Pollution Incident Response Management Plant

(PIRMP)

Document Number: MCW-BOT-MGT-SHE-001

Scope of Application: Botany CAP

Revision: 9

Issued: 25th August 2020

Document Owner: Site Manager, Botany

CONTENTS

[LIST OF ACRONYMS 4](#_Toc391923760)

[1 Introduction 5](#_Toc391923761)

[1.1 Relationships with Other Documents 5](#_Toc391923762)

[1.2 Plan Authority 5](#_Toc391923763)

[1.3 Document Control and Distribution 5](#_Toc391923764)

[2 objectives 7](#_Toc391923765)

[3 legislative requirements 8](#_Toc391923766)

[4 nature of operations 9](#_Toc391923767)

[4.1 Manning 9](#_Toc391923768)

[4.2 Neighbouring Facilities and the Community 9](#_Toc391923769)

[4.3 Internal and External Resources 9](#_Toc391923770)

[5 Hazard Identification and Risk Assessment Process 10](#_Toc391923771)

[5.1 Scenario Selection 11](#_Toc391923772)

[5.2 Plant Areas and Bunding 11](#_Toc391923773)

[5.3 Risk Assessment 12](#_Toc391923774)

[5.3.1 Likelihood and Common Controls 13](#_Toc391923775)

[5.4 Safety Equipment 13](#_Toc391923776)

[5.4.1 DCS, Instrumentation, Alarms and Trips 13](#_Toc391923777)

[5.4.2 Equipment Design 14](#_Toc391923778)

[5.4.3 Valves 14](#_Toc391923779)

[5.4.4 Bunding 14](#_Toc391923780)

[5.4.5 Emergency Stops 14](#_Toc391923781)

[5.4.6 Personal Protective Equipment (PPE) 14](#_Toc391923782)

[5.4.7 Safety Showers 14](#_Toc391923783)

[5.4.8 Hazchem Spill Kit Bins, Stormwater Drain Covers, Sand/Soil/Drysorb and Slaked Lime 15](#_Toc391923784)

[5.4.9 Stormwater Transfer to Botany Industrial Park Effluent System 15](#_Toc391923785)

[5.4.10 Botany Industrial Park Diversion Basin 15](#_Toc391923786)

[5.5 Minimising Harm to Persons on the Premises 15](#_Toc391923787)

[5.5.1 Ixom Emergency Service (ERS) 16](#_Toc391923788)

[5.5.2 Shift Team 16](#_Toc391923789)

[5.5.3 Site Emergency Response Team 17](#_Toc391923790)

[5.5.4 Site Safety 17](#_Toc391923791)

[5.5.5 Crisis Management Team 17](#_Toc391923792)

[6 maps 18](#_Toc391923793)

[6.1 Matraville and Surrounding Suburbs and Aquatic Environments 18](#_Toc391923794)

[6.2 Botany Industrial Park Effluent System 18](#_Toc391923795)

[6.3 Stormwater System and Location of Potential Pollutants 18](#_Toc391923796)

[6.4 Botany Chlor-Alkali Effluent System 18](#_Toc391923797)

[7 PLAN ACTIVATION 20](#_Toc391923798)

[7.1 Incident Notification to relevant Authorities and Communication with Neighbours and the Local Community 20](#_Toc391923799)

[7.2 Ixom Chlor-Alkali Facility Staff Responsibilities 22](#_Toc391923800)

[8 staff training 23](#_Toc391923801)

[9 Plan Testing and Revisions 24](#_Toc391923802)

[10 APPENDICES 25](#_Toc391923803)

[10.1 APPENDIX A - Description of Hazards to Human Health and the Environment and Risk Assessment 26](#_Toc391923804)

[10.2 APPENDIX B - Botany Chlor-Alkali Facility and the Surrounding Neighbourhood 194](#_Toc391923805)

[10.3 APPENDIX C - Botany Industrial Park Effluent System 195](#_Toc391923806)

[10.4 APPENDIX D - Stormwater System and Chemical Locations on Site 196](file://AUYBTB02/cymf$/Botany%20Projects/Effluent%20Management%20Plan/PIRMP%202014/Orica%20Chlor-Alkali%20PIRMP%20-%20Final%20Report%20Rev%206.docx#_Toc391923807)

[10.5 APPENDIX E - Chlor-Alkali Facility Effluent 199](#_Toc391923808)

[10.6 APPENDIX F Environmental Incident Notification Procedure 201](#_Toc391923809)

LIST OF ACRONYMS

| **ACRONYM** | **DEFINITION** |
| --- | --- |
| BIP | Botany Industrial Park |
| CAP | Chlor-Alkali Plant |
| CC | Critical Control |
| CMP | Crisis Management Plan |
| DCS | Distributed Control System |
| EP | Effluent Pit |
| EPA | NSW Environment Protection Authority |
| EP6 | Effluent Pit 6 |
| ERA | Environmental Risk Assessment |
| ERP | Emergency Response Plan |
| ERS | Ixom Emergency Response Service |
| E-Stop | Emergency Stop |
| HCl | Hydrochloric Acid |
| Hum | Human |
| LOC | Loss of Containment |
| MHF | Major Hazard Facility |
| NGO | Non-Governmental Organisation |
| Nat | Natural Environment |
| ORP | Oxidation Reduction Potential |
| PIRMP | Pollution Incident Response Management Plan |
| POEO Act | Protection of the Environment Operations Act 1997 |
| POEO (G) | Protection of the Environment Operations (General) Regulation 2009 |
| PPE | Person Protective Equipment |
| PVC | Polyvinyl chloride |
| SH&E | Safety, Health and Environmental |
| SIS | Safety Instrumented System |
| SBS | Sodium Bisulphite |
| SW | Stormwater |
| SWOOS | Southern and Western Suburbs Ocean Outfall Sewer |

# Introduction

Ixom Chlor-Alkali Facility operates under Environment Protection Licence No. 20547. NSW legislation requires all Environment Protection Licence holders to have a Pollution Incident Response Management Plan (PIRMP).

A pollution incident as defined by the NSW Environment Protection Authority (EPA) Environmental Guidelines: Preparation of Pollution Incident Response Management Plans is “an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of any noise”.

This document has been prepared in accordance with requirements in Part 5.7A of the Protection of the Environment Operations Act 1997 (POEO Act).

## Relationships with Other Documents

References are made to the Emergency Response Plan and Ixom Botany Chlor-Alkali Major Hazard Facility (MHF) Safety Report.

This Plan should be read in conjunction with Notification of Pollution Incidents located in Appendix F.

It is important to note that not all pollution events are an emergency and not all emergencies are pollution events.

## Plan Authority

The plan is issued on the authority of the Site Manager. Contact details are:

Street Address: 16-20 Beauchamp Rd, Matraville NSW 2036

Telephone: (02) 9352 2254

Fax: (02) 9352 2244

## Document Control and Distribution

The master controlled copy of the PIRMP is located on the Botany Chlor-Alkali Facility Document Management System (DMS). Document control, revision, retention and authorisation are managed through the functionality of the DMS. All permanent personnel have access to the plan via the DMS.

The following parts of this plan are to be made publicly available upon written request:

* Contact details of the Relevant Authorities, and
* Procedure on Communicating with Neighbours and the Local Community.

# objectives

This document aims to meet the following objectives outlined in the NSW EPA Guidelines for the Preparation of Pollution Incident Response Management Plans (State of NSW and EPA, March 2012):

* Ensure comprehensive and timely communication about a pollution incident to staff at the premises, the EPA, other relevant authorities specified in the Act (such as local councils, NSW Ministry of Health, WorkCover NSW, and Fire and Rescue NSW) and people outside the facility who may be affected by the impacts of the pollution incident;
* Minimise and control the risk of a pollution incident at the facility by requiring identification of risks and the development of planned actions to minimise and manage those risks; and
* Ensure that the plan is properly implemented by trained staff, identifying persons responsible for implementing it, and ensuring that the plan is regularly tested for effectiveness in achieving these objectives.

# legislative requirements

The specific requirements for Pollution Incident Response Management Plans are set out in Part 5.7A of the POEO Act and the Protection of the Environment Operations (General) Regulation 2009 (POEO(G) Regulation). In summary, this provision requires the following:

* All holders of environment protection licences must prepare a Pollution Incident Response Management Plan (section 153A, POEO Act).
* The plan must include the information detailed in the POEO Act (section 153C) and be in the form required by the POEO(G) Regulation (clause 98B).
* Licensees must keep the plan at the premises to which the environment protection licence relates or, in the case of trackable waste transporters and mobile plant, where the relevant activity takes place (section 153D, POEO Act).
* Licensees must test the plan in accordance with the POEO(G) Regulation (clause 98E).
* If a pollution incident occurs in the course of an activity so that material harm to the environment is caused or threatened, licensees must immediately implement the plan (section 153F, POEO Act).

# nature of operations

Botany Chlor-Alkali Facility is located at Botany Industrial Park Site (BIP) on the corner of Beauchamp Road and Denison Street. The facility encompasses:

* Chlor-Alkali Plant
* Ferric Chloride Plant
* Hydrochloric Acid Plant
* Sodium Hypochlorite Plant
* Support infrastructure including Control Room, Laboratory and Maintenance Workshop
* Dangerous goods storages

## Manning

The Chlor-Alkali Facility operates 24 hours per day, 365 days per year with a shift operations team that continuously man the plant. During normal business hours, site occupancy will be approximately 30 people. Outside normal business hours, the site occupancy reduces to a minimum of 2 Plant Operators. Manning may be further increased by periodic presence of additional support personnel, contract service providers, contract labour for significant maintenance tasks and project work.

## Neighbouring Facilities and the Community

The Chlor-Alkali Facility is a part of Botany Industrial Park, with Huntsman and Qenos operating other manufacturing plants on site (Appendix B). Of the roads surrounding Botany Industrial Park, Ixom Chlor- Alkali Facility is in close proximity to Denison Street and Beauchamp Road. A residential area exists on the other side of Denison Street, while numerous businesses occupy the other side of Beauchamp Road, with Matraville Public School located 750 m east. Westfield Shopping Centre Eastgardens is located on the opposite side of Wentworth Avenue, approximately 1 kilometre north. As a result of neighbouring businesses and residents, it is imperative that operations at Ixom Chlor-Alkali Facility are safe, with the likelihood of potential hazards to human health and the environment minimised.

This PIRMP has been developed in coordination with neighbouring facilities to ensure a degree of consistency in the management of emergencies on the BIP.

## Internal and External Resources

Ixom Botany has demonstrable access to a range of internal and external resources with experience in environmental incidents. These include environmental consultants, contractors (civil, waste and emergency response), risk assessors and health experts.

# Hazard Identification and Risk Assessment Process

Hazards to human health and the environment at Ixom Chlor-Alkali Facility have been identified in reference to the chemical in which the hazard relates. Appendix A contains for each chemical:

* A description of the hazards to human health or the environment
* The likelihood of any such hazards occurring, including details of controls in place to reduce the likelihood
* Details of the pre-emptive action (response plan) to be taken to minimize or prevent any risk of harm to human health or the environment

Table 1 outlines the chemicals on site and associated quantities if all tanks and vessels are full (does not include chemicals in piping). The quantity of chlorine on site includes chlorine in piping.

Table 1 - Chemicals On Site and Maximum Quantities

|  |  |  |  |
| --- | --- | --- | --- |
| **Chemical** | **Storage**  **Tanks (L)** | **Process**  **Vessels (L)** | **Total**  **Quantity (L)** |
| Acid Effluent | - | 27,200 | 27,200 |
| Alkaline Effluent | - | 20,700 | 20,700 |
| Brine | - | 383,000 | 383,000 |
| Chlorinated Brine | - | 37,000 | 37,000 |
| Chlorinated Sulphuric Acid | - | 6,300 | 6,300 |
| Chlorine (kg) | 204,100 | 250 | 204,300 |
| Coagulant | - | 5,000 | 5,000 |
| Cobalt Sulphate | - | 200 | 200 |
| Cooling Water | - | 231,700 | 231,700 |
| Cooling Water Dosing Chemicals | - | 2,400 | 2,400 |
| Ferric Chloride | 405,700 | 27,300 | 433,000 |
| Ferrous Chloride | 2,898,600 | 202,800 | 3,101,400 |
| Filter Aid / Pre-Coat | - | 4,800 | 4,800 |
| Hydrochloric Acid | 736,700 | 3,700 | 740,400 |
| Magnesium Chloride | - | 2,000 | 2,000 |
| Oil, Grease and Diesel | - | - | N/A |
| Sodium Hydroxide | 2,200,000 | 93,000 | 2,293,000 |
| Sodium Hypochlorite | 590,700 | 59,100 | 649,800 |
| Sodium Bisulphite | - | 4,500 | 4,500 |
| Sulphuric Acid | 78,300 | 3,300 | 81,600 |

## Scenario Selection

In considering the likelihood of hazards occurring at the Ixom Chlor-Alkali Facility, the following scenarios have been investigated:

* Overfilling storage tanks and process vessels
* Mechanical failure of the aforementioned storage tanks and process vessels
* Loss of containment from piping
* Loss of containment from loading/unloading activities

## Plant Areas and Bunding

A total of 98 scenarios were identified in which hazards have the potential to do harm to human health or the environment. Tanks and vessels are located in the following areas:

* CAP Bund
* Ferric Chloride Plant and Storage
* Hydrochloric Acid Plant and Storage
* Sodium Hypochlorite Plant and Storage
* Iron Salts Storage
* Sulphuric Acid Storage
* Cooling Tower Dosing Chemicals Storage
* Loading Bays
* Unbunded Areas

The CAP front-end area consists of two large bunds. The first bund contains a trench which flows into the second bund, which also contains a separate area for acidic effluent. The alkaline effluent and acidic effluent are neutralised separately and discharged into the same Effluent Header which flows to EP6 and subsequently to Site Utilities effluent system. In order for harm to the environment to occur from a loss of containment in the CAP bund, a bund must fail significantly or effluent must be discharged with pH out of specification.

As outlined in Appendix E, any loss of containment within the Ferric Chloride Plant or Hydrochloric Acid Plant will be transferred to Effluent Tank PET18 for use in the Ferric Plant.

Any loss of containment within the Sodium Hypochlorite Plant must undergo dechlorination before discharge to the Effluent Header. Any loss of containment is transferred to Out-of-Spec Tank 6X, which transfers the effluent to the Hypo Decomp Tank for dechlorination.

Iron Salts, Sulphuric Acid and Cooling Tower Dosing Chemicals have their own chemical bunds and each chemical has been assessed separately. Tanker loading for different chemicals takes place in different bunded areas in which common controls are in place such as self-loading licenses for drivers and high level cutouts for transfer pumps.

Losses of containment outside of bunded areas have been assessed individually by chemical.

## Risk Assessment

An Environmental Risk Assessment (ERA) has been carried out for each of the identified environmental and pollution hazards. ERAs provide a method to explore the identified hazards in more detail, undertake risk assessments and establish controls commensurate with the level of risk and to reduce risk to as low as reasonable practical through implementing additional controls where required. The ERAs were undertaken as a multifunctional group by identifying and assessing established controls and determining the Risk Level. If a hazard has a Risk Level of III or IV it is considered to be as low as reasonable practical, if it is of a higher risk additional controls are required to be explored. There are already initiatives in place to address hazards with risk level of II.

Appendix Acontains the environmental risk assessments for each scenario identified that may lead to a pollution incident. For each scenario, controls have been specified which reduce the risk of the hazard occurring. Failure of any of these controls will increase the likelihood of the pollution event occurring. Furthermore, Appendix A contains response plans for each chemical, outlining the pre-emptive actions to be taken to prevent or minimise harm to human health or the environment.

The consequences of each chemical causing harm to the environment have been identified, with a particular focus on overflow from the stormwater system to Springvale Drain. These consequences are based on LC50 data of different aquatic species from material safety data sheets and incorporate the heavy rainfall that will accompany an overflow from the stormwater system.

The consequences of each chemical causing harm to human health consider the impact of personnel or contractors being directly exposed to the chemical, while the off-site impact of a chlorine release is covered by the MHF Safety Report. Losses of containment from an overflow event will be released at ground level and will pose little risk to personnel or contractors, particularly when considering controls such as personal protective equipment and safety showers on site. In addition, the overflow of slippery substances may lead to an injury from a slip and fall. The consequences of mechanical failure events have been assessed keeping in mind that a tank leak is likely to identified and addressed before becoming a serious hazard for personnel and contractors. Mechanical failures for different tanks or vessels of the same chemical have been grouped, with the risk rating reflecting that of the tank or vessel with the highest risk.

### Likelihood and Common Controls

While the tanks and vessels have individual controls (Appendix A) to prevent overflow and mechanical failure events such as level indication and alarms, trips of pumps, closure of valves and regular tank inspections, many additional controls are common. The majority of tanks and vessels are located in bunded areas and in the event of bund failure, a minor leak is expected which would be able to be contained, preventing further loss into the stormwater system.

If a loss of containment enters a stormwater drain, the effluent will eventually reach Interceptor Pit 1, which uses two pumps to transfer the effluent to the Site Utilities effluent system at a flow rate of 120 m3/h. If the effluent is unsuitable for disposal, it is diverted to the Diversion Basin, where further treatment can occur before discharge into the SWOOS (Southern and Western Suburbs Ocean Outfall Sewer). If the Interceptor Pit 1 transfer pumps are unable to transfer all of the effluent, such as during heavy rainfall, it will overflow into Springvale Drain. Interceptor Pit 1 has a volumetric capacity of 11,365 L, however, since transfer starts at 40% level, 6,819 L may only be available at any given time.

Losses of containment from piping and tanker activities have a higher likelihood for environmental harm since there is piping outside of bunded areas and a loss of containment from loading/unloading activities may go beyond the bunded area. Similarly, there is a higher likelihood for harm to human health, due to potential drips from overhead piping and the nature of tanker activities.

## Safety Equipment

Each scenario of the Environmental Risk Assessment outlines controls which reduce the risk of hazards to the environment and human health (see Appendix A for detailed preventative controls). The Response Plan flowchart for each chemical outlines safety equipment used to prevent further harm to the environment or human health. The following is a description of prominent safety equipment used to reduce risk for the majority of hazards (refer to MHF Safety Report for additional safety equipment and locations on site).

### DCS, Instrumentation, Alarms and Trips

The Distributed Control System (DCS) is a computerised control system used to control the chemical processes at Ixom Chlor-Alkali Facility. Instrumentation in the field allows measurements of flow rate, temperature, pressure, level and other variables to be recorded and displayed on screens in the Control Room. Alarms will be activated if a measured variable is approaching an undesired value, such as boundary chlorine gas detector alarms prompting operator response. In the case of overfilling a tank, a high and/or high-high level alarm is likely to be activated if the substance within the tank is approaching the overflow point. In many cases, a high level will cause a transfer pump to trip or an automated valve to close, to ensure no further addition of chemical to the tank, thus avoiding overflow. In serious circumstances, the measurement of a variable may result in a plant trip to ensure the safety and well-being of people on site and in the surrounding area.

### Equipment Design

While it is expected that tanks, vessels and piping are suitable for use, specific inherent equipment design features such as a gooseneck vents to prevent overpressure, overflows to lutes and pipe supports minimise the risk of hazards. Scrubbers are also in place to treat harmful gases, while gas detectors are used to detect high concentrations of these gases.

### Valves

Valves on pipelines allow leaks to be isolated in a loss of containment event. Depending on the system, valves may be manual or automated. Automated valves may close automatically prior or during a loss of containment event.

### Bunding

As outlined previously, the majority of tanks and vessels on site are in bunded areas, which prevent a loss of containment from spreading to undesired regions of the site and beyond. Treatment of the spill takes place before discharge to Effluent Pit 6.

### Emergency Stops

Emergency stop or E-stop buttons in the field allow certain processes to be stopped if humans or the environment are at risk. For example, a hose is leaking during the unloading of sulphuric acid may prompt the tanker driver to hit the E-stop to trip the transfer pump and stop unloading. E-stops are located in close vicinity of the hazard.

### Personal Protective Equipment (PPE)

All plant personnel must wear long sleeves and long pants, steel cap shoes, safety hat and chlorine respirator when on site. In addition, monogoggles must be worn when entering a bunded (process) area and particular maintenance activities may require a full chemical suit, respiratory protection equipment and/or faceshield for protection against chemicals.

### Safety Showers

Safety showers are located near hazardous areas, allowing an employee or contractor to wash affected areas with water to prevent or reduce harm done. Safety showers are also alarmed to inform the Control Room if an incident may have occurred. Safety showers are routinely checked to ensure their reliability.

### Hazchem Spill Kit Bins, Stormwater Drain Covers, Sand/Soil/Drysorb and Slaked Lime

Hazchem spill kit bins which are suitable for acids and caustic contain absorbent pads, absorbent booms, waste bags and chemical resistant gloves and are located at the following locations:

* Control Room
* HCl/Ferric Loading Bays
* Hypo Loading Bays
* Caustic Loading Bays
* Sulphuric Acid Loading Bay
* Iron Salts Loading Bay
* Store (spare)

General spill kit bins are also available on site which are more suitable for scenarios such as oil spills.

