Pollution Incident Response Management Plant (PIRMP)

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

Scope of Application: Botany CAP

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1 PURPOSE

IXOM OPERATIONS PTY LTD holds an Environment Protection Licence with the NSW Environment Protection Authority (EPA) for **Botany ChlorAlkali Plant**. As per the Protection of the Environment Operations Act 1997 (the POEO Act), the holder of an Environment Protection Licence must prepare, keep, test and implement a pollution incident response management plan (PIRMP) that complies with Part 5.7A of the POEO Act in relation to the activity to which the licence relates.

If a pollution incident occurs in the course of an activity so that material harm to the environment (within the meaning of section 147 of the POEO Act) is caused or threatened, the person carrying out the activity must immediately implement this plan in relation to the activity required by Part 5.7A of the POEO Act.

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, 2019):

- 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 the EPA, SafeWork NSW, local councils, NSW Ministry of Health, 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.

2 ENVIRONMENTAL PROTECTION LICENCE (EPL) DETAILS

Name of Licensee:	IXOM OPERATIONS PTY LTD
EPL Number:	20547
Premises name and address: Botany	Botany ChlorAlkali Plant 16-20 Beauchamp Road Matraville NSW 2036
Company or business contact details:	Ben Smith Head of Manufacturing – Botany CAP Business hours contact numbers: T: (02) 9352 2254 / M: 0456 917 739 After hours contact numbers: 0456 917 739 Email: Ben.Smith@ixom.com
Website address:	www.ixom.com
Scheduled activities on EPL:	Chemical production Chemical storage Waste processing (non-thermal treatment) Waste storage
Fee-based activities on EPL:	Dangerous goods production General chemicals storage Non-thermal treatment of hazardous and other waste Waste storage – hazardous, restricted solid, liquid, clinical and related waste, and asbestos waste

3 POLLUTION INCIDENT – PERSONS RESPONSIBLE

PIRMP activation	DCS Operator Business hours contact numbers: T: (02) 9352 2060 After hours contact numbers: (02) 9352 2060
Notifying relevant authorities	Carl Byron Operations Manager – Botany CAP Business hours contact numbers: T: (02) 9352 2391 / M: 0482 610 984 After hours contact numbers: 0482 610 984 Email: Carl.Byron@ixom.com Ben Smith Head of Manufacturing – Botany CAP Business hours contact numbers: T: (02) 9352 2254 / M: 0456 917 739 After hours contact numbers: 0456 917 739 Email: Ben.Smith@ixom.com Benedick Pagarigan NEWA Compliance Manager Business hours contact numbers: T: (02) 9352 2118 / M: 0476 410 458 After hours contact numbers: 0476 410 458 Email: Benedick.Pagarigan@ixom.com
Managing response to pollution incident	DCS Operator Business hours contact numbers: T: (02) 9352 2060 After hours contact numbers: (02) 9352 2060

4 DEFINITION OF TERMS

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"*.

What is **"material harm"** to the environment?

Harm to the environment is material if it:

a. involves actual or potential harm to the health or safety of people or ecosystems that is not trivial, or

b. results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations). To estimate "loss", 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 is included.

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.

The definition of **'water pollution'** in the Protection of the Environment Operations Act 1997 (POEO Act) sets out general and specific circumstances that constitute pollution. At its broadest, water pollution means introducing any matter into waters which changes the physical, chemical or biological condition of the water. It also includes placing any matter where it might fall, descend, be washed, be blown or percolates into any waters (e.g. soil which might washed into a waterway).

Air pollution is 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 is the introduction 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.

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

ACRONYM	DEFINITION
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

5 ENVIRONMENTAL INCIDENT NOTIFICATION PROCEDURE

Notification of Relevant Authorities

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 notification documents in Appendix F Incident Notification to Authorities. IMMEDIATE means promptly without delay.

Notification must be made IMMEDIATELY when a “pollution incident” occurs, which causes or threatens "material harm" to the environment. This means promptly and without delay.

- First, verify that the incident is a “pollution incident” in accordance with the definitions above.
- Secondly, if it is a pollution incident, determine whether it is causing or threatening “material harm” to the environment. Refer to the definitions set out above to make these determinations.
    - If it is a pollution incident that is causing or threatening “material harm” to the environment, notify the pollution incident immediately in accordance with this procedure.
    - If it does not cause or threaten material harm but a non-compliance to the Environmental Protection Licence, a notification must be made to the EPA.

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.

Once the initial notification is made, it is necessary to continuously notify any additional information that becomes known in accordance with the above procedure. It may be possible to exclude regulators not directly involved in incident response and management from further notifications if their agreement is obtained. However, if their agreement is not obtained, updated information should still be provided to them as required by legislation. It is crucial to provide concise factual information that

will help response agencies comprehend the incident's nature and associated hazards. Truthfulness and clear communication of known facts are essential, while speculation should be avoided as this will not assist the response agencies in responding to the incident.

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 SafeWork Authority on 131 050

4 Bayside Council, Bryce Spelta, Manager City Infrastructure on 0411 744 562

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.

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

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 SafeWork of a loss of primary containment.
- Odour that does not threaten material harm.

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/Operations Manager. They should speak directly to these people, in order of preference, and NOT merely leave a phone message.

A record of notification must be kept in the Velocity EHS 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.

Notification of Neighbours and Local Community

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.

2. 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/. 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.

6 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
- Repack Plant

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 36 people. Outside normal business hours, the site occupancy reduces to a minimum of 3 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 Indorama 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.

Communication materials are regularly sent to the community to provide information on how to respond in case of chemical emergency (ie chlorine leak). Please see stakeholder engagement documents.

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.

7 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 C contains 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.

7.1.1 Likelihood and Common Controls

While the tanks and vessels have individual controls (Appendix C) 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 m^3/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 C 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).

7.1.2 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.

7.1.3 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.

7.1.4 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.

7.1.5 *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.

7.1.6 *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.

7.1.7 *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.

7.1.8 *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.

7.1.9 *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)
- Repack Plant
- Outside Sulphuric Acid Chlorine Compressor (Slaked Lime)

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.

7.1.10 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 m^3/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.

7.1.11 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 0, 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 permit to work system
- Personal Protective Equipment (PPE) requirements
- Ixom's Unsafe Acts Prevention program

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.

7.1.12 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 Safety Data Sheets (SDS) 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.

7.1.13 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
- Maintenance Team

7.1.14 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. 2nd Street Near Boom Gate

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.

7.1.15 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.

7.1.16 Crisis Management Team

All serious emergencies (typically Level 2) shall be reported immediately to the Executive Vice President Group Operations. This is managed by ERS. Consideration will be given to activating the Ixom Crisis Management Plan IXO-GBL-REF-EMG-001.

8 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 0, 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 m^3 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).

9 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.

10 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.

11 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.

12 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. Hard copies are also maintained in the control room and admin office.

13 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 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.

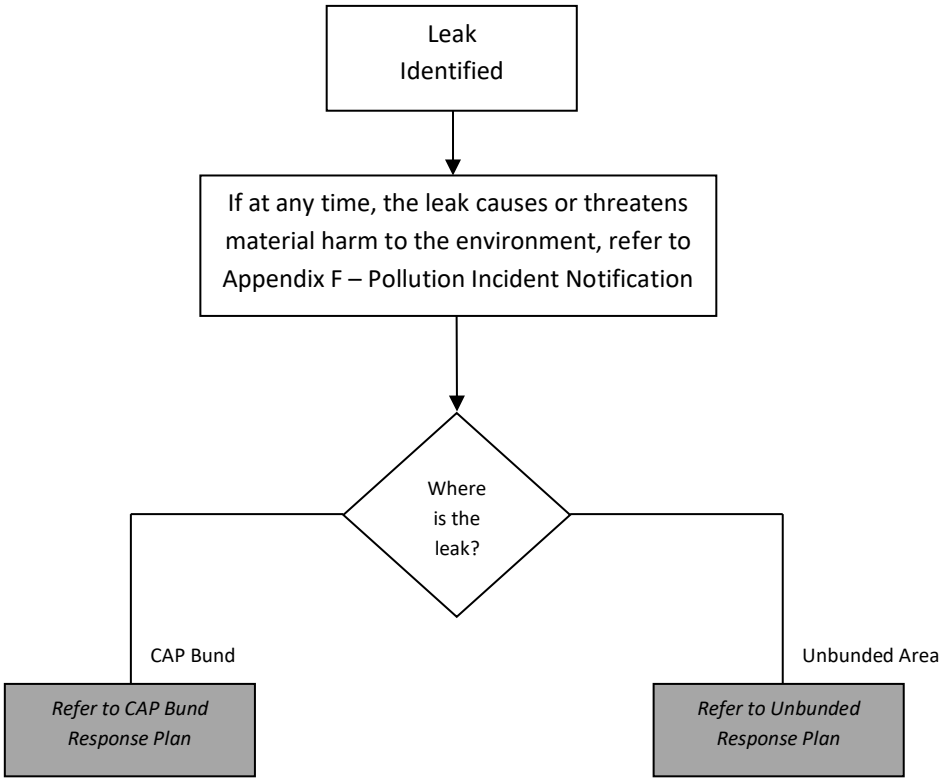
Environmental Aspects Plant Activities and Sources of Risk	Receptors?	Environmental Hazard Potential Pathway and Adverse Impacts	Currently Implemented Risk Control Measures	Conseq Impact	Likelihood Estimate	Risk Level
Item [01]. Overfilling Hypo Destruct Tank						
	Nat	Interceptor Pit 1 overflow to 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.	Category 3.2	Very Unlikely	Level IV

			☐ 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			
	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

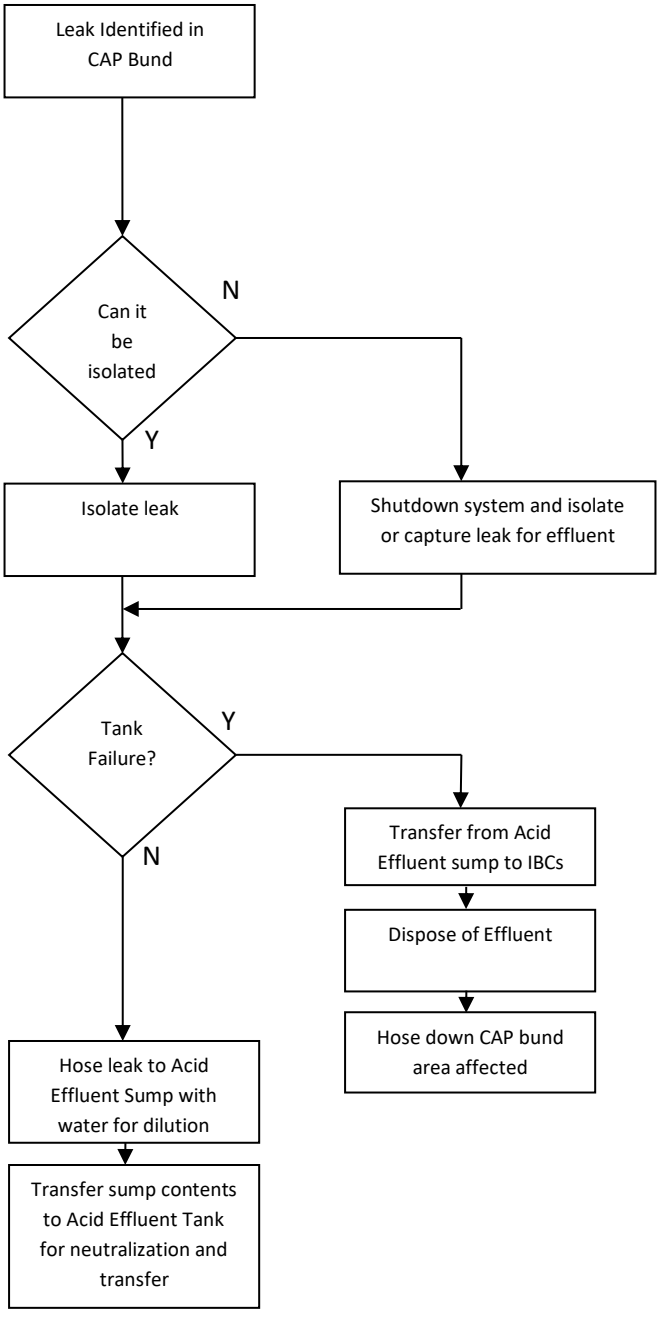
	Hum	People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature.	☐ As for "Nat" ☐ Monogoggle area ☐ Safety showers **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	☐ As for "Nat" ☐ Monogoggle area	Category 3.2	Very Unlikely	Level IV

		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.	☐ Safety showers **MHF-CC-087**			
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

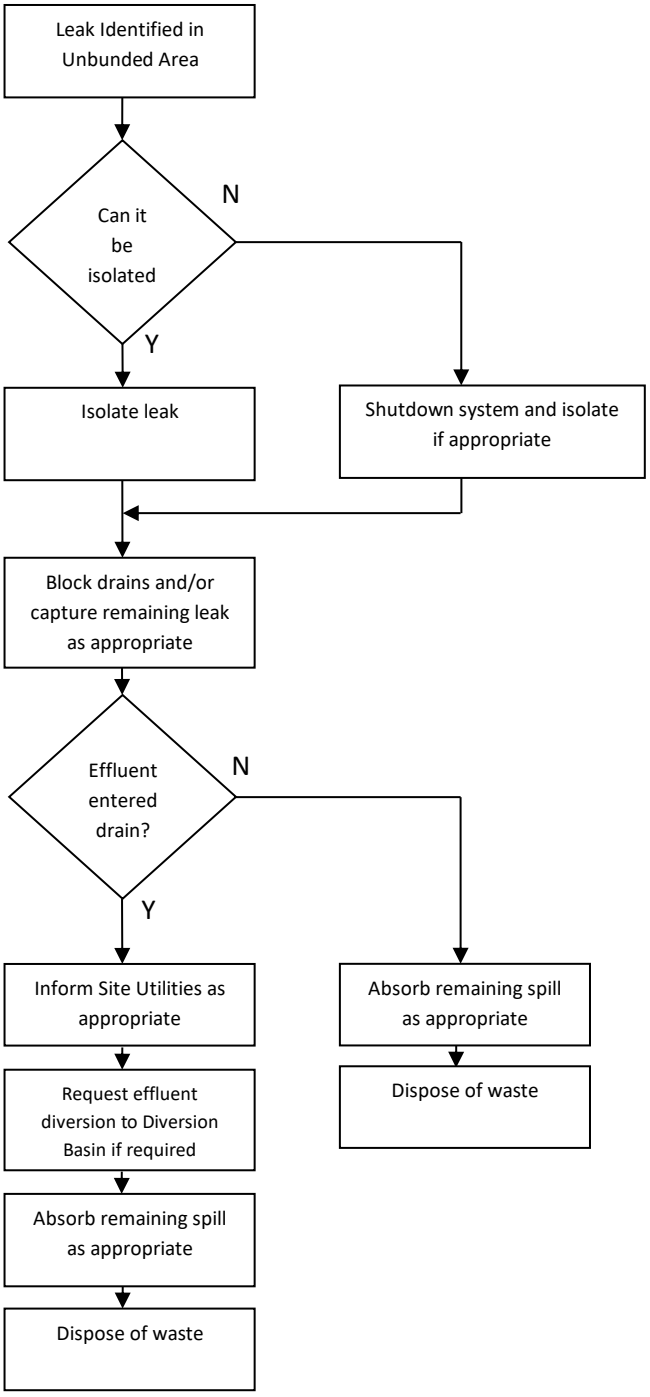
Acid Effluent Response Plan



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?
Y
N
Transfer from Acid Effluent sump to IBCs
Dispose of Effluent
Hose down CAP bund area affected
Hose leak to Acid Effluent Sump with water for dilution
Transfer sump contents to Acid Effluent Tank for neutralization and transfer

Unbunded Area



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.

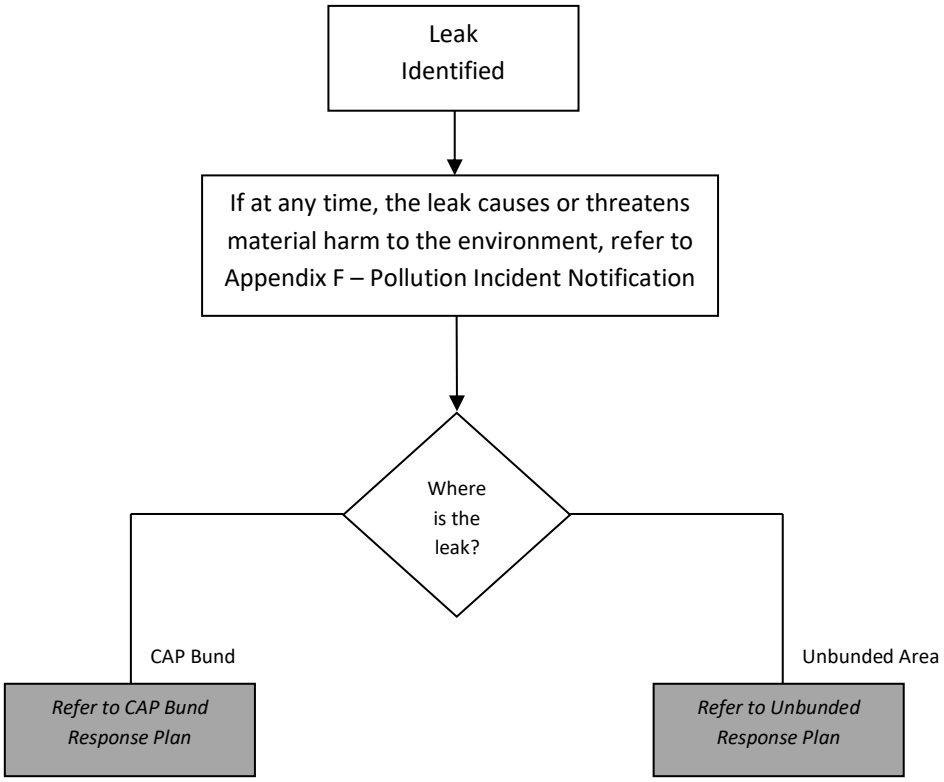
Environmental Aspects Plant Activities and Sources of Risk	Receptors?	Environmental Hazard Potential Pathway and Adverse Impacts	Currently Implemented Risk Control Measures	Conseq Impact	Likelihood Estimate	Risk Level
Item [01]. Overfilling Alkaline Effluent Tank						
	Nat	Interceptor Pit 1 overflow 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	Category 3.1	Very Unlikely	Level IV

			☐ Safety showers **MHF-CC-087**			
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	Category 3.2	Very Unlikely	Level IV

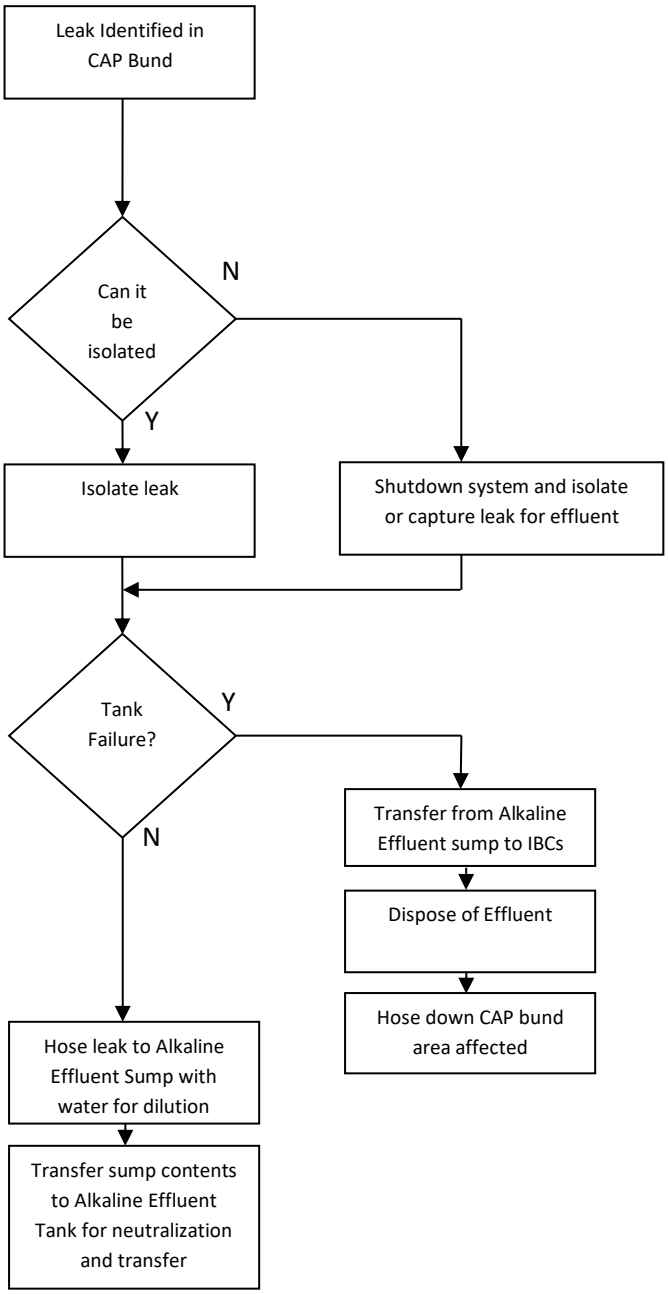
			☐ ORP measurement on Alkaline Effluent Tank indicating available chlorine in effluent ☐ Effluent dechlorinated with sodium bisulphite ☐ Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	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	Category 3.2	Very Unlikely	Level IV

			☐ Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	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

