AUDIT

BULK STORAGES - CORROSIVE SUBSTANCES
AS 3780

SHOALHAVEN STARCHES

BOLONG ROAD
BOMADERRY NSW

DATE	REV	STATUS	PREPARED	VERIFIED	AUTHORISED
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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

The Shoalhaven Starches facility is located within an industrial and farming area of Bomaderry, approximately 3km north of the city of Nowra.

The industrial processes carried out on this site require the storage and handling of large quantities of hazardous chemicals. This report summarises compliances audits of the bulk storage of Class 8 corrosive substances on this site. A separate report will summarise the compliance audits of the bulk storage and handling of Class 3 flammable liquids. The compliance audits summarised in this report were carried out in late 2019 and early 2020.

Australian Standard AS 3780 – The storage and handling of corrosive substances specifies requirements appropriate to the storage and handling of these hazardous chemicals. The summary reports and check lists in this document advise non-compliances with this standard.

Summary of Major Findings

(i) Corrosive storage tanks, and the pumps, piping and other equipment essential to each storage facility requires a high level of maintenance.

(ii) The layout of some storage, (eg Caustic Depots 22 and 49) is less than ideal. These layouts issues have made maintenance of these depots difficult.

(iii) The stormwater drainage system for the main site is designed to ensure that stormwater and other materials entering the drainage system is collected and pumped to the waste-water treatment plant at the Farm. Chemical spillage at road tanker unloading areas could also enter this system. Large acid or caustic spills could damage this drainage system before the system is flushed with dilution water.

(iv) It is recommended that consideration be given to the provision of blind sumps at each tanker unloading point.

(v) Piping from the tanker unloading connection to the bulk tank is often HDPE piping, with compression fittings and screwed connections. These lines are not colour coded, or readily visible. Mechanical damage, and joint leakage is a concern. Regular inspection of these lines is difficult.

(vi) The Class 8 bunds and storage tanks at the Farm area and of more recent construction and are in good condition.

(vii) As part of the proposed Mod 19, a new phosphorous oxychloride storage and transfer system will be constructed. This will include the improvements recommended in this report for DG Depot No. 58.

(viii) More detailed recommendations are included in the reports for individual depots.

2. FACILITY DESCRIPTION

The Shoalhaven Starches facility is located within an industrial and farming area of Bomaderry, in the Shoalhaven Local Government Area which is located approximately 160 km south of Sydney. The facility is located on Bolong Road which is the main road from the Princess Highway to Shoalhaven Heads. The manufacturing facility is located approximately 3km north of the city of Nowra, and is situated on a flat alluvial plain on the northern banks of the Shoalhaven River.

The immediate surrounding environment can be described as follows:

- North: The property boundary faces the sealed Bolong Road. The company has approximately 1000 hectares of cattle grazing land beyond Bolong Road.
- South: The property faces onto the south bank of the Shoalhaven River.
- East: The property boundary faces onto vacant land, with the decommissioned Australian Paper plant located a few hundred meters beyond.
- West: The property boundary faces a Concrete Batching Plant.

The Shoalhaven Starches facility operates on a 24 hour, seven days a week, production cycle. There are four shift teams named Red, Green, Yellow and Blue shifts. Each shift consists of approximately 35 personnel who work 12 hour shifts being: Day Shift - 6:00am to 6:00pm and Night Shift - 6:00pm to 6:00am.

On Day Shift Monday to Friday there are approximately 120 employees on site, including engineering personnel at the Main Administration Building situated at 36 Bolong Road, Bomaderry. Contract personnel on-site can range from twenty to two hundred personnel depending on the number of construction or maintenance projects underway at any one time.

The facility manufactures a product range that includes Starch, Gluten, Glucose, Brewer's Syrup, Gem Sweet, Ethanol and Dried Distillers Grain (DDGS). The production process involves mixing flour with water and separating the watery starch substance from the dough. The starch and gluten are dried in various steam and gas heated driers. The waste in liquid and solid form from the starch and gluten plant is distilled to produce high grade Ethanol.

Waste Syrup, Mill-mix (pelletised grain husks) and other protein-rich waste are processed to produce Dried Distillers Grain (DDGS) a protein-rich stockfeed that is sold in both liquid, powder and pellet form.

Waste water from the production processes is treated and reused in the factory and to irrigate pastures on a 1000 hectare Environmental Farm where grasses are grown as feed for beef cattle that graze on the farm. Bio Gas produced from the factory effluent is recirculated back to the factory for steam production in the Boilers.

3. HAZARDOUS CHEMICAL STORAGE AND HANDLING

The industrial processes carried out on this site require the storage and handling of large quantities of hazardous chemicals. These processes result in the production and storage and handling of large volumes of ethanol. Ethanol is a highly flammable liquid and is also classified as a hazardous chemical.

This report summarises compliances audits of the bulk storage of Class 8 corrosive substances on this site. A separate report will summarise the compliance audits of the bulk storage and handling of Class 3 hazardous chemicals, being flammable liquids including ethanol.

Australian Standard AS 3780 – The storage and handling of corrosive substances specifies requirements appropriate to the storage and handling of these hazardous chemicals.

The compliance audits summarised in this report were carried out in late 2019 and early 2020. These bulk storages reviewed in this report are listed in the table below.

Class 8 Bulk Storage Depots
Shoalhaven Starches
Bomaderry Site

Depot No.	Contents	DG Class	Tank Capacity litres	Storage Type	Tank Location	Map Ref. No.
22	Sodium Hydroxide UN 1824	8- PG II	52,000	Above-Ground Tank	Glucose	22
48	Sodium Hydroxide UN 1824	8- PG II	36,000	Above-Ground Tank	DDG	48
49	Hydrochloric Acid UN1789	8- PG II	32,000	Above-Ground Tank	Glucose	49
40	Hydrochloric Acid UN1789	8- PG II	10,000	Above-Ground Tank	DDG	40
36	Sodium Hypochlorite UN1791	8- PG II	36,000	Above-Ground Tank	Stillage	
58	Phosphorous Oxychloride UN	8- PG II	500	20L containers in cabinet	Starch	58
TBA Part of Mod 19	Phosphorous Oxychloride UN	8- PG II	1,500	To include pump to transfer to reactors	Starch	TBA relocated
54	Ammonia Solution Sodium Hydroxide Solution Hypochlorite Solution	8- PG II 8- PG II 8- PG II	2,000 2,000 12,000	Above-Ground Tanks	Farm	54
53	Ferric Chlorite Solution UN2582	8- PG III	20,000	Above-Ground Tank	Farm	53

4. DEPOT AUDITS – DESCRIPTIONS AND RECOMMENDATIONS

4.1 Caustic Storage Tank – Depot No 22

Details of this storage are summarised below.

- Tank Capacity is 52,000 litres of 50% Caustic Soda.
- This vertical tank is bunded. Bund height is approx 2.5 m – just below the top of the tank shell.
- Distance between tank and bund is approx. 1 m.
- Signage advises that this bund is a confined space. Pumps and other equipment requiring regular maintenance is within this confined space.
- A mixer is installed in this tank. The tank is not heated, and not insulated.
- It is noted that 50% caustic soda solution freezes at 12 deg C.
- Brickwork on one side is cracked, and mortar is badly eroded, suggesting the bund may not be leak tight.
- All piping is HDPE. Some lines are underground, and difficult to inspect. Many pipe supports are badly corroded.
- Piping is not colour coded, or identified to show that it contains caustic soda.
- It is not known if the tank has been ultrasonically thickness tested.
- Not known if the delivery tanker uses this GPO when unloading, or if it uses its own power take off.

- Piping from tanker unloading area is HDPE. Some lines are underground, and difficult to inspect. Many pipe supports are badly corroded.
- Piping is not colour-coded, or identified to show that it contains caustic soda.
- A level transmitter, and level switch are installed on this tank.
- The level switch cuts power to the GPO for the unloading pump.
- The sump at the tanker unloading point discharges to the plant storm water system. Initially a major spill at the tanker loading area would spread to other drain entries, perhaps to the drain entry at caustic unloading area, or drains in ethanol storage and loading areas. Any spill would eventually be mixed with the 9 million litres of water sent to the water treatment plant daily. Considerable damage could be done before this dilution occurs.
- The Sump at the unloading point is concrete. The material of drainage pipes is not known.

