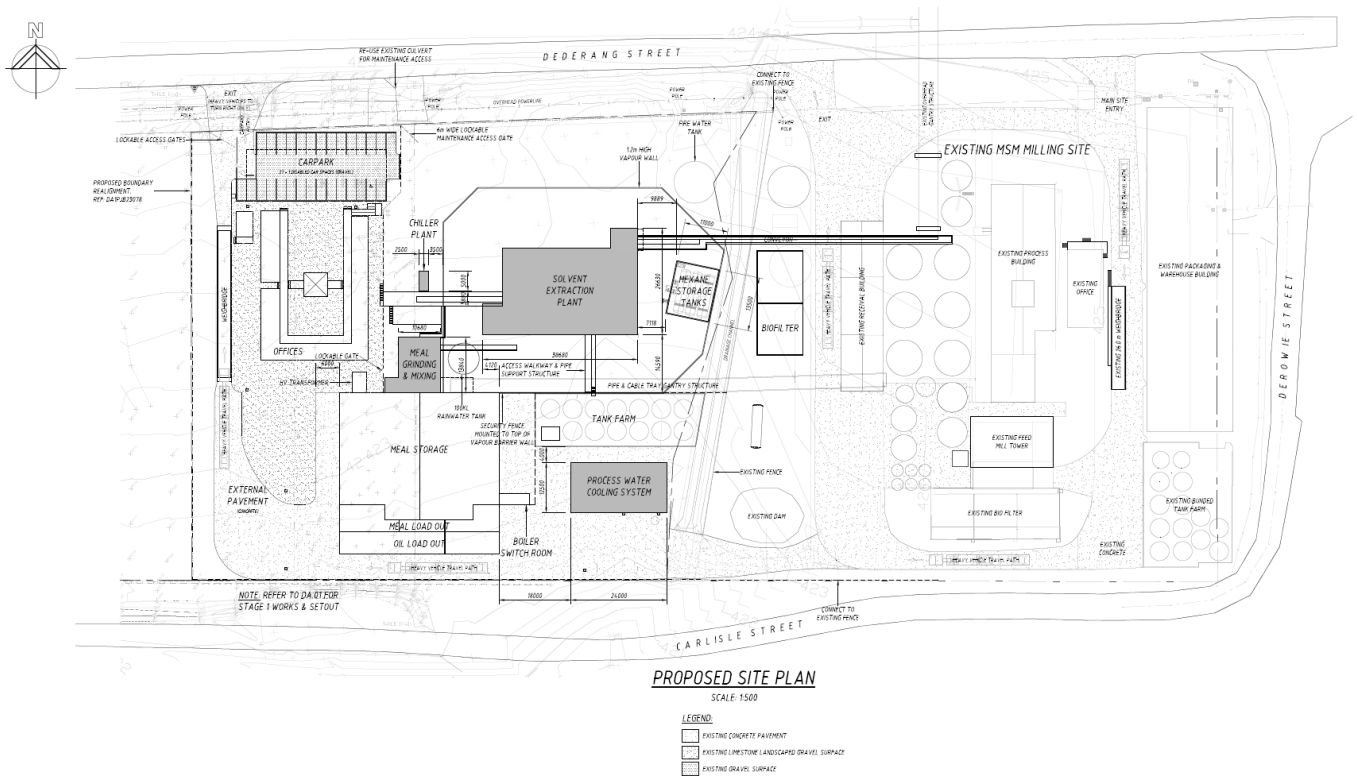


Figure 2.1 Proposed site map expansion [3]

2.2 Land use

The location of the development is within 1.0 km of Manildra residential area. Therefore, it is within 0.5 km of hospitals, schools, child-care facilities, aged care facilities, residential housing, hotels, motels, and tourist resorts.

2.3 Process description

The expansion aims to provide a solvent extraction process that utilises hexane to extract the residual oil from the canola seed cake. This method is expected to be more efficient in terms of energy and cost compared to mechanical pressing at the existing plant. The detailed operation process is shown in Figure 2.2.

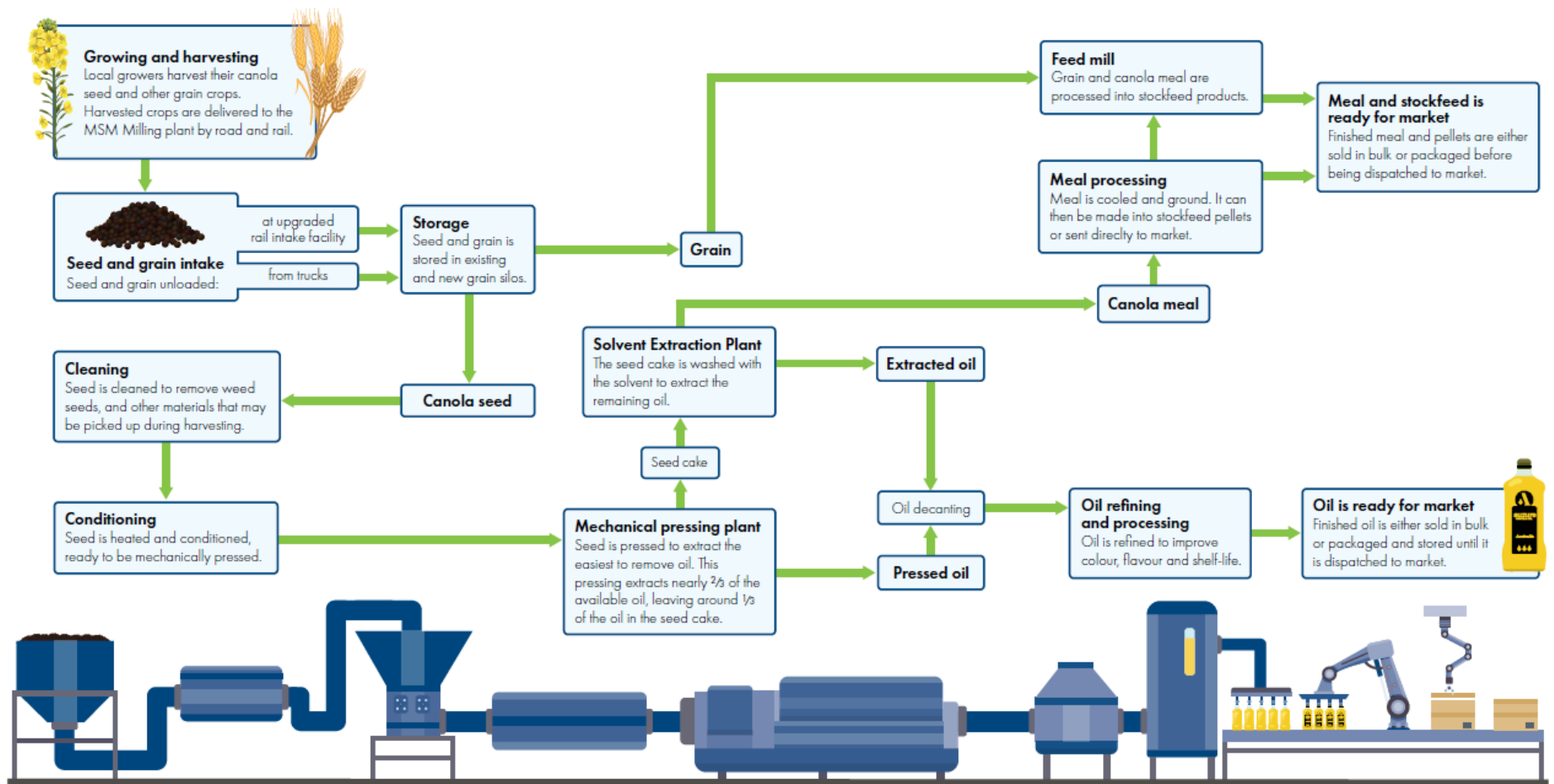


Figure 2.2 Solvent extraction plant operations process [4]

3. Legislative and policy context

3.1 State Environmental Planning Policy (Resilience and Hazards)

The NSW Department of Planning and Environment consolidated the state environmental planning policies (SEPPs) in December 2021 and was introduced in March 2022. As a result, the previously named *SEPP 33 – Hazardous and Offensive Development* provisions have been transferred to the SEPP (Resilience and Hazards). No policy changes have been made. The SEPP consolidation does not change the legal effect of the SEPPs being repealed and section 30A of the Interpretation Act 1987 applies to the transferred provisions, meaning the transfer does not affect the operation or meaning of the SEPP provisions.

The Department of Planning and Environment, NSW, 2011, *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines* [5] continues to provide the process for assessing if developments are potentially hazardous or offensive, including threshold levels that trigger the potentially hazardous or offensive status. *Applying SEPP 33* is the main guidance document that has been followed for this PHA.

3.2 Hazardous Industry Planning Advisory Paper No 4

The Department of Planning and Environment, NSW, 2011, *Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning* (HIPAP No 4) [6] sets out risk criteria for industries that are considered hazardous to comply to. This document is used when *Applying SEPP 33* [5] indicates a development is potentially hazardous.

3.3 Hazardous Industry Planning Advisory Paper No 6

The Department of Planning and Environment, NSW, 2011, *Hazardous Industry Planning Advisory Paper No 6 – Guidelines for Hazard Analysis* (HIPAP No 6) [7] lists the process required for undertaking a PHA. This document is used when *Applying SEPP 33* [5] indicates a development is potentially hazardous.

4. Methodology

The methodology to determine whether a project would be deemed potentially hazardous or potentially offensive and the required follow up assessments is provided in Table 4.1.

Table 4.1 Applying SEPP 33 method for potentially hazardous or offensive industries

Issue	Methodology to determine if potentially hazardous / offensive	Follow up assessment if confirmed as potentially hazardous / offensive industry
Potentially hazardous industry	Applying SEPP 33 risk screening process	Preliminary Hazard Analysis (PHA) required
Potentially offensive industry	Review of potential impacts to the amenity of the site or discharges, such as emissions (e.g. noise, air)	Meeting any licencing requirements issued by relevant authorities e.g. NSW Environmental Protection Agency (EPA) is required

The Applying SEPP 33 process is discussed in Sections 4.1 to 4.3.

4.1 Risk screening

SEPP (Resilience and Hazards) applies to any project which falls under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'. If not controlled appropriately, some activities within these industries may create an offsite risk or offence to people, property or the environment thereby making them potentially hazardous or potentially offensive.

SEPP (Resilience and Hazards) requires a screening process be undertaken and if the screening indicates that the project is potentially hazardous, then a PHA is required. If the project is potentially offensive, after giving consideration to the quantity and nature of any discharges and the significance of the offence likely to be caused, having regard to surrounding land use and the proposed controls, then additional controls are required.

A 'potentially hazardous industry' is one in which when all locational, technical, operational, and organisational safeguards are employed, continues to pose a significant risk, as per the requirements of SEPP (Resilience and Hazards). A 'potentially offensive industry' is one which would, in the absence of safeguards, emit a polluting discharge which would cause a significant level of offence.

The risk screening process concentrates on the storage of specific DG classes that have the potential for significant off-site effects. Specifically, the assessment involves the identification of classes and quantities of all DGs to be used, stored, or produced on-site with an indication of storage locations. The quantities of DGs are then assessed against the SEPP (Resilience and Hazards) 33 threshold quantities.

The overall risk screening process, as outlined in *Applying SEPP 33*, is summarised in Figure 4.1.

4.2 Hazard identification

Following screening, SEPP (Resilience and Hazards) requires a determination of whether the proposal poses significant risk or offence. This requires identification of potential hazards to highlight any risks associated with the interaction of the proposal (as a whole) with the surrounding environment (i.e. a systematic process to identify any potential off-site impacts). The aim of the hazard identification process is to show the project does not pose any significant risk or offence.

The Hazard Identification (HAZID) process is a desktop assessment and involves documenting possible events that could lead to a possible off-site incident. The assessment then lists the potential causes of the incident, as well as identification of operational and organisational safeguards to prevent the incidents from occurring or mitigate their impact.

The hazard identification process is conducted for both construction and operation of the project.

4.3 Preliminary hazard analysis

For a development proposal classified as 'potentially hazardous', a PHA is required to determine the risk to people, property, and the environment at the proposed location and in the presence of controls. Criteria of acceptability are used to determine if the development proposal is classified as a 'hazardous industry'. If this is the case, the development proposal may not be permissible within most industrial zonings in NSW.

The PHA identifies the potential hazards, analyses these hazards in terms of their impact to people and the environment and their likelihood of occurrence, quantifies the resulting risk to surrounding land uses and assess the risk to demonstrate that the proposal will not impose an unacceptable level of risk.

Applying SEPP 33 identifies three (3) levels of PHA. If a PHA is required, a judgement of the level of risk associated with the proposal is determined using the results of the screening and HAZID stages.

The three (3) levels of PHA are:

- Level 1 – if low potential for harm is identified, a qualitative PHA is completed
- Level 2 – if medium potential for harm is identified, a semi-quantitative PHA is completed
- Level 3 – if high potential for harm is identified, a quantitative PHA is completed.

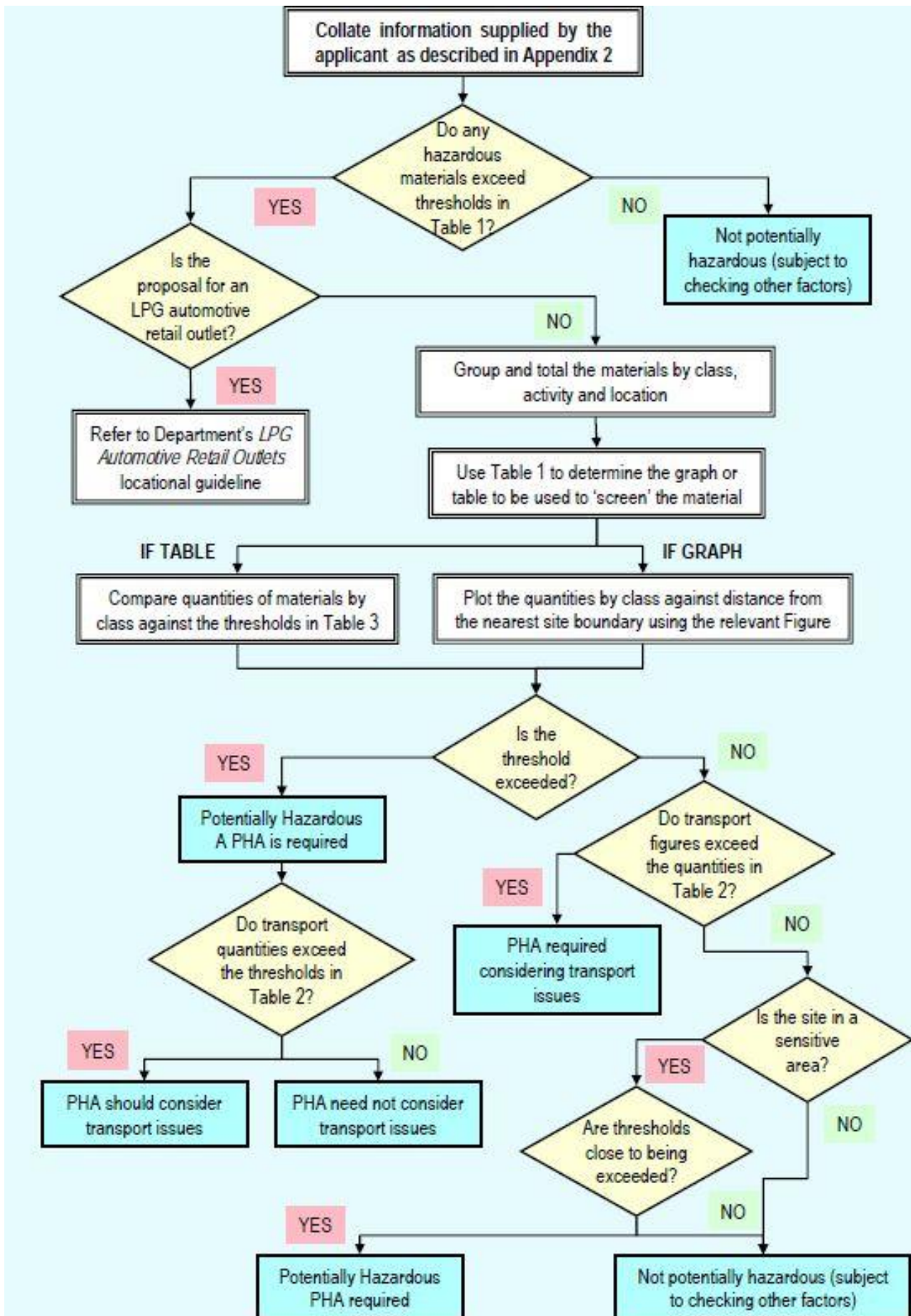


Figure 4.1 SEPP (Resilience and Hazards) risk screening process [2]

5. Risk screening and emissions

5.1 Dangerous goods screening

A DG is a substance or article that poses a risk to people, property, or the environment [5]. Each class represents a different type of DG. Some classes are divided into Packing Groups (PG) where PG I substances present a high level of danger, PG II substances present a medium level of danger, and PG III substances present a low level of danger. A summary of the different DG classes is shown in Table 5.1.

Table 5.1 Dangerous good classes [5]

DG Class	Packing Group	Description
1.1	N/A	Substances and articles which have a mass explosion hazard
1.2	N/A	Substances and articles which have a projection hazard but not a mass explosion hazard
1.3	N/A	Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both but not a mass explosion hazard
1.4	N/A	Substances and articles which present no significant hazard
1.5	N/A	Very insensitive substances which have a mass explosion hazard
1.6	N/A	Extremely insensitive articles which do not have a mass explosion hazard
2.1	N/A	Flammable gases
2.2	N/A	Non-flammable, non-toxic gases
2.3	N/A	Toxic gases
3	I, II, or III	Flammable liquids
4.1	I, II, or III	Flammable solids, self-reactive substances and solid desensitised explosives
4.2	I, II, or III	Substances liable to spontaneous combustion
4.3	I, II, or III	Substances which in contact with water emit flammable gases
5.1	I, II, or III	Oxidising substances
5.2	I, II, or III	Organic peroxides
6.1	I, II, or III	Toxic substances
6.2	I, II, or III	Infectious substances
7	N/A	Radioactive material
8	I, II, or III	Corrosive substances
9	I, II, or III	Miscellaneous dangerous goods and articles

Note, Class 1 combustible liquids are not classified as DGs under the United Nations (UN) but are considered DGs under workplace legislation.

5.1.1 Construction of the project

It is expected that chemicals used during the construction of the project will be present in small quantities. Therefore, it is expected that the SEPP (Resilience and Hazards) threshold will not be exceeded during the construction phase of the project.

5.1.2 Operation of the project

The chemical data (UN number, dangerous goods classification) was based on available Safety Data Sheets (SDS) provided by MSM Milling and are referenced in Appendix B.

A summary of the chemicals proposed to be used and/or stored on-site during operation of the proposal is shown in Table 5.2. Assumptions that have been made about the usage of these chemicals on-site, DG classification, quantities, and whether the chemicals exceed the SEPP (Resilience and Hazards) threshold have also been provided in Table 5.2.

Table 5.2, is split into the solvent extraction plant dangerous goods and the existing plant dangerous goods. The total quantities of dangerous goods for the entire site apart from LPG and canola meal do not exceed the SEPP (Resilience and Hazards) thresholds.

Table 5.2 Operations dangerous goods screening

Chemical/ product	UN #	DG class	Packing group	Expected storage quantity (Tonnes)	SEPP (Resilience and Hazards) combined storage threshold	Exceedance of SEPP (Resilience and Hazards) threshold	Comments / assumptions
Dangerous goods: Solvent extraction plant expansion							
Hexane	1208	3	II	99.7	10 m from boundary	Does not exceed threshold	
Canola meal, MS01 seed cake with more than 1.5% oil and not more than 11% moisture	1386	4.2	III	6100	1 Tonne	Exceeds threshold	Stored in new Meal Storage shed The existing plant meal storage silos will be used for canola seed once the expansion is operational
Sodium hydroxide, solution (Caustic Soda)	1824	8	III	1	1 Tonne	Does not exceed threshold	
Hydrogen Peroxide	2014	5.1	II	1	5 Tonne	Does not exceed threshold	
Dangerous goods: Existing Plant							
LPG (butane)	1011	2.1	-	35	10 Tonne or 16 m³ (Above ground)	Exceeds threshold	Stored in AGT (Above ground tank)
LPG (petroleum gases liquefied)	1075	2.1	-	0.8	10 Tonne or 16 m ³ (Above ground)	Does not exceed threshold	Portable Tank
Formaldehyde solution with not less than 25% formaldehyde	2209	8	III	11.3	50 Tonnes	Does not exceed threshold	
Phosphoric acid, solution	1805	8	III	7.2	50 Tonnes	Does not exceed threshold	
Sodium hydroxide, solution	1824	8	III	11.3	50 Tonnes	Does not exceed threshold	
Sodium hypochlorite, solution	1791	8	III	0.3	50 Tonnes	Does not exceed threshold	
Chlorine	1791	8	II	4.5	25 Tonnes	Does not exceed threshold	

The storage of LPG1 (butane) and Canola meal (MS01 seed cake) will exceed the SEPP (Resilience and Hazards) threshold.

5.2 Transport screening

5.2.1 Construction of the project

It is assumed that during construction of the project, there would be low volumes of DGs stored in the construction compound. Therefore, the transportation volumes of chemicals during construction are considered to be minimal. Based on this, the SEPP (Resilience and Hazards) transport thresholds for construction of the project are not exceeded.

5.2.2 Operation of the project

The SEPP (Resilience and Hazards) transport screening relates to the carriage of DGs to and from the proposal site. Table 5.3 shows the transport screening for the operation of the proposal. This includes the expected vehicle movements of each DG class and the vehicle movement thresholds according to SEPP (Resilience and Hazards).

The transport estimations were supplied by MSM Milling, based on yearly and monthly consumption of product. Hexane or LPG do not exceed the SEPP (Resilience and Hazards) transport thresholds. However, Canola meal is transferred off-site regularly to move the meal to the customer, therefore exceeding the SEPP (Resilience and Hazards) transport thresholds.

Table 5.3 Operations transport screening

Chemical/ product	DG Class	Combined quantity (as per Table 5.2) (Tonnes)	Combined transport movements (annual)	Transport movements threshold (annual)	Exceedance of SEPP (Resilience and Hazards) threshold
LPG1 (butane)	2.1	35	60	500	Does not exceed threshold
LPG (petroleum gases liquefied)	2.1	0.8	Unknown, assumed below threshold	500	Does not exceed threshold
Hexane	3	99.7	20	750	Does not exceed threshold
Canola meal (MS01 seed cake with more than 1.5% oil and not more than 11% moisture)	4.2	6100	2,500	100	Exceed threshold
Formaldehyde solution with not less than 25% formaldehyde	8	11.3	Unknown, assumed below threshold	500	Does not exceed threshold
Phosphoric acid, solution	8	7.2	Unknown, assumed below threshold	500	Does not exceed threshold
Sodium hydroxide, solution	8	11.3	Unknown, assumed below threshold	500	Does not exceed threshold
Sodium hypochlorite, solution	8	0.3	Unknown, assumed below threshold	500	Does not exceed threshold
Chlorine	8	4.5	Unknown, assumed below threshold	500	Does not exceed threshold

5.3 Summary of risk screening results

According to SEPP (Resilience and Hazards, if any of the screening thresholds are exceeded then the proposed development should be considered a 'potentially hazardous industry' and a PHA is required.

The results of the dangerous goods screening indicate that the proposed MSM Milling expansion project does exceed the thresholds within the SEPP (Resilience and Hazards) requirements for DG storage. The project is therefore considered a 'medium hazardous industry' and a semi-quantitative PHA is required. Given the type of dangerous goods that have exceeded the threshold, a Level 2 PHA (semi-quantitative) assessment is required, which is provided in Section 7.

The results of the transport screening do exceed the dangerous goods movement thresholds for canola meal. The same safety management system for storing the canola meal will also be used to mitigate the risk during transport as discussed in section 8.1. If changes are to occur to the proposed transport of dangerous goods, it is recommended that the screening process be repeated in order to determine if a route evaluation is required.

Any change to the separation distance, the proposed design or increase in DG inventories will require a review of this assessment.

6. Hazard identification and management

6.1 Hazard identification (HAZID)

The results of the HAZID associated with MSM Milling expansion project are presented Table 6.1. The hazard identification was conducted as a desktop study and focused specifically on the operational activities as a result of the plant expansion. Safeguards are also outlined in Table 6.1 and are required to ensure the risk scenarios that were identified are contained or at least controlled to an acceptable level.

A number of assumptions were made in undertaking the HAZID and are listed in Section 1.6.

Additional scenarios are considered to have potential off-site impact, but these are due to external off-site impact like bushfire.

6.2 Chemical and spill management

Any chemicals brought on-site should be stored in accordance with the relevant Australian Standards. It is recommended that each chemical have appropriate labelling, separation where necessary, and disposal in accordance with Australian Standards. Emergency services require access to the safety data sheet (SDS) register of all chemicals that are located on-site.

Additionally, appropriate safe work procedures should be implemented for the handling of all chemicals including transfer, storage, spill prevention, and clean up requirements.

6.2.1 LPG

LPG is a fuel used in domestic, commercial, industrial and automotive applications. LPG compositions will vary depending upon whether supplied a propane or butane. The LPG supplied to site will be approximately 91 to 99% butane with less than 5% propane and less the 2% propylene and ethane.

LPG is a highly flammable gas which may explode if heated and under pressure. In high concentrations, LPG can lead to asphyxiation.

6.2.2 Hexane

Hexane (C₆H₁₄) is used within the new solvent extraction process. This colourless and odourless liquid is highly flammable in both its liquid and vapor forms. Hexane can cause skin and eye irritation, and if ingested and aspirated, it may be fatal. Additionally, it poses a threat to aquatic life, with long-lasting effects.

6.2.3 Canola meal

Canola meal is a by-product derived from the oil extraction process of canola seeds.

It is important to note the canola meal may self-heat slowly if wet or containing excessive oil content or when oxidised, may spontaneously ignite. It is therefore important to keep cool, protect from sunlight, store away from other materials.

6.2.4 Canola oil

Canola oil is a vegetable-based oil extracted from the seeds of the canola plant. The oil can be used as an edible oil, margarine and spreads, mayonnaise, lubricant, caulking compound, dust suppressant and agricultural adjuvant.

Canola oil is not classified as hazardous according to Safe Work Australia but it is a Class C2 (Combustible Liquid) for the purposes of storage and handling, in accordance with the requirement of AS1940.

6.2.5 Hydrogen Peroxide

Hydrogen peroxide will be used in the new solvent extraction plant in the vapour scrubber prior to biofiltration. It is an aqueous solution containing between 20% and 60% hydrogen peroxide is used at the new solvent extraction plant. The solution is a clear, colourless, water-like liquid with a slightly sharp odour.

Hydrogen peroxide is an oxidising liquid, which may intensify fires.

6.2.6 Phosphoric acid

Phosphoric acid (H_3PO_4) is a colourless solid traditionally used as a major industrial chemical and component of fertilizer. The phosphoric acid is used to remove the gums (primarily phospholipids) from the crude canola oil as it is more effective than using only water. Phosphoric acid is corrosive to metals and can cause acute oral toxicity, skin and serious eye damage.

6.2.7 Formaldehyde

Formaldehyde is a colourless, irritating, and unpleasant-smelling gas that is commonly found in water-based solutions. Exposure to formaldehyde can lead to mild to moderate irritation of the eyes, nose, and throat.

Formaldehyde will be stored on site in solution as Salcarb Liquid Antimicrobial, which is added into canola meal to control salmonella as well as mould growth.

6.2.8 Sodium hydroxide

Sodium hydroxide (NaOH), also known as caustic soda, is a highly corrosive base used in the process to neutralise the free fatty acids. It can cause severe skin burns, eye damage, and respiratory irritation.

6.2.9 Sodium hypochlorite solution

Sodium hypochlorite solution (NaOCl) is an aqueous solution of sodium hypochlorite and sodium hydroxide used in the process to control salmonella. Its hazards include being corrosive to tissues and most metals, toxic by ingestion, and very toxic to aquatic life.

6.2.10 Chlorine

Chlorine (Cl) is a corrosive gas that can cause severe skin burns and respiratory irritation. Chlorine is commonly used in water treatment and disinfection. In the plant, the chlorine is added to the heavy phase tank to assist in controlling salmonella.