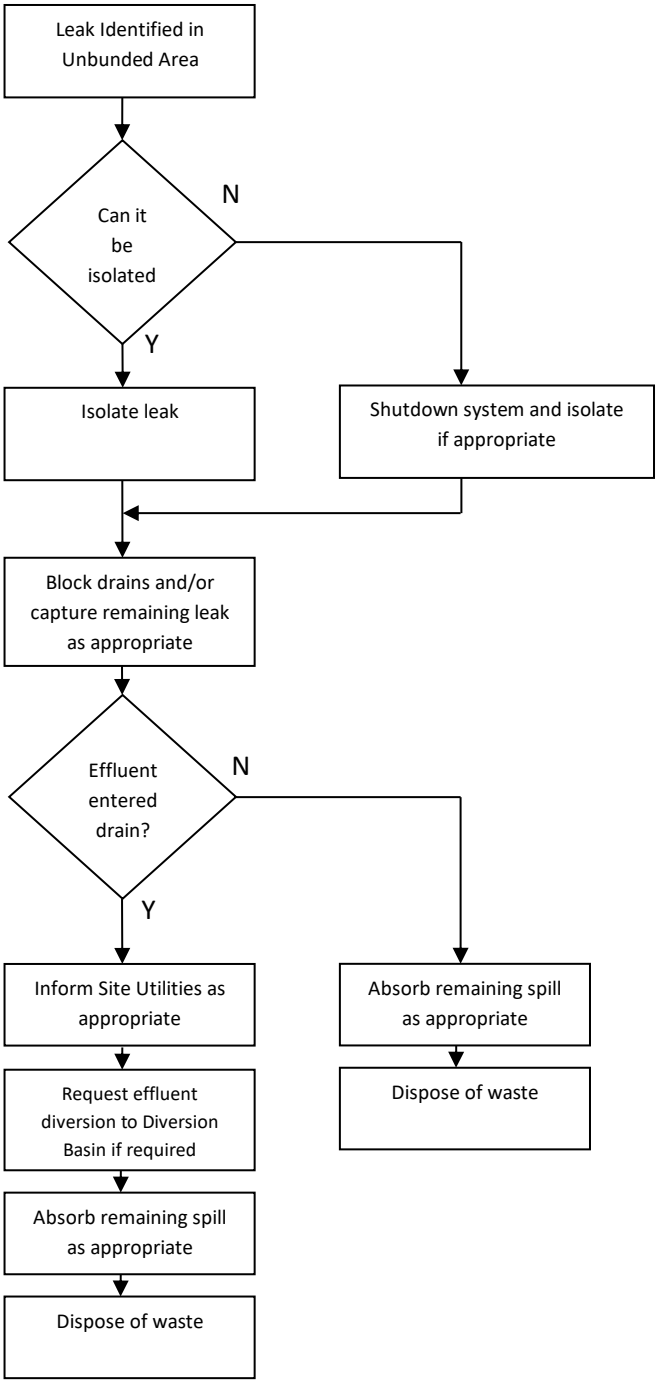
Alkaline Effluent Response Plan



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?
Y
N
Transfer from Alkaline Effluent sump to IBCs
Dispose of Effluent
Hose down CAP bund area affected
Hose leak to Alkaline Effluent Sump with water for dilution
Transfer sump contents to Alkaline Effluent Tank for neutralization and transfer

Unbunded Area



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	Category 1	Unlikely	Level IV

			☐ 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			
	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	☐ DCS high level alarms: Hi and hi-hi on LIC11155	Category 1	Unlikely	Level IV

		impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.	☐ 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			
	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						

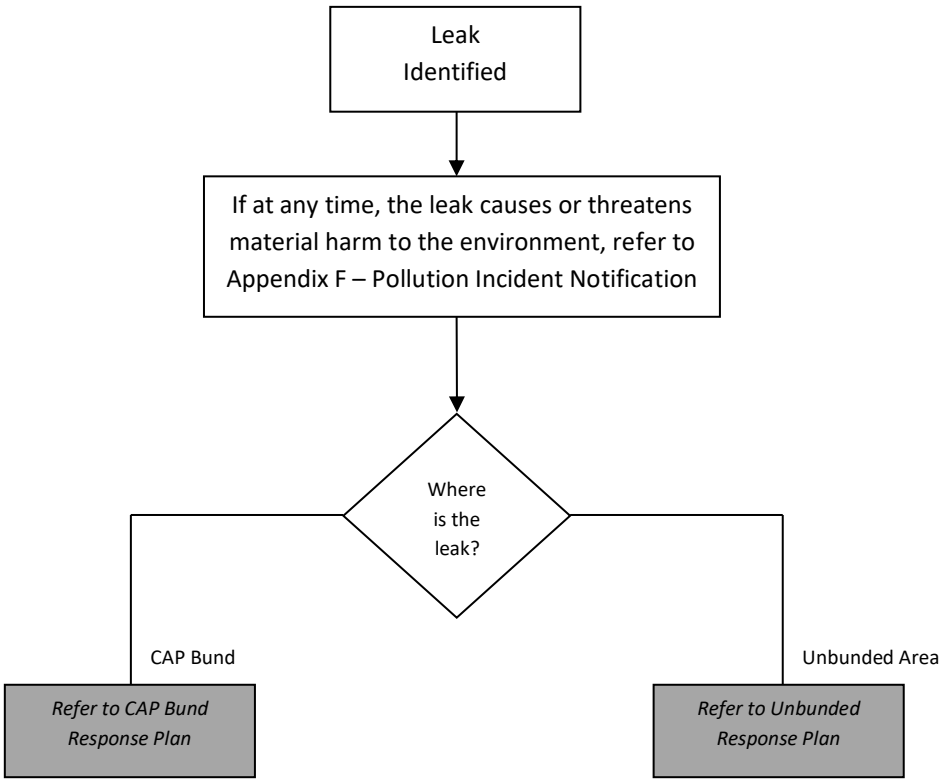
	Nat	Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.	☐ DCS high level alarm: Hi on LIC18516 (controls caustic condensate flow 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.	Category 2	Very Unlikely	Level IV

			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			
	Hum	People – Acute (immediate) adverse impact on human health with irritation to skin or	☐ As for “Nat” ☐ Monogoggle area	Category 3.1	Very Unlikely	Level IV

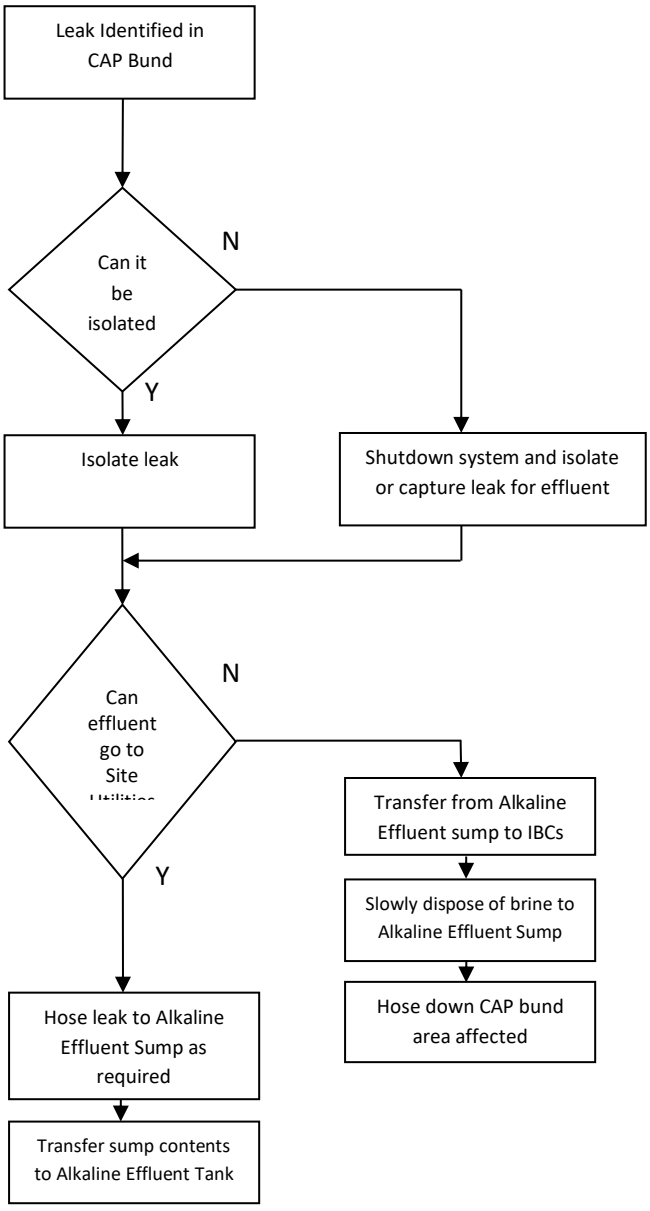
		eyes. Burns to skin at high temperatures.	☐ Safety showers **MHF-CC-087**			
Item [08]. Loss of containment from piping						
	Nat	Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting 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

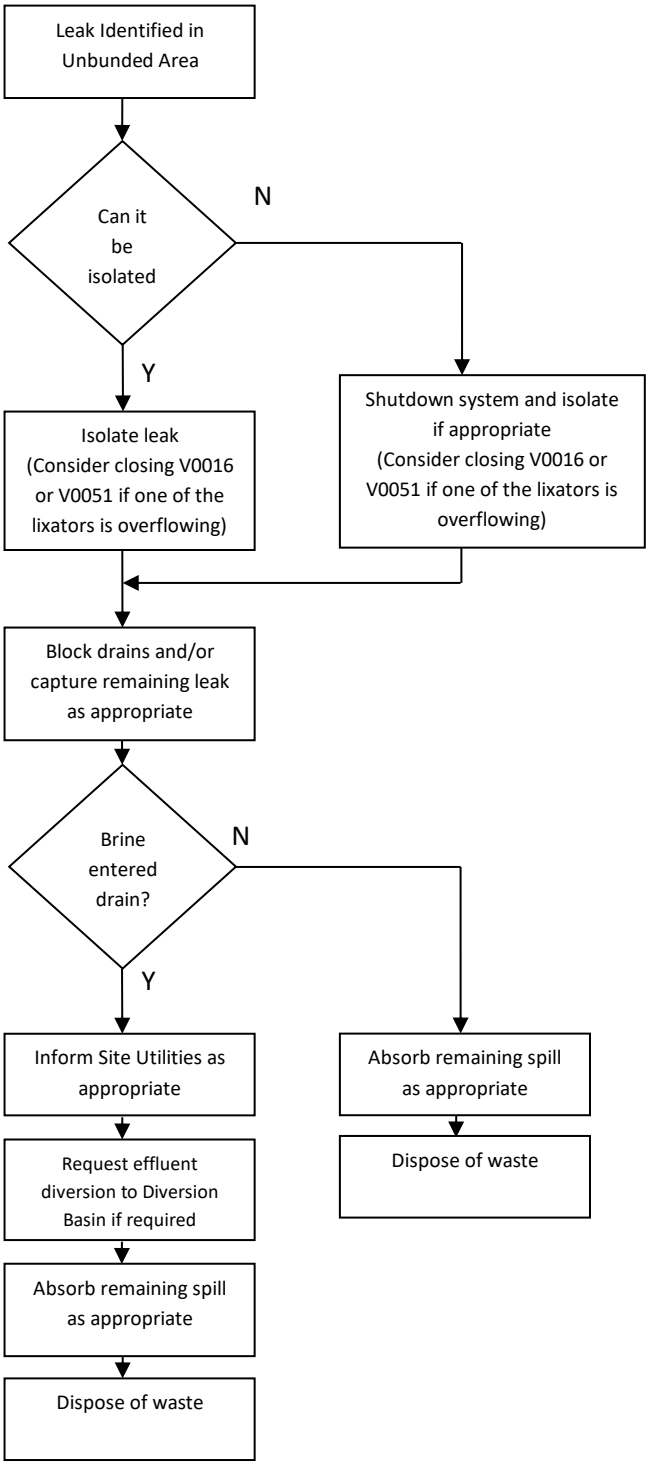
Brine Solution/Sludge Response Plan



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
N
Y
Transfer from Alkaline Effluent sump to IBCs
Slowly dispose of brine to Alkaline Effluent Sump
Hose down CAP bund area affected
Hose leak to Alkaline Effluent Sump as required
Transfer sump contents to Alkaline Effluent Tank

Unbunded Area



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.

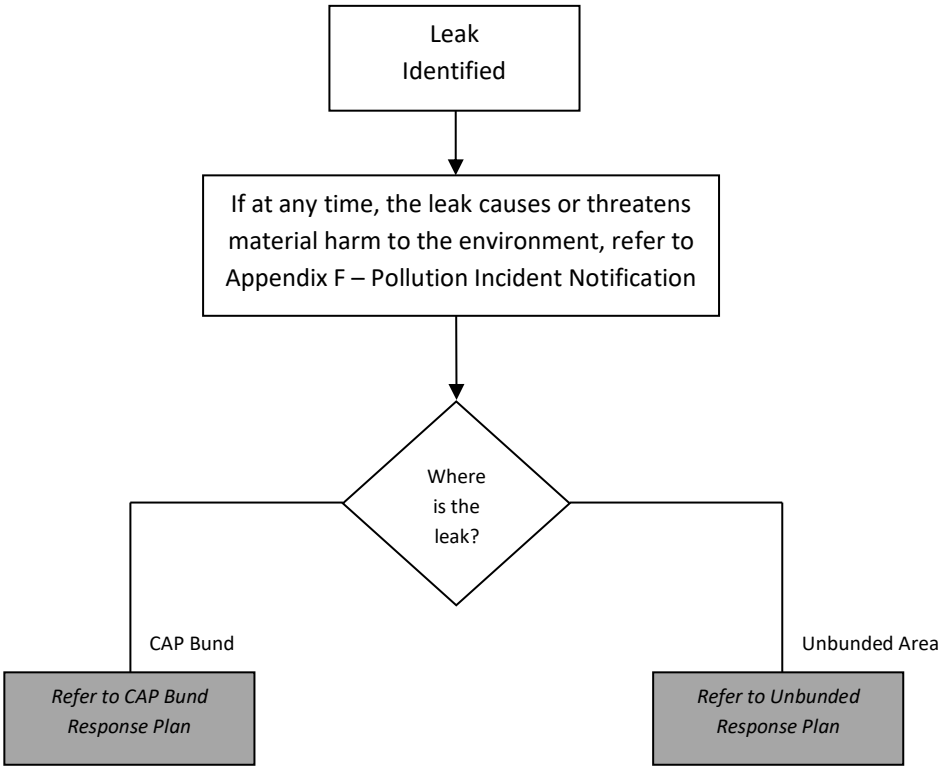
Environmental Aspects Plant Activities and Sources of Risk	Receptors?	Environmental Hazard Potential Pathway and Adverse Impacts	Currently Implemented Risk Control Measures	Conseq Impact	Likelihood Estimate	Risk Level
Item [01]. Overfilling Weak Brine Tank						
	Nat	Interceptor Pit 1 overflow to Springvale 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	Category 3.2	Very Unlikely	Level IV

			system with pH indication and Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	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	Category 3.2	Very Unlikely	Level IV

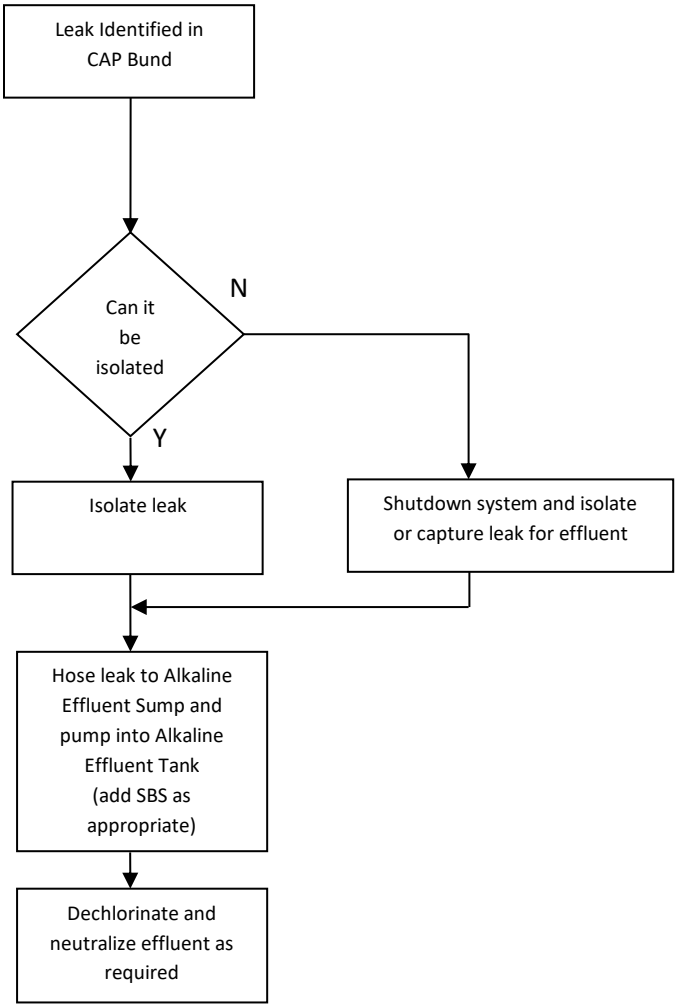
			☐ Acid Effluent Pit hi-hi level alarm on LI18522 ☐ Acid Effluent Pit pH alarms (hi, hi-hi, lo and lo-lo) on AI18534 ☐ Effluent neutralisation and dechlorination before transfer to Site Utilities ☐ Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	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**	Category 3.2	Unlikely	Level III

			☐ 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			
	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

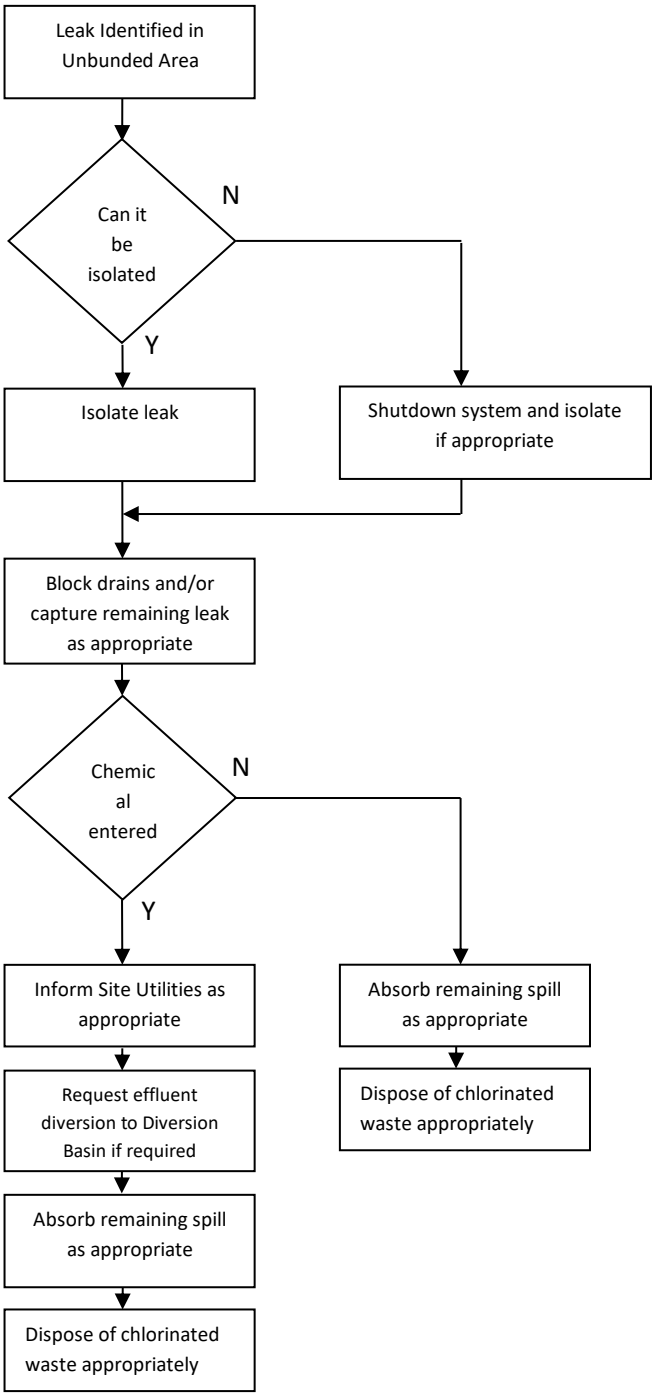
Chlorinated Brine Response Plan



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



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.

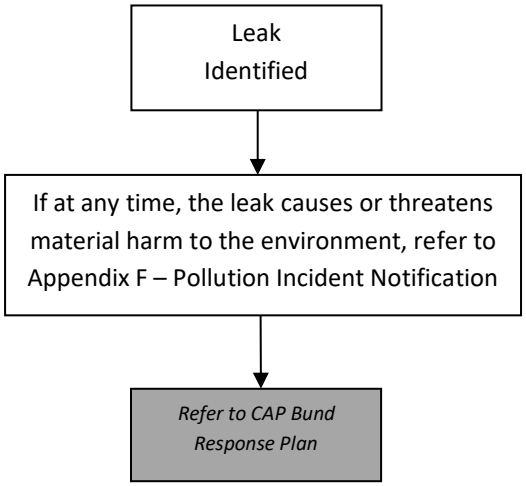
The ecological impacts of chlorinated sulphuric acid are not known. Based on the known environmental hazards of sulphuric acid and chlorine, a release is likely to result in significant local pollution.

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

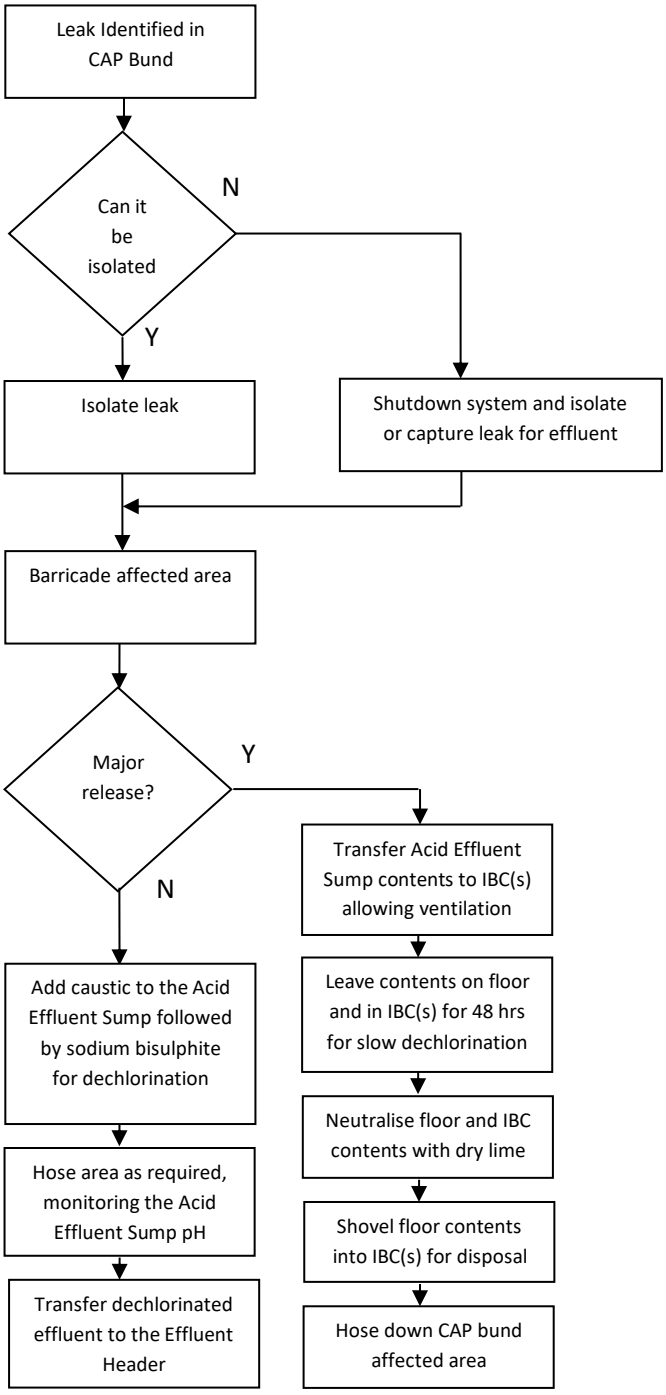
	Hum	People – Acute (immediate) adverse impact on human health with burns to skin or eyes, with possible permanent injury.	☐ As for "Nat" ☐ Monogoggle area ☐ Safety showers **MHF-CC-087**	Category 3.2	Very Unlikely	Level IV
Item [03]. Mechanical Failure of Sulphuric Acid Drying Towers or Sulphuric Acid 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



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
N
Transfer Acid Effluent Sump contents to IBC(s) allowing ventilation
Leave contents on floor and in IBC(s) for 48 hrs for slow dechlorination
Neutralise floor and IBC contents with dry lime
Shovel floor contents into IBC(s) for disposal
Hose down CAP bund affected area
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.

