Dangerous Goods Compliance Report

Food Processing & Packaging Facility, Erskine Park, NSW

Project Title:	**Food Processing and Packaging Facility** **Part Lot 2304 Templar Road** **Erskine Park, NSW**
Job Number:	**64389**
Date:	29 August 2013
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Revision History:

Date	Rev No	No. of Pages	Revision Description	Checked By	Approved By	Date Approved
14/06/13	1		Dangerous Goods Review	S Branca	N Browne	14/06/13
26/07/13	2	10	Revised review report	S Branca	N Browne	26/07/13
29/07/13	3	10	Revised to include acid information	S Branca	N Browne	29/07/13
31/07/13	4	11	SEPP 33 not triggered	S Branca	N Browne	31/07/13
21/08/13	5	16	Amalgamated PHA Report in this document	S Branca	N Browne	21/08/13
29/08/13	6	11	Re-established that SEPP 33 not triggered; no requirement for PHA	S Branca	N Browne	29/08/13

EXECUTIVE SUMMARY

The design for the new Food Processing and Packaging Facility at Part Lot 2304 Templar Road, Erskine Park, NSW is proceeding in compliance with the requirements of the *New South Wales Work Health & Safety Act 2011*.

The design drawings and chemical inventory have been reviewed to assess the foreseeable hazards and risks and recommendations offered to design out the hazards. Where hazards and risks could not be eliminated through alternative designs, engineering controls have been incorporated into the design to substitute the hazard for a less hazardous alternative or the hazard has been isolated to minimise the exposure and risk.

1. Project Details and Scope

This report has been prepared as the result of a review of the project drawings and documentation for the facility (depicted in DA-010 Site Plan). The project scope includes:–

- Warehouse building
- Meat processing rooms and machinery
- Canteen
- Office areas
- Fabrication Workshop
- Forklift battery charge areas
- Wastewater Treatment
- Ammonia refrigeration system
- Glycol-based heat transfer system
- Gas bottle storage
- Bulk tanks
    - Liquid Oxygen
    - Liquid Nitrogen
    - Liquid Carbon Dioxide
    - Quat foam (10 000 litres)
    - chlorinated foam (20 000 litres)

2. Legislative & Statutory Requirements

It is the responsibility of the designers of a structure to comply with of the *Work Health and Safety Act 2011*.

The NSW *Work Health and Safety Act 2011* is based upon the nationally harmonised Model WHS Act 2010. Section 22 of the new WHS Act 2011 states that “The designer must ensure, as far as is reasonably practicable, that the plant, substance or structure is designed to be without risks to the health and safety of persons”. This report provides advice consistent with the requirements of the Act and forms part of the trail of evidence in support of the requirements. The design will also be reviewed for consistency with a relevant Australian Standards.

No physical testing of any plant or equipment was undertaken by us in the preparation of this report.

3. Drawings

The following drawings and documents were reviewed and referred to as part of this report:

Drawing / Doc No.	Revision	Description
13424-DA-010	P2	Locality and Site Plan
L101P	0	Wastewater Treatment Plant: General Layout
Design Brief	1.6	Property Design Brief for Retail Ready Meat Processing Centre

4. Background

The main dangerous goods which will be present on the site are:
- Anhydrous ammonia
- Liquid carbon dioxide
- Liquid oxygen
- Liquid nitrogen
- Hypofoam sanitiser
- Shurfoam
- Quat Foam
- Gases for welding
- Flammable gases from forklift battery recharge

In all cases the appropriate storage strategy for Dangerous Goods depends on the class of material. Some materials are incompatible with one another and can react causing fire, injury, or damage to property and equipment.

The below quantities are based on information provided by the proponent, and shown on plans and design drawings that form part of the Development Application.

Description	Class	Estimated quantity
Ammonia, anhydrous	**2.3 / 8**	4800 kg
Argon gas	**2.2**	Size G cylinder
Liquid Carbon Dioxide	**2.2**	50 000 kg
Liquid Nitrogen	**2.2**	3 000 kg
Liquid Oxygen	**2.2 / 5.1**	$\leq$ 5 000 kg
Oxygen gas	**2.2 / 5.1**	Size G
Acetylene gas	**2.1**	Size G
LPG*	**2.1**	4 x 15 kg cylinders
Acid “Divosheen Dilac”	**8**	10 x 20 litre
Shurfoam	**8**	5000 litres#
Hypofoam	**8▲**	<20 000 kg#
Quat Foam	**TBC**	<10 000 kg#
Cleaning chemical bulk storage sanitiser	**TBC**	<5 000 kg#

* Note: as per Section 7.3 and Section 8.4 of the Design Brief, and hot water plant at Section 18, mains gas (i.e. natural gas) will be supplied to the property. This avoids the requirement for an LPG bulk tank which would require its own stringent safety measures.