Table 6.1 Identified hazards for the MSM Plant Expansion

ID	Hazard scenario	Cause	Consequences	Potential to cause off-site impact	Identified / recommended safeguards
Construction Phase					
1	Vehicle interaction within the modification area	Vehicle movements in vicinity of personnel	Personal injury	No	<ul style="list-style-type: none"> – Prepare traffic management plans including standard traffic rules and signage for construction and operation & maintenance – Site speed limits – Designated pedestrian areas for construction and operation – Driver competency
2	Natural hazards	Flooding, earthquake, lightning, bushfire	Personal injury Asset damage Plant shut down	No	<ul style="list-style-type: none"> – A construction environmental management plan – New works to be above 1:100 probable max flood level – Bushfire Management Plan implemented – Earthing and Bonding strategy, including provision of lightning arrestors.
3	Fire started within the project area	Hot works	Personal injury / fatality	Yes	<ul style="list-style-type: none"> – Manage fuel for vehicles and machinery on site to appropriate standards – A construction environmental management plan including hot work permit process to be implemented
4	Loss of containment of chemicals, including dangerous goods	<ul style="list-style-type: none"> – Damage to storage containers e.g. due to external impact – Human error 	Environmental damage Personal injury	No	<ul style="list-style-type: none"> – Store chemicals in line with appropriate standards, such as AS1940 for flammable and combustible liquids, and AS3780 for corrosives. – Regular inspection and maintenance regime for chemical storage areas – Standard handling procedures – Safe Work Method Statement detailing safe methods & procedures for chemical handling and transfer – Spill kits to be used in the event of an incident involving release of chemicals – Personal Protective Equipment (PPE) to all staff handling chemicals

ID	Hazard scenario	Cause	Consequences	Potential to cause off-site impact	Identified / recommended safeguards
5	Contact with chemicals, including dangerous goods	<ul style="list-style-type: none"> – General construction activities (welding, refueling) – Vegetation management 	Personal injury	No	<ul style="list-style-type: none"> – Store chemicals in line with appropriate standards, such as AS1940 for flammable and combustible liquids, and AS3780 for corrosives. – Regular inspection and maintenance regime for chemical storage areas – Standard handling procedures – Safe Work Method Statement detailing safe methods & procedures for chemical handling and transfer – Spill kits to be used in the event of an incident involving release of chemicals – PPE to all staff handling chemicals
Operations & Maintenance					
6	Ignition of a loss of containment of flammable liquids (Canola oil)	<ul style="list-style-type: none"> – Class C2 combustible – Large spill or leak – Ignition source near production – Human error 	Personal injury/fatality Fire Asset Damage Environmental damage (e.g. toxic to aquatic life)	Yes	<ul style="list-style-type: none"> – Class C2 Combustible Liquid stored in line with appropriate standards (AS1940). For containers, store in a cool, dry, well-ventilated area, removed from incompatible substances and foodstuffs and out of direct sunlight – Emergency spill kits – Comprehensive emergency plan and procedures provided for the site – Material Safety Data Sheets (MSDS) for all materials – Fire and evacuation training for staff – Oil spills collected within the primary oil storage pit or bund
7	Ignition of a loss of containment of flammable liquids	<ul style="list-style-type: none"> – Large spill or leak – Ignition source near production – Human error 	Personal injury/fatality Fire Asset Damage Environmental damage (e.g. toxic to aquatic life)	Yes	<ul style="list-style-type: none"> – Process hold-up minimised by design – Emergency spill kits – Comprehensive emergency plan and procedures provided for the site – MSDS for all materials – Fire and evacuation training for staff – Fire safety study – Fire management plan – Fire protection systems

ID	Hazard scenario	Cause	Consequences	Potential to cause off-site impact	Identified / recommended safeguards
8	Loss of containment of corrosive liquids: 32% Caustic Soda 85% Phosphoric Acid 12.5% Sodium Hypochlorite Solution	<ul style="list-style-type: none"> – Class 8 Group II or III - Corrosive substances – Large spill or leak – Human error 	Personal injury/fatality Fire Asset Damage Environmental damage (e.g. toxic to aquatic life)	No	<ul style="list-style-type: none"> – Emergency spill kits – Comprehensive emergency plan and procedures provided for the site – MSDS for all materials – Evacuation training for staff – Safe chemical handling procedure – Appropriate PPE
9	Loss of containment of other chemicals, including dangerous goods stored in the process- including: - Magnesium Oxide - Flossy Fine Salt - Sodium Bicarbonate - Calcium Propionate Kemira	<ul style="list-style-type: none"> – Large spill or leak – Ignition source near production – Human error 	Personal injury/fatality Asset Damage Environmental damage (e.g. toxic to aquatic life)	No	<ul style="list-style-type: none"> – Stored in specialised approved bunded storage contained – Emergency spill kits – Comprehensive emergency plan and procedures provided for the site – MSDS for all materials – Fire and evacuation training for staff – Safe chemical handling procedure – Appropriate PPE
10	Loss of containment of cleaning chemicals (e.g. bleach and Hydrogen Peroxide)	<ul style="list-style-type: none"> – Large spill or leak – Human error 	Personal injury/fatality Fire Asset Damage Environmental damage (e.g. toxic to aquatic life)	No	<ul style="list-style-type: none"> – Emergency spill kits – Comprehensive emergency plan and procedures provided for the site – MSDS for all materials – Fire and evacuation training for staff – Safe chemical handling procedure – Storage of chemicals to appropriate standards
11	Contact with electricity	<ul style="list-style-type: none"> – Contact with live electrical source – Cranes impacting overhead lines – Connection to existing HV equipment 	Personal injury/fatality Asset Damage	No	<ul style="list-style-type: none"> – Implement a Workplace Health and Safety (WHS) plan – Implement isolation procedures – Install fit for purpose electrical systems – Flash protective PPE – Qualified personnel

ID	Hazard scenario	Cause	Consequences	Potential to cause off-site impact	Identified / recommended safeguards
12	Natural hazards	<ul style="list-style-type: none"> - Bushfire - Flooding - Earthquake - Lightning - Storm surge 	Personal injury/fatality Possible fire Asset damage Plant shut down Environmental impact	No	<ul style="list-style-type: none"> - Design building/ structure to appropriate codes and standards - Chemical storage inspection and maintenance regime - Design building/ structure to appropriate codes and standards - Housekeeping standards - Fire protection systems - Fire management plan - Emergency management plan
13	PV Panels	<ul style="list-style-type: none"> - Adding PV panels to the site 	Personal injury/fatality Asset Damage Plant shut down Environmental impact	Yes	<ul style="list-style-type: none"> - Ensure the location of the solar PV panels is outside the hazardous area classifications - Ensure the correct installation and maintenance procedure
Bulk Storage (Tank Farm & Materials Shed)					
13	Ignition of stored canola oil	<ul style="list-style-type: none"> - Class C2 combustible - Damage to storage container e.g. due to external impact or wear/ corrosion - Ignition source near storage - Human Error 	Personal injury/fatality Fire Asset Damage	Yes	<ul style="list-style-type: none"> - Store as a Class C2 Combustible Liquid (AS1940). For containers, store in a cool, dry, well ventilated area, removed from incompatible substances and foodstuffs and out of direct sunlight - Emergency spill kits - Comprehensive emergency plan and procedures provided for the site - MSDS for all materials - Fire and evacuation training for staff - Oil Spills collected within the primary oil storage pit or bund of 130 % oil capacity (A secondary oil collection system or retention pond will also be provided). - Regular inspection and maintenance regime for chemical storage areas

ID	Hazard scenario	Cause	Consequences	Potential to cause off-site impact	Identified / recommended safeguards
14	Ignition of stored canola meal	<ul style="list-style-type: none"> – Self ignition in large quantities – Ignition source near storage 	Personal injury/fatality Fire Asset Damage Environmental damage (e.g. toxic to aquatic life)	Yes	<ul style="list-style-type: none"> – Store as a Class 4.2 (liable to spontaneous combustion) (AS1940). For containers, store in a cool, dry, well ventilated area, removed from incompatible substances and foodstuffs and out of direct sunlight – Emergency spill kits – Comprehensive emergency plan and procedures provided for the site – MSDS for all materials – Fire and evacuation training for staff – Regular inspection and maintenance regime for chemical storage areas – Retention time for 2 weeks
15	Dust – canola meal	<ul style="list-style-type: none"> – If dust is finely dispersed in the air, it can form a flammable dust cloud – Ignition source near storage 	Personal injury (respiratory issues) Fire Explosion risk Asset Damage	No	<ul style="list-style-type: none"> – MSM employ a number of important dust suppression controls for storage, including; – Moisture content to 11 % – Use of Dust suppression hoppers to new meal store – Retention times are typically 2 weeks, under normal production rates
16	Ignition of Hexane tank	<ul style="list-style-type: none"> – Class 3 Group II (Flammable liquid) – Damage to storage container e.g. due to external impact or wear/corrosion – Large spill or leak – Ignition source near production – Human error 	Personal injury/fatality Fire Asset Damage Environmental damage (e.g. toxic to aquatic life)	Yes	<ul style="list-style-type: none"> – Tanks to be compliant with AS1940 – Stored in storage class (TRGS 510): 3: Flammable liquids – Emergency spill kits – Comprehensive emergency plan and procedures provided for the site – MSDS for all materials – Fire and evacuation training for staff – Regular inspection and maintenance regime for chemical storage areas

ID	Hazard scenario	Cause	Consequences	Potential to cause off-site impact	Identified / recommended safeguards
17	Ignition of LPG Tank	<ul style="list-style-type: none"> – Spill of flammable gas/liquid into the bund – Ignition and bund fire 	Personal injury/fatality Jet fire Flash fire Explosion	Yes	<ul style="list-style-type: none"> – Above ground tank/ Isolated location to AS1596 requirements – Provide emergency spill kits – Comprehensive emergency plan and procedures provided for the site – Fire and evacuation training for staff – Fire water supply and fire main – Tanks are regularly inspected for potential leaks and corrosion impact – No incidents or near misses of the LPG tank have occurred since the single tank was installed 10 years ago.
18	Loss of containment of corrosive liquids : 32% Caustic Soda 85% Phosphoric Acid 12.5% Sodium Hypochlorite Solution	<ul style="list-style-type: none"> – Class 8 Group II or III - Corrosive substances – Large spill or leak – Human error – Damage to storage container e.g. due to external impact or wear/ corrosion 	Personal injury/fatality Fire Asset Damage Environmental damage (e.g. toxic to aquatic life)	No	<ul style="list-style-type: none"> – Stored in specialised approved bunded storage container – Provide emergency spill kits – Comprehensive emergency plan and procedures provided for the site – MSDS for all materials – Fire and evacuation training for staff – Appropriate PPE – Regular inspection and maintenance regime for chemical storage areas
19	Loss of containment of other chemicals, including dangerous goods stored on-site	<ul style="list-style-type: none"> – Large spill or leak – Ignition source near production – Human error 	Personal injury/fatality Fire Asset Damage Environmental damage (e.g. toxic to aquatic life)	No	<ul style="list-style-type: none"> – Stored in specialised approved bunded storage container – Provide emergency spill kits – Comprehensive emergency plan and procedures provided for the site – MSDS for all materials – Fire and evacuation training for staff – Regular inspection and maintenance regime for chemical storage areas

ID	Hazard scenario	Cause	Consequences	Potential to cause off-site impact	Identified / recommended safeguards
20	Hexane / Bund Fire	<ul style="list-style-type: none"> – Overfill of tank during tank filling – Spill of flammable/ combustible liquid into the bund 	Personal injury/fatality Fire Asset Damage	Yes	<ul style="list-style-type: none"> – All flammable & combustible liquid storages are bunded, no offsite release – Tanks are monitored during filling using level instrumentation (level in tanks repeated in the site control room) – All tanks are fitted with high level instruments and alarms (audible & visual in the site control room) – Visual inspection and checking of tank/bund area is performed during the transfer/filling operation – Fire main (complying with AS 2419, fire pumps and fire water tank) – Fire hydrants and hose reels close to the storage – Foam generation equipment will be available at the site for use by the Fire Brigades – Fire contained to bund – bund capacity exceeds largest tank in bund (in accordance with the requirements of AS1940) – Majority of materials on site are combustible liquids stored at ambient temperature (low ignition potential) – Control of ignition sources in the bund area (bund will be classified as a hazardous area in accordance with Australian Standards – e.g. AS2430 & AS60079) – All tanks will be regularly inspected for potential leaks and corrosion impact, in the unlikely event of water build up in the tanks it will be drained regularly to prevent internal corrosion potential.
21	Tank Farm / Flammable liquids Vapour space ignition leading to explosion and tank fire	<ul style="list-style-type: none"> – Ignition of Flammable liquid in the tank 	Personal injury/fatality Fire Asset Damage	No	<ul style="list-style-type: none"> – Flammable liquid tanks are all fitted with nitrogen blankets to eliminate the potential for vapour build up in the ullage space of the tank – All tanks will be fully vented with anti-flash gauze on vents to prevent ignition from entering the tank via the vent – All electrical equipment in the tank will be suitably specified for the specific hazardous area in which it will be installed

ID	Hazard scenario	Cause	Consequences	Potential to cause off-site impact	Identified / recommended safeguards
22	Tank farm leak of stored goods, including dangerous goods	<ul style="list-style-type: none"> – Pipework, valve or flange leak – Pump seal leak 	Environmental impact Personnel injury/fatality Asset damage Fire	No	<ul style="list-style-type: none"> – Pipework between tanks and pumps is bunded and leaks will be contained within the tanks bunded area – Pump seals are double mechanical type to minimise the potential for leak – Pump area is bunded to contain spills – Pipework between pumps and flexible hose is located in a spill containment to prevent spills offsite – Pump operation is only conducted when site is staffed and pump/filling operations can be continually monitored
Road and rail intake facility					
23	Seed or grain storage silos and meal storage bins / Dust explosion	<ul style="list-style-type: none"> – Dust generation in the seed storage silos and transfer equipment during silo filling – Dust generation in the meal storage bins and transfer systems 	Personal injury/fatality Fire Asset Damage	No	<ul style="list-style-type: none"> – Ignition sources controlled in the silos (i.e. hazardous area classification of silos) – Canola seeds are high in oil content with low dust generation potential – Silos are sealed to minimise potential for ignition of dust from an external source – Explosion relief systems (e.g. explosion panels or bursting discs) are fitted to those silos where combustible/ explosive dusts with explosion panels. Explosion relief systems are to be designed in accordance with NFPA68 – Regular inspection and maintenance regime for chemical storage areas
24	Gas tanker carting LPG unloading bays / Transfer hose failure, ignition and pool fire	<ul style="list-style-type: none"> – Tanker impacts pipework adjacent to the bay – Tanker drive away whilst connected – Flexible hose failure (leak/rupture) – Operator error - incorrect connection of flexible hose (connection fails) 	Personal injury/fatality Fire Asset Damage	Yes	<ul style="list-style-type: none"> – Loading bay area is graded to drain away spills from beneath the tank – Road tanker unloading operation is monitored by tanker drivers and plant operators during the full transfer operations – Delivery and dispatch trucks are fitted with drive away protection to prevent drivers leaving the site whilst the truck is connected to the delivery pipework (via the flexible hose) – Pipework and tank is installed behind protective bund walls or bollards to prevent truck impact

ID	Hazard scenario	Cause	Consequences	Potential to cause off-site impact	Identified / recommended safeguards
25	Rail tanker carrying canola grain	<ul style="list-style-type: none"> – Train impacts pipework adjacent to the bay 	Personal injury/fatality Fire Asset Damage	Yes	<ul style="list-style-type: none"> – Canola seeds are high in oil content with low dust generation potential – Train unloading/loading operation is monitored by plant operators during the full transfer operations – Pipework is installed behind protective bund walls to prevent train impact on entering and leaving the bays
26	Liquid transfer via pipeline throughout the plant / Pipeline leak & pool fire	<ul style="list-style-type: none"> – Pipeline leak due to corrosion, overpressure, poor construction (welding), external interference 	Personal injury/fatality Fire Asset Damage	Yes	<ul style="list-style-type: none"> – Pipeline will be fully welded steel along the full length (no flanges creating leak sources) – Pipeline will be non-destructively tested by hydrostatic pressure on completion of construction & prior to commissioning – Pipeline will be designed to withstand full pump “dead-head” with a conservative factor of safety (i.e. no rupture) – Pipelines installed above ground and will be fully visible for regular inspection
27	Acid spill from road tanker or rail unloading	<ul style="list-style-type: none"> – Delivery tanker impacts pipework adjacent to the bay – Delivery tanker drive away whilst connected – Flexible hose failure (leak/rupture) – Operator error – incorrect connection of flexible hose (connection fails) 	Environmental impact Personnel injury/fatality Asset damage Fire	No	<ul style="list-style-type: none"> – Flammable liquid tanks are all fitted with nitrogen blankets to eliminate the potential for vapour build up in the ullage space of the tank – All tanks will be fully vented with anti-flash gauze on vents to prevent ignition from entering the tank via the vent – All electrical equipment in the tank will be suitably specified for the specific hazardous area in which it will be installed
28	Contact with corrosive chemicals, including dangerous goods	<ul style="list-style-type: none"> – Overfill of tank during tank filling – Spill of corrosive liquid into the bund 	Environmental impact Personnel injury/fatality Asset damage Fire	Yes	<ul style="list-style-type: none"> – All corrosive liquid storages are bunded, no offsite release – Tanks are monitored during filling using level instrumentation (level in tanks repeated in the site control room) – All tanks are fitted with high level instruments and alarms (audible & visual in the site control room) – Visual inspection and checking of tank/bund area is performed during the transfer/filling operation

7. Preliminary Hazard Analysis (PHA)

A semi-quantitative (Level 2) PHA was required as a medium potential for harm is identified.

7.1 Summary of hazard scenarios

The following eleven (11) scenarios were identified from the HAZID phase of the study to have a potential for off-site impact:

4. Fire started within the project area
5. Ignition of a loss of containment of flammable liquids (canola oil) during the process
6. Ignition of a loss of containment of flammable liquids during the process
7. Ignition of stored canola oil
8. Ignition of stored canola meal
9. Ignition of LPG tank
10. Ignition of hexane tank
11. Hexane / bund fire
12. Gas tanker carting LPG unloading bays / transfer hose failure, ignition and pool fire
13. Rail tanker carrying canola grain
14. Liquid transfer via pipeline throughout the plant / pipeline leak & pool fire

The risk of a fire started within the project area will be discussed in detail within the Fire Safety Study.

The modelling did not consider scenarios involving canola oil due to its high flash point of 285°C [8], which results in an extremely low likelihood of ignition. Similarly, scenarios related to canola meal were not modelled because of its low oil content and solid nature. However, when implementing the new oil and meal storage, it is essential to incorporate any existing mitigation measures for canola meal and oil storage from the current plant.

The rail transfer of grain has not been modelled due to the solid nature of the material. Similarly, the gas tanker and liquid transfer scenarios were not included in the modelling process. This decision was based on the worst-case scenario, which would be the leakage and ignition events. For any transfer scenarios, it is assumed that they result have a lower impact than the LPG or hexane tank leaks.

Due to this reasoning of these eleven (11) scenarios, the following two (2) scenarios were analysed in the PHA:

1. LPG tank leakage events, and ignition
2. Hexane tank leakage events, and ignition leading to hexane / bund fire

An LPG tank leak or failure is expected to have the largest off-site impact and therefore it has been included in the scenarios to be modelled. Hexane is not an existing material on-site, however, is highly flammable, therefore it has also been included in the scenarios to be modelled.

A summary of the model input parameters is presented in Section 7.3.

7.2 Relevant risk criteria

The identification of hazards and the quantification of risks outside the boundaries of a potentially hazardous development, and assessment of that risk in terms of the nature of land uses in the vicinity provide the basis for compatible land use safety planning.

7.2.1 Heat radiation criteria

The effects of various heat radiation levels are summarised in Table 7.1 as per the NSW Hazardous Industry Planning Paper (HIPAP) No. 4 [6]. The heat radiation levels reported in this assessment include 4.7 kW/m², 12.6 kW/m², 23 kW/m² and 35 kW/m².

Table 7.1 Heat radiation criteria [6]

Heat radiation (kW/m ²)	Effect
4.7	Will cause pain in 1.5 to 20 seconds and injury after 30 seconds' exposure (at least second degree burns will occur)
12.6	Significant chance of fatality for extended exposure. High chance of injury Causes the temperature of wood to rise to a point where it can be ignited by a naked flame after long exposure Thin steel with insulation on the side away from the fire may reach a thermal stress level high enough to cause structural failure
23	Likely fatality for extended exposure and chance of fatality for instantaneous exposure Spontaneous ignition of wood after long exposure Unprotected steel will reach thermal stress temperatures which can cause failure Pressure vessel needs to be relieved or failure would occur
35	Cellulosic material will pilot ignite within one minute's exposure Significant chance of fatality for people exposed instantaneously

7.2.2 Explosion overpressure criteria

The effects of various explosion overpressures are presented in Table 7.2 as per NSW HIPAP 4 [6]. The overpressure levels reported in this assessment include 0.07 bar, 0.14 bar, 0.21 bar and 0.35 bar.

Table 7.2 Effects of explosion overpressure criteria [6]

Explosion overpressure (bar)	Effect
0.07	Damage to internal partitions and joinery but can be repaired Probability of injury is 10% No fatality
0.14	House uninhabitable and badly cracked
0.21	Reinforced structures distort Storage tanks fail 20% chance of fatality to a person in a building
0.35	House uninhabitable Wagons and plants items overturned Threshold of eardrum damage 50% chance of fatality for a person in a building and 15% chance of fatality for a person in the open

7.2.3 Individual risk criteria

The cumulative individual risk results are computed by combining the event frequencies and consequence distances (fatality effects) at the boundary of the site. These cumulative risk levels are then compared to the suggested individual fatality risk criteria for adjacent land uses as shown in Table 7.3. The proposal is located in the 'Hospitals, schools, child-care facilities, old age housing' land use category.

Table 7.3 Individual fatality risk criteria [6]

Land use	Suggested criteria (risk in a million per year)	Comments
Hospitals, schools, child-care facilities, old age housing	0.5	Manildra Medical centre is located approximately 300 m from the expansion site. Manildra Preschool and St Joseph's school is located approx. 0.5 km from the site.

Land use	Suggested criteria (risk in a million per year)	Comments
		Manildra Public School is located approx. 1 km from the site.
Residential, hotels, motels, tourist resorts	1.0	The site is located in proximity to the Manildra residential area.
Commercial developments including retail centres, offices and entertainment centres	5	There are no major commercial developments in the vicinity.
Sporting complexes and active open space, roads	10	The site is adjacent to Manildra bowling club.
Industrial	50	The site is approximately 500 m from the Manildra Flour Mills.

7.2.4 Injury risk criteria

Relying entirely upon fatality risk criteria may not account for the following factors such as societies concern about risk of injury and that fatality risk levels may not entirely reflect variations in people's vulnerability to risk.

Some people may be affected at a lower level of hazard exposure than others. Therefore, it is appropriate to consider injury risk criteria (i.e. levels of effects that may cause injury to people but will not necessarily cause fatality).

The NSW HIPAP 4 [6] injury risk criterion for heat radiation and explosion overpressure are:

- Incident heat flux radiation at residential and sensitive use areas should not exceed 4.7 kW/m² at a frequency of more than 50 chances in a million per year.
- Incident explosion overpressure at residential and sensitive use areas should not exceed 0.07 bar at frequencies of more than 50 chances in a million per year.

7.3 Assumptions

7.3.1 General modelling assumptions

The general modelling input parameters used in the consequence modelling are shown in Table 7.4.

Table 7.4 General modelling input parameters

Parameter	Value	Units	Comment
Release location	-	-	All releases are assumed to be outdoor releases, over land
Release direction	Horizontal	-	Conservative basis
Height of interest	1.5	m	Average standing height of a person
Terrain	Flat	-	-
Surface roughness	1	m	Regular, large obstacle coverage <i>Representing the infrastructure present on the site e.g., vessels, pipes, etc. (affects the turbulence in the air as it reaches the release)</i> <i>The surface roughness of upwind terrain affects the turbulence in the air as it reaches the release</i>

7.3.1.1 Weather conditions

The weather conditions modelled were:

- Three Pasquill atmospheric stability classes (D/3, D/5 and F/1)
- Weather conditions representing the average conditions for the proposed site, as provided by the Bureau of Meteorology [8] This information is summarised in Table 7.5.

Table 7.5 Weather conditions

Parameter	Inputs / Description
Pasquill Stability Conditions [9] / Wind Speed	D-Classification (<i>Meteorologically neutral atmosphere, daytime conditions</i>) – 3 m/s (D/3) – 5 m/s (D/5) F-Classification (<i>Very stable atmosphere, night-time conditions</i>) – 1 m/s (F/1)
Humidity	54%
Ambient temperature	18°C
Surface temperature	18°C

7.3.2 Scenario assumptions

The model inputs and outputs from the consequence modelling for each of the following scenarios are presented in Table 7.6.

Table 7.6 Summary of Scenarios

Scenario	Scenario Description
1a	Catastrophic failure of LPG (butane) storage tank (hot failure)
1b	Small leak of LPG (butane) storage tank (25mm hole size)
1c	Medium leak of LPG (butane) storage tank (50mm hole size)
1d	Large leak of LPG (butane) storage tank (75mm hole size)
2	Catastrophic failure of Hexane storage tank

Only relevant outcome results are presented for each of the above cases.

The input parameters for the LPG scenarios are shown in Table 7.7.

Table 7.7 Scenario 1: LPG (butane) tank

Parameter	Value	Units	Comment
Model	Pressure Vessel	-	-
Material	n-Butane	-	LPG will be modelled as the (butane) component
Temperature	55	°C	Design temperature
Pressure	17.5	barg	Design pressure
Inventory	35	T	Based on LPG storage is in a single tank If the LPG storage is in multiple AGT (above ground tanks) then the inventory for one tank will be used assuming the other tanks are isolated (i.e. only one tank is in use at any one time)
Release elevation	1.5	m	Based on height of interest
Tank head	4	m	Assumption based on standard height of tank
Surface area under tank	Gravel	-	No bund required under the tank
1a - Catastrophic failure of LPG (butane) storage tank (hot failure)			
Scenario	Catastrophic rupture	-	-
1b - Small leak of LPG (butane) storage tank (25mm)			
Scenario	Leak	-	
Orifice diameter	25	mm	Small leak
1c - Medium leak of LPG (butane) storage tank (50mm)			

Parameter	Value	Units	Comment
Scenario	Leak	-	
Orifice diameter	50	mm	Medium leak
1d - Large leak of LPG (butane) storage tank (75mm)			
Scenario	Leak	-	
Orifice diameter	75	mm	Large leak

The input parameters for the hexane scenario are shown in Table 7.8.

Table 7.8 Scenario 2: Catastrophic failure of hexane storage tank

Parameter	Value	Units	Comment
Model	Atmospheric Tank	-	-
Scenario	Catastrophic rupture	-	-
Material	n-Hexane	-	<i>Hexane will be modelled as the n-Hexane component</i>
Temperature	18	°C	Ambient temperature
Pressure	1.01325	bar	Atmospheric Pressure
Inventory	33.2	T	Based on Hexane storage is in a single tank The total Hexane storage (99.7 T) is in three single wall steel tanks (above ground tanks), including two tanks in operation (102 m ³ of hexane in circulation during operation) and one tank in standby
Release elevation	1.5	m	<i>Based on height of interest</i>
Tank head	4	m	<i>Based on standard height of Tank</i>
Bund height	1	m	-
Bund surface area	143	m ²	-
Surface area under tanks	Concrete	-	-

7.4 Consequence results

PHASt is recognised as the industry standard for comprehensive process hazard analysis inclusive of flammable, fire, explosion, and toxic hazards. It is used to estimate, understand, and visualise the effects from loss of containment scenarios. PHAST performs dispersion and consequence calculations in terms of hazard range and event duration (where applicable) for each scenario and considers weather class / wind speed classification.

Based on the following scenarios PHAST modelled the following types of events:

7.4.1 Dispersion results

The flammable range of a gas is the concentration range for which it will burn if an ignition source is present. This is described by the following:

- Upper Flammable Limit (UFL)
 - This is the upper air fuel mixture concentration at which the material will burn in air. Concentrations higher than the UFL are considered too rich to burn.
- Lower Flammable Limit (LFL)
 - This is the lower air fuel mixture concentration at which the material will burn in air.
- 50% of the Lower Flammable Limit (0.5 LFL)
 - This is a concentration (50% LFL) providing a safety factor that gives an indication of the maximum distance at which a flammable cloud could be ignited. This considers the effects of imperfect mixing that may lead to local concentrations higher than those predicted by the dispersion modelling.

The flammability limit values are defined for the materials modelled in Table 7.9, where all values are in parts per million (ppm).

Table 7.9 Flammability limit values

Material	0.5 LFL	LFL	UFL
LPG (n-Butane)	8,000 ppm	16,000 ppm	84,000 ppm
n-Hexane	6,000 ppm	12,000 ppm	72,000 ppm

Based on these flammability limit values, Table 7.10 summarises the dispersion results for all the scenarios and weather conditions.

The worst-case scenario from those modelled is a large leak of LPG (butane) storage tank in weather category 1/F, which results in a 499 m dispersion distance at 0.5 LFL. As shown in Figure 7.1, the 0.5 LFL (blue contour) and LFL (green contour) effect zones are outside of the site parameters, whereas UFL (red contour) remains within the site boundary.

Table 7.10 Summary of dispersion results

Scenario	Weather Category	Distance Downwind (m)		
		0.5 LFL [m]	LFL [m]	UFL [m]
Scenario 1a: Catastrophic failure of LPG (butane) storage tank (hot failure)	Category 1/F	240	178	36
	Category 3/D	290	211	47
	Category 5/D	307	222	57
Scenario 1b: Small leak of LPG (butane) storage tank (25mm hole size)	Category 1/F	181	63	10
	Category 3/D	96	47	9
	Category 5/D	79	42	8
Scenario 1c: Medium leak of LPG (butane) storage tank (50mm)	Category 1/F	428	171	20
	Category 3/D	207	134	18
	Category 5/D	170	111	17
Scenario 1d: Large leak of LPG (butane) storage tank (75mm)	Category 1/F	499	243	33
	Category 3/D	313	216	30
	Category 5/D	256	179	29
Scenario 2: Catastrophic failure of Hexane storage tank	Category 1/F	7	7	6
	Category 3/D	8	8	8
	Category 5/D	28	8	8

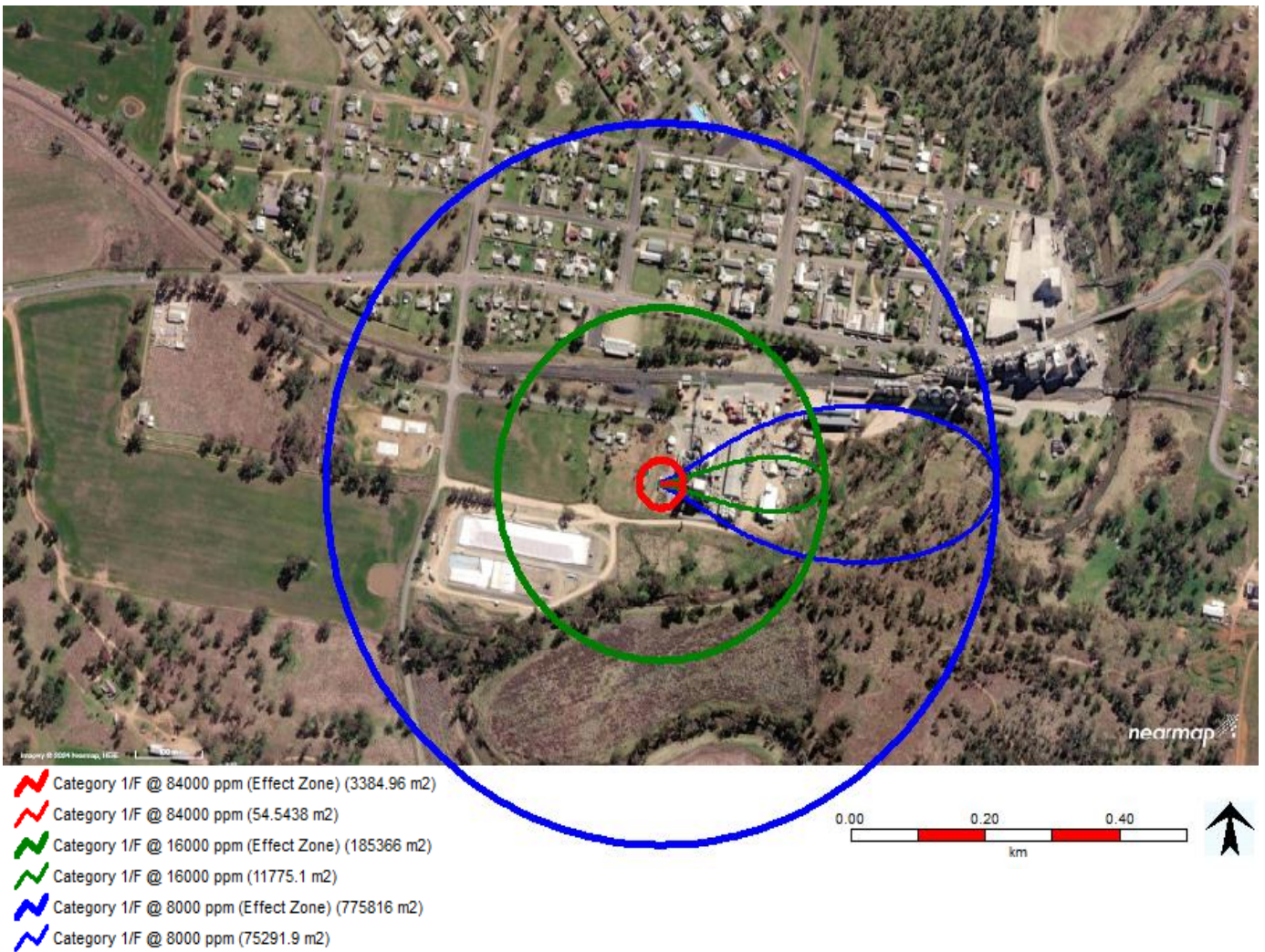


Figure 7.1 Large leak of LPG (butane) storage tank – maximum cloud foot print (Weather category 1/F)

7.4.2 Explosion results

An explosion is an overpressure blast which is comprised of several events, not all occurring simultaneously. Firstly, there is an overpressure associated with the expansion of vapour upon release of the material. There is then an accompanying increase in pressure resulting from the combustion of the material released.

The distance downwind for the relevant loss of containment scenarios are shown in Table 7.11.

The worst-case scenario from those modelled is a large leak of LPG (butane) storage tank in weather category 1/F, which results in a 663 m distance. As shown in Figure 7.2, the 0.35 bar overpressure contour (purple contour) will have a 50% chance of fatality for a person in a building and 15% chance of fatality for a person in an open space.

Similarly, the 0.07 (blue contour) bar overpressure contour lies beyond the site boundary. Consequently, it is imperative that the safety management system for LPG storage is highly dependable in order to reduce the probability of any explosion event.

