NSW Ports Port Botany

2017 Hazard Audit of Bulk Liquids Berth No.2

For NSW Ports

22 December 2017

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Summary

NSW Ports operates two Bulk Liquid Berths (BLB) at Port Botany, NSW. Various terminal operators use the BLBs for import/ export of bulk chemicals and fuels. The ship/shore transfer operations are carried out by the individual terminal operators. NSW Ports has an overall governance responsibility for the BLBs.

NSW Ports is required by NSW Department of Planning to undertake a hazard audit of Bulk Liquids Berth No.2 (BLB2) in accordance with the conditions of development consent.

NSW Ports commissioned Arriscar Pty Ltd to undertake the first Hazard Audit in November 2014 [1]. This report was extended to include the ship/shore transfer operations of Terminals Pty Ltd and Vopak Australia Pty Ltd (BLB2 users) [2].

This report contains the findings of the current Hazard Audit of BLB2, that includes the operations of Terminal, Vopak and the governance role of NSW Ports.

NSW Ports personnel and user facility personnel were very helpful and open during the audit. The following major findings arose from the audit:

- Process safety is managed at BLB2 on the site is carried out in accordance with a well-developed Safety Management System (SMS). The SMS covers both the maintenance aspects of BLB2 and the governance aspects of the product transfer operations carried out by Terminal Operators.
- There have been incidents of minor product spill in BLB2, mainly fuel oil. These were contained and there have been no significant safety or environmental incidents.
- In general, the SMS is well linked to the process safety management, providing a process and evidence of how the process risks are managed at the Berth.
- The SMS covers all regulatory requirements defined in the NSW WHS Regulation for a major hazard facility (MHF), even though BLB2 is not classified as a MHF.

Some potential improvements were identified as part of the present Hazard Audit. These have been arranged into recommendations (see Tables 5 to 8 in Section 5 of this report) and are summarised below.

New dock lines and equipment have been installed at BLB2 by Terminals for import of refined petroleum products. This facility is yet to be commissioned. In the auditor's view, the safety reviews conducted for this modification are insufficient and further reviews have been recommended.

Wharf modifications for the Terminals Site C Project were approved in accordance with SEPP (3 Ports) [3], with Landowner consent received from NSW Ports and Complying Development Certificate issued by Randwick City Council. The PHA and HAZOP were carried out by Terminals. I was found that the Fire Safety Study (FSS), originally prepared for BLB2 development in 2011 [4] to cover Vopak import facility and Terminals chemicals import facility on BLB2 had not been updated to include the 2017 refined petroleum products import modifications by Terminals. A review of the FSS for the fire protection system adequacy for the modifications has been recommended.

The auditor found that the facility has been well maintained and operated safely and that all personnel are aware of the potential hazards and the control measures in place. The safety management system and its implementation are considered adequate for the governance role of NSW Ports.

Recommendations

The following recommendations were developed for NSW Ports Management for additional improvements to overall safety at BLB2.

Each recommendation is categorised based on its relative significance from 1 (highest) to 3 (lowest). Recommendations that are directly associated with a legal requirement (e.g. condition of development consent, etc.) are generally allocated to the highest category.

No.	Recommendation	Responsibility	Target Completion Date	Priority
1/17	Upload the latest WHS policy dated 27/4/2016 into the intranet to replace the superseded version which does not specify 'zero harm'.	BLB Manager	February 2018 Completed	2
2/17	Include the following lead indicators for safety performance and set KPIs: (a) % of conforming PTWs as one more lead indicator (b) Management of change process correctly implemented and drawings updated (c) Number of emergency exercises completed versus planned (d) % of planned maintenance completed on schedule	BLB Manager	June 2018 Completed	1
3/17	The SMS was due for review in March 2017 was not completed. The review is overdue and must be undertaken as soon as possible.	BLB Manager	June 2018	2
4/17	Keep a hard copy of the current SMS at BLB1 office as contractors have no access to the intranet.	BLB Manager	December 2018 Copy in office	3
5/17	Undertake a review and update of BLB Operations Manual which was due in March 2017	BLB Manager	June 2018 Completed	2
6/17	Review the list of user company procedures in the Operations Manual for relevance to NSW Ports' governance role.	BLB Manager	June 2018 Completed	3
7/17	Update out of date Safety Data Sheets to current ones. Vopak to supply current SDS.	BLB Manager	March 2018 Updated	2
8/17	Complete the identified non-compliant elements in the hazardous area compliance survey for BLB2.	BLB Manager	June 2018 Completed	1
9/17	Develop a risk review procedure for capital projects, as part of MOC process.	BLB Manager	March 2018	2