Recommendations for Caustic Tank No 22

- Repair damage to bund wall, and ensure bund is leak tight.
- A structural engineer should assess the integrity of this bund.
- Carry out ultrasonic thickness testing of this tank.
- Ensure that tanker driver unloads caustic using power from the GPO.
- Ensure that the operation of the tank high level switch, and power isolation are checked regularly.
- Determine how caustic is handled when temperature is below the freezing point -12 deg C.
- Heat trace piping, pump and tank if necessary.
- Consider the provision of a 9,000 litre compound for containment of spills from the tanker unloading area; (as required by AS 3780.)
- Consider replacement of underground piping with aboveground piping; (as required by AS 3780).
- Check that appropriate PPE is available for use in case of a spill.
- Colour code all caustic piping, or use line markers to show that lines contain caustic soda.

4.2 Caustic Storage Tank – Depot No 48

Details of this storage are summarised below.

- Total capacity of Depot 48 is 36,000 litres of 50% caustic Soda.
- There are two horizontal tanks in this tank bund, mounted one above the other.
- The top tank is behind a steel fence barrier.
- Distance between tank and bund is approx. 1 m. Bund height is 1.5 m.
- Signage advises that this bund is a confined space. Pumps and other equipment requiring regular maintenance is within this confined space.
- The tanks are not heated, and not insulated.
- It is noted that 50% caustic soda solution freezes at 12 deg C.
- The filling line is connected to the bottom tank. Once the bottom tank is filled the connecting pipe fills the top tank.
- Bund is of concrete construction.
- Water supply to safety shower and eye wash outside this bund requires attention. Does not reach eyes.
- Three caustic transfer pumps are located within the bund. (air operated diaphragm type.)
- All piping is HDPE. Some lines are underground, and difficult to inspect. Many pipe supports are badly corroded.
- Piping is not colour-coded, or identified to show that it contains caustic soda.
- It is not known if the tanks have been ultrasonically thickness tested.

- A level transmitter is installed on this pair of tanks. But no level switch.
- There is no level display at the remote tanker loading bay.
- There is no GPO at the tanker loading bay. The delivery tanker uses it own pump and power take off.
- It is presumed that the tanker driver contacts the control room operator by mobile phone, to monitor tank level.
- A 50 mm galvanised water line is connected to the caustic unloading line, at the tanker unloading bay. It is presumed that this water supply is used to flush caustic unloading hoses.
- It is not known it this water supply comes via a break tank.
- The sump at the tanker unloading point is part of the plant storm water system. Any spill would be mixed with the 9 million litres of water sent to the water treatment plant daily.
- The caustic line from the tanker bay to the tank crosses a creek. The hdpe caustic line is protected by an outer hdpe pipe, but any leak would drain into the creek.
- The SCADA shows the filling system for this tank incorrectly.

Recommendations for Caustic Tank No 48

- Carry out ultrasonic thickness testing of these two tanks.
- Check that the water supply to the unloading piping comes via a break tank.
- Improve the integrity of the caustic line crossing the creek. - This section of the line could be in stainless steel.
- Install GPO at the unloading area. Power to this GPO to be isolated if tank level is high.
- Ensure that tanker driver unloads caustic using power from the GPO.
- Install level display at the tanker unloading point.
- Ensure that the operation of the tank high level switch, and power isolation are checked regularly.
- Advise how caustic is handled when temperature is below the freezing point (-12 deg C.)
- Heat trace piping, pump and tank if necessary.
- Consider the provision of a 9,000 litre compound for containment of spills from the tanker unloading area; (as required by AS 3780.)
- Consider replacement of underground piping with aboveground piping; (as required by AS 3780).
- Check that appropriate PPE is available for use in case of a spill.
- Colour code all caustic piping, or use line markers to show that lines contain caustic soda.

- **Consider Replacement of Tanks 22 and 48, by a new tank at a central location. Provide new fully welded piping to all caustic users. New tank and piping to be heat traced.**

4.3 Hydrochloric Acid Tank – Depot No 49

Details of this storage are summarised below.

- Capacity of this depot is 32,000 litres of 30% HCL. Nameplate advises capacity is 50,000litres.
- This horizontal tank is bunded. Bund height is approx 1.5 m. A Perspex screen is installed on top of the bund wall. This prevents leaks from the transfer pumps escaping the bund.
- Distance between tank and bund is approx. 1 m.
- Signage advises that this bund is a confined space.
- This tank overflow vents through a water seal with separate scrubber.

- This tank is of vinyl ester, fibreglass construction, with vinyl ester corrosion barrier. The nameplate advises that the was constructed in 2008. 33% HCl, 50,000 litres.
- Piping from tanker unloading area is HDPE. Some lines are underground, and difficult to inspect. Many pipe supports are badly corroded.
- Piping is not colour-coded, or identified to show that it contains hydrochloric acid.
- A level transmitter, and level switch are installed on this tank.
- The level switch cuts power to the GPO for the unloading pump.
- Not known if the delivery tanker uses this GPO when unloading, or if it uses its own power take off.
- The sump at the tanker unloading point discharges to the plant storm water system. Initially a major spill at the tanker loading area would spread to other drain entries, perhaps to the drain entry at caustic unloading area, or drains in ethanol storage and loading areas. Any spill would eventually be mixed with the 9 million litres of water sent to the water treatment plant daily. Considerable damage could be done before this dilution occurs.
- The Sump at the unloading point is concrete. The material of drainage pipes is not known.

Recommendations for Hydrochloric Acid Tank No 49

- Assess condition of vinyl ester resin, and determine if any breakdown has occurred.
- Ensure that tanker driver unloads caustic using power from the GPO.
- Ensure that the operation of the tank high level switch, and power isolation are checked regularly.
- Determine the material used for the stormwater pipes from the sump at the tanker unloading point.
- Determine the impact of acid spills from the tanker unloading area, and the risk to the local drainage system. Identify all pits from which acid vapours might be released.
- Consider the provision of a 9,000 litre compound for containment of spills from the tanker unloading area; (as required by AS 3780.)
- Consider replacement of underground acid piping with aboveground piping; (as required by AS 3780).
- Check that appropriate PPE is available for use in case of a spill.
- Colour code all piping, or use line markers to show that lines contain hydrochloric acid.

4.4 Hydrochloric Acid Storage Tank - Depot No 40

Details of this storage are summarised below.

- SafeWork notification advises that the capacity of this depot is 10,000 litres of 30% HCL.
- This vertical HDPE tank is within a concrete block bund. Bund height is approx 1.5 m.
- Distance between tank and bund is approx. 1 m.
- Class 8 Signage is displayed at the bund and at the tanker unloading point. Pumps and other equipment requiring regular maintenance are within the bunded area.
- This tank overflow vents through a water seal.
- Piping from tanker unloading area is HDPE. Some pipe supports are corroded.
- Piping is not colour-coded, or identified to show that it contains hydrochloric acid.
- A level transmitter, and level switch are installed on this tank.
- The level switch cuts power to the GPO for the unloading pump.
- Advised that the driver of the tanker is instructed to use this GPO when unloading, not the power take-off on the truck.

- The drain at the tanker unloading point discharges to the plant storm water system. Initially a major spill at the tanker loading area would spread to other drain entries. Any spill would eventually be mixed with the 9 million litres of water sent to the water treatment plant daily. Considerable damage could be done before this dilution occurs.
- The drain at the unloading point is concrete. The material of drainage pipes is not known.

Recommendations for Hydrochloric Acid Tank No 40

- Ensure that tanker driver unloads using power from the GPO.
- Ensure that the operation of the tank high level switch, and power isolation are checked regularly.
- Determine the material used for the stormwater pipes from the sump at the tanker unloading point.
- Determine the impact of acid spills from the tanker unloading area, and the risk to the local drainage system. Identify all pits from which acid vapours might be released.
- Consider the provision of a 9,000 litre compound for containment of spills from the tanker unloading area; (as required by AS 3780.)
- Check that appropriate PPE is available for use in case of a spill.
- Colour code all piping, or use line markers to show that lines contain hydrochloric acid.

4.5 Sodium Hypochlorite Storage Tank – Depot No 36

Details of this storage are summarised below.

- SafeWork notification advises that the capacity of this depot is 36,000 litres.
- This vertical Fibreglass lined tank is within a concrete block bund. Bund height is approx 1.5 m.
- Spill marks on the tank shell indicate that the shell of this tank has leaked recently, and that the leaks have been repaired.
- Distance between tank and bund is approximately 1.5 m.
- The tanker unloading point is at the bund.
- Class 8 Signage is displayed at the bund and at the tanker unloading point. Pumps and other equipment requiring regular maintenance are within the bunded area.
- This tank overflow discharges into an IBC.
- Piping within bund is UPVC. Most piping to the plant is UPVC. Some piping is HDPE.
- Piping in bund is labelled to show that it contains sodium hypochlorite.
- A level transmitter, and level switch are installed on this tank. Level transmitter display is located at the unloading point.
- The level switch cuts power to the GPO for the unloading pump.
- Sign advises that the driver of the tanker is to use this GPO when unloading.
- There appears to be a blind sump near the tanker unloading point. The capacity of this sump is not known, but would be less than the 9,000 litres specified by AS 3780.
- Signs indicate that IBCs are filled from this tank, adjacent the blind sump. The method of controlling the risk of overfilling of IBCs is not clear.
- The drain at the unloading point is concrete. The material of drainage pipes is not known.