Table 7.11 Summary of explosion results

Scenario	Weather Category	Distance Downwind to Explosion (m)			
		0.07 bar	0.14 bar	0.21 bar	0.35 bar
Scenario 1a: Catastrophic failure of LPG (butane) storage tank (hot failure)	Category 1/F	660	521	476	442
	Category 3/D	568	435	391	356

Scenario	Weather Category	Distance Downwind to Explosion (m)			
		0.07 bar	0.14 bar	0.21 bar	0.35 bar
	Category 5/D	556	422	384	354
Scenario 1b: Small leak of LPG (butane) storage tank (25mm hole size)	Category 1/F	253	230	223	216
	Category 3/D	143	125	118	113
	Category 5/D	119	102	97	92
Scenario 1c: Medium leak of LPG (butane) storage tank (50mm)	Category 1/F	566	512	494	479
	Category 3/D	321	274	258	245
	Category 5/D	266	225	211	200
Scenario 1d: Large leak of LPG (butane) storage tank (75mm)	Category 1/F	663	572	548	532
	Category 3/D	492	414	388	367
	Category 5/D	405	339	317	298
Scenario 2: Catastrophic failure of Hexane storage tank	Category 1/F	55	40	35	31
	Category 3/D	60	43	37	33
	Category 5/D	64	46	42	39

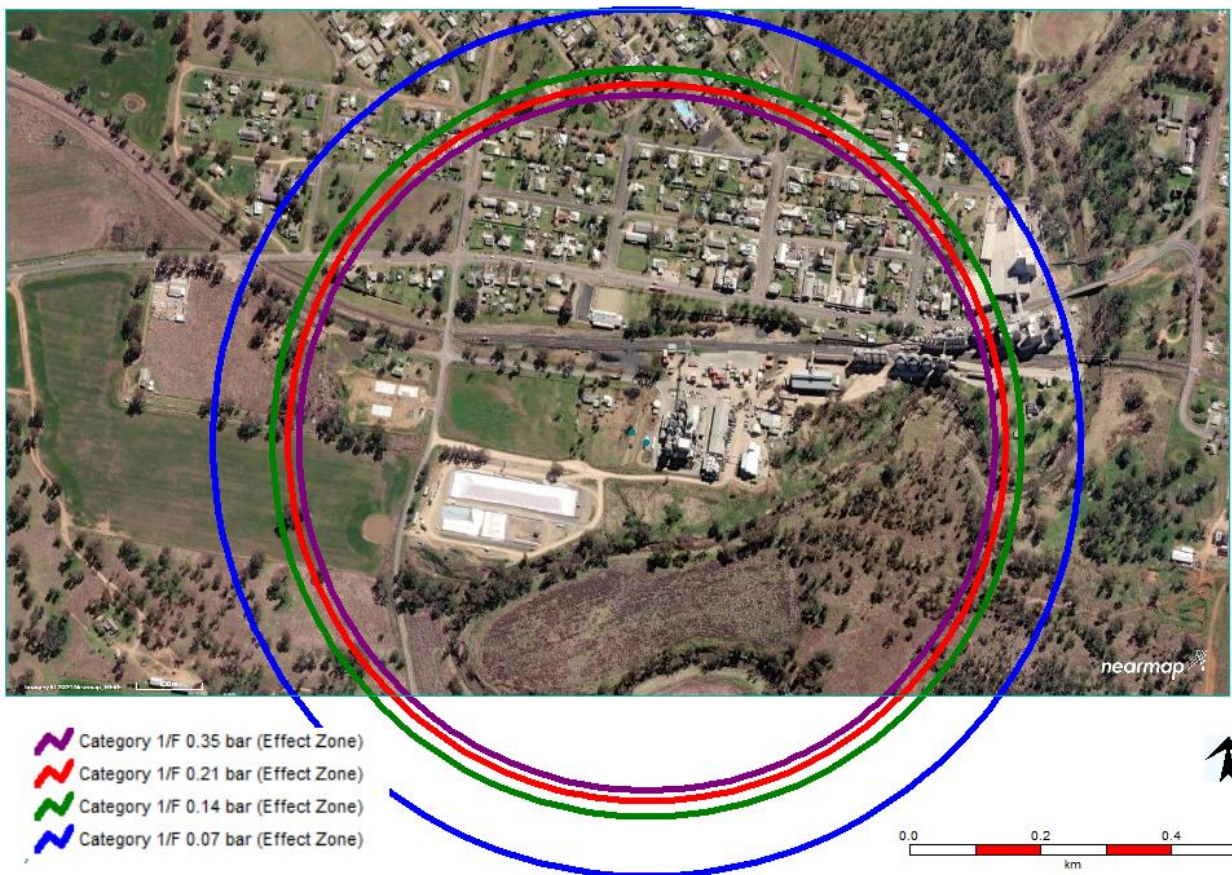


Figure 7.2 Large leak of LPG (butane) storage tank (75mm)– explosion worst case radii (effect zone) (Weather category 1/F)

7.4.3 Fireball results

A fireball is the instantaneous flashing of superheated material due to the catastrophic failure of a storage container creating an expanding cloud of material. As defined in Table 7.12, the only release scenario that will

create a fireball is a catastrophic failure of LPG (butane) storage tank. The weather is not a factor in a fireball events.

Similar to the explosion results and as seen in Figure 7.3, all fireball intensity levels are off-site. The largest effect zone with a heat radiation level of 4.7 kW/m² (blue contour) will cause pain in 15 to 20 seconds and injury after 30 seconds exposure (at least second-degree burns will occur). These results highlight the importance to minimise the possibility of catastrophic failure of LPG (butane) storage tank.

Table 7.12 Summary of fireball results

Scenario	Weather Category	Distance Downwind to intensity levels (m)			
		4.7 kW/m ²	12.6 kW/m ²	23 kW/m ²	35 kW/m ²
Scenario 1a: Catastrophic failure of LPG (butane) storage tank (hot failure)	Category 1/F	638	400	297	239
	Category 3/D				
	Category 5/D				

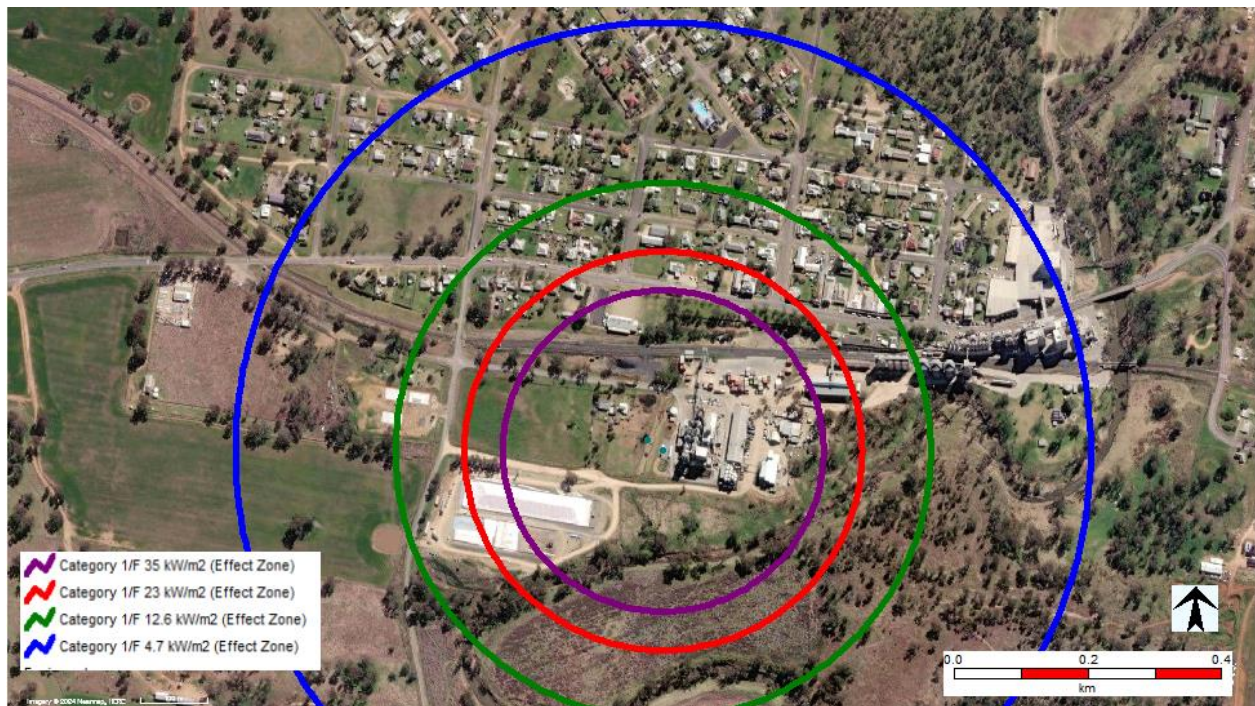


Figure 7.3 Catastrophic failure of LPG (butane) storage tank – radiation eclipse for fireball (effect zone) (Weather category 1/F)

7.4.4 Late pool fire results

A pool fire will form if a flammable or combustible liquid spill ignites. Pools can also form if a pressurised liquid is released and then ‘rains out’ to form a pool. Pool fires have low momentum flames and therefore their direction is dependent on wind conditions. A summary of the late pool fire results is available in Table 7.13.

The worst-case scenario from those modelled is a catastrophic failure of LPG (butane) storage tank in weather category 5/D, which results in a heat radiation of 4.7 kW/m² at 148 m from the release point. A heat radiation level of 4.7 kW/m² results in pain in 15 to 20 seconds and injury after 30 seconds of exposure (at least second-degree burns will occur). The contours for this scenario are shown in Figure 7.4.

Table 7.13 Summary of late pool fire results

Scenario	Weather Category	Distance Downwind to intensity level (m)			
		4.7 kW/m ²	12.6 kW/m ²	23 kW/m ²	35 kW/m ²
	Category 1/F	138	86	61	46
	Category 3/D	146	98	75	60

Scenario	Weather Category	Distance Downwind to intensity level (m)			
		4.7 kW/m ²	12.6 kW/m ²	23 kW/m ²	35 kW/m ²
Scenario 1a: Catastrophic failure of LPG (butane) storage tank (hot failure)	Category 5/D	148	101	81	67
Scenario 2: Catastrophic failure of Hexane storage tank	Category 1/F	35	21	16	14
	Category 3/D	38	23	17	15
	Category 5/D	39	23	17	15

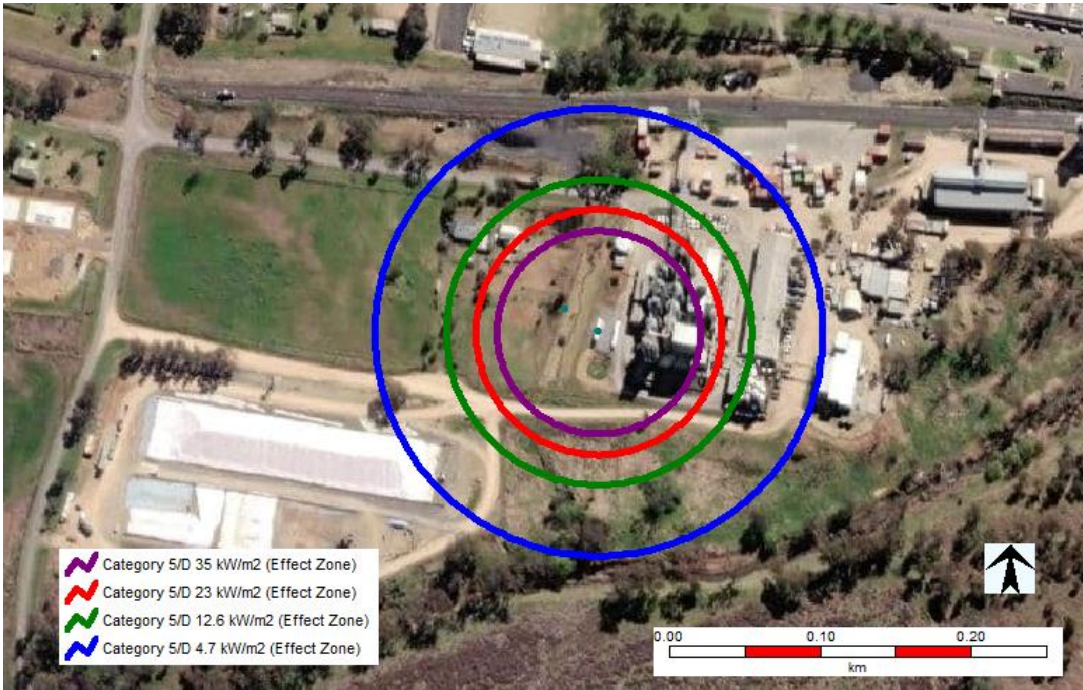


Figure 7.4 Catastrophic failure of LPG (butane) storage tank – radiation eclipse for late pool fire (effect zone) (Weather category 5/D)

In comparison, the worst-case scenario for the catastrophic failure of hexane storage tank occurs in weather category 5/D which results in a heat radiation of 4.7 kW/m² at 39 m from the release point. Figure 7.5 indicates that the late pool fire for a hexane catastrophic failure of the storage tank will have the majority of the release contained to the proposed expansion area and slightly to affect the existing MSM Milling site. An additional fire water storage tank is planned for the site approximately 16 m from the hexane storage, however this is within the 23 kW/m² envelope in which unprotected steel can cause failure. It is recommended that the new fire water storage tank is located outside of the 12.6 kW/m² radiation level.

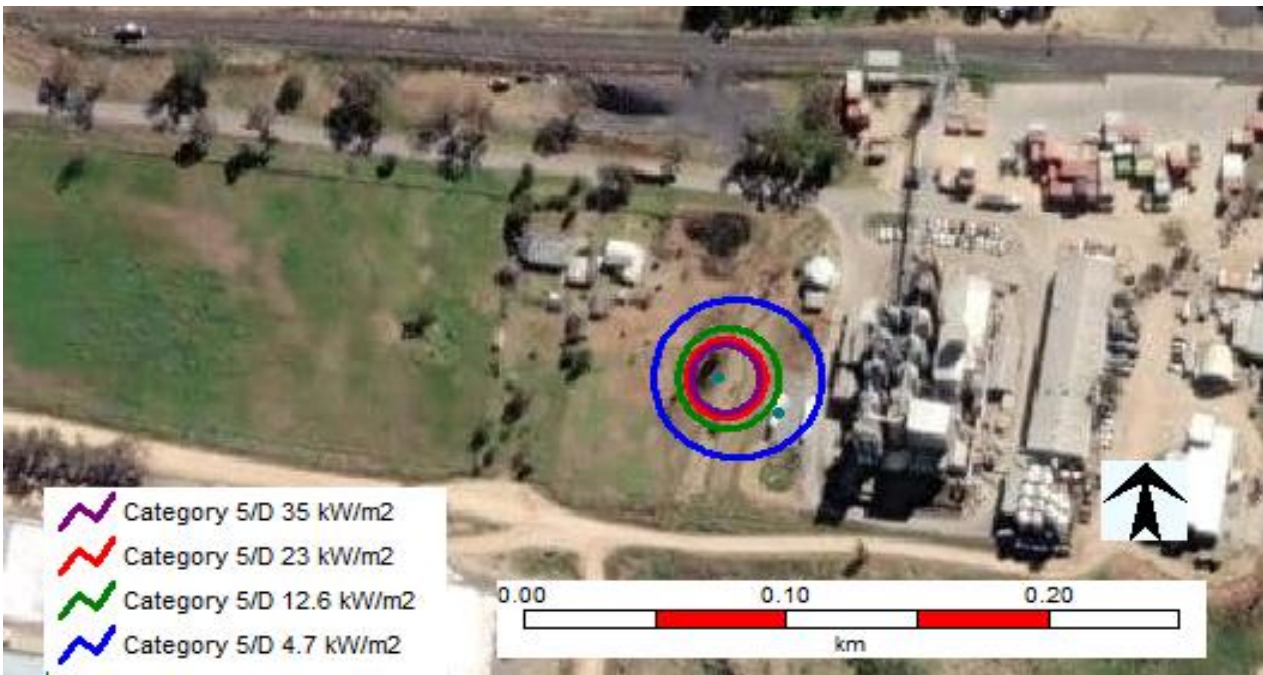


Figure 7.5 Catastrophic failure of hexane storage tank – radiation eclipse for late pool fire (effect zone) (Weather category 5/D)

7.4.5 Jet fire results

A jet fire risk is present whenever there are pressurised flammable gases or liquids. Jet fires result from the ignition of escaping fluid that is ignited immediately. Turbulence evoked by pressurised fluid escape entrains ambient oxygen and can create a mixture that lies within the material’s flammability limits. The PHAST modelling software does not take into account any effect of obstructions (e.g. electrolyser) that may be present, and the software models it as an unimpeded jet fire. Operations associated with this risk typically involve the escape of gaseous material during transfer between containers/tanks via piping, pipelines or hoses.

A jet fire is the combustion of material emerging from an orifice with a significant momentum. Table 7.14 summarises the jet fire results for the leak scenarios 1b, 1c and 1d as they are the only scenarios emerging from an orifice.

The worst-case scenario from those modelled is a large leak of LPG (butane) storage tank in weather category 1/F, which results in a heat radiation of 4.7 kW/m² at 228 m from the release point. A heat radiation level of 4.7 kW/m² results in pain in 15 to 20 seconds and injury after 30 seconds exposure (at least second-degree burns will occur). The contours for this scenario are shown in Figure 7.8.

Figure 7.6, Figure 7.7 and Figure 7.8 illustrate the increased effect zone of the jet fire as the orifice or leak size increases from 25mm to 75mm. The smallest leak at 25 mm as seen in Figure 7.6 is contained within the site while the largest leak at 75mm in Figure 7.8 is outside of the proposed site. Scenario 1d effect zone of 4.7 kW/m² (blue line) is intruding onto the Manildra Bowling Club located north-west of the site which at least second-degree burns will occur.

Table 7.14 Summary of jet fire results

Scenario	Weather Category	Distance Downwind to intensity level (m)			
		4.7 kW/m ²	12.6 kW/m ²	23 kW/m ²	35 kW/m ²
Scenario 1b: Small leak of LPG (butane) storage tank (25mm hole size)	Category 1/F	85	69	63	59
	Category 3/D	77	61	54	49
	Category 5/D	73	57	50	45
	Category 1/F	159	129	115	108
	Category 3/D	144	113	99	91

Scenario	Weather Category	Distance Downwind to intensity level (m)			
		4.7 kW/m ²	12.6 kW/m ²	23 kW/m ²	35 kW/m ²
Scenario 1c: Medium leak of LPG (butane) storage tank (50mm)	Category 5/D	134	104	90	83
Scenario 1d: Large leak of LPG (butane) storage tank (75mm)	Category 1/F	228	184	165	154
	Category 3/D	205	160	141	130
	Category 5/D	188	145	126	116

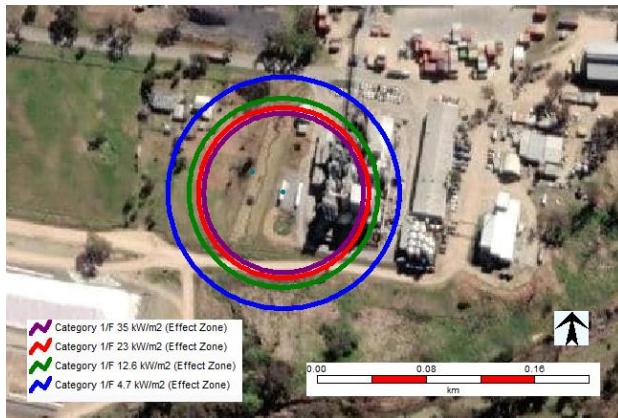


Figure 7.6 Small leak of LPG (butane) storage tank (25mm hole size) – radiation ellipse for jet fire (Weather category 1/F)

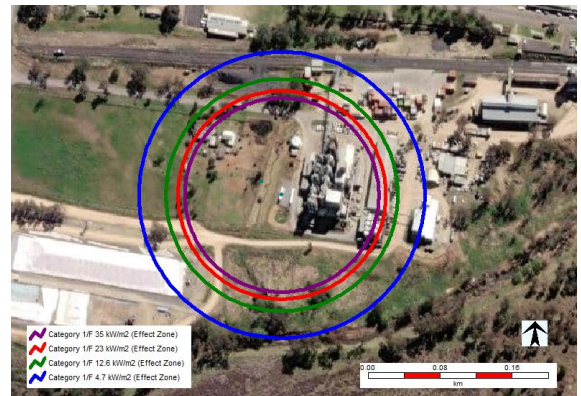


Figure 7.7 Medium leak of LPG (butane) storage tank (50mm) – radiation ellipse for jet fire (Weather category 1/F)



Figure 7.8 Large leak of LPG (butane) storage tank (75mm) – radiation ellipse for jet fire (Weather category 1/F)

7.4.6 Flash fire results

A flash fire occurs when a released vapour cloud is ignited after a delay, but no significant overpressure is created at the flame front. Unlike a vapour cloud explosion, the negligible overpressure created does not accelerate the flame front and thus energy released from the combustion does not take the form of an explosive blast and consequent overpressure blast wave which normally causes the majority of the damage. Flash fire results from

each of the relevant loss of containment scenarios displayed as downwind distance to the LFL fraction (0.5 LFL) and the LFL at a release height of 1.5 m. These results are shown in Table 7.15.

The worst-case scenario from those modelled is a large leak of LPG (butane) storage tank in weather category 1/F, which results in 0.5 LFL (pink contour) at 499 m from the release point and LFL (teal contour) at 243 m from the release point. The contours for this scenario are shown in Figure 7.9. The results show that both 0.5 LFL and LFL envelopes for this release scenario are reached at all site boundaries and have the potential to impact personnel at any of the on-site office and carpack in the proposed site expansion.

Table 7.15 Summary of flash fire results

Scenario	Weather Category	Distance Downwind (m)	
		0.5 LFL	LFL
Scenario 1a: Catastrophic failure of LPG (butane) storage tank (hot failure)	Category 1/F	240	178
	Category 3/D	290	211
	Category 5/D	307	222
Scenario 1b: Small leak of LPG (butane) storage tank (25mm hole size)	Category 1/F	181	63
	Category 3/D	96	47
	Category 5/D	79	42
Scenario 1c: Medium leak of LPG (butane) storage tank (50mm)	Category 1/F	428	171
	Category 3/D	207	134
	Category 5/D	170	111
Scenario 1d: Large leak of LPG (butane) storage tank (75mm)	Category 1/F	499	243
	Category 3/D	313	216
	Category 5/D	256	179
Scenario 2: Catastrophic failure of Hexane storage tank	Category 1/F	7	7
	Category 3/D	8	8
	Category 5/D	28	8

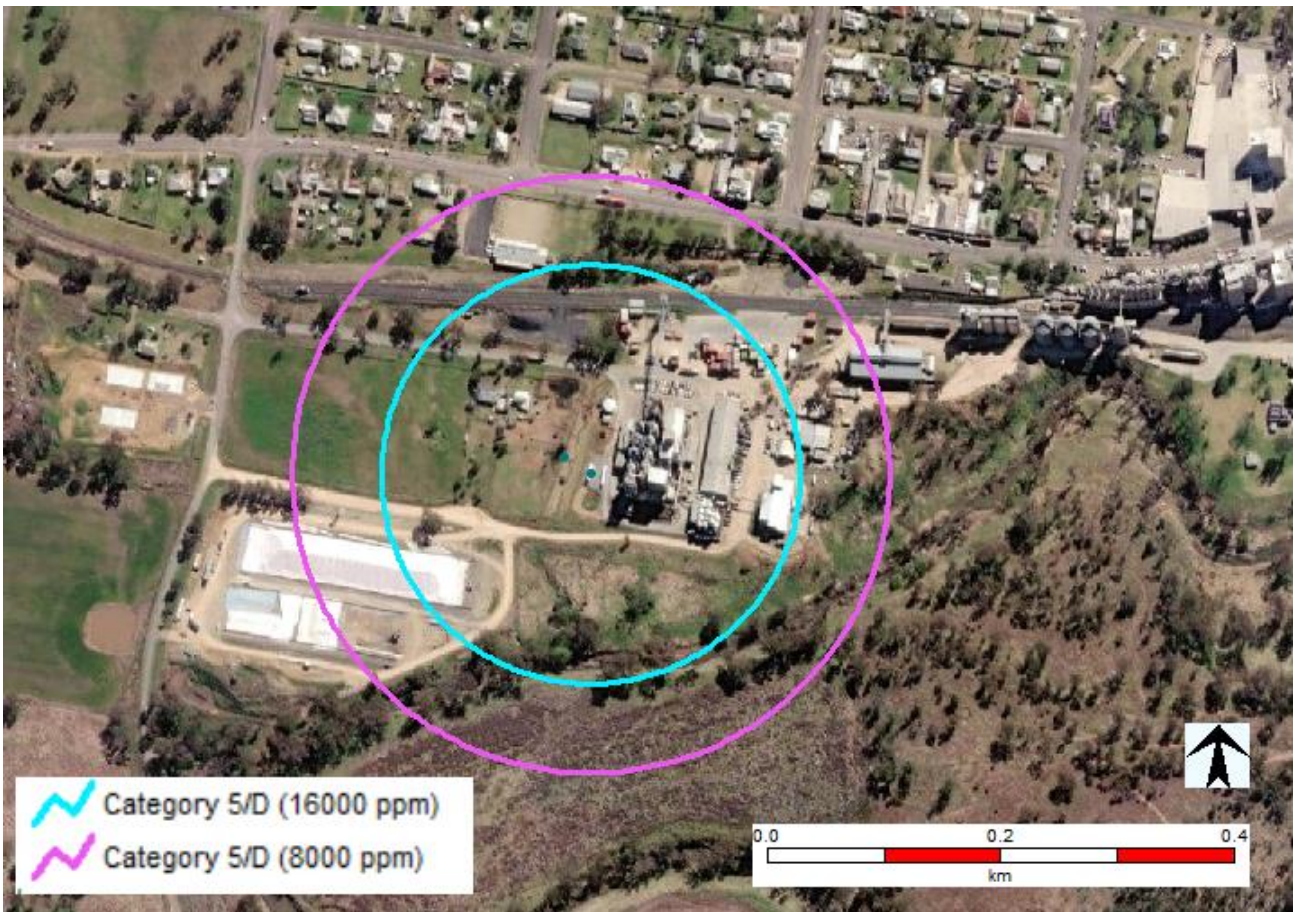


Figure 7.9 Large leak of LPG (butane) storage tank (75mm)– flash fire envelope (Weather category 5/D)

In comparison, the worst-case scenario for the catastrophic failure of hexane storage tank occurs in weather category 5/D, which results in 0.5 LFL (pink contour) at 28 m from the release point and LFL (teal contour) at 8 m from the release point. The contours for this scenario are shown in Figure 7.10. The results show that both LFL and 0.5 LFL envelopes for this release scenario are within all site boundaries.



Figure 7.10 Catastrophic failure of Hexane storage tank – flash fire envelope (Weather category 5/D)

7.5 Risk results

7.5.1 Likelihood calculations

The likelihood of three (3) different locations was used to calculate the individual fatality risk, including:

- On-site boundary
- Residential, hotels, motels, tourist resorts
- Hospitals, schools, child-care facilities, old age housing

The summary of these calculation is in Table 7.16 and full details on calculations for these individual fatality risks are provided in Appendix C.

Table 7.16 Individual fatality risk

Land use	Individual Fatality Risk
On-site boundary	4.22×10^{-6}
Residential, hotels, motels, tourist resorts	0.21×10^{-6}
Hospitals, schools, child-care facilities, old age housing	0.21×10^{-6}

7.5.2 Summary of risk results

A summary of the compliance of all the individual fatality with the relevant risk criteria from HIPAP 4 is provided in Table 7.17. This assessment shows that the project will comply with the risk criteria.

Table 7.17 Risk criteria compliance

Land use	Individual Fatality Risk	HIPAP risk criteria	Compliance
On-site boundary	4.22×10^{-6}	50.0×10^{-6}	Complies
Residential, hotels, motels, tourist resorts	0.21×10^{-6}	1.0×10^{-6}	Complies
Hospitals, schools, child-care facilities, old age housing	0.21×10^{-6}	0.5×10^{-6}	Complies

8. Safety management systems

The MSM Milling expansion should also include, but not limited to, the following safety management systems.

8.1 Site expansion

Hexane, although having a smaller impact compared to LPG, still poses potential risks both off-site and on-site to individuals. To address this, a safety management system must be established. This system includes storing hexane in a tank compliant with AS1940 standards and located in bunded areas to contain any spills and protect nearby equipment in case of a fire. Hexane is also a new chemical to be stored on-site therefore MSDS sheets should be supplied on-site, and operators be notified of the risk. The solvent extraction plant is also designed to be an unmanned site during normal operations lowering the risk to personnel.

The site expansion involves the addition of new storage and loading facilities specifically for canola meal. The current meal storage consists of two 900 m³ silos. With this expansion, the site's capacity for holding meal increases from approximately 850 tonnes to 6,100 tonnes. The new site aims to increase storage capacity to accommodate higher production levels and provide flexibility in transport timing and customer offtake.

Canola meal falls under the category of dangerous goods (4.2) due to its susceptibility to spontaneous combustion. Consequently, the upgraded meal storage area incorporates additional safety measures to prevent self-ignition. These mitigations measures for self-ignition include:

- **Temperature Control:** The meal's temperature is regulated before it enters the storage area. The storage area's angled design allows for better natural ventilation and cooling.
- **Moisture Control:** Moisture content is kept below 11% to prevent mould growth and dampness, which may lead to self-heating and ignition.
- **Oil Content Control:** While high oil content increases the risk of spontaneous combustion, having 0% oil content could create excess dust. Therefore, the oil content is controlled to be higher than 1.5%.
- **Retention time:** The stored meal is moved out within approximately 2 weeks, as the delivery offtakes occur regularly. The meal storage will also be managed to ensure stock turnover. MSM's previous experience with storing meal also indicates that hot spots may occur in the meal after multiple months of being in storage, not weeks. Management procedures therefore mitigate this.
- **Dusts suppression:** Dust suppression hoppers are used to feed the stockpile without entraining air, and hence minimise dust creation during transfer.

Given that canola meal is stored under these conditions, it is also transported in similar conditions, thereby minimising the risk of self-ignition or combustion.

8.2 Existing plant

The risk assessment identified several LPG scenarios that could impact individuals both off-site and on-site. However, the likelihood of such scenarios, resulting in significant consequences, is low due to the protective measures in place. In particular, the safeguard which provides the greatest protection from this scenario is the storage to AS1596 requirements.

Safety management system for the LPG storage tank have been in place for multiple years since the tank was constructed. Including regular internal and external inspection that align with AS1596 requirements.

For all incidents on site the following safety management system should be established, or the existing plant procedures updated:

- Regular inspection and maintenance regime for chemical storage areas.
- Provide emergency spill kits.
- Comprehensive emergency plan and procedures provided for the site.
- MSDS for all materials.
- Fire and evacuation training for staff.

- Continue to complete annual fire safety drills with Manildra Rural Fire Brigade, including the new site expansion.

The existing site already contains a firefighting infrastructure including a 500kL fire water supply and fire main. A Fire Safety Study will be completed to identify the required fire systems and mitigation measures due to the expansion. The fire protection system at the solvent extraction plant will be implemented to be compliant with National Fire Protection Association (NFPA) 36 Standard for Solvent Extraction Plants.

9. Conclusions and recommendations

This study included a risk screening of the proposal in accordance with the requirements of the SEPP (Resilience and Hazards). The results indicate that the screening thresholds for DG storage and transportation during operation of the proposal are exceeded.

A Level 2 PHA was considered appropriate, and a desktop semi-quantitative analysis study was completed as a systematic way to identify any potential offsite impacts that required semi-quantitative assessment.

The risk assessment findings align with the HIPAP 4 criteria for individual risk: 50 in a million at the proposal boundaries, 1 in a million for residential areas, hotels, motels, and tourist resorts, and 0.5 in a million for hospitals, schools, child-care facilities, and old age housing.

The risk assessment findings indicate that while consequences can extend beyond the site boundary, MSM Milling can effectively manage the frequency and risk with the recommendations outlined in Section 8 and 9.1 to an acceptable level of risk.

It is important to note that this study is based on the assumptions outlined in this report and any deviations from these will require review and reassessment to ensure that the conclusions and recommendations remain the same.