No.	Recommendation	Responsibility	Target Completion Date	Priority
10/17	Include questions on the Permit to Work system/ Isolation in the induction quiz.	BLB Manager	April 2018 Completed	2
11/17	NSW Ports to ensure that returned work permit forms be signed off by the permit authority noting the work as complete or incomplete as the case may be.	BLB Manager	December 2017 Completed	2
12/17	The modification form is not being effectively used for change management and there is no/inadequate documentation for changes that have occurred at the BLB during the audit period. This is a serious non-conformance and should be remedied.	BLB Manager	December 2017 Done	1
13/17	The ERP Section does not contain an organisation chart for emergency management. This needs to be included in the next revision.	BLB Manager	June 2018 Will be done	2
14/17	Conduct two emergency drills for BLB2, one jointly with Vopak and the other jointly with Terminals Pty Ltd, for a flammable liquid spill and fire scenario and review the Emergency Plan based on lessons learnt. This exercise is to be part of annual on-going emergency exercises.	BLB Manager	October 2018 Done	1
15/17	NSW Ports, in liaison with Terminals must undertake a review of the 2011 Fire Safety Study to ensure that the existing fire protection system at BLB2 can adequately protect against loss of containment and fire scenarios of the new refined petroleum products import modifications.	EGM Operations & Environment/ Terminals	Fire safety study completed	1
16/17	Vopak to ensure that returned work permits are signed off by the Permit Authority as complete/ incomplete/ equipment is safe to work on etc.	Vopak	March 2018 Done	2

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Notation

Abbreviation	Description
AFFF	Aqueous Film Forming Foam
AS	Australian Standard
ASIO	Australian Security Intelligence Organisation
BLB	Bulk Liquids Berth
CCTV	Closed Circuit Television
DOP	Department of Planning
EP	Emergency Plan
EPA	Environment Protection Authority (NSW)
ESD	Emergency Shutdown
ESDV	Emergency Shutdown Valve
HAZOP	Hazard and Operability Study
HIPAP	Hazardous Industry Planning Advisory paper
ID	Identification
kPag	Kilo-Pascals gauge
KPI	Key Performance Indicator
LTI	Lost Time Injury
MHF	Major Hazard Facility
MOC	Management of Change
MSIC	Maritime Security Identification Card
MTI	Medically Treated Injury
P&ID	Piping & Instrumentation Diagram
PAMS	Property Asset Management System
PS	Performance Standard
PTW	Permit to Work
SDS	Safety Datasheet
SMS	Safety Management System
SOP	Standard Operating Procedure

Abbreviation	Description
STEMS	Proprietary name for safety system
WHS	Workplace Health & Safety

1 INTRODUCTION

1.1 Background

Port Botany Operations Pty Ltd, trading as NSW Ports, is responsible for the management of the port facilities at Port Botany, NSW. The main role and responsibility is to maintain the Port infrastructure for the tenants and Port users. The container terminals are operated by stevedores. Shipping in and out of the BLBs is controlled by the Port Authority of NSW.

A condition of development consent for BLB2 development was to undertake a Hazard Audit every 3 years after the first audit, in accordance with NSW Department of Planning and Environment (DP&E) "Hazardous Industry Planning Advisory Guidelines" (HIPAP) No.5 [5]. This audit is to be undertaken by an approved independent auditor and the report submitted to the NSW Department of Planning. The first hazard audit was carried out in November 2015.

Even though NSW Ports has no operational role in the bulk liquid transfers, since the operations were located on the BLB2 site which is the subject of development consent, the operations were to be included in the hazard audit in accordance with the directions of DP&E. This audit was carried out in March 2016 and an addendum report was produced.

The current audit was carried out in November 2017. This report contains the findings of this Hazard Audit of BLB2, including the ship/shore transfer operations of tenant companies.

1.2 Audit Scope

The scope of the Hazard Audit included the following areas of NSW Ports and BLB2 tenants (Terminals and Vopak):

- Company organisation, safety policy and safety responsibility structure;
- Safety Management System (SMS), specifically covering the procedures for operation, maintenance, training, change management, incident investigation and emergency response;
- Plant areas directly under the control of NSW Ports:
  - Bulk Liquids Berth No. 2
  - Firewater system
  - Security and access control, and
  - Coordination of work carried out at BLB2.
- Terminal ship to shore transfer manifold, valves and pipework, including the emergency shutdown (ESD) system for the bitumen lines and proposed refined petroleum product import lines.
- Vopak marine loading arms (MLAs), manifold, valves and pipework, and ESD system.
- Documentation related to the above items, including document control and record keeping.

