

DGL ENVIRONMENTAL PTY LTD

201 Five Islands Road, Unanderra NSW 2526

HS203 POLLUTION INCIDENT RESPONSE MANAGEMENT PLAN (PIRMP)

DOCUMENT CONTROL

Version	Date	Author	Change		
1.0	22/04/2015	JP	New document.		
2.0	11/07/2016	JP	Updated chemical register and storage locations.		
3.0	31/07/2017	JP	Updated chemical register and storage locations.		
4.0	16/03/2018	JP	Updated site plan, chemical register and storage locations.		
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6.0	02/10/2018	JP	Updated per EPA emailed comments (26/09/2018).		
7.0	16/08/2019	KM	Updated organisation structure, chemical register, equipment and adding online location of PIRMP.		
7.1	05/08/2020	КM	Updated company name, organisational chart, safety equipment.		
8.0	07/08/2020	JP	Reformatted document and updated figures with new company logo.		
8.1	11/08/2020	КM	Updates following testing		
8.2	24/03/2021	КM	Updated company logo and following testing after incident activation		
8.3	23/09/2021	КM	Updated evacuation diagrams		
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8.7	31/03/2025	КM	Updated emergency contact details & org chart		

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1. OVERVIEW

This Pollution Incident Response Management Plan (**PIRMP** or **Plan**) has been written to comply with the legislative requirements under the *Protection of the Environment Operations Act 1997* (**POEO Act**) and the *Protection of the Environment Operations (General) Regulation 2009*.

This Plan covers DGL Environmental Pty Ltd (**DGL**) Unanderra facility located at 201 Five Islands Road, Unanderra NSW 2526. The facility operates under an Environment Protection License (**EPL 5874**) administered by the NSW Environment Protection Authority (**EPA**).

Under the legislation referred above, the EPL requires a PIRMP to clearly document pollution risks, communication procedures to authorities and community regarding pollution incidents and testing and training for pollution response. The legislation requires DGL to implement the Plan if there is a pollution incident involving material harm or threatened material harm to human health or the environment.

The PIRMP contains the following sections as required by the regulation:

- **1. Background:** describes the main features of the regulation.
- 2. Hazard, probability and pre-emptive actions to prevent pollution incident risks: describes type of pollution incidents that may be possible and lists procedures that are already in place to minimize and manage pollution. Ranking of risks is included in appendices.
- **3. Maps:** locality map to show location of potentially affected neighbours and environmentally sensitive areas.
- 4. Emergency incident response procedures: what to do in case of material harm.
- **5.** Early warnings and communication to neighbours: when to contact neighbours in case of pollution incidents and information required for website.
- 6. **Training:** information to be passed on to staff and contractors.
- 7. Updating of plan: frequency of updates.
- 8. Testing: frequency of drills to test effectiveness of PIRMP.
- **9. Implementing of plan:** reference to legislation requirement to carry out aspects of the plan during a pollution incident.

1.1 Introduction

The Unanderra facility is owned and operated by DGL Environmental Pty Limited. The facility is licensed for the following scheduled activities:

- resource recovery;
- hazardous, restricted and general solid waste storage;
- hazardous liquid waste storage.

1.2 Purpose

This PIRMP is to improve the way pollution incidents are reported, managed and communicated to the general community.

The purpose of this Plan is to:

- A. Ensure comprehensive and timely communication about a pollution incident to staff at the premises, the Environment Protection Authority (EPA), other relevant authorities specified in the Act (such as local councils, NSW Ministry of Health, SafeWork NSW and Emergency Services) and people outside the facility who may be affected by the impacts of the pollution incident.
- B. Minimise and control the risk of a pollution incident at the facility by requiring identification of risks and the development of planned actions to minimise and manage those risks.
- C. Ensure that the Plan is properly implemented by trained staff, identifying persons responsible for implementing it and ensuring that the Plan is regularly tested for accuracy, currency and suitability.

The PIRMP will be activated only if material harm to human health or the environment occurs or threatens to occur.

The principal activities undertaken at the Unanderra facility are (a.) used lead acid battery recycling and (b.) wastewater treatment. Environmental management at the facility is subject to continuous improvement in operations, processes and practices. To accommodate these ongoing changes and to accommodate increases in facility specific environmental assessment and management, the Plan will be progressively reviewed.

This Plan is to clearly define the requirements of staff to report and respond to pollution incidents in accordance with the 2011 and 2012 changes to the POEO Act and the POEO (General) Regulation 2009.

1.3 Documentation

DGL has implemented a structured Environmental Management System (EMS) (HMC.EMS.18.001.01) to achieve a consistently high standard of performance. The EMS will strive to ensure DGL meets the obligations of its internal Environmental Policy and relevant legislation and standards.

HS707 Hazard Incident and Injury Register is used to keep record and monitor all health & safety and environmental incidents within the organisation. The register will assist with record keeping, reporting and determining improvements to incident response and review of the Plan.

2. PLAN COMPLIANCE

This Pollution Incident Response Management Plan complies with the requirements under the:

- Part 5.7A of the POEO Act
- Part 3A of POEO (General) Regulation 2009

The requirements under the legislation are supported by *the Environmental Guidelines: Preparation of Pollution Incident Response Management Plans,* which provides additional advice from the EPA on plan preparation.

Plan preparation is a requirement for holders of EPLs. The Unanderra facility operates under EPL 5874 and is therefore required to prepare a PIRMP and implement the PIRMP if and when an incident occurs.

3. HAZARD, PROBABILITY AND PRE-EMPTIVE ACTIONS TO PREVENT POLLUTION INCIDENT RISKS

3.1 Overview

This chapter deals with the POEO (General) Regulation 2009's Sections 98C(a) to 98C(f). These sections deal with the hazard, probability and pre-emptive actions which are similar processes to undertaking a risk assessment and providing appropriate control measures to minimise those risks.