9.1 Recommendations

Any changes to the assumptions used in this report should result in a review and update of the screening, HAZID, and PHA processes. If changes are to occur to the proposed transport of dangerous goods, it is recommended that the screening process be repeated to determine any impact.

It is important to note that any new equipment will have operational and maintenance procedures developed for their safe operation.

Based on the results of the study, it is recommended that MSM Milling undertake the tasks listed in Table 9.1.

Table 9.1 Recommendations from PHA study

Item	Consequence	Recommendation
1	Fire and explosion consequences	Review impact of consequence contours on existing MSM Milling plant equipment and determine how to reduce any adverse consequences if required
2	Fire and explosion consequences	Ensure safe shutdown systems are tested in accordance with manufacturers specifications
3	All consequences	The MSM Milling update their existing Site Emergency Plan to include the new development, and ensure that consequence results for the various scenarios are considered during emergency response planning, including location of emergency muster points and shelter-in-place advice

10. Terms and abbreviations

Table 10.1 Terms and abbreviations

Abbreviation	Description
ADG	Australian Dangerous Goods Code
AS	Australian Standard
bar	Metric unit of pressure
DA	Development Applications
DG	Dangerous Good
DNV	Det Norske Veritas
GHD	GHD Pty Ltd
HAZID	Hazard Identification
HIPAP	Hazardous Industry Planning Advisory Paper
kW/m ²	Kilowatt per square meter
LFL	Lower Flammability Limit
LPG	Liquefied Petroleum Gas
m	Metre
m ²	Metre squared
mm	Millimetre
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
NSW	New South Wales
PG	Packing Group
PHA	Preliminary Hazard Analysis
PHAST	Process Hazard Analysis Software Tool
PPE	Personal Protective Equipment
ppm	Parts per million
SDS	Safety Data Sheet
SEPP	State Environmental Planning Policy
T	Tonnes
UFL	Upper Flammable Limit
UN	United Nations

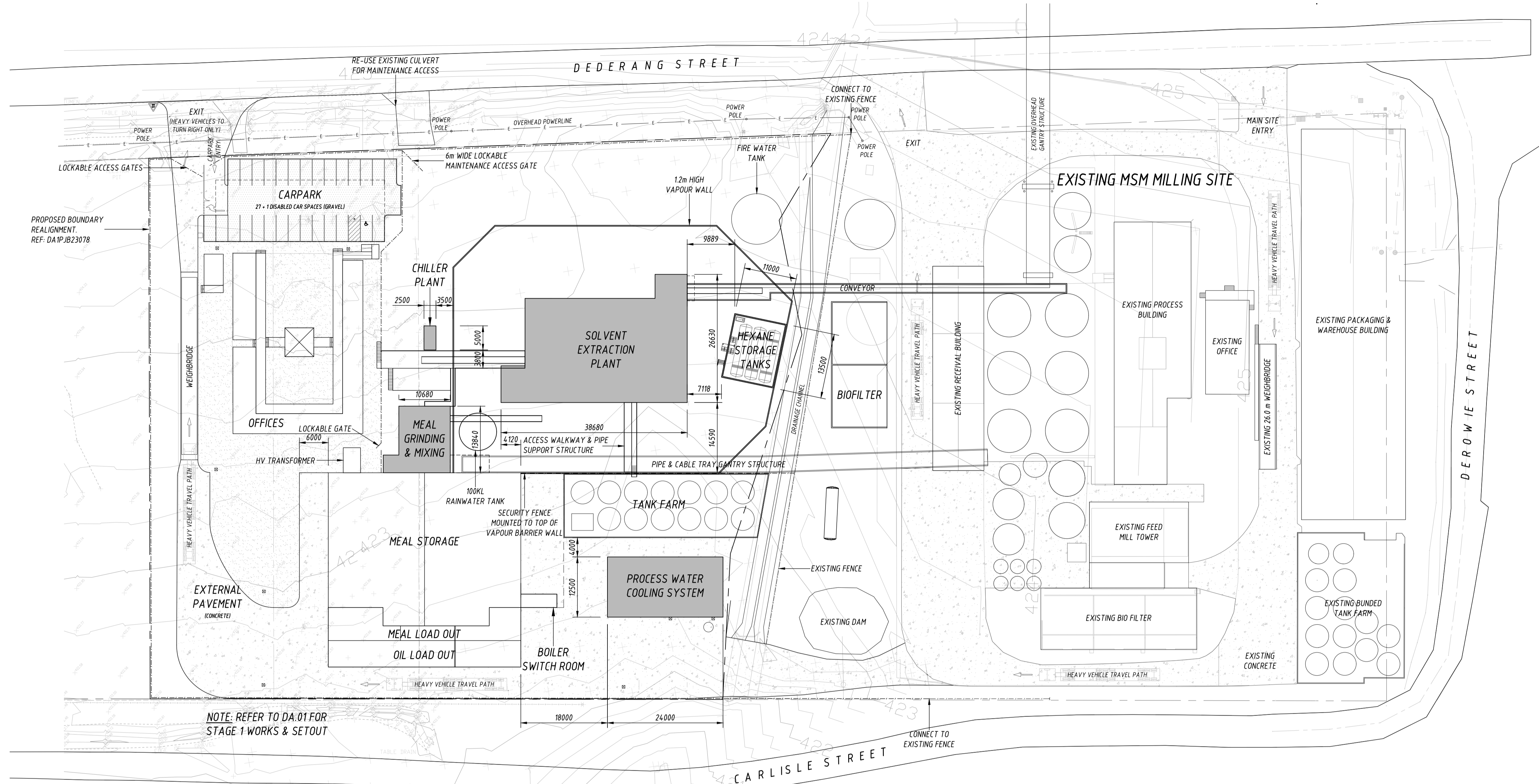
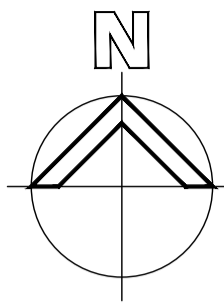
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Appendices

Appendix A

Site plan



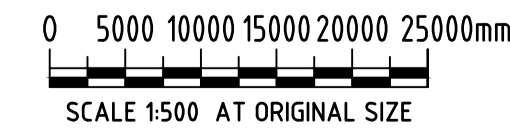
NOTE: REFER TO DA.01 FOR STAGE 1 WORKS & SETOUT

PROPOSED SITE PLAN

SCALE: 1:500

LEGEND:

- EXISTING CONCRETE PAVEMENT
- EXISTING LIMESTONE LANDSCAPED GRAVEL SURFACE
- EXISTING GRAVEL SURFACE



DO NOT SCALE

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Rev	Revision Description	Drawn	Approved	Date
F	GENERALLY REVISED	JTB	-	01.05.24
E	GENERALLY REVISED	JTB	-	04.04.24
D	GENERALLY REVISED	JTB	-	26.03.24
C	GENERALLY REVISED	JTB	-	25.03.24
B	GENERALLY REVISED	JTB	-	22.03.24
A	ISSUED FOR APPROVAL	JTB	-	21.03.24

Project	MSM MILLING PLANT EXPANSION	
	NO. 18-22 DEDERANG STREET, MANILDRA	
Title	PROPOSED SITE PLAN - STAGE 2	

Client	MSM MILLING Pty Ltd		
Drawn	JTB	Designed	Approved
Scale	AS NOTED	Date	MARCH '24'
Job No:	220502	Dwg No:	DA.2
		This Drawing must not be used for Construction unless signed as Approved	Original Size A1

Appendix B

Safety Data Sheets

Australian statement of hazardous nature : Classified as hazardous according to criteria of Safe Work Australia

Section 1 - Identification

Product Name n-Hexane

Product Code	ACR16078, ACR19736, ACR23210, ACR32666, ACR32671, ACR32678, ACR32692, ACR32789, ACR36437, ACR38380, ACR44572, AJA2320, AJA250, AJA2508, AJA251, AJA2543, AJA3475, AJA590, ALF032454, ALF039199, ALF041727, ALF042100, ALF043263, ALFL09938, BAK9262, BAK9304, BSPHL710, FSBH/0350, FSBH/0355, FSBH/0400, FSBH/0402, FSBH/0403, FSBH/0406, FSBH/0409, FSBH/0420, FSBH/0421, FSBH292, FSBH300, FSBH302, FSBH306, MKTH487
Address	ThermoFisher Scientific Australia Pty Ltd 5 Caribbean Drive, Scoresby VICTORIA 3179, Australia
Emergency Tel.	CHEMTREC@ 03 9757 4559 or +613 9757 4559
Telephone / Fax Numbers	Tel: 1300 735 292 Fax: 1800 067 639
E-mail address	auinfo@thermofisher.com

Recommended Use Laboratory chemicals.

Section 2 - Hazard(s) Identification

Classification under Safe Work Australia

Classified as hazardous according to criteria of Safe Work Australia

<u>Physical hazards</u>	
Flammable liquids	Category 2
<u>Health hazards</u>	
Aspiration Toxicity	Category 1
Skin Corrosion/Irritation	Category 2
Reproductive Toxicity	Category 2
Specific target organ toxicity - (single exposure)	Category 3
Specific target organ toxicity - (repeated exposure)	Category 2
<u>Environmental hazards</u>	
Chronic aquatic toxicity	Category 2

Label Elements



Flame



Health Hazard



Exclamation Mark



Environment

Signal Word**Danger****Hazard Statements**

H225 - Highly flammable liquid and vapor
 H304 - May be fatal if swallowed and enters airways
 H315 - Causes skin irritation
 H336 - May cause drowsiness or dizziness
 H361 - Suspected of damaging fertility or the unborn child
 H373 - May cause damage to organs through prolonged or repeated exposure
 H411 - Toxic to aquatic life with long lasting effects

Precautionary Statements

P201 - Obtain special instructions before use
 P202 - Do not handle until all safety precautions have been read and understood
 P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
 P233 - Keep container tightly closed
 P240 - Ground/bond container and receiving equipment
 P242 - Use non-sparking tools
 P243 - Take precautionary measures against static discharge
 P260 - Do not breathe dust/fume/gas/mist/vapors/spray
 P264 - Wash face, hands and any exposed skin thoroughly after handling
 P271 - Use only outdoors or in a well-ventilated area
 P280 - Wear eye protection/ face protection
 P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
 P303 + P361 + P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
 P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
 P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
 P308 + P313 - IF exposed or concerned: Get medical advice/attention
 P331 - Do NOT induce vomiting
 P332 + P313 - If skin irritation occurs: Get medical advice/attention
 P363 - Wash contaminated clothing before reuse
 P370 + P378 - In case of fire: Use CO₂, dry chemical or foam for extinction
 P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
 P501 - Dispose of contents/ container to an approved waste disposal plant

Other information

No information available

Section 3 - Composition and Information on Ingredients

Component	CAS-No	Weight %
Hexane	110-54-3	>95
2-Methylpentane	107-83-5	<2.5
3-Methylpentane	96-14-0	<1

Section 4 - First Aid Measures

Inhalation	Risk of serious damage to the lungs (by aspiration).
Ingestion	Do NOT induce vomiting. Call a physician or poison control center immediately. If vomiting occurs naturally, have victim lean forward.
Skin Contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes.
Eye Contact	Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.
Self-Protection of the First Aider	Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.
First Aid Facilities	Eyewash, safety shower and washroom.
Most important symptoms and effects	Difficulty in breathing. . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically. Symptoms may be delayed.

Section 5 - Fire Fighting Measures

Suitable Extinguishing Media

Water mist may be used to cool closed containers.

Extinguishing media which must not be used for safety reasons

Do not use a solid water stream as it may scatter and spread fire.

Specific Hazards Arising from the Chemical

Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Special protective equipment and precautions for fire fighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

Section 6 - Accidental Release Measures

Emergency procedures

Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions

Do not flush into surface water or sanitary sewer system. See Section 12 for additional Ecological Information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up

Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

Reference to Other Sections

Refer to protective measures listed in Sections 8 and 13.

Section 7 - Handling and Storage

Precautions for Safe Handling

Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Take precautionary measures against static discharges. Use spark-proof tools and explosion-proof equipment.

Conditions for Safe Storage, Including any Incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Keep away from heat, sparks and flame. Flammables area.

AS/NZS 2243.10:2004, Safety in laboratories - Storage of chemicals

AS 1940-2004 - The storage and handling of flammable and combustible liquids does not apply to this product. It is covered by the ADG Code Class 3 exclusion clause (i.e. SP No 144 An aqueous solution containing not more than 24% alcohol by volume is not subject to the ADG Code, AS1940 section 1.2). Refer to AS1940 to ensure compliance of individual storage and handling facilities.

Section 8 - Exposure Controls and Personal Protection

Exposure limits

AUS - Exposure Standards for Atmospheric Contaminants in the Occupational Environment - Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:3008(1995)]

Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003(1995)]

updated in August, 2005. Safe Work Australia **ACGIH** - Threshold Limit Values - Ceiling (TLV-C) guidelines by the American Conference of Governmental Industrial Hygienists (ACGIH) for controlling worker exposure to airborne chemical concentrations in the workplace. **UK** - EH40/2005 Work Exposure Limits, Third edition. Published 2018. **DE** - MAK and BAT values of Hazardous Chemical Compounds in the Work Area. Published by German Research Foundation on July 1, 2011

Component	Australia	New Zealand WEL	ACGIH TLV	The United Kingdom	Germany
Hexane	TWA: 20 ppm TWA: 72 mg/m ³	TWA: 20 ppm TWA: 72 mg/m ³	TWA: 50 ppm Skin	TWA: 72 mg/m ³ TWA: 20 ppm STEL: 60 ppm STEL: 216 mg/m ³	TWA: 180 mg/m ³ TWA: 50 ppm
2-Methylpentane			TWA: 500 ppm STEL: 1000 ppm		TWA: 500 ppm (8 Stunden). AGW - exposure factor 2 TWA: 1800 mg/m ³ (8 Stunden). AGW - exposure factor 2 TWA: 500 ppm (8 Stunden). MAK TWA: 1800 mg/m ³ (8 Stunden). MAK Höhepunkt: 1000 ppm Höhepunkt: 3600 mg/m ³
3-Methylpentane			TWA: 500 ppm STEL: 1000 ppm		TWA: 500 ppm (8 Stunden). AGW - exposure factor 2 TWA: 1800 mg/m ³ (8 Stunden). AGW - exposure factor 2 TWA: 500 ppm (8 Stunden). MAK TWA: 1800 mg/m ³ (8 Stunden). MAK Höhepunkt: 1000 ppm Höhepunkt: 3600 mg/m ³

Biological limit values

This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies

Component	Australia	New Zealand	European Union	United Kingdom	Germany
Hexane		5 mg/L (urine) end of shift (2,5-Hexanedione)			2,5-Hexandione plus 4,5-Dihydroxy-2-hexanone (after hydrolysis): 5 mg/L urine (end of shift)

Exposure Controls

Engineering Measures

Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.

Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment**Eye Protection**

Wear safety glasses with side shields (or goggles) (Australian/New Zealand Standard AS/NZS 1337 - Eye protectors for Industrial applications)

Hand Protection

Protective gloves

Glove material	Breakthrough time	Glove thickness	AUS/NZ Standard	Glove comments
Nitrile rubber	See manufacturers recommendations	-	AS/NZS 2161.1	(minimum requirement)
Viton (R)				

Inspect gloves before use.

Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)

Ensure gloves are suitable for the task: Chemical compatibility, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.

Remove gloves with care avoiding skin contamination.

Skin and body protection

Long sleeved clothing

Respiratory Protection

Use an AS/NZS 1716 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained in line with AS/NZS 1715 on the use and maintenance of respiratory protective devices

Recommended Filter type:

Organic gases and vapours filter Type A Brown conforming to EN14387 (or AUS/NZ equivalent)

Recommended half mask:-

Valve filtering: EN405 or Half mask: EN140 plus filter, EN 141 (or AUS/NZ equivalent)
When RPE is used a face piece Fit Test should be conducted

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

Environmental exposure controls

Prevent product from entering drains. Do not allow material to contaminate ground water system.

Section 9 - Physical and Chemical Properties

Information on basic physical and chemical properties

Appearance	Colorless	
Physical State	Liquid	
Odor	No information available	
Odor Threshold	No data available	
pH	No information available	
Melting Point/Range	-95 °C / -139 °F	
Softening Point	No data available	
Boiling Point/Range	69 °C / 156.2 °F	
Flash Point	-22 °C / -7.6 °F	Method - No information available
Evaporation Rate	No data available	
Flammability (solid,gas)	Not applicable	Liquid
Explosion Limits	No data available	
Vapor Pressure	No data available	
Vapor Density	No data available	(Air = 1.0)
Specific Gravity / Density	No data available	
Bulk Density	Not applicable	Liquid
Water Solubility	Insoluble in water	
Solubility in other solvents	No information available	
Partition Coefficient (n-octanol/water)		
Component	log Pow	
Hexane	4.11	
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	

Viscosity	No data available	
Explosive Properties	No information available	Vapors may form explosive mixtures with air
Oxidizing Properties	No information available	

Other information

Molecular Formula	C6 H14
Molecular Weight	86.18

Section 10 - Stability and Reactivity

Reactivity	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Keep away from open flames, hot surfaces and sources of ignition.
Hazardous Decomposition Products	None under normal use conditions.
Hazardous Polymerization	No information available.

Section 11 - Toxicological Information

Information on Toxicological Effects**Product Information****(a) acute toxicity;**

Oral

Based on available data, the classification criteria are not met

Dermal

Based on available data, the classification criteria are not met

Inhalation

Based on available data, the classification criteria are not met

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Hexane	LD50 = 25 g/kg (Rat)	LD50 = 3000 mg/kg (Rabbit)	LC50 = 48000 ppm (Rat) 4 h

(b) skin corrosion/irritation; Category 2**(c) serious eye damage/irritation;** No data available**(d) respiratory or skin sensitization;**

Respiratory

No data available

Skin

No data available

(e) germ cell mutagenicity; No data available**(f) carcinogenicity;** No data available

There are no known carcinogenic chemicals in this product

(g) reproductive toxicity; Category 2**(h) STOT-single exposure;** Category 3**(i) STOT-repeated exposure;** Category 2

Target Organs

Central nervous system (CNS), Peripheral Nervous System (PNS).

(j) aspiration hazard; Category 1

Symptoms / effects, both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Section 12 - Ecological Information

Ecotoxicity effects

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Fish	Water Flea	Freshwater Algae	Microtox
Hexane	LC50: 2.1 - 2.98 mg/L, 96h flow-through (Pimephales promelas)	EC50: 3.87 mg/L/48h		

Persistence and Degradability

Persistence

Persistence is unlikely, based on information available.

Degradation in sewage treatment plant

Contains substances known to be hazardous to the environment or not degradable in waste water treatment plants.

Bioaccumulative Potential

Bioaccumulation is unlikely

Component	log Pow	Bioconcentration factor (BCF)
Hexane	4.11	No data available

Mobility

The product contains volatile organic compounds (VOC) which will evaporate easily from all surfaces. Will likely be mobile in the environment due to its volatility. Disperses rapidly in air

Endocrine Disruptor Information

This product does not contain any known or suspected endocrine disruptors

Persistent Organic Pollutant

This product does not contain any known or suspected substance

Ozone Depletion Potential

This product does not contain any known or suspected substance

Section 13 - Disposal Considerations

Waste from Residues/Unused Products

Do not allow into drains or watercourses or dispose of where ground or surface waters may be affected. Wastes, including emptied containers, are controlled wastes and should be disposed of in accordance with all federal, E.P.A., state and local regulations. Assure conformity with all applicable regulations.

Contaminated Packaging

Dispose of this container to hazardous or special waste collection point. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep product and empty container away from heat and sources of ignition.

Other Information

Chemical wastes should be disposed through a licensed commercial waste collection service. Do not flush to sewer. Waste codes should be assigned by the user based on the application for which the product was used. Can be landfilled or incinerated, when in compliance with local regulations. Do not let this chemical enter the environment. Do not empty into drains.

Section 14 - Transport Information

IMDG/IMO

UN-No UN1208
 Proper Shipping Name HEXANES
 Hazard Class 3
 Packing Group II

Component	IMDG Marine Pollutant
Hexane 110-54-3 (>95)	IMDG regulated marine pollutant (Listed in the index)

ADG

UN-No UN1208
 Proper Shipping Name HEXANES
 Hazard Class 3

Packing Group IATA	II
UN-No	UN1208
Proper Shipping Name	HEXANES
Hazard Class	3
Packing Group	II
Environmental hazards	Dangerous for the environment Product is a marine pollutant according to the criteria set by IMDG/IMO
Special Precautions	No special precautions required
Additional information	None known

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories X = listed

Component	AICS	NZIoC	EINECS	ELINCS	TSCA	DSL	NDSL	PICCS	ENCS	IECSC	KECL
Hexane	X	X	203-777-6	438-390-3	X	X	-	X	X	X	KE-18626
2-Methylpentane	X	X	203-523-4	438-390-3	X	X	-	X	X	X	KE-24699
3-Methylpentane	X	X	202-481-4	438-390-3	X	X	-	X	X	X	KE-24700

Standard for the Uniform Scheduling of Medicines and Poisons S7 - Poison

Component	Ozone Depletion Potential	Australian Ozone Depleting substance listings	New Zealand Ozone Depleting Substances listing	Persistent Organic Pollutant	IMDG Marine Pollutant
Hexane					IMDG regulated marine pollutant (Listed in the index)

Prohibition or notification/licensing requirements Shown below are details of specific prohibition/notifications or licencing requirements when they apply.

Section 16 - Other Information

Legend

AICS - Australian Inventory of Chemical Substances	NZIoC - New Zealand Inventory of Chemicals
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory	EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List	ENCS - Japanese Existing and New Chemical Substances
IECSC - Chinese Inventory of Existing Chemical Substances	KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances	CAS - Chemical Abstracts Service
TWA - Time Weighted Average	ACGIH - American Conference of Governmental Industrial Hygienists Predicted No Effect Concentration (PNEC)
IARC - International Agency for Research on Cancer	IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code
ICAO/IATA - International Civil Aviation Organization/International Air Transport Association	ADG Australian Code for the Transport of Dangerous Goods by Road and Rail
MARPOL - International Convention for the Prevention of Pollution from Ships	OECD - Organisation for Economic Co-operation and Development
NZS 5433:2012 - Transport of Dangerous Goods on Land	LC50 - Lethal Concentration 50%
LD50 - Lethal Dose 50%	ATE - Acute Toxicity Estimate
EC50 - Effective Concentration 50%	RPE - Respiratory Protective Equipment
WEL - Workplace Exposure Limit	NOEC - No Observed Effect Concentration
DNEL - Derived No Effect Level	BCF - Bioconcentration factor
POW - Partition coefficient Octanol:Water	PBT - Persistent, Bioaccumulative, Toxic
vPvB - very Persistent, very Bioaccumulative	
VOC (volatile organic compound)	

Key literature references and sources for data

Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Training Advice

Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.

Use of personal protective equipment, covering appropriate selection, compatibility, breakthrough thresholds, care, maintenance, fit and standards.

First aid for chemical exposure, including the use of eye wash and safety showers.

Fire prevention and fighting, identifying hazards and risks, static electricity, explosive atmospheres posed by vapours and dusts.

Chemical incident response training.

Revision Date

04-Jul-2020

Revision Summary

Not applicable.

This safety data sheet complies with the requirements of Safe Work Australia WHS Regulation

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of Safety Data Sheet



Safety Data Sheet

Review Date: 3 July 2018

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product Name: HY-CLOR GRANULAR POOL CHLORINE
Chemical Name: Calcium Hypochlorite
Synonyms calcium; dihypochlorite
Product Code: HYCG02, HYCG04, HYCG10

Recommended Use of the Chemical and Restrictions on Use: Swimming Pool disinfectant and Sanitiser

Supplier: HY-CLOR AUSTRALIA PTY LTD
Street Address: 178 Power Street
Glendenning NSW 2761

Telephone Number: 02 8805 2400
After Hours Contact: 0404 859 515
Facsimile: 02 8805 2401
Email Contact: help@hyclor.com.au
Emergency Telephone: 13 11 26 (Australia Poisons Information Centre)

Please ensure you refer to the limitations of this Safety Data Sheet as set out in the "Other Information"

2. HAZARDS IDENTIFICATION

Classified as hazardous according to the criteria of the GHS as adopted in Australia. A Dangerous Good according to ADG 7.5.

Poisons Schedule: S6. SIGNAL WORD: Poison
GHS Hazard Statement(s)

Oxidising Solid	Category 2	H272	May Intensify fire: oxidizer
Acute Oral Toxicity	Category 4	H302	Harmful if swallowed
Skin Corrosion irritation	Category 1B	H314	Causes severe skin burns and eye damage
Aquatic acute toxicity	Category 1	H400	Very Toxic to the aquatic life

Prevention:

Precautionary statements

P210: Keep away from heat.
P220: Keep/Store away from clothing, other chemicals, acids and combustible materials such as paper, fabric, sawdust or kerosene.
P221: Take any precaution to avoid mixing with combustibles, acids and other chemicals ...
P260: Do not breathe mists.
P264: Wash face and hands thoroughly after handling.
P270 : Do not eat, drink or smoke when using this product.
P280: Wear protective gloves/ eye protection/ face

Product Name: HY-CLOR GRANULAR POOL CHLORINE

Review Date: 3 July 2018



Safety Data Sheet

Review Date: 3 July 2018

protection.

P273: Avoid release to the environment. - if this is not the intended use.

Response:

P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P310: Immediately call a POISON CENTER or doctor/ physician.

P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P363: Wash contaminated clothing before reuse.

P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P370+P378: In case of fire: Use water for extinction.

P391: Collect spillage.

Storage:

P405: Store locked up.

Disposal:

P501: Dispose of contents/container in accordance with local & regional waste disposal legislation



Hazard pictograms

Signal word

Danger

Label Statements:

Keep out of reach of Children
Read Label before use
If medical advice is needed, have product container or label at hand.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	CAS Number	Concentration (% w/w)
Calcium Hypochlorite	7778-54-3	65-68%
Not contributing to the product hazard		Balance



4. FIRST AID MEASURES

If poisoning occurs, or medical advice needed contact a Poisons Information Centre. Phone Australia 13 1126 or a doctor. Have this SDS when you call.

- Swallowed:** Do not induce vomiting unless advised to do so from, a medical practitioner. Give a glass of water. Wash out mouth with water. Seek medical attention.
- Skin:** Wash affected area thoroughly with soap and water. Remove contaminated clothing and wash before reuse or discard. If irritation occurs seek immediate medical attention.
- Eye:** If in eyes, hold eyes open, flood with water for at least 15 minutes. Take care not to rinse contaminated water into the non-affected eye. If irritation occurs seek immediate medical attention.
- Inhaled:** Remove from contaminated area. If symptoms develop seek medical attention.
- Note to Physician** Treat symptomatically

5. FIRE FIGHTING MEASURES

- Suitable extinguishing media:** Flooding water spray. Do not use foam or dry agent.
- Special hazards arising from the chemical:** Inhalation, ingestion or contact (skin, eyes) with vapors or substance may cause severe injury, burns or death. Fire may produce irritating, corrosive and/or toxic gases. Carbon monoxide (in conditions of incomplete combustion), carbon dioxide, nitrogen oxides and hydrogen chloride may be produced if water in the product boils off. May accelerate burning when involved in a fire. May decompose explosively when heated or involved in a fire. May explode from heat or contamination. May react explosively with hydrocarbons (fuels). May ignite combustibles (wood, paper, oil, clothing, etc.). Containers may explode when heated. Runoff may create fire or explosion hazard. Runoff from fire control or dilution water may cause pollution.

- Special protective equipment and precautions for fire firefighters:** The product is not combustible. However, after evaporation of water in the product, the residue may be combustible. In confined areas or areas of excessive smoke, fire fighter must wear full protection and self-contained breathing apparatus.

Hazchem Code: 2P

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedure** Evacuate all unnecessary personnel. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop leak if you can do it without risk. Do not get water inside containers. Avoid skin and eye contact and inhalation of dust. Wear appropriate



Safety Data Sheet

Review Date: 3 July 2018

Environmental precautions	protective equipment and clothing – See section 8. Use in a well ventilated area. Keep spilt products out of drains, sewers and waterways. If large quantities of this material enter the waterways contact the Environmental Protection Authority, or your local Waste Management Authority.
Methods and materials for containment and cleaning up	For minor spills, contain and absorb with inert materials (sand, earth), sweep up, place contaminated material in a sealed container and place in garbage. Wash area down with excess water. For large spills contact the emergency response number.

7. HANDLING AND STORAGE

Keep out of the reach of children.

Precautions for safe handling	Avoid skin and eye contact and breathing in dust. Wear appropriate protective equipment and clothing. Remove contaminated clothing. Use in a well ventilated area. Avoid spillage onto floor. Maintain personal hygiene by washing hands prior to eating, drinking, smoking or using toilet.
Safe storage, including any incompatibilities	Store in a cool, dry well-ventilated area, out of direct sunlight. Store in labelled, original containers. Keep containers tightly closed and upright. Avoid spillage onto the floor. Do not allow into contact with water. Store away from sources of ignition, heat and incompatible materials described in Section 10.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits: Exposure limits have not been established by Safe Work Australia for this product or any of its components. It is appropriate to apply the exposure standard for nuisance dusts of 10 mg/m³, measured as inhalable dust (8 hour TWA).

Workplace Exposure Standard(s) for decomposition product(s) are:

- Chlorine: TWA Peak Limitation = 3 mg/m³ (1 ppm)
- Hydrogen chloride: TWA = 7.5 mg/m³ (5 ppm)
- Nitrogen oxides: Nitrous oxide. TWA = 31 mg/m³ (25 ppm).
Nitrogen dioxide TWA – 5.6 mg/m³ (3 ppm). STEL 9.4 mg/m³ (5 ppm)
- Carbon oxides: carbon dioxide: TWA = 9g/m³ (5000 ppm).
carbon monoxide: TWA = 34 mg/m³ (30 ppm).

Exposure controls

Appropriate Engineering Controls:

Technical measures and appropriate working operations should be given priority over the use of personal protective equipment. Avoid generating and inhaling dusts. Use in a well-ventilated area only. Keep containers in a well-ventilated area. Local exhaust ventilations system may be required, especially if chlorine gas evolved.

Personal Protective equipment - for manufacturing and bulk handling situations:

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The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods, and environmental factors.

Skin Protection:	Suitable protective clothing should be worn e.g. cotton overalls and safety shoes. Wear gloves of impervious material such as nitrile rubber (glove thickness 0.11 mm & breakthrough time > 480 min) that comply with AS/NZS 2126. Final choice of appropriate gloves will vary according to individual circumstances i.e. methods of handling or according to risk assessments undertaken.
Eye Protection:	Tightly fitting safety goggles or full-faced shields as appropriate recommended and that comply with AS/NZS 1336 and 1337. Final choice of appropriate eye/face protection will vary according to individual circumstances i.e. methods of handling or engineering controls and according to risk assessments undertaken.
Respiratory Protection:	Respiratory protection is not normally necessary, unless the production of dust is significant. In such cases, a suitable respirator may be worn that meets the requirements of AS/NZS 1715 and 1716.
Personal Hygiene:	Always wash hands after handling this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	White to cream, dry free flowing powder	Vapour density:	No data found
Odour:	Chlorine	Relative density:	No data found
pH:	10-11.5 at 1% solution	Water solubility:	200 g/L at 20°C
Melting point / freezing point:	~ 100°C	Partition coefficient n-octanol/water:	Not applicable, inorganic compound
Initial boiling point and boiling range:	Not applicable	Auto-ignition temperature:	Not applicable
Flash point:	Not flammable	Decomposition temperature:	>177 °C
Evaporation rate:	No data found	Viscosity:	Not applicable
Flammability:	Not flammable	Explosive properties:	May explode when in contact with incompatible substances
Upper/lower flammability limits:	Not flammable	Oxidising properties:	GHS Cat 2 oxidiser
Vapour pressure:	No data found		

10. STABILITY AND REACTIVITY

Reactivity:	Oxidising agent. Violent explosions possible
Chemical Stability:	This product is stable and unlikely to react or decompose under normal circumstances. In a fire and reactive conditions chlorine gas evolves.