In the event of a chemical spill potentially reaching stormwater drains, stormwater drain covers (1100 x 1100 mm, located in the Control Room and the Store) and/or absorbents from the spill kit bins can prevent chemicals from entering the stormwater system. Sand, soil or drysorb can then be used to absorb the spill from the area while slaked lime (Ca(OH)2) may be used for neutralisation if the spill is acidic. Waste management contractors can be contacted for the disposal of waste if required.

### Stormwater Transfer to Botany Industrial Park Effluent System

The contents of the stormwater system will enter Interceptor Pit 1 before reaching the Springvale Drain. A pump transfers the contents of Interceptor Pit 1 to the Botany Industrial Park Effluent System at 120 m3/h (approx.) when both pumps are running, with overflow from the pit only likely during heavy rainfall. Therefore it is likely that any chemical spill into the stormwater system will be treated before discharge into SWOOS.

### Botany Industrial Park Diversion Basin

If undesired effluent is transferred to Effluent Pit 6, it can be diverted downstream to the Diversion Basin for further treatment. Effluent will automatically be diverted if pH or total oxygen demand is out of specification, with the BIP effluent analyser house located upstream of the Diversion Basin.

## Minimising Harm to Persons on the Premises

While preventative controls used to minimise harm are detailed in section 5.4, all personnel and contractors must complete a plant induction before being granted access to the Chlor-Alkali Facility. The induction details the following:

* The chemicals manufactured by Ixom on site
* The potential hazards on site
* What to do in case of an emergency
* Details of the work clearance system
* Personal Protective Equipment (PPE) requirements
* Ixom’s Unsafe Acts Prevention program

Section 6 of the Ixom Chlor-Alkali Emergency Response Plan (ERP) details:

* The arrangements for minimising the risks of harm to any persons on the premises or present where the scheduled activity is being carried on.
* A detailed a description of how any identified risk of harm to human health will be reduced including by means of early warnings, updates and the action to be taken during or immediately after a pollution incident to reduce that risk.

It outlines the overall process of how Ixom Botany responds to an emergency, incorporating procedural flowcharts, roles and responsibilities of key people, internal and external communications, search and rescue and evacuation.

The following is an outline of potential key people in an emergency scenario and their responsibilities.

### Ixom Emergency Service (ERS)

The Ixom Emergency Response Service (ERS) provides communication and co-ordination support to company personnel involved in an emergency and also provides expert assistance. The single number operates 24 hours a day from anywhere in Australia and is a free call. ERS will assist by:

* Contacting the Chlor-Alkali management team
* Contacting site management, senior management, defined plant personnel and media relations personnel
* Locating company doctors and facilitating contact between them and treating doctors. This is to ensure that injured employees receive the best possible medical care.
* Liaising with government authorities and emergency services personnel.
* Contacting Ixom legal and insurance personnel.
* Obtaining information from Material Safety Data Sheets (MSDS) 24 hours per day.
* Locating product experts.
* Participating in simulated emergencies
* Participating in the development of site specific ERS standing instructions. This is designed to streamline the provision of assistance during incidents.

### Shift Team

The normal response team for all emergencies is the shift team and they comprise full manning out of hours. This team is fully trained in emergency response and in the use of emergency equipment (i.e. fire fighting, SCBAs and first aid).

For minor incidents, the response plan flowcharts for each chemical will be followed by the shift team to minimise risk to the environment and human health.

The shift response team is backed by the site emergency response team which include:

* Emergency Wardens
* Site Security
* Site Safety
* Plant and Site Management
* Plant Engineers
* Reliability Team

### Site Emergency Response Team

The site emergency response team is primarily responsible for providing resources and support to the shift response team as requested. The shift response team may request any or all of the site emergency response team to attend incident or provide support.

All site personnel (including those in the site emergency response team that are not specifically requested for assistance) shall report for a head count at the designated emergency assembly point:

1. Control Room
2. Administration Building
3. GTP Control Room

In the Control Room all non-shift personnel will be under the direction of the Chief Emergency Warden during normal business hours or the Emergency Commander after normal business hours. In the Administration Building all personnel will be under the direction of the Administration Emergency Warden.

### Site Safety

The Site Safety Technician who is fully trained in emergency response is available 24 hours a day to assist with emergencies including SCBA response & First Aid. They will also assist with emergency simulations.

### Crisis Management Team

Crisis Management Team (CMT) consists of senior personnel from Botany Chlor Alkali Plant. In the event of requiring involvement from the other BIP occupants, the respective senior personnel (such as BIP Operations Manager and BIP Environmental Engineer) will be invited to be part of the Crisis Management Team.

# maps

## Matraville and Surrounding Suburbs and Aquatic Environments

Appendix B contains a map of Matraville and its surrounding suburbs and aquatic environments, while Botany Industrial Park has been marked with a red border. Within Botany Industrial Park in the bottom corner is Ixom Chlor-Alkali Facility, marked blue. As noted in Section 4.2, Matraville Public School and Westfield Shopping Centre are in close proximity to the site, while a residential area is located on the opposite side of Denison Street and businesses occupy the opposite side of Beauchamp Road.

Stormwater leaving Ixom Chlor-Alkali Facility is discharged at the Botany Industrial Park site boundary and flows to Springvale Drain, marked in the south-west corner of the map. Botany Chlor-Alkali effluent flows through the Botany Industrial Park Effluent System and is discharged at the Southern and Western Suburbs Ocean Outfall Sewer in Malabar, marked in the south-east corner of the map. Details of the stormwater and effluent systems can be found in Appendices B-D.

## Botany Industrial Park Effluent System

Appendix C outlines the Botany Industrial Park Effluent System. Effluent from Ixom Chlor-Alkali Facility (Appendix E) and Stormwater Interceptor Pit 1 (Appendix D) enter the effluent system, which also receives effluent from other sources within Botany Industrial Park such as Huntsman and Qenos (Alkatuff, Alkathene and Olefines). The effluent system incorporates a Diversion Basin, which can hold approximately 2100 m3 of effluent. Effluent will be automatically diverted to the Diversion Basin if pH or total oxygen demand is out of specification. Ixom Chlor-Alkali can request diversion if a pollution incident has occurred.

## Stormwater System and Location of Potential Pollutants

Appendix D outlines the Ixom Chlor-Alkali stormwater system which collects stormwater from numerous drains on site. The stormwater eventually reaches Interceptor Pit 1, where it is pumped to the Botany Industrial Park Effluent System (Appendix C) or overflows to Springvale Drain. Appendix D also identifies locations of chemicals on site, which may be in the form of storage tank, process vessel or loading bays.

## Botany Chlor-Alkali Effluent System

Appendix E is a simplified version of the Ixom Chlor-Alkali Effluent System. Effluent is continuously neutralised in the Alkaline and Acid Effluent Pits and transferred to Effluent Pit 6, while dechlorinated effluent from the Sodium Hypochlorite Plant (Hypo Decomp) is transferred when required. Appendix E also demonstrates how effluent from the Hydrochloric Acid and Ferric Chloride Plants are recycled in the Ferric Plant, while the Hypo Decomp effluent is transferred out of the plant.

This PIRMP has been developed in coordination with neighbouring facilities to ensure a degree of consistency in the management of emergencies on the BIP.

The impact of a pollution of waters event would be estimated using information about the location of the discharge, the estimated volume of material discharged (based on the rate and duration).

# PLAN ACTIVATION

In accordance with Section 5.7A of the *Protection of the Environment Operations Act 1997*, Ixom Botany has prepared Pollution Incident Response Management Plans (PIRMPs). The PIRMPs outline the processes to prevent and minimise the risk of pollution incidents and ensure comprehensive and timely information is provided to relevant authorities and stakeholders.

## Incident Notification to relevant Authorities and Communication with Neighbours and the Local Community

In the event of a pollution incident, Ixom Botany will implement the following procedure for notifying relevant authorities and other stakeholders (see Appendix F for the detailed Environmental Incident Notification Procedure including the Checklist and Record of Regulator Notification).

The following information shall be recorded where possible and provided to those agencies requiring notification:

* The time, date, nature, duration and location of the pollution incident;
* The location of the place where hazard / pollution is occurring or is likely to occur;
* The nature, the estimated quantity or volume and the concentration of any hazards / pollutants involved;
* The circumstances in which the pollution incident occurred (including the cause of the incident, if known); and
* The action taken or proposed to be taken to deal with the pollution incident and any resulting risks / pollution or threatened risks / pollution.

Immediately contact the following authorities:

1. 000 – If the incident presents an immediate threat to human health or property. Emergency Services (Fire & Rescue, the Police and NSW Ambulance Service) are the first responders responsible for controlling and containing incidents.
2. If the incident does not require Emergency Services (or once 000 has been called) notify the relevant authorities in the following order:
   1. EPA Environment Line - 131 555
   2. Ministry of Health – Randwick Public Health Nurse
      1. Office Hours 1300 066 055
      2. Outside office hours (Request Public Health Nurse) 02 9382 2222
   3. The WorkCover Authority 131 050
   4. Bayside Council, 95621520/0412455068

* 1. Fire & Rescue (if not contacted already) 1300 729 579
  2. Department of Planning and Infrastructure 02 9228 6333
  3. Randwick City Council (as required) - 02 9939 0999 / 02 9937 2450 (after hrs)
  4. Bayside Council 0412455068/95621520

Following the above reporting, communication with the following groups shall occur as soon as practical:

1. Potentially affected community members (this includes owners/occupiers of industrial, commercial and residential properties) via door knocks or letter box drops. Door knocks and letterbox drops will also be used to provide early warnings and regular updates to owners/occupiers as required. Potentially affected community members will be determined based on the nature / scale of the pollution incident and the current weather conditions. Community notifications will include where possible:

* A brief statement on the nature and timing of the pollution incident;
* The party / parties responsible for responding (e.g. Emergency Services or EPA);
* The action (if any) required by the recipient of the notification; and
* Contact details for seeking further information.

**NOTE: if the pollution incident presents an immediate threat to human health or property then public notifications will be made by Emergency Services.**

1. Interested stakeholders, as appropriate for the nature / scale of the pollution incident, such as the Community Participation and Review Committee, Community Liaison Committee and the Botany Industrial Park Community Consultative Committee via phone and / or email.

An initial notification may be followed by an update (to the original recipients, or a smaller or larger group as deemed relevant) in the event that Ixom:

* is instructed by the authorities to do so;
* determines that a new or different response is required by relevant authorities and other stakeholders in response to the pollution incident; or
* decides to provide an update on the status of the investigation.

Notification may also be provided to the wider community, by way of media release and /or posting of media releases on [http://botany.ixom.com/](http://botany.orica.com/). A Community Emergency Response pamphlet is also available on the Ixom Botany website under Emergency Response, with information to assist in minimising harm such as staying indoors and closing windows.

## Ixom Chlor-Alkali Facility Staff Responsibilities

Since Plant Operators will be the plant personnel responding to an incident, the Emergency Commander (DCS Operator) is responsible for activating the Pollution Incident Response Management Plan. If the incident is likely to result in material harm to humans or the environment, the first step is to refer to the Environmental Incident Notification Procedure. The Emergency Commander is also responsible for managing the response to a pollution incident, while Table 2 outlines the staff responsible for notifying relevant authorities.

Ixom Botany Chlor-Alkali Facility staff with responsibilities under this Plan:

Table 2: Staff Responsible for Notifying Relevant Authorities

|  |  |
| --- | --- |
| **Responsible for Activating this Plan** | **Emergency Commander**  DCS Operator  (02) 9352 2060 |
| **Authorised to Notify relevant Authorities Under Notification of Pollution Incidents** | **Ian Parker - Regional Manufacturing Manager NEA (Acting)**  (02) 9352 2254  400 686 047 |
| **Nick Brazil - Operations Lead (Acting)**  (02) 9352 2242  450 181 469 |
| **John Khair - Maintenance Lead**  (02) 9352 2102  0447 440 783 |
| **Responsible for managing the Response to a Pollution Incident** | **Emergency Commander**  DCS Operator  (02) 9352 2060 |

# staff training

All inducted Botany Chlor-Alkali workers will undertake pollution incident awareness training in conjunction with emergency awareness training as a part of induction. Induction is undertaken at commencement of a worker’s tenure and each three years thereafter.

Training for workers with roles in the PIRMP will be undertaken in conjunction with Emergency Response training. This will be undertaken within each Ixom financial year.

Training for persons who have responsibility to notify relevant authorities will be undertaken before that person bears that responsibility.

Competency against the requirements of the PIRMP is measured by evaluation of the effectiveness of the response during emergency drills. Training records will be updated and stored on the Botany Chlor-Alkali Training Database.

# Plan Testing and Revisions

The Emergency Response Plan is tested using an emergency exercise at least four times per annum, one of which will include a pollution incident scenario and the testing of this Plan.

Revision of this plan will be considered following a pollution incident as a part of the incident investigation. This will ensure that learnings from the event debrief are incorporated into the Plan as required. Pollution event debriefs are included in the SH&E Audit Management Database and this shows the date on which Plan tests have been conducted and the name of the person who carried out the test.

This Plan will be reviewed at least annually. The revision status on the cover of this Plan indicates the latest version and the date it was issued.

# APPENDICES

**APPENDIX A   
Description of Hazards to Human Health and the Environment and Risk Assessment**

**APPENDIX B   
Botany Chlor-Alkali Facility and the Surrounding Neighbourhood**

**APPENDIX C   
Botany Industrial Park Effluent System**

**APPENDIX D   
Stormwater System and Chemical Locations on Site**

**Appendix E   
Chlor-Alkali Facility Effluent**

**APPENDIX F   
Environmental Incident Notification Procedure**

## APPENDIX A - Description of Hazards to Human Health and the Environment and Risk Assessment

A.1 Acid Effluent

A.2 Alkaline Effluent

A.3 Brine Solution/Sludge

A.4 Chlorinated Brine

A.5 Chlorinated Sulphuric Acid

A.6 Chlorine

A.7 Coagulant

A.8 Cobalt Sulphate

A.9 Cooling Tower Dosing Chemicals

A.10 Cooling Water

A.11 Ferric Chloride

A.12 Ferrous Chloride

A.13 Filter Aid / Pre-Coat

A.14 Fire Water

A.15 Hydrochloric Acid

A.16 Magnesium Chloride

A.17 Oil and Grease

A.18 Sodium Hypochlorite

A.19 Sodium Hydroxide

A.20 Sodium Bisulphite

A.21 Sulphuric Acid

**APPENDIX A.1   
Acid Effluent**

The Acid Effluent area receives all effluent from the front end of the Chlor-Alkali Plant that does not flow to the Alkaline Effluent area. These two areas are separated since the mixture of acidic effluent may reduce the pH of chlorinated effluent, resulting in the release of chlorine. Furthermore, the mixing of strong alkalis with strong acids will produce large quantities of heat. Acid effluent flows to the Acid Effluent Sump, where it is pumped to the Acid Effluent Tank for neutralisation before transfer to Effluent Pit 6 Interception and subsequently, Site Utilities.

**Hazards to Human Health and the Environment**

For hazards to human health and the environment, see hazards for individual chemicals. The following chemicals are in the Acid Effluent area and are compatible to the point where they do not pose a hazard to human health or the environment after neutralisation: Sulphuric acid, chlorinated sulphuric acid, cooling water, hydrochloric acid and water.

A release from the Acid Effluent Tank may be harmful to human health if neutralisation is incomplete. Acid effluent may pose an environmental hazard if the Chlor-Alkali Plant acid bund fails or the control system fails, transferring low pH effluent to Effluent Pit 6 Interception.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Hypo Destruct Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Hi and hi-hi level alarms on LI15023. * XSV15031 caustic valve closes on LI15023 hi level. * HIC15024 acid valve closes on LI15023 hi-hi level. * Overflow to lute in acid effluent bunded area, with acid effluent treatment downstream. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [02]. Overfilling Acid Effluent Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Hi and hi-hi level alarm on LI18510. * LAHHH18510 hi-hi-hi level discrete alarm. * Sump transfer pump trips on LI18510 hi-hi level. * HIC18511 caustic dosing valve closes on LI18501 hi-hi-hi level alarm. * HIC18525 acid dosing valve closes on LI18501 hi-hi-hi level alarm. * HS15025 destruct transfer valve closes on LI18510 hi-hi level alarm. * Overflow to acid effluent bunded area. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Out of Spec Effluent Unintendedly Transferred from CAP Plant | | | | | | | |
|  | **Nat** | Overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Containment and segregated CAP effluent collection system * AI18513 pH hi, hi-hi, lo and lo-lo alarms * Caustic (HIC18511) and acid (HIC18525) dosing valves close when transfer pump is stopped * HS15025 Hypo Destruct Valve closes on hi pH AI15029 * Operator training to release out of spec effluent only to neutralise effluent downstream * EP6 lo and lo-lo pH alarms on AI7011. * AAL7011 discrete pH alarm. * Site Utilities contact Control Room if pH is out of spec. * Site Utilities effluent diversion capabilities | Category 2 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 2 | | Unlikely | Level IV |
| Item [04]. Mechanical Failure of Hypo Destruct Tank or Acid Effluent Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Informal regular checks on external condition * Correct material and thickness specification * Tanks and vessels protected by bund walls * DCS Tank low level alarms: Hypo Destruct Tank:   Lo-lo on LI15023.  LALLL15023 discrete alarm.   Acid Effluent Tank:  Lo-lo on LI18510.  LALLL18510 discrete alarm.   * Bund capacity is 110% of largest tank or vessel * Hypo Destruct Tank pressure relief to Chlorine Cooler. Vacuum relief from vent to atmosphere. * Acid Effluent Tank pressure and vacuum relief to atmosphere. * Weeping effluent may be detectable * Acid Effluent Pit hi-hi level alarm on LI18522. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [05]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves and automatic isolation valves * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Site Utilities contact Control Room * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Unlikely | Level III |

**Acid Effluent Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Unbunded Response Plan*

*Refer to CAP Bund Response Plan*

Where is the leak?

CAP Bund

Unbunded Area

**CAP Bund**

Leak Identified in   
CAP Bund

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate  
or capture leak for effluent

Tank Failure?

Transfer from Acid Effluent sump to IBCs

Dispose of Effluent

Hose down CAP bund area affected

Y

N

Hose leak to Acid Effluent Sump with water for dilution

Transfer sump contents to Acid Effluent Tank for neutralization and transfer

**Unbunded Area**

Can it be isolated?

Leak Identified in Unbunded Area

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

Effluent entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Absorb remaining spill as appropriate

Inform Site Utilities as appropriate

Dispose of waste

Dispose of waste

Absorb remaining spill as appropriate

**APPENDIX A.2   
Alkaline Effluent**

The Alkaline Effluent area receives all effluent from the front end of the Chlor-Alkali Plant that does not flow to the Acid Effluent area. These two areas are separated since the mixture of acidic effluent may reduce the pH of chlorinated effluent, resulting in the release of chlorine. Furthermore, the mixing of strong alkalis with strong acids will produce large quantities of heat. Alkaline effluent flows to the Alkaline Effluent Sump, where it is pumped to the Alkaline Effluent Tank for neutralisation before transfer to Effluent Pit 6 Interception and subsequently, Site Utilities.

**Hazards to Human Health and the Environment**

For hazards to human health and the environment, see hazards for individual chemicals. The following chemicals are in the Alkaline Effluent area and are compatible to the point where they don’t pose a hazard to human health or the environment after neutralisation: Brine, chlorinated brine, sodium bisulphite, magnesium chloride, filter aid / pre-coat, cooling water, sodium hypochlorite, sodium hydroxide, coagulant and water.

A release from the Alkaline Effluent Tank may be harmful to human health if neutralisation is incomplete. Alkaline effluent may pose an environmental hazard if the Chlor-Alkali Plant alkaline bund fails or the control system fails, transferring high pH effluent to Effluent Pit 6 Interception.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Alkaline Effluent Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Hi and hi-hi level alarm on LI18501. * LAHHH18501 hi-hi-hi level discrete alarm. * Sump transfer pump trips on LI18501 hi-hi level. * HIC18533 caustic dosing valve closes on LI18501 hi-hi-hi level alarm. * HIC18502 acid dosing valve closes on LI18501 hi-hi-hi level alarm. * Overflow to Lute in alkaline effluent bunded area. * ORP measurement on Alkaline Effluent Tank indicating available chlorine in effluent * Effluent dechlorinated with sodium bisulphite * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.1 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Chlorine Gas Detectors * All personnel carry a chlorine respirator * Controls to prevent chlorinated effluent entering the Alkaline Effluent Tank * Shutdown procedures to dechlorinate chlorinated effluent after draining * Acid and Alkaline effluent areas separated * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [02]. Out of Spec Effluent Unintendedly Transferred from CAP Plant | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Containment and segregated CAP effluent collection system * AI18505 pH hi-hi, lo and lo-lo alarms * Caustic (HIC18533) and acid (HIC18502) dosing valves close when transfer pump is stopped * HS18524 transfer valve closes on AI18513 hi-hi pH * EP6 hi-hi pH alarm on AI7011. * AAH7011 discrete pH alarm. * Site Utilities contact Control Room if pH is out of spec. * Site Utilities effluent diversion capabilities | Category 2 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 2 | | Unlikely | Level IV |
| Item [03]. Mechanical Failure of Alkaline Effluent Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Informal regular checks on external condition * Correct material and thickness specification * Tanks and vessels protected by bund walls * LI18501 lo-lo level alarm. * Bund capacity is 110% of largest tank or vessel * Pressure relief to Hypo suction. * Vacuum relief from vent to atmosphere. * Weeping effluent may be detectable * ORP measurement on Alkaline Effluent Tank indicating available chlorine in effluent * Effluent dechlorinated with sodium bisulphite * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Chlorine Gas Detectors * All personnel carry a chlorine respirator * Controls to prevent chlorinated effluent entering the Alkaline Effluent Tank * Shutdown procedures to dechlorinate chlorinated effluent after draining * Acid and Alkaline effluent areas separated * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves and automatic isolation valves * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Unlikely | Level III |

**Alkaline Effluent Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Unbunded Response Plan*

*Refer to CAP Bund Response Plan*

Where is the leak?