Marine loading arms and hose manifolds are operated and maintained by the user companies, including the emergency shutdown (ESD) system. The emergency response is initially provided by the user, with an overarching responsibility by NSW Ports. The licence agreement between NSW Ports and the User Company sets out the responsibilities.

The focus of the hazard audit was on the effectiveness of the Safety Management System (SMS) in managing process safety at BLB2.

1.3 Auditor

The audit was carried out by Dr Raghu Raman from Arriscar.

Dr Raman is a chemical engineer, with more than 40 years of total experience since graduation. This includes 12 years in the chemical industry in production, process design, process development, project engineering and safety engineering and 8 years of research and teaching in chemical engineering at university level. For the last 30 years, Dr Raman has provided specialist consulting services in process safety and risk management to industry and government.

2 AUDIT METHODOLOGY

2.1 Overview

This Hazard Audit was conducted based on the guidelines given in HIPAP No. 5, "Hazard Audit Guidelines".

To provide a structure for the site visits, Arriscar utilised an audit process covering the elements in a process safety management system. The elements listed in the NSW Ports SMS for BLBs, are compared with the standard requirements in Table 1.

Table 1 - Process Safety Management Elements Audited

Element	Process safety Management System Element	Matching BLB SMS Element
1	Structure, responsibility and accountability	Safety Management Policy and Implementation
2	Process safety information	Operating Procedures
3	Standards, codes and regulations	Listed in the BLB Operations Manual
4	Process risk management	Pre-startup review, Safe Working Practices
5	Process/equipment integrity	Equipment Integrity
6	Training and performance	Training and Education
7	Management of suppliers/third party services	Managing Contractors, Procurement
8	Management of change	Management of Change
9	Emergency preparedness and response	Emergency Planning
10	Incident reporting and investigation	Accident / Injury / Near-Miss Reporting and Investigation
11	Audits and corrective actions	Monitoring Procedures
12	Security Management	Security

It can be seen that all the required elements have been addressed in the BLBs SMS.

The Vopak SMS has 20 elements, and includes additional elements not relevant to BLB2 such as management of operations, confined spaces, tank storage etc. Otherwise all the above 12 elements in Table 1 are present in the Vopak SMS.

Terminals has a similar SMS manual.

In addition, compliance audit with AS 3846-2005 [6] was included in the scope.

2.2 Verification Process

The Hazard Audit comprised three major components:

- BLB2 site and equipment inspections;
- Personnel interviews; and
- Document reviews.

Site visits were conducted as follows:

NSW Ports- 1st November 2017

Vopak – 2nd November 2017

Terminals - 3rd November 2017

Discussions were held with several personnel at the site.

The discussions were structured to establish if:

- The SMS is adequately documented (manuals, procedures, forms, and other related documents);
- Staff are aware of the system (adequately communicated to staff); and
- The system is working to ensure safety is adequately managed (staff following procedures, follow-up actions implemented, and records kept and available).

Discussions with the personnel summarised in the following table took place as part of the Hazard Audit.

An audit protocol was developed and findings were recorded as the audit progressed. Details are given in Section 7.

All personnel were extremely helpful and open during the audit.

Table 2 – Personnel Involved in Audit

Name	Role	Organisation
Mr Wayne Ashton	BLB Manager	NSW Ports
Mr Ashley Rangott	BLB Maintenance Coordinator	NSW Ports
Mr Bryce Littman	BLB Operator	NSW Ports
Mr Adrian Quek	SHECQ Coordinator	Vopak
Mr Steve Bates	Terminal Manager	Vopak
Mr Adrian Phillips	Operations Manager	Terminals
Mr Ted Wagstaff	Maintenance Manager	Terminals

Document reviews of a selection of procedures were carried out. Random checks of completed forms were done (e.g. modification form, work permits) to check degree of completion and to assess the effectiveness of the systems in place.

2.3 Report Structure

This report is intended to be read as a stand-alone document without reference to other documents. The broad structure is:

- Overview of BLB infrastructure (Section 5).
- Overview of BLB operations (Section 5).
- Overview of SMS (Section 6).
- Findings and recommendations for each audit element (Section 7) for the three entities.

3 SITE DESCRIPTION

3.1 Location

BLB2 is located between Brotherson Dock and Molineux Point, to the south of BLB1, Port Botany, NSW. A map of the site location is shown in Figure 1 with respect to other tenants at Port Botany.