▲based on “Hypofoam VF6”.
The combined mass of Class 8 materials (which are mainly sanitising foams) will be managed to stay below 25 000 kg.

5. SEPP 33 not triggered

Based upon the information provided regarding the chemical inventory above, the proposed use is not a hazardous or offensive industry according to SEPP 33. Specifically, the relevant Dangerous Goods are intended to be used at the following quantities:

Material	*Proposed Holding*	*SEPP 33 Threshold*
Ammonia, anhydrous - UN 1005	4800 kg	5000 kg
Class 8 materials	<25000 kg	25000 kg
Liquid Oxygen (Class 2.2/5.1)	<5000 kg	5000 kg

The Class 2.2 gases and cryogenic liquids do not trigger a PHA, as "Classes 1.4, 1.5, 1.6, 2.2, 7 and 9 are excluded from the risk screening" under *Applying SEPP 33*.
Liquid oxygen also carries a Subsidiary Risk of 5.1, but it still does not trigger a PHA at the proposed quantity as it is limited to below 5000 kg.

6. DG Review

6.1 Ammonia

Ammonia is a toxic gas and is corrosive. It carries the Dangerous Goods Class 2.3 with a Subsidiary Risk of 8.

Issue / Hazard	Recommendations
Ammonia – Incompatibility	Ammonia and LPG must be separated by at least 6 metres. Ammonia must not be stored in a Chemical Store. Note: There is no LPG bulk tank and the proposal complies with this requirement.
AS 2022 compliance	AS/NZS 2022:2003 refers to anhydrous ammonia. However the scope of that Standard does not include refrigeration systems. If storage is to take place on this site, over and above that contained within the refrigeration system and associated plant, a review against this Standard would be required. Note: Regular storage is not required. Review against AS 2022 not required.
Fire	Any combustion equipment (such as boilers), naked flames or air compressors shall not be located in the ammonia refrigeration machinery room space. Note: The design complies.
Fire	It is not recommended to use fire extinguishers on an ammonia fire. If there is an ammonia leak or an ammonia fire, persons on the site should be evacuated to a safe place upwind. Note: This can be addressed by procedures on site. The site layout allows evacuation of persons upwind.
Chemical Store Ventilation	The refrigeration area must be adequately ventilated. Note: The design can achieve this easily by natural air movement or by mechanical ventilation.
Separation from offices	The ammonia refrigeration plant should be kept more than 7 metres from any offices. Note: The design complies.

6.2 Plant and Equipment Areas

The following items of equipment need to be kept away from dangerous goods, particularly flammable dangerous goods.

Issue / Hazard	Ref	Recommendations
Heat load	Design Brief	Communication rooms, and any other electrical devices generating heat should be separated from any chemical storage or handling areas. Note: The design complies.
Heat load		Given the amount of flammables and combustibles, adequate ventilation is required for all weather conditions. Direct any exhausts away from occupied areas and air intakes to buildings. Note: The design complies.
Workshop equipment – fire risk	Drawing	Workshop equipment (e.g. lathe, grinder, drill) can generate sparks and heat. An area must be provided so these are separated from any and all flammable or combustible material storage and handling. Note: The design complies.

6.3 Corrosive Materials

Caustic Soda (NaOH) and hydrochloric acid (HCl) are to be used in the Wastewater Treatment plant as depicted in drawing L101P.

These chemicals, depending on concentration, are Class 8 Corrosive. However, despite being in the same DG Class, they are not compatible with each other and could react violently if mixed.
Some of the sanitiser foams are also Class 8 Corrosive.

The proposed development allows adequate separation such that these materials can be stored and handled safely.

Issue / Hazard	Recommendations
Acids/Alkali incompatibility	Do not store acids (e.g. hydrochloric acid) near alkalis (e.g. caustic soda or Shurfoam). They require a separate bund or separate spill containment. Note: The design complies.
Caustic Soda incompatibility	Caustic soda (sodium hydroxide) must not be stored on galvanised shelving or near galvanised fittings. Note: The design can readily comply – this is a fitting issue rather than a building design issue.
Spills	Manage spills with the use of spill management equipment such as a spill kit. Note: This will be provided for small spills.
Loss of containment	Adequate Bunding is necessary to contain spills. Bunding should be able to hold the volume of the largest vessel, plus an extra 10% is recommended for additional safety. For example, if there are 1000-litre IBCs stored here, the bund should be able to hold 1100 litres in case of spillage. Note: Bunding will be provided for larger spills.
Foodstuffs	Store foodstuffs away from the above listed materials.