CAP Bund

Unbunded Area

**CAP Bund**

Leak Identified in   
CAP Bund

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
or capture leak for effluent

Tank Failure?

Transfer from Alkaline Effluent sump to IBCs

Dispose of Effluent

Hose down CAP bund area affected

Y

N

Hose leak to Alkaline Effluent Sump with water for dilution

Transfer sump contents to Alkaline Effluent Tank for neutralization and transfer

**Unbunded Area**

Can it be isolated?

Leak Identified in Unbunded Area

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

Effluent entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Absorb remaining spill as appropriate

Inform Site Utilities as appropriate

Dispose of waste

Dispose of waste

Absorb remaining spill as appropriate

**APPENDIX A.3  
Brine Solution / Sludge**

Brine is transferred from the lixators to the Primary and Secondary treatment tanks to precipitate impurities for separation in the Clarifier. The brine is then filtered and deionised before being transferred to the Weak Brine Tank for recirculation to the Electrolysers for the production of chlorine. Before being sent back to the lixators, the hot acidified brine from the Weak Brine Tank is dechlorinated in the Brine Dechlorinator. If sulphate levels are too high, the brine is processed through the sulphate removal system (KCSR).

**Hazards to Human Health**

The primary hazard to human health is heat, with the brine processed on site potentially reaching temperatures of 90 degrees Celsius. Exposure to hot brine can result in burns to the skin. If ingested, large amounts may cause nausea or vomiting, with no adverse effects expected from small amounts. Brine may be an eye irritant and contact with skin at lower temperatures may result in irritation.

**Hazards to the Environment**

Brine is not biodegradable and contamination of waterways is to be avoided. While brine solution (26%) will dehydrate animal and vegetable species, sodium chloride is practically non-toxic to aquatic organisms.

LC50: Lemonis Macrochirus 96 hr – 5560-6080 mg/L (flow-through) or 12946 mg/L (static).

<http://www.novachem.com/Product%20Documents/BrineSolution_MSDS_EN.pdf>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Lixators | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS high level alarms:   Hi on LIC11000 (controls waste  liquor into lixator) Hi on LIC11001 (controls waste   liquor into lixator)   * Dechlorinated brine into Lixators A and B can be isolated by V0016 and V0051, respectively, diverting all flow into one lixator. * Effluent drain surrounding lixators, with flow to Alkaline Effluent sump for transfer into Alkaline Effluent Tank * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [02]. Overfilling Primary Brine Treatment Tank, Secondary Brine Treatment Tank or Clarifier | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Primary Brine Treatment Tank overflows to Secondary Brine Treatment Tank: Normal operation * Secondary Brine Treatment Tank overflows to Clarifier: Normal operation * Clarifier overflows to Clarified Brine Tank: Normal operation * All tanks/equipment in CAP bunded area. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [03]. Overfilling Clarified Brine Tank, Filtered Brine Tank or Deionised Brine Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS high level alarms:   Clarified Brine Tank: Hi on LIC11016  Filtered Brine Tank:   Hi and hi-hi on LIC11048  Deionised Brine Tank:   Hi on LIC11108   * All three tanks overflow to Alkaline Trench in CAP bunded area, with Alkaline Effluent Tank downstream for neutralisation of effluent * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [04]. Overfilling Brine Sludge Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS high level alarms:   Hi and hi-hi on LIC11155   * Overflow to floor in CAP bunded area, with Alkaline Effluent trench and Alkaline Effluent Tank downstream for neutralisation of liquid sludge * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [05]. Overfilling KCSR Feed Storage Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS high level alarms:   Feed Storage Tank:   Hi-hi on LI11572.  HV11526 inlet valve closes on  LI11572 hi-hi level.   * Feed Storage Tank overflows to Alkaline Trench in CAP bunded area, with Alkaline Effluent Tank downstream for neutralisation before transfer to Site Utilities * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [06]. Overfilling Waste Liquor Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS high level alarm:   Hi on LIC18516 (controls caustic condensate flow into tank).   * Overflow to Alkaline Trench in CAP bunded area, with Alkaline Effluent Tank downstream for neutralisation before transfer to Site Utilities * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 2 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [07]. Mechanical Failure of Storage Tanks or Brine Process Vessels | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Informal regular checks on external condition * Correct material and thickness specification * Tanks and vessels protected by bund walls   DCS Tank low level alarms:   * Lixators: Lo and lo-lo on LIC11000.  Lo and lo-lo on LIC11001. * Clarified Brine Tank:   Lo and lo-lo on LIC11016  LALLL11016 discrete alarm. * Filtered Brine Tank:  Lo and lo-lo on LIC11048. * Deionised Brine Tank:  Lo and lo-lo on LIC11108. * Brine Sludge Tank: Lo on LIC11155. * KCSR Feed Storage Tank:  Lo-lo on LI11572. * Waste Liquor Tank:   Lo and lo-lo on LIC18516.   Pressure and vacuum relief:   * Lixator open to atmosphere * Primary Brine Treatment Tank  pressure relief through Carbon   Dioxide Scrubber   * Primary and Secondary Treatment  tanks venting through overflows. * Clarifier open to atmosphere. * Clarified Brine Tank vent to  atmosphere. * Filtered Brine Tank vent to  atmosphere. Deionised Brine Tank vent to  atmosphere * Brine Sludge Tank vent to  atmosphere. * KCSR Feed Storage Tank vent to  atmosphere. * Waste Liquor Tank vent to   atmosphere. * Bund capacity is at least 110% of largest tank or vessel * Weeping brine may be detectable * Alkaline Effluent Pit hi-hi level alarm on LI18521 * Alkaline Effluent Pit pH alarms (hi, hi-hi, lo and lo-lo) on AI18532 * Acid Effluent Pit hi-hi level alarm on LI18522 * Acid Effluent Pit pH alarms (hi, hi-hi, lo and lo-lo) on AI18534 * Effluent (except Lixators) neutralisation before transfer to Site Utilities * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [08]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves and automatic isolation valves * Alkaline Effluent Pit hi-hi level alarm on LI18521 * Alkaline Effluent Pit pH alarms (hi, hi-hi, lo and lo-lo) on AI18532 * Acid Effluent Pit hi-hi level alarm on LI18522 * Alkaline Effluent Pit pH alarms (hi, hi-hi, lo and lo-lo) on AI18534 * EP6 hi-hi pH alarm on AI7011.   **ERA-CC-001**   * EP6 lo and lo-lo pH alarms on AI7011.   **ERA-CC-001**   * AAH7011 discrete pH alarm. * AAL7011 discrete pH alarm. * Site Utilities contact Control Room if pH is out of spec. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 2 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |

**Brine Solution/Sludge Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Unbunded Response Plan*

*Refer to CAP Bund Response Plan*

Where is the leak?

CAP Bund

Unbunded Area

**CAP Bund**

Leak Identified in   
CAP Bund

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
or capture leak for effluent

Can effluent go to Site Utilities (TDS)?

N

Transfer from Alkaline Effluent sump to IBCs

N

Y

Hose down CAP bund area affected

Slowly dispose of brine to Alkaline Effluent Sump

Hose leak to Alkaline Effluent Sump as required

Transfer sump contents to Alkaline Effluent Tank

**Unbunded Area**

Leak Identified in Unbunded Area

Can it be isolated?

N

Y

Shutdown system and isolate   
if appropriate  
(Consider closing V0016 or V0051 if one of the lixators is overflowing)

Isolate leak  
(Consider closing V0016 or V0051 if one of the lixators is overflowing)

Block drains and/or capture remaining leak as appropriate

Brine entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Absorb remaining spill as appropriate

Inform Site Utilities as appropriate

Dispose of waste

Absorb remaining spill as appropriate

Dispose of waste

**APPENDIX A.4  
Chlorinated Brine**

The processing of brine on site has been described in *Brine Solution/Sludge*. This section covers a potential loss of containment of brine from the Weak Brine Tank and Brine Dechlor Tower, once the brine has been chlorinated.

**Hazards to Human Health**

All hazards of brine are relevant for chlorinated brine.

Chlorinated brine contains chlorine. Refer to MHF Safety Report for chlorine hazards and controls.

**Hazards to the Environment**

All hazards of brine are relevant for chlorinated brine.

It has been advised to avoid contaminating waterways. Limited ecological information is available on chlorinated brine, but it is toxic to aquatic organisms.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Weak Brine Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS high level alarms:   Hi and hi-hi on LIC12101  Hi and hi-hi on LIC12102  I65 trip on hi-hi level   * Tank located in CAP bunded area, with Alkaline Trench and Alkaline Effluent Tank downstream for neutralisation and dechlorination before transfer to Site Utilities. * Chlorine gas detectors * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * No overflow for personnel to be exposed to chlorinated brine * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [02]. Overfilling Dechlor Brine Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS high level alarms:   Hi and hi-hi on LIC11502   * I65 trip on hi-hi level * Chlorine gas detectors * Overflow to lute in CAP bunded area, with Alkaline Trench and Alkaline Effluent Tank downstream for neutralisation and dechlorination before transfer to Site Utilities. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Mechanical Failure of Weak Brine Tank or Dechlor Brine Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Informal regular checks on external condition * Correct material and thickness specification * Tanks and vessels protected by bund walls   Pressure and vacuum relief:   * Weak Brine Tank: Pressure and  vacuum seals to protect tank.  I65 trip on lo-lo pressure and hi-hi   pressure. * Dechlor Brine Tank vent to Hypo.  Air intake vent for vacuum relief. * Chlorine gas detectors.   DCS Tank low level alarms:   * Weak Brine Tank:   Lo and lo-lo on LIC12101.  Lo and lo-lo on LIC12102. * Dechlor Brine Tank:   Lo and lo-lo on LIC11502.  LALL11502 discrete alarm. * Bund capacity is at least 110% of largest tank or vessel * Weeping brine may be detectable * Alkaline Effluent Pit hi-hi level alarm on LI18521 * Alkaline Effluent Pit pH alarms (hi, hi-hi, lo and lo-lo) on AI18532 * Acid Effluent Pit hi-hi level alarm on LI18522 * Acid Effluent Pit pH alarms (hi, hi-hi, lo and lo-lo) on AI18534 * Effluent neutralisation and dechlorination before transfer to Site Utilities * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves and automatic isolation valves * Chlorine gas detectors * Alkaline Effluent Pit hi-hi level alarm on LI18521 * Alkaline Effluent Pit pH alarms (hi, hi-hi, lo and lo-lo) on AI18532 * EP6 hi-hi pH alarm on AI7011.   **ERA-CC-001**   * EP6 lo and lo-lo pH alarms on AI7011.   **ERA-CC-001**   * AAH 7011 discrete pH alarm. * AAL7011 discrete pH alarm. * Site Utilities contact Control Room if pH is out of spec. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Burns to skin at high temperatures. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Unlikely | Level III |

**Chlorinated Brine Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Unbunded Response Plan*

*Refer to CAP Bund Response Plan*

Where is the leak?

CAP Bund

Unbunded Area

**CAP Bund**

Leak Identified in   
CAP Bund

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
or capture leak for effluent

Hose leak to Alkaline Effluent Sump and pump into Alkaline Effluent Tank  
(add SBS as appropriate)

Dechlorinate and neutralize effluent as required

**Unbunded Area**

Leak Identified in Unbunded Area

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

Chemical entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Absorb remaining spill as appropriate

Inform Site Utilities as appropriate

Absorb remaining spill as appropriate

Dispose of chlorinated waste appropriately

Dispose of chlorinated waste appropriately

**APPENDIX A.5  
Chlorinated Sulphuric Acid**

The processing of sulphuric acid on site has been described in *Sulphuric Acid*. This section covers a potential loss of containment of sulphuric acid from the Sulphuric Acid Drying Towers and Sulphuric Acid Dechlor Tower, once it has been chlorinated.

**Hazards to Human Health**

All hazards of sulphuric acid are relevant for chlorinated sulphuric acid.

Chlorinated sulphuric acid contains chlorine. Refer to MHF Safety Report for chlorine hazards and controls.

**Hazards to the Environment**

All hazards of sulphuric acid are relevant for chlorinated sulphuric acid.

The ecological impacts of chlorinated sulphuric acid are not known. Based on the known environmental hazards of sulphuric acid and chlorine, a release is likely to result in significant local pollution.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Primary and Secondary Sulphuric Acid Drying Towers | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank high level alarms:   Hi and hi-hi on LI14146 (Primary) * Secondary Drying Tower overflows into Primary Drying Tower as normal operation. * Acid addition valve FV14271 closes on CAP trip. * Chlorine gas detectors. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin or eyes, with possible permanent injury. | * As for “Nat” * No overflow on Primary Tower for personnel to be exposed to chlorinated sulphuric acid. * Monogoggle area * Safety showers   **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [02]. Overfilling Sulphuric Acid Dechlor Tower | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Transfer valve closes on high tank level. * DCS high level alarms:  Hi and hi-hi on LI14270. * Overflow to lute in bund. * Chlorine gas detectors. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin or eyes, with possible permanent injury. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Mechanical Failure of Sulphuric Acid Drying Towers or Sulphuric Acid Dechlor Tower | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Correct material and thickness specification * Towers protected by bund walls * Vacuum and pressure relief for drying towers in chlorine lines. * Dechlor tower pressure relief to Hypo. Vacuum relief from air intake. * DCS Tank low level alarms: P’ry Sulphuric Acid Drying Tower:  Lo and lo-lo on LI14146. Sulphuric Acid Dechlor Tower:  Lo and lo-lo on LI14270. * Chlorine gas detectors. * Bund capacity is 110% of largest tank * Acid Effluent Pit level alarm LAH18522 * Acid Effluent Pit pH alarms AAH18534 and AAHH18534 * Informal regular inspections of area. * Weeping acid may be detectable * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin or eyes, with possible permanent injury. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Double block isolations on offshoots * Piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves * Chlorine gas detectors * Acid Effluent Pit level alarm LAH18522 * Acid Effluent Pit pH alarms AAH18534 and AAHH18534   **ERA-CC-003**   * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin or eyes, with possible permanent injury. | * As for “Nat” * All personnel carry chlorine respirators * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Unlikely | Level III |

**Chlorinated Sulphuric Acid Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to CAP Bund Response Plan*

**CAP Bund**

Leak Identified in   
CAP Bund

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
or capture leak for effluent

Barricade affected area

Major release?

Y

Neutralise floor and IBC contents with dry lime

Shovel floor contents into IBC(s) for disposal

Hose down CAP bund affected area

Transfer Acid Effluent Sump contents to IBC(s) allowing ventilation

Leave contents on floor and in IBC(s) for 48 hrs for slow dechlorination

N

Add caustic to the Acid Effluent Sump followed by sodium bisulphite for dechlorination

Hose area as required, monitoring the Acid Effluent Sump pH

Transfer dechlorinated effluent to the Effluent Header

**APPENDIX A.6  
Chlorine**

Chlorine is produced in the electrolysers at the front-end of the Chlor-Alkali Plant and is cooled, filtered and dried before being compressed and transferred to the Sodium Hypochlorite Plant, Ferric Chloride Plant and Hydrochloric Acid Plant.

**Hazards to Human Health**

Chlorine is an irritant to the mucous membranes of the respiratory tract (airways), may cause coughing or shortness of breath and may cause adverse lung effects if high concentrations are inhaled. Inhalation of vapours may cause severe breathing difficulties and lung oedema while delayed fluid build-up in the lungs may occur, with severe exposure having the potential to cause lung damage. Overexposure may result in death.

**Hazards to the Environment**

While chlorine does not accumulate in organisms and the material is not expected to bioconcentrate, it has been advised to avoid contaminating waterways. Chlorine is very toxic to aquatic organisms and is very ecotoxic in the soil environment.

LC50: Fish 96 hr – 0.014 ppm.

Refer to Scenario Likelihood Calculation under Botany ChlorAlkali Safety Case in the Botany SHE Risk Register for the likelihood of different chlorine releases and refer to Attachment A3 in the Emergency Response Plan for actions to take in a chlorine release emergency.

**APPENDIX A.7  
Coagulant (Ciba ALCLAR 665)**

Coagulant binds a number of combined calcium and magnesium crystals in brine together to form larger, more easily settled aggregates ready for clarification. Coagulant solution is prepared by mixing coagulant powder with demineralised water.

**Hazards to Human Health**

The primary hazard to human health is the slippery nature of the coagulant, which can result in injuries from slips and falls. The coagulant is a low toxicity product when swallowed, is not an irritant to skin, but may cause irritation to the eyes or respiratory tract if dust is inhaled.

**Hazards to the Environment**

It has been advised not to flush the coagulant into surface water drains or sanitary sewer system.

LC50: Freshwater fish Brachydanio rerio 96 hr – 357 mg/L

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling T11045 Coagulant Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS hi level warning alarm on LI11047 * Tank contained in CAP bunded area. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 2 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to eyes. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. * Safety showers **MHF-CC-087** | Category 3.1 | | Unlikely | Level III |
| Item [02]. Mechanical Failure of T11045 Coagulant Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Informal regular checks on external condition * Correct material and thickness specification * Tank protected by bund walls * Bund capacity is at least 110% of largest tank or vessel * Low level warning alarm on LI11047. * Loss of containment drains to Alkaline Effluent Sump * Weeping solution may be detectable * Alkaline Effluent Pit hi-hi level alarm on LI18521 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and * Diversion Basin downstream for out of specification effluent * Response Plan | Category 2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to eyes. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. * Safety showers  **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [03]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves * Visual inspections by operator during coagulant addition * Alkaline Effluent Pit hi-hi level alarm on LI18521 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to eyes. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. * Safety showers  **MHF-CC-087** | Category 3.1 | | Unlikely | Level III |

**Coagulant**

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

Leak   
Identified

*Refer to CAP Bund Response Plan*

**CAP Bund**

Leak Identified in   
CAP Bund

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
or capture leak for effluent

Hose down CAP bund affected area

Transfer sump contents to Alkaline Effluent Tank

**APPENDIX A.8  
Cobalt Sulphate Solution**

Cobalt sulphate is used in the decomposition of chlorine in effluent from the Sodium Hypochlorite Plant. A loss of containment of cobalt sulphate will flow to the 6X Sump and transferred to the 6X Tank and subsequently the Decomp Tank. The cobalt sulphate IBC is located above a temporary bund, which will contain any loss of containment from the IBC, so shift inspections will identify the LOC visually or by poor decomposition of sodium hypochlorite.

**Hazards to Human Health**

Ingestion of cobalt sulphate can result in nausea, vomiting, diarrhoea and abdominal pain. Cobalt sulphate may cause physical irritation to the eyes and skin, while breathing in dust may result in respiratory irritation and can cause allergic reactions, producing asthma-like symptoms. Available evidence indicates that cobalt sulphate is an animal carcinogen and therefore should be considered a possible human carcinogen. On heating, cobalt sulphate decomposes emitting toxic fumes.

**Hazards to the Environment**

Cobalt sulphate is very toxic to aquatic organisms and may cause long term adverse effects in the aquatic environment. Contamination of waterways is to be avoided. Cobalt sulphate degrades to sulphur oxides and metal oxides.

LC50: Selenastrum Capricornutum: 72 hr – 0.4-72 mg/L

<http://www.martrexinc.com/msds/MSDS_Cobalt_Sulfate_33.pdf>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Cobalt Sulphate IBC Overfilled | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * IBC manually filled to low level by Chemist. * IBC is above a temporary bund inside 6X bund to allow time for action in a loss of containment event * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Nausea, vomiting, diarrhoea and abdominal pain from ingestion. Potential carcinogen. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |
| Item [02]. Mechanical Failure of Cobalt Sulphate IBC | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * IBC suitable for application * Regular inspections of IBC by shift operators. * Poor decomposition will prompt physical inspection by shift operator. * Only up to 200 L in IBC at one time * Double bund containment * Transfer from temporary or secondary bund back to IBC in a loss of containment event * Chemist will re-use any spilled chemical. * IBC protected by bund wall * Pressure and vacuum relief to atmosphere * Bund capacity is at least 110% of largest tank * Informal regular checks on external condition * Weeping solution may be detectable * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Nausea, vomiting, diarrhoea and abdominal pain from ingestion. Potential carcinogen. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.1 | | Unlikely | Level III |
| Item [03]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Correct material and gasket specification * Piping and valves in bunded area to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves * Informal regular checks on external condition * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to skin or eyes. Nausea, vomiting, diarrhoea and abdominal pain from ingestion. Potential carcinogen. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.1 | | Very Unlikely | Level IV |

**Cobalt Sulphate Solution Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Products Bund Response Plan*

**Products Bund**

Leak Identified in Products Bund

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate or capture leak for effluent

Pump 6X Sump contents containing cobalt sulphate to IBC

Chemist to prepare catalyst for re-use

Hose down affected area

**APPENDIX A.9  
Cooling Tower Dosing Chemicals**

The Cells and Products Cooling Towers on site are managed by Nalco, who also supply and manage dosing chemicals. The same Nalco dosing chemicals are used for each cooling tower.

