# HAZARDOUS INDUSTRY ASSESSMENT REPORT

# RURAL SUPPLY PREMISES

# SCREENING AND PRELIMINARY HAZARD ANALYSIS

## DEPARTMENT OF PRIMARY INDUSTRIES AND REGIONAL DEVELOPMENT

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## ABBREVIATIONS

| | |
|---|---|
| ADGC | Australian Dangerous Goods Code |
| AEGL | Acute Exposure Guideline Level |
| ALARP | As Low As Reasonably Practicable |
| APC | Activation Precinct Certificate |
| AQR | Aggregate Quantity Ratio |
| DG | Dangerous Good |
| DPIRD | Department of Primary Industries and Regional Development |
| GHS | Globally Harmonised System |
| HAZID | Hazard Identification |
| HBr | Hydrogen Bromide |
| HCl | Hydrogen Chloride |
| HIPAP | Hazardous Industry Planning Advisory Paper |
| LC | Lethal Concentration |
| LD | Lethal Dose |
| LFL | Lower Flammability Limit |
| LOC | Loss of Containment |
| MHF | Major Hazard Facility |
| MLRA | Multi-Level Risk Assessment |
| $NO_2$ | Nitrogen Dioxide |
| PG | Packaging Group |
| $PH_3$ | Phosphine |
| PHA | Preliminary Hazard Analysis |
| SAP | Special Activation Precinct |
| SDS | Safety Data Sheet |
| SEPP | State Environmental Planning Policy |
| VCE | Vapour Cloud Explosion |
| WHS | Work Health and Safety |

# 1. EXECUTIVE SUMMARY

## 1.1. Overview

Cumboogle Farming Pty Ltd is proposing to operate a rural supplies premises and construct two warehouses at 7 Harry Sullivan Avenue, Moree (Lot 9 DP 1212873)[1]. The goods, which are primarily agricultural products, will be stored in the warehouses and supplied to customers in their original packaging. There will be no processing or repacking of the materials.

If approved, the proposed development would be in the Moree Special Activation Precinct (SAP), an area designated for commercial and industrial activities requiring an Activation Precinct Certificate (APC) to support a development application.

The NSW Department of Primary Industries and Regional Development (DPIRD) has reviewed a hazard analysis prepared for the development, Ref [1], and in response has engaged Sherpa Consulting Pty Ltd (Sherpa) to conduct additional risk screening and a Preliminary Hazard Analysis (PHA) to further assess the risks associated with the toxic nature of materials proposed for storage and handling.

## 1.2. Purpose

The purpose of this study is to identify potential hazardous scenarios associated with the storage of hazardous materials at the premises and assess the impact on surrounding areas to inform the APC application for the proposed development.

## 1.3. Study approach

The following key steps were undertaken to complete this study:

- Apply State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021, Ref [2], to determine whether the proposed development is potentially hazardous based on the criteria specified in *Applying SEPP 33*, Ref [3] (SEPP screening).
- Based on the outcome of the SEPP screening, conduct a PHA to identify hazards associated with the materials proposed for onsite storage, assess the consequence impact distances from the identified incidents and determine whether the offsite risk is tolerable in accordance with Hazardous Industry Planning Advisory Paper (HIPAP) 4 *Risk Criteria for Land Use Planning*, Ref [4], and HIPAP 6 *Hazard Analysis*, Ref [5].
- Assessment against the NSW Work Health and Safety Regulation 2017, Ref [6], to determine whether the quantity of Schedule 15 materials proposed for storage onsite exceeds the specified thresholds.

[1] The project also includes Lot 10 DP 1212873 (12 Perry James Crescent, Moree). However, the warehouses will be constructed on Lot 9 DP 1212873.

## 1.4. SEPP screening findings

The storage of toxic substances (Class 6.1) exceeds the screening threshold specified in *Applying SEPP 33*, Ref [3], and the proposed development is considered 'potentially hazardous', requiring a PHA in line with HIPAP 6, Ref [5], to demonstrate that risks can be managed to an acceptable level.

As the package sizes and the number of vehicle movements to/from the warehouse are unknown at this stage, this study cannot confirm whether the transportation thresholds are exceeded. The previous PHA report, Ref [1], includes a discussion on route selection and can be referenced for Dangerous Goods (DGs) movements. Sherpa has reviewed the assessment in the previous PHA and considers it to be appropriate given the limited information available. The load per transfer of hazardous materials should not exceed the transportation screening thresholds (i.e. 10 tonnes for Class 4.3, 3 tonnes for Class 6.1, and 5 tonnes for Class 8 materials). This will minimise the transport risk, and a transport study will not be required. It is assumed that this is achievable, given the small quantity of the stored materials.

## 1.5. PHA findings

### 1.5.1. Hazardous scenarios

Sherpa was advised by DPIRD that the Inland Rail workers temporary accommodation site adjacent to the proposed site is currently being decommissioned. The conclusions in this assessment assume the temporary accommodation is closed before the premises are occupied.

Two receivers were identified in the vicinity of the development with the potential to be affected by the proposed development:

- A caravan park, approximately 70 m north of the warehouses
- Residentially zoned area, approximately 170 m north of the warehouses.

Two hazardous scenarios with the potential for injuries and fatalities at the receivers were identified:

***1. Release of phosphine***

Phosphine gas is an acute toxin, rapidly resulting in fatality on inhalation. The development proposes to store Fumitoxin Tables (DG Class 4.3 - Dangerous when wet, Subclass 6.1 – Toxic). The tablets are designed to evolve phosphine gas in the presence of atmospheric moisture to fumigate warehouses and silos. If the tablets come into contact with water, the generation of phosphine gas occurs rapidly as stated in the SDS (APPENDIX A).

The tablets are supplied in various package sizes with the smallest typically a 1.5 kg container containing pellets (referred to as a 'flask' by the suppliers), the flasks are supplied in 21 kg cases (14 flasks in a case). The maximum proposed inventory in

storage is 45 kg of Fumitoxin. Supplier information states the mass of phosphine gas generated is 1/3 the mass of the tablets. (i.e. a 1.5 kg flask would generate 0.5 kg of phosphine gas in contact with water).

The consequence modelling shows:

- For a flask – there is the potential for injury 49 m beyond the site boundary and fatality 29 m beyond the site boundary. Injury and fatality toxic levels for a single flask are not expected to reach the caravan park or areas zoned residential.
- For a case of 14 flasks – there is the potential for injury 228 m beyond the site boundary and fatality 150 m beyond the site boundary. Of note there is the potential for fatality at the caravan park.
- For the full inventory (45 kg) – there is the potential for injury up to 348 m beyond the site boundary and fatality 229 m beyond the site boundary. Of note there is the potential for fatality at areas zoned residential. Shelter in place or evacuation may be required in the area based on the prevailing wind direction.

***2. Warehouse fire***

A warehouse fire could result in a toxic smoke plume due to the thermal decomposition of stored materials. Consequence modelling for the representative materials indicates that the injury and fatality toxic levels could extend up to 112 m and 94 m from the warehouse, respectively. Given the distance between the warehouse and the nearest receivers (i.e. caravan park, 70 m north), there is potential for offsite injuries and fatalities from the combustion products.

Evacuation or shelter in place may be required at the receivers based on prevailing wind conditions.

### 1.5.2. Risk analysis

Incidents with potential offsite impacts, identified in Section 1.5.1, were carried forward for the risk assessment.

Based on the *Multi-level Risk Assessment* guideline, Ref [7], a semi-quantitative approach (i.e. Level 2 analysis) can be adopted if the likelihood of risk contributors with off-site effects is low. This level of risk analysis was determined appropriate for this study as the occurrence of identified scenarios with offsite effects were found very unlikely.

The likelihood of an incident leading to the generation of phosphine was considered:

- Full inventory (45 kg) or case (21 kg) – Extremely Unlikely – would require loss of containment from multiple flasks (e.g. forklift tine punctures multiple flasks) at the same time as water is present (e.g. unloading during a rain event with standing water).
- Single flask (1.5 kg) – Very Unlikely – would require complete loss of contents from a single flask (e.g. opened in error, package failure) at the same time as water is

present (e.g. during a rain event) or inadvertent use of water after a spill (e.g. safety shower activation or hose reel used to wash down product).

Based on the TNO Purple Book, Ref [8], the frequency of a warehouse fire ranges from $1.8 \times 10^{-4}$ to $8.8 \times 10^{-4}$ per year depending on the safety systems implemented. Use of the most frequent value is conservative for the development as it includes warehouses that store flammable liquids or gases as well as those with basic safety systems. Additionally, the severity of the impact depends on weather conditions and wind direction. The toxic plume is typically buoyant with toxins dispersed at altitude. Therefore, whilst irritation is possible, potential for an incident to lead to offsite injury/fatality is considered very unlikely.

The individual risk level at the receivers was found to be 'moderate' for the worst-case scenarios, meaning the offsite risk is tolerable if reduced As Low As Reasonably Practicable (ALARP).

Societal risk (the effect of infrequent events on large numbers of people) has not been calculated due to the high level of uncertainty in determining the frequency of a phosphine release. However, the surrounding areas will consist of low-density industrial and commercial lands; therefore, a large number of people would not be affected by the identified incidents, and the societal risk is considered insignificant.

### 1.5.3. MHF Consideration

The assessment against the Work Health and Safety (WHS) Regulation 2017 indicates that the Schedule 15 chemicals proposed for onsite storage exceeds 10% of the Major Hazard Facility (MHF) threshold quantities (approximately 34%) and hence the facility must notify SafeWork NSW. The facility may be classified as an MHF if the regulator (SafeWork NSW) decides to hold a Determination Inquiry and, on inquiry determines the facility to be an MHF.

## 1.6. Recommendations

Recommendations made to support the PHA conclusions are provided in Table 1.1.

**Table 1.1: Recommendations**

| No. | Description |
|---|---|
| 1 | The size of the DG load per vehicle movement should remain below the minimum quantity specified in Table 4.3 (*Applying SEPP 33* criteria) to minimise transportation risk. This is especially important for Class 6.1 materials, as any movement exceeding the minimum load quantity (1 tonne in bulk or 3 tonnes in packaging per load) would exceed the threshold. |
| 2 | An Emergency Response Plan should be developed for the facility, and it should include notification and action to be taken for the caravan park, residential areas and the airport. |
| 3 | The warehouse design should include necessary controls and risk reduction measures to ensure risks are reduced As Low as Reasonably Practicable (ALARP). Specifically, the risk associated with the warehouse fire and loss of containment of Fumitoxin should be effectively managed. |

# 2. INTRODUCTION

## 2.1. Background

Cumboogle Farming Pty Ltd (the Proponent) is proposing to develop and operate a rural supply premises at 7 Harry Sullivan Avenue, Moree[2]. The premises will be used for the sale of farm supplies and inputs such as agricultural chemicals, fertiliser and trace element products, seeds, oils and lubricants, animal health and nutrition.

The proposed facility is located within the Moree Special Activation Precinct (SAP), which is a designated area intended to streamline and support regional development under the State Environmental Planning Policy (SEPP) (Precincts–Regional) 2021. The SAP planning requires an Activation Precinct Certificate (APC) for new developments. A Preliminary Hazard Analysis Report (PHA) was prepared by the Proponent to support the application for the APC[3] and development consent for the proposal, Ref [1].

Department of Primary Industries and Regional Development (DPIRD) has engaged Sherpa Consulting Pty Ltd (Sherpa) to conduct additional risk screening and PHA to further assess the risks associated with the toxic nature of materials proposed for onsite storage.

## 2.2. Objectives

The objectives of the risk assessment were to:

- Review findings from the previous PHA and determine if the project is 'potentially hazardous' under SEPP (Resilience and Hazards) 2021 (Resilience and Hazards SEPP), Ref [2].
- If required, complete a PHA in line with Hazardous Industry Planning Advisory Paper (HIPAP) 6 *Hazard Analysis*, Ref [5], including the following activities:
  - Conduct a Hazard Identification (HAZID) to identify hazardous scenarios with the potential for offsite safety impacts.
  - Perform consequence analysis for the identified scenarios to determine injury and fatality impact footprint.
  - Undertake an appropriate level of risk assessment, based on the *Multi-level Risk Assessment* guideline, Ref [7], to determine the offsite risk level.
  - Assess the risk level against criteria in HIPAP 4 *Risk Criteria for Land Use Planning*, Ref [4].
- Report the study findings.

[2] The project also includes Lot 10 DP 1212873 (12 Perry James Crescent, Moree). However, the warehouses will be constructed on Lot 9 DP 1212873.

[3] APC was issued on 18 April 2024.

## 2.3. Location and surroundings

The site location and surrounding areas are shown in Figure 2.1. The proposed site is located at 7 Harry Sullivan Avenue Moree (Lot 9 DP 1212873) within the Moree SAP, an area designated for commercial and industrial activities

Adjacent development sites are currently vacant. The nearest residentially zoned land is approximately 170 m north of the warehouse. Two forms of short-term accommodation are located nearby: a caravan park approximately 70 m to the north and Inland Rail workers temporary accommodation site approximately 55 m to the south from warehouses. The Inland Rail site is estimated to accommodate approximately 350 people[4]. The accommodation site is currently in the process of being decommissioned and expected to be demolished before the warehouse operations begin. Therefore, the caravan park is assumed the nearest occupied area to the proposed site.

The Moree airport is located approximately 370 m southwest of the proposed site.

## 2.4. Development description

The proposed development is a storage facility for farm supplies and agricultural chemicals. Two warehouses, as shown in Figure 2.2 and Figure 2.3, will be used for storage purposes. The loading and unloading operations to/from the warehouses will be conducted using standard equipment such as forklifts, pallet lifts and manual handling. Site activities will be limited to the receipt, storage, and supply of products to customers. There will be no formulation, dilution, repackaging or decanting. Pallets, boxes or cartons may be opened and individual items sold but all individual products will remain in their original unopened packaging.

Warehouse A includes offices and staff amenities with direct access the warehouse floor. Warehouse B is a stand-alone structure. It is assumed all toxic material will be stored in Warehouse B to provide separation from onsite staff and customers.

The study assumes material will be received and dispatched from the hardstand area to the north of the warehouse and that controls will be in place to manage deliveries and stock to minimise the time stock is held outside of a warehouse.

Construction drawings show each warehouse has roller over kerbs for vehicle access and a centrally located drain. While there are no details of the warehouse drainage, it is assumed they are routed to sumps to prevent discharge offsite.

The design has not been verified for compliance to Australian codes and standards. It is assumed the warehouse will meet requirements relating to storage of Dangerous Goods (DGs) including segregation requirements within the warehouses.

[4] https://www.markcoulton.com.au/inland-rail-accommodation-facility-provides-opportunity/

## 2.5. Operations

The proposed operating hours for the site would be from 8 am to 5:30 pm on weekdays and from 8 am to 12 pm on Saturdays. The site would be manned by six full-time onsite personnel. The access to the facility would be provided for both retail customers and heavy vehicles for deliveries and large pick-ups. The typical number of client visits is expected to be between 2 to 4 per day. It is assumed a traffic management plan will be in place to manage the risk of traffic interactions on site.

## 2.6. Exclusions, assumptions and limitations

The exclusions, assumptions and limitations that apply to this study are summarised in Table 2.1.

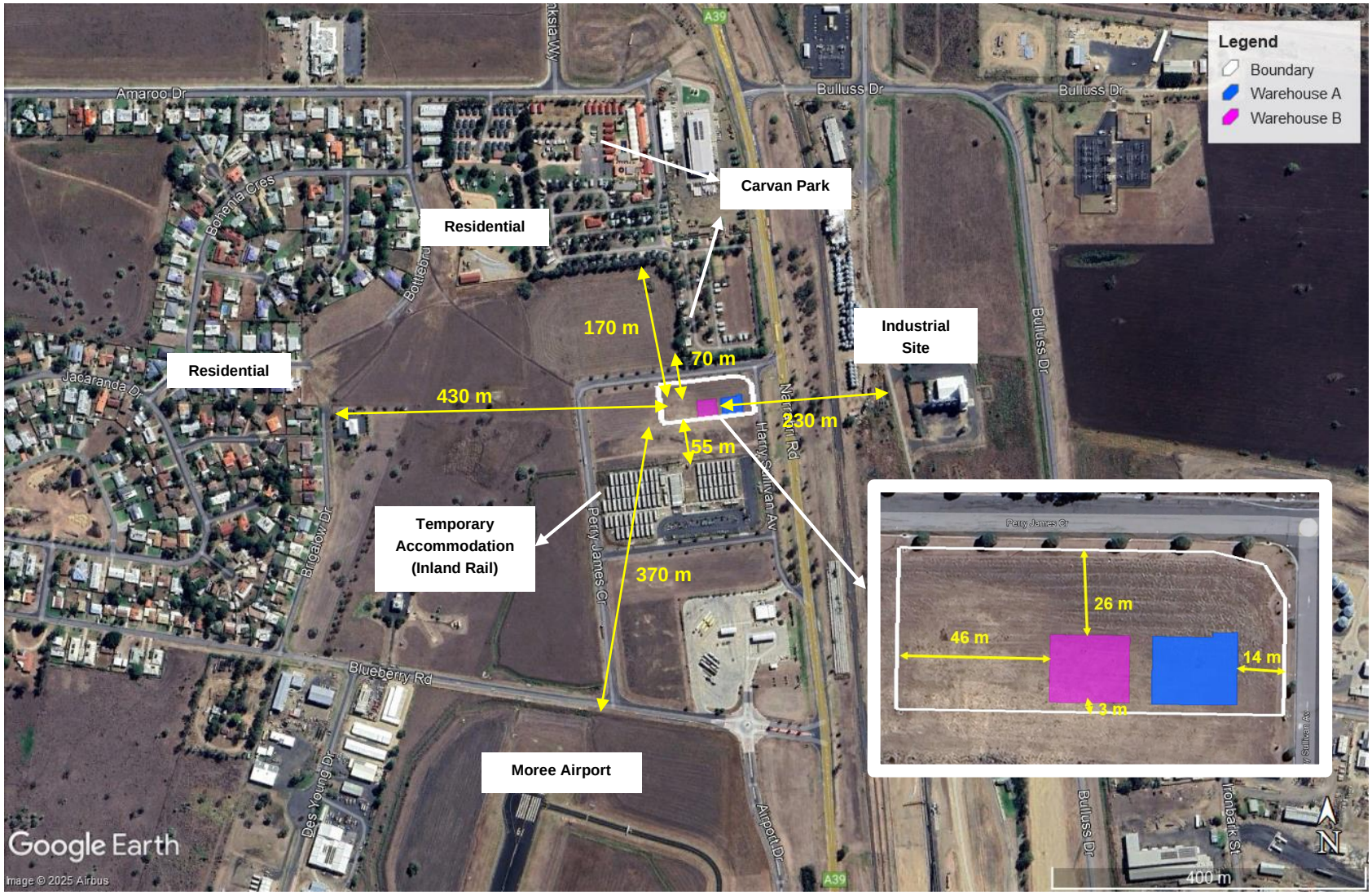
**Table 2.1: Exclusions, assumptions and limitations**

| Item | Scope area | Exclusion/assumption/limitation |
|---|---|---|
| 1 | Level of information | Sherpa relied on DPIRD to provide the required information. The provided documents do not detail the design safety measures (e.g. fire detection, fire prevention and firefighting systems) for the warehouses and DG segregations within the warehouses. It is assumed that the detailed design would be based on the industry best practices, codes, and standards and make a use of the PHA findings and recommendations. |
| 2 | List of materials | The study used the materials provided in the previous PHA report, Ref [1][5], for the hazard assessment. |
| 3 | PHA scope | The PHA is required to include all DGs, regardless of whether they exceed the SEPP screening threshold. |
| 4 | Consequence modelling | The effect of the warehouses in confining the toxic gases was not considered in the consequence modelling to account for the worst-case scenario (e.g. the doors may be open at the time of release, or the loss of containment event may occur outside the warehouse during delivery or sale). |
| 5 | Risk matrix | A generic risk matrix has been used for the study. |
| 6 | Spill of material during handling | Where a spill of material during handling (e.g. receipt or dispatch) can lead to an acute safety risk, the risk was assessed in the study. Spill of material that does not present an acute offsite risk was not considered in the assessment. |
| 7 | Toxicity impact | The materials classified as Class 6 can be toxic through inhalation, ingestion, or skin contact. However, since the focus of the PHA study is on offsite effects, only inhalation toxicity, which has the potential for offsite impact, is of concern. Ingestion or skin contact are considered to have only localised impact, as the materials will be stored within warehouses equipped with kerbing and drainage to prevent runoff and offsite migration. |
| 8 | Onsite risk | The study considered offsite risk only. It does not cover onsite risk to staff and visitors and it not an assessment of the adequacy of control of onsite risks. |

[5] There are three revisions of the PHA report, and Sherpa were directed to use revision 2 (dated 15/01/2024) for the list of materials proposed to be stored onsite.

| Item | Scope area | Exclusion/assumption/limitation |
|---|---|---|
| 9 | Temporary accommodation site | The Inland Rail accommodation site is being decommissioned, and it is expected to be demolished before the warehouse operations begin. Therefore, the land currently occupied by the accommodation is assumed as potentially a commercial/ industrial area. |