3.2 Substances Having Potential Human Health Impacts

The substances currently processed or generated on site with potential to adversely impact human health include:

- Lead: Evidence shows that lead is a multi-targeted toxicant, causing effects in the gastrointestinal tract, hematopoietic system, cardiovascular system, central and peripheral nervous systems, kidneys, immune system, and reproductive system.
- **Cadmium**: Exposure to cadmium may cause gastrointestinal irritation, vomiting, abdominal pain, and diarrhoea. Longer term exposure to cadmium primarily affects the kidneys, resulting in tubular proteinosis although other conditions such as "itai-itai" disease may involve the skeletal system. Inhalation exposure to cadmium and cadmium compounds may result in effects including headache, chest pain, muscular weakness, pulmonary edema, and even death. An 8-hour TWA (time-weighted-average) exposure level of 5 mg/m3 has been estimated for lethal effects of inhalation exposure to cadmium, and exposure to 1 mg/m3 is considered to be immediately dangerous to human health.
- **Zinc:** Gastrointestinal distress is a common symptom of acute oral exposure to zinc compounds. Symptoms develop within 24 hours and include nausea, vomiting, diarrhoea, and abdominal cramps. High doses may result in gastrointestinal bleeding and subsequent hematological signs of anaemia.
- **Sulphuric Acid Mist:** Sulphuric acid mists have long been recognised as having the potential to cause short-term irritation of eyes and skin, etching of teeth, irritation of the lungs (chemical pneumonitis) and upper respiratory tract and nasal problems. In 1992 IARC classified strong acid mists containing sulphuric acid as a group 1 carcinogen.
- Strong Alkali Solutions: Strong alkali solutions are irritating and corrosive. They can cause severe burns and permanent damage to any tissue that it comes in contact with. The extent of damage to the gastrointestinal tract may not be clear until several hours after ingestion. Inhaled alkali salts can cause swelling of the larynx and an accumulation of fluid in the lungs. For example, contact with 25-50% sodium hydroxide solutions produces immediate irritation, while after contact with sodium hydroxide solutions of 4% or less, irritation may not develop for several hours.

More detailed toxicological information with respect to each of these substances is included in Appendix A and can be found in Safety Data Sheets (SDSs) for the relevant hazardous chemical that is stored, handled or used on premises.

3.3 Events or Scenarios Creating Increased Risk - Human Health Impacts

All personnel, visitors and contractors are required to comply with the PPE requirements for the various operational areas of the site. In normal operational circumstances, the PPE specified will offer sufficient protection to ensure there are no adverse health impacts through undertaking work activities or visiting the site.

Provided PPE and general safety requirements are observed, there are no likely scenarios that would result in increased risk to human health. Only highly improbable events/scenarios such as wilful acts, terrorist attack or impact by an aircraft could introduce increased human health risks.

3.4 Events or Scenarios Creating Increased Risk – Environmental Impacts

Liquids

In normal circumstances, the site first flush system acts as a secondary 'bund' to all operational activities. The key features of the site first flush system include:

- 1. Collection of all liquids at the lowest point on the site: Located adjacent to the south-eastern corner at the lowest elevation of the site, the first flush pit is the natural collection point for all liquids, stormwater, etc. arising and most particularly those arising in operational areas.
- 2. Capacity to hold 165kL: The first flush system has an operating capacity of 165kL. This is sufficient to retain the first 10mm of stormwater runoff from the operational footprint of the site or equivalent. In the event of a spill or loss of containment event, there will be no off-site impacts where all liquids are intercepted.

3. Emptying of first flush pit to storage tank is automated: The first flush pit is fitted with level sensors that automatically stop and start the first flush pit pumps. These pumps transport any captured liquids to storage tanks. The total storage tank volume typically available is 100kL. Typically, collected site stormwater will be harvested in this manner. Irrespective of the storage requirements for harvested stormwater, DGL will ensure the first flush system is always kept empty to cater for an unexpected onsite emergency.

Given the operation of the site first flush system as described above, the events potentially leading to increased environmental risk from the existing site operations would include:

- Power supply failure to the first flush pit pumps with a secondary storm event (assumes first flush pit is already full) coincident with a major loss of containment event involving the breach of another bund on-site. It is considered the coincidence of all these events to be most unlikely.
- Loss of containment from a bulk liquid tanker on-site but outside the catchment area of the first flush system.

Gases/Vapours

There are currently no processing operations that could result in major gas or vapour emissions from the site.

The risk assessment in Appendix B lists the main risk scenarios associated with the current activities being undertaken at the Unanderra facility, with the potential to impact human health or the environment. The risk assessment documents the likelihood of any such hazards occurring and the control measures that have been implemented to mitigate or manage the potential risks arising from those hazards.

3.5 Pollutant Types and Quantities

Refer to the Work Health and Safety Procedures: Hazardous Chemicals Management (HMC.PRO.18.021.01) which lists the substances, quantities and respective storage locations. A copy is attached to Appendix C.

4. MAPS OF SITE AND SAFETY EQUIPMENT LOCATIONS

This section covers the POEO (General) Regulation 2009 Section 98C(k) requirements which are (a.) detailed set of maps showing the location of the premises to which the license relates, (b.) the surrounding area that is likely to be affected by a pollution incident, (c.) the location of potential pollutants on the premise and (d.) the location of any storm water drains on the premises.

4.1 Site Geographic Location

Site identification information is provided in Table 1. A detail map of the site showing location of the premises and neighbours are shown in Figure 1.