**Hazards to Human Health**

Nalco 7730: This chemical is hazardous and classed as a dangerous good. This chemical will cause eye burns and permanent tissue damage. If contact with the skin is made, severe irritation or tissue damage may occur, depending on length of exposure. Skin sensitisation may result from prolonged contact. Ingestion will cause chemical burns to the mouth, throat and stomach. Inhalation will result in irritation.

3D TRASAR 3DT284: This chemical is hazardous and classed as a dangerous good. This chemical will cause eye burns and permanent tissue damage. If contact with the skin is made, severe irritation or tissue damage may occur, depending on length of exposure. Ingestion will cause chemical burns to the mouth, throat and stomach. Inhalation will result in irritation in high concentrations.

3D TRASAR 3DT191: Eye and skin contact may cause irritation with prolonged contact and no adverse effects are expected from ingestion and inhalation.

Nalco 77393: This chemical is hazardous. This chemical is a severe irritant and will injure eye tissue, possibly resulting in permanent eye damage. If contact with the skin is made, mild irritation may be experienced. Ingestion may cause gastrointestinal irritation. No adverse effects are expected from inhalation.

**Hazards to the Environment**

Nalco 7730 may pose a risk to aquatic ecosystems and contamination of waterways should be prevented. LC50: Rainbow Trout 96 hr – 12.67 mg/L.

3D TRASAR 3DT284 contamination of surface water should be prevented. LC50: Rainbow Trout 96 hr – >5000 mg/L.

3D TRASAR 3DT191 contamination of surface water should be prevented. LC50: Rainbow Trout 96 hr – 2813 mg/L

Nalco 77393 contamination of surface water should be prevented. Potential environmental hazard classified as low.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Cooling Water Dosing Tank 7730, 3DT284, 3DT191 and 77393 on Cells or Products Cooling Tower or Loss of Containment during Loading | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Cells Cooling Tower dosing tanks overflow to tank bunds * Products Cooling Tower dosing tanks overflow on discharge line to tank bunds * All decant work conducted will be by designated Toll Chemical Logistics drivers, who are inducted into the Ixom Chlor-Alkali Plant (CAP) site, understand the Ixom safety requirements, and plant layout. * Driver checks. * Driver monitors load. * Driver to drain as much product as possible after transfer by lifting a small section of hose and walking the length of the hose, lifting a small section at a time. * Recently written JSERA outlines drivers ensure drip tray is in position to collect any potential spilt product. * Nalco monitor and manage chemical dosing tanks and bunds * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 2 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with possible burns and permanent injury to eyes and damage to tissue. Irritation from inhalation. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Acid Suit and face shield specified on recent JSERA for DG chemicals. | Category 2 | | Very Unlikely | Level IV |
| Item [02]. Mechanical Failure of Cooling Water Dosing Tank 7730, 3DT284, 3DT191 and 77393. | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Nalco monitor and manage chemical dosing tanks and bunds * Correct material and thickness specification * Tanks located away from vehicle paths on site * Products Cooling Tower dosing tank pressure and vacuum relief to atmosphere * Bund capacity is at least 110% of largest tank or vessel * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with possible burns and permanent injury to eyes and damage to tissue. Irritation from inhalation. | * As for “Nat” * Dosing tanks in individual bunds (difficult to access) * Small tanks contain little static head for discharge * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Correct material and gasket specification * Piping, valves and tubing in bunded areas or away from physical impact hazards * Piping and tubing supports to prevent strain, cracks and loss of containment * Selected piping and tubing elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves * Weekly inspections by Nalco representative * EP6 lo and lo-lo pH alarms on AI7011 * EP6 AALL7011 discrete pH alarm.   **ERA-CC-001**   * Site Utilities contact Control Room if pH is out of spec. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with possible burns and permanent injury to eyes and damage to tissue. Irritation from inhalation. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Unlikely | Level III |

**Cooling Tower Dosing Chemicals Response Plan**

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

Leak   
Identified

Chemical Bund

*Refer to Unbunded Response Plan*

*Refer to Chemical Bund Response Plan*

Where is the leak?

Unbunded Area

**Nalco Tank Bund**

Leak Identified in   
Chemical Bund

Can it be isolated?

N

Y

Shutdown system and isolate  
or capture leak if appropriate

Isolate leak

Contact Nalco representative to clean spill and repair dosing system

**Unbunded Area**

Can it be isolated?

Leak Identified in Unbunded Area

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

Chemical entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Absorb remaining spill as appropriate

Inform Site Utilities as appropriate

Absorb remaining spill as appropriate

Contact Nalco and dispose of waste.  
  
Note: If the LOC is from loading activities, the driver should take the waste off site.

Contact Nalco and dispose of waste.  
  
Note: If the LOC is from loading activities, the driver should take the waste off site.

**APPENDIX A.10  
Cooling Water**

Cooling water is pumped from the Cells Cooling Tower and Products Cooling Tower to different processes to cool liquids and gases to desired temperatures. While cooling water is primarily water, bacteria can form over time and the conductivity of the water increases as evaporation takes place. Since chemicals are dosed to prevent bacterial growth, the cooling water cannot be considered to be pure water.

**Hazards to Human Health**

A lack of chemical treatment for cooling water can result in the formation of legionella. Legionella causes legionellosis, a potentially fatal infectious disease, which can cause high fever and pneumonia. Ixom contracts Nalco to monitor the cooling towers and prevent the generation of harmful bacteria.

**Hazards to the Environment**

Due to evaporation, the conductivity of the water in the cooling towers increases with time. Blowdown and addition of water takes place to control the conductivity of the cooling water. However, the conductivity of the cooling water is higher than that of pure water. Total dissolved solids can be determined from conductivity, with high levels affecting plants and animals through dehydration of the skin and having a laxative effect. Humans have a tolerance of up to 500 mg/L, while beef cattle have a tolerance up to 10000 mg/L. Most aquatic ecosystems involving mixed fish fauna can tolerate 1000 mg/L. Both Cooling Towers perform to keep total dissolved solids below 700 mg/L.

Furthermore, dosage of treatment chemicals also reduce the purity of the cooling water.

Boyd, Claude E. (1999). *Water Quality: An Introduction*. The Netherlands: Kluwer Academic Publishers Group. [ISBN](http://en.wikipedia.org/wiki/International_Standard_Book_Number) [0-7923-7853-9](http://en.wikipedia.org/wiki/Special:BookSources/0-7923-7853-9).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Cells Cooling Tower Basin | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage from high TDS or legionella. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Nalco manage dosing system to ensure no legionella in cooling towers. * Hi level alarm on LIC3030. * Water addition FIC3030A and FIC3030B control valves based on basin level. * Overflow to Effluent Header. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 1 | | Unlikely | Level IV |
| Item [02]. Overfilling Products Cooling Tower Basin | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage from high TDS or legionella. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Nalco manage dosing system to ensure no legionella in cooling towers. * High level alarms:  Hi and hi-hi on LIC7034. * Water addition LIC7034 control valves based on basin level. * Overflow to Effluent Header. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 1 | | Unlikely | Level IV |
| Item [03]. Mechanical Failure of Cells or Products Cooling Tower Basin | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage from high TDS or legionella. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Nalco manage dosing system to ensure no legionella in cooling towers. * 5 yearly external risk assessment conducted for each tower * Informal regular checks on external condition * Correct material and thickness specification * Pressure and vacuum relief to atmosphere. * Low level alarms:   Cells: Lo on LIC3030.  Products: Lo-lo on LIC7034.  LAL7034 discrete warning alarm.   * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 1 | | Unlikely | Level IV |
| Item [04]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage from high TDS or legionella. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Nalco manage dosing system to ensure no legionella in cooling towers. * Correct material and gasket specification * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Likely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 1 | | Likely | Level III |

**Cooling Water Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Unbunded Area Response Plan*

***Note:***  *Cooling water LOCs in Products bunds will go to effluent (Hypo area) or Ferric Product (Ferric and HCl areas).*

**Unbunded Area**

Leak Identified

Can leak be isolated?

N

Y

Isolate leak if required

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

Water entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Absorb remaining spill as appropriate

Inform Site Utilities as appropriate

Dispose of waste

Dispose of waste

Absorb remaining spill as appropriate

**APPENDIX A.11  
Ferric Chloride**

Ferric chloride is produced on site for dispatch by tanker. Any loss of containment in a bunded area will be pumped to PET18 Effluent Tank for use in the Ferric Plant. Any loss of containment outside of a bunded area may need to be contained, absorbed, neutralised with slaked lime lime and disposed.

**Hazards to Human Health**

Ferric chloride is corrosive to the eyes and may cause corneal burns and permanent injury. Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain and chemical burns to the gastrointestinal tract. Contact with the skin may cause burns due to ferric chloride’s corrosive nature. Breathing in mists or aerosols may produce respiratory irritation.

Ferric chloride is also slippery and reacts exothermically with alkalis and reacts with metals liberating flammable hydrogen gas. Hydrolysis produces hydrogen chloride.

**Hazards to the Environment**

Ferric chloride is harmful to terrestrial species and contamination of waterways is to be avoided. Ferric chloride is acidic and may result in a reduction of pH, which can be toxic to aquatic organisms.

LC50: Striped bass 96 hr – 6 mg/L.

<http://www.cleartech.ca/msds/ferricchloride.pdf>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling PER11 Reduction Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi and hi-hi level alarms on LI7742 * Intermediate Circulation Pumps trip on LI7742 hi level * Ferric Plant trips on LSHH7742 * Overflow to Intermediate Pump Tank is normal operation * Secondary overflow bypasses Vibratory Screen to Ferric Sump and downstream to PET18 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [02]. Overfilling PET13 Intermediate Pump Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi and hi-hi level alarms on LI7607. * LSH7607 * LSHH7607 discrete alarm * LSHH7607 stops Pickle Liquor transfer pumps * LSHH7607 trips Ferric Plant * PEP18 Effluent Pump trips on no chlorine injection, activated by LSHH7607. * Overflow to PET12 Final Pump Tank * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Overfilling PET12 Final Pump Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi-hi level alarm on LI7630. Hi-hi-hi level discrete alarm LAHHH7630 * Ferric Plant trips on LAHH7630. * Overflow to lute in bunded area. * Bunded capacity at least 110% of largest tank or vessel. * Losses of containment flow to Ferric Sump and are pumped to PET18 for recycle into Ferric Plant. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Overfilling PET15/16/17/20 Ferric Stock Tanks | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | DCS tank high level alarms:   * PET15: Hi and hi-hi on LI7654.   Hi and hi-hi on LY7654   * PET16: Hi and hi-hi on LI7657   Hi and hi-hi on LY7657   * PET17: Hi and hi-hi on LI7660.   Hi and hi-hi on LY7660   * PET20: Hi and hi-hi on LI7648   Hi and hi-hi on LY7648   * Automated valve HV7636 and   control valve FV7636 close on hi-hi  level (feed line to all tanks)  Overflow:   * PET15: to PET16 Ferric Stock Tank   with raised overflow to Ferric  Sump if all tanks overflowing   * PET16: Overflow to PET15 and  PET17 Ferric Stock Tanks with  raised overflows to Storage Tank   bund if all tanks are overflowing   * PET17: Overflow to PET16 Ferric  Stock Tank with raised overflow to  Storage Tank Bund if all tanks  are overflowing * PET20: Overflow to lute in Storage Tank Bund. * Bund contents is pumped to PET18 for recycle into Ferric Plant. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [05]. Overfilling Ferric Sludge Tank PET14 | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank high level alarms: Hi and hi-hi log alarms. * Overflow to lute in bund, transfer to PET18 downstream for recycle into Ferric Plant. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |
| Item [06]. Mechanical Failure of Process Vessels, Storage Tanks PET15/16/17/20 | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * 5 year internal inspections of storage tanks (except Sludge) and informal regular checks on external condition   **ERA-CC-008**   * Correct material and thickness specification * Tanks and vessels protected by bund walls or plant housing     Pressure and Vacuum relief:   * Reduction Tank pressure relief to PEC11 extraction fan * Intermediate Tower and Circulation Tank pressure relief to Hypo Primary Tower * Final Tower and Circulation Tank pressure relief to Intermediate Tower * PET15/16/17 pressure and vacuum relief to atmosphere * PET20 pressure relief to Fume Scrubber Unit * PCV7729 vacuum relief connected to PET20 venting line. * Sludge Tank pressure relief to Extraction Fan PEC11.   DCS Tank low level alarms:   * PET15: Lo and lo-lo on LI7654.   Lo and lo-lo on LY7654. * PET16: Lo and lo-lo on LI7657.   Lo and lo-lo on LY7657. * PET17: Lo and lo-lo on LI7660.   Lo and lo-lo on LY7660. * PET20: Lo and lo-lo on LI7648.   Lo and lo-lo on LY7648. * Reduction Tank: None. AIC7595  ferrous concentration lo and lo-lo  alarms (loss of overflow). * Intermediate Circulation Pump  Tank: Lo and lo-lo on LI7607.   LALL7607 discrete alarm. * Final Circulation Pump Tank:  Lo-lo on LI7630. LSLL7630 discrete  alarm. * Bund capacity is at least 110% of largest tank or vessel * Ferric chloride loss of containment will be contained and pumped to PET18 for recycle in the Ferric Plant * Weeping solution may be detectable * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [07]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Correct material and gasket specification * Double block isolations on offshoots * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves * Visual inspections by loader * EP6 lo and lo-lo pH alarms on AI7011.   **ERA-CC-001**   * AAL7011 discrete pH alarm. * Site Utilities contact Control Room if pH is out of spec. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |
| Item [08]. Overfilling Tanker or LOC during Loading | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * All drivers have a self-load license. * High-high level switch LSHH7670 trips loading pumps PEP16A and PEP16B and alarms. * LSH7671 loading interlock. * LI7671 hi and hi-hi log alarms. * Loading arm position interlock to prevent LOC. * FALL7672 loading interlock. * Driver monitors batch quantities on local control panel * Manual valves operated at tanks frequently. * Sample cabinets. * Any LOC will be captured in the loading bay bund and transferred to PET 18 for recycle into the Ferric Plant. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent. | * As for “Nat” * Monogoggle area * Driver wears face shield while loading. * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |

**Ferric Chloride Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Unbunded Response Plan*

Where is the leak?

Unbunded Area

*Refer to Products Bund Response Plan*

Products Bund

**Products Bund**

Leak Identified in Products Bund

Can it be isolated?

N

Y

Shutdown system and isolate or capture leak for effluent

Isolate leak

Enough capacity in PET18/19?

Transfer Effluent to a Tanker

Slowly transfer from Tanker to PET18/19 for use in Ferric Plant

Transfer sump contents to PET18/19 for use in Ferric Plant

Hose down affected area

Y

N

**Unbunded Area**

Leak Identified in Unbunded Area

N

Can it be isolated?

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

Ferric entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Inform Site Utilities as appropriate

Neutralise with slaked lime if required

Dispose of waste

Absorb remaining liquid as appropriate

Dispose of waste

Absorb remaining spill as appropriate

Neutralise with slaked lime if required

**APPENDIX A.12  
Ferrous Chloride**

The Iron Salts Farm is used as a stock point for receiving pickle liquor from customers and distributing it to suppliers.

Pickle liquor is unloaded at the Ferric Loading Bay for transfer into PET18 and PET19 for use in the Ferric Plant.

**Hazards to Human Health**

Corrosive to the eyes, ferrous chloride may cause corneal burns and result in permanent injury. Ferrous chloride is also corrosive to the skin and may cause skin burns. Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain and chemical burns to the gastrointestinal tract, while inhalation may cause irritation to the mucous membranes of the respiratory tract.

Ferrous chloride decomposes on heating emitting toxic fumes including those of hydrogen chloride. It is also corrosive to many metals, liberating extremely flammable hydrogen gas, and will react exothermically with alkalis.

**Hazards to the Environment**

Contamination of waterways is to be avoided. Ferrous chloride contains hydrochloric acid, a liquid with high volatility. The product does not bioaccumulate and the product is predicted to have a high mobility in soil. Large discharges of hydrochloric acid may contribute to the acidification of water, may be fatal to fish and other aquatic life and can cause damage to vegetation.

Chronic toxicity: Daphnia Magna – 130 ppm.

<http://www.californiawatertechnologies.com/pdf/FerrousMSDS.pdf>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling PET71, PET72, PET73 or PET74 | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Tank high level alarms: PET71: Hi on LI8020.   LAH8020 discrete.   LAHH8021 discrete.  PEP40 trips on LAHH8021.PET72:  Hi on LI8022.   LAH8022 discrete.   LAHH8025 discrete.  PEP40 trips on LAHH8025.PET73:  Hi on LI8015.   LAH8015 discrete.   LAHH8016 discrete.  PEP40 trips on LAHH8016.PET74:  Hi on LI8018.   LAH8018 discrete.   LAHH8019 discrete.   PEP40 trips on LAHH8019. * Loss of containment to Iron Salts Bund for transfer back into tanks. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [02]. Overfilling PET18/19 Effluent/Pickle Liquor Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | DCS tank high level alarms:   * PET18: Hi on LI7644.   Transfer pumps PEP14, PEP17 and  PEP28 trip on LI7644 hi-hi level. * PET19: Hi and hi-hi on LI7646.  LAHH7647 discrete alarm. HV7647   (inlet valve) closes on LAHH7647.   * PET 18 and PET19 overflow to each other with raised overflow to lute in Storage Bund if both tanks overflowing. * Storage Bund contents are pumped to PET18 for recycle into Ferric Plant. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Mechanical Failure of Storage Tanks | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * 5 year internal inspections of storage tanks and informal regular checks on external condition   **ERA-CC-008**   * Correct material and thickness specification * Tanks and vessels protected by bund walls.   DCS Tank low level alarms:   * PET71:   Lo on LI8020. LALL8020 discrete. * PET72:  Lo on LI8022. LALL8022 discrete. * PET73:  Lo on LI8015. LALL8015 discrete. * PET74:  Lo on LI8018. LALL8018 discrete. * PET18: Lo and lo-lo on LI7644. * PET19: Lo and lo-lo on LI7646 * PET18/19 pressure relief to Fume Scrubber Unit * PCV7729 vacuum relief connected to PET18/19 venting lines. * Bund capacity is 110% of largest tank or vessel * PET71/72/73/73 loss of containment can be pumped back into tanks or transferred to PET18. * PET18/19 loss of containment will be contained and pumped to PET18 for recycle in the Ferric Plant * Weeping solution may be detectable * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Correct material and gasket specification * Double block isolations on offshoots * Piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves and automatics isolation valves. * Visual inspections by loader * EP6 lo and lo-lo pH alarms on AI7011.   **ERA-CC-001**   * AAL7011 discrete pH alarm. * Site Utilities contact Control Room * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 3.2 | | Very Unlikely | Level IV |
| Item [05]. Overfilling Tanker or LOC during Unloading | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Drivers undertake self-loading assessment. * PLC high iron salts tanker level LSH1006 loading pump trip. * Hardwired tanker E-stop HS1003/4 * LSH8006 high level switch. * High level discrete alarm LAH8006. * Loading area bund contents transferred to effluent tank and then to ferric plant. * DCS low sump pH alarms. * Driver present during loading and unloading. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. | * As for “Nat” * Monogoggle area * Driver wears face shield while loading. * Safety showers **MHF-CC-087** * Response Plan | Category 3.2 | | Unlikely | Level III |

**Ferrous Chloride Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Products / Storage Bund Response Plan*

Products / Storage Bund

*Refer to Unbunded Response Plan*

Where is the leak?

Unbunded Area

**Products / Storage Bund**

Leak Identified in   
Products / Storage Bund

Can it be isolated?

N

Y

Shutdown system and isolate   
or capture leak for effluent

Isolate leak

Is it at Iron Salts?

Y

Enough capacity in PET18/19?

Transfer Effluent to a Tanker

Slowly transfer from Tanker to PET18/19 for use in Ferric Plant

Close stormwater diversion from sump

Start sump pump (within bund) and divert to existing tanks which are not leaking

Contact Logistics with information about existing tank levels and approx. volume or weight of leaked product if appropriate

N

Logistics will arrange for road tankers and/or alternate storage or disposal based on available spare capacity at Customer sites

Hose down affected area

Transfer to PET18/19 for use in Ferric Plant

N

Y

**Unbunded Area**

Leak Identified in Unbunded Area

Can leak be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

Ferrous entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Inform Site Utilities as appropriate

Neutralise with slaked lime if required

Absorb remaining liquid as appropriate

Dispose of waste

Dispose of waste

Absorb remaining spill as appropriate

Neutralise with slaked lime if required

**APPENDIX A.13  
Filter Aid and Pre-Coat (Diacel 150, 200 and 1000 Filter Powder)**

Filter aid is used to extend the brine filter cycle time. The filter aid suspension is prepared batchwise in the Filter Aid Tank.

Pre-Coat provides a disposable filter surface on the filter candles and allows the filter to attain the required filtration efficiency at start-up. Pre-coat slurry is prepared in the filter Pre-Coat Tank using the filter pre-coat agitator.

