



# OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN (WATER TREATMENT PLANT)

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<b>Approved By:</b>	Simon Thorn - Executive Manager Coffs Harbour Water
<b>Remarks</b>	Issued for Use

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## 1.0 BACKGROUND

### 1.1 Introduction

1.1.1 This document constitutes the Operational Environmental Management Plan (OEMP) for the operation of the Coffs Harbour Water Treatment Plant (WTP) to be undertaken by Coffs Harbour City Council (CHCC).

1.1.2 The WTP was approved by the Minister for Planning on 26<sup>th</sup> September 2007 under Section 75J of the Environmental Planning and Assessment Act 1979. It was recognised through the project approval process that there is a need for the management of environmental issues post construction, this OEMP has been prepared to provide a system for the implementation of the requirements stipulated in the project approval.

1.1.3 In conjunction with the requirements of the project approval the OEMP is consistent with the requirements for environmental management plans contained in the 'Guideline for the Preparation of Environmental Management Plans', Department of Infrastructure Planning and Natural Resources (2004). The OEMP, in conjunction with task specific Procedures and Checklists, forms the Environmental Management System for the operation of the WTP.

### 1.2 Project Description

#### 1.2.1 Location

1.2.1.1 The WTP is located on Upper Orara Road 11km to the west of Coffs Harbour CBD on the NSW Mid North Coast, situated at 130 m RL and is approximately 600 metres north east of Karangi Dam. The locality of the WTP is shown in *Appendix 1, Figure 1* and the site plan showing the location of the adjacent environmentally sensitive areas is provided in *Appendix 1, Figure 2*. The WTP is within a rural area that includes the following surrounds:

- Orara River and adjacent riparian zone situated on the north western boundary of the site. The riparian strip is zoned 7A Environmental Protection Habitat and Catchment and is outside the WTP footprint.
- Upper Orara Road winds past the southern edge of the site and is used for site access.
- The properties adjoining the site are zoned 1A Rural Agriculture with a large electricity substation to the north east along Casuarina Lane. The five closest neighbours are indicated as R1, R2, R3, R4 and R5 in *Figure 2, Appendix 1*.
- The Orara River riparian zone, the south western section of the site and the property to the south west of the site are mapped as being tertiary koala habitat.

#### 1.2.2 Operational Activities

1.2.2.1 The WTP has been designed to treat water at a maximum rate of 42 ML/day. The main items of the WTP providing treatment of the raw water from Karangi Dam are listed below and a schematic of the process shown in drawing WTP-DWG-P-200-01-0 contained in *Appendix 1*.

1.2.2.2 Raw water pump station and lime dosing facility:

- The pumps with new variable speed drives (VSD's) supplying the WTP with raw water
- Control valves for gravity supply of raw water
- Surge vessel including air compressors
- Lime feeder, batching and dosing system
- MCC, PLC, SCADA and communications network

1.2.2.3 Pre treatment and coagulation:

- Valves and flowmeters regulating flow of raw water
- Potassium Permanganate contact tank with mixer
- Powder Activated Carbon (PAC) contact tank with mixer
- Rapid mixing tank and mixers for coagulation

#### 1.2.2.4 Dissolved air floatation filtration

- Three Dissolved Air Flotation Filtration (DAFF) process trains comprising upstream flocculation tanks.
- Flocculator mixers
- DAF recycle pumps, saturators and air compressors
- Floated sludge skimmers
- Dual media filters, plenum floor and filter nozzles
- Backwash pumps and air scour blowers
- Filter pipework, valves and flowmeters

#### 1.2.2.5 Disinfection and treated water storage

- Ultraviolet disinfection system
- 5.8 ML Treated Water Storage Tank
- Treated water pump station
- Surge vessel

#### 1.2.2.6 Washwater recovery and sludge dewatering

- Washwater holding tank & transfer pumps
- Sludge thickener, thickened sludge transfer pumps and supernatant return pump station
- Thickened sludge storage tank and mixing pump
- Centrifuge, feed pumps, transfer conveyors, sludge bins and centrate tank

#### 1.2.2.7 Chemical dosing systems

- Chlorine gas storage and dosing
- Aluminium Sulphate (Alum) storage and dosing
- CO<sub>2</sub> storage and dosing
- Coagulant aid (liquid polymer) storage and dosing
- Filter aid (dry polymer) storage, batching and dosing
- Potassium Permanganate (KMnO<sub>4</sub>) storage, batching and dosing
- Powder Activated Carbon (PAC) storage, batching and dosing
- Sodium Hydroxide (Caustic Soda) storage and dosing
- Fluorosilicic Acid storage and dosing
- Sludge Thickener Polymer storage, batching and dosing
- Centrifuge Polymer storage, batching and dosing

#### 1.2.2.8 Miscellaneous systems

- Compressed air system
- Service water and sample water pumping systems
- Emergency storage lagoon and pump station

#### 1.2.2.9 Electrical, control and SCADA systems

- Instrumentation
- Main switchboards and MCC's

- PLC's and SCADA system
- Generator

1.2.2.10 The standard hours of operation are 7:00am to 3:30pm Monday to Friday and two to three hours on Saturdays and Sundays. Works outside of these hours is expected for the automatic operation of plant and the response required to alarms. These times will be reviewed during operation to determine if longer operator presence is required. The WTP will require three operators for standard operation.

### 1.3 OEMP Context

1.3.1 The WTP was considered a major project under State Environmental Planning Policy (Major Projects) 2005 through the definition of Water Supply Works with a capital investment value greater than \$30 million. The WTP facility was therefore considered to be a Major Project to which Part 3A of the EP&A Act 1979 applied.

1.3.2 The WTP was approved by the Minister for Planning on 26<sup>th</sup> September 2007 under Section 75J of the Environmental Planning and Assessment Act 1979. The project approval was conditional on the project being undertaken in accordance with the following:

- Project Application 06\_0285;
- The Coffs Harbour City Council Water Treatment Plant Environmental Assessment, prepared by the CIA and dated June 2007;
- The Coffs Harbour City Council Water Treatment Plant Submissions Report, prepared by the CIA and dated August 2007; and
- The conditions of approval, refer to **Appendix 2**.

1.3.3 Subsequent studies relevant to the operational environmental management of the WTP include:

- Blue Gum Removal Assessment, Coffs Harbour Water Treatment Plant 140 Upper Orara Road, Karangi. Ecological Australia, November 2007.
- Hazard and Operability Study (HAZOP) Report for Coffs Harbour City Council. Proposed Chlorine Storage and Chlorination Plant Section of Water Treatment Plant for Water from Karangi Dam. Whamcorp Pty Ltd, May 2008.

1.3.4 The documents listed above recognised the need for the management of environmental issues post construction, this OEMP has been prepared to provide a system for the implementation of the requirements stipulated in the project approval and subsequent studies.

1.3.5 All government agency and stakeholder consultation was undertaken during the preparation and finalisation of the EA and during the Public Exhibition Period. Government Authority submissions following the public exhibition period are provided in **Appendix 2 Table A2.3**. The licenses and approvals required for the operation of the WTP are included in **Appendix 3 Table A2.4**.

1.3.6 The CHCC is operating with an Integrated Management System (IMS) of which this OEMP forms part. Underneath the OEMP is a Permit to Work system, Standard Operating Procedures (SOPs) and forms that assist in the implementation of the OEMP.

1.3.7 The OEMP was approved in a letter from the Department of Planning dated 14 April 2009. Revision 1 of the OEMP dated 7 May 2009 was prepared and submitted to the Department of Planning in response to minor comments and suggestions following the review of Revision 0 dated 13 March 2009. The comments from the review of Revision 0 and how these have been addressed within Revision 1 are shown in **Appendix 2 Table A2.6**.

## 1.4 OEMP Objectives

1.4.1 The objectives of this OEMP involve providing a framework of processes and resources to minimise the environmental impacts associated with the operation of the WTP. The objectives include:

- Provide a process for the implementation of all the mitigation measures and safeguards identified in the project approval, EA, Submissions Report, Statement of Commitments, MCoA and any subsequent hazard and environmental studies relevant to the operation of the WTP;
- Providing a process to implement best management practice to minimise any potential impacts to the adjacent neighbours and surrounding sensitive environments such as the Orara River and adjacent riparian areas.
- Defining all obligations to regulatory authorities and providing guidance on implementing those obligations;
- Setting the processes required for resourcing and implementing the OEMP; and
- Define the processes of auditing, monitoring and recording the environmental performance of implementing this OEMP.

## 1.5 Environmental Policy



### Occupational Health and Safety, Environment and Quality Policy Statement

At Coffs Harbour City Council, we demonstrate a duty of care for the health and safety of all, the protection of the environment and provide high quality services to the community.

We aim to be at the forefront of occupational health and safety, environmental protection and quality performance by:

- Identifying and managing risks to health, safety and the environment to minimise the harmful effects that may result from exposure to those risks.
- Ensure budgetary allowances are planned for to ensure continuous improvement to the safety, environment and quality aspects of our operations.
- Manage incidents that do occur to minimise their harmful effects and to prevent recurrence.
- Continuously review and improve our management system, establishing measurable objectives and targets, which work towards excellence in safety, environmental protection and quality.
- Ensure compliance with all relevant legislative requirements and standards.
- Ensure all staff, suppliers and contractors are appropriately qualified and competent to carry out the tasks required of them.
- Promote safe and environmentally sound practices among the community and staff through instruction, training and education
- Consult with our staff, suppliers, contractors and community to enable them to contribute to decisions affecting their health, safety, welfare and the protection of the environment.
- Ensure clear accountability for safety, environment and quality at all levels.

We will implement this policy through the development of our integrated management system throughout all levels of the organisation.

**Approved by:** *Executive Team in consultation with staff.*

.....  
**Mayor**

.....  
**General Manager**

.....  
**OH&S Committee Chairperson**  
CHCC-M-POLS-001

**6 July 2006**

## 2.0 ENVIRONMENTAL MANAGEMENT

### 2.1 Environmental Management Structure and Responsibility

#### 2.1.1 Organisation

2.1.1.1 The initial WTP Organisation Chart for the operation of the WTP is provided in *Appendix 3*. A description of the roles and responsibilities for those roles identified in the organisation chart are as follows:

2.1.1.2 General Manager – Oversees the establishment of environmental policies and ensures that the policy objectives reflect the intentions of the council and remain up to date and relevant.

2.1.1.3 Director of City Services – Makes provision for adequate resources to be available for the implementation of the council policy objectives and provide feedback to the General Manager.

2.1.1.4 Executive Manager Coffs Harbour Water – Ensures that the SOPs are in place, cover all applicable works and include the procedures required to implement the management strategies contained in the OEMP.

2.1.1.5 Assistant Manager Treatment Process Control – Updates the SOPs as required and provides the Executive Manager Coffs Harbour Water with feedback on the implementation of the management strategies and provides recommendations on resource requirements.

2.1.1.6 Water Supply Headworks Superintendent – Supervises the daily activities on the WTP site and provides instruction on how these activities are to be undertaken for compliance with the SOPs. Provides recommendations on resource requirements to the Assistant Manager Treatment Process Control or Executive Manager Coffs Harbour Water.

2.1.1.7 Water Service Attendant – Undertake activities as instructed by the Water Supply Headworks Superintendent.

2.1.1.8 Contractors – Contractors are to be contractually required to undertake works in accordance with this OEMP and relevant SOP(s).

### 2.2 Approval and Licensing Requirements

2.2.1 A summary of the approval and licensing requirements is provided in *Appendix 2*.

### 2.3 Reporting

#### 2.3.1 Reporting

2.3.1.1 Reporting requirements have been tabled in *Appendix 2 – A2-5 Environmental Reporting Requirements*.

2.3.1.2 The compliance tracking program that has been prepared to provide a means of tracking the compliance with the requirements of the conditions of approval has been included in *Appendix 2 – Table A2-2*. The program is to be updated one month prior to the start of operation (for the initial submission of this OEMP) and then in conjunction with the environmental systems review (refer to Section 2.3.2).

#### 2.3.2 Environmental Management Review and Continuous Improvement

2.3.2.1 A review of the environmental systems to ensure the system's continuing suitability and effectiveness will be undertaken within 6 months of operation commencing then every 12 months thereafter.



### 2.3.3 OEMP Review

2.3.3.1 The OEMP shall be reviewed in conjunction with the review of the environmental systems and periodically updated (if required) to reflect knowledge gained.

2.3.3.2 Any changes to the OEMP are to be consistent with the objectives stated in Section 1.4.

### 2.3.4 Complaints

2.3.4.1 The CHCC approach to receiving and delegating community enquiries or complaints is to be consistent with the established central system through existing phone numbers and addresses published in phone books and websites. All enquiries are to be directed through either the CHCC enquiries line – phone number 66484000 or written enquiries to [coffs.council@chcc.nsw.gov.au](mailto:coffs.council@chcc.nsw.gov.au) or Locked Bag 155 Coffs Harbour NSW 2450.

2.3.4.2 The complaint / enquiry are referred to the responsible officer for action and response. Response times are to be in accordance with the following:

- Supply failure – two hours;
- Oral enquiry / complaint – one day; and
- Written enquiry / complaint – ten working days.

## 2.4 Environmental Training

### 2.4.1 Objective

2.4.1.1 The objective of the environmental inductions and training is to ensure that all personnel working on the project understand and are committed to:

- Preventing environmental harm.
- Complying with the incident management procedures.
- Achieving the required environmental outcomes.
- The implementation of the OEMP.
- Awareness and compliance with legislative requirements.

### 2.4.2 Induction Content

2.4.2.1 The inductions should cover to the extent practical:

- The applicable content and intent of the OEMP.
- The importance of conformance with the OEMP, and roles and responsibility in achieving conformance with the OEMP.
- Legal responsibilities and relevant conditions of approval.
- Significant on-site and off-site environmental issues and impacts (actual or potential) of their work activities, and the environmental benefits of improved personal performance.
- Individual responsibilities.
- Environmental management techniques for relevant elements such as waste, noise, and chemical storage.
- Incident Management. Specifically this will include:
  - Locations of the incident management plan and spill kits;
  - Actions to be taken in the event of different types of emergencies;
  - Responsibilities and authorities during an incident.

2.4.2.2 A register of who has been inducted is to be maintained at the WTP site.

### 2.4.3 Standard Operating Procedures

- 2.4.3.1 Standard Operating Procedures (SOPs) have been produced to provide standard and consistent detail on the steps required to operate the plant and achieve the desired water quality output. The mitigation measures identified to manage the risks of operating the WTP are to be incorporated into the applicable SOP.
- 2.4.3.2 Persons undertaking any operational works are to be trained in the relevant SOP and judged as being competent to carry out the works prior to being given approval to work without supervision. A register of who has been trained in an SOP and who has been deemed competent to undertake an activity is to be maintained.

## 2.5 Emergency Procedures

### 2.5.1 Emergency Preparedness and Response

- 2.5.1.1 An emergency plan has been prepared in accordance with condition of approval number 5.4 and included as *Appendix 4*.
- 2.5.1.2 DECC staff can be contacted 24-hours/day via the Pollution Line on 131 555 to provide urgent advice on cleaning-up an incident or on the disposal of any resulting waste materials.

### 2.5.2 Duty to Notify

- 2.5.2.1 There is a duty to report pollution incidents under section 148 of the Protection of the Environment Operations Act 1997 (POEO Act). A 'pollution incident' includes a leak, spill or escape of a substance, or circumstances in which this is likely to occur. Incidents should be reported to the DECC (being the regulatory body that must be notified) on 131 555.
- 2.5.2.2 The following people have a duty to notify a pollution incident occurring in the course of an activity that causes or threatens material harm to the environment:
1. The person carrying on the activity;
  2. An employee or agent carrying on the activity;
  3. An employer carrying on the activity; and
  4. The occupier of the premises where the incident occurs.
- 2.5.2.3 Notification must be given as soon practicable after the person becomes aware of the incident.
- 2.5.2.4 You don't have to report if council or the DECC has already been notified.
- 2.5.2.5 Only persons engaged in the activity resulting in the pollution incident, and occupiers of the land where the incident occurs, have a duty to report the incident.

## 3.0 IMPLEMENTATION

### 3.1 Risk Assessment

3.1.1 A risk assessment for the operation of the WTP has been provided within *Appendix 5*. This risk assessment is periodically reviewed and updated as part of the review of the environmental systems.

### 3.2 Safety Management System

3.2.1 A Safety Management System has been prepared in accordance with condition of approval 5.4 to document the safety related procedures, responsibilities and policies. The Safety Management Plan is provided in *Appendix 4*.

### 3.3 Environmental Management Activities and Controls

3.3.1 Environmental Control Plans (ECPs) have been developed to detail the actions and control measures to be undertaken during the operation of the WTP to provide for an acceptable level of environmental management.

3.3.2 ECPs have been produced for the following environmental controls and are shown within *Appendix 6*:

- Air Quality
- Cultural Heritage
- Flora and Fauna
- Hazardous Materials and Storage
- Noise and Vibration
- Soil and Water Quality
- Waste Minimisation and Management

## 4.0 MONITORING

### 4.1 Environmental Monitoring

4.1.1 The environmental monitoring requirements are set out within the ECPs contained in *Appendix 6*.

### 4.2 Auditing

#### 4.2.1 Environmental Auditing

4.2.2 Condition of approval 3.2 requires an independent environmental audit be undertaken within one year of the commencement of operation of the project. The independent person or team undertaking the audit are to be appropriately qualified and shall be approved by the Director General prior to the commencement of the audit. An environmental audit report is then to be submitted to the Director General within two months of completing the audit. The audit report is required to detail the findings and recommendations of the audit and any responses from CHCC relating to those recommendations.

#### 4.2.2 Hazard Auditing

4.2.3 Condition of approval 3.5 requires an independent environmental audit be undertaken within one year of the commencement of operation of the project. The independent person or team undertaking the audit are to be appropriately qualified and shall be approved by the Director General prior to the commencement of the audit. The hazard audit report is then to be submitted to the Director General within one month of completing the audit. The hazard audit is to be undertaken in accordance with Hazardous Industry Advisory Paper No5 – Hazard Audit Guidelines (DoP, 1991).

4.2.4 Further hazard audits are to be undertaken every three years (or as directed or agreed by the Director General) and a report for each audit submitted to the Director General for approval within one month of completion of the audit.

### 4.3 Non – Conformance, Corrective Action and Preventive Action,

4.3.1 An important aspect in any environmental program is the incorporation of preventive action strategies and the management of non-conformances, “incidents” or potential non-compliances. An environmental incident is defined as an event that either resulted in, or could have resulted in pollution of the local environment.

4.3.2 It is emphasised to all personnel working on the site that all incidents should be documented, investigations conducted and action plans established in order that the event does not occur again.

#### 4.3.1 Incident Investigation and Reporting

4.3.1.1 An environmental investigation includes the following basic elements:

- Identifying the cause, extent and responsibility of the incident;
- Identifying and implementing the necessary corrective action;
- Identifying the personnel responsible for carrying out the corrective action;
- Implementing or modifying controls necessary to avoid repetition;
- Recording any changes in the relevant SOP as required; and
- Advising the environmental authority.

4.3.1.2 The CHCC standard incident report form is provided in *Appendix 7*.

### **4.3.2 Corrective Action**

4.3.2.1 Any request for corrective action arising from the following may result in the raising of a Non-Conformance Report (NCR):

- Internal audits;
- External audits;
- Regulatory authority inspections; and
- Relevant community complaints (such as waste, noise, dust, water quality and so on).

4.3.2.2 The NCR system will:

- Specify the time for correction;
- Document the proposed corrective action;
- Nominate responsibility for rectifying the non-conformance; and
- Nominate responsibility for following-up the NCR.

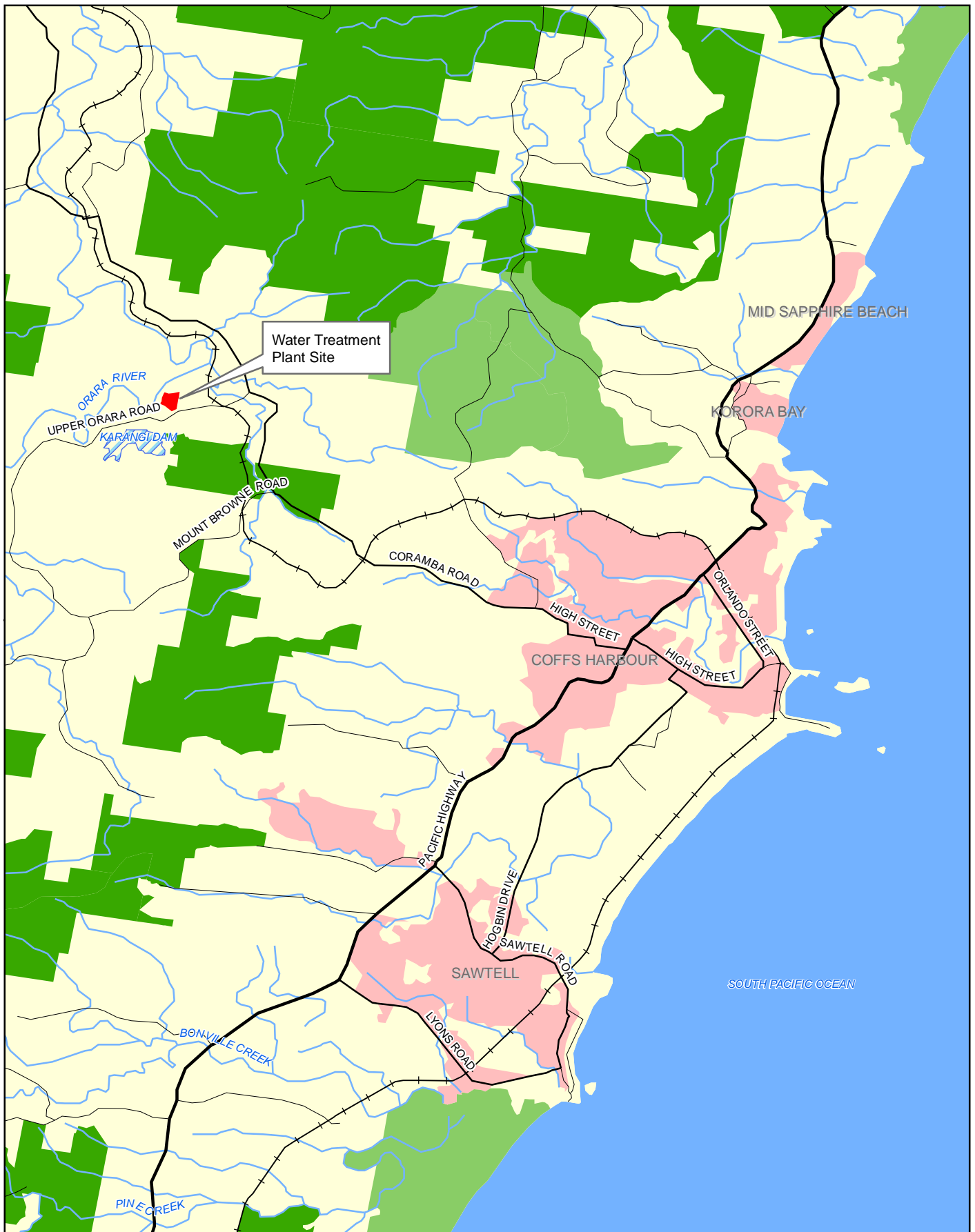
### **4.3.3 Preventive Action**

4.3.3.1 This OEMP provides processes to prevent the occurrence of non-conformities. Preventive measures include:

- Familiarisation with this OEMP and the ECPs;
- Preparation of SOPs that identify environmental safeguards and mitigation measures to be implemented for that activity;
- Regular toolboxing of environmental issues and reminder of environmental safeguards and mitigation measures; and
- Reporting of 'near miss' incidents so that the necessary corrective measures can be adjusted and / or incorporated into the OEMP or SOP.

# Appendix 1      Figures

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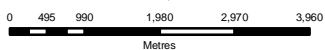
GRID



LEGEND

- |                  |               |                      |                               |
|------------------|---------------|----------------------|-------------------------------|
| — Minor Road     | —+— Railways  | ■ Built Up Areas     | ■ Forestry Reserve            |
| — Principal Road | — Watercourse | ■ Town/Rural/Storage | ■ Nature Conservation Reserve |
| — Secondary Road | ■ Seas        |                      | ■ WTP Site                    |

1:100,000



Geographic Coordinate System  
Horizontal Datum: Geodetic Datum of Australia 1994



CLIENTS | PEOPLE | PERFORMANCE

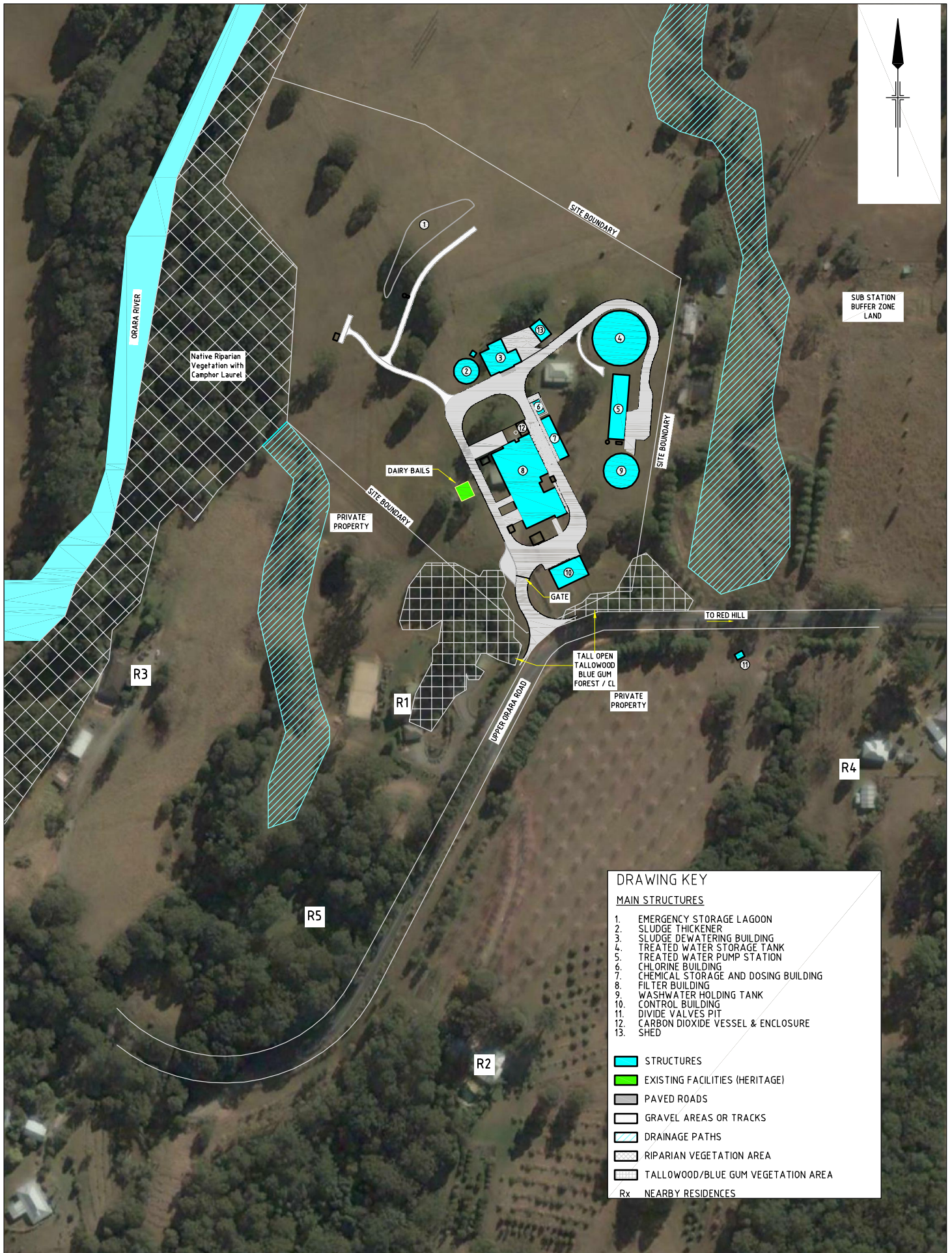
Coffs Harbour City Council  
Water Treatment Plant

job no. | 31-18991-11  
rev no. | B

Regional Location

Figure 1

4 | March 2009



**DRAWING KEY**

**MAIN STRUCTURES**

1. EMERGENCY STORAGE LAGOON
2. SLUDGE THICKENER
3. SLUDGE DEWATERING BUILDING
4. TREATED WATER STORAGE TANK
5. TREATED WATER PUMP STATION
6. CHLORINE BUILDING
7. CHEMICAL STORAGE AND DOSING BUILDING
8. FILTER BUILDING
9. WASHWATER HOLDING TANK
10. CONTROL BUILDING
11. DIVIDE VALVES PIT
12. CARBON DIOXIDE VESSEL & ENCLOSURE
13. SHED

**LEGEND**

- STRUCTURES
- EXISTING FACILITIES (HERITAGE)
- PAVED ROADS
- GRAVEL AREAS OR TRACKS
- DRAINAGE PATHS
- RIPARIAN VEGETATION AREA
- TALLOWOOD/BLUE GUM VEGETATION AREA
- Rx NEARBY RESIDENCES



**COFFS INFRASTRUCTURE ALLIANCE**  
 Level 5, 145 Eagle St Brisbane  
 QLD 4000 Australia  
 GPO Box 668 Brisbane QLD 4001  
 T 61 7 3316 3000 F 61 2 9219 7772  
 E ciarail@cia.optusincite.com



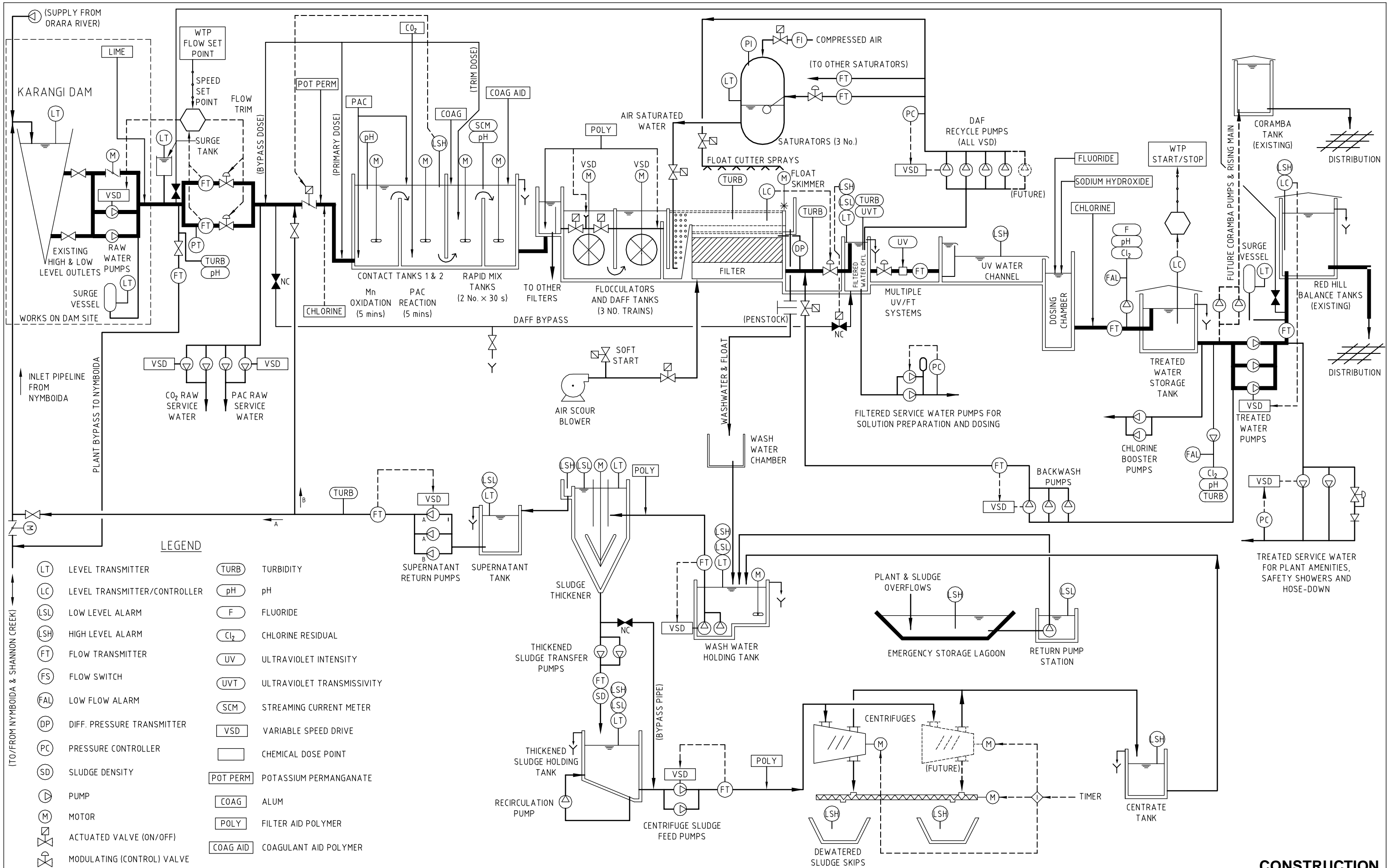
**CLIENTS | PEOPLE | PERFORMANCE**

**COFFS HARBOUR CITY COUNCIL  
 WATER TREATMENT PLANT  
 INDICATIVE LOACTION OF  
 ENVIROMENTALLY SENSITIVE AREAS**  
 scale | NTS for A4 date | 25/02/09

job no. | 31-18991  
 rev no. | C

**Figure 2**





**CONSTRUCTION**

0	ISSUED FOR CONSTRUCTION	RB	GCM*	GCM*	30.07.08	
No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Checked	Approved	Date

Plot Date: 31 July, 2008 - 12:55 PM Cad File No: G:\31118991\CADD\Drawings\WTP-DWG-P-200-01.dwg



**COFFS INFRASTRUCTURE ALLIANCE**  
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Drawn R.MARRIOTT  
 Drafting Check R. ANDERSON\*  
 Approved G. MODULON\*  
 Date 30.07.08  
 Scale NOT TO SCALE

Designed M.CHAPMAN  
 Design Check G. MODULON\*  
 This Drawing must not be used for construction unless signed as Approved

Client **COFFS HARBOUR CITY COUNCIL**  
 Project **WATER TREATMENT PLANT**  
 Title **PROCESS FLOW DIAGRAM**  
 Original Size **A1**  
 Drawing No: **WTP-P-200-01-0**

## Appendix 2

## Approvals and Permit

**A2-1 STATUTORY LEGISLATION / STATUES:**

Occupational Health and Safety Act 2000

Occupational Health and Safety Regulation 2001

Workplace Injury Management and Workers' Compensation Act 1998

Workers Compensation Act 1987

Environmental Planning and Assessment Act, 1979

Environmental Planning and Assessment Regulation, 2000

Protection of the Environment Operations Act 1997

National Parks and Wildlife Act 1974

Environmental Protection and Biodiversity Conservation Act 1999

Native Vegetation Act 2003

Waste Avoidance and Resource Recovery Act 2001

Heritage Act 1997

Environmentally Hazardous Chemicals Act 1985

Native Title Act 1993 Soil Conservation Act 1938

Forestry Act 1916

Water Act 1912

Noxious Weeds Act 1993

Wetlands Policy of the Commonwealth Government of Australia 1997

Threatened Species Conservation Act 1995

Roads Act 1993

Environmental Protection and Biodiversity Conservation Act 2001

Local Government Act 1993

Threatened Species Conservation Act 1995

Crown Lands Act 1989

Fisheries Management Act 1994

Rural Fires Act 1997

Rivers and Foreshores Improvement Act 1948

## A2-2 CONDITIONS OF APPROVAL - WATER TREATMENT PLANT

The conditions and modifications required as part of Department of Planning approval for the Coffs Harbour WTP works are to be added following the final approval from the Minister.

### Conditions of Approval

Number	Condition	Area Addressed
ADMINISTRATIVE CONDITIONS		
1.1	The Proponent shall carry out the project generally in accordance with the: <ul style="list-style-type: none"> <li>a) Major Project Application 06_0285;</li> <li>b) <i>Coffs Harbour City Council Water Treatment Plant Environmental Assessment</i>, prepared by Coffs Infrastructure Alliance and dated June 2007;</li> <li>c) <i>Coffs Harbour City Council Water Treatment Plant Submissions Report</i>, prepared by Coffs Infrastructure Alliance and dated August 2007; and</li> <li>d) the conditions of this approval</li> </ul>	Throughout the CEMP and OEMP
1.2	In the event of an inconsistency between: <ul style="list-style-type: none"> <li>a) the conditions of this approval and any document listed from condition 1.1a) to 1.1c) inclusive, the conditions of this approval shall prevail to the extent of the inconsistency; and</li> <li>b) any document listed from condition 1.1a) to 1.1c) inclusive, and any other document listed from condition 1.1a) to 1.1c) inclusive, the most recent document shall prevail to the extent of the inconsistency.</li> </ul>	Noted
1.3	The Proponent shall comply with any reasonable requirement(s) of the Director-General arising from the Department's assessment of: <ul style="list-style-type: none"> <li>a) any reports, plans or correspondence that are submitted in accordance with this approval; and</li> <li>b) the implementation of any actions or measures contained in these reports, plans or correspondence.</li> </ul>	Noted
1.4	This project approval shall lapse five years after the date on which it is granted, unless the works the subject of this approval are physically commenced on or before that time	Construction works commenced 15 October 2007. Operation programmed to start mid April.
1.5	The processing capacity of the water treatment plant shall not exceed 42 megalitres per day	Noted – included within the plant design.

## Conditions of Approval

Number	Condition	Area Addressed
1.6	The Proponent shall ensure that all licences, permits and approvals are obtained as required by law and maintained as required with respect to the project. No condition of this approval removes the obligation for the Proponent to obtain, renew or comply with such licences, permits or approvals	Section 2.2 and Appendix A3-4.
SPECIFIC ENVIRONMENTAL CONDITIONS		
2.1	The Proponent shall employ soil and water management controls to minimise soil erosion and discharge of sediments and other pollutants to lands and/or waters during site preparation and construction activities, in accordance with <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom, 2004)	Undertaken during construction period. Site landscaped, drains established for operation.
2.2	The Proponent shall design, construct, maintain and operate the project such that the water produced by the project meets the performance targets listed in Table 5.3 of the document referred to under condition 1.1b) of this approval and the water quality parameters within the ' <i>Australian Drinking Water Guidelines</i> ' (NHMRC, 2004)	Included within the plant design, proved during commissioning. Ongoing monitoring of plant water quality in accordance with SOPs.
2.3	The Proponent shall design, construct, maintain and operate the project such that there is no discharge of wastewater from the site to the surrounding environment during the operational life of the project. This condition does not apply to supernatant returned to Karangi Dam, wastewater directed to sewer or wastewater trucked from the site in the event of an emergency	Noted – included within the plant design.
2.4	The Proponent shall only undertake site preparation and construction activities associated with the project (other than sheet piling, pile driving and any similar impulsive or tonal noise activities), that would generate an audible noise at any residential premises during the following hours: <ul style="list-style-type: none"> <li>a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;</li> <li>b) 8:00 am to 1:00 pm on Saturdays; and</li> <li>c) at no time on Sundays or public holidays.</li> </ul> <p>This condition does not apply in the event of a direction from police or other relevant authority for safety reasons.</p>	Addressed during construction within CEMP – Appendix 6
2.5	The Proponent shall only undertake sheet piling, pile driving and any similar impulsive or tonal noise activities during the following hours: <ul style="list-style-type: none"> <li>a) 9:00 am to 12:00 pm and 2:00 pm to 5:00 pm, Mondays to Fridays, inclusive;</li> <li>b) 9:00 am to 1:00 pm on Saturdays; and</li> <li>c) at no time on Sundays or public holidays.</li> </ul> <p>Where these activities are undertaken for a continuous three hour period and are audible to noise sensitive receptors, a minimum respite period of at least one hour shall be scheduled before activities re-commence</p>	Addressed during construction within CEMP – Appendix 6.

## Conditions of Approval

Number	Condition	Area Addressed
2.6	The hours of construction and impulsive/ tonal noise activities specified under conditions 2.4 and 2.5 of this approval may be varied with the prior written approval of the Director-General. Any request to alter the hours of construction or impulsive/ tonal activities specified under conditions 2.4 and 2.5 shall be: <ol style="list-style-type: none"> <li>considered on a case-by-case or activity-specific basis;</li> <li>accompanied by details of the nature and need for activities to be conducted during the varied construction hours; and</li> <li>accompanied by sufficient information for the Director-General to reasonably determine that activities during the varied construction hours will not adversely impact on the acoustic amenity of receptors in the vicinity of the site</li> </ol>	Addressed during construction within CEMP – Appendix 6.
2.7	The Proponent shall design, construct, operate and maintain the project to ensure that operational noise contributions from the project at the most-affected residential receptor do not exceed an $L_{Aeq(15\text{-minute})}$ noise level of 35 dB(A) at any time. For the purpose of monitoring compliance with this condition, noise contribution from the project shall be measured at the nearest affected point on or within the site boundary in accordance with the NSW Industrial Noise Policy	Refer to Appendix 6 – ECP Operational Noise
2.8	The Proponent shall construct the project in a manner that minimises dust impacts generated by the construction works, including wind-blown and traffic-generated dust, on the receiving environment, including sensitive receivers and road users	Addressed during construction within CEMP – Appendix 6.
2.9	The Proponent shall not permit any offensive odour, as defined under section 129 of the <i>Protection of the Environment Operations Act 1997</i> , to be emitted beyond the boundary of the site at any time	Refer to Appendix 6 – ECP Operational Waste
2.10	Prior to the commencement of construction of the project (except for construction of those works that are outside the scope of the hazard studies), the Proponent shall submit for the approval of the Director-General, the following pre-construction studies: <ol style="list-style-type: none"> <li>a <b>Hazard and Operability Study</b> for the proposed chlorination plant and associated alarm system chaired by an independent qualified person approved by the Director-General. The study shall be carried out in accordance with the Department's <i>Hazardous Industry Planning Advisory Paper No. 8 – HAZOP Guidelines</i> (DUAP, 1995). The study report shall be accompanied by an implementation program for all recommendations made in the report. If the Proponent intends to defer the implementation of a recommendation, justification shall be included.</li> <li>a <b>Final Hazard Analysis</b> for the proposed chlorination plant prepared in accordance with the Department's <i>Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis</i> (DoP, 1992). If the final design is unchanged from the design at the project approval stage, the Proponent may request in writing an exemption from this condition from the Director-General</li> </ol>	<ul style="list-style-type: none"> <li>Peter Hunt Whamcorp Pty Ltd approved as chair DoP letter dated 22<sup>nd</sup> April 2008.</li> <li>HAZOP held on 6<sup>th</sup> May 2008.</li> <li>HAZOP approved as appropriate in letter from DoP dated 24<sup>th</sup> July 2008.</li> <li>Exemption from FHA approved by DoP 3<sup>rd</sup> November 2008.</li> </ul>
2.11	The Proponent shall ensure that all artefacts recovered from the site are provided to the Coffs Harbour and District Local Aboriginal Land Council and Gumbula Julipi Elders and that those parties are permitted to redeposit the artefacts following completion of project-related disturbance works. The location(s) for redeposition of artefacts shall be identified by the Proponent in consultation with the DECC	Refer to Appendix 6 – ECP Cultural Heritage

## Conditions of Approval

Number	Condition	Area Addressed
2.12	In the event that any material of potentially high cultural significance is uncovered during any stage of the project, all disturbance works in the vicinity of the object(s) shall cease immediately, and the DECC, the Coffs Harbour and District Local Aboriginal Land Council and Gumbula Julipi Elders contacted to determine an appropriate course of action prior to re-commencement of work in the vicinity of the object(s)	Addressed during construction within CEMP – Appendix 6.
2.13	The area around the Dairy Bails building shall be fenced prior to commencement of construction works to avoid any construction impacts to the building. The Proponent shall prepare and implement a conservation and maintenance strategy for the Dairy Bails building to preserve the heritage significance of this building in accordance with NSW Heritage Office guidelines	Refer to Appendix 6 – ECP Cultural Heritage.
2.14	<p>Prior to the commencement of construction of the project, the Proponent shall prepare and submit for the approval of the Director-General an <b>Urban Design and Landscaping Plan</b> to detail design treatments and landscaping measures for the project. The Plan shall be prepared in consultation with affected landowners surrounding the site, and shall include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li>a) landscape elements and built elements, including proposed treatments, finishes and materials of exposed surfaces (including colour specifications and samples);</li> <li>b) landscaping to be undertaken to provide visual screening of the site to affected properties and to revegetate areas affected by construction;</li> <li>c) a schedule of species to be used in landscaping and revegetation;</li> <li>d) identification of existing trees that will be retained on the site;</li> <li>e) timing and progressive implementation of landscaping works; and</li> <li>f) procedures and methods to monitor and maintain landscaped or rehabilitated areas</li> </ul>	<p>Urban Design and Landscape Plan submitted to the DoP on 10 Oct 2007. Plan resubmitted on 8 Feb 08 following amendments and updates.</p> <p>The Progressive implementation, monitoring and maintenance of landscape works is detailed in Appendix 6 – ECP Flora and Fauna</p>
2.15	The large, hollow-bearing Sydney Blue Gum on the site shall be retained and protected during construction and operation of the project. The Proponent shall not destroy or otherwise affect the tree without the prior agreement of the Director-General, and only should the retention of the tree pose safety concerns to life and/ or property, as verified by a qualified arborist	<p>Sydney Blue Gum has been removed following verification of safety concerns by a qualified arborist and an ecological assessment.</p> <p>DoP letter dated 18<sup>th</sup> Jan 2008 approving the removal of the Sydney Blue Gum.</p>
2.16	All waste generated by the project shall in the first instance be beneficially reused and recycled, otherwise the wastes shall be disposed to a waste facility lawfully permitted to accept the materials	Refer to Appendix 6 – ECP Waste
2.17	The Proponent shall ensure that all wastes generated as a consequence of the project are assessed and classified in accordance with <i>Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes</i> (DEC, 2004)	Refer to Appendix 6 – ECP Waste

### Conditions of Approval

Number	Condition	Area Addressed
COMPLIANCE MONITORING AND TRACKING		
3.1	<p>The Proponent shall develop and implement a <b>Compliance Tracking Program</b> to track compliance with the requirements of this approval. The Program shall include, but not necessarily limited to:</p> <ul style="list-style-type: none"> <li>a) provisions for periodic review of the compliance status of the project against the requirements of this approval;</li> <li>b) provisions for periodic reporting of compliance status to the Director-General;</li> <li>c) a program for independent environmental auditing at least annually, or as otherwise agreed by the Director-General, in accordance with <i>ISO 19011:2002 - Guidelines for Quality and/ or Environmental Management Systems Auditing</i>;</li> <li>d) a program for compliance reporting and auditing for hazard related operational requirements; and</li> <li>e) mechanisms for rectifying any non-compliance identified during environmental auditing or review of compliance</li> </ul>	This table constitutes the compliance tracking program and is to be updated as required.
3.2	<p>Within one year of the commencement of operation of the project, and then as may be directed or agreed by the Director-General, the Proponent shall commission an independent person or team to undertake an <b>Environmental Audit</b> of the project. The independent person or team shall be approved by the Director-General prior to the commencement of the Audit. The Audit shall:</p> <ul style="list-style-type: none"> <li>a) be carried out in accordance with <i>ISO 19011:2002 - Guidelines for Quality and/or Environmental Management Systems Auditing</i>;</li> <li>b) assess compliance with the requirements of this approval, and other licences and approvals that apply to the project;</li> <li>c) assess the environmental performance of the project against the predictions made and conclusions drawn in the documents referred to under condition 1.1 of this approval; and</li> <li>d) review the effectiveness of the environmental management of the project, including any environmental impact mitigation works</li> </ul>	Refer to Section 4.2.1
3.3	<p>An <b>Environmental Audit Report</b> shall be submitted to the Director-General within two months of the completion of the Audit, detailing the findings and recommendations of the Audit and including a detailed response from the Proponent to any of the recommendations contained in the Report</p> <p>The Director-General may require the Proponent to undertake reasonable works to address the findings or recommendations presented in the Report in relation to compliance with this approval. Any such works shall be completed within such time as the Director-General may require</p>	Refer to Section 4.2.1



## Conditions of Approval

Number	Condition	Area Addressed
3.4	<p>Three months after the commencement of operation of the project, the Proponent shall submit a <b>Hazards Study Compliance Report</b> to the Director-General detailing compliance with conditions 2.10 and 5.4 of this approval. The Report shall include:</p> <ul style="list-style-type: none"> <li>a) dates of each hazards study, and commencement of construction and commissioning;</li> <li>b) actions taken or proposed to implement the recommendations made in each hazards study;</li> <li>c) responses to any requirement imposed by the Director-General under condition 1.3 with respect to each hazards study;</li> <li>d) verification that the Emergency Plan required under condition 5.4a) is effectively in place and that at least one emergency exercise has been conducted;</li> <li>e) verification that the Safety Management System required under 5.4b) has been fully implemented and that records required by the system are being kept;</li> <li>f) certification by the Proponent that the each hazards study has been undertaken or prepared in accordance with the relevant Hazardous Industry Planning Advisory Paper;</li> <li>g) certification by the Proponent that all recommendations in each hazards study have been implemented; and</li> <li>h) certification by the Proponent that all safety systems have been implemented and are being maintained</li> </ul>	Refer to Section 4.2.2
3.5	<p>Within one year of the commencement of operation of the project, or within such further period as the Director-General may agree, the Proponent shall commission an independent person or team to undertake a comprehensive <b>Hazard Audit</b> of the project. The independent person or team shall be approved by the Director-General prior to the commencement of the Audit. The Hazard Audit report shall be submitted to the Director-General within one month of the completion of the audit. Hazard Audits shall be carried out at the Proponent's expense, and in accordance with the Department's <i>Hazardous Industry Planning Advisory Paper No 5 – Hazard Audit Guidelines</i> (DoP, 1991). Further audits shall be carried out every three years, or as directed or agreed by the Director-General, and a report of each audit shall be submitted to the Director-General for approval within one month of the completion of the audit</p>	Refer to Section 4.2.2
COMMUNITY INFORMATION, CONSULTATION AND INVOLVEMENT		
4.1	<p>Prior to the commencement of construction of the project, the Proponent shall ensure that the following are available for community complaints for the life of the project (including construction and operation):</p> <ul style="list-style-type: none"> <li>a) a telephone number on which complaints about the project may be registered;</li> <li>b) a postal address to which written complaints may be sent; and</li> <li>c) an email address to which electronic complaints may be transmitted.</li> </ul> <p>The telephone number, the postal address and the email address shall be advertised in a newspaper circulating in the locality on at least one occasion prior to the commencement of construction and six-monthly intervals thereafter until conclusion of construction works. The telephone number, the postal address and the email address shall also be provided on the website or dedicated web pages referred to under condition 4.3 of this approval</p>	<p>Telephone number established - (02)6648 4000.          Postal address – Locked Bag 155 Coffs Harbour 2450.          Email address – <a href="mailto:coffs.council@chcc.nsw.gov.au">coffs.council@chcc.nsw.gov.au</a>.</p> <p>1<sup>st</sup> advertisement – Coffs Coast Advocate 06/10/07, Coffs District</p>

## Conditions of Approval

Number	Condition	Area Addressed
		Independent 11/10/07. 2 <sup>nd</sup> advertisement – Coffs District Independent 01/05/08. 3 <sup>rd</sup> advertisement – Coffs District Independent 11/12/08 All contact details provided on the website.
4.2	<p>The Proponent shall record details of all complaints received through the means listed under condition 4.1 of this approval in an up-to-date Complaints Register. The Register shall record, but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li>a) the date and time, where relevant, of the complaint;</li> <li>b) the means by which the complaint was made (telephone, mail or email);</li> <li>c) any personal details of the complainant that were provided, or if no details were provided, a note to that effect;</li> <li>d) the nature of the complaint;</li> <li>e) any action(s) taken by the Proponent in relation to the complaint, including any follow-up contact with the complainant; and</li> <li>f) if no action was taken by the Proponent in relation to the complaint, the reason(s) why no action was taken.</li> </ul> <p>The Complaints Register shall be made available for inspection by the Director-General upon request</p>	<p>Complaint register established for construction.</p> <p>Operation enquires and complaints through CHCC central system as detailed in Section 2.3.4.</p>
4.3	<p>Prior to the commencement of construction of the project, the Proponent shall establish and maintain a new website, or dedicated pages within its existing website for the provision of electronic information associated with the project. The Proponent shall publish and maintain up-to-date information on this website or dedicated pages including, but not necessarily limited to:</p> <ul style="list-style-type: none"> <li>a) information on the development and the current implementation status of the project;</li> <li>b) a copy of this approval;</li> <li>c) a copy of each relevant environmental approval, licence or permit required and obtained in relation to the project;</li> <li>d) a copy of each monitoring program and each environmental management required under this approval, or details of where a member of the public may inspect those documents;</li> <li>e) details of environmental performance of the project;</li> <li>f) details of the outcomes of reviews and audits of the project; and</li> <li>g) details of a contact point(s) to which community complaints or inquiries may be directed, including a telephone number, a postal address and an email address</li> </ul>	<p>Website updated 04/10/07.</p> <p>Website has been periodically updated as required to show the progression of construction through to operation.</p>

## Conditions of Approval

Number	Condition	Area Addressed
ENVIRONMENTAL MANAGEMENT		
5.1	<p>Prior to the commencement of site preparation works, the Proponent shall nominate a suitably qualified and experienced Environmental Representative(s) whose appointment is to receive prior approval of the Director-General. The Proponent shall employ the Environmental Representative(s) on a full-time basis, or as otherwise agreed by the Director General, during construction of the project. The Environmental Representative shall be:</p> <ul style="list-style-type: none"> <li>a) the primary contact point in relation to the environmental performance of the project;</li> <li>b) responsible for all Management Plans and Monitoring Programs required under this approval;</li> <li>c) responsible for considering and advising on matters specified in the conditions of this approval, and all other licences and approvals related to the environmental performance and impacts of the project;</li> <li>d) responsible for receiving and responding to complaints in accordance with conditions 4.1 and 4.2 of this approval; and</li> <li>e) given the authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur.</li> </ul> <p>The Proponent shall notify and seek the approval of the Director-General to any changes to that appointment that may occur during construction of the project</p>	<p>Appointment of Jeff Green as Environmental Representative and Paul Shepherd as the Alternate Environmental Representative approved by the Director General on 09/10/07.</p> <p>No requirement following the end of construction phase of the project.</p>
5.2	The Proponent shall implement the <b>Construction Environmental Management Plan</b> (CIA-WTP-CEMP-001, dated 28 August 2007), prepared by the Coffs Infrastructure Alliance throughout the construction of the project.	Noted. Updated revisions of CEMP have remained consistent with the 28 August 2007 version.