Recommendations for Sodium Hypochlorite Tank No 36

- Ensure that tanker driver unloads using power from the GPO.

- Ensure that the operation of the tank high level switch, and power isolation are checked regularly.
- Monitor the recent tank repair. Plan for the replacement of this tank.
- Determine the impact of spills from the tanker unloading area, and the risk to the concrete paving and the concrete sump.
- Consider the provision of a 9,000 litre compound for containment of spills from the tanker unloading area; (as required by AS 3780.)
- Check that appropriate PPE and clean up equipment is available for use in case of a spill.

4.6 Phosphorous OxyChloride Storage Cabinet. - Depot No 58

Details of this storage are summarised below.

- This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

➢ Corrosive to metals	Category 1
➢ Acute oral toxicity	Category 4
➢ Acute Inhalation Toxicity – Vapours	Category 2
➢ Skin Corrosion/irritation	Category 1A
➢ Serious Eye Damage/Eye Irritation	Category 1
➢ Specific target organ toxicity (single exposure)	Category 3
➢ Target Organs - Respiratory system.	
➢ Specific target organ toxicity - (repeated exposure)	Category 1

- The POCl drum is in a locked metal cabinet.
- This cabinet is bunded.
- This cabinet is suffering corrosion.
- A drum pump is used to transfer the POCl to a 5 litre plastic container.
- This plastic container and carried up-stairs to the reactor, and the POCl transferred into the reactor daily.

Recommendations for Phosphorous OxyChloride.

- Phosphorous OxyChloride is extremely corrosive to both metal, skin and other soft tissue. Phosphorous OxyChloride hydrolyses in moist air releasing phosphoric acid and hydrogen chloride.

  - ➢ Harmful if swallowed
  - ➢ Causes severe skin burns and eye damage
  - ➢ May cause respiratory irritation
  - ➢ Fatal if inhaled
  - ➢ Causes damage to organs through prolonged or repeated exposure

- Ensure staff are aware of the risks in handling this chemical, and wear full protective clothing. This should include:-
  - Eye/face Protection
    - Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
  - Skin and body protection
    - Long sleeved clothing.
  - Respiratory Protection
    - Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

- Hygiene Measures
  - Handle in accordance with good industrial hygiene and safety practice.
  -
  -

- Provide Safety Showers and Eyewash stations wherever this chemical is handled.

- Consider the installation of a system to transfer the POCl directly from the drum to the reactor, as is used at other sites. (Ingredion at Lane Cove and Tamworth)

- Mod 19 requires the installation of a new POCl storage and handling system in a new location. This could include a 1,500 litre storage tank, metering pump, and tubing to transfer POCl directly to reactors. Tank must be of a material compatible with POCl (Inconel or equivalent.). Metering pump and transfer tubing must be compatible with POCl.

4.7 Waste-Water Treatment Plant – Depot No 53 and 54

The waste-water treatment plant is located on the Farm area of the facility. This is located approximately 2 kilometers from the main site. All water water from the main industrial site is pumped to this treatment plant. The main drainage system is also pumped to this waste-water treatment plant.

Hazardous Chemicals used in the treatment of this waste-water are stored at the treatment plant site. These include;

	Depot 53	Depot 54 Bund 1	Depot 54 Bund 1	Depot 54 Bund 2	Depot 54 Bund 3	Bund 4
Contents	Ferric Chloride Solution	Hypochlorite Solution	Sodium Hydroxide Solution	Ammonia Solution	(AntiScalant Ameron 710 A)	Citric Acid
UN Number	UN 2582	UN 1791	UN 1824	UN 2672	Not Classified as Dangerous Goods	Not Classified as Dangerous Goods
DG Class	Class 8 PG II Acidic 20,000 litres	Class 8 PG II Alkaline	Class 8 PG II Alkaline	Class 8 PG II Alkaline		
Capacity	20,000 litres	12,000 litres	1,600 litres	2,000 litres	1,200 litres	1,200 litres
Tank Construction Details	HDPE Tank Dia: 3.6 m Height: 2.4 m	HDPE Tank Dia: 2.6 m Height: 2.4 m	HDPE Tank Dia: 1 m Height: 2.1 m	HDPE Tank Dia: 1.2 m Height: 2.1 m	HDPE Tank Dia: 1 m Height: 2.1 m	HDPE Tank Dia: 1 m Height: 2.1 m
Bund Construction Details	7 m * 5 m 600 high Capacity 21,000 litres	8 m * 5 m 600 high Capacity 24,000 litres	Shares bund 1	3.5 m * 3.5 m 600 high Capacity 7,000 litres	HDPE Bund	HDPE Bund
	Filled from road tanker in Unloading Bund	Filled from road tanker in Unloading Bund	Filled from IBCs in Unloading Bund	Filled from IBCs in Unloading Bund	Filled from IBCs in Unloading Bund	Filled from IBCs in Unloading Bund
	Level Transmitter	Level Transmitter	High and Low Level Switches	High and Low Level Switches	Low Level Switch & Float Type Level Indicator	
				Vents to water drum		

5. AS 3780 Compliance Check Lists

5.1 Compliance Check List - Depot 22. - Caustic Tank

Caustic Storage Tank No. 22

Code Precaution	True	Not True	Code Reference	Comment
CONTAINER TYPES: Portable Bulk Tanks -IBC complying with ADG code. -ISO complying with IMDG code -demountable tank complying with AS 2809.1& 2809.4 Fixed bulk container, filled and discharged in situ.			5.2	-Tank capacity has capacity of 52,000 litres of 50% caustic soda.
SEPARATION DISTANCES: -Minmum distance between tanks is 0.6 m. -Min distance to protected places and boundaries as in Table 5.1. For liquids of PG II & III Table 5.1 specifies the minimum distance from container to protected places and boundaries as; -Separation dist of 3 m if capacity<= 3000L -Separation dist of 5 m if capacity<= 50,000L -Separation dist of 8 m if capacity> 50,000L -Min distance from bund to protected places and boundaries is 3m. -Separation distances may be measured around a wall having FRL of 120/120/120. -Wall must be 1 m above container, or above protected place.	Only one tank Complies Complies		5.3.2.2	This vertical tank is bunded. Bund height is approx. 2.5 m. -Distance tank and bund is approximately 1 m. -Signage advises that this bund is a confined space.
SEGREGATION: Incompatible liquids shall be; -in separate compounds, or -segregated by 5 m Liquids that react dangerously shall be; - segregated by 5 m, and - in separate compounds, not sharing a common drainage system. Segregation distances may be measured around a wall having FRL of 120/120/120. -Wall must be to height of container, if goods so segregated are Class 2.1, 3, 4 or 5.	Complies		5.3.3	

BUNDS: -For PGII & III Bund Capacity >= 100% of largest container -Min distance from container to bund shall be as in Fig 5.1 -Min distance not less than 1 m if capacity >=3000L -distance to be greater if container pressurised. -Entry and Exit over bund to be safe. -Drainage shall slope away from any container to a sump. -Compound drain valves to be normally closed, and outside the compound. -Compound drain pumps to be manually controlled.	Yes		5.4	PREFERABLY 110% (EPA) Bund is just below the top of the tank shell. Bund capacity should be sufficient. Fig 5.1 requires distance from bund wall to container to be half the height of container above the bund. Signage advises bund is Confined Space. Entry is not locked. Damage to this bund is evident. This requires repair, and structural assessment of bund integrity.
TANK FOUNDATIONS: -foundation designed to support direct load when tank full of water. -foundation designed to resist overturning moment due to wind, earthquake -Tanks in flood prone area shall be anchored to prevent floating.	O.K.		5.5.2	
BUND DESIGN AND CONSTRUCTION: -Impervious -Retain structural integrity in fire situation. -Not higher than 1.5 m unless safe and rapid exit provided. -Distance from inside perimeter of bund to protected place or on site protected place shall be at least half that required by Table 5.4, or 15m whichever is less.	O.K.		5.5.3	Bund of concrete construction. Approx 1.5 m high. Evidence of floor corrosion.
FILL POINTS: Fill point shall be readily accessible. Fill point shall be protected from damage. Fill point shall be in open air, -no ignition sources within hazardous area. Fill point located so that tank vehicle is not required to enter the tank compound. Each fill point shall be clearly identified. Area around the fill point and hose connection shall be impervious to the product.	O.K. O.K. O.K. O.K.		5.3.2	Fill point is remote, and piping to fill point is underground. Area around fill point is concrete. Site drain adjacent.
LIQUID LEVEL INDICATION: -It shall be possible to monitor the amount of liquid in any tank intended to receive a delivery. The gauge shall show the normal fill level of the tank.	O.K.		5.3.2	Tank level transmitter displays at tanker unloading area. Tanker driver instructed to use local GPO.