Port Botany Tenants

A	ACFS	H	Gube Logistics	O	PB Towage
B	Vopak Terminals	I	DP World	P	Truck Marshalling Area
C	Qenos Pty Ltd	J	Patrick Stevedores	Q	ACFS/Tyne
D	Elgas	K	Caltex Australia	R	NSW Ports Corporation – Operations Centre
E	Terminals	L	Svitzer	S	Sydney International Container Terminals Pty Ltd
F	Origin Energy	M	Australian Customs Service	1	Berth Numbers
G	Patrick Port Logistics	N	Warehouse Solutions International	1	Bulk Liquids Berth Numbers

Figure 1 – BLB Location Map

3.2 BLB2 Infrastructure

A layout diagram of BLB2 is shown in Figure 2.

3.2.1 Infrastructure under NSW Ports

The site comprises the following main infrastructure components:

- Main retaining wall
- Mooring dolphins
- Dry chemical extinguishers on wheeled trolleys (2 x 70 kg)
- Hydrants and hose reels
- Fire monitor tower (remotely operated)
- Retractable access bridge to ship's deck from fire monitor tower for crew access
- Access road (Charlotte Road/ BLB2 Site Road)
- BLB2 berth office

The main BLB office is located at BLB1. The BLB2 berth office at the wharf is manned only during a ship/shore transfer.

3.2.2 Vopak Infrastructure

- Two marine loading arms and hydraulics
- Common manifold
- Associated instrumentation
- Pipelines from BLB2 to Vopak Terminal

3.2.3 Terminals Infrastructure

- Common manifold with five (5) chemical product dock lines with hose connections to ship.
- Manual isolation valves for product lines at wharf.
- Independent dock lines for bunker fuel and bitumen, hose connections and ESD valves.
- New manifold for two (2) refined petroleum products import with 14" hose connections and ESD valves.
- Pipelines of chemicals, bitumen to Areas A and B, and refined petroleum products to Area C of Terminals. The bitumen line is insulated and heat traced (electric).

Note: The refined petroleum products import lines were under construction at the time of audit and yet to be commissioned.

3.3 Staffing

3.3.1 NSW Ports

BLB2 is essentially unmanned except during a ship visit and during any maintenance activity. Most of the staff are located at the BLB1 office. The staffing consists of the following:

- General Manager, Operations (located in the main office at Brotherson House)
- BLB security officer at BLB gatehouse (present 24/7)
- BLB maintenance coordinator
- BLB officers (operate on a 9-hour shift with 1 hour overlap between shift changeovers)

The BLB officers are contractors, supplied by OPEC Pty Ltd.

3.3.2 Terminals

Terminals has contracted the bulk liquids transfer operations to contracting companies, who supply the labour. The supervision of the operations is carried out by Terminals. There would be 4 persons at the berth during connection/disconnection and 2 persons during ship/shore cargo transfer.

3.3.3 Vopak

Vopak uses its own personnel to operate the wharf. There would be up to 3 persons during connection/ disconnection of the hydraulic loading arm, and pigging. During transfer, there would be 2 persons minimum at the berth.

3.4 Site Security

BLBs 1 and 2 are enclosed by a chain wire fence approximately 2 m high, with barbed wire at the top.

There are two vehicle access point to the site:

(a) from Charlotte Road (main access route)

(b) from Molineux Point to BLB2 Site Road (emergency access)

Access point (a) is controlled by automatic sliding security gate, operated by the BLB operator at the BLB1 office. Access point (b) is manually operated, and not normally used. The site is well lit at night.

All staff required to work on BLB are required to have a Maritime Security Identification Card (MSIC). This includes a check by Federal Police and ASIO. Employees access the BLB site through a security turnstile, operated by MSI C & ID swipe card.

Visitors to the site must contact the BLB security gate and may be allowed access subject to authorisation, and must complete a BLB general induction.

No weapon of any type is permitted on the berth or ship.

A camera surveillance system is installed at the BLBs and monitored from the BLB1 security gate.