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Possibility of hazardous reactions:

- A risk of explosion and/or of toxic gas formation exists with the following substances: Water, acids ferric oxide, ethanol, glycerol, Methanol, carbon/soot, Organic Substances, acetic acid, with, potassium cyanide
- Violent reactions possible with: phenol, combustible substances, Alcohols, Alkali metals, Amines, ammonium compounds, Halogenated hydrocarbon, mercaptans, metallic oxides, organic nitro compounds, Reducing agents, sulphur.

Conditions to avoid:

Heating.

Incompatible materials:

See possibility of hazardous reactions.

11. TOXICOLOGICAL INFORMATION

No data available for the product. Information given is based on the calcium hypochlorite component (70% w/w).

Acute Oral

Harmful if swallowed. Ingestion may cause nausea, vomiting, shock and coma. Corrosive. Will cause severe damage to the mucous membranes, including irritation and/or burns to the entire gastrointestinal tract. This is characterised by nausea, vomiting, diarrhea, abdominal pain, bleeding and/or tissue ulceration. May also cause circulatory collapse, cyanosis, shock, confusion, delirium and swelling of the throat or tongue resulting in obstruction of the airway. Oral LD50 (rat) = 790 mg/kg.

Acute Dermal

Dermal LD50 (rat) > 2000mg/kg

Skin corrosion/irritation

Corrosive to skin – causes burns. Dermal exposure can cause severe irritation and/or burns characterised by redness, swelling and scab formation. Skin contact may also cause eruptions and eczema.

Serious eye damage/eye irritation

Causes burns and is a severe eye irritant. Contact may cause impairment of vision or corneal damage.

Inhalation

The vapour is an irritant to the mucous membranes and respiratory tract. Inhalation of dust will result in respiratory irritation. Inhalation may result in headaches, dizziness and possible nausea. May also cause burns to the respiratory tract with the production of lung edema which can result in shortness of breath, wheezing, choking, chest pain and impairment of lung function. Inhalation of high concentrations can result in permanent lung damage. Inhalation exposures to concentrations of greater than about 500 ppm (10 min or more) may be fatal for rats.

Respiratory or skin sensitisation

Inhalation of mist may result in respiratory irritation. No data found for skin or respiratory sensitisation

Mutagenicity

Chromosomal aberrations were analyzed in Chinese hamster cells treated for 24 or 48 hours with three

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	<p>different doses of calcium hypochlorite, in the absence of metabolic activation. A positive increase in chromosomal aberrations was observed only in a culture treated with 0.5 ug/mL (6.7 mol/L = approx. 3.5 umol/L active chlorine) for 48 hours.</p>
Reproduction/Development	<p>No reproductive toxic effects were shown up to 5 mg/kg (highest dose tested) of sodium salt (equivalent to 4.8 mg/kg of Calcium salt) in a one generation oral study in rats. No evidence of adverse developmental effects were reported in animals. Moreover, epidemiological studies in humans did not show any evidence of toxic effects on reproduction and development.</p>
Carcinogenicity	<p>No carcinogenicity was observed in mice or rats exposed by inhalation to chlorine and orally to sodium hypochlorite, except some equivocal results were reported for female rats by oral route. For human carcinogenicity, no causal relationship between hypochlorite exposure and tumor incidence was observed. The observation is applicable to calcium hypochlorite.</p>
Specific target organ toxicity - single exposure	<p>Moderate depression of the central nervous system was found at 1 hour after administration. Most survivors showed a mild to moderate persistent anorexia. Most affected animals showed diarrhea for several days.</p>
Specific target organ toxicity - repeated exposure	<p>A NOAEL (chronic) can be calculated to be approximately 14 mg available chlorine /kg bw/day for rats and 22.5 mg available chlorine /kg bw/day for mice.</p>
Aspiration hazard	<p>Not considered to be an aspiration hazard.</p>

12. ECOLOGICAL INFORMATION

No data available for the product. Information given is based on the calcium hypochlorite component (70% w/w).

Aquatic toxicity	<p>LC₅₀ for <i>Ceriodaphnia dubia</i> is 5 µg FAC/L (FAC=Free available chlorine). Adequate standard acute tests in fish are not available. Data for TRC (total residual chlorine = the sum of combined and free residual available chlorine) - 96h LC₅₀ = 60 µg TRC/L and 168h LC₅₀ = 330 µg TRC/L.</p> <p>Lowest result for algae is reported for <i>Thalassiosira pseudonana</i> with a IC₅₀ of 75 µg/L (20°C).</p> <p>Long-term toxicity to freshwater organisms: lowest NOEC = 5 µg/L (<i>Ictalurus punctatus</i>, 133d, growth).</p> <p>In microcosm and field studies the most sensitive parameter was the density of zooplankton with a NOEC of 1.5 µg TRC/L.,</p>
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	Salt water: fish (<i>Oncorhynchus kisutch</i>) 96 h LC ₅₀ = 32 µg TRO/L) (TRO = Total Residual Oxidant) Molluscs: are more 15d NOEC of 6.2 µg TRO/L.
Persistence and degradability	High water solubility and rapid reaction with organic matter leads to rapid disappearance of the hypochlorite moiety. Biodegradation of this substance cannot be measured
Bioaccumulative potential:	The bioaccumulation potential of this substance can be disregarded, because of its water solubility and its high reactivity.
Mobility in soil	substance decomposes rapidly in each compartment (air, water, soil and sediment). Therefore, this substance itself does not exist in nature.
PBT identification:	This product is not identified as a PBT/vPvB substance.
Other adverse effects:	None known.

13. DISPOSAL CONSIDERATIONS

Disposal: Rinse empty containers in the pool and dispose of by wrapping with paper and putting in garbage. For larger quantities, refer to local government authority for disposal recommendations. Dispose of material through a licensed waste contractor. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

14. TRANSPORT INFORMATION

Consult the ADG 7.5, IMDG and ICAO/IATA Codes for all the transport requirements for the specified UN Number.

	Land Transport (ADG 7.5)	Sea Transport (IMDG)	Air Transport (ICAO/IATA)
UN Number	2880	2880	2880
UN proper shipping name	CALCIUM HYPOCHLORITE, HYDRATED MIXTURE with not less than 5.5% but not more than 16% water	CALCIUM HYPOCHLORITE, HYDRATED MIXTURE with not less than 5.5% but not more than 16% water	CALCIUM HYPOCHLORITE, HYDRATED MIXTURE with not less than 5.5% but not more than 16% water
Transport Hazard Class	5.1	5.1	5.1
Packaging Group	II or III (see ADG 7.5 for details)	II	II
Marine Pollutant		Yes	
Special Provisions*	223, 314, 322		

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* See ADG 7.5 for details

15. REGULATORY INFORMATION

Poisons Standard (Scheduling):	Schedule 6
APVMA Product Number:	56157
Listing in the Australian Inventory of Chemical Substances (AICS)	Not applicable for APVMA registered products

16. OTHER INFORMATION

ADG	Australian Code for the Transport of Dangerous Goods by Road & Rail Edition 7.5, 2017
AS/NZS	Australian Standard/New Zealand Standard
CAS Number:	Unique Chemical Abstracts Service Registry Number
EC₅₀:	Ecotoxic Concentration 50% – concentration in water which is fatal to 50% of a test population (e.g. daphnia, fish species).
GHS:	Globally Harmonized System of classification and labelling of chemicals (GHS)
Hazchem Code:	Emergency action code of numbers and letters that provide information to emergency services, especially fire fighters
HCIS:	Hazardous Chemical Information System (http://hcis.safeworkaustralia.gov.au/HazardousChemical)
IARC:	International Agency for Research on Cancer
LD₅₀:	Lethal Dose 50% – dose which is fatal to 50% of a test population (usually rats).
IDLH:	Immediately dangerous to life or health (IDLH) is defined by the US National Institute for Occupational Safety and Health (NIOSH)
LC₅₀:	Lethal Concentration 50% – concentration in air which is fatal to 50% of a test population.
NTP:	National Toxicology Program (USA)
SDS:	Safety Data Sheet
STEL:	Short term exposure limit (STEL) means the time-weighted average maximum airborne concentration of a substance calculated over a 15 minute period.
TWA:	8-hour Time-weighted average (TWA) means the maximum average airborne concentration of a substance when calculated over an eight-hour working day, for a five-day working week.
WES:	Workplace exposure standard
UN Number:	United Nations Dangerous Goods Number

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References:

Work Safe Australia Preparation of Safety Data Sheets for Hazardous Chemicals Code of Practice (February 2016). The exposure standards comply with the Australian Workplace Exposure Standards for Airborne Contaminants. The Dangerous Goods Classification complies with the Australian Code for the Transport of Dangerous Goods by Road & Rail Edition 7.5, 2017. Other information from ChemIDPlus and linked databases and the European Chemicals Agency Classification and Labelling database. OECD SIDS.

Sections Revised: All

Replaces revision: 11 July 2013

Disclaimer

This Safety Data Sheet (SDS) has been prepared in compliance with the Work Safe Australia Preparation of Safety Data Sheets for Hazardous Chemicals Code of Practice (February 2016). The information in this SDS should be provided to all who will use, handle, store, transport, or otherwise be exposed to this product. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. HY-CLOR Australia Pty. Limited shall not be held liable for any damage resulting from handling or from contact with the above product.

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Mr Mark Sheridan

Technical Regulations Manager

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Product Name: HY-CLOR GRANULAR POOL CHLORINE

Review Date: 3 July 2018



SAFETY DATA SHEET

PRODUCT: Phosphoric Acid FG (25% - 85%)

Date of Issue: December 2020

1. IDENTIFICATION OF CHEMICAL PRODUCT AND SUPPLIER

PRODUCT IDENTIFICATION:

Product Names:	Supplier's Product Code
Phosphoric Acid 25%	
Phosphoric Acid 50%	
Phosphoric Acid 85%	2719

Other Names:	Orthophosphoric acid
Recommended Use:	General chemical
Formula:	H ₃ PO ₄
Chemical family	Inorganic acid


Supplier:	Formula Chemicals (N.S.W.) Pty Ltd
Address:	82-88 Hermitage Rd West Ryde NSW 2114
Telephone Number:	(02) 9807 4266
Emergency Telephone:	(02) 9807 4266 or Poisons Information 131126
ABN:	37 001 129 406

2. HAZARDS IDENTIFICATION

HAZARDOUS SUBSTANCE.

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.

This material is hazardous according to Safe Work Australia; HAZARDOUS SUBSTANCE

Signal Word	DANGER	
GHS Classification	Pictogram	Hazard Statement
Eye Damage - Category 1 Skin Corrosion: Sub-category 1B	 CORROSIVE	H318 Causes serious eye damage.

Hazard Statement(s):

H314	Causes severe skin burns and eye damage
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Precautionary Statements:

GENERAL P101 P102 P103	If medical advice is needed, have product container or label at hand Keep out of reach of children Read label before use
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Phosphoric Acid FG 25-85

Date of Issue: December 2020

<u>PREVENTATIVE</u> P260 P264 P280	Do not breathe dust / fume / gas / mist / vapours / spray Wash hands thoroughly after handling Wear protective gloves/eye protection/face protection
<u>RESPONSE</u> P301+P330+P331 P303+P361+P353 P321 P363 P305 + P351 + P338 P304+P340	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower Specific treatment (see First Aid Measures on Safety Data Sheet) Wash contaminated clothing before re-use IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF INHALED: Remove person to fresh air and keep comfortable for breathing
<u>STORAGE</u> P405	Store locked up
<u>DISPOSAL</u> P501	Dispose of contents/container in accordance with local/regional/national/international regulations.

Poisons Schedule (SUSMP): S6 Poison

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Nil
Appearance: Liquid, Clear, Slightly Turbid

Component	CAS Number	Proportion	Hazard Codes
Water	7732-18-5	Up to 100%	
Phosphoric acid	7664-38-2	25-85%	H314

All the constituents of this material are listed on the Australian Inventory of Chemical Substances (AICS)

4. FIRST AID MEASURES

Poison Information Centres in each state can provide additional assistance for scheduled poisons.
Phone 131126 from anywhere in Australia

Description of necessary first aid measures:

Inhalation	Remove victim from area of exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. Seek medical advice if effects persist
Skin Contact	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. If irritation occurs seek medical advice.
Eye Contact:	Immediately wash in and around the eye area with large amounts of water for at least 15 minutes. Eyelids to be held apart. Remove clothing if contaminated and wash skin. Urgently seek medical assistance. Transport promptly to hospital or medical centre. Continue to wash with large amounts of water until medical help is available.
Ingestion	Rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water. Seek medical advice.

Indication of immediate medical attention and special treatment needed:

Treat symptomatically. Can cause corneal burns.

5. FIRE FIGHTING MEASURES

Suitable extinguishing equipment

Not combustible, however, if material is involved in a fire use: Fine water spray, normal foam, dry agent (carbon dioxide, dry chemical powder).

Specific hazards arising from the chemical

Non-combustible material

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Special protective equipment and precautions for fire fighters

Decomposes on heating emitting toxic fumes, including those of oxides of phosphorus. Fire fighters to wear self-contained breathing apparatus and suitable protective clothing if risk of exposure to products of decomposition. Keep containers cool with water spray.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment

Slippery when spilt. Avoid accidents, clean up immediately. Wear protective equipment to prevent skin and eye contact and breathing in vapours. Work up wind or increase ventilation. Contain - prevent run off into drains and waterways. Use absorbent (soil, sand or other inert material). Neutralise with lime or soda ash. Collect and seal in properly labelled containers or drums for disposal. Wash area down with excess water.

Environmental precautions and emergency procedures

Clear area of all unprotected personnel. If contamination of sewers or waterways has occurred advise local emergency services.

7. HANDLING AND STORAGE

This material is a Scheduled Poison S6 and must be stored, maintained and used in accordance with the relevant regulations.

Precautions for safe handling

Avoid skin and eye contact and breathing in vapour, mists and aerosols. Keep out of reach of children. May crystallise below 15°C.

Conditions for safe storage, including any incompatibilities

Store in a cool, dry, well ventilated place. Store away from foodstuffs. Store away from incompatible materials described in Section 10. Keep containers closed when not in use - check regularly for leaks.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Standards:

No value assigned for this specific material by Safe Work Australia. However, Workplace Exposure Standard(s) for constituent(s):

Phosphoric acid: 8hr TWA = 1 mg/m³, 15 min STEL = 3 mg/m³

As published by Safe Work Australia Workplace Exposure Standards for Airborne Contaminants.

TWA - The time-weighted average airborne concentration of a particular substance when calculated over an eight-hour working day, for a five-day working week.

STEL (Short Term Exposure Limit) - the airborne concentration of a particular substance calculated as a time-weighted average over 15 minutes, which should not be exceeded at any time during a normal eight hour work day. According to current knowledge this concentration should neither impair the health of, nor cause undue discomfort to, nearly all workers.

These Workplace Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These workplace exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity

Engineering Controls:

Ensure ventilation is adequate and that air concentrations of components are controlled below quoted Workplace Exposure Standards. Keep containers closed when not in use.

If in the handling and application of this material, safe exposure levels could be exceeded, the use of engineering controls such as local exhaust ventilation must be considered and the results documented. If achieving safe exposure levels does not require engineering controls, then a detailed and documented risk assessment using the relevant Personal Protective Equipment (PPE) (refer to PPE section below) as a basis must be carried out to determine the minimum PPE requirements.

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Phosphoric Acid FG 25-85

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Personal Protection:

The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods, and environmental factors.

OVERALLS, CHEMICAL GOGGLES, FACE SHIELD, GLOVES (Long), APRON, RUBBER BOOTS



Wear overalls, chemical goggles and impervious gloves. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storage or re-use. If determined by a risk assessment an inhalation risk exists, wear a suitable mist respirator meeting the requirements of AS/NZS 1715 and AS/NZS 1716.

9. PHYSICAL & CHEMICAL PROPERTIES

Appearance:	Clear Liquid
Colour:	Colourless
Odour:	Odourless
Specific Gravity:	at 20C approx. range 1.10 – 1.20 (typically 1.17)
Flash Point:	N/A
pH:	< 1
Solubility in water:	Miscible in water

10. STABILITY AND REACTIVITY

Reactivity:	Reacts exothermically with alkalis.
Chemical stability:	Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Possibility of hazardous reactions:	Corrosive to most metals.
Conditions to avoid:	Avoid contact with foodstuffs
Incompatible materials:	Incompatible with most metals, alkalis
Hazardous decomposition products:	Oxides of phosphorus

11. TOXICOLOGICAL INFORMATION

Information given is based on product data, knowledge of the components and the toxicology of similar products. No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

Ingestion:	Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain and chemical burns to the gastrointestinal tract.
Eye contact:	A severe eye irritant. Corrosive to eyes; contact can cause corneal burns. Contamination of eyes can result in permanent injury.
Skin contact:	Contact with skin will result in severe irritation. Corrosive to skin - may cause skin burns.
Inhalation:	Breathing in mists or aerosols may produce respiratory irritation
Acute toxicity:	No LD50 data available for the product. For the constituent Phosphoric acid : Oral LD50 (rat): 1530 mg/kg. Dermal LD50 (rabbit): 2740 mg/kg.
Skin corrosion/irritation:	Severe irritant (rabbit).
Serious eye damage/irritation:	Severe irritant (rabbit).
Chronic effects:	Repeated or prolonged skin contact may cause dermatitis

12. ECOLOGICAL INFORMATION

Ecotoxicity: Avoid contaminating waterways

13. DISPOSAL CONSIDERATIONS

FORMULA CHEMICALS (NSW) PTY LTD

Phosphoric Acid FG 25-85

Date of Issue: December 2020

Refer to Waste Management Authority. Dispose of contents/container in accordance with local/regional/national/international regulations..

14. TRANSPORT INFORMATION

Road and Rail Transport

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.



UN No. 1805
Transport Hazard Class: 8 Corrosive
Packing Group: III
Proper Shipping Name or Technical Name: PHOSPHORIC ACID, SOLUTION
Hazchem or Emergency Action Code: 2R

Marine Transport

Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS.

UN No. 1805
Transport Hazard Class: 8 Corrosive
Packing Group: III
Proper Shipping Name or Technical Name: PHOSPHORIC ACID, SOLUTION

IMDG EMS Fire: F-A
IMDG EMS Spill: S-B

Air Transport

Classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air; DANGEROUS GOODS

UN No. 1805
Transport Hazard Class: 8 Corrosive
Packing Group: III
Proper Shipping Name or Technical Name: PHOSPHORIC ACID, SOLUTION

15. REGULATORY INFORMATION

Classification:

This material is hazardous according to Safe Work Australia; HAZARDOUS SUBSTANCE

Poisons Schedule (SUSMP): S6 Poison.

Classification of the substance or mixture:

Skin Corrosion - Sub-category 1B

Eye Damage - Category 1

Hazard Statement(s):

H314 Causes severe skin burns and eye damage

All the constituents of this material are listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

This SDS summarises to our best knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material in the workplace. Since Formula Chemicals Pty Ltd cannot anticipate or control the conditions under which the product may be used, each user must, prior to usage, assess and control the risks arising from its use of the material.

References:

(1) 'Registry of Toxic Effects of Chemical Substances'. Ed. D. Sweet, US Dept. of Health & Human Services: Cincinnati, 2012. (2) National Code of Practice for the preparation of MSDS [NOHSC:2011(2003), (3) List of Designated Hazardous Substances [NOHSC:10005:1999] (4) ADG Code 7th Edition (5) www.safeworkaustralia.gov.au

Contact Point: Quality Assurance Manager Tel (02) 9807 4266

DISCLAIMER: All information given in this data sheet and by the company's technical staff is compiled from the best information currently available to the company. The company accepts no responsibility whatsoever for its accuracy or for any results which may be obtained by customers. Any customer who relies upon any advice or information given in this data sheet by the company or by its technical staff does so entirely at its own risk, and the company will not be liable for any loss or damage thereby suffered notwithstanding any want of care on the part of the company or its staff in compiling or giving the advice or information.


Autogas Safety Data Sheet (SDS)

LPG-BUS-HSE-IST-0005 / LPG362
Released 28 February 2019. Version 9.0

1 Product and Company Details

1.1 Product Identifier	
Product Name	Autogas
Proper Shipping Name	Petroleum Gases, Liquefied
Other Names	LPG, LP Gas, Liquefied Petroleum Gas
1.2 Recommended use and restrictions on use	
Use(s)	As fuel in automotive applications
Restrictions	Not to be concentrated and intentionally inhaled.
1.3 Supplier details	
Company	Origin Energy LPG Limited Level 32 Tower 1, 100 Barangaroo Avenue, Barangaroo NSW 2000 Website: www.originenergy.com.au/lpg
Enquiries	General and Technical Information 133 LPG (133 574)
Emergency Telephone	1800 808 526 all hours

2 Hazards identification

2.1 Classification of the substance or mixture	
LPG as supplied by Origin contains less than 0.1% of 1,3 Butadiene. LPG as classified as a Dangerous Good by the Australian Dangerous Goods Code.	
GHS Classification	Flammable Gases: Category 1 Gases under pressure: Liquefied gas
2.2 Label Elements	
Signal word	Danger
Pictogram	
Hazard statement(s)	H220 Extremely flammable gas H280 Contains gas under pressure, may explode if heated
Prevention Statements(s)	P210 Keep away from heat / sparks / open flames / hot surfaces. No smoking
Response Statement(s)	P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely P381 Eliminate all ignition sources if safe to do so.
Storage statement	P410 + P403 Protect from sunlight. Store in a well-ventilated place.
Disposal Statement	None allocated
2.3 Other Hazards	

Asphyxiant. Effects are proportional to oxygen displacement.

Smell: People with poor or no sense of smell should be made aware of the risk in the event of a gas leak.

3 Composition and Information on Ingredients

3.1 Substance / Mixtures			
Ingredient	CAS Number	Content v/v	Notes
LP Gas	68476-85-7		Composition in accordance with the appropriate Gas Energy Australia Specifications
Propane	0074-98-6	45-99%	
Propylene (Propene)	115-07-1	<20%	
Butane (mixture of "n" and "iso" isomers)	106-97-8	0 – 50%	
Ethane	74-84-0	<5%	
1,3 Butadiene	106-99-0		
Ethyl Mercaptan	75-08-1		Approx. 25ppm
Alternative Names: LPG Gas, or Liquefied Petroleum Gas	UN Number 1075		

4 First Aid

4.1 Description of first aid measures	
Eye	Cold burns: Immediately flush with tepid water or with sterile saline solution. Hold eyelids apart for 15 minutes. Seek medical attention.
Inhalation	If inhaled, remove from contaminated area. To protect rescuer, use an Air-line respirator or Self Contained \Breathing Apparatus (SCBA). Be aware of possible explosive atmospheres. Apply artificial respiration if not breathing. Give oxygen if available. For advice, contact a Poison Information Centre on 131126 (Australia Wide) or a doctor.
Skin	Cold burns: Remove contaminated clothing and gently flush the affected areas with warm water (30°C) for 15 minutes. DO NOT apply any form of direct heat. Seek immediate medical attention.
Ingestion	Due to product form and application, ingestion is considered unlikely.
First aid facilities	Eye wash facilities and / or safety shower should be available. This will depend upon the nature of use and associated risks.
4.2 Most important symptoms and effects, both acute and delayed	
In high concentrations, may cause asphyxiation. Direct contact with the liquefied material or escaping compressed gas may cause frostbite injury.	
4.3 Immediate material attention and special treatment needed	
Treat symptomatically	

5 Fire Fighting Measures

5.1 Extinguishing media

Stop flow of gas if safe to do so, such as by slowly closing the cylinder or tank valve as appropriate to the event.

5.2 Special hazards arising from the substance or mixture

Extremely flammable. Eliminate all ignition sources including cigarettes, open flames, spark producing switches / tool, heaters, naked lights, pilot lights, mobile phones etc. when handling.

5.3 Advice for fire-fighters

Temperatures in a fire may cause cylinders to rupture and internal pressure relief devices to be activated. Cool cylinders or containers exposed to fire by applying water from a protected location. Do not extinguish flame if resulting escape gas poses greater risk. Do not approach cylinder or containers suspected of being hot. This material is capable of forming explosive mixtures in air.

5.4 Hazchem code

2YE

2 Fine Water Spray

Y Risk of violent reaction or explosion. Wear full kit and breathing apparatus. Contain spill and run-off.

E Evacuation of people in and around the immediate vicinity of the incident should be considered.

6 Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

If the cylinder is leaking, evacuate area of personnel. Inform manufacturer / supplier of leak. Use Personal Protective Equipment (PPE) as detailed in Section 8 of the SDS. Ventilate area where possible and eliminate ignition sources.

6.2 Environmental precautions

Prevent from entering sewers, basements and work pits, or any place where its accumulation can be dangerous.

6.3 Methods of cleaning up

Stop the flow of material, if it is without risk. If the leak is irreparable, move the cylinder to a safe and well ventilated area, and allow to discharge. Keep the area evacuated and free from ignition sources until any leaked or spilled liquid has evaporated.

6.4 Reference to other sections

See section 8 and 13 for exposure controls and disposal

7 Handling and Storage

7.1 Precautions for safe handling

Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating, prohibit eating, drinking and smoking in contaminated areas.

7.2 Conditions for safe storage, including any incompatibilities

Do not store near incompatible substances and sources of ignition. Cylinders should be stored: Upright, prevented from falling, in a secure area: below 45°C in a dry, well ventilated area constructed of non-combustible material with firm level floor (preferably concrete), away from areas of heavy traffic and emergency exits.

7.3 Specific end use(s)

No information provided

8 Exposure Controls and Personal Protection

8.1 Control parameters

Exposure Standards

Ingredient	Reference	TWA	
Butane	NOHSC	800 ppm 8 hours	Asphyxiant
Propane	ACGIH	1000 ppm 8 hours	Asphyxiant
Propylene	ACGIH	500 ppm 8 hours	Asphyxiant
Ethane	ACGIH	1000 ppm 8 hours	Asphyxiant

Biological limits: No biological limits have been entered for this product

8.2 Exposure Controls

Engineering Controls	Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical explosion proof extraction ventilation is recommended.
PPE – Eye / Face	Wear safety glasses
PPE – Hands	Wear insulated or leather gloves
PPE – Body	Wear non-static long sleeved shirts and trousers, or coveralls

9 Physical and Chemical Properties

9.1 Physical Description / Properties

Appearance	Colourless gas
Odour	Normally an odourless gas. Ethyl Mercaptan is added at prescribed quantities to give a distinctive odour to warn of the presence of gas.
Flammability	Extremely flammable
Boiling Point	-42 to 0°C
Flash Point	-104 to -60°C
Melting Point	-188°C to -160°C
Auto Ignition Temperature	450°C
Evaporation Rate	Not applicable
pH	Not applicable
Specific Gravity Liquid	0.51 to 0.58 (water = 1)
Relative Vapour Density	1.55 to 2.01 (Air = 1)
Solubility (water)	Slightly soluble
Partition coefficient	Not available
Vapour Pressure (at 40°C)	800 – 1530 kPa
Upper explosive limit	9.6%
Lower explosive limit	2.1%
Decomposition temperature	Not available
Viscosity	Not available
Oxidising Properties	Not available
Odour threshold	Not available

9.2 Other Information

% Volatiles	100%
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10 Stability and reactivity

10.1 Reactivity

Carefully review all information provided in sections 10.2 to 10.6

10.2 Reactivity

Stable under recommended conditions of storage

10.3 Possibility of hazardous reactions

Polymerization will not occur

10.4 Conditions to avoid

Avoid heat, sparks, open flames and other ignition sources

10.5 Incompatible materials

Incompatible with oxidising agents (e.g hypochlorite), acids, (e.g. Nitric acid), heat and ignition sources. **DO NOT** use natural rubber flexible hoses. Also incompatible (potentially violently) with oxygen, halogens and metal halides. Compatible with most common metals.

10.6 Hazardous decomposition products

This material will not decompose to form hazardous products other than that already present.

11 Toxicological Information**11.1 Information on toxicological effects**

Acute toxicity	No known toxicological effects from this product. Based on available data, the classification criteria are not met.
Skin	Not classified as a skin irritant. Contact with the liquefied material or escaping compressed gas may cause frostbite injury.
Eyes	Not classified as an irritant to the eyes. Contact with the liquefied material or escaping compressed gas may cause frostbite injury.
Sensitisation	Not classified as causing skin or respiratory sensitisation.
Mutagenicity	Not classed as a mutagen.
Carcinogenicity	Not classified as a carcinogen.
Reproductive	Not classified as a reproductive toxin
STOT – single exposure	Asphyxiant. Effects are proportional to oxygen displacement. Over exposure may result in dizziness, drowsiness, weakness, fatigue, breathing difficulties and unconsciousness.
Aspiration	Not classified as causing aspiration

12 Ecological Information**12.1 Toxicity**

No information provided

12.2 Persistence and degradability

No information provided

12.3 Bio-accumulative potential

No Information provided

12.4 Mobility in soil

No information provided

12.5 Other adverse effects

No known ecological damage is caused by this product

13 Disposal Considerations**13.1 Waste treatment methods**

Waste disposal	Autogas cylinders should be handled by a Gas Cylinder Test Station for disposal of contents prior to disposal of the cylinder Autogas storage tanks remain the responsibility of the owner or site occupier for disposal of the contents
Legislation	Dispose of in accordance with the relevant local legislation.

14 Transport Information

Classified as a Dangerous Good by the criteria if the ADG code



	Land Transport (ADG)	Sea Transport (IMDG / IMO)
14.1 UN Number	1075	1075
14.2 Proper Shipping Name	Petroleum Gas, Liquefied	Petroleum Gas, Liquefied
14.3 Transport Hazard Class	2.1	2.1
14.4 Packing Group	None allocated	None allocated
Alternative Names	Petroleum gases, Liquefied; Liquefied Petroleum Gas; LPG; LP Gas	
14.5 Environmental hazards	No information provided	
14.6 Special precautions for user		
Hazchem Code	2YE.	
GTEPG	2A2.	
EMS	F-D, S-U	
Other Information	Transport in accordance with the requirements of ADG Code and the Load Restraint Guide	

15 Regulatory Information

15.1 Safety, health and environmental regulations / legislation specific for the substance or mixture	
Poison schedule	A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).
Classifications	SafeWork Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals. The classifications and phrases listed below are based on the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)]
Hazard Codes	F+ Extremely flammable
Safety phrases	S9 Keep container in a well-ventilated place S16 Keep away from sources of ignition – No smoking
Inventory listing(s)	AUSTRALIA: AICS (Australian Inventory of Chemical Substances). All components are listed on AICS or are exempt

16 Other Information

16.1 Additional Information

The storage of on-site Autogas storage tanks must comply with AS/NZS 1596 The storage and handling of LP Gas.

Asphyxiants (1)	When present in the atmosphere in high concentrations, asphyxiants reduce the oxygen concentration by displacement. Atmospheres deficient in oxygen do not provide sensory warning of danger and most simple asphyxiants are odourless. Therefore, it is not appropriate to recommend an exposure standard for each asphyxiant, but to maintain oxygen concentrations. However, some asphyxiants may be given an exposure standard due to the potential for narcotic effects at high concentrations or an explosion hazard.
Asphyxiants (2)	There is a significant hazard associated with workers entering poorly ventilated areas (e.g. tanks) where oxygen may be deficient. An air supplied breathing apparatus may be required if adequate ventilation is not ensured.
Personal protective equipment guidelines	The recommendation for protective equipment contained within this SDS is provided as a guide only. Factors such as methods of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.
Health effects from exposure	It should be noted that the effects from exposure to this product will depend upon several factors including frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a report which would encompass all possible scenarios, it is anticipated that users will assess the risk and apply control methods where appropriate.