-The Fill level shall not exceed 95% of the tank capacity. -Tanks (with capacity > 5,000 litres of flammable) shall have a high level alarm set at a maximum of 97% of tank capacity. -A contents gauge and LAH remote from the tank, shall be provided at the fill point, or… -In addition to the LAH they shall incorporate an independent LAHH.- set at below the tank rated capacity				Tank high level switch cuts power to GPO if high level sounded.
VENTING: Each tank shall be fitted with; -A free vent or Pressure Vacuum Vent. -An emergency vent when conditions of 5.5 apply. -Vapours shall be safely discharged outdoors unless recovery and treatment is required.	O.K.		5.4	Tank vents through scrubber. Over flow discharges through water.
Transfer Point. For PGII, 5 m from boundary and protected places. Safety Shower and Eye wash	 O.K. O.K.		5.5.7 5.5.7 (f)	
Pipes and fittings -Pipes to be colour coded. -Pipework to be well supported. -Flexible hoses shall not be used except at transfer points	 NO ? ?		5.5.8.1	 Piping not identified Some supports corroded. Mainly UPVC piping around storage tanks, but transfer lines from tanker unloading area appear to be agricultural HDPE, with screwed joints.
Spillage Control for corrosive liquids. -filling area, and unloading area shall have a system for collecting any spilt liquid and draining it to a containment tank or compound. -The vehicle standing area shall be graded so that any spillage will drain away to a dedicated tank or compound, and not spread to other loading or filling areas. -The surface shall be impervious. -Substances that are incompatible or might react dangerously shall not be directed into a common compound. -Capacity of the system shall be the capacity of the largest tanker compartment or 9,000 litres. -the spillage containment areas shall be immune to attack by corrosives to be retained (5.4.3)			5.8.4	Tanker unloading area drains to the site drainage system. -Surfaces are <u>not</u> resistant to caustic. Drainage piping may <u>not</u> resistant to caustic. -Acid, ethanol and other chemicals could also drain from adjacent unloading areas, and mix with caustic spills. Spills will be diluted when they are mixed with the large quantities of water drained from the site each day. It is possible that a large spill of caustic could create significant risk before it is diluted.
Signs and Placards -'Warning, restricted area, authorised personnel only' -Sign listing emergency contact names, and phone numbers. -Layout diagram showing the location of any fixed fire protection			6.3	Signs are displayed at the storage tank.

facilities, drainage system, and Emergency Stop switches.				
Maintenance of Storage and Piping.			6.10.2	Tanks, piping, pumps, valves in caustic systems require high levels of maintaince, and regular inspection. Protective coatings on bund surfaces, and other spillage containment surfaces require frequent repair.
Clean-up of Leaks and Spills.			5.8.4 7.5	Large quantities of absorbant material and neutraliser are required to clean up after caustic spills.
Emergency Planning			Section 7	

5.2 Compliance Check List - Depot 49. - HCL Storage

HCL Storage Tank No. 49

Code Precaution	True	Not True	Code Reference	Comment
CONTAINER TYPES: Portable Bulk Tanks -IBC complying with ADG code. -ISO complying with IMDG code -demountable tank complying with AS 2809.1& 2809.4 Fixed bulk container, filled and discharged in situ.			5.2	-Notification advises tank capacity is 32,000 litres of 30% HCl -Nameplate advises capacity is 50,000litres. -Constructed in 2008. -Tank is of fibreglass construction with vinyl ester corrosion barrier.
SEPARATION DISTANCES: -Minimum distance between tanks is 0.6 m. -Min distance to protected places and boundaries as in Table 5.1. For liquids of PG II & III Table 5.1 specifies the minimum distance from container to protected places and boundaries as; -Separation dist of 3 m if capacity<= 3000L -Separation dist of 5 m if capacity<= 50,000L -Separation dist of 8 m if capacity> 50,000L -Min distance from bund to protected places and boundaries is 3m. -Separation distances may be measured around a wall having FRL of 120/120/120. -Wall must be 1 m above container, or above protected place.	Only one tank Complies Complies		5.3.2.2	Perspex screen wall is installed on top of bund, behind pumps. This would contain pump leaks inside the bund.
SEGREGATION: Incompatible liquids shall be; -in separate compounds, or -segregated by 5 m Liquids that react dangerously shall be; - segregated by 5 m, and - in separate compounds, not sharing a common drainage system. Segregation distances may be measured around a wall having FRL of 120/120/120. -Wall must be to height of container, if goods so segregated are Class 2.1, 3, 4 or 5.	Complies		5.3.3	
BUNDS: -For PGII & III Bund Capacity >= 100% of largest container			5.4	PREFERABLY 110% (EPA) Bund capacity not checked.

-Min distance from container to bund shall be as in Fig 5.1 -Min distance not less than 1 m if capacity >=3000L -distance to be greater if container pressurised. -Entry and Exit over bund to be safe. -Drainage shall slope away from any container to a sump. -Compound drain valves to be normally closed, and outside the compound. -Compound drain pumps to be manually controlled.	Yes			Fig 5.1 requires distance from bund wall to container to be half the height of container above the bund. Signage advises bund is Confined Space. Entry is not locked. Leaking isolation valve has now been replaced.
TANK FOUNDATIONS: -foundation designed to support direct load when tank full of water. -foundation designed to resist overturning moment due to wind, earthquake -Tanks in flood prone area shall be anchored to prevent floating.	O.K.		5.5.2	
BUND DESIGN AND CONSTRUCTION: -Impervious -Retain structural integrity in fire situation. -Not higher than 1.5 m unless safe and rapid exit provided. -Distance from inside perimeter of bund to protected place or on-site protected place shall be at least half that required by Table 5.4, or 15m whichever is less.	O.K.		5.5.3	Bund of concrete construction. Approx 1.5 m high. Evidence of floor corrosion.
FILL POINTS: Fill point shall be readily accessible. Fill point shall be protected from damage. Fill point shall be in open air, -no ignition sources within hazardous area. Fill point located so that tank vehicle is not required to enter the tank compound. Each fill point shall be clearly identified. Area around the fill point and hose connection shall be impervious to the product.	O.K. O.K. O.K. O.K.		5.3.2	Fill point is remote, and piping to fill point is underground. Area around fill point is concrete. Site drain adjacent.
LIQUID LEVEL INDICATION: -It shall be possible to monitor the amount of liquid in any tank intended to receive a delivery. The gauge shall show the normal fill level of the tank. -The Fill level shall not exceed 95% of the tank capacity. -Tanks (with capacity > 5,000 litres of flammable) shall have a	O.K.		5.3.2	Tank level transmitter displays at tanker unloading area. Tanker driver instructed to use local GPO. Tank high level switch cuts power to GPO if high level sounded.

high level alarm set at a maximum of 97% of tank capacity. -A contents gauge and LAH remote from the tank, shall be provided at the fill point, or… -In addition to the LAH they shall incorporate an independent LAHH.- set at below the tank rated capacity				
VENTING: Each tank shall be fitted with; -A free vent or Pressure Vacuum Vent. -An emergency vent when conditions of 5.5 apply. -Vapours shall be safely discharged outdoors unless recovery and treatment is required.	O.K.		5.4	Tank vents through scrubber. Over flow discharges through water.
Transfer Point. For PGII, 5 m from boundary and protected places. Safety Shower and Eye wash	 O.K. O.K.		5.5.7 5.5.7 (f)	
Pipes and fittings -Pipes to be colour coded. -Pipework to be well supported. -Flexible hoses shall not be used except at transfer points	NO ? ?		5.5.8.1	Piping not identified Some supports corroded. Mainly UPVC piping around storage tanks, but transfer lines from tanker unloading area appear to be agricultural HDPE, with screwed joints.
Spillage Control for corrosive liquids. -filling area, and unloading area shall have a system for collecting any spilt liquid and draining it to a containment tank or compound. -The vehicle standing area shall be graded so that any spillage will drain away to a dedicated tank or compound, and not spread to other loading or filling areas. -The surface shall be impervious. -Substances that are incompatible or might react dangerously shall not be directed into a common compound. -Capacity of the system shall be the capacity of the largest tanker compartment or 9,000 litres. -the spillage containment areas shall be immune to attack by corrosives to be retained (5.4.3)			5.8.4	Tanker unloading area drains to the site drainage system. -Surfaces are <u>not</u> resistant to acid. Drainage piping is <u>not</u> resistant to acid. -Caustic soda, ethanol and other chemicals could also drain from adjacent unloading areas. Spills will be diluted when they are mixed with the large quantities of water drained from the site each day. It seems possible that a large spill of acid could create significant risk before it is diluted.
Signs and Placards -'Warning, restricted area, authorised personnel only' -Sign listing emergency contact names, and phone numbers. -Layout diagram showing the location of any fixed fire protection facilities, drainage system, and Emergency Stop switches.			6.3	Signs are displayed at the storage tank.
Maintenance of Acid Storage and Piping.			6.10.2	Tanks, piping, pumps, valves in acid systems require high levels

				of maintenance, and regular inspection. Protective coatings on bund surfaces, and other spillage containment surfaces require frequent repair.
Clean-up of Leaks and Spills.			5.8.4 7.5	Large quantities of hydrated lime or crushed limestone are required to clean up after acid spills.
Emergency Planning			Section 7	