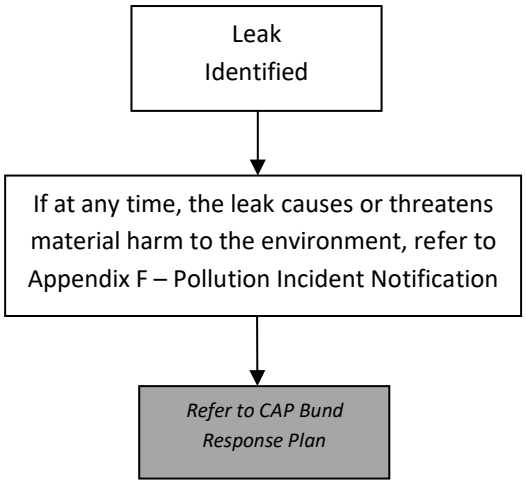
LC50: Freshwater fish Brachydanio rerio 96 hr – 357 mg/L

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	Category 2	Very Unlikely	Level IV

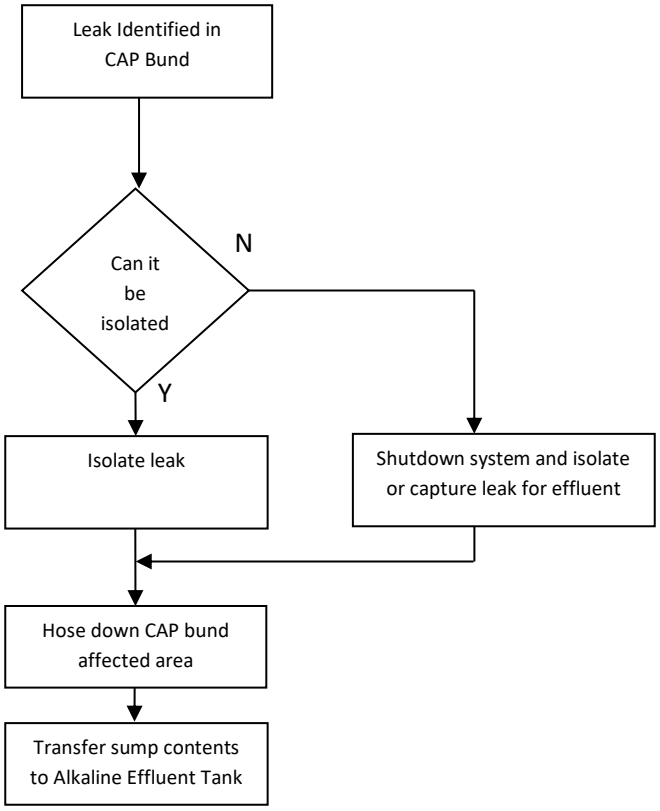
			☐ Stormwater automatically intercepted to Site Utilities effluent system with pH indication and ☐ Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	Hum	People – Acute (immediate) adverse impact on human health with irritation to eyes. Injuries due to slippery effluent.	☐ 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	Category 3.1	Unlikely	Level III

			part of behaviour safety requirements. ☐ Safety showers **MHF-CC-087**			

Coagulant


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
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

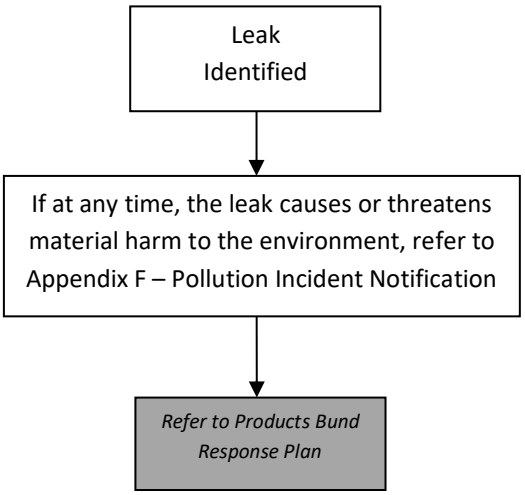
http://www.martrexinc.com/msds/MSDS_Cobalt_Sulfate_33.pdf

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	Category 3.2	Unlikely	Level III

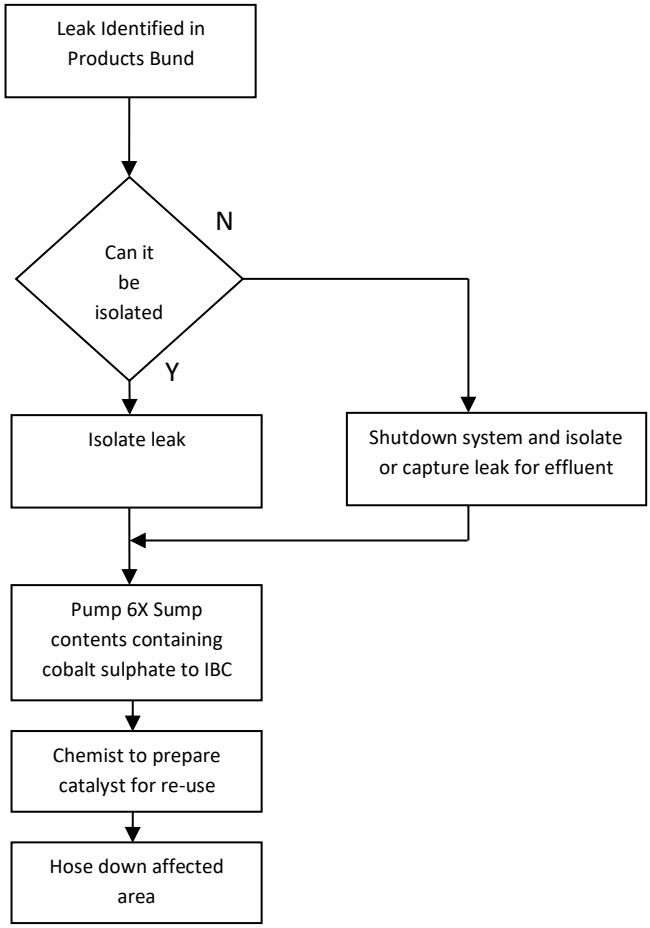
			☐ Bund capacity is at least 110% of largest tank ☐ Informal regular checks on external condition ☐ Weeping solution may be detectable ☐ Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	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.	☐ As for "Nat" ☐ Monogoggle area	Category 3.1	Very Unlikely	Level IV

		Nausea, vomiting, diarrhoea and abdominal pain from ingestion. Potential carcinogen.	☐ Safety showers **MHF-CC-087**			

Cobalt Sulphate Solution Response Plan



Products Bund



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

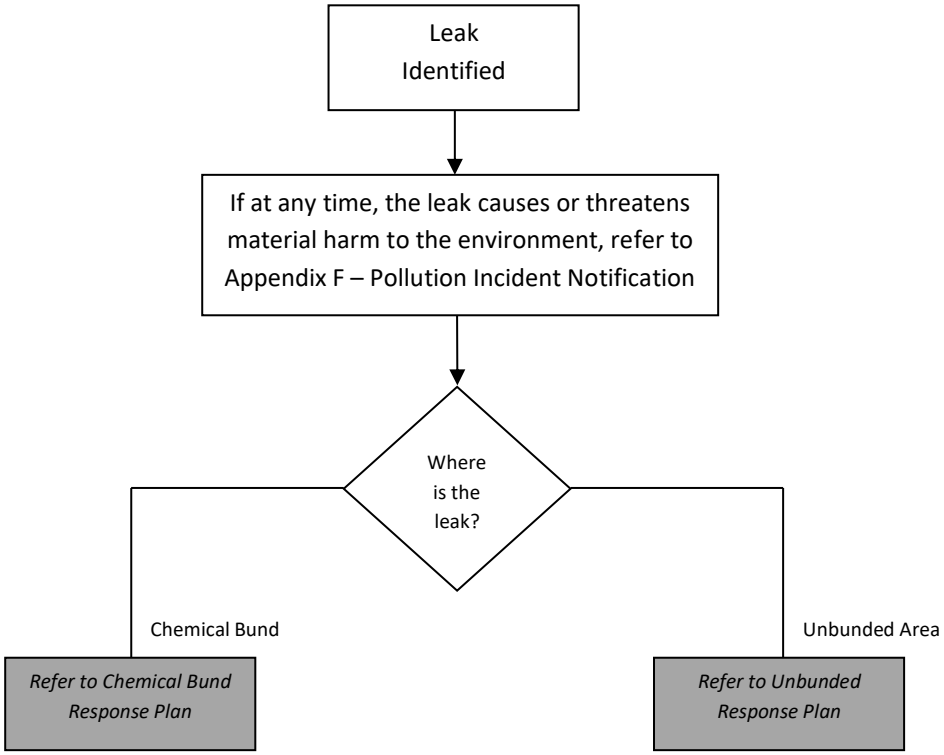
Nalco 77393 contamination of surface water should be prevented. Potential environmental hazard classified as low.

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	☐ As for “Nat” ☐ Monogoggle area	Category 2	Very Unlikely	Level IV

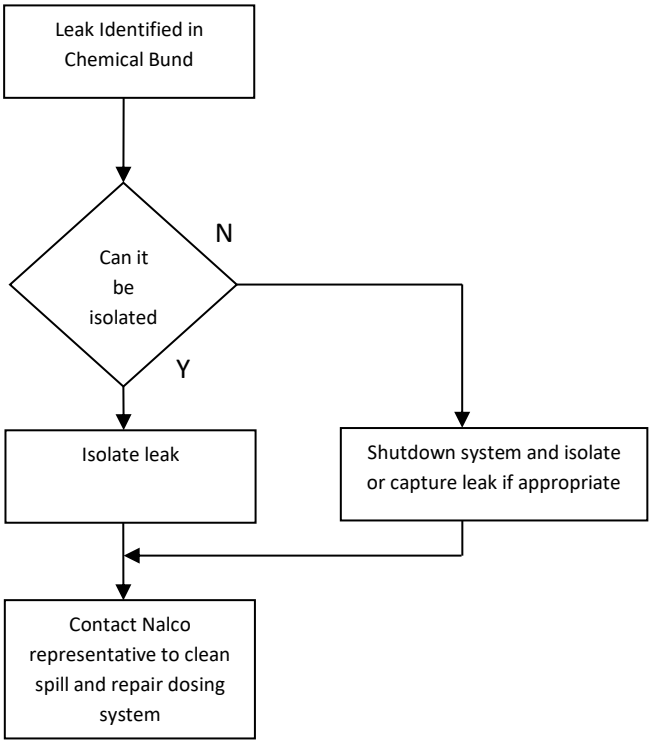
		health with possible burns and permanent injury to eyes and damage to tissue. Irritation from inhalation.	☐ Safety showers **MHF-CC-087** ☐ Acid Suit and face shield specified on recent JSERA for DG chemicals.			
Item [02]. Mechanical Failure of Cooling Water Dosing Tank 7730, 3DT284, 3DT191 and 77393.						
	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	Category 3.2	Unlikely	Level III

			☐ 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			
	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

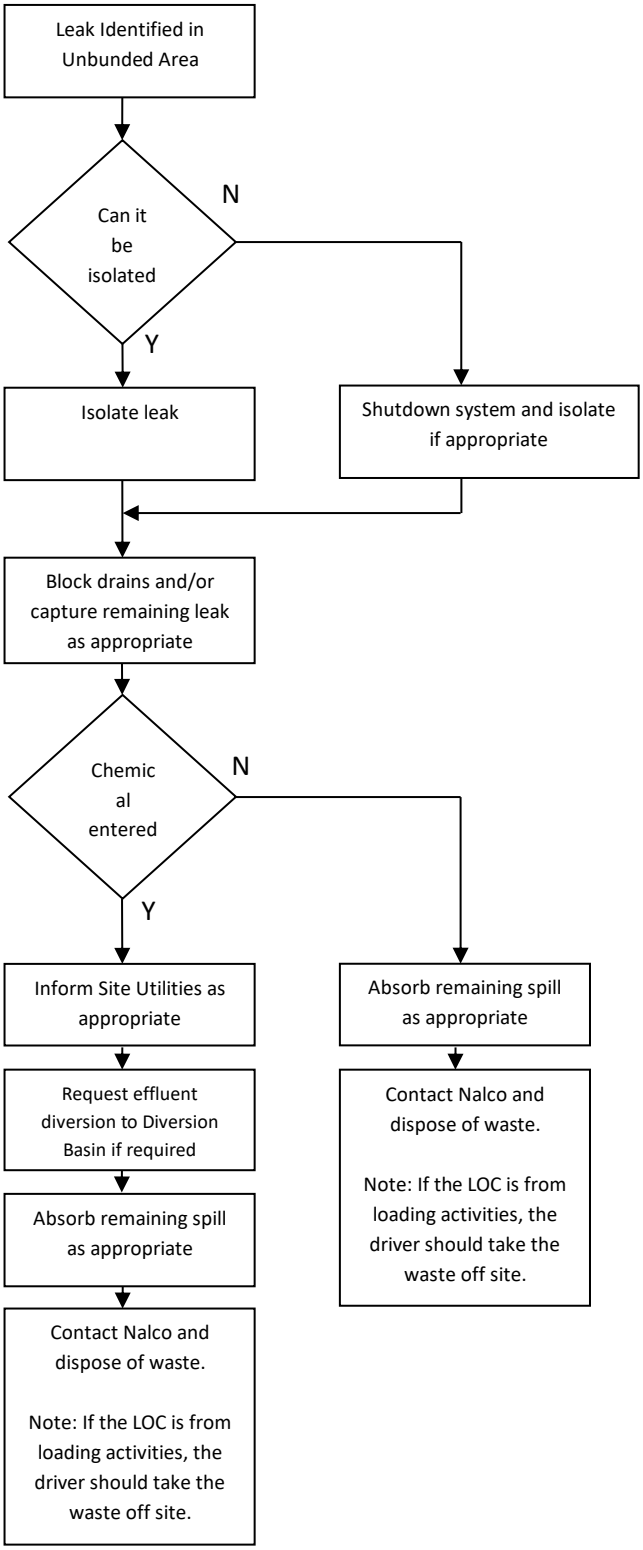
Cooling Tower Dosing Chemicals Response Plan



Nalco Tank Bund



Unbunded Area



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.

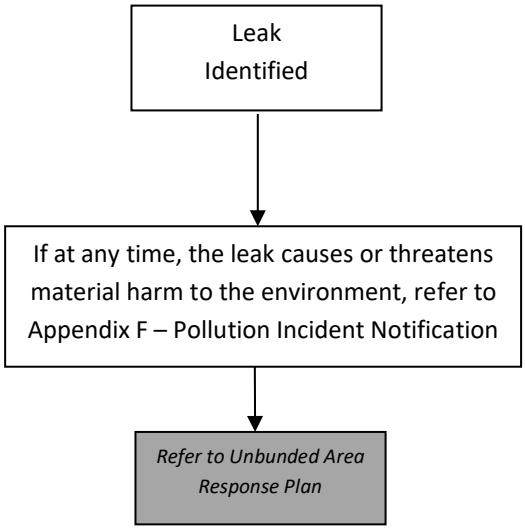
Boyd, Claude E. (1999). *Water Quality: An Introduction*. The Netherlands: Kluwer Academic Publishers Group. ISBN 0-7923-7853-9.

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 –	☐ 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	Category 1	Likely	Level III

		Groundwater contamination, Adverse impact on a biological component – habitat.	☐ 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			
	Hum	People – Acute (immediate) adverse impact on human health.	☐ As for "Nat" ☐ Monogoggle area ☐ Safety showers **MHF-CC-087**	Category 1	Likely	Level III

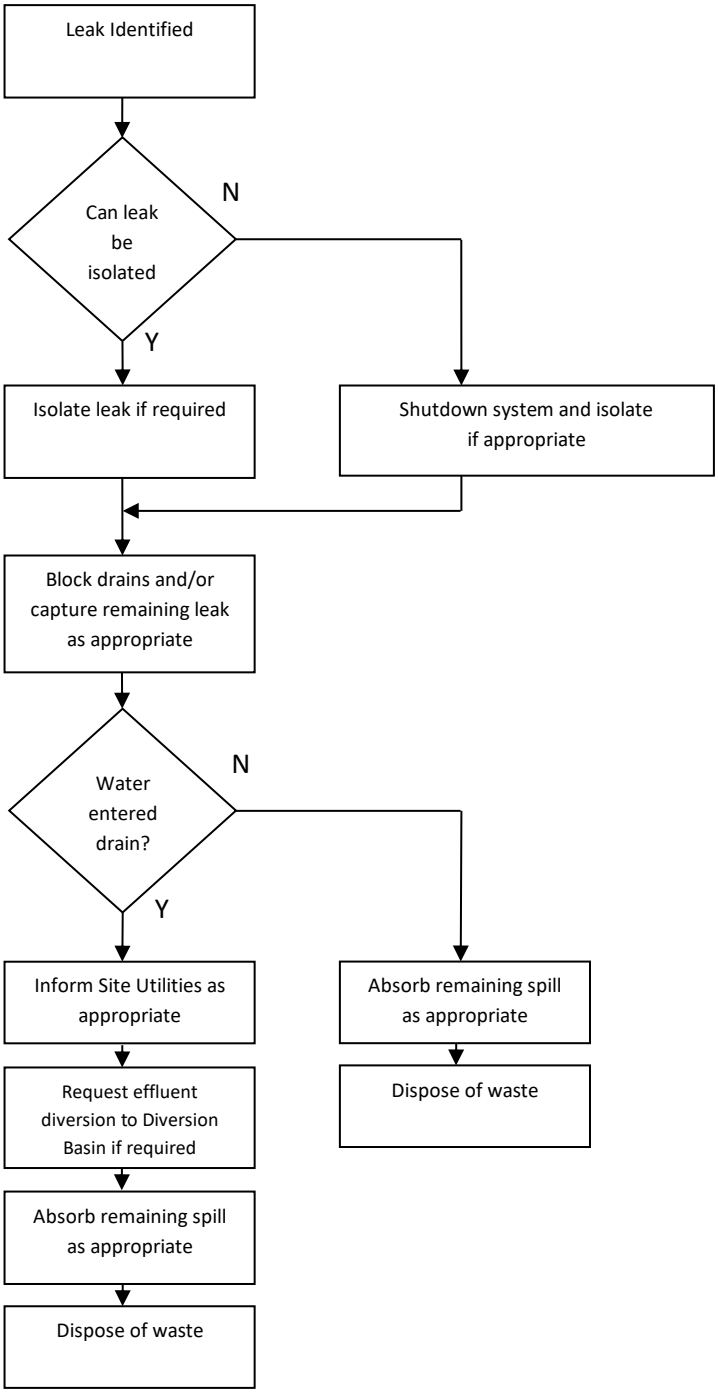
Cooling Water Response Plan



Note:

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

Unbunded Area



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	Category 3.2	Very Unlikely	Level IV

			☐ 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			
	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**	Category 3.2	Very Unlikely	Level IV

			☐ Personnel and contractors informed not to rush on site as a part of behaviour safety requirements.			
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

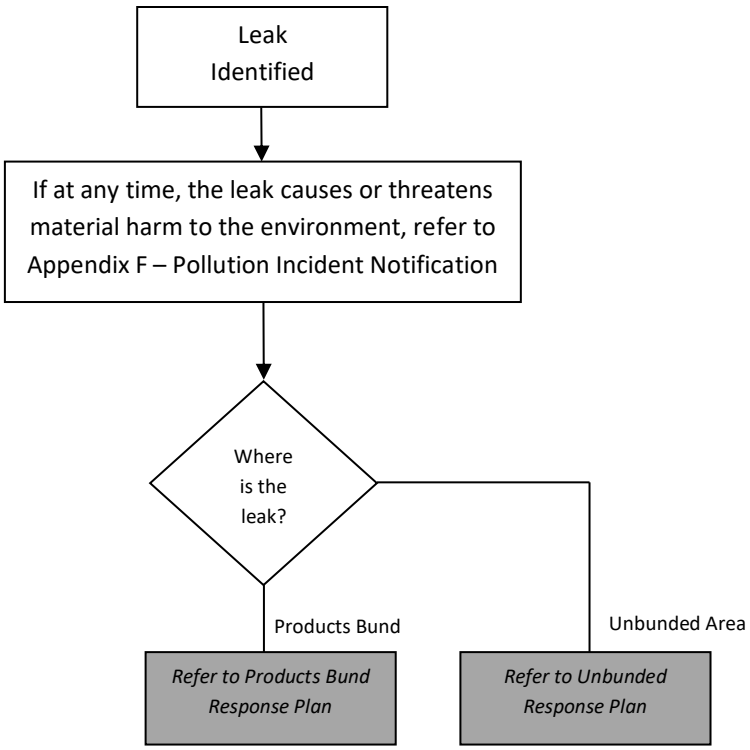
	Hum	People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent.	☐ As for "Nat" ☐ Monogoggle area ☐ Safety showers **MHF-CC-087** ☐ Personnel and contractors informed not to rush on site as a part of behaviour 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:	Category 3.2	Very Unlikely	Level IV

			☐ 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			

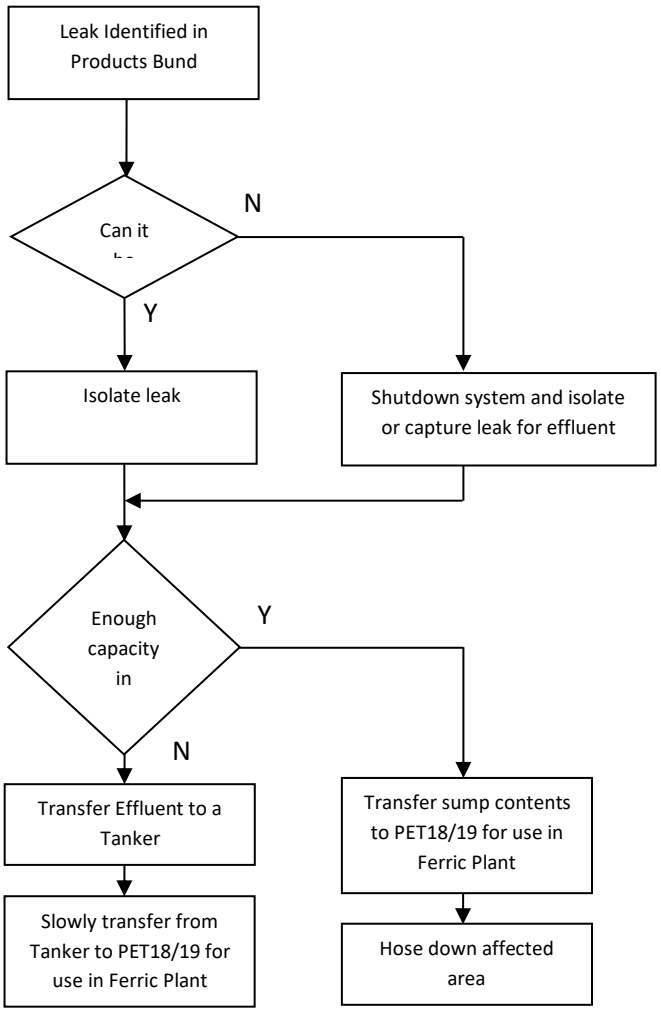
			Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	Hum	People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent.	☐ As for "Nat" ☐ Monogoggle area ☐ Safety showers **MHF-CC-087** ☐ 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	☐ As for "Nat" ☐ Monogoggle area	Category 3.2	Unlikely	Level III

		health with potential permanent injury to the eyes and burns to skin. Injuries due to slippery effluent.	☐ Safety showers **MHF-CC-087** ☐ Personnel and contractors informed not to rush on site as a part of behaviour safety requirements.			
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