## Conditions of Approval

Number	Condition	Area Addressed
5.3	<p>An <b>Operation Environmental Management Plan</b> shall be prepared and implemented in accordance with the Department's publication <i>Guideline for the Preparation of Environmental Management Plans</i> (DoP, 2004) or its latest revision. The Plan shall include but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li>a) identification of all statutory and other obligations that the Proponent is required to fulfil in relation to operation of the project, including all approvals, licences, approvals and consultations;</li> <li>b) a description of the roles and responsibilities for all relevant employees involved in the operation of the project, including a management organisational chart illustrating the reporting relationships;</li> <li>c) overall environmental policies and principles to be applied to the operation of the project;</li> <li>d) standards and performance measures to be applied to the project, and a means by which environmental performance can be periodically reviewed and improved, where appropriate; and</li> <li>e) management policies to ensure that environmental performance goals are met and to comply with the conditions of this approval.</li> </ul> <p>The Plan shall be submitted for the approval of the Director-General no later than one month prior to the commencement of operation of the project, or within such period otherwise agreed by the Director-General. Operation shall not commence until written approval has been received from the Director-General</p>	Noted. OEMP to be submitted one month prior to the commencement of operation
5.4	<p>As part of the Operational Environmental Management Plan for the project required under condition 5.3 of this approval, the Proponent shall prepare and implement the following plans and documents:</p> <ul style="list-style-type: none"> <li>a) a comprehensive <b>Emergency Plan</b> detailing emergency procedures for the proposed water treatment plant. The plan shall include detailed procedures for the safety of all people outside of the project site who may be at risk from the development. The plan shall be in accordance with the Department's <i>Hazardous Industry Planning Advisory Paper No. 1, 'Industry Emergency Planning Guidelines'</i>; and</li> <li>b) a document setting out a comprehensive <b>Safety Management System</b>, covering all on-site operations involving hazardous materials, The document shall clearly specify all safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to the procedures. Records shall be kept on site and shall be available for inspection by the Director-General or nominee upon request. The Safety Management System shall be developed in accordance with the Department's <i>Hazardous Industry Planning Advisory Paper No. 9, 'Safety Management'</i></li> </ul>	Refer to Appendix 4.
ENVIRONMENTAL REPORTING		
6.1	The Proponent shall notify the Director-General of any incident with actual or potential significant off-site impacts on people or the biophysical environment as soon as practicable and within 24 hours after the occurrence of the incident. The Proponent shall provide full written details of the incident to the Director-General within seven days of the date on which the incident occurred	Noted

Conditions of Approval

Number	Condition	Area Addressed
6.2	The Proponent shall maintain a register of accidents, incidents and potential incidents with actual or potential significant off-site impacts on people or the biophysical environment. The register shall be made available for inspection at any time by the independent qualified person or team conducting a Hazard Audit or Environmental Audit, the Director-General or nominee	Noted
6.3	The Proponent shall meet all reasonable requirements of the Director-General to address the cause or impact of any incident, as it relates to this approval, reported in accordance with condition 6.1 of this approval, within such period as the Director-General may require	Noted

## A2-3

**GOVERNMENT AUTHORITY RESPONSE TO THE EA – WATER TREATMENT PLANT**

## Government Authority Submissions Following Public Exhibition of the EA

Department	Government Response	Area Addressed
DECC	<ul style="list-style-type: none"> <li>Wastewater management – main concern was the discharging of polluted waters from the site. Agreement that setting of backwash material and returning supernatant back to Karangi Dam as well as the addition of the emergency storage lagoon will help avoid any discharge</li> </ul>	Noted
NSW Health – North Coast Area Health Service	<ul style="list-style-type: none"> <li>Emergency storage lagoon should be designed in such a way as to minimise the potential for any water at all to be stored in it, either from pumping or following rainfall, to ensure it does not become a mosquito breeding site.</li> <li>Early consultation should occur with NSW Health regarding the design and nature of the fluoridation of the water supply.</li> </ul>	Noted, incorporated into the design. CHCC to undertake consultation with NSW Health regarding the fluoridation system as early as possible.
DPI	<ul style="list-style-type: none"> <li>No agricultural, mining or forestry issues.</li> <li>Noted that the removal of the Coramba pipeline avoids fisheries issues from the proposal at this stage. Pipeline route and watercourse crossings will require appropriate assessment by the Aquatic Habitat Protection Unit within DPI when that proposal is finalised.</li> </ul>	Noted

## A2-4 LICENCES APPROVALS AND PERMITS – WATER TREATMENT PLANT

Legislation and the licenses and approvals / permits required to be obtained under the relevant legislation is listed in the following Table

Legislation, licenses, approvals and permits relevant to the Water Treatment Plant

Legislation	Relevance to the Project	Approval / License Requirements	Approval/ License Obtained (Yes/No)	Approval / License Reference No.	Staff Responsible
Environmental Planning and Assessment Act 1979	Planning and development approval	Department of Planning to approve Environmental Assessment subject to certain conditions.	Yes. Approval obtained prior to construction.	06_0285	
Environmentally Hazardous Chemicals Act 1985	Storage of chemicals	None of the chemicals being used on site are the subject of a chemical control order or declared chemical waste as defined in the Act.	NA	NA	
Heritage Act 1977	Dairy Bails have been assessed as being of local heritage significance.	Dairy Bails to be retained and protected, no license requirements.	NA	NA	
Local Government Act 1993, Section 60	A Council must obtain approval for the construction or extension of a water treatment plant	Approval pending	Pending. Approval sought 26 July 2007.		
Local Government Act 1993 and Local Government (General) Regulation 2005	Council approval is required to install and operate an onsite sewage system.	On site Disposal System Application to completed and lodged with Council.	No - Pending		
National Parks and Wildlife Act 1974, Section 91	If a person becomes aware of an Aboriginal object on the WTP site and does not notify the Director – General within a reasonable time period is guilty of an offence under the Act.	No approval or license requirements	NA	NA	
Noxious Weeds Act 1993	Council are required to notify the local control authority within three days of discovering that a 'notifiable weed' is on the	No approval or license requirements	NA	NA	

## Legislation, licenses, approvals and permits relevant to the Water Treatment Plant

Legislation	Relevance to the Project	Approval / License Requirements	Approval/ License Obtained (Yes/No)	Approval / License Reference No.	Staff Responsible
	property. Council must control noxious weeds to which a weed control order applies to the extent that the weed will not spread to adjoining property.				
Occupational Health and Safety Act, 2000	Council are required to provide a safe working environment	No approval or license requirements	NA	NA	
Occupational Health and Safety Regulation, 2001	Dangerous Goods are to be stored on site in quantities that exceed the quantities specified in Schedule 5.	WorkCover are required to be notified of the type, quantity and use of dangerous goods on site within 14 days after the obligation to notify arises.	WorkCover notified 14 <sup>th</sup> Jan 2009. Unique reference number 2446620265320	NA	
Protection of the Environment Operations Act 1997, Section120	Prohibits activities that cause water pollution except under license.	No licensing requirements. Noted that without a license pollution of waters is prohibited.	NA.	NA	
Protection of the Environment Operations Act 1997, Schedule 1	Scheduled activities require a license to operate. Applies to the storage of chemicals (>200 tonnes liquefied gas and 2000 tonnes of any other chemical) and the generation, storage, transport and disposal of industrial, hazardous, Group A or Group B waste.	No licensing requirements at this stage. To monitor chemical storage thresholds and classification of waste.	NA	NA	
Waste Avoidance and Resource Recovery Act 2001	Resource efficiency and waste reduction and management in relation to regions, industry sectors and resources is to be implemented in accordance with the objectives of the Act.	No licensing requirements. Waste is to be managed in accordance with the objectives of the Act.	NA	NA	



## A2-5

## ENVIRONMENTAL REPORTING REQUIREMENTS

## Environmental Reporting Requirements

Report	Content	Distribution	Frequency	Section of OEMP	Responsibility
<b>Compliance Tracking Program</b>	Review of the compliance status of the project against the requirements of the conditions of approval. Results of independent environmental auditing. Mechanisms for rectifying any non conformances.	Director-General Department of Planning	The program is to be updated one month prior to the start of operation (for the initial submission of the OEMP) and then in conjunction with the environmental systems review (refer to Section 2.3.2)	Section 2.3.1 Table A3-2	EMCHW
<b>Environmental Audit report</b>	Details the findings and recommendations of the independent environmental audit to be undertaken within one year of commencement of operation.	Director-General Department of Planning	Within two months of the completion of the audit.	Section 4.2	EMCHW
<b>Hazards Study Compliance Report</b>	Details compliance with conditions of approval 2.10 (HAZOP for Chlorine infrastructure) and 5.4 (emergency plan and safety management system).	Director-General Department of Planning	Three months after the commencement of operation.	Section 2.3.1	EMCHW
<b>Hazard Audit Report</b>	Details the findings and recommendations of the hazard audit for the project that is to be undertaken within one year of the commencement of operation.	Director-General Department of Planning	Within one month of completion of the hazard audit.	Section 4.2	EMCHW
<b>Complaints Register</b>	Record of details for any complaint. To include date/time, nature of the complaint, action taken and any follow up contact.	Provided to the Director-General on request.	Recorded as needed and reported on request.	Section 2.3.4	EMCHW
<b>Incident Reporting</b>	Details of any incident with actual or potential significant off-site impacts on people or the biophysical environment.	Director-General Department of Planning	As soon as practicable and within 24 hours after the occurrence of the incident.  Full written details are to be provided within seven days.	Section 2.5.2	S
<b>Incident Register</b>	Record of accidents, incidents and potential incidents.	Director-General or nominee on request and the person or team conducting the Hazard or Environmental Audit.	The Director-General or nominee on request and during the hazard or environmental audit.	Section 2.5.2	S

Note – EMCHW = Executive Manager Coffs Harbour Water

- S = Plant Superintendent

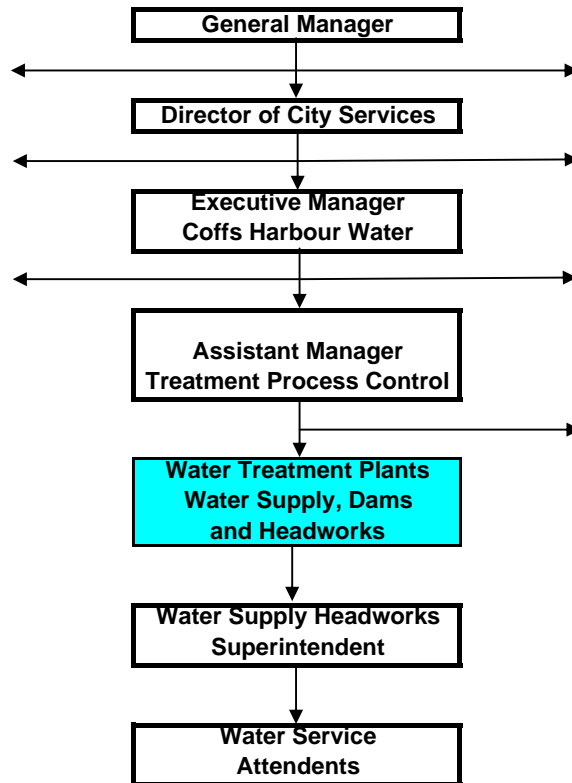
## A2-6 OEMP REVIEW

### OEMP Review

Revision	Organisation	Comment	Addressed
0 (13-3-09)	Department of Planning	Loose pages due to binding, page A3-5 upside down, back cover missing	Document re bound.
		<ul style="list-style-type: none"> <li>Poor quality figure: in particular the Operations Layout Plan in Appendix 4 is partially illegible.</li> <li>The Plan in Appendix 6 is illegible and not labeled or numbered.</li> </ul>	<p>Poor quality of figures likely due to the print quality. re printing the OEMP should address this.</p> <p>Comment added to plan in Appendix 6 to reference origins of plan.</p>
		Incorrect referencing of Appendix 4 and 5 within Section 3.	Referencing error corrected and remaining document checked.
		<ul style="list-style-type: none"> <li>Inconsistent naming and numbering of figures.</li> <li>No figure number provided for the process flow diagram.</li> </ul>	<p>Figures have been sourced from the EA document and have a unique number. This is considered sufficient for use in the OEMP.</p> <p>Process flow diagram has a standard drawing number used for the WTP, this number is referenced in the main body of the OEMP and is considered sufficient for use in the OEMP.</p>
		Reference is made to a landscape plan but has not been provided.	Landscape plan included in Revision 1.
		Add ECP for traffic specifying operational traffic limits for staff vehicle movement and chemical deliveries. This issue was raised in a private submission.	<p>Traffic issues were assessed in the EA and Submissions report to be of a minor impact and no submissions raised concerns about operational traffic (only construction related traffic).</p> <p>ECP Traffic added to identify need to include traffic mitigation in induction and during engagement of supply contractors.</p>

## Appendix 3 Initial Organisational Chart

## Water Treatment Plant Operational Organisational Chart



## Appendix 4

# Emergency Plan and Safety Management System



# OPERATIONS EMERGENCY PLANNING MANAGEMENT PLAN (OEPMP)

for

***Coffs Harbour City Council's***

***Water Treatment Plant***

***140 Upper Orara Road Karangi NSW 2450***

## Revision List

Revision:	6
Date:	26 March 2009
Prepared:	Paul Johnson
Reviewed:	Neil Matthews
Approved for Issue:	Simon Thorn

Signature: .....

## Distribution List

Organisation	Name	Controlled Copy
Coffs Infrastructure Alliance	Warwick Tidswell	1
Coffs Infrastructure Alliance	Stefan Everingham	2
Coffs Harbour City Council	Glenn O'Grady	3
Coffs Harbour City Council	Neil Matthews	4
Department of Planning	Scott Jeffries	5

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## 1.0 Policy Statement

### 1.1 Water Treatment Plant Emergency Management Policy Statement

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#### Water Treatment Plant Emergency Management Policy Statement

At Coffs Harbour City Council, we demonstrate a duty of care for the health and safety of all, the protection of the environment and provide high quality services to the community.

Emergency Planning and Management is an essential element in achieving the above.

Our aims in relation to the Water Treatment Plant Operations Emergency Management Planning are:

- To provide a risk focused system and resources to deal with emergencies to protect people, property and the environment; and
- To minimize adverse impacts on people, property and the environment.

Our objectives in relation to the Water Treatment Plant Operations Emergency Management Planning are:

- To maintain a high level of preparedness;
- To respond quickly and efficiently to limit the impact of an emergency;
- To manage an emergency until the emergency services arrive and take control;
- To support emergency services with information, knowledge, skills and equipment; and
- To protect emergency responders, personnel and the community from harm.

Our principles are:

- To effectively and consistently consult stakeholders;
- Focus on emergency prevention rather than management of emergencies.
- Prompt implementation of emergency response plans will minimise harm to staff, contractors, community and the environment.

Approved by:

.....  
Simon Thorn

.....  
13 March 2009

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## 1.2 Risk Management Policy Statement

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### ***Risk Management Policy Statement***

Managing risk is essential for the efficient management of Council and applies to all of Council's operations. Effective risk management ensures continual improvement and is as much about identifying opportunities as avoiding or mitigating losses.

Management will ensure that all hazards and their associated risks are identified assessed, where possible eliminated or other wise controlled.

Prioritisation of the actions for the implementation of control measures is required where,

- the risks can not be immediately eliminated or the risk reduced to an acceptable level
- the long term controls are not implemented prior to commencement of the activity

Council will review risk assessments and all measures adopted to control risks, whenever

- there is evidence that the risk assessment is no longer valid
- adverse impacts result from exposure to a hazard to which the risk assessment relates
- a significant change is proposed in our place of work or in work practices or procedures to which the risk assessment relates.

Consultation will take place,

- when risks relating to Council's activities are assessed
- when decisions are made about the measures to be taken to control risks
- when the assessment of risks are reviewed
- when introducing or altering the procedures for monitoring risks
- when decisions are made about the adequacy of facilities
- when changes are proposed to the systems or methods of work or the plant or substances used for work.

The hazard identification, risk assessment and control process will be documented and retained by Council's information management system.

**Approved by:** *Executive Team in consultation with staff.*

.....  
**Mayor**

.....  
**General Manager**

.....  
**OH&S Committee Chairperson**

**Date**  
**9 June 2002**

## 2.0 Introduction

### 2.1 Scope / Parameters

2.1.1 This document constitutes the Operations Emergency Planning Management Plan (OEPMP) for the entire life cycle of the Water Treatment Plant at 140 Upper Orara Road, Karangi NSW 2450 from the commencement of operations.

2.1.2 The scope of this Operations Emergency Planning Management Plan satisfies Section 5.4 a) of the Department of Planning Project Approval (Application 06-0285) given under Section 75J of the Environment Planning and Assessment Act 1979.

2.1.3 Project Approval Extract:

5.4 a) a comprehensive Emergency Plan detailing emergency procedures for the proposed water treatment plant. The plan shall include detailed procedures for the safety of all people outside the project site who may be at risk from the development. The plan shall be in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 1, 'Industry Emergency Planning Guidelines'*

### 2.2 Aim / Objectives / Principles

2.2.1 The aim, objectives and principals of the Operational Emergency Planning Management Plan as detailed in the policy statement page 4, are:

- To provide a risk focused system and resources to deal with emergencies to protect people, property and the environment;
- To minimise adverse impacts on people, property and the environment;
- To maintain a high level of preparedness;
- To respond quickly and efficiently to limit the impact of an emergency;
- To manage an emergency until the emergency services arrive and take control;
- To support emergency services with information, knowledge, skills and equipment;
- To protect emergency responders, personnel and the community from harm;
- To effectively and consistently consult stakeholders;
- Focus on emergency prevention rather than management of emergencies;
- Prompt implementation of emergency response plans will minimise harm to staff, contractors, community and the environment.

### 2.3 Key Risks

2.3.1 In relation to this Water Treatment Plant Emergency Management Planning the facility specific key risks have been identified in consultation with operations representatives and key stakeholders.

2.3.2 The emergency risks listed below, are such that if not planned and managed effectively could have significant impact in Council achieving its policy objectives;

- Medical Emergency
- Gas Leak
- Natural Disaster

- Chemical Spill / Hazardous Substances / Dangerous Goods
- Explosion & Fire Emergency
- Rescue – Confined Space / At Height / Over-Under Water / trapped
- Moving Equipment Accident
- Power Failure (Possibility of Emergency)
- Public Unauthorised Entry
- Threat of any Nature

Refer Section 5.0 of this plan for Emergency Response Action Plans.

## **2.4 NSW Department of Planning – Preferred Model Adopted**

- 2.4.1 The main consideration of emergency planning is the protection of people, property and the environment from harm during an emergency situation. This is achieved by developing an emergency plan that implements a system able to respond promptly to any emergency and that leads to the most effective outcome possible under the circumstances. This plan is designed to be comprehensive, yet concise, simple and flexible. This plan is dynamic and interactive, ensuring ongoing relevance to the needs of the facility and all stakeholders by continual monitoring, review and consultation. Emergency planning process adopted is therefore a cyclical processes as illustrated in Figure 2.1 and the Emergency Plan Preparation process is as illustrated in Figure 2.2 below. All of the stages are inter-related and plan details are continually evaluated and revised as appropriate.

Figure 2-1: Emergency Planning Process Adopted

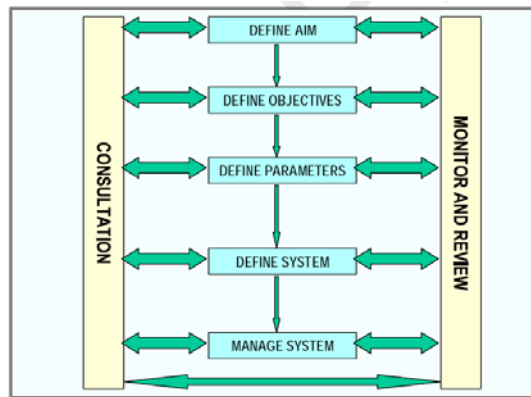
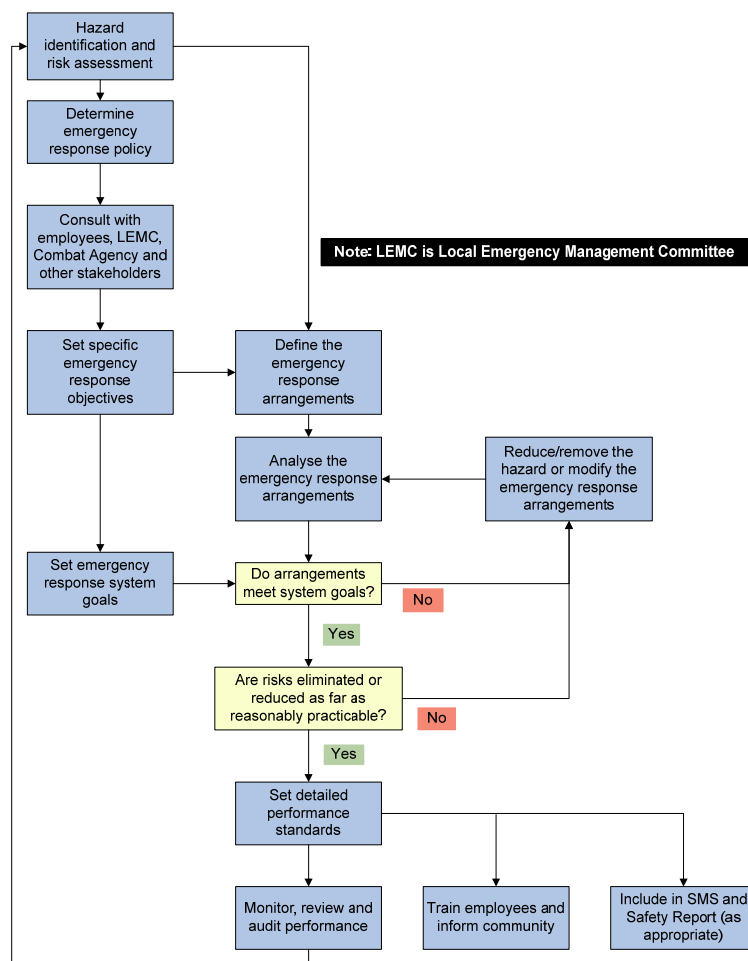


Figure 2-2: Emergency Plan Preparation



## 3.0 Planning

### 3.1 EPMP Development

3.1.1 The risk focused emergency planning and management processes are documented in this plan. The plan defines areas such as the facility's emergency functions and organisational structure, emergency procedures, equipment, reporting and communication channels, and the type of interface with emergency services such as Police, Fire Service etc.

3.1.2 The plan clearly identifies:

- the name of the facility and the operator; (Refer Cover Page)
- the identity, scope and status of the emergency plan; (Refer Cover Page & 2.1)
- the location of the facility; (Refer Cover Page and Appendix 2)
- preparation details (the date of preparation and other terms of reference); (Refer Cover Page and Appendix 5)
- authorisation details (person(s) responsible); (Refer Cover Page, Appendix 4 and OSMP 3.2 & Appendix 3)
- contact details; (Refer Cover Page and Appendix 1)
- document control information; (Refer Cover Page and OSMP 10.0)
- definition of the situation that constitutes an emergency for the facility; (Refer Appendix 5)
- aim, objectives and principles of the plan; (Refer 1.1 and 2.2)
- clearly defines the roles, responsibilities, functions and needs of stakeholders; (Refer 1.1, 2.2, Appendix 4 and OSMP 3.2 & Appendix 3)
- facility specific hazards identified as having a significant impact including hazardous materials; (Refer OSMP Appendix 1 and 11.0)
- hazardous materials in significant quantities under the control of the facility, including hazardous intermediates; (Refer Appendix 1 and 11.0)
- types and levels of possible emergencies identified for the facility; (Refer 5.0)
- emergency functions and organisational structure; (Refer 5.0, Appendix 4 and OSMP 3.0)
- the person fulfilling the function of facility emergency control, and designated as the facility emergency controller; (Refer 3.6.2 and Appendix 4)
- the people acting in a position within the organisational structure, or conducting certain emergency functions; (Refer 5.0 and Appendix 4)
- facility specific emergency response action plans which are an important part of the system to manage an emergency, which are clear, simple, practical and achievable; (Refer 5.0)
- the resources including equipment and amenities required to respond to emergencies; (Refer 3.0, 4.1, 4.2, 4.3, 4.4, 4.5 and 4.6)
- the location of the facility emergency control centre and any alternative nominated; (Refer Appendix 1)
- the facility alarm and warning system for all levels of emergency; (Refer 5.0)

- the roles, responsibilities and duties of all personnel involved in activating the emergency plan; (Refer 5.0 and Appendix 4)
- the role, responsibilities of the person nominated to report the emergency to the emergency services; (Refer 5.0 and Appendix 4)
- where applicable, person nominated to report an environmental emergency to appropriate agencies identified; (Refer 5.0 and Appendix 4)
- terminating an emergency; (Refer 5.0 and Appendix 4)
- criteria for what is required to manage the plan; (Refer Cover Page, 2.0, 3.0, 4.0 and Appendix 4)
- information supporting the plan and essential for the emergency services; (Refer 3.6, 5.0, Appendix 1, 2 & 3)
- identify the locations of, and allow for access to, relevant safety, health and environmental information to assist with managing the emergency; (Refer 3.6, 5.0, Appendix 1, 2, 3 & 5 and CEMP, OSMP).
- location maps detailing significant facility and local community features; (Refer Appendix 2 & 3)
- site layout plan detailing significant facility features; (Refer Appendix 2 & 3)
- an easily accessible list of current emergency contact numbers; (Refer 3.6.1 and Appendix 1)
- glossary of references, definitions and abbreviations. (Refer Appendix 5).

## 3.2 Hazard Identification

3.2.1 Prior to commencement of operations, risks associated with the operations were assessed through a formal risk assessment workshop. The risk assessment workshop held on the 4<sup>th</sup> February 2009 was attended by operations representatives and key stakeholders. The identified hazards together with the risk control measures are documented in Appendix 1 of the Operational Safety Management Plan (OSMP) for ongoing review and updating as further risks are identified once operations commence.

## 3.3 Determining Policy

3.3.1 The plant specific Water Treatment Plan Emergency Management Policy Statement as detailed in page 4 of this plan was developed by operations representatives and key stakeholders. Adherence to this policy statement is vital to the success of the Operational Emergency Planning Management System.

## 3.4 Consultation with Stakeholders

3.4.1 Using a combination of the communication process and other methods as stated throughout this plan, all employees including contractors shall be consulted with regard to the hazards, risks and risk controls that impact on them through the particular work activity that they are performing.

## 3.5 Facility Specific Objectives

- To maintain a high level of preparedness;
- To respond quickly and efficiently to limit the impact of an emergency;
- To manage an emergency until the emergency services arrive and take control;
- To support emergency services with information, knowledge, skills and equipment; and
- To protect emergency responders, personnel and the community from harm.

## 3.6 Emergency Response Arrangements

3.6.1 Emergency Response Action Plans as detailed in Section 5 of this plan shall be posted in a prominent location at the plant. Emergency instructions shall be included in the plant specific inductions.

3.6.2 The Plant Superintendent has been nominated as the Emergency Coordinator to ensure planning and preparation in the event of an emergency is performed in accordance with the Emergency Response Action Plans.

3.6.3 Once operations have commenced a familiarisation inspection by emergency services should be undertaken.

3.6.4 The Plant Superintendent shall arrange for an emergency / evacuation exercise to test the effectiveness of the Emergency Response Action Plans and the readiness of Plant attendants within 3 months of operations commencing. The Plant Superintendent may invite participation from external parties and stakeholders to take part in exercises. A debrief shall occur after the exercise to determine and adopt lessons learnt principles.



## 4.0 Implementation

### 4.1 Training

- 4.1.1 The Plant Superintendent shall ensure that a yearly training review is carried out to identify any training requirements that are required for himself/herself or plant attendants and contractors as appropriate, e.g. refresher first aid certificate.
- 4.1.2 The outcome of the Plant Superintendent's training review shall be approved for implementation by the Manager – Treatment Process Control.
- 4.1.3 Training records shall be maintained by the Plant Superintendent.

### 4.2 Performance Standards Evaluation / Improvement

- 4.2.1 Performance standards against which the implementation of the Safety Management System can be measured may include:
- % emergency response action plans activated per year – Target 0
  - % of hazards identified and closed out within 7 days – Target 95%
  - % of attendant's relevant competencies attained – Target 90%

### 4.3 Inspection and Testing

- 4.3.1 Inspection and testing shall be carried out using a number of methodologies and practices to ensure that material, plant, equipment, work method, protective measures and other items as necessary are in place which are fit for purpose in the case of an emergency.
- 4.3.2 Methodologies and functions shall include:
- Maintaining of Plant and Equipment
  - Monitoring of Work Activities
  - Informal Hazard Inspections
  - Formal Hazard Inspections (Audits)

Refer project specific Operations Safety Management Plan for further detail Section 7.1.

### 4.4 Audit / Monitoring Program

- 4.4.1 Auditing and monitoring of safety practices including emergency planning and management shall be performed as detailed in the Plant Superintendents yearly audit schedule. The audit schedule details the audit frequency and the areas or sections (including contractors) to be audited.
- 4.4.2 As a minimum the Emergency Planning Management Plan shall be audited within 3 months of operations commencement and at a frequency not > twelve monthly and within every 3 years thereafter.
- 4.4.3 The Plant Superintendent shall carry out self audits/reviews of the plant on a regular basis, where a non-conformance is found through the self audit/review process, the Plant Superintendent shall forward audit/review reports to the Manager – Treatment Process Control for review/comments.
- 4.4.4 The Plant Superintendent shall ensure any agreed deficiencies identified within audit/reviews that corrective actions are taken to the point of close out.

---

## 4.5 Investigation, Reporting and Notifications

- 4.5.1 The Plant Superintendent shall ensure all incidents including emergency response are managed in accordance with section 7.3 Incident Management of the project specific Operational Safety Management Plan (OSMP).
- 4.5.2 Section 7.3 of the OSMP details the following:
- Reporting and investigation requirements
  - Incident class definitions
  - Incident notification and reporting timeframes
  - Reporting requirement to external parties

## 4.6 Management System Review (Change & Continual Improvement)

- 4.6.1 The Plant Superintendent shall collate monitoring and surveillance data, stakeholder feedback and improvement data relating to emergency planning and management. The results of the analysis are presented to management for review. The emergency planning and management system review is normally conducted as an integral part of the overall review of the plant systems. Records of such reviews are documented as minutes. Any deficiencies, corrective action or preventive action identified are managed to a point of close out by the Plant Superintendent. Records of management reviews relating to the Plant are maintained by the Plant Superintendent.
- 4.6.2 System reviews are generally carried out yearly.

## 5.0 Emergency Response Action Plans

### 5.1 Emergency Response and Evacuation

- 5.1.1 Emergency Response Action Plans shall be included as part of the Plant specific Induction and posted prominently in operations offices and amenities.
- 5.1.2 The Plant Superintendent has been nominated as the Emergency Coordinator to ensure planning and preparation in the event of an emergency is performed in accordance with this Plan. Unplanned events that may occur at the Plant that are covered in the emergency response action plans below include:
- Medical Emergency
  - Gas Leak
  - Natural Disaster
  - Chemical Spill / Hazardous Substances / Dangerous Goods
  - Explosion & Fire Emergency
  - Rescue – Confined space / At Height / Over-Under Water / Trapped
  - Moving Equipment Accident
  - Power Failure (Possibility of Emergency)
  - Public Unauthorised Entry
  - Threat of any Nature
- 5.1.3 Once operations have commenced a familiarisation inspection by emergency services should be undertaken including a review of the following appendices;
- Appendix 1 Emergency Response Contacts List
- Appendix 3 Operations Layout Plan
- Appendix 6 Hazardous Substances / Maximum Quantities / MSDS's
- 5.1.4 The Plant Superintendent shall arrange for an emergency / evacuation exercise to test the effectiveness of responses and the readiness of operational staff and contractors. The Plant Superintendent may invite participation from external parties and providers to the exercise. A debrief shall occur after the exercise to determine and adopt lessons learnt.

## 5.2 Emergency Level and Classifications

### 5.2.1 Levels of Emergency

Emergencies can vary in scale. Information provided in Appendix 1 Risk Assessment of the OSMP will provide guidance in determining the level of emergency for a particular type of incident.

Table 5-1: Levels of Emergency

Local	Site	External
An emergency where the impacts on people, property and the environment: <ul style="list-style-type: none"> <li>are expected to be confined to a specific location within the facility and no escalation is expected.</li> </ul>	An emergency where the impact on people, property and the environment <ul style="list-style-type: none"> <li>are expected to spread to or affect parts of the facility, but not offsite.</li> </ul>	An emergency where the impact on people, property and the environment <ul style="list-style-type: none"> <li>are expected to impact both within the facility and beyond the boundary of the facility.</li> </ul>
Emergency Services MAY BE REQUIRED	Emergency Services SHOULD BE REQUIRED	Emergency Services WILL BE REQUIRED
Examples: <ul style="list-style-type: none"> <li>leaking flange or seal</li> <li>small fire in kitchen</li> </ul>	Examples: <ul style="list-style-type: none"> <li>pipe rupture</li> <li>overflowing tank</li> </ul>	Examples: <ul style="list-style-type: none"> <li>uncontrolled fire</li> <li>explosion</li> <li>toxic gas release</li> </ul>

### 5.2.2 Emergency Classifications

#### **Class 1**

**People** – Causes or has the potential to cause damage which permanently alters the future of the individual (fatality, quadriplegia, amputee, disabled or psychological disturbance).

**Environment** – Causes or has the potential to cause permanent environmental damage and results in remediation costs of > \$50,000.

**Plant / Equipment / Property** – Causes or has the potential to cause damage to plant / equipment and / or property > \$50,000.

#### **Class 2**

**People** – Causes or has the potential to cause an injury or disease resulting in temporary disability or time lost from work of one or more complete days or shifts.

**Environment** – Causes or has the potential to cause damage to the environment which can be rectified and results in remediation costs of > \$10,000 and < \$50,000.

**Plant / Equipment / Property** – Causes or has the potential to cause damage to plant / equipment and / or property > \$10,000 and < \$50,000.

**Class 3**

**People** – Causes or has the potential to cause an injury which inconveniences the individual such as minor cuts or sprains, but allows the person to continue to carry out normal duties.

**Environment** – Causes or has the potential to cause damage to the environment which can be easily rectified and results in remediation costs of < \$10,000.

**Plant / Equipment / Property** – Causes or has the potential to cause damage to plant / equipment and / or property < \$10,000.

## 5.3 Medical Emergency

Table 5-2: Medical Emergency

Actions	Responsible Person	Emergency Authorities	CHCC Notifications
Assess situation and determine course of action necessary	Plant Superintendent (Emergency Coordinator)	Ambulance  Note: Ask for Rescue Unit if an injured person is in a confined space or trapped.	Manager – Treatment Process Control (Refer OSMP 7.3 for timeframe).
Provide first aid as necessary support as required			
Contact relevant authority (000) Ambulance, Fire Rescue and convey precise location and state of the victim.			
Provide access and egress to emergency location if practical to do so.			
Assemble Operational Team to assess damage/issues/repairs of plant as required			

## 5.4 Gas Leak

NOTE: A Hazard and Operability Study (HAZOP) has been carried out by operations staff and key stakeholders. The study identified numerous chlorine gas safeguards which were successfully worked into the final design, these included:

- leak detection system
- SCADA system alerts
- automated emergency services e-mail notification
- ventilation system maybe activated / deactivated externally
- Plant siren installed for emergency evacuation.

Table 5-3: Gas Leak

Actions	Responsible Person	Emergency Authorities	CHCC Notifications
Raise the alarm and notify Emergency Services if required.	Plant Superintendent (Emergency Coordinator)	Advise emergency services as required.	Manager – Treatment Process Control (Refer OSMP 7.3 for timeframe).
Raise Plant evacuation siren if not automatically set off.			
Assess hazard zone – determine course of action necessary and initiate control measures.			
Emergency evacuation to be initiated if necessary.			
Follow directions given by Emergency Coordinator and emergency service personnel.			
In the event of a major uncontrollable leak there is only one course of action to be taken: <ul style="list-style-type: none"> <li>• Evacuate the plant and hand over to emergency services and provide assistance.</li> </ul>			

## 5.5 Natural Disaster (e.g. flood, storm, earthquake)

Table 5-4: Natural Disaster

Actions	Responsible Person	Emergency Authorities	CHCC Notifications
Try to remove personnel and equipment from immediate danger	Plant Superintendent (Emergency Coordinator)	Contact emergency services as required.	Manager – Treatment Process Control (Refer OSMP 7.3 for timeframe).
Isolate any dangerous equipment, hazardous substances or areas of buildings if safe to do so			
Assemble Operational Team to assess vacating plant/ damage/issues/repairs of plant as required.			



## 5.6 Chemical Spill / Hazardous Substances / Dangerous Goods

Table 5-5: Chemical Spill / Hazardous Substance / Dangerous Goods

Actions	Responsible Person	Emergency Authorities	CHCC Notifications
Raise the alarm – notification to Emergency / Environmental Services if required	Plant Superintendent (Emergency Coordinator)	Advise emergency services as required.	Manager – Treatment Process Control (Refer OSMP 7.3 for timeframe).
Secure the area – establish hazard zone			
Approach with care – beware of vapours and gases, approach from upwind			
Identify products – look for signage, and Operations & Maintenance Manual and Material Safety Data Sheets.			
Assess situation – determine course of action necessary and initiate control measures <b>IF SAFE TO DO SO.</b>			
Evacuation procedure to be initiated if necessary			
Follow directions given by Emergency Coordinator and emergency service personnel			
In the event of a major spill or leak there are three courses of action to be taken:			
<ul style="list-style-type: none"> <li>• Containment of the spill or leak.</li> </ul>			
<ul style="list-style-type: none"> <li>• Recovery and disposal of the materials used to contain or clean up the spill or leak.</li> <li>• Evacuate the plant and hand over to emergency services.</li> </ul>			
Assemble Operational Team to assess vacating plant/damage/issues/repairs of plant as required.			



## 5.7 Explosion and Fire Emergency

Table 5-6: Explosion and Fire Emergency

Actions	Responsible Person	Emergency Authorities	CHCC Notifications
Assist any person in immediate danger, if safe to do so.	Emergency Coordinator (Plant Superintendent)	Advise Fire Brigade and Police  Note: Ask for Fire Brigade Rescue Unit if an injured person is in a confined space or trapped.	Manager – Treatment Process Control (Refer OSMP 7.3 for timeframe).
Close doors to isolate fire.			
Notify Emergency Services.			
Use fire fighting equipment to attack fire, only <b>IF SAFE TO DO SO</b> .			
Evacuate under direction of Emergency Coordinator (Plant Superintendent) and remain in evacuation assembly area until advised otherwise.			
Follow directions given by Emergency Coordinator (Plant Superintendent) or emergency service personnel.			
Take samples of any contaminated water leaving the site if time permits.			
Provide assistance to the Fire Brigade who will assume control of the site.			
Assemble Operational Team to assess vacating plant/damage/issues/repairs of plant as required.			



## 5.8 Rescue – Confined Space / At Height / Over-Under Water / Trapped

- Identify location of person requiring rescue and potential access/egress limitations.
- Contact Emergency Services through fire brigade – specifically specific rescue team required and the nature of the rescue, e.g. confined space, trapped, at height.
- Ascertain if any person/s injured – if yes, request Ambulance.
- Initiate rescue if possible and safe to do so.
- Handover control of rescue to emergency services and deploy resources as applicable to support emergency personnel.

**Table 5-7: Rescue – Confined Space / At Height / Over-Under Water / Trapped**

Actions	Responsible Person	Emergency Authorities	CHCC Notifications
Identify location of person requiring rescue and potential access/egress limitations	Plant Superintendent (Emergency Coordinator)	Advise Fire Brigade if required.	Manager – Treatment Process Control (Refer OSMP 7.3 for timeframe).
Contact Emergency Services through fire brigade – specify rescue team required and the nature of the rescue, e.g. confined space, trapped, at height.			
Ascertain if any person/s injured – if yes, request Ambulance.			
Initiate rescue if possible and safe to do so.			
Handover control of rescue to emergency services and deploy resources as applicable to support emergency personnel.			

## 5.9 Moving Equipment Accident

Table 5-8: Plant or Car Accident

Actions	Responsible Person	Emergency Authorities	CHCC Notifications
Remove other personnel from area and secure.			
Apply first aid if necessary.			
Contact Emergency Services if required.			
Notify the Emergency Response Coordinator (ERC) of the incident requiring emergency response		Advise Ambulance and Police.	
Emergency Coordinator (Plant Superintendent) attends incident site and coordinates emergency response and recovery until Emergency Services arrive.	Emergency Coordinator (Plant Superintendent)	Note: Ask for Fire Brigade Rescue if an injured person is trapped.	Manager – Treatment Process Control (Refer OSMP 7.3 for timeframe).
Assist Emergency Services as necessary and/or follow directions and provide assistance.			
Quarantine the scene for investigative purposes.			

## 5.10 Power Failure (Possibility of Emergency)

Table 5-9: Power Failure for Extended Period

Actions	Responsible Person	Emergency Authorities	CHCC Notifications
<p>Contact Electricity Authority to determine how long supply will be off.</p> <p>Provide 'Metering Point' and 'Meter Number'</p> <p><b>Note</b> that the generator will cut in automatically when power fails. This is also monitored on plant system.</p>	<p>Plant Superintendent ( Emergency Coordinator)</p>	<p>Country Energy 132 080</p>	<p>Manager – Treatment Process Control (Refer OSMP 7.3 for timeframe).</p>
<p>Generator will have to be refuelled within 12 hours if power failure is extended.</p>			
<p>When Power Supply is returned, shutdown generator should be refuelled as required. Contact Plant Superintendent to ensure the generator is checked and serviced as required.</p>			



## 5.11 Public Unauthorised Entry

Table 5-10: Public Unauthorised Entry

Actions	Responsible Person	Emergency Authorities	CHCC Notifications
Contact Plant Superintendent and try to isolate intruder(s).	Plant Superintendent	Advise Police if required	Manager – Treatment Process Control (Refer OSMP 7.3 for timeframe).
Contact Police if required			
Assemble Operational Team to assess damage/issues/repairs of plant as required			



## 5.12 Threat of any Nature

### THREAT RECORDING FORM

In the event that Council receives a threat of any kind, the following must be filled in.

If the threat is received by phone, remain calm and try to keep the caller on the line. *This form must be kept at the Switchboard and in the Plant Superintendents office.*

<b>Who received the threat?</b>		<b>Location</b>	<b>Time</b>	<b>Date</b>
How was the threat received?    Post <input type="radio"/> Telephone <input type="radio"/> Delivery <input type="radio"/> Note <input type="radio"/> Other <input type="radio"/>				
Did the person identify themselves?				
<b>Threat details</b>				
<b>What is the threat?</b>	Contamination <input type="radio"/> Biological <input type="radio"/> Chemical <input type="radio"/> Bomb / explosive <input type="radio"/> Threat to tamper <input type="radio"/> Personal physical violence <input type="radio"/> Other <input type="radio"/> (explain)			
<b>What is the source of the threat?</b> (contaminant type, quantity, etc)				
<b>When is it going to happen?</b>				
<b>Where is it going to happen?</b>				
<b>Why are you doing this?</b>				
<b>Does caller appear familiar with Council area by description of threat location?</b>				
<b>Identity of the caller</b>	<b>Sex</b> Male <input type="radio"/> Female <input type="radio"/>	<b>Age</b> Young <input type="radio"/> Old <input type="radio"/>	<b>Accent</b> Local <input type="radio"/> Foreign <input type="radio"/> Origin?	
<b>Caller's voice</b>				
Soft <input type="radio"/> Calm <input type="radio"/> Slow <input type="radio"/> Fast <input type="radio"/> Angry <input type="radio"/> Loud <input type="radio"/> Deep <input type="radio"/> Laughing <input type="radio"/> Slurred <input type="radio"/> Normal <input type="radio"/> Nasal <input type="radio"/> Lisp <input type="radio"/> Stutter <input type="radio"/> Cracking <input type="radio"/> Other <input type="radio"/>				
<b>Language</b>				
Foul <input type="radio"/> Illiterate <input type="radio"/> Well spoken <input type="radio"/> Incoherent <input type="radio"/> Irrational <input type="radio"/> Familiar? (who did it sound like?)				
<b>Background noise</b> (describe)				
Music <input type="radio"/> Voices <input type="radio"/> Machinery <input type="radio"/> Street noises <input type="radio"/> Animals <input type="radio"/> Children <input type="radio"/> Office <input type="radio"/> Traffic <input type="radio"/> Other <input type="radio"/>				
<b>Origin of call?</b> Local <input type="radio"/> STD <input type="radio"/> Mobile <input type="radio"/> Other <input type="radio"/>			Is the call connection clear?    Yes <input type="radio"/> No <input type="radio"/>	
<b>Emergency action taken?</b> (including notification to authorities)				

On completion of this Form you must distribute a copy immediately to your Manager, Director and the General Manager.