Street Address:	201 Five Islands Road, Unanderra NSW 2526				
Lot Title:	Lot 3 in DP 259921				
Site Area:	20,000m ² approx.				
Current Land Use Zoning:	IN3 Heavy Industrial				
Local Government Area:	Wollongong City Council				
Adjoining Land Uses:	- North: Five Islands Road				
	- South: Bisalloy Steel				
	- East: M1 Princes Motorway				
	- West: BlueScope Steel Welded Products				

Table 1: Site Identification Summary

4.2 Location and Types of Safety Equipment

The following fire equipment/protocols exist at the site:

- One Fire Brigade Booster Unit (FBBU) (located internally at the entrance to the site;
- Six (6) fire hydrants with 10 L/s @ 250 kPa at the most hydraulically disadvantaged hydrant;
- Three (3) fire hose reels used for fighting wood, paper & plastic fires;
- Fifteen (15) dry powder fire extinguishers used for fighting electrical, flammable/combustible liquids & gases;
- Six (6) CO2 fire extinguishers used for fighting electrically energised equipment;
- Three (3) fire blankets used for fighting cooking oil & fat fires and clothing;
- Legislated routine fire equipment servicing;
- Regulatory Fire Safety Statement half yearly;
- Legislated Sydney Water non-return valves checking and certification annually; and
- Fire Warden training.

The following general safety equipment/protocols exist at the site:

- Site first flush system (primarily utilised for stormwater harvesting to minimise site potable water consumption);
- Four (4) general spill kits for any liquids;
- Two (2) fuel specific spill kit located adjacent to the diesel tank and Tanker Unloading area;
- One Emergency Services manifest box consistent with the requirements stipulated in the Work Health and Safety Regulation 2017;
- Take 5s, procedures and signage for areas storing chemicals;
- Works permits, hot work permits, confined space permits and isolation procedures;
- Barriers, dedicated unloading areas & walkways and green zones;
- Splash screens and guards;
- Handrailing and line marking;
- Four first aid kits;
- First aid training;
- Three (3) Emergency defibrator used for cardiac arrests; and
- Emergency exit signage.

Safety Equipment Generally Located Outdoors

Figure 2 shows the general site layout including the location of fire hydrants, spill kits and the emergency services manifest box close to the site entry point. Most of this equipment is located outside although two spill kits and two single fire hydrants are located indoors.

Safety Equipment Located Indoors

Appendix D provides emergency evacuation information for each building. Also included in each building diagram is the safety equipment layout within. Each individual building map shows the location of bathroom facilities, fire extinguishers, fire blankets, fire hose reels, first aid kits and emergency exit points.



Figure 1: Map of the DGL Facility and Surrounding Businesses



Figure 2: DGL Site Plan

5. EMERGENCY INCIDENT RESPONSE PROCEDURES

5.1 Internal Communications

Internal communications procedures are outlined in DGLE Emergency Plan v3.1.

5.2 Organisational Structure and Key Personnel

The DGL organisational structure is presented in Figure 3.

The most senior operational officer on-site at the time of a pollution incident event or a potential incident event will be responsible for the implementation of this Plan and initiation of the appropriate pollution incident response.

List of key personne	l and their	contact detail	s:
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Employee Name	Position	Contact No.			
Heath Pylyp	Operations Manager - NSW	0435 565 343			
Paul Tansey	HSE Compliance Officer	0438 168 801			
	BRP Team Leader	0472 868 795			
	WTP Team Leader	0423 575 872			

5.3 Action to be Taken Immediately After a Pollution Incident

This PIRMP must be followed in conjunction with DGLE Emergency Plan v3.1 immediately after a pollution incident occurs.

Procedures to be followed by the responsible person notifying the pollution incident:

Worker

- 1. Report incidents immediately to the Team Leader;
- 2. Assist with implementing controls in the event of a pollution incident;
- 3. Provide information as required.

Team Leader

- 1. Notify Management
- 2. Ensure the PIRMP and DGL Environmental Emergency Plan is made available to staff and authorised offices;
- 3. Provide advice on controls and containment measures;
- 4. Assistance with implementation of response actions to pollution incidents;
- 5. Obtain information from workers and witnesses.

Manager/Supervisor

- 1. Implement response actions to pollution incidents;
- 2. Obtain information required to adequately notify the EPA of an environmental emergency;
- 3. Contact all the regulatory authorities;
- 4. Communicate to neighbours and the local community;
- 5. Notify the General Manager / Operations Manager.

General Manager / Operations Manager

- 1. Launch an incident investigation and draft report;
- 2. Submit report to Directors and authorities.

5.4 Procedure to be Followed Following a Spill Incident

As discussed in Section 3.4, the combination of the site first flush system, the available tank capacity and the continuous ability to pump liquids from the 165kL first flush system will serve to prevent pollution incidents occurring (particularly with respect to off-site impacts) due to spillage and/or loss of containment events.

Minor spill events will likely be managed using the available spill kits on site.

In any significant spill or loss of containment event on site, all site personnel are trained to ensure the first flush system is fully functional as the primary pollution preventative measure. The precise procedures, checks and actions required to ensure satisfactory operation of the first flush system are covered under DGLE Emergency Plan v3.1.

For incidents involving material harm, the fire brigade or Hazmat would combat the pollution caused by a spill incident and become the emergency controller.

Pollution Incidents – Spills

A spill can be the release of any chemical or substance that may potentially enter stormwater, creeks, rivers, ground water or contaminate soil.

Clean-Up Action

All spillage and loss of containment incidents are required to be acted upon immediately. This is a separate action to that of notification. Clean-up actions/operations involve the cleaning/washing/hosing down of the site to ensure that all spilt substances have been consolidated to the first flush pit and transferred to the appropriate storage tank(s).

Where possible, clean-up actions and notification actions should be undertaken concurrently.

5.5 Procedure to be Followed Following an Air Incident

An air emission can include smoke, dust, odour or emission of a chemical or air impurity. There are no current processing operations likely to result in major gas or vapour emissions from the site leading to human health or environmental impacts.