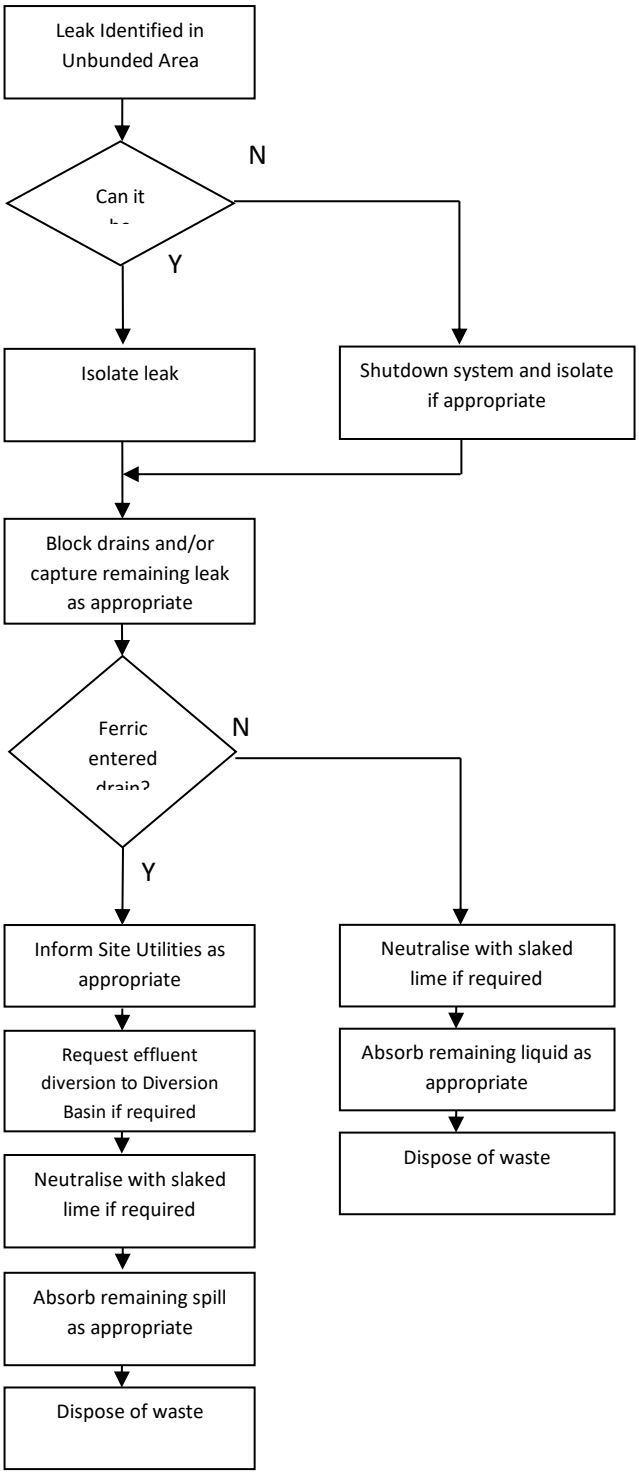
Ferric Chloride Response Plan



Products Bund



Unbunded Area



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						

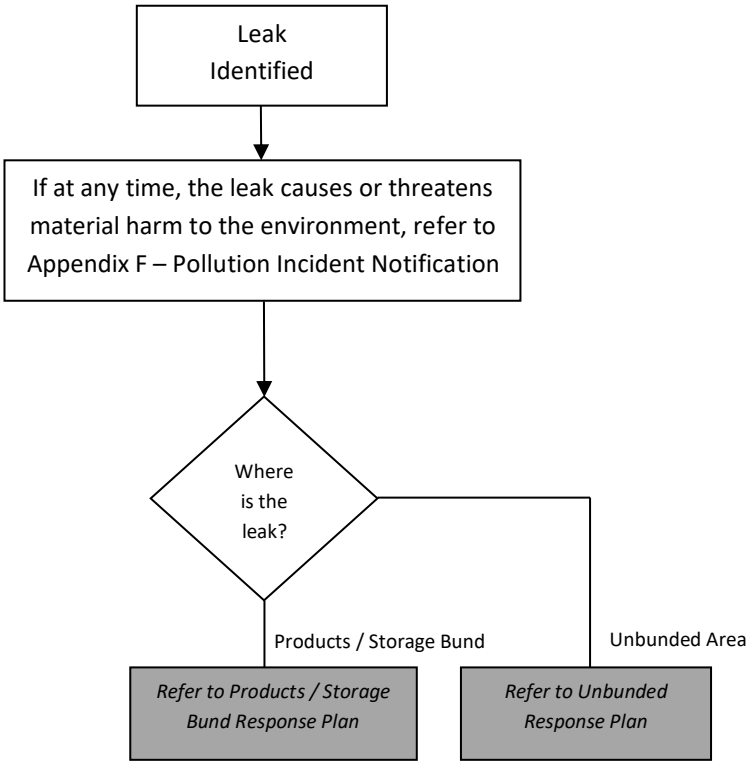
	Nat	Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.	DCS tank high level alarms: ☐ PET18: Hi on LI7644. Transfer pumps PEP14, 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.	Category 3.2	Very Unlikely	Level IV

			☐ 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			
	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	Category 3.2	Very Unlikely	Level IV

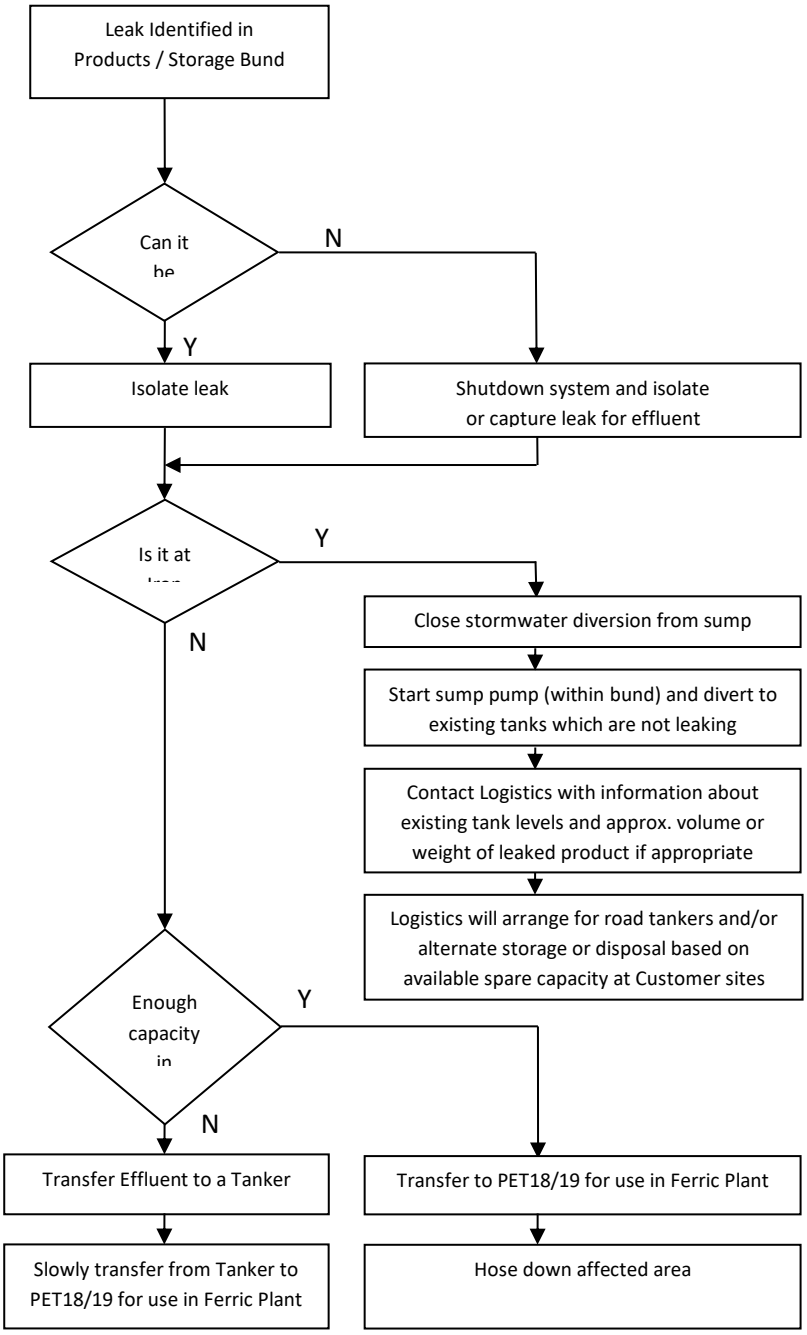
			☐ Amount of nozzles and flange connections minimised ☐ Isolation valves and automatics isolation valves. ☐ Visual inspections by loader ☐ EP6 lo and lo-lo pH alarms on AI7011. **ERA-CC-001** ☐ AAL7011 discrete pH alarm. ☐ Site Utilities contact Control Room ☐ Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	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

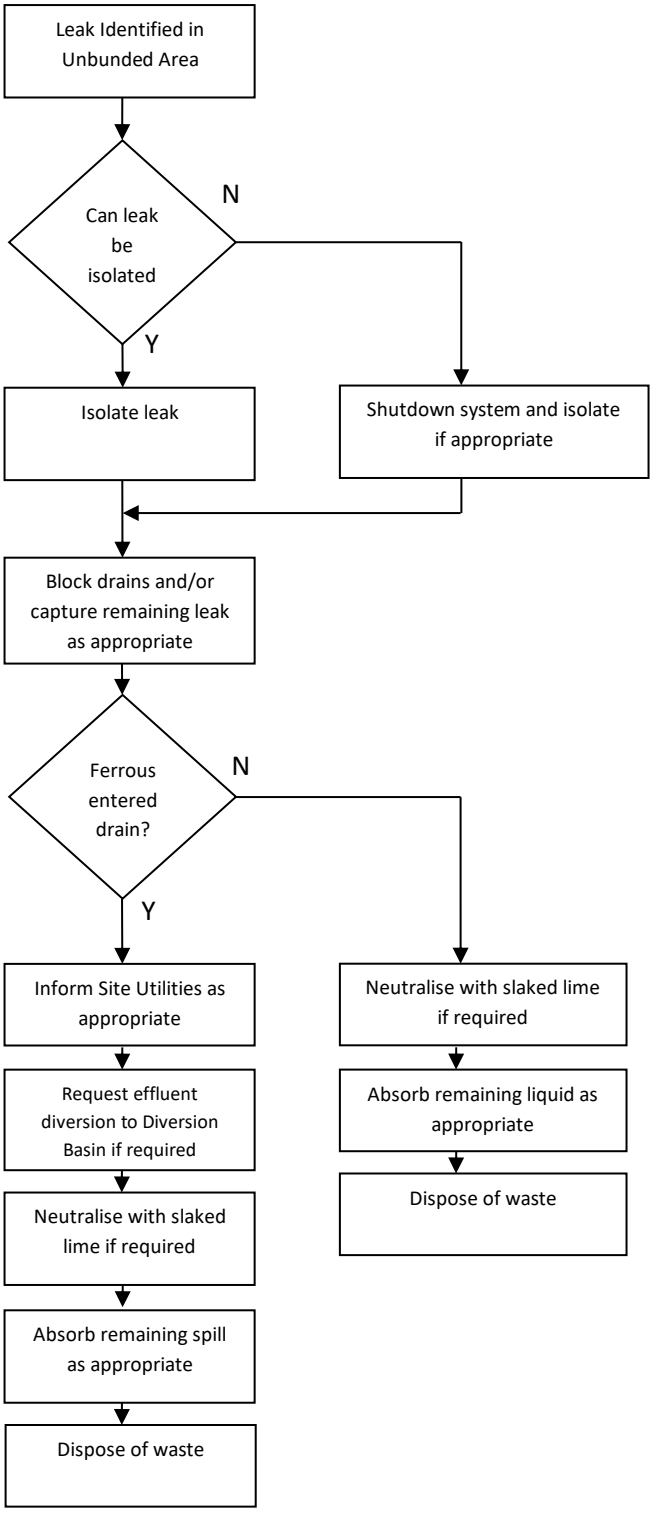
Ferrous Chloride Response Plan



Products / Storage Bund



Unbunded Area



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.

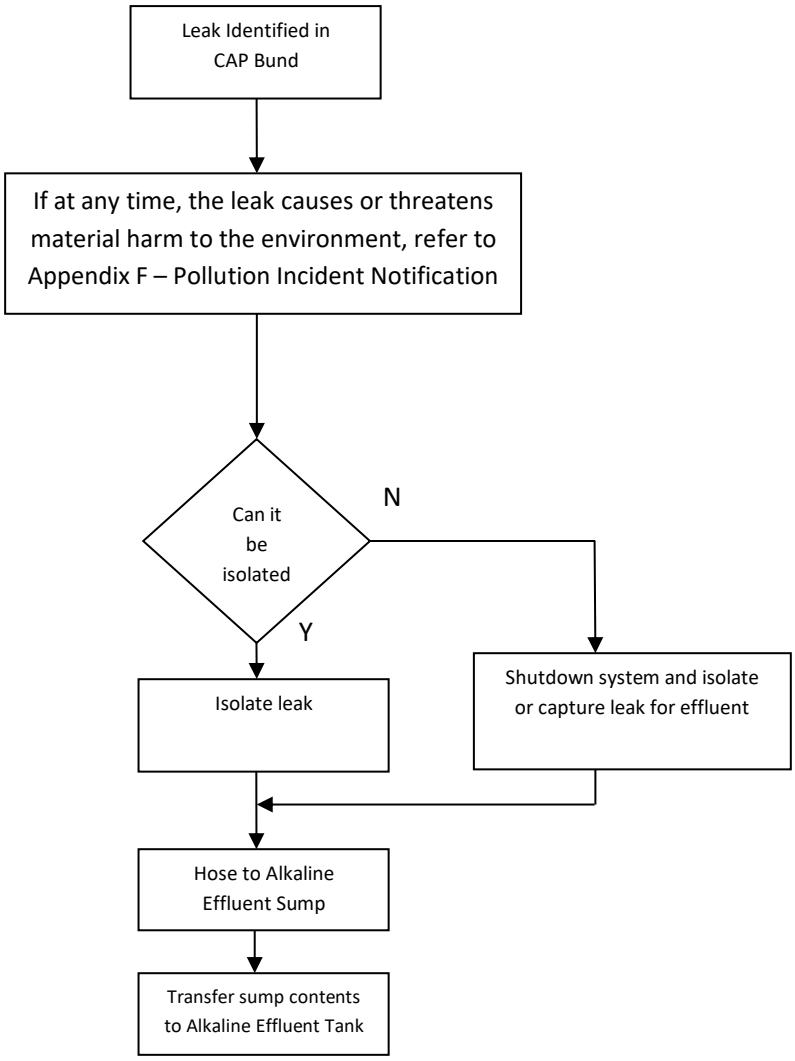
Hazards to the Environment

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.	Category 1	Very Unlikely	Level IV

			☐ 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			
	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



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	Category 3.2	Very Unlikely	Level IV

			☐ Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	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.	Category 3.2	Very Unlikely	Level IV

			☐ 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			
	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	☐ As for "Nat" ☐ Monogoggle area ☐ Safety showers **MHF-CC-087**	Category 3.2	Very Unlikely	Level IV

		system through the inhalation of vapours. Potential slips and falls due to slippery nature.	☐ Personnel and contractors informed not to rush on site as a part of behaviour safety requirements.			
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

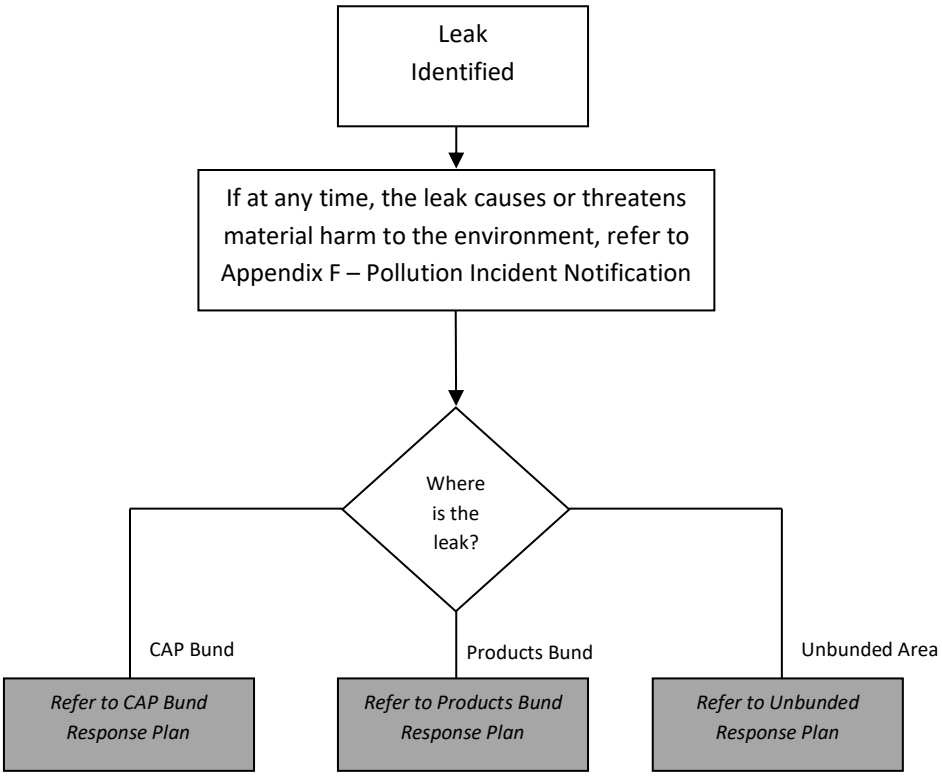
	Hum	People – Acute (immediate) adverse impact on human health with potential permanent injury to the eyes and burns to skin. Severe irritation to the respiratory system through the inhalation of vapours. Potential slips and falls due to slippery nature.	☐ As for "Nat" ☐ Monogoggle area ☐ Safety showers **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.	Category 3.2	Very Unlikely	Level IV

			☐ 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			
	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						

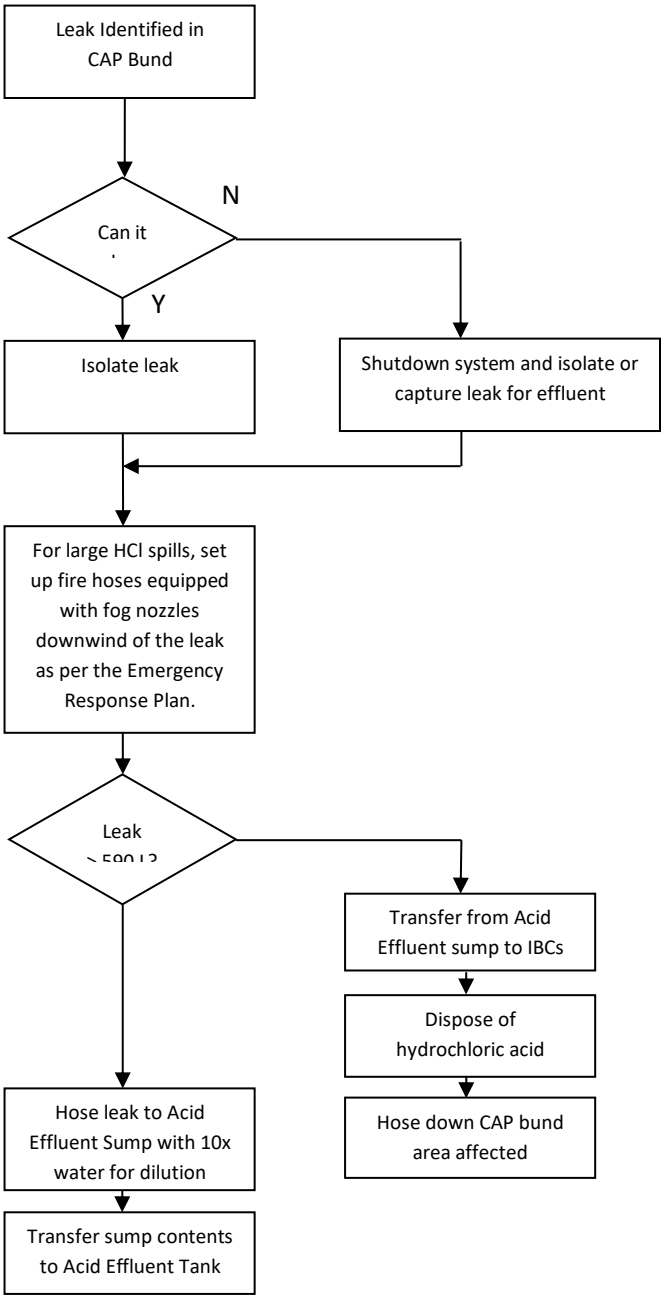
	Nat	Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. Soil – Soil contamination (direct), Groundwater – Groundwater contamination, 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	☐ 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

		of vapours. Potential slips and falls due to slippery nature.				
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