# Appendix 1      Emergency Response Contacts List



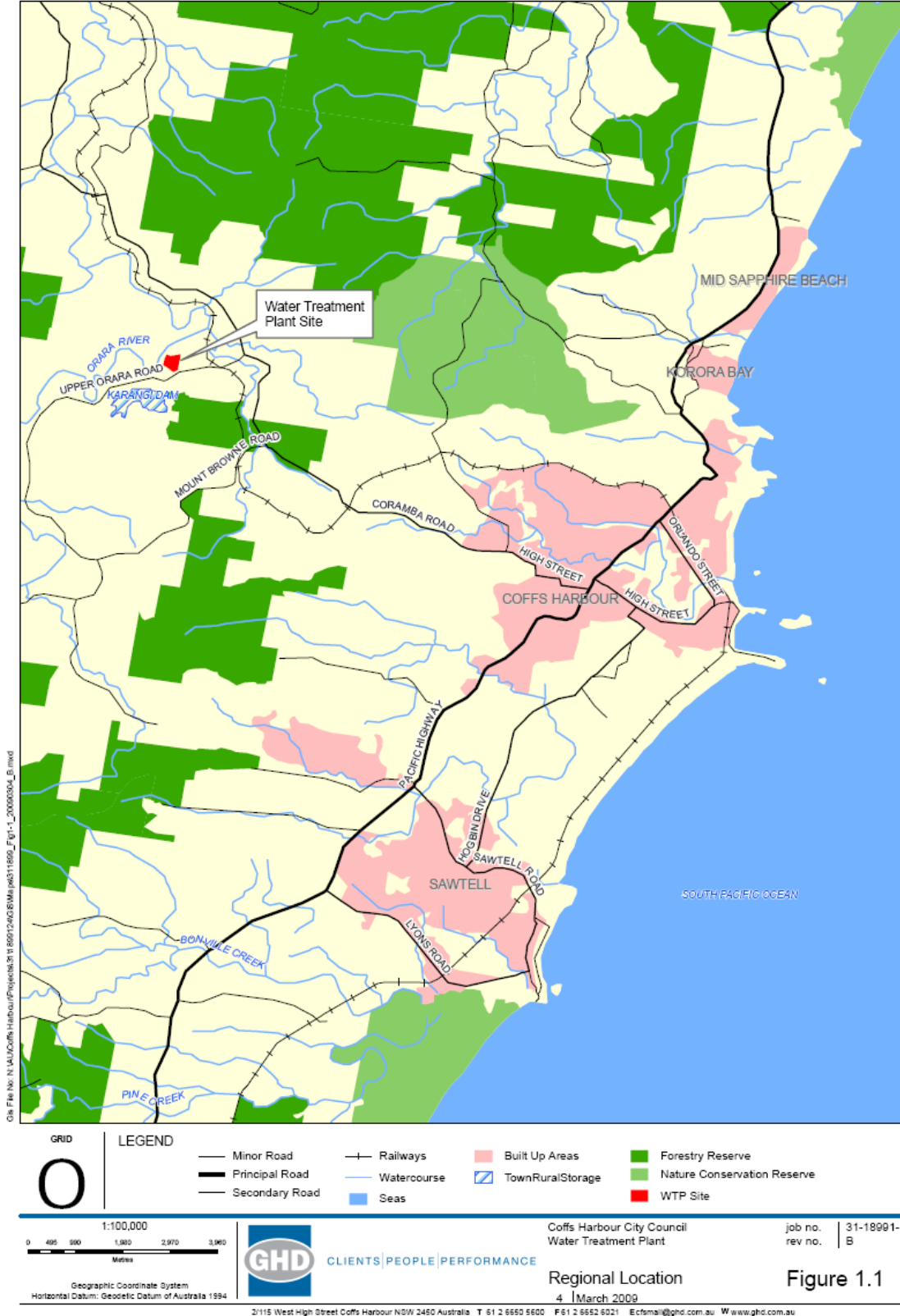
Appendix 1 – Emergency Response Contacts List

<b>EMERGENCY CONTACT PHONE NUMBERS</b>		
<b>CONTACT</b>	<b>Bus. Phone No.</b>	<b>After Hours Phone No.</b>
<b>COFFS HARBOUR WATER</b>		
Treatment Process Control – Manager	TBA	0427 409 612
Water Treatment Plant – Superintendent – Les Potter	(02) 6648 4498	0429 411 935
<b>COFFS HARBOUR CITY COUNCIL WATER TREATMENT PLANT CONTACTS</b>		
City Services – Director – Jason Gordon	(02) 6648 4401	0419 425 681
Coffs Harbour Water – Executive Manager – Simon Thorn	(02) 6648 4470	0428 484 470
<b>OTHER EMERGENCY CONTACTS</b>		
<b>POLICE</b>	000	000
<b>AMBULANCE</b>	000	000
<b>Workplace Health and Safety</b>	1300 369 915	1300 369 915
<b>FIRE - Control Centre (Sydney)</b>	000	000
<b>HOSPITALS</b>	(02) 6656 7000	(02) 6656 7000
<b>ELECTRICITY</b>	13 6262	13 6262
<b>TELSTRA</b>	13 2203	13 2203
<b>ENVIRONMENT PROTECTION AGENCY (DECC)</b>	1300 130 372 / 131 555	1300 130 372 / 131 555



# Appendix 2      Operations Location Plan

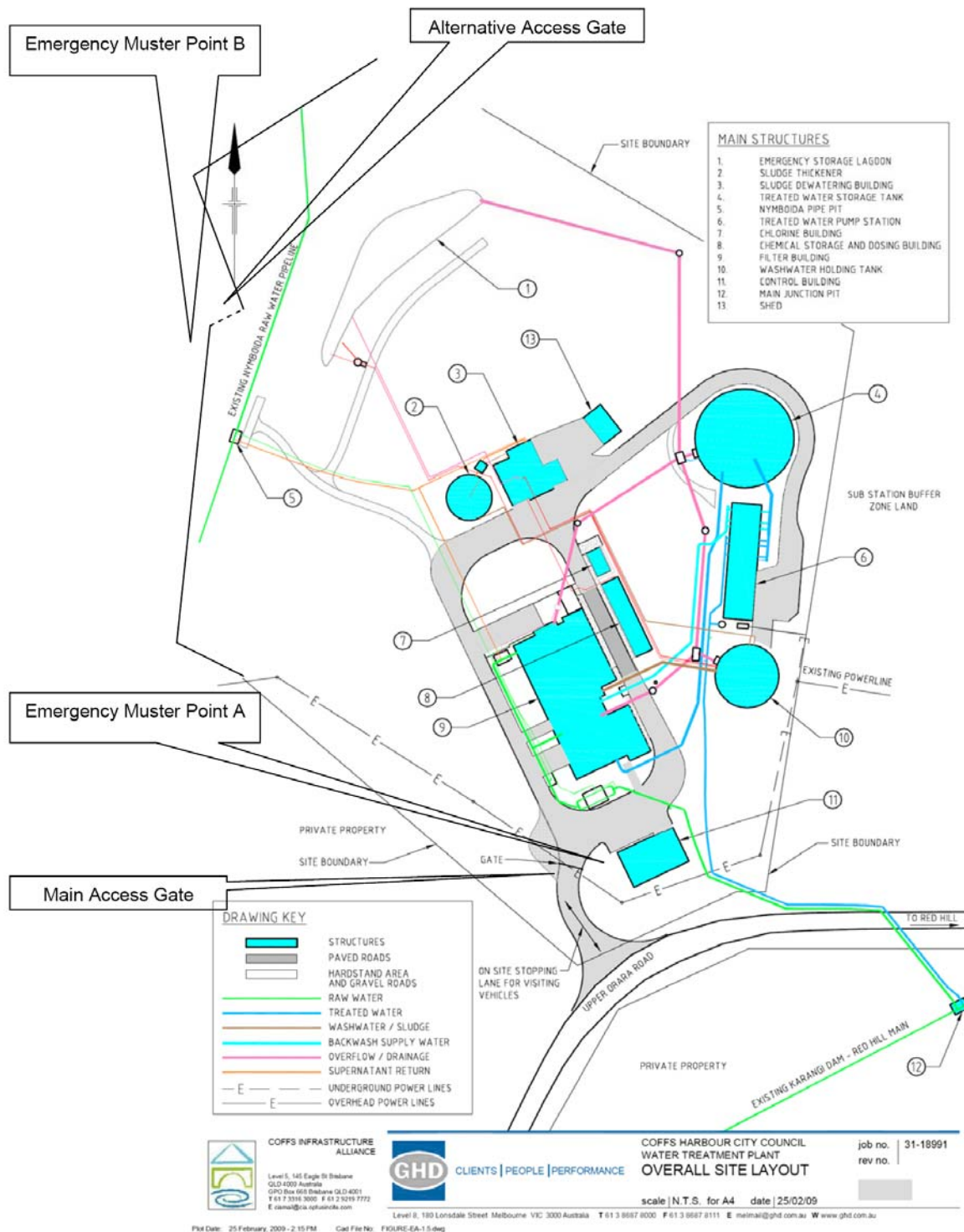
## Operations Location Plan





## Appendix 3      Operations Layout Plan

## Operations Layout Plan





# Appendix 4      Emergency Response Personnel Responsibilities Matrix

Appendix 4 – Emergency Response Personnel Responsibilities Matrix

The following matrix summarises the main activities which must be undertaken, the positions that have primary responsibility to undertake the activities and the positions that are required to provide support or assistance.

Emergency Description.	Executive Manager – Coffs Harbour Water	Manager – Treatment Process Control	Plant Superintendent	Attendants / Contractors	Police	Ambulance	Workplace Health & Safety	Fire	Hospitals	Electricity	Telstra	Environment Protection Agency (DECC)
Medical Emergency (Refer 5.3)		S	P	S		ES						
Gas Leak (Refer 5.4)		S	P	S	ES							
Natural Disaster (Refer 5.5)		P	S	S	ES							
Chemical Spill / Hazardous Substances / Dangerous Goods (Refer 5.6)		S	P	S	ES							
Explosion & Fire Emergency (Refer 5.7)		S	P	S				ES				
Rescue – Confined Space / At Height / Over-Under Water / Trapped(Refer 5.8)		S	P	S		ES		ES				
Moving Equipment Accident (Refer 5.9)		S	P	S		ES						
Power Failure (Possibility of Emergency) (Refer 5.10)		S	P	S						ES		
Public Unauthorised Entry (Refer 5.11)		S	P	S	ES							
Threat of any Nature (Refer 5.12)	S	P	S	S	ES							
<b>LEGEND</b>												
P = CHCC Lead    S = CHCC Support    ES = Emergency Services												



## **Appendix 5**

# **Definitions, References and Abbreviations**

## A5-1 Definitions

Emergency situation	<p>The diverse nature of industries implies that the system developed by one facility to manage an emergency may not be appropriate for another facility. Even the basic definition of an emergency situation may differ from facility to facility.</p> <p>This definition should also identify the types of incident or circumstance that do not constitute an emergency and the point at which an emergency ceases to be an emergency. A facility's definition of an emergency should be distinguished from, and yet complementary with, the use of the term by Police, Fire and other emergency services. The term, as used by the emergency services, will apply not only to events involving hazardous materials in industry but also to a wider range of conceivable incidents.</p> <p>Their sense of the term (and similar expressions such as 'emergency situation') is derived from definitions in relevant legislation and associated policies for determining whether a particular incident or circumstance is to be considered as an emergency.</p>
Emergency	<p>as defined by the NSW State Emergency Management and Rescue Act (SERMA), 1989, means an emergency due to actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, epidemic or warlike action) which:</p> <p>(a) endangers, or threatens to endanger, the safety or health of persons or animals in the State; or</p> <p>(b) destroys or damages, or threatens to destroy or damage, any property in the State, being an emergency which requires a significant and coordinated response.</p> <p>For the purposes of the definition of "<b>Emergency</b>", property in the State includes any part of the environment of the State. Accordingly, reference to:</p> <p>(a) threats or danger to property includes a reference to threats or danger to the environment, and</p> <p>(b) the protection of property includes a reference to the protection of the environment.</p> <p>a definition of an emergency situation is necessary because an emergency plan is only activated in an emergency situation and de-activated when the emergency situation ceases to exist.</p> <p><b>For the purpose of this plant specific Operational Emergency Planning Management Plan the definition of what constitutes an emergency at the facility (i.e. a situation, which activates and de-activates the emergency plan), is as follows:</b></p> <ul style="list-style-type: none"><li>• <i>a hazardous situation (or threat of a hazardous situation) which requires action to control, correct and return the site to a safe condition and also requires timely action to protect people, property and the environment from harm. The level at which a hazardous situation should be regarded as an emergency</i></li></ul>



## A5-2 References

### OH&S Management Systems:

AS 4801 OH&S management systems – Specification with guidance for use

### Other Standards:

US Standard 29 CFR 1910 OS&H standards

### Hazardous Industry Planning Advisory Papers (HIPAPs):

- No. 1 Industry Emergency Planning Guidelines
- No. 2 Fire Safety Study Guidelines
- No. 3 Environmental Risk Assessment Guidelines
- No. 4 Risk Criteria for Land Use Planning
- No. 5 Hazard Audit Guidelines
- No. 6 Guidelines for Hazard Analysis
- No. 7 Construction Safety Studies
- No. 8 HAZOP Guidelines
- No. 9 Safety Management System Guidelines
- No. 10 Land Use Safety Planning (Consultation Draft)

### Other Publications:

Applying SEP 33: Hazardous and Offensive Development Application Guidelines

Multi-level Risk Assessment

Locational Guideline: Development in the Vicinity of Operating Coal Seam Methane Wells

Liquefied Petroleum Gas Automotive Retail Outlets

### Other in use documentation:

Woolgoolga - Water Reclamation Plant (WRP) Emergency Plan

4 February 2009 - Plant Specific Risk Assessment

John Holland Group Various Design & Construction Safety system related documents.

## A5-3      **Abbreviations**

OEPMP	Operations Emergency Planning Management Plan
ERC	Emergency Response Coordinator
HAZOP	Hazard and Operability
HIPAP's	Hazardous Industry Planning Advisory Papers
ITP	Inspection and Test Plan
MSDS	Material Safety Data Sheet
NCR	Non Conformance Report
NSW	New South Wales
OH&S	Occupational Health & Safety
OHS&R	Occupational Health Safety & Rehabilitation
OSMP	Operation Safety Management Plan
SERMA	State Emergency Management and Rescue Act
SWMS	Safe Work Method Statement
WRP	Water Reclamation Plant



# Appendix 6      Hazardous Substances / Maximum Quantities / MSDS's

Appendix 6 – Hazardous Substances / Maximum Quantities / MSDS's

PID Legend	Chemical Dosing system	Chemical	Quantity Stored onsite	Location	MSDS
264	Sludge Thickener Polydosing system	LT425 - Coagulant	1500Kg powder in pallet/2000L as Batched Liquid	Sludge Dewatering Building Polydosing room	Refer attached MSDS No. 1
265	Sludge Centrifuge Polydosing system	LT425 - Coagulant	1500Kg powder in pallet/2000L as Batched Liquid	Sludge Dewatering Building Polydosing room	Refer attached MSDS No. 2
281	Potassium Permanganate Dosing Sys	Potassium Permanganate 100% Crystals	1500Kg powder in pallet/4000L as Batched Liquid	Potassium Dosing Room DAFF Area	Refer attached MSDS No. 3
282	Powder Activated Carbon Dosing System	Powder Activated Carbon	1500kg Bag	PAC Dosing Room DAFF Area	Refer attached MSDS No. 4
284	Alum dosing System 100% alum	Alum	50000L as Liquid	Liquid Bunded Area	Refer attached MSDS No. 5
285	Coagulant Aid Polymer	LT425 - Coagulant	6500L as liquid	Liquid Bunded Area	Refer attached MSDS No. 6
286	Filter Aid Dosing system	LT425 - Coagulant	500L as Liquid	Filter Aid Dosing Room DAFF Area	Refer attached MSDS No. 7
288	Caustic Dosing System	Sodium Hydroxide Dosing System 46% conc	25000L as Liquid	Liquid Bunded Area	Refer attached MSDS No. 8
290	Fluoride Dosing System	Hydrofluorosilicic acid 25% conc	25500L as Liquid	Liquid Bunded Area	Refer attached MSDS No. 9
	Chlorine Dosing System	Cl <sub>2</sub> (g)	1,700L	Chlorine Building	Refer attached MSDS No. 10
	Emergency Generator	Diesal	620L	Emergency Generator	Refer attached MSDS No. 11

## MSDS No's. 1, 2 6 & 7 LT425 Coagulant

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### CIBA MAGNAFLOC LT425 COAGULANT

Chemwatch Material Safety Data Sheet (REVIEW)  
Issue Date: 16-Apr-2005

Revision No: 2

Hazard Alert Code:  
**LOW**

Chemwatch 7063-49  
CD 2007/2

#### Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** CIBA MAGNAFLOC LT425 COAGULANT

##### SYNONYMS

"coagulant drinking water"

##### PRODUCT USE

Coagulant used in drinking water treatment.

##### SUPPLIER

Company: Ciba Specialty Chemicals Pte Ltd

##### Address:

4 Fourth Lok Yang Road

Singapore, 629701

SGP

Telephone: + 65 265 3622

Emergency Tel: + 65 9631 7540

##### HAZARD RATINGS

	Min	Max
Flammability:	0	■
Toxicity:	0	■
Body Contact:	0	■
Reactivity:	1	■■■■■
Chronic:	0	■

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4

#### Section 2 - HAZARDS IDENTIFICATION

##### STATEMENT OF HAZARDOUS NATURE

**NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.**

##### POISONS SCHEDULE

None

##### RISK

##### SAFETY

#### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
low molecular weight cationic resin, unspecified		N/S
water	7732-18-5	N/S

#### Section 4 - FIRST AID MEASURES

##### SWALLOWED

- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

##### EYE

If this product comes in contact with eyes:

- Wash out immediately with water.
- If irritation continues, seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

##### SKIN

If skin or hair contact occurs:

- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

##### INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

##### NOTES TO PHYSICIAN

Treat symptomatically.

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**Section 5 - FIRE FIGHTING MEASURES**

**EXTINGUISHING MEDIA**

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

**FIRE FIGHTING**

- Use water delivered as a fine spray to control fire and cool adjacent area.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

**FIRE/EXPLOSION HAZARD**

- Non combustible.
  - Not considered a significant fire risk, however containers may burn.
- Decomposition may produce toxic fumes of: carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), other pyrolysis products typical of burning organic material.

**FIRE INCOMPATIBILITY**

Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result.

**HAZCHEM**

None

**Section 6 - ACCIDENTAL RELEASE MEASURES**

**EMERGENCY PROCEDURES**

**MINOR SPILLS**

- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labelled container for waste disposal.

**MAJOR SPILLS**

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Control personal contact by using protective equipment.
- Prevent spillage from entering drains, sewers or water courses.
- Recover product wherever possible.
- Put residues in labelled containers for disposal.
- If contamination of drains or waterways occurs, advise emergency services.

**SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS**



X: Must not be stored together  
C: May be stored together with specific precautions  
+: May be stored together

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

**Section 7 - HANDLING AND STORAGE**

**PROCEDURE FOR HANDLING**

- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.

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- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

**SUITABLE CONTAINER**

- Polyethylene or polypropylene container.
- Packing as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

**STORAGE INCOMPATIBILITY**

Avoid contamination of water, foodstuffs, feed or seed.  
Avoid reaction with oxidising agents.

**STORAGE REQUIREMENTS**

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

**Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**

**EXPOSURE CONTROLS**

The following materials had no OELs on our records

- water: CAS:7732-18-5

**MATERIAL DATA**

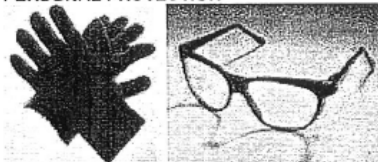
Not available. Refer to individual constituents.

**INGREDIENT DATA**

WATER:

No exposure limits set by NOHSC or ACGIH.

**PERSONAL PROTECTION**



**EYE**

- Safety glasses with side shields
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

**HANDS/FEET**

Wear general protective gloves, eg. light weight rubber gloves.

**OTHER**

No special equipment needed when handling small quantities.

OTHERWISE:

- Overalls.
- Barrier cream.
- Eyewash unit.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

**ENGINEERING CONTROLS**

General exhaust is adequate under normal operating conditions. If risk of overexposure exists, wear SAA approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air)	0.25-0.5 m/s (50-100 f/min)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active	0.5-1 m/s (100-200 f/min.)

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generation)

direct spray, spray painting in shallow booths, drum filling,  
conveyer loading, crusher dusts, gas discharge (active generation  
into zone of rapid air motion) 1-2.5 m/s (200-500 f/min)

grinding, abrasive blasting, tumbling, high speed wheel generated  
dusts (released at high initial velocity into zone of very high rapid  
air motion). 2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 4: Small hood - local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

**Section 9 - PHYSICAL AND CHEMICAL PROPERTIES**

**APPEARANCE**

Amber liquid with slight odour; mixes with water.

**PHYSICAL PROPERTIES**

Liquid.

Mixes with water.

Molecular Weight: Not Applicable

Melting Range (°C): Not Available

Solubility in water (g/L): Miscible

pH (1% solution): Not Available

Volatile Component (%vol): Not Available

Relative Vapour Density (air=1): Not Available

Lower Explosive Limit (%): Not Applicable

Autoignition Temp (°C): Not Applicable

State: Liquid

Boiling Range (°C): 100 approx

Specific Gravity (water=1): 1.09

pH (as supplied): 6.0 approx

Vapour Pressure (kPa): Not Available

Evaporation Rate: Not Available

Flash Point (°C): Not Applicable

Upper Explosive Limit (%): Not Applicable

Decomposition Temp (°C): Not Available

Viscosity: Not Available

**Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION**

**CONDITIONS CONTRIBUTING TO INSTABILITY**

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

**Section 11 - TOXICOLOGICAL INFORMATION**

**POTENTIAL HEALTH EFFECTS**

**ACUTE HEALTH EFFECTS**

**SWALLOWED**

The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (eg. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

**EYE**

Although the liquid is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).

**SKIN**

The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

**INHALED**

The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

<http://max.chemwatch.net/cg2/msds.exe?fontsize=&print=Y&rCode=N&prefname=&c...> 6/08/2007



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**CHRONIC HEALTH EFFECTS**

Long-term exposure to the product is not thought to produce chronic effects adverse to the health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.

**TOXICITY AND IRRITATION**

~TOXICITY FIGURE

~IRRITATION

~GENOTOX

~OTHER

WATER:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances

TOXICITY IRRITATION.

No significant acute toxicological data identified in literature search.

**Section 12 - ECOLOGICAL INFORMATION**

No data

**Section 13 - DISPOSAL CONSIDERATIONS**

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licenced land-fill or incineration in a licenced apparatus (after admixture with suitable combustible material).
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

**Section 14 - TRANSPORTATION INFORMATION**

Labels Required:

HAZCHEM: None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:UN, IATA,  
IMDG

**Section 15 - REGULATORY INFORMATION**

**POISONS SCHEDULE**

None

**REGULATIONS**

water (CAS: 7732- 18- 5) is found on the following regulatory lists;

Australia Inventory of Chemical Substances (AICS)

Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) -

Appendix E (Part 2)

Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) -

Appendix F (Part 3)

OECD Representative List of High Production Volume (HPV) Chemicals

**Section 16 - OTHER INFORMATION**

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<http://max.chemwatch.net/cg2/msds.exe?fontsize=&print=Y&rCode=N&prefname=&c...> 6/08/2007

## MSDS No. 3 Potassium Permanganate 100% Crystals

CG2

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### POTASSIUM PERMANGANATE

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 HIGH

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#### Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME**  
 POTASSIUM PERMANGANATE

**SYNONYMS**

Mn-O4.K, KMinO4, Cairox, "chameleon mineral", "Condy' s crystals", "permanganic acid, potassium salt", "permanganate of potash", "purple salt", "C.I. 77755", APS, AR00000414, TECH00004459, M-F00011080, M-F00011080, UL00000415, BP00004446, USP00005769, TECH00005770

**PROPER SHIPPING NAME**

POTASSIUM PERMANGANATE

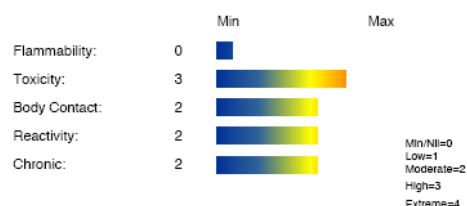
**PRODUCT USE**

Bleaching of waxes, fats, oils, straw, cotton, silk, chamois, other fibres Dyeing wood brown; printing fabrics; photography; tanning leathers. Disinfection; deodoriser, algacide for water treatment, an agent for medical treatment for some poisons; an important reagent in analytical and organic chemistry. Regeant

**SUPPLIER**

Company: Merck Pty Ltd  
 Address:  
 207 Colchester Road  
 Kilsyth  
 VIC, 3137  
 AUS  
 Telephone: +61 3 9728 5855  
 Telephone: 1800 337 460  
 Emergency Tel: +61 3 9728 5855  
 Fax: +61 3 9728 1351

**HAZARD RATINGS**



#### Section 2 - HAZARDS IDENTIFICATION

**STATEMENT OF HAZARDOUS NATURE**

**HAZARDOUS SUBSTANCE. DANGEROUS GOODS.** According to the Criteria of NOHSC, and the ADG Code.

**POISONS SCHEDULE**

S6, NZS4

**RISK**

- » Harmful if swallowed.
- » Irritating to eyes.
- » Very toxic to aquatic organisms may cause long-term adverse effects in the aquatic environment.
- » Contact with combustible material may cause fire.
- » Contact with air may produce sufficient heat to ignite combustible materials.\*
- » Inhalation may produce health damage\*.
- » Cumulative effects may result following exposure\*.

**SAFETY**

- » Keep away from combustible material.
- » Do not breathe dust.
- » Avoid contact with eyes.
- » Wear suitable protective clothing.
- » Use only in well ventilated areas.
- » Keep container in a well ventilated place.
- » To clean the floor and all objects contaminated by this material use water.

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» May produce discomfort of the respiratory system and skin\*.

\* (limited evidence).

» This material and its container must be disposed of in a safe way.

» Keep away from food drink and animal feeding stuffs.

» In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.

» If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).

» Use appropriate container to avoid environment contamination.

» Avoid release to the environment. Refer to special instructions/ safety data sheets.

» This material and its container must be disposed of as hazardous waste.

### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
potassium permanganate	7722-64-7	>99

### Section 4 - FIRST AID MEASURES

#### SWALLOWED

»

- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- For advice, contact a Poisons Information Centre or a doctor.
- Urgent hospital treatment is likely to be needed.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.
- Where medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:
- INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

#### EYE

» If this product comes in contact with the eyes:

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

#### SKIN

» If skin contact occurs:

- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

#### INHALED

»

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

#### NOTES TO PHYSICIAN

» Both dermal and oral toxicity of manganese salts is low because of limited solubility of manganese. No known permanent pulmonary sequelae develop after acute manganese exposure. Treatment is supportive.

[Ellenhorn and Barceloux: Medical Toxicology]

In clinical trials with miners exposed to manganese-containing dusts, L-dopa relieved extrapyramidal symptoms of both hypo kinetic and dystonic patients. For short periods of time symptoms could also be controlled with scopolamine and amphetamine. BAL and

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calcium EDTA prove ineffective.  
[Gosselin et al: Clinical Toxicology of Commercial Products.]

### Section 5 - FIRE FIGHTING MEASURES

#### EXTINGUISHING MEDIA

» FOR SMALL FIRE:

- USE FLOODING QUANTITIES OF WATER.
- DO NOT use dry chemical, CO<sub>2</sub>, foam or halogenated-type extinguishers.

FOR LARGE FIRE

- Flood fire area with water from a protected position

#### FIRE FIGHTING

»

- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Fight fire from a safe distance, with adequate cover.
- Extinguishers should be used only by trained personnel.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- If fire gets out of control withdraw personnel and warn against entry.
- Equipment should be thoroughly decontaminated after use.

#### FIRE/EXPLOSION HAZARD

»

- Will not burn but increases intensity of fire.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- Heat affected containers remain hazardous.
- Contact with combustibles such as wood, paper, oil or finely divided metal may produce spontaneous combustion or violent decomposition.
- May emit irritating, poisonous or corrosive fumes.

#### FIRE INCOMPATIBILITY

»

- Avoid storage with reducing agents.
- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous

#### HAZCHEM

1Y

### Section 6 - ACCIDENTAL RELEASE MEASURES

#### EMERGENCY PROCEDURES

##### MINOR SPILLS

»

- Clean up all spills immediately.
- No smoking, naked lights, ignition sources.
- Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials, as ignition may result.
- Avoid breathing dust or vapours and all contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with dry sand, earth, inert material or vermiculite.
- DO NOT use sawdust as fire may result.
- Scoop up solid residues and seal in labelled drums for disposal.
- Neutralise/decontaminate area.

##### MAJOR SPILLS

»

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus and protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.
- No smoking, flames or ignition sources.
- Increase ventilation.

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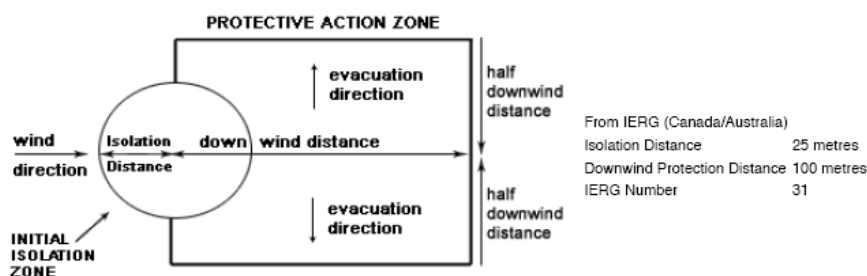
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- Contain spill with sand, earth or other clean, inert materials.
- NEVER USE organic absorbents such as sawdust, paper or cloth.
- Use spark-free and explosion-proof equipment.
- Collect any recoverable product into labelled containers for possible recycling.
- Avoid contamination with organic matter to prevent subsequent fire and explosion.
- DO NOT mix fresh with recovered material.
- Collect residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- Decontaminate equipment and launder protective clothing before storage and re-use.
- If contamination of drains or waterways occurs advise emergency services.

### PROTECTIVE ACTIONS FOR SPILL



### FOOTNOTES

- 1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
- 2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
- 3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
- 4 SMALL SPILLS involve a leaking package of 200 litres (50 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
- 5 Guide 140 is taken from the US DOT emergency response guide book.
- 6 IERG information is derived from CANUTEC - Transport Canada.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



- X: Must not be stored together  
 O: May be stored together with specific precautions  
 +: May be stored together

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

### Section 7 - HANDLING AND STORAGE

#### PROCEDURE FOR HANDLING

- Avoid personal contact and inhalation of dust, mist or vapours.
- Provide adequate ventilation.
- Always wear protective equipment and wash off any spillage from clothing.
- Keep material away from light, heat, flammables or combustibles.
- Keep cool, dry and away from incompatible materials.
- Avoid physical damage to containers.

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- DO NOT repack or return unused portions to original containers. Withdraw only sufficient amounts for immediate use.
- Contamination can lead to decomposition leading to possible intense heat and fire.
- When handling NEVER smoke, eat or drink.
- Always wash hands with soap and water after handling.
- Use only good occupational work practice.
- Observe manufacturer's storing and handling directions.

### SUITABLE CONTAINER

- Glass container is suitable for laboratory quantities
  - DO NOT repack. Use containers supplied by manufacturer only.
- For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
  - Where a can is to be used as an inner package, the can must have a screwed enclosure.
- For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids:
- Removable head packaging and
  - cans with friction closures may be used.
- 
- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages \*.
- 
- In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage \*.
- 

\* unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

### STORAGE INCOMPATIBILITY

- Segregate permanganates from concentrated acids, tin, sulfur, alcohol, peroxides, bromides, iodides, arsenates, glycols, ammonium compounds, metallic powders, phosphorous, hydrazine, ferrous or mercury salts, oxalates and combustible materials and organic substances generally.
- Permanganates may react vigorously with metallic powders, ammonium compounds, phosphorous, carbon, arsenates, ethylene glycol, sulfur, hydrazine, metal hydrides, peroxides, alcohol and other combustible materials.
- Permanganates may react violently when exposed to sulfuric acid or hydrogen peroxide.
- May form explosive compounds with ammonium compounds, cellulose (such as cotton, paper).
- Permanganates are readily decomposed by many reducing substances such as
- ferrous or mercury salts, iodides, bromides, oxalates, etc., especially in the presence of an acid.
- Permanganates reacts with concentrated acids to produce oxygen and with hydrochloric acid to produce chlorine.
- May cause spontaneous ignition if mixed with glycol anti-freeze compounds
- WARNING: Avoid or control reaction with peroxides. All transition metal peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively.
- The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono- or poly-fluorobenzene show extreme sensitivity to heat and are explosive.
- Avoid reaction with borohydrides or cyanoborohydrides
- Avoid storage with reducing agents.
- Inorganic reducing agents react with oxidizing agents to generate heat and products that may be flammable, combustible, or otherwise reactive. Their reactions with oxidizing agents may be violent.
- Incidents involving interaction of active oxidants and reducing agents, either by design or accident, are usually very energetic and examples of so-called redox reactions.
- Contact with acids produces toxic fumes
- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous
- Inorganic oxidising agents can react with reducing agents to generate heat and products that may be gaseous (causing pressurization of closed containers). The products may themselves be capable of further reactions (such as combustion in the air).
- Organic compounds in general have some reducing power and can in principle react with compounds in this class. Actual reactivity varies greatly with the identity of the organic compound.
- Inorganic oxidising agents can react violently with active metals, cyanides, esters, and thiocyanates.

### STORAGE REQUIREMENTS

- In addition, Goods of Class 5.1, packing group II should be:
  - stored in piles so that
  - the height of the pile does not exceed 1 metre
  - the maximum quantity in a pile or building does not exceed 1000 tonnes unless the area is provided with automatic fire extinguishers
  - the maximum height of a pile does not exceed 3 metres where the room is provided with automatic fire extinguishers or 2 metres if not.
  - the minimum distance between piles is not less than 2 metres where the room is provided with automatic fire extinguishers or 3 metres if not.
  - the minimum distance to walls is not less than 1 metre.

### Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

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### EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA FCC
Australia Exposure Standards	potassium permanganate (Manganese, fume (as Mn))		1		3			
Australia Exposure Standards	potassium permanganate (Manganese, dust & compounds (as Mn))		1					

### EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m <sup>3</sup> )	Revised IDLH Value (ppm)
potassium permanganate	500	

### MATERIAL DATA

» Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

A number of studies have shown that susceptibility to the effects of manganese at or about 1 - 5 mg/m<sup>3</sup> (TWA) can lead to clinical manifestations of manganism or more commonly to the development of indicators of sub-clinical manganism (e.g. hand tremor, exaggerated reflexes, short-term memory deficits, poor psychomotor performance). Controlling long-term exposure to the recommended ES TWA level or below should provide protection for those individuals susceptible to neurological effects of prolonged exposure.

Ceiling values were recommended for manganese and compounds in earlier publications. As manganese is a chronic toxin a TWA is considered more appropriate. Because workers exposed to fume exhibited manganism at air-borne concentrations below those that affect workers exposed to dust a lower value has been proposed to provide an extra margin of safety. This value is still above that experienced by two workers exposed to manganese fume in the course of one study.

### PERSONAL PROTECTION



### EYE

- » Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

### HANDS/FEET

- » Wear chemical protective gloves, eg. PVC.
  - Wear safety footwear or safety gumboots, eg. Rubber
- Suitability and durability of glove type is dependent on usage. Factors such as:
- frequency and duration of contact,
  - chemical resistance of glove material,
  - glove thickness and

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- dexterity, are important in the selection of gloves.
- DO NOT wear cotton or cotton-backed gloves.
- DO NOT wear leather gloves.
- Promptly hose all spills off leather shoes or boots or ensure that such footwear is protected with PVC over-shoes.

### OTHER

- »
- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- »
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

### RESPIRATOR

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x ES	P1 Air-line*	- -	PAPR-P1 -
50 x ES	Air-line**	P2	PAPR-P2
100 x ES	-	P3	-
		Air-line*	-
100+ x ES	-	Air-line**	PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

### ENGINEERING CONTROLS

» Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations.

Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

- |  |                                  |
|--|----------------------------------|
| Lower end of the range                                     | Upper end of the range           |
| 1: Room air currents minimal or favourable to capture      | 1: Disturbing room air currents  |
| 2: Contaminants of low toxicity or of nuisance value only. | 2: Contaminants of high toxicity |
| 3: Intermittent, low production.                           | 3: High production, heavy use    |
| 4: Large hood or large air mass in motion                  | 4: Small hood-local control only |

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus,



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make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

#### APPEARANCE

Purple-bronze almost black, odourless, crystals powder with metallic lustre. Sweet with an astringent after-taste; mixes with water. Solubility in water: 28.3 g/l @ 0 C. and : 250 g/l @ 65 C. Concentrated solutions are alkaline. Decomposed by alcohol and many other organic solvents.

#### PHYSICAL PROPERTIES

Solid.

Mixes with water.

Molecular Weight: 158.04

Melting Range (°C): <240 (decomp.)

Solubility in water (g/L): Miscible

pH (1% solution): >7

Volatile Component (%vol): Not applicable.

Relative Vapour Density (air=1): Not available.

Lower Explosive Limit (%): Not applicable

Autoignition Temp (°C): Not applicable

State: Divided solid

Boiling Range (°C): Decomposes

Specific Gravity (water=1): 2.7

pH (as supplied): Not applicable

Vapour Pressure (kPa): Not available.

Evaporation Rate: Not applicable

Flash Point (°C): Not applicable

Upper Explosive Limit (%): Not applicable

Decomposition Temp (°C): Not Available

Viscosity: Not Applicable

### Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

#### CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable under normal handling conditions.
- Prolonged exposure to heat.
- Hazardous polymerisation will not occur.
- Presence of elevated temperatures.
- Presence of incompatible materials

### Section 11 - TOXICOLOGICAL INFORMATION

#### POTENTIAL HEALTH EFFECTS

##### ACUTE HEALTH EFFECTS

###### SWALLOWED

» Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

Poisonings rarely occur after oral administration of manganese salts because they are poorly absorbed from the gut.

Ingestion of permanganates may cause brown discolouration and burns to the mouth with oedema of the glottis, nausea, vomiting and diarrhoea. Other symptoms, including a high-pitched noisy breathing (stridor) slow pulse, shock and fall in blood pressure may occur. Fatal oral dose is estimated to be around 10g. Death may occur up to one month from the time of poisoning.

###### EYE

» This material can cause eye irritation and damage in some persons.

Eye contact with permanganates may produce brown discolouration.

###### SKIN

» There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.

Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

###### INHALED

» Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.

There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

Manganese fume is toxic and produces nervous system effects characterised by tiredness. Acute poisoning is rare although acute inflammation of the lungs may occur. A chemical pneumonia may also result from frequent exposure. Inhalation of freshly formed metal oxide particles sized below 1.5 microns and generally between 0.02 to 0.05 microns may result in "metal fume fever".

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Symptoms may be delayed for up to 12 hours and begin with the sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalised feeling of malaise. Mild to severe headache, nausea, occasional vomiting, fever or chills, exaggerated mental activity, profuse sweating, diarrhoea, excessive urination and prostration may also occur. Tolerance to the fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours following removal from exposure.

### CHRONIC HEALTH EFFECTS

» Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

Manganese is an essential trace element. Chronic exposure to low levels of manganese can include a mask-like facial expression, spastic gait, tremors, slurred speech, disordered muscle tone, fatigue, anorexia, loss of strength and energy, apathy and poor concentration.

Long term exposures to manganese compounds may effect the central nervous system. Symptoms include muscular weakness and tremors similar to Parkinson's disease. Behavioural changes and handwriting differences may also appear.

### TOXICITY AND IRRITATION

» unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

#### TOXICITY

Oral (human) LDLo: 143 mg/kg

Oral (woman) TDLo: 2.4 mg/kg/d

Oral (rat) LD50: 1090 mg/kg

Intravenous (Rabbit) LD: 70 mg/kg

Oral (Guinea) pig: LD50 1151 mg/kg

Oral (Human) LD: 100 mg/kg

Oral (Human) LD: 143 mg/kg

Oral (Mouse) LD50: 2157 mg/kg

Oral (Dog) LD: 400 mg/kg

Oral (Rabbit) LD: 600 mg/kg

Dyspnae, nausea, effects on spermatogenesis and the male fertility index recorded.

#### IRRITATION

Nil Reported

## Section 12 - ECOLOGICAL INFORMATION

» Fish LC50 (96hr.) (mg/l):

3.6

» Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

» Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

» For manganese and its compounds:

#### Environmental fate:

It has been established that while lower organisms (e.g., plankton, aquatic plants, and some fish) can significantly bioconcentrate manganese, higher organisms (including humans) tend to maintain manganese homeostasis. This indicates that the potential for biomagnification of manganese from lower trophic levels to higher ones is low.

There were two mechanisms involved in explaining the retention of manganese and other metals in the environment by soil. First, through cation exchange reactions, manganese ions and the charged surface of soil particles form manganese oxides, hydroxides, and oxyhydroxides which in turn form absorption sites for other metals. Secondly, manganese can be adsorbed to other oxides, hydroxides, and oxyhydroxides through ligand exchange reactions. When the soil solution becomes saturated, these manganese oxides, hydroxides, and oxyhydroxides can precipitate into a new mineral phase and act as a new surface to which other substances can adsorb. The tendency of soluble manganese compounds to adsorb to soils and sediments depends mainly on the cation exchange capacity and the organic composition of the soil. The soil adsorption constants (the ratio of the concentration in soil to the concentration in water) for Mn(II) span five orders of magnitude, ranging from 0.2 to 10,000 mL/g, increasing as a function of the organic content and the ion exchange capacity of the soil; thus, adsorption may be highly variable. In some cases, adsorption of manganese to soils may not be a readily reversible process. At low concentrations, manganese may be "fixed" by clays and will not be released into solution readily. At higher concentrations, manganese may be desorbed by ion exchange mechanisms with other ions in solution. For example, the discharge of waste water effluent into estuarine environments resulted in the mobilization of manganese from the bottom sediments. The metals in the effluent may have been preferentially adsorbed resulting in the release of manganese. The oxidation state of manganese in soil and sediments may be altered by microbial activity; oxidation may lead to the precipitation of manganese. Bacteria and microflora can increase the mobility of manganese.

The transport and partitioning of manganese in water is controlled by the solubility of the specific chemical form present, which in turn is determined by pH, Eh (oxidation-reduction potential), and the characteristics of the available anions. The metal may exist in water in any of four oxidation states.

Manganese(II) predominates in most waters (pH 4-7) but may become oxidized at a pH >8 or 9. The principal anion associated with Mn(II) in water is usually carbonate (CO<sub>3</sub>), and the concentration of manganese is limited by the relatively low solubility (65 mg/L) of MnCO<sub>3</sub>. In relatively oxidized water, the solubility of Mn(II) may be controlled by manganese oxide equilibria, with manganese being converted to the Mn(III) or Mn(IV) oxidation states. In extremely reduced water, the fate of manganese tends to

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be controlled by formation of a poorly soluble sulfide. Manganese in water may undergo oxidation at high pH or Eh and is also subject to microbial activity. For example, Mn(II) in a lake was oxidized during the summer months, but this was inhibited by a microbial poison, indicating that the oxidation was mediated by bacteria. The microbial metabolism of manganese is presumed to be a function of pH, temperature, and other factors.

Manganese in water may be significantly bioconcentrated at lower trophic levels. A bioconcentration factor (BCF) relates the concentration of a chemical in plant and animal tissues to the concentration of the chemical in the water in which they live. The BCF of manganese was estimated as 2,500 - 6,300 for phytoplankton, 300 - 5,500 for marine algae, 80 - 830 for intertidal mussels, and 35 - 930 for coastal fish. Similarly, the BCF of manganese was estimated to be 10,00 - 20,000 for marine and freshwater plants, 10,000 - 40,000 for invertebrates, and 10 - 600 for fish. In general, these data indicate that lower organisms such as algae have larger BCFs than higher organisms. In order to protect consumers from the risk of manganese bioaccumulation in marine mollusks, the U.S. EPA has set a criterion for manganese at 0.1 mg/L for marine waters.

Elemental manganese and inorganic manganese compounds have negligible vapor pressures but may exist in air as suspended particulate matter derived from industrial emissions or the erosion of soils. Manganese-containing particles are mainly removed from the atmosphere by gravitational settling, with large particles tending to fall out faster than small particles. The half-life of airborne particles is usually on the order of days, depending on the size of the particle and atmospheric conditions. Some removal by washout mechanisms such as rain may also occur, although it is of minor significance in comparison to dry deposition.

\* DO NOT discharge into sewer or waterways.

\* The material is classified as an ecotoxin\* because the Daphnia EC50 (48 hours) is less than or equal to 0.1 mg/l

\* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

### Section 13 - DISPOSAL CONSIDERATIONS

\*)

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

For small quantities of permanganate:

- Dissolve solid residue in water. Add a reducer (hypochlorite, a bisulfate, or a ferrous salt but not carbon, sulfur or strong reducing agent) and sulfuric acid to promote reduction.

- Neutralise with soda ash.

- Bury precipitate in an authorised landfill.

- Decontaminate empty containers with reducer, acid and soda ash, as above.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction,
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.
- Recycle containers if possible, or dispose of in an authorised landfill.

### Section 14 - TRANSPORTATION INFORMATION



Labels Required: OXIDIZING AGENT  
HAZCHEM: 1Y (ADG6)  
Land Transport UNDG:

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Class or division:	5.1	Subsidiary risk:	None
UN No.:	1490	UN packing group:	II
Shipping Name: POTASSIUM PERMANGANATE			
<b>Air Transport IATA:</b>			
ICAO/IATA Class:	5.1	ICAO/IATA Subrisk:	None
UN/D Number:	1490	Packing Group:	II
Special provisions:	None		
Shipping Name: POTASSIUM PERMANGANATE			
<b>Maritime Transport IMDG:</b>			
IMDG Class:	5.1	IMDG Subrisk:	None
UN Number:	1490	Packing Group:	II
EMS Number:	F-H,S-Q	Special provisions:	None
Limited Quantities:	1 kg		
Shipping Name: POTASSIUM PERMANGANATE			

### Section 15 - REGULATORY INFORMATION

#### POISONS SCHEDULE

S6, NZS4

#### REGULATIONS

potassium permanganate (CAS: 7722- 64- 7) is found on the following regulatory lists;

Australia Exposure Standards

Australia Hazardous Substances

Australia Illicit Drug Reagents/Essential Chemicals - Category III

Australia Inventory of Chemical Substances (AICS)

Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix E (Part 2)

Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix F (Part 3)

Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 9

OECD Representative List of High Production Volume (HPV) Chemicals

United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances - Table II

United Nations List of Precursors and Chemicals Frequently used in the Illicit Manufacture of Narcotic Drugs and Psychotropic

Substances Under International Control - Table I (English)

United Nations List of Precursors and Chemicals Frequently used in the Illicit Manufacture of Narcotic Drugs and Psychotropic

Substances Under International Control - Table I (French)

United Nations List of Precursors and Chemicals Frequently used in the Illicit Manufacture of Narcotic Drugs and Psychotropic

Substances Under International Control - Table I (Spanish)

### Section 16 - OTHER INFORMATION

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

A list of reference resources used to assist the committee may be found at:

[www.chemwatch.net/references](http://www.chemwatch.net/references).

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

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## MSDS No. 4 Powder Activated Carbon

CG2

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#### Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

##### PRODUCT NAME

CARBON, ACTIVATED

##### SYNONYMS

"activated carbon powder", "activated charcoal", "activated carbon, granular", "carbon powder, activated", "charcoal activated", "Anticarbene, Norit", "Columbia LCK", "Nuchar, Anthrasorb, "Suchar 681", "CUZ 3", SKT, SKG, Pelikan, "CWN 2", Hydrodarco, Darco, Watercarb, "Filtrisorb 200 400", "Carbopol Z4", "Carbopol extra", M, SV2000, Carbosieve, "Carbosorbit R", "Supersorbon IV", "Supersorbon IV", SI, K257, XE340, Cecarbon, Grosafe, "CLF II", "CLF II", Jado, "Witecarb 940", "MB 200", "MA 100 (Carbon)", "Tennant Trading Gold Gobbler", Ebara-Inflico

##### PROPER SHIPPING NAME

CARBON, ACTIVATED

##### PRODUCT USE

Used for clarifying, decolourizing, deodorizing and filtering solutions, public water supply.

##### SUPPLIER

Company: Calgon Corp. / Hall Labs. / Carlyle / Multichem Pty Ltd Company: Pinman T/As NZ Townsville(Mintrade ) Pty Ltd

Address:  
 Suite 6, 400 High Street  
 Kew  
 VIC, 3101  
 AUS  
 Telephone: 1800 999 988  
 Telephone: +61 3 9853 29

Address:  
 PO Box 7862  
 Garbutt  
 QLD, 4814  
 AUS

##### HAZARD RATINGS

	Min	Max
Flammability:	2	
Toxicity:	2	
Body Contact:	2	
Reactivity:	2	
Chronic:	2	

Min/Nil=0  
 Low=1  
 Moderate=2  
 High=3  
 Extreme=4

#### Section 2 - HAZARDS IDENTIFICATION

##### STATEMENT OF HAZARDOUS NATURE

**☠ DANGEROUS GOODS. NON-HAZARDOUS SUBSTANCE. According to the Criteria of NOHSC, and the ADG Code.**

##### POISONS SCHEDULE

None

##### RISK

- » May cause fire.
  - » Flammable.
  - » Spontaneously flammable in air.
  - » Inhalation may produce health damage\*.
  - » Cumulative effects may result following exposure\*.
  - » May produce discomfort of the eyes and respiratory tract\*.
  - » Limited evidence of a carcinogenic effect\*.
- \* (limited evidence).

##### SAFETY

- » Do not breathe dust.
- » Avoid contact with skin.
- » Wear eye/ face protection.
- » Use only in well ventilated areas.
- » Keep container in a well ventilated place.
- » In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
- » This material and its container must be disposed of as hazardous waste.

#### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
carbon, activated	7440-44-0	>98

<http://max.chemwatch.net/cg2/msds.exe?fontsize=&print=Y&rCode=&prefname=&c...> 31/03/2009

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### Section 4 - FIRST AID MEASURES

#### SWALLOWED

- »
- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

#### EYE

- »
  - If in eyes, hold eyelids apart and flush the eye continuously with running water.
  - Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
  - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
  - If pain persists or recurs seek medical attention.
  - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
- For THERMAL burns:
- Do NOT remove contact lens
  - Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye.
  - Seek urgent medical assistance, or transport to hospital.