## Figure 2.1: Local context and separation distances



## Figure 2.2: Warehouse details (sideview)

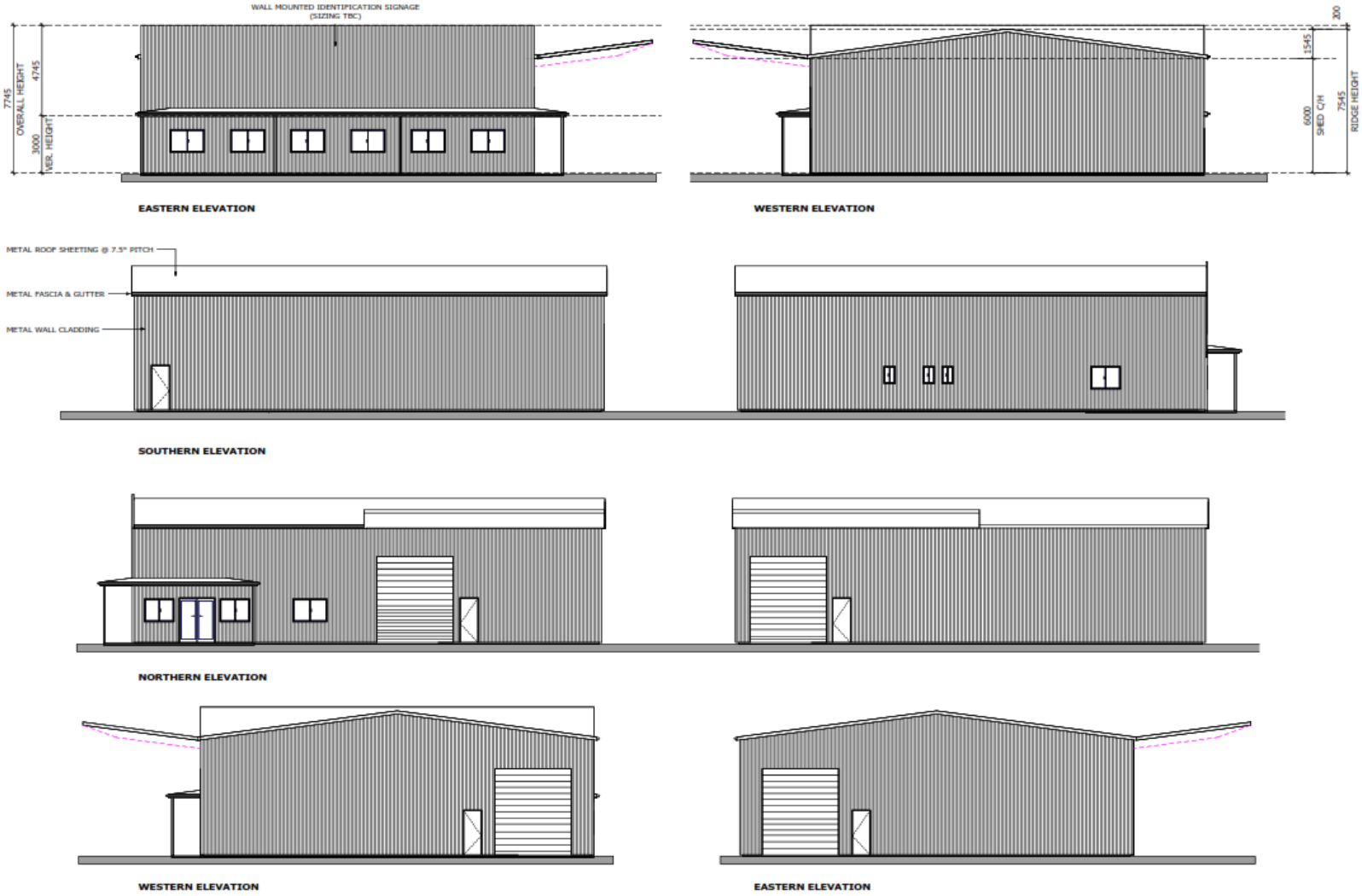
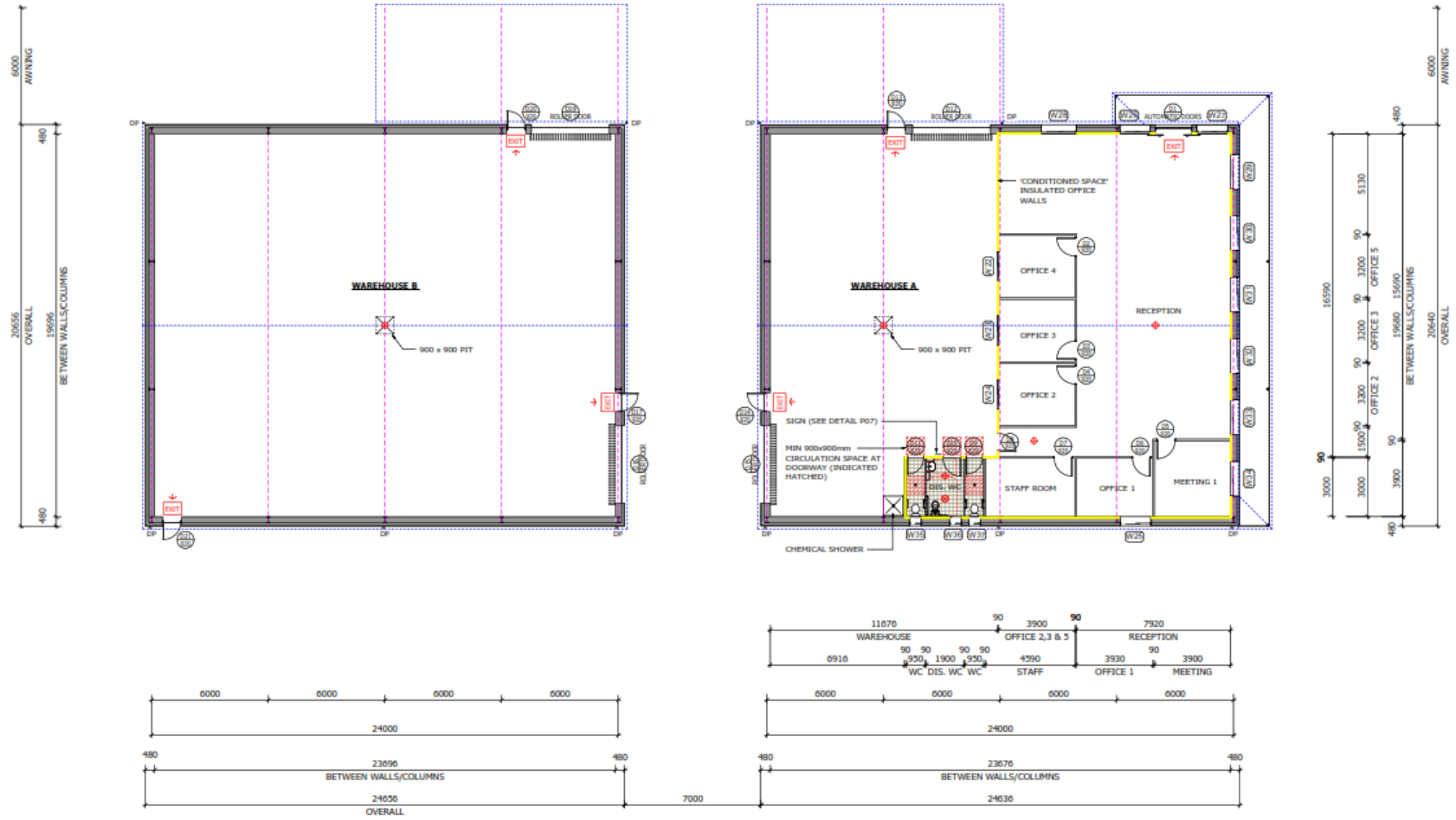


**Figure 2.3: Site plan (top view)**



# 3. METHODOLOGY

## 3.1. Study basis

This risk assessment was undertaken with reference to the following:

- Resilience and Hazards SEPP, Ref [2].
- *Applying SEPP 33*, Ref [3].
- HIPAP 6 *Hazard Analysis*, Ref [5].
- HIPAP 4 *Risk Criteria for Land Use Safety Planning*, Ref [4].
- Assessment Guideline: *Multi-level Risk Assessment* (MLRA), Ref [7].
- NSW Work Health and Safety (WHS) Regulation 2017, Schedule 15, Ref [6].

## 3.2. Hazards SEPP screening

A Resilience and Hazards SEPP screening was conducted using the process shown in Figure 3.1 (reproduced from Figure 4 of the *Applying SEPP 33* guideline).

The objective of the screening is to determine whether the project is 'potentially hazardous' in the context of the Resilience and Hazards SEPP.

The Resilience and Hazards SEPP defines potentially hazardous industry as follows:

> '*Potentially hazardous industry' means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:*
>
> *(a) to human health, life or property, or*
>
> *(b) to the biophysical environment,*
>
> *and includes a hazardous industry and a hazardous storage establishment*.'

Proposed developments that are classified as 'potentially hazardous' industry must undergo a PHA in compliance with HIPAP 6.

The screening process considers:

- **Risk screening** which reviews the type and quantity of hazardous materials to be stored on site.
- **Transport screening** which reviews the expected number of hazardous materials transport movements.

- **Other risks screening** which reviews 'other risk factors' to identify hazards outside the scope of the risk screening method[6] and a list of industries that may be potentially hazardous.[7]

'Hazardous materials' are defined in the *Applying SEPP 33* guideline, Ref [3], as substances that fall within the classification of the Australian Dangerous Goods Code (ADGC) (i.e. have a DG classification). The DG classification can be informed from the materials' Safety Data Sheets (SDSs).

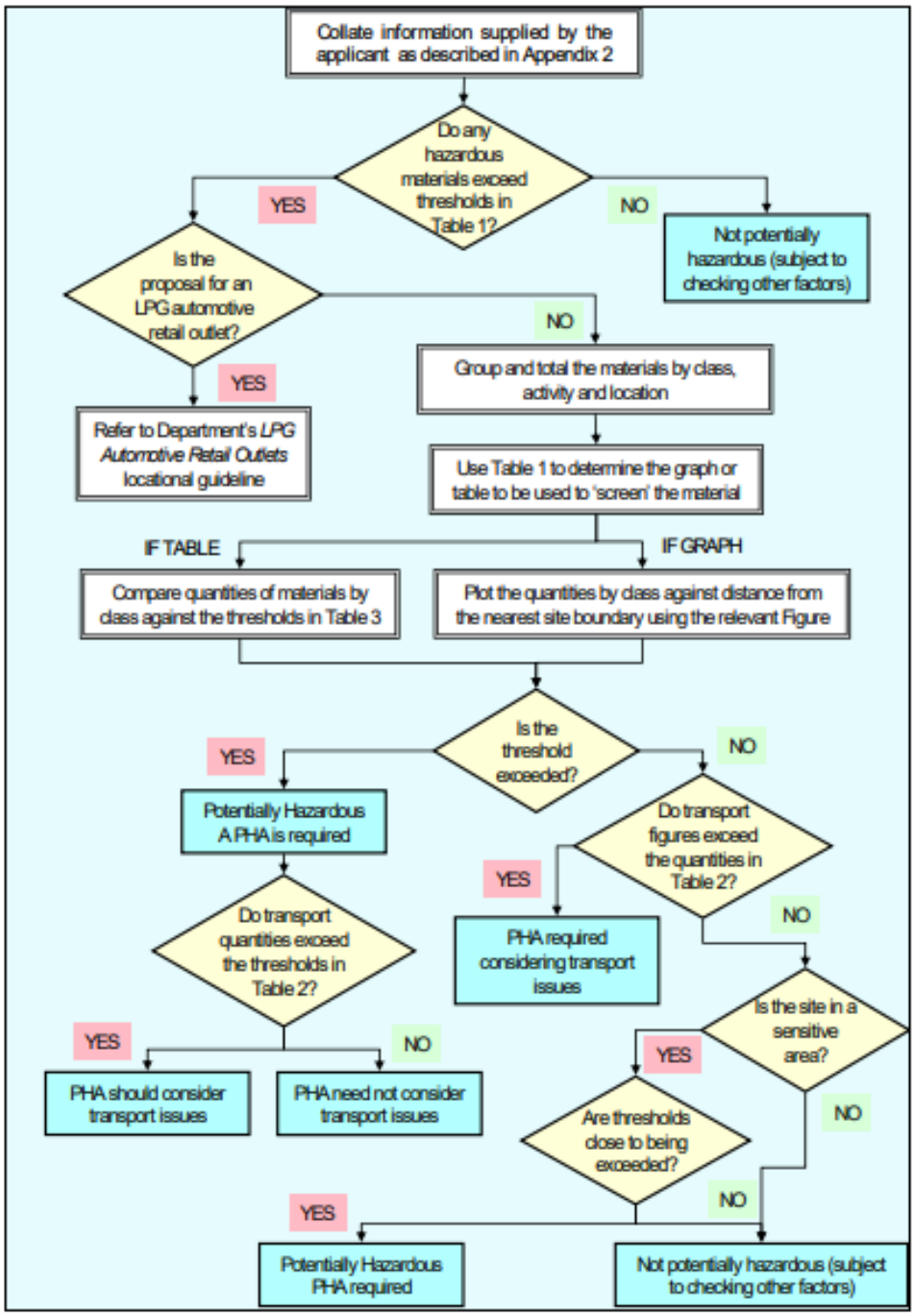
The *Applying SEPP 33* guideline is based on the 7th edition of ADGC, Ref [9], and refers to hazardous chemicals by their DG classification. In this document, substances are referred to by their DG classification rather than their classification under the Globally Harmonised System (GHS), which is used in the ADGC Edition 7.6 or newer.

Risk screening was undertaken by comparing the storage quantity of the hazardous materials or expected number of vehicle movements with the screening threshold specified in the *Applying SEPP 33* guideline.

[6] Listed in Appendix 2 of *Applying SEPP 33.*

[7] Listed in Appendix 3 of *Applying SEPP 33.*

**Figure 3.1: Risk screening process**



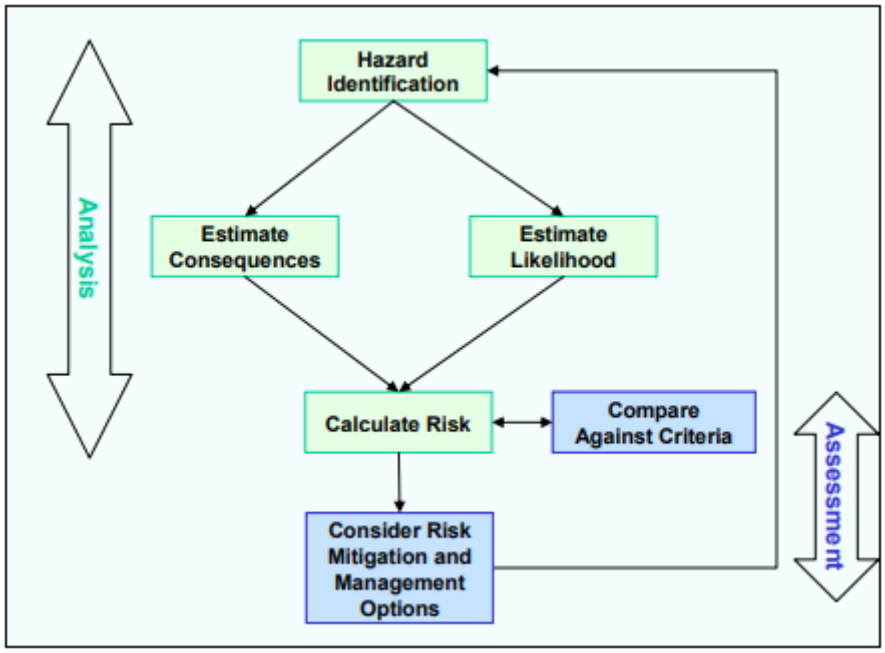

## 3.3. Preliminary hazard analysis

### 3.3.1. Overview

If the Resilience and Hazards SEPP screening determines that a proposed development is 'potentially hazardous', then a PHA following HIPAP 6 is required for the project. The purpose of the PHA is to analyse the risk at an appropriate level of detail based on the MLRA guideline, Ref [7], and assess the risks against qualitative and/or quantitative criteria in HIPAP 4.

A schematic of the PHA process is shown in Figure 3.2 (reproduced from Figure 2 of HIPAP 6).

**Figure 3.2: PHA flowchart**




### 3.3.2. Level of analysis

The MLRA guideline, Ref [10], sets out three levels of risk analysis that may be appropriate for a land use safety planning assessment. The levels and a high-level summary of the justification required for each level are shown in Table 3.1. This guidance document was consulted to determine the level of analysis required for this study.

**Table 3.1: Level of analysis**

| Level | Analysis type | Appropriate/can be justified if |
|---|---|---|
| 1 | Qualitative | There are no potential events with significant off-site consequences and societal risk is negligible. |
| 2 | Partially quantitative | The frequency of occurrence of risk contributors having off-site consequences is low. |
| 3 | Quantitative | There are significant off-site risk contributors, and a Level 2 analysis is unable to demonstrate that the risk criteria will be met. |

The outcomes of the HAZID and consequence analysis were used to determine the appropriate level of analysis for the proposed development.

## 3.4. Major hazard facility screening

Major Hazard Facilities (MHFs) are locations where a large quantity of hazardous materials[8] are stored or handled. Schedule 15 of the NSW WHS Regulation 2017,

[8] Hazardous materials are equivalent to 'hazardous chemicals' in the WHS legislation.

Ref [6], introduces the screening method and specifies thresholds for hazardous materials to determine if the site is an MHF. As distinct from determination of the quantity of hazardous materials used in the 'Hazards SEPP screening' (Section 3.2), the MHF screening method allows the use of only the fraction of a mixture that is hazardous (referred to as 'active components' in this study).

MHF screening in not required for a PHA study, but it was conducted to determine if the proposed facility may be an MHF and address the DPIRD comment in this regard. The details of the assessment are provided in APPENDIX B.

### 3.5. Uncertainty in hazard analysis

This study follows the standard process and conventional methods outlined in the NSW guidelines for risk screening and hazard analysis. However, conducting hazard and risk analyses involves several inputs and assumptions, which introduce a degree of uncertainty into the assessments. To mitigate this uncertainty, the following approaches were adopted:

- where discrepancies were identified in the input information (e.g. inconsistencies in product SDSs), the most conservative information was used.
- The study used the recognised consequence models and calculation methods, with the results being sense-checked to ensure both accuracy and reliability.
- The consequence assessment considered a range of worst case, credible scenarios. For example, toxic modelling covered a range of package sizes sold by the manufacturer and assumed an incident could occur outside of a warehouse during product handling or inside a warehouse when the door is open.
- Design and operating considerations relating to assumptions that could alter the conclusion or lead to a major difference are identified in the study.

# 4. RESILIENCE AND HAZARDS SEPP SCREENING

## 4.1. Materials for SEPP screening

The materials to be stored onsite, along with their maximum proposed storage quantity, are listed in Table 4.1. The DG classification as well as subsidiary risk and packaging grouping are taken from the product SDS (included as APPENDIX A). The following factors were taken into account to determine if a material should be carried forward for SEPP screening:

- The storage screening excludes Class 9 materials, as no threshold is specified by *Applying SEPP 33* guideline. All other DGs were carried forward for storage screening
- All hazardous materials with DG classification (including Class 9) were covered in the transportation screening.
- *Applying SEPP 33* guideline only considers combustible liquids of Class C1 as potentially hazardous if stored with flammable materials. Based on the list of materials, no flammable substances (i.e. Class 2.1 or 3) are proposed to be stored onsite, and therefore, combustible substances are excluded from SEPP screening.
- Both primary and subcategories are used in the screening.

## Table 4.1: List of materials

| Trade name | UN number | DG class | Sub class | Flammability class | Packing Group (PG) | Maximum quantity | Category | Carried forward to SEPP risk screening | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Storage | Transport |
| Adama Cavalier 240 | 3082 | 9 | - | C1 | III | 600 L | Miscellaneous dangerous goods/combustible liquids | No | Yes |
| Alpha Boomblitz | 1759 | 8 | 9 | - | II | 250 kg | Corrosive substances | Yes | Yes |
| Nuf Fumitoxin tablets | 1397 | 4.3 | 6.1 | - | I | 45 kg | Substances which in contact with water emit flammable gases/toxic substances | Yes | Yes |
| Syng Gramoxone Pro 360 | 2922 | 8 | 6.1 | - | III | 5000 L | Corrosive substances with a subcategory of toxic | Yes | Yes |
| Syng Pirimor 500WG | 2757 | 6.1 | - | - | III | 500 kg | Toxic substances | Yes | Yes |
| Syng Sprayseed 250 | 3016 | 6.1 | - | - | III | 20,000 L | Toxic substances | Yes | Yes |
| ADAMA Legacy MA | 3082 | 9 | - | C1 | III | 1600 L | Miscellaneous dangerous goods/combustible liquids | No [(a), (b)] | Yes [(a), (b)] |
| BCS Prosaro 420 SC | 3082 | 9 | - | - | III | 800 L | Miscellaneous dangerous goods | No [(b)] | Yes [(b)] |
| BCS SAKURA WG85 | 3077 | 9 | - | - | III | 450 kg | Miscellaneous dangerous goods | No [(b)] | Yes [(b)] |
| DOW TRANSFORM WG Insecticide | 3077 | 9 | - | - | III | 20 kg | Not classified as a dangerous good | No [(b)] | Yes [(b)] |
| FSA 24D ESTER LV 680 | 3082 | 9 | | C2 | III | 5000 L | Miscellaneous dangerous goods | No [(a), (b)] | Yes [(a), (b)] |
| FSA 24DB (BUTTRESS) | - | - | - | - | - | 40 L | Not classified as a dangerous good | No | No |
| FSA 700 Surfactant (LI700) | - | - | - | - | - | 6000 L | Not classified as a dangerous good | No | No |

| Trade name | UN number | DG class | Sub class | Flammability class | Packing Group (PG) | Maximum quantity | Category | Carried forward to SEPP risk screening | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Storage | Transport |
| FSA CLETHODIM 360 EC (SELECT) | - | - | - | C1 | - | 1600 L | Not classified as a dangerous good | No [a] | No [a] |
| FSA CLOPYRALID 300 (LONTREL) | - | - | - | - | - | 840 L | Not classified as a dangerous good | No | No |
| FSA DICAMBA 500 | - | - | - | - | - | 1500 L | Not classified as a dangerous good | No | No |
| FSA DRY GLYPHOSATE 680 | - | - | - | - | - | 1000 kg | Not classified as a dangerous good | No | No |
| FSA GLYPHOSATE 450 | 3082 | 9 | - | - | III | 30000 L | Miscellaneous dangerous goods | No [b] | Yes [b] |
| FSA GLYPHOSATE 540 K HERBICIDE | 3082 | 9 | | - | - | 5000 L | Miscellaneous dangerous goods | No [b] | Yes [b] |
| FSA TRIASULFURON 750WG (LOGRAN) | - | - | - | - | - | 200 kg | Not classified as a dangerous good | No | No |
| FSA WETTER 1000 | - | - | - | C2 | - | 800 L | Not classified as a dangerous good | No [a] | No [a] |
| OZCROP TERBUTRYN 500 IGRAN | 3082 | 9 | - | - | III | 700 L | Miscellaneous dangerous goods | No [b] | Yes [b] |
| SYNG BOXER GOLD | 3082 | 9 | - | C1 | III | 3000 L | Miscellaneous dangerous goods | No [a], [b] | Yes [a], [b] |

Notes:

(a) There is no screening threshold for combustible liquids if they are segregated from flammable material.

(b) No screening threshold for storage of Class 9 substances; only for transportation screening.