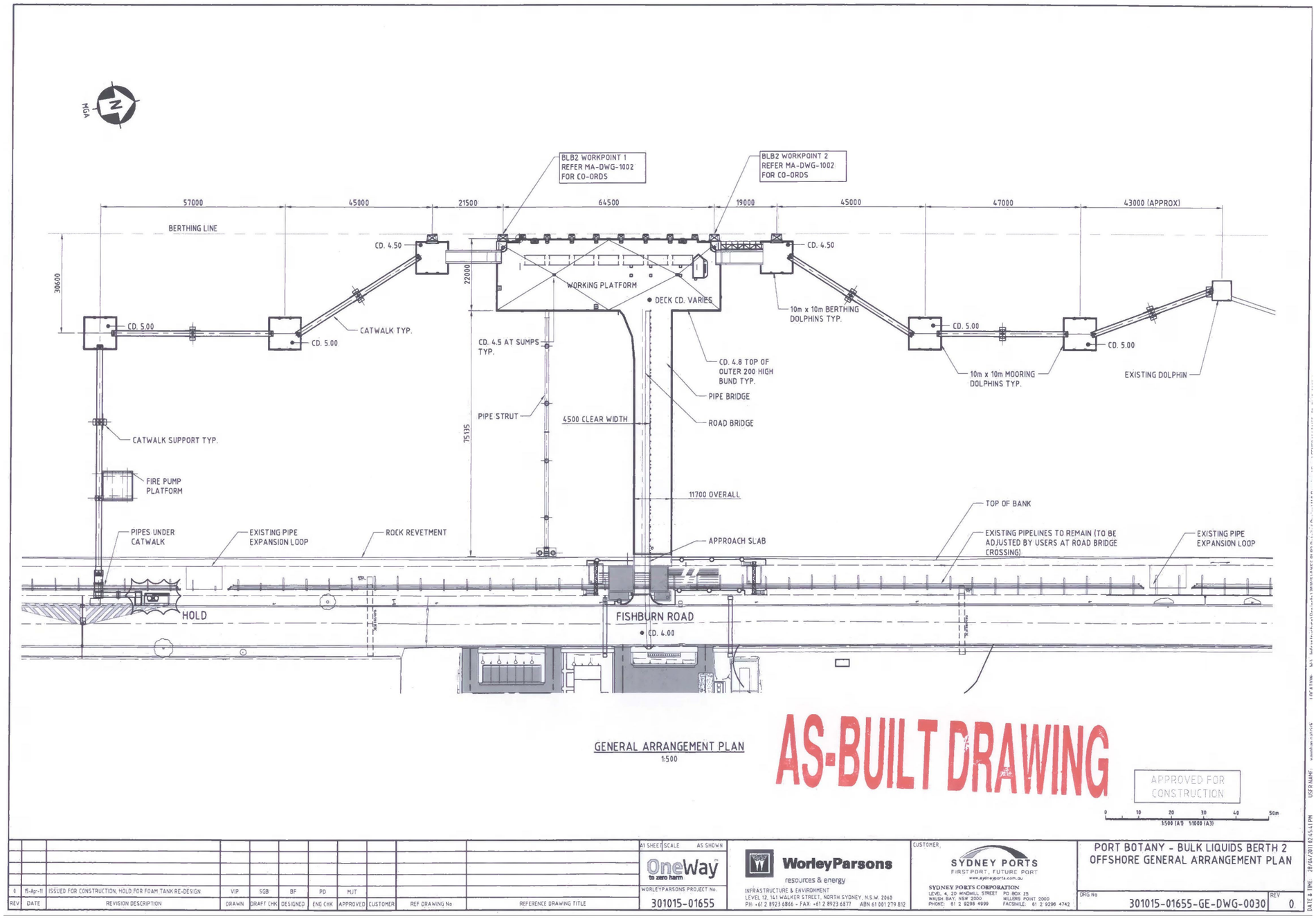

Figure 2 – BLB2 Site Layout

3.5 BLB2 Ship/Shore Transfer Operations

3.5.1 Terminals

There are seven (7) dock lines for bulk liquids transfer operated by Terminals. Two of the dock lines are dedicated to bunker fuel and bitumen respectively. The bitumen line is heat traced due to its high viscosity.

There are no loading arms, and transfer is by flexible hoses. The hoses are kept at the Terminal and brought to BLB2 whenever a transfer is required. Five of the chemical dock lines have a manual isolation valve each, that has to be closed by the operator in an emergency. Emergency shutdown (ESD) valves are installed on the fuel oil (FO) line and the bitumen line. The actuating motive power for the pneumatically actuated valves is nitrogen, provided from bottles at the wharf.

Emergency alarm activation station is located at the wharf and at the approach to the berth. On activation they raise an alarm locally and at the BLB office, but no executive action.

ESD activation stations are located for the FO line and bitumen line at the wharf and at BLB office for remote shutdown.

Each ESD valve is tested for reliability prior to commencement of a transfer, and recorded in the wharf isolation valve checklist.

The dock lines are cleaned after the transfer. Any spill is collected in a spill collection tray and taken back to the Terminal for safe disposal.