5.3 Compliance Check List - Depot 40. - Hydrochloric Acid Storage Tank

Hydrochloric Acid Tank No. 40

Code Precaution	True	Not True	Code Reference	Comment
CONTAINER TYPES: Portable Bulk Tanks -IBC complying with ADG code. -ISO complying with IMDG code -demountable tank complying with AS 2809.1& 2809.4 Fixed bulk container, filled and discharged in situ.			5.2	-Tank capacity has capacity of 10,000 litres of hydrochloric acid - A safety shower with eyewash is located near this storage tank.
SEPARATION DISTANCES: -Minimum distance between tanks is 0.6 m. -Min distance to protected places and boundaries as in Table 5.1. For liquids of PG II & III Table 5.1 specifies the minimum distance from container to protected places and boundaries as; -Separation dist of 3 m if capacity<= 3000L -Separation dist of 5 m if capacity<= 50,000L -Separation dist of 8 m if capacity> 50,000L -Min distance from bund to protected places and boundaries is 3m. -Separation distances may be measured around a wall having FRL of 120/120/120. -Wall must be 1 m above container, or above protected place.	Only one tank Complies Complies		5.3.2.2	This vertical tank is bunded. Bund height is approx. 2.0 m. -Distance tank and bund is approximately 1 m.
SEGREGATION: Incompatible liquids shall be; -in separate compounds, or -segregated by 5 m Liquids that react dangerously shall be; - segregated by 5 m, and - in separate compounds, not sharing a common drainage system. Segregation distances may be measured around a wall having FRL of 120/120/120. -Wall must be to height of container, if goods so segregated are Class 2.1, 3, 4 or 5.	Complies		5.3.3	
BUNDS: -For PGII & III Bund Capacity >= 100% of largest container			5.4	PREFERABLY 110% (EPA)

-Min distance from container to bund shall be as in Fig 5.1 -Min distance not less than 1 m if capacity >=3000L -distance to be greater if container pressurised. -Entry and Exit over bund to be safe. -Drainage shall slope away from any container to a sump. -Compound drain valves to be normally closed, and outside the compound. -Compound drain pumps to be manually controlled.	Yes			Bund is just below the top of the tank shell. Bund capacity should be sufficient. Fig 5.1 requires distance from bund wall to container to be half the height of container above the bund. - O.K. Damage to this bund floor is evident.
TANK FOUNDATIONS: -foundation designed to support direct load when tank full of water. -foundation designed to resist overturning moment due to wind, earthquake -Tanks in flood prone area shall be anchored to prevent floating.	O.K.		5.5.2	
BUND DESIGN AND CONSTRUCTION: -Impervious -Retain structural integrity in fire situation. -Not higher than 1.5 m unless safe and rapid exit provided. -Distance from inside perimeter of bund to protected place or on-site protected place shall be at least half that required by Table 5.4, or 15m whichever is less.			5.5.3	Bund of concrete block construction. Approx 2.0 m high. Evidence of floor corrosion. Bund Egress is congested.
FILL POINTS: Fill point shall be readily accessible. Fill point shall be protected from damage. Fill point shall be in open air, Fill point located so that tank vehicle is not required to enter the tank compound. Each fill point shall be clearly identified. Area around the fill point and hose connection shall be impervious to the product.	O.K. O.K. O.K. O.K.		5.3.2	Fill point is remote, Area around fill point is concrete/bitumen. Tanker Unloading area is adjacent creek.
LIQUID LEVEL INDICATION: -It shall be possible to monitor the amount of liquid in any tank intended to receive a delivery. The gauge shall show the normal fill level of the tank. -The Fill level shall not exceed 95% of the tank capacity. -Tanks (with capacity > 5,000 litres of flammable) shall have a high level alarm set at a maximum of 97% of tank capacity.	Complies.		5.3.2	Tank level transmitter displays at tanker unloading area. Tanker driver instructed to use local GPO. Tank high level switch cuts power to GPO if high level sounded.

-A contents guage and LAH remote from the tank, shall be provided at the fill point, or… -In addition to the LAH they shall incorporate an independent LAHH.- set at below the tank rated capacity				
VENTING: Each tank shall be fitted with; -A free vent or Pressure Vacuum Vent. -An emergency vent when conditions of 5.5 apply. -Vapours shall be safely discharged outdoors unless recovery and treatment is required.	O.K.		5.4	Tank vents through scrubber. Over flow discharges through water.
Transfer Point. For PGII, 5 m from boundary and protected places. Safety Shower and Eye wash	 O.K. O.K.		5.5.7 5.5.7 (f)	 A safety shower with eyewash is located near the tanker unloading point.
Pipes and fittings -Pipes to be colour coded. -Pipework to be well supported. -Flexible hoses shall not be used except at transfer points	 NO ? ?		5.5.8.1	 Piping not identified Some supports corroded. Mainly HDPE piping, with screwed joints.
Spillage Control for corrosive liquids. -filling area, and unloading area shall have a system for collecting any spilt liquid and draining it to a containment tank or compound. -The vehicle standing area shall be graded so that any spillage will drain away to a dedicated tank or compound, and not spread to other loading or filling areas. -The surface shall be impervious. -Substances that are incompatible or might react dangerously shall not be directed into a common compound. -Capacity of the system shall be the capacity of the largest tanker compartment or 9,000 litres. -the spillage containment areas shall be immune to attack by corrosives to be retained (5.4.3)	 Does not comply Does not comply with bund capacity rule.		5.8.4	.Risk of large spills overflowing kerb into creek. Tanker unloading area drains to the site drainage system Spills will be diluted when they are mixed with the large quantities of water drained from the site each day. It is probable that a large spill of acid would damage local drains and spread acid fumes before dilution. This would cause significant risk. Concrete is impervious but would be damaged by acid spills Bund capacity does not comply.
Signs and Placards -'Warning, restricted area, authorised personnel only' -Sign listing emergency contact names, and phone numbers. -Layout diagram showing the location of any fixed fire protection facilities, drainage system, and Emergency Stop switches.			6.3	Signs are displayed at the storage tank and at the tanker unloading area.
Maintenance of Acid Storage and Piping.			6.10.2	Tanks, piping, pumps, valves in systems require high levels of

				maintenance, and regular inspection. Protective coatings on bund surfaces, and other spillage containment surfaces require frequent repair.
Clean-up of Leaks and Spills.			5.8.4 7.5	Large quantities of absorbent material and neutraliser are required to clean up after spills.
Emergency Planning			Section 7	

5.4 Compliance Check List - Depot 36. - Sodium Hypochlorite Storage Tank

Sodium Hypochlorite Tank No. 36

Code Precaution	True	Not True	Code Reference	Comment
CONTAINER TYPES: Portable Bulk Tanks -IBC complying with ADG code. -ISO complying with IMDG code -demountable tank complying with AS 2809.1& 2809.4 Fixed bulk container, filled and discharged in situ.			5.2	-Tank capacity has capacity of 36,000 litres. - A safety shower with eyewash is located inside the storage tank bund, another at the unloading point.
SEPARATION DISTANCES: -Minmum distance between tanks is 0.6 m. -Min distance to protected places and boundaries as in Table 5.1. For liquids of PG II & III Table 5.1 specifies the minimum distance from container to protected places and boundaries as; -Separation dist of 3 m if capacity<= 3000L -Separation dist of 5 m if capacity<= 50,000L -Separation dist of 8 m if capacity> 50,000L -Min distance from bund to protected places and boundaries is 3m. -Separation distances may be measured around a wall having FRL of 120/120/120. -Wall must be 1 m above container, or above protected place.	Only one tank Complies Complies		5.3.2.2	This vertical tank is bunded. Bund height is approx. 2.0 m. -Distance tank and bund is approximately 1.5 m.
SEGREGATION: Incompatible liquids shall be; -in separate compounds, or -segregated by 5 m Liquids that react dangerously shall be; - segregated by 5 m, and - in separate compounds, not sharing a common drainage system. Segregation distances may be measured around a wall having FRL of 120/120/120. -Wall must be to height of container, if goods so segregated are Class 2.1, 3, 4 or 5.	Complies		5.3.3	
BUNDS: -For PGII & III Bund Capacity >= 100% of largest container			5.4	PREFERABLY 110% (EPA)