Both tanks are located in the CAP bunded area.

**Hazards to Human Health**

Diacel is classed as non-hazardous according to the criteria of Worksafe Australia, with NIL as the risk and safety phrases. It is non-hazardous when digested, and may cause irritation to the eyes or upper respiratory system in dust form (congestion may occur) and possible irritation to the eyes and skin when in solution.

**Hazards to the Environment**

Diacel is classed as harmless, regarded as environment friendly natural fibres). It naturally biodegrades (decomposes) with time.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling T11057 Filter Aid Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain, very minor pollution. | * DCS tank hi and hi-hi level alarms on LI11141. * Overflow to CAP bunded area, with effluent treatment downstream * Response Plan | Category 1 | | Very Unlikely | Level IV |
|  | **Hum** | People – May cause irritation to the eyes, upper respiratory system or skin. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 1 | | Unlikely | Level IV |
| Item [02]. Overfilling T11060 Pre-Coat Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain, very minor pollution. | * DCS tank hi and hi-hi level alarms on LI11142. * Overflow to alkaline trench, with effluent treatment downstream * Response Plan | Category 1 | | Very Unlikely | Level IV |
|  | **Hum** | People – May cause irritation to the eyes, upper respiratory system or skin. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 1 | | Unlikely | Level IV |
| Item [03]. Mechanical Failure of Filter Aid Tank or Pre-Coat Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain, very minor pollution. | * Informal regular checks on external condition * Correct material and thickness specification * Tanks and vessels protected by bund walls * Pressure and vacuum relief to atmosphere on both tanks. * Filter Aid Tank lo and lo-lo level on LI11141. * Pre-Coat Tank lo and lo-lo level on LI11142. * Bund capacity is 110% of largest tank or vessel * Loss of containment drains to Alkaline Effluent Sump * Weeping solution may be detectable. * Alkaline Effluent Pit level alarm LAHH18521 * Response Plan | Category 1 | | Very Unlikely | Level IV |
|  | **Hum** | People – May cause irritation to the eyes, upper respiratory system or skin. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 1 | | Unlikely | Level IV |
| Item [04]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain, very minor pollution. | * Correct material and gasket specification * Piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves. * Visual inspections by operator when preparing solutions. * Alkaline Effluent Pit level alarm LAHH18521 * Response Plan | Category 1 | | Very Unlikely | Level IV |
|  | **Hum** | People – May cause irritation to the eyes, upper respiratory system or skin. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 1 | | Unlikely | Level IV |

**Filter Aid / Pre-Coat Response Plan  
CAP Bund**

Leak Identified in   
CAP Bund

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate or capture leak for effluent

Hose to Alkaline Effluent Sump

Transfer sump contents to Alkaline Effluent Tank

**APPENDIX A.14  
Fire Water**

While fire water itself is not expected to pose a serious hazard to human health or the environment, runoff from the treatment of a fire is likely to contaminate the water. The fire water may come into contact with corrosives or combustibles from a fire and enter the site stormwater system. Interceptor Pit 1 will automatically transfer contaminated fire water to the Site Utilities effluent system, where transfer to the Diversion Basin can occur if the effluent requires treatment. At full rates, assuming Interceptor Pit 1 is at 40% (transfer begins) and all runoff enters the stormwater system, overflow to Springvale Drain should occur after 17 minutes. The hazards to human health and the environment correspond to those for individual chemicals in this response plan.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Fire Water Runoff Contamination | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain, pollution as per that of individual chemicals. | * Fire Risk Management Plan * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Emergency Response Plan   **MHF-CC-073**   * Site Effluent Diversion Capabilities | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Hazards as per that of individual chemicals. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 3.2 | | Unlikely | Level III |

*For response plans for different fire and explosion scenarios, refer to Emergency Response Plan Attachment A3 – Scenarios C6-C13.*

**APPENDIX A.15  
Hydrochloric Acid (33%)**

Hydrochloric acid (HCl) is produced on site for dispatch by tanker, but is also pumped to the CAP Head Tank in unbunded piping. Excluding the CAP Head Tank, any loss containment of HCl in a bunded area will be pumped to PET18 Effluent Tank for use in the Ferric Plant. Any loss of containment in the CAP bunded area will flow to the Acid Effluent Sump and be transferred to the Acid Effluent Tank for neutralisation. Any loss of containment outside of these bunded areas may need to be contained, absorbed, neutralised with slaked lime and disposed. Workers must stay upwind to prevent breathing in vapours.

**Hazards to Human Health**

Corrosive to the eyes, hydrochloric acid may cause corneal burns and result in permanent injury. Hydrochloric acid is also corrosive to the skin and may cause skin burns. Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain and chemical burns to the gastrointestinal tract. Breathing in mists or aerosols will produce respiratory irritation, while hydrochloric acid decomposes on heating emitting toxic fumes. Hydrochloric acid is corrosive to many metals with the liberation of extremely flammable hydrogen gas and reacts violently with alkalis. Hydrochloric acid is also slippery and may result in slips and falls.

**Hazards to the Environment**

Contamination of waterways is to be avoided. Hydrochloric acid will exhibit evaporation from soil surfaces and upon transport through the soil, will dissolve some of the soil materials, with the acid neutralising to a degree. Harmful ecological effects are expected due to the reduction in pH, with this change being potentially toxic to aquatic organisms.

LC50: Bluegill/Sunfish 48 hr – 3.6 mg/L

LC50 has been reported to be between 10-100 ppm in most sensitive species.

<http://fscimage.fishersci.com/msds/11155.htm>  
<http://www.ggc.com/uploads/100040_msdsOther/100294.pdf>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling PDT13 Series HCl Acid Storage Tanks | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * 13A tank high level alarms:  Hi on LI7811.  Hi and hi-hi log alarms on LY7811.  LSH7811 discrete log alarm.  LSHH7810 alarm (SIS).  HCl Unload Pump PDP-10C trips  on LSH7811.  Burner Management System  trips on LSHH7810 (SIS). * 13B tank high level alarms:  Hi on LI7813.  Hi and hi-hi alarms on LY7811.  LSH7813 discrete log alarm.  HCl Unload Pump PDP-10C trips  on LSH7813. * 13C tank high level alarms:  Hi on LI7815.  Hi and hi-hi alarms on LY7815.  LSH7815 discrete log alarm.  HCl Unload Pump PDP-10C trips  on LSH7815. * 13D tank high level alarms:   Hi on LI7817.  Hi and hi-hi alarms on LY7817.  LSH7817 discrete log alarm.  LSHH7816 alarm (SIS).  HCl Unload Pump PDP-10C trips  on LSH7817.  Burner Management System  trips on LSHH7816 (SIS). * All tanks overflow to lute in bunded area * Bund sump transfers to Effluent Tank PET18 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [02]. Overfilling PDT14 Series HCl Acid Storage Tanks | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * 14A tank high level alarms:  Hi and hi-hi log alarms on LI7861.  Hi on LY7811.  LSHH7865 alarm (SIS).  Burner Management System  trips on LSHH7865 (SIS). * 14B tank high level alarms:  Hi and hi-hi log alarms on LI7862.  Hi on LY7812. * 14C tank high level alarms:  Hi and hi-hi log alarms on LI7863.  Hi on LY7813. * 14D tank high level alarms:   Hi and hi-hi log alarms on LI7864.  Hi on LY7814.  LSHH7868 alarm (SIS).  Burner Management System  trips on LSHH7868 (SIS). * Overflows:   14A to 14B, raised overflow to lute  in bund.  14B to 14C and 14A (raised   overflow to lute in bund).  14C to 14B and 14D (raised   overflow to lute in bund).  14D to 14C, raised overflow to lute  in bund.   * Bund sump transfers to Effluent Tank PET18 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers   **MHF-CC-087**   * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Overfilling HCl Head Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank high level alarms Hi and hi-hi on LI17031. * PDP21 Feed Pump trips and HS17031 Feed Valve close on LAHH17031. * Overflow to lute in bunded area * Bund drains to Acid Effluent Pit to be neutralised in Acid Effluent Tank before transfer to Site Utilities * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Overfilling KCSR Wash Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Process Operators fill tank manually by observing a sight glass * Wash Tank overflows to Acid Effluent Sump, with Acid Effluent Tank downstream for neutralisation before transfer to Site Utilities * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.1 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.1 | | Very Unlikely | Level IV |
| Item [05]. Overfilling Acid Measuring Tank T11075 | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Process Operators fill tank manually * DCS High level alarms:   Hi and hi-hi on LI11094   * Overflows to Acid Effluent Sump, with Acid Effluent Tank downstream for neutralisation before transfer to Site Utilities * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [06]. Mechanical Failure of Burner Tower PDR20, Tail Tower PDR21 or Storage Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * 5 year internal inspections of tanks and informal regular checks on external condition   **ERA-CC-008**   * 2 year external inspection and 4 year internal inspection of HCl Burner Tower (pressure vessel) * Correct material and thickness specification * Tanks and vessels protected by bund walls * Pressure relief to Fume Scrubber for 13 and 14 series storage tanks * Vacuum Relief on selected tanks. * Pressure relief to Hypo Tower for HCl Head Tank * Bursting Disk on HCl Burner Tower * Pressure relief to HCl Gas Stack for HCl Tail Tower * Vacuum Breaker PCV7729 connected to 13 and 14 Series Storage tanks and HCl Burner vent line. * KCSR Wash Tank vent to atmosphere. * Acid Measuring Tank vent to Hypo and vacuum relief from atmosphere * HCl gas detectors in area   **ERA-CC-009**  DCS Tank low level alarms:   * 13A: Lo log alarm on LY7811.  Lo and lo-lo on LI7811. * 13B: Lo alarm on LY7813.  Lo and lo-lo on LI7813. * 13C: Lo alarm on LY7815.  Lo and lo-lo on LI7815. * 13D: Lo alarm on LY7817.  Lo and lo-lo on LI78117. * 14A: Lo alarm on LY7861.  Lo and lo-lo log alarms on LI7861. * 14B: Lo alarm on LY7862.  Lo and lo-lo log alarms on LI7862.  LALL7862 discrete alarm. * 14C: Lo alarm on LY7863.  Lo and lo-lo log alarms on LI7863. * 14D: Lo alarm on LY7864.  Lo and lo-lo log alarms on LI7864. * Cap Head Tank:   Lo and lo-lo on LI17031. * Acid Measuring Tank:   Lo and lo-lo on LI11094.   * Bund capacity is 110% of largest tank or vessel * Sump and PDP04 transfer to PET18 for transfer into Ferric Plant * Weeping acid may be detectable. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [07]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Double block isolations on offshoots * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Secondary containment PVC piping and inspection point on piping from storage to loading bay * Routine inspection of piping by external contractor (critical piping) * Amount of nozzles and flange connections minimised * Isolation valves * HCl Burner Tower FSLL7935 SIS Trip * Visual inspections by loader * Acid Effluent Pit level alarm LAH18521 * Acid Effluent Pit pH alarms AAH18532 and AAHH18532 * EP6 hi-hi pH alarm AAHH7011.   **ERA-CC-001**   * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Site Utilities contact Control Room * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |
| Item [08]. Overfilling Tanker or LOC during Loading | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * All drivers have a self-load license. * Hardwired high high tanker level LSHH7871 trip of loading. * LAH7880A (Loading Interlock) and LAHH7871 (Loading Interlock) * LAH7880A trips PDP-10A and PDP-10B * DCS hi and hi- hi tanker loading area sump level alarms on LI7666. * Drivers monitor batch quantities on local control panel * Manual valves operated at tanks frequently. * Sample cabinets. * Gas detectors in area. **ERA-CC-009** * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Driver wears face shield while loading. * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |

**Hydrochloric Acid Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Unbunded Response Plan*

*Refer to CAP Bund Response Plan*

Where is the leak?

CAP Bund

Unbunded Area

*Refer to Products Bund Response Plan*

Products Bund

**CAP Bund**

Leak Identified in   
CAP Bund

N

Can it be isolated?

Y

Shutdown system and isolate or capture leak for effluent

Isolate leak

For large HCl spills, set up fire hoses equipped with fog nozzles downwind of the leak as per the Emergency Response Plan.

Hose leak to Acid Effluent Sump with 10x water for dilution

Transfer sump contents to Acid Effluent Tank

Leak   
> 590 L?

Transfer from Acid Effluent sump to IBCs

Dispose of   
hydrochloric acid

Hose down CAP bund area affected

**Products Bund**

Leak Identified in Products Bund

Can it be isolated?

N

Y

Y

Isolate leak

Shutdown system and isolate or capture leak for effluent

For large HCl spills, set up fire hoses equipped with fog nozzles downwind of the leak as per the Emergency Response Plan.

Transfer sump contents to PET18 with as much dilution as possible

Hose down affected area

Test Acid Strength in PET18

Y

Transfer Effluent to Ferric Plant as Required

Slowly Transfer from Tanker to PET18 with sufficient dilution for use in Ferric Plant

Transfer Effluent to a Tanker

Strength too high for Ferric?

N

**Unbunded Area**

Leak Identified in Unbunded Area

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

For large HCl spills, set up fire hoses equipped with fog nozzles downwind of the leak as per the Emergency Response Plan.

N

Acid entered drain?

N

Y

Neutralise with slaked lime if required

Dispose of waste

Inform Site Utilities as appropriate

Absorb remaining liquid as appropriate

Request effluent diversion to Diversion Basin if required

Neutralise with slaked lime if required

Dispose of waste

Absorb remaining spill as appropriate

**APPENDIX A.16  
Magnesium Chloride**

Magnesium chloride is added to the Secondary Brine Treatment Tank to decrease calcium/magnesium ratio in salt.

Two IBCs are used for dosing. One IBC is permanent while the other is sent off-site to be refilled when empty. Transfer between the two IBCs takes place to fill the permanent IBC.

**Hazards to Human Health**

Ingestion should result in no adverse effects, however large amounts may cause nausea and vomiting. Contact with eyes and skin may cause irritation and breathing in mists or aerosols may produce respiratory irritation.

**Hazards to the Environment**

Contamination of waterways is to be avoided. The product itself and its products of degradation are not toxic. Possibly hazardous short-term degradation products are not likely, however, long-term degradation products may arise.

<http://www.sciencelab.com/msds.php?msdsId=9926023>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling IBCs | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Temporary IBC re-filled off-site * Transfer from temporary IBC to permanent IBC done by Operator in field * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to the eyes and skin. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** | Category 1 | | Unlikely | Level IV |
| Item [02]. Mechanical Failure of IBCs | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Informal regular checks on external condition * IBC suitable for application * IBCs protected by bund walls * Pressure and vacuum relief to atmosphere * Bund capacity is 110% of largest tank or vessel * Loss of containment drains to Alkaline Effluent Sump * Weeping solution may be detectable * Alkaline Effluent Pit level alarm LAHH18521 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to the eyes and skin. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 1 | | Unlikely | Level IV |
| Item [03]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Correct material and gasket specification * Piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves * Visual inspections by loader * Alkaline Effluent Pit level alarm LAHH18521 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Site Utilities contact Control Room * Response Plan | Category 1 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with irritation to the eyes and skin. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** | Category 1 | | Unlikely | Level IV |

**Magnesium Chloride Response Plan**

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

Leak Identified

*Refer to Unbunded Response Plan*

*Refer to CAP Bund Response Plan*

Where is the leak?

CAP Bund

Unbunded Area

**CAP Bund**

Can it be isolated?

Leak Identified in   
CAP Bund

N

Y

Isolate leak

Shutdown system and isolate or capture leak for effluent

Hose leak to Alkaline Effluent Sump with water for dilution

Transfer sump contents to Alkaline Effluent Tank

**Unbunded Area**

Can it be isolated?

Leak Identified in Unbunded Area

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

Solution entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Absorb remaining spill as appropriate

Inform Site Utilities as appropriate

Dispose of waste

Dispose of waste

Absorb remaining spill as appropriate

**APPENDIX A.17  
Oil, Grease and Diesel**

Oil and grease are used for various equipment on site, while diesel can be used as fuel for equipment such as generators. Unlike other substances, oil, grease and diesel do not mix well with water. As a result, dilution may not be effective in reducing the concentration of oil, grease or diesel in the water and it is preferential to remove the pollutants. Consequently, while a release in a bunded area is preferred, a significant release should be attended to rather than relying on effluent treatment downstream. Since there are numerous products used on site, the hazards are based on Mobil SHC 626, Mobil XHP 222 grease and Shell Diesel (002D1791).

**Hazards to Human Health**

Mobil SHC 626 is a non-hazardous substance and non-dangerous good. It has a low order of toxicity. However, excessive exposure may result in eye, skin or respiratory irritation. High-pressure injection under the skin may cause serious damage. Spills may become a slip hazard. Material can accumulate static charges which many cause an electrical spark (ignition source). Excessive heat and high energy sources of ignition are to be avoided.

MobilGrease XHP 222 is a non-hazardous substance and non-dangerous good. It has a low order of toxicity. However, excessive exposure may result in eye, skin or respiratory irritation. High-pressure injection under the skin may cause serious damage. Spills may become a slip hazard and ignition sources are to be avoided.

Shell Diesel is a hazardous substance and non-dangerous good. Diesel is slightly irritating to the eyes and respiratory system, and may cause moderate skin irritation (but insufficient to classify), whilst prolonged contact may lead to dermatitis. Ignition sources are to be avoided.

**Hazards to the Environment**

Mobil SHC 626 is not expected to be harmful to aquatic organisms or demonstrate chronic toxicity to aquatic organisms. However, it has been stated that entry into waterways, sewers, basements of confined areas is to be prevented. There should be no visible slicks of oil on water.

LL50: Oncorhynchus mykiss 96 hr – 1003 mg/L

NOELR: Water Flea 21 days – 1 mg / L

ExxonMobil SDS.

Mobil XHP 222 is not expected to be harmful to aquatic organisms. However, it has been stated that entry into waterways, sewers, basements of confined areas is to be prevented. Limited ecological (concentration) data was found for Mobil XHP 222. According to Timken, ‘the major components in the formulation show no aquatic toxicity at 1000 mg/L loading, therefore long-term adverse effects in the aquatic environment are not expected’.

Shell Diesel is toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment. Based on an SDS for diesel fuel from Hess, the LC50 (96 hr) for Pimephales promelas is 35 mg/L (flow-through).

<http://www.southerncrosslubes.com.au/downloads/MOBILGREASE-XHP-222.aspx>  
<http://www.timken.com/en-in/products/lubrication/Documents/MSDS/MobilMobilgreaseXHP22210446.pdf>  
<http://www.hess.com/docs/us-safety-data-sheets/dieselfuel_alltypes_includingultralowsulfur_diesel(ulsd).pdf?sfvrsn=2>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Oil or grease spill in a bunded area | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Spill in a bunded area * Current action to revise hi vibration alarm(s) on chlorine compressor * Pump failure from oil loss likely to cause process upset and plant trip * Stormwater automatically intercepted to Site Utilities effluent system with Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Extremely Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health. Irritation to the eye, skin or respiratory system is possible through excessive exposure. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.1 | | Very Unlikely | Level IV |
| Item [02]. Oil or grease spill in an unbunded area on the plant | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Area behind Atlas Air Compressor contains an oil sump * Regular services on both air compressors based on hours of operation * Air compressor trips on high temperature * Stormwater automatically intercepted to Site Utilities effluent system with Diversion Basin downstream for out of specification effluent * Response Plan | Category 1 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health. Irritation to the eye, skin or respiratory system is possible through excessive exposure. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers   **MHF-CC-087**   * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.1 | | Very Unlikely | Level IV |

**Oil, Grease and Diesel Response Plan**

Leak Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

Bunded Area

*Refer to Bunded Response Plan*

*Refer to Unbunded Response Plan*

Where is the leak?

Unbunded Area on the Plant

**Bunded Area**

Leak Identified in   
Bunded area

Block and absorb leak until leak has been fixed

>100 mL entered sump?

N

Y

Inform Site Utilities about potential oil, grease or diesel in effluent

Once leak has stopped, dispose of absorbent(s) and pollutant

**Unbunded Area on the Plant**

Leak Identified in   
Unbunded area on the Plant

Block and absorb leak until leak has been fixed

Did spill enter drain?

N

Y

Inform Site Utilities as appropriate (Note: potential pollutant in intercepted effluent)

Spill area > 1 m2?

N

Y

Once leak has stopped, dispose of absorbent(s) and pollutant

Once leak has stopped, dispose of absorbent(s) and pollutant and remove remaining oil, grease or diesel

**APPENDIX A.18  
Sodium Hydroxide (46-50%)**

Sodium hydroxide is produced in the electrolysers and enters the Catholyte Tank. The Catholyte Pumps transfer sodium hydroxide to the electrolysers and Intermediate Caustic Tank. The Intermediate Caustic Pumps transfer sodium hydroxide to the distribution header for use on site and to the Caustic Evaporation system where the sodium hydroxide is strengthened to 50% and transferred to Storage Tanks PAT-01 and PAT-02 for loading into tankers. Strengthened sodium hydroxide is also transferred to the Pure Caustic Head Tank above the Catholyte Tank. Sodium hydroxide use on site includes filling the ECS Dump Tank which acts as an added protection against a chlorine release.