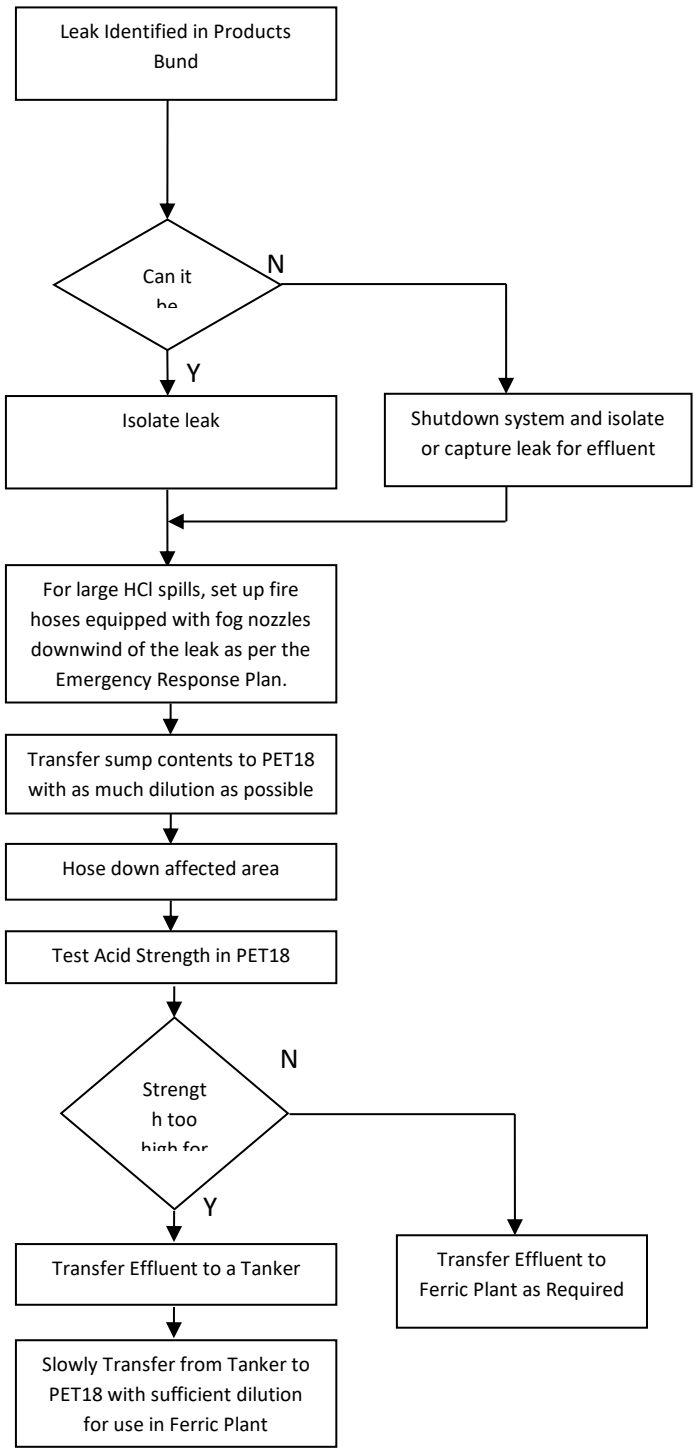
Hydrochloric Acid Response Plan



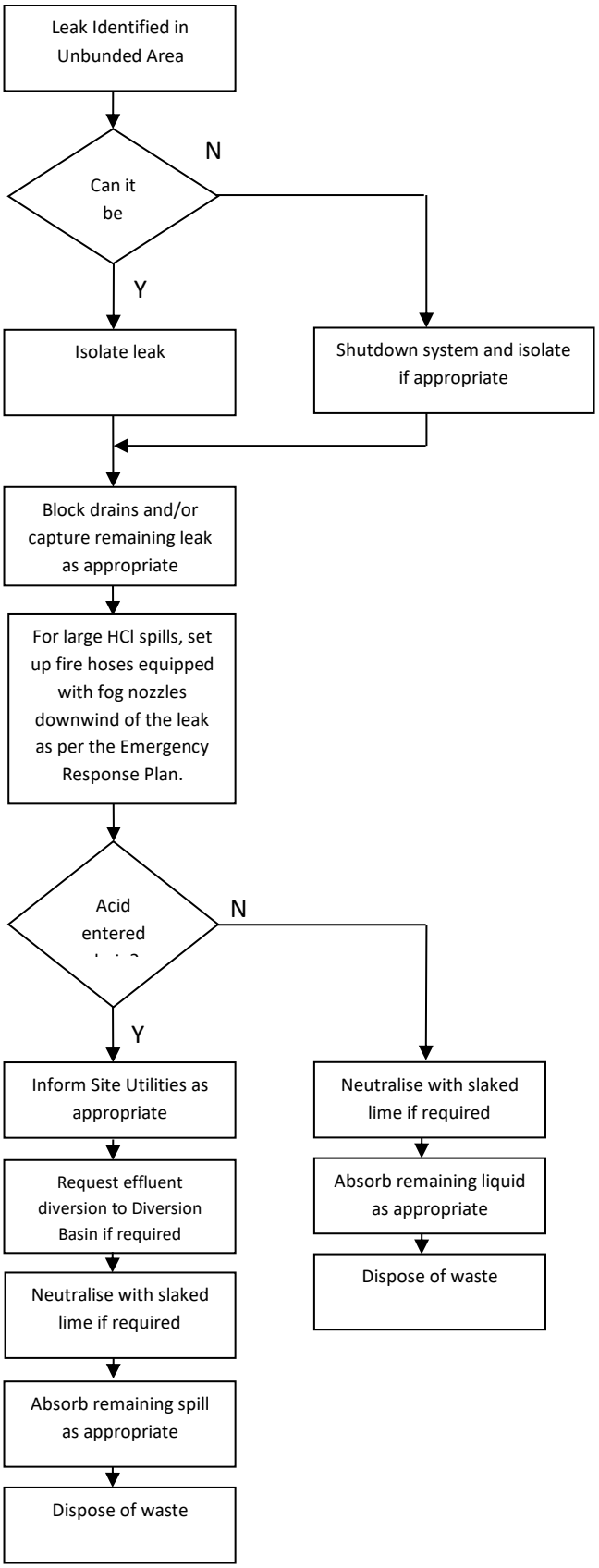
CAP Bund


Leak Identified in CAP Bund
Can it
N
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.
Leak
Transfer from Acid Effluent sump to IBCs
Dispose of hydrochloric acid
Hose down CAP bund area affected
Hose leak to Acid Effluent Sump with 10x water for dilution
Transfer sump contents to Acid Effluent Tank

Products Bund



Unbunded Area



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

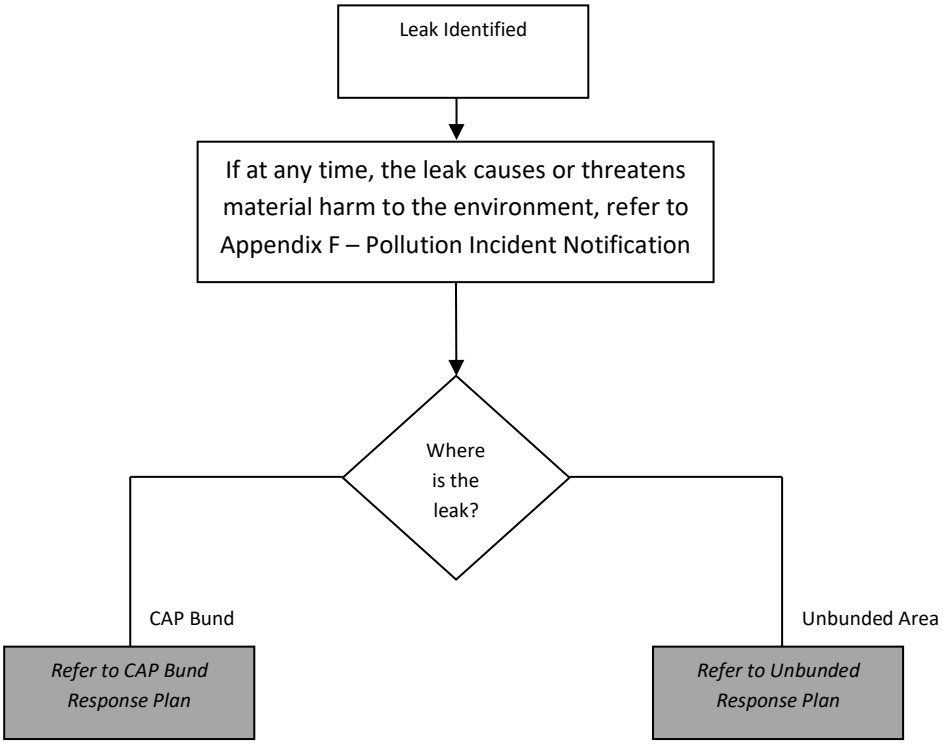
Contamination of waterways is to be avoided. The product itself and its products of degradation are not toxic. Possibly hazardous short-term degradation products are not likely, however, long-term degradation products may arise.

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

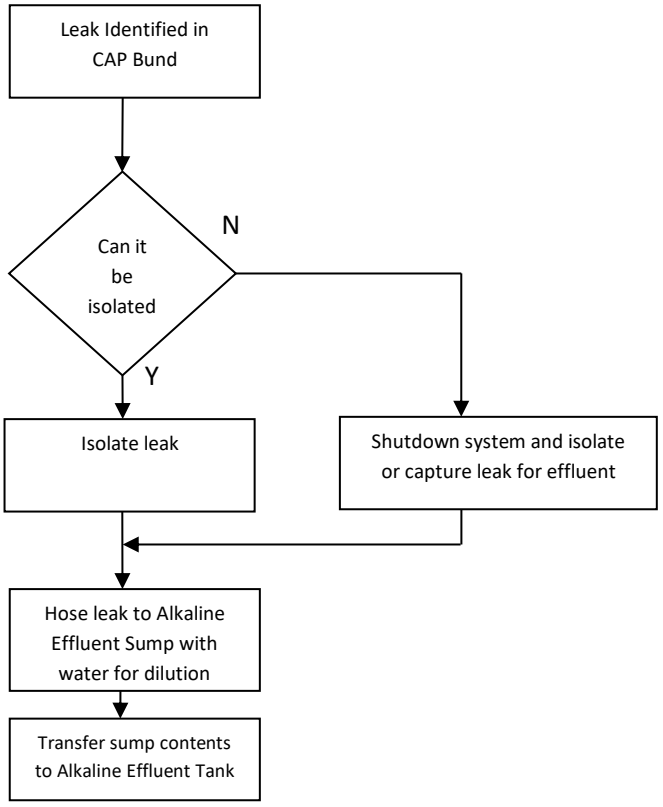
Environmental Aspects Plant Activities and Sources of Risk	Receptors?	Environmental Hazard Potential Pathway and Adverse Impacts	Currently Implemented Risk Control Measures	Conseq Impact	Likelihood Estimate	Risk Level
Item [01]. Overfilling IBCs						
	Nat	Interceptor Pit 1 overflow to Springvale Drain. 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

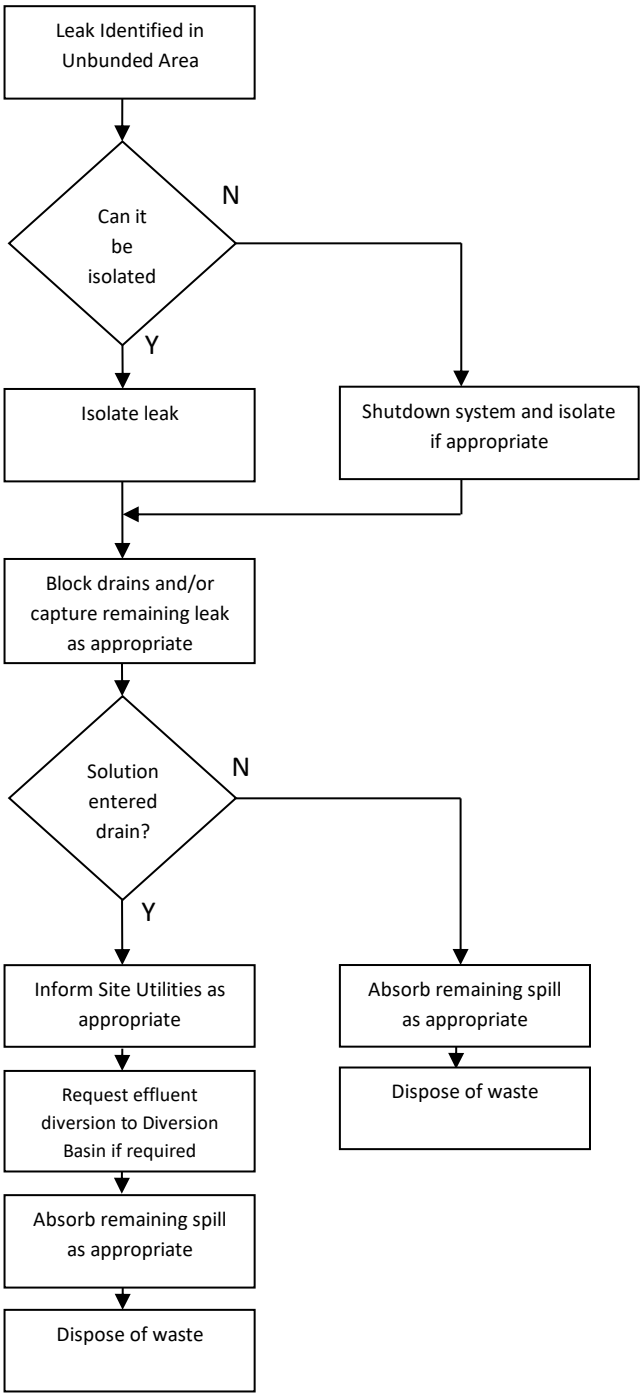
Magnesium Chloride Response Plan



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 with water for dilution
Transfer sump contents to Alkaline Effluent Tank

Unbunded Area



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'.

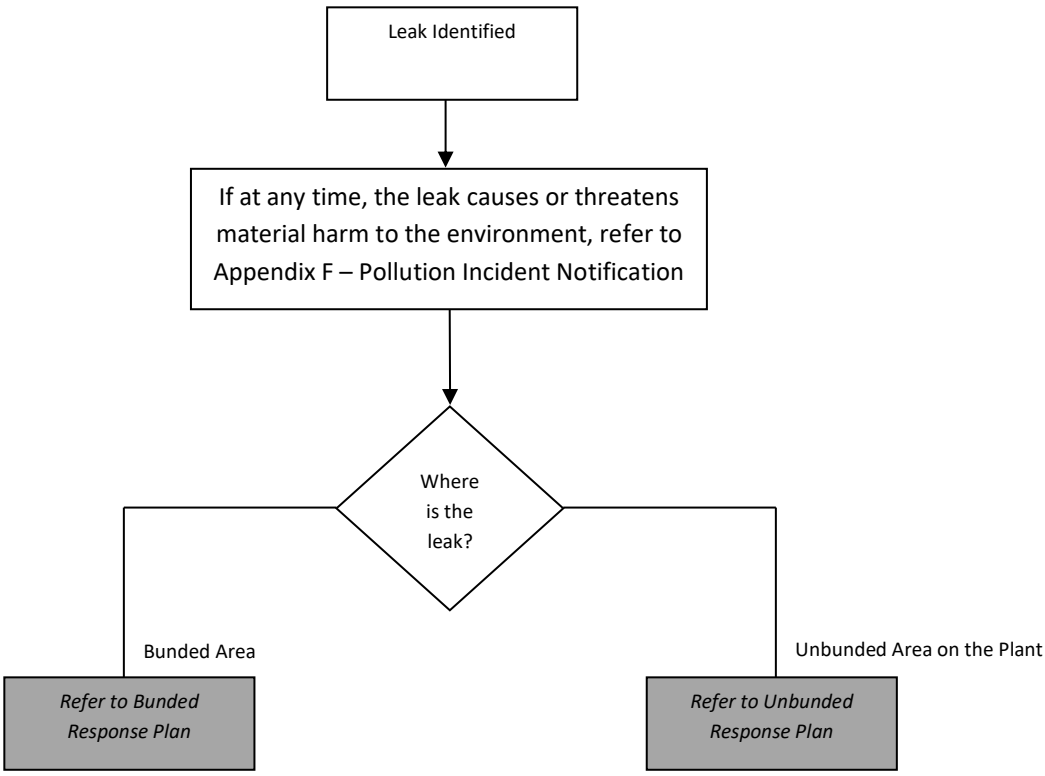
Shell Diesel is toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment. Based on an SDS for diesel fuel from Hess, the LC50 (96 hr) for Pimephales promelas is 35 mg/L (flow-through).

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

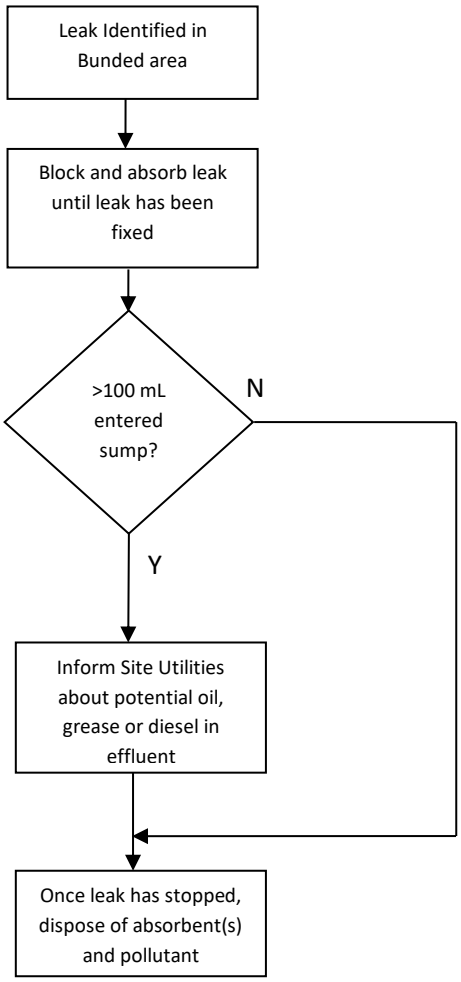
Environmental Aspects Plant Activities and Sources of Risk	Receptors?	Environmental Hazard Potential Pathway and Adverse Impacts	Currently Implemented Risk Control Measures	Conseq Impact	Likelihood Estimate	Risk Level
Item [01]. Oil or grease spill in a bunded area						
	Nat	Interceptor Pit 1 overflow 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

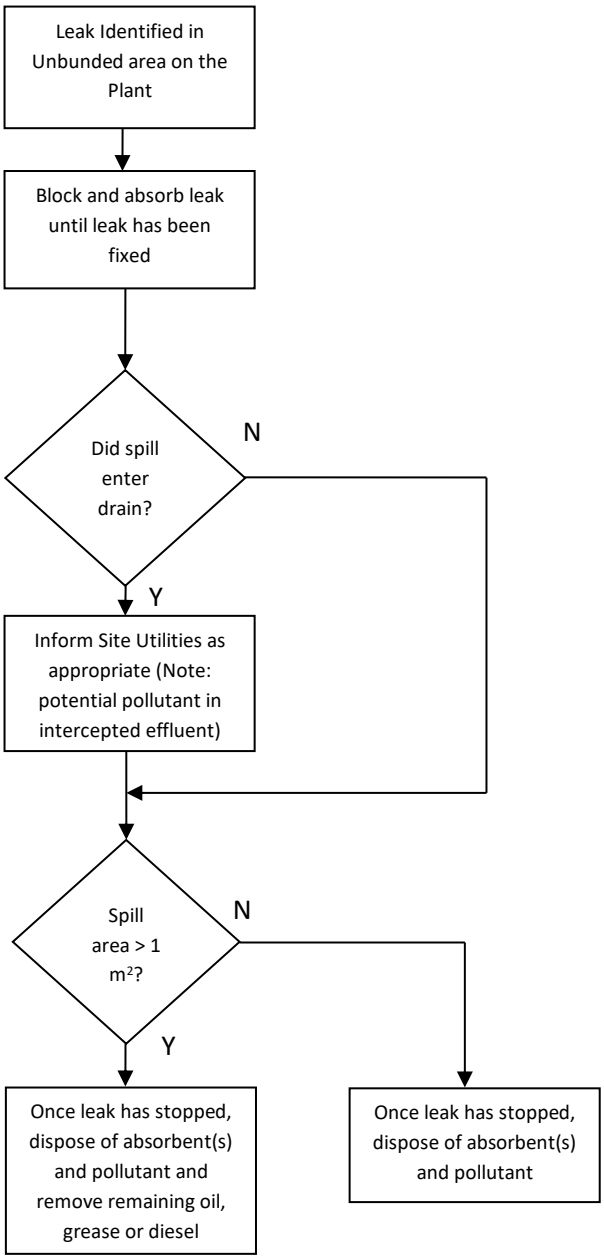
Oil, Grease and Diesel Response Plan



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



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	Category 3.2	Very Unlikely	Level IV

			☐ 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			
	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,	☐ 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	Category 2	Unlikely	Level IV

		resulting in adverse impact on trade waste water quality.	☐ Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	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	☐ Process Operators fill tank manually ☐ DCS High level alarms:	Category 3.2	Very Unlikely	Level IV

		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 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			
	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	Category 3.2	Extremely Unlikely	Level IV

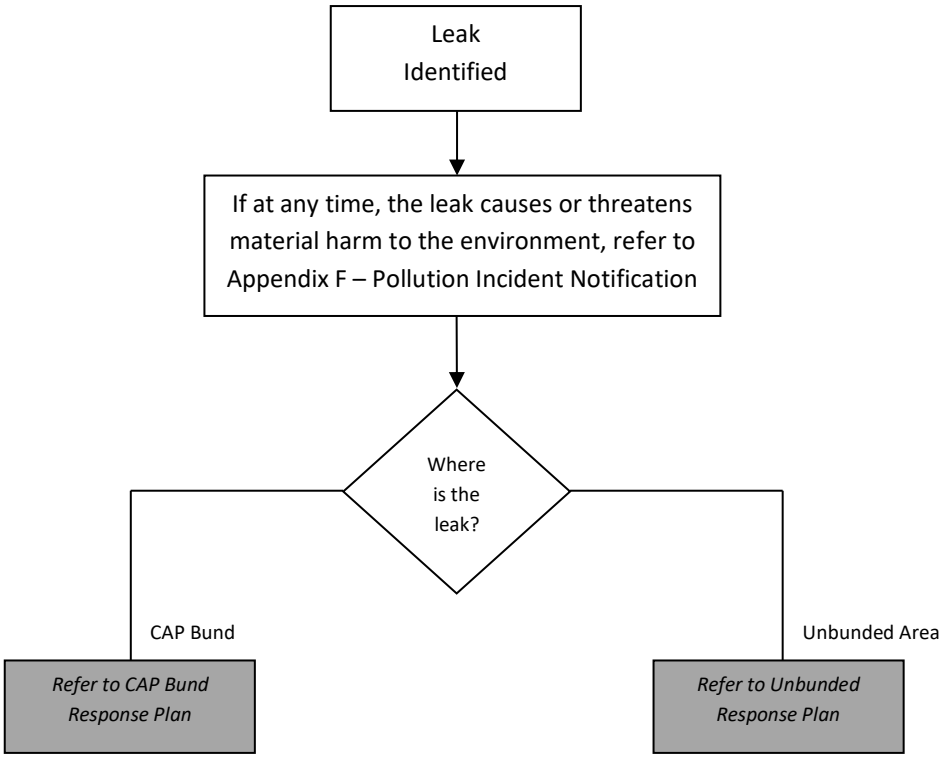
			Vacuum Pump. Vacuum controlled by PV13013. ☐ V13014 Second Effect Vapour Body pressure relief to Caustic Evap Vacuum Pump. Vacuum controlled by PV13023. ☐ Caustic Tank T13049 and T13050 pressure relief and vacuum relief (vent) to atmosphere ☐ Caustic Condensate Tank pressure and vacuum relief to atmosphere ☐ 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			
	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	Category 3.2	Very Unlikely	Level IV