## 4.2. SEPP33 screening

The hazardous substances proposed for storage onsite were grouped based on their DG classes, and the cumulative quantity of each DG class was assessed against the screening threshold specified by *Applying SEPP 33* guideline, as summarised in Table 4.2. The assessment concludes that:

- The storage of Class 6.1 PG III (toxic material) exceeds the storage threshold. Hence, the proposed development is considered 'potentially hazardous' with respect to the storage of DGs and a PHA study is required for the proposed development.
- As the package sizes and the number of vehicle movements to/from the warehouse are currently unknown, this study cannot confirm whether the transportation thresholds are exceeded. However, the previous PHA report includes a discussion on route selection and can be referenced for DG transport.

***Recommendation 1 – The size of the DG load per vehicle movement should remain below the minimum quantity specified in Table 4.3 (Applying SEPP 33 criteria) to minimise transportation risk. This is especially important for Class 6.1 materials, as any movement exceeding the minimum load quantity (1 tonne in bulk or 3 tonnes in packaging per load) would exceed the threshold.***

## 4.3. Additional screening factors

Appendix 2 of *Applying SEPP 33* guideline outlines additional risk factors for consideration in identifying hazards beyond the scope of the risk screening method, as detailed below:

- Storage or transport of incompatible materials (i.e. hazardous and non-hazardous).
- Generation of hazardous waste.
- Possible generation of dusts within confined areas.
- Types of activities the DG and otherwise hazardous materials are associated with (storage, processing, reaction, etc.).
- Incompatible, reactive or unstable materials and process conditions that could lead to uncontrolled reaction or decomposition.
- Storage or processing operations involving high (or extremely low) temperature and/or pressures.
- Details of known past incidents (and near misses) involving hazardous materials and processes in similar industries.

No new issues were identified by the additional screening factors.

**Table 4.2: SEPP33 screening summary – storage**

| DG Class | PG | Material | Quantity | Cumulative quantity (tonnes) | Screening threshold (tonnes) | Comment |
|---|---|---|---|---|---|---|
| 4.3 | - | Nuf Fumitoxin tablets | 45 kg | 0.045 | 1 | Threshold is not exceeded. |
| 6.1 | I | Nuf Fumitoxin tablets | 45 kg | 0.045 | 0.5 | Threshold is not exceeded. |
| 6.1 | III | Syng Gramoxone Pro 360 | 5,000 L (5,700 kg)(a) | 29.4 (c) | 2.5 | Cumulative storage quantity **exceeds the storage threshold**. |
| | | Syng Pirimor 500WG | 500 kg | | | |
| | | Syng Sprayseed 250 | 20,000 L (23,200 kg)(b) | | | |
| 8 | II | Alpha Boomblitz | 250 kg | 0.25 | 25 | Threshold is not exceeded. |
| 8 | III | Syng Gramoxone Pro 360 | 5,000 L (5,700 kg)(a) | 5.7 | 50 | Threshold is not exceeded. |

Notes:
(a) Density 1.14 g/cm$^3$ as per product SDS.
(b) Density 1.16 g/cm$^3$ as per product SDS.
(c) The screening was based the cumulative quantity as all DGs will be stored in a same area.

**Table 4.3: SEPP 33 screening summary – transportation**

| DG Class | Material | Transport threshold | |
|---|---|---|---|
| | | Movements | Minimum quantity per load (tonnes) |
| 4.3 | Nuf Fumitoxin tablets | > 200 (annual)<br>> 12 (weekly) | 5 (bulk)<br>10 (packages) |
| 6.1 | Nuf Fumitoxin tablets | All | 1 (bulk)<br>3 (packages) |
| | Syng Gramoxone Pro 360 | | |
| | Syng Pirimor 500WG | | |
| | Syng Sprayseed 250 | | |
| 8 | Alpha Boomblitz | > 500 (annual)<br>> 30 (weekly) | 2 (bulk)<br>5 (packages) |
| | Syng Gramoxone Pro 360 | | |
| 9 | Adama Cavalier 240 | > 1000 (annual)<br>> 60 (weekly) | No limit |
| | Alpha Boomblitz | | |
| | ADAMA Legacy MA | | |
| | BCS Prosaro 420 SC | | |
| | BCS SAKURA WG85 | | |
| | DOW TRANSFORM WG Insecticide | | |
| | FSA 24D ESTER LV 680 | | |
| | FSA GLYPHOSATE 450 | | |
| | FSA GLYPHOSATE 540 K HERBICIDE | | |
| | OZCROP TERBUTRYN 500 IGRAN | | |
| | SYNG BOXER GOLD | | |

# 5. HAZARD IDENTIFICATION

## 5.1. Overview

The SEPP screening found that the proposed development is 'potentially hazardous', and therefore, a PHA is required for the project following the methodology outlined in HIPAP 6, Ref [5].

The first step in the PHA process is to undertake a HAZID to identify hazardous scenarios and their potential causes and consequences. The HAZID covers all material at site regardless of the SEPP screening threshold.

The HAZID was carried out using information obtained from product SDSs, properties of the hazardous materials, past incidents for similar storage facilities and assumptions made for this study as summarised in Table 5.1.

**Table 5.1: HAZID assumptions**

| No. | Assumptions |
|---|---|
| 1 | Construction drawings show each warehouse has roller over kerbs for vehicle access and a centrally located drain. While there are no details of the warehouse drainage, it is assumed they are routed to sumps to prevent discharge offsite. |
| 2 | The design has not been verified for compliance to Australian codes and standards. It is assumed the warehouse will meet requirements relating to storage of DGs including segregation requirements within the warehouses. |
| 3 | Warehouse A includes offices and staff amenities with direct access the warehouse floor. Warehouse B is a standalone structure. It is assumed all toxic material will be stored in Warehouse B. |
| 4 | The study assumes material will be received and dispatched from the hardstand area to the north of the warehouse and that controls will be in place to manage deliveries and stock to minimise the time stock is held outside of a warehouse. |
| 5 | The Class 8 materials (corrosive substances) will not be stored with incompatible materials. |

## 5.2. Hazard review

Based on the list of materials, the following could potentially lead to offsite impacts:

- Toxic materials (Class 6.1and sub-class 6.1):
  - Fumitoxin
  - Syng Pirimor 500WG
  - Gramoxone 360 Pro and Spray Seed.
- Corrosive substances (Class 8).

In addition, a warehouse fire involving DG at the warehouse could lead to offsite consequences.

The materials classified as Class 6.1 can be toxic through inhalation, ingestion, or skin contact. However, since the focus of the PHA study is on offsite effects, only inhalation toxicity is of concern. Ingestion or skin contact are considered to have onsite effects

only, as the materials will be stored within warehouses equipped with kerbing and drainage to prevent runoff and offsite migration.

### 5.2.1. Fumitoxin

Fumitoxin is a Class 4.3 (Dangerous when wet) with a subclass 6.1 (Toxic). The substance is designed to emit phosphine (a toxic gas) when exposed to atmospheric moisture. The SDS states that the substance reacts vigorously with water liberating toxic phosphine gas. Phosphine is also flammable, posing a fire and explosion risk.

The Fumitoxin manufacturer notes that in contact with water additives result in generation of carbon dioxide (to supress the flammability of phosphine) and ammonia (in small quantities) to provide an odour warning.

Fumitoxin was carried forward for assessment as a toxic and flammable hazard with the initiating event being contact with water.

### 5.2.2. Syng Pirimor 500WG

Pirimor is an insecticide stored in granular form. Based on the information provided in the SDS, the substance is not toxic by inhalation for the purposes of the ADGC (refer to the SDS, APPENDIX A, for explanation).

The SDS also states the material may form a combustible dust mixture with air. Dust explosions require a level of confinement and hence typically occur inside warehouses with the explosion venting through openings. The roller door is the most likely vent path and the distance to the site boundary from the door would be sufficient to prevent offsite consequences from a dust explosion.

A loss of containment of Pirimor was not carried forward for further assessment.

### 5.2.3. Gramoxone 360 Pro and Spray Seed

Gramoxone 360 Pro and Spray seed are both liquid herbicides containing paraquat. The SDS for the materials state, under acute toxicity, that the substances are not toxic on inhalation as defined by dangerous goods regulations.

As the materials are not toxic through inhalation and any spill will be contained in the warehouse or loading area, the potential for offsite oral or dermal exposure is not considered credible, and the material was not carried forward for further assessment.

### 5.2.4. Class 8

Class 8 materials are liquid corrosive and reactive when in contact with specific substances. It is assumed that they will be stored separately from incompatible materials, in accordance with the product SDS.

In the event of a spill, the spill would remain onsite due to bunding and drainage and therefore no credible offsite consequences are expected.

Class 8 materials were not carried forward for further assessment.

### 5.2.5. Warehouse fires

In addition to the hazards covered by the DG classification, there is the potential for a warehouse fire to lead to harmful consequences. A review of the potential consequences of a fire are detailed by substance in Table 5.2.

A warehouse fire was carried forward for further assessment.

## 5.3. Findings

The review of material properties and potential hazardous incidents concluded that that following scenarios have the potential for offsite consequences are credible and require further assessment:

- Nuf Fumitoxin tablets (classified as Class 4.3 and 6.1) emit phosphine gas if exposed to water. Phosphine is both toxic on inhalation and flammable, and the loss of containment (LOC) scenarios associated with tablets could potentially result in offsite impacts. Scenarios that could result in contact with water are:
  - container pierced by forklift tine and spills into standing water
  - container dropped and spills into standing water
  - container degrades and spills into standing water
  - operational error including inadvertent opening of container, water spray onto damage packaging, spill and activation of safety shower.
- In the event of a warehouse fire involving the stored materials, the combustion process could generate a smoke plume containing toxic substances such as HBr, HCl, $NO_2$ with potential offsite effects.

**Table 5.2: Hazard review**

| Material | DG Class | Hazardous event/potential causes | Proposed controls (to manage offsite risk) | Potential consequences | Comment | Potential offsite impact? |
|---|---|---|---|---|---|---|
| Nuf Fumitoxin tablets | Class 4.3<br>(subclass 6.1) | Loss of containment and reaction with water<br><br><u>Causes</u><br>Faulty container<br>Impact by forklift<br>Dropped impact | -Package size 1.5 kg (flask capacity)<br>-Supplier packaging, packages remain sealed in the warehouse<br>-Confinement building, containing spills, under cover/dry environment<br>-Site traffic management plan<br>-Licensed forklift operator<br>-Well-sealed container provided by reputable supplier- | -Release of toxic gas (phosphine), toxic by inhalation<br>-Fire/explosion | -Fumitoxin contains ammonium carbamate which liberates ammonia and carbon dioxide. These are essentially non-flammable and act as an interfering agent to reduce fire hazards. The ammonia also acts as a warning agent.<br>-No credit taken for the warehouse preventing gas dispersion. The roller door may be open, and the higher risk operation is a dropped container during receipt/dispatch. Handing may take place outside of the warehouse. | **Yes** |
| Syng Gramoxone Pro 360 | Class 8<br>(corrosive)<br>(subclass 6.1) | Loss of containment - contact with metal<br><br><u>Causes</u><br>Faulty packaging<br>Impact by forklift<br>Dropped impact | -Confinement building, containing spills, under cover/dry environment<br>-Site traffic management plan<br>-Licensed forklift operator<br>-Well-sealed container provided by reputable supplier- | -Damage to metal structures<br>-Acute inhalation toxicity | -Corrosive to tin plate, galvanised sheet metal and sheet steel, only localised impact is expected.<br>-As per SDS, the substance/mixture is not toxic on inhalation as defined by dangerous goods regulations.<br>-The warehouse design and proposed drainage will prevent offsite spill with no credible mechanism for offsite direct exposure (ingestion/skin contact). | No |
| Alpha Boomblitz | Class 8<br>(corrosive) | Loss of containment and reaction with other substances<br><br><u>Causes</u><br>Faulty packaging<br>Impact by forklift<br>Dropped impact | -Confinement building, containing spills, under cover/dry environment<br>-Site traffic management plan<br>-Licensed forklift operator<br>-Well-sealed container provided by reputable supplier- | -Reaction with incompatible materials and emit flammable/toxic gases | It is assumed the product will not be stored with incompatible materials, and therefore no hazardous consequence is expected (refer to SDS for materials to avoid). | No |
| Syng Pirimor 500WG | Class 6.1 | Loss of containment<br><br><u>Causes</u><br>Faulty packaging<br>Impact by forklift<br>Dropped impact | -Confinement building, containing spills, under cover/dry environment<br>-Site traffic management plan<br>-Licensed forklift operator<br>-Well-sealed container provided by reputable supplier<br>-Storage of material in accordance with AS 4452 (The storage and handling of toxic substances) | -Acute inhalation toxicity | -The LC50 (1 hour equivalent) is 5.64 mg/L. This value is higher than the PG III cut of (4mg/L) and hence the substance is not toxic by inhalation for the purposes of the ADG code. | No |
| Syng Sprayseed 250 | Class 6.1 | Loss of containment<br><br><u>Causes</u><br>Faulty packaging<br>Impact by forklift<br>Dropped impact | -Confinement building, containing spills, under cover/dry environment<br>-Site traffic management plan<br>-Licensed forklift operator<br>-Well-sealed container provided by reputable supplier<br>-Storage of material in accordance with AS 4452 (The storage and handling of toxic substances) | -Acute inhalation toxicity | -As per SDS, the substance/mixture is not toxic on inhalation as defined by dangerous goods regulations. It is interpreted that the LOC does not result in significant toxic impact. | No |
| All | - | Warehouse fire<br><br><u>Causes</u><br>Electrical faults<br>Fire involving combustibles | -No-smoking policy/ignition control<br>-No storage of flammables onsite<br>-Emergency Response Plan<br>-Fire brigade interference (Rural Fire Service) | -Thermal decomposition of stored materials and release of toxic components (acute toxicity)<br>-Heat radiation impact | -Thermal decomposition may produce toxic fumes and compounds, with potential offsite impact. | **Yes** |

# 6. CONSEQUENCE ANALYSIS

## 6.1. Overview

Scenarios identified by the HAZID with the potential for offsite impacts are summarised in Table 6.1. These scenarios were carried forward for consequence analysis to assess the magnitude of the impact and determine whether they could affect the offsite community.

**Table 6.1: Hazardous scenarios for consequence analysis**

| Scenario | Potential impact |
|---|---|
| Release of phosphine due to reaction of Fumitoxin with water<br><br>Three different scenarios were modelled to account for a range of scenarios:<br>1. Maximum storage (45 kg of tablets)<br>2. A case of tables (7 kg of tablets)<br>3. A flask (1.5 kg of tablets) | -Acute inhalation toxicity<br>-Fire (heat radiation)<br>-Flammable gas (explosion overpressure) |
| Warehouse fire<br><br>The toxic smoke resulting from a warehouse fire was modelled only for the DGs (excluding Class 9 substances), as they contain toxic components. SDS for other materials proposed for storage indicate they may contribute to the toxic products of combustion. As the materials are not classified as DGs, the contribution is assumed to be secondary to a fire involving DGs. | -Fire (heat radiation)<br>-Product of combustion (acute inhalation toxicity) |

## 6.2. Modelling approach

The following tools were used to conduct the consequence modelling:

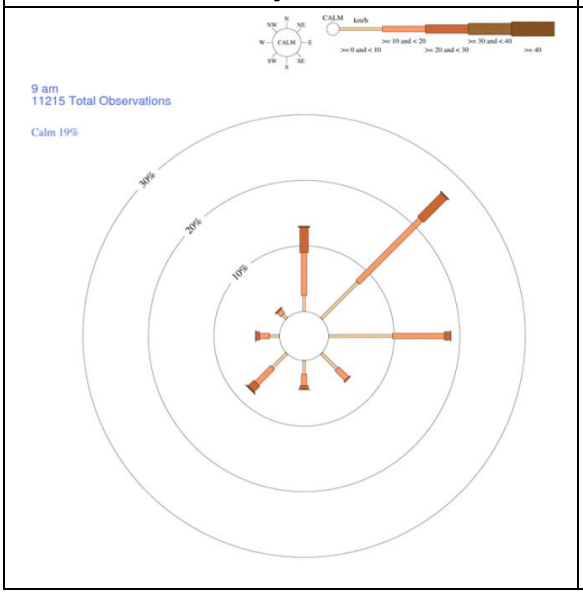
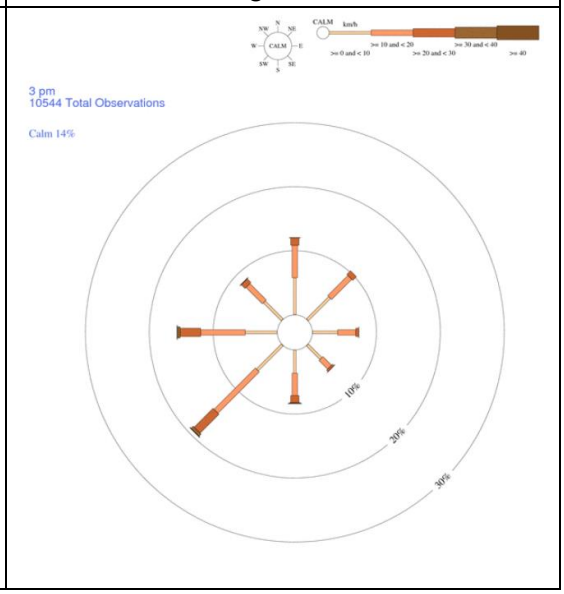
- Gexcon EFFECTS v12.4: The software provides specific models for toxic releases due to the loss of containment of toxic materials and for toxic plume resulting from fires (e.g. a warehouse fire). EFFECTS was also used to determine the consequence effects of flammable gases.
- Stefan-Boltzmann law: This correlation was used to estimate the heat radiation impact associated with a warehouse fire. The details of the heat radiation calculation method are provided in APPENDIX C.

The environmental parameters used in the consequence modelling are summarised in Table 6.2. Assumptions for each scenario are detailed in APPENDIX C. The wind roses for daytime and nighttime, shown in Figure 6.1, indicate that the prevailing winds mainly come from the northeast or southwest.

**Table 6.2: Environmental inputs**

| Parameter | Input | Comments |
|---|---|---|
| Ambient temperature | 20ºC | Typical average day time temperature. |
| Relative humidity | 83% | Not critical input. |
| Wind/weather | F1.5 and D5 | Representative typical wind and weather stability conditions for day (D5) and night (F1.5).<br>The yearly average of the wind speed is approximately 4.7 m/s which falls within the selected wind speeds. |
| Surface roughness | 0.1 m | Representative of an area with low crops and occasional large objects. |

**Figure 6.1: Wind rose**

| Daytime | Nighttime |
|---|---|
|  |  |



## 6.3. Consequence criteria

### 6.3.1. Toxic exposure

Adverse effects from exposure to toxic substances occur when a threshold level is exceeded. In this study, the Acute Exposure Guideline Levels (AEGLs) for 30-minute exposure, Ref [11], were used to determine the distances at which the LOC for toxic materials could potentially cause harm. The AEGL concentrations for phosphine and other common toxic substances found in thermal decomposition products are summarised in Table 6.3. The impact of the AEGL levels is interpreted as follows:

- AEGL 2: Irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. This is considered equivalent to the **injury** HIPAP toxic effect.
- AEGL 3: Life-threatening health effects or death. This is considered equivalent to the **fatality** HIPAP toxic effect.

The application of AEGL levels in this study is discussed below:

***Release of phosphine***

When Fumitoxin tablets come into contact with bulk water, they react violently, resulting in an instantaneous release of phosphine gas (as per SDS). This scenario was modelled as an instantaneous release of the material, which then disperses as a cloud. The dispersing cloud results in a time varying dose at a location. To account for both concentration and exposure duration a dose response model was used.

***Warehouse fires***

A warehouse fire is a long-duration incident that requires time to develop and spread, with the fire gradually propagating from one product to another. Given the extended nature of such events, AEGL concentration levels for a 30-minute exposure are appropriate for the assessment.

This approach assumes that an individual does not take any action to move away from the exposure for the entire duration of half hour and takes no credit for protection afforded by an individual being indoors.

**Table 6.3: AEGL [30 min] threshold concentrations**

| | Concentration level (ppm) | |
|---|---|---|
| **Component** | **AEGL 2 (injury)** | **AEGL 3 (fatality)** |
| Hydrogen chloride (HCl) | 43 | 210 |
| Hydrogen bromide (HBr) | 83 | 250 |
| Nitrogen dioxide ($NO_2$) | 15 | 25 |
| Phosphine ($PH_3$) [(a)] | 4 | 7.2 |

Notes:

(a) Toxic dose is equal to $(C^n)$*t, where 'C' is concentration (ppm), 'n' is Probit constant N (2 for phosphine) and 't' is exposure duration (min). The AEGL 2 and AEGL 3 equivalent toxic doses are 28,800 and 93,312 ppm*min^2, respectively.

### 6.3.2. Fire incident impact

The assessment criteria for exposure to fire scenarios are sourced from HIPAP 6, Ref [5], and summarised in Table 6.4.

**Table 6.4: Vulnerability criteria for fire scenarios**

| Event | Level | Effects | Effect |
|---|---|---|---|
| Continuous fire (e.g. warehouse fire) | 4.7 kW/m$^2$ | Will cause pain in 15-20 seconds and injury after 30 seconds exposure (at least second-degree burns will result) | Injury level |
| | 12.6 kW/m$^2$ | Significant chance of fatality for extended exposure. High chance of injury.<br>After long exposure, causes the temperature of wood to rise to a point where it can be readily ignited by a naked flame. | Serious injury/fatality level |

| Event | Level | Effects | Effect |
|---|---|---|---|
| Flash fire | Within Lower Flammability Limit (LFL) | 100% fatality within the flash fire envelop (assumed as LFL footprint) | Fatality level |

### 6.3.3. Overpressure impact

The overpressure levels and their associated effects are summarised in Table 6.5.