#### SKIN

- » If skin or hair contact occurs:
  - Immediately flush body and clothes with large amounts of water, using safety shower if available.
  - Quickly remove all contaminated clothing, including footwear.
  - Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.
  - Transport to hospital, or doctor.
- In case of burns:
- Immediately apply cold water to burn either by immersion or wrapping with saturated clean cloth.
  - DO NOT remove or cut away clothing over burnt areas. DO NOT pull away clothing which has adhered to the skin as this can cause further injury.
  - DO NOT break blister or remove solidified material.
  - Quickly cover wound with dressing or clean cloth to help prevent infection and to ease pain.
  - For large burns, sheets, towels or pillow slips are ideal; leave holes for eyes, nose and mouth.
  - DO NOT apply ointments, oils, butter, etc. to a burn under any circumstances.
  - Water may be given in small quantities if the person is conscious.
  - Alcohol is not to be given under any circumstances.
  - Reassure.
  - Treat for shock by keeping the person warm and in a lying position.
  - Seek medical aid and advise medical personnel in advance of the cause and extent of the injury and the estimated time of arrival of the patient.

#### INHALED

- »
- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.
- If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear breathing passages.
- Ask patient to rinse mouth with water but to not drink water.
- Seek immediate medical attention.

#### NOTES TO PHYSICIAN

- » Treat symptomatically.

### Section 5 - FIRE FIGHTING MEASURES

#### EXTINGUISHING MEDIA

- » For SMALL FIRES:
  - Dry chemical, CO<sub>2</sub>, water spray or foam.
- For LARGE FIRES:
- Foam, fog or water spray
  - DO NOT use water jets.

#### FIRE FIGHTING

- »
- Wear SCBA and fully-encapsulating, gas-tight suits when handling these substances.
- Always wear thermal protective clothing when handling molten substances.

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- Structural fire fighter's uniform will only provide limited protection.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- Fight fire from a safe distance, with adequate cover.
- If safe, switch off electrical equipment until vapour fire hazard removed.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

### FIRE/EXPLOSION HAZARD

»

- May ignite on contact with air leading to spontaneous combustion
- May decompose explosively when heated or involved in fire.
- May REIGNITE after fire is extinguished.
- Gases generated in fire may be poisonous, corrosive or irritating.
- Containers may explode on heating.
- Runoff may create multiple fire or explosion hazard.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), other pyrolysis products typical of burning organic material.

May heat spontaneously.

A fire in bulk finely divided carbon may not be obviously visible unless the material is disturbed and sparks appear. A straw broom may be useful to produce the disturbance. Explosion and Ignition Behaviour of Carbon Black with Air

Lower Limit for Explosion: 50 g/m<sup>3</sup> (carbon black in air)

Maximum Explosion Pressure: 10 bar

Maximum Rate of Pressure Rise: 30-100 bar/sec

Minimum Ignition Temperature: 315 deg. C.

Ignition Energy: >1 kJ

Glow Temperature: 500 deg. C. (approx.)

Notes on Test Methods:

Tests 1, 2 and 3 were conducted by Bergwerkeschaftliche Versuchsstrecke, Dortmunde-Derne, using a 1 m<sup>3</sup> vessel with two chemical igniters having an intensity of 5000 W.S.

Tests 1 and 2 results are confirmed by information in the Handbook of Powder Technology, Vol. 4 (P. Field)

In Test 4, a modified Godbert-Greenwald furnace was used. See U.S. Bureau of Mines, Report 5624, 1960, p.5, "Lab Equipment and Test Procedures".

Test 5 used a 1 m<sup>3</sup> vessel with chemical igniters of variable intensity.

Test 6 was conducted in a laboratory oven. Active glowing appeared after 3 minutes exposure.

(European Committee for Biological Effects of Carbon Black) (2/84).

### FIRE INCOMPATIBILITY

»

- Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

### HAZCHEM

1Y

## Section 6 - ACCIDENTAL RELEASE MEASURES

### EMERGENCY PROCEDURES

#### MINOR SPILLS

»

- Eliminate all ignition sources.
- Cover with WET earth, sand or other non-combustible material.
- Use clean, non-sparking tools to collect absorbed material
- Wear gloves and safety glasses as appropriate.

#### MAJOR SPILLS

»

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Eliminate all ignition sources (no smoking, flares, sparks or flames)
- Stop leak if safe to do so; prevent entry into waterways, drains or confined spaces.
- May be violently or explosively reactive.
- DO NOT walk through spilled material.
- DO NOT touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Cover with WET earth, sand or other non-combustible material.
- Use clean, non-sparking tools to collect absorbed material and place into loosely-covered metal or plastic containers ready for disposal.

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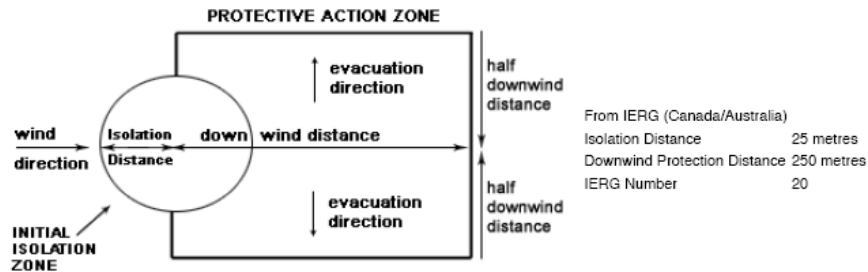
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- Alternately, the spill may be contained using WET earth, sand, or vermiculite and then covered with a high boiling point mineral oil.
- Recover the liquid using non-sparking appliances and place in labelled, sealable container.
- Water spray may be used to knock down vapours or divert vapour clouds.
- Wash area with water and dike for later disposal;
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

### PROTECTIVE ACTIONS FOR SPILL



### FOOTNOTES

- 1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
- 2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
- 3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
- 4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
- 5 Guide 133 is taken from the US DOT emergency response guide book.
- 6 IERG Information is derived from CANUTEC - Transport Canada.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



- X: Must not be stored together  
 O: May be stored together with specific preventions  
 +: May be stored together

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

## Section 7 - HANDLING AND STORAGE

### PROCEDURE FOR HANDLING

» NOTE:

- Wet, activated carbon removes oxygen from the air thus producing a severe hazard to workers inside carbon vessels and in enclosed or confined spaces where activated carbons might accumulate.
- Before entry to such areas, sampling and test procedures for low oxygen levels should be undertaken; control conditions should be established to ensure the availability of adequate oxygen supply.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure occurs.
- Use in a well-ventilated area.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.



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- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately and before re-use
- Use good occupational work practice.
- Observe manufacturer's storing/handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

NOTE: The material may remove oxygen from the air thus producing a severe hazard to workers inside enclosed or confined spaces where the material might accumulate. Before entry to such areas, sampling and test procedures for low oxygen levels should be undertaken; control conditions should be established to ensure the availability of adequate oxygen supply.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

### SUITABLE CONTAINER

» For low viscosity materials and solids:

Drums and jerricans must be of the non-removable head type.

Where a can is to be used as an inner package, the can must have a screwed enclosure.

For materials with a viscosity of at least 2680 cSt. (23 deg. C):

- Removable head packaging and
- cans with friction closures may be used.

Where combination packages are used, there must be sufficient inert absorbent material to absorb completely any leakage that may occur, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

All combination packages for Packing group I and II must contain cushioning material.

### STORAGE INCOMPATIBILITY

»

- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous

For carbon powders:

- Avoid oxidising agents, reducing agents.
- Reaction with finely divided metals, bromates, chlorates, chloramine monoxide, dichlorine oxide, iodates, metal nitrates, oxygen difluoride, peroxyformic acid, peroxyfuroic acid and trioxygen difluoride may result in an exotherm with ignition or explosion. Less active forms of carbon will ignite or explode on suitably intimate contact with oxygen, oxides, peroxides, oxosalts, halogens, interhalogens and other oxidising species.
- Explosive reaction with ammonium nitrate, ammonium perchlorate, calcium hypochlorite and iodine pentoxide may occur following heating. Carbon may react violently with nitric acid and may be explosively reactive with nitrogen trifluoride at reduced temperatures. In the presence of nitrogen oxide, incandescence and ignition may occur. Finely divided or highly porous forms of carbon, exhibiting a high surface area to mass (up to 2000 m<sup>2</sup>/g) may function as unusually active fuels possessing both adsorptive and catalytic properties which accelerate the release of energy in the presence of oxidising substances. Dry metal-impregnated charcoal catalysts may generate sufficient static, during handling, to cause ignition.
- Graphite in contact with liquid potassium, rubidium or caesium at 300 deg. C. produces intercalation compounds (C8M) which ignite in air and may react explosively with water. The fusion of powdered diamond and potassium hydroxide may produce explosive decomposition.
- Activated carbon, when exposed to air, represents a potential fire hazard due to a high surface area and adsorptive capacity. Freshly prepared material may ignite spontaneously in the presence of air especially at high humidity. Spontaneous combustion in air may occur at 90-100 deg. C. The presence of moisture in air facilitates the ignition. Drying oils and oxidising oils promote spontaneous heating and ignition; contamination with these must be avoided. Unsaturated drying oils (linseed oil etc.) may ignite following adsorption owing to an enormous increase in the surface area of oil exposed to air; the rate of oxidation may also be catalysed by metallic impurities in the carbon. A similar, but slower effect occurs on fibrous materials such as cotton waste. Spontaneous heating of activated carbon is related to the composition and method of preparation of the activated carbon. Free radicals, present in charcoal, are responsible for autoignition. Self-heating and autoignition may also result from adsorption of various vapours and gases (especially oxygen). For example, activated carbon auto-ignites in flowing air at 452-518 deg. C.; when the base, triethylenediamine, is adsorbed on the carbon (5%) the autoignition temperature is reduced to 230-260 deg. C.. An exotherm is produced at 230-260 deg. C., at high flow rates of air, although ignition did not occur until 500 deg. C.. Mixtures of sodium borohydride with activated carbons, in air, promote the oxidation of sodium borohydride, producing a self-heating reaction that may result in the ignition of charcoal and in the production of hydrogen through thermal decomposition of the borohydride.

### STORAGE REQUIREMENTS

» Carbon and charcoal may be stabilised for storage and transport, without moistening, by treatment with hot air at 50 deg. C.. Use of oxygen-impermeable bags to limit oxygen and moisture uptake has been proposed. Surface contamination with oxygenated volatiles may generate a heat of reaction (spontaneous heating). Should stored product reach 110 deg. C., stacked bags should be pulled apart with each bag separated by an air space to permit cooling away from other combustible materials.

- Store under an inert gas, e.g. argon or nitrogen.

FOR MINOR QUANTITIES:

- Store in an indoor fireproof cabinet or in a room of noncombustible construction.
- Provide adequate portable fire-extinguishers in or near the storage area.

FOR PACKAGE STORAGE:

- Store in original containers in approved flame-proof area.
- No smoking, naked lights, heat or ignition sources.
- DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry, well ventilated area.

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- Protect containers against physical damage and check regularly for leaks.
- Protect containers from exposure to weather and from direct sunlight unless: (a) the packages are of metal or plastic construction; (b) the packages are securely closed are not opened for any purpose while in the area where they are stored and (c) adequate precautions are taken to ensure that rain water, which might become contaminated by the dangerous goods, is collected and disposed of safely.
- Ensure proper stock-control measures are maintained to prevent prolonged storage of dangerous goods.
- Observe manufacturer's storing and handling recommendations.

### Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

#### EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC
Australia Exposure Standards	carbon, activated (Carbon black)		3					
Australia Exposure Standards	carbon, activated (Inspirable dust (not otherwise classified))		10					

#### EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m <sup>3</sup> )	Revised IDLH Value (ppm)
carbon, activated	1,750	

#### MATERIAL DATA

» Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

The TLV-TWA for carbon black is recommended to minimise complaints of excessive dirtiness and applies only to commercially produced carbon blacks or to soots derived from combustion sources containing absorbed polycyclic aromatic hydrocarbons (PAHs). When PAHs are present in carbon black (measured as the cyclohexane-extractable fraction) NIOSH has established a REL-TWA of 0.1 mg/m<sup>3</sup> and considers the material to be an occupational carcinogen.

The NIOSH REL-TWA was "selected on the basis of professional judgement rather than on data delineating safe from unsafe concentrations of PAHs".

This limit was justified on the basis of feasibility of measurement and not on a demonstration of its safety.

NOTE: This substance has been classified by the ACGIH as A4 NOT classifiable as causing Cancer in humans.

- as fine dust: defined as a dust which can reach the alveolar region of the lung.

MAK Group C: There is no reason to fear risk of damage to the developing embryo when MAK and BAT values are observed.

MAK values, and categories and groups are those recommended within the Federal Republic of Germany.

as carbon black CAS RN 1333-86-4

TLV TWA: 3.5 mg/m<sup>3</sup> A4

ES TWA: 3 mg/m<sup>3</sup>

MAK value: 6 mg/m<sup>3</sup>

#### PERSONAL PROTECTION



#### EYE

- Safety glasses with side shields.
- Chemical goggles.

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- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

### HANDS/FEET

» Suitability and durability of glove type is dependent on usage. Factors such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity,

are important in the selection of gloves.

- Fire resistant/ heat resistant gloves where practical, otherwise
- Heavy-duty chemically resistant gloves capable of providing short-term protection against spontaneous ignition.

### OTHER

» Wear protective clothing appropriate for the work situation.

For large scale or continuous use, when handling dry powder, wear :

- non-sparking safety footwear,
- tight-weave, non-static, noncombustible or flameproof clothing without cuffs, metallic fasteners, pockets, or laps in which powder may collect.

»

- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

### RESPIRATOR

»

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x ES	P1 Air-line*	- -	PAPR-P1 -
50 x ES	Air-line**	P2	PAPR-P2
100 x ES	-	P3	-
		Air-line*	-
100+ x ES	-	Air-line**	PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

### ENGINEERING CONTROLS

» Exhaust ventilation should be designed to prevent accumulation and recirculation in the workplace and safely remove carbon black from the air.

Note: Wet, activated carbon removes oxygen from the air and thus presents a severe hazard to workers inside carbon vessels and enclosed or confined spaces. Before entering such areas sampling and test procedures for low oxygen levels should be undertaken and control conditions set up to ensure ample oxygen availability. [Linde].

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

- particle dust respirators, if necessary, combined with an absorption cartridge;
- filter respirators with absorption cartridge or canister of the right type;
- fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

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Within each range the appropriate value depends on:

Lower end of the range

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 metres distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

#### APPEARANCE

Black, amorphous solid. Insoluble in water, acids, alkalis. Steam activated carbon is not subject to the provisions of UN 1362.

#### PHYSICAL PROPERTIES

Solid.

Does not mix with water.

Sinks in water.

Molecular Weight: 12.01

Melting Range (°C): >3500

Solubility in water (g/L): Immiscible

pH (1% solution): 9-10 @ 4%

Volatile Component (%vol): Nil @ 38 C.

Relative Vapour Density (air=1): Not applicable.

Lower Explosive Limit (%): Not applicable

Autoignition Temp (°C): Not available.

State: Divided solid

Boiling Range (°C): 4200

Specific Gravity (water=1): 1.8 (0.45 Bulk)

pH (as supplied): Not applicable

Vapour Pressure (kPa): Not applicable.

Evaporation Rate: Non Volatile

Flash Point (°C): Not available.

Upper Explosive Limit (%): Not applicable

Decomposition Temp (°C): Not Available

Viscosity: Not Applicable

### Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

#### CONDITIONS CONTRIBUTING TO INSTABILITY

»

- Presence of incompatible materials
- May heat spontaneously
- Identify and remove sources of ignition and heating.
- Incompatible material, especially oxidisers, and/or other sources of oxygen may produce unstable product(s).
- Hazardous polymerization will not occur.

### Section 11 - TOXICOLOGICAL INFORMATION

#### POTENTIAL HEALTH EFFECTS

##### ACUTE HEALTH EFFECTS

###### SWALLOWED

» The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (eg. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

Ingestion of finely divided carbon may produce gagging and constipation. Aspiration does not appear to be a concern as the material is generally regarded as inert and is often used as a food additive. Ingestion may produce a black stool.

###### EYE

» There is some evidence to suggest that this material can cause eye irritation and damage in some persons.

Eyes exposed to carbon particulates may be liable to irritation and burning. These can remain in the eye causing inflammation lasting weeks, and can cause permanent dark dotty discolouration.

###### SKIN

» The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

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Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

### INHALED

» Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.

There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

Impurities found in carbons, including iodine, can be toxic. Carbon dusts in the air may cause irritation of the mucous membranes, eyes and skin. Coughing, irritation of the upper airways and eye burning may occur.

### CHRONIC HEALTH EFFECTS

» There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.

Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

There is insufficient evidence to suggest that exposure to carbon black causes increased susceptibility to cancer or other ill effects. Some lung changes can occur after a prolonged period of exposure as well as increased strain on the right side of the heart.

### TOXICITY AND IRRITATION

» unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

» No significant acute toxicological data identified in literature search.

### The substance is classified by IARC as Group 3:

NOT classifiable as to its carcinogenicity to humans.

Evidence of carcinogenicity may be inadequate or limited in animal testing.

### CARCINOGEN

carbon, activated

International Agency for Research on Cancer (IARC) Carcinogens

Group 2B

## Section 12 - ECOLOGICAL INFORMATION

» DO NOT discharge into sewer or waterways.

## Section 13 - DISPOSAL CONSIDERATIONS

» Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction,
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorised landfill.

## Section 14 - TRANSPORTATION INFORMATION



Labels Required: SPONTANEOUSLY COMBUSTIBLE  
HAZCHEM: 1[Z] (ADG6)  
Land Transport UNDG:

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Class or division:	4.2	Subsidiary risk:	None
UN No.:	1362	UN packing group:	III
Shipping Name:	CARBON, ACTIVATED		
<b>Air Transport IATA:</b>			
ICAO/IATA Class:	4.2	ICAO/IATA Subrisk:	None
UN/ID Number:	1362	Packing Group:	III
Special provisions:	A3		
Shipping Name:	CARBON, ACTIVATED		
<b>Maritime Transport IMDG:</b>			
IMDG Class:	4.2	IMDG Subrisk:	None
UN Number:	1362	Packing Group:	III
EMS Number:	F-A,S-J	Special provisions:	223 925
Limited Quantities:	None		
Shipping Name:	CARBON, ACTIVATED		

### Section 15 - REGULATORY INFORMATION

#### POISONS SCHEDULE

None

#### REGULATIONS

carbon, activated (CAS: 7440- 44- 0) is found on the following regulatory lists;  
Australia Dangerous Goods Code (ADG Code) - Goods Too Dangerous To Be Transported  
Australia Exposure Standards  
Australia Hazardous Substances  
Australia High Volume Industrial Chemical List (HVICL)  
Australia Inventory of Chemical Substances (AICS)  
Australia Therapeutic Goods Administration (TGA) Substances that may be used as active ingredients in Listed medicines  
International Agency for Research on Cancer (IARC) Carcinogens  
International Air Transport Association (IATA) Dangerous Goods Regulations  
International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List  
International Council of Chemical Associations (ICCA) - High Production Volume List  
OECD Representative List of High Production Volume (HPV) Chemicals

### Section 16 - OTHER INFORMATION

» Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.  
A list of reference resources used to assist the committee may be found at:  
[www.chemwatch.net/references](http://www.chemwatch.net/references).

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

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## MSDS No. 5 Alum

CG2

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### ORICA ALUMINIUM SULFATE SOLUTION

Hazard Alert Code:  
HIGH

Chemwatch Material Safety Data Sheet (REVIEW)

Revision No: 3

Chemwatch 7114-23

Issue Date: 16-Aug-2006

CD 2009/1

#### Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

##### PRODUCT NAME

ORICA ALUMINIUM SULFATE SOLUTION

##### SYNONYMS

water, treatment, chemical

##### PRODUCT USE

Water treatment; paper and pulp; dyes; printing fabric.

##### SUPPLIER

Company: Orica

Address:

1 Nicholson Street  
Melbourne  
VIC, 3000

AUS

Telephone: +61 3 9665 7111

Emergency Tel: +1800 033 111 (All Hours)

Fax: +61 3 9665 7937

##### HAZARD RATINGS

	Min	Max
Flammability:	0	1
Toxicity:	2	3
Body Contact:	3	4
Reactivity:	0	1
Chronic:	2	3

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4



#### Section 2 - HAZARDS IDENTIFICATION

##### STATEMENT OF HAZARDOUS NATURE

**HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS.** According to the Criteria of NOHSC, and the ADG Code.

##### POISONS SCHEDULE

None

##### RISK

- » Irritating to eyes and skin.
- » Ingestion may produce health damage\*.
- » Cumulative effects may result following exposure\*.
- » May produce discomfort of the respiratory system\*.

\* (limited evidence).

##### SAFETY

- » Do not breathe gas/ fumes/ vapour/ spray.
- » Avoid contact with skin.
- » Wear eye/ face protection.
- » To clean the floor and all objects contaminated by this material use water.
- » In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
- » If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).

#### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
aluminium sulfate	10043-01-3	47
water	7732-18-5	53

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### Section 4 - FIRST AID MEASURES

#### SWALLOWED

- »
- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.

#### EYE

- » If this product comes in contact with the eyes:
- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

#### SKIN

- » If skin or hair contact occurs:
- Immediately flush body and clothes with large amounts of water, using safety shower if available.
- Quickly remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.
- Transport to hospital, or doctor.

#### INHALED

- »
- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

#### NOTES TO PHYSICIAN

- » Treat symptomatically.
- Manifestation of aluminium toxicity include hypercalcaemia, anaemia, Vitamin D refractory osteodystrophy and a progressive encephalopathy (mixed dysarthria-apraxia of speech, asterixis, tremulousness, myoclonus, dementia, focal seizures). Bone pain, pathological fractures and proximal myopathy can occur.
- Symptoms usually develop insidiously over months to years (in chronic renal failure patients) unless dietary aluminium loads are excessive.
- Serum aluminium levels above 60 ug/ml indicate increased absorption. Potential toxicity occurs above 100 ug/ml and clinical symptoms are present when levels exceed 200 ug/ml.
- Deferoxamine has been used to treat dialysis encephalopathy and osteomalacia. CaNa2EDTA is less effective in chelating aluminium.

[Ellenhorn and Barceloux: Medical Toxicology].

### Section 5 - FIRE FIGHTING MEASURES

#### EXTINGUISHING MEDIA

- »
- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

#### FIRE FIGHTING

- »
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

#### FIRE/EXPLOSION HAZARD

»

<http://max.chemwatch.net/cg2/msds.exe?fontsize=&print=Y&rCode=&prefname=&c...> 31/03/2009



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- Non combustible.
- Not considered to be a significant fire risk.
- Expansion or decomposition on heating may lead to violent rupture of containers.
- Decomposes on heating and may produce toxic/irritating fumes.
- May emit acrid smoke.

Decomposition may produce toxic fumes of: sulfur oxides (SO<sub>x</sub>), metal oxides.  
May emit poisonous fumes.

May emit corrosive fumes.

### FIRE INCOMPATIBILITY

» None known.

### HAZCHEM

None

## Section 6 - ACCIDENTAL RELEASE MEASURES

### EMERGENCY PROCEDURES

#### MINOR SPILLS

- »
- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable, labelled container for waste disposal.

#### MAJOR SPILLS

- » Moderate hazard.
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Neutralise/decontaminate residue.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X: Must not be stored together

O: May be stored together with specific precautions

+: May be stored together

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

## Section 7 - HANDLING AND STORAGE

### PROCEDURE FOR HANDLING

- »
- DO NOT use aluminium, galvanised or tin-plated containers
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with moisture.
- Avoid contact with incompatible materials.

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- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
- DO NOT allow clothing wet with material to stay in contact with skin

### SUITABLE CONTAINER

- Polyethylene or polypropylene container.
- Packing as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

### STORAGE INCOMPATIBILITY

» None known.

### STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC
Australia Exposure Standards	aluminium sulfate (Aluminium, soluble salts (as Al))		2					

The following materials had no OELs on our records

• water: CAS:7732-18-5

### MATERIAL DATA

» Not available. Refer to individual constituents.

### INGREDIENT DATA

#### ALUMINIUM SULFATE:

» Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

The TLV is based on the exposures to aluminium chloride and the amount of hydrolysed acid and the corresponding acid TLV to provide the same degree of freedom from irritation. Workers chronically exposed to aluminium dusts and fumes have developed severe pulmonary reactions including fibrosis, emphysema and pneumothorax. A much rarer encephalopathy has also been described.

#### WATER:

» No exposure limits set by NOHSC or ACGIH.

### PERSONAL PROTECTION

<http://max.chemwatch.net/cg2/msds.exe?fontsize=&print=Y&rCode=&prefname=&c...> 31/03/2009

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### EYE

»

- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

### HANDS/FEET

»

- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber
- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

### OTHER

»

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

### RESPIRATOR

» Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	-AUS P	-
1000	50	-	-AUS P
5000	50	Airline *	-
5000	100	-	-2 P
10000	100	-	-3 P
	100+		Airline**

\* - Continuous Flow \*\* - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

### ENGINEERING CONTROLS

» Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

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### Lower end of the range

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only.
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion

### Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### APPEARANCE

Off-white to light grey liquid; mixes with water.

### PHYSICAL PROPERTIES

Liquid.

Mixes with water.

Molecular Weight: Not Applicable

Melting Range (°C): -15

Solubility in water (g/L): Miscible

pH (1% solution): Not Available

Volatile Component (%vol): Not Available

Relative Vapour Density (air=1): Not Applicable

Lower Explosive Limit (%): Not Applicable

Autoignition Temp (°C): Not Applicable

State: Liquid

Boiling Range (°C) : 102

Specific Gravity (water=1): 1.31-1.33

pH (as supplied): 2-2.2

Vapour Pressure (kPa): Not Available

Evaporation Rate: Not Available

Flash Point (°C): Not Applicable

Upper Explosive Limit (%): Not Applicable

Decomposition Temp (°C): Not Available

Viscosity: Not Available

## Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

### CONDITIONS CONTRIBUTING TO INSTABILITY

»

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

## Section 11 - TOXICOLOGICAL INFORMATION

### POTENTIAL HEALTH EFFECTS

#### ACUTE HEALTH EFFECTS

##### SWALLOWED

» Accidental ingestion of the material may be damaging to the health of the individual.

The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

Acute toxic responses to aluminium are confined to the more soluble forms.

##### EYE

» The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

##### SKIN

» The material can produce chemical burns following direct contact with the skin.

This material can cause inflammation of the skin on contact in some persons.

The material may accentuate any pre-existing dermatitis condition.

Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.

Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

##### INHALED

» The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

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The material is not thought to produce adverse health effects following inhalation (as classified by EC Directives using animal models). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

### CHRONIC HEALTH EFFECTS

» Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production. Exposure to large doses of aluminium has been connected with the degenerative brain disease Alzheimer's Disease.

### TOXICITY AND IRRITATION

» Not available. Refer to individual constituents.

#### ALUMINIUM SULFATE:

» unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

#### TOXICITY

Oral (mouse) LD50: 6207 mg/kg

Oral (rat) TDLo: 10138 mg/kg/8D-C

Intraperitoneal (Mouse) LD50: 274 mg/kg

#### IRRITATION

Eye (rabbit): 10 mg/24h SEVERE

#### WATER:

» No significant acute toxicological data identified in literature search.

## Section 12 - ECOLOGICAL INFORMATION

» DO NOT discharge into sewer or waterways.

Refer to data for ingredients, which follows:

#### ALUMINIUM SULFATE:

» For aluminium and its compounds and salts:

#### Environmental fate:

Aluminium occurs in the environment in the form of silicates, oxides and hydroxides, combined with other elements such as sodium, fluorine and arsenic complexes with organic matter.

Acidification of soils releases aluminium as a transportable solution. Mobilisation of aluminium by acid rain results in aluminium becoming available for plant uptake.

As an element, aluminium cannot be degraded in the environment, but may undergo various precipitation or ligand exchange reactions. Aluminium in compounds has only one oxidation state (-3), and would not undergo oxidation-reduction reactions under environmental conditions. Aluminium can be complexed by various ligands present in the environment (e.g., fulvic and humic acids). The solubility of aluminium in the environment will depend on the ligands present and the pH.

The trivalent aluminium ion is surrounded by six water molecules in solution. The hydrated aluminium ion,  $[Al(H_2O)_6]^{3+}$ , undergoes hydrolysis, in which a stepwise deprotonation of the coordinated water ligands forms bound hydroxide ligands (e.g.,  $[Al(H_2O)_5(OH)]^{2+}$ ,  $[Al(H_2O)_4(OH)_2]^+$ ). The speciation of aluminium in water is pH dependent. The hydrated trivalent aluminium ion is the predominant form at pH levels below 4. Between pH 5 and 6, the predominant hydrolysis products are  $Al(OH)_2^+$  and  $Al(OH)_2^+$ , while the solid  $Al(OH)_3$  is most prevalent between pH 5.2 and 8.8. The soluble species  $Al(OH)_4^-$  is the predominant species above pH 9, and is the only species present above pH 10. Polymeric aluminum hydroxides appear between pH 4.7 and 10.5, and increase in size until they are transformed into colloidal particles of amorphous  $Al(OH)_3$ , which crystallise to gibbsite in acid waters. Polymerisation is affected by the presence of dissolved silica; when enough silica is present, aluminium is precipitated as poorly crystallised clay mineral species.

Hydroxyaluminum compounds are considered amphoteric (e.g., they can act as both acids and bases in solution). Because of this property, aluminum hydroxides can act as buffers and resist pH changes within the narrow pH range of 4-5.

Monomeric aluminum compounds, typified by aluminum fluoride, chloride, and sulfate, are considered reactive or labile compounds, whereas polymeric aluminum species react much more slowly in the environment. Aluminum has a stronger attraction for fluoride in an acidic environment compared to other inorganic ligand.

The adsorption of aluminum onto clay surfaces can be a significant factor in controlling aluminum mobility in the environment, and these adsorption reactions, measured in one study at pH 3.0-4.1, have been observed to be very rapid. However, clays may act either as a sink or a source for soluble aluminum depending on the degree of aluminum saturation on the clay surface.

Within the pH range of 5-6, aluminum complexes with phosphate and is removed from solution. Because phosphate is a necessary nutrient in ecological systems, this immobilization of both aluminum and phosphate may result in depleted nutrient states in surface water.

Plant species and cultivars of the same species differ considerably in their ability to take up and translocate aluminum to above-ground parts. Tea leaves may contain very high concentrations of aluminum, >5,000 mg/kg in old leaves. Other plants that may contain high levels of aluminum include Lycopodium (Lycopodiaceae), a few ferns, Symlocos (Symlocaceae), and Orites (Proteaceae). Aluminum is often taken up and concentrated in root tissue. In sub-alpine ecosystems, the large root biomass of the Douglas fir, *Abies amabilis*, takes up aluminum and immobilizes it, preventing large accumulation in above-ground tissue. It is

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unclear to what extent aluminum is taken up into root food crops and leafy vegetables. An uptake factor (concentration of aluminum in the plant/concentration of aluminum in soil) of 0.004 for leafy vegetables and 0.00065 for fruits and tubers has been reported, but the pH and plant species from which these uptake factors were derived are unclear. Based upon these values, however, it is clear that aluminum is not taken up in plants from soil, but is instead biodiluted.

Aluminum concentrations in rainbow trout from an alum-treated lake, an untreated lake, and a hatchery were highest in gill tissue and lowest in muscle. Aluminum residue analyses in brook trout have shown that whole-body aluminum content decreases as the fish advance from larvae to juveniles. These results imply that the aging larvae begin to decrease their rate of aluminum uptake, to eliminate aluminum at a rate that exceeds uptake, or to maintain approximately the same amount of aluminum while the body mass increases. The decline in whole-body aluminum residues in juvenile brook trout may be related to growth and dilution by edible muscle tissue that accumulated less aluminum than did the other tissues.

The greatest fraction of the gill-associated aluminum was not sorbed to the gill tissue, but to the gill mucus. It is thought that mucus appears to retard aluminum transport from solution to the membrane surface, thus delaying the acute biological response of the fish. It has been reported that concentrations of aluminum in whole-body tissue of the Atlantic salmon exposed to high concentrations of aluminum ranging from 3 ug/g (for fish exposed to 33 ug/L) to 96 ug/g (for fish exposed to 264 ug/L) at pH 5.5. After 60 days of exposure, BCF's ranged from 76 to 190 and were directly related to the aluminum exposure concentration. In acidic waters (pH 4.6-5.3) with low concentrations of calcium (0.5-1.5 mg Ca/L), labile aluminum between 25 and 75 ug/L is toxic. Because aluminum is toxic to many aquatic species, it is not bioaccumulated to a significant degree (BCF <300) in most fish and shellfish; therefore, consumption of contaminated fish does not appear to be a significant source of aluminum exposure in humans. Bioconcentration of aluminum has also been reported for several aquatic invertebrate species. BCF values ranging from 0.13 to 0.5 in the whole-body were reported for the snail. Bioconcentration of aluminum has also been reported for aquatic insects.

### Ecotoxicity:

Freshwater species pH >6.5

Fish: Acute LC50 (48-96 h) 5 spp: 0.6 (Salmo salar) - 106 mg/L; Chronic NOEC (8-28 d): 7 spp, NOEC, 0.034-7.1 mg/L. The lowest measured chronic figure was an 8-d LC50 of 0.17 mg/L for Micropterus sp.

Amphibian: Acute LC50 (4 d): Bufo americanus, 0.86-1.66 mg/L; Chronic LC50 (8-d) 2.28 mg/L

Crustaceans LC50 (48 h): 1 sp 2.3-36.9 mg/L; Chronic NOEC (7-28 d) 3 spp, 0.136-1.72 mg/L

Algae EC50 (96 h): population growth, 0.46-0.57 mg/L; 2 spp, chronic NOEC, 0.8-2.0 mg/L

Freshwater species pH <6.5 (all between pH 4.5 and 6.0)

Fish LC50 (24-96 h): 4 spp, 0.015 (S. trutta) - 4.2 mg/L; chronic data on Salmo trutta, LC50 (21-42 d) 0.015- 0.105 mg/L

Amphibians LC50 (4-5 d): 2 spp, 0.540-2.670 mg/L (absolute range 0.40-5.2 mg/L)

Alga: 1 sp NOEC growth 2.0 mg/L

Among freshwater aquatic plants, single-celled plants are generally the most sensitive to aluminum. Fish are generally more sensitive to aluminum than aquatic invertebrates. Aluminium is a gill toxicant to fish, causing both ionoregulatory and respiratory effects.

The bioavailability and toxicity of aluminum is generally greatest in acid solutions. Aluminium in acid habitats has been observed to be toxic to fish and phytoplankton. Aluminium is generally more toxic over the pH range 4.4-5.4, with a maximum toxicity occurring around pH 5.0-5.2. The inorganic single unit aluminium species (Al(OH)<sub>2</sub><sup>+</sup>) is thought to be the most toxic. Under very acid conditions, the toxic effects of the high H<sup>+</sup> concentration appear to be more important than the effects of low concentrations of aluminium; at approximately neutral pH values, the toxicity of aluminium is greatly reduced. The solubility of aluminium is also enhanced under alkaline conditions, due to its amphoteric character, and some researchers found that the acute toxicity of aluminium increased from pH 7 to pH 9. However, the opposite relationship was found in other studies. The uptake and toxicity of aluminium in freshwater organisms generally decreases with increasing water hardness under acidic, neutral and alkaline conditions. Complexing agents such as fluoride, citrate and humic substances reduce the availability of aluminium to organisms, resulting in lower toxicity. Silicon can also reduce aluminium toxicity to fish.

### Drinking Water Standards:

aluminium: 200 ug/l (UK max.)

200 ug/l (WHO guideline)

chloride: 400 mg/l (UK max.)

250 mg/l (WHO guideline)

fluoride: 1.5 mg/l (UK max.)

1.5 mg/l (WHO guideline)

nitrate: 50 mg/l (UK max.)

50 mg/l (WHO guideline)

sulfate: 250 mg/l (UK max.)

Soil Guideline: none available.

Air Quality Standards: none available.

Toxicity Fish: LC50(12-96)100mg/L

WATER:

### Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible.
  - Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
  - Dispose of by: Burial in a licenced land-fill or incineration in a licenced apparatus (after admixture with suitable combustible material).
  - Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
  - Containers may still present a chemical hazard/ danger when empty.
  - Return to supplier for reuse/ recycling if possible.
- Otherwise:
- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store

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- the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

### Section 14 - TRANSPORTATION INFORMATION

HAZCHEM: None (ADG6)

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: UN, IATA, IMDG

### Section 15 - REGULATORY INFORMATION

#### POISONS SCHEDULE

None

#### REGULATIONS

Regulations for ingredients

Orica Aluminium Sulfate Solution (CAS: None):

No regulations applicable

aluminium sulfate (CAS: 10043- 01- 3) is found on the following regulatory lists:

Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (Domestic water supply - inorganic chemicals)

Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Agricultural uses (Stock)

Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Domestic water quality

Australia Exposure Standards

Australia Hazardous Substances

Australia High Volume Industrial Chemical List (HVICL)

Australia Inventory of Chemical Substances (AICS)

Australia Therapeutic Goods Administration (TGA) Substances that may be used as active ingredients in Listed medicines

GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships

IMO IBC Code Chapter 17: Summary of minimum requirements

IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances

International Council of Chemical Associations (ICCA) - High Production Volume List

OECD Representative List of High Production Volume (HPV) Chemicals

water (CAS: 7732- 18- 5) is found on the following regulatory lists;

Australia Inventory of Chemical Substances (AICS)

GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships

IMO IBC Code Chapter 18: List of products to which the Code does not apply

OECD Representative List of High Production Volume (HPV) Chemicals

### Section 16 - OTHER INFORMATION

#### EXPOSURE STANDARD FOR MIXTURES

» "Worst Case" computer-aided prediction of spray/ mist or fume/ dust components and concentration: » Composite Exposure Standard for Mixture (TWA) :100 mg/m<sup>3</sup>.

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

A list of reference resources used to assist the committee may be found at:

[www.chemwatch.net/references](http://www.chemwatch.net/references).

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

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## MSDS No. 8 Sodium Hydroxide Dosing System 46% conc

### Material Safety Data Sheet



#### 1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

**Product Name:** CAUSTIC SODA - LIQUID (46%-50%)

**Other name(s):** Sodium hydroxide - liquid (46%-50%), Soda lye solution (46%-50%), Caustic soda solution (46%-50%), Sodium hydroxide solution (46%-50%), Liquid caustic soda (46%-50%), LCS 46%, Rezolv 46, Algane C46.

**Recommended Use:** Chemical manufacture; neutralising agent; pulp and paper, aluminium, detergent, and textile processing; vegetable oil refining; reclaiming rubber; etching and electroplating; food additive.

**Supplier:** Orica Australia Pty Ltd  
**ABN:** 004 117 828  
**Street Address:** 1 Nicholson Street,  
Melbourne 3000  
Australia  
**Telephone Number:** +61 3 9665 7111  
**Facsimile:** +61 3 9665 7937

**Emergency Telephone:** 1 800 033 111 (ALL HOURS)

#### 2. HAZARDS IDENTIFICATION

This material is hazardous according to criteria of ASCC; HAZARDOUS SUBSTANCE.

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

**Risk Phrases:** Causes severe burns. Risk of serious damage to eyes.

**Safety Phrases:** Avoid contact with skin and eyes. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible).

**Poisons Schedule:** S6 Poison.

#### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Components / CAS Number	Proportion	Risk Phrases
Sodium hydroxide 1310-73-2	46-50%	R35, R41

**Product Name:** CAUSTIC SODA - LIQUID (46%-50%)  
**Substance No:** 000031006701

**Issued:** 14/10/2008 **Version:** 4

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Water 50-54% -  
7732-18-5



### 4. FIRST AID MEASURES

For advice, contact a Poisons Information Centre (Phone eg. Australia 131 126; New Zealand 0 800 764766) or a doctor.

**Inhalation:** Remove victim from area of exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. For all but the most minor symptoms arrange for patient to be seen by a doctor as soon as possible, either on site or at the nearest hospital.

**Skin Contact:** If spilt on large areas of skin or hair, immediately drench with running water and remove clothing. Continue to wash skin and hair with plenty of water (and soap if material is insoluble) until advised to stop by the Poisons Information Centre or a doctor.

**Eye Contact:** If in eyes, hold eyelids apart and flush the eye continuously with running water. Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.

**Ingestion:** Immediately rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water. Seek immediate medical assistance.

**Medical attention and special treatment:** Treat symptomatically. Can cause corneal burns.

### 5. FIRE FIGHTING MEASURES

**Hazards from combustion products:** Non-combustible material.

**Precautions for fire fighters and special protective equipment:** Not combustible, however following evaporation of aqueous component residual material can decompose if involved in a fire, emitting toxic fumes. Contact with metals may liberate hydrogen gas which is extremely flammable. Fire fighters to wear self-contained breathing apparatus and suitable protective clothing if risk of exposure to products of decomposition.

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

**Hazchem Code:** 2R

### 6. ACCIDENTAL RELEASE MEASURES

**Product Name:** CAUSTIC SODA - LIQUID (46%-50%)  
**Substance No:** 000031006701

**Issued:** 14/10/2008 **Version:** 4

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## Material Safety Data Sheet



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

**Methods and materials for containment and clean up:** Slippery when spilt. Avoid accidents, clean up immediately. Wear protective equipment to prevent skin and eye contact and breathing in vapours. Work up wind or increase ventilation. Contain - prevent run off into drains and waterways. Use absorbent (soil, sand or other inert material). Collect and seal in properly labelled containers or drums for disposal. Caution - heat may be evolved on contact with water.

### 7. HANDLING AND STORAGE

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

**Conditions for safe storage:** Store in cool place and out of direct sunlight. Store away from incompatible materials described in Section 10. Store away from foodstuffs. Do not store in aluminium or galvanised containers nor use die-cast zinc or aluminium bungs; plastic bungs should be used. At temperatures greater than 40°C, tanks must be stress relieved. Keep containers closed when not in use - check regularly for leaks.

**Precautions for safe handling:** Avoid skin and eye contact and breathing in vapour, mists and aerosols.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Occupational Exposure Limits:**

No value assigned for this specific material by the National Occupational Health and Safety Commission. However, Exposure Standard(s) for constituent(s):

Sodium hydroxide: Peak Limitation = 2 mg/m<sup>3</sup>

As published by the National Occupational Health and Safety Commission.

Peak Limitation - a ceiling concentration which should not be exceeded over a measurement period which should be as short as possible but not exceeding 15 minutes.

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

**Engineering controls:**

Ensure ventilation is adequate and that air concentrations of components are controlled below quoted Exposure Standards. If inhalation risk exists: Use with local exhaust ventilation or while wearing suitable mist respirator. Keep containers closed when not in use.

**Personal Protective Equipment:**

**Product Name:** CAUSTIC SODA - LIQUID (46%-50%)  
**Substance No:** 000031006701

**Issued:** 14/10/2008 **Version:** 4

## Material Safety Data Sheet



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

Orica Personal Protection Guide No. 1, 1998: D - OVERALLS, RUBBER BOOTS, CHEMICAL GOGGLES, FACE SHIELD, SAFETY SHOES, GLOVES (Long), APRON.



Wear overalls, chemical goggles, 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 storage or re-use.

If risk of inhalation exists, wear suitable mist respirator meeting the requirements of AS/NZS 1715 and AS/NZS 1716.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Physical state:</b>	Liquid
<b>Colour:</b>	Colourless to Slightly Coloured
<b>Solubility:</b>	Miscible with water.
<b>Specific Gravity:</b>	1.48-1.52 @20°C
<b>Relative Vapour Density (air=1):</b>	Not available
<b>Vapour Pressure (20 °C):</b>	1.34 mm Hg (calculated)
<b>Flash Point (°C):</b>	Not applicable
<b>Flammability Limits (%):</b>	Not applicable
<b>Autoignition Temperature (°C):</b>	Not applicable
<b>Boiling Point/Range (°C):</b>	ca. 145 (literature)
<b>pH:</b>	14 (literature)
<b>Freezing Point/Range (°C):</b>	ca. 12 (calculated)

### 10. STABILITY AND REACTIVITY

**Chemical stability:** Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Absorbs carbon dioxide from the air.

**Conditions to avoid:** Avoid exposure to moisture.

**Incompatible materials:** Incompatible with aluminium , ammonium salts , tin , and zinc .

**Hazardous decomposition products:** None known.

**Product Name:** CAUSTIC SODA - LIQUID (46%-50%)  
**Substance No:** 000031006701

**Issued:** 14/10/2008

**Version:** 4

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## Material Safety Data Sheet



**Hazardous reactions:** Reacts violently with acids . Reacts exothermically on dilution with water. Reacts readily with various reducing sugars (i.e. fructose, galactose, maltose, dry whey solids) to produce carbon monoxide. Take precautions including monitoring the tank atmosphere for carbon monoxide to ensure safety of personnel before vessel entry.

### 11. TOXICOLOGICAL INFORMATION

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

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

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

**Skin contact:** Contact with skin will result in severe irritation. Corrosive to skin - may cause skin burns.

**Inhalation:** Breathing in mists or aerosols may produce respiratory irritation.

**Long Term Effects:**  
No information available for the product.

**Toxicological Data:**  
No LD50 data available for the product. For the constituent Sodium hydroxide :  
SKIN: Severe irritant (rabbit).

### 12. ECOLOGICAL INFORMATION

**Ecotoxicity** Avoid contaminating waterways.

### 13. DISPOSAL CONSIDERATIONS

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

### 14. TRANSPORT INFORMATION

#### Road and Rail Transport

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



**UN No:** 1824  
**Class-primary** 8 Corrosive  
**Packing Group:** II

**Product Name:** CAUSTIC SODA - LIQUID (46%-50%)  
**Substance No:** 000031006701

**Issued:** 14/10/2008 **Version:** 4



## Material Safety Data Sheet

**Proper Shipping Name:** SODIUM HYDROXIDE SOLUTION  
**Hazchem Code:** 2R

### Marine Transport

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

**UN No:** 1824  
**Class-primary:** 8 Corrosive  
**Packing Group:** II  
**Proper Shipping Name:** SODIUM HYDROXIDE SOLUTION

### Air Transport

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

**UN No:** 1824  
**Class-primary:** 8 Corrosive  
**Packing Group:** II  
**Proper Shipping Name:** SODIUM HYDROXIDE SOLUTION

## 15. REGULATORY INFORMATION

**Classification:** This material is hazardous according to criteria of ASCC; HAZARDOUS SUBSTANCE.

**Hazard Category:** C: Corrosive

**Risk Phrase(s):** R35: Causes severe burns.  
R41: Risk of serious damage to eyes.

**Safety Phrase(s):** S24/25: Avoid contact with skin and eyes.  
S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
S36/37/39: Wear suitable protective clothing, gloves and eye/face protection.  
S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible).

**Poisons Schedule:** S6 Poison.

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

**Product Name:** CAUSTIC SODA - LIQUID (46%-50%)  
**Substance No:** 000031006701

**Issued:** 14/10/2008 **Version:** 4

## Material Safety Data Sheet



### 16. OTHER INFORMATION

'Registry of Toxic Effects of Chemical Substances'. Ed. D. Sweet, US Dept. of Health & Human Services: Cincinnati, 2008.

This material safety data sheet has been prepared by SH&E Shared Services, Orica.

**Reason(s) for Issue:**

Change in Stability and Reactivity requirements

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

If clarification or further information is needed, the user should contact their Orica representative or Orica Limited at the contact details on page 1.

Orica Limited's responsibility for the material as sold is subject to the terms and conditions of sale, a copy of which is available upon request.

**Product Name:** CAUSTIC SODA - LIQUID (46%-50%)  
**Substance No:** 000031006701  
**Issued:** 14/10/2008  
**Version:** 4

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## MSDS No. 9 Hydrofluorosilicic acid 25% conc

# Material Safety Data Sheet



### 1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

**Product Name:** FLUOROSILICIC ACID 40%

**Recommended Use:** Lead and tin refining, additive in electroplating chromium, fluoridation of water supplies, pretreatment and finishing various metals, increases hardness of ceramics, plaster and cement.

**Supplier:** Orica Australia Pty Ltd  
**ABN:** 004 117 828  
**Street Address:** 1 Nicholson Street,  
Melbourne 3000  
Australia  
**Telephone Number:** +61 3 9665 7111  
**Facsimile:** +61 3 9665 7937

**Emergency Telephone:** 1 800 033 111 (ALL HOURS)

### 2. HAZARDS IDENTIFICATION

This material is hazardous according to criteria of NOHSC; HAZARDOUS SUBSTANCE.

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

**Risk Phrases:** Causes burns. Risk of serious damage to eyes.

**Safety Phrases:** Keep locked up and out of the reach of children. Avoid contact with skin and eyes. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible).

**Poisons Schedule:** S7 Dangerous Poison.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Components / CAS Number	Proportion	Risk Phrases
Water 7732-18-5	max 60%	-
Fluorosilicic acid 16961-83-4	min 40%	R34, R41
Sulfuric acid 7664-93-9	max 0.1%	R35, R41

**Product Name:** FLUOROSILICIC ACID 40%  
**Substance No:** 000000014417

**Issued:** 11/08/2006  
**Version:** 1

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## Material Safety Data Sheet



### 4. FIRST AID MEASURES

For advice, contact a Poisons Information Centre (Phone eg. Australia 131 126; New Zealand 0 800 764766) or a doctor.

**Inhalation:** Remove victim from area of exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. If patient finds breathing difficult and develops a bluish discoloration of the skin (which suggests a lack of oxygen in the blood - cyanosis), ensure airways are clear of any obstruction and have a qualified person give oxygen through a face mask. Apply artificial respiration if patient is not breathing. Seek immediate medical advice.

**Skin Contact:** If skin contact occurs, immediately remove contaminated clothing. Flush skin under running water for 15 minutes. Then apply calcium gluconate gel. Contact the Poisons Information Centre. For skin burns, cover with a clean, dry dressing until medical help is available.