3.5.2 Vopak

There are two hydraulic marine loading arms installed at the Vopak facility. A hydraulic power unit cabinet at the berth provides the hydraulic power for the arms movement.

There are ESD valves on the MLAs that automatically shut if the MLA safe operating limits are exceeded.

In addition, there is an emergency release coupling (ERC) on each MLA, that can be activated by the wharf operator in an emergency.

On completion of unloading, the outboard side of the MLA is drained back to the storage tank in the Vopak terminal. The inboard side of the arm is drained to a local pump suction. The pump at the wharf pumps the liquid back to the storage tank.

Pigging is carried out with nitrogen, which is piped to the wharf.

3.5.3 New Dock Lines for Refined Petroleum Products Import for Terminals

Terminals is currently constructing two new dock lines, 14” diameter each, for importing refined petroleum products (gasoline and diesel). The existing manifold for Vopak is extended to connect the two new lines to Terminals Area C.

There are no loading arms and the transfer is through flexible hoses. ESD valves are installed on the wharf.

This project is expected to be commissioned in early 2018.

3.5.4 Utilities

The main utilities and services in the berth are:

- Nitrogen cylinders which also provides instrument gas for pneumatically actuated valves
- The site power is supplied by Energy Australia
- There is an emergency diesel-driven generator set
- Utilities water is supplied from Sydney Water supply main
- A workshop is provided for minor maintenance work
- Push button/ break glass wharf alarm system
- Berth firefighting system (see Section 5.6)

Communication on the berth is achieved primarily by use of intrinsically safe two-way radios, carried by all personnel. Sufficient redundancy exists to provide backup radios in the event of a fault. A multi battery charger in the control room allows for charging of radio batteries.

3.6 Fire Fighting Equipment

The site is equipped with firefighting equipment consisting of:

- Fire detection (thermal detectors or manual detection).
- Fire alarm initiated by thermal detector or activation of break glass unit or fire alarm buttons.
- Fire alarm signal to a fire monitoring service to take further action.
- Firewater pump house (supplying both BLB1 and BLB2).
- Firewater monitor tower with foam induction system for hydrocarbon fires with remote operation of the monitors.
- 2x70 kg dry chemical portable extinguisher system on wheeled trolleys.

4 SAFETY MANAGEMENT SYSTEM

4.1 Overview

NSW Ports has developed a Safety Management System manual, with elements matching the requirements of a process safety management system as listed in Table 1. The manual is available to all site personnel.

The SMS elements are described in detail below.

4.2 Element 1 - Structure, Responsibility and Accountability

The SMS is tiered as follows:

- Workplace Health & Safety Policy that defines the management commitment.
- Core elements of the SMS, based on the hazards and risks in BLB1 and BLB2.
- Detailed procedures, forms, checklists etc.

The NSW Ports WHS Policy emphasises commitment to management leadership and accountability and states the goals and objectives in relation to safety performance.

4.3 Element 2 – Process Safety Information

This element overarches other elements in managing hazards on the site.

The operating procedures manual describes the hazards on the site, and significant safety, environmental, property and/or security risks.

For activities involving the Terminal Companies at the BLBs, the risk assessment of their respective operations is carried by the Companies, and approved by NSW Ports, as part of the governance role.

The hazards and risks are highlighted in the safety induction manual for persons accessing the BLBs.

NSW Ports keeps a record of the following process safety information:

- Berth equipment design basis and design details;
- Chemicals stored and processed;
- Hazardous area classification;
- Details of safety critical equipment;
- Piping and Instrumentation Diagrams (P&IDs);
- A technical library as a basis for maintenance and enhancement of skills and knowledge.

Information may be stored in a wide variety of forms including engineering drawings, data sheets, registers, photographs and manuals. Within NSW Ports, this information is located in the Document Management System.

For all equipment installed and operated by the Terminal Companies at BLB 1 and BLB 2, the process safety information is to be retained by the Terminal Operators and available to NSW Ports on request.

4.4 Element 3 – Standards, Codes and Regulations

The BLB Operations Manual contains a list of the following, as applicable to the site:

- Acts and Regulations
- Guides, Codes and Standards

The above cover both Australian and International guidelines and standards relating to dangerous goods handling and maritime standards.

Details are provided in the Operations Manual, and appear comprehensive.

4.5 Element 4 – Process Risk Management

In a governance role, NSW Ports does not have a direct role in process risk management, which falls under the responsibility of the respective Terminal Companies. However, pre-startup review and Safe Working Practices come under Element 4.