**Table 6.5: Overpressure vulnerability criteria**

| Overpressure level (kPa) | Effects | HIPAP overpressure effect |
|---|---|---|
| 7 | Probability of injury is 10% - No fatality.<br>Damage to internal partitions and joinery but can be repaired. | Injury level |
| 14 | House uninhabitable and badly cracked | Injury level |
| 21 | Reinforced structures distort<br>20% chance of fatality to a person in a building. | Serious injury/fatality level |

## 6.4. Results

### 6.4.1. Release of phosphine

The consequence results are presented in Table 6.6 and Table 6.7. The distances to representative locations from the warehouse footprint are also provided in Table 6.6 for reference. The consequence modelling demonstrates that:

- The maximum distances to the injury (AEGL 2) and fatality (AEGL 3) levels for a single flask LOC are estimated to be 52 m and 32 m, respectively. Whilst the injury and fatality levels are not reached at the nearest offsite location (i.e. caravan park, 70 m away), uncertainty in the modelling of toxic dispersion in the near field means the consequence of injury at the site cannot be discounted.
- The distances to the injury and fatality levels from a LOC involving a Fumitoxin case are estimated to be 231 m and 153 m, respectively. Injuries and fatalities could potentially occur to the caravan park and residents to the north as a result of exposure to phosphine gas. The impact footprint becomes larger when considering the maximum proposed quantity (i.e. 351 m to injury and 232 m to fatality toxic dose).
- The residential areas to the west would not be affected by any of the LOC scenarios due to the adequate separation distance from the warehouse (430 m). No toxicity impact at the airport location is expected.
- The distance to the fatality level (i.e. LFL) from a flash fire involving the maximum proposed inventory is estimated to be 20 m. In the event of an explosion involving the same quantity, the distances to the injury (7 kPa) and fatality (14 kPa) overpressure levels are 16 m and 9 m, respectively. Since the consequence footprint does not extend to any offsite receptors, the potential for offsite impact from a phosphine fire or explosion is not carried forward to the risk assessment.

**Table 6.6: Toxic impact consequences (at 1.5 m receiver height)-phosphine releases**

| | | D5 - Distance to toxic dose (m) | | F1.5 - Distance to toxic dose (m) | | Distance to locations (measured from warehouse footprint) (m) | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Fumitoxin mass** | **Phosphine mass released (kg)** | **AEGL 2** | **AEGL 3** | **AEGL 2** | **AEGL 3** | **Boundary (south)** | **Boundary (north)** | **Carvan park (temporary)** | **Nearest residential area** |
| 1.5 kg (flask) | 0.5 | 32 | 22 | 52 | 32 | 3 | 26 | 70 | 170 |
| 21 kg (case) | 7 | 111 | 80 | 231 | 153 | 3 | 26 | 70 | 170 |
| 45 kg (max inventory) | 15 | 158 | 115 | 351 | 232 | 3 | 26 | 70 | 170 |

**Table 6.7: Fire and explosion consequences (at 1.5 m receiver height)-phosphine releases**

| | | D5 | | | F1.5 | | |
|---|---|---|---|---|---|---|---|
| **Fumitoxin mass** | **Phosphine mass released (kg)** | **Fire- Distance to LFL (m)** | **Explosion- Distance to 7 kPa (m)** | **Explosion- Distance to 14 kPa (m)** | **Fire- Distance to LFL (m)** | **Explosion- Distance to 7 kPa (m)** | **Explosion- Distance to 14 kPa (m)** |
| 1.5 kg (flask) | 0.5 | 6 | 4 | 2 | 4 | 4 | 2 |
| 21 kg (case) | 7 | 14 | 12 | 7 | 1 | 11 | 7 |
| 45 kg (max inventory) | 15 | 20 | 16 | 9 | 2 | 15 | 9 |

### 6.4.2. Warehouse fire

The consequence results are presented in Table 6.8 and Table 6.9. The consequence modelling demonstrates that:

- The toxic plume from a warehouse fire could extend beyond the site boundary. The maximum consequence footprint is associated with the release of $NO_2$, a product of the Fumitoxin combustion. For this scenario, the distances to injury and fatality toxic levels are 112 m, and 94 m, respectively, while the distance to the nearest offsite receptor (i.e. caravan park) is 70 m.
- While the toxic plume is not expected to cause injuries or fatalities at ground level in the airport area, given the daytime prevailing wind direction, the smoke could affect visibility during take-off and landing and impact airport operations.
- The distances to the injury (i.e. 4.7 kW/m$^2$) and fatality (i.e. 12.6 kW/m$^2$) heat radiation levels for a warehouse fire were estimated to be 18 m and 11 m, respectively, these radiation levels are retained onsite. Heat radiation from a warehouse fire was not carried forward to the risk assessment.

***Recommendation 2 – An Emergency Response Plan should be developed for the facility, and it should include notification and action to be taken for the caravan park, residential areas and the airport.***

**Table 6.8: Toxic impact consequences (at 1.5 m receiver height)- product of combustion**

| | | D5 – Distance to toxic concentration (m) | | F1.5 - Distance to toxic concentration (m) | |
|---|---|---|---|---|---|
| **Material** | **Combustion product** | **AEGL 2** | **AEGL 3** | **AEGL 2** | **AEGL 3** |
| Alpha Boomblitz | HCl | 96 | 54 | 16 | 16 |
| | $NO_2$ | 109 | 93 | 15 | 14 |
| Nuf Fumitoxin tablets | $NO_2$ | 112 | 94 | 17 | 16 |
| Syng Gramoxone Pro 360 | HCl | 46 | 37 | 8 | 6 |
| | $NO_2$ | 47 | 41 | 8 | 7 |
| Syng Pirimor 500WG | $NO_2$ | 58 | 51 | 9 | 9 |
| Syng Sprayseed 250 | HBr | 31 | 16 | 7 | 5 |
| | HCl | 41 | 21 | 8 | 6 |
| | $NO_2$ | 49 | 42 | 8 | 8 |

**Table 6.9: Heat radiation consequences (at 2 m receiver height)- warehouse fire**

| | | Distance to (m) | |
|---|---|---|---|
| **Scenario** | **Fire dimensions (height x width)** | **4.7 kW/m²** | **12.6 kW/m²** |
| Warehouse fire | 4.5m x 4m (equivalent to roller door area) | 18 | 11 |

# 7. RISK ANALYSIS

## 7.1. Level of analysis

Two scenarios were found to have the potential for offsite injury or fatality impacts:

- Scenario 1: release of phosphine due to the contact of Fumitoxin tablets with water.
- Scenario 2: toxic smoke plume from a warehouse fire.

Based on the MLRA guideline, a semi-quantitative approach (i.e. Level 2 analysis) can be adopted if the likelihood of risk contributors with off-site effects is low. A semi-quantitative approach was determined appropriate for this study because:

- Scenario 1: A significant consequence footprint would occur only if multiple flasks are damaged and, at the same time, a source of bulk water is present to fully react with the tablets (i.e. atmospheric humidity alone would not lead to full conversion and rapid release of a large quantities of phosphine). The frequency of such an event is considered extremely unlikely (not reported, not realistically expected to occur).
- Scenario 2: Based on the TNO Purple Book, Ref [8], the frequency of a warehouse fire ranges from $1.8 \times 10^{-4}$ to $8.8 \times 10^{-4}$ per year depending on the safety systems implemented. The upper limit is conservative for the development as it includes warehouses that store flammable liquids or gases as well as those with basic safety systems. Additionally, the severity of the impact depends on weather conditions and wind direction. The toxic plume is typically buoyant with toxins dispersed at altitude. Therefore, whilst irritation is possible, potential for an incident to lead to offsite injury/fatality is considered very unlikely.

## 7.2. Risk matrix and acceptance criteria

The risk was qualitatively assessed based on the severity and likelihood ratings of incidents, using the general risk matrix presented in Table 7.1. The interpretation of the risk levels is as follows:

- High: unlikely to be tolerable, review if activity should proceed.
- Medium: tolerable, if As Low As Reasonably Practicable (ALARP).
- Low: broadly acceptable.

## 7.3. Risk results

The scenarios identified from the HAZID and consequence modelling with potential offsite impact were carried forward for risk analysis. In this process, severity and likelihood ratings were assigned to each incident, and the risk level was then determined using the adopted risk matrix. The results are shown in Table 7.2.

Based on the risk matrix, the risk level for scenarios with insignificant offsite impact is 'low', regardless of likelihood rating. Therefore, the risk level for all other scenarios discussed in the HAZID are considered 'Low' and are not included in the table.

The risk ranking for scenarios with the potential for offsite impact (major consequence) were found to be 'moderate', meaning the risk is tolerable if reduced to ALARP.

***Recommendation 3 – The warehouse design should include necessary controls and risk reduction measures to ensure risks are reduced As Low as Reasonably Practicable (ALARP). Specifically, the risk associated with the warehouse fire and loss of containment of Fumitoxin should be effectively managed.***

## 7.4. Assessment against HIPAP 4 qualitative criteria

The proposed development was assessed against the HIPAP 4 qualitative risk criteria, as summarised in Table 7.3.

**Table 7.1: Adopted risk matrix**

| Severity | Likelihood | | | |
|---|---|---|---|---|
| | **Extremely unlikely** (not reported, not realistically expected to occur) | **Very unlikely** (requires multiple co-incident failures, not expected to occur) | **Unlikely** (could occur in the next 10 years) | **Likely** (could occur in the next year) |
| **Major** (fatality/permanent injury) | Medium | Medium | High | High |
| **Moderate** (severe injury/lost time) | Low | Medium | Medium | High |
| **Minor** (injury/visit to doctor) | Low | Low | Medium | Medium |
| **Insignificant** (slight injury/first aid) | Low | Low | Low | Low |

**Table 7.2: Qualitative risk assessment**

| Hazardous event | Severity ranking | Potential controls | Likelihood ranking | Risk |
|---|---|---|---|---|
| Scenario 1- release of phosphine due to the contact of Fumitoxin tablets with water<br>*(LOC from a case or greater quantities)* | ***Major***<br><br>Phosphine is toxic and could cause injuries or fatalities at the caravan park and residential areas to the north in the event of LOC from a case or larger quantities. Therefore, the worst severity level was selected for this incident. | -Package size 1.5 kg (flask capacity)<br>-Supplier packaging, packages remain sealed in the warehouse<br>-Confinement building, containing spills, under cover/dry environment<br>-Site traffic management plan<br>-Licensed forklift operator | ***Extremely unlikely***<br><br>Although the scenario is not impossible, a series of events would need to occur to result in offsite fatalities. These include damage to the multiple flasks and complete conversion of the tablets into phosphine gas in the presence of free water. | ***Medium*** |
| Scenario 1- release of phosphine due to the contact of Fumitoxin tablets with water<br>*(LOC from a single flask)* | ***Minor***<br><br>Based on the consequence results, the toxic cloud from a flask LOC would not result in significant injury or fatality at the caravan park or residential areas, and the effects could be considered minor. | As above | ***Very unlikely***<br><br>The LOC of a single flask is considered more probable than the LOC of a case or the entire inventory due to the higher handling frequency. However, it still requires the presence of water to react. | ***Low*** |
| Scenario 2- toxic smoke due to a warehouse fire | ***Major***<br><br>The toxic plume could cause fatalities or serious injuries at the caravan park if individuals are exposed to it for an extended period. | -No-smoking policy/ignition control<br>-No storage of flammables onsite<br>-Emergency Response Plan<br>-Fire brigade interference (Rural Fire Service)<br>-Firefighting system (TBC) | ***Very unlikely***<br><br>Warehouse fires do occur. However, the likelihood is reduced due to the absence of flammables. Additionally, the severity of the impact depends on weather conditions and wind direction. The toxic plume is typically buoyant with toxins dispersed at altitude, Therefore, the incident leading to offsite consequences is considered very unlikely. | ***Medium*** |

## Table 7.3: Comparison against HIPAP No. 4 qualitative risk criteria

| Criteria | Comments | Complies? |
|---|---|---|
| a) All 'avoidable' risks should be avoided. This necessitates the investigation of alternative locations and alternative technologies, wherever applicable, to ensure that risks are not introduced in an area where feasible alternatives are possible and justified. | -Site activities are limited to the receipt, storage, and distribution of products to customers. No complex processes, such as formulation, dilution, repackaging, or decanting, will take place, and all products will remain in their original packaging.<br>-The hazards and risks associated with DGs are well understood, and the required controls to prevent hazardous incidents or mitigate potential offsite consequences will be implemented (refer to Section 5).<br>-The storage of the proposed materials is part of the business and they cannot be substituted with less dangerous materials.<br>-The site is located within the Moree SAP, which is designated primary for agribusiness, logistics and food processing facilities. The proposed development is compatible with land use planning (See Criteria d). | Yes |
| b) The risk from a major hazard should be reduced wherever practicable, irrespective of the numerical value of the cumulative risk level from the whole installation. In all cases, if the consequences (effects) of an identified hazardous incident are significant to people and the environment, then all feasible measures (including alternative locations) should be adopted so that the likelihood of such an incident occurring is made very low. This necessitates the identification of all contributors to the resultant risk and the consequences of each potentially hazardous incident. The assessment process should address the adequacy and relevancy of safeguards (both technical and locational) as they relate to each risk contributor. | -The identified scenarios with potential offsite impacts were found to have a low likelihood of occurrence.<br>-Recommendations were made by this study to further reduce the risk. | Yes |
| c) The consequences (effects) of the more likely hazardous events (i.e. those of high probability of occurrence) should, wherever possible, be contained within the boundaries of the installation. | -The more likely scenarios in the warehouse involve the LOC of DGs due to improper handling. However, considering the properties of the materials and the fact that the warehouse kerbing constrains the LOC of materials, only localised effects are expected.<br>-The identified scenarios with potential offsite impact are very unlikely. | Yes |
| d) Where there is an existing high risk from a hazardous installation, additional hazardous developments should not be allowed if they add significantly to that existing risk. | The adjacent sites are currently vacant, and there is no MHF facility in the surrounding area. Therefore, the existing risk does not consider high. | Yes |

# 8. CONCLUSION AND RECOMMENDATIONS

## 8.1. Conclusion

The SEPP screening found that:

- The storage of toxic substances (Class 6.1) exceeds the screening threshold specified in *Applying SEPP 33*, Ref [3], and the proposed development is considered 'potentially hazardous', requiring a PHA in line with the HIPAP 6, Ref [5], to demonstrate that risks can be managed to an acceptable level.
- As the package sizes and the number of vehicle movements to/from the warehouse are unknown at this stage, this study cannot confirm whether the transportation thresholds are exceeded. However, the previous PHA report, Ref [1], includes a discussion on route selection and can be referenced for DG movements. Sherpa has reviewed the assessment in the previous PHA and considers it to be appropriate given the limited information available. See Recommendation 1 of this study.

A PHA study in line with the methodology outlined in the HIPAP 6 was conducted. Key findings are:

- The study identified two scenarios that could potentially lead to offsite serious injuries or fatalities:
  - Fumitoxin tablets (classified as Class 4.3 and 6.1) emit toxic phosphine gas when exposed to water. A LOC from a flask (1.5 kg of tablets) and reaction with balk water could result in injuries at the caravan park, located 70 m north of the warehouses. Incidents involving larger quantities (e.g. a tablet case or the maximum inventory) could significantly affect offsite areas and result in injuries and fatalities at the residential areas.
  - A warehouse fire could result in a toxic smoke plume due to the thermal decomposition of stored materials. Given the distance between the warehouse and the nearest offsite receptors (i.e. caravan park, 70 m north) and consequence modelling results, there is potential for offsite injuries and fatalities from the combustion products.
- The likelihood of incidents leading to offsite impacts was considered:
  - LOC from full inventory (45 kg) or case (21 kg) of tablets – Extremely Unlikely – would require loss of containment from multiple flasks (e.g. forklift tine punctures multiple flasks) at the same time as water is present (e.g. unloading during a rain event with standing water).
  - LOC from a single flask (1.5 kg) – Very Unlikely – would require loss of containment from a single flask (e.g. opened in error, package failure) at the same time as water is present (e.g. during a rain event) or inadvertent use of water after a spill (e.g. safety shower activation or hose reel use).

- Warehouse fire – Very Unlikely – Warehouse fires do occur. However, the likelihood is reduced due to the absence of flammables. Additionally, the severity of the impact depends on weather conditions and wind direction. The toxic plume is typically buoyant with toxins dispersed at altitude, Therefore, the incident leading to offsite consequences is considered very unlikely.

- The risk level of incidents was determined using the adopted risk matrix, based on the severity and likelihood ratings assigned to each incident. The risk level was found to be 'moderate' for the worst-case scenarios, meaning the offsite risk is tolerable if reduced ALARP. Societal risk (the effect of infrequent events on large numbers of people) has not been calculated due to the high level of uncertainty in determining the frequency of a phosphine release. However, the surrounding areas consist of vacant lands and low-density population zones; therefore, a large number of people would not be affected by the identified incidents, and the societal risk is not considered significant.

The assessment against the WHS Regulation 2017 indicates that the Schedule 15 chemicals proposed for onsite storage exceeds 10% of the MHF threshold quantities (approximately 34%) and hence the facility must notify SafeWork NSW. The facility may be classified as an MHF if the regulator (SafeWork NSW) decides to hold a Determination Inquiry and, on inquiry determines the facility to be an MHF.

## 8.2. Recommendations

The recommendations made to support the PHA conclusions are provided in Table 8.1.

**Table 8.1: Recommendations**

| No. | Description |
|---|---|
| 1 | The size of the DG load per vehicle movement should remain below the minimum quantity specified in Table 4.3 (*Applying SEPP 33* criteria) to minimise transportation risk. This is especially important for Class 6.1 materials, as any movement exceeding the minimum load quantity (1 tonne in bulk or 3 tonnes in packaging per load) would exceed the threshold. |
| 2 | An Emergency Response Plan should be developed for the facility, and it should include notification and action to be taken for the caravan park, residential areas and the airport. |
| 3 | The warehouse design should include necessary controls and risk reduction measures to ensure risks are reduced As Low as Reasonably Practicable (ALARP). Specifically, the risk associated with the warehouse fire and loss of containment of Fumitoxin should be effectively managed. |

# APPENDIX A. SAFETY DATA SHEETS

The SDSs for the following DGs are appended:

- Alpha Boomblitz
- Nuf Fumitoxin tablets
- Syng Gramoxone Pro 360
- Syng Pirimor 500WG
- Syng Sprayseed 250.

# SAFETY DATA SHEET

# BOOMBLITZ

## 1. SUBSTANCE IDENTIFICATION

| | |
|---|---|
| PRODUCT NAME | BOOMBLITZ |
| SUPPLIER NAME | Alphakem Global Pty Ltd |
| ABN | 86 621 159 608 |
| SUPPLIER ADDRESS | PO Box 1354, Sunshine West, VIC 3020 |
| SUPPLIER CONTACT DETAILS | 0428 506 665<br>www.alphakem.com.au |
| EMERGENCY PHONE | |
| POISON INFORMATION | 13 11 26 (24 hours) |
| CHEMICAL EMERGENCY | 0428 506 665 |
| USE | Pesticide decontaminant |

## 2. HAZARDS IDENTIFICATION

Classified as Hazardous according to GHS criteria

| | |
|---|---|
| GHS CLASSIFICATIONS | Corrosive to metals Category 1<br>Skin corrosion Category 1A<br>Serious eye damage Category 1<br>Acute inhalation toxicity Category 4<br>Hazardous to the aquatic environment acute Category 2<br>Hazardous to the aquatic environment chronic Category 2 |
| SIGNAL WORD | DANGER |
| PICTOGRAMS |  |
| HAZARD STATEMENTS | H290 May be corrosive to metals.<br>H314 Causes severe skin burns and eye damage.<br>H318 Causes serious eye damage.<br>H332 Harmful if inhaled.<br>H401 Toxic to aquatic life (acute)<br>H411 Toxic to aquatic life with long lasting effects (chronic) |
| PREVENTION STATEMENTS | P102 Keep out of reach of children.<br>P103 Read carefully and follow all instructions.<br>P234 Keep only in original container.<br>P260 Do not breathe dust/fume<br>P264 Wash face and hands thoroughly after handling.<br>P270 Do not eat, drink or smoke when using this product.<br>P271 Use only outdoors or in a well-ventilated area.<br>P273 Avoid release to the environment.<br>P280 Wear protective gloves / protective clothing / eye protection / face protection. |
| RESPONSE STATEMENTS | P101 If medical advice is needed, have product container or label on hand.<br>P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. |

## 2. HAZARDS IDENTIFICATION

| | |
|---|---|
| | P303 + P361 + P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.<br>P304 + P340 IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.<br>P304 + P340 IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.<br>P305 + P351 +P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.<br>P310 Immediately call a POISON CENTER or doctor/physician.<br>P363 Wash contaminated clothing before reuse.<br>P390 Absorb spillage to prevent material damage.<br>P391 Collect spillage. |
| STORAGE STATEMENTS | See Section 7. |
| DISPOSAL STATEMENTS | P501 Dispose of contents/ containers in accordance with relevant regulations. See Section 13. |

## 3. COMPOSITION / INFORMATION ON INGREDIENTS

| COMMON NAME | CAS NUMBER | CONCENTRATION %w/w |
|---|---|---|
| Sodium carbonate | 497-19-8 | 50 - 60 |
| Sodium tripolyphosphate | 7758-29-4 | 10 - 30 |
| Sodium hydroxide | 1310-73-2 | <10 |
| Sodium dichloroisocyanate | 51580-86-0 | 10 - 20 |

## 4. FIRST AID MEASURES

**For advice call the Poison Information Centre (ph 13 11 26) 24 hours or a doctor**. If medical advice is needed have product container or label to hand.

| | |
|---|---|
| EYE CONTACT | Get immediate medical attention. Rinse cautiously for several minutes. Remove contact lenses if present and easy to do so. Continue rinsing. |
| SKIN (or hair) CONTACT | Remove contaminated clothing and flush skin and hair with running water. If skin irritation occurs, get medical advice/ attention. |
| INHALATION | Remove to fresh air and keep at rest in a position comfortable for breathing. Apply artificial respiration if not breathing. Call doctor if you feel unwell. |
| INGESTION | Do NOT induce vomiting. Rinse mouth. Call the Poison Information Centre or a doctor if you feel unwell. |
| NOTES TO DOCTOR | Treat symptomatically. |
| FIRST AID FACILITIES | Eye wash facilities and safety shower should be available. |

## 5. FIRE FIGHTING MEASURES

| | |
|---|---|
| EXTINGUISHING MEDIA | Water fog. Prevent extinguishing media from entering drains. |

## 5. FIRE FIGHTING MEASURES

| | |
|---|---|
| THERMAL DECOMPOSITION PRODUCTS | Thermal decomposition products include chlorine gas therefore fumes are toxic and corrosive. |
| SPECIAL FIRE FIGHTING METHODS | Self-contained breathing apparatus with full face-piece and protective clothing. Cool fire exposed containers with water spray. |
| HAZCHEM CODE | 2W |

## 6. ACCIDENTAL RELEASE MEASURES

| | |
|---|---|
| PERSONAL PRECAUTIONS | Exclude non-essential people from the area. Wear Personal Protective Equipment (PPE) as detailed in Section 8 of the SDS. Ventilate enclosed spaces. |
| ENVIRONMENTAL PRECAUTIONS | Prevent product from entering waterways or drains. |
| SPILLS AND DISPOSAL | Spills may be slippery and should be cleaned up immediately. Contain spillage, neutralise with sodium thiosulphate if available, then cover / absorb with inert, non-combustible absorbent material (attapulgite or similar). Collect and place in suitable sealed, labelled containers for disposal. Wash area with water and absorb with further inert material. DO NOT incinerate as heating releases toxic and corrosive vapours. |