5.4 External Communications – Government Agencies and Other Parties

POEO Act Section 153C states in relation to the contents of a PIRMP:

(c.) the procedures to be followed for coordinating, with the authorities or persons that have been notified, any action taken in combating the pollution caused by the incident and, in particular, the persons through whom all communications are to be made.

Evacuation

Major incidents such as bush fires or flooding, the highest officer of the company on site may consider evacuation of staff to appropriate distances away from the incident. Evacuation information for each building is presented in Appendix D. Also follow DGLE Emergency Plan v3.2.

5.6 Procedures for Notifying Pollution Incident to the EPA or Local Council

This is covered under Section 6.2 and in DGLE Emergency Plan v3.2.



Figure 3: DGL Environmental Organisational Chart

6. EARLY WARNINGS AND COMMUNICATIONS TO NEIGHBOURS

6.1 Communication and Consultation with Community

DGL had and would continue to undertake community and stakeholder consultation where necessary. DGL will continue to update the community where required.

Company Name	Site Address	Contact No.
BlueScope Steel Welded Products	203 Five Islands Road, Unanderra	4272 2544
Bisalloy Steels	18 Resolution Drive, Unanderra	4272 0444
Morrow Equipment Company	25 Resolution Drive, Unanderra	4272 2044
McKeon Swim Centre	1 Marley Place, Unanderra	4272 7272
Onsite Rental Group	6 Marley Place, Unanderra	4247 3400
Premium Tyre Service	2/6 Marley Place, Unanderra	4276 4090
Prokote	6 Marley Place, Unanderra	4272 3411

Refer below table for contact details of neighbouring businesses.

6.2 Website Information

This PIRMP has been written to comply with the legislative requirements under the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (General) Regulations 2009 Section 98D:

(2) A plan is also to be made publicly available in the following manner within 14 days after it is prepared: (a.) in a prominent position on a publicly accessible website of the person who is required to prepare the plan,

(b.) if the person does not have such a website, by providing a copy of the plan, without charge, to any person who makes a written request for a copy.

(3) Subclause (2) applies only in relation to that part of a plan that includes the information required under: (a.) Section 153C(a) of the Act, and

(b.) clause 98C(1) (h) and (i) or (2) (b) and (c) (as the case requires).

A copy of the PIRMP is accessible on the front page of the DGL website.

Emergency Incident Response Procedures

Under Part 5.7 of the POEO Act, there is a duty to notify each relevant authority (identified below) of a pollution incident, where material harm to the environment is caused or threatened. Material harm includes actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial or that results in actual or potential loss (refer definitions) or property damage of an amount over \$10,000.

For the above pollution incidents, DGL Management will be responsible for reporting to the authorities below without delay.

If there is an immediate threat to human health or the environment, call Emergency Services First on 000.

NSW EPA	131 555
The Ministry of Health (Wollongong Hospital) →ask for Public Health Officer on call	(02) 4222 5000
SafeWork NSW	131 050
Wollongong City Council	(02) 4227 7111

Early warnings for affected or potentially affected community members for any pollution incident are to be communicated to those members via a door knock process. The Operations Manager or nominated person will be responsible for coordinating the door knock.

For air pollution incidents that may affect neighbours, those neighbours will be asked to close their doors and windows and stay indoors until further notice.

For water pollution incidents that may affect neighbours who could access the contaminated water, those neighbours will be asked to avoid use of the water until further notice.

Regular updates of any pollution incidents will be via a letterbox drop to the local community, notices in local papers or via a door knocks as required.

6.3 Availability and Location of this Plan

The POEO (General) Regulation 2009 Section 98D(1) states:

(1) A plan is to be made readily available:

(a.) to an authorised officer on request, and (b.) at the premises to which the relevant licence relates, or where the relevant activity takes place, to any person who is responsible for implementing the plan.

Hard copies of the PIRMP are kept in the following buildings:

- Admin Building Meeting Room
- Site Office
- Logistics Office
- Battery Recycling Plant Control Room
- Liquid Treatment Plant Control Room

Electronic copy of the PIRMP is available on DGL's SharePoint server and on the website.

7. TRAINING

Necessary environmental management competencies have been determined for each of the broad positions within the organisation including:

- Managers
- All other employees

Training of prospect staff falls into several categories:

- Formal internal and external training
- Project/Facility Training Information provided on facility such as inductions and toolbox meetings

Details of the training records will be kept on DGL SharePoint server under HS704 Health and Safety Training and Competency Register.

The below information will also be included to comply with PIRMP training requirements:

- Awareness of the PIRMP
- Where this Plan can be accessed
- Pollution incident classification and reporting under this Plan
- Spill response actions under this Plan
- Other incident response actions under this Plan
- Early warnings internally and to neighbours where appropriate
- Specific procedures in dealing with potential pollution incidents e.g. spill response procedure

8. UPDATING OF PLAN

This Plan was first created on 22.04.2015. Updates to this Plan are recorded on the table titled 'Document Control'.

This Plan will be reviewed and updated according to the following:

- 12 months from the last update; or
- Within 1 month of a Category 1 incident; or
- As identified after testing of the Plan (refer Section 9); or
- Following an EPA audit of DGL Environmental Management Systems and/or PIRMP.

9. TESTING OF PLAN

The POEO (General) Regulation 2009 Section 98E states for testing of the Plan:

(1) The testing of a plan is to be carried out in such a manner as to ensure that the information included in the plan is accurate and up to date and the plan is capable of being implemented in a workable and effective manner.

(2) Any such test is to be carried out:

(a.) routinely at least once every 12 months, and

(b.) within 1 month of any pollution incident occurring in the course of an activity to which the license relates so as to assess, in the light of that incident, whether the information included in the plan is accurate and up to date and the plan is still capable of being implemented in a workable and effective manner.