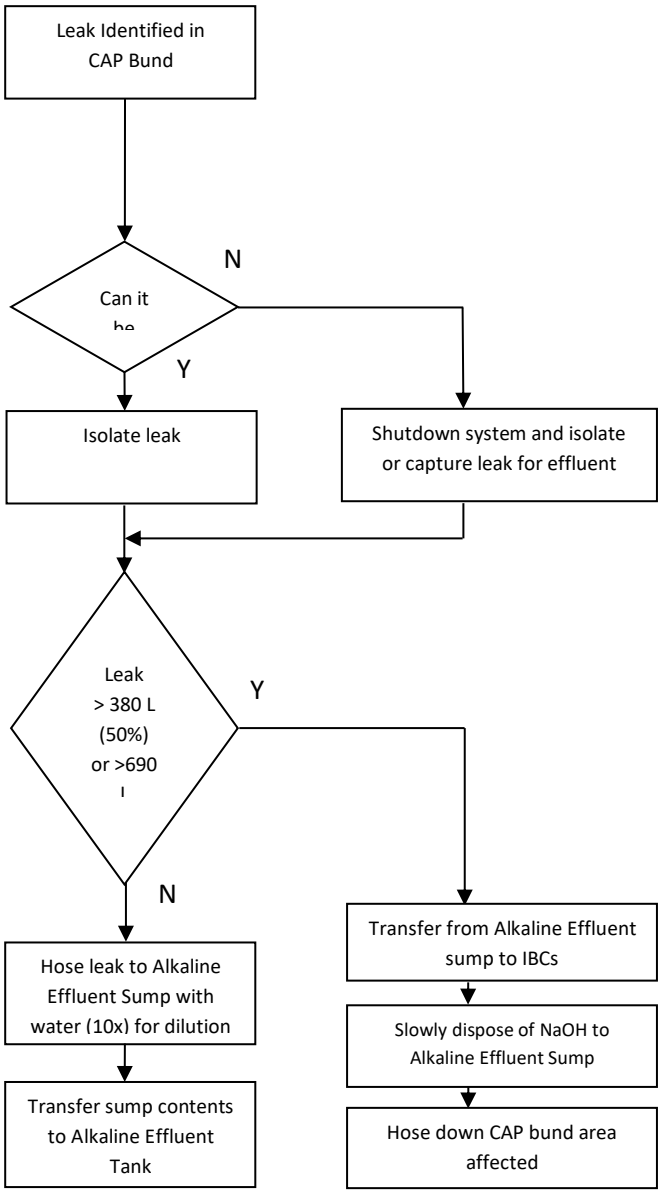
			☐ Alkaline Effluent Pit level alarm LAH18521 ☐ Alkaline Effluent Pit pH alarms AAH18532 and AAHH18532 ☐ EP6 hi-hi pH alarm AAHH7011. **ERA-CC-001** ☐ Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent ☐ Site Utilities contact Control Room ☐ Response Plan			
	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

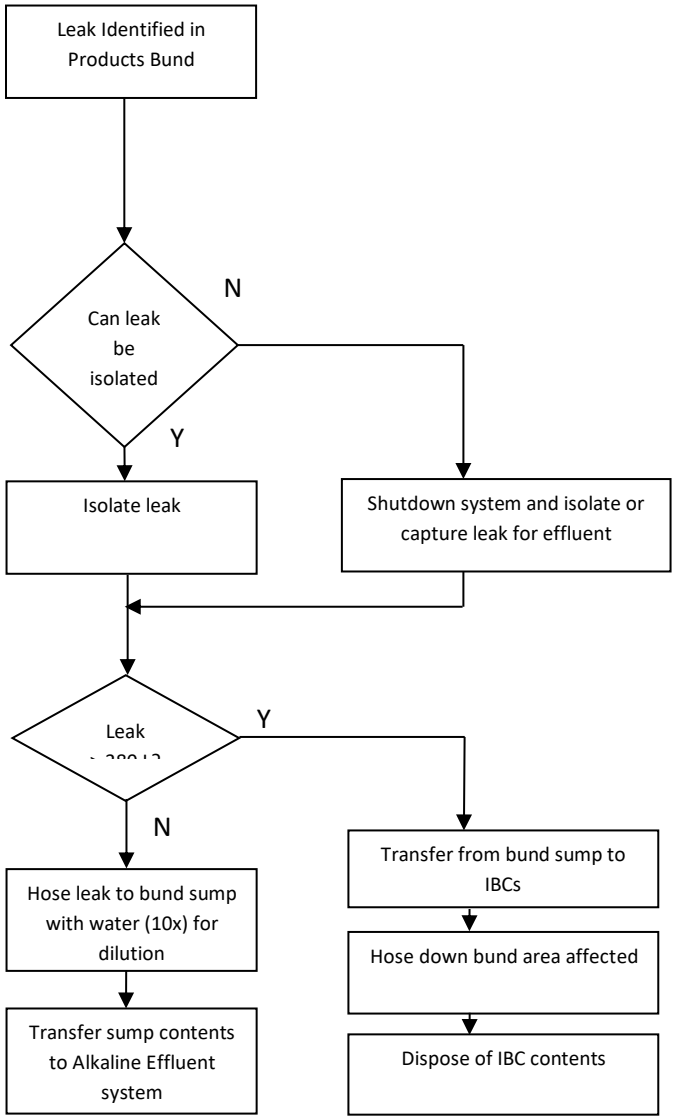
Sodium Hydroxide Response Plan



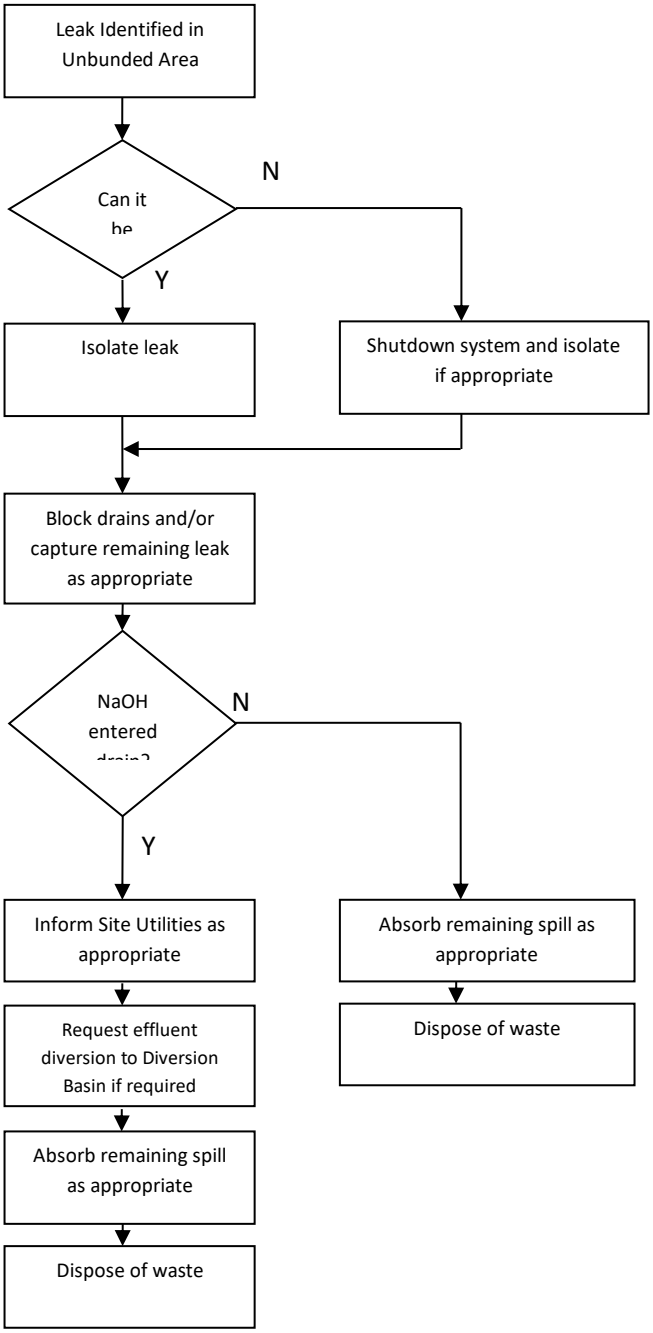
CAP Bund


Leak Identified in CAP Bund
Can it be
N
Y
Isolate leak
Shutdown system and isolate or capture leak for effluent
Leak > 380 L (50%) or >690 l
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



Unbunded Area



APPENDIX A.19
Sodium Hypochlorite (13% Av. Cl_2)

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	Category 3.2	Very Unlikely	Level IV

			☐ Monogoggle area ☐ Safety showers **MHF-CC-087** ☐ Personnel and contractors informed not to rush on site as a part of behaviour safety requirements.			
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.	DCS tank high level alarms (9X): ☐ Hi and hi-hi on LI15295. ☐ LAH15295 discrete alarm.	Category 3.2	Very Unlikely	Level IV

		Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.	☐ 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			
	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	Category 3.2	Very Unlikely	Level IV

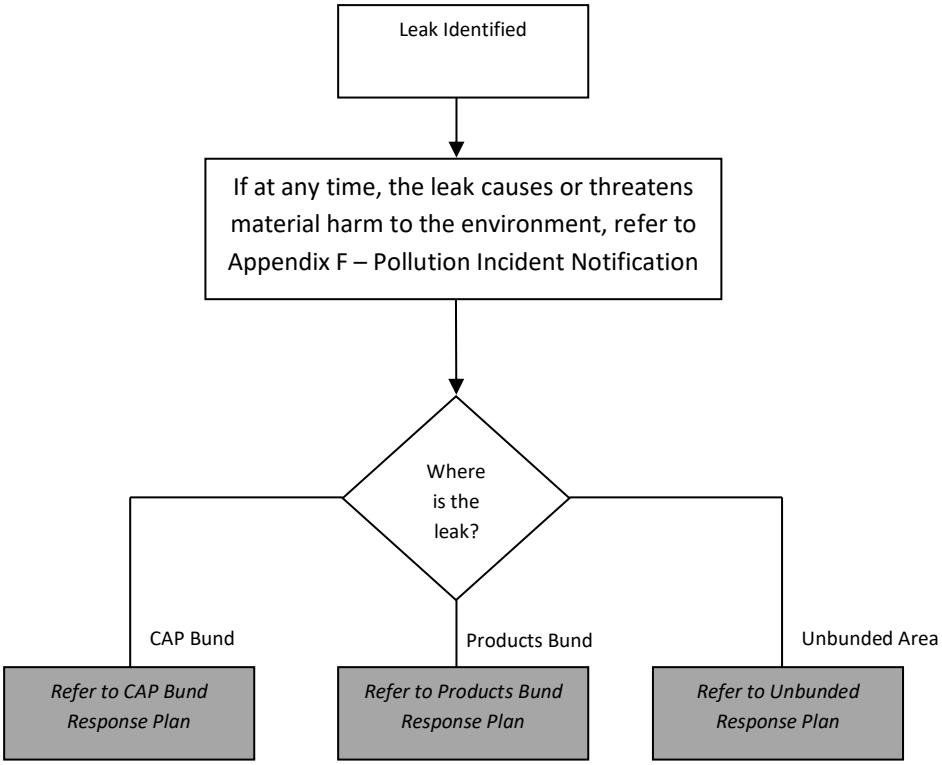
			☐ 7X/8X splash guards due to close proximity to bund wall ☐ Storage Tank pressure and vacuum relief to atmosphere ☐ ECS pressure relief to ECS fans and atmosphere ☐ Backing Tower pressure relief to Backing Tower fans and atmosphere ☐ Backing Tower Circulation Tank pressure relief to Backing Tower ☐ Hypo 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			
	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						

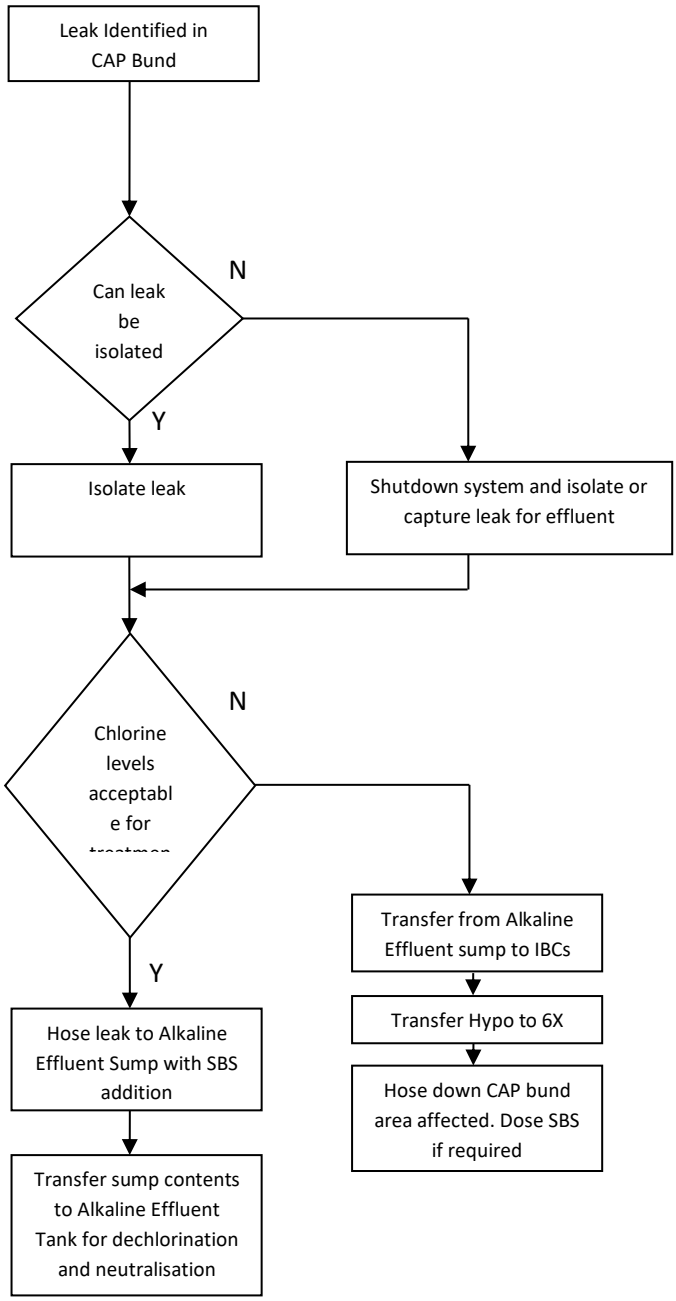
	Nat	Interceptor Pit 1 overflow to Springvale Drain. Adverse impact on aquatic organisms, including lethal dosage. Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality. Soil – Soil contamination (direct), Groundwater – Groundwater contamination, 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

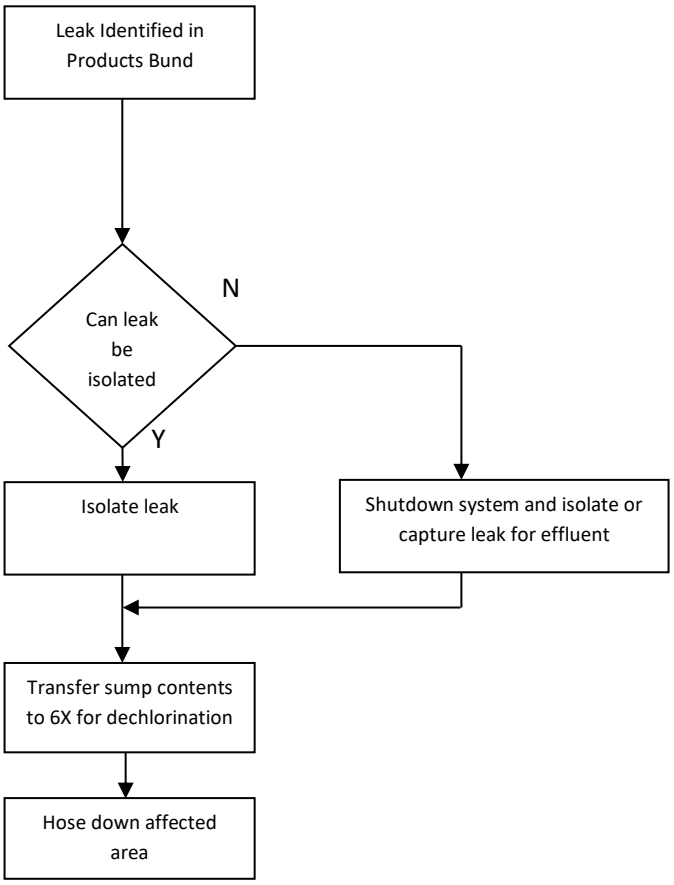
Sodium Hypochlorite Response Plan



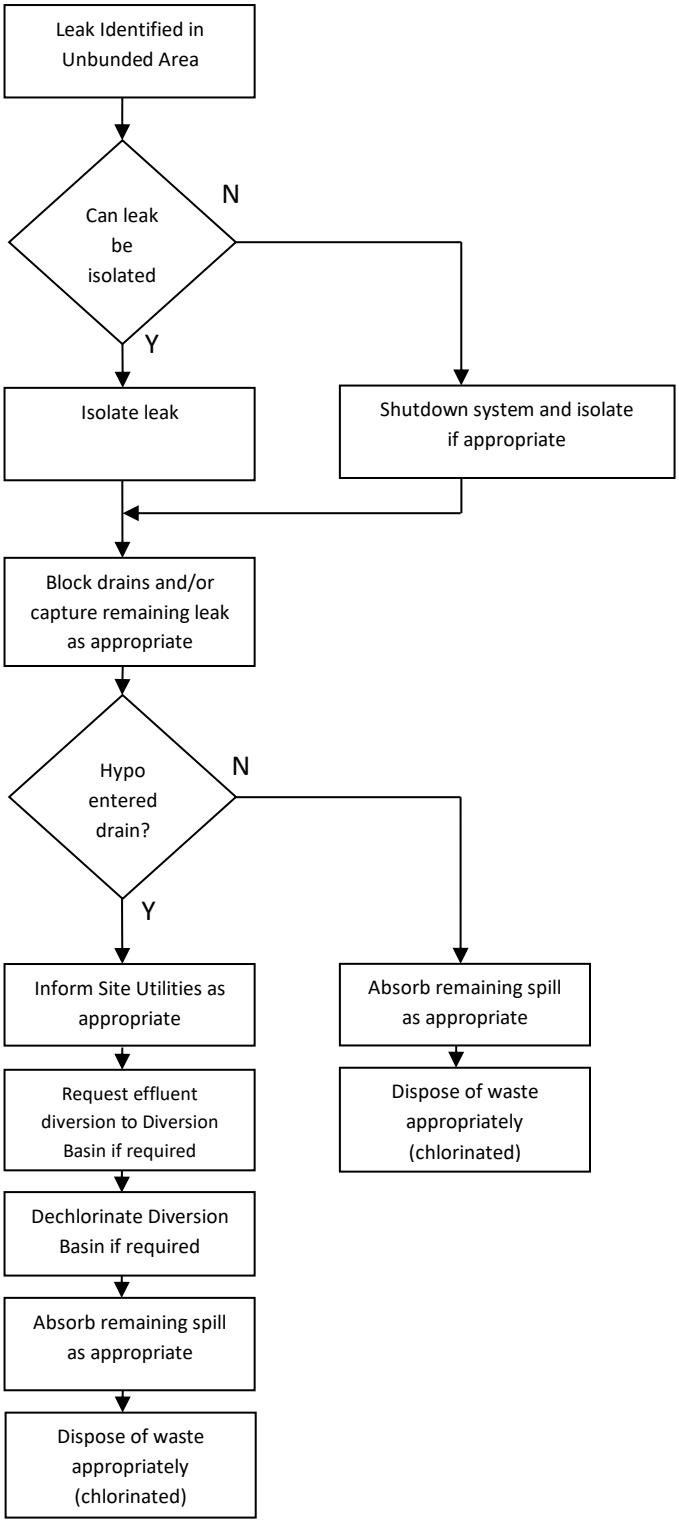
CAP Bund


Leak Identified in CAP Bund
Can leak be isolated
N
Y
Isolate leak
Shutdown system and isolate or capture leak for effluent
Chlorine levels acceptabl e for
N
Y
Transfer from Alkaline Effluent sump to IBCs
Transfer Hypo to 6X
Hose down CAP bund area affected. Dose SBS if required
Hose leak to Alkaline Effluent Sump with SBS addition
Transfer sump contents to Alkaline Effluent Tank for dechlorination and neutralisation

Products Bund



Unbunded Area



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

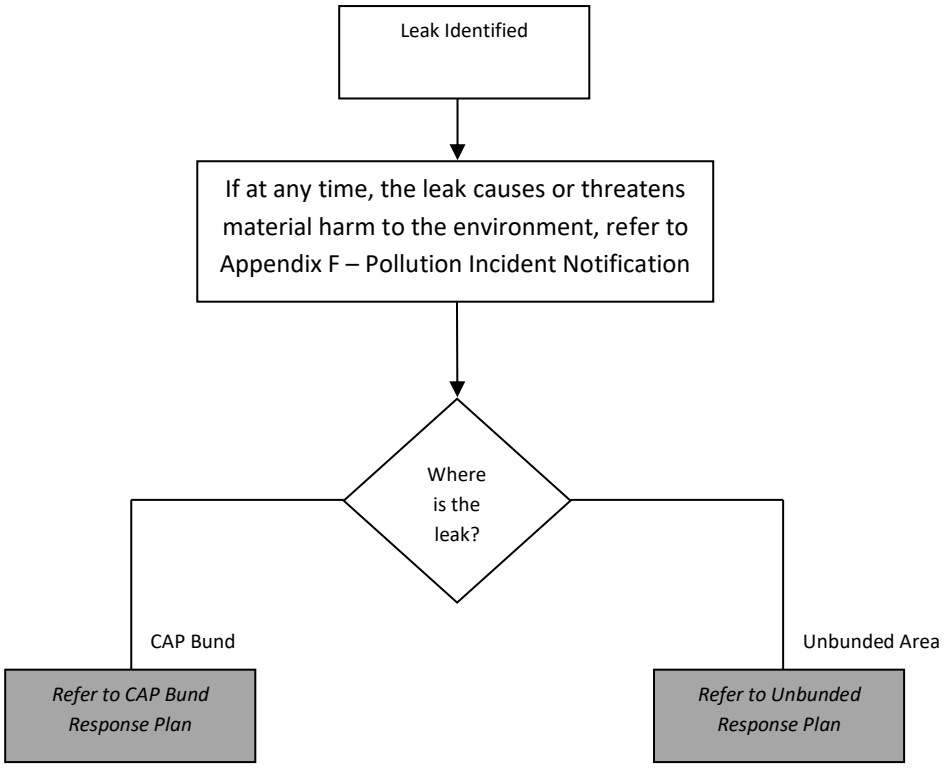
Environmental Aspects Plant Activities and Sources of Risk	Receptors?	Environmental Hazard Potential Pathway and Adverse Impacts	Currently Implemented Risk Control Measures	Conseq Impact	Likelihood Estimate	Risk Level
Item [01]. Overfilling T11560 SBS Solution Tank or Loss of Containment during Loading						
	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	Category 3.2	Very Unlikely	Level IV