## 7. HANDLING AND STORAGE

| | |
|---|---|
| PRECAUTIONS FOR HANDLING | Carefully read the label before use. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands and face before eating. Prohibit eating, drinking and smoking in contaminated areas. |
| STORAGE | Store in original container, tightly closed, in a secure, dry, cool and well-ventilated area and avoid direct sunlight. Store away from foodstuffs, fertilisers or seeds. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Do not subject to extremes of temperature. Not to be transported in unlined metal drums. Do not store for prolonged periods in direct sunlight. This material is an S6 Poison and must be stored, maintained and used in accordance with the relevant regulations. |

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

| | |
|---|---|
| EXPOSURE LIMITS | Workplace exposure standards<br>Sodium hydroxide TWA 2 mg/m3 (peak limitation)<br>Chlorine TWA 1ppm / 3 mg/m3 (peak limitation) |
| EYE PROTECTION | Wear splash proof googles and face shield |
| RESPIRATORY PROTECTION | Respiratory protection is not required if good ventilation is maintained. Where an inhalation risk exists, wear a full face respirator. |
| PROTECTIVE CLOTHING | Wear overalls, chemical resistance gloves and rubber boots. |
| ENGINEERING CONTROLS | Use in a well ventilated area. |
| HYGIENE PRECAUTIONS | Do not eat, drink or smoke while working with this product. Remove clothing that becomes soaked or contaminated and wash before reuse. Wash hands and face before breaks and after work. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| APPEARANCE / STATE/ ODOUR | Light bluish powder with chlorine odour |
| BOILING POINT | Not Available |
| DENSITY | 1.06 g/ml @ 25ºC |
| DECOMPOSITION TEMPERATURE | Not Available. |
| FLASHPOINT | Not Applicable. |
| EXPLOSION PROPERTIES | Not Applicable. |
| SOLUBILITY | Soluble in water |
| pH | >12 |
| SETTING POINT | Not Applicable. |
| AUTOIGNITION TEMP | Not Determined. |
| VAPOUR DENSITY | Not Applicable. |
| VAPOUR PRESSURE | Not Applicable. |
| VISCOSITY | Not Applicable. |
| OCTANOL / WATER PARTITION COEFFICIENT | Not Applicable. |
| OTHER PROPERTIES | Oxidising agent. Reacts with acids evolving chlorine. When heated to decomposition, emits toxic fumes including chlorine. |

## 10. STABILITY AND REACTIVITY

| | |
|---|---|
| STABILITY | Contamination of product and exposure to light with accelerate decomposition. |
| CONDITIONS TO AVOID | Direct sunlight, |
| MATERIALS TO AVOID | Acids, reducing agents. Corrosive to many metals with liberation of extremely flammable hydrogen gas. Reacts violently with acids, and chlorinated hydrocarbons. Reacts with ammonium salts liberating ammonium gas. Exothermic reaction with water. Absorbs carbon dioxide from air. |
| HAZARDOUS DECOMPOSITION PRODUCTS | Hazardous polymerisation will not occur. Thermal decomposition may produce toxic fumes and compounds. |

## 11. TOXICOLOGICAL INFORMATION

| | |
|---|---|
| **ACUTE EFFECTS** | No toxicological data is available for the finished product. |
| ORAL TOXICITY | Causes corrosion of mucous membranes. |
| DERMAL TOXICITY | No information. |
| INHALATION TOXICITY | Harmful if inhaled. May cause respiratory irritation. |
| EYE CORROSION / IRRITANCY | Causes serious eye damage. |
| SKIN CORROSION / IRRITANCY | Causes severe skin burns. |

## 11. TOXICOLOGICAL INFORMATION

| **CHRONIC EFFECTS** | |
|---|---|
| CARCINOGENICITY | No information |
| REPRODUCTIVE TOXICITY | No information |
| GERM CELL MUTAGENICITY | No information |
| ASPIRATION | No information |
| STOT/SE | No information |
| STOT/RE | No information |
| NARCOTIC EFFECTS | No information |

## 12. ECOLOGICAL INFORMATION

| | |
|---|---|
| TOXICITY | Very toxic to aquatic life with long lasting effects. |
| PRECAUTIONS | This product must not be applied directly into or onto water. Take all reasonable steps to ensure that the substance does not cause any significant adverse effects to the environment beyond the area of application. Avoid contamination of any waterways with product or empty container. |
| ECOTOXICITY INFORMATION | Sodium dichloroisocyanurate LC50 (Oncorhynchus mykiss, 96hr) 0.25 mg/L<br>EC50 (Daphnia magna, 48hr) 0.28 mg/L |
| BIOACCUMMULATIVE | No information. |
| READILY DEGRADABLE | No |

## 13. DISPOSAL CONSIDERATIONS

Do not contaminate streams, rivers or waterways with the chemical or the used container.

| | |
|---|---|
| PRODUCT DISPOSAL | Dispose of by using product as intended, according to the label directions. If this is not possible, dispose of at an approved landfill. For large amounts contact your supplier or chemical recycling facility. Consult your local authority for disposal. |
| CONTAINER DISPOSAL | DO NOT burn. Dispose at an approved landfill. |

## 14. TRANSPORT INFORMATION

CLASSIFIED AS A DANGEROUS GOOD ACCORDING TO THE AUSTRALIAN CODE OR THE TRANSPORT OF DANGEROUS GOODS BY ROAD AND RAIL.

## 14. TRANSPORT INFORMATION

| | Land Transport (ADG code) | Sea Transport (IMDG) | Air Transport (IATA) |
|---|---|---|---|
| **UN Number** | 1759 | 1759 | 1759 |
| **Proper Shipping Name** | CORROSIVE SOLIDS, N.O.S. (contains 7% sodium hydroxide) | CORROSIVE SOLIDS, N.O.S. (contains 7% sodium hydroxide) | CORROSIVE SOLIDS, N.O.S. (contains 7% sodium hydroxide) |
| **Transport Hazard Class** | 8 | 8 | 8 |
| **Subsidiary Class** | 9 | 9 | 9 |
| **Packing Group** | II | II | II |
| **Hazchem** | 2W | 2W | 2W |
| **Marine Pollutant Status** | | Marine Pollutant | |

The Environmentally Hazardous Substance Mark is not required when transported in packages of less than 5kg/L (UN Model Regulations: Special Provision 375; IATA Special Provision A197; IMDG; Special Provision 969)

## 15. REGULATORY INFORMATION

| | |
|---|---|
| APVMA REGISTRATION | Not listed |
| POISON SCHEDULE | 6 |
| INVENTORY | Australian Inventory of Chemical Substances. |
| STATUS | Components Listed |

## 16. OTHER INFORMATION

| | |
|---|---|
| SDS ISSUE DATE | 6 April 2022 |
| SDS REVIEW DATE | April 2027 |
| REFERENCES | Supplier SDS<br>Safe Work Australia – Workplace Exposure Standards<br>Australian Pesticides and Veterinary Medicines Authority |
| ABBREVIATIONS | |
| APVMA | Australian Pesticides and Veterinary Medicines Authority |
| CAS Number | Chemical Abstract Service Number - used to uniquely identify chemical compounds |
| g/L | Grams per litre |
| GHS | Globally Harmonised System |
| HSNO | Hazardous Substances and New Organisms |
| LC50 | Lethal Concentration, 50% / Median Lethal Concentration |
| LD50 | Lethal Dose, 50% / Median Lethal Dose |
| $mg/m^3$ | Milligrams per cubic metre |
| STEL | Short Term Exposure Limit |
| WES | Workplace Exposure Standard |
| IMDG | International Maritime Dangerous Goods |
| IATA | International Air Transport Association |
| TLV | Threshold Limit Value |
| TWA | Time Weighted Average |
| OEL | Occupational Exposure Limit |

## 16. OTHER INFORMATION

The data given here is based on current knowledge and experience. The purpose of this safety data sheet is to describe the products in terms of their safety requirements. The data does not signify any warranty with regard to the products properties.

End of Safety Data Sheet

Infosafe No™ 3NU8Y | Issue Date :May 2019 | ISSUED by NUFARM

Product Name **FUMITOXIN Coated Insecticide Tablets**

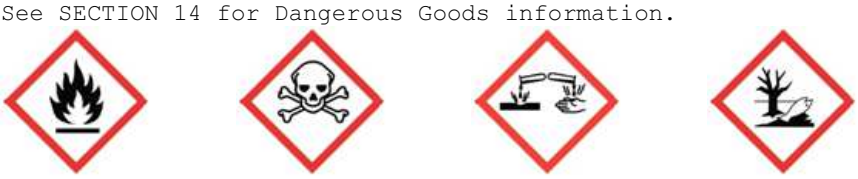
Classified as hazardous

## 1. Identification

| | |
|---|---|
| **GHS Product Identifier** | FUMITOXIN Coated Insecticide Tablets |
| **Product Code** | 1203 |
| **Product Type** | Group 24A Insecticide |
| **Company Name** | NUFARM AUSTRALIA LIMITED. (ABN 80 004 377 780) |
| **Address** | 103-105 Pipe Road Laverton North<br>Victoria 3026 Australia |
| **Telephone/Fax Number** | Tel: +61 3 9282-1000<br>Fax: +61 3 9282-1001 |
| **Emergency phone number** | 1800 033 498 (24hr Australia) |
| **Recommended use of the chemical and restrictions on use** | For control of insect pests of stored products in certain situations as per the Directions for Use table on the label. |
| **Other Information** | |

## 2. Hazard Identification

| | |
|---|---|
| **GHS classification of the substance/mixture** | EF1 Substances and Mixtures which, in contact with water, emit flammable gases: Category 1<br>OT2 Acute Toxicity - Oral: Category 2<br>ED1 Eye Damage/Irritation: Category 1<br>AA1 Hazardous to the Aquatic Environment - Acute Hazard: Category 1 |
| **Signal Word (s)** | DANGER |
| **Hazard Statement (s)** | H260 In contact with water releases flammable gases which may ignite spontaneously.<br>H300 Fatal if swallowed.<br>H318 Causes serious eye damage.<br>H400 Very toxic to aquatic life. |
| **General Precautionary Statement (s)** | P101 If medical advice is needed, have product container or label at hand.<br>P102 Keep out of reach of children.<br>P103 Read label before use. |
| **Pictogram (s)** | Flame, Skull and crossbones, Corrosion, Environment,<br>The below pictograms are GHS Hazard symbols for workplace use only.<br>See SECTION 14 for Dangerous Goods information. |



| | |
|---|---|
| **Precautionary statement – Prevention** | P223 Keep away from any possible contact with water, because of violent reaction and possible flash fire.<br>P232 Protect from moisture.<br>P280 Wear protective gloves, clothing, eye and face protection.<br>P264 Wash hands and exposed skin thoroughly after handling.<br>P270 Do not eat, drink or smoke when using this product. |
| **Precautionary statement – Response** | P335+P334 Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.<br>P370+P378 In case of fire: Use dry agents only for extinction.<br>P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.<br>P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.<br>P310 Immediately call a POISON CENTER or doctor/physician. |
| **Other Information** | Poisons Schedule S7 DANGEROUS POISON |

## 3. Composition/information on ingredients

| | |
|---|---|
| **Chemical Characterization** | Solid |

**Ingredients**

| Name | CAS | Proportion |
|---|---|---|
| Phosphine (PH3) present as Aluminium Phosphide | 20859-73-8 | 330 g/kg |
| Ammonium carbamate | | 10-30 % |
| Inert ingredients | | Balance |

**Other Information** Fumitoxin contains ammonium carbamate which liberates ammonia and carbon dioxide. These gases are essentially non-flammable and act as an interfering agent to reduce fire hazards. The ammonia also acts as a warning agent.

## 4. First-aid measures

**Inhalation**
Remove victim from exposure - avoid becoming a casualty.
Obtain medical attention urgently.
The rescuer must wear breathing protection. If the victim has any breathing difficulties, oxygen may be given by a trained person. If breathing has stopped, give artificial resuscitation.

**Ingestion**
Accidental ingestion is highly unlikely, the product is in tablet form.
If swallowed do NOT induce vomiting; seek medical advice immediately and show this container or label or contact the Poisons Information Centre on 13 11 26 (Aust). Make every effort to prevent vomit from entering the lungs by careful placement of the patient.
Do not give mouth-to-mouth resuscitation if swallowed. To protect rescuer, use air-viva, oxy-viva or one-way mask. Resuscitate in a well-ventilated area.
CAUTION:
The person assisting the victim must be aware that the victim may exhale phosphine. The assisting person should consider breathing protection.

**Skin**
If skin contact occurs, remove contaminated clothing and wash skin thoroughly with water.
Remove contaminated clothing and launder before re-use.
CAUTION:
The product reacts with water to form highly toxic phosphine gas. If major contamination exists, decontamination must be done in a manner which keeps people safe from the gas that will be generated.

**Eye contact**
If in eyes, hold eyelids open and wash with copious amounts of water for at least 15 minutes.

**First Aid Facilities**
If poisoning occurs, contact a doctor or the Poisons Information Centre (Australia) on 13 11 26.

**Advice to Doctor**
Exposure cases should be kept at rest in bed and under continuous medical supervision. Persons who inhaled the gas at levels exceeding the TLV should be considered as potential 'exposure cases'. Pulmonary oedema usually results within 24 hrs but can appear several days later. In this case, a physician may administer oxygen at atmospheric pressure. Since positive pressure breathing apparatus requires an effort on the part of the patient, the physician must use this only after evaluation of each case. Absolute rest seems essential. Steriod therapy should be considered on about the fourth day if pulmonary oedema persists or recurs. (1)
Magnesium therapy may reduce the likelihood of a fatal outcome.
Dose: 3g magnesium sulfate during first 24 hrs as a continuous infusion, followed by 6g / 24 hrs for next 3 to 5 days. (2)

## 5. Fire-fighting measures

**Suitable extinguishing media**
USE DRY AGENTS ONLY.

**Hazards from Combustion Products**
If involved in a fire, it will emit toxic fumes that may contain phosphine, oxides of phosphorous and possibly nitrogen oxides.

**Special Protective Equipment for fire fighters**
Breathable air apparatus must be worn when fighting a fire in which this product is involved.

| | |
|---|---|
| **Specific hazards arising from the chemical** | Fire water will react with any spilled tablets to form the highly toxic and flammable phosphine gas. Be especially wary of this possibility during clean-up after a fire has been extinguished. |
| **Hazchem Code** | 4W |

## 6. Accidental release measures

| | |
|---|---|
| **Spills & Disposal** | If tablets are spilled, vacate the area and put on breathing apparatus before cleaning up spill. Keep other persons well away from the area.<br>Keep the tablets dry. Collect the tablets in sealed containers for disposal.<br>If tablets have become wet or the circumstances are such that the tablets could be moist, evacuate the area. Keep others well away. If uncertain what to do, get professional advice and/or involve emergency authorities.<br>If it is certain that the area down wind has been totally evacuated, then a final hose down with water (after picking up all the visible product) is advisable to ensure that the area is totally safe. Ensure that water is sprayed from up-wind and that any person doing so is wearing full breathing protection. |

## 7. Handling and storage

| | |
|---|---|
| **Precautions for Safe Handling** | WARNING: ALWAYS OPEN CONTAINERS OF FUMITOXIN IN THE OPEN AIR BECAUSE, UNDER CERTAIN CONDITIONS, THEY MAY FLASH UPON OPENING.<br>When opening, point the top of the container away from face and body and open slowly. Never open a container while in a flammable atmosphere or close to flammable materials.<br>The containers of tablets MUST be kept dry. In that form, they may be handled using natural ventilation only. Fumitoxin tablets give off phosphine gas on reaction with moisture.<br>Phosphine gas is toxic and heavier than air. Once the container is opened, breathing protection should be worn when handling the tablets. For effective protection from phosphine gas, wear breathable air apparatus (SCBA).<br>Phosphine smells like decaying fish. If the odour is detected, vacate the area immediately and put on SCBA before re-entry. |
| **Conditions for safe storage, including any incompatabilities** | Store in the closed, original container in a dry, well ventilated area out of direct sunlight.<br>Store in a locked enclosure.<br>Keep container tightly sealed and do not store with seed, fertilisers or foodstuffs.<br>Do not allow product to become wet or overheated in storage. |
| **Other Information** | Always read the label and any attached leaflet before use. |

## 8. Exposure controls/personal protection

| | |
|---|---|
| **Occupational exposure limit values** | No exposure standards have been set for this product.<br>Safe Work Australia has set the following exposure standard for phosphine : TLV (TWA) 0.3 ppm or 0.42 mg/m3, STEL 1 ppm or 1.4 mg/m3.<br><br>WARNING: The odour threshold of phosphine is 2 ppm which is higher than these exposure limits. Impurities in the product may lower the odour threshold to 0.2 ppm.<br>DO NOT RELY ON ODOUR of phosphine to determine if the atmosphere is safe.<br>IF ODOUR OF PHOSPHINE IS DETECTED, the concentration of phosphine may be above the exposure limit and the area should be evacuated immediately. |
| **Appropriate engineering controls** | The containers of tablets MUST be kept dry. In that form, they may be handled using natural ventilation only. Fumitoxin tablets give off phosphine gas on reaction with moisture.<br>Phosphine gas is toxic and heavier than air. Once the container is opened, breathing protection should be worn when handling the tablets. For effective protection from phosphine gas, wear breathable air apparatus (SCBA).<br>Phosphine smells like decaying fish. If the odour is detected, vacate the area immediately and put on SCBA before re-entry. |
| **Personal Protective Equipment** | Wear cotton overalls buttoned to the neck and wrist, eye protection (chemical goggles preferred), PVC gloves and breathing protection (self contained breathing apparatus - SCBA).<br>RE-ENTRY PERIOD: |

| | |
|---|---|
| | After application, wait until the exposure period has passed, then thoroughly ventilate for the required ventilation period to the required Standard. Re-entry to fumigation areas is not recommended until measuring device(s) indicate that they are free of phosphine. The use of gas detection tubes or other measuring devices is recommended for monitoring gas levels in fumigation areas as phosphine gas may still be present even after treated commodities have been removed and fumigation areas ventilated. Do not re-enter a storage after application has commenced or once treated grain/commodity has been emptied without wearing a full face respirator with particulate (P1) and self-contained breathing apparatus, until a measuring device indicates that it is free of phosphine or the total fumigation period (minimum exposure period plus ventilation period) has elapsed. |
| **Hygiene Measures** | After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use, wash contaminated clothing and safety equipment. |
| **Requirements Concerning Special Training** | Check State or Territory regulations that require people who use pesticides in their job or business to have training in the application of the materials. |

## 9. Physical and chemical properties

| | |
|---|---|
| **Form** | Solid |
| **Appearance** | Grey coloured tablets |
| **Vapour Density (Air=1)** | 1.18 |
| **Volatile Component** | 33% as phosphine on reaction with water. |
| **Flammability** | Aluminium phosphide forms a flammable gas on reaction with moisture. The gas may ignite in air, however, materials have been added to release carbon dioxide and ammonia which suppresses spontaneous ignition of the gas under normal circumstances. |
| **Auto-Ignition Temperature** | 38°C for phosphine |
| **Flammable Limits - Lower** | 1% for phosphine |
| **Flammable Limits - Upper** | ~100% for phosphine |
| **Other Information** | Reacts vigorously with water, liberating toxic phosphine gas which may ignite spontaneously. |

## 10. Stability and reactivity

| | |
|---|---|
| **Chemical Stability** | Reacts with atmospheric moisture to form phosphine gas. |
| **Incompatible Materials** | Avoid contact with water and acids. Phosphine reacts with copper, copper alloys, brass and precious metals such as gold and silver. |

## 11. Toxicological Information

| | |
|---|---|
| **Acute Toxicity - Oral** | LD50 (rat) 8.7 mg/kg for aluminium phosphide |
| **Acute Toxicity - Inhalation** | LC50 (rat) (4hr) 0.015 mg/l for phosphine The lowest recorded toxic dose of phosphine for humans is recorded at 1000 ppm over 5 minutes. |
| **Ingestion** | Ingestion is an extreme hazard due to the rapid release of phosphine gas. The symptoms of exposure are described under 'Inhalation'. |
| **Inhalation** | Inhalation of dust or liberated phosphine gas is an extreme hazard to lungs. The inhalation of phosphine causes coughing, dyspnoea and severe pulmonary oedema. The symptoms of poisoning include headache, fatigue, nausea, vomiting, jaundice, paraethesia, ataxia, intention tremor, diplopia, coma and death. |
| **Skin** | May cause burns. Dermal moisture will promote decomposition, phosphine gas will be released. |
| **Eye** | Dust from tablets or released gas may cause serious damage. |

| | |
|---|---|
| **Chronic Effects** | Exposure leading to chronic effects seems to be rare. However, if exposure was regular, the likely effects include anemia, bronchitis, gastrointestinal disturbances and visual, speech and motor disturbances. |

## 12. Ecological information

| | |
|---|---|
| **Other Precautions** | Do not contaminate dams, waterways or sewers with this product or the containers which have held this product. |
| **Acute Toxicity - Fish** | LC50 (96hr) for rainbow trout is 9.7 µg/l. |
| **Acute Toxicity - Daphnia** | EC50 (24hr) for daphnia is 0.2 mg/l for phosphine. |

## 13. Disposal considerations

| | |
|---|---|
| **Product Disposal** | Ideally, all tablets should be used for the intended purpose.<br>Seek expert advice regarding disposal of unwanted tablets. |
| **Container Disposal** | Ensure that containers are totally empty before disposal. Crush containers and dispose of in accordance with local regulations. Do not use the containers for any other purpose. Because of its ability to produce highly toxic phosphine gas, never dispose of surplus or part-filled containers in tips or other rubbish disposal or by burial, be aware that others, especially children, could locate the container and be exposed to risk. |

## 14. Transport information

| | |
|---|---|
| **U.N. Number** | 1397 |
| **UN proper shipping name** | ALUMINIUM PHOSPHIDE |
| **Transport hazard class(es)** | 4.3 |
| **Sub.Risk** | 6.1 |
| **Hazchem Code** | 4W |
| **Packaging Method** | 3.8.4.1 |
| **Packing Group** | I |
| **Storage and Transport** | Considered dangerous for transport by the Australian Code for the Transport of Dangerous Goods by Road and Rail. |
| **EPG Number** | 4B3 |
| **IERG Number** | 27 |

## 15. Regulatory information

| | |
|---|---|
| **Regulatory Information** | WHS Schedule 11: item 21, item 33. |
| **Poisons Schedule** | S7 |
| **Packaging & Labelling** | DANGEROUS POISON<br>KEEP OUT OF REACH OF CHILDREN<br>READ SAFETY DIRECTIONS BEFORE OPENING OR USING |
| **Other Information** | This product is registered with the Australian Pesticides and Veterinary Medicines Authority (APVMA). APVMA product number: 32069. |

## 16. Other Information

| | |
|---|---|
| **Date of preparation or last revision of SDS** | Revised 07/05/2019.<br>This SDS replaces document dated August 2016. |
| **Literature References** | (1) Encyclopedia of Occupational Health and Safety, ILO Geneva.<br>(2) Recognition and Management of Pesticide Poisonings, 5th Ed. USEPA. |
| **Contact Person/Point** | Normal Hours: Mrs Kathleen Marsh Phone: +61 3 9282 1000<br>After Hours: Shift Supervisor Phone: 1800 033 498 |
| **Revisions Highlighted** | The SDS was reviewed. Minor changes were made to the information.<br>Product type group insecticide corrected to match the label.<br>Hazard Identification information in section 2 to include environmental |

statements.
...End Of MSDS...