Testing of the Plan will be integrated into other emergency and incident testing and training programs where possible.

Initial testing of the Plan will be undertaken within 6 months of the acceptance of the PIRMP. Design of the testing will be undertaken 1 month before the testing is conducted.

Records of the testing will be kept with the PIRMP.

Testing Dates

This Plan will be tested according to the following:

- 12 months from the last test, or;
- Design of the testing method will be 1 month before the initial date;
- Or before one month after a reportable incident (Category 1).

Recording of Testing

A detailed record of the testing of the Plan will be prepared after each testing of the Plan is undertaken. If the test identifies any shortcomings in the Plan, especially the implementation of the spill response procedures, the Plan will be corrected or appropriate non-conformance actions will be undertaken.

The PIRMP was last tested on **12 June 2024** following 12 months since last test.

10. IMPLEMENTATION OF THE PLAN

The POEO Act Section 153F requires the Plan to be implemented if a pollution incident occurs. A maximum fine of \$2 million apply for failing to implement the Plan.

Hence if a pollution incident occurs:

- It must be responded to according to this Plan and its reference documents;
- An incident investigation report must be completed.

Appendix A: Toxicological Information

Lead¹

The systemic toxic effects of lead in humans have been well-documented by the EPA (EPA, 1986a-e, 1989a, 1990) and ATSDR (1993), who extensively reviewed and evaluated data reported in the literature up to 1991. The evidence shows that lead is a multi-targeted toxicant, causing effects in the gastrointestinal tract, hematopoietic system, cardiovascular system, central and peripheral nervous systems, kidneys, immune system, and reproductive system.

The target blood lead level for general population in Australia has dropped from 10 μ g/dL to 5 μ g/dL. Slightly higher levels are tolerated for workers in lead processing industries. Given the potential impacts upon infants and children, care should be exercised before risking the potential exposure of women of child bearing age.

TARGET ORGANS/CRITICAL EFFECTS

Primary Target(s)

The effects of exposure to lead have been characterized much better in humans than in laboratory animals; the following targets have been identified in humans.

Central nervous system: neurobehavioral deficits in children and adults. Effects occur at lower blood levels in children.

Cardiovascular system: increased blood pressure in adults.

Red blood cells: interference with hemoglobin synthesis and erythropoiesis

<u>Kidney: nephropathy is a characteristic manifestation of lead toxicity; may be related to cardiovascular</u> <u>effects.</u>

Other Target(s)

1. Immune system: equivocal evidence of immunosuppression in humans

Liver: serum enzyme levels reduced

Gastrointestinal tract: symptoms of colic occur in both adults and children

Carcinogenicity

The results of documented studies do not provide evidence for a casual association between exposure to lead and mortality due to cancer at any specific sites. Elevated death rates for stomach and lung cancer were observed in some studies, but the analyses were based on small numbers of deaths, and exposures to other metals confounded interpretation of the results.

REFERENCE DOSE (RfD)

According to the EPA (1994b), the degree of uncertainty regarding the health effects of lead is very low. The critical effects that occur as a result of exposure to lead (changes in levels of certain blood enzymes, elevation of blood pressure, and neurobehavioral deficits in children) occur at exposure levels (measured as blood lead) so low as to be essentially without a threshold. Therefore, the EPA's RfD Work Group considers it inappropriate to develop an RfD for inorganic lead.

The Integrated Exposure Uptake Biokinetic (IEUBK) Model developed by the EPA is a site-specific method for estimating blood lead levels in children 0.5 to 7 years old based on multimedia exposures to lead in air, diet, drinking water, dust, soil, and paint (EPA, 1994c). Children are more sensitive to effects of lead than adults. The source contribution to lead uptake is predicted; mean distribution of lead in blood, bone, liver, and kidney is predicted, and finally, the frequency distribution for lead levels in a population of children is estimated assuming a log-normal distribution and a specified geometric standard deviation, which has a default value of 1.6. This model estimates the risk of blood levels in a child or a population of children exceeding 10 ug/dL, the level of

¹ The Risk Assessment Information System – RAIS - https://rais.ornl.gov/tox/profiles/lead.html

concern. A computer program is used for these calculations. Site-specific concentrations of lead in various media are used when available; otherwise default values are assumed. The EPA has established a screening level of 400 ppm (ug/g) for lead in soil (EPA, 1994a). This is the level above which there may be enough concern to conduct a site-specific study of risk to lead exposure.

Cadmium²

Acute oral exposure to 20-30 g have caused fatalities in humans. Exposure to lower amounts may cause gastrointestinal irritation, vomiting, abdominal pain, and diarrhea (ATSDR, 1989). An asymptomatic period of one-half to one hour may precede the onset of clinical signs. Oral LD₅₀ values in animals range from 63 to 1125 mg/kg, depending on the cadmium compound (USAF, 1990). Longer term exposure to cadmium primarily affects the kidneys, resulting in tubular proteinosis although other conditions such as "itai-itai" disease may involve the skeletal system. Cadmium involvement in hypertension is not fully understood (Goyer, 1991).

Inhalation exposure to cadmium and cadmium compounds may result in effects including headache, chest pains, muscular weakness, pulmonary edema, and death (USAF, 1990). The 1-minute and 10-minute lethal concentration of cadmium for humans has been estimated to be about 2,500 and 250 mg/m³, respectively (Barrett et al., 1947; Beton et al., 1966). An 8-hour TWA (time-weighted-average) exposure level of 5 mg/m³ has been estimated for lethal effects of inhalation exposure to cadmium, and exposure to 1 mg/m³ is considered to be immediately dangerous to human health (Friberg, 1950). Renal toxicity (tubular proteinosis) may also result from inhalation exposure to cadmium (Goyer, 1991).