6.4 Bulk Liquid tanks

There are bulk liquid tanks planned for the facility, to receive bulk delivery of cryogenic liquids.
Measures taken to control the risk associated with these tanks assumes that they are all filled to capacity.
One of the tanks will be used to store liquid oxygen.
Liquid oxygen is Class 2.2 and importantly it carries the Subsidiary Risk 5.1 as it is an oxidising agent. While it will not itself burn, it will vigorously support combustion and therefore carries a special fire risk.
Recommendations are provided herein to design the liquid oxygen storage in accordance with AS 1894.

Issue / Hazard	Recommendations
Combustible Materials	The area within **12 metres** of vaporiser units or couplings, valves, vents, etc. on the vessel is to be kept clear of all solid combustible materials. This will include wood or cardboard packaging, waste paper, tyres, but not materials in a structure such as timber in a fence.
Liquid Oxygen – Separation Offices	It is recommended that the vessel used for Liquid Oxygen should not be near offices, canteen or other places where people gather. Note: The design complies.

Issue / Hazard	Recommendations
Liquid Oxygen – Separation Air Intakes	Compressor or ventilator air intakes should be at least **7 metres** from the liquid oxygen cylinder. Note: The design complies.
Liquid Oxygen – Separation Underground Systems	Underground drains, pits, ducts, surface water drains, or openings or systems below ground level should be at least **7 metres** from the liquid oxygen cylinder. Note: The design can readily comply.
Liquid Oxygen – Separation Electrical Equipment	Any electrical equipment that is located within **4 m** distance from the liquid oxygen tanks and fittings must have a rating of not less than IP54 in accordance with AS 1939. Note: The design can readily comply.
Liquid Oxygen – Joint materials	The design of an area for liquid oxygen should minimise joints in the concrete. Note: The design complies. Materials used in expansion joints shall be suitable for use with liquid oxygen. Bituminous materials are not suitable due to their high combustibility in the presence of liquid oxygen.
Sources of Ignition	(1) Areas where open flames, smoking or sources of ignition are permitted must be at least **4 metres** from the liquid oxygen tank. (2) It is recommended that signage be provided to restrict significant ignition sources, such as open flames, but not for mobile phones. Note: Appropriate NO SMOKING signage will be erected to alert people to this restriction.
Cold water supply	Cryogenic liquids are extremely cold and can cause the freezing of valves and fittings. A supply of cold water is necessary to assist in de-icing and freeing valves. Note: The design complies.
Physical Protection	The vessels and filling points shall be protected against damage caused by vehicles. This may be by the installation of traffic bollards or guardrails that are of heavy construction. The protection shall provide a clear area of at least 1 m all around the vessel. Note: The design can readily comply.
Transfer area	The delivery tanker must be able to pull off in a designated area that does not obstruct other traffic, yet allows the vehicle a quick and direct means of exit in an emergency. It must be in the open air, near the fill coupling and free of any enclosure that would restrict the escape of liquid or heavy vapour. Note: The design can readily comply.
Transfer area Surface	For liquid oxygen the hardstand area must be of non-porous concrete of at least 2.5 m x 2.5 m on which the tanker's pipework and couplings can stand. The design of the hardstand area should avoid joints within 1 m of the couplings. Note: The design can readily comply.
Ventilation	The principle controlling the requirement for ventilation is to prevent the accumulation of gas or vapour evaporated from the liquid. Oxygen is not a flammable gas but will vigorously support combustion.

Issue / Hazard	Recommendations
Cryogenic liquid cylinders	If the following items are to be found nearby, or are inside the minimum separation of 6 m, the design may need to be modified. • Fixed installations of gases in cylinders • Other dangerous goods stores of other classes or subsidiary risks • Medium or high voltage electrical equipment greater than 415 volts • Building or structure with a combustible exterior • Process equipment and machinery that is not part of the installation • Fittings, e.g. valves, unions, flanges, in pipeline containing flammable gas or liquid • Openings in walls of adjacent buildings or structures
Heat load	Comms rooms, and any other electrical devices generating heat should be separated from any chemical storage or handling areas. Note: The design complies.
Heat load	Given the amount of flammables and combustibles, adequate ventilation is required for all weather conditions. Direct any exhausts away from occupied areas and air intakes to buildings.