# SAFETY DATA SHEET

## Section 1: Identification: Product identifier and chemical identity

| | |
|---|---|
| **Product Identifier:** | **GRAMOXONE 360 Pro Herbicide** |
| **Other Means of Identification:** | **Proper shipping name:** Corrosive Liquid, Toxic N.O.S. (paraquat dichloride)<br>**Applicable only for marine and air transport**<br><br>**Product code:** A12837AJ |
| **Recommended Use:** | Herbicide |
| **Details of manufacturer or importer** | **Syngenta Australia Pty Ltd**<br>ABN 33 002 933 717 |
| **Address:** | **Level 1, 2-4 Lyonpark Road**<br>**MACQUARIE PARK NSW 2113**<br>**AUSTRALIA** |
| **Website:** | **syngenta.com.au** |
| **Phone Number:** | **(02) 8014 5200** |
| **Emergency Phone Number:** | **24 hours - 1800 033 111** |

## Section 2: Hazards identification

| | |
|---|---|
| **Classification of the Hazardous Chemical:** | Corrosive to metals – Category 1<br>Acute toxicity (Oral) – Category 4<br>Acute toxicity (Dermal) – Category 3<br>Acute toxicity (Inhalation) – Category 1<br>Skin irritation – Category 2<br>Serious eye damage – Category 1<br>Specific target organ toxicity – repeated exposure – Category 1 |
| **Signal Word:** | Danger |
| **Hazard Statement(s):** | H290 May be corrosive to metals.<br>H302 Harmful if swallowed.<br>H311 Toxic in contact with skin.<br>H315 Causes skin irritation.<br>H318 Causes serious eye damage.<br>H330 Fatal if inhaled.<br>H335 May cause respiratory irritation.<br>H372 Causes damage to organs through prolonged or repeated exposure. |
| **Precautionary Statement(s):** | P102 Keep out of reach of children.<br>P280 Wear protective gloves/ protective clothing/ eye protection/face protection.<br>P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.<br>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.<br>P310 Immediately call a POISON CENTRE or doctor/ physician.<br>P390 Absorb spillage to prevent material damage.<br>P391 Collect spillage.<br>P501 Dispose of contents/ container to an approved waste disposal plant. |

**Hazard Symbols:**

## Section 3: Composition and information on ingredients

| **SUBSTANCE** | |
|---|---|
| **Chemical Identity of Pure Substance:** | Paraquat dichloride |
| **Synonym:** | PP148 |
| **CAS Number:** | 1910-42-5 |

**MIXTURE**

| **Chemical Identity of Ingredients:** | **CAS No** | **Proportion (% w/v)** |
|---|---|---|
| Paraquat ion present as paraquat dichloride | 1910-42-5 | 36% |
| 2-amino-6-methyl-4-propyl-1,2,4-triazolo[1,5-a]pyrimidin-5(4H)-one | 27277-00-5 | <1 |
| other ingredients determined not to be hazardous | - | to 100 |

## Section 4: First aid measures

**Description of Necessary First Aid Measures:**

In case of poisoning by any exposure route get to a doctor or hospital quickly. Phone Poisons Information Centre on 131 126.
Have the product label or SDS with you when calling or going for treatment.

**Ingestion:** **SPEED IS ESSENTIAL**. Immediate medical attention is required. DO NOT induce vomiting. If available, give an adsorbent such as activated charcoal or bentonite.

**Eye contact:** Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses. Immediate medical attention is required.

**Skin contact:** Take off all contaminated clothing immediately. Wash off immediately with plenty of water. If irritation persists, call a physician. Wash contaminated clothing before re-use.

**Inhalation:** Move person to fresh air. If breathing is irregular or stopped, administer artificial respiration. Keep patient warm and at rest. Call a physician or Poisons Information Centre immediately.

**Symptoms Caused by Exposure:**

Symptoms include inflammation of the mouth, throat and oesophagus, gastrointestinal discomfort and diarrhoea.

**Medical Attention and Special Treatment:**

Refer to the booklet 'Paraquat Poisoning. A Practical Guide to Diagnosis, First Aid and Hospital Treatment' (www.syngenta.com/pqmedguide/).
Administer either activated charcoal (100 g for adults or 2 g/kg body weight in children).
NOTE: The use of gastric lavage without administration of an adsorbent has not shown any clinical benefit.
Do not use supplemental oxygen.
Eye splashes from concentrated material should be treated by an eye specialist after initial treatment. With the possibility of late onset corneal ulceration it is advised that patients with paraquat eye injuries are reviewed by an eye specialist the day after first presentation.

## Section 5: Fire fighting measures

| | |
|---|---|
| **Suitable Extinguishing Equipment:** | **Small fires:** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.<br>**Large fires:** Use alcohol-resistant foam or water spray.<br><br>DO NOT use a solid water stream as it may scatter and spread fire. |
| **Specific Hazards Arising from the Chemical:** | As the product contains combustible organic components, fire will produce dense black smoke containing hazardous products of combustion. Combustion or thermal decomposition will evolve toxic and irritant vapours. Exposure to decomposition products may be a hazard to health. |
| **Special Protective Equipment and Precautions for Fire Fighters:** | Wear full protective clothing and self-contained breathing apparatus.<br>DO NOT allow run-off from fire fighting to enter drains or water courses.<br>Cool closed containers exposed to fire with water spray. |
| **Hazchem Code:** | 2X |

## Section 6: Accidental release measures

| | |
|---|---|
| **Personal Precautions, Protective Equipment and Emergency Procedures:** | In case of spillage it is important to take all steps necessary to<br>• Avoid eye and skin contact<br>• Avoid contamination of waterways<br>Wear full length clothing and PVC gloves<br>Keep all bystanders away |
| **Environmental precautions:** | Prevent further leakage or spillage if safe to do so.<br>DO NOT flush into surface water or sanitary sewer system. |
| **Methods and Materials for Containment and Clean Up:** | **Procedure for spill**<br>(1) Keep all bystanders away<br>(2) Wear full length clothing and PVC gloves<br>(3) Reposition any leaking containers so as to minimise further leakage<br>(4) Dam and absorb spill with an absorbent material (eg sand or soil)<br>(5) Shovel the absorbed spill into drums<br>(6) Disposal of the absorbed material will depend upon the extent of the spill<br>• For quantities up to 50 L of product bury in a secure landfill site<br>• For quantities greater than 50 L seek advice from the manufacturer (use emergency contact number below) before attempting disposal. Contain in a secure location until disposal method is established<br>(7) Decontaminate spill area with detergent and water and rinse with the smallest volume of water practicable |

## Section 7: Handling and storage

| | |
|---|---|
| **Precautions for Safe Handling:** | MANUFACTURE, PACKAGING AND TRANSPORT:<br>Avoid skin and eye contact and the inhalation of vapour and mist. Wear overalls, face shield, elbow-length impervious gloves, splash apron and rubber boots. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.<br>If inhalation risk of vapour or spray exists wear organic vapour respirator meeting the requirements of Standards Australia<br>PREPARATION AND USE OF PRODUCT:<br>This product can only be purchased by authorised persons holding a current certificate in the safe and responsible use of agricultural chemicals, eg. Chemcert Certificate.<br>Very dangerous, particularly the concentrate. Product is poisonous if swallowed. Will irritate the nose, throat and skin. Attacks the eyes, protect the eyes while using. Avoid contact with eyes, skin and clothing. When opening the container and preparing product for use wear:<br>• elbow-length PVC gloves<br>• face shield or goggles<br>If product on skin, immediately wash area with soap and water. If clothing becomes contaminated with product remove clothing immediately. If product in eyes, wash it out immediately with water. Avoid contact with spray mist. DO NOT inhale spray mist. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use, wash gloves and face shield or goggles and contaminated clothing. |
| **Conditions for Safe Storage, Including any Incompatibilities:** | Store in the closed, original container in a dry, cool, well ventilated locked room or place away from children, animals, food, feedstuffs, seed and fertilisers. DO NOT store for prolonged periods in direct sunlight. |

## Section 8: Exposure controls and personal protection

**ALWAYS READ AND FOLLOW THE LABEL INSTRUCTIONS AND WARNINGS**

| | Component | Exposure limit | Value type |
|---|---|---|---|
| **National Exposure Standards:** | Paraquat (respirable sizes) | 0.1 mg/m$^3$ | TWA |
| **Syngenta Exposure Standards:** | Paraquat ion (inhalable particulate) | 0.01 mg/m$^3$<br>0.03 mg/m$^3$ | 8 h TWA<br>15 min STEL |
| | Paraquat dichloride (respirable dust) | 0.08 mg/m$^3$ | 8 h TWA |
| **Biological Limit Values:** | No biological limits allocated | | |
| **Engineering Controls:** | No special requirements. Product is used outdoors. | | |
| **Personal Protective Equipment:** | MANUFACTURE, PACKAGING AND TRANSPORT:<br>Avoid skin and eye contact and the inhalation of vapour and mist. Wear overalls, face shield, elbow-length impervious gloves, splash apron and rubber boots. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.<br>If inhalation risk of vapour or spray exists wear organic vapour respirator meeting the requirements of Standards Australia<br><br>PREPARATION AND USE OF PRODUCT:<br>This product can only be purchased by authorised persons holding a current certificate in the safe and responsible use of agricultural chemicals, eg. Chemcert Certificate. | | |

| | |
|---|---|
| | Very dangerous, particularly the concentrate. Product is poisonous if swallowed. Will irritate the nose, throat and skin. Attacks the eyes, protect the eyes while using. Avoid contact with eyes, skin and clothing. When opening the container and preparing product for use wear:<br>• elbow-length PVC gloves<br>• face shield or goggles<br>If product on skin, immediately wash area with soap and water. If clothing becomes contaminated with product remove clothing immediately. If product in eyes, wash it out immediately with water. Avoid contact with spray mist. DO NOT inhale spray mist. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use, wash gloves and face shield or goggles and contaminated clothing. |

## Section 9: Physical and chemical properties

| | | | |
|---|---|---|---|
| **Appearance:** | Green liquid | **Boiling Point/Range:** | Not available |
| **Odour:** | Characteristic | **Freezing/Melting Point:** | Not available |
| **pH:** | 4 – 6 | **Solubility:** | Soluble in water |
| **Vapour Pressure:** | Not available | **Specific Gravity/Density:** | 1.137 g/cm$^3$ at 20°C |

| | | | |
|---|---|---|---|
| **Flash Point:** | Not detected below 107°C | **Explosive Properties:** | Not explosive |
| **Upper and Lower Flammable (Explosive) Limits in Air:** | Not flammable | **Oxidising Properties:** | Not oxidising |
| | | **Combustibility:** | Not combustible |
| **Auto - Ignition Temperature:** | Not detected below 650°C | **Corrosiveness:** | Corrosive to tin plate, galvanised sheet metal and sheet steel<br>Not corrosive to stainless steel |

## Section 10: Stability and reactivity

| | |
|---|---|
| **Reactivity:** | No information available |
| **Chemical Stability:** | No information available |
| **Possibility of Hazardous Reactions:** | Corrosive in contact with metals |
| **Conditions to Avoid:** | No information available |
| **Incompatible Materials:** | Aluminium, mild steel, iron |
| **Hazardous Decomposition Products:** | Combustion or thermal decomposition will evolve toxic and irritant vapours. |

## Section 11: Toxicological information

| **Health Effects from Likely Routes of Exposure:** | | |
|---|---|---|
| **Acute** | **Oral toxicity:** | **TOXIC**<br>Tests on rats indicate this product is toxic following single doses of a similar formulation. This formulation contains safening agents which significantly reduce the oral toxicity in vomiting species.<br>$LD_{50}$ = 283 mg/kg females; 344 mg/kg males) |
| | **Dermal toxicity:** | **LOW TOXICITY**<br>Tests on rats indicate this product has a low toxicity following skin contact with a similar formulation.<br>$LD_{50}$ >2,000 mg/kg |
| | **Inhalation:** | (Humans): Assessment: The substance/mixture is not toxic on inhalation as defined by dangerous goods regulations.<br>Remarks: Nose bleeding and soreness of the throat may result from spray mist or dust trapped on the nasal mucosa.<br>Acute toxicity estimate: 0.01 mg/L<br>Exposure time: 4 h<br>Test atmosphere: dust/mist<br>Method: Calculation method |
| | **Skin irritation:** | **SEVERE IRRITANT** |
| | **Eye irritation:** | **MODERATE IRRITANT** |
| | **Sensitisation:** | **NOT A SENSITISER** |
| **Chronic** | **Paraquat dichloride technical** has been extensively tested on laboratory mammals and in test-tube systems. No evidence was obtained of mutagenic, carcinogenic, or teratogenic effects. Ocular effects (cataracts) have been reported following long term oral exposure of laboratory animals. | |

## Section 12: Ecological information

| | | |
|---|---|---|
| **Ecotoxicity** | The following are based on tests conducted with the active ingredient | |
| | **Toxicity to fish:** | **Slightly toxic to fish**<br>*Oncorhynchus mykiss* (rainbow trout):<br>$LC_{50}$ = 55 mg/L, 96 h |
| | **Toxicity to daphnia and other aquatic invertebrates:** | **Slightly toxic to aquatic invertebrates**<br>*Daphnia magna* (Water flea):<br>$EC_{50}$ = 6.1 mg/L, 48 h |
| | **Toxicity to algae:** | **Highly toxic to algae**<br>*Pseudokirchneriella subcapitata* (green algae):<br>$EC_{50}$ = 0.60 mg/L, 72 h<br>*Navicula pelliculosa* (freshwater diatom):<br>$EC_{50}$ = 0.00103 mg/L, 72 h |
| **Persistence and Degradability:** | Paraquat is persistent in water (Degradation half-life: > 30 d).<br>Paraquat is persistent in soil (Degradation half-life: ca. 20 y).<br>Paraquat is rapidly and strongly bound to soil particles, however it is biodegradable in soil pore water and will not accumulate in soils. | |
| **Mobility in Soil:** | Paraquat is immobile in soil. | |
| **Bioaccumulative Potential:** | Paraquat does not bioaccumulate | |

## Section 13: Disposal considerations

| | |
|---|---|
| **Disposal Methods:** | **Non-returnable containers:**<br>Triple rinse or preferably pressure rinse containers with water. Add the rinsings to the spray tank. DO NOT dispose of undiluted chemicals on site. If recycling, replace cap and return clean containers to recycler or designated collection point. If not recycling, break, crush or puncture and bury empty containers in a local authority landfill. If no landfill is available, bury the containers below 500 mm in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots. Empty containers and product should not be burnt.<br>**Returnable containers:**<br>Empty contents fully into application equipment. Close all valves and return to point of supply for refill or storage. |
| **Special Precautions for Incineration or Landfill:** | Not applicable |

## Section 14: Transport information

| **LAND TRANSPORT**<br>ADG | | | |
|---|---|---|---|
| **UN Number:** | 2922 | **Packing Group:** | III |
| **UN Proper Shipping Name:** | Corrosive Liquid, Toxic N.O.S. (Paraquat Dichloride) | **Special Precautions for User:** | |
| **Transport Hazard Class:** | 8 | **Hazchem or Emergency Action Code:** | 2X |
| **Subsidiary Risk:** | 6.1 | | |

| **SEA TRANSPORT**<br>IMDG | | | |
|---|---|---|---|
| **UN Number:** | 2922 | **Subsidiary Risk:** | 6.1 |
| **UN Proper Shipping Name:** | Corrosive Liquid, Toxic N.O.S. (Paraquat Dichloride) | **Packing Group:** | III |
| **Transport Hazard Class:** | 8 | **Environmental hazards for Transport Purposes:** | Marine pollutant |

| **AIR TRANSPORT**<br>IATA - DGR | | | |
|---|---|---|---|
| **UN Number:** | 2922 | **Subsidiary Risk:** | 6.1 |
| **UN Proper Shipping Name:** | Corrosive Liquid, Toxic N.O.S. (Paraquat Dichloride) | **Packing Group:** | III |
| **Transport Hazard Class:** | 8 | | |

## Section 15: Regulatory information

| | |
|---|---|
| **APVMA Product Number:** | 68577 |
| **Poisons Schedule (SUSMP):** | 7 |

## Section 16: Any other relevant information

**Date of preparation or last revision:** 20 October 2021

**Source of Data:** The information provided in this SDS is sourced from Syngenta internal studies which have been conducted according to Regulatory requirements including OECD and CIPAC Guidelines and EC Directives. A comprehensive package of toxicological and environmental data for the active ingredients of this product has been submitted to the government health and environment authorities and has been evaluated by expert toxicologists and environmental scientists.

**Note: This product is a registered agricultural chemical and must, therefore, be used in accordance with the container label directions**

**CONTACT POINT:** Regulatory Affairs Manager, Syngenta Australia Pty Ltd
(02) 8014 5200
**24 HOURS EMERGENCY CONTACT: 1800 033 111**

This Safety Data Sheet summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this SDS and consider the information in the context of how the product will be handled and used in the workplace including in conjunction with other products.
If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact this company.

**DISCLAIMER**
This product complies with the specifications in its statutory registration. Implied terms and warranties are excluded. Syngenta's liability for breach of the express or any non-excludable implied warranty is limited to product replacement or purchase price refund. The purchaser must determine suitability for intended purpose and take all proper precautions in the handling, storage and use of the product including those on the label and/or safety data sheet failing which Syngenta shall have no liability.

# PIRIMOR WG

| Version | Revision Date: | SDS Number: | This version replaces all previous versions. |
|---|---|---|---|
| 7.0 | 13.10.2021 | S172641386 | |

## SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : PIRIMOR WG

Design code : A10788A

**Manufacturer or supplier's details**

Company : Syngenta Australia Pty Ltd (ABN 33 002 933 717)
www.syngenta.com.au

Address : 2-4 Lyonpark Road
Macquarie Park NSW 2113
Australia

Telephone : (02) 8014 5200

Emergency telephone number : 13 11 26 (Poison Information Centre)
1800 033 111 (Syngenta)

Telefax : (02) 8876 8446

**Recommended use of the chemical and restrictions on use**

Recommended use : Insecticide

## SECTION 2. HAZARDS IDENTIFICATION

**GHS Classification**

Acute toxicity (Oral) : Category 3

Acute toxicity (Inhalation) : Category 4

Serious eye damage/eye irritation : Category 2A

Carcinogenicity : Category 2

**GHS label elements**

Hazard pictograms :

Signal word : Danger

Hazard statements : H301 Toxic if swallowed.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H351 Suspected of causing cancer.

Precautionary statements :

**Prevention:**

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P261 Avoid breathing dust.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.

**Response:**

P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
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.
P337 + P313 If eye irritation persists: Get medical advice/ attention.

**Storage:**

P405 Store locked up.

**Disposal:**

P501 Dispose of contents/ container to an approved waste disposal plant.

**Other hazards which do not result in classification**

This product contains an anticholinesterase compound. Do not use if under medical advice not to work with such compounds.
May form combustible dust concentrations in air.

## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

**Components**

| Chemical name | CAS-No. | Concentration (% w/w) |
|---|---|---|
| pirimicarb (ISO) | 23103-98-2 | >= 50 -< 70 |
| talc | 14807-96-6 | >= 10 -< 20 |
| sodium; 1,2-bis-(2-ethyl-hexyloxycarbonyl)-ethanesulfonate | 577-11-7 | >= 1 -< 3 |

## SECTION 4. FIRST AID MEASURES

General advice : Have the product container, label or Safety Data Sheet with

you when calling the emergency number, a poison control center or physician, or going for treatment.

| | | |
|---|---|---|
| If inhaled | : | Move the victim to fresh air.<br>If breathing is irregular or stopped, administer artificial respiration.<br>Keep patient warm and at rest.<br>Call a physician or poison control centre immediately. |
| In case of skin contact | : | Take off all contaminated clothing immediately.<br>Wash off immediately with plenty of water.<br>If skin irritation persists, call a physician.<br>Wash contaminated clothing before re-use. |
| In case of eye contact | : | Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.<br>Remove contact lenses.<br>Immediate medical attention is required. |
| If swallowed | : | If swallowed, seek medical advice immediately and show this container or label.<br>Do NOT induce vomiting. |
| Most important symptoms and effects, both acute and delayed | : | Poisoning produces effects associated with anticholinesterase activity which may include:<br>Nausea<br>Diarrhoea<br>Vomiting |
| Notes to physician | : | Consider taking venous blood for determination of blood cholinesterase activity (use heparin tube).<br>Administer atropine sulphate as antidote.<br>Since there is no therapeutic effect, the use of oxime preparations (or other cholinesterase reactivators) is contraindicated. |

## SECTION 5. FIREFIGHTING MEASURES

| | | |
|---|---|---|
| Suitable extinguishing media | : | Extinguishing media - small fires<br>Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.<br>Extinguishing media - large fires<br>Alcohol-resistant foam<br>or<br>Water spray |
| Unsuitable extinguishing media | : | Do not use a solid water stream as it may scatter and spread fire. |
| Specific hazards during firefighting | : | Fire will spread by burning with a visible flame.<br>As the product contains combustible organic components, fire will produce dense black smoke containing hazardous products of combustion (see section 10).<br>Exposure to decomposition products may be a hazard to health. |
| Specific extinguishing methods | : | Do not allow run-off from fire fighting to enter drains or water courses.<br>Cool closed containers exposed to fire with water spray. |
| Special protective equipment for firefighters | : | Wear full protective clothing and self-contained breathing apparatus. |
| Hazchem Code | : | 2X |

## SECTION 6. ACCIDENTAL RELEASE MEASURES

| | | |
|---|---|---|
| Personal precautions, protective equipment and emergency procedures | : | Refer to protective measures listed in sections 7 and 8.<br>Avoid dust formation. |
| Environmental precautions | : | Do not flush into surface water or sanitary sewer system.<br>If the product contaminates rivers and lakes or drains inform respective authorities. |
| Methods and materials for containment and cleaning up | : | Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).<br>Do not create a powder cloud by using a brush or compressed air.<br>Clean contaminated surface thoroughly.<br>Clean with detergents. Avoid solvents.<br>Retain and dispose of contaminated wash water. |

## SECTION 7. HANDLING AND STORAGE

| | | |
|---|---|---|
| Advice on safe handling | : | This material is capable of forming flammable dust clouds in air, which, if ignited, can produce a dust cloud explosion.<br>Flames, hot surfaces, mechanical sparks and electrostatic discharges can serve as ignition sources for this material.<br>Electrical equipment should be compatible with the flammability characteristics of this material. The flammability characteristics will be made worse if the material contains traces of flammable solvents or is handled in the presence of flammable solvents.<br><br>This material can become readily charged in most operations.<br><br>Avoid contact with skin and eyes.<br>When using do not eat, drink or smoke.<br>For personal protection see section 8. |
| Conditions for safe storage | : | Keep containers tightly closed in a dry, cool and well-ventilated place.<br>Keep out of the reach of children.<br>Keep away from food, drink and animal feedingstuffs. |
| Further information on storage stability | : | Physically and chemically stable for at least 2 years when stored in the original unopened sales container at ambient temperatures. |

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Components with workplace control parameters**

| | | |
|---|---|---|
| **Engineering measures** | : | THE FOLLOWING RECOMMENDATIONS FOR EXPOSURE CONTROLS/PERSONAL PROTECTION ARE INTENDED FOR THE MANUFACTURE, FORMULATION AND PACKAGING OF THE PRODUCT. FOR COMMERCIAL |

APPLICATIONS AND/OR ON-FARM APPLICATIONS
CONSULT THE PRODUCT LABEL.