TARGET ORGANS/CRITICAL EFFECTS

Oral Exposures - Primary Target(s)

- 1. Kidney: Renal tubular proteinuria is the primary toxic effect of long-term cadmium exposure.
- 2. Gastrointestinal tract: Acute exposure to high levels of cadmium and cadmium compounds may cause irritation, vomiting, nausea, and diarrhea.

Oral Exposures - Other Target(s)

The liver, bones, testes, and cardiovascular system have been shown to be affected to various degrees by cadmium.

Inhalation Exposures - Primary Target(s)

- 1. Kidney: Renal tubular proteinuria may result from chronic exposure to cadmium and cadmium compounds.
- 2. Lung: Inhalation exposure to cadmium dust, fumes, aerosols, and some cadmium compounds causes irritation of the respiratory tract, emphysema, and death for acute exposure to high cadmium concentrations.

Carcinogenicity

Classification-B1: Probable human carcinogen

Basis - Limited evidence from multiple occupational exposure studies showing an association between cadmium exposure and increased incidence of lung cancer. Adequate data are available showing a carcinogenic response to cadmium by rats and mice following inhalation exposure and parenteral administration.

REFERENCE DOSE (RfD)

<u>Chronic</u>

ORAL RfDc: 5E-4 mg/kg/day (water) (U.S. EPA, 1991) 1E-3 mg/kg/day (food) UNCERTAINTY FACTOR: 10 (for both food and water) MODIFYING FACTOR: 1 (for both food and water)

² The Risk Assessment Information System – RAIS - https://rais.ornl.gov/tox/profiles/cadmium.html

NOAEL: 0.005 mg/kg/day (water) 0.01 mg/kg/day (food) LOAEL: Not available CONFIDENCE: Study: Not applicable Data base: High RfD: High VERIFICATION DATE: 05/25/88 PRINCIPAL STUDY: The data supporting the RfD have been derived from many animal and human studies that have provided information on cadmium toxicity (renal toxicity using proteinuria as the critical effect) and the calculation of pharmacokinetic parameters regarding calcium absorption, distribution and excretion. COMMENTS: Due to background cadmium in the diet, no sub-chronic RfD was calculated.

Zinc³

Gastrointestinal distress is a common symptom of acute oral exposure to zinc compounds (ATSDR, 1989), particularly when zinc salts of strong mineral acids are ingested (Stokinger, 1981). Accidental poisonings have occurred as a result of the therapeutic use of zinc supplements and from food contamination caused by the use of zinc galvanized containers. Symptoms develop within 24 hr and include nausea, vomiting, diarrhea, and abdominal cramps (Stokinger, 1981; Elinder, 1986). The concentration in drinking water that can cause an emetic effect ranges from 675 to 2,280 ppm (Stokinger, 1981). High doses may result in gastrointestinal bleeding and subsequent hematological signs of anemia as was seen in the case of an individual taking zinc sulfate capsules (6.47 mg/kg/day) for one week (Moore, 1978).

Oral Exposures - Primary Target(s)

- 1. Blood: Copper deficiency and hypochromic microcytic anemia in humans chronically exposed. Anemia in <u>animals.</u>
- 2. Pancreas: Pancreatitis in humans acutely exposed, and in animals acutely, sub-chronically, or chronically exposed.
- 3. Gastrointestinal Tract: Vomiting, diarrhea, cramps, and possibly bleeding following acute or sub-chronic exposures in humans and animals.

Oral Exposures - Other Target(s)

- 1. Immune System: Possible impairment in humans following sub-chronic exposures.
- 2. Kidney: Renal lesions in animals following acute and sub-chronic exposures.
- 3. Developmental Effects: Reduced foetal growth in animals.
- 4. Reproductive Effects: Inhibition of reproduction in animals following sub-chronic exposures.
- 5. Skin: Hair loss in animals following sub-chronic exposure to zinc phosphide.

Inhalation Exposures - Primary Target(s)

1. Lung: Pulmonary congestion, leukocytic infiltration (zinc oxide); pneumonitis, ulceration, sub-pleural hemorrhage, and fibrosis (zinc chloride) in occupationally exposed workers most likely from acute exposures.

Inhalation Exposures - Other Target(s)

- 1. Blood: Leukocytosis, hypocalcemia in humans following acute exposures.
- 2. Gastrointestinal Tract: Possible ulcers in occupationally exposed workers.
- 1.3. Liver: Possible changes in hepatic enzymes in occupationally exposed workers.

Sulphuric Acid Mist⁴

Summary

 Sulphuric acid mist at high concentrations causes corrosion of the teeth and is irritating to the respiratory system, but long-term low concentration exposure can also cause cancer of the larynx.

³ The Risk Assessment Information System – RAIS - https://rais.ornl.gov/tox/profiles/zn.html ⁴ https://www.aioh.org.au/static/uploads/files/sulphuric-acid-position-paper-wfqrnbfbbivc.pdf

- The AIOH believes that exposure may be adequately controlled by conventional means such as local
 exhaust ventilation and segregation of workers from areas of high concentration.
- A standard to limit exposure to no more than 0.1 mg of sulphuric acid mist in each cubic metre of air is recommended for the measured inhalable fraction.

General Exposure Information

Sulphuric acid is a strong acid and will oxidise, dehydrate or sulphonate most organic compounds. Dehydration occurs because sulphuric acid has a strong affinity for water. It forms various hydrates when in contact with organic matter or water vapour. Although it is miscible with water, contact with water generates heat and may produce a violent reaction. The reaction with water releases toxic and corrosive fumes and mists. Sulphuric acid is non-combustible, but it can release flammable hydrogen gas when in contact with metals.