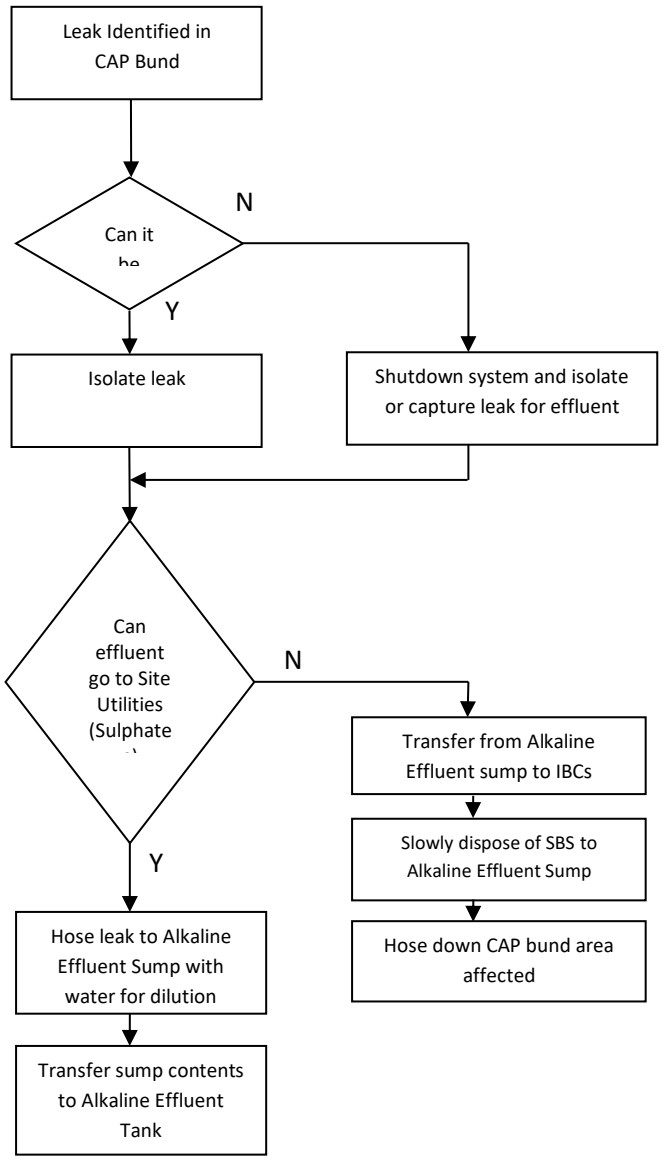
			☐ Weeping SBS may be detectable ☐ Alkaline Effluent Pit level hi-hi alarm on LI18521 ☐ Alkaline Effluent Pit Lo and Lo-lo pH alarms on AI18532 ☐ EP6 lo and lo-lo pH alarm on AI7011. **ERA-CC-001**. ☐ AAL7011 discrete pH alarm. ☐ Stormwater automatically intercepted to Site Utilities effluent system with pH indication and Diversion Basin downstream for out of specification effluent ☐ Response Plan			
	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	Category 3.2	Unlikely	Level III

			☐ 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			
	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 .

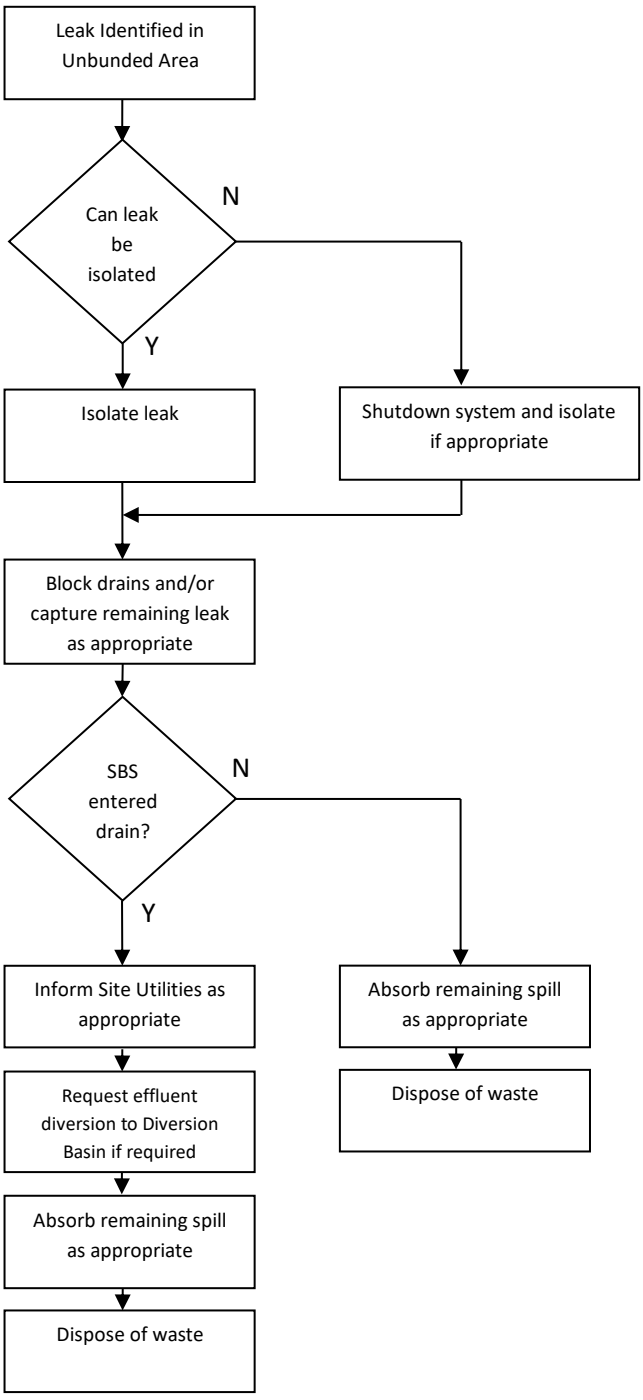
Sodium Bisulphite Response Plan



CAP Bund


Leak Identified in CAP Bund
Can it be
N
Y
Isolate leak
Shutdown system and isolate or capture leak for effluent
Can effluent go to Site Utilities (Sulphate
N
Y
Transfer from Alkaline Effluent sump to IBCs
Slowly dispose of SBS to Alkaline Effluent Sump
Hose down CAP bund area affected
Hose leak to Alkaline Effluent Sump with water for dilution
Transfer sump contents to Alkaline Effluent Tank

Unbunded Area



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.	☐ DCS high level alarms: Hi and hi-hi on LI3547.	Category 3.2	Unlikely	Level III

		Release to SWOOS from Site Utilities without treatment, resulting in adverse impact on trade waste water quality.	☐ 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			
	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

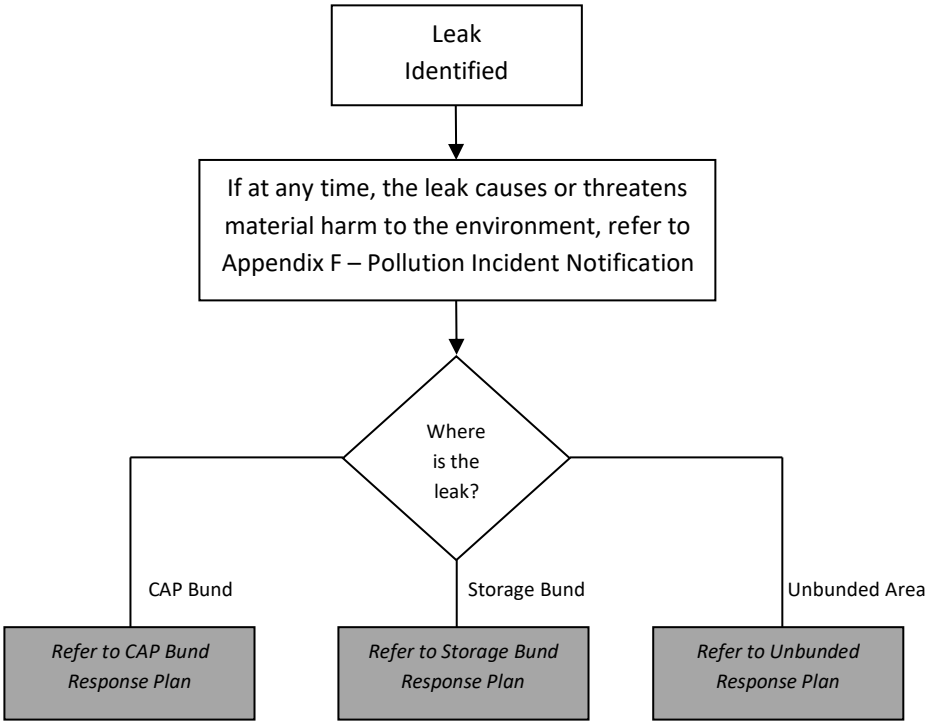
	Hum	People – Acute (immediate) adverse impact on human health with burns to skin and permanent injury to the eyes. Slips and falls from slippery nature.	☐ As for "Nat" ☐ Monogoggle area ☐ Safety showers **MHF-CC-087** ☐ Personnel and contractors informed not to rush on site as a part of behaviour safety 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.	Category 3.2	Very Unlikely	Level IV

			☐ 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			
	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,	☐ 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	Category 3.2	Unlikely	Level III

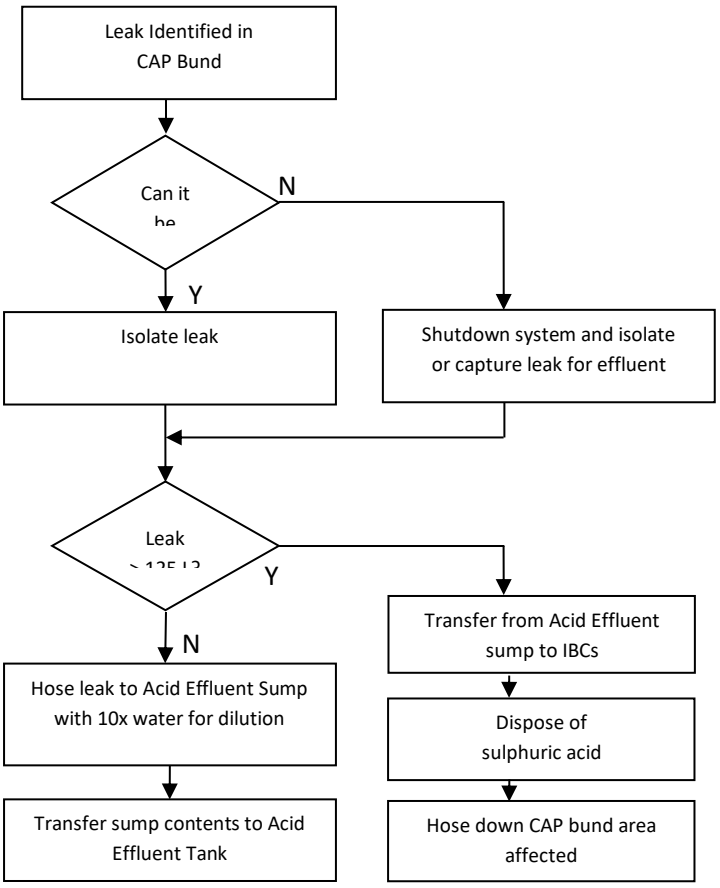
		resulting in adverse impact on trade waste water quality. Soil – Soil contamination (direct), Groundwater – Groundwater contamination, Adverse impact on a biological component – habitat.	☐ Piping supports to prevent strain, cracks and loss of containment ☐ Selected piping elevated to prevent physical 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			
	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,	☐ Driver monitors tanker level. ☐ DCS hi sump level alarm on LI3542A and hi-hi sump level on LI3542B. ☐ Effluent transfer to EP6.	Category 3.2	Unlikely	Level III

		resulting in adverse impact on trade waste water quality.	☐ 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			
	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

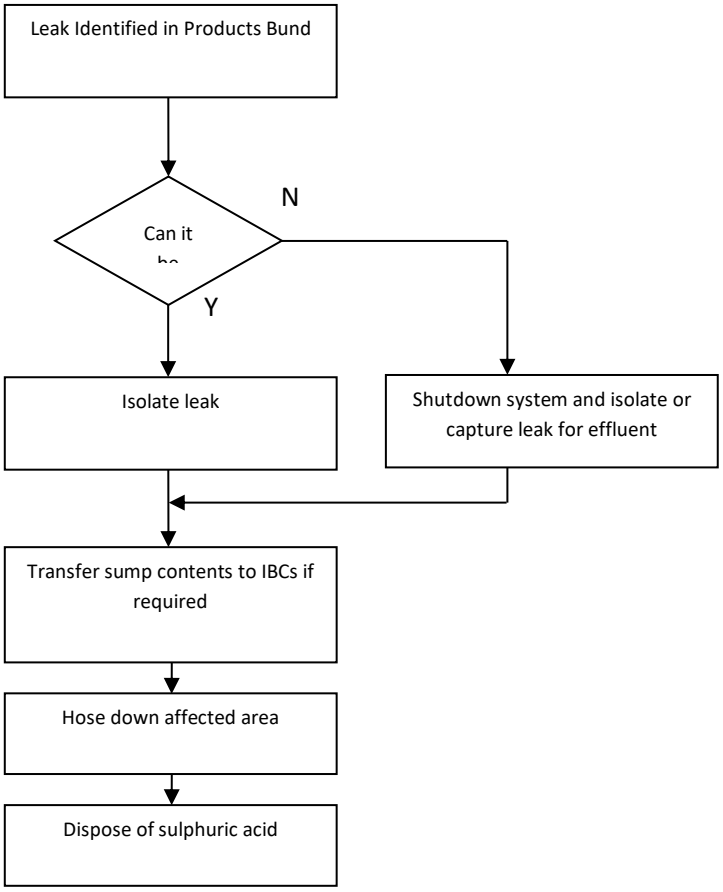
Sulphuric Acid Response Plan



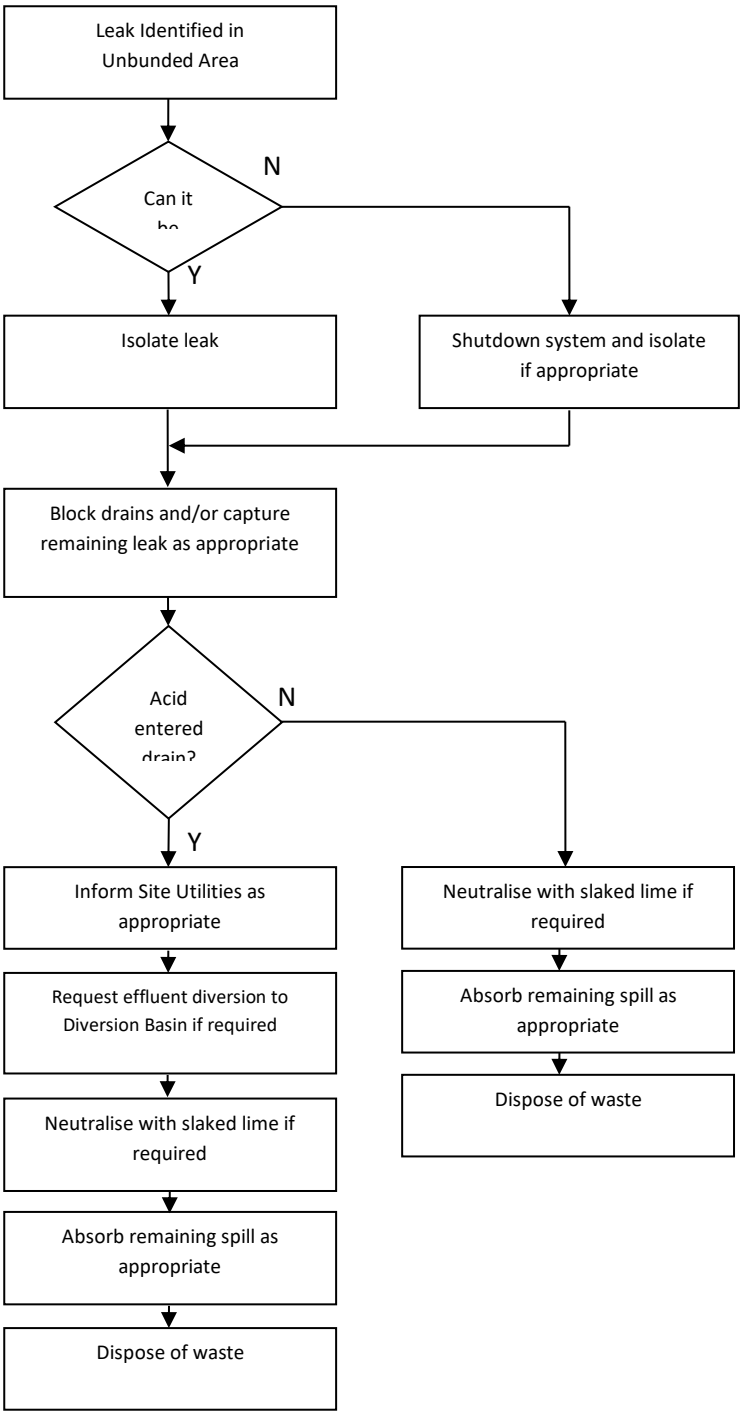
CAP Bund


Leak Identified in CAP Bund
Can it be
N
Y
Isolate leak
Shutdown system and isolate or capture leak for effluent
Leak
Y
N
Transfer from Acid Effluent sump to IBCs
Hose leak to Acid Effluent Sump with 10x water for dilution
Dispose of sulphuric acid
Transfer sump contents to Acid Effluent Tank
Hose down CAP bund area affected