**Hazards to Human Health**

A severe eye irritant, sodium hydroxide is corrosive to eyes and contact can cause corneal burns and permanent injury. Contact with the skin will result in severe irritation and may cause skin burns. Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain and chemical burns to the gastrointestinal tract, while breathing in mists or aerosols may produce respiratory irritation. Contact with metals may liberate hydrogen gas which is extremely flammable. Sodium hydroxide reacts violently with acid and reacts exothermically on dilution with water. Sodium hydroxide is also very slippery.

**Hazards to the Environment**

There is no degradation of sodium hydroxide in waters. Loss is due to absorption or neutralisation and contamination of waterways is to be avoided. The damaging effects of sodium hydroxide are primarily due to increase in pH, with most freshwater fish able to tolerate up to a pH of 8.4. The pH must generally exceed 9 for an aqueous environment to become lethal for fully developed fish. Freshwater algae are destroyed above pH 8.5 and concentrations of 20-100 mg/L have been reported to kill salmon, trout, carp and crayfish.

The pH effect of sodium hydroxide in water is naturally reduced by the absorption of atmospheric carbon dioxide, dilution of water and natural acidity of water bodies.

LC50: Bluegill sunfish 48 hr – 99 mg/L.

<http://msds.fmc.com/msds/100000010035-msds_us-e.pdf>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Catholyte Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi and hi-hi level alarms on LI12118 and LI12119 * Plant I65 trip on Catholyte Tank hi-hi level. * Bursting disk to lute for overflow * Tank in bunded area, Alkaline Effluent Pit downstream. * Alkaline Effluent Pit level alarm LAHH18521 * Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [02]. Overfilling Pure Caustic Head Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi and hi-hi level alarms on LI13030 * Inlet valve manually operated by Process Operators. * Overflow to bund, Alkaline Effluent Pit downstream * Alkaline Effluent Pit level alarm LAHH18521 * Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Overfilling Intermediate Caustic Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi and hi-hi level alarms on LI13002 * Plant I65 trip on Intermediate   Caustic Tank hi-hi level.   * Overflow to bund, Alkaline Effluent Pit downstream. * Alkaline Effluent Pit level alarm LAHH18521 * Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Overfilling Caustic Storage Tanks T13049 and T13050 | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank high level alarms: T13049: Hi and hi-hi on LI13111.  LSHH13110 discrete alarm.   T13050: Hi and hi-hi on LI13121  LSHH13120 discrete alarm.   * Concentrated Caustic Transfer Pump trips on T13049 and T13050 hi-hi level (LSHH13110 and LSHH13120, respectively) * Pumping into a tank from the bund is an abnormal scenario which requires precaution and supervision. * T13049 and T13050 both overflow separately to ground * EP6 hi-hi pH alarm AAHH7011.   **ERA-CC-001**   * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Site Utilities contact Control Room * Response Plan | Category 3.2 | | Extremely Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Extremely Unlikely | Level IV |
| Item [05]. Overfilling Caustic Condensate Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi level alarm on LI13029 * Overflow to bund, Alkaline Effluent Pit downstream * Alkaline Effluent Pit level alarm LAHH18521 * Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 2 | | Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.1 | | Very Unlikely | Level IV |
| Item [06]. Overfilling Caustic Dump Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Normal operation is overflow to ECS Tower * Tank in bunded area, Alkaline Effluent Pit downstream. * Alkaline Effluent Pit level alarm LAHH18521 * Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [07]. Overfilling Caustic Measuring Tank T11077 | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Process Operators fill tank manually * DCS High level alarms:   Hi and hi-hi on LI11093   * Overflows to Alkaline Effluent Trench, with Alkaline Effluent Tank downstream for neutralisation before transfer to Site Utilities * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [08]. Mechanical Failure of Storage Tanks, Process Vessels or Pressure Vessels | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * 10 year internal inspections of T13049 and T13050 **ERA-CC-008** * 5 year internal inspection of Pure Caustic Head Tank **ERA-CC-008** * 2 year external inspections and 4 year internal inspections of V13011 First Effect Vapour Body and V13014 Second Effect Vapour Body (pressure vessels) * Correct material and thickness specification * All tanks and vessels are surrounded by bund walls * Catholyte Tank pressure relief to Hydrogen Compressor. Compressor trips on low pressure (no excess vacuum) * Pure Caustic Head Tank pressure and vacuum relief to atmosphere * Intermediate Caustic Tank pressure and vacuum relief to atmosphere * V13011 First Effect Vapour Body pressure relief to Caustic Evap Vacuum Pump. Vacuum controlled by PV13013. * V13014 Second Effect Vapour Body pressure relief to Caustic Evap Vacuum Pump. Vacuum controlled by PV13023. * Caustic Tank T13049 and T13050 pressure relief and vacuum relief (vent) to atmosphere * Caustic Condensate Tank pressure and vacuum relief to atmosphere * Caustic Dump Tank pressure and vacuum relief to atmosphere * Caustic Measuring Tank pressure and vacuum relief to atmosphere   DCS Tank low level alarms:   * Catholyte Tank lo and lo-lo level on  LI12118 and LI12119. * Pure Caustic Head Tank lo level on  LI13030. * Intermediate Caustic Tank lo and lo  lo level on LI13002. * V13011 First Effect Vapour Body  lo and lo-lo level on LI13011. * V13014 Second Effect Vapour Body  lo and lo-lo level on LI13018. * Caustic Tank T13049 lo and lo-lo  level on LI13111. LSLL13110 discrete   alarm. * Caustic Tank T13050 lo and lo-lo  level on LI13121. LALL13120 discrete  alarm. * Caustic Condensate Tank lo and lo  lo level on LI13029.. * Caustic Dump Tank low level: None.  OPR will indicate loss of overflow. * Caustic Measuring Tank lo and lo-lo level on LI11093. * Bund capacity is at least 110% of largest tank * Losses of containment in bunds can be transferred to Alkaline Effluent system for neutralisation before transfer to the Effluent Header. * Alkaline Effluent Pit level alarm LAH18521 * Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 * EP6 hi-hi pH alarm AAHH7011.   **ERA-CC-001**   * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Site Utilities contact Control Room * Response Plan | Category 3.2 | | Extremely Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.1 | | Very Unlikely | Level IV |
| Item [09]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Double block isolations on offshoots * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves and automatic isolation valves * Visual inspections by loader * Alkaline Effluent Pit level alarm LAH18521 * Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 * EP6 hi-hi pH alarm AAHH7011.   **ERA-CC-001**   * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Site Utilities contact Control Room * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [10]. Overfilling Tanker or LOC during Loading | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Loading activities in loading bay bund. * DCS high-high caustic tanker level LSHH6729A trip of filling valve. * LAH7630 hi level alarm trips loading. * DCS high caustic loading sump level LAH6736 trip of filling * LAHH6736 sump hi level alarm. * Driver present during loading. * E-stop HS6729 and HS6729B. * Bund pump- out facilities to EP6. * EP6 high high pH alarm AAHH7011. **ERA-CC-001** * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Potential slips and falls due to slippery nature. | * As for “Nat” * Monogoggle area * Driver wears face shield while loading. * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |

**Sodium Hydroxide Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

Where is the leak?

*Refer to Unbunded Response Plan*

*Refer to CAP Bund Response Plan*

CAP Bund

Unbunded Area

**CAP Bund**

Leak Identified in   
CAP Bund

N

Can it be isolated?

Y

Shutdown system and isolate or capture leak for effluent

Isolate leak

Leak   
> 380 L (50%) or >690 L (32%)?

Y

N

Hose leak to Alkaline Effluent Sump with water (10x) for dilution

Transfer sump contents to Alkaline Effluent Tank

Transfer from Alkaline Effluent sump to IBCs

Slowly dispose of NaOH to Alkaline Effluent Sump

Hose down CAP bund area affected

**Storage Bund**

Leak Identified in Products Bund

Can leak be isolated?

N

Y

Isolate leak

Shutdown system and isolate or capture leak for effluent

Hose leak to bund sump with water (10x) for dilution

Transfer sump contents to Alkaline Effluent system

Leak   
> 380 L?

Transfer from bund sump to IBCs

Hose down bund area affected

Dispose of IBC contents

Y

N

**Unbunded Area**

Leak Identified in Unbunded Area

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

NaOH entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Inform Site Utilities as appropriate

Absorb remaining spill as appropriate

Dispose of waste

Dispose of waste

Absorb remaining spill as appropriate

**APPENDIX A.19  
Sodium Hypochlorite (13% Av. Cl2)**

Sodium hypochlorite (hypo) is produced on site for dispatch by tanker. Sodium hypochlorite becomes unbunded from the plant to the Loading Bay and from the plant to Hypo 1X Tank, Hypo 3X Tank, Hypo 4X Tank, Offspec Hypo 6X Tank and Offspec Decomp Tank. Any loss containment of sodium hypochlorite in a bunded area will be pumped to 6X Offspec Hypo Tank, to be transferred to the Offspec Decomp Tank for decomposition of chlorine and transfer to the Effluent Header. Any loss of containment outside of these bunded areas will need to be contained, absorbed, and disposed. The sodium hypochlorite must not be neutralised since chlorine will be released. Workers must stay upwind to prevent breathing in vapours.

**Hazards to Human Health**

Sodium hypochlorite causes burns to the skin and may cause permanent injury to the eyes. On contact with acid or heating, sodium hypochlorite liberates toxic chlorine gas. Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain and chemical burns to the gastrointestinal tract, while breathing in mists or aerosols may produce respiratory irritation. Sodium hypochlorite is also slippery.

**Hazards to the Environment**

Contamination of waterways is to be avoided, with sodium hypochlorite being very toxic to aquatic organisms and expected to be harmful to terrestrial species. Sodium hypochlorite is basic and may result in an increase of pH, potentially harming aquatic organisms. Sodium hypochlorite is biodegradable.

LC50: Fish 48 hr – 0.07-5.9 mg/L.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Storage Tanks 1X, 3X, 4X or 6X | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | DCS tank high level alarms:   * 1X: Hi and hi-hi on LI7300.  LAHHH7300 discrete alarm. * 3X: Hi and hi-hi on LI7302.   LAHHH7302 discrete alarm. * 4X: Hi and hi-hi on LI7303.  Hypo trips on hi-hi level if  INSPEC selected * 6X: LAH7389 disabled. LSHH7305  discrete alarm.  Hypo trips on hi-hi level if  OFFSPEC selected   Overflow:   * 1X: to 4X * 3X: to 4X * 4X: to sump pit. Transfer to 6X * 6X: to sump pit. Transfer to 6X * 6X transfers to Decomp Tank for  decomposition of chlorine before  transfer to Effluent Header * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Chlorine Gas Detectors * All personnel carry a chlorine respirator * No acidic chemicals in area to reduce pH of sodium hypochlorite, thus releasing chlorine * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [02]. Overfilling Hypo Decomp Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi level alarm on LI15251. LAH15251 discrete log alarm. LSHH15251 discrete alarm. * Transfer pumps P15090, P15093 and PFP21 trip on LAHH15251 * Overflow to lute * Lute overflows to sump pit for transfer to 6X * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Chlorine Gas Detectors * All personnel carry a chlorine respirator * No acidic chemicals in area to reduce pH of sodium hypochlorite, thus releasing chlorine * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Overfilling Hypo Tank 9X or 10X | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | DCS tank high level alarms (9X):   * Hi and hi-hi on LI15295. * LAH15295 discrete alarm. * Hi and hi-hi on LI15300. * LSHH15300 alarm (SIS). * Transfer pumps P15090 and  P15093 trip on SIS hi-hi level. * Automatic inlet valves HV15293  and HV15266 close on SIS hi-hi  level (and HV15266 on hi-hi level). * Overflow to bund. Transfer to  Sump Pit and 6X.   DCS tank high level alarms (10X):   * Hi and hi on LI15298. * LAH15298 discrete alarm. * Hi and hi-hi on LI15301. * LSHH15301 alarm (SIS) * Transfer pumps P15090 and  P15093 trip on SIS hi-hi level. * Automatic inlet valves HV15296  and HV15268 close on SIS hi-hi  level (and HV15268 on hi-hi level). * Overflow to bund. Transfer to  Sump Pit and 6X. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Chlorine Gas Detectors * All personnel carry a chlorine respirator * No acidic chemicals in area to reduce pH of sodium hypochlorite, thus releasing chlorine * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Overfilling Hypo Tank 7X or 8X | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | 7X DCS tank high level alarms:   * Hi level on LI7307. * LAH7307 discrete alarm. * Hi and hi-hi on LI7314. * LSHH7314 alarm (SIS). * LDI7314 level differential hi alarm  to identify errors in level  measurement. * Transfer pumps P15090 and PFP21  trip on SIS hi-hi level. * Automatic inlet valves HV15320  and HV7323 close on SIS hi-hi level  (and HV7323 on hi-hi level). * Overflow to bund. Transfer to Sump Pit and 6X.     8X DCS tank high level alarms:   * Hi level on LI7306. * LAH7306 discrete alarm. * Hi and hi-hi on LAH7315. * LSHH7315 alarm (SIS). * LDI7315 level differential hi alarm  to identify errors in level  measurement. * Transfer pumps P15090 and PFP21  trip on SIS hi-hi level. * Automatic inlet valves HV15321  and HV7324 close on SIS hi-hi level  (and HV7324 on hi-hi level). * Overflow to bund. Transfer to Sump Pit and 6X. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Chlorine Gas Detectors * All personnel carry a chlorine respirator * No acidic chemicals in area to reduce pH of sodium hypochlorite, thus releasing chlorine * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [05]. Overfilling ECS Tower Pump Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | DCS tank high level alarms:   * Hi and hi-hi on LIC15013 * Caustic addition controlled by LIC15013 * Overflow to alkaline trench in bunded area, with neutralisation and dechlorination downstream in Alkaline Effluent Tank * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [06]. Overfilling Hypo Primary Tower or Backing Tower Recirculation Tanks | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | Primary Tower Recirculation Tank:   * Hi level alarm on LIC15220 * Level controlled by LIC15220 (sodium hypochlorite to storage) * Overflow to Backing Tower Recirculation Tank   Backing Tower Recirculation Tank:   * Hi and hi-hi level alarms on LI15278 * LI15279 and LDI15279 level difference hi and hi-hi alarms * Level controlled by LIC15278 * Overflow to floor in bunded area * Sump contents pumped to 6X Tank * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [07]. Mechanical Failure of Storage Tanks, Process Vessels or Pressure Vessels | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * 5 year internal inspections of tanks and informal regular checks on external condition   **ERA-CC-008**   * Correct material and thickness specification * Tanks and vessels protected by bund walls * 7X/8X splash guards due to close proximity to bund wall * Storage Tank pressure and vacuum relief to atmosphere * ECS pressure relief to ECS fans and atmosphere * Backing Tower pressure relief to Backing Tower fans and atmosphere * Backing Tower Circulation Tank pressure relief to Backing Tower * Hypo Primary Tower pressure relief to Backing Tower   DCS Tank low level alarms:   * ECS Tower: Lo and lo-lo on LI15013. * Hypo Primary Tower: Lo on LI15220.  LALL15220 discrete alarm. * Hypo Make Tower: None. * Backing Recirculation Tank:   Lo on LI15278. Lo on LI15279.  LSLL15279 alarm (SIS).  LDI15279 level differential hi and  hi-hi alarm to identify errors in  level measurement. * Hypo Tank 3X: Lo and lo-lo on  LI7302 * Hypo Tank 1X: None * Hypo Tank 4X: None * Hypo Tank 6X: Lo on LI7305 * Hypo Decomp Tank: Lo on LI15251.  LAL15251 discrete log alarm. * Hypo Tank 9X:   Lo and lo-lo on LI15300.  Lo on 15295.   LAL15295 discrete log alarm. * Hypo Tank 10X:   Lo and lo-lo on LI15301.  Lo on LI15298.  LAL15298 discrete log alarm. * Hypo Tank 7X:   Lo and lo-lo on LI7307  LI7307 discrete log alarm  LDI7314 level differential hi alarm  to identify errors in level  measurement. * Hypo Tank 8X:   Lo and lo-lo on LI7306  LI7306 discrete log alarm  LDI7315 level differential hi alarm  to identify errors in level  measurement. * Bund capacity is 110% of largest tank or vessel * Alkaline Effluent Pit level alarm LAH18521 * Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 * Sodium hypochlorite loss of containment in Products Area will be contained and pumped to Storage Tank 6X and Decomp Tank for decomposition of sodium hypochlorite before discharging to EP6 * Weeping sodium hypochlorite may be detectable * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Chlorine Gas Detectors * All personnel carry a chlorine respirator * No acidic chemicals in area to reduce pH of sodium hypochlorite, thus releasing chlorine * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [08]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Double block isolations on offshoots * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves and automatic isolation valves * Visual inspections by loader * Alkaline Effluent Pit level alarm LAH18521 * Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 * EP6 hi-hi pH alarm AAHH7011.   **ERA-CC-001**   * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Site Utilities contact Control Room * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Chlorine Gas Detectors * All personnel carry chlorine respirators * No acidic chemicals in area to reduce pH of sodium hypochlorite, thus releasing chlorine * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |
| Item [09]. Overfilling Tanker or LOC during Loading | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Hypo bund contents pumped into effluent tank 6X for destruction in the hypo destruction unit. * DCS high hypo sump level alarm LAH7396. * DCS hypo tanker high level switches LSH7366 and LSH7386 trip loading pumps PFP25 and PFP26, respectively. **ERA-CC-012.** * EP6 high high pH alarm AAHH7011. **ERA-CC-001**. * Gas detectors at EP6 and SRA boundary. **ERA-CC-011.** * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |

**Sodium Hypochlorite Response Plan**

Leak Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Unbunded Response Plan*

*Refer to CAP Bund Response Plan*

Where is the leak?

CAP Bund

Unbunded Area

*Refer to Products Bund Response Plan*

Products Bund

**CAP Bund**

Leak Identified in   
CAP Bund

Can leak be isolated?

N

Y

Isolate leak

Shutdown system and isolate or capture leak for effluent

Chlorine levels acceptable for treatment?

N

Transfer from Alkaline Effluent sump to IBCs

Y

Transfer Hypo to 6X

Hose leak to Alkaline Effluent Sump with SBS addition

Hose down CAP bund area affected. Dose SBS if required

Transfer sump contents to Alkaline Effluent Tank for dechlorination and neutralisation

**Products Bund**

Leak Identified in Products Bund

Can leak be isolated?

N

Y

Isolate leak

Shutdown system and isolate or capture leak for effluent

Transfer sump contents to 6X for dechlorination

Hose down affected area

**Unbunded Area**

Can leak be isolated?

Leak Identified in Unbunded Area

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

Hypo entered drain?

N

Y

Absorb remaining spill as appropriate

Dechlorinate Diversion Basin if required

Request effluent diversion to Diversion Basin if required

Inform Site Utilities as appropriate

Dispose of waste appropriately (chlorinated)

Absorb remaining spill as appropriate

Dispose of waste appropriately (chlorinated)

**APPENDIX A.20  
Sodium Bisulphite (SBS)**

Sodium Bisulphite (SBS) is used on site to dechlorinate substances. It is important to acknowledge that excess SBS dosing may result in a breach of sulphate limit in effluent and SBS may decompose to release toxic sulphur dioxide. A loss of containment of SBS will flow to the Alkaline Effluent Sump and be transferred to the Alkaline Effluent Tank. Any loss of containment outside of the front-end bund will need to be contained and disposed of slowly.

**Hazards to Human Health**

An eye irritant, contact with the skin will result in irritation. Swallowing can result in nausea, vomiting, diarrhoea and gastrointestinal irritation, while breathing in mists or aerosols may produce respiratory irritation and may cause respiratory sensitisation in sensitive individuals, producing asthma-like symptoms.

Contact with acid or heating liberates toxic sulphur dioxide gas.

Note: Initially, the risk assessments were done based on SMBS. While the impact of SBS on human eyes is likely to be less harmful than solid SMBS, risk assessments [02], [03] and [04] are still conservatively based on potential permanent injury. Both Highly Significant (3.1) and Serious (3.2) consequences result in the same risk level for these scenarios.

**Hazards to the Environment**

Note: Since mixing sodium metabisulphite (SMBS) with water produces SBS, the content below is from SMBS information.

Contamination of waterways is to be avoided, with contributions to elevated chemical oxygen demand in aquatic environments, having a negative impact on aquatic organisms. Sodium bisulphite is acidic, and may result in a reduction of pH, potentially harming aquatic organisms.

LC50: Salmo Gairneri 96 hr – 15-220 mg/L.