-Min distance from container to bund shall be as in Fig 5.1 -Min distance not less than 1 m if capacity >=3000L -distance to be greater if container pressurised. -Entry and Exit over bund to be safe. -Drainage shall slope away from any container to a sump. -Compound drain valves to be normally closed, and outside the compound. -Compound drain pumps to be manually controlled.	Yes			Bund is just below the top of the tank shell. Bund capacity should be sufficient. Fig 5.1 requires distance from bund wall to container to be half the height of container above the bund. - O.K.
TANK FOUNDATIONS: -foundation designed to support direct load when tank full of water. -foundation designed to resist overturning moment due to wind, earthquake -Tanks in flood prone area shall be anchored to prevent floating.	O.K.		5.5.2	
BUND DESIGN AND CONSTRUCTION: -Impervious -Retain structural integrity in fire situation. -Not higher than 1.5 m unless safe and rapid exit provided. -Distance from inside perimeter of bund to protected place or on-site protected place shall be at least half that required by Table 5.4, or 15m whichever is less.			5.5.3	Bund of concrete block construction. Approx 1.5 m high.
FILL POINTS: Fill point shall be readily accessible. Fill point shall be protected from damage. Fill point shall be in open air, Fill point located so that tank vehicle is not required to enter the tank compound. Each fill point shall be clearly identified. Area around the fill point and hose connection shall be impervious to the product.	 O.K. O.K. O.K. O.K.		5.3.2	Fill point is at bund wall. Area around fill point is concrete/bitumen.
LIQUID LEVEL INDICATION: -It shall be possible to monitor the amount of liquid in any tank intended to receive a delivery. The gauge shall show the normal fill level of the tank. -The Fill level shall not exceed 95% of the tank capacity. -Tanks (with capacity > 5,000 litres of flammable) shall have a high level alarm set at a maximum of 97% of tank capacity.	Complies.		5.3.2	Tank level transmitter displays at tanker unloading area. Tanker driver instructed to use local GPO. Tank high level switch cuts power to GPO if high level sounded.

-A contents guage and LAH remote from the tank, shall be provided at the fill point, or… -In addition to the LAH they shall incorporate an independent LAHH.- set at below the tank rated capacity				
VENTING: Each tank shall be fitted with; -A free vent or Pressure Vacuum Vent. -An emergency vent when conditions of 5.5 apply. -Vapours shall be safely discharged outdoors unless recovery and treatment is required.	O.K.		5.4	Over flow discharges into IBC within bund.
Transfer Point. For PGII, 5 m from boundary and protected places. Safety Shower and Eye wash	 O.K. O.K.		5.5.7 5.5.7 (f)	 A safety shower with eyewash is located near the tanker unloading point.
Pipes and fittings -Pipes to be colour coded. -Pipework to be well supported. -Flexible hoses shall not be used except at transfer points	Pipe markers used.		5.5.8.1	
Spillage Control for corrosive liquids. -filling area, and unloading area shall have a system for collecting any spilt liquid and draining it to a containment tank or compound. -The vehicle standing area shall be graded so that any spillage will drain away to a dedicated tank or compound, and not spread to other loading or filling areas. -The surface shall be impervious. -Substances that are incompatible or might react dangerously shall not be directed into a common compound. -Capacity of the system shall be the capacity of the largest tanker compartment or 9,000 litres. -the spillage containment areas shall be immune to attack by corrosives to be retained (5.4.3)	Blind sump provided Does not comply with bund capacity rule.		5.8.4	.Risk of large spills overflowing kerb into creek. Concrete is impervious but would be damaged by spills Bund capacity does not comply.
Signs and Placards -'Warning, restricted area, authorised personnel only' -Sign listing emergency contact names, and phone numbers. -Layout diagram showing the location of any fixed fire protection facilities, drainage system, and Emergency Stop switches.			6.3	Signs are displayed at the storage tank and at the tanker unloading area.
Maintenance of Storage and Piping.			6.10.2	Tanks, piping, pumps, valves in corrosive systems require high levels of maintaince, and regular inspection.

				Protective coatings on bund surfaces, and other spillage containment surfaces require frequent repair.
Clean-up of Leaks and Spills.			5.8.4 7.5	Large quantities of absorbant material and neutraliser are required to clean up after spills.
Emergency Planning			Section 7	

5.5 Compliance Check List - Depot 54. - Sodium Hypochlorite Tank

Caustic Soda and Sodium Hypochlorite
Depot No. 54

Code Precaution	True	Not True	Code Reference	Comment
CONTAINER TYPES: Portable Bulk Tanks -IBC complying with ADG code. -ISO complying with IMDG code -demountable tank complying with AS 2809.1& 2809.4 Fixed bulk container, filled and discharged in situ.	**Fixed Bulk Tanks**		5.2	-Two tanks in common bund. -Both HDPE construction. -1,600 Litre capacity Caustic Soda Tank. Dia 1 m, by 2.1 m high -12,000 Litre capacity Sodium Hypochlorite Tank. Dia 2.6 m, by 2.4 m high -Bund adjacent the tanker Unloading Pad. - Tanker unloading pad drains to blind sump.?? - A safety shower with eyewash is located adjacent this storage tank.
SEPARATION DISTANCES: -Minimum distance between tanks is 0.6 m. -Min distance to protected places and boundaries as in Table 5.1. For liquids of PG II & III Table 5.1 specifies the minimum distance from container to protected places and boundaries as; -Separation dist of 3 m if capacity<= 3000L -Separation dist of 5 m if capacity<= 50,000L -Separation dist of 8 m if capacity> 50,000L -Min distance from bund to protected places and boundaries is 3m. -Separation distances may be measured around a wall having FRL of 120/120/120. -Wall must be 1 m above container, or above protected place.	Only one tank Complies Complies		5.3.2.2	-Bund Size is 8 m by 5 m by 600mm high.(approx.) -Bund capacity is approximately 24,000 litres. -Distance from tank to bund is approximately 1.5 m.
SEGREGATION: Incompatible liquids shall be; -in separate compounds, or -segregated by 5 m Liquids that react dangerously shall be; - segregated by 5 m, and - in separate compounds, not sharing a common drainage system.	Complies		5.3.3	

Segregation distances may be measured around a wall having FRL of 120/120/120. -Wall must be to height of container, if goods so segregated are Class 2.1, 3, 4 or 5.				
BUNDS: -For PGII & III Bund Capacity >= 100% of largest container -Min distance from container to bund shall be as in Fig 5.1 -Min distance not less than 1 m if capacity >=3000L -distance to be greater if container pressurised. -Entry and Exit over bund to be safe. -Drainage shall slope away from any container to a sump. -Compound drain valves to be normally closed, and outside the compound. -Compound drain pumps to be manually controlled.	Yes		5.4	PREFERABLY 110% (EPA) Fig 5.1 requires distance from bund wall to container to be half the height of container above the bund. - O.K. .
TANK FOUNDATIONS: -foundation designed to support direct load when tank full of water. -foundation designed to resist overturning moment due to wind, earthquake -Tanks in flood prone area shall be anchored to prevent floating.	O.K.		5.5.2	
BUND DESIGN AND CONSTRUCTION: -Impervious -Retain structural integrity in fire situation. -Not higher than 1.5 m unless safe and rapid exit provided. -Distance from inside perimeter of bund to protected place or on site protected place shall be at least half that required by Table 5.4, or 15m whichever is less.	Complies		5.5.3	Bund of concrete construction. Approx 0.6 m high. .
FILL POINTS: Fill point shall be readily accessible. Fill point shall be protected from damage. Fill point shall be in open air, Fill point located so that tank vehicle is not required to enter the tank compound. Each fill point shall be clearly identified. Area around the fill point and hose connection shall be impervious to the product.	O.K. O.K. O.K. O.K.		5.3.2	Fill point is adjacent. Area around fill point is concrete/bitumen.