**Eye Contact:** If in eyes, hold eyelids apart and flush the eye continuously with running water. Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.

**Ingestion:** Immediately rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water. Seek immediate medical assistance.

**Medical attention and special treatment:** Treat symptomatically. Effects may be delayed. Can cause corneal burns.

### 5. FIRE FIGHTING MEASURES

**Hazards from combustion products:** Non-combustible material.

**Precautions for fire fighters and special protective equipment:** Decomposes on heating emitting toxic fumes, including those of hydrogen fluoride. Keep containers cool with water spray. Fire fighters to wear self-contained breathing apparatus and suitable protective clothing if risk of exposure to products of decomposition.

**Suitable Extinguishing Media:** Not combustible, however, if material is involved in a fire use: Water fog (or if unavailable fine water spray), foam, dry agent (carbon dioxide, dry chemical powder).

**Hazchem Code:** 2X

### 6. ACCIDENTAL RELEASE MEASURES

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

**Methods and materials for containment and clean up:** Wear protective equipment to prevent skin and eye contact and breathing in vapours. Contain - prevent run off into drains and waterways. Use absorbent (soil, sand or other

**Product Name:** FLUOROSILICIC ACID 40%  
**Substance No:** 00000014417

**Issued:** 11/08/2006 **Version:** 1

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## Material Safety Data Sheet



inert material). Neutralise with lime or soda ash. Collect and seal in properly labelled containers or drums for disposal. Wash area down with detergent and excess water.

### 7. HANDLING AND STORAGE

This material is a Scheduled Poison S7 and must be stored, maintained and used in accordance with the relevant regulations.

**Conditions for safe storage:** Store in cool place and out of direct sunlight. Store away from foodstuffs. Store away from incompatible materials described in Section 10. Keep dry - reacts with water, may lead to drum rupture. Keep containers closed when not in use - check regularly for leaks.

**Precautions for safe handling:** Avoid skin and eye contact and breathing in vapour, mists and aerosols. Always add the acid to water, never the reverse.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Occupational Exposure Limits:**

No value assigned for this specific material by the National Occupational Health and Safety Commission. However, Exposure Standard(s) for constituent(s):

Fluorides (as F): 8hr TWA = 2.5 mg/m<sup>3</sup>

As published by the National Occupational Health and Safety Commission.

TWA - The time-weighted average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life.

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

**Engineering controls:**

Ensure ventilation is adequate and that air concentrations of components are controlled below quoted Exposure Standards. If inhalation risk exists: Use with local exhaust ventilation or while wearing suitable mist respirator. Keep containers closed when not in use.

**Personal Protective Equipment:**

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

Orica Personal Protection Guide No. 1, 1998: D - OVERALLS, RUBBER BOOTS, CHEMICAL GOGGLES, FACE SHIELD, SAFETY SHOES, GLOVES (Long), APRON.

**Product Name:** FLUOROSILICIC ACID 40%  
**Substance No:** 00000014417

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## Material Safety Data Sheet



Wear overalls, chemical goggles, 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 storage or re-use.

If risk of inhalation exists, wear suitable mist respirator meeting the requirements of AS/NZS 1715 and AS/NZS 1716.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Physical state:</b>	Clear Liquid
<b>Colour:</b>	Almost Colourless
<b>Odour:</b>	Acidic
<b>Solubility:</b>	Miscible with water.
<b>Specific Gravity:</b>	1.42
<b>Relative Vapour Density (air=1):</b>	Not available
<b>Vapour Pressure (20 °C):</b>	Not available
<b>Flash Point (°C):</b>	Not applicable
<b>Flammability Limits (%):</b>	Not applicable
<b>Autoignition Temperature (°C):</b>	Not applicable
<b>Boiling Point/Range (°C):</b>	115
<b>pH:</b>	Not available

**Freezing Point/Range (°C):** -30

### 10. STABILITY AND REACTIVITY

<b>Chemical stability:</b>	Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
<b>Conditions to avoid:</b>	Avoid contact with foodstuffs.
<b>Incompatible materials:</b>	Incompatible with alkalis , sulphides , carbonates , cyanides , and many metals .
<b>Hazardous decomposition products:</b>	Hydrogen fluoride.
<b>Hazardous reactions:</b>	Reacts exothermically on dilution with water. Corrosive to metals. Reacts violently with bases , and organic chemicals .

### 11. TOXICOLOGICAL INFORMATION

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

<b>Ingestion:</b>	Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain and chemical burns to the gastrointestinal tract.
<b>Eye contact:</b>	A severe eye irritant. Corrosive to eyes; contact can cause corneal burns. Contamination of eyes can result in permanent injury.

**Product Name:** FLUOROSILICIC ACID 40%  
**Substance No:** 00000014417

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## Material Safety Data Sheet



**Skin contact:** Contact with skin will result in severe irritation. Corrosive to skin - may cause skin burns.

**Inhalation:** Breathing in mists or aerosols may produce respiratory irritation.

**Long Term Effects:**  
Repeated or prolonged exposure may result in fluorosis.

**Toxicological Data:**  
No LD50 data available for the product. For the constituent  
FLUOSILICIC ACID:

Oral LD50 (rat): 430 mg/kg.

### 12. ECOLOGICAL INFORMATION

**Ecotoxicity** Avoid contaminating waterways.

### 13. DISPOSAL CONSIDERATIONS

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

### 14. TRANSPORT INFORMATION

#### Road and Rail Transport

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

**UN No:** 1778  
**Class-primary:** 8 Corrosive  
**Packing Group:** II  
**Proper Shipping Name:** FLUOROSILICIC ACID

**Hazchem Code:** 2X

#### Marine Transport

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

**UN No:** 1778  
**Class-primary:** 8 Corrosive  
**Packing Group:** II  
**Proper Shipping Name:** FLUOROSILICIC ACID

#### Air Transport

**Product Name:** FLUOROSILICIC ACID 40%  
**Substance No:** 00000014417

**Issued:** 11/08/2006 **Version:** 1  
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## Material Safety Data Sheet

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

**UN No:** 1778  
**Class-primary:** 8 Corrosive  
**Packing Group:** II  
**Proper Shipping Name:** FLUOROSILICIC ACID

### 15. REGULATORY INFORMATION

**Classification:** This material is hazardous according to criteria of NOHSC; HAZARDOUS SUBSTANCE.

**Hazard Category:** C: Corrosive

**Risk Phrase(s):** R34: Causes burns.  
R41: Risk of serious damage to eyes.

**Safety Phrase(s):** S1/2: Keep locked up and out of the reach of children.  
S24/25: Avoid contact with skin and eyes.  
S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
S36/37/39: Wear suitable protective clothing, gloves and eye/face protection.  
S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible).

**Poisons Schedule:** S7 Dangerous Poison.

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

### 16. OTHER INFORMATION

'Registry of Toxic Effects of Chemical Substances'. Ed. D. Sweet, US Dept. of Health & Human Services: Cincinnati, 2006.

**Reason(s) for Issue:**  
Creation in WERCS database

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

If clarification or further information is needed, the user should contact their Orica representative or Orica Limited at the contact details on page 1.

Orica Limited's responsibility for the material as sold is subject to the terms and conditions of sale, a copy of which is

**Product Name:** FLUOROSILICIC ACID 40%  
**Substance No:** 000000014417

**Issued:** 11/08/2006 **Version:** 1  
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## Material Safety Data Sheet



available upon request.

**Product Name:** FLUOROSILICIC ACID 40%  
**Substance No:** 000000014417

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**Version:** 1

## MSDS No. 10 Cl2(g)

CG2

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### CHLORINE

Hazard Alert Code:  
HIGH

Chemwatch Material Safety Data Sheet (REVIEW)

Revision No: 8

Chemwatch 1017

Issue Date: 14-Nov-2008

CD 2009/1

#### Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

##### PRODUCT NAME

CHLORINE

##### SYNONYMS

Cl2, "chlorine gas", "Gas Code No. 160", "misspelling as clorine", "liquefied chlorine"

##### PROPER SHIPPING NAME

CHLORINE

##### PRODUCT USE

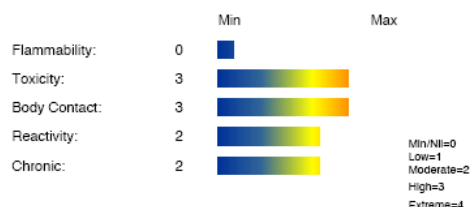
» The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation. Water purification; bleaching agent, particularly for paper and textiles; manufacture of bleaching powder; manufacture of chemicals such as chlorinated hydrocarbons, ethylene glycol, glycerine and tetraethyl lead. Intermediate

##### SUPPLIER

Company: Orica  
Address:  
1 Nicholson Street  
Melbourne  
VIC, 3000  
AUS  
Telephone: +61 3 9665 7111  
Emergency Tel: +1800 033 111 (All Hours)  
Fax: +61 3 9665 7937

Company: Wesfarmers CSBP Ltd  
Address:  
PO Box 345  
Kwinana  
WA, 6167  
AUS  
Telephone: +61 8 9411 8777  
Fax: +61 8 9411 8289

##### HAZARD RATINGS



#### Section 2 - HAZARDS IDENTIFICATION

##### STATEMENT OF HAZARDOUS NATURE

**HAZARDOUS SUBSTANCE. DANGEROUS GOODS.** According to the Criteria of NOHSC, and the ADG Code.

##### POISONS SCHEDULE

S7

##### RISK

- » Toxic by inhalation.
- » Irritating to eyes respiratory system and skin.
- » Risk of explosion if heated under confinement.
- » Very toxic to aquatic organisms.
- » Contact with air may produce sufficient heat to ignite combustible materials\*.
- » Cumulative effects may result following exposure\*.
- » Eye contact may produce serious damage\*.
- \* (limited evidence).

##### SAFETY

- » Keep locked up.
- » Keep away from combustible material.
- » Do not breathe gas/ fumes/ vapour/ spray.
- » Avoid contact with eyes.
- » Wear suitable protective clothing.
- » In case of insufficient ventilation wear suitable respiratory equipment.
- » Use only in well ventilated areas.
- » Keep container in a well ventilated place.
- » To clean the floor and all objects contaminated by this material use water and detergent.
- » Keep container tightly closed.

## CHLORINE

Hazard Alert Code:  
HIGH

Chemwatch Material Safety Data Sheet (REVIEW)

Revision No: 8

Chemwatch 1017

Issue Date: 14-Nov-2008

CD 2009/1

- » This material and its container must be disposed of in a safe way.
- » Keep away from food drink and animal feeding stuffs.
- » Take off immediately all contaminated clothing.
- » In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
- » If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).
- » Use appropriate container to avoid environment contamination.
- » Avoid release to the environment. Refer to special instructions/ safety data sheets.
- » This material and its container must be disposed of as hazardous waste.
- » In case of accident by inhalation: remove casualty to fresh air and keep at rest.

### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
chlorine	7782-50-5	> 99.5%

### Section 4 - FIRST AID MEASURES

#### SWALLOWED

- »
- Not considered a normal route of entry.

#### EYE

- »
- If product comes in contact with eyes remove the patient from gas source or contaminated area.
- Take the patient to the nearest eye wash, shower or other source of clean water.
- Open the eyelid(s) wide to allow the material to evaporate.
- Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners.
- The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage.
- Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s)
- Transport to hospital or doctor.
- Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur.
- If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage.
- Ensure verbal communication and physical contact with the patient.

DO NOT allow the patient to rub the eyes DO NOT allow the patient to tightly shut the eyes DO NOT introduce oil or ointment into the eye(s) without medical advice DO NOT use hot or tepid water.

#### SKIN

- » If skin or hair contact occurs:
- Immediately flush body and clothes with large amounts of water, using safety shower if available.
- Quickly remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.
- Transport to hospital, or doctor.
- In case of cold burns (frost-bite):
- Move casualty into warmth before thawing the affected part; if feet are affected carry if possible
- Bathe the affected area immediately in luke-warm water (not more than 35 deg C) for 10 to 15 minutes, immersing if possible and without rubbing
- DO NOT apply hot water or radiant heat.
- Apply a clean, dry, light dressing of "fluffed-up" dry gauze bandage
- If a limb is involved, raise and support this to reduce swelling
- If an adult is involved and where intense pain occurs provide pain killers such as paracetamol
- Transport to hospital, or doctor
- Subsequent blackening of the exposed tissue indicates potential of necrosis, which may require amputation.

#### INHALED

- »
- Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema.
- Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).
- As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested.

<http://max.chemwatch.net/cg2/msds.exe?fontsize=&print=Y&rCode=&prefname=&c...> 31/03/2009

## CHLORINE

Hazard Alert Code:  
HIGH

Chemwatch Material Safety Data Sheet (REVIEW)

Revision No: 8

Chemwatch 1017

Issue Date: 14-Nov-2008

CD 2009/1

- Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered.
- This must definitely be left to a doctor or person authorised by him/her. (ICSC13719).
- Following exposure to gas, remove the patient from the gas source or contaminated area.
  - NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer.
  - Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures.
  - If the patient is not breathing spontaneously, administer rescue breathing.
  - If the patient does not have a pulse, administer CPR.
  - If medical oxygen and appropriately trained personnel are available, administer 100% oxygen.
  - Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction.
  - Keep the patient warm, comfortable and at rest while awaiting medical care.
  - MONITOR THE BREATHING AND PULSE, CONTINUOUSLY.
  - Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary.

### NOTES TO PHYSICIAN

» Excellent warning properties force rapid escape of personnel from chlorine vapour thus most inhalations are mild to moderate. If escape is not possible, exposure to high concentrations for a very short time can result in dyspnea, haemophysis and cyanosis with later complications being tracheobroncho-pneumonitis and pulmonary oedema. Oxygen, intermittent positive pressure breathing apparatus and aerosolised bronchodilators are of therapeutic value where chlorine inhalation has been light to moderate. Severe inhalation should result in hospitalisation and treatment for a respiratory emergency.

Any chlorine inhalation in an individual with compromised pulmonary function (COPD) should be regarded as a severe inhalation and a respiratory emergency. [CCINFO, Dow 1988]

Effects from exposure to chlorine gas include pulmonary oedema which may be delayed. Observation in hospital for 48 hours is recommended.

Diagnosed asthmatics and those people suffering from certain types of chronic bronchitis should receive medical approval before being employed in occupations involving chlorine exposure.

If burn is present, treat as any thermal burn, after decontamination.

Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorised by him/her should be considered. (ICSC24419/24421).

## Section 5 - FIRE FIGHTING MEASURES

### EXTINGUISHING MEDIA

- »
- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

### FIRE FIGHTING

#### GENERAL

- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.
- Fight fire from a safe distance, with adequate cover.
- If safe, switch off electrical equipment until vapour fire hazard removed.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach cylinders suspected to be hot.
- Cool fire exposed cylinders with water spray from a protected location.
- If safe to do so, remove cylinders from path of fire.
- Equipment should be thoroughly decontaminated after use.

#### FIRE FIGHTING PROCEDURES:

- Excessive pressures may develop in a gas cylinder exposed in a fire; this may result in explosion.
  - Cylinders with pressure relief devices may release their contents as a result of fire and the released gas may constitute a further source of hazard for the fire-fighter.
- Cylinders without pressure-relief valves have no provision for controlled release and are therefore more likely to explode if exposed to fire.

#### FIRE FIGHTING REQUIREMENTS:



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- Positive pressure, self-contained breathing apparatus is required for fire-fighting of hazardous materials.
- Full structural fire-fighting (bunker) gear is the minimum acceptable attire.
- The need for proximity, entry and special protective clothing should be determined for each incident, by a competent fire-fighting safety professional.

### FIRE/EXPLOSION HAZARD

- » Containers may explode when heated - Ruptured cylinders may rocket
  - May burn but does not ignite easily.
  - Fire exposed cylinders may vent contents through pressure relief devices thereby increasing vapour concentration.
  - Fire may produce irritating, poisonous or corrosive gases.
  - Runoff may create fire or explosion hazard.
  - May decompose explosively when heated or involved in fire.
  - Contact with gas may cause burns, severe injury and/ or frostbite.
  - POISONOUS: MAY BE FATAL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN
- Decomposition may produce toxic fumes of: hydrogen chloride.  
Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.

### FIRE INCOMPATIBILITY

» None known.

### HAZCHEM

2XE

### Personal Protective Equipment

Gas tight chemical resistant suit.  
Limit exposure duration to 1 BA set 30 mins.

## Section 6 - ACCIDENTAL RELEASE MEASURES

### EMERGENCY PROCEDURES

#### MINOR SPILLS

- » Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.
- Check regularly for spills and leaks.
- Avoid breathing vapour and any contact with liquid or gas. Protective equipment including respirator should be used.
- DO NOT enter confined spaces where gas may have accumulated.
- Increase ventilation.
- Clear area of personnel.
- Stop leak only if safe to do so.
- Remove leaking cylinders to safe place. Release pressure under safe controlled conditions by opening valve.
- Orientate cylinder so that the leak is gas, not liquid, to minimise rate of leakage
- Keep area clear of personnel until gas has dispersed.

#### MAJOR SPILLS

- » Clear area of all unprotected personnel and move upwind.
- Alert Emergency Authority and advise them of the location and nature of hazard.
- Wear full body clothing with breathing apparatus.
- Prevent by any means available, spillage from entering drains and water-courses.
- Consider evacuation.
- Increase ventilation.
- No smoking or naked lights within area.
- Stop leak only if safe to do so.
- Water spray or fog may be used to disperse vapour.
- DO NOT enter confined space where gas may have collected.
- Keep area clear until gas has dispersed.
- Remove leaking cylinders to a safe place.
- Fit vent pipes. Release pressure under safe, controlled conditions
- Burn issuing gas at vent pipes.
- DO NOT exert excessive pressure on valve; DO NOT attempt to operate damaged valve.

For gas spills:

Avoid spraying water directly onto leaking containers as this will increase gas hazard.

For liquid spills:

Avoid breathing vapours - large volumes of gas will evaporate from liquid spills. Prevent spillage from entering drains. Contain liquid spillage with sand, earth, inert material or vermiculite. Cover and absorb liquid with protein foam (150 mm thick). Avoid spraying water onto liquid pools as this will increase evolution of chlorine gas.

### PROTECTIVE ACTIONS FOR SPILL

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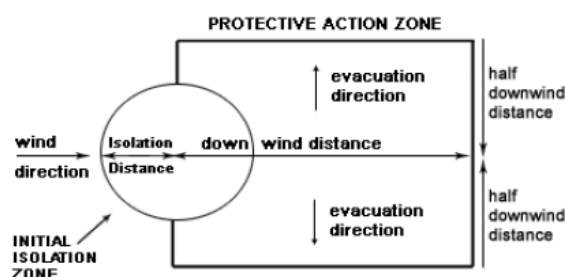
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From IERG (Canada/Australia)  
 Isolation Distance 100 metres  
 Downwind Protection Distance 800 metres  
 IERG Number 12

From US Emergency Response Guide 2000 Guide 124

### SMALL SPILLS

Name	Isolation Distance	Downwind Day	Protection Night
Chlorine	100 ft (30 m)	0.2 mile (0.3 km)	0.7 mile (1.1 km)

### LARGE SPILLS

Name	Isolation Distance	Downwind Day	Protection Night
Chlorine	900 ft (275 m)	1.7 mile (2.7 km)	4.2 mile (6.8 km)

### FOOTNOTES

- 1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confine the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
- 2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
- 3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
- 4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
- 5 Guide 124 is taken from the US DOT emergency response guide book.
- 6 IERG information is derived from CANUTEC - Transport Canada.

### EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

chlorine 20ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

chlorine 3ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:

chlorine 1ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according exceed the following cutoffs

Very Toxic (T+) >= 0.1% Toxic (T) >= 3.0%

R50 >= 0.25% Corrosive (C) >= 5.0%

R51 >= 2.5%

else >= 10%

where percentage is percentage of ingredient found in the mixture

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

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X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

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

### Section 7 - HANDLING AND STORAGE

#### PROCEDURE FOR HANDLING

- Consider use in closed pressurised systems, fitted with temperature, pressure and safety relief valves which are vented for safe dispersal.
- Use a pressure reducing regulator when connecting cylinder to lower pressure (<100 psig) piping or systems
- Use a check valve or trap in the discharge line to prevent hazardous back-flow into the cylinder
- Check regularly for spills or leaks. Keep valves tightly closed but do not apply extra leverage to hand wheels or cylinder keys.
- Valve protection caps must remain in place unless container is secured with valve outlet piped to use point.
- Do NOT drag, slide or roll cylinders - use a suitable hand truck for cylinder movement
- Test for leakage with brush and detergent - NEVER use a naked flame.
- Do NOT heat cylinder by any means to increase the discharge rate of product from cylinder.
- Leaking gland nuts may be tightened if necessary.
- If a cylinder valve will not close completely, remove the cylinder to a well ventilated location (e.g. outside) and, when empty, tag as FAULTY and return to supplier.
- Obtain a work permit before attempting any repairs.
- DO NOT attempt repair work on lines, vessels under pressure.
- Atmospheres must be tested and O.K. before work resumes after leakage.
- DO NOT transfer gas from one cylinder to another.

#### SUITABLE CONTAINER

- Cylinder:
- Ensure the use of equipment rated for cylinder pressure.
- Ensure the use of compatible materials of construction.
- Valve protection cap to be in place until cylinder is secured, connected.
- Cylinder must be properly secured either in use or in storage.
- Cylinder valve must be closed when not in use or when empty.
- Segregate full from empty cylinders.

WARNING: Suckback into cylinder may result in rupture. Use back-flow preventive device in piping.  
Use gases in cylinder sizes that will ensure complete usage of the cylinder content in a reasonably short amount of time.

#### STORAGE INCOMPATIBILITY

- Chlorine:
  - is a strong oxidiser
  - reacts explosively with acetylene, boron, diborane, or other boron hydrides at ordinary temperatures
  - forms easily ignited, sensitive explosive mixtures with gases and vapours such as anhydrous ammonia, benzene, butane, ethane, ethylene, fluorine, hydrocarbons, formaldehyde, hydrogen, hydrogen bromide, hydrogen chloride, oxygen, propane, propene in the presence of heat, hot surfaces, welding arc, sparks, strong sunlight, UV light, or a catalyst such as mercury oxide
  - contact with 2-carboxymethylisothiuronium chloride or s-ethylisothiuronium hydrogen sulfate may form nitrogen trichloride. a dangerous explosive
  - reacts violently with combustible materials, reducing agents, acetylene, molten aluminium (ignites on contact with the gas), alcohols, arsenic compounds, arsine, bismuth, boron, calcium compounds, carbon, diethylzinc, dimethylformamide, ether, ethyl phosphine, fluorine, germanium, hydrocarbons, hydrazine, hydrogen sulfide, hydroxylamine, iridium, lithium, lithium acetylide, magnesium, magnesium oxide, magnesium phosphide, mercury sulfide, methyl vinyl ether, metal carbides, molybdenum trioxide, potassium acetylide, sodium acetylide, sulfamic, sulfur dioxide, triethylborane and many other substances
  - forms explosive mixtures with gasoline and petroleum products, such as mineral oil, greases, phosphorus, silicones, turpentine, finely divided metals, organic compounds
  - in its liquid form reacts explosively with carbon disulfide, linseed oil, propylene, rubber, wax, white phosphorus
  - attacks some plastics and coatings
  - may cause dangerous fires in contact with hot solid metals (especially steel - iron/ chlorine fire can cause the bursting of storage containers)
  - when moist (150 ppm in water) is extremely corrosive to most metals especially in the presence of heat.
  - reacts with water to give hydrogen chloride, with carbon monoxide to form phosgene, and with sulfur dioxide to give sulfuryl

<http://max.chemwatch.net/cg2/msds.exe?fontsize=&print=Y&rCode=&prefname=&c...> 31/03/2009

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chloride  
 Chlorine storage areas shall be separated from anhydrous ammonia storage areas by a vapour path of at least 10 meters.

- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous
- Avoid storage with reducing agents.
- Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances

### STORAGE REQUIREMENTS

- Store in an upright position.
  - Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open.
  - Such compounds should be sited and built in accordance with statutory requirements.
  - The storage compound should be kept clear and access restricted to authorised personnel only.
  - Cylinders stored in the open should be protected against rust and extremes of weather.
  - Cylinders in storage should be properly secured to prevent toppling or rolling.
  - Cylinder valves should be closed when not in use.
  - Where cylinders are fitted with valve protection this should be in place and properly secured.
  - Gas cylinders should be segregated according to the requirements of the Dangerous Goods Act.
  - Preferably store full and empty cylinders separately.
  - Check storage areas for hazardous concentrations of gases prior to entry.
  - Full cylinders should be arranged so that the oldest stock is used first.
  - Cylinders in storage should be checked periodically for general condition and leakage.
  - Protect cylinders against physical damage. Move and store cylinders correctly as instructed for their manual handling.
- NOTE: A 'G' size cylinder is usually too heavy for an inexperienced operator to raise or lower.

### Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

#### EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC
Australia Exposure Standards	chlorine (Chlorine)					1	3	

#### EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m <sup>3</sup> )	Revised IDLH Value (ppm)
chlorine		10

#### MATERIAL DATA

» Odour Threshold Value: 0.08 ppm (detection) - olfactory fatigue may develop  
 NOTE: Detector tubes for chlorine, measuring in excess of 0.2 ppm, are commercially available. Long-term measurements (8 hrs) may be conducted to detect concentrations exceeding 0.13 ppm.  
 Smell is not a good indicator of severity of exposure in the range 0.5 to 2 ppm. In this range subjects found exposure unpleasant with itching and burning of the throat reported and occasionally an urge to cough. Significant differences in the responses of males and females were also recorded with females often reporting headache and drowsiness.  
 Exposure at 1 ppm chlorine for 8 hours produced significant changes in pulmonary function and increased subjective irritation. Similar 8 hour exposures at 0.5 ppm produced no significant pulmonary function changes and less severe subjective irritation. Exposures for 2 hours at 2 ppm chlorine produced no significant changes in pulmonary irritation.  
 An 8 hour exposure at 1.5 ppm produced increased mucous secretion from the nose and increased mucous in the hypopharynx. Exposure at or below the TLV-TWA and STEL is thought to protect the worker against annoying symptoms in nose, throat and conjunctiva and declines in pulmonary function.

Odour Safety Factor(OSF)  
 OSF=1.6 (CHLORINE).

#### PERSONAL PROTECTION



#### EYE

- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical

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exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

### HANDS/FEET

- »
- Neoprene gloves
- When handling sealed cylinders wear cloth or leather gloves.
- Insulated gloves

### OTHER

- »
- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.
- »
- Positive pressure, full face, air-supplied breathing apparatus should be used for work in enclosed spaces if a leak is suspected or the primary containment is to be opened (e.g. for a cylinder change)
- Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated.

### GLOVE SELECTION INDEX

» Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the computer-generated selection: chlorine

» Protective Material CPI \*

BUTYL/NEOPRENE	A
NEOPRENE	A
NITRILE	A
SARANEX-23	A
VITON/NEOPRENE	A
PE	B

» \* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

\* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

### RESPIRATOR

» Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	B-AUS P	-
1000	50	-	B-AUS P
5000	50	Airline *	-
5000	100	-	B-2 P
10000	100	-	B-3 P
	100+		Airline**

\* - Continuous Flow \*\* - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

### ENGINEERING CONTROLS

- »
- Areas where cylinders are stored require good ventilation and, if enclosed, need discrete/controlled exhaust ventilation.
- Secondary containment and exhaust gas treatment may be required by certain jurisdictions
- Local exhaust ventilation is required in work areas.
- Consideration should be given to the use of doubly-contained piping; diaphragm or bellows-sealed, soft-seat valves; backflow prevention devices; and flow- monitoring or limiting devices.
- Gas cabinets, with appropriate exhaust treatment, are recommended, as is automatic monitoring of the secondary enclosures and workplaces, for potential release.
- Automated alerting systems with automatic shutdown of gas-flow may be appropriate and may in fact be mandatory in certain

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jurisdictions.

- Respiratory protection in the form of air-supplied or self-contained breathing equipment must be worn if the oxygen concentration in the workplace air is less than 19%.
- Cartridge respirators do NOT give protection and may result in rapid suffocation.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
Within each range the appropriate value depends on:	
Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

#### APPEARANCE

» Packed as liquid under pressure and remains liquid only under pressure. Sudden release of pressure or leakage may result in rapid vapourisation with generation of large volumes of gas. Greenish-yellow gas or amber liquid when under pressure, with acutely irritating and pungent odour. Slightly soluble in water and alkalis. Soluble in many organic solvents but may react violently. Gas has a relative density of 2.5 and may collect in pits, depressions. Chlorine is an oxidising agent and may assist combustion. Properties at NTP: Gas density 2.980 g/L Liquid density 1.56 kg/l Vapour Pressure 689 KPa @ 21 °C. Relative gas density 2.473 @ 20 °C where air = 1.

#### PHYSICAL PROPERTIES

Gas.	Boiling Range (°C): -34.0
Does not mix with water.	Specific Gravity (water=1): 1.41 @ 20C Liq.
Sinks in water.	pH (as supplied): Not applicable
Corrosive.	Vapour Pressure (kPa): 666 @ 20 C
Toxic or noxious vapours/gas.	Evaporation Rate: Fast
Molecular Weight: 70.9	Flash Point (°C): Non flammable
Melting Range (°C): -101	Upper Explosive Limit (%): Not applicable
Solubility in water (g/L): Partly miscible	Decomposition Temp (°C): Not Available
pH (1% solution): Not available.	Viscosity: Not Available
Volatile Component (%vol): 100	
Relative Vapour Density (air=1): 2.5 @ 20 C	
Lower Explosive Limit (%): Not applicable	
Autoignition Temp (°C): Not applicable	
State: Liquefied gas	

### Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

#### CONDITIONS CONTRIBUTING TO INSTABILITY

- »
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

### Section 11 - TOXICOLOGICAL INFORMATION

#### POTENTIAL HEALTH EFFECTS

##### ACUTE HEALTH EFFECTS

###### SWALLOWED

» Overexposure is unlikely in this form.  
Not normally a hazard due to physical form of product.

###### EYE

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» The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating. Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, even through normal gloves. Frozen skin tissues are painless and appear waxy and yellow. Signs and symptoms of frost-bite may include "pins and needles", paleness followed by numbness, a hardening an stiffening of the skin, a progression of colour changes in the affected area, (first white, then mottled and blue and eventually black; on recovery, red, hot, painful and blistered).  
If applied to the eyes, this material causes severe eye damage.

### SKIN

» The material can produce chemical burns following direct contact with the skin.  
Skin contact is not thought to produce harmful health effects (as classified under EC Directives using animal models). Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.  
Open cuts, abraded or irritated skin should not be exposed to this material.  
Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.  
Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, even through normal gloves. Frozen skin tissues are painless and appear waxy and yellow. Signs and symptoms of frost-bite may include "pins and needles", paleness followed by numbness, a hardening an stiffening of the skin, a progression of colour changes in the affected area, (first white, then mottled and blue and eventually black; on recovery, red, hot, painful and blistered).

### INHALED

» Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may produce toxic effects.

Inhalation of the vapour is hazardous and may even be fatal.

The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing.

Before starting consider control of exposure by mechanical ventilation.

Inhalation of toxic gases may cause:

- Central Nervous System effects including depression, headache, confusion, dizziness, stupor, coma and seizures;
- respiratory: acute lung swellings, shortness of breath, wheezing, rapid breathing, other symptoms and respiratory arrest;
- heart: collapse, irregular heartbeats and cardiac arrest;
- gastrointestinal: irritation, ulcers, nausea and vomiting (may be bloody), and abdominal pain.

Chlorine vapour is extremely irritating to the upper respiratory tract and lungs

Symptoms of exposure to chlorine include coughing, choking, breathing difficulty, chest pain, headache, vomiting, pulmonary oedema. Inhalation may cause lung congestion, bronchitis and loss of consciousness. Effects may be delayed. Delayed effects of exposure to chlorine vapour can include shortness of breath, violent headaches, pulmonary oedema and pneumonia.

Earlier reports suggested that concentrations around 5 ppm chlorine caused respiratory complaints, corrosion of the teeth, inflammation of the mucous membranes of the nose and increased susceptibility to tuberculosis in chronically-exposed workers. Recent studies have not confirmed these findings. Concentrations too low to effect the lower respiratory tract may however irritate the eyes, nose and throat.

Amongst 29 volunteers exposed at 0.5, 1 or 2 ppm chlorine for 4 to 8 hours the following responses were recorded: itching or burning of the nose, itching or burning of the throat, production of tears, urge to cough, runny nose, nausea, headache, general discomfort, dizziness, drowsiness and shortness of breath.

Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. Vapour is heavier than air and may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure.

### CHRONIC HEALTH EFFECTS

» Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Gastrointestinal disturbances may also occur. Chronic exposures may result in dermatitis and/or conjunctivitis.

Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

Principal route of occupational exposure to the gas is by inhalation.

Reduced respiratory capacity may result from chronic low level exposure to chlorine gas. Chronic poisoning may result in coughing, severe chest pains, sore throat and haemoptysis (bloody sputum). Moderate to severe exposures over 3 years produced decreased lung capacity in a number of workers.

Delayed effects can include shortness of breath, violent headaches, pulmonary oedema and pneumonia.

Amongst chloralkali workers exposed to mean concentrations of 0.15 ppm for an average of 10.9 years a generalised pattern of fatigue (exposures of 0.5 ppm and above) and a modest increased incidence of anxiety and dizziness were recorded. Leukocytosis and a lower haematocrit showed some relation to exposure.

### TOXICITY AND IRRITATION

» unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

#### TOXICITY

#### IRRITATION

Inhalation (human) LCLo: 500 ppm/5 minutes

Inhalation (rat) LC50: 293 ppm/1 hour

» Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely

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reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

### Section 12 - ECOLOGICAL INFORMATION

Marine Pollutant: Yes

» Hazardous Air Pollutant: Yes

» Fish LC50 (96hr.) (mg/l): 0.44

» Daphnia magna EC50 (48hr.) (mg/l): 0.49 (96hr)

» Very toxic to aquatic organisms.

» Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

» For chlorine:

Environmental fate:

Atmospheric chlorine produced as a result of such process as disinfection forms hydrochloric (HCl) or hypochlorous (HOCl) acid in the atmosphere, either through reactions with hydroxy radicals or other trace species such as hydrocarbons. These acids are believed to be removed from the atmosphere primarily through precipitation washout (i.e. wet deposition as chlorine is scrubbed out by rain in the subcloud layer) or dry deposition as gaseous chlorine contacts and reacts with the earth's surface.

Water chlorination, resulting from municipal and industrial wastewater treatment and cooling water disinfection, initially introduces chlorine into the water as chlorine gas, hypochlorite ion (OCl<sup>-</sup>), or its salt. These forms of chlorine are termed free residual chlorines (FRC). Chlorine in aqueous systems volatilises or quickly decays to residual forms such as hypochlorous acid, chloramine and chlorinated organics. Aquatic chemistry is determined by aquatic factors including pH, ammonium ion (which combines with chlorine to produce chloramine) and certain other reducing agents. Inorganic reducing agents in estuarine waters include sulfur, iron and manganese. Other organic compounds in water also contribute to chlorine decay rate. The reactions of chlorine or hypochlorites in water produce a number of by-products many of which have been implicated as genotoxic or tumourigenic.

Chlorine, added to drinking water as chlorine gas (Cl<sub>2</sub>) or hypochlorite salts (e.g., NaOCl), effectively inactivates bacteria in 20 minutes at concentrations of 0.03 to 0.06 mg/l at pH range of 7.0 to 8.5 and temperature range of 4 deg.C to 22 deg.C.

Chlorine disinfectants in wastewater react with organic matters, giving rise to organic chlorine compounds such as AOX (halogenated organic compounds absorbable on activated carbon), which are toxic for aquatic organisms and are persistent environmental contaminants.

Chlorine hydrolyses very rapidly in water (rate constants range from 1.5 x 10<sup>-4</sup> at deg. C to 4.0 x 10<sup>-4</sup> at 25 deg.C; half-life in natural waters, 0.005 seconds. In fresh and wastewaters at pH >6, complete hydrolysis occurs with the formation of hypochlorous acid (HOCl) and chloride ion (Cl<sup>-</sup>). The hypochlorous acid ionizes to hydrogen ion (H<sup>+</sup>) and hypochlorite ion (OCl<sup>-</sup>). At pH values >5, OCl<sup>-</sup> predominates; at pH values <5, HOCl predominates. Free chlorine (Cl<sub>2</sub>, HOCl, and OCl<sup>-</sup>) reacts rapidly with inorganics such as bromide and more slowly with organic material present in natural waters. These reactions yield chloride, oxidised organics, chloroorganics (including trihalomethanes), oxygen, nitrogen, chlorate, bromate and bromoorganics.

Chlorines ultimate aqueous fate is chloride.

Vapourisation of molecular chlorine (Cl<sub>2</sub>) from water to the atmosphere may be significant at low pH values and high concentrations (e.g., pH 2 and 3500 mg/l chlorine), but is insignificant at neutral pH and low concentrations.

Vegetation acts as an important sink for chlorine air pollution. Plant exposure to elevated levels of chlorine can cause plant injury; however chlorine tends to be rapidly converted to other less toxic forms.

Atmospheric: When chlorine, hypochlorous acid or hydrogen chloride mixes in the atmosphere with water vapour, dilute solutions of strong mineral acids are formed that fall to earth as acid rain, snow, and fog, or acidified dry particles.

Chlorine may react with soil components to form chlorides; depending on their water solubility, these chlorides are easily washed out from the soil.

Bioaccumulation/ bioconcentration: There is no potential for the bioaccumulation or bioconcentration of chlorine.

Ecotoxicity:

Fish LC50 (96 h): 0.015-13.5 mg/l

Chlorine has high acute toxicity to aquatic organisms; many toxicity values are less than or equal to 1 mg/l. Twenty-four-hour LC50 values range from 0.076 to 0.16 mg/l for Daphnia magna (water flea) and from 0.005 to 0.1 mg/l for Daphnia pulex (cladocern); 48-hour LC50 values range from 5.3 to 12.8 mg/l for Nitocra spinipes (snail); and 96-hour LC50 values range from 0.13 to 0.29 mg/L for Oncorhynchus mykiss (rainbow trout), from 0.1 to 0.18 mg/l for Salvelinus fontinalis (brook trout), and from 0.71-0.82 mg/l for Lepomis cyanellus (green sunfish)

Papillomas of the oral cavity in fish have been associated with exposure to chlorinated water supplies.

Chlorine is phytotoxic but is also essential to plant growth; crops need around 2 kg or more of chlorine per acre. Acute toxicity to plants is characterized by defoliation with no leaf symptoms and, in higher plant forms, by spotting of the leaves (at 1.5 mg/m<sup>3</sup>) and marginal and interveinal injury (at 150-300 mg/m<sup>3</sup>)

Data from experimental studies indicate that injury to animals occurs only in the presence of high concentrations of chlorine, either in drinking water or the ambient atmosphere.

[http://www.epa.gov/chemfact/s\\_chlori.txt](http://www.epa.gov/chemfact/s_chlori.txt)

U.S. ENVIRONMENTAL PROTECTION AGENCY August 1994.

» DO NOT discharge into sewer or waterways.

» The material is classified as an ecotoxin\* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

\* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

### Section 13 - DISPOSAL CONSIDERATIONS

- »
- Evaporate residue at an approved site.



## CHLORINE

Hazard Alert Code:  
HIGH

Chemwatch Material Safety Data Sheet (REVIEW)

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- Return empty containers to supplier. If containers are marked non-returnable establish means of disposal with manufacturer prior to purchase.
  - Ensure damaged or non-returnable cylinders are gas-free before disposal.
- Empty containers may have residues.  
Chlorine may be absorbed in dilute solutions of caustic (NaOH), soda ash (Na<sub>2</sub>CO<sub>3</sub>) or hydrated lime (Ca(OH)<sub>2</sub>). For every kg of chlorine: caustic and soda ash solution should contain 0.36 kg/litre and lime 0.12 kg/litre. [Dow]

### Section 14 - TRANSPORTATION INFORMATION



Labels Required: TOXIC GAS,OXIDIZING AGENT,CORROSIVE

HAZCHEM: None (ADG6)

Land Transport UNDG:

Class or division:	2.3	Subsidiary risk:	5.1, 8
UN No.:	1017	UN packing group:	None

Shipping Name:CHLORINE

**Air Transport IATA:**

ICAO/IATA Class:	2.3	ICAO/IATA Subrisk:	8
UN/ID Number:	1017	Packing Group:	None
Special provisions:	A2		

Cargo Only

Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden
Passenger and Cargo		Passenger and Cargo	
Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden
Passenger and Cargo Limited Quantity		Passenger and Cargo Limited Quantity	
Packing Instructions:	-	Maximum Qty/Pack:	-

Shipping Name: CHLORINE

**Maritime Transport IMDG:**

IMDG Class:	2.3	IMDG Subrisk:	8
UN Number:	1017	Packing Group:	None
EMS Number:	F-C,S-U	Special provisions:	None
Limited Quantities:	None	Marine Pollutant:	Yes

Shipping Name: CHLORINE

### Section 15 - REGULATORY INFORMATION

**POISONS SCHEDULE**

S7

**REGULATIONS**

chlorine (CAS: 7782-50-5) is found on the following regulatory lists;  
Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (AQUA/1 to 6 - inorganic chemicals)  
Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Aquatic habitat)  
Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Domestic water quality  
Australia - Queensland Hazardous Materials and Prescribed Quantities for Major Hazard Facilities  
Australia Exposure Standards  
Australia Hazardous Substances  
Australia High Volume Industrial Chemical List (HVICL)  
Australia Inventory of Chemical Substances (AICS)  
Australia National Pollutant Inventory  
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix E (Part 2)  
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix F (Part 3)  
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix G  
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix J (Part 2)

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HIGH

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Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 5  
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 6  
Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 7  
International Council of Chemical Associations (ICCA) - High Production Volume List  
OECD Representative List of High Production Volume (HPV) Chemicals  
WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water

### Section 16 - OTHER INFORMATION

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

A list of reference resources used to assist the committee may be found at:  
[www.chemwatch.net/references](http://www.chemwatch.net/references).

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

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## MSDS No. 11 Diesel

Diesel

### Safety Data Sheet

## Diesel

#### 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

**Product Type/Use** Automotive gas oil. Fuel for on-road diesel-powered engines.

**Other Names**

**Name**  
Alpine Diesoline 20, Alpine Diesoline 40  
Alpine Diesoline 100, Diesoline Gas Oil, Industrial Diesel Fuel  
Light Marine Diesel Fuel, Low Emission Distillate HP  
Diesoline 50, Diesel 50  
Diesel 10, Marine Gas Oil

**Supplier**  
Shell Company of Australia Ltd.  
Level 2, 8 Redfern Road,  
Hawthorn East, Victoria 3123  
(ABN 46 004 610 459)  
AUSTRALIA

**Telephone Numbers**  
**Emergency Tel.**  
1800 651 818  
**Telephone/Fax Number**  
Tel: 03 9666 5444 Fax: 03 8823 4800

#### 2. COMPOSITION/INFORMATION ON INGREDIENTS

##### Preparation Description

Complex mixture of hydrocarbons consisting of paraffins, cycloparaffins, aromatic and olefinic hydrocarbons with carbon numbers predominantly in the C9 to C25 range. May contain catalytically cracked oils in which polycyclic aromatic compounds, mainly 3-ring but some 4- to 6-ring species, are present. May also contain several additives at <0.1% v/v each. Dyes and markers can be used to indicate tax status and prevent fraud. May contain cetane improver (Ethyl Hexyl Nitrate) at <0.2% v/v.

Name	CAS	EINECS	Proportion	Hazard	R Phrase
Fuels, diesel	68334-30-5	269-822-7	0-100 %	Xn, N	R40, R65, R66, R51/53
Fuels, diesel, no.2	68476-34-6	270-676-1	0-100 %	Xn, N	R40, R65, R66, R51/53

##### Other Information

See Section 16 'Other Information' for full text of each relevant Risk Phrase.

#### 3. HAZARDS IDENTIFICATION

**Hazards Identification**  
HAZARDOUS SUBSTANCE.

[www.shell.com](http://www.shell.com)



Diesel

**NON-DANGEROUS GOODS.**

Hazard classification according to the criteria of NOHSC.

Dangerous goods classification according to the Australia Dangerous Goods Code.

**Human Health Hazards**

Harmful, may cause lung damage if swallowed. Limited evidence of a carcinogenic effect. Prolonged or repeated exposure to skin may give rise to dermatitis. Under conditions of poor personal hygiene, excessive exposure may lead to irritation, oil acne and folliculitis and development of warty growths which may subsequently become malignant.

**Safety Hazards**

Not classified as flammable, but will burn. May ignite on surfaces at temperatures above auto-ignition temperature. Vapour in the headspace of tanks and containers may ignite and explode at temperatures exceeding auto-ignition temperature, where vapour concentrations are within the flammability range.

**Environmental Hazards**

Toxic to aquatic organisms. May cause long term adverse effects in the aquatic environment.

**Other Information**

This product is intended for use as a fuel in a closed system. If used for any other purpose, in open systems or as a spray, ignition and exposure risks will increase and a careful risk assessment should be carried out.

#### 4. FIRST AID MEASURES

**Symptoms and Effects**

Not expected to give rise to an acute hazard under normal conditions of use. Aspiration into the lungs may occur directly or following ingestion. This may cause chemical pneumonitis which may be fatal. If ingested may lead to irritation of the mouth, irritation of the throat, irritation of the digestive tract, and vomiting. Splashes into the eye may cause irritation.

**Inhalation**

Remove to fresh air. If breathing but unconscious, place in the recovery position. If breathing has stopped, apply artificial respiration. If heartbeat absent, give external cardiac compression. Monitor breathing and pulse. Seek urgent medical advice.

**Skin**

Wash skin with water using soap if available. Contaminated clothing must be removed as soon as possible. It must be laundered before reuse. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop.

**Eye**

Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

**Ingestion**

DO NOT INDUCE VOMITING. Protect airway if vomiting begins. Give nothing by mouth. If breathing but unconscious, place in recovery position. If breathing has stopped, apply artificial respiration. OBTAIN MEDICAL ATTENTION IMMEDIATELY.

**Advice to Doctor**

Treat symptomatically. In cases of ingestion, consider gastric lavage. Gastric lavage must only be undertaken after cuffed endotracheal intubation in view of the risk of aspiration. Administration of carbon for medicinal use (carbo medicinalis) may reduce absorption from the digestive tract. In cases of chemical pneumonitis, antibiotic and corticosteroid therapy should be considered, but only under expert guidance and with special care facilities. High pressure injection injuries require prompt surgical intervention and possibly steroid therapy, to minimise tissue damage and loss of function.



Diesel

## 5. FIRE FIGHTING MEASURES

### Specific Hazards

Combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates (smoke), and gases, including carbon monoxide, oxides of sulphur, and unidentified organic and inorganic compounds. Flammable vapours may be present even at temperatures below the flash point.

### Extinguishing Media

Foam, fine water spray and dry chemical powder. Carbon dioxide, Clean Agents (e.g. Inergen, Argonite etc.), sand or earth may be used for small fires only.

### Unsuitable Extinguishing Media

Do not use water in a jet.

### Protective Equipment

Proper protective equipment must be worn, this should include breathing apparatus when approaching a fire in a confined space.

### Other Information

Keep adjacent drums and tanks cool by spraying with water from a safe location. If possible remove them from the danger zone. If adequate cooling cannot be achieved, the area needs to be evacuated, and further fire fighting and cooling attempts should be carried out from a safe location.

## 6. ACCIDENTAL RELEASE MEASURES

### Personal Precautions

Remove all possible sources of ignition in the surrounding area. Evacuate all personnel. Do not breathe fumes, vapour. Do not operate electrical equipment. Avoid contact with skin, eyes, clothing. Ventilate contaminated area thoroughly. Wear chemical resistant knee length safety boots and PVC jacket and trousers. Wear safety glasses or full face shield if splashes are likely to occur.

### Environmental Precautions

Prevent from spreading or entering into drains and surface waters (e.g. lakes, ponds, ditches, rivers and streams) by using sand, earth, or other appropriate non-combustible barriers. Inform local authorities if impacts cannot be prevented.

### Clean-up Methods - Small Spillages

To minimize soil and groundwater contamination, absorb liquid with sand earth or other recommended sorbent material, as soon as possible. Sweep up and remove to a suitable, clearly marked container for disposal in accordance with local regulations. Do not disperse using water.

### Clean-up Methods - Large Spillages

Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Dispose of as for small spills.

### Maritime Spillages

Maritime spillages should be dealt with using a Shipboard Oil Pollution Emergency Plan (SOPEP), as required by MARPOL Annex 1 Regulation 26.

### Other Information

Local authorities should be advised if significant spillages cannot be contained. Observe all relevant local regulations.

## 7. HANDLING AND STORAGE

### Exposures in Normal Use

Maintenance and fuelling activities - Avoid inhalation of vapours and contact with skin when emptying containers.



Diesel

#### Handling

Avoid naked flames. The vapour is heavier than air, spreads along the ground and distant ignition is possible. When using do not eat, drink or smoke. Never siphon by mouth. Only use in well-ventilated areas. Take precautionary measures against static discharges. Ensure all equipment is properly earthed. If using pressurised equipment, take extra care to avoid injection under the skin. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Avoid prolonged or repeated contact with skin. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Prevent spillages. Cloth, paper and other materials that are used to absorb spills present a fire hazard. Avoid their accumulation by disposing of them safely and immediately. In addition to any specific recommendations given for controls of risks to health, safety and the environment, an assessment of risks must be made to help determine controls appropriate to local circumstances.

#### Storage

This product must never be stored in buildings occupied by people. Drums and small containers should be stored in well-ventilated areas, flameproof cabinets or stores. Keep container tightly closed in a dry, well-ventilated place away from direct sunlight and other sources of heat or ignition. Keep in a bunded area with a sealed (low permeability) floor, to provide containment against spillage. Stack drums to a height not exceeding 3 metres without the use of racking. Locate tanks away from heat and other sources of ignition. Seek specialist advice for the design, construction and operation of bulk storage facilities.

#### Storage Temperatures

Ambient.