16.2 Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS#	Chemical Abstract Service number – used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	European Community Number
EMS	Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods)
GHS	Globally Harmonised System
GTEPG	Group Text Emergency Procedure Guide
IARC	International Agency for Research on Cancer
LC50	Lethal Dose, 50% / Median Lethal Concentration
LD50	Lethal Dose, 50% / Median Lethal Dose
Mg/m ³	Milligrams per Cubic Metre
OEL	Occupational Exposure Limit
pH	Related to hydrogen ion concentration using a scale of 0 (highly acidic) to 14 (highly alkaline)
ppm	Parts Per Million
STEL	Short Term Exposure Limit
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
SWA	Safe Work Australia
TLV	Threshold Limit Value
TWA	Time Weighted Average

SDS Receipt Acknowledgement

I hereby acknowledge that I have been provided with a copy of the Origin Safety Data Sheet for Autogas, Issue 9, Released 28 February 2019.

Name: _____

Title: _____

Company: _____

Customer Number: _____

Signed: _____

Dated: _____


Liquefied Petroleum Gas (LPG) Safety Data Sheet (SDS)

LPG-BUS-HSE-IST-0007 / LPG364
Released 13 November 2019 Version 14.0

1 Product and Company Details

1.1 Product Identifier	
Product Name	Liquefied Petroleum Gas
Proper Shipping Name	Petroleum Gases Liquefied
Other Names	LPG, LP Gas, Commercial Propane, Propane, Butane
1.2 Recommended use and restrictions on use	
Use(s)	As fuel in domestic, commercial, industrial and automotive applications.
Restrictions	Not to be concentrated and intentionally inhaled.
1.3 Supplier details	
Company	Origin Energy LPG Limited Level 32 Tower 1, 100 Barangaroo Avenue, Barangaroo NSW 2000 Website: www.originenergy.com.au/lpg
Enquiries	General and Technical Information 133 LPG (133 574)
Emergency Telephone	1800 808 526 all hours

2 Hazards identification

2.1 Classification of the substance or mixture	
LPG as supplied by Origin contains less than 0.1% of 1,3 Butadiene. LPG is classified as a Dangerous Good by the Australian Dangerous Goods Code.	
GHS Classification	Flammable Gases: Category 1 Gases under pressure: Liquefied gas
2.2 Label Elements	
Signal word	Danger
Pictogram	
Hazard statement(s)	H220 Extremely flammable gas H280 Contains gas under pressure, may explode if heated
Prevention Statements(s)	P210 Keep away from heat / sparks / open flames / hot surfaces. No smoking
Response Statement(s)	P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely P381 Eliminate all ignition sources if safe to do so.
Storage statement	P410 + P403 Protect from sunlight. Store in a well-ventilated place.
Disposal Statement	None allocated
2.3 Other Hazards	

Asphyxiant. Effects are proportional to oxygen displacement.

Smell: People with poor or no sense of smell should be made aware of the risk in the event of a gas leak.

3 Composition and Information on Ingredients

3.1 Substance / Mixtures				
Ingredient	CAS Number	Content v/v		Notes
		Propane	Butane	
LP Gas	68476-85-7			Composition in accordance with the appropriate Gas Energy Australia Standards and state regulations.
Propane	0074-98-6	45 – 99%	<5%	
Propylene (Propene)	115-07-1	<.150%	<2%	
Butane (mixture of “n” and “iso” isomers)	106-97-8 75-28-5	<7.5%	91 – 99%	
Ethane	74-84	<2%	<2%	Composition will vary depending upon whether supplied as propane or butane.
1,3 Butadiene	106-99-0			<0.1%
Ethyl Mercaptan (Odorant)	75-08-1			Approx. 25ppm
Alternative Names		UN Number		
Propane		1978		
LP Gas, or LPG		1075		
Butane		1011		

4 First Aid

4.1 Description of first aid measures	
Eye	Cold burns: Immediately flush with tepid water or with sterile saline solution. Hold eyelids apart for 15 minutes. Seek medical attention.
Inhalation	If inhaled, remove from contaminated area. To protect rescuer, use an Air-line respirator or Self Contained \Breathing Apparatus (SCBA). Be aware of possible explosive atmospheres. Apply artificial respiration if not breathing. Give oxygen if available. For advice, contact a Poison Information Centre on 131126 (Australia Wide) or a doctor.
Skin	Cold burns: Remove contaminated clothing and gently flush the affected areas with warm water (30°C) for 15 minutes. DO NOT apply any form of direct heat. Seek immediate medical attention.
Ingestion	Due to product form and application, ingestion is considered unlikely.
First aid facilities	Eye wash facilities and / or safety shower should be available. This will depend upon the nature of use and associated risks.
4.2 Most important symptoms and effects, both acute and delayed	
In high concentrations, may cause asphyxiation. Direct contact with the liquefied material or escaping compressed gas may cause frostbite injury.	
4.3 Immediate material attention and special treatment needed	
Treat symptomatically	

5 Fire Fighting Measures

5.1 Extinguishing media

Stop flow of gas if safe to do so, such as by slowly closing the cylinder or tank valve as appropriate to the event.

5.2 Special hazards arising from the substance or mixture

Extremely flammable. Eliminate all ignition sources including cigarettes, open flames, spark producing switches / tool, heaters, naked lights, pilot lights, mobile phones etc. when handling.

5.3 Advice for fire-fighters

Temperatures in a fire may cause cylinders to rupture and internal pressure relief devices to be activated. Cool cylinders or containers exposed to fire by applying water from a protected location. Do not extinguish flame if resulting escape gas poses greater risk. Do not approach cylinder or containers suspected of being hot. This material is capable of forming explosive mixtures in air.

5.4 Hazchem code

2YE

2 Fine Water Spray

Y Risk of violent reaction or explosion. Wear full kit and breathing apparatus. Contain spill and run-off.

E Evacuation of people in and around the immediate vicinity of the incident should be considered.

6 Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

If the cylinder is leaking, evacuate area of personnel. Inform manufacturer / supplier of leak. Use Personal Protective Equipment (PPE) as detailed in Section 8 of the SDS. Ventilate area where possible and eliminate ignition sources.

6.2 Environmental precautions

Prevent from entering sewers, basements and work pits, or any place where its accumulation can be dangerous.

6.3 Methods of cleaning up

Stop the flow of material, if it is without risk. If the leak is irreparable, move the cylinder to a safe and well ventilated area, and allow to discharge. Keep the area evacuated and free from ignition sources until any leaked or spilled liquid has evaporated.

6.4 Reference to other sections

See section 8 and 13 for exposure controls and disposal

7 Handling and Storage

7.1 Precautions for safe handling

Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating, prohibit eating, drinking and smoking in contaminated areas.

7.2 Conditions for safe storage, including any incompatibilities

Do not store near incompatible substances and sources of ignition. Cylinders should be stored: Upright, prevented from falling, in a secure area: below 45°C in a dry, well ventilated area constructed of non-combustible material with firm level floor (preferably concrete), away from areas of heavy traffic and emergency exits.

7.3 Specific end use(s)

No information provided

8 Exposure Controls and Personal Protection

8.1 Control parameters

Exposure Standards

Ingredient	Reference	TWA	
Propane	ACGIH	1000 ppm 8 hours	Asphyxiant
Butane	NOHSC	800 ppm 8 hours	Asphyxiant
Propylene	ACGIH	500 ppm 8 hours	Asphyxiant
Ethane	ACGIH	1000 ppm 8 hours	Asphyxiant

Biological limits: No biological limits have been entered for this product

8.2 Exposure Controls

Engineering Controls	Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical explosion proof extraction ventilation is recommended.
PPE – Eye / Face	Wear safety glasses
PPE – Hands	Wear insulated or leather gloves
PPE – Body	Wear non-static long sleeved shirts and trousers, or coveralls

9 Physical and Chemical Properties

9.1 Physical Description / Properties

Appearance	Colourless gas
Odour	Normally an odourless gas. Ethyl Mercaptan is added at prescribed quantities to give a distinctive odour to warn of the presence of gas.
Flammability	Extremely flammable
Boiling Point	-42 to 0°C (depending upon composition)
Flash Point	-80°C approx. (increased with increasing concentration of n-butane)
Melting Point	-188°C to -135°C (depending upon composition)
Auto Ignition Temperature	450°C - 540°C (depending upon composition)
Evaporation Rate	Not applicable
pH	Not applicable
Specific Gravity Liquid	0.51 to 0.58 (water = 1)
Relative Vapour Density	1.55 to 2 (Air = 1)
Solubility (water)	Slightly soluble
Partition coefficient	Not available
Vapour Pressure (at 40°C)	1275 kPa max (propane); 280 kPa (butane)
Upper explosive limit	9.6%
Lower explosive limit	1.8%
Decomposition temperature	Not available
Viscosity	Not available
Oxidising Properties	Not available
Odour threshold	Not available

9.2 Other Information

% Volatiles	100%
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10 Stability and Reactivity

10.1 Reactivity

Carefully review all information provided in sections 10.2 to 10.6

10.2 Reactivity

Stable under recommended conditions of storage

10.3 Possibility of hazardous reactions

Polymerization will not occur

10.4 Conditions to avoid

Avoid heat, sparks, open flames and other ignition sources

10.5 Incompatible materials

Incompatible with oxidising agents (e.g. hypochlorite), acids, (e.g. Nitric acid), heat and ignition sources. DO NOT use natural rubber flexible hoses. Also incompatible (potentially violently) with oxygen, halogens and metal halides. Compatible with most common metals.

10.6 Hazardous decomposition products

This material will not decompose to form hazardous products other than that already present.

11 Toxicological Information

11.1 Information on toxicological effects

Acute toxicity	No known toxicological effects from this product. Based on available data, the classification criteria are not met.
Skin	Not classified as a skin irritant. Contact with the liquefied material or escaping compressed gas may cause frostbite injury.
Eyes	Not classified as an irritant to the eyes. Contact with the liquefied material or escaping compressed gas may cause frostbite injury.
Sensitisation	Not classified as causing skin or respiratory sensitisation.
Mutagenicity	Not classed as a mutagen.
Carcinogenicity	Not classified as a carcinogen.
Reproductive	Not classified as a reproductive toxin
STOT – single exposure	Asphyxiant. Effects are proportional to oxygen displacement. Over exposure may result in dizziness, drowsiness, weakness, fatigue, breathing difficulties and unconsciousness.
Aspiration	Not classified as causing aspiration

12 Ecological Information

12.1 Toxicity

No information provided

12.2 Persistence and degradability

No information provided

12.3 Bio-accumulative potential

No Information provided

12.4 Mobility in soil

No information provided

12.5 Other adverse effects

No known ecological damage is caused by this product

13 Disposal Considerations

13.1 Waste treatment methods

Waste disposal	<p>Cylinders should be returned to the supplier for disposal of contents. Small customers owned cylinders should be made safe at a Gas Cylinder Test Station prior to disposal.</p> <p>LPG cylinders should be returned to the owning organisation stamped on the cylinder when no longer required.</p> <p>Contact Origin for disposal of LPG from tanks.</p>
Legislation	Dispose of in accordance with the relevant local legislation.

14 Transport Information

Classified as a Dangerous Good by the criteria if the ADG code



	Land Transport (ADG)	Sea Transport (IMDG / IMO)	Air Transport (IATA / ICAO)
14.1 UN Number	1075	1075	1075
14.2 Proper Shipping Name	Petroleum Gas, Liquefied	Petroleum Gas, Liquefied	Petroleum Gas, Liquefied
14.3 Transport Hazard Class	2.1	2.1	2.1
14.4 Packing Group	None allocated	None allocated	None allocated
Alternative Names			
Petroleum Gases, Liquefied; LPG; LP Gas; Propane; Commercial Propane; Butane			
14.5 Environmental hazards			
No information provided			
14.6 Special precautions for user			
Hazchem Code	2YE.		
GTEPG	2A2.		
EMS	F-D, S-U		
Other Information	<p>Ensure cylinders is separated from driver and that outlet of relief valve device is not obstructed.</p> <p>Cylinders must be secured in an upright position fro transport.</p> <p>Transport in accordance with the requirements of ADG Code and the Load Restraint Guide.</p>		

15 Regulatory Information

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

Poison schedule	A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).
Classifications	SafeWork Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.

	The classifications and phrases listed below are based on the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)]
Hazard Codes	F+ Extremely flammable
Safety phrases	S9 Keep container in a well-ventilated place S16 Keep away from sources of ignition – No smoking
Inventory listing(s)	AUSTRALIA: AICS (Australian Inventory of Chemical Substances). All components are listed on AICS or are exempt

16 Other Information

16.1 Additional Information

The storage of significant quantities of gas cylinders must comply with AS4332. The storage and handling of gases in cylinders, and AS/NZS 1596. The storage and handling of LP Gas.

Asphyxiants (1)	When present in the atmosphere in high concentrations, asphyxiants reduce the oxygen concentration by displacement. Atmospheres deficient in oxygen do not provide sensory warning of danger and most simple asphyxiants are odourless. Therefore, it is not appropriate to recommend an exposure standard for each asphyxiant, but to maintain oxygen concentrations. However, some asphyxiants may be given an exposure standard due to the potential for narcotic effects at high concentrations or an explosion hazard.
Asphyxiants (2)	There is a significant hazard associated with workers entering poorly ventilated areas (e.g. tanks) where oxygen may be deficient. An air supplied breathing apparatus may be required if adequate ventilation is not ensured.
Personal protective equipment guidelines	The recommendation for protective equipment contained within this SDS is provided as a guide only. Factors such as methods of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.
Health effects from exposure	It should be noted that the effects from exposure to this product will depend upon several factors including frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a report which would encompass all possible scenarios, it is anticipated that users will assess the risk and apply control methods where appropriate.

16.2 Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS#	Chemical Abstract Service number – used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	European Community Number
EMS	Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods)
GHS	Globally Harmonised System
GTEPG	Group Text Emergency Procedure Guide
IARC	International Agency for Research on Cancer

LC50	Lethal Dose, 50% / Median Lethal Concentration
LD50	Lethal Dose, 50% / Median Lethal Dose
Mg/m ³	Milligrams per Cubic Metre
OEL	Occupational Exposure Limit
pH	Related to hydrogen ion concentration using a scale of 0 (highly acidic) to 14 (highly alkaline)
ppm	Parts Per Million
STEL	Short Term Exposure Limit
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
SWA	Safe Work Australia
TLV	Threshold Limit Value
TWA	Time Weighted Average

SDS Receipt Acknowledgement

I hereby acknowledge that I have been provided with a copy of the Origin Safety Data Sheet for Liquefied Petroleum Gas Issue 14, Released 13 November 2019.

Name: _____

Title: _____

Company: _____

Customer Number: _____

Signed: _____

Dated: _____



MSM MILLING PTY LTD

SAFETY DATA SHEET

Product: Bulk Canola Meal - Expeller

Date of Issue: March, 2018

1. IDENTIFICATION OF CHEMICAL PRODUCT AND SUPPLIER

PRODUCT IDENTIFICATION:

Product Name: Bulk Canola Meal – Expeller

Recommended Use: Animal feed

Chemical family: Seed Cake

Supplier: MSM Milling Pty Ltd

Address: Lot 1 Dederang Street Manildra NSW 2865

Telephone Number: (02) 6364 5999

Emergency Telephone: General Manager – (02) 6364 5999 or 0438 885 194

ABN: 57 115 070 150

2. HAZARDS IDENTIFICATION

Hazard Category: Classified as hazardous according to Safe Work Australia criteria

ADG Classification: Class 4.2 (Substances liable to spontaneous combustion) for the purposes of storage and handling, in accordance with the requirement of AS1940.

Hazard statement: H252 Self heating in large quantities; may catch fire

Prevention statements: P235 + P410 Keep cool. Protect from sunlight

P280 Wear protective gloves/protective clothing/eye protection/face protection

P420 Store away from other materials

3. COMPOSITION AND INFORMATION ON INGREDIENTS

Ingredient	CAS Number	UN Number	Content
Canola Meal	121957-95-7	1386	100%

4. FIRST AID MEASURES

Eye: If in eyes, hold eye lids apart and flush continuously with running water. Continue flushing for at least 15 minutes.

Inhalation: If inhaled, remove from contaminated area. Apply artificial respiration if not breathing,

Ingestion: If swallowed, do not induce vomiting. Ingestion is considered unlikely due to product form.

Skin: If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry agent, carbon dioxide, foam or water fog.

Special hazards: Combustible. May evolve carbon oxides and hydrocarbons when heated to decomposition.

HazChem Code: 1Y
1: Coarse water spray
Y: Risk of violent reaction or explosion. Wear full fire kit and breathing apparatus. Contain spill and run off.

6. ACCIDENTAL RELEASE MEASURES

Small Spills: Contain spillage. Collect in properly labelled containers for reuse or disposal.

Large Spills: Restrict access to area. Contain spillage. Collect and seal in properly labelled containers for reuse or disposal.

7. HANDLING AND STORAGE

Precautions: Use of safe working practices is recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating.

Storage: Store in a cool dry, well ventilated area, removed from incompatible substances and foodstuffs. Bulk silos and bins must be suitable for holding seed cake. These must be maintained to prevent any entry of moisture. Store below 75°C.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

PPE

Eye/Face: Wear dust proof goggles.

Hands: Wear PVC or rubber gloves

Body: When using large quantities or where heavy contamination is likely, wear coveralls.

Respiratory: Where an inhalation risk exists, wear a Class P1 (particulate) respirator.

Exposure Standards: This substance has no Permissible Exposure Limit (PEL) Threshold Limit Value (TLV) or other recommended exposure limit

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Dark brown coarse powder

Odour:	Grainy odour
Flammability:	Spontaneously combustible
Flash point:	N/A
Boiling point:	N/A
Melting point:	N/A
Evaporation rate:	N/A
Specific gravity:	0.55
Vapour pressure:	N/A

10. STABILITY AND REACTIVITY

Reactivity:	May self-heat slowly if wet or containing excessive oil content. When oxidised, may spontaneously ignite.
Chemical stability:	Stable under normal conditions
Hazardous reactions:	No dangerous reaction known under conditions of normal use
Incompatible materials:	Strong oxidising agents, acids, alkalis, heat and ignition sources.
Decomposition products:	May evolve carbon oxides and hydrocarbons when heated.

11. TOXICOLOGICAL INFORMATION

Health hazard summary:	Non-toxic. Under normal conditions of use, adverse health effects are not anticipated.
Eye:	Non to low irritant
Inhalation:	Non-irritant. Adverse health effects are not anticipated under normal condition of use
Skin:	Non-irritant
Ingestion:	Non-toxic
Toxicity data:	No median lethal dose (LD50) data available

12. ECOLOGICAL INFORMATION

Eco toxicity:	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
Degradability:	No data available
Bio cumulative:	No data available
Mobility in soil:	No data available
Other adverse effects:	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this product

13. DISPOSAL CONSIDERATIONS

Disposal instructions:	Do not wash into drains, water courses or onto the ground. Do not allow the material to be washed into sewers or water supplies. Do not contaminate ponds, waterways or ditches
Local disposal rules:	Dispose of in accordance with local regulations

Hazardous waste code: Not established

14. TRANSPORT INFORMATION

- Road and Rail Transport:** Transport Hazard Class 4.2, Packing Group III by the criteria of the "Australian Dangerous Goods Code for Transport by Road or Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods by Land".
- Marine Transport:** Transport Hazard Class 4.2, Packing Group III by the criteria of the "International Marine Dangerous Goods Code" (IMDG Code) for transport by sea.
- Air Transport:** Transport Hazard Class 4.2, Packing Group III by the criteria of the "International Air Transport Association (IATA) Dangerous Goods Regulations for Transport by Air".

15. REGULATORY INFORMATION

- Poison Schedule:** A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).
- Classifications:** Safe Work Australia criteria are based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.
- Hazard Code:** None allocated
- Risk phrases:** None allocated
- Safety phrases:** None allocated

16. OTHER INFORMATION

- Issue date:** 20th March 2018
- Revision date:** March 2018



MSM MILLING PTY LTD

SAFETY DATA SHEET

Product: Canola Oil (including Organic Canola Oil)

Date of Issue: March 2022

1. IDENTIFICATION OF CHEMICAL PRODUCT AND SUPPLIER

PRODUCT IDENTIFICATION:

Product Names:

- Crude Canola Oil
- Refined Canola Oil
- Bleached Canola Oil
- Refined, Bleached and Deodorised (RBD) Canola Oil

Recommended Use: Edible oil, margarine and spreads, mayonnaise, lubricant, caulking compound, dust suppressant, agricultural adjuvant

Chemical family: Triglyceride

Supplier: MSM Milling Pty Ltd
Address: Lot 1 Dederang Street Manildra NSW 2865
Telephone Number: (02) 6364 5999
Emergency Telephone: General Manager – (02) 6364 5999 or 0438 885 194
ABN: 57 115 070 150

2. HAZARDS IDENTIFICATION

Hazard Category: Not classified as hazardous according to Safe Work Australia criteria
ADG Classification: Class C2 (Combustible Liquid) for the purposes of storage and handling, in accordance with the requirement of AS1940.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

Ingredient	CAS Number	Content
Canola Seed Oil	120962-03-0	100%

4. FIRST AID MEASURES

- Eye:** If in eyes, hold eye lids apart and flush continuously with running water. Continue flushing for at least 15 minutes.
- Inhalation:** Due to product form and nature of use, an inhalation hazard is not anticipated.
- Ingestion:** First aid is not generally required
- Skin:** First aid is not generally required

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry agent, carbon dioxide or foam.

Special hazards: Combustible. May evolve carbon oxides and hydrocarbons when heated to decomposition.

HazChem Code: None allocated

6. ACCIDENTAL RELEASE MEASURES

Small Spills: Contain using non-combustible absorbent - sand, diatomaceous earth, vermiculite or similar. Collect and seal in properly labelled containers.

Large Spills: Restrict access to area. Extinguish or remove all sources of ignition and stop leak if safe to do so. Pump into properly labelled containers. Clean up using non-combustible absorbent - sand, diatomaceous earth, vermiculite or similar.

7. HANDLING AND STORAGE

Precautions: Do not handle or store near an open flame, heat or other sources of ignition. Incompatible with oxidising agents (e.g. hypochlorites). Take precautionary measures against static discharges – all equipment used when handling the product must be grounded.

Storage: Store as a Class C2 Combustible Liquid (AS1940). For containers, store in a cool, dry, well ventilated area, removed from incompatible substances and foodstuffs and out of direct sunlight.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

PPE Eye/Face: Not required under normal conditions of use

Hands: Not required under normal conditions of use

Body: Not required under normal conditions of use

Respiratory: Not required under normal conditions of use

Exposure Standards: This substance has no Permissible Exposure Limit (PEL) Threshold Limit Value (TLV) or other recommended exposure limit

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Light to dark amber coloured liquid

Odour: Absent (RBD) or characteristic vegetable oil odour for other grades

Flammability: Class C2 combustible

Flash point: Approximately 285°C minimum by Cleveland Open Cup (COC) method and 150°C minimum closed cup

Boiling point: Decomposes

Melting point: Approximately minus 12°C

Evaporation rate: Negligible

Specific gravity: 0.91 – 0.93 @ 25°C

Vapour pressure: <0.1kPa @ 25°C

10. STABILITY AND REACTIVITY

Reactivity: Stable and non-reactive under normal conditions of use, storage and transport

Chemical stability: Stable under normal conditions

Hazardous reactions: No dangerous reaction known under conditions of normal use

Incompatible materials: Strong oxidising agents

Decomposition products: No hazardous decomposition products if stored and handled as indicated

11. TOXICOLOGICAL INFORMATION

Health hazard summary: Non-toxic. Under normal conditions of use, adverse health effects are not anticipated.

Eye: Non to low irritant

Inhalation: Non-irritant. Adverse health effects are not anticipated under normal condition of use

Skin: Non-irritant

Ingestion: Non-toxic

Toxicity data: No median lethal dose (LD50) data available

12. ECOLOGICAL INFORMATION

Eco toxicity: 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

Degradability: No data available

Bio cumulative: No data available

Mobility in soil: No data available

Other adverse effects: No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this product

13. DISPOSAL CONSIDERATIONS

Disposal instructions: Do not discharge into drains, water courses or onto the ground. Do not allow the material to drain into sewers or water supplies. Do not contaminate ponds, waterways or ditches

Local disposal rules: Dispose of in accordance with local regulations

Hazardous waste code: Not established

14. TRANSPORT INFORMATION

Road and Rail Transport: Not classified as dangerous goods by the criteria of the "Australian Dangerous Goods Code for Transport by Road or Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods by Land".

Marine Transport: Not classified as dangerous goods by the criteria of the “International Marine Dangerous Goods Code” (IMDG Code) for transport by sea.

Air Transport: Not classified as dangerous goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air.

15. REGULATORY INFORMATION

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

Classifications: Safe Work Australia criteria are based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.

Hazard Code: None allocated

Risk phrases: None allocated

Safety phrases: None allocated

16. OTHER INFORMATION

Issue date: 12th March 2018

Revision date: March 2022

Section 1 - Identification

Product Name Sodium hydroxide dilute

Product Code	ACR12419, ACR34968, AJA637, ALF035625, FSBJ/7660, BSPVL711.2.5, BSPVL714.5, HAC14764, HAC193, HAC23493, HAC671, ROA0059, ROA0060, ROA0061, ROA0062, ROA0064, ROA1183, ROA3365, ROA3756, ROA4785, ROA4999, ROA5000, TFSLT130082
Address	ThermoFisher Scientific Australia Pty Ltd 5 Caribbean Drive, Scoresby VICTORIA 3179, Australia
Emergency Tel.	CHEMTREC@ 03 9757 4559 or +613 9757 4559
Telephone / Fax Numbers	Tel: 1300 735 292 Fax: 1800 067 639
E-mail address	auinfo@thermofisher.com

Recommended Use Laboratory chemicals.

Section 2 - Hazard(s) Identification

Classification under Safe Work Australia

Classified as not hazardous according to criteria of Safe Work Australia. Concentration below cutoff.

<u>Physical hazards</u> No hazards identified
<u>Health hazards</u> No hazards identified
<u>Environmental hazards</u> No hazards identified

Label Elements None required

Other information
No information available

Section 3 - Composition and Information on Ingredients

Component	CAS-No	Weight %
Water	7732-18-5	99.6

Sodium hydroxide	1310-73-2	0.4
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Section 4 - First Aid Measures

Inhalation	Remove to fresh air.
Ingestion	Clean mouth with water and drink afterwards plenty of water.
Skin Contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes.
Eye Contact	Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.
Self-Protection of the First Aider	No special precautions required.
First Aid Facilities	Eyewash, safety shower and washroom.
Most important symptoms and effects	No information available.
Notes to Physician	Treat symptomatically.

Section 5 - Fire Fighting Measures

Suitable Extinguishing Media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Extinguishing media which must not be used for safety reasons

No information available.

Specific Hazards Arising from the Chemical

None reasonably foreseeable.

Special protective equipment and precautions for fire fighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

Section 6 - Accidental Release Measures

Emergency procedures

Ensure adequate ventilation.

Environmental Precautions

See Section 12 for additional Ecological Information.

Reference to Other Sections

Refer to protective measures listed in Sections 8 and 13.

Section 7 - Handling and Storage

Precautions for Safe Handling

Ensure adequate ventilation.

Conditions for Safe Storage, Including any Incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

AS/NZS 2243.10:2004, Safety in laboratories - Storage of chemicals

Section 8 - Exposure Controls and Personal Protection

Exposure limits

AUS - Exposure Standards for Atmospheric Contaminants in the Occupational Environment - Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:3008(1995)]

Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003(1995)]

updated in August, 2005. Safe Work Australia **ACGIH** - Threshold Limit Values - Ceiling (TLV-C) guidelines by the American Conference of Governmental Industrial Hygienists (ACGIH) for controlling worker exposure to airborne chemical concentrations in the workplace. **UK** - EH40/2005 Work Exposure Limits, Third edition. Published 2018. **DE** - MAK and BAT values of Hazardous Chemical Compounds in the Work Area. Published by German Research Foundation on July 1, 2011

Component	Australia	New Zealand WEL	ACGIH TLV	The United Kingdom	Germany
Sodium hydroxide	2 mg/m ³ TWA	Ceiling: 2 mg/m ³	Ceiling: 2 mg/m ³	2 mg/m ³ STEL	2 mg/m ³ TWA (inhalable fraction)

Biological limit values

This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies

Exposure Controls

Engineering Measures

None under normal use conditions.

Personal protective equipment

Eye Protection

Wear safety glasses with side shields (or goggles) (Australian/New Zealand Standard AS/NZS 1337 - Eye protectors for Industrial applications)

Hand Protection

Protective gloves

Glove material	Breakthrough time	Glove thickness	AUS/NZ Standard	Glove comments
Natural rubber	See manufacturers recommendations	-	AS/NZS 2161.1	(minimum requirement)
Nitrile rubber				
Neoprene				
PVC				

Inspect gloves before use.

Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)

Ensure gloves are suitable for the task: Chemical compatibility, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.

Remove gloves with care avoiding skin contamination.

Skin and body protection

Long sleeved clothing

Respiratory Protection

Use an AS/NZS 1716 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained in line with AS/NZS 1715 on the use and maintenance of respiratory protective devices

Recommended Filter type:

Particle filter (or AUS/NZ equivalent)

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

Environmental exposure controls

No information available.

Section 9 - Physical and Chemical Properties

Information on basic physical and chemical properties

Appearance	Clear, colorless solution	
Physical State	Liquid	
Odor	No information available	
Odor Threshold	No data available	
pH	No information available	
Melting Point/Range	No data available >0	
Softening Point	No data available	
Boiling Point/Range	No data available	
Flash Point	No information available	Method - No information available
Evaporation Rate	No data available	
Flammability (solid,gas)	Not applicable	Liquid
Explosion Limits	No data available	
Vapor Pressure	No data available	
Vapor Density	No data available	(Air = 1.0)
Specific Gravity / Density	No data available	
Bulk Density	Not applicable	Liquid
Water Solubility	Soluble in water	
Solubility in other solvents	No information available	
Partition Coefficient (n-octanol/water)		
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	
Viscosity	No data available	
Explosive Properties	No information available	
Oxidizing Properties	No information available	
Other information		
Molecular Formula	NaOH	
Molecular Weight	40	

Section 10 - Stability and Reactivity

Reactivity	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Heat, flames and sparks.
Hazardous Decomposition Products	None under normal use conditions.
Hazardous Polymerization	No information available.

Section 11 - Toxicological Information

Information on Toxicological Effects

Product Information

(a) acute toxicity;

Oral	Based on available data, the classification criteria are not met
Dermal	Based on available data, the classification criteria are not met
Inhalation	Based on available data, the classification criteria are not met

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Water	-	-	-
Sodium hydroxide		LD50 = 1350 mg/kg (Rabbit)	

(b) skin corrosion/irritation;	No data available
(c) serious eye damage/irritation;	No data available
(d) respiratory or skin sensitization;	
Respiratory	No data available
Skin	No data available
(e) germ cell mutagenicity;	No data available
(f) carcinogenicity;	No data available
(g) reproductive toxicity;	There are no known carcinogenic chemicals in this product
(h) STOT-single exposure;	No data available
(i) STOT-repeated exposure;	No data available
Target Organs	No information available.
(j) aspiration hazard;	No data available
Symptoms / effects,both acute and delayed	No information available

Section 12 - Ecological Information

Ecotoxicity effects Contains no substances known to be hazardous to the environment or that are not degradable in waste water treatment plants.

Component	Freshwater Fish	Water Flea	Freshwater Algae	Microtox
Sodium hydroxide	LC50: = 45.4 mg/L, 96h static (Oncorhynchus mykiss)	-	-	-

Persistence and Degradability

Persistence Soluble in water, Persistence is unlikely, based on information available.

Bioaccumulative Potential

Bioaccumulation is unlikely

Mobility

The product is water soluble, and may spread in water systems. Will likely be mobile in the environment due to its water solubility Highly mobile in soils

Endocrine Disruptor Information

This product does not contain any known or suspected endocrine disruptors

Persistent Organic Pollutant

This product does not contain any known or suspected substance

Ozone Depletion Potential

This product does not contain any known or suspected substance

Section 13 - Disposal Considerations

Waste from Residues/Unused Products

Do not allow into drains or watercourses or dispose of where ground or surface waters may be affected. Wastes, including emptied containers, are controlled wastes and should be disposed of in accordance with all federal, E.P.A., state and local regulations. Assure conformity with all applicable regulations.