LIQUID LEVEL INDICATION: -It shall be possible to monitor the amount of liquid in any tank intended to receive a delivery. The gauge shall show the normal fill level of the tank. -The Fill level shall not exceed 95% of the tank capacity. -A contents gauge and LAH remote from the tank, shall be provided at the fill point, or… -In addition to the LAH they shall incorporate an independent LAHH.- set at below the tank rated capacity	Complies.		5.3.2	Tank level transmitter displays at tanker unloading area. Tanker driver instructed to use local GPO. Tank high level switch cuts power to GPO if high level sounded.
VENTING: Each tank shall be fitted with; -A free vent or Pressure Vacuum Vent. -An emergency vent when conditions of 5.5 apply. -Vapours shall be safely discharged outdoors unless recovery and treatment is required.	O.K.		5.4	
Transfer Point. For PGII, 5 m from boundary and protected places. Safety Shower and Eye wash	 O.K. O.K.		5.5.7 5.5.7 (f)	 A safety shower with eyewash is located near the tanker unloading point.
Pipes and fittings -Pipes to be colour coded. -Pipework to be well supported. -Flexible hoses shall not be used except at transfer points	NO		5.5.8.1	Piping not identified Mainly PVC piping, with welded joints.
Spillage Control for corrosive liquids. -filling area, and unloading area shall have a system for collecting any spilt liquid and draining it to a containment tank or compound. -The vehicle standing area shall be graded so that any spillage will drain away to a dedicated tank or compound, and not spread to other loading or filling areas. -The surface shall be impervious. -Substances that are incompatible or might react dangerously shall not be directed into a common compound. -Capacity of the system shall be the capacity of the largest tanker compartment or 9,000 litres. -the spillage containment areas shall be immune to attack by corrosives to be retained (5.4.3)	Complies		5.8.4	Tanker unloading area drains to the site drainage system Spills will be diluted when they are mixed with the large quantities of water drained from the site each day. Bund capacity complies.
Signs and Placards -'Warning, restricted area, authorised personnel only' -Sign listing emergency contact names, and phone numbers.			6.3	Signs are displayed at the storage tank / tanker unloading area.

-Layout diagram showing the location of any fixed fire protection facilities, drainage system, and Emergency Stop switches.				
Maintenance of Storage and Piping.			6.10.2	Tanks, piping, pumps, valves in systems require high levels of maintaince, and regular inspection.
Clean-up of Leaks and Spills.			5.8.4 7.5	Large quantities of absorbant material and neutraliser are required to clean up after spills.
Emergency Planning			Section 7	

5.6 Compliance Check List - Depot 53. - Sodium Hypochlorite Tank

Ferric Chlorite Solution
Depot No. 53

Code Precaution	True	Not True	Code Reference	Comment
CONTAINER TYPES: Portable Bulk Tanks -IBC complying with ADG code. -ISO complying with IMDG code -demountable tank complying with AS 2809.1& 2809.4 Fixed bulk container, filled and discharged in situ.	**Fixed Bulk Tanks**		5.2	-Tank of HDPE construction. -20,000 Litre capacity -Tank. Dia 3.6 m, by 2.4 m high - -Bund adjacent the tanker Unloading Pad. - Tanker unloading pad drains to blind sump.?? - A safety shower with eyewash is located nearby the unloading point for this storage tank.
SEPARATION DISTANCES: -Minmum distance between tanks is 0.6 m. -Min distance to protected places and boundaries as in Table 5.1. For liquids of PG II & III Table 5.1 specifies the minimum distance from container to protected places and boundaries as; -Separation dist of 3 m if capacity<= 3000L -Separation dist of 5 m if capacity<= 50,000L -Separation dist of 8 m if capacity> 50,000L -Min distance from bund to protected places and boundaries is 3m. -Separation distances may be measured around a wall having FRL of 120/120/120. -Wall must be 1 m above container, or above protected place.	Only one tank Complies Complies		5.3.2.2	-Bund Size is 7 m by 5 m by 600mm high.(approx.) -Bund capacity is approximately 21,000 litres. -Distance from tank to bund is approximately 1.5 m.

SEGREGATION: Incompatible liquids shall be; -in separate compounds, or -segregated by 5 m Liquids that react dangerously shall be; - segregated by 5 m, and - in separate compounds, not sharing a common drainage system. Segregation distances may be measured around a wall having FRL of 120/120/120. -Wall must be to height of container, if goods so segregated are Class 2.1, 3, 4 or 5.	Complies		5.3.3	
BUNDS: -For PGII & III Bund Capacity >= 100% of largest container -Min distance from container to bund shall be as in Fig 5.1 -Min distance not less than 1 m if capacity >=3000L -distance to be greater if container pressurised. -Entry and Exit over bund to be safe. -Drainage shall slope away from any container to a sump. -Compound drain valves to be normally closed, and outside the compound. -Compound drain pumps to be manually controlled.	Yes		5.4	PREFERABLY 110% (EPA) Fig 5.1 requires distance from bund wall to container to be half the height of container above the bund. - O.K. .
TANK FOUNDATIONS: -foundation designed to support direct load when tank full of water. -foundation designed to resist overturning moment due to wind, earthquake -Tanks in flood prone area shall be anchored to prevent floating.	O.K.		5.5.2	
BUND DESIGN AND CONSTRUCTION: -Impervious -Retain structural integrity in fire situation. -Not higher than 1.5 m unless safe and rapid exit provided. -Distance from inside perimeter of bund to protected place or on site protected place shall be at least half that required by Table 5.4, or 15m whichever is less.	Complies		5.5.3	Bund of concrete construction. Approx 0.6 m high. .
FILL POINTS: Fill point shall be readily accessible. Fill point shall be protected from damage. Fill point shall be in open air,	O.K. O.K.		5.3.2	Fill point is adjacent.

Fill point located so that tank vehicle is not required to enter the tank compound. Each fill point shall be clearly identified. Area around the fill point and hose connection shall be impervious to the product.	O.K. O.K.			Area around fill point is concrete/bitumen.
LIQUID LEVEL INDICATION: -It shall be possible to monitor the amount of liquid in any tank intended to receive a delivery. The gauge shall show the normal fill level of the tank. -The Fill level shall not exceed 95% of the tank capacity. -A contents gauge and LAH remote from the tank, shall be provided at the fill point, or… -In addition to the LAH they shall incorporate an independent LAHH.- set at below the tank rated capacity	Complies.		5.3.2	Tank level transmitter displays at tanker unloading area. Tanker driver instructed to use local GPO. Tank high level switch cuts power to GPO if high level sounded.
VENTING: Each tank shall be fitted with; -A free vent or Pressure Vacuum Vent. -An emergency vent when conditions of 5.5 apply. -Vapours shall be safely discharged outdoors unless recovery and treatment is required.	O.K.		5.4	
Transfer Point. For PGII, 5 m from boundary and protected places. Safety Shower and Eye wash	 O.K. O.K.		5.5.7 5.5.7 (f)	 A safety shower with eyewash is located near the tanker unloading point.
Pipes and fittings -Pipes to be colour coded. -Pipework to be well supported. -Flexible hoses shall not be used except at transfer points	NO		5.5.8.1	Piping not identified Mainly PVC piping, with welded joints.
Spillage Control for corrosive liquids. -filling area, and unloading area shall have a system for collecting any spilt liquid and draining it to a containment tank or compound. -The vehicle standing area shall be graded so that any spillage will drain away to a dedicated tank or compound, and not spread to other loading or filling areas. -The surface shall be impervious. -Substances that are incompatible or might react dangerously shall not be directed into a common compound. -Capacity of the system shall be the capacity of the largest tanker compartment or 9,000 litres.	Complies		5.8.4	Tanker unloading area drains to the site drainage system Spills will be diluted when they are mixed with the large quantities of water drained from the site each day. Bund capacity complies.