Pre-startup safety reviews ensure that new facilities, plants or processes are checked against safe design, construction and process specifications before operation is allowed to commence. Pre-start-up safety reviews include procedures for confirming in writing that:

- Equipment has been fabricated, installed and constructed in accordance with the design specifications;
- Written procedures, including safety, operating, maintenance and emergency procedures are in-place;
- All pre-commissioning procedures, including physical inspections and leak and pressure testing, have been completed and the results documented;
- All agreed measures arising out of HAZOPs and other hazard identification studies, as well as other pre-construction and pre-commissioning safety studies, have been implemented;
- New processes and significant modifications to existing processes have been carried out in accordance with the management of change procedures;
- Employees are qualified and have been appropriately involved in the review process.
- Pre-start-up checklists have been completed correctly, including ensuring that alarm systems have not been corrupted or inadvertently modified during a shutdown, and that temporary bypasses of trips and other safety equipment are all reversed.

Safe working practices include the following:

- Permits and procedures for maintenance and construction including:
  - Cold work;
  - Hot work;
  - Liquid wharf clearance certificate;
  - Line cleaning;
  - Confined space entry;
  - Tagging of equipment, for example, portable electrical equipment;

- Lock out and tag out; and
- Isolation and re-commissioning of plant and equipment including utilities;

- Handover between shifts;
- Supervision of safe work practices by the BLB Officer and BLB Manager;
- Procedures for hazardous processes such as rigging, scaffolding and cranes;
- Working at heights;
- Classification and definition of hazardous areas;
- Internal site traffic control and movement of vehicles; and
- Control of access to hazardous areas and processes.

For all construction and maintenance work controlled by the Terminal Companies at BLB 1 and BLB 2, the NSW Ports Permit-to-Work system is used in conjunction with the Terminal Company's permit systems.

4.6 Element 5 – Process and Equipment Integrity

The SMS describes the asset integrity management program. The following assets are controlled by NSW Ports:

- BLB1 and BLB2 including containment systems
- Fire protection systems (diesel pumps, emergency generator)
- Control building
- Security systems including gates, access control and CCTV, and
- Gangways for ship access.

The integrity management program consists of:

- Planned inspection and maintenance program including repairs where required
- Defined frequency of inspections and testing of equipment and alarms
- Monitoring and reporting of equipment defects/ faults/ degraded performance
- Spare parts management including quality assurance in procurement

The documentation for the above NSW Ports requirements is stored within the NSW Ports Property Asset Management System (PAMS).

4.7 Element 6 – Training and Performance

The employee training program of NSW Ports consists of the following:

- Criteria and processes for employee section and on-going training
- Induction to new employees and contractors (refreshed 2-yearly) and records kept
- Properties of dangerous goods handled at the facility;
- Safe working practices;
- Detailed equipment operation, including:

- Shipping transfers; and
- Emergency conditions and responses;

- SMS implementation and responsibilities.

4.8 Element 7 – Management of Suppliers/ Third Party Services

The following 3rd party service providers are used by NSW Ports at the BLBs.

1. Brownlec Pty Ltd - Maintenance of electrical equipment in classified hazardous areas.
2. Prime Pumps – Inspection and maintenance of fire protection equipment, and monitoring site fire alarm through dedicated communication link.
3. Star Group – Electrical equipment maintenance (Generators and lighting).
4. Halliday Engineering – Mechanical maintenance.
5. Treli Mechanical Pty Ltd – Mechanical maintenance. Selected on the basis of previous track record with NSW Ports.

A contractor selection procedure exists whereby contractor is selected on the basis of their safety performance and existing safety management systems, besides professional competence.

All contractor personnel are inducted in site safety and in safe work procedures. Contractors used by Terminal Companies are inducted in the use of NSW Ports permit to work (PTW) system, in conjunction with the respective Company's own permit systems.

The induction process includes:

- NSW Ports WH&S Commitment
- BLB site function, security and access
- Responsibilities of the contractor and NSW Ports under the WHS regulation
- Visitor access arrangements
- De-matching requirements (ignition control)
- PPE requirements
- Emergency response and evacuation routes/ assembly areas
- Specific hazards – working at water's edge, gangway access
- Incident reporting
- First aid facilities available
- Driver site safety rules
- Work Permits
- Hazardous substances handled at the BLBs and Safety Data Sheets (SDS)
- Asbestos warnings
- Drug and alcohol policy

4.9 Element 8 – Management of Change

Management of Change (MOC) is an important element in the SMS. This element describes the requirements and responsibilities for the management of changes at the site. The purpose is to ensure that changes and modifications to equipment, communication systems, procedures and organisational structure are reviewed and documented for their potential impact on health, safety and the environment prior to implementation. If the change is temporary, the termination time is to be specified.