Contaminated Packaging

Empty remaining contents. Dispose of in accordance with local regulations. Do not re-use empty containers.

Other Information

Chemical wastes should be disposed through a licensed commercial waste collection service.

Section 14 - Transport Information

IMDG/IMO

Not regulated

ADG Not regulated

Component	Hazchem Code
Sodium hydroxide 1310-73-2 (0.4)	2W 2R

IATA Not regulated**Environmental hazards** No hazards identified**Special Precautions** No special precautions required**Additional information** None known

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories X = listed

Component	AICS	NZIoC	EINECS	ELINCS	TSCA	DSL	NDSL	PICCS	ENCS	IECSC	KECL
Water	X	X	231-791-2	-	X	X	-	X	X	X	KE-3540 0
Sodium hydroxide	X	X	215-185-5	-	X	X	-	X	X	X	KE-3148 7

Standard for the Uniform Scheduling of Medicines and Poisons

Component	Standard for the Uniform Scheduling of Medicines and Poisons	Health Surveillance
Sodium hydroxide	Schedule 5 listed - except its salts and derivatives; in preparations being: solid preparations the PH of which in a 10 g/L aqueous solution is >11.5; liquid or semi-solid preparations the PH of which is >11.5 except in food additive preparations for domestic use Schedule 6 listed - except its salts and derivatives; except: [a] when included in Schedule 5 or Schedule 10, [b] in preparations containing <=5% of Sodium hydroxide being: [i] solid preparations, the pH of which in a 10 g/L aqueous solution is <=11.5, or [ii] liquid or semi-solid preparations the pH of which is <=11.5	
Component	Australian - Illicit Drug Precursors/Reagents Substance List	
Sodium hydroxide	Category 3	

Prohibition or notification/licensing requirements Shown below are details of specific prohibition/notifications or licencing requirements when they apply.

Section 16 - Other Information

Legend

AICS - Australian Inventory of Chemical Substances
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
IECSC - Chinese Inventory of Existing Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances

NZIoC - New Zealand Inventory of Chemicals
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS - Japanese Existing and New Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
CAS - Chemical Abstracts Service

TWA - Time Weighted Average

IARC - International Agency for Research on Cancer

ICAO/IATA - International Civil Aviation Organization/International Air Transport Association

MARPOL - International Convention for the Prevention of Pollution from Ships

NZS 5433:2012 - Transport of Dangerous Goods on Land

LD50 - Lethal Dose 50%

EC50 - Effective Concentration 50%

WEL - Workplace Exposure Limit

DNEL - Derived No Effect Level

POW - Partition coefficient Octanol:Water

vPvB - very Persistent, very Bioaccumulative

VOC (volatile organic compound)

ACGIH - American Conference of Governmental Industrial Hygienists
Predicted No Effect Concentration (PNEC)

IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code

ADG Australian Code for the Transport of Dangerous Goods by Road and Rail

OECD - Organisation for Economic Co-operation and Development

LC50 - Lethal Concentration 50%

ATE - Acute Toxicity Estimate

RPE - Respiratory Protective Equipment

NOEC - No Observed Effect Concentration

BCF - Bioconcentration factor

PBT - Persistent, Bioaccumulative, Toxic

Key literature references and sources for data

Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Training Advice

Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.

Revision Date

04-Jul-2020

Revision Summary

Not applicable.

This safety data sheet complies with the requirements of Safe Work Australia WHS Regulation

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of Safety Data Sheet



SAFETY DATA SHEET

PRODUCT: SODIUM HYPOCHLORITE SOLUTIONS
(5 - 15% avail chlorine)

Date of Issue: November 2020

1. IDENTIFICATION OF CHEMICAL PRODUCT AND SUPPLIER

PRODUCT IDENTIFICATION:

Product Names:	Supplier's Product Code:
SODIUM HYPOCHLORITE 5%	3216
SODIUM HYPOCHLORITE 6%	32166
SODIUM HYPOCHLORITE 12.5%	3211

Other Names:	Pool chlorine, chlorinated soda solution, chlorine bleach.
Recommended Use:	Bleaching agent, purification of water, sanitizer, potable grade for drinking water.
Formula:	NaOCl
Chemical family:	Sodium hypochlorite solution

Supplier:	Formula Chemicals (N.S.W.) Pty Ltd
Address:	82-88 Hermitage Rd West Ryde NSW 2114
Telephone Number:	(02) 9807 4266
Emergency Telephone:	(02) 9807 4266 or Poisons Information 131126
ABN:	37 001 129 406




2. HAZARDS IDENTIFICATION

HAZARDOUS SUBSTANCE. DANGEROUS GOODS

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.

This material is hazardous according to Safe Work Australia; HAZARDOUS SUBSTANCE.

Poisons Schedule (SUSMP): S5 Caution.

Signal Word		DANGER	
GHS Classification	Pictogram		Hazard Statement
Skin Corrosion/Irritation, Sub-Category 1C Category 1	 EXCLAMATION MARK	 CORROSIVE	H315 Causes skin irritation H314 Causes severe skin burns and eye damage
Acute Aquatic Toxicity, Category 1	 ENVIRONMENT		H400 Very toxic to aquatic life.

Precautionary Statements:

<u>GENERAL</u> P101 P102 P103	If medical advice is needed, have product container or label at hand Keep out of reach of children Read label before use
<u>PREVENTATIVE</u> P260 P264 P273 P280 P281	Do not breathe dust / fume / gas / mist / vapours / spray Wash thoroughly after handling Avoid release to the environment Wear protective gloves/eye protection/face protection Use personal protective equipment as required
<u>RESPONSE</u> P301 + P310 P302 + P352 P303 + P361 + P353 P308 + P313 P331 P332 + P313 P362 P305 + P351 + P338 P391	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician IF ON SKIN: Wash with plenty of soap and water IF ON SKIN (or hair): Take off contaminated clothing and wash before reuse Rinse skin with water/shower IF exposed or concerned: Get medical advice/attention DO NOT induce vomiting Take off contaminated clothing and wash before reuse IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Collect spillage
<u>STORAGE</u> P405	Store locked up
<u>DISPOSAL</u> P501	Dispose of contents/container in accordance with local regulations

Other Hazards: AUH031 Contact with acids liberates toxic gas

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Nil
Appearance: Clear Red Liquid with solvent smell

Component	CAS Number	Proportion	Hazard Codes
Water	7732-18-5	Up to 100%	
Sodium hypochlorite	7681-52-9	5-15%	H314 H400
Sodium hydroxide	1310-73-2	<1%	H290 H314 H318

All the constituents of this material are listed on the Australian Inventory of Chemical Substances (AICS)

4. FIRST AID MEASURES

Poison Information Centres in each state can provide additional assistance for scheduled poisons. Phone 131126 from anywhere in Australia

Description of necessary first aid measures:

Inhalation	Remove victim from area of exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. If patient finds breathing difficult and develops a bluish discoloration of the skin (which suggests a lack of oxygen in the blood - cyanosis), ensure airways are clear of any obstruction and have a qualified person give oxygen through a face mask. Apply artificial respiration if patient is not breathing. Seek immediate medical advice.
Skin Contact	If spilt on large areas of skin or hair, immediately drench with running water and remove clothing. Continue to wash skin and hair with plenty of water (and soap if material is insoluble) until advised to stop by the Poisons Information Centre or a doctor.
Eye Contact:	Immediately wash in and around the eye area with large amounts of water for at least 15 minutes. Eyelids to be held apart. Remove clothing if contaminated and wash skin. Urgently seek medical

	assistance. Transport promptly to hospital or medical centre. Continue to wash with large amounts of water until medical help is available
Ingestion	Immediately rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water. Seek immediate medical assistance.

Indication of immediate medical attention and special treatment needed:

Treat symptomatically. Can cause corneal burns. Delayed pulmonary oedema may result.

5. FIRE FIGHTING MEASURES

Suitable extinguishing equipment

Not combustible, however, if material is involved in a fire use: Fine water spray, normal foam, dry agent (carbon dioxide, dry chemical powder).

Specific hazards arising from the chemical

Non-combustible material

Special protective equipment and precautions for fire fighters

Decomposes on heating emitting toxic fumes, including those of chlorine. Fire fighters to wear self-contained breathing apparatus and suitable protective clothing if risk of exposure to products of decomposition

Hazchem or Emergency Action Code: 2X

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment

Slippery when spilt. Avoid accidents, clean up immediately. Wear protective equipment to prevent skin and eye contact and breathing in vapours. Work up wind or increase ventilation. Contain - prevent run off into drains and waterways. Use absorbent (soil, sand or other inert material). Collect and seal in properly labelled containers or drums for disposal.

Environmental precautions and emergency procedures

Clear area of all unprotected personnel. If contamination of sewers or waterways has occurred advise local emergency services.

7. HANDLING AND STORAGE

This material is a Scheduled Poison S5 and must be stored, maintained and used in accordance with the relevant regulations.

Precautions for safe handling

Avoid skin and eye contact and breathing in vapour, mists and aerosols. Keep out of reach of children

Conditions for safe storage, including any incompatibilities

Store in cool place and out of direct sunlight. Store away from foodstuffs. Store away from acids. Store away from incompatible materials described in Section 10. Keep containers closed when not in use - check regularly for leaks.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Standards:

No value assigned for this specific material by Safe Work Australia. However, Workplace Exposure Standard(s) for constituent(s):

Chlorine: Peak Limitation = 3 mg/m³ (1 ppm)

Sodium hydroxide: Peak Limitation = 2 mg/m³

As published by Safe Work Australia Workplace Exposure Standards for Airborne Contaminants.

Peak Limitation - a maximum or peak airborne concentration of a particular substance determined over the shortest analytically practicable period of time which does not exceed 15 minutes.

These Workplace Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These workplace exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

Engineering Controls:

Ensure ventilation is adequate and that air concentrations of components are controlled below quoted Workplace Exposure Standards. If inhalation risk exists: Use with local exhaust ventilation or while wearing air supplied mask.

Keep containers closed when not in use.

Personal Protection:

The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods, and environmental factors.

OVERALLS, CHEMICAL GOGGLES, FACE SHIELD, GLOVES (Long), APRON, RUBBER BOOTS.



Wear overalls, chemical goggles, face shield, elbow-length impervious gloves, splash apron or equivalent chemical impervious outer garment, and rubber boots. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storage or re-use. If determined by a risk assessment an inhalation risk exists, wear an air supplied respirator meeting the requirements of AS/NZS 1715 and AS/NZS 1716.

9. PHYSICAL & CHEMICAL PROPERTIES

Appearance:	Liquid
Colour:	Pale Yellow – Green tinge
Odour:	Chlorine
Specific Gravity:	at 20C approx. range 1.1 – 1.2
Flash Point:	Not combustible
Flammability limits	Non-flammable
pH:	Approx 12.5 (1% w/w)
Solubility in water:	Miscible in water

10. STABILITY AND REACTIVITY

Chemical stability:	Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. The amount of available chlorine diminishes over time.
Possibility of hazardous reactions:	Hazardous polymerisation will not occur. Reacts exothermically with acids . Reacts with ammonia, amines and ammonium salts to product chloramines. Decomposes on heating to produce chlorine gas.
Conditions to avoid:	Avoid contact with foodstuffs. Avoid exposure to heat, sources of ignition, and open flame. Avoid exposure to light. Avoid contact with other chemicals. Avoid contact with acids .
Incompatible materials:	Incompatible with acids , metals , metal salts , peroxides , reducing agents , and ethylene diamine tetraacetic acid . Incompatible with ammonia and ammonium compounds such as amines and ammonium salts.
Hazardous decomposition products:	Chlorine.

11. TOXICOLOGICAL INFORMATION

Information given is based on product data, knowledge of the components and the toxicology of similar products. No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

Ingestion:

Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain and chemical burns to the gastrointestinal tract

Eye contact:

A severe eye irritant. Corrosive to eyes; contact can cause corneal burns. Contamination of eyes can result in permanent injury.

Skin contact:

Contact with skin will result in severe irritation. Corrosive to skin - may cause skin burns

Inhalation:

Breathing in mists or aerosols may produce respiratory irritation. Delayed (up to 48 hours) fluid build up in the lungs may occur.

Acute toxicity: No LD50 data available for the product. For the constituent SODIUM HYPOCHLORITE: Oral LD50 (mice): 5800 mg/kg

Serious eye damage/irritation: Moderate irritant (rabbit). Standard Draize test

Chronic effects: No information available for the product.

12. ECOLOGICAL INFORMATION

Ecotoxicity:	Avoid contaminating waterways. For SODIUM HYPOCHLORITE:
Persistence/degradability:	This material is biodegradable.
Aquatic toxicity:	Very toxic to aquatic organisms.
48hr LC50 (fish):	0.07 - 5.9 mg/L

13. DISPOSAL CONSIDERATIONS

Refer to Waste Management Authority. Dispose of material through a licensed waste contractor. Decontamination and destruction of containers should be considered.

14. TRANSPORT INFORMATION

Road and Rail Transport

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.



UN No.	1791
Transport Hazard Class:	8 Corrosive
Packing Group:	III
Proper Shipping Name or Technical Name:	HYPOCHLORITE SOLUTION
Hazchem or Emergency Action Code:	2X

Marine Transport

Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS.

UN No.	1791
Transport Hazard Class:	8 Corrosive
Packing Group:	III
Proper Shipping Name or Technical Name:	HYPOCHLORITE SOLUTION
Hazchem or Emergency Action Code:	2X
IMDG EMS Fire:	F-A
IMDG EMS Spill:	S-B

Air Transport

Classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air; DANGEROUS GOODS

UN No.	1791
Transport Hazard Class:	8 Corrosive
Packing Group:	III
Proper Shipping Name or Technical Name:	HYPOCHLORITE SOLUTION
Hazchem or Emergency Action Code:	2X

15. REGULATORY INFORMATION

Classification:

This material is hazardous according to Safe Work Australia; HAZARDOUS SUBSTANCE.

Classification of the substance or mixture:

Skin Corrosion - Sub-category 1C

Eye Damage - Category 1

Acute Aquatic Toxicity - Category 1

Hazard Statement(s):

H314 Causes severe skin burns and eye damage.

H400 Very toxic to aquatic life.

Poisons Schedule (SUSMP): S5 Caution.

All the constituents of this material are listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

This SDS summarises to our best knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material in the workplace. Since Formula Chemicals Pty Ltd cannot anticipate or control the conditions under which the product may be used, each user must, prior to usage, assess and control the risks arising from its use of the material.

References:

(1) National Code of Practice for the preparation of MSDS [NOHSC:2011(2003), (2) List of Designated Hazardous Substances [NOHSC:10005:1999] (3) ADG Code 7th Edition (4) www.safeworkaustralia.gov.au

Contact Point: Quality Assurance Manager Tel (02) 9807 4266

DISCLAIMER: All information given in this data sheet and by the company's technical staff is compiled from the best information currently available to the company. The company accepts no responsibility whatsoever for its accuracy or for any results which may be obtained by customers. Any customer who relies upon any advice or information given in this data sheet by the company or by its technical staff does so entirely at its own risk, and the company will not be liable for any loss or damage thereby suffered notwithstanding any want of care on the part of the company or its staff in compiling or giving the advice or information.

SAFETY DATA SHEET

Version 6.8
Revision Date 30.08.2023
Print Date 25.02.2024

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

1.1 Product identifiers

Product name : Formaldehyde solution, 36.5-38%

Product Number : F8775

Brand : Sigma

1.2 Other means of identification

No data available

1.3 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : For R&D use only. Not for pharmaceutical, household or other uses.

1.4 Details of the supplier of the safety data sheet

Company : Merck Life Science Pty Ltd
Ground Floor, Building 1, 885 Mountain Highway
BAYSWATER VIC 3153
AUSTRALIA

Telephone : +61 1800 800 097

E-mail address : customersupport.anz@merckgroup.com

1.5 Emergency telephone

Emergency Phone # : Free call (24/7): 1800 862 115
Int'l (24/7): +61 2 9037 2994
(CHEMTREC)

SECTION 2: Hazards identification

2.1 GHS Classification

Flammable liquids (Category 3), H226

Acute toxicity, Oral (Category 3), H301

Acute toxicity, Inhalation (Category 2), H330

Acute toxicity, Dermal (Category 3), H311

Skin corrosion/irritation (Category 1B), H314

Serious eye damage/eye irritation (Category 1), H318

Skin sensitization (Category 1), H317

Germ cell mutagenicity (Category 2), H341

Carcinogenicity (Category 1B), H350

Specific target organ toxicity - single exposure (Category 1), Eyes, Central nervous system, H370

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word

Danger

Hazard statement(s)

H226

Flammable liquid and vapor.

H301 + H311

Toxic if swallowed or in contact with skin.

H314

Causes severe skin burns and eye damage.

H317

May cause an allergic skin reaction.

H330

Fatal if inhaled.

H335

May cause respiratory irritation.

H341

Suspected of causing genetic defects.

H350

May cause cancer.

H370

Causes damage to organs (Eyes, Central nervous system).

Precautionary statement(s)

Prevention

P201

Obtain special instructions before use.

P210

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

P260

Do not breathe mist or vapors.

P264

Wash skin thoroughly after handling.

P280

Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

P301 + P310 + P330

IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.

P303 + P361 + P353

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.

P304 + P340 + P310

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.

P305 + P351 + P338 + P310

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.

P308 + P311

IF exposed or concerned: Call a POISON CENTER/ doctor.

P308 + P313

IF exposed or concerned: Get medical advice/ attention.

P370 + P378

In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Storage

P403 + P233

Store in a well-ventilated place. Keep container tightly closed.

Restricted to professional users.

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

Substance / Mixture : Mixture

3.2 Mixtures

Hazardous ingredients

Component	Classification	Concentration
formaldehyde		
CAS-No. 50-00-0 EC-No. 200-001-8 Index-No. 605-001-00-5	Acute Tox. 3; Acute Tox. 2; Acute Tox. 3; Skin Corr./Irrit. 1B; Eye Dam./Irrit. 1; Skin Sens. 1; Muta. 2; Carc. 1B; STOT SE 3; H301, H330, H311, H314, H318, H317, H341, H350, H335 Concentration limits: >= 25 %: Skin Corr. 1B, H314; 5 - < 25 %: Eye Irrit. 2, H319; >= 5 %: STOT SE 3, H335; >= 0.2 %: Skin Sens. 1, H317; 5 - < 25 %: Skin Irrit. 2, H315; >= 25 %: Skin Corr. 1B, H314; 5 - < 25 %: Skin Irrit. 2, H315; 5 - < 25 %: Eye Irrit. 2, H319; >= 5 %: STOT SE 3, H335; >= 0.2 %: Skin Sens. 1, H317;	>= 30 - < 50 %
Methanol		
CAS-No. 67-56-1 EC-No. 200-659-6 Index-No. 603-001-00-X	Flam. Liq. 2; Acute Tox. 3; STOT SE 1; H225, H301, H331, H311, H370 Concentration limits: >= 10 %: STOT SE 1, H370; 3 - < 10 %: STOT SE 2, H371;	>= 10 - < 20 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled

After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact

In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact

After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed

After swallowing: fresh air. Make victim drink ethanol (e.g. 1 drinking glass of a 40% alcoholic beverage). Call a doctor immediately (mention methanol ingestion). Only in exceptional cases, if no medical care is available within one hour, induce vomiting (only in fully conscious persons) and make victim drink ethanol again (approx. 0.3 ml of a 40% alcoholic beverage/kg body weight/hour). Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures**5.1 Extinguishing media****Suitable extinguishing media**

Water Foam Carbon dioxide (CO₂) Dry powder

Unsuitable extinguishing media

For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides

Mixture with combustible ingredients.

Vapors are heavier than air and may spread along floors.

Forms explosive mixtures with air at elevated temperatures.

Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.

Evacuate the danger area, observe emergency procedures, consult an expert.

For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling

Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Hygiene measures

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage stability

Recommended storage temperature

15 - 25 °C

Storage class

Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.3 no other specific uses are stipulated.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
formaldehyde	50-00-0	STEL	2 ppm 2.5 mg/m3	Australia. Workplace Exposure Standards for Airborne Contaminants.
	Remarks	Category 2 (Carc. 2) Suspected human carcinogen Sensitiser		

		TWA	1 ppm 1.2 mg/m3	Australia. Workplace Exposure Standards for Airborne Contaminants.
		Category 2 (Carc. 2) Suspected human carcinogen Sensitiser		
Methanol	67-56-1	TWA	200 ppm 262 mg/m3	Australia. Workplace Exposure Standards for Airborne Contaminants.
	Remarks	Skin absorption		
		STEL	250 ppm 328 mg/m3	Australia. Workplace Exposure Standards for Airborne Contaminants.
		Skin absorption		

8.2 Exposure controls

Appropriate engineering controls

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 480 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.2 mm

Break through time: 60 min

Material tested: Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Flame retardant antistatic protective clothing.

Respiratory protection

required when vapours/aerosols are generated.

Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure

Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Physical state	liquid
b) Color	clear
c) Odor	No data available
d) Melting point/freezing point	No data available
e) Initial boiling point and boiling range	No data available
f) Flammability (solid, gas)	No data available
g) Upper/lower flammability or explosive limits	Upper explosion limit: 73 %(V) Lower explosion limit: 7 %(V)
h) Flash point	56.11 °C - closed cup
i) Autoignition temperature	No data available
j) Decomposition temperature	No data available
k) pH	No data available
l) Viscosity	Viscosity, kinematic: No data available Viscosity, dynamic: No data available
m) Water solubility	at 20 °C soluble
n) Partition coefficient: n-octanol/water	No data available
o) Vapor pressure	69 hPa at 37 °C
p) Density	1.09 g/cm ³ at 20 °C
Relative density	1.09 at 20 °C
q) Relative vapor density	1.04 - (Air = 1.0)

- r) Particle characteristics No data available
- s) Explosive properties Not classified as explosive.
- t) Oxidizing properties none

9.2 Other safety information

Relative vapor density 1.04 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Heating.

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Mixture

Acute toxicity

Oral: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages: , damage of respiratory tract

Dermal: No data available

Skin corrosion/irritation

Skin - Rabbit

Result: Corrosive after 3 minutes to 1 hour of exposure - 20 h
(OECD Test Guideline 404)

Remarks: Mixture causes burns.

Serious eye damage/eye irritation

Eyes - Rabbit

Result: Corrosive - 7 d
(OECD Test Guideline 405)

Remarks: Mixture causes serious eye damage.

Risk of blindness!

Respiratory or skin sensitization

Maximization Test - Guinea pig
Result: Causes sensitization.
May cause allergic skin reaction.
(OECD Test Guideline 406)
Mixture may cause an allergic skin reaction.

Germ cell mutagenicity

Evidence of genetic defects.

Carcinogenicity

Possible carcinogen.

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure

Mixture causes damage to organs. - Eyes, Central nervous system
Mixture may cause respiratory irritation.

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Handle in accordance with good industrial hygiene and safety practice.

Components**formaldehyde****Acute toxicity**

LD50 Oral - Rat - 100 mg/kg

Remarks: (Lit.)

LC50 Inhalation - Rat - male and female - 4 h - < 0.57 mg/l - vapor
(OECD Test Guideline 403)

LD50 Dermal - Rabbit - 270 mg/kg

Remarks: (RTECS)

Skin corrosion/irritation

Skin - Rabbit

Result: Causes burns. - 20 h

(OECD Test Guideline 404)

Serious eye damage/eye irritation

Remarks: Causes serious eye damage.

Respiratory or skin sensitization

Local lymph node assay (LLNA) - Mouse

Result: positive

(OECD Test Guideline 429)

Germ cell mutagenicity

Suspected of causing genetic defects.

Carcinogenicity

Presumed to have carcinogenic potential for humans

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure

May cause respiratory irritation.

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Methanol**Acute toxicity**

Acute toxicity estimate Oral - 100.1 mg/kg

(Expert judgment)

Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Symptoms: Nausea, Vomiting

Acute toxicity estimate Inhalation - 4 h - 3.1 mg/l - vapor

(Expert judgment)

Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Symptoms: Irritation symptoms in the respiratory tract.

Acute toxicity estimate Dermal - 300.1 mg/kg

(Expert judgment)

Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Skin corrosion/irritation

Skin - Rabbit

Result: No skin irritation

Remarks: (ECHA)

Remarks: Drying-out effect resulting in rough and chapped skin.

Serious eye damage/eye irritation

Eyes - Rabbit

Result: No eye irritation

Remarks: (ECHA)

Respiratory or skin sensitization

Sensitisation test: - Guinea pig

Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity

Based on available data the classification criteria are not met.
Test Type: Ames test
Test system: Salmonella typhimurium
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster lung cells
Result: negative
Method: OECD Test Guideline 474
Species: Mouse - male and female - Bone marrow
Result: negative

Carcinogenicity

Did not show carcinogenic effects in animal experiments.

Reproductive toxicity

Based on available data the classification criteria are not met.

Specific target organ toxicity - single exposure

Causes damage to organs. - Eyes, Central nervous system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Acute oral toxicity - Nausea, Vomiting
Acute inhalation toxicity - Irritation symptoms in the respiratory tract.

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

SECTION 12: Ecological information

12.1 Toxicity

Mixture

No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

Components

formaldehyde

Toxicity to fish	static test LC50 - Morone saxatilis - 6.7 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia pulex (Water flea) - 5.8 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test EC50 - Desmodesmus subspicatus (green algae) - 4.89 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	static test EC50 - activated sludge - 19 mg/l - 3 h (OECD Test Guideline 209)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - >= 6.4 mg/l - 21 d (OECD Test Guideline 211)

Methanol

Toxicity to fish	flow-through test LC50 - Lepomis macrochirus (Bluegill) - 15,400.0 mg/l - 96 h (US-EPA)
Toxicity to daphnia and other aquatic invertebrates	semi-static test EC50 - Daphnia magna (Water flea) - 18,260 mg/l - 96 h (OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (green algae) - ca. 22,000.0 mg/l - 96 h (OECD Test Guideline 201)
Toxicity to bacteria	static test IC50 - activated sludge - > 1,000 mg/l - 3 h (OECD Test Guideline 209)
Toxicity to fish(Chronic toxicity)	NOEC - Oryzias latipes (Orange-red killifish) - 7,900 mg/l - 200 h Remarks: (External MSDS)

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

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

ADR/RID: 1198

IMDG: 1198

IATA-DGR: 1198

14.2 UN proper shipping name

ADR/RID: FORMALDEHYDE SOLUTION, FLAMMABLE

IMDG: FORMALDEHYDE SOLUTION, FLAMMABLE

IATA-DGR: Formaldehyde solution, flammable

14.3 Transport hazard class(es)

ADR/RID: 3 (8)

IMDG: 3 (8)

IATA-DGR: 3 (8)

14.4 Packaging group

ADR/RID: III

IMDG: III

IATA-DGR: III

14.5 Environmental hazards

ADR/RID: no

IMDG Marine pollutant: no

IATA-DGR: no

14.6 Special precautions for user

None

14.7 Incompatible materials

Strong oxidizing agents

Other regulations

Hazchem Code : •2W

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

Standard for the Uniform Scheduling of Medicines and Poisons : Schedule 6

SECTION 16: Other information**-Full text of H-Statements referred to under sections 2 and 3.**

H225	Highly flammable liquid and vapor.
H226	Flammable liquid and vapor.
H301	Toxic if swallowed.
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H331	Toxic if inhaled.
H335	May cause respiratory irritation.
H341	Suspected of causing genetic defects.
H350	May cause cancer.

H370 Causes damage to organs.
H371 May cause damage to organs.

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Rowe Scientific Hydrogen peroxide solution 20 - 60 %

ROWE SCIENTIFIC

Chemwatch Hazard Alert Code: 3

Chemwatch: 20-3713

Issue Date: 28/02/2018

Version No: 7.1.1.1

Print Date: 01/03/2018

Safety Data Sheet according to WHS and ADG requirements

S.GHS.AUS.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	Rowe Scientific Hydrogen peroxide solution 20 - 60 %
Synonyms	CH0338, CH1001, CH1197, CH2843, CH2849, CH2852, CH2863, CH2878, CH2930 100 volume
Proper shipping name	HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 20% but not more than 60% hydrogen peroxide (stabilised as necessary)
Other means of identification	Not Available

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

Relevant identified uses	Laboratory chemical.
--------------------------	----------------------

Details of the supplier of the safety data sheet

Registered company name	ROWE SCIENTIFIC
Address	11 Challenge Boulevard Wangara WA 6065 Australia
Telephone	+61 8 9302 1911
Fax	+61 8 9302 1905
Website	https://rowe.com.au/
Email	rowewa@rowe.com.au

Emergency telephone number

Association / Organisation	Not Available
Emergency telephone numbers	+61 8 9302 1911 (24 Hrs)
Other emergency telephone numbers	Not Available

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

HAZARDOUS CHEMICAL. DANGEROUS GOODS. According to the WHS Regulations and the ADG Code.

Poisons Schedule	AS6
Classification ^[1]	Oxidizing Liquid Category 2, Acute Toxicity (Oral) Category 4, Acute Toxicity (Inhalation) Category 4, Skin Corrosion/Irritation Category 1A, Serious Eye Damage Category 1
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HSIS ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI

Label elements

Hazard pictogram(s)	
SIGNAL WORD	DANGER

Continued...

Rowe Scientific Hydrogen peroxide solution 20 - 60 %

Hazard statement(s)

H272	May intensify fire; oxidiser.
H302	Harmful if swallowed.
H332	Harmful if inhaled.
H314	Causes severe skin burns and eye damage.

Precautionary statement(s) Prevention

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P221	Take any precaution to avoid mixing with combustibles/organic material.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P220	Keep/Store away from clothing/organic material/combustible materials.
P270	Do not eat, drink or smoke when using this product.

Precautionary statement(s) Response

P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/physician.
P370+P378	In case of fire: Use alcohol resistant foam or fine spray/water fog for extinction.
P363	Wash contaminated clothing before reuse.
P301+P312	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Precautionary statement(s) Storage

P405	Store locked up.
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Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
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SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
7722-84-1	20-60	<u>hydrogen peroxide</u>
7732-18-5	40-80	<u>water</u>

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▶ Immediately hold eyelids apart and flush the eye continuously with running water. ▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. ▶ Transport to hospital or doctor without delay. ▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ Immediately flush body and clothes with large amounts of water, using safety shower if available. ▶ Quickly remove all contaminated clothing, including footwear.

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	<ul style="list-style-type: none"> ▶ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre. ▶ Transport to hospital, or doctor.
Inhalation	<ul style="list-style-type: none"> ▶ If fumes or combustion products are inhaled remove from contaminated area. ▶ Lay patient down. Keep warm and rested. ▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▶ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▶ Transport to hospital, or doctor. ▶ Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema. ▶ Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs). ▶ As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested. ▶ Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered. <p>This must definitely be left to a doctor or person authorised by him/her. (ICSC13719)</p>
Ingestion	<ul style="list-style-type: none"> ▶ For advice, contact a Poisons Information Centre or a doctor at once. ▶ Urgent hospital treatment is likely to be needed. ▶ If swallowed do NOT induce vomiting. ▶ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▶ Observe the patient carefully. ▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▶ Transport to hospital or doctor without delay.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

Hydrogen peroxide at moderate concentrations (5% or more) is a strong oxidant.

- ▶ Direct contact with the eye is likely to cause corneal damage especially if not washed immediately. Careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered.
- ▶ Because of the likelihood of systemic effects attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided.
- ▶ There is remote possibility, however, that a nasogastric or orogastric tube may be required for the reduction of severe distension due to gas formation"

Fisher Scientific SDS

Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorised by him/her should be considered.

(ICSC24419/24421)

SECTION 5 FIREFIGHTING MEASURES**Extinguishing media**

For hydrogen peroxide

NOTE: Chemical extinguishing agents may accelerate decomposition. [CCINFO]

- ▶ **DO NOT** use halogenated fire extinguishing agents.

FOR SMALL FIRE:

- ▶ USE FLOODING QUANTITIES OF WATER.
- ▶ **DO NOT** use dry chemical, CO₂, foam or halogenated-type extinguishers.