<http://www.vinvicta.com.au/information/SodiumMetabisulphiteMSDS.pdf>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling T11560 SBS Solution Tank or Loss of Containment during Loading | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi and hi-hi level alarms on LI11508. * XS13005 (valve into tank) closes on hi level or increase > 70%  Note: Valve rarely used. * Driver present during loading. * Loading ramp and slope down to bunded area if tanker parked accordingly. * Air purge of hose after load. * Tank overflow to alkaline trench * Alkaline Effluent Pit level hi-hi alarm on LI18521 * Alkaline Effluent Pit Lo and Lo-lo pH alarms on AI18532 * EP6 lo and lo-lo pH alarm on AI7011.  **ERA-CC-001**. * AAL7011 discrete pH alarm. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.1 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and irritation to the skin. Generation of sulphur dioxide gas from contact with acids. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Alkaline effluent area separated from acid effluent area. | Category 3.1 | | Very Unlikely | Level IV |
| Item [02]. Overfilling T11563 SBS Storage Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank hi and hi-hi level alarms on LI11511 * Sodium Sulphite Transfer Pump trips on hi level * Overflow to alkaline trench * Alkaline Effluent Pit level hi-hi alarm on LI18521 * Alkaline Effluent Pit Lo and Lo-lo pH alarms on AI18532 * EP6 lo and lo-lo pH alarm on AI7011.  **ERA-CC-001**. * AAL7011 discrete pH alarm. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and irritation to the skin. Generation of sulphur dioxide gas from contact with acids. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Alkaline effluent area separated from acid effluent area. | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Mechanical Failure of SBS Solution Tank or SBS Storage Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Informal regular checks on external condition * Correct material and thickness specification * Tanks and vessels protected by bund walls * Pressure and vacuum relief to atmosphere on tanks T11560 and T11563. * SBS Solution Tank lo and lo-lo level on LI11508 * SBS Storage Tank lo and lo-lo level on LI11511 * Bund capacity is 110% of largest tank or vessel * Loss of containment drains to Alkaline Effluent Sump * Weeping SBS may be detectable * Alkaline Effluent Pit level hi-hi alarm on LI18521 * Alkaline Effluent Pit Lo and Lo-lo pH alarms on AI18532 * EP6 lo and lo-lo pH alarm on AI7011.  **ERA-CC-001**. * AAL7011 discrete pH alarm. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and irritation to the skin. Generation of sulphur dioxide gas from contact with acids. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Alkaline effluent area separated from acid effluent area. | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Correct material and gasket specification * Double block isolations on offshoots * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Amount of nozzles and flange connections minimised * Isolation valves and automatic isolation valves * Visual inspections by loader * Alkaline Effluent Pit level hi-hi alarm on LI18521 * Alkaline Effluent Pit Lo and Lo-lo pH alarms on AI18532 * EP6 lo and lo-lo pH alarm on AI7011.  **ERA-CC-001**. * AAL7011 discrete pH alarm. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Site Utilities contact Control Room * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and irritation to the skin. Generation of sulphur dioxide gas from contact with acids. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Alkaline effluent area separated from acid effluent area. | Category 3.2 | | Unlikely | Level III  *.* |

**Sodium Bisulphite Response Plan**

Leak Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

*Refer to Unbunded Response Plan*

*Refer to CAP Bund Response Plan*

Where is the leak?

CAP Bund

Unbunded Area

**CAP Bund**

Leak Identified in   
CAP Bund

Can it be isolated?

N

Y

Isolate leak

Shutdown system and isolate or capture leak for effluent

Can effluent go to Site Utilities (Sulphates)  
?

N

N

Transfer from Alkaline Effluent sump to IBCs

Hose down CAP bund area affected

Slowly dispose of SBS to Alkaline Effluent Sump

Y

Hose leak to Alkaline Effluent Sump with water for dilution

Transfer sump contents to Alkaline Effluent Tank

**Unbunded Area**

Leak Identified in Unbunded Area

Can leak be isolated?

N

Y

Isolate leak

Shutdown system and isolate   
if appropriate

Block drains and/or capture remaining leak as appropriate

SBS entered drain?

N

Y

Request effluent diversion to Diversion Basin if required

Absorb remaining spill as appropriate

Inform Site Utilities as appropriate

Dispose of waste

Dispose of waste

Absorb remaining spill as appropriate

**APPENDIX A.21  
Sulphuric Acid**

Strong sulphuric acid (98%) is delivered to site by tanker and transferred into the Strong Sulphuric Acid Storage Tank (CET01). Sulphuric acid is pumped from CET01 to the CAP Head Tank, which uses gravity flow to transfer strong acid to the Secondary Drying Tower. Once the sulphuric acid has absorbed moisture, the weak acid is transferred to the Sulphuric Acid Dechlor Tower where chlorine is scrubbed by air to the Hypo Plant. The dechlorinated sulphuric acid is transferred to the Weak Sulphuric Acid Tank (CET02), where it is transferred to tanker for use offsite.

**Hazards to Human Health**

Sulphuric acid can cause severe burns to human skin and result in permanent damage to the eyes. On heating, it can decompose to emit toxic fumes, including those of oxides of sulphur and can cause expansion or decomposition resulting in containers exploding. Addition of water will generate significant heat and may cause violent spattering, while corrosion of metals can liberate flammable hydrogen gas. Assessments have been done to assess the amount of hydrogen gas produced in the storage tanks, while nitrogen is used to purge the CAP Head Tank.

Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain and chemical burns to the gastrointestinal tract, while breathing in mists or aerosols may produce respiratory irritation. Sulphuric acid is also slippery.

**Hazards to the Environment**

Contamination of waterways is to be avoided, with sulphuric acid being slightly to moderately toxic to aquatic life. Large discharges may lower pH and be fatal to aquatic life and soil micro-organisms. Sulphuric acid is soluble in water and remains in definitely in the environment as sulphate. It has a high mobility in soil and the acid will dissolve some of the soil material resulting in some neutralisation. Large discharges may contribute to the acidification of effluent treatment systems and injure sewage treatment organisms. Sulphuric acid has a low potential for bioaccumulation.

LC50: Bluegill/Sunfish 96 hr – 10.5 ppm.

<http://www.csbp.com.au/Media/MSDS/AN/MSDS_Sulfuric_Acid_98__Solution.aspx>

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Aspects Plant Activities and Sources of Risk** | **Receptors?** | **Environmental Hazard Potential Pathway and Adverse Impacts** | **Currently Implemented**  **Risk Control Measures** | **Conseq**  **Impact** | **Likelihood**  **Estimate** | | **Risk Level** |
| Item [01]. Overfilling Strong Sulphuric Acid Tank CET01 | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS tank high level alarms:   Hi and hi-hi on LI3548.  LAHH3548 discrete alarm. * Overflow to lute in bund. Bund   leads to Effluent Pit 7 and  downstream to EP6.   * Current improvements being made to measure acid flow into tank and install a high level cut-out to prevent overflow. * EP6 lo and lo-lo pH alarms on AI7011   **ERA-CC-001**   * AAL7011 discrete pH alarm * Site Utilities contact Control Room if pH is out of spec. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |
| Item [02]. Overfilling Weak Sulphuric Acid Tank CET02 | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * DCS high level alarms:  Hi and hi-hi on LI3547. * Overflow to lute in bund. Bund leads to Effluent Pit 7 and  downstream to EP6. * EP6 lo and lo-lo pH alarms on AI7011   **ERA-CC-001**   * AAL7011 discrete pH alarm * Site Utilities contact Control Room if pH is out of spec. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [03]. Overfilling CAP Sulphuric Acid Head Tank | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Tank high level alarms:   Hi and hi-hi on LI14274.  LSHH14274 discrete alarm.  Hi and hi-hi on LI14276.  LAHH14276 discrete alarm.  LSHH14276 discrete alarm.  LSHH14274 trips transfer pump.   * Overflow to bund with drainage to Acid Effluent Pit (in CAP bunded area) downstream. Transfer to Acid Effluent Tank for neutralisation before transfer to Site Utilities. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [04]. Mechanical Failure of Storage Tanks | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * 10 year internal inspections of Strong Sulphuric Acid Tank CET01 and CAP Sulphuric Acid Head Tank T14074 and informal regular checks on external condition   **ERA-CC-008**   * 5 year internal inspections of Weak Sulphuric Acid Tank CET02 and informal regular checks on external condition   **ERA-CC-008**   * Correct material and thickness specification * Tanks protected by bund walls * Strong Sulphuric Acid Tank CET01 pressure and vacuum relief to atmosphere * Weak Sulphuric Acid Tank CET02 pressure and vacuum relief to atmosphere via overflow * CAP Sulphuric Acid Head Tank TI14074 pressure and vacuum relief to atmosphere. PSV on nitrogen purging line to tank.   DCS Tank low level alarms:   * Strong Sulphuric Acid Tank CET01:  Lo on LI3548.   LALL3548 discrete alarm. * Weak Sulphuric Acid Tank CET02: LALL3547 discrete alarm. * CAP Sulphuric Acid Head Tank  T14074: Lo and lo-lo on LI14274.  Lo and lo-lo on LI14276. * Bund capacity is at least 110% of largest tank * CAP Sulphuric Acid Head Tank T14074 loss of containment drains to Acid Effluent Pit, for neutralisation before transfer to Effluent Header. * Acid Effluent Pit hi-hi level alarm on LI18522 * Acid Effluent Pit pH alarms (lo and lo-lo) on AI18534 * CET01 and CET02 bund sump hi level alarm on LI3545A. * A major sulphuric acid LOC in CET01 and CET02 bund to be transferred to tanker for disposal. Minor losses of containment can be treated on site with slaked lime before disposal. * Informal regular inspections of area. * Weeping acid may be detectable * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Very Unlikely | Level IV |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Very Unlikely | Level IV |
| Item [05]. Loss of containment from piping | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.  Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat. | * Correct material and gasket specification * Double block isolations on offshoots * Numerous piping and valves in bunded areas to avoid physical impact and contain potential spills * Piping supports to prevent strain, cracks and loss of containment * Selected piping elevated to prevent physical impact damage * Valves selected suitable for operation * Routine inspection of piping by external contractor (critical piping) * Amount of nozzles and flange connections minimised * Isolation valves * Visual inspections by loader * Acid Effluent Pit hi-hi level alarm on LI18522 * Acid Effluent Pit pH alarms (lo and lo-lo) on AI18534 * EP6 lo and lo-lo pH alarms on AI7011.   **ERA-CC-001**   * AAL7011 discrete pH alarm. * Site Utilities contact Control Room if pH is out of spec. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |
| Item [06]. Overfilling Tanker or LOC during Loading | | | | | | | |
|  | **Nat** | Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. | * Driver monitors tanker level. * DCS hi sump level alarm on LI3542A and hi-hi sump level on LI3542B. * Effluent transfer to EP6. * EP6 lo and lo-lo pH alarm on AI7011.  **ERA-CC-001**. * AAL7011 discrete pH alarm. * Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent * Response Plan | Category 3.2 | | Unlikely | Level III |
|  | **Hum** | People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature. | * As for “Nat” * Monogoggle area * Safety showers  **MHF-CC-087** * Personnel and contractors informed not to rush on site as a part of behaviour safety requirements. | Category 3.2 | | Unlikely | Level III |

**Sulphuric Acid Response Plan**

Leak   
Identified

If at any time, the leak causes or threatens material harm to the environment, refer to Appendix F – Pollution Incident Notification

Where is the leak?

*Refer to CAP Bund Response Plan*

*Refer to Storage Bund Response Plan*

*Refer to Unbunded Response Plan*

CAP Bund Storage Bund Unbunded Area

**CAP Bund**

Leak Identified in   
CAP Bund

Can it be isolated?

Shutdown system and isolate   
or capture leak for effluent

Isolate leak

N

Y

Y

Leak   
> 125 L?

Y

Hose leak to Acid Effluent Sump with 10x water for dilution

Hose down CAP bund area affected

Transfer sump contents to Acid Effluent Tank

Transfer from Acid Effluent sump to IBCs

N

Dispose of  
sulphuric acid

N

**Storage Bund**

Leak Identified in Products Bund

Can it be isolated?

Shutdown system and isolate or capture leak for effluent

Isolate leak

Transfer sump contents to IBCs if required

Hose down affected area

Dispose of sulphuric acid

N

Y

**Unbunded Area**

Leak Identified in   
Unbunded Area

Can it be isolated?

Shutdown system and isolate   
if appropriate

Isolate leak

N

Y

Y

Block drains and/or capture remaining leak as appropriate

Acid entered drain?

N

Y

Neutralise with slaked lime if required

Absorb remaining spill as appropriate

Dispose of waste

Neutralise with slaked lime if required

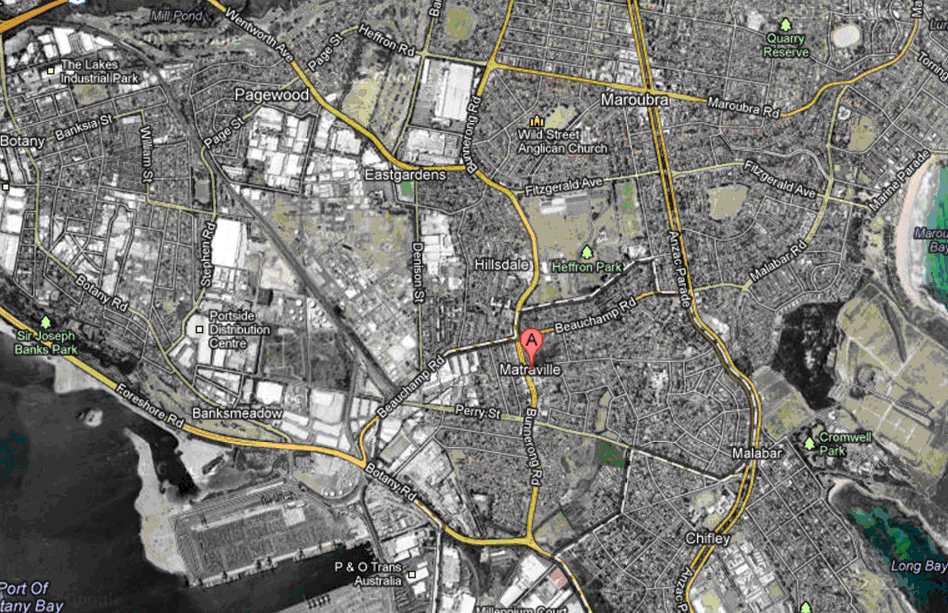
Absorb remaining spill as appropriate

Dispose of waste

Inform Site Utilities as appropriate

Request effluent diversion to Diversion Basin if required

## APPENDIX B - Botany Chlor-Alkali Facility and the Surrounding Neighbourhood



Westfield Shopping Centre

SWOOS Discharge

Springvale Drain Discharge

Matraville Public School

Ixom Chlor-Alkali Facility

Botany Industrial Park

## APPENDIX C - Botany Industrial Park Effluent System

ChlorAlkali

*.*

Site Utilities Demin Plant

Site Utilities Ash Water

Alkatuff

Huntsman

Stormwater Interceptor Pit

ALA CO2 Recovery

GTP

Diversion Basin

SWOOS

Effluent Monitoring Station

14th Avenue Gauging Pit

8th Avenue ETP

On-line flow meter

RO reject stream

CT blowdown

Oil separator

Caustic scrubber effluent

SU tag FI0531

SU tag FI5205

GTP tag FI3712

A’tuff tag FI94292

SU tag FI5354

SU tag FI7125

GTP tag FI7107

SU tag FI5380 Fast Loop

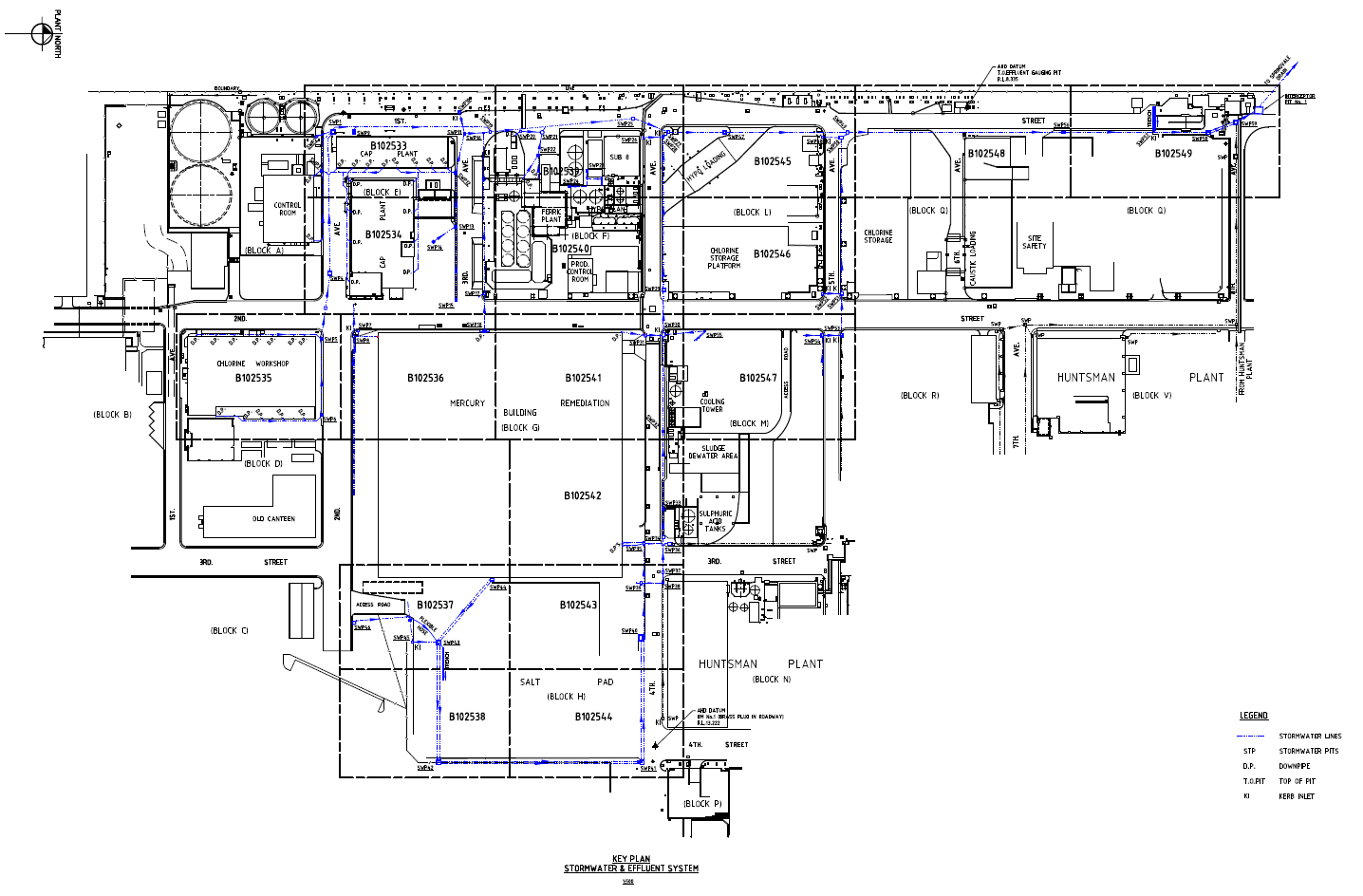
SU tag FI5358 Dip Leg

Total Flow FI5369 = FI5380 + FI5358

CAP tag FI7007

Olefines CT

Alkathene



*Discharge location of stormwater drains if not   
intercepted to Site Utilities effluent system*