Containment and/or segregation is the most reliable technical protection measure if exposure cannot be eliminated.

The extent of these protection measures depends on the actual risks in use.

Maintain air concentrations below occupational exposure standards.
Where necessary, seek additional occupational hygiene advice.

**Personal protective equipment**

Respiratory protection : When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
Suitable respiratory equipment:
Respirator with a half face mask
The filter class for the respirator must be suitable for the maximum expected contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product. If this concentration is exceeded, self-contained breathing apparatus must be used.

Hand protection

Material : Nitrile rubber
Break through time : > 480 min
Glove thickness : 0.5 mm

Remarks : Wear protective gloves. The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. The break through time depends amongst other things on the material, the thickness and the type of glove and therefore has to be measured for each case. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Eye protection : Tightly fitting safety goggles
Always wear eye protection when the potential for inadvertent eye contact with the product cannot be excluded.

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.
Remove and wash contaminated clothing before re-use.
Wear as appropriate:
Dust impervious protective suit

Protective measures : The use of technical measures should always have priority

over the use of personal protective equipment.
When selecting personal protective equipment, seek appropriate professional advice.

Personal protective equipment should comply with relevant national standards

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

| | | |
|---|---|---|
| Appearance | : | granules |
| Colour | : | blue green to green |
| Odour | : | weak |
| Odour Threshold | : | No data available |
| pH | : | 7 - 11<br>Concentration: 1 % w/v |
| Melting point/range | : | 89 °C |
| Boiling point/boiling range | : | No data available |
| Flash point | : | No data available |
| Evaporation rate | : | No data available |
| Flammability (solid, gas) | : | May form combustible dust concentrations in air. |
| Burning number | : | 5 (20 °C)<br>5 (100 °C) |
| Upper explosion limit / Upper flammability limit | : | No data available |
| Lower explosion limit / Lower flammability limit | : | No data available |
| Vapour pressure | : | No data available |
| Relative vapour density | : | No data available |
| Bulk density | : | 0.4 - 0.6 g/cm3 |
| Solubility(ies) | | |
| Water solubility | : | soluble |
| Solubility in other solvents | : | No data available |
| Partition coefficient: n-octanol/water | : | No data available |

| | | |
|---|---|---|
| Auto-ignition temperature | : | 245 °C |
| Decomposition temperature | : | No data available |
| Minimum ignition temperature | : | 500 °C |
| Viscosity | | |
| Viscosity, dynamic | : | No data available |
| Viscosity, kinematic | : | No data available |
| Explosive properties | : | Not explosive |
| Oxidizing properties | : | The substance or mixture is not classified as oxidizing. |
| Minimum ignition energy | : | > 1,000 mJ |
| Particle size | : | No data available |

## SECTION 10. STABILITY AND REACTIVITY

| | | |
|---|---|---|
| Reactivity | : | None reasonably foreseeable. |
| Chemical stability | : | Stable under normal conditions. |
| Possibility of hazardous reactions | : | No dangerous reaction known under conditions of normal use. |
| Conditions to avoid | : | No decomposition if used as directed. |
| Incompatible materials | : | None known. |
| Hazardous decomposition products | : | Carbon monoxide<br>Carbon dioxide (CO2)<br>Nitrogen oxides (NOx)<br>Sulphur oxides |
| Hazardous decomposition products | : | No hazardous decomposition products are known. |

## SECTION 11. TOXICOLOGICAL INFORMATION

Sherpa Comment: The Acute inhalation toxicity (LC50, 4-hour duration) is reported as 1.41mg/l. The ADG code table 2.6.2.2.4.1 details the LC50 (1 hour duration) for Class 6.1 with a note that the LC50 4-hour value should be multiplied by 4 to generate an equivalent LC50 (1 hour value). Applying the multiplication factor, the LC50 (1 hour equivalent) is 5.64mg/l. This value is higher than the PG III cut off (4mg/l) and hence the substance is not toxic by inhalation for the purposes of the ADG code.

| | | |
|---|---|---|
| Exposure routes | : | Ingestion<br>Inhalation<br>Skin contact<br>Eye contact |

**Acute toxicity**

**Product:**

| | | |
|---|---|---|
| Acute oral toxicity | : | LD50 (Rat, male and female): 87 mg/kg |
| Acute inhalation toxicity | : | LC50 (Rat, male and female): 1.41 mg/l<br>Exposure time: 4 h<br>Test atmosphere: dust/mist |
| Acute dermal toxicity | : | LD50 (Rat, male and female): > 2,000 mg/kg<br>Assessment: The substance or mixture has no acute dermal toxicity |

**Components:**

**pirimicarb (ISO):**

Acute oral toxicity : LD50 (Rat, female): 142 mg/kg

Acute inhalation toxicity : LC50 (Rat, female): 0.858 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist

Acute dermal toxicity : LD50 (Rat, male and female): > 2,000 mg/kg
Assessment: The substance or mixture has no acute dermal toxicity

**Skin corrosion/irritation**

**Product:**

Species : Rabbit
Result : No skin irritation

**Components:**

**pirimicarb (ISO):**

Species : Rabbit
Result : No skin irritation

**sodium; 1,2-bis-(2-ethyl-hexyloxycarbonyl)-ethanesulfonate:**

Result : Irritating to skin.

**Serious eye damage/eye irritation**

**Product:**

Species : Rabbit
Result : Irritation to eyes, reversing within 21 days

**Components:**

**pirimicarb (ISO):**

Species : Rabbit
Result : No eye irritation

**sodium; 1,2-bis-(2-ethyl-hexyloxycarbonyl)-ethanesulfonate:**

Result : Irreversible effects on the eye

**Respiratory or skin sensitisation**

**Product:**

Test Type : Buehler Test
Species : Guinea pig

Result : Did not cause sensitisation on laboratory animals.

**Components:**

**pirimicarb (ISO):**

Species : Guinea pig
Result : May cause sensitisation by skin contact.

**Chronic toxicity**

**Germ cell mutagenicity**

**Components:**

**pirimicarb (ISO):**

Germ cell mutagenicity - Assessment : Weight of evidence does not support classification as a germ cell mutagen.

**Carcinogenicity**

**Components:**

**pirimicarb (ISO):**

Carcinogenicity - Assessment : Limited evidence of carcinogenicity in animal studies

**Reproductive toxicity**

**Components:**

**pirimicarb (ISO):**

Reproductive toxicity - Assessment : Animal testing did not show any effects on fertility.
Animal testing did not show any effects on foetal development.

**STOT - single exposure**

**Components:**

**pirimicarb (ISO):**

Assessment : The substance or mixture is not classified as specific target organ toxicant, single exposure.

**Repeated dose toxicity**

**Components:**

**pirimicarb (ISO):**

Remarks : No adverse effect has been observed in chronic toxicity tests.

## SECTION 12. ECOLOGICAL INFORMATION

### Ecotoxicity

**Product:**

| | | |
|---|---|---|
| Toxicity to fish | : | LC50 (Lepomis macrochirus (Bluegill sunfish)): 78 mg/l<br>Exposure time: 96 h<br>Remarks: Based on data from similar materials |
| Toxicity to daphnia and other aquatic invertebrates | : | EC50 (Daphnia magna (Water flea)): 0.046 mg/l<br>Exposure time: 48 h |

**Components:**

**pirimicarb (ISO):**

| | | |
|---|---|---|
| Toxicity to fish | : | LC50 (Oncorhynchus mykiss (rainbow trout)): 79 mg/l<br>Exposure time: 96 h |
| Toxicity to daphnia and other aquatic invertebrates | : | EC50 (Daphnia magna (Water flea)): 0.017 mg/l<br>Exposure time: 48 h |
| Toxicity to algae/aquatic plants | : | ErC50 (Raphidocelis subcapitata (freshwater green alga)): 180 mg/l<br>Exposure time: 96 h<br><br>NOEC (Raphidocelis subcapitata (freshwater green alga)): 50 mg/l<br>End point: Growth rate<br>Exposure time: 96 h |
| M-Factor (Acute aquatic toxicity) | : | 10 |
| Toxicity to fish (Chronic toxicity) | : | NOEC (Oncorhynchus mykiss (rainbow trout)): 18 mg/l<br>Exposure time: 28 d |
| Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) | : | NOEC (Daphnia magna (Water flea)): 0.0009 mg/l<br>Exposure time: 21 d |
| M-Factor (Chronic aquatic toxicity) | : | 100 |

### Persistence and degradability

**Components:**

**pirimicarb (ISO):**

| | | |
|---|---|---|
| Stability in water | : | Degradation half life: 36 - 55 d<br>Remarks: Product is not persistent. |

**Bioaccumulative potential**

**Components:**

**pirimicarb (ISO):**

Bioaccumulation : Remarks: Does not bioaccumulate.

**Mobility in soil**

**Components:**

**pirimicarb (ISO):**

Distribution among environmental compartments : Remarks: Moderately mobile in soils

Stability in soil : Dissipation time: 29 - 365 d
Percentage dissipation: 50 % (DT50)
Remarks: Product is not persistent.

**Other adverse effects**

**Components:**

**pirimicarb (ISO):**

Results of PBT and vPvB assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

## SECTION 13. DISPOSAL CONSIDERATIONS

**Disposal methods**

Waste from residues : Do not contaminate ponds, waterways or ditches with chemical or used container.
Do not dispose of waste into sewer.
Where possible recycling is preferred to disposal or incineration.
If recycling is not practicable, dispose of in compliance with local regulations.

Contaminated packaging : Non-returnable containers:
Triple rinse containers.
Add rinsings to spray tank
If recycling, replace cap and return clean containers to recycler or designated collection point. Containers marked with the drumMUSTER container logo can be taken to a drumMUSTER collection site (02 6206 6868, www.drummuster.org.au).
Empty containers can be landfilled, when in accordance with the local regulations.
If no landfill is available, bury the containers below 500 mm in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots. Empty containers and product should not be burnt.
Returnable containers:
Empty contents fully into application equipment. Close all

valves and return to point of supply for refill or storage.

## SECTION 14. TRANSPORT INFORMATION

### International Regulations

**UNRTDG**

| | | |
|---|---|---|
| UN number | : | UN 2757 |
| Proper shipping name | : | CARBAMATE PESTICIDE, SOLID, TOXIC (PIRIMICARB) |
| Class | : | 6.1 |
| Packing group | : | III |
| Labels | : | 6.1 |

**IATA-DGR**

| | | |
|---|---|---|
| UN/ID No. | : | UN 2757 |
| Proper shipping name | : | Carbamate pesticide, solid, toxic (PIRIMICARB) |
| Class | : | 6.1 |
| Packing group | : | III |
| Labels | : | Toxic |
| Packing instruction (cargo aircraft) | : | 677 |
| Packing instruction (passenger aircraft) | : | 670 |

**IMDG-Code**

| | | |
|---|---|---|
| UN number | : | UN 2757 |
| Proper shipping name | : | CARBAMATE PESTICIDE, SOLID, TOXIC (PIRIMICARB) |
| Class | : | 6.1 |
| Packing group | : | III |
| Labels | : | 6.1 |
| EmS Code | : | F-A, S-A |
| Marine pollutant | : | yes |

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

Not applicable for product as supplied.

### National Regulations

**ADG**

| | | |
|---|---|---|
| UN number | : | UN 2757 |
| Proper shipping name | : | CARBAMATE PESTICIDE, SOLID, TOXIC (PIRIMICARB) |
| Class | : | 6.1 |
| Packing group | : | III |
| Labels | : | 6.1 |
| Hazchem Code | : | 2X |

**Special precautions for user**

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

## SECTION 15. REGULATORY INFORMATION

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

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

Prohibition/Licensing Requirements : There is no applicable prohibition, authorisation and restricted use requirements, including for carcinogens referred to in Schedule 10 of the model WHS Act and Regulations.

Product Registration Number : APVMA Approval No. 49835

## SECTION 16. OTHER INFORMATION

Revision Date : 13.10.2021

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

Date format : dd.mm.yyyy

**Full text of other abbreviations**

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No

1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

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.

AU / EN

# SAFETY DATA SHEET

## Section 1: Identification: Product identifier and chemical identity

| | |
|---|---|
| **Product Identifier:** | **SPRAY.SEED 250 Herbicide** |
| **Other Means of Identification:** | **Proper shipping name:** Bipyridilium Pesticides Liquid, N.O.S. (Paraquat and Diquat)<br>**Applicable only for marine and air transport**<br><br>**Product code:** A12984A / A12984C / A12984E / A12984G / A12984J |
| **Recommended Use:** | Herbicide |
| **Details of manufacturer or importer** | **Syngenta Australia Pty Ltd**<br>ABN 33 002 933 717 |
| **Address:** | **Level 1, 2-4 Lyonpark Road**<br>**MACQUARIE PARK NSW 2113**<br>**AUSTRALIA** |
| **Website:** | **syngenta.com.au** |
| **Phone Number:** | **(02) 8014 5200** |
| **Emergency Phone Number:** | **24 hours - 1800 033 111** |

## Section 2: Hazards identification

| | |
|---|---|
| **Classification of the Hazardous Chemical:** | Corrosive to metals – Category 1<br>Acute toxicity (Oral) – Category 4<br>Acute toxicity (Inhalation) – Category 1<br>Skin irritation – Category 2<br>Serious eye damage – Category 1<br>Skin sensitisation – Category 1<br>Specific target organ toxicity – repeated exposure – Category 1 |
| **Signal Word:** | Danger |
| **Hazard Statement(s):** | H290 May be corrosive to metals.<br>H302 Harmful if swallowed.<br>H311 Toxic in contact with skin.<br>H315 Causes skin irritation.<br>H317 May cause an allergic skin reaction.<br>H318 Causes serious eye damage.<br>H330 Fatal if inhaled.<br>H335 May cause respiratory irritation.<br>H372 Causes damage to organs through prolonged or repeated exposure. |
| **Precautionary Statement(s):** | P102 Keep out of reach of children.<br>P280 Wear protective gloves/ protective clothing/ eye protection/face protection.<br>P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.<br>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.<br>P310 Immediately call a POISON CENTER or doctor/ physician.<br>P390 Absorb spillage to prevent material damage.<br>P391 Collect spillage.<br>P501 Dispose of contents/ container to an approved waste disposal plant. |

**Hazard Symbols:**

## Section 3: Composition and information on ingredients

| **SUBSTANCE** | | |
|---|---|---|
| **Chemical Identity of Pure Substance:** | Paraquat dichloride | Diquat dibromide |
| **Synonym:** | PP148 | PP901 |
| **CAS Number:** | 1910-42-5 | 85-00-7 |

| **MIXTURE** | | |
|---|---|---|
| **Chemical Identity of Ingredients:** | **CAS No** | **Proportion (% w/v)** |
| Paraquat ion present as paraquat dichloride | 1910-42-5 | 13.5 |
| Diquat ion present as diquat dibromide | 85-00-7 | 11.5 |
| Pyridine alkyl derivatives | 68391-11-7 | <1 |
| 2-amino-6-methyl-4-propyl-1,2,4-triazolo[1,5-a]pyrimidin-5(4H)-one | 27277-00-5 | <1 |
| Non-hazardous ingredients | - | to 100 |

## Section 4: First aid measures

**Description of Necessary First Aid Measures:**

In case of poisoning by any exposure route get to a doctor or hospital quickly.
Phone Poisons Information Centre on 131 126.
Have the product label or SDS with you when calling or going for treatment.

**Ingestion:** **SPEED IS ESSENTIAL**. Immediate medical attention is required. DO NOT induce vomiting. If available, give an adsorbent such as activated charcoal or bentonite.

**Eye contact:** Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses. Immediate medical attention is required.

**Skin contact:** Take off all contaminated clothing immediately. Wash off immediately with plenty of water. If irritation persists, call a physician. Wash contaminated clothing before re-use.

**Inhalation:** Move person to fresh air. If breathing is irregular or stopped, administer artificial respiration. Keep patient warm and at rest. Call a physician or Poisons Information Centre immediately.

**Symptoms Caused by Exposure:**

Symptoms include inflammation of the mouth, throat and oesophagus, gastrointestinal discomfort and diarrhoea.

**Medical Attention and Special Treatment:**

Refer to the booklet 'Paraquat Poisoning. A Practical Guide to Diagnosis, First Aid and Hospital Treatment' (www.syngenta.com/pqmedguide/).
Administer either activated charcoal (100 g for adults or 2 g/kg body weight in children).
NOTE: The use of gastric lavage without administration of an adsorbent has not shown any clinical benefit.
Do not use supplemental oxygen.
Eye splashes from concentrated material should be treated by an eye specialist after initial treatment. With the possibility of late onset corneal ulceration it is advised that patients with paraquat eye injuries are reviewed by an eye specialist the day after first presentation.

## Section 5: Fire fighting measures

| | |
|---|---|
| **Suitable Extinguishing Equipment:** | **Small fires:** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.<br>**Large fires:** Use alcohol-resistant foam or water spray.<br><br>DO NOT use a solid water stream as it may scatter and spread fire. |
| **Specific Hazards Arising from the Chemical:** | As the product contains combustible organic components, fire will produce dense black smoke containing hazardous products of combustion. Combustion or thermal decomposition will evolve toxic and irritant vapours. Exposure to decomposition products may be a hazard to health. |
| **Special Protective Equipment and Precautions for Fire Fighters:** | Wear full protective clothing and self-contained breathing apparatus.<br>DO NOT allow run-off from fire fighting to enter drains or water courses.<br>Cool closed containers exposed to fire with water spray. |
| **Hazchem Code:** | 2X |

## Section 6: Accidental release measures

| | |
|---|---|
| **Personal Precautions, Protective Equipment and Emergency Procedures:** | In case of spillage it is important to take all steps necessary to<br>• Avoid eye and skin contact<br>• Avoid contamination of waterways<br>Wear full length clothing and PVC gloves<br>Keep all bystanders away |
| **Environmental precautions:** | Prevent further leakage or spillage if safe to do so.<br>DO NOT flush into surface water or sanitary sewer system. |
| **Methods and Materials for Containment and Clean Up:** | **Procedure for spill**<br>(1) Keep all bystanders away<br>(2) Wear full length clothing and PVC gloves<br>(3) Reposition any leaking containers so as to minimise further leakage<br>(4) Dam and absorb spill with an absorbent material (eg sand or soil)<br>(5) Shovel the absorbed spill into drums<br>(6) Disposal of the absorbed material will depend upon the extent of the spill<br>• For quantities up to 50 L of product bury in a secure landfill site<br>• For quantities greater than 50 L seek advice from the manufacturer (use emergency contact number below) before attempting disposal. Contain in a secure location until disposal method is established<br>(7) Decontaminate spill area with detergent and water and rinse with the smallest volume of water practicable |

## Section 7: Handling and storage

| | |
|---|---|
| **Precautions for Safe Handling:** | MANUFACTURE, PACKAGING AND TRANSPORT:<br>Avoid skin and eye contact and the inhalation of vapour and mist. Wear overalls, face shield, elbow-length impervious gloves, splash apron and rubber boots. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.<br>If inhalation risk of vapour or spray exists wear organic vapour respirator meeting the requirements of Standards Australia,<br><br>PREPARATION AND USE OF PRODUCT:<br>Very dangerous, particularly the concentrate. Product is poisonous if absorbed by skin contact, inhaled or swallowed. Will irritate the eyes, nose, throat and skin. Attacks eyes. Protect eyes while using. Avoid contact with eyes, skin and clothing.<br>DO NOT inhale spray mist. When opening the container, preparing product for use and using the prepared spray, wear:<br>• cotton overalls buttoned to the neck and wrist<br>• a washable hat<br>• elbow-length PVC gloves<br>• face shield or goggles<br>• half facepiece respirator or disposable respirator<br>If clothing becomes contaminated with product, or wet with spray, remove contaminated clothing immediately. If product on skin, immediately wash area with soap and water. If product in eyes, wash it out immediately with water. Avoid contact with spray mist. DO NOT inhale spray mist. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use, wash gloves, respirator and if rubber wash with detergent and warm water, face shield or goggles and contaminated clothing. |
| **Conditions for Safe Storage, Including any Incompatibilities:** | Store in the closed, original container in a dry, cool, well ventilated locked room or place away from children, animals, food, feedstuffs, seed and fertilisers. DO NOT store for prolonged periods in direct sunlight. |