-the spillage containment areas shall be immune to attack by corrosives to be retained (5.4.3)				
Signs and Placards -'Warning, restricted area, authorised personnel only' -Sign listing emergency contact names, and phone numers. -Layout diagram showing the location of any fixed fire protection facilities, drainage system, and Emergency Stop switches.			6.3	Signs are displayed at the storage tank / tanker unloading area.
Maintenance of Storage and Piping.			6.10.2	Tanks, piping, pumps, valves in systems require high levels of maintaince, and regular inspection.
Clean up of Leaks and Spills.			5.8.4 7.5	Large quantities of absorbant material and neutraliser are required to clean up after spills.
Emergency Planning			Section 7	

5.7 Compliance Check List - Depot 53. - Aqua Ammonia Storage Tank

Ammonia Solution
Depot No. 53

Code Precaution	True	Not True	Code Reference	Comment
CONTAINER TYPES: Portable Bulk Tanks -IBC complying with ADG code. -ISO complying with IMDG code -demountable tank complying with AS 2809.1& 2809.4 Fixed bulk container, filled and discharged in situ.	**Fixed Bulk Tanks**		5.2	-Tank of HDPE construction. -2,000 Litre capacity -Tank. Dia 1.2m, by 2.1m high - -Bund adjacent the tanker Unloading Pad. - Tanker unloading pad drains to blind sump.?? - A safety shower with eyewash is located nearby the unloading point for this storage tank.
SEPARATION DISTANCES: -Minmum distance between tanks is 0.6 m. -Min distance to protected places and boundaries as in Table 5.1. For liquids of PG II & III Table 5.1 specifies the minimum distance from container to protected places and boundaries as; -Separation dist of 3 m if capacity<= 3000L -Separation dist of 5 m if capacity<= 50,000L -Separation dist of 8 m if capacity> 50,000L -Min distance from bund to protected places and boundaries is 3m. -Separation distances may be measured around a wall having FRL of 120/120/120. -Wall must be 1 m above container, or above protected place.	Only one tank Complies Complies		5.3.2.2	-Bund Size is 3.5 m by 3.5 m by 600mm high.(approx.) -Bund capacity is approximately 7,000 litres. -Distance from tank to bund is approximately 1.2 m.
SEGREGATION: Incompatible liquids shall be; -in separate compounds, or -segregated by 5 m Liquids that react dangerously shall be; - segregated by 5 m, and - in separate compounds, not sharing a common drainage system.	Complies		5.3.3	

Segregation distances may be measured around a wall having FRL of 120/120/120. -Wall must be to height of container, if goods so segregated are Class 2.1, 3, 4 or 5.				
BUNDS: -For PGII & III Bund Capacity >= 100% of largest container -Min distance from container to bund shall be as in Fig 5.1 -Min distance not less than 1 m if capacity >=3000L -distance to be greater if container pressurised. -Entry and Exit over bund to be safe. -Drainage shall slope away from any container to a sump. -Compound drain valves to be normally closed, and outside the compound. -Compound drain pumps to be manually controlled.	Yes		5.4	PREFERABLY 110% (EPA) Fig 5.1 requires distance from bund wall to container to be half the height of container above the bund. - O.K. .
TANK FOUNDATIONS: -foundation designed to support direct load when tank full of water. -foundation designed to resist overturning moment due to wind, earthquake -Tanks in flood prone area shall be anchored to prevent floating.	O.K.		5.5.2	
BUND DESIGN AND CONSTRUCTION: -Impervious -Retain structural integrity in fire situation. -Not higher than 1.5 m unless safe and rapid exit provided. -Distance from inside perimeter of bund to protected place or on site protected place shall be at least half that required by Table 5.4, or 15m whichever is less.	Complies		5.5.3	Bund of concrete construction. Approx 0.6 m high. .
FILL POINTS: Fill point shall be readily accessible. Fill point shall be protected from damage. Fill point shall be in open air, Fill point located so that tank vehicle is not required to enter the tank compound. Each fill point shall be clearly identified. Area around the fill point and hose connection shall be impervious to the product.	O.K. O.K. O.K. O.K.		5.3.2	Fill point is adjacent. Area around fill point is concrete/bitumen.

LIQUID LEVEL INDICATION: -It shall be possible to monitor the amount of liquid in any tank intended to receive a delivery. The gauge shall show the normal fill level of the tank. -The Fill level shall not exceed 95% of the tank capacity. -A contents guage and LAH remote from the tank, shall be provided at the fill point, or… -In addition to the LAH they shall incorporate an independent LAHH.- set at below the tank rated capacity	Complies.		5.3.2	Tank level transmitter displays at tanker unloading area. Tanker driver instructed to use local GPO. Tank high level switch cuts power to GPO if high level sounded.
VENTING: Each tank shall be fitted with; -A free vent or Pressure Vacuum Vent. -An emergency vent when conditions of 5.5 apply. -Vapours shall be safely discharged outdoors unless recovery and treatment is required.	O.K.		5.4	
Transfer Point. For PGII, 5 m from boundary and protected places. Safety Shower and Eye wash	 O.K. O.K.		5.5.7 5.5.7 (f)	 A safety shower with eyewash is located near the tanker unloading point.
Pipes and fittings -Pipes to be colour coded. -Pipework to be well supported. -Flexible hoses shall not be used except at transfer points	NO		5.5.8.1	Piping not identified Mainly PVC piping, with welded joints.
Spillage Control for corrosive liqids. -filling area, and unloading area shall have a system for collecting any spilt liquid and draining it to a containment tank or compound. -The vehicle standing area shall be graded so that any spillage will drain away to a dedicated tank or compound, and not spread to other loading or filling areas. -The surface shall be impervious. -Substances that are incompatible or might react dangerously shall not be directed into a common compound. -Capacity of the system shall be the capacity of the largest tanker compartment or 9,000 litres. -the spillage containment areas shall be immune to attack by corrosives to be retained (5.4.3)	Complies		5.8.4	Tanker unloading area drains to the site drainage system Spills will be diluted when they are mixed with the large quantities of water drained from the site each day. Bund capacity complies.
Signs and Placards -'Warning, restricted area, authorised personnel only' -Sign listing emergency contact names, and phone numers.			6.3	Signs are displayed at the storage tank / tanker unloading area.

-Layout diagram showing the location of any fixed fire protection facilities, drainage system, and Emergency Stop switches.				
Maintenance of Storage and Piping.			6.10.2	Tanks, piping, pumps, valves in systems require high levels of maintaince, and regular inspection.
Clean up of Leaks and Spills.			5.8.4 7.5	Large quantities of absorbant material and neutraliser are required to clean up after spills.
Emergency Planning			Section 7	

6. REFERENCE DOCUMENTS

(i) Australian Standard AS 3780 -The storage and handling of corrosive substances.
(ii) NSW Work, Health and Safety Regulation

Appendix 1

Site Layout Drawings

HAZARDOUS GOODS FLAMMABLE ZONE

HAZARDOUS CONTAINER AREA

HAZARDOUS DEPOT AREA

ZONES

ZONE

N

Shoalhaven River

RIVER BOUNDARY BY DP 567683

BOLONG ROAD

ZONE 1 ZONE 2 ZONE 3 ZONE 4 ZONE 5 ZONE 6 ZONE 7 ZONE 8 ZONE 9 ZONE 10 ZONE 11 QA ZONE

C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C19 C20 C21 C22 C23 C24

ETHANOL STORAGE AREA

FERMENTATION AREA

GLUCOSE PLANT

STARCH PLANT

STARCH DRYER #5.

MAINTENANCE WORKSHOP

BOILER HOUSE

GLUTEN DRYER

PROTEIN PLANT

DDG STORAGE AREA

EVAPORATORS

PELLETING PLANT

CARPARK

CLEARY BROS CONCRETE BATCHING PLANT

MANILDRA GROUP ADMINISTRATION OFFICE

EXISTING BRICK OFFICES MANILDRA OFFICE COMPLEX

PT LOT 62 DP1078788

DP 538289

DP 381054

DP 371388

DP 433118

PRIVATE RAILWAY

OPEN STORMWATER DRAIN

RIPARIAN VEGETATION SCREEN

EXISTING FENCE

APPROX RAILWAY LINES

ETHANOL STORAGE AREA INSET
Scale 1:1000

ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
L	24-09-19	All	C24 was 61. C23 was 19. DDG #4 added & C22.	P.C.	J.S.
K	15-02-19	E6	9 was 8.	P.C.	Rowan.
J	15-02-19	H1	16 was 62.58 relocated.	P.C.	J.S.
I	14-02-19	H1	62 added to ethanol storage area.	P.C.	Rowan.
H	09-11-18	All	C18 & emergency 150 tank storage removed.	P.C.	J.S.
G	10-04-18	All	Latest plant additions added.	P.C.	J.S.
E	30-12-16	C9	Starch dryer 9 added.	P.C.	J.S.
D	30-06-16	D2	Depot 18 & ethanol evaporator removed.	P.C.	J.S.

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PC Drafting 0439 436508

DRAWN PC	DATE 10/12/12	JOB TITLE SHOALHAVEN STARCHES.	SHT SIZE A3
CHKD JS	DATE	DWG TITLE OVERALL SITE PLAN. DANGEROUS GOODS AREAS.	
APPD	DATE		REV. L
	SCALE 1 : 2000	PROJECT No. 4978	DWG No. MN00-001