FOR LARGE FIRE

- ▶ Flood fire area with water from a protected position

Special hazards arising from the substrate or mixture

Fire Incompatibility	▶ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous
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Advice for firefighters

Fire Fighting	<ul style="list-style-type: none"> ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear breathing apparatus plus protective gloves in the event of a fire. ▶ Prevent, by any means available, spillage from entering drains or water courses. ▶ Use fire fighting procedures suitable for surrounding area. ▶ DO NOT approach containers suspected to be hot. ▶ Cool fire exposed containers with water spray from a protected location. ▶ If safe to do so, remove containers from path of fire. ▶ Equipment should be thoroughly decontaminated after use.
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Fire/Explosion Hazard	<ul style="list-style-type: none"> ▶ Will not burn but increases intensity of fire. ▶ Heating may cause expansion or decomposition leading to violent rupture of containers. ▶ Heat affected containers remain hazardous. ▶ Contact with combustibles such as wood, paper, oil or finely divided metal may produce spontaneous combustion or violent decomposition. ▶ May emit irritating, poisonous or corrosive fumes.
HAZCHEM	2P

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	<ul style="list-style-type: none"> ▶ Clean up all spills immediately. ▶ No smoking, naked lights, ignition sources. ▶ Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials, as ignition may result. ▶ Avoid breathing dust or vapours and all contact with skin and eyes. ▶ Control personal contact with the substance, by using protective equipment. ▶ Contain and absorb spill with dry sand, earth, inert material or vermiculite. ▶ DO NOT use sawdust as fire may result. ▶ Scoop up solid residues and seal in labelled drums for disposal. ▶ Neutralise/decontaminate area.
Major Spills	<ul style="list-style-type: none"> ▶ Clear area of personnel and move upwind. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ May be violently or explosively reactive. ▶ Wear full body protective clothing with breathing apparatus. ▶ Prevent, by any means available, spillage from entering drains or water course. ▶ Consider evacuation (or protect in place). ▶ No smoking, flames or ignition sources. ▶ Increase ventilation. ▶ Contain spill with sand, earth or other clean, inert materials. ▶ NEVER use organic absorbents such as sawdust, paper, cloth; as fire may result. ▶ Avoid any contamination by organic matter. ▶ Use spark-free and explosion-proof equipment. ▶ Collect any recoverable product into labelled containers for possible recycling. ▶ DO NOT mix fresh with recovered material. ▶ Collect residues and seal in labelled drums for disposal. ▶ Wash area and prevent runoff into drains. ▶ Decontaminate equipment and launder all protective clothing before storage and re-use. ▶ If contamination of drains or waterways occurs advise emergency services. <p>For hydrogen peroxide:</p> <ul style="list-style-type: none"> ▶ Dilute with large quantities of water (at least ten (10) times the volume of hydrogen peroxide). ▶ Sodium bicarbonate may be used to accelerate breakdown.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	<ul style="list-style-type: none"> ▶ DO NOT allow clothing wet with material to stay in contact with skin ▶ Avoid personal contact and inhalation of dust, mist or vapours. ▶ Provide adequate ventilation. ▶ Always wear protective equipment and wash off any spillage from clothing. ▶ Keep material away from light, heat, flammables or combustibles. ▶ Keep cool, dry and away from incompatible materials. ▶ Avoid physical damage to containers. ▶ DO NOT repack or return unused portions to original containers. Withdraw only sufficient amounts for immediate use. ▶ Use only minimum quantity required. ▶ Avoid using solutions of peroxides in volatile solvents. Solvent evaporation should be controlled to avoid dangerous concentration of the peroxide. ▶ Do NOT allow peroxides to contact iron or compounds of iron, cobalt, or copper, metal oxide salts, acids or bases. ▶ Do NOT use metal spatulas to handle peroxides
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	<ul style="list-style-type: none"> ▶ Do NOT use glass containers with screw cap lids or glass stoppers. ▶ Store peroxides at the lowest possible temperature, consistent with their solubility and freezing point. ▶ CAUTION: Do NOT store liquids or solutions of peroxides at a temperature below that at which the peroxide freezes or precipitates. Peroxides in this form are extremely shock and heat-sensitive. Refrigerated storage of peroxides must ONLY be in explosion-proof units. ▶ The hazards and consequences of fires and explosions during synthesis and use of peroxides is widely recognised; spontaneous or induced decomposition may culminate in a variety of ways, ranging from moderate gassing to spontaneous ignition or explosion. The heat released from spontaneous decomposition of an energy-rich compound causes a rise in the surrounding temperature; the temperature will rise until thermal balance is established or until the material heats to decomposition, ▶ The most effective means for minimising the consequences of an accident is to limit quantities to a practical minimum. Even gram-scale explosions can be serious. Once ignited the burning of peroxides cannot be controlled and the area should be evacuated. ▶ Unless there is compelling reason to do otherwise, peroxide concentration should be limited to 10% (or less with vigorous reactants). Peroxide concentration is rarely as high as 1% in the reaction mixture of polymerisation or other free-radical reactions, ▶ Peroxides should be added slowly and cautiously to the reaction medium. This should be completed prior to heating and with good agitation. ▶ Addition of peroxide to the hot monomer is extremely dangerous. A violent reaction (e.g., fire or explosion) can result from inadvertent mixing of promoters (frequently used with peroxides in polymerisation systems) with full-strength peroxide ▶ Organic peroxides are very sensitive to contamination (especially heavy-metal compounds, metal oxide salts, alkaline materials including amines, strong acids, and many varieties of dust and dirt). This can initiate rapid, uncontrolled decomposition of peroxides and possible generation of intense heat, fire or explosion The consequences of accidental contamination from returning withdrawn material to the storage container can be disastrous. ▶ When handling NEVER smoke, eat or drink. ▶ Always wash hands with soap and water after handling. ▶ Use only good occupational work practice. ▶ Observe manufacturer's storage and handling recommendations contained within this SDS.
Other information	<ul style="list-style-type: none"> ▶ Store in original containers. ▶ Keep containers securely sealed. ▶ Store in a cool, dry, well-ventilated area. ▶ Store away from incompatible materials and foodstuff containers. ▶ Protect containers against physical damage and check regularly for leaks. ▶ Observe manufacturer's storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

Suitable container	<ul style="list-style-type: none"> ▶ Glass container is suitable for laboratory quantities ▶ DO NOT use mild steel or galvanised containers ▶ DO NOT repack. Use containers supplied by manufacturer only. <p>For low viscosity materials</p> <ul style="list-style-type: none"> ▶ Drums and jerricans must be of the non-removable head type. ▶ Where a can is to be used as an inner package, the can must have a screwed enclosure. <p>For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids:</p> <ul style="list-style-type: none"> ▶ Removable head packaging and ▶ cans with friction closures may be used. <p>-</p> <p>Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages *.</p> <p>-</p> <p>In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage *.</p> <p>-</p> <p>* unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.</p> <p>Hydrogen peroxide containing/ generating materials requiring rigid packaging.</p> <p>Store in:</p> <ul style="list-style-type: none"> ▶ containers with vented lids. ▶ properly passivated aluminium containers. ▶ properly passivated stainless steel. ▶ polyethylene containers. ▶ porcelain, vitreous stoneware ▶ Teflon lined containers.
Storage incompatibility	<p>Hydrogen peroxide</p> <ul style="list-style-type: none"> ▶ is a powerful oxidiser ▶ contamination or heat may cause self accelerating exothermic decomposition with oxygen gas and steam release - this may generate dangerous pressures - steam explosion. ▶ reacts dangerously with rust, dust, dirt, iron, copper, acids, metals and salts, organic material. ▶ is unstable if heated. (e.g): one volume of 70% hydrogen peroxide solution decomposes to produce 300 volumes of oxygen gas. ▶ in presence of a strong initiating source may be explosively reactive

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- ▶ concentrated or pure material can generate heat and decompose spontaneously; can ignite or explode when heated, shocked, contaminated; or if placed in a basic (>7) environment, especially in the presence of metal ions
- ▶ mixtures with combustible materials may result in spontaneous combustion or may be impact- or heat- sensitive - evaporation or drying on towels or mop may cause a fire.
- ▶ reacts violently with reducing agents, alcohols, ammonia, carboxylic acids, acetic acid, cobalt oxides, copper(II) chloride, ethers, metal powder, permanganates, acetone, benzenesulfonic anhydride, 1,1-dimethylhydrazine, dimethylphenylphosphine, gadolinium hydroxide, hydrogen selenide, iron oxides, lithium tetrahydroaluminate, magnesium tetrahydroaluminate, manganese(II) oxide, mercury oxide, methyl hydrazine, nickel monoxide, nitrogenous bases, osmium tetroxide, alpha-phenylselenoketones, phosphorus, phosphorus(V) oxide, quinoline, tetrahydrothiophene, tin(II) chloride, thiodiglycol, thiophane, tin(II) chloride, unsaturated organic compounds, readily oxidisable and combustible materials; avoid contact with combustibles including lubricants and graphite
- ▶ reacts with cobalt, copper and its alloys, chromium, iridium, iron, lead, manganese, Monel, osmium, palladium, platinum, gold, silver, zinc, and other catalytic metals, metal oxides and salts - avoid metallic bowls and stirrers.
- ▶ violent catalytic decomposition will occur in contact with certain metals such as iron, copper, chromium, brass, bronze, lead, silver, manganese or their salts.
- ▶ forms unstable and possible explosive materials with acetic anhydride, aconitic acid, aniline, carboxylic acids, 1,4-diazabicyclo[2,2,2]octane, diphenyl diselenide, ethyl acetate, glycols, ketene, ketones, triethyltin hydroperoxide, 1,3,5-trioxane, vinyl acetate.
- ▶ is incompatible with mercurous chloride
- ▶ decomposes in presence of alkalis and even ordinary dust or rust
- ▶ decomposes slowly at ordinary temperatures and builds up pressure in a closed container; the rate of decomposition doubles for each 10 deg C rise in temperature and decomposition becomes self-sustaining at 141 deg. C
- ▶ contact with rough surfaces can cause decomposition
- ▶ attacks and may ignite some plastics, rubber and coatings
- ▶ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous
- ▶ Protect from light.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	hydrogen peroxide	Hydrogen peroxide	1.4 mg/m3 / 1 ppm	Not Available	Not Available	Not Available

EMERGENCY LIMITS


Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
hydrogen peroxide	Hydrogen peroxide	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
hydrogen peroxide	75 ppm	Not Available
water	Not Available	Not Available

Exposure controls

Appropriate engineering controls	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.</p> <p>Employers may need to use multiple types of controls to prevent employee overexposure.</p> <p>General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in specific circumstances. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.</p>				
	<table border="1"> <thead> <tr> <th>Type of Contaminant:</th> <th>Air Speed:</th> </tr> </thead> <tbody> <tr> <td>solvent, vapours, degreasing etc., evaporating from tank (in still air).</td> <td>0.25-0.5 m/s (50-100 f/min)</td> </tr> </tbody> </table>	Type of Contaminant:	Air Speed:	solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min)
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solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min)				

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	<p>aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)</p>	0.5-1 m/s (100-200 f/min.)										
	<p>direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</p>	1-2.5 m/s (200-500 f/min.)										
	<p>grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).</p>	2.5-10 m/s (500-2000 f/min.)										
	<p>Within each range the appropriate value depends on:</p> <table border="1"> <thead> <tr> <th>Lower end of the range</th> <th>Upper end of the range</th> </tr> </thead> <tbody> <tr> <td>1: Room air currents minimal or favourable to capture</td> <td>1: Disturbing room air currents</td> </tr> <tr> <td>2: Contaminants of low toxicity or of nuisance value only.</td> <td>2: Contaminants of high toxicity</td> </tr> <tr> <td>3: Intermittent, low production.</td> <td>3: High production, heavy use</td> </tr> <tr> <td>4: Large hood or large air mass in motion</td> <td>4: Small hood-local control only</td> </tr> </tbody> </table> <p>Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.</p>		Lower end of the range	Upper end of the range	1: Room air currents minimal or favourable to capture	1: Disturbing room air currents	2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity	3: Intermittent, low production.	3: High production, heavy use	4: Large hood or large air mass in motion	4: Small hood-local control only
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3: Intermittent, low production.	3: High production, heavy use											
4: Large hood or large air mass in motion	4: Small hood-local control only											
Personal protection												
Eye and face protection	<ul style="list-style-type: none"> ▶ Chemical goggles. ▶ Full face shield may be required for supplementary but never for primary protection of eyes. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent] 											
Skin protection	See Hand protection below											
Hands/feet protection	<ul style="list-style-type: none"> ▶ Wear chemical protective gloves, e.g. PVC. ▶ Wear safety footwear or safety gumboots, e.g. Rubber ▶ When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots. ▶ Where hydrogen peroxide exposure may occur do NOT wear PVA gloves. ▶ DO NOT use leather or cotton gloves, leather shoes as spill may cause fire. ▶ Care: Effects may be delayed. ▶ Hand cream offers no protection for hydrogen peroxide and should not be used. 											
Body protection	See Other protection below											
Other protection	<ul style="list-style-type: none"> ▶ Overalls. ▶ PVC Apron. ▶ PVC protective suit may be required if exposure severe. ▶ Eyewash unit. ▶ Ensure there is ready access to a safety shower. <ul style="list-style-type: none"> · Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity. · For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets). · Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return. 											
Thermal hazards	Not Available											

Respiratory protection

Type B-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Continued...

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Clear, colourless, water-like liquid with a slightly sharp odour; mixes with water. Hydrogen peroxide readily decomposes and requires stabilization. Soluble in ether, insoluble in hydrocarbons and decomposed by many organic solvents. Material hazard increases as concentration of peroxide, H ₂ O ₂ increases.		
Physical state	Liquid	Relative density (Water = 1)	1.132 +/- 0.005
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Applicable
pH (as supplied)	2 - 4	Decomposition temperature	Not Available
Melting point / freezing point (°C)	-25 (as 30%)	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	106 (as 30%)	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Applicable	Taste	Not Available
Evaporation rate	< 1 Ether=1	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Applicable	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Applicable	Volatile Component (%vol)	Not available.
Vapour pressure (kPa)	0.67 @ 30C	Gas group	Not Available
Solubility in water (g/L)	Miscible	pH as a solution (1%)	Not available.
Vapour density (Air = 1)	Not Applicable	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable under normal handling conditions. ▶ Prolonged exposure to heat. ▶ Hazardous polymerisation will not occur. <p>Solutions of hydrogen peroxide slowly decompose, releasing oxygen, and so are often stabilised by the addition of acetanilide, etc.</p>
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	<p>Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be harmful. Inhalation of quantities of liquid mist may be extremely hazardous, even lethal due to spasm, extreme irritation of larynx and bronchi, chemical pneumonitis and pulmonary oedema.</p> <p>Inhaling excessive levels of mist may result in headache, dizziness, vomiting, diarrhoea, irritability, sleeplessness and fluid in the lungs, and cause extreme irritation of the nose and chest, cough, discomfort, shortness of breath and inflammation of the nose and throat. Whole-body effects of hydrogen peroxide poisoning include tremor, numbness of the limbs, convulsions, coma and shock. Hydrogen peroxide has poor warning properties.</p>
Ingestion	<p>Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.</p> <p>Hydrogen peroxide may cause blistering and bleeding from the throat and stomach. When swallowed, it may release large quantities of oxygen which could hyper-distend the stomach and gut and may cause internal bleeding, mouth and throat</p>

Rowe Scientific Hydrogen peroxide solution 20 - 60 %

	burns and rupture of the gut. There may also be fever, nausea, foaming at the mouth, vomiting, chest and stomach pain, loss of consciousness, and movement disorders and death. Large amounts can also cause cessation of breath, dizziness, headache, tremors weakness or numbness in the extremities and convulsions. Hydrogen peroxide concentrate is corrosive and must not be taken undiluted. The material can produce severe chemical burns within the oral cavity and gastrointestinal tract following ingestion.
Skin Contact	Skin contact will result in rapid drying, bleaching, leading to chemical burns on prolonged contact Reactions may not occur on exposure but response may be delayed with symptoms only appearing many hours later Open cuts, abraded or irritated skin should not be exposed to this material Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected. The material can produce chemical burns following direct contact with the skin.
Eye	Hydrogen peroxide concentrations above 10% are corrosive to the eye and may cause corneal ulceration even days after exposure. The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.
Chronic	Hydrogen peroxide as a human food additive is generally regarded as safe, when used with certain limitations. In experimental animals hydrogen peroxide given by mouth causes damage to the teeth, liver, kidney, stomach and bowel. Inhalation exposure to hydrogen peroxide caused skin irritation, sneezing and death in animals. Skin irritation, sneezing, excessive secretion of tears, and whitening of the hair was also seen in animals chronically exposed to hydrogen peroxide. Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and/or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs.

Rowe Scientific Hydrogen peroxide solution 20 - 60 %	TOXICITY	IRRITATION
	Not Available	Not Available
hydrogen peroxide	TOXICITY	IRRITATION
	dermal (rat) LD50: 4060 mg/kg ^[2]	Not Available
	Inhalation (rat) LC50: >0.17 mg/l4 h ^[1]	
	Oral (rat) LD50: 376 mg/kg ^[2]	
water	TOXICITY	IRRITATION
	Not Available	Not Available
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

WATER	No significant acute toxicological data identified in literature search.
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Acute Toxicity	✓	Carcinogenicity	⊘
Skin Irritation/Corrosion	✓	Reproductivity	⊘
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	⊘
Respiratory or Skin sensitisation	⊘	STOT - Repeated Exposure	⊘
Mutagenicity	⊘	Aspiration Hazard	⊘

Legend: ✗ – Data available but does not fill the criteria for classification
✓ – Data available to make classification
⊘ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Rowe Scientific Hydrogen peroxide solution 20 - 60 %	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
hydrogen peroxide	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	16.4mg/L	2
	EC50	48	Crustacea	2.32mg/L	4
	EC50	72	Algae or other aquatic plants	0.71mg/L	4

Continued...

Rowe Scientific Hydrogen peroxide solution 20 - 60 %

	EC0	24	Crustacea	=3.8mg/L	1
	NOEC	192	Fish	0.028mg/L	4
water	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data				

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
hydrogen peroxide	LOW	LOW
water	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
hydrogen peroxide	LOW (LogKOW = -1.571)
water	LOW (LogKOW = -1.38)

Mobility in soil

Ingredient	Mobility
hydrogen peroxide	LOW (KOC = 14.3)
water	LOW (KOC = 14.3)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> ▶ Containers may still present a chemical hazard/ danger when empty. ▶ Return to supplier for reuse/ recycling if possible. <p>Otherwise:</p> <ul style="list-style-type: none"> ▶ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill. ▶ Where possible retain label warnings and SDS and observe all notices pertaining to the product. <p>Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.</p> <p>A Hierarchy of Controls seems to be common - the user should investigate:</p> <ul style="list-style-type: none"> ▶ Reduction ▶ Reuse ▶ Recycling ▶ Disposal (if all else fails) <p>This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.</p> <ul style="list-style-type: none"> ▶ DO NOT allow wash water from cleaning or process equipment to enter drains. ▶ It may be necessary to collect all wash water for treatment before disposal. ▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▶ Where in doubt contact the responsible authority. <p>For small quantities of oxidising agent:</p> <ul style="list-style-type: none"> ▶ Cautiously acidify a 3% solution to pH 2 with sulfuric acid. ▶ Gradually add a 50% excess of sodium bisulfite solution with stirring. ▶ Add a further 10% sodium bisulfite. ▶ If no further reaction occurs (as indicated by a rise in temperature) cautiously add more acid. ▶ Recycle wherever possible. ▶ Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified. ▶ Treat and neutralise at an approved treatment plant. Treatment should involve: Neutralisation followed by: burial in a
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Continued...

Rowe Scientific Hydrogen peroxide solution 20 - 60 %

- ▶ land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus (after admixture with suitable combustible material)
 - ▶ Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
- Decompose small amounts by slowly adding to warm caustic solution.

SECTION 14 TRANSPORT INFORMATION

Labels Required

		
Marine Pollutant	NO	
HAZCHEM	2P	

Land transport (ADG)

UN number	2014	
UN proper shipping name	HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 20% but not more than 60% hydrogen peroxide (stabilised as necessary)	
Transport hazard class(es)	Class	5.1
	Subrisk	8
Packing group	II	
Environmental hazard	Not Applicable	
Special precautions for user	Special provisions	Not Applicable
	Limited quantity	1 L

Air transport (ICAO-IATA / DGR)

UN number	2014	
UN proper shipping name	Hydrogen peroxide, aqueous solution with 20% or more but 40% or less hydrogen peroxide (stabilized as necessary)	
Transport hazard class(es)	ICAO/IATA Class	5.1
	ICAO / IATA Subrisk	8
	ERG Code	5C
Packing group	II	
Environmental hazard	Not Applicable	
Special precautions for user	Special provisions	Not Applicable
	Cargo Only Packing Instructions	554
	Cargo Only Maximum Qty / Pack	5 L
	Passenger and Cargo Packing Instructions	550
	Passenger and Cargo Maximum Qty / Pack	1 L
	Passenger and Cargo Limited Quantity Packing Instructions	Y540
	Passenger and Cargo Limited Maximum Qty / Pack	0.5 L

Sea transport (IMDG-Code / GGVSee)

UN number	2014	
UN proper shipping name	HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary)	
Transport hazard class(es)	IMDG Class	5.1
	IMDG Subrisk	8
Packing group	II	
Environmental hazard	Not Applicable	

Rowe Scientific Hydrogen peroxide solution 20 - 60 %

Special precautions for user	EMS Number	F-H , S-Q
	Special provisions	Not Applicable
	Limited Quantities	1 L

Transport in bulk according to Annex II of MARPOL and the IBC code

Source	Product name	Pollution Category	Ship Type
IMO MARPOL (Annex II) - List of Noxious Liquid Substances Carried in Bulk	Hydrogen peroxide solutions (over 60% but not over 70% by mass) Hydrogen peroxide solutions (over 8% but not over 60% by mass)	Y; Y	2 3

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

HYDROGEN PEROXIDE(7722-84-1) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Exposure Standards

Australia Hazardous Substances Information System - Consolidated Lists

Australia Inventory of Chemical Substances (AICS)

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List Passenger and Cargo Aircraft

WATER(7732-18-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Inventory of Chemical Substances (AICS)

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (hydrogen peroxide; water)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	Y
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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Appendix C

Likelihood calculations

Likelihood & Probit calculations

The probability assessments rely on the event tree associated with an ongoing release of pressurized liquefied flammable gas [10]. Such a continuous release of LPG can lead to immediate or delayed ignition, resulting in scenarios like jet fires, explosions, flash fires, or no impact.

Figure C.1 shows the event tree for continuous release of a pressurised liquefied flammable gas.

Table C.1 calculates the probability of these scenarios occurring.

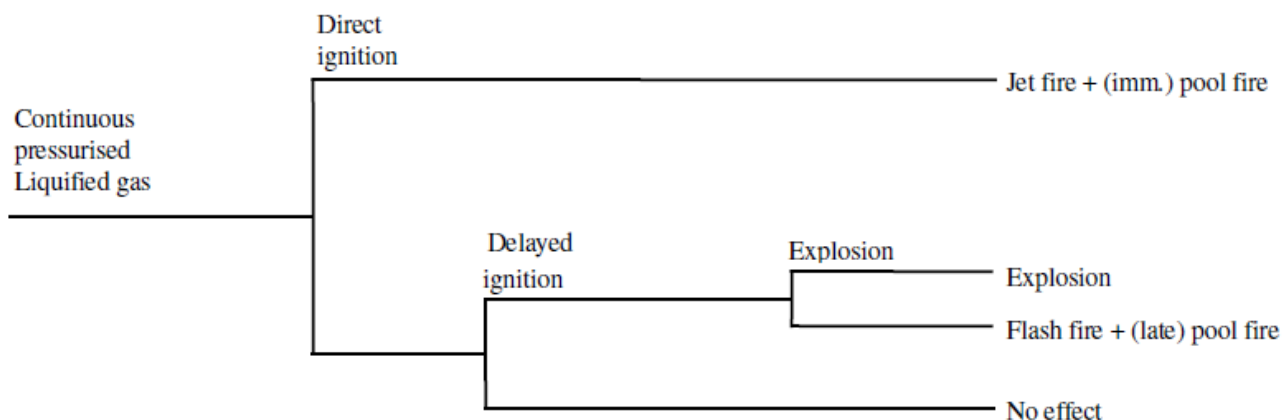


Figure C.1 Event tree for a continuous release of a pressurised liquefied flammable gas [10]

Table C.1 Failure rate and probability of ignition

ID	Event	Calculation	Comment
A	Failure Rate: Jet Fire (Direct Ignition)	6.00×10^{-6}	HSE UK failure rates (2017), page 18 [11]
B	Failure Rate: Explosion (Delayed Ignition)	2.70×10^{-8}	HSE UK failure rates (2017), page 21 [11]
C	Failure Rate: Flash fire (Delayed Ignition)	2.70×10^{-8}	HSE UK failure rates (2017), page 21 [11]
D	Probability of direct ignition	0.7	Probability of direct ignition for stationary installations – Category 0 (Highly Flammable) – Quantity (>10,000 kg) National Institute of Public Health and the Environment (RIVM) - Reference Manual Bevi Risk Assessments, Page 19, Table 7 [10]
E	Probability of delayed ignition	0.3	Calculation (1-D) National Institute of Public Health and the Environment (RIVM) - Reference Manual Bevi Risk Assessments, Page 22, Table 11 [10]
F	Probability of ignition of a Jet fire	4.20×10^{-6}	Calculation A x D
G	Probability of ignition of an Explosion	8.10×10^{-9}	Calculation B x E
H	Probability of ignition of a Flash fire	8.10×10^{-9}	Calculation C x E

On-site boundary

Table C.2 calculates the total individual risk at the site boundary.

Table C.2 Individual fatality risk for site boundary

ID	Probability Event	Fatality Probability	Comment
I	Probability of fatality for Jet fire at site boundary	1	Probability of dying for flammable substances – heat radiation > 35 kW/m ² National Institute of Public Health and the Environment (RIVM) - Reference Manual Bevi Risk Assessments, Page 24, Table 13 [12]
J	Probability of fatality for Explosion at site boundary	1	Probability of dying for flammable substances - overpressure – Overpressure > 0.3 bar National Institute of Public Health and the Environment (RIVM) - Reference Manual Bevi Risk Assessments, Page 24, Table 14 [12]
K	Probability of fatality for Flash fire at site boundary	1	Probability of dying for flammable substances - overpressure – Overpressure > 0.3 bar National Institute of Public Health and the Environment (RIVM) - Reference Manual Bevi Risk Assessments, Page 24, Table 14 [12]
L	Individual risk for Flash fire at site boundary	4.20 x 10 ⁻⁶	Calculation F x I
M	Individual risk for Explosion at site boundary	8.10 x 10 ⁻⁹	Calculation G x J
N	Individual risk for Flash fire at site boundary	8.10 x 10 ⁻⁹	Calculation H x K
O	Individual Fatality Risk (Total) at site boundary	4.22 x 10 ⁻⁶	Calculation L + M + N

Residential, hotels, motels, tourist resorts

Table C.3 calculates the total individual risk at the closest residential area.

Table C.3 Individual fatality risk for residential, hotels, motels, tourist resorts

ID	Probability Event	Fatality Probability	Comment																						
P	Probability of fatality for Jet fire at residential, hotels, motels, tourist resorts	0.045	$Y = -14.0 + 2.56 \times \ln(V)$ Where: $V = I^{4/3} \times T$ $I = 23 \text{ kW/m}^2$ (at the residential area) $T = 18.75 \text{ s}$ $Y = 3.31$ $X = 4.5$																						
			<table border="1"> <thead> <tr> <th>%</th> <th>0</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>-</td> <td>2.67</td> <td>2.95</td> <td>3.12</td> <td>3.25</td> <td>3.36</td> <td>3.45</td> <td>3.52</td> <td>3.59</td> <td>3.66</td> </tr> </tbody> </table>	%	0	1	2	3	4	5	6	7	8	9	0	-	2.67	2.95	3.12	3.25	3.36	3.45	3.52	3.59	3.66
%	0	1	2	3	4	5	6	7	8	9															
0	-	2.67	2.95	3.12	3.25	3.36	3.45	3.52	3.59	3.66															
			Probability of fatality = 0.045 Probit analysis [12]																						

ID	Probability Event	Fatality Probability	Comment
Q	Probability of fatality for Explosion at residential, hotels, motels, tourist resorts	1	Probability of dying for flammable substances - overpressure – Overpressure > 0.3 bar National Institute of Public Health and the Environment (RIVM) - Reference Manual Bevi Risk Assessments, Page 24, Table 14 [12]
R	Probability of fatality for Flash fire at residential, hotels, motels, tourist resorts	1	Probability of dying for flammable substances - overpressure – Overpressure > 0.3 bar National Institute of Public Health and the Environment (RIVM) - Reference Manual Bevi Risk Assessments, Page 24, Table 14 [12]
S	Individual risk for Flash fire at residential, hotels, motels, tourist resorts	1.89×10^{-7}	Calculation F x P
T	Individual risk for Explosion at residential, hotels, motels, tourist resorts	8.10×10^{-9}	Calculation G x Q
U	Individual risk for Flash fire at residential, hotels, motels, tourist resorts	8.10×10^{-9}	Calculation H x R
V	Individual Fatality Risk (Total) at residential, hotels, motels, tourist resorts	0.21×10^{-6}	Calculation S + T + U

Hospitals, schools, child-care facilities, old age housing

Table C.4 calculates the total individual risk at the closest hospital (Manildra Medical Centre).

Table C.4 Individual fatality risk for hospitals, schools, child-care facilities, old age housing

ID	Probability Event	Fatality Probability	Comment																						
W	Probability of fatality for Jet fire at hospitals, schools, child-care facilities, old age housing	0.045	$Y = -14.0 + 2.56 \times \ln(V)$ Where: $V = I^{4/3} \times T$ $I = 23 \text{ kW/m}^2$ (at the Manildra Medical Centre) $T = 18.75 \text{ s}$ $Y = 3.31$ $X = 4.5$																						
			<table border="1"> <thead> <tr> <th>%</th> <th>0</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>-</td> <td>2.67</td> <td>2.95</td> <td>3.12</td> <td>3.25</td> <td>3.36</td> <td>3.45</td> <td>3.52</td> <td>3.59</td> <td>3.66</td> </tr> </tbody> </table> Probability of fatality = 0.045 Probit analysis [12]	%	0	1	2	3	4	5	6	7	8	9	0	-	2.67	2.95	3.12	3.25	3.36	3.45	3.52	3.59	3.66
%	0	1	2	3	4	5	6	7	8	9															
0	-	2.67	2.95	3.12	3.25	3.36	3.45	3.52	3.59	3.66															
X	Probability of fatality for Explosion at hospitals, schools, child-care facilities, old age housing	1	Probability of dying for flammable substances - overpressure – Overpressure > 0.3 bar																						

ID	Probability Event	Fatality Probability	Comment
			National Institute of Public Health and the Environment (RIVM) - Reference Manual Bevi Risk Assessments, Page 24, Table 14 [12]
Y	Probability of fatality for Flash fire at hospitals, schools, child-care facilities, old age housing	1	Probability of dying for flammable substances - overpressure – Overpressure > 0.3 bar National Institute of Public Health and the Environment (RIVM) - Reference Manual Bevi Risk Assessments, Page 24, Table 14 [12]
Z	Individual risk for Flash fire at hospitals, schools, child-care facilities, old age housing	1.89×10^{-7}	Calculation F x W
AA	Individual risk for Explosion at hospitals, schools, child-care facilities, old age housing	8.10×10^{-9}	Calculation G x X
AB	Individual risk for Flash fire at hospitals, schools, child-care facilities, old age housing	8.10×10^{-9}	Calculation H x Y
AC	Individual Fatality Risk (Total) at hospitals, schools, child-care facilities, old age housing	0.21×10^{-6}	Calculation Z + AA + AB