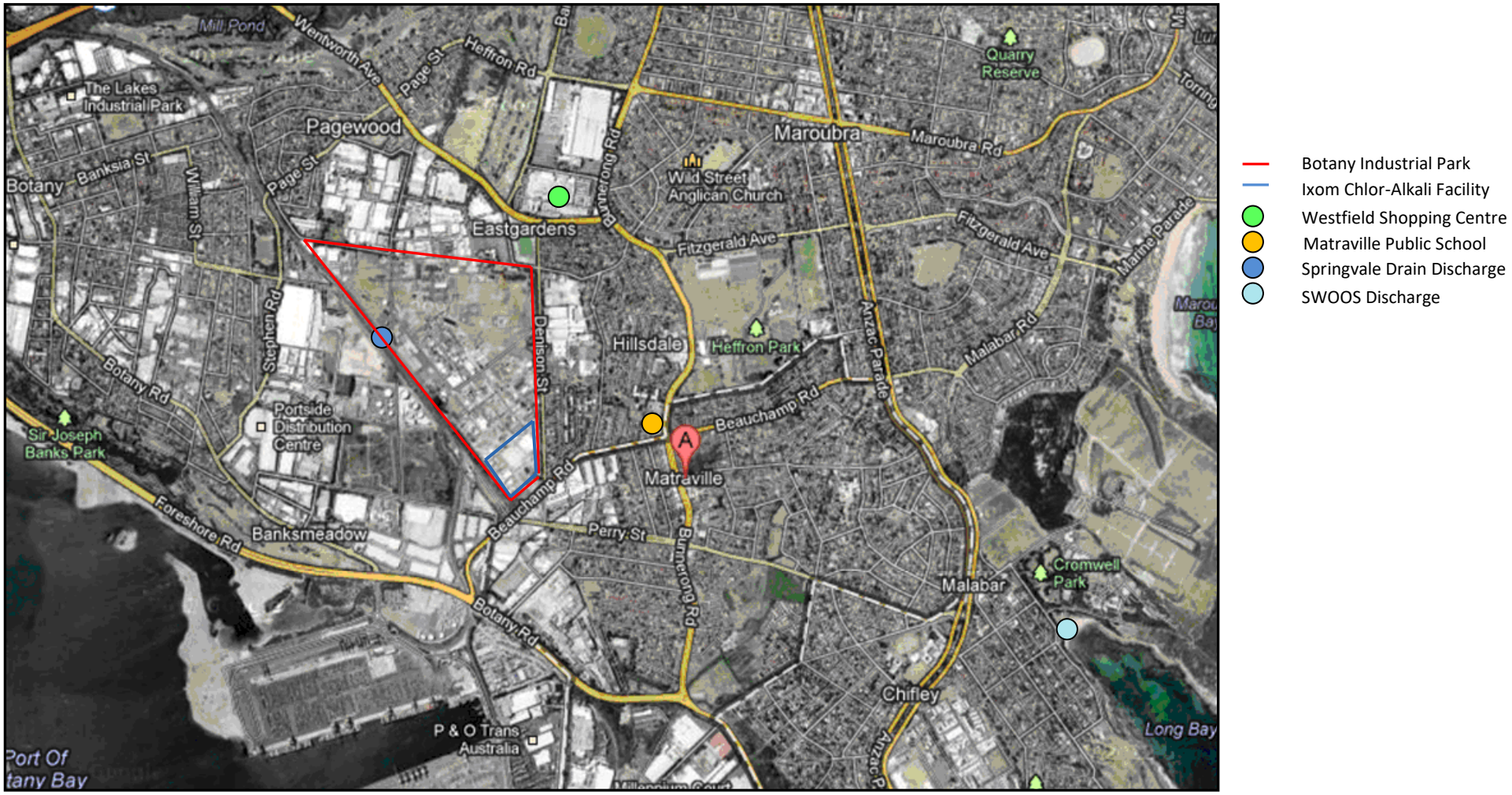
Storage Bund



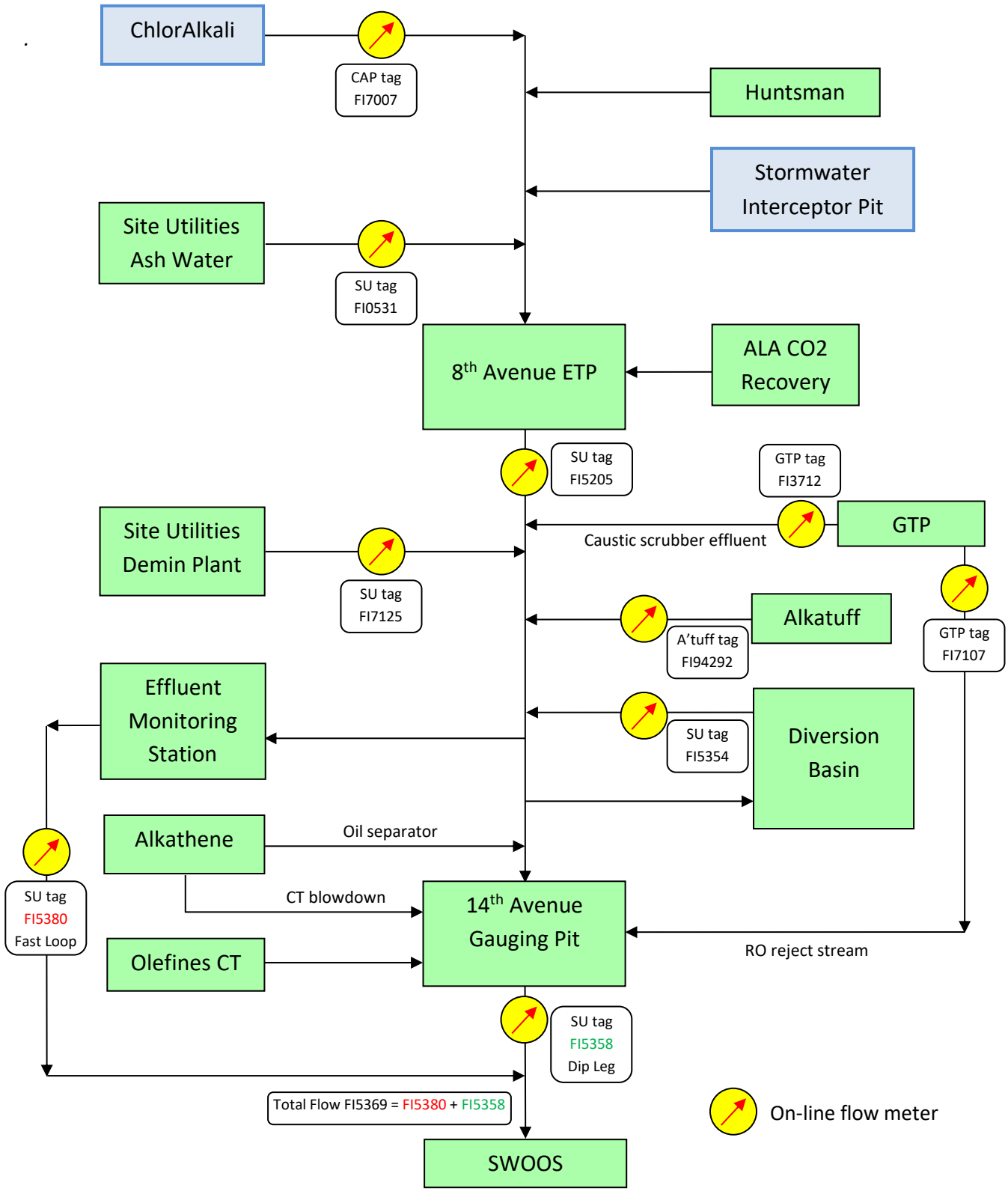
Unbunded Area



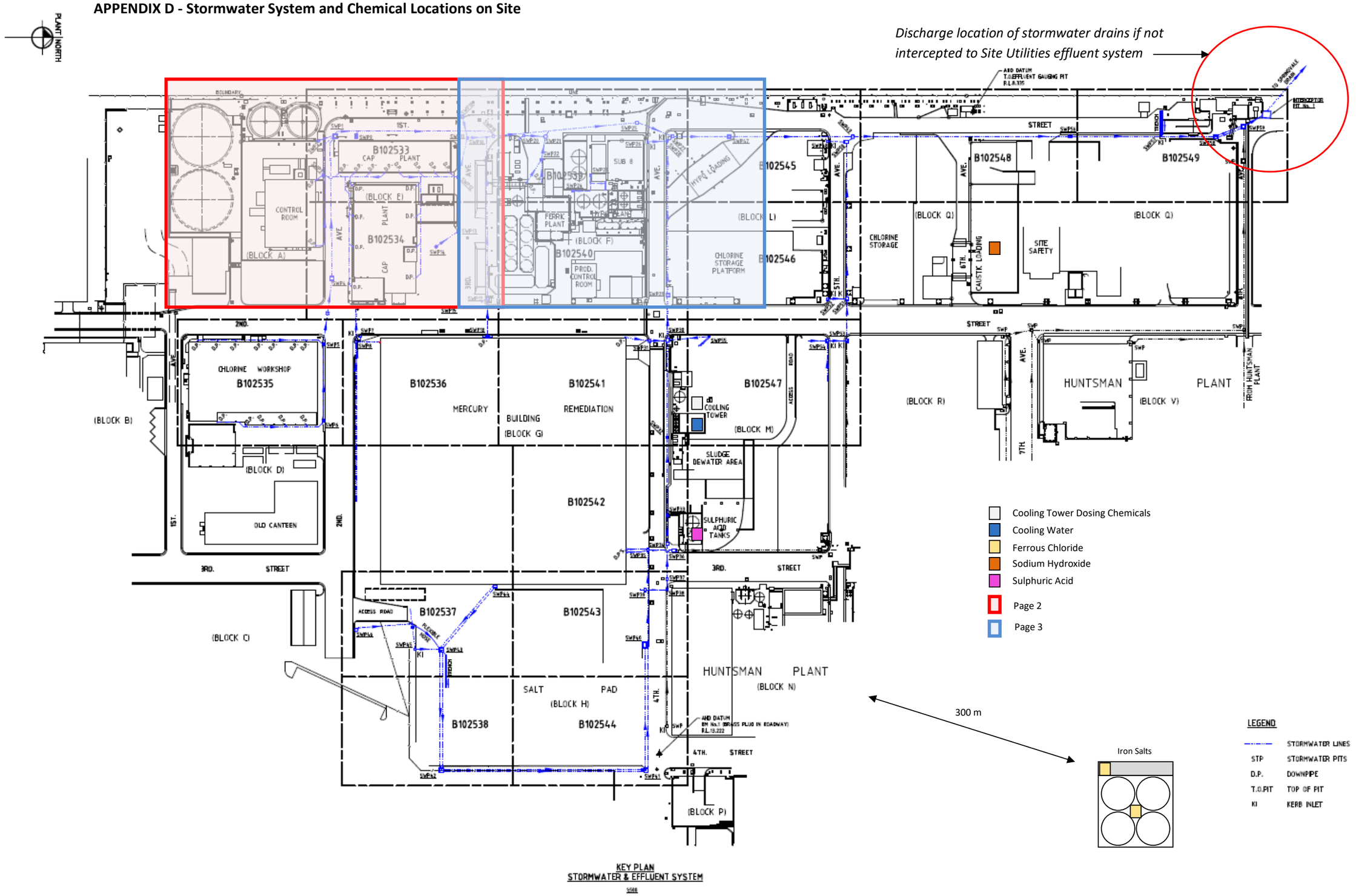
APPENDIX B - Botany Chlor-Alkali Facility and the Surrounding Neighbourhood



APPENDIX C - Botany Industrial Park Effluent System

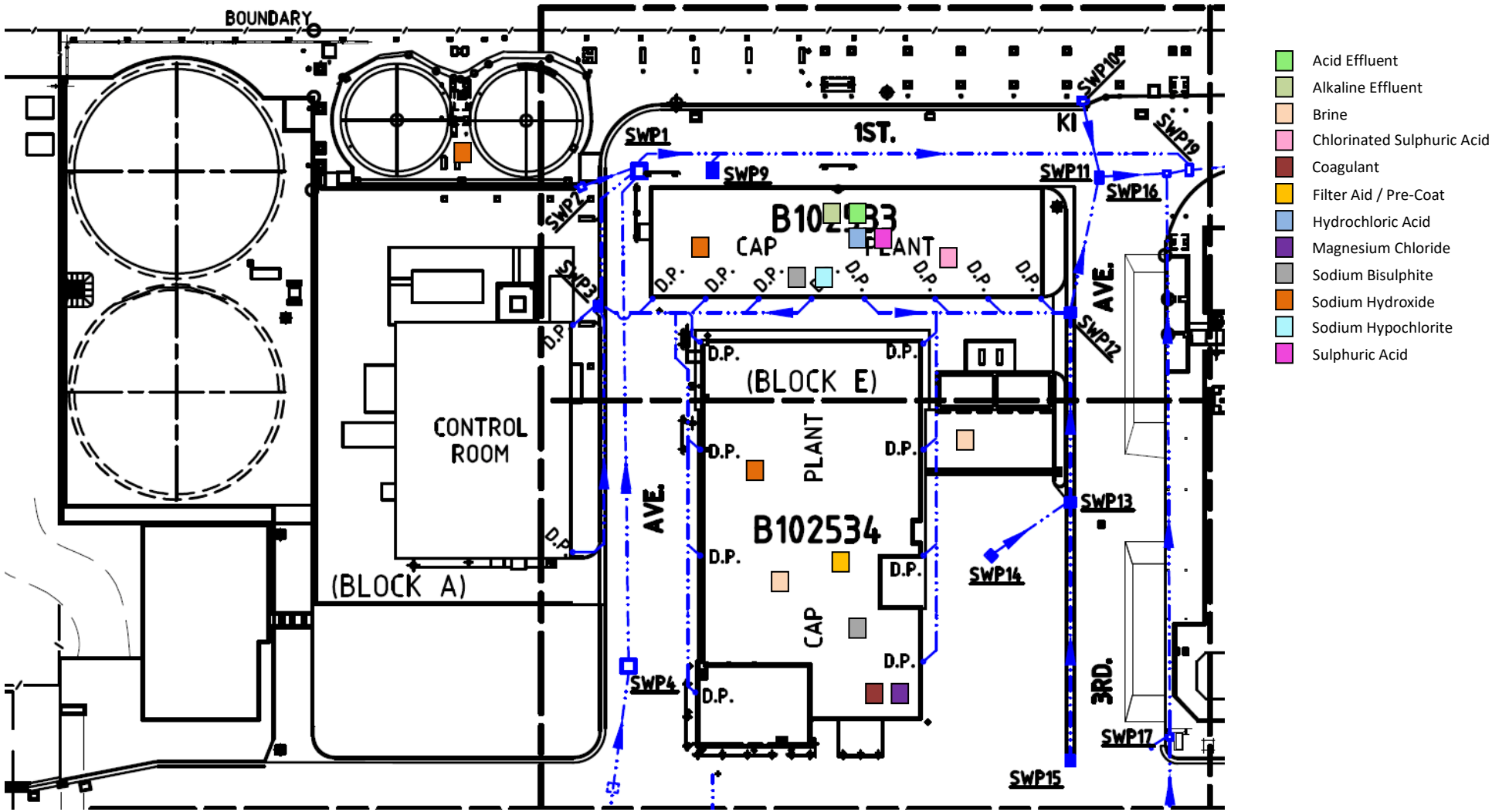


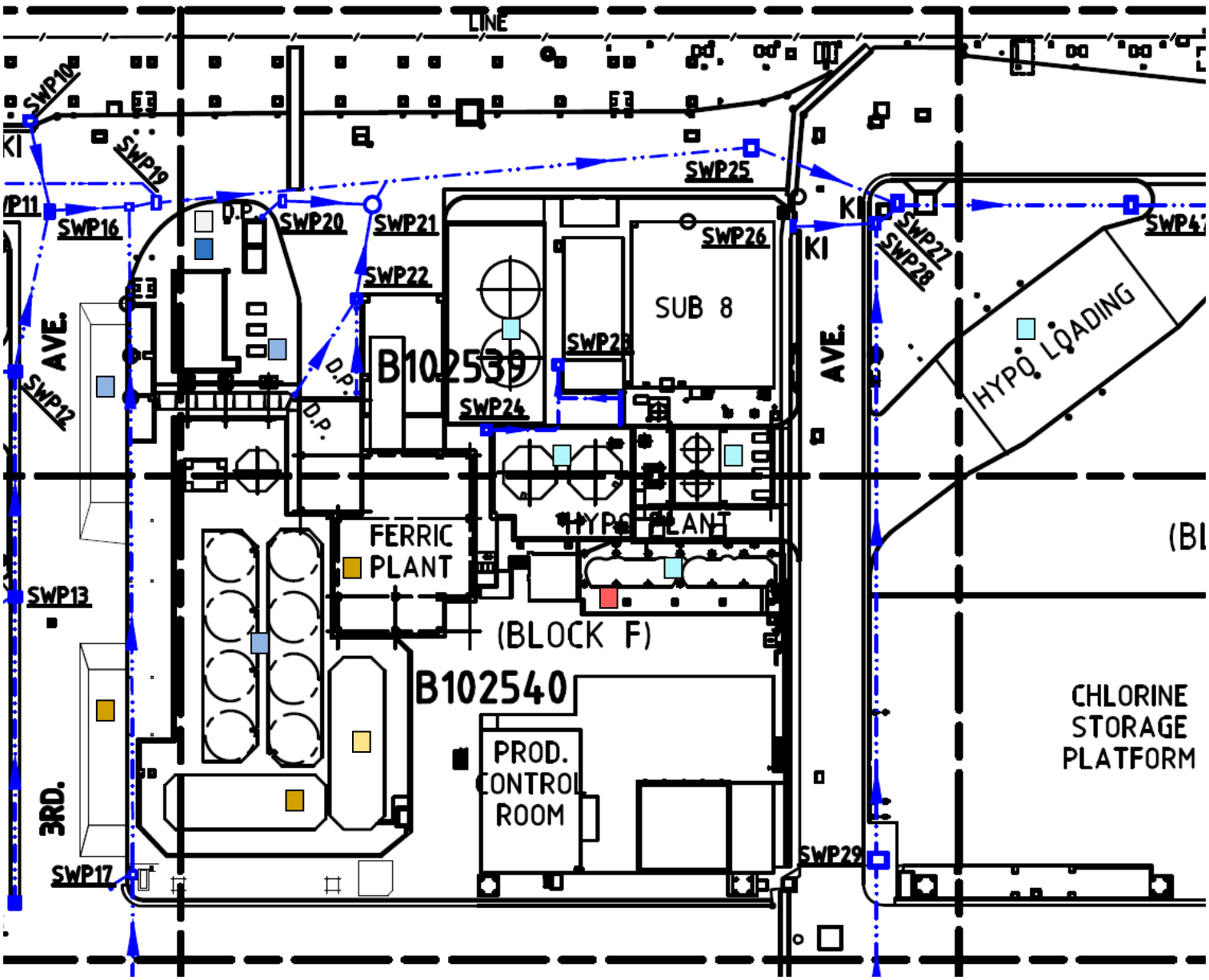
APPENDIX D - Stormwater System and Chemical Locations on Site



KEY PLAN
STORMWATER & EFFLUENT SYSTEM

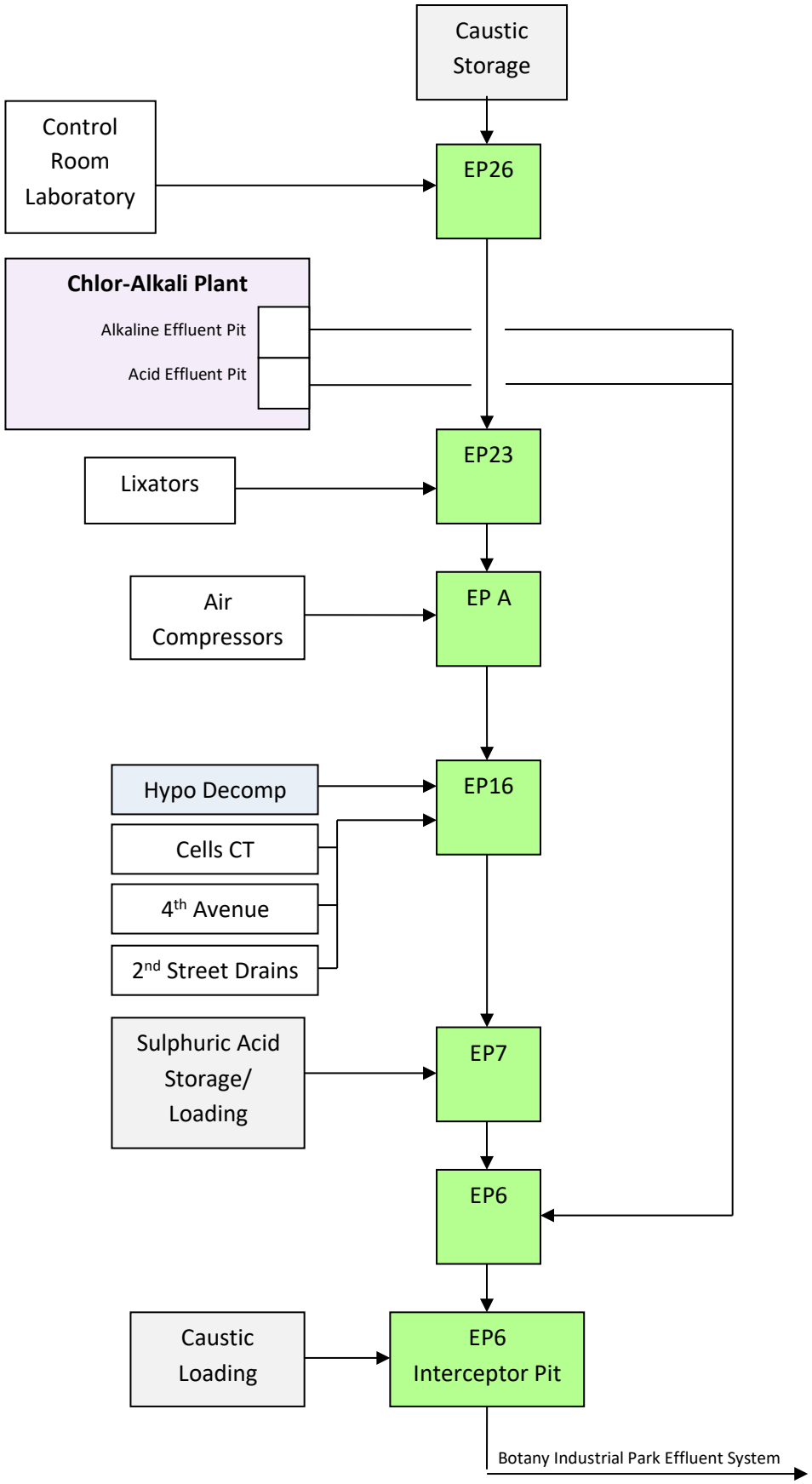
APPENDIX D - Stormwater System and Chemical Locations on Site (continued)





- Cobalt Sulphate
- Cooling Water
- Cooling Tower Dosing Chemicals
- Ferric Chloride
- Ferrous Chloride
- Hydrochloric Acid
- Sodium Hypochlorite

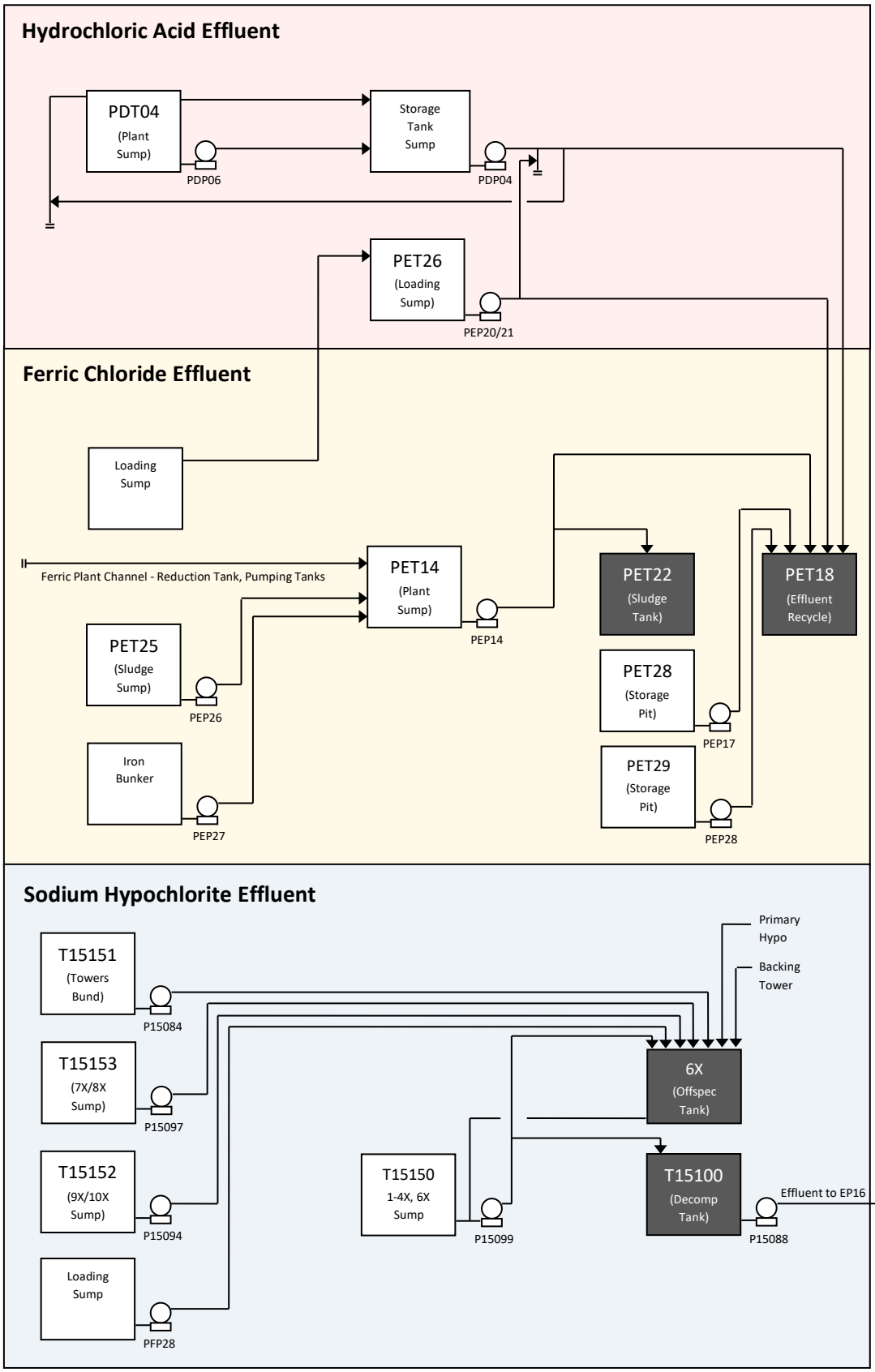
APPENDIX E - Chlor-Alkali Facility Effluent



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

APPENDIX E - Chlor-Alkali Facility Effluent

Product Plants Effluent



APPENDIX F – Incident Notification to Authorities

F.1 Reporting to the EPA

Reporting to the EPA.pdf

F.2 Reporting to SafeWork

Reporting to the SafeWork NSW.pdf

F.3 Reporting to Bayside Council

https://www.bayside.vic.gov.au/apply-pay-and-report/report-problem

Revision

Date	Revision	Details	Who
12/2/2019	1	Issued in Ixom format	J. Nguyen
25/08/2020	9	Update personnel details	N Majlish
28/02/2022	10	Update personnel details	B Pagarigan
01/03/2023	11	Update personnel details	B Pagarigan
03/10/2023	12	Updated procedure based on Preparation of Pollution Incident Response Management Plans (State of NSW and EPA, 2019)	B Pagarigan