Sulphuric acid mists have long been recognised as having the potential to cause the following health effects (NSAA, 2013):

- Short-term irritation of eyes and skin.
- Irritant dermatitis (red, itchy, dry skin) and itching due to repeated exposure to low concentrations of mists or aerosols.
- Etching of teeth after a few weeks exposure, progressing to erosion after a few months exposure.
 Dental etching and erosion occurred about four times as frequently in a high exposure group (> 0.3 mgfm3) compared to a low exposure group (< 0.07 mgfm3).
- Irritation of the lungs (chemical pneumonitis) and upper respiratory tract after brief exposure to high concentrations of sulphuric acid mist and in severe cases may cause pulmonary oedema. Symptoms include coughing and shortness of breath and can be delayed until hours or days after the exposure.
- Nasal problems, throat irritation bronchial hyper reactivity and/or damage to the lining of the throat in the region of the larynx after repeated exposure to lower concentrations of the mist.

In 1992 IARC classified strong acid mists containing sulphuric acid as a group 1 carcinogen (known human carcinogen). IARC (2012) reaffirmed this classification for "mists from strong inorganic acids", noting that such mists cause cancer of the larynx. IARC (2012) also note that a positive association has been observed between exposure to mists from strong inorganic acids and cancer of the lung.

The National Toxicology Program (NTP, 2014) first listed "Strong Inorganic Acid Mists Containing Sulfuric Acid" as being 'Known to be human carcinogens' in 2000. They state that occupational exposure to strong inorganic acid mists containing sulphuric acid is specifically associated with laryngeal and lung cancer.

ACGIH (2011) maintain that sulphuric acid is a suspected human carcinogen that decreases lung function in individuals with pre-existing respiratory disease.

SCOEL (2012) found no evidence that sulphuric acid caused any signs of systemic toxicity upon penetration of the skin (penetration is via corrosion of the skin) hence there is no requirement for a 'Sk' notation.

It should be noted that the carcinogen classification is for inorganic acid mists containing sulphuric acid only and does not apply to sulphuric acid or sulphuric acid solutions where no mist or vapour is generated.

Strong Acid Solutions – (e.g. Sulphuric Acid)⁵

Summary - Health Impacts

Sulphuric acid is corrosive to all body tissues. Inhalation of vapor may cause serious lung damage. Contact with eyes may result in total loss of vision. Skin contact may produce severe necrosis. Fatal amount for adult: between 1 teaspoonful and one-half ounce of the concentrated chemical. Even a few drops may be fatal if the

⁵ https://pubchem.ncbi.nlm.nih.gov/compound/sulfuric_acid#section=EPA-Safer-Chemical

acid gains access to the trachea. Chronic exposure may cause tracheobronchitis, stomatitis, conjunctivitis, and gastritis. Gastric perforation and peritonitis may occur and may be followed by circulatory collapse. Circulatory shock is often the immediate cause of death. Those with chronic respiratory, gastrointestinal, or nervous diseases and any eye and skin diseases are at greater risk. (EPA, 1998)

<u>Contact with eyes or skin causes severe burns, the severity depending on the strength of the acid. Ingestion can cause severe irritation of mouth and stomach. (USCG, 1999)</u>

Carcinogen, Corrosive, Reactive - 2nd degree

Summary – Physical Properties

It is highly reactive and capable of igniting finely-divided combustible materials on contact. When heated, it emits highly toxic fumes. Avoid heat; water and organic materials. Sulfuric acid is explosive or incompatible with an enormous array of substances. Can undergo violent chemical change at elevated temperatures and pressure. May react violently with water. When heated, it emits highly toxic fumes. Hazardous polymerization may not occur. (EPA, 1998)

Strong Alkali Solutions – (e.g. Sodium Hydroxide)⁶

Acute Exposure

Sodium hydroxide is strongly irritating and corrosive. It can cause severe burns and permanent damage to any tissue that it comes in contact with. The extent of damage to the gastrointestinal tract may not be clear until several hours after ingestion. Inhaled sodium hydroxide can cause swelling of the larynx and an accumulation of fluid in the lungs. Contact with 25-50% solutions produces immediate irritation, while after contact with solutions of 4% or less, irritation may not develop for several hours. It may not be possible to correctly ascertain the degree of damage to eyes for up to 72 hours after exposure.

Respiratory

Inhalation of sodium hydroxide is immediately irritating to the respiratory tract. Swelling or spasms of the larynx leading to upper-airway obstruction and asphyxia can occur after high-dose inhalation. Inflammation of the lungs and an accumulation of fluid in the lungs may also occur.

People with asthma or emphysema may be more susceptible to the toxicity of this agent.

<u>Dermal</u>

Skin contact with solid sodium hydroxide or its concentrated solutions can cause severe burns with deep ulcerations. Burns appear soft and moist and are very painful. Although contact with concentrated solutions causes pain and irritation within 3 minutes, contact with dilute solutions may not cause symptoms for several hours.

<u>Ocular</u>

Eye exposure may produce diffuse or localized blood vessel clots and an accumulation of fluid in the eye. Softening, sloughing, and ulcerations of the cornea may occur. Ulcerations may continue to progress for many days. Severe injury can lead to clouding of the eye surface and blindness.

⁶ Information derived from the US Agency for Toxic Substances & Disease Registry at: https://www.atsdr.cdc.gov/mmg/mmg.asp?id=246&tid=45

Gastrointestinal

Ingestion of sodium hydroxide can cause spontaneous vomiting, chest and abdominal pain, and difficulty swallowing with drooling. Corrosive injury to the mouth, throat, esophagus, and stomach is extremely rapid and may result in perforation, hemorrhage, and narrowing of the gastrointestinal tract.

Carcinogenicity

Sodium hydroxide has not been classified for carcinogenic effects.