## Section 8: Exposure controls and personal protection

**ALWAYS READ AND FOLLOW THE LABEL INSTRUCTIONS AND WARNINGS**

| | Component | Exposure limit | Value type |
|---|---|---|---|
| **National Exposure Standards:** | Paraquat (respirable sizes) | 0.1 $mg/m^3$ | TWA |
| | Diquat | 0.5 $mg/m^3$ | TWA |
| **Syngenta Exposure Standards:** | Paraquat ion (inhalable particulate) | 0.01 $mg/m^3$ | 8 h TWA |
| | | 0.03 $mg/m^3$ | 15 min STEL |
| | Paraquat dichloride (respirable dust) | 0.08 $mg/m^3$ | 8 h TWA |
| | Diquat dibromide | 0.5 $mg/m^3$ | 8h TWA |
| | | 1 $mg/m^3$ | 15 min STEL |
| **Biological Limit Values:** | No biological limits allocated | | |
| **Engineering Controls:** | No special requirements. Product is used outdoors. | | |

| | |
|---|---|
| **Personal Protective Equipment:** | MANUFACTURE, PACKAGING AND TRANSPORT:<br>Avoid skin and eye contact and the inhalation of vapour and mist. Wear overalls, face shield, elbow-length impervious gloves, splash apron and rubber boots. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.<br>If inhalation risk of vapour or spray exists wear organic vapour respirator meeting the requirements of Standards Australia.<br><br>PREPARATION AND USE OF PRODUCT:<br>Very dangerous, particularly the concentrate. Product is poisonous if absorbed by skin contact, inhaled or swallowed. Will irritate the eyes, nose, throat and skin. Attacks eyes. Protect eyes while using. Avoid contact with eyes, skin and clothing.<br>DO NOT inhale spray mist. When opening the container, preparing product for use and using the prepared spray, wear:<br>• cotton overalls buttoned to the neck and wrist<br>• a washable hat<br>• elbow-length PVC gloves<br>• face shield or goggles<br>• half facepiece respirator or disposable respirator<br>If clothing becomes contaminated with product, or wet with spray, remove contaminated clothing immediately. If product on skin, immediately wash area with soap and water. If product in eyes, wash it out immediately with water. Avoid contact with spray mist. DO NOT inhale spray mist. After use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water. After each day's use, wash gloves, respirator and if rubber wash with detergent and warm water, face shield or goggles and contaminated clothing. |

## Section 9: Physical and chemical properties

| | | | |
|---|---|---|---|
| **Appearance:** | Dark green/blue liquid | **Boiling / Melting Point:** | Approx. 100°C |
| **Odour:** | Characteristic of pyridine base | **Freezing Point:** | Not available |
| **pH:** | 5 - 6 | **Solubility:** | Soluble in water |
| **Vapour Pressure:** | Not available | **Specific Gravity:** | 1.16 g/cm$^3$ at 20°C |
| **Vapour Density:** | Not available | | |

| | | | |
|---|---|---|---|
| **Flash Point:** | Not applicable | **Explosive Properties:** | Not available |
| **Upper and Lower Flammable (Explosive) Limits in Air:** | Not applicable | **Oxidising Properties:** | Not available |
| | | **Combustibility:** | Not combustible |
| **Ignition Temperature:** | Not applicable | **Corrosiveness:** | Corrosive |

## Section 10: Stability and reactivity

| | |
|---|---|
| **Reactivity:** | No information available |
| **Chemical Stability:** | No information available |
| **Possibility of Hazardous Reactions:** | Corrosive in contact with metals |
| **Conditions to Avoid:** | No information available |
| **Incompatible Materials:** | Aluminium, mild steel, iron |
| **Hazardous Decomposition Products:** | Combustion or thermal decomposition will evolve toxic and irritant vapours. |

## Section 11: Toxicological information

**Health Effects from Likely Routes of Exposure:**

| | | |
|---|---|---|
| **Acute** | **Oral toxicity:** | **TOXIC**<br>Tests on rats indicate this product is toxic following single doses of active ingredient.<br>Paraquat dichloride: $LD_{50}$ = 93.4 mg/kg<br>Diquat dibromide: $LD_{50}$ = 214 mg/kg |
| | **Dermal toxicity:** | **LOW TOXICITY**<br>Tests on rats indicate this product has a low toxicity following skin contact with active ingredient.<br>Paraquat dichloride:$LD_{50}$ > 2,000 mg/kg<br>Diquat dibromide: $LD_{50}$ > 2,000 mg/kg |
| | **Inhalation:** | (Humans): Assessment: The substance/mixture is not toxic on inhalation as defined by dangerous goods regulations.<br>Remarks: Nose bleeding and soreness of the throat may result from spray mist or dust trapped on the nasal mucosa.<br>Acute toxicity estimate: 0.03 mg/L<br>Exposure time: 4 h<br>Test atmosphere: dust/mist<br>Method: Calculation method |
| | **Skin irritation:** | **IRRITANT** |
| | **Eye irritation:** | **IRRITANT** |
| | **Sensitisation:** | **SENSITISER** |
| **Chronic** | **Paraquat dichloride technical** has been extensively tested on laboratory mammals and in test-tube systems. No evidence was obtained of mutagenic, carcinogenic, or teratogenic effects. Ocular effects (cataracts) have been reported following long term oral exposure of laboratory animals.<br>**Diquat dibromide technical** has been extensively tested on laboratory mammals and in test-tube systems. No evidence was obtained of mutagenic, carcinogenic, teratogenic or reproductive effects. Ocular effects (cataracts) have been reported following long term oral exposure of laboratory animals. | |

## Section 12: Ecological information

| | | |
|---|---|---|
| **Ecotoxicity** | The following are based on tests conducted with the active ingredients | |
| | **Toxicity to fish:** | **Slightly toxic to fish**<br>Paraquat<br>*Oncorhynchus mykiss* (rainbow trout):<br>$LC_{50}$ = 55 mg/L, 96 h<br>Diquat dibromide<br>*Oncorhynchus mykiss* (rainbow trout):<br>$LC_{50}$ = 21 mg/L as diquat ion, 96 h (static) |
| | **Toxicity to daphnia and other aquatic invertebrates:** | **Moderately toxic to aquatic invertebrates**<br>Paraquat<br>*Daphnia magna* (Water flea):<br>$EC_{50}$ = 6.1 mg/L, 48 h<br>Diquat<br>*Daphnia magna* (Water flea):<br>$EC_{50}$ = 5.9 mg/L as diquat ion, 48 h |
| | **Toxicity to algae:** | **Highly toxic to algae**<br>Paraquat dichloride<br>*Pseudokirchneriella subcapitata* (green algae):<br>$EC_{50}$ = 0.60 mg/L, 72 h<br>*Navicula pelliculosa* (freshwater diatom):<br>$E_rC_{50}$ = 0.00103 mg/L as diquat ion, 72 h<br>Diquat<br>*Navicula pelliculosa* (freshwater diatom):<br>$E_rC_{50}$ = 0.003 mg/L as diquat ion, 72 h |
| **Persistence and Degradability:** | Paraquat is persistent in water (Degradation half-life: > 30 d).<br>Diquat is persistent in water (Degradation half-life: > 30 d)<br><br>Paraquat is persistent in soil (Degradation half-life: ca. 20 y).<br>Diquat is persistent in soil (Degradation half-life: 11 - 41 y).<br><br>Paraquat is rapidly and strongly bound to soil particles, however it is biodegradable in soil pore water and will not accumulate in soils. | |
| **Mobility in Soil:** | Paraquat and diquat are immobile in soil. | |
| **Bioaccumulative Potential:** | Paraquat and diquat do not bioaccumulate | |

## Section 13: Disposal considerations

| | |
|---|---|
| **Disposal Methods:** | **Non-refillable containers:**<br>Triple rinse or preferably pressure rinse containers with water. Add the rinsings to the spray tank. DO NOT dispose of undiluted chemicals on site. If recycling, replace cap and return clean containers to recycler or designated collection point. If not recycling, break, crush or puncture and bury empty containers in a local authority landfill. If no landfill is available, bury the containers below 500 mm in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots. Empty containers and product should not be burnt.<br>**Refillable containers:**<br>Empty contents fully into application equipment. Close all valves and return to point of supply for refill or storage. |
| **Special Precautions for Incineration or Landfill:** | Not applicable |

## Section 14: Transport information

| **LAND TRANSPORT**<br>ADG | | | |
|---|---|---|---|
| **UN Number:** | 3016 | **Packing Group:** | III |
| **UN Proper Shipping Name:** | Bipyridilium Pesticides Liquid, N.O.S. (Paraquat and Diquat) | **Special Precautions for User:** | None allocated |
| **Transport Hazard Class:** | 6.1 | **Hazchem or Emergency Action Code:** | 2X |
| **Subsidiary Risk:** | None allocated | | |

| **SEA TRANSPORT**<br>IMDG | | | |
|---|---|---|---|
| **UN Number:** | 3016 | **Subsidiary Risk:** | None allocated |
| **UN Proper Shipping Name:** | Bipyridilium Pesticides Liquid, N.O.S. (Paraquat and Diquat) | **Packing Group:** | III |
| **Transport Hazard Class:** | 6.1 | **Environmental hazards for Transport Purposes:** | Marine pollutant |

| **AIR TRANSPORT**<br>IATA - DGR | | | |
|---|---|---|---|
| **UN Number:** | 3016 | **Subsidiary Risk:** | None allocated |
| **UN Proper Shipping Name:** | Bipyridilium Pesticides Liquid, N.O.S. (Paraquat and Diquat) | **Packing Group:** | III |
| **Transport Hazard Class:** | 6.1 | | |

## Section 15: Regulatory information

| | |
|---|---|
| **APVMA Product Number:** | 46516 |
| **Poisons Schedule (SUSMP):** | 7 |

## Section 16: Any other relevant information

**Date of preparation or last revision:** 20 October 2021

**Source of Data:** The information provided in this SDS is sourced from Syngenta internal studies which have been conducted according to Regulatory requirements including OECD and CIPAC Guidelines and EC Directives. A comprehensive package of toxicological and environmental data for the active ingredients of this product has been submitted to the government health and environment authorities and has been evaluated by expert toxicologists and environmental scientists.

**Note: This product is a registered agricultural chemical and must, therefore, be used in accordance with the container label directions**

**CONTACT POINT:** Regulatory Affairs Manager, Syngenta Australia Pty Ltd
(02) 8876 8444
**24 HOURS EMERGENCY CONTACT: 1800 033 111**

This Material Safety Data Sheet summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this SDS and consider the information in the context of how the product will be handled and used in the workplace including in conjunction with other products.
If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact this company.

**DISCLAIMER**
This product complies with the specifications in its statutory registration. Implied terms and warranties are excluded. Syngenta's liability for breach of the express or any non-excludable implied warranty is limited to product replacement or purchase price refund. The purchaser must determine suitability for intended purpose and take all proper precautions in the handling, storage and use of the product including those on the label and/or safety data sheet failing which Syngenta shall have no liability.

# APPENDIX B. SCHEDULE 15 AQR CALCULATION

MHFs include sites such as chemical manufacturing plants, LPG facilities, hydrocarbon storage and distribution terminals and logistics sites that store, handle or process large quantities of hazardous chemicals. The thresholds for hazardous materials are provided in Schedule 15 of the NSW WHS Regulation 2017 (Table 15.1 and Table 15.2). To determine if a facility is classified as MHF, Aggregate Quantity Ratio (AQR) need to be calculated. If there is more than one hazardous chemical present or likely to be present at the facility, the following aggregation formula must be used:

$$AQR = (q_x/Q_x) + (q_y/Q_y) + \ldots + (q_n/Q_n)$$

Where:

- x, y,…, n are the different Schedule 15 chemicals present.
- $q_x$, $q_y$,.., $q_n$ is the total quantity of each Schedule 15 chemical present or likely to be present.
- $Q_x$,$Q_y$,…,$Q_n$ is the relevant MHF threshold quantity for Schedule 15 chemical x,y…n.

If the AQR is > 0.1 the facility must notify and if the result is ≥ 1.0, the facility will be determined to be an MHF. Where Schedule 15 chemicals are present in mixtures, the relevant quantities of the hazardous chemicals, referred to as ‘active components’, must be calculated from their concentration in the mixture. For example, the active components in Syng Sprayseed 250 are paraquat and diquat with a total quantity of 5 tonnes in the mixture, which is used for AQR calculation.

The threshold quantity for toxic materials varies depending on the toxicity level of the materials. Table 15.3 of the NSW WHS Regulation 2017 specifies the criteria for 'toxic' and 'very toxic' materials based on their Lethal Dose (LD) and Lethal Concentration (LC) values. This approach has been used to determine the toxicity of Class 6.1 materials.

The AQR calculation for the proposed facility is summarised in Table B.1. As the AQR is between 0.1 and 1, the facility must notify SafeWork NSW and may be classified as an MHF if the regulator decides to hold a Determination Inquiry and, on inquiry determines the facility to be an MHF.

**Table B.1: AQR calculation**

| Material | DG Class | Sub class | PG | Quantity | Active component | Active component quantity (tonnes) | Schedule 15 threshold, $Q_x$ (tonnes) | Ratio, $q_x/Q_x$ | Comment |
|---|---|---|---|---|---|---|---|---|---|
| Nuf Fumitoxin tablets | 4.3 | 6.1 | I | 45 kg[(a)] | Phosphine | 0.015 | 20 | 0.001 | -Oral toxicity ($LD_{50}$): 8.7 mg/kg (aluminium phosphide)<br>-Dermal toxicity ($LD_{50}$) not reported<br>-Inhalation toxicity ($LC_{50}$): 0.015 mg/L (phosphine)<br>Given the inhalation toxicity level of material, it is considered 'very toxic' in the context of Schedule 15, with threshold quantity of 20 tonnes. As this is lower than the Class 4.3 threshold (i.e. 200 tonnes), this is selected for AQR calculation. |
| Syng Gramoxone Pro 360 | 8 | 6.1 | III | 5,000 L[(b)] | Paraquat | 1.8 | 20 | 0.09 | -Oral toxicity ($LD_{50}$): 283 mg/kg<br>-Dermal toxicity ($LD_{50}$)> 2,000 mg/kg<br>-Inhalation toxicity ($LC_{50}$): 0.01 mg/L based on calculation<br>Given the inhalation toxicity level of mixture, the material is considered 'very toxic' in the context of Schedule 15. As no threshold is specified for Class 8 materials, the threshold for 'very toxic' material is used for AQR calculation.<br>The toxic component in the mixture is paraquat. |
| Syng Pirimor 500WG | 6.1 | - | III | 500 kg | All | 0.5 | 200 | 0.003 | -Oral toxicity ($LD_{50}$): 87 mg/kg<br>-Dermal toxicity ($LD_{50}$)>2,000 mg/kg<br>-Inhalation toxicity ($LC_{50}$): 1.41 mg/L<br>Given the inhalation toxicity level, the material is considered 'toxic' in the context of Schedule 15. |
| Syng Sprayseed 250 | 6.1 | - | III | 20,000 L[(c)] | Paraquat/ Diquat | 5 | 20 | 0.25 | -Oral toxicity ($LD_{50}$): 93.4 mg/kg<br>-Dermal toxicity ($LD_{50}$)> 2,000 mg/kg<br>-Inhalation toxicity ($LC_{50}$): 0.03 mg/L<br>Given the inhalation toxicity level of mixture, the material is considered 'very toxic' in the context of Schedule 15,<br>The toxic components in the mixture are paraquat and diquat. |
| Alpha Boomblitz | 8 | 9 | II | 250 kg | - | - | - | 0 | No threshold provided for Class 8/Class 9 materials. |
| | | | | | | | **AQR** | **0.34** | **Must be notified** |

Notes:
(a) Phosphine quantity, 33% of total mass.
(b) Paraquat concentration: 360 g/L.
(c) Paraquat concentration: 135 g/L, Diquat concentration: 115 g/L.

# APPENDIX C. CONSEQUENCE MODELLING

## C1.1. Scenarios modelled

The following consequences were modelled to determine the potential impact:

- Release of $PH_3$ due to reaction of Nuf Fumitoxin tablets with water
  - Toxic dispersion
  - Flash fire/Vapour Cloud Explosion (VCE)
- Warehouse fire
  - Heat radiation impact
  - Toxic dispersion following thermal combustion

As the focus of this study is on toxic and hazardous materials, the toxic smoke modelling resulting from a warehouse fire was conducted only for the identified DGs (i.e. Class 4.3, Class 6.1, and Class 8), as they tend to contain toxic components and potentially pose a greater consequence footprint. The other materials proposed for onsite storage are expected to have effects in the event of a fire. The details of the consequence modelling for the identified scenarios are presented in Table C.1.

## C1.2. Heat radiation calculation

Consequence modelling for a warehouse fire was conducted using the Stefan-Boltzmann correlation. The emitted heat flux was calculated with the Stefan-Boltzmann Law:

$$E_{emitted} = e\sigma T^4$$

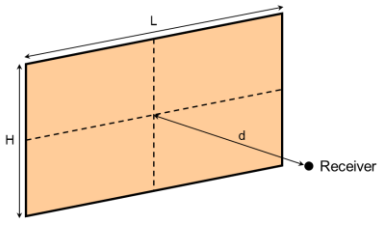
where E is the radiant emittance, $e$ is the emissivity, $\sigma$ is the Stefan-Boltzmann constant and T is the surface temperature (K).

The heat radiation experienced by the receptor was estimated using the view factor method, where d is the distance between the fire source and the receptor:

$$\emptyset = \frac{1}{2\pi}\left[\frac{a}{(1+a^2)^{1/2}} tan^{-1}\frac{b}{(1+a^2)^{1/2}} + \frac{b}{(1+b^2)^{1/2}} tan^{-1}\frac{a}{(1+b^2)^{1/2}}\right]$$

$$a = \frac{0.5\,H}{d}\,, a = \frac{0.5\,L}{d}$$

The figure below provides a graphical depiction of the parameters used in the calculation:



## Table C.1: Consequence modelling details

| Incident | Effects | Modelling tool | Key inputs and assumptions |
|---|---|---|---|
| Release of phosphine (reaction of Nuf Fumitoxin tablets with water) | Acute toxicity | EFFECTS,<br>Toxic dispersion model | -Three scenarios were covered: LOC from a single flask (1.5kg of tablets, case (21kg of tablets) and maximum proposed storage quantity (45kg of tablets)<br>-Phosphine formation on reaction with water assumed 33% as per SDS (i.e. maximum released mass of phosphine is 0.33*45=15 kg). |
| | Flash fire and heat radiation impact | EFFECTS,<br>Flammable cloud dispersion model | -The total released mass as above. |
| | Vapour cloud explosion and overpressure impact | EFFECTS,<br>Vapour cloud explosion model (Multi-Energy model) | -The total released mass as above.<br>-Curve No. 5 is selected for vapour cloud explosion modelling. |
| Warehouse fire | Toxic smoke and acute toxicity impact | EFFECTS,<br>Combustion products model<br>Plume rise from fires model | -Components average molecular formula and concentration/mass fraction as per SDSs.<br>-Total mass involving in the fire assumed equal to the maximum quantity proposed for onsite storage.<br>-Assumed that only a single material is involved in the fire.<br>-Assumed the maximum area of a spillage does not exceed a quarter of the warehouse surface area, as the drain is located in the middle of the warehouse. |
| | Fire and heat radiation impact | Stefan-Boltzmann law | -Assumed the fire remains contained within the warehouse and only escapes through weak points such as doors (e.g. door left open), and the concrete/masonry walls will remain standing. The fire is assumed to be equal to the area of the roller door (4.5 m height, 4 m width).<br>-Flames at roof height are elevated with reduced impact at ground level.<br>-The flame temperature is estimated to be around 1,200°C, as the warehouse fire involves polymeric packaging and solvents, which typically burn at this temperature. |

Notes:

(a) The 'Combustion products' model in EFFECTS requires the average molecular formula when the specific chemical is not available in the EFFECTS database. The information used to calculate average molecular formula for materials of interest is provided in Table C.2.

## Table C.2: Material ingredients and average molecular formula

| Trade name | Known ingredients | Concentration/weight fraction [(a)] |
|---|---|---|
| Alpha Boomblitz | -$Na_2CO_3$ (Sodium carbonate)<br>-$Na_5P_3O_{10}$ (Sodium tripolyphosphate)<br>-NaOH (Sodium hydroxide)<br>-$C_3Cl_2N_3NaO_3$ (Sodium dichloroisocyanurate) | -$Na_2CO_3$, 55%<br>-$Na_5P_3O_{10}$, 20%<br>-NaOH, 5%<br>-$C_3Cl_2N_3NaO_3$, 20%<br>Average molecular formula:<br>$Na_{1.93}C_1H_{0.16}O_{3.17}Cl_{0.23}P_{0.21}N_{0.35}$ |
| Nuf Fumitoxin tablets | -AlP (Aluminium Phosphide)<br>-$H_2NCOONH_4$ (Ammonium carbamate) | -AlP, 55%<br>-$H_2NCOONH_4$, 30%<br>-Unknown, 15%<br>Average molecular formula:<br>$Al_{0.7}P_{0.7}C_{0.3}O_{0.6}N_{0.6}H_{1.7}$ |
| Syng Gramoxone Pro 360 | $C_{12}H_{14}Cl_2N_2$ (Paraquat dichloride) | $C_{12}H_{14}Cl_2N_2$, 500 g/L (equivalent to 360 g/L paraquat) |
| Syng Pirimor 500WG | -$C_{11}H_{18}N_4O_2$ (pirimicarb)<br>-$Mg_3Si_4O_{10}(OH)_2$ (talc) | -$C_{11}H_{18}N_4O_2$, 70%<br>-$Mg_3Si_4O_{10}(OH)_2$, 20%<br>-Unknown, 10%<br>Average molecular formula:<br>-$C_{9.3}H_{15.6}N_{3.4}O_{3.5}Mg_{0.5}Si_{0.6}$ |
| Syng Sprayseed 250 | -$C_{12}H_{14}N_2Cl_2$ (Paraquat dichloride)<br>-$C_{12}H_{12}N_2Br_2$ (diquat dibromide) | -$C_{12}H_{14}N_2Cl_2$ ,186 g/L (equivalent to 135 g/L paraquat)<br>-$C_{12}H_{12}N_2Br_2$ ,215 g/L (equivalent to 115 g/L diquat)<br>Average molecular formula:<br>$C_{12}H_{13.1}N_2Cl_{1.1}Br_{0.9}$ |

Notes:

(a) For a mixture, the number of atoms per element in the average molecular formula is obtained by weighting the number of atoms of each element in the molecular formulas of the individual components by their respective mole fractions and summing these values.

# APPENDIX D. REFERENCES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