#### Product Transfer

Electrostatic charges may be generated during pumping. Ensure electrical continuity by bonding all equipment. Avoid splash filling. Wait 2 minutes after tank filling (for tanks such as those on road tanker vehicles) before opening hatches or manholes. Wait 30 minutes after tank filling (for large storage tanks) before opening hatches or manholes. Contamination resulting from product transfer may give rise to light hydrocarbon vapour in the headspace of tanks that have previously contained gasoline. This vapour may explode if there is a source of ignition. Partly filled containers present a greater hazard than those that are full, therefore handling, transfer and sampling activities need special care.

#### Tank Cleaning

Cleaning, inspection and maintenance of storage tanks is a specialist operation that requires the implementation of strict procedures and precautions. These include issuing of work permits, gas-freeing of tanks, using a manned harness, lifelines, and wearing air-supplied breathing apparatus. Prior to entry and whilst cleaning is underway, the atmosphere within the tank must be monitored using an oxygen meter and explosimeter. Additional precautions are required where the tank may previously have contained leaded gasoline.

#### Recommended Materials

For containers or container linings, use mild steel or stainless steel. Aluminium may also be used for applications where it does not present an unnecessary fire hazard. Examples of suitable materials are: high density polyethylene (HDPE), polypropylene (PP), and Viton (FKM), which have been specifically tested for compatibility with this product. For container linings, use amine-adduct cured epoxy paint. For seals and gaskets use: graphite, PTFE, Viton A, Viton B.

#### Unsuitable Materials

Synthetic materials such as plastics and fibreglass may be unsuitable for containers or container linings depending on the material specification and intended use. Examples of materials to avoid are: natural rubber (NR), nitrile rubber (NBR), ethylene propylene rubber (EPDM), polymethyl methacrylate (PMMA), polystyrene, polyvinyl chloride (PVC), polyisobutylene. However, some may be suitable for glove materials.

#### Other Information

Ensure that all local and international regulations regarding handling and storage facilities are followed.

## 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

### Exposure Limits

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Diesel

Substance	Regulations	Exposure Duration	Exposure Limit	Units	Notes
Fuels, diesel	ACGIH	TWA	100	mg/m <sup>3</sup>	
Oil mist, mineral	ACGIH	TWA	5	ppm	
	ACGIH	TWA	10	mg/m <sup>3</sup>	

ACGIH ACGIH Threshold Limit Values.

#### Exposure Controls

The level of personal protection and the types of controls necessary will vary depending on exposure conditions. Select controls based on a risk assessment of local circumstances. Use sealed systems as far as possible. Use local, intrinsically safe, exhaust ventilation if there is a risk of inhalation of vapours, mists, or aerosols. Provide eye washes and showers for emergency use.

#### Respiratory Protection

Care should be taken to keep exposures below applicable occupational exposure limits. If this cannot be achieved, use of a respirator fitted with an organic vapour cartridge combined with a particulate pre-filter should be considered. Where air-filtering respirators are unsuitable (e.g. where airborne concentrations are high, there is a confined space or a risk of oxygen deficiency) use appropriate positive pressure breathing apparatus.

#### Hand Protection

Select gloves tested to a relevant standard (e.g. Europe EN374, US F739). When prolonged or frequent repeated contact occurs, Nitrile, Neoprene or PVC gloves may be suitable. (Breakthrough time of > 240 minutes). Breakthrough times for gloves vary depending on, e.g. chemical resistance, material thickness, frequency and duration of contact. Selection should also take into account other usage requirements, e.g. dexterity, heat resistance, other chemical substances handled. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

#### Eye Protection

Wear safety glasses or full face shield if splashes are likely to occur.

#### Body Protection

Minimise all forms of skin contact. In the event of risk from splashing wear e.g. Nitrile, PVC, or neoprene rubber apron. Wear safety shoes or boots which are chemical and petroleum distillate resistant.

#### Environmental Exposure Controls

Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

#### Exposure Measurement Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an Occupational Exposure Limit and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Information on suitable methods is available on request.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

Colour	Colourless/pale straw/yellow.
Physical State	Liquid.
Odour	Characteristic. May contain a reodorant.
pH Value	Data not available.
Vapour Pressure	<0.1 kPa at 20°C.
Initial Boiling Point	circa 170°C.
Final Boiling Point	circa 360°C.
Solubility In Water	Negligible.



Diesel

<b>Density</b>	820 to 845 kg/m <sup>3</sup> at 15°C.
<b>Flash Point</b>	>60.5°C.
<b>Flammable Limits - Upper</b>	6%(V/V) maximum.
<b>Flammable Limits - Lower</b>	1%(V/V) minimum.
<b>Auto-ignition Temperature</b>	>220°C.
<b>Kinematic Viscosity</b>	2 to 7 mm <sup>2</sup> /s at 40°C.
<b>Vapour Density (Air=1)</b>	Greater than 5.
<b>Partition co-efficient, n-octanol/water</b>	log Pow 3 to 6.
<b>Other Information</b>	The above properties are generic. There may be parameters for which National Specifications apply.

## 10. STABILITY AND REACTIVITY

### Stability

Stable under normal use conditions.

### Conditions to Avoid

Heat, flames and sparks.

### Materials to Avoid

Strong oxidizing agents e.g. chlorates and ammonium nitrate.

### Hazardous Decomposition Products

Hazardous decomposition products are not expected to form during normal storage.

## 11. TOXICOLOGICAL INFORMATION

### Basis for Assessment

Fuels are typically made from blending several refinery streams. Toxicological studies have been carried out on a variety of hydrocarbon blends and streams but not those containing additives. Information given is based on a knowledge of the components and the toxicology of similar products.

### Acute Toxicity - Oral

LD<sub>50</sub> > 5000 mg/kg. Ingestion may lead to vomiting and aspiration into the lungs, this may result in chemical pneumonitis, which may be fatal.

### Acute Toxicity - Dermal

LD<sub>50</sub> > 2000 mg/kg.

### Acute Toxicity - Inhalation

LC<sub>50</sub> expected to be >5mg/l.

### Eye Irritation

Slightly irritating.

### Skin Irritation

Slightly irritating.

### Respiratory Irritation

Expected to be slightly irritating.

### Skin Sensitisation

Not a skin sensitizer.

### Carcinogenicity

Dermal application to mice causes skin tumours.

### Mutagenicity

In-vitro mutagenicity studies show that mutagenic activity is related to 4-6 ring polycyclic aromatic content.





Diesel

**Reproductive Toxicity**

Not a developmental toxicant.

**Human Effects**

Prolonged/repeated contact may cause defatting of the skin which can lead to dermatitis and may make the skin more susceptible to irritation and penetration by other materials. Under conditions of poor personal hygiene, excessive exposure may lead to irritation, oil acne and folliculitis and development of warty growths which may subsequently become malignant.

**Other Information**

High pressure injection of product into the skin may lead to local necrosis if the product is not surgically removed.

## 12. ECOLOGICAL INFORMATION

**Basis for Assessment**

Fuels are typically made from blending several refinery streams. Ecotoxicological studies have been carried out on a variety of hydrocarbon blends and streams but not those containing additives. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

**Mobility**

Floats on water. Contains volatile components. Partly evaporates from water or soil surfaces, but a significant proportion will remain after one day. If it enters soil, it will adsorb to soil particles and will not be mobile. Large volumes may penetrate soil and could contaminate groundwater.

**Persistence / Degradability**

Major components are inherently biodegradable. Persists under anaerobic conditions. The volatile components oxidise rapidly by photochemical reactions in air.

**Bioaccumulation**

Contains components which may have the potential to bioaccumulate. May cause tainting of fish and shellfish.

**Ecotoxicity**

Poorly soluble mixture. Product is classified as toxic to aquatic organisms, LL/EL50 1 -10 mg/l. (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract). Films formed on water may affect oxygen transfer and damage organisms.

## 13. DISPOSAL CONSIDERATIONS

**Waste Disposal**

Waste arising from a spillage or tank cleaning should be disposed of in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor to deal satisfactorily with this type of product should be established beforehand. Do not dispose into the environment, in drains or in water courses. Do not dispose of tank water bottoms by allowing them to drain into the ground. This will result in soil and groundwater contamination.

**Product Disposal**

As for waste disposal.

**Container Disposal**

Recycle or dispose of in accordance with the legislation in force with a recognised collector or contractor. Do not pollute the soil, water or environment with the waste product.



Diesel

**14. TRANSPORT INFORMATION**

**Transport Information**

Not dangerous for transport under ADG, IMO and IATA/ICAO regulations.

**ADG UN Class**

None Allocated

**ADG Packing Group**

None Allocated

**ADG Hazchem Code**

None Allocated

**IMDG Hazard Class**

None Allocated

**IMDG Packing Group**

None Allocated

**IATA Hazard Class**

None Allocated

**IATA Packing Group**

None Allocated

**Other Information**

Not a Marine Pollutant under IMDG. MARPOL rules apply for bulk shipments by sea.

**15. REGULATORY INFORMATION**

EC Symbols	Xn N
EC Risk Phrase	R40 Limited evidence of a carcinogenic effect. R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R65 Harmful: may cause lung damage if swallowed. R66 Repeated exposure may cause skin dryness and cracking.
EC Safety Phrase	S2 Keep out of reach of children. S29 Do not empty into drains. S36/37 Wear suitable protective clothing and gloves. S61 Avoid release to the environment. Refer to special instructions/safety data sheet. S62 If swallowed, do not induce vomiting; seek medical advice immediately and show this container or label.

**AICS (Australia)**

All components listed.

**National Legislation**

National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011]

List of Designated Hazardous Substances [NOHSC:10005].

Approved Criteria for Classifying Hazardous Substances [NOHSC:1008].

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

Australian Dangerous Goods Code.

Standard Uniform Scheduling of Drugs and Poisons.

**Hazard Category**

Harmful, Carcinogenic (Category 3), Dangerous for the environment

**Packaging & Labelling**

Contains fuels, diesel.



www.shell.com



Diesel

## 16. OTHER INFORMATION

### Revisions Highlighted

No amendments made to information.

### SDS Distribution

This document contains important information to ensure the safe storage, handling and use of this product. The information in this document should be brought to the attention of the person in your organisation responsible for advising on safety matters.

### References

For detailed advice on Personal Protective equipment, refer to the following Australian Standards :-  
HB 9 (Handbook 9) Manual of industrial personal protection.  
AS/NZS 1337 Eye protectors for industrial applications.  
AS/NZS 1715 Selection, use and maintenance of respiratory protective devices.  
AS/NZS 1716 Respiratory protective devices.

### Poisons Schedule

NS.

### Restrictions

This product must not be used in applications other than those recommended without first seeking the advice of the supplier.

This product is not to be used as a solvent or cleaning agent, for lighting or brightening fires, or as a skin cleanser.

### List of R Phrases in Section 2

R40 Limited evidence of a carcinogenic effect.  
R65 Harmful: may cause lung damage if swallowed.  
R66 Repeated exposure may cause skin dryness and cracking.  
R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

### Technical Contact Numbers

(03) 9666 5444.

### Further Information

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It does not constitute a guarantee for any specific property of the product.

... End Of SDS ...



COFFS  
HARBOUR



# OPERATIONS SAFETY MANAGEMENT PLAN (OSMP)

for

**Coffs Harbour City Council's**

**Water Treatment Plant**

140 Upper Orara Road Karangi NSW 2450

## Revision List

Revision:	5
Date:	13 March 2009
Prepared:	Paul Johnson
Reviewed:	Neil Matthews
Approved for Issue:	Simon Thorn
Signature:	

## Distribution List

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Coffs Harbour City Council	Neil Matthews	4
Department of Planning	Scott Jeffries	5



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## 1.0 Policy Statements

### 1.1 Occupational Health and Safety, Environment and Quality Policy Statement



#### Occupational Health and Safety, Environment and Quality Policy Statement

At Coffs Harbour City Council, we demonstrate a duty of care for the health and safety of all, the protection of the environment and provide high quality services to the community.

We aim to be at the forefront of occupational health and safety, environmental protection and quality performance by:

- Identifying and managing risks to health, safety and the environment to minimise the harmful effects that may result from exposure to those risks.
- Ensure budgetary allowances are planned for to ensure continuous improvement to the safety, environment and quality aspects of our operations.
- Manage incidents that do occur to minimise their harmful effects and to prevent recurrence.
- Continuously review and improve our management system, establishing measurable objectives and targets, which work towards excellence in safety, environmental protection and quality.
- Ensure compliance with all relevant legislative requirements and standards.
- Ensure all staff, suppliers and contractors are appropriately qualified and competent to carry out the tasks required of them.
- Promote safe and environmentally sound practices among the community and staff through instruction, training and education
- Consult with our staff, suppliers, contractors and community to enable them to contribute to decisions affecting their health, safety, welfare and the protection of the environment.
- Ensure clear accountability for safety, environment and quality at all levels.

We will implement this policy through the development of our integrated management system throughout all levels of the organisation.

**Approved by:** *Executive Team in consultation with staff.*

.....  
**Mayor**

.....  
**General Manager**

.....  
**OH&S Committee Chairperson**  
CHCC-M-POLS-001

**6 July 2006**

## 1.2 Injury Management and Rehabilitation Policy Statement

### Injury Management and Rehabilitation Policy Statement



### Injury Management and Rehabilitation Policy Statement

Coffs Harbour Council is committed to providing effective injury management and rehabilitation of injured workers.

To achieve this, we have adopted the following specific goals:

- Council will ensure the health, safety and welfare at work of all employees;
- Ensure that return to work as soon as possible after injury is a normal practice and expectation;
- Provide suitable and meaningful duties consistent with the nature of the injury/illness as soon as safely possible;
- Identify, implement and promote best practice in injury and rehabilitation management systems;
- Provide support throughout the rehabilitation process;
- Consult with employees and their representatives, to ensure that our rehabilitation programs operate effectively;
- Comply with all relevant legislation and go beyond mere compliance where necessary to improve Council's performance;
- Achieve continual improvement in performance through ongoing review and assessment of our systems.

**Approved by:** *Executive Team in consultation with staff.*

.....  
**Mayor**

.....  
**General Manager**

**Date**

**9<sup>th</sup> June 2002**

CHCC-M-POLS-002

V00(09/06/02)



## 1.3 Risk Management Policy Statement



### ***Risk Management Policy Statement***

Managing risk is essential for the efficient management of Council and applies to all of Council's operations. Effective risk management ensures continual improvement and is as much about identifying opportunities as avoiding or mitigating losses.

Management will ensure that all hazards and their associated risks are identified assessed, where possible eliminated or other wise controlled.

Prioritisation of the actions for the implementation of control measures is required where,

- the risks can not be immediately eliminated or the risk reduced to an acceptable level
- the long term controls are not implemented prior to commencement of the activity

Council will review risk assessments and all measures adopted to control risks, whenever

- there is evidence that the risk assessment is no longer valid
- adverse impacts result from exposure to a hazard to which the risk assessment relates
- a significant change is proposed in our place of work or in work practices or procedures to which the risk assessment relates.

Consultation will take place,

- when risks relating to Council's activities are assessed
- when decisions are made about the measures to be taken to control risks
- when the assessment of risks are reviewed
- when introducing or altering the procedures for monitoring risks
- when decisions are made about the adequacy of facilities
- when changes are proposed to the systems or methods of work or the plant or substances used for work.

The hazard identification, risk assessment and control process will be documented and retained by Council's information management system.

**Approved by:** *Executive Team in consultation with staff.*

.....  
**Mayor**

.....  
**General Manager**

.....  
**OH&S Committee Chairperson**

**Date**  
**9 June 2002**

## 2.0 Introduction

### 2.1 Scope of Plan

- 2.1.1 This document constitutes the Operations Safety Management Plan (OSMP) for the entire life cycle of the Water Treatment Plant at 140 Upper Orara Road Karangi NSW 2450 from the commencement of operations.
- 2.1.2 The scope of this Operations Safety Management Plan satisfies Section 5.4 b) of the Department of Planning Project Approval (Application 06-0285) given under Section 75J of the Environmental Planning and Assessment Act 1979.
- 2.1.3 Project Approval Extract:  
5.4 b) a document setting out a comprehensive Safety Management System, covering all operations involving hazardous materials. The document shall clearly specify all safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to the procedures. Records shall be kept at the Plant site and shall be available for inspection by the Director-General or nominee upon request. The Safety Management System shall be developed in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 9, 'Safety Management'*.

### 2.2 Objectives

- 2.2.1 The objectives of the Operational Safety Management are:
- Provide an effective Safety Management System based on two models the AS4801 continual improvement model combined with specific operational controls adopted from the US Standard 29 CFR 1910 Process Safety Management model.
  - Fit for purpose Safety Management System that is comprehensive, comprehensible and integrated to cover the full range of operational activities that could have significant safety impact.
  - Risk based that represents the hazards that are present and support the actual practices of the facility.
  - Provide a Safety Management System that meets relevant legislative requirements.

### 2.3 Key Risks

- 2.3.1 The key risks associated with the operations of the plant were identified through a formal Risk Assessment workshop held 4th February 2009.
- 2.3.2 Attendees including operational staff and major stakeholders. The items listed below as key risk are risks identified at the workshop which received a 'high' risk rating prior to mitigating controls being put in place. It is important to note for this plant, the stakeholders at the risk assessment workshop identified no risks as 'extreme'. Refer Appendix 1 for project specific workshopped operational risk assessment. The following are the risks identified as 'high' prior to mitigating controls being put in place;
- Non compliance with OH&S legislation with standard management systems in place
  - Incidents/accidents
  - Chlorine gas leak in chlorine building
  - Chlorine gas leak outside building

- Unauthorised access to site
- Crane operations damage underground services
- Staff inexperienced in plant operation and process
- Substandard contractors exposed to high risks
- Undue delays in arrival of emergency services
- Undue delays in attendance of injured personnel
- Undue delays in stopping and cleaning chemical spills and leaks
- Entry into pits and chambers – confined space, access
- Trips and falls – falling into water

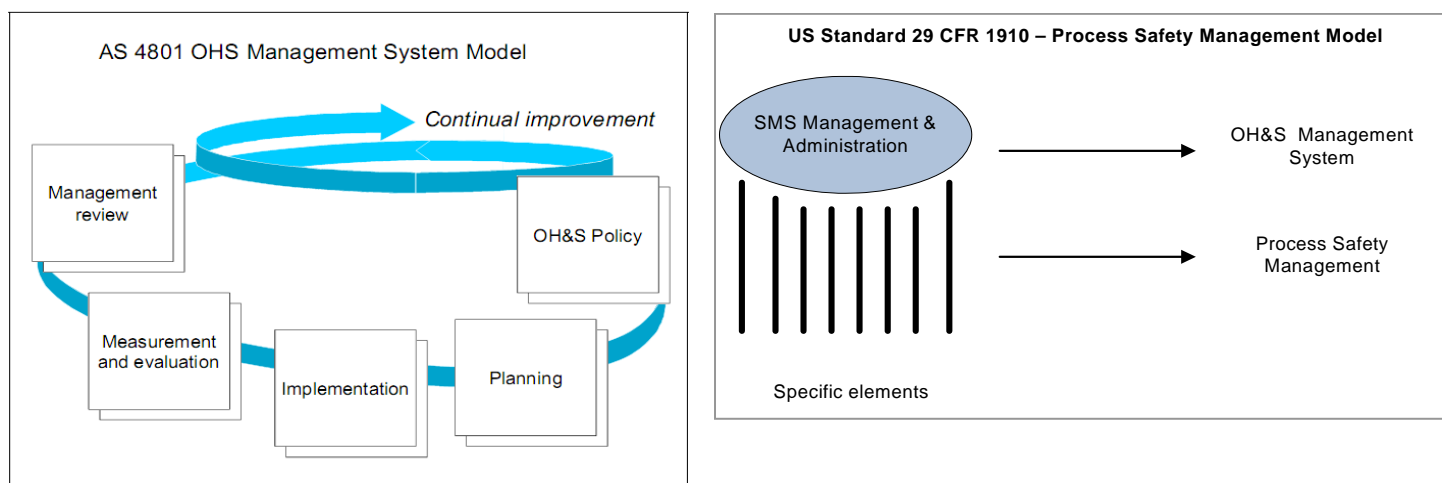
## 2.4 NSW Department of Planning

2.4.1 This Operational Safety Management System is based on compliance with the following document:  
NSW Government Department of Planning Hazardous Industry Planning Advisory Paper No. 9  
Safety Management.

The NSW Department of Planning have clearly described the preferred model for an effective Safety Management System is based, in part, on the AS4801 continual improvement model combined with specific operational controls adopted from US OSHA Process Safety Management Standard 29 CFR 1910.

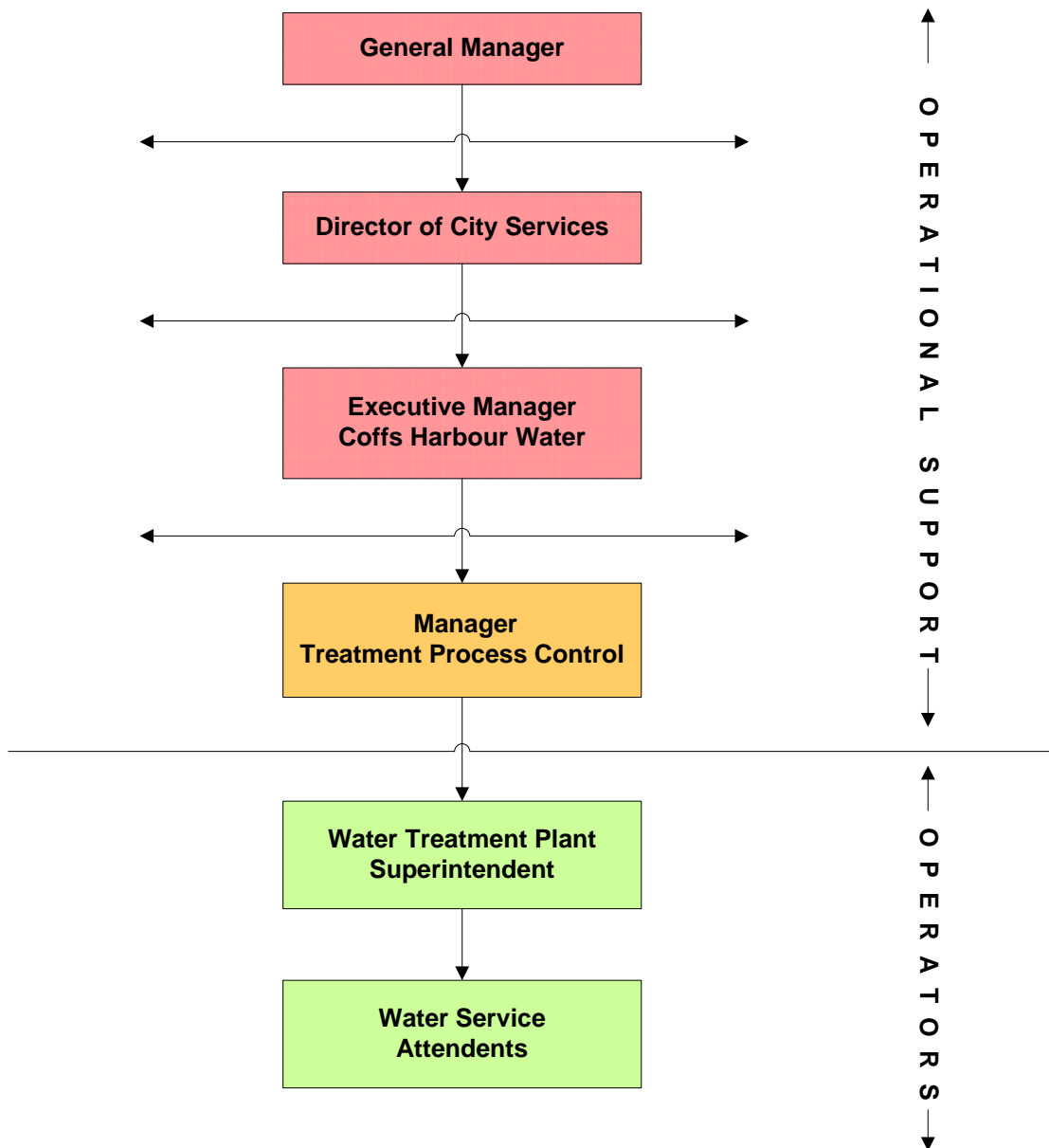
Below are the two models adopted in the compilation of the Safety Management System.

Figure 2-1: Preferred Models Adopted



## 3.0 Structure and Accountabilities

### 3.1 Organisation Chart



## 3.2 Accountabilities and Responsibilities

- 3.2.1 Responsibility for safety lies with the Coffs Harbour City Council (CHCC) General Manager who is ultimately in charge of the facility. Just as authority is delegated down through the organisational structure to ensure that the objectives of the CHCC are efficiently fulfilled, safety needs to be delegated and persons held responsible. Those who are accountable for the safety of operational staff for the Plant have the authority to redesign work processes. Below are the accountabilities and responsibilities for those presented on the organisation chart.
- 3.2.2 General Manager
- Oversees the establishment of policies and ensures that the policy objectives reflect the intentions of the council and remain up to date and relevant.
- 3.2.3 Director of City Services
- Makes provision for adequate resources to be available for the implementation of the council policy objectives and provide feedback to the General Manager.
- 3.2.4 Executive Manager – Coffs Harbour Water
- Ensures that the systems are in place, cover all applicable works and include the processes required to implement the management strategies.
- 3.2.5 Manager – Treatment Process Control
- Updates the systems as required and provides the Executive Manager Coffs Harbour Water with feedback on the implementation of the management strategies and provides recommendations on resource requirements.
- 3.2.6 Water Treatment Plant – Superintendent
- Supervises the daily activities on the Water Treatment Plant and manages how these activities are to be undertaken for compliance with systems.
  - Provides recommendations on improvements and resource requirements to the Manager - Treatment Process Control.
- 3.2.7 Water Service – Attendants
- Undertake activities as instructed by the Water Treatment Plant Superintendent.
- 3.2.8 Contractors
- Contractors are contractually required to undertake works in accordance with CHCC systems and directions from the Water Treatment Plant Superintendent.

Appendix 3 - OHS&R critical position – responsibility matrix provides plant specific responsibilities in line with the contents of this Plan.

## 4.0 Planning

### 4.1 General

4.1.1 An effective Safety Management System is one that combines all the generic management system elements and supports all the plant specific operational control measures in proportion to their influence on safe operation. In the planning process it was decided by stakeholders this safety management system needed to incorporate two overall aspects.

- Generic Safety Management Systems aspects that provide a framework for planning, implementing, checking and correcting and reviewing measures for preventing major incidents.
- Specific Safety Management Systems elements which address the facility, its hazards, potential major incidents and associated risk, and the control measures.

The following sections of planning detail the core management processes and administration activities of the system:

- Identification of Hazards, Assessment and Control of Risks
- Contractor Management
- Safety Objectives, Targets and Performance Standards
- Management System
- Relevant Industry Codes of Practice, Standards and Legislation

### 4.2 Identification of Hazards, Assessment and Control of Risks

4.2.1 The process of identifying hazards and assessing risks is an important aspect for the effective planning for the development and implementation of the Safety Management System. The following section provides an overview of the process to ensure that the Safety Management System is adequate and "fit for purpose". For further details refer Section 5.1 Risk Management and Appendix 1 – Plant Specific Risk Assessment.

4.2.2 The adopted risk management principals as outlined in detail in Section 5.1 of this plan are:

- identify hazards
- access risks
- control the risks related to the full scope of activities (including design, construction, normal, abnormal and emergency situations) products and services of the organisation
- periodically evaluate the effectiveness of the controls.

## 4.3 Contractor Management

- 4.3.1 CHCC has a statutory obligation to ensure contractors perform their activities in a manner which is safe and without risk to their own employees or other persons.
- 4.3.2 The Occupational Health and Safety Policy (refer page 4) states that CHCC will “ensure all, suppliers and contractors are appropriately qualified and competent to carry out the tasks required of them”.
- 4.3.3 Leading up to the establishment of a contract, health and safety shall be taken into account.
- 4.3.4 At the commencement of each contract, the Plant Superintendent ensures the following is performed:
- details of the contractor’s organisation are available;
  - contract personnel attend the plant specific induction;
  - where applicable the name and position of the contractor’s OHS&R representative is provided.
- 4.3.5 During the performance of the contract the Plant Superintendent as required ensures that:
- contractor personnel are included in interface meetings such as toolbox and meetings;
  - contractor’s OHS&R practices are monitored and audited;
  - accidents and incidents involving contractors are recorded and reported appropriately;
  - the performance of the contractor is evaluated for future contracts.

## 4.4 Safety Objectives, Targets and Performance Standards

- 4.4.1 The Plant specific Operational Safety Management System objectives established by key stakeholders during the planning phase are:
- Provide an effective Safety Management System based on two models the AS4801 continual improvement model combined with specific operational controls adopted from the US Standard 29 CFR 1910 Process Safety Management model.
  - Fit for purpose Safety Management System that is comprehensive, comprehensible and integrated to cover the full range of operational activities that could have significant safety impact.
  - Risk based that represents the hazards that are present and support the actual practices of the facility.
  - Provide a Safety Management System that meets relevant legislative requirements.
- 4.4.2 For targets and performance standards established refer Section 5.10 of this Plan.
- 4.4.3 Appendix 3 – OHS&R Critical Positions – Responsibility Matrix is a useful tool for reviewing performance and;
- the designation of responsibility
  - assessing resources required
  - timeframe and applicable systems

## 5.0 Implementation

### 5.1 Risk Management

5.1.1 The management of risk is an integral part of CHCC's good business practices. Refer page 6 for CHCC Risk Management Policy Statement. Risk Management is an iterative process that consists of well-defined steps which, taken in sequence, will support better decision making by contributing a greater insight into risks and their impacts.

A structured process is therefore required to ensure that all risks (and opportunities) associated with the operational activities, are identified, analysed, prioritised and treated in order to eliminate/mitigate (or take advantage of) the consequences should that event occur.

5.1.2 The main elements of the risk management process are consistent with AS/NZS 4360:1999: 'Risk Management' for this Safety Management System are as follows:

5.1.3 Risk Category / Potential Risk (Identify the Risks)

All risks that may have some effect on the operational/activities are identified via 'brain-storming' techniques. The risk identification process covers the risks associated with the entire operational life cycle of the Plant from commencement of operations. Risks are then recorded together with any existing controls or mitigation factors on the Risk Assessment Worksheet. Refer Appendix 1 for Plant specific Risk Assessment workshopped 4 February 2009.

5.1.4 Risk Rating (Evaluate and analyse the risks)

The identified risks are evaluated, to indicate their maximum potential impact. Existing controls and mitigating strategies are then considered to determine a residual for each risk. The risks are then analysed in terms of the probability that things may go wrong and what the consequences for the plant will be in the context of current controls. These elements (probability and consequence) are combined to produce an estimated level of risk. The parameters for rating of consequences as minor, major, catastrophic etc will vary from activity to activity. Refer Appendix 1 for 'Consequence' and 'likelihood' which combine to establish the Risk Rating.

5.1.5 Risk Priorities (Assess and prioritise the risks)

The estimated levels of risk are then reviewed and all risks are ranked on the Risk Assessment Worksheet to identify priorities and thereby facilitate their management. The assessed residual risk is also considered in this process on the basis of the 'is the risk acceptable'.

5.1.6 Risk Treatment Options (Treat the risks)

Low priority risks are generally accepted and monitored. Appropriate methods for managing other risks are developed. These may include reducing the consequences and/or likelihood of the risk, avoiding or eliminating the risk or a combination of the above. Refer Appendix 1 "Controls/Risk Treatments".

5.1.7 Implement, monitor report and review (Implement risk treatments and review improve)

The performance of the risk management methods are monitored and reviewed throughout the life of the operational activities to ensure that they remain applicable and that any changes needed are identified. Progress against the management of risks is a key component of the plants reporting regimes and periodical management reviews.



## 5.2 Operations Inductions

- 5.2.1 All personnel working at the plant unsupervised for a period exceeding four hours shall attend the plant specific induction. The plant specific induction shall be plant specific and fit for purpose.
- 5.2.2 The Plant Specific Induction shall reference this plan and focus on the inherent risks associated with the plant.
- 5.2.3 At the completion of the induction a Plant Specific Induction Pass will be issued to the inductee.
- 5.2.4 Copies of all certificates of competency, licences and other qualifications as deemed necessary by the Plant Superintendent shall be copied and attached to the induction. This information shall be maintained on the plant files for future reference.

## 5.3 Work Team Briefings

- 5.3.1 The Plant Superintendent will carry out work team briefings as deemed necessary at the commencement of the shift to ensure safety issues specific to the work being performed are addressed. These team briefings may be daily in the case of shutdowns. At a minimum diaries reference to the team briefings shall be maintained. In addition, this forum shall be used to provide a consultative framework for employees to raise and discuss safety issues and to ensure appropriate actions are taken.

## 5.4 Toolbox Meetings

- 5.4.1 These meetings are intended to be informal, the frequency to be determined by the Plant Superintendent. Toolbox meetings are designed to discuss Safe Work Method Statements that have been developed for a specific work task and/or an informal and open discussion about relevant health and safety matters between the Superintendent and the workforce, including Contractor employees.
- 5.4.2 A copy of toolbox meetings shall be maintained on the plant files for future reference.
- 5.4.3 Action items shall be promptly followed up and the results reported at the next meeting.

## 5.5 Consultation

- 5.5.1 Using a combination of the communication process and other methods as stated throughout this plan, all employees including contractors' employees shall be consulted with regard to the hazards, risks and risk controls that impact on them through the particular work activity that they are performing.

Note: Appendix 1 - Risk Assessment details a 'Consultation' related risk as having a risk rating of 'high'.

## 5.6 Meetings

- 5.6.1 CHCC, contractor and stakeholder meetings may be held to ensure that issues and planning of critical activities that interface with other activities and other stakeholders on the site are formally discussed and minuted. Records of these meetings will be maintained in the plant files by the Plant Superintendent.

## 5.7 Safety Notice Board

5.7.1 A safety notice board shall be established in a prominent area, with pertinent Safety related documentation. e.g. Industry Safety Alerts.

## 5.8 Site Safety Rules

5.8.1 Site Safety Rules may be developed for the plant and shall be handed out during the plant induction and displayed in a prominent location.

## 5.9 Auditing

5.9.1 Planning and auditing of this plan, OHS practices and control measures shall be performed. The Plant Superintendent shall prepare a basic audit plan showing the audit frequency and the areas or sections (contractors) to be audited.

5.9.2 As a minimum the Plant Safety Management Plan shall be audited within 3 months of operations commencing followed by a minimum of one in the preceding 12 months and within every 36 month period thereafter.

5.9.3 The Plant Superintendent shall carry out self audits/reviews/site inspections of the project on a regular basis.

5.9.4 Deficiencies identified as a result of audits/review/site inspection shall be documented and rectified to a point of close out by the Plant Superintendent.

## 5.10 Performance Reporting

5.10.1 Performance standards against which the implementation of the Safety Management System can be measured may include:

- % of audit recommendations implemented as per audit plan – Target 100%
- % of hazard identified and closed out within seven days – Target 95%;
- % of attendant's relevant competencies obtained – Target 90%.

## 5.11 Management System Review (Change & Continual Improvement)

5.11.1 The Plant Superintendent shall collate monitoring and surveillance data, stakeholder feedback and improvement data. The results of the analysis are presented to the Manager - Treatment Process Control for review. The Operations Safety Management System review is an integral part of the overall review of the plant systems. Records of such reviews are documented as minutes and maintained by the Manager - Treatment Process Control.

5.11.2 System reviews are generally carried out within 12 months after operations commencement and at a frequency of not exceeding 12 months thereafter.

## 6.0 Standard Operations Controls

### 6.1 Introduction

- 6.1.1 For the purpose of this Plan, Standard Operations Controls are defined as any systems, procedures, and operational hardware and software, that are intended to eliminate hazards, prevent or reduce the likelihood of incident from occurring, or reduce/mitigate the severity of consequences of any incidents that do occur. Standard Operations Controls are the primary tools which the Operator utilises to deliver a safe operation at the facility.
- 6.1.2 Standard Operations Controls may be pro-active, in that they eliminate, prevent or reduce the likelihood of incidents, or they may be reactive, in that they reduce or mitigate the consequences of such incidents that do occur. Both types of Standard Operations Controls are essential for an effective Safety Management System.
- 6.1.3 The systematic and comprehensive hazard identification and risk assessment (Refer Appendix 1) assists the Plant Superintendent to manage the facility in a manner that minimises risk to people, property and the environment. It is the risk assessment process that details the level of controls necessary to prevent major accidents. The risk assessment in Appendix 1 sets out to:
- Develop a detailed understanding of major accident risks associated with the facility.
  - Provide a transparent and robust basis for making decisions on control measures, management systems and other resources for safe operation of the facility.
  - Identify critical controls measures and link these controls to the identified hazards.

The below Standard Operations Controls compliment the risk assessment process described in Section 5.1 to provide clear instructions for all attendants for ensuring that activities are conducted methodically, reproducibly and safely. The Plant Superintendent on an ongoing basis identifies work methods, processes, or critical tasks that have significant potential safety and environmental risks and develops where deemed necessary Safe Work Method Statements to prevent associated incidents.

### 6.2 Personal Protective Equipment (PPE)

All employees have a responsibility for maintaining and wearing the appropriate Personal Protective Equipment (PPE) at all times whilst at the plant. Mandatory Personal Protective equipment is detailed within Plant Induction.

The Plant Superintendent will ensure that all employees are supplied with the necessary Personal Protective Equipment required to perform their duties and meet legislative requirements.

All contractors are required to supply their employees with any necessary personal protective equipment.

Examples of PPE

#### Head Protection



Approved safety helmets to AS 1801. Employees shall not write, paint or otherwise mark helmets. Stickers identifying site specific inductions shall be displayed. Employees are to exchange out of date helmets as required.

## Occupational Protective Footwear



Approved steel-capped safety footwear to AS2210.2.

## High Visibility Apparel



Appropriate high visibility apparel to AS4602 - High Visibility Safety Garments and as described in AS 1742.2.

## Protective Clothing



Appropriate industrial clothing. Where additional protective clothing is required by personnel perform task such as welding etc. then that clothing shall be provided by the Contractor to the employee.

## Eye Protection

Approved eye protection to AS 1337 - Eye protectors for industrial applications, appropriate to the task, all times by all personnel using grinders, oxy / acetylene, welding, power and pneumatically driven tools and equipment.

## Hearing Protection



The identification, assessment of risk and control of risk associated with noise in the workplace must be in accordance with relevant legislation.

Approved hearing protection to AS 1270, must be worn where an employee is in a designated mandatory hearing protection area. Where an employee in carrying out a task that generates noise and exposes the employee to noises > 85dbA, then the appropriate hearing protection will be provided and must be worn by the employee and by any other employee that is effected.

All plant and equipment that exposes an employee to noises > 85dbA is required to have mandatory hearing protection signs displayed.

## Hand Protection



Hand protection in accordance with AS/NZS 2161.1 - Occupational protective gloves - Part 1: Selection, use and maintenance, must be worn when the employee is exposed to chemical contaminants or work that has the potential to cause injury to an employees hands. The gloves provided, must suit the task and the hazard which the employee is exposed to, the gloves must be maintained in good condition and free from excessive wear.

## UV Protection

Due to the nature of work being outdoors on occasion, it is required that a supply of 30+ sun-block, UV safety glasses and broad brim for hard hats be available to all employees.

## Wet Weather Clothing

Wet weather clothing that is suitable for the task shall be provided to all employees required to work during wet weather.

## Additional Personal Protective Equipment

Additional personal protective equipment may be required to be worn by personnel undertaking tasks with additional hazards. Equipment may include: goggles; face shields; fall arrest equipment; respirators; life vests; self-rescuers. The equipment requirements for a particular task shall be determined by the relevant Supervisor in consultation with the Plant Superintendent.

## 6.3 Site Security

6.3.1 The Plant Superintendent shall ensure that systems are in place to monitor and control security and legitimate access to the site, as well as to prevent all forms of non-legitimate access to the site. Attendants should pay particular attention to the physical security of the facility, chemical storage areas, and chemical processes. All facilities shall have appropriate security in place to minimise crime and to protect people, property and the environment.

6.3.2 The plant shall have a perimeter fence installed that is adequate for the risks associated with operating a Water Treatment Plant in accordance with relevant legislation.

Note: Appendix 1 – Risk Assessment details a ‘Site Security’ related risk as having a risk rating of ‘high’.

## 6.4 Fire Prevention and Protection

6.4.1 Fire Prevention and protection shall be taken into account when planning operational activities.

6.4.2 An assessment of the suitability of fire fighting equipment should be made for the plant. AS 2444 provides details on the various types available and their use and effectiveness for various types of fire.

6.4.3 Where a task being undertaken exposes any employee and/or property to fire, appropriate temporary fire protection equipment shall be provided at that location. Hot Work Permits may be required for all hot work carried out at the Plant.

6.4.4 Employees shall be adequately instructed in the use of the fire fighting equipment.

6.4.5 Fire fighting equipment must be tagged to be in compliance with AS 2444.

## 6.5 Traffic Management

6.5.1 A process for management of delivery and transport vehicles shall be established by the Plant Superintendent prior to operations commencement.

6.5.2 Specific site rules regarding traffic management and control are to be incorporated in to the operations induction.

## 6.6 Isolation of Services

6.6.1 It is essential that when work is being carried out on any operational equipment or facility and the work may affect the facility’s operations, that a procedure to isolate systems in place.

This is to ensure that the safety and the integrity of the related systems are not jeopardised because of the works.

6.6.2 An isolation system will only ensure protection when:

- All stored energies within the equipment are reduced to non-injurious levels
- All sources of energy to the equipment are removed

## 6.7 'Danger' and 'Out of Service' Tagging

- 6.7.1 'Danger' tagging where appropriate shall be implemented to ensure the safety of personnel working on plant and equipment to prevent inadvertent use by unauthorised persons during maintenance / repair processes or to ensure isolated equipment is secure prior to working in an area or on a piece of equipment or plant that may affect employees working in such areas or on such equipment.
- 6.7.2 'Out of Service' tagging shall be implemented to ensure that defective plant and equipment that requires servicing or repair is correctively identified as 'Out of Service' to prevent inadvertent use of such plant or equipment.

## 6.8 Excavation and Trenching

- 6.8.1 All excavation and trenching operation shall be suitably benched, battered and/or shored to ensure that there are systems in place to prevent / control:
- Falling or dislodgement of earth and rock within the excavation
  - Instability of the excavation or adjacent structures
  - In-rush of water into the excavation
  - Placement of spoil and materials impacting or falling into the excavation
  - Instability due to persons or plant working adjacent to the excavation
- 6.8.2 An Excavation Work Permit may be required (determined by the Plant Superintendent) prior to the commencement of excavation works.

## 6.9 Safe Work in Confined Spaces

- 6.9.1 All work carried out on the project shall be assessed to determine if a particular work activity maybe deemed as confined spaces as per the definition stipulated in applicable legislation. Where a potential confined space is identified the Plant Superintendent shall assess. As a preference, the Plant Superintendent will implement appropriate controls to ensure the work area is designed as a place of work to eliminate the hazards and/or where this can not be achieved then deem that the work area is to be carried out as 'working in a confined space'.
- 6.9.2 Where work is carried out in an area deemed to be 'working in a confined space', then the work shall be carried out strictly in accordance with the legislation.
- 6.9.3 For further guidance refer to – AS 2865 – 2001 – Safe working in a confined space and AS/NZ Handbook – HB 213:2003 – Guidelines for safe working in a confined space.
- Note: Appendix 1 – Risk Assessment details a 'Safe Work in Confined Spaces' related risk as having a risk rating of 'high'.

## 6.10 Work at Heights

- 6.10.1 Personnel who are required to perform work in an elevated position, and where there is the potential to free-fall and sustain injury, shall ensure systems and controls exist to prevent such falls.
- 6.10.2 The general requirement is that, when a person is required to work in an elevated position > 2.0m the control hierarchy for fall protection shall be used. However, where the potential to sustain an injury from falling is identified at heights < 2.0m, the same considerations shall be taken and necessary controls implemented to prevent such a fall.
- 6.10.3 For further guidance refer OHS Regulation – cl. 56 – Prevention of falls from Height – particular control measures and OHS (Safety Standards) Regulations 1994 - Part 13.

## 6.11 Scaffolding

- 6.11.1 All scaffolding shall be erected and maintained in accordance with AS 1576, Part 1-4 and the erection carried out by a competent person(s), holding the relevant Certificate of Competency for the task.
- 6.11.2 All scaffold erected must have a scaffold hand-over certificate supplied by the erector.
- 6.11.3 Scaffold must comply with the requirements of OHS Regulation – cl. 58 – Scaffold – particular control measures. Further guidance may be obtained from AS/NZS 4576 – Guidelines for Scaffolds.

## 6.12 Hot Work

- 6.12.1 Hot work includes any of the following work activities:
- All forms of welding
  - Oxy acetylene cutting
  - Grinding or cutting using abrasive tools
- 6.12.2 Persons undertaking hot work may be required to be accompanied by an assistant whose duties will include that of fire watcher and monitoring of the work area after the work has been completed.
- 6.12.3 All hot work in areas other than designated workshops / process areas where appropriate fuel reduction and fire fighting equipment is permanently established or where hot work is required to be performed in a confined space may require a Hot Work Permit being issued.
- 6.12.4 Where 'total fire bans' are in force the Plant Superintendent shall ensure all requirements are met through consultation with the local fire department.

## 6.13 Use of Plant and Equipment

- 6.13.1 Plant personnel who are required to operate plant and/or equipment at the plant shall be trained and possess the necessary skills and where applicable licences to ensure the safe and competent operation of the plant.
- 6.13.2 Where plant or equipment in use requires a certified operator, the operator shall provide a copy of a current certificate of competency at the plant induction.
- 6.13.3 All relevant certificates of competency shall be copied and a record maintained by the Plant Superintendent.
- 6.13.4 Plant and equipment shall be inspected as per the manufacturer recommendations.

## 6.14 Cranes and Elevated Work Platform (EWP)

- 6.14.1 All persons required to operate any mobile crane or Elevated Work Platforms (EWP) shall be trained and/or certified for the equipment and must hold the appropriate competence certification for the plant item being used in accordance with acceptable industry practice and/or Certificates of Competency.

Note: Appendix 1 – Risk Assessment details a 'Cranes and Elevated Work Platforms' related risk as having a risk rating of 'high'.

## 6.15 Material Handling

- 6.15.1 Materials handling for the plant is limited to the transportation, receipt, unloading, storage and placement of permanent and temporary material, equipment and plant.

- 6.15.2 Employees should be trained in correct manual handling techniques and the process of identify manual handling hazards. Suitable controls should be implemented where deviations are required from "correct manual handling techniques" in accordance with relevant legislation and the National Code of Practice for Manual Handling.

## 6.16 Electrical Equipment

- 6.16.1 All electrical equipment must be thoroughly inspected prior to use and where damage is evident the equipment must be tagged 'DO NOT USE' and reported to the Plant Superintendent.
- 6.16.2 Any tools and equipment that do not have a current inspection tag in place must not be used at the plant.

## 6.17 Rigging, Lifting and Fall Protection Equipment

- 6.17.1 All rigging equipment shall be inspected by the rigger and/or dogman prior to use. Any damaged or equipment with out of date test certificates is not to be used until tested and certified.
- 6.17.2 All slings, chains, shackles, hooks and other lifting equipment shall have the Safe Working Load and/or WLL details clearly marked on the equipment.
- 6.17.3 All mechanically operated lifting / rigging equipment (chain blocks, turfers etc) may require to be independently inspected and re-certified on a 12 monthly basis.

## 6.18 Work Above and/or On Water

- 6.18.1 Prior to commencing any work over water the following control should be applied and implemented to eliminate and/or minimise risk:
- Determine what activities need to be carried out over water,
  - Plan the work to minimise the amount of activity required over water which would incorporate access and egress provisions.
- 6.18.2 Where appropriate implement the following to eliminate and/or minimise the risk;
- Safe Work Platform
- Provide a safe working platform, either fixed or floating, with handrails, kickboards and/or mesh guarding to prevent personnel, materials and equipment entering water;
  - Provide containment controls to prevent chemicals from entering water.
- 6.18.3 Provide restraint and/or fall arrest devices
- Provide fall restraint equipment, e.g. Harnesses, may be used to provide support in an unstable position, or to restrain movement to prevent a person encroaching on an unprotected edge.
- Note: Fall restraint devices must not be used to arrest falls.
- 6.18.4 Minimise injury and damage
- Provide personnel flotation devices (PFD's), of a vest type, to all persons that are not prevented from free fall into water; and
  - Provide temporary floating bunds and a spill kit to contain any fuel / chemical spills.
- Personnel working over or on water should be in the company of a least one other person.



## 7.0 Measurement and Evaluation

### 7.1 Inspection and Testing

7.1.1 Inspection and testing shall be carried out using a number of methodologies and practices to ensure that material, plant, equipment, work method, protective measures and other items as necessary are in place. The inspection and testing regime below are endorsed by the Manager - Treatment Process Control as representing the management of the hazards that are present and support the actual practices of the facility.

#### 7.1.1 Monitoring of Plant and Equipment

7.1.1.1 The Plant Superintendent shall ensure that the plant and equipment are inspected at the frequency specified in the manufacturer's recommendations and/or legislative requirements.

#### 7.1.2 Monitoring of Work Activities

7.1.2.1 The Plant Superintendent shall ensure that regular inspections and audits are undertaken of work activities being carried out. Where appropriate inspections shall be carried out in conjunction with attendants for a particular activity.

7.1.2.2 Monitoring of the activities shall generally be carried out by the following processes:

- Informal, on an 'as seen' basis during normal work activities;
- Structured, through a formal 'inspection' program and prioritised on the level of risk for each process;
- Safe Work Method Statement implementation reviews.

#### 7.1.3 Informal Hazard Inspections

7.1.3.1 CHCC employees and contractors are encouraged at all times to identify and control hazards on a 'see and fix' basis where it is in their ability to do so.

7.1.3.2 Hazards which are identified, but are outside a person's ability to immediately rectify, should be immediately reported to the Plant Superintendent.