Reproductive and Developmental Effects

Sodium hydroxide dissociates within the body and would not reach the reproductive organs in an unchanged state. No data were located concerning reproductive endpoints in humans exposed to sodium hydroxide. Sodium hydroxide is not teratogenic in rats. Sodium hydroxide is not included in *Reproductive and Developmental Toxicants*, a 1991 report published by the U.S. General Accounting Office (GAO) that lists 30 chemicals of concern because of widely acknowledged reproductive and developmental consequences.

Appendix B: Environmental & Human Health Risk Assessment

Refer to following documents:

- Human Health Risk Assessment (EP Risk, 2018)
- Preliminary Hazard Analysis (Advitech, 2019)

Appendix C: Chemical Register

Business Name				Business Address					
DGL Environmental Pty Limited				201 Five Islands Road, Unanderra NSW 2526					
NA: None Allocated; N/A: Not Applicable (substance is not hazardous nor is the way the substance is being used hazardous); N/R: Not Required (substance is being used in accordance with the SDS and the purpose for which it is intended); REQ: Required (substance is being mixed or used in a manner that increase the risk controls required above those indicated on the SDS)									
Chemical/Trade Name	Storage Depot	DG Class	UN No.	Packing Group	Hazchem Code	Supplier v	Total Quantity ₹	SDS Issue Date	Chemical Risk Assessment Completed 🗸
Acetylene	STORE H	2.1	1001	NA	2SE	Supagas	50kg	05.05.2017	N/R
Activated Carbon	STORE A	N/A	N/A	N/A	N/A	Haycarb	20t	01.10.2016	N/A
Air Compressed	STORE H	2.2	1002	N/A	2T	Supagas	153kg	30.04.2017	N/R
Argon	STORE H	2.2	1006	N/A	2T	Supagas	76kg	09.06.2020	N/R
Batteries - Lead Acid	STORE D&E	8	2794	NA	2R	Hydromet	2000t	01.11.2015	YES
Battery Acid	STORE B	8	2796	-	2R	Hydromet	200t	01.11.2018	YES
Calcium Chloride Dihydrate	STORE A	N/A	N/A	N/A	N/A	Redox	10t	18.12.2015	N/A
Caustic Soda Liquid	STORE A	8	1824	-	2R	Redox	10t	03.11.2016	YES
CORE SHELL 71300	N/A	N/A	N/A	N/A	N/A	Nalco	100kg	10.06.2016	YES
Diatomaceous Earth	STORE A	N/A	N/A	N/A	N/A	Redox	30t	01.01.2016	N/A
Diesel	STORE I	9	3082		NA	Shell Australia	15t	18.07.2016	YES
Foamexit 8002	N/A	N/A	N/A	N/A	N/A	Ovivo	50L	08.03.2016	N/R
Gypsum Filter cake	STORE K	N/A	N/A	N/A	N/A	Hydromet	100t	01.06.2015	N/A
Hydrated Lime	STORE A	N/A	N/A	N/A	N/A	Cement Australia	80t	01.02.2017	N/A
Hydrochloric Acid 33%	STORE F	8	1789	-	2R	bxom	10t	22.06.2017	YES
Hydrogen Peroxide 20-60%	STORE B	5.1/8	2014	=	2P	Redox	5t	12.04.2016	N/R
Lead Grid	Store C	N/A	N/A	N/A	N/A	Hydromet	500t	01.06.2015	N/A
Lead Paste	Store C	N/A	N/A	N/A	N/A	Hydromet	500t	01.06.2017	N/A
LPG	STORE I	2.1	1075	NA	2YE	Supagas	100kg	10.12.2015	YES
Magnesium Oxide	STORE A	N/A	N/A	N/A	N/A	Swancorp	10t	23.10.2015	YES
NALCLEAR 7767	N/A	N/A	N/A	N/A	N/A	Nalco	100kg	10.06.2016	YES
NALCO 71D5 PLUS	N/A	N/A	N/A	N/A	N/A	Nalco	100kg	22.01.2018	YES
Oxygen	STORE H	2.2&5.1	1072	N/A	2S	Supagas	50kg	30.04.2017	N/R
Petrol Vortex 95	N/A	3	1203	-	3YE	Caltex	40L	03.11.2016	N/R
Phosphoric Acid	STORE F	8	1805	=	2R	Redox	50t	25.05.2018	YES
Quicklime	STORE A	N/A	N/A	N/A	N/A	Boral	20t	03.01.2020	YES
Sodium Sulphide	STORE A	8	1849	-	2X	Redox	5t	02.10.2015	N/R
Spent Caustic	STORE B	8	1824	-	2R	Hydromet	400t	01.06.2017	YES
Spent Chromic Acid	STORE B	8	1755	-	2X	Hydromet	100t	01.06.2017	YES
Spent Pickle Liquor	STORE B	8	1760	-	2X	Hydromet	250t	01.06.2017	YES
Sulphuric Acid <51%	STORE B	8	2796	-	2R	Redox	100t	29.07.2019	YES
Sulphuric Acid >51%	STORE B	8	1830		2P	Redox	50t	21.06.2019	YES
Sulphuric Acid 98%	STORE J	8	1830	I	2P	Incitec Pivot	50t	16.11.2016	YES
Supashield 52	STORE H	2.2	1956	N/A	2TE	Supagas	50kg	01.05.2016	N/R
Superfect	STORE A	N/A	N/A	N/A	N/A	Incitec Pivot	20t	27.02.2017	N/A
WAC Effluent	STORE B	N/A	N/A	N/A	N/A	South 32	20t	17.02.2017	N/R
Waste Polyethylene	N/A	N/A	N/A	N/A	N/A	Hydromet	20t	01 06 2017	N/A

Appendix D: Safety Equipment Locations