6.5 Gas Bottle Storage

The following cylinder gases are expected to be used on site.

AS 4332 allows for storage quantities of cylinder gases to be classified as major or minor storage.

With regard to separation from protected buildings, fire safety, emergency management and other parameters, compliance with the standard is more straightforward in the case of a minor storage.

The conditions for designation as minor storage are given as follows:

Maximum Quantities of Gases Permissible for Designation as Minor Storage

Class / Division of Gas	Example Product	Maximum aggregate water capacity, L	Equivalent No. of G-size cylinders
2.1	Acetylene	500	10
2.2	Argon, Argoshield	2000	40
2.2, with Division 5.1 subsidiary risk	Oxygen	1000	20

- The total quantity of all gases in a mixed gas store is not to exceed 2000 L.
- For the purpose of calculating quantities, all empty and in-use cylinders are counted as if they are full.
- Where gases of mixed classes are kept together there are minimum segregation distances between certain classes. Typically this is 3 m between classes that may react with one another (e.g. class 2.1 and class 2.2/5.1).
- AS4332 does not permit the total capacity of gases being kept to exceed one minor storage quantity per 200 m^2 of floor area.

Empty cylinders should be stored with full cylinders of the same gas only.

Based on the proposed quantities of cylinder gases listed above (page 4), the design complies with AS 4332.

Issue / Hazard		Recommendations
Segregation		Oxygen and acetylene can react with one another and must be segregated by a minimum of 3 metres within a store. This 3 m segregation can, for example, be achieved by using inert gases (e.g. argon, helium, CO_2, air) to separate the two incompatible gases. Note: The design can readily comply.
Ventilation	AS 4332	A gas store must be adequately ventilated in accordance with AS4332, clause 2.7.1(e). This can be achieved by natural air movement or by mechanical ventilation. It is recommended that the door be of an open construction allowing free air flow (e.g. metal grill or louvres). To provide air cross-flow the external wall should have a reasonable area of open grills or louvres. Note: The design complies.
Lighting	AS 1680.2.1	Lighting should comply with AS1680.2.1 and include provision for emergency lighting. It is recommended that fittings be sealed, closed units preventing the accumulation of dirt and grime. Note: The design can readily comply.
Ignition Source		If fitted, a switch for internal lighting for the store should be mounted on an outside wall.
Ignition Source		Sealed concrete floors generate significant static charge. It is recommended that the floor in a gas bottle store be unsealed concrete. Note: The design can readily comply.
Security		Access to the store should be restricted to authorised persons only. The door should be fitted with a lock or accessed by swipe card, etc. Note: The design can readily comply.
Entrapment		Gas store doors should open outwards and be permanently openable from the inside. Note: The design can readily comply.
Falling cylinder		Individual cylinders should be mounted against a solid wall using brackets strong enough to prevent falling if they are accidentally knocked.

6.6 General Recommendations

Issue / Hazard	Recommendations
Liquids - General	Do not store liquid Dangerous Goods above powders/solids.
Battery Recharge - Incompatible chemicals	Batteries contain sulphuric acid which is corrosive and will react violently with some chemicals such as Caustic Soda. It is recommended that no other chemicals be stored in, or used in, Battery Recharge areas. Note: The design can readily comply.
Battery Recharge - Gases	The ceiling in battery recharge areas should slope slightly and have ventilation at the highest point, to allow any emitted hydrogen to disperse Note: The design complies.

Combustible Liquids		Example: engine oil. If these are kept in the store, apply the same recommendations as for Flammable Liquids.
Flammable Liquids	DG Class 3	If > 250 kg to be stored, do so as separate batches of up to 250 kg within the store, separated by at least 20 m
Flammable liquids		Do not store flammable goods individual packages greater than 20 litres. Example: methylated spirit in drums.
Flammable liquids		If 20 litre packages are stored, total flammable liquids volume should be kept below 200 litres. Note: this is a procedural matter; the design can readily comply.
Ventilation	NOHSC-1003	Provide natural or mechanical ventilation in areas where Dangerous Goods are stored, to maintain atmospheric contaminant levels below safe thresholds
Manifest		A dangerous goods manifest or inventory should be provided and maintained. Note: This will form part of the Statement of Commitments.
Injury		Provide safety shower and eye wash near chemical storage facilities. Note: The design can readily comply.
Fire protection		Provide fire safety systems e.g. sprinklers, extinguishers. Note: The design complies.
Security		Secure the facility. Allow access only to authorised persons. Note: The design complies.