#### 7.1.4 Formal Hazard Inspections

7.1.4.1 Formal plant hazard inspections will be completed regularly applicable to the work activities or work process being performed.

7.1.4.2 The frequency of the hazard inspections will be at the Plant Superintendents discretion.

7.1.4.3 The purpose of the hazard inspection is to identify any matters which may have been overlooked through the normal daily OHS&R management process.

7.1.4.4 At the conclusion of the hazard inspection, the Plant Superintendent shall provide a summary of all identified hazards or non-conforming items found during the inspection.

7.1.4.5 The Plant Superintendent shall track the rectification status on the identified hazards to a point of close out.

7.1.4.6 The Plant Superintendent shall maintain records of all completed 'Hazard Inspection Reports'.

## 7.2 Emergency Preparedness

### 7.2.1 Emergency Response and Evacuation

- 7.2.1.1 The Manager – Treatment Process Control in consultation with operational staff and key stakeholders shall develop a Plant specific Operational Emergency Planning Management Plan.
- 7.2.1.2 Emergency Instructions and Emergency Response Action Plans shall be included as part of the Plant specific Induction and posted prominently in operations offices and amenities.
- 7.2.1.3 The Plant Superintendent has been nominated as the Emergency Coordinator to ensure planning and preparation in the event of an emergency is performed in accordance with the Plant specific Operational Emergency Planning Management Plan (OEPMP). Unplanned events that may occur at the Plant that are covered in the OEPMP include:
- Medical Emergency
  - Gas Leak
  - Natural Disaster
  - Chemical Spill / Hazardous Substances / Dangerous Goods
  - Fire
  - Explosion
  - Rescue – Confined space / At Height / Over-Under Water / Trapped
  - Moving Equipment Accident
  - Power Failure (Possibility of Emergency)
  - Public Unauthorised Entry
  - Threat of any Nature
- 7.2.1.4 Once operations have commenced a familiarisation inspection by emergency services should be undertaken.
- 7.2.1.5 The Plant Superintendent shall arrange for an emergency / evacuation exercise to test the effectiveness of responses and the readiness of operational staff and contractors. The Plant Superintendent may invite participation from external parties and providers to the exercise. A debrief shall occur after the exercise to determine and adopt lessons learnt.

Note: Appendix 1 – Risk Assessment details 3 off ‘Emergency Reference and Evacuation’ related risks as having a risk rating of ‘high’.

### 7.2.2 Crisis Management

- 7.2.2.1 A crisis is an out of ordinary event, announcement, disclosure or set of circumstances, which threatens the safety or well being of employees or other stakeholders or the integrity, performance, reputation or survival of the organisation.
- 7.2.2.2 CHCC recognised that certain events as listed below can be detrimental to certain stakeholders and require special attention to avert undue attention to the Plant:
- Events that adversely affect the health and safety of people or the environment;
  - Major issues affecting normal operations;
  - Security breaches;

- Threats to the reputation, integrity or survival of the operations stakeholders.

It is therefore essential that when developing and training personnel in plant specific emergency response the Emergency Coordinator (Plant Superintendent) is aware of CHCC crisis management protocols.

## 7.3 Incident Management

### 7.3.1 Reporting and Investigation Requirements

7.3.1.1 The Plant Superintendent shall ensure all incidents are managed in accordance with:

- Incident Class Definitions
- Incident Notification and Reporting Timeframes

as summarised in the tables below.

**Table 7-1: Incident Class Definitions**

Impact Area	Class 1A or 1P	Class 2A or 2P	Class 3A or 3P
People	damage which permanently alters the future of the individual (fatality, quadriplegia, amputee, disabled back or psychological disturbance).	an injury or disease resulting in temporary disability or time lost from work of one or more complete days or shifts.	an injury which inconveniences the individual such as minor cuts or sprains, but allows the person to continue to carry out normal duties.
Environment.	Causes (1A) or has the potential (1P) to cause damage to the environment which can be rectified and results in remediation costs of >\$50,000.	Causes (2A) or has the potential (2P) to cause damage to the environment which can be rectified and results in remediation costs of >\$10,000 <\$50,000.	Causes (3A) or has the potential (3P) to cause damage to the environment which can be rectified and results in remediation costs of <\$10,000.
Plant / Equipment / Property	damage to plant/equipment and/or property >\$50,000	damage to plant/equipment and/or property >\$10,000 <\$50,000	damage to plant/equipment and/or property <\$10,000

**Legend:** Causes actual (A) or has the potential (P) to cause:

**Table 7-2: Incident Notification and Reporting Timeframes**

<b>Incident Category</b>	<b>Incident must be Notified to</b>	<b>Notification Time Frame and Report Type</b>	<b>Written Investigation Report Time Frame and Report Type</b>
<b>All Incidents</b>	<ul style="list-style-type: none"> <li>Plant Superintendent</li> </ul>	Immediately	As per below categories
<b>Class 3A or 3P</b>	<ul style="list-style-type: none"> <li>Plant Superintendent</li> </ul>	Within 24 hours to Manager – Treatment Process Control.	Within 24 hours (Interim report within 24 hours if not practicable to provide completed final report).
<b>Class 2A or 2P</b>	<ul style="list-style-type: none"> <li>Plant Superintendent</li> <li>Manager – Treatment Process Control</li> </ul>	By the end of current shift verbal notification to Manager – Treatment Process Control	Within 24 hours (Interim report within 24 hours if not practicable to provide completed final report).
<b>Class 1A or 1P</b>	<ul style="list-style-type: none"> <li>Plant Superintendent</li> <li>Manager – Treatment Process Control and Executive Manager – Coffs Harbour Water</li> </ul>	Immediate notification to Manager – Treatment Process Control and Executive Manager - Water Treatment Plants.	Within 24 hours interim report Within 7 days final report.

Note: Appendix 1 – Risk Assessment details 3 off ‘Incident Notification and Reporting Timeframes’ related risks as having a risk rating of ‘high’.

### 7.3.2 Reporting Requirements to External Parties

- 7.3.2.1 The Manager – Treatment Process Control in consultation with senior CHCC representatives where applicable may have legislative requirements to notify of incidents e.g. NSW WorkCover Authority and Environmental Protection Agency. (Department of Environment and Climate Change).
- 7.3.2.2 Contractors may be required to provide evidence of notification to the NSW WorkCover or Environmental Protection Agency.
- 7.3.2.3 Where appropriate the Plant Superintendent must ensure that non-disturbance of places and plant involved in certain occurrence until permission is given by the relevant Statutory Authority.

## 7.4 Injury Management and Rehabilitation

### 7.4.1 First Aid and Medical Services

- 7.4.1.1 Injury Management and Rehabilitation Policy Statement (Refer Section 1.2) for the plant shall be prominently displayed on the Site Safety Notice board and explained in the Plant Specific Induction.
- 7.4.1.2 Adequate First Aid facilities shall be established on site to provide employees with access to immediate first aid treatment when required. The Plant Superintendent shall be provided with appropriate first aid training, and a backup nominated.
- 7.4.1.3 A suitable independent medical provider shall be nominated by the Plant Superintendent to provide medical treatment for any work injuries requiring treatment beyond first aid. The Plant Superintendent shall brief the medical provider on:
- The plant safety objectives and the absolute commitment to pro-active injury management and rehabilitation principles;
  - Work location, the tasks being completed;
  - Alternative duties that may be utilised in the event a worker may sustain an injury.
- 7.4.1.4 CHCC have a Return to Work Coordinator, in the event of an injury the Plant Superintendent transfers injury management at a particular point to the CHCC Return to Work Coordinator.

Note: Appendix 1 – Risk Assessment details 3 off ‘First Aid and Medical Services’ related risks as having a risk rating of ‘high’.

## 8.0 Control of Issues

### 8.1 Issue Resolution

8.1.1 The Plant Superintendent shall ensure prompt effective resolution of safety issues by facilitating resolution at the lowest management level possible and promptly implementing agreed actions.

### 8.2 Non Conformance and Corrective Action

8.2.1 Non-compliance identified as a result of verification, testing or audits may be documented in a Non-Compliance Report.

8.2.2 The Plant Superintendent shall ensure that all agreed corrective actions, are verified as being complete or complied with and closed off.

## 9.0 Training

9.1 A training program for all attendants shall be implemented to ensure a minimum acceptable level of employee competence and to develop an appropriate level of process knowledge and understanding. The training program will ensure that employees are fully aware of the hazards associated with the processes and are competent in the use of adopted control measures. Training will also cultivate a safety culture and reduce human errors that may lead to major accidents.

9.2 The Plant Superintendent shall ensure that a yearly training review is carried out to identify any training requirements that are required for himself/herself and Plant Attendants, e.g. refresher first aid certificate, manual handling etc.

9.3 The outcome of the Plant Superintendents training review shall be approved for implementation by the Manager –Treatment Process Control.

9.4 Training Records shall be maintained by the Plant Superintendent.

Note: Appendix 1 – Risk Assessment details 3 off 'Training' related risks as having a risk rating of 'high'.

## 10.0 Document Control

10.1 The Plant Documentation and Control system shall be implemented by the Plant Superintendent including the filing system for the following safety related documents;

- Correspondence and meeting minutes
- Injury and rehabilitation
- Accident / incident investigations
- Inspection and testing
- Audits
- Training
- Records of qualification and competency
- Risks assessments
- Plant hazard assessments
- Non-compliance and corrective action
- Permits and approvals

- 10.2 The Plant Superintendent shall determine which documents shall be electronically stored and/or hard copy filed.

## 11.0 Procurement and Hazardous Materials & Substances

- 11.1 The Plant Superintendent shall ensure that purchasing related hazards are controlled prior to goods and services being delivered to the Plant with particular attention to hazardous materials and substances.
- 11.2 Written systems should exist for purchasing chemical substances, machinery/equipment, and services.
- 11.3 The Plants overall procurement system includes:
- Systems to ensure that suppliers provide all relevant safety information about their products including the provision of Material Safety Data Sheets (MSDSs).
  - Purchasing documents contain, where applicable:
    - Precise identification of product/services to be delivered.
    - Product acceptance criteria.
    - Specific references to drawings, specifications, standards etc.
  - Specific reference to approvals and/or qualifications of product, processes, equipment or personnel, including appropriate verifications where relevant.
  - Appropriate methods of receipt, storage, transfer, handling and waste disposal for materials procured (where relevant).
  - Records of quantities of chemicals and other hazardous substances are maintained.
  - Checking compliance of delivered products and services to procurement specifications.
  - Segregation and disposal of nonconforming products.
  - Provision of applicable licences, safe storage and handling facilities for all hazardous materials and equipment.
  - An inspection system for all materials and equipment stored, to ensure that these are not issued in a deteriorated or unserviceable condition.



# Appendix 1      Risk Assessment: Identified / Rating / Controls Review



<b>Project: Coffs Harbour Water Treatment Plant</b> <b>Issue Date: 4-2-09 Rev No: 1</b>  <b>WORKSHOP ATTENDEES (04.02.09)</b>		<table border="1"> <thead> <tr> <th colspan="3">Consequence</th> </tr> <tr> <th>Level</th> <th>Descriptor</th> <th>People (effect if risk occurs) Example of Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Insignificant</td> <td>No injuries, low financial loss</td> </tr> <tr> <td>2</td> <td>Minor</td> <td>First Aid treatment, Medium financial loss</td> </tr> <tr> <td>3</td> <td>Moderate</td> <td>Medical Treatment Required, high financial loss</td> </tr> <tr> <td>4</td> <td>Major</td> <td>Extensive Injuries, loss of production capability, major financial loss</td> </tr> <tr> <td>5</td> <td>Catastrophic</td> <td>Fatality, huge financial loss</td> </tr> </tbody> </table>		Consequence			Level	Descriptor	People (effect if risk occurs) Example of Description	1	Insignificant	No injuries, low financial loss	2	Minor	First Aid treatment, Medium financial loss	3	Moderate	Medical Treatment Required, high financial loss	4	Major	Extensive Injuries, loss of production capability, major financial loss	5	Catastrophic	Fatality, huge financial loss	<table border="1"> <thead> <tr> <th colspan="3">Likelihood (chance of problem occurring)</th> </tr> <tr> <th>Level</th> <th>Descriptor</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Almost certain</td> <td>Event is expected to occur in most circumstances</td> </tr> <tr> <td>B</td> <td>Likely</td> <td>Event will probably occur in most circumstances</td> </tr> <tr> <td>C</td> <td>Moderate</td> <td>Event might occur at some time</td> </tr> <tr> <td>D</td> <td>Unlikely</td> <td>Event could occur at some time</td> </tr> <tr> <td>E</td> <td>Rare</td> <td>Event may occur only in exceptional circumstances</td> </tr> </tbody> </table>		Likelihood (chance of problem occurring)			Level	Descriptor	Description	A	Almost certain	Event is expected to occur in most circumstances	B	Likely	Event will probably occur in most circumstances	C	Moderate	Event might occur at some time	D	Unlikely	Event could occur at some time	E	Rare	Event may occur only in exceptional circumstances																															
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	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5																																																																									
A (Almost Certain)	H	H	E	E	E																																																																									
B (Likely)	M	H	H	E	E																																																																									
C (Moderate)	L	M	H	E	E																																																																									
D (Unlikely)	L	L	M	H	E																																																																									
E (Rare)	L	L	M	H	H																																																																									



No.	Category	Potential Risks	Risk Rating	Risk Priority	Risk Treatment Options	Controls/Risk Treatments	New Risk Rating	Responsibility	Date Actioned
1	Overall OH&S Risk Management	<ul style="list-style-type: none"> <li>Non compliance with OH&amp;S legislation with standard management systems in place</li> <li>Incidents/accidents</li> </ul>	5E	H	Accept Risk	<ul style="list-style-type: none"> <li>Development of safety system and emergency plan prior to the start of operation</li> <li>Operational Staff aware of responsibilities and proactive in promoting OH&amp;S</li> <li>Independent auditing of compliance with systems and hazard study</li> </ul>			
2	Overall Environmental Risk Management	<ul style="list-style-type: none"> <li>Non compliance with environmental legislation</li> <li>Incidents resulting in clean up costs and / or fines</li> </ul>	3E	M	Accept Risk	<ul style="list-style-type: none"> <li>Full review of all EA and statutory requirements, initiatives and recommendations. These are then to be reflected in the OEPMP</li> <li>Development and approval of OEPMP before operation</li> <li>Operational Staff aware of responsibilities and proactive in promoting preventative measures through various training programs</li> </ul>			
3	Community Issues	Unauthorised access to site	4E	H	Accept Risk	Existing security system including security fencing, gates and security patrols.			
		Residences subject to excessive operational impacts such as odour and noise	2D	L	Accept Risk	Plant to comply with environmental legislation and approval documents.			
4	Incliment weather	Excessive wet weather results in poor site conditions Flooding causes damage to structures/machinery	2D	L	Accept Risk	All structures are located above the 1 in 100 year flood level and Probable Maximum Flood Level.			
5	Equipment / Machinery Standards	Failure of equipment / machinery resulting in environmental damage.	2D	L	Accept Risk	All equipment assessed to AS4024 compliance with DoP approval, relevant legislation and dangerous goods standards			

6	Crane Operations								
6.1		Crane operations hit services	2D	L	Accept Risk	Crane operators to be fully qualified.			
6.2		Crane operations damage underground services	4E	H	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>Existing designated crane areas around the site for use during heavy lifts.</li> <li>Plan to be prepared that identifies the areas where heavy lift cranes can set up and operate.</li> </ul>	2E L	Phil Woodford – Design Manager	
7	Electrical								
7.1		Electrical fire due to switchroom equipment failure	2C	M	Reduce likelihood	<ul style="list-style-type: none"> <li>Existing fire detection and alarm system.</li> <li>Regular maintenance including thermographic surveys.</li> <li>SOP to be prepared identifying the maintenance requirements.</li> </ul>	2D L	Executive Manager Operations – Simon Thorn	
7.2		General site fire event	2D	L	Accept risk	<ul style="list-style-type: none"> <li>Existing fire detection and alarm system.</li> <li>Compliance with requirements for workplace fire safety.</li> </ul>			
7.3		Bush Fire	3D	M	Accept risk	<ul style="list-style-type: none"> <li>Noted site is located outside of the recognised bush fire hazard zones.</li> <li>Bushfire plan incorporated into emergency plan.</li> <li>Landscape maintenance on a regular basis</li> </ul>			
8	Operational staff, Contractors	<ul style="list-style-type: none"> <li>Staff inexperienced in plant operation and process</li> <li>Substandard contractors exposed to high risks</li> </ul>	3B	H	Reduce likelihood and consequences	CHCC to instigate permit to work system. Adopt JV system used during commissioning and modify accordingly to CHCC protocols.	2D L	Executive Manager Operations – Simon Thorn	

9	Emergency Procedures	<ul style="list-style-type: none"> <li>Undue delays in arrival of emergency services</li> <li>Undue delays in attendance of injured personnel</li> <li>Undue delays in stopping and cleaning chemical spills and leaks.</li> </ul>	3C	H	Reduce likelihood and consequences	Induction of emergency services to site	3D M	Executive Manager Operations – Simon Thorn	
10	Waste	<ul style="list-style-type: none"> <li>Illegal disposal</li> <li>Stormwater pollution</li> <li>Odour</li> <li>Aesthetics</li> <li>Poor use of resources</li> </ul>	2D	L	Accept Risk	<ul style="list-style-type: none"> <li>Compliance with statutory requirements.</li> <li>Existing waste management strategy.</li> <li>Requirements included within OEPMP</li> </ul>			
11	DAFF – through to UV channel								
11.1		Chemical line breakage in dosing pit and discharging to emergency storage lagoon.	2D	L	Accept Risk	<ul style="list-style-type: none"> <li>Covered by SOP, inspection of lagoon by operator.</li> <li>Noted that volumes of chemicals would be small.</li> </ul>			
11.2		Entry into pits and chambers – confined space, access	5E	H	Reduce likelihood and consequences	Permit to work to complement existing confined space procedures.	2E L	Executive Manager Operations – Simon Thorn	
11.3		Trips and falls – falling into water	5E	H	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>Permit to work and SOP for working over water.</li> <li>Existing system to prevent unauthorised access via use of security gates and fences.</li> </ul>	2E L	Executive Manager Operations – Simon Thorn	
11.4		Overflow - inlet water, filtered water channel, washwater.	2E	L	Accept risk	<ul style="list-style-type: none"> <li>Existing system where overflows are directed to the emergency storage lagoon. Lagoon has been designed to contain these events.</li> <li>Existing alarms installed that notify operators of overflows.</li> </ul>			

11.5		Insufficient maintenance leading to machinery malfunction – noise emission	2D	L	Accept risk	Ensure maintenance undertaken to manufacturer's recommendations and breakdown maintenance adhered to immediately.			
11.6		Lighting upsetting environmental amenity	1C	L	Accept Risk	<ul style="list-style-type: none"> <li>Lights will not to be operating when works not being undertaken (assessed as being for the norm for the majority of circumstances).</li> <li>If night operation or emergency works are required the operator's safety is paramount and lights will be turned on as required.</li> </ul>			
11.7		Inundation of floor areas (filter gallery and UV area) with water. Excess water in excess of floor drainage capacity flows through stormwater system into environment. Floor drainage flows to washwater tank.	1D	L	Accept Risk	Filtered water to flow through established drainage system, consequence insignificant.			
11.8		Fluoride and sodium hydroxide dosing within dosing chamber at end of UV channel. Pipe breakage outside of channel substances spilling onto the ground outside of the building.	2D	L	Reduce likelihood and consequences	Pipe attached to wall to be double contained. Vermin mesh required.	1E L	Phil Woodford – Design Manager	
11.9		Breakage of chemical lines from chemical storage to dosing points.	2C	M	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>Regular pit inspections along the dosing lines.</li> <li>Lines are double contained.</li> <li>Maintenance of dosing lines to include hose replacement as required following regular inspections.</li> <li>Labelling of dosing lines within pits.</li> </ul>	2D L	John Saleh – Commissioning Engineer	

12	<b>Dry Chemical Storage, switchroom and blower room.</b>								
12.1		Spillage of bags during unloading.	2C	M	Reduce likelihood and consequences	SOP to be prepared to manage dry chemical spills.	1D L	John Saleh – Commissioning Engineer	
12.2		Process of unloading. To use mechanical methods – walker stacker. Dropping pallets, plant / worker interaction.	2D	L	Accept Risk	SOP and manufactures training			
12.3		Air quality. Dust from spillage and loading activities. Dust inhalation.	2D	L	Accept Risk	SOP prepared. All operators trained in MSDS.		John Saleh – Commissioning Engineer	
12.4		Release to atmosphere of lime dust.	1C	L	Accept Risk	Dust reducer / extractor used during operation.			
12.5		Release of CO2 to atmosphere.	1D	L	Accept risk	CO2 vessel not enclosed within a building and access restricted (fenced).			
12.6		Noise emissions from compressor and blower.	2D	L	Accept risk	<ul style="list-style-type: none"> <li>Noise attenuation designed within the plant.</li> <li>Compliance with statutory requirements and approval documents.</li> </ul>			
13	<b>Liquid chemical storage area</b>								
13.1		Release of vapours to atmosphere	1D	L	Accept risk	Fluorosilic acid vented through water bath.			
13.2		Leakage of chemicals inside bunded storage area	2D	L	Accept risk	Bunded areas to Australian Standards to contain all spills and leaks.			
13.3		Spillage of chemicals during filling of chemical storage tanks	2D	L	Accept risk	<ul style="list-style-type: none"> <li>SOP prepared</li> <li>Existing tanker unloading area designed to contain spill</li> </ul>		John Saleh – Commissioning Engineer	

13.4		Chemicals unloaded into the wrong tank	2D	L	Reduce likelihood	<ul style="list-style-type: none"> <li>SOP prepared.</li> <li>Permit to work for operator to escort deliveries during unloading.</li> </ul>	2E L	Executive Manager Operations – Simon Thorn	
13.5		Operator contact with chemicals.	2D	L	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>SOP prepared.</li> <li>Awareness of MSDS.</li> <li>CHCC to purchase required PPE.</li> </ul>	1D L	Executive Manager Operations – Simon Thorn	
13.6		Discharging of fluoride water vent bath.	1C	L	Accept risks	SOP to be prepared and detail the safe disposal of water.		John Saleh – Commissioning Engineer	
13.7		Breakage of chemical hose on cable tray	2E	L	Reduce likelihood	Ensure chemical dosing lines are double contained when outside of bunded areas and out of ground. Regular checks of hoses.	2E L	Phil Woodford – Design Manager	
13.8		Noise from high level sirens / lights following malfunction.	1D	L	Accept risk	Infrequent but necessary component of operation.			
14	<b>Chlorine Storage and Dosing</b>								
14.1		Chlorine gas leak in chlorine building	5E	H	Reduce consequences	<ul style="list-style-type: none"> <li>Existing standby chloguard system</li> <li>Existing standby sensor system</li> <li>Existing chloguard system activating ventilation system</li> <li>SOP for entry to chlorine building including PPE</li> <li>Permit to work for any works on chlorine system</li> <li>Restricted access into the chlorine building</li> <li>Emergency procedures</li> <li>Ensure personnel working on chlorine system to have supplier training</li> </ul>	3E M	Executive Manager Operations – Simon Thorn John Saleh – Commissioning Engineer Phil Woodford – Design Manager	
14.2		Chlorine gas leak outside of the chlorine building.	5E	H	Reduce consequences	<ul style="list-style-type: none"> <li>Chlorine awareness to be included in visitor inductions</li> <li>Emergency plan including site evacuation</li> </ul>	3E M	Executive Manager Operations – Simon Thorn	

14.3		Unloading drums from truck. Drum falling off truck during unloading procedure.	2E	L	Accept risk	<ul style="list-style-type: none"> <li>• Drum designed for heavy impact to prevent damage.</li> <li>• Review drivers SWMS prior to unloading.</li> </ul>			
15	<b>Backwash and Residual Thickening and Handling System</b>								
15.1		Trips and falls – falling into water	5E	H	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>• Permit to work and SOP for working over water</li> <li>• Existing system to prevent unauthorised access via use of security gates and fences.</li> </ul>	2E L	Executive Manager Operations – Simon Thorn	
15.2		Overflow to environment.	2D	L	Accept risk	Existing system to direct overflow to emergency storage lagoon and washwater tank.			
15.3		Spillage of bags during unloading.	2C	M	Reduce likelihood and consequences	SOP to be prepared to manage dry chemical spills.	1D L	John Saleh – Commissioning Engineer	
15.4		Process of unloading. To use mechanical methods – walker stacker. Dropping pallets, plant / worker interaction.	2D	L	Accept Risk	SOP and manufacturers training			
15.5		Air quality. Dust from spillage and loading activities. Dust inhalation.	2D	L	Accept Risk	<ul style="list-style-type: none"> <li>• SOP prepared.</li> <li>• All operators trained in MSDS.</li> </ul>		John Saleh – Commissioning Engineer	
15.6		Sludge spillage to environment	2D	L	Accept Risk	Existing drainage system to direct water to washwater tank			
15.7		Overflow / spill of residue from skip bins	2C	M	Reduce consequences	<ul style="list-style-type: none"> <li>• SOP to be prepared.</li> <li>• Existing covers over bins when transporting.</li> </ul>	1C L	John Saleh – Commissioning Engineer	
15.8		Odour emissions.	1D	L	Accept risk	Regular off site disposal of sludge.			
15.9		Noise from centrifuges	1D	L	Accept risk	Plant to comply with noise criteria and approval conditions.			



15.10		Excessive noise from backwash water discharging to washwater tank	2D	L	Accept risk	Plant to comply with noise criteria and approval conditions			
16	<b>Treated Water Storage and Pump Station</b>								
16.1		Trips and falls – falling into water	5E	H	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>Permit to work and SOP for working over water</li> <li>Existing system to prevent unauthorised access via use of security gates and fences.</li> </ul>	2E L	Executive Manager Operations – Simon Thorn	
16.2		Discharge from fluoride analyser pit	2D	L	Accept risk	Existing system for high level alarm and emergency discharge into washwater tank			
16.3		Water spill flooding TWPS	1D	L	Accept risk	Existing system to direct water back to washwater tank			
16.4		Water flooding switchroom sub floor	2D	L	Accept risk	Existing measures to ensure water levels do not exceed the level of the switchroom sub floor.			
16.5		Diesel spill from generator	2D	L	Accept risk	Existing bunded area			
16.6		Noise from TWPS	2D	L	Accept risk	<ul style="list-style-type: none"> <li>Comply to noise criteria and approval conditions.</li> <li>Existing building properties to provide adequate noise attenuation</li> <li>Normal maintenance as per manufacturer's recommendations.</li> </ul>			
17	<b>Emergency Storage Lagoon</b>								
17.1		Overflow of lagoon to the environment	2D	L	Accept risk	Existing measures to pump water back to washwater tank.			
17.2		Trips and falls – falling into water	1D	L	Accept risk	<ul style="list-style-type: none"> <li>Permit to work and SOP for working over water</li> <li>Existing site security system to prevent unauthorised access.</li> </ul>		Executive Manager Operations – Simon Thorn	



## **Appendix 2      Definitions, References and Abbreviations**



## A2-1 Definitions

There are various definitions of what constitutes a safety management system (SMS). Consistent with the definition of the SMS in the National Standard for the Control of Major Hazard Facilities, for the purpose of this Operational Safety Management Plan the definition of a SMS is a comprehensive and integrated system for managing safety at a potentially hazardous facility which sets out:

- The safety objectives
- The systems and procedures by which these are to be achieved
- The performance standards which are to be met
- The means by which adherence to these standards is to be maintained
- The key accountabilities and responsibilities
- The training assessment system
- The records management system
- Classification of hazards
- Scope with respect to nature scale and risk of activities
- Associated monitoring requirements
- Hazardous Areas
- What constitutes an emergency for the purpose of invoking the plan
- Auditing requirements and how non-conformities are managed to close out.
- Definition and classification of emergencies

Stakeholder *a. Persons who reside in; and*  
*b. persons who are owners or managers of land in; and*  
*c. persons in management and control of workplaces, or of places where persons gather for recreational, cultural or sporting purposes in;*  
*the area within which a major accident may cause harm.*

*In determining the extent of this area, the operator of a major hazard facility must consider the area defined by the emergency plan for the facility and the area included in the emergency services evacuation plan, and choose whichever is greater.*



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Emergency Services	<p><i>Any combat agency identified in the NSW State Disaster Plan and includes but is not limited to the:</i></p> <ul style="list-style-type: none"><li><i>a. Ambulance Service of New South Wales,</i></li><li><i>b. New South Wales Fire Brigades,</i></li><li><i>c. NSW Rural Fire Service,</i></li><li><i>d. Police Service,</i></li><li><i>e. Roads and Traffic Authority,</i></li><li><i>f. State Emergency Service,</i></li><li><i>g. Environment Protection Authority,</i></li><li><i>h. New South Wales Volunteer Rescue Association Incorporated.</i></li></ul>
Environment	<p><i>Components of the earth, including:</i></p> <ul style="list-style-type: none"><li><i>a. land, air and water, and</i></li><li><i>b. any layer of the atmosphere, and</i></li><li><i>c. any organic or inorganic matter and any living organism, and</i></li><li><i>d. human-made or modified structures and areas,</i></li></ul> <p><i>and includes interacting natural ecosystems that include components referred to in paragraphs (a)–(c).</i></p>
Facility	<p><i>The whole area under the control of the Plant Superintendent upon or within which a potentially hazardous activity could take place.</i></p>
Hazard	<p><i>An intrinsic property of a material or a physical situation with the potential to cause harm to people or the environment.</i></p>
Incident	<p><i>All undesired events, including major accidents and near misses.</i></p>
Major Accident	<p><i>An occurrence (including a major emission, loss of containment, fire, explosion or release of energy or projectiles) resulting from uncontrolled developments in the course of the operation of a facility and leading to serious danger or harm, whether immediate or delayed, to people or the environment.</i></p>
Modification	<p><i>Modification to a facility, means any:</i></p> <ul style="list-style-type: none"><li><i>a. change to plant, processes, materials, operating conditions, operating procedures or quantities of materials;</i></li><li><i>b. introduction of new plant, processes, materials, operating conditions, operating procedures or quantities of materials; or</i></li><li><i>c. change to the safety management system, in particular, organisational change;</i></li></ul> <p><i>that may alter the likelihood, extent or severity of a potential accident at the facility.</i></p>
Near Miss	<p><i>Any occurrence which, but for mitigation effects, actions or systems, could have escalated to a major accident.</i></p>



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Operator	<i>An employer, occupier or person who has at some point management or control of a part of the facility.</i>
Risk	<i>The likelihood of an undesired event with specified consequences occurring within a specified period or in specified circumstances.</i>



## A2-2 References

### OH&S Management Systems:

AS 4801 OH&S management systems – Specification with guidance for use

US Standard 29 CFR 1910 - OS&H standards

### Hazardous Industry Planning Advisory Papers (HIPAPs):

- No. 1 Industry Emergency Planning Guidelines
- No. 2 Fire Safety Study Guidelines
- No. 3 Environmental Risk Assessment Guidelines
- No. 4 Risk Criteria for Land Use Planning
- No. 5 Hazard Audit Guidelines
- No. 6 Guidelines for Hazard Analysis
- No. 7 Construction Safety Studies
- No. 8 HAZOP Guidelines
- No. 9 Safety Management System Guidelines
- No. 10 Land Use Safety Planning (Consultation Draft)

### Other Publications:

Applying SEP 33: Hazardous and Offensive Development Application Guidelines

Multi-level Risk Assessment

Locational Guideline: Development in the Vicinity of Operating Coal Seam Methane Wells

Liquefied Petroleum Gas Automotive Retail Outlets

### Other reference documents:

John Holland Group Various Design & Construction Safety system related documents.



## A2-3 Abbreviations

CFR	Code of Federal Regulations
CHCC	Coffs Harbour City Council
EWP	Elevated Work Platform
HIPAP's	Hazardous Industry Planning Advisory Papers
ITP	Inspection and Test Plan
NCR	Non Conformance Report
NSW	New South Wales
OEPMP	Operations Emergency Planning Management Plan
OH&S	Occupational Health & Safety
OHS&R	Occupational Health Safety & Rehabilitation
OSMP	Operations Safety Management Plan
PFD	Personal Flotation Device
SMS	Safety Management System
SOP	Standard Operational Procedures
SWMS	Safe Work Method Statement



## **Appendix 3      Critical Positions – Responsibilities Matrix**





The following matrix summarises the main activities which must be undertaken, the positions that have primary responsibility to undertake the activities and the positions that are required to provide support or assistance. (P = Primary Responsibility and S = Support or Assistance)

Activity Description.	Executive Manager – Coffs Harbour Water	Manager – Treatment Process Control	Plant Superintendent	Attendants / Contractors	Applicable System
Plan and initiate OH&S System audits.		S	P	S	5.9
Ensure that the systems are in place, cover all applicable works and include the processes required to implement the management strategies.	P	S	S	S	3.2.4
Manager – Treatment Process Control updates the systems as required and provides the Executive Manager Coffs Harbour Water with feedback on the implementation of the management strategies and provides recommendations on resource requirements.	S	P	S		3.2.5
Records of management are documented as minutes and maintained by the Manager - Treatment Process Control		P	S		5.11.1
The Manager –Treatment Process Control in consultation with operational staff and key stakeholders shall develop a Plant specific Operational Emergency Planning Management Plan		P	S		7.2.1.1



Activity Description.	Executive Manager – Coffs Harbour Water	Manager –Treatment Process Control	Plant Superintendent	Attendants / Contractors	Applicable System
The Manager – Treatment Process Control in consultation with senior CHCC representatives where applicable may have legislative requirements to notify of incidents e.g. NSW WorkCover Authority and Environmental Protection Agency. (Department of Environment and Climate Change).	S	P	S		7.3.2.1
At the commencement of each contract, the Plant Superintendent ensures the following is performed: <ul style="list-style-type: none"> <li>• details of the contractor's organisation are available;</li> <li>• contract personnel attend the plant specific induction;</li> </ul> where applicable the name and position of the contractor's OHS&R representative is provided.		S	P		4.3.4
During the performance of the contract the Plant Superintendent as required ensures that: <ul style="list-style-type: none"> <li>• contractor personnel are included in interface meetings such as toolbox and meetings;</li> <li>• contractor's OHS&amp;R practices are monitored and audited;</li> <li>• accidents and incidents involving contractors are recorded and reported appropriately;</li> <li>• the performance of the contractor is evaluated for future contracts.</li> </ul>		S	P		4.3.5
The outcome of the Plant Superintendents training review shall be approved for implementation by the Manager –Treatment Process Control.		S	P		9.3



Activity Description.	Executive Manager – Coffs Harbour Water	Manager –Treatment Process Control	Plant Superintendent	Attendants / Contractors	Applicable System
Copies of all certificates of competency, licences and other qualifications as deemed necessary by the Plant Superintendent shall be copied and attached to the induction.		S	P		5.2.5
The Plant Superintendent will carry out work team briefings as deemed necessary at the commencement of the shift to ensure safety issues specific to the work being performed are addressed.		S	P		5.3.1
Records of meetings will be maintained on the plant files by the Plant Superintendent.		S	P		5.6.1
The Plant Superintendent shall prepare a basic audit plan showing the audit frequency and the areas or sections (or contractors) to be audited.		S	P		5.9.1
The Plant Superintendent shall carry out self audits/reviews/site inspections of the project on a regular basis		S	P		5.9.3
The Plant Superintendent shall collate monitoring and surveillance data, stakeholder feedback and improvement data		S	P		5.11.1
The Plant Superintendent on an ongoing basis identifies work methods, processes, or critical tasks that have significant potential safety and environmental risks and develops Safe Work Method Statements to prevent associated incidents.		S	P		6.1.3
The Plant Superintendent will ensure that employees are supplied with the necessary Personal Protective Equipment required to perform their duties and meet legislative requirements.		S	P	S	6.2



Activity Description.	Executive Manager – Coffs Harbour Water	Manager –Treatment Process Control	Plant Superintendent	Attendants / Contractors	Applicable System
The Plant Superintendent shall ensure that systems are in place to monitor and control security and legitimate access to the site, as well as to prevent all forms of non-legitimate access to the site.		S	P	S	6.3.1
A process for management of delivery and transport vehicles shall be established by the Plant Superintendents prior to operations commencement.		S	P	S	6.5.1
Where a potential confined space is identified the Plant Superintendent shall assess		S	P	S	6.9.1
As a preference, the Plant Superintendent will implement appropriate controls to ensure the work area is designed as a place of work to eliminate the hazards and/or where this can not be achieved then deem that the work area is to be carried out as 'working in a confined space'.		S	P	S	6.9.1
Where 'total fire bans' are in force the Plant Superintendent shall ensure all requirements are met through consultation with the local fire department.		S	P	S	6.12.4
The Plant Superintendent shall ensure that the plant and equipment are inspected at the frequency specified in the manufacturer's recommendations and/or legislative requirements		S	P	S	7.1.1.1
The Plant Superintendent shall ensure that regular inspections and audits are undertaken of work activities being carried out.		S	P	S	7.1.2.1
At the conclusion of the hazard inspection, the Plant Superintendent shall provide a summary of all identified hazards or non-conforming items found during the inspection.			P	S	7.1.4.4
The Plant Superintendent shall track the rectification status on the identified hazards to a point of close out.		S	P	S	7.1.4.5



Activity Description.	Executive Manager – Coffs Harbour Water	Manager –Treatment Process Control	Plant Superintendent	Attendants / Contractors	Applicable System
The Plant Superintendent shall maintain records of all completed 'Hazard Inspection Reports'.			P		7.1.4.6
The Plant Superintendent shall arrange for an emergency / evacuation exercise to test the effectiveness of responses and the readiness of operational staff and contractors	S	S	P	S	7.2.1.5
The Plant Superintendent shall ensure all incidents are managed in accordance with: <ul style="list-style-type: none"> <li>• Incident Class Definitions;</li> <li>• Incident Notification and Reporting Timeframes</li> </ul>	S	S	P		7.3.1.1



Activity Description.	Executive Manager – Coffs Harbour Water	Manager –Treatment Process Control	Plant Superintendent	Attendants / Contractors	Applicable System
The Plant Superintendent shall brief the medical provider on: <ul style="list-style-type: none"> <li>• The plant safety objectives and the absolute commitment to pro-active injury management and rehabilitation principles;</li> <li>• Work location, the tasks being completed;</li> <li>• Alternative duties that may be utilised in the event a worker may sustain an injury.</li> </ul>			P		7.4.3
The Plant Superintendent shall ensure prompt effective resolution of safety issues by facilitating resolution at the lowest management level possible and promptly implementing agreed actions	S	S	P	S	8.1.1
The Plant Superintendent shall ensure that all agreed corrective actions, are verified as being complete or complied with and closed off.		S	P	S	8.2.2
The Plant Superintendent shall ensure that a yearly training review is carried out to identify any training requirements that are required for himself/herself and Plant Attendants, e.g. refresher first aid certificate, manual handling etc.	S	S	P	S	9.2
The Plant Documentation and Control system shall be implemented by the Plant Superintendent including the filing system for the safety related documents as discussed in Section 10.1.		S	P	S	10.1



Activity Description.	Executive Manager – Coffs Harbour Water	Manager –Treatment Process Control	Plant Superintendent	Attendants / Contractors	Applicable System
The Plant Superintendent shall determine which documents shall be electronically stored and/or hard copy filed			P		10.2
The Plant Superintendent shall ensure that purchasing related hazards are controlled prior to goods and services being delivered to the Plant with particular attention to hazardous materials and substances.		S	P	S	11.1
All contractors are required to supply their employees with any necessary personal protective equipment.			P	S	6.2
Contractors may be required to provide evidence of notification of incidents to the NSW WorkCover or Environmental Protection Agency.			P	S	7.3.2.2
<p><b>LEGEND</b>            P = CHCC Lead            S = CHCC Support</p>					

# Appendix 5 Risk Assessment



<b>Project: Coffs Harbour Water Treatment Plant</b>	
<b>Issue Date: 4-2-09 Rev No: 1</b>	
George Frougas	JH Facilitator
Carlo Modulon	GHD Design Lead
Glen O'Grady	CHCC Project Manager
Les Potter	CHCC Superintendent
John Saleh	JH Commissioning Engineer
Mark Knight	CNF&A Electrical Engineer
Matt Landers	Abi Project Manager
Nathan Oliver	JH Commissioning Manager
Peter Buckingham	CHCC Mechanical / Electrical Coordinator
Phil Woodford	CNF&A Design Manager
Simon Thorn	CHCC Executive Manager Coffs Harbour Water
Tyron Cook	CHCC Assistant Manager Treatment Process Control
Stefan Everingham	Abi Environmental Engineer

<b>Consequence</b>		
<i>People (effect if risk occurs)</i>		
Level	Descriptor	Example of Description
1	Insignificant	No injuries, low financial loss
2	Minor	First Aid treatment, Medium financial loss
3	Moderate	Medical Treatment Required, high financial loss
4	Major	Extensive injuries, loss of production capability, major financial loss
5	Catastrophic	Fatality, huge financial loss

<b>Likelihood (chance of problem occurring)</b>		
Level	Descriptor	Description
A	Almost certain	Event is expected to occur in most circumstances
B	Likely	Event will probably occur in most circumstances
C	Moderate	Event might occur at some time
D	Unlikely	Event could occur at some time
E	Rare	Event may occur only in exceptional circumstances

<b>Risk Rating</b>					
<b>Likelihood</b>	<b>Consequence</b>				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
<b>A (Almost Certain)</b>	H	H	E	E	E
<b>B (Likely)</b>	M	H	H	E	E
<b>C (Moderate)</b>	L	M	H	E	E
<b>D (Unlikely)</b>	L	L	M	H	E
<b>E (Rare)</b>	L	L	M	H	H

Legend E – Extreme Risk, H - High risk; M - Medium risk; L - Low risk

**Risk Priority**  
1. Extreme  
2. High  
3. Medium  
4. Low

**Risk treatment Options**  
Avoid the Risk  
Transfer the Risk  
Accept the Risk  
Reduce the Consequence  
Reduce the likelihood

No.	Category	Potential Risks	Risk Rating	Risk Priority	Risk Treatment Options	Controls/Risk Treatments	New Risk Rating	Responsibility	Date Actioned
1	<b>Overall OH&amp;S Risk Management</b>	<ul style="list-style-type: none"> <li>Non compliance with OH&amp;S legislation with standard management systems in place</li> <li>Incidents/accidents</li> </ul>	5E	H	Accept Risk	<ul style="list-style-type: none"> <li>Development of safety system and emergency plan prior to the start of operation</li> <li>Operational Staff aware of responsibilities and proactive in promoting OH&amp;S</li> <li>Independent auditing of compliance with</li> </ul>			

						systems and hazard study			
2	<b>Overall Environmental Risk Management</b>	<ul style="list-style-type: none"> <li>Non compliance with environmental legislation</li> <li>Incidents resulting in clean up costs and / or fines</li> </ul>	3E	M	Accept Risk	<ul style="list-style-type: none"> <li>Full review of all EA and statutory requirements, initiatives and recommendations. These are then to be reflected in the OEMP</li> <li>Development and approval of OEMP before operation</li> <li>Operational Staff aware of responsibilities and proactive in promoting preventative measures through various training programs</li> </ul>			
3	<b>Community Issues</b>	Unauthorised access to site	4E	H	Accept Risk	Existing security system including security fencing, gates and security patrols.			
		Residences subject to excessive operational impacts such as odour and noise	2D	L	Accept Risk	Plant to comply with environmental legislation and approval documents.			
4	<b>Inclement weather</b>	Excessive wet weather results in poor site conditions Flooding causes damage to structures/machinery	2D	L	Accept Risk	All structures are located above the 1 in 100 year flood level and Probable Maximum Flood Level.			
5	<b>Equipment / Machinery Standards</b>	Failure of equipment / machinery resulting in environmental damage.	2D	L	Accept Risk	All equipment assessed to AS4024 compliance with DoP approval, relevant legislation and dangerous goods standards			
6	<b>Crane Operations</b>								
6.1		Crane operations hit services	2D	L	Accept Risk	Crane operators to be fully qualified.			
6.2		Crane operations damage underground services	4E	H	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>Existing designated crane areas around the site for use during heavy lifts.</li> <li>Plan to be prepared that identifies the areas where heavy lift cranes can set up and operate.</li> </ul>	2E L	Phil Woodford – Design Manager	
7	<b>Electrical</b>								

7.1		Electrical fire due to switchroom equipment failure	2C	M	Reduce likelihood	<ul style="list-style-type: none"> <li>Existing fire detection and alarm system.</li> <li>Regular maintenance including thermographic surveys.</li> <li>SOP to be prepared identifying the maintenance requirements.</li> </ul>	2D L	Executive Manager Operations – Simon Thorn	
7.2		General site fire event	2D	L	Accept risk	<ul style="list-style-type: none"> <li>Existing fire detection and alarm system.</li> <li>Compliance with requirements for workplace fire safety.</li> </ul>			
7.3		Bush Fire	3D	M	Accept risk	<ul style="list-style-type: none"> <li>Noted site is located outside of the recognised bush fire hazard zones.</li> <li>Bushfire plan incorporated into emergency plan.</li> <li>Landscape maintenance on a regular basis</li> </ul>			
8	<b>Operational staff, Contractors</b>	<ul style="list-style-type: none"> <li>Staff inexperienced in plant operation and process</li> <li>Substandard Subcontractors exposed to high risks</li> </ul>	3B	H	Reduce likelihood and consequences	CHCC to instigate permit to work system. Adopt JV system used during commissioning and modify accordingly to CHCC protocols.	2D L	Executive Manager Operations – Simon Thorn	
9	<b>Emergency Procedures</b>	<ul style="list-style-type: none"> <li>Undue delays in arrival of emergency services</li> <li>Undue delays in attendance of injured personnel</li> <li>Undue delays in stopping and cleaning chemical spills and leaks.</li> </ul>	3C	H	Reduce likelihood and consequences	Induction of emergency services to site	3D M	Executive Manager Operations – Simon Thorn	
10	<b>Waste</b>	<ul style="list-style-type: none"> <li>Illegal disposal</li> <li>Stormwater pollution</li> <li>Odour</li> <li>Aesthetics</li> <li>Poor use of resources</li> </ul>	2D	L	Accept Risk	<ul style="list-style-type: none"> <li>Compliance with statutory requirements.</li> <li>Existing waste management strategy.</li> <li>Requirements included within OEMP</li> </ul>			

11	<b>DAFF – through to UV channel</b>								
11.1		Chemical line breakage in dosing pit and discharging to emergency storage lagoon.	2D	L	Accept Risk	<ul style="list-style-type: none"> <li>Covered by SOP, inspection of lagoon by operator.</li> <li>Noted that volumes of chemicals would be small.</li> </ul>			
11.2		Entry into pits and chambers – confined space, access	5E	H	Reduce likelihood and consequences	Permit to work to complement existing confined space procedures.	2E L	Executive Manager Operations – Simon Thorn	
11.3		Trips and falls – falling into water	5E	H	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>Permit to work and SOP for working over water.</li> <li>Existing system to prevent unauthorised access via use of security gates and fences.</li> </ul>	2E L	Executive Manager Operations – Simon Thorn	
11.4		Overflow - inlet water, filtered water channel, washwater.	2E	L	Accept risk	<ul style="list-style-type: none"> <li>Existing system where overflows are directed to the emergency storage lagoon. Lagoon has been designed to contain these events.</li> <li>Existing alarms installed that notify operators of overflows.</li> </ul>			
11.5		Insufficient maintenance leading to machinery malfunction – noise emission	2D	L	Accept risk	Ensure maintenance undertaken to manufacturer's recommendations and breakdown maintenance adhered to immediately.			
11.6		Lighting upsetting environmental amenity	1C	L	Accept Risk	<ul style="list-style-type: none"> <li>Lights will not to be operating when works not being undertaken (assessed as being for the norm for the majority of circumstances).</li> <li>If night operation or emergency works are required the operator's safety is paramount and lights will be turned on as required.</li> </ul>			
11.7		Inundation of floor areas (filter gallery and UV area) with water. Excess water in excess of floor drainage capacity flows through stormwater system into environment.	1D	L	Accept Risk	Filtered water to flow through established drainage system, consequence insignificant.			