## APPENDIX D - Stormwater System and Chemical Locations on Site

Page 3

Page 2

Sulphuric Acid

300 m

Iron Salts

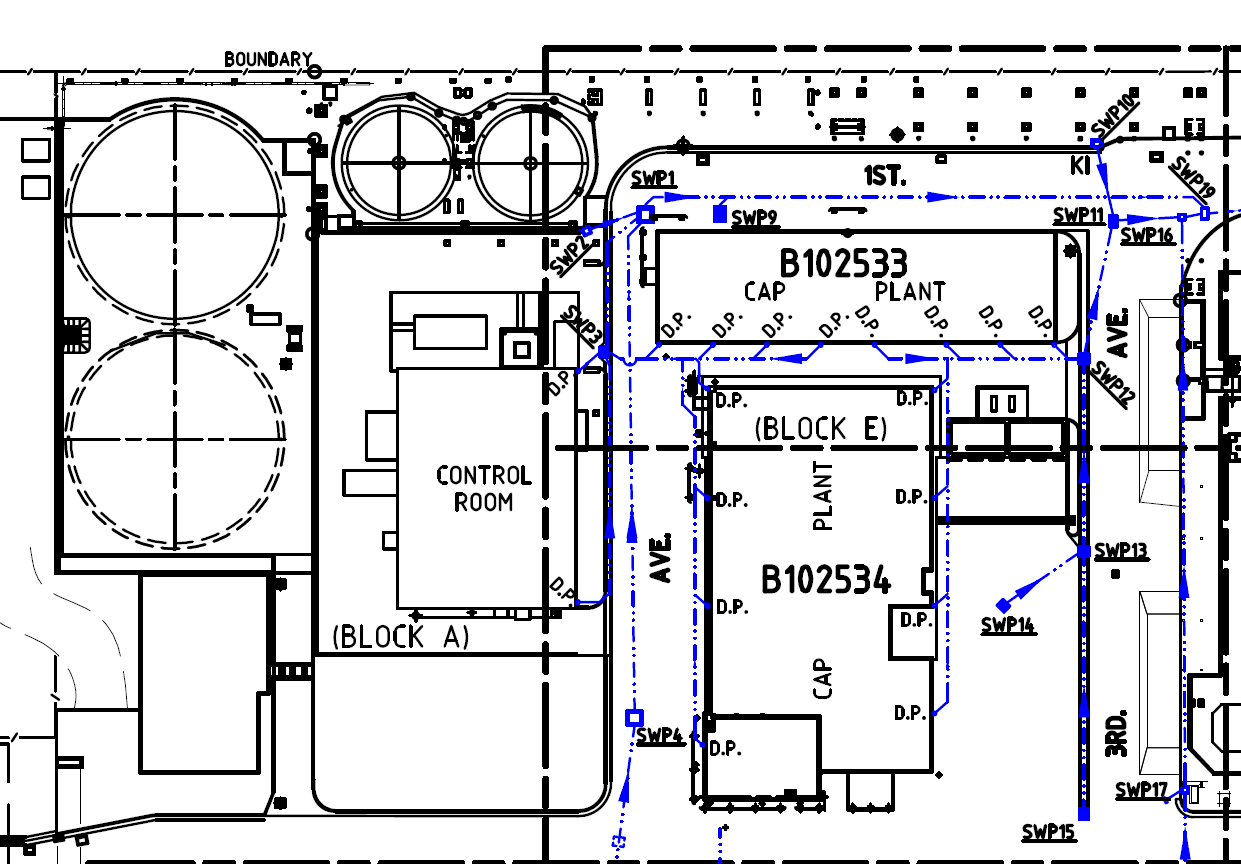
Sodium Hydroxide

Ferrous Chloride

Cooling Water

Cooling Tower Dosing Chemicals

**APPENDIX D - Stormwater System and Chemical Locations on Site (continued)**



Sodium Hypochlorite

Sodium Hydroxide

Sodium Bisulphite

Magnesium Chloride

Hydrochloric Acid

Filter Aid / Pre-Coat

Chlorinated Sulphuric Acid

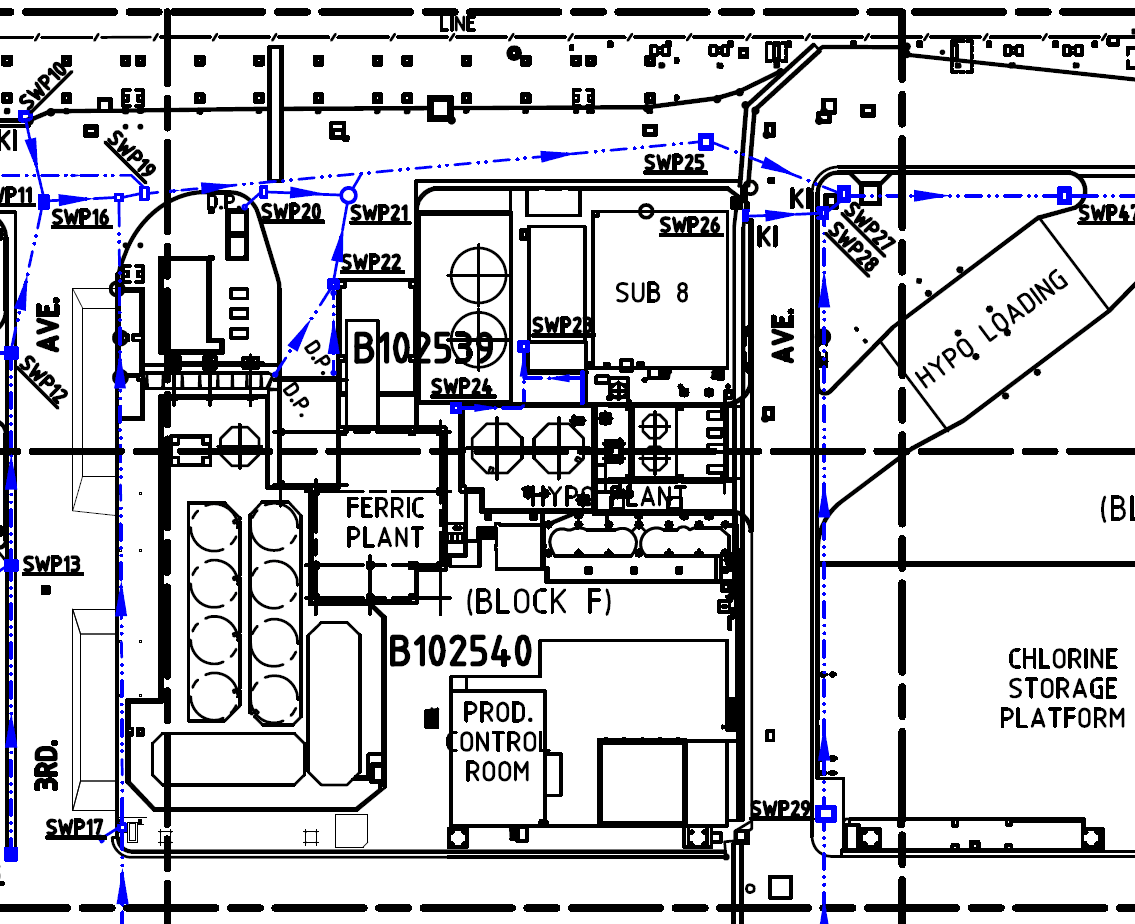
Alkaline Effluent

Sulphuric Acid

Coagulant

Brine

Acid Effluent



**APPENDIX D - Stormwater System and Chemical Locations on Site (continued)**

Sodium Hypochlorite

Ferrous Chloride

Cooling Tower Dosing Chemicals

Cooling Water

Cobalt Sulphate

Ferric Chloride

Hydrochloric Acid

## APPENDIX E - Chlor-Alkali Facility Effluent

EP6

EP A

EP26

Caustic Loading

EP6  
Interceptor Pit

EP7

EP16

Air Compressors

Lixators

**Chlor-Alkali Plant**

Control Room Laboratory

Acid Effluent Pit

Alkaline Effluent Pit

EP23

Caustic Storage

Hypo Decomp

Cells CT

4th Avenue Drains

2nd Street Drains

Sulphuric Acid Storage/  
Loading

Botany Industrial Park Effluent System

Note: Only Hypo Decomp effluent expected from Product Plants. See next page.

**APPENDIX E - Chlor-Alkali Facility Effluent**

**Product Plants Effluent**

**Hydrochloric Acid Effluent**

PEP20/21

PET26  
(Loading Sump)

PDP04

PDP06

Storage Tank  
Sump

PDT04  
(Plant Sump)

**Ferric Chloride Effluent**

Loading Sump

Primary Hypo

Backing Tower

6X  
(Offspec   
Tank)

P15099

T15150  
1-4X, 6X Sump

P15088

T15100  
(Decomp Tank)

PFP28

Loading Sump

P15084

T15151  
(Towers  
Bund)

T15152  
(9X/10X Sump)

T15153  
(7X/8X Sump)

P15094

P15097

**Sodium Hypochlorite Effluent**

PEP28

PET29  
(Storage   
Pit)

PEP17

PET28  
(Storage Pit)

PET22  
(Sludge Tank)

PEP27

PEP14

PEP26

Ferric Plant Channel - Reduction Tank, Pumping Tanks

Iron Bunker

PET25  
(Sludge Sump)

PET14  
(Plant Sump)

PET18  
(Effluent Recycle)

Effluent to EP16

## APPENDIX F Environmental Incident Notification Procedure

**PURPOSE**

This procedure was prepared having regard to the amendments in the *Protection of the Environment Legislation Amendment Act 2011* (Act) that commenced on 6 February 2012. It will be updated as further amendments are commenced. Model Procedure BG-06: Incident Management and Corrective Action require that measures be implemented to notify external authorities of certain incidents. In addition, regulators such as WorkCover, Office of Environment and Heritage, Ministry of Health, and Department of Planning and Infrastructure require notification in the event of incidents which meet their defined criteria.

This procedure details when notification of regulators is required, the timeframe for notification and who is responsible for the notification.

Note: Please keep a detailed file note of all notifications in accordance with the document titled “**Checklist and Record of Regulator Notification”.**

**Environmental Incident Notification Procedure**

| **Incident Occurs** | **Notify Following Regulator** | **Reporting Responsibility (Order of Priority)** |
| --- | --- | --- |
| **Pollution Incident which causes or threatens Material Harm to the Environment**  You must notify when a "pollution incident" occurs, which causes or threatens "material harm" to the environment IMMEDIATELY. This means promptly and without delay.  First, you should verify that the incident is a “pollution incident” in accordance with the definitions below.  Secondly, if it is a pollution incident, you should determine whether it is causing or threatening “material harm” to the environment. Refer to the definitions set out below to make these determinations.  If it is a pollution incident that is causing or threatening “material harm” to the environment you must notify the pollution incident immediately in accordance with this procedure.  If it does not cause or threaten material harm, you do not need to notify the regulators. You may however need to notify it separately under your licence (for example in the site’s annual return)  HOWEVER where action could be immediately taken to prevent immediate danger or further harm to people and/or the environment you should ensure that action is being taken to avoid or minimise immediate danger or further harm before you notify the Regulators.  **What is a "pollution incident"?**  A "pollution incident" occurs when there is, or is likely to be, a leak, spill or other escape or deposit of a substance, which results in, or is likely to result in:   * water pollution, * air pollution; or * land pollution.   A “pollution incident” is not an incident that only involves the emission of noise.  See definitions below.  **What is "material harm" to the environment?**  Harm to the environment is material if it:   1. involves actual or potential harm to the health or safety of people or ecosystems that is not trivial, either offsite or onsite; or 2. results in actual or potential **loss** or property damage exceeding $10,000, either off-site or on-site. To estimate “**loss”** you should include the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment   This will generally include the costs associated with sampling, investigation and waste disposal. It does not necessarily include the cost of equipment repair, but may if the equipment repair is necessary to prevent or mitigate harm to the environment.  Therefore there may be situations where “material harm to the environment” in the ordinary meaning has not occurred, but because the cost of clean up and prevention exceeds $10,000, it falls within the statutory definition and must be reported immediately.  **Exceptions: Do not need to notify where:**   * all relevant authorities are already aware of the incident; * the incident is an ordinary result of action required to be taken to comply with an environment protection licence, or an environment protection notice; or * the incident involved only the emission of odour (however if the odour is associated with a substance that threatens material harm to the environment, this will need reporting). * The incident involved only the emission of noise. | If the incident presents an **immediate threat to human health or property,** **IMMEDIATELY** call **000. Fire and Rescue NSW, the NSW Police and the NSW Ambulance Service** are the first responders, responsible for controlling and containing incidents.  If the incident does not require an initial combat agency, IMMEDIATELY notify the relevant authorities in the following order and in accordance with the document titled “Checklist and Record of Regulator Notification”: IMMEDIATE means promptly without delay.  Where the site does not need assistance to manage the incident, you should advise that to the regulators during your initial notification. Where you have not determined that the pollution incident has caused or threatened material harm, (eg you are awaiting analysis of stormwater discharge), but you are notifying out of a matter of caution, you should also advise the regulators of this.  **Order of Notification**  ***1 The EPA on 131 555***  ***2 The Ministry of Health Randwick on 1300 066 055 / 9382 2222 (after hours). Ask for Public Health Nurse on call.***  ***3 The WorkCover Authority on 13 10 50***  ***4 Bayside Council, Karim Elazar, Team Leader on 95621520/0412455068***  ***5 Fire and Rescue NSW on 1300 729 579 (if 000 not called first for Immediate Threat Incidents)***  Written notification to be provided within 7 days.  A record of notification must be kept in the SHERMIS report.  The notification should include, where possible:  (a)  the time, date, nature, duration and location of the incident;  (b)  the location of the place where pollution is occurring or is likely to occur;  (c)  the nature, the estimated quantity or volume and the concentration of any pollutants involved;  (d)  the circumstances in which the incident occurred (including the cause of the incident, if known); and  (e)  the action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution.  The obligation to notify is continuous, so if any of the above information becomes known after the initial notification is made, that information must also be notified **immediately in accordance with the above procedure**.It may be possible to obtain the agreement of regulators not directly involved in the incident response and management to omit them from further notifications – however unless you obtain their agreement you should continue to provide them with updated information as required under the legislation.  It is important to provide succinct factual information which will assist the response agencies to understand the nature of the incident and the hazards involved. You should be truthful and clearly state the facts as known at that time. You should not speculate as this will not assist the response agencies in responding to the incident.  Note: Any incident or near incident with actual or potential significant off-site impacts on people or the biophysical environment needs to be reported to the NSW Department of Planning and Infrastructure within 24 hours.  NSW Department of Planning and Infrastructure Sydney East Region: 9228 6333 | **Who Must Notify the Regulators**  The Botany Site Manager/Legacy Operations Manager must notify the Regulators in accordance with this procedure. The Site Manager/Legacy Operations Manager may delegate this function to other site personnel trained in this procedure. See Delegates below for each of the three Ixom Botany Facilities.  **Botany Chlor-Alkali Facility**   * Ian Parker - Regional Manufacturing Manager NEA (Acting): (02) 9352 2254 0/400 686 047 * Nick Brazil, CAP Operations Lead   (Acting): 9352 2242 / 450 181 469   * John Khair, Maintenance Lead: 9352 2102 / 0447440783   **GTP**   * Ian Parker - Regional Manufacturing Manager NEA (Acting): (02) 9352 2254 0/400 686 047 * Sandip Ramani, GTP Technical Lead: 9352 2279 / 0427063090 * Mrinmoy Das, GTP Operations Lead: 9352 2287 / 0401692426 * Geoff Fairey, Responsible Mechanical Engineer 9352 2044 / 0412 254 579   **HCB Waste Stores**   * Colin Wiley, Orica Legacy Operations Manager: 9352 2285 / 0411 023 881 * Domenic Cappelli, GTP Lead: 9352 2287 / 0405 317 972   **Internal Notification**  All employees have a duty to notify Ixom of an incident.  In the first instance employees witnessing the incident shall contact Site Manager/Legacy Operations Manager. They should speak directly to these people, in order of preference, and NOT merely leave a phone message.  The call out list above should be used for each facility. If personnel on the list above can not be contacted see additional staff below  **Botany Chlor-Alkali Facility**   * CAP Control Room: 9352 2060   **GTP**   * GTP Control Room: 9352 2280   **HCB Waste Stores**   * HCB Logistics Coordinator: 9352 2373   If the employee who becomes aware of the incident cannot notify any these people, the **employee must** notify the regulators directly in accordance with the above steps. This is a duty that the employee has under the legislation.  Therefore all personnel that may become aware of an environmental incident and require regulatory notification shall use the ***Checklist and Record of Regulator Notification*.**  . |
| **Water Pollution** means:   * the discharge of any matter, whether solid, liquid or gaseous, so that the physical, chemical or biological condition of the waters is changed; * the discharge of any refuse, litter, debris or other matter, whether solid or liquid or gaseous, that changes the condition of the waters or is likely to make the waters unclean, noxious, poisonous or impure, detrimental to the health, safety, welfare or property of persons, undrinkable for farm animals, poisonous or harmful to aquatic life, animals, birds or fish in or around the waters or unsuitable for use in irrigation, or obstructs or interferes with, or is likely to obstruct or interfere with persons in the exercise or enjoyment of any right in relation to the waters; or * the discharge of any solid, liquid or gas that does not comply with the requirements of the Environment Protection Licence;   including:   * placing any solid, liquid or gas in a position where it can be discharged into a waterway; or * placing any solid, liquid or gas into the dry bed of any waters or into any drain, channel or gutter designed to receive or pass water,   if it would have polluted those waters had it been placed in them. |  |  |
| **Air pollution** means:   * the emission into the air of any air impurity (which includes smoke, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, mists, odours and radioactive substances). |  |  |
| **Land pollution** means:   * introducing into or onto land, any matter, whether solid, liquid or gas that causes or is likely to cause degradation of the land and actual or potential harm to the health or safety of people, animals, terrestrial life or ecosystems, or actual or potential loss or property damage, that is not trivial. |  |  |
| **Site based examples of incidents that would not generally require reporting:**  Spill from tank into containment system so that there is not potential for water, air or land pollution and no material harm is caused. Under MHF, there may be requirements to notify WorkCover of a loss of primary containment.  Odour that does not threaten material harm. |  |  |

**Checklist and Record of Regulator Notification**

This checklist and record of Regulator Notification is to be used in conjunction with the document titled “**Environmental Incident Notification Procedure”**

Follow and complete this document when you have determined that the incident requires **immediate** notification in accordance with “**Environmental Incident Notification Procedure”**. The completed document will act as a written record of the notification.

NOTE: You will be required to provide follow up written report within 7 days of the reporting the incident.

**REMEMBER: IMMEDIATE MEANS PROMPTLY AND WITHOUT DELAY.**

The *Protection of the Environment Operations Act 1997* (the “Act”) sets out the information that is required to be provided to the regulators, if known. If this information becomes known after the initial notification, you will need to telephone each regulator again and provide them with further updates. You must also keep a record of the further updates.

**Incidents presenting an immediate threat to human health or property must be notified IMMEDIATELY to emergency services - call 000.** You should do this as soon as it is safe to do so. Fire and Rescue NSW, the NSW Police and the NSW Ambulance Service are the first responders, responsible for controlling and containing incidents.

The information that must be provided, if known at the time of notification is listed on page 2. The person responsible for notifying the regulators should complete the table on page 2 prior to telephoning the regulators. There is a continuous obligation to notify this information. Where you become aware of the required information after the initial notification, you must immediately notify the regulators of the further information in accordance with the procedure.

Keep the information factual, as speculation will not assist the response agencies.

If the person completing the table on page 2 is required to attend to immediate incident response, the task of telephoning the regulator should be delegated. The delegate can then relay the completed information on page 2 to the Regulator. The table commencing on page 3 must be completed at the time of notification.

**NAME OF IXOM PERSONNEL COMPLETING INFORMATION TABLE………………………………………………….**

|  |  |  |
| --- | --- | --- |
| Information that must be notified, if known, under the POEO Act | Complete Details for Initial Notification Here | Complete relevant information here, if not known at the time of initial notification – for subsequent notification |
| The time, date, nature, duration and location of the incident |  |  |
| The location of the place where pollution is occurring or is likely to occur |  |  |
| The nature, the estimated quantity or volume and the concentration of any pollutants involved |  |  |
| The circumstances in which the incident occurred (including the cause of the incident, if known) |  |  |
| The action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution |  |  |

In addition to this required information, the following information may be useful to the regulators:

|  |  |
| --- | --- |
| Does Ixom require assistance of a particular regulator or group of regulators to immediately respond to the incident? Who and advise accordingly? |  |
| Is Ixom notifying only out of caution in the event that actual or threatened material harm subsequently becomes apparent? |  |

**Name of NOTIFIER……………………………………………………………………………..**

**EMERGENCY SERVICES – CONTACT FIRST ONLY IF THERE IS AN IMMEDIATE THREAT TO PEOPLE OR PROPERTY, OTHERWISE SKIP THIS SECTION TO NEXT PAGE**

|  |  |  |
| --- | --- | --- |
| Regulator | Emergency Services | Subsequent Notifications – Information Updates |
| Telephone Number | **000** |  |
| Ixom Notifier |  |  |
| Time, date of notification |  |  |
| Individual from regulator taking the call |  |  |
| Other information conveyed or requested by regulator. List Here |  |  |
| Has regulator **directed** Ixom take certain action, provide information or contact other stakeholders? List here |  |  |
| Regulator | EPA | Subsequent Notifications – Information Updates |
| Telephone Number | **131 555** |  |
| Ixom Notifier |  |  |
| Time, date of notification |  |  |
| Individual from regulator taking the call |  |  |
| Other information conveyed or requested by regulator. List Here |  |  |
| Has regulator **directed** Ixom take certain action, provide information or contact other stakeholders? List here |  |  |

|  |  |  |
| --- | --- | --- |
| Regulator | Ministry of Health via local Public Health Unit | Subsequent Notifications – Information Updates |
| Telephone Number | Randwick Public Health Unit: **1300 066 055**  After hours: **9382 2222**, ask for Public Health Nurse on call |  |
| Ixom Notifier |  |  |
| Time, date of notification |  |  |
| Individual from regulator taking the call |  |  |
| Other information conveyed or requested by regulator. List Here |  |  |
| Has regulator **directed** Ixom take certain action, provide information or contact other stakeholders? List here |  |  |
| Regulator | The WorkCover Authority | Subsequent Notifications – Information Updates |
| Telephone Number | 13 10 50 |  |
| Ixom Notifier |  |  |
| Time, date of notification |  |  |
| Individual from regulator taking the call |  |  |
| Other information conveyed or requested by regulator. List Here |  |  |
| Has regulator **directed** Ixom take certain action, provide information or contact other stakeholders? List here |  |  |
| Regulator | Bayside Council | Subsequent Notifications – Information Updates |
| Telephone Number | *Karim Elazar, Team Leader Regulation:* ***95621520***  After hours:  ***0412455068*** |  |
| Ixom Notifier |  |  |
| Time, date of notification |  |  |
| Individual from regulator taking the call |  |  |
| Other information conveyed or requested by regulator. List Here |  |  |
| Has regulator **directed** Ixom take certain action, provide information or contact other stakeholders? List here |  |  |
| Regulator | Fire and Rescue NSW | Subsequent Notifications – Information Updates |
| Telephone Number | 1300 729 579 |  |
| Ixom Notifier |  |  |
| Time, date of notification |  |  |
| Individual from regulator taking the call |  |  |
| Other information conveyed or requested by regulator. List Here |  |  |
| Has regulator **directed** Ixom take certain action, provide information or contact other stakeholders? List here |  |  |

**Revision**

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Revision** | **Details** | **Who** |
| **12/2/2019** | **1** | **Issued in Ixom format** | **J. Nguyen** |
| **25/08/2020** | **9** | **Update personnel details** | **N Majlish** |
|  |  |  |  |