		Floor Drainage flows to washwater tank.							
11.8		Fluoride and sodium hydroxide dosing within dosing chamber at end of UV channel. Pipe breakage outside of channel substances spilling onto the ground outside of the building.	2D	L	Reduce likelihood and consequences	Pipe attached to wall to be double contained. Vermin mesh required.	1E L	Phil Woodford – Design Manager	
11.9		Breakage of chemical lines from chemical storage to dosing points.	2C	M	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>Regular pit inspections along the dosing lines.</li> <li>Lines are double contained.</li> <li>Maintenance of dosing lines to include hose replacement as required following regular inspections.</li> <li>Labelling of dosing lines within pits.</li> </ul>	2D L	John Saleh – Commissioning Engineer	
12	<b>Dry Chemical Storage, switchroom and blower room.</b>								
12.1		Spillage of bags during unloading.	2C	M	Reduce likelihood and consequences	SOP to be prepared to manage dry chemical spills.	1D L	John Saleh – Commissioning Engineer	
12.2		Process of unloading. To use mechanical methods – walker stacker. Dropping pallets, plant / worker interaction.	2D	L	Accept Risk	SOP and manufactures training			
12.3		Air quality. Dust from spillage and loading activities. Dust inhalation.	2D	L	Accept Risk	SOP prepared. All operators trained in MSDS.		John Saleh – Commissioning Engineer	
12.4		Release to atmosphere of lime dust.	1C	L	Accept Risk	Dust reducer / extractor used during operation.			
12.5		Release of CO2 to atmosphere.	1D	L	Accept risk	CO2 vessel not enclosed within a building and access restricted (fenced).			
12.6		Noise emissions from compressor and blower.	2D	L	Accept risk	<ul style="list-style-type: none"> <li>Noise attenuation designed within the plant.</li> <li>Compliance with statutory requirements and</li> </ul>			

						approval documents.			
13	<b>Liquid chemical storage area</b>								
13.1		Release of vapours to atmosphere	1D	L	Accept risk	Fluorosilic acid vented through water bath.			
13.2		Leakage of chemicals inside bunded storage area	2D	L	Accept risk	Bunded areas to Australian Standards to contain all spills and leaks.			
13.3		Spillage of chemicals during filling of chemical storage tanks	2D	L	Accept risk	<ul style="list-style-type: none"> <li>• SOP prepared</li> <li>• Existing tanker unloading area designed to contain spill</li> </ul>		John Saleh – Commissioning Engineer	
13.4		Chemicals unloaded into the wrong tank	2D	L	Reduce likelihood	<ul style="list-style-type: none"> <li>• SOP prepared.</li> <li>• Permit to work for operator to escort deliveries during unloading.</li> </ul>	2E L	Executive Manager Operations – Simon Thorn	
13.5		Operator contact with chemicals.	2D	L	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>• SOP prepared.</li> <li>• Awareness of MSDS.</li> <li>• CHCC to purchase required PPE.</li> </ul>	1D L	Executive Manager Operations – Simon Thorn	
13.6		Discharging of fluoride water vent bath.	1C	L	Accept risks	SOP to be prepared and detail the safe disposal of water.		John Saleh – Commissioning Engineer	
13.7		Breakage of chemical hose on cable tray	2E	L	Reduce likelihood	Ensure chemical dosing lines are double contained when outside of bunded areas and out of ground. Regular checks of hoses.	2E L	Phil Woodford – Design Manager	
13.8		Noise from high level sirens / lights following malfunction.	1D	L	Accept risk	Infrequent but necessary component of operation.			
14	<b>Chlorine Storage and Dosing</b>								
14.1		Chlorine gas leak in chlorine building	5E	H	Reduce consequences	<ul style="list-style-type: none"> <li>• Existing standby chlorguard system</li> <li>• Existing standby sensor system</li> <li>• Existing chlorguard system activating ventilation system</li> <li>• SOP for entry to chlorine building including</li> </ul>	3E M	Executive Manager Operations – Simon Thorn John Saleh –	

						PPE <ul style="list-style-type: none"> <li>• Permit to work for any works on chlorine system</li> <li>• Restricted access into the chlorine building</li> <li>• Emergency procedures</li> <li>• Ensure personnel working on chlorine system to have supplier training</li> </ul>		Commissioning Engineer Phil Woodford – Design Manager	
14.2		Chlorine gas leak outside of the chlorine building.	5E	H	Reduce consequences	<ul style="list-style-type: none"> <li>• Chlorine awareness to be included in visitor inductions</li> <li>• Emergency plan including site evacuation</li> </ul>	3E M	Executive Manager Operations – Simon Thorn	
14.3		Unloading drums from truck. Drum falling off truck during unloading procedure.	2E	L	Accept risk	<ul style="list-style-type: none"> <li>• Drum designed for heavy impact to prevent damage.</li> <li>• Review drivers SWMS prior to unloading.</li> </ul>			
15	<b>Backwash and Residual Thickening and Handling System</b>								
15.1		Trips and falls – falling into water	5E	H	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>• Permit to work and SOP for working over water</li> <li>• Existing system to prevent unauthorised access via use of security gates and fences.</li> </ul>	2E L	Executive Manager Operations – Simon Thorn	
15.2		Overflow to environment.	2D	L	Accept risk	Existing system to direct overflow to emergency storage lagoon and washwater tank.			
15.3		Spillage of bags during unloading.	2C	M	Reduce likelihood and consequences	SOP to be prepared to manage dry chemical spills.	1D L	John Saleh – Commissioning Engineer	
15.4		Process of unloading. To use mechanical methods – walker stacker. Dropping pallets, plant / worker interaction.	2D	L	Accept Risk	SOP and manufactures training			
15.5		Air quality. Dust from spillage and loading activities. Dust inhalation.	2D	L	Accept Risk	<ul style="list-style-type: none"> <li>• SOP prepared.</li> <li>• All operators trained in MSDS.</li> </ul>		John Saleh – Commissioning Engineer	

15.6		Sludge spillage to environment	2D	L	Accept Risk	Existing drainage system to direct water to washwater tank			
15.7		Overflow / spill of residue from skip bins	2C	M	Reduce consequences	<ul style="list-style-type: none"> <li>SOP to be prepared.</li> <li>Existing covers over bins when transporting.</li> </ul>	1C L	John Saleh – Commissioning Engineer	
15.8		Odour emissions.	1D	L	Accept risk	Regular off site disposal of sludge.			
15.9		Noise from centrifuges	1D	L	Accept risk	Plant to comply with noise criteria and approval conditions.			
15.10		Excessive noise from backwash water discharging to washwater tank	2D	L	Accept risk	Plant to comply with noise criteria and approval conditions			
16	<b>Treated Water Storage and Pump Station</b>								
16.1		Trips and falls – falling into water	5E	H	Reduce likelihood and consequences	<ul style="list-style-type: none"> <li>Permit to work and SOP for working over water</li> <li>Existing system to prevent unauthorised access via use of security gates and fences.</li> </ul>	2E L	Executive Manager Operations – Simon Thorn	
16.2		Discharge from fluoride analyser pit	2D	L	Accept risk	Existing system for high level alarm and emergency discharge into washwater tank			
16.3		Water spill flooding TWPS	1D	L	Accept risk	Existing system to direct water back to washwater tank			
16.4		Water flooding switchroom sub floor	2D	L	Accept risk	Existing measures to ensure water levels do not exceed the level of the switchroom sub floor.			
16.5		Diesel spill from generator	2D	L	Accept risk	Existing bunded area			
16.6		Noise from TWPS	2D	L	Accept risk	<ul style="list-style-type: none"> <li>Comply to noise criteria and approval conditions.</li> <li>Existing building properties to provide adequate noise attenuation</li> <li>Normal maintenance as per manufacturer's recommendations.</li> </ul>			
17	<b>Emergency Storage Lagoon</b>								



17.1		Overflow of lagoon to the environment	2D	L	Accept risk	Existing measures to pump water back to washwater tank.			
17.2		Trips and falls – falling into water	1D	L	Accept risk	<ul style="list-style-type: none"> <li>• Permit to work and SOP for working over water</li> <li>• Existing site security system to prevent unauthorised access.</li> </ul>		Executive Manager Operations – Simon Thorn	

## Appendix 6      Environmental Control Plans

# Environmental Control Plan Air Quality

## ECP AQ

### Environmental Control Plan – Air Quality

#### 1. Scope

This plan details the procedure to identify and minimise air and dust emissions on this project.

#### 2. References

- Protection of the Environment and Operations Act, 1997
- Protection of the Environment Operations (Clean Air) Regulation 2002
- Coffs Harbour WTP Environmental Assessment, CIA 2007.
- Coffs Harbour WTP Submissions Report, CIA 2007.
- Coffs Harbour WTP Ministers Conditions of Approval.

#### 3. Responsibility

- EMCHW – Executive Manager Coffs Harbour Water
- S – Plant Superintendent

#### 4. Sources of Air Pollution

The following activities have the potential to cause air pollution:

- Dust generation from unsealed areas;
- Operation of plant; and
- Odour from dewatered residues.

#### 5. Criteria

Parameter	Criteria	Measurement Location
Odour	No offensive odour emissions from the site. Offensive odour being defined in the PEO Act as an odour that:  (a) by reason of its strength, nature, duration, character or quality, or the time at which it is emitted, or any other circumstances:  (i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or  (ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or  (b) is of a strength, nature, duration, character or quality prescribed by the regulations or that is emitted at a time, or in other circumstances, prescribed by the regulations.	Boundary of the site with measurement being based on complaint history.

## 6. Procedure for the Mitigation of Impacts

Control Measures	Responsibility	Timing / Frequency	Monitoring
Unsealed areas kept to a minimum and landscaping maintained to prevent dust generation. Landscaping maintenance in accordance with the Landscape Plan contained within ECP Flora and Fauna.	EMCHW / S	Prior to operation & Ongoing	Audit
Plant and equipment is to be in good working order, properly maintained and fitted with appropriate emission controls. Plant and equipment maintained in accordance with manufacturers instruction and relevant SOP	S	As per manufacturers instruction.	Audit
Odour emissions to be managed by: Limit decomposition of organic matter by removing plant residues from site at regular intervals (disposed at appropriate location). Sludge Building roller doors to be kept closed when possible	S	Ongoing	Audit

## Environmental Control Plan – Cultural Heritage

### 1. Scope

This plan details how known and potential archaeological and heritage sites will be managed throughout the project. These include:

- Aboriginal sites, materials, relics, and artefacts,
- Items of European heritage and cultural significance.

### 2. References

- National Parks and Wildlife Service Act 1974
- Heritage Act, 1977
- Coffs Harbour WTP Environmental Assessment, CIA 2007.
- Coffs Harbour WTP Submissions Report, CIA 2007.
- Coffs Harbour WTP Ministers Conditions of Approval.

### 3. Responsibility

- EMCHW – Executive Manager Coffs Harbour Water
- S – Plant Superintendent

### 4. Criteria/ Targets

To ensure any item, site or relic of Aboriginal or European Heritage Significance is protected and recorded.

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## 5. Procedure

Mitigating Actions	Responsibility	Timing	Monitoring
The LALC and Gumbula Julipi Elders are to be given the opportunity to re-deposit any of the recovered artefacts following the completion of construction.	SMCHW / S	Following construction	Audit
In the unlikely event that any material of potentially high cultural significance is uncovered during any stage of the development all disturbance works must cease in the vicinity of the find. The DECC, LALC and Gumbula Julipi Elders would then be required to be immediately contacted for management advice	S	As Required	Audit Project Induction
Dairy bails are to be maintained as recommended in the conservation and maintenance strategy detailed in Section 5 of this ECP.	S	As required	Audit

## 6. Conservation and Maintenance Strategy – Dairy Bails

### Introduction

This conservation and maintenance strategy sets out the work required for the conservation management for the Dairy Bails located at the Water Treatment Plant (WTP), 140 Upper Orara Road Karangi NSW 2450 and previously part of the 'Avondale' dairy which was originally nearly 500 acres. A plan showing the layout of the dairy bails has been reproduced and included as an attachment.

The original building consisted of a roofed 6 cow walk through milking bail and at one step higher a machine room, separator room and a clean-up or store room. The floors are concrete, the walls are timber framed with vertical sawn hardwood planks and a galvanised iron roof. The bail has lost its roof and walls and a later room has been built over part of the surviving slab.

### Cultural Significance

The cultural significance of the Dairy Bails was assessed in *Statement of Heritage Significance for Dairy Bails at 'Avondale' 140 Upper Orara Road Karangi NSW 2450* by Jamison Architects October 2006 (the 'report'). The report was included within the Environmental Assessment for the WTP and describes the significance of the Dairy Bails as follows:

**Historical** – An early c.1930's dairy bail in the boom era of dairying on the north coast. The layout is a common design, representative of the walk through bail type and milking sheds from the 1920's to the early 1960's – local significance.

**Aesthetic** – A picturesque milking shed evocative of the early farming days in the Orara Valley still largely in its original setting with clear views to the river flats of the Orara River – local significance.

**Technical** – A building that with further study would demonstrate the effects of the Dairy Acts and Regulations between 1919 and the 1960's – local significance.

**Association** – The property and the dairy bails are associated with one of the pioneer families in the Orara Valley. The building sits on 'Avondale' taken up by Patrick O'Neil in 1889, inherited by Alf O'Neil, his son, and retained in the family until 1958 – local significance.

### Constraints of the Conservation Policy

Coffs Harbour City Council as the owner / operator of the WTP will be responsible for the conservation of the Dairy Bail. The Council has limited resources to commit to any large scale reconstruction works and thus reconstruction activities are not proposed to be undertaken in this conservation and maintenance strategy.

The degree in which the Dairy Bails will be available for public inspection is also constrained by the health, safety and security implications of allowing unrestricted access to view the dairy bails within an operational water treatment plant. It is however envisaged that school and community groups will be able to participate in viewings by appointment. It is also planned to incorporate an inspection of the Dairy Bails as part of pre-organised school tours of the water treatment process.

### Conditions of the Fabric and Recommendations

The following information was obtained from *Statement of Heritage Significance for Dairy Bails at 'Avondale' 140 Upper Orara Road Karangi NSW 2450* by Jamison Architects October 2006.

- The galvanised roof sheets and timber vertical cladding are in a reasonable condition and should generally be left as is, conserved, and only replaced piece by piece as individual portions fail.
- The timber frame and cladding built over concrete plinths has been kept away from ground moisture and is in better condition than that around the clean up area where there is no plinth. The grass and ground line around the clean up area should be cleared away from the base of the timber.
- The buildings roof should have second hand sheets replace defective sheets if necessary to make the roof waterproof.
- Internal additions subsequent to its use as a dairy should be removed but the existing dairy era fabric retained as is.
- A maintenance strategy to incorporate regular inspections, once per year, to check on the condition of fabric and water resistance.

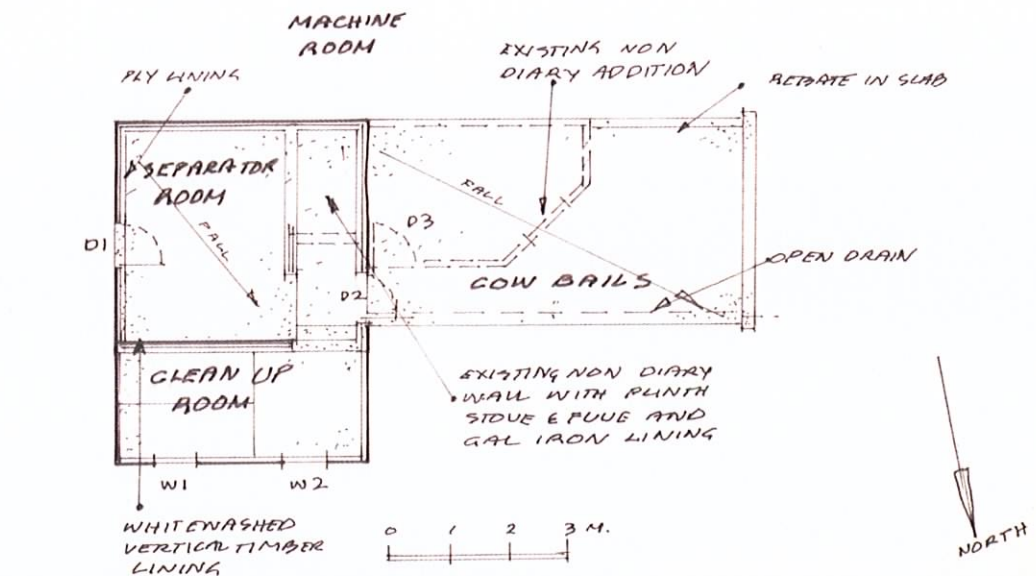
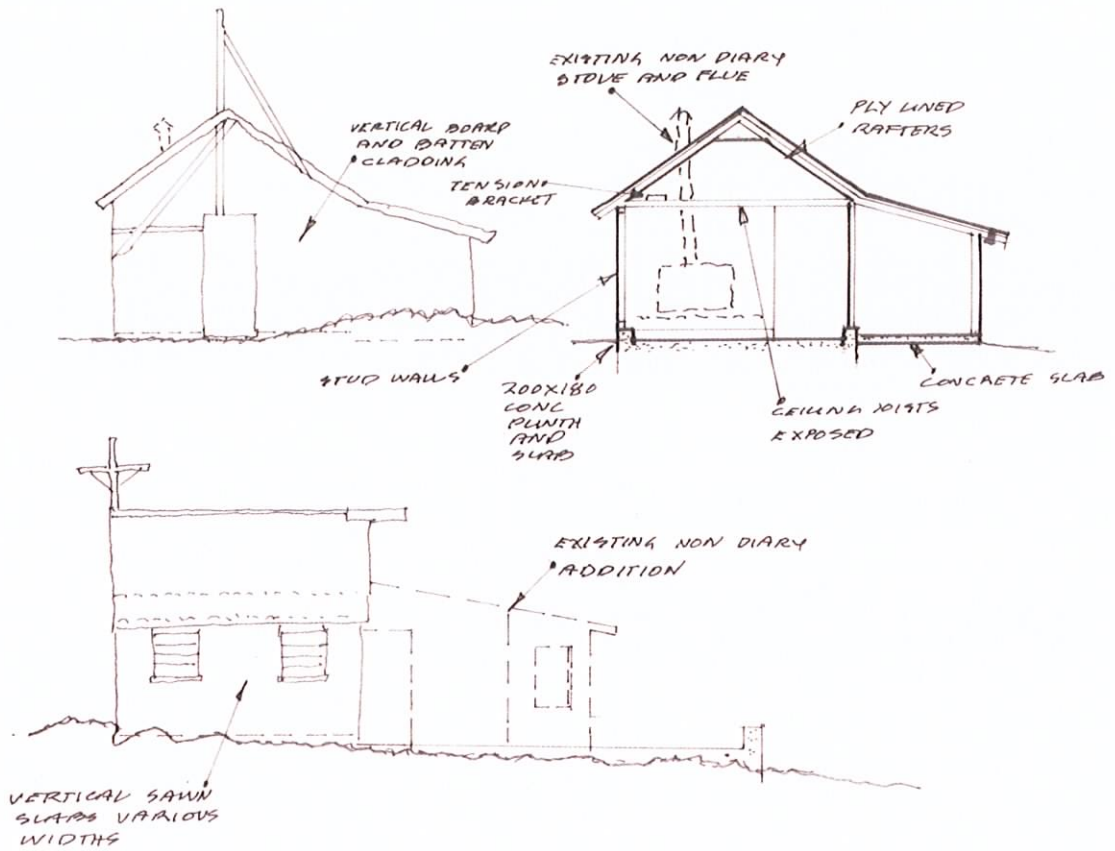
## Conservation Policy

Coffs Harbour City Council recognises that there are a limited number of circa 1920 – 1960 dairy bails remaining in the region and that having the dairy bails under public ownership represents an opportunity to retain the building and maintain a link between the past dairy land uses of the area and the existing water treatment plant. Council is committed to maintaining the Dairy Bails in a condition that preserves the fabric and prevents further deterioration and enables the building's associations and story to be publicly available. The Council will attempt to achieve these objectives by undertaking the following:

- Providing a means for which interested community groups can arrange to view the Dairy Bails.
- Including a description of the historical background of the site and how the Dairy Bails fits into the place.
- Replace defective roofing sheets with second hand sheets as required to keep the building water proof.
- Maintain the fabric of the Dairy Bails so that the building retains the existing ambience.
- Maintain the grass and ground line around the building to prevent build up of moisture.



6. PLAN Figure taken from 'Statement of Heritage Significance', Jamison 2006.



1:100 SCALE  
TREVOR JAMISON  
0623.

AVONDALE DIARY BAILS 2006  
UPPER ORARA ROAD KARINGI

# Environmental Control Plan Flora and Fauna

## ECP F&F

### Environmental Control Plan – Flora and Fauna

#### 1. Scope

This plan details the program requirements to maintain site landscaping, minimise disturbance to existing vegetation and impacts on the existing fauna (if any) during operation.

#### 2. References

- Native Vegetation Act 2003
- Threatened Species Conservation Act 1995
- Coffs Harbour WTP Environmental Assessment, CIA 2007.
- Coffs Harbour WTP Submissions Report, CIA 2007.
- Coffs Harbour WTP Ministers Conditions of Approval.
- Blue Gum Removal Assessment, Ecological November 2007

#### 3. Responsibility

- EMCHW – Executive Manager Coffs Harbour Water
- S – Plant Superintendent

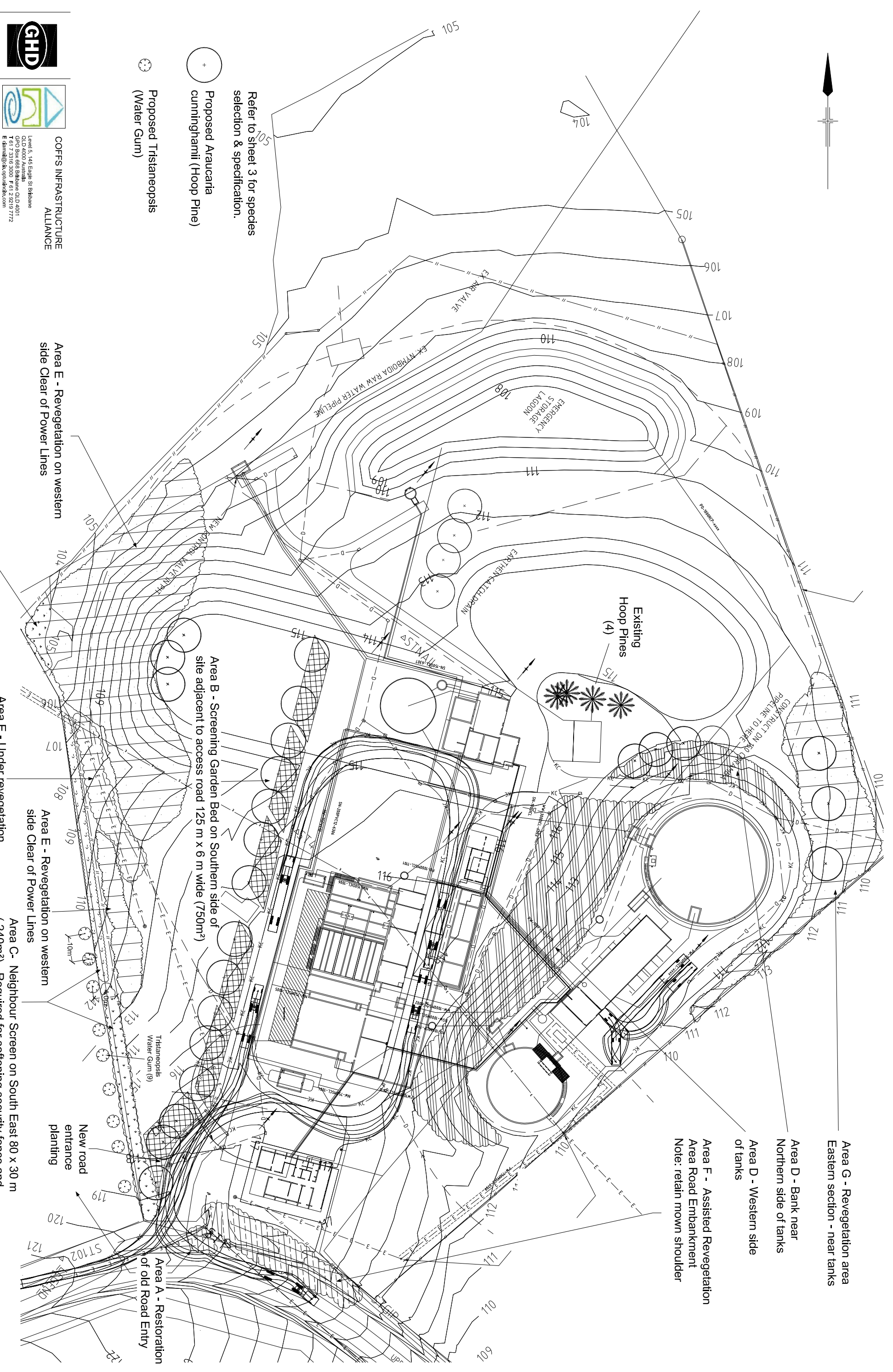
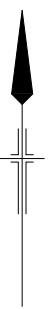
#### 4. Criteria

The key targets of the management of flora and fauna on site are to ensure the successful implementation of the landscape plan and that disturbance of habitat is kept to a minimum, protected flora is not damaged and fauna are protected.

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## 5. Procedure

Mitigating Actions	Responsibility	Timing	Monitoring
<p>If any party becomes aware of the presence of threatened species which are likely to be affected:</p> <ul style="list-style-type: none"> <li>• immediately cease all work likely to affect the threatened species;</li> <li>• inform the Director General of the DECC; and</li> <li>• not recommence work likely to affect the threatened species until receiving advice from the DECC to do so.</li> </ul>	EMCHW / S	On detection of threatened species	Audit
Active management and maintenance of all preserved, planted and rehabilitated vegetation in accordance with the approved landscape plan.	EMCHW / S	Ongoing and in accordance with the approved landscape plan	Audit
Any identified noxious or environmental weed species are to be destroyed as soon as possible following their identification. Environmental weeds that are providing a visual screen for neighbouring properties are to remain until the native species are adequately established (refer to approved landscape plan).	S	Ongoing	Audit
<p>Placement of nest boxes into suitable trees as follows:</p> <p>One nest box for glossy black cockatoo;</p> <p>Two nest boxes for brush tailed phascogale; and</p> <p>Six nest boxes for microchiropteran bats.</p>	EMCHW / S	Within 3 months of the start of operation	Audit.



Refer to sheet 3 for species selection & specification.

Proposed Araucaria cunninghamii (Hoop Pine)

Proposed Tristaneopsis (Water Gum)

COFFS INFRASTRUCTURE ALLIANCE



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Rev	Description	Date	CHK
A	ISSUED FOR APPROVAL		

Rev	Description	Date	CHK
A	ISSUED FOR APPROVAL		

Survey	Designed	SEP 07	Construction Engineer	Date
DAVID	REF	MAR 07	Design Engineer	
Checked				
Date			Works No	
Status				

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Survey	Designed	SEP 07	Construction Engineer	Date
DAVID	REF	MAR 07	Design Engineer	
Checked				
Date			Works No	
Status				

KARANGI WATER TREATMENT PLANT  
 LANDSCAPE PLAN  
 UPPER ORARA ROAD  
 KARANGI

Council Plan No	Sheet	Rev
*****	2	A1

Area G - Revegetation area Eastern section - near tanks

Area D - Bank near Northern side of tanks

Area D - Western side of tanks

Area F - Assisted Revegetation Area Road Embankment  
 Note: retain mown shoulder

Area B - Screening Garden Bed on Southern side of site adjacent to access road 125 m x 6 m wide (750m<sup>2</sup>)

Area E - Revegetation on western side Clear of Power Lines

Area H - Retain Wetland

Area E - Under revegetation side Clear of Power Lines

Area C - Neighbour Screen on South East 80 x 30 m (240m<sup>2</sup>) - Required for softening security fence and maintaining security to site

Area A - Restoration of old Road Entry

New road entrance planting

Tristaneopsis Water Gum (9)

Existing Hoop Pines (4)

ASTORIA

EK NYMBODA RAW WATER PIPELINE

EX AIR VALVE

EARTHEN CATCH-BRAIN

CONCRETE DN PIPE PIPELINE TO HEAD

NEW CONTROL VALVE

Area E - Revegetation on western side Clear of Power Lines

Area E - Revegetation on western side Clear of Power Lines

Area E - Revegetation on western side Clear of Power Lines

New road entrance planting

New road entrance planting

New road entrance planting

KARANGI WATER TREATMENT PLANT	UNIT	No.
<b>SPECIES AND SPECIFICATION</b>		
Tree Protection for Retained trees		
Preparation and Maintenance of Revegetation Areas		
STAGE 1 for the Revegetation Areas is to establish a hardy screen and provide frost and summer heat protection by establishing a fast growing tree canopy		
STAGE 2 follow planting after 2 years will establish longer term vegetation and species diversity		
Spray out all areas to be planted to eliminate all weed species. Where there is existing native vegetation apply chemical selectively to ensure there is no damage to vegetation.		
For large revegetation areas deep rip with cultivator.		
Spread Hardwood and camphor mulch to depth 200mm depth		
For each planting hole add 150mm expanded water crystal mixed with slow release fertiliser - Multicoat @ 30 grams		
Water if required prior to planting		
In absense of adequate rainfall water each week for the first month, then as required to establish plants.		
AREA A - Restoration of Old Road Entry		
Deep rip old road as required. Install 5 cubic metres of soil and sow grass seed mix	Container Size	No.
AREA A - New Road Entrance Planting		
Plant 3 Araucaria cunninghamii (Hoop Pine)	25 Litre	3
Underplant with Lomandra 'Tanika'	Tube	150
AREA B - Screening Garden Bed on Southern side of site adjacent to access road 125 m x 6 m wide (750m <sup>2</sup> )		
Spray out area. Install HW timber edging flush with finished ground level.		
Improve soil	m <sup>3</sup>	120
Plant 1 Araucaria cunninghamii (Hoop Pine), Remove single camphor laurel in 5 years and grind stump.	25 Litre	1
Syzygium 'Cascade' 200mm size pot @ 1.5 m centres	200mm	50
(Photinia 'Red Robin' - Alternative)		
Pittosporum undulatum (Sweet pittosporum)	200mm	10
Backhousia citriodora ( lemon scented myrtle)	25 Litre	
Tristaniopsis laurina ( Watergum)	150-200mm	10
Lomandra 'Tanika'	Tube	200
AREA C- Neighbour Screen on South East 160 x 3m ( 480m <sup>2</sup> ) - Required for softening security fence and maintaining security to site	Container Size	No.
Retain existing Eucalyptus trees. Remove all camphor laurel trees and other weeds		
Plant Syzygium 'Cascade'.	Maxitube	480
(Photinia 'Red Robin' ) hedge substitute		
Lomandra 'Tanika' on neighbours side in front of hedge plants	Tube	200
Specimen plantings on neighbouring property, Tristaniopsis @ 10m cts.	25 Litre	16
Mulch		
AREA D - Bank near Northern side of tanks, 50mx10m (500m <sup>2</sup> )		
Prepare soil and install weed matt		
Plant Grevillea 'Royal Mantle' @ 2.5 m centres	150mm -200mm	1200
Plant Araucaria cunninghamii (Hoop Pine) as Shown.	25 Litre	4



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L:\DWG\Water\0000\Karangi Water Treatment Plant\landscape\karangi water treatment plant landscape plan by CHC.dwg

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Survey | C | Design | CKB | SEP 07

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Drawn	REF	SEP 07
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Date		
Status		

Construction Engineer | Date

Design Engineer	
Works No	
Date	

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SURVEY | AN | DES | BN | BRANCH

KARANGI WATER TREATMENT PLANT  
 LANDSCAPE PLAN SPECIES SELECTION & SPECIFICATION  
 UPPER ORARA ROAD  
 KARANGI

Council Plan No  
 \*\*\*\*\*  
 Sheet 3 of 5  
 Rev A1 C

AREA D - Bank near Western side of tanks, 120mx20m (2400m <sup>2</sup> )		
Plant Species		
Plant Grevillea 'Royal Mantle' @ 2.5 m centres		
AREA E - Revegetation Area on western side with Power Lines (250m <sup>2</sup> )	UNIT	No.
Lomandra longifolia (Mat rush)	Tube	200
Pittosporum undulatum (Sweet Pittosporum)	Tube	15
Cryptocaya glaucescens (Jackwood)	Tube	15
Hymenosporum flavum (Native Frangipani)	Tube	50
AREA E -Revegetation on western side Clear of Power Lines (3500m <sup>2</sup> )		
Acacia melanoxylon ( Blackwood)	Tube	200
Eleocarpus obovatus ( Hard Quandong)	Tube	70
Cryptocaya glaucescens (Jackwood)	Tube	120
Cryptocarya obovata (Pepperberry)	Tube	40
Acmenea smithii (Lillypilly)	Tube	400
Backhousia myrtifolia (Carrol)	Tube	80
Rhodomyrtus psidiodes (Native Guava)	Tube	100
Tristaniopsis laurina (Watergum)	Tube	600
Eucalyptus microcorys (Tallowwood)	Tube	100
Lomandra longifolia (Mat Rush)	Tube	1000
Hymenosporum flavum ( Native Frangipani)	Tube	100
Pittosporum undulatum ( Sweet Pittosporum )	Tube	100
Eucalyptus saligna (Sydney Blue Gum)	Tube	50
AREA E - Revegetation Planting Clear of Power Lines.		
Sloanea australis ( Maidens Bush)	Tube	10
Sloanea woolsii (Yellow Carabeen)	Tube	20
Cryptocaya glaucescens (Jackwood)	Tube	40
Guoia semilglauca (Guoia )	Tube	30
Tristaniopsis laurina (Watergum)	Tube	40
Clematis ardisitata (Old Man's Beard)	Tube	10
Cordyline stricta ( Cordyline)	Tube	20
Eleocarpus reticularis ( Blueberry Ash)	Tube	30
AREA F - Assisted Revegetation Area Road Embankment 60mx10m (600m <sup>2</sup> )		
Remove camphor laurel and other weeds		
Callistemon salignus ( Pink Tipped bottlebrush )	Tube	15
Eucalyptus microcorys (Tallowwood)	Tube	5
Eucalyptus pilularis (Blackbutt)	Tube	5
Acacia melanoxylon ( Blackwood)	Tube	5
Eucalyptus saligna (Sydney Blue Gum)	Tube	50
Eucalyptus grandis (Flooded Gum)	Tube	50
Pittosporum undulatum (Sweet pittosporum)	Tube	10
Eleocarpus reticularis ( Blueberry Ash)	Tube	20
Lomandra longifolia ( Mat rush)	Tube	200

THE MAINTENANCE REGIME applies to both the bush regeneration areas and the landscape amenity areas. There is a 3 month establishment period by CHCC Recreational Service Operational Staff that includes watering in the absence of adequate rain, checking and replacement of failed plants with original species and weed control. After this time the areas will move into a general maintenance period for 3 years. This involves a minimum of 3 visits per year and includes weed control as required, replacement of failed plants, reapplying mulch, pruning of the amenity landscape shrubs as required, formative pruning of trees in the amenity landscape areas. The bush regeneration has an additional follow up planting scheduled after 2 years which will be maintained to establish. Weed control shall also occur at this time. The second planting will utilise the canopy of the first planting for frost and sun protection.



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Survey	C	SEP 07
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Drawn	REF	SEP 07
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Date		
Status		

Construction Engineer	Date
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SURVEY DESIGN BRANCH

KARANGI WATER TREATMENT PLANT

LANDSCAPE PLAN SPECIES SELECTION & SPECIFICATION

UPPER ORARA ROAD

KARANGI

Council Plan No
*****
Sheet 4 of 5
Rev C

UNIT	No.
AREA G - Northern section - near tanks (1200m <sup>2</sup> )	
Acacia melanoxylon ( Blackwood)	Tube 100
Eleocharpus obovatus ( Hard Quandong)	Tube 40
Cryptocaya glaucescens (Jackwood)	Tube 20
Cryptocarya obovata (Pepperberry)	Tube 20
Acmenea smithii ( Lilly pilly)	Tube 150
Backhousia myrtifolia (Carrol)	Tube 60
Rhodomyrtus psidiodes (Native Guava)	Tube 80
Tristaniopsis laurina (Watergum)	Tube 300
Eucalyptus microcorys (Tallowwood)	Tube 80
Lomandra longifolia (Mat Rush)	Tube 600
Araucaria cunninghamii (Hoop Pine) - as shown on plan	25 Litre 4
Hymenosporum flavum ( Native Frangipanii)	Tube 50
Sloanea australis ( Maidens Bush)	Tube 15
Sloanea woosii (Yellow Carabeen)	Tube 10
Cryptocaya glaucescens (Jackwood)	Tube 10
Guoia semilglauca (Guoia )	Tube 10
Tristaniopsis laurina (Watergum)	Tube 15
Clematis ardisitata (Old Man's Beard)	Tube 80
Cordyline stricta ( Cordyline)	Tube 20
Eleocharpus reticularis ( Blueberry Ash)	Tube 40
AREA H - Wetland Area 400m <sup>2</sup>	
Marginal area (under water) species:	
Juncus usitatus	Floral Edge # 60
Lomandra hystrix	Viro Tube 60
Crinum pedunculatum	140mm 60
Carex appressa	Viro Tube 60
Lower Bank:	
Juncus usitatus	Viro tube 30
Lomandra longifolia	Viro Tube 30
Crinum pedunculatum	140mm 30
Carex appressa	Viro Tube 30
Isolepsis nodosa	Viro tube 30
Gahnia sieberana	Viro Tube 30
# Floral Edge (500mm long) to be planted in 2m long strips across the drain area.	
NOTE: All revegetation stock in tubes and all trees in 25L pots.	
Seed Mix for disturbed cut and fill areas and as restoration after construction	
Couch	
Perennial Rye 2kg/100m <sup>^</sup>	
Anchor Fertiliser 40g / m <sup>^</sup>	
Fill general depressions to assist with future mowing. Seed with seed mix	
TIMING	
All works shown on plan to occur within construction program for treatment plant. Revegetation plantings to commence in Dec 2007/Jan 2008	
Area A to occur after demobilisation of work site sheds	
Area B to occur after earthworks complete	
Area C to occur after earthworks complete	
Area D to occur after pipework installed	
Area E to occur after earthworks complete	
Area F to occur after earthworks complete	
Area G to occur as part of the construction program	
Restoration Seeding as soon as practical - avoid months of April, June ,July	



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Date						
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 LANDSCAPE PLAN SPECIES SELECTION & SPECIFICATION  
 UPPER ORARA ROAD  
 KARANGI

Council Plan No  
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 Sheet 5 of 5  
 Rev  
 A1 C

# Environmental Control Plan Hazardous Material & Storage

## ECP HMSAS

### Environmental Control Plan – Hazardous Materials and Storage

#### 1. Scope

The aim of this plan is to describe the measures that will be implemented on the program for the identification, storage and handling of hazardous materials to minimise risk of potential or actual environmental harm.

#### 2. References

- Protection of the Environment and Operations Act, 1997
- Environmentally Hazardous Chemicals Act 1985
- Environmentally Hazardous Chemicals Regulation 1999
- AS1940: The Storage and Handling of Flammable and Combustible Liquids
- EPA Bunding and Spill Guidelines
- Operations Safety Management Plan
- Operations Emergency Planning Management Plan
- Coffs Harbour WTP Environmental Assessment, CIA 2007.
- Coffs Harbour WTP Submissions Report, CIA 2007.
- Coffs Harbour WTP Ministers Conditions of Approval.

#### 3. Responsibility

- EMCHW – Executive Manager Coffs Harbour Water
- S – Plant Superintendent

#### 4. Criteria/ Targets

Prevention of air, soil and water pollution.



# Environmental Control Plan Hazardous Material & Storage

ECP HMS

## 4. Procedure

Mitigating Actions	Responsibility	Timing	Monitoring
Fuel and chemicals shall be stored in a locked, bunded area away from drainage lines or stormwater drains. Appropriate placarding shall be placed on the storage. All chemical storage in accordance with relevant standards and codes.	EMCHW / S	Ongoing	Audit
MSDS for the chemicals and fuel stored and used on site must be held in a location (such as the storage area) readily accessible to staff using the chemicals.  The MSDS must be updated as often as required to cover the chemicals held or stored at the time	S	Prior to Works Commencing & Ongoing	Audit
Adequate spill control equipment (spill kits) shall be available in the area of storage and use of chemicals and fuels. The spill kits shall be appropriate to the containment of the chemical involved.  Refuelling and maintenance is to take place away from drains and waterways.	S	Ongoing	Audit
Regular inspections pits (draining chemical lines) and hoses to check for spills, leaks and fatigue.	S	Weekly	Audit
Compliance with Safety Management System	EMCHW / S	Ongoing	Audit

# Environmental Control Plan Hazardous Material & Storage

ECP HMS

Mitigating Actions	Responsibility	Timing	Monitoring
Standard Operating Procedure's to include: Management of dry chemical spills; Unloading of dry chemical; Management of liquid chemical spill inside bunded area; Management of liquid chemical spill at truck unloading bay; Unloading of liquid chemical including enforcement of permit to work system for operator to escort deliveries during unloading; Disposal of spills, fluoride vent bath water; Entry into the chlorine building; and Residue spill.	EMCHW / S	Ongoing	Audit

## Environmental Control Plan – Noise and Vibration

### 1. Scope

This plan details how noise and vibration sources will be identified and managed for the program.

### 2. References

- Protection of the Environment and Operations Act, 1997
- Industrial Noise Policy, EPA 2000
- NSW EPA Environmental Noise Control Manual (ENCM)
- NSW EPA Environmental Noise Management Manual (ENMM)
- Coffs Harbour WTP Environmental Assessment, CIA 2007.
- Coffs Harbour WTP Submissions Report, CIA 2007.
- Coffs Harbour WTP Ministers Conditions of Approval.

### 3. Responsibility

- EMCHW – Executive Manager Coffs Harbour Water
- S – Plant Superintendent

### 4. Criteria

#### Criterion for Noise Emissions

The Industrial Noise Policy (DECC, 2000) provides guidance on the assessment of operational noise impacts. This was undertaken as part of the Environmental Assessment where it was determined that the applicable criteria was the intrusive noise limit of 35dB(A) (background 30dB(A) plus 5dB(A)).

Doc No: ECP Operational Noise	Rev: 1	07/05/2009	
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# Environmental Control Plan Operational Noise

ECP Operational Noise

## 5. Procedure for the Mitigation of Impacts

Mitigating Actions	Responsibility	Timing	Monitoring
Noise monitoring of the operational plant is to be undertaken in accordance with the Industrial Noise Policy to confirm compliance of operating plant with the operational noise criteria of 35dB(A) at the residential receivers.	EMCHW	Prior to Works Commencing and following receiving of valid complaint.	Audit
Residents should be notified where possible of any maintenance work that could potentially have a noise impact on those residents. It is recognised that this may not be possible for some emergency maintenance activities.  Records of correspondence with residents are to be maintained.	S	As required	Audit
All site workers are to be made aware of the potential noise impacts for local residents and encouraged to minimise noise during the course of their activities.	S	Prior to Works Commencing & Ongoing	Audit
Doors for rooms where noisy activities are being undertaken are to remain closed when ever possible with particular emphasis on the compressor blower room, treated water pump station and sludge building pump room.	S	Ongoing	NA

# Environmental Control Plan Soil & Water Quality

## ECP S&WQ

### Environmental Control Plan Soil and Water Quality

#### 1. Scope

This plan details the procedure to manage soil erosion and control water pollution on this project.

#### 2. References

- Protection of the Environment Operations Act, 1997.
- Protection of the Environment Operations (General) Regulation, 1998.
- Coffs Harbour WTP Environmental Assessment, CIA 2007.
- Coffs Harbour WTP Submissions Report, CIA 2007.
- Coffs Harbour WTP Ministers Conditions of Approval.

#### 3. Responsibility

- EMCHW – Executive Manager Coffs Harbour Water
- S – Plant Superintendent

#### 4. Soil and Water Quality Criterion

The operational activities are not permitted to cause water pollution as defined in Schedule 3 of the Protection of the Environment Operations (General) Regulation, 1998.

The operational activities are not permitted to cause the pollution of land, defined as increasing the concentrations of chemicals in the soil above naturally occurring levels.

Doc No: ECP S&WQ	Rev: 1	07/05/2009	
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Environmental Control Plan Soil & Water Quality  
ECP S&WQ

**5. Procedure**

Mitigating Actions	Responsibility	Timing	Monitoring
Stormwater drainage system is to be maintained in a suitable condition that prevents scouring and adequately dissipates flows at the outlet.	S	Ongoing	Audit
Maintenance of landscaped areas to prevent elevated levels of suspended solids in stormwater run off.	S	Ongoing	Audits
Emergency Response Plan to be prepared and tested for events such as chemical spills.	EMCHW / S	Within 6 months of operation and then every 12 months.	Audit
Monitoring of chemical lines, pits, bunded areas etc in accordance with ECP Hazardous Materials Storage and Handling	S	Refer to ECP Hazardous Materials Storage and Handling	Audit

# Environmental Control Plan Traffic

## ECP Traffic

### Environmental Control Plan – Traffic

#### 1. Scope

This plan details the practices for minimising impacts from traffic resulting from the operation of the water treatment plant.

#### 2. References

- Coffs Harbour WTP Environmental Assessment, CIA 2007.
- Coffs Harbour WTP Submissions Report, CIA 2007.
- Coffs Harbour WTP Ministers Conditions of Approval.

#### 3. Responsibility

- EMCHW – Executive Manager Coffs Harbour Water
- S – Plant Superintendent

#### 4. Criteria/ Targets

Minimise traffic disruptions and incidents as a result of operational vehicle movements.

#### 5. Procedure

The Plant Superintendent and EMCHW are to provide any persons undertaking the transportation of goods with sufficient information such that following is undertaken:

- The most direct route, being Coramba Road into Upper Orara Road is to be followed to site unless this route is not open to traffic.
- The relevant Standard Operating Procedures (or sections of) are to be provided to those persons delivering any hazardous substance prior to deliveries being undertaken.
- Site inductions are to include the site road rules and restrictions.

Doc No: ECP Traffic	Rev: 1	07/05/2009	
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## Environmental Control Plan – Waste Minimisation and Management

### 1. Scope

This plan details the practices for minimising, recycling, reusing or recovering waste that is generated as a result of operational activities.

### 2. References

- Protection of the Environment Act Operations 1997
- Waste Avoidance and Resource Recovery Act 2001
- EPA Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Waste (the EPA Guidelines)
- Coffs Harbour WTP Environmental Assessment, CIA 2007.
- Coffs Harbour WTP Submissions Report, CIA 2007.
- Coffs Harbour WTP Ministers Conditions of Approval.

### 3. Responsibility

- EMCHW – Executive Manager Coffs Harbour Water
- S – Plant Superintendent

### 4. Sources

The main sources of non-liquid waste are classified as inert or solid as per the DECC Guidelines and are identified below:

- Green Waste – this would be mulched and used on site wherever possible
- General waste – food, bottles
- Office and packaging waste – recycled wherever possible
- Used oil drums, rags and filters – disposed of to a licensed receiver

The main source of liquid waste is wastewater effluent from ablutions and the laboratory, which is classified as Group C Liquid waste as per the DECC Guidelines.

If any other identified waste will be assessed using the waste hierarchy and managed in accordance with the procedures outlined in section 6.

### 5. Criteria/ Targets

The target for the management of waste on site is to ensure that the waste minimisation policy is followed and waste is reused or recycled and only sent to landfill as the last measure.

Doc No: ECP WM&M	Rev: 1	07/05/2009	
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# Environmental Control Plan Waste Minimisation and Management

## 6. Procedure

Mitigating Actions	Responsibility	Timing	Monitoring
The application of the waste minimisation hierarchy principles of avoid-reduce-reuse-recycle-dispose;	EMCHW / S	Ongoing	Audit
Waste material that is unable to be re-used, reprocessed or recycled is to be disposed of to a facility licensed by the DECC to receive that type of waste.	S	As Required	Audit
Implementation of energy conservation best practice.	S	Ongoing	Audit
Residue wastes are to be classified and appropriate disposal options identified.	EMCHW / S	Following first residue batch and then once per 12 months	Audit
Monitoring of septic alarm system required to adequately organise pump out contractor.	S	Ongoing	NA

## Appendix 7 Incident Report Forms

COFFS HARBOUR CITY COUNCIL  
INCIDENT REPORT

BRANCH	TASK		
OCCURRED AT hours (2400hrs)	on (date)		/ /20
ADDRESS			
SPECIFIC LOCATION			
DESCRIPTION OF INCIDENT			
INCIDENT CATEGORY (circle all appropriate)			
Material / stock loss	Environmental damage (B)	Production downtime (hours)	
Vehicle / Plant / Equipment damage (C)	Personal injury (A)	Other (specify)	
Contributing factors			
Immediate action taken			
To prevent recurrence I suggest the following actions			
By whom	by when		
Witnesses			
<b>VEHICLE INCIDENTS</b>	Council vehicle no.	Driver	
Other vehicle owner	Address	Phone no.	
Vehicle reg no.	Insurance co.	(see) Driver Licence no.	
Driver	Address	Phone No.	
Vehicle details: make	body type	colour	any signage
Police officer	Incident no.	Station	
Reported by:	.....(print name).....	date:	/ /20
Supervisor:	..... (signature).....	date:	/ /20
<b>PLEASE FORWARD THIS FORM to HUMAN RESOURCES</b>			
<b>CHCC-O-FRM-007</b>			

**COFFS HARBOUR CITY COUNCIL - Pollution Incident  
Department of Environment and Conservation, Public Health Unit  
and Other Authority Notification**

Date of incident:

Estimated time:

Time Staff notified:

Time Staff on site:

**DESCRIPTION OF INCIDENT** (inc. photos and detailed reports if relevant)

Exact site / location of incident:

Property / land / receiving waters affected:

Nature of incident:  
(Tick all that apply)

Habitat disturbance  Air pollution  Noise  Waterway affected

Sewer / chemical / oil release  Other  .....

Estimated volume / quantity:

Estimated Concentration:

**DETAILS OF INCIDENT** [inc. probable cause; actions taken to; stop incident, cleanup, prevent happening again, resulting / threatened pollution and notification of the public (if required).

Council Operational Incident

External Incident

Weather conditions:  
(Tick all that apply)

Dry / Fine  Wet / Rain  Wind  Other detail: Power Outage

Notifier of incident:

Owner / Council Staff / Supervisor / Community Member

Other:

Who attended?

Name:

Position:

**Department of Environment and Conservation Notification 131 555**  
(by Branch Manager / Supervisor OR Environmental Services)

Date notified:

Time notified:

Office notified: \_\_\_\_\_ Officer notified: \_\_\_\_\_  
 Follow-up call required to DEC: Yes / No Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 By: \_\_\_\_\_ To: \_\_\_\_\_  
 Follow-up made by DEC to CHCC: Yes / No Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Office: \_\_\_\_\_ Officer: \_\_\_\_\_

**Department of Health Notification**  
 (by Branch Manager / Supervisor OR Environmental Services)

Date notified: \_\_\_\_\_ Time notified: \_\_\_\_\_  
 Office notified: \_\_\_\_\_ Officer notified: \_\_\_\_\_  
 Follow-up call required to DOH: Yes / No Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 By: \_\_\_\_\_ To: \_\_\_\_\_  
 Follow-up made by DOH to CHCC: Yes / No Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Office: \_\_\_\_\_ Officer: \_\_\_\_\_

**OTHER AUTHORITIES NOTIFIED / CONTACTED** – Fax this form to DIPNR (02) 6642 0640  
 (inc. Fire Brigade, Police, Dept of Health, CHCC Branch, DIPNR, etc)

Provision of information to the public:

**COMMENTS**

.....

**SIGNATORY**

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
 Name: \_\_\_\_\_ Position: \_\_\_\_\_

**Acknowledgement by OPERATIONS MANAGER, ..... BRANCH, CHCC**

Comments

.....  
 .....

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
 Name: \_\_\_\_\_