Special Change Assessment Forms have been designed for the change management process.

- Equipment, Alarm setting and procedures
- Structures and buildings
- Organisational change
- Completion check sheets

The approval authority is the BLB Manager.

Modifications to Terminal Company owned equipment is managed by the Terminal Company, a copy of which is sent to NSW Ports for review and records.

A similar procedure exists for Vopak and for Terminals.

4.10 Element 9 – Emergency Preparedness and Response

Emergency Management describes the requirements and responsibilities for developing and maintaining an effective emergency response system at the BLBs. The BLB Emergency Plan is the documented outcome of this emergency response system. This forms Section 18 of the BLB Operations Manual.

A written emergency has been developed and maintained that is appropriate to the level of risk at the BLBs. The EP conforms to HIPAP No.1, Emergency Planning Guidelines.

All Terminal Operators using BLB1 and BLB2 are to have their own emergency response plans. The Terminals Emergency Plan dated 24/2/16 also refers to interface with BLB Operator/ Management. These are to be consistent with the NSW Ports requirements.

Copies of these plans must be provided to NSW Ports and kept at the BLB Office.

4.11 Element 10 - Incident reporting and investigation

NSW Ports has an accident / injury / near-miss reporting and investigation procedure. This covers prompt reporting and investigation of accidents and near misses, and the communication of relevant information to all personnel. Main features of this element are:

- Supportive and non-punitive approach to comprehensive reporting of accidents and near misses
- Identification of corrective actions to prevent future occurrences
- Implementation of corrective actions within specified time frame
- Accidents/injuries/near-misses associated with the Terminal Companies activities at the BLBs are to be assessed using the NSW Ports procedure as well as the Terminal Company's systems.
- Monthly review of reported incidents.

4.12 Element 11 – Audits and Corrective Actions

The safety performance monitoring procedure includes:

- Maintaining the WHS Policy up-to-date;
- Hazard control measures for identified hazards;
- Performance standards and indicators;
- Review of performance against standards in reviews and audits.

The following audits and reviews are undertaken:

- Routine walk through audits by management
- Monthly workplace safety inspections (Safety Security & Traffic Manager/ General Manager Operations)
- Annual Corporate audits
- External audits as required by DoP
- External audits by Terminal Companies/ Cargo owners (as required)

All audit findings are followed up and actions taken as appropriate.

4.13 Element 12 – Security Management

NSW Ports has an approved Maritime Security Plan for BLB 1 & 2 which covers threats from outside the facility (e.g. trespassing, unauthorised entry, theft, burglary, vandalism, bomb threats, or terrorism) and inside the facility (e.g. sabotage, disgruntled employee or contractor actions and workplace violence). The security plan is approved by the Office of Transport Security. It covers:

- Facilities in-place to monitor and control security and authorised access to the site (fencing, gates, security lighting and security cameras).
- Preventing unauthorised access
- Requirements for access (MSIC & ID card, pass signed by Ship's Master/ Agent)
- BLB general induction completion

It is a requirement that the security plan is reviewed and updated at least annually.

5 STATUS OF IMPLEMENTATION OF 2015-16 HAZARD AUDIT RECOMMENDATIONS

Table 3 summarises the recommendations listed in Refs. 1 and 2, and the status of implementation.

Table 3 – Status of Previous Audit Recommendations Implementation

No.	Recommendation	Finding	Status
1/15	The latest WHS policy is dated 4/4/2014 and the intranet needs to be updated accordingly.	Completed. Latest policy is dated 27/4/2016, but intranet version date not updated.	Partial. Carried forward 1/17
2/15	The SMS manual states that the focus is on prevention of major incidents. This needs to be amended to state 'goal of zero harm', consistent with the WHS Policy.	SMS manual has been updated in April 2016.	Closed
3/15	Include the 5-yearly chloride penetration test for integrity of BLB2 wall in the performance standard. The test for BLB is not due until 2019.	No change. Schedule entered into MEX maintenance software.	Closed
4/15	Include % of conforming PTWs as one more lead indicator	Not done. Recommendation carried forward.	Open. Carried forward 2/17
5/15	It is recommended that the SMS manual be subject to a review and update in 2015, and thereafter every 2 years.	Completed. Latest update is dated April 2016.	Closed
6/15	Define a review interval for the BLB Operations Manual and include in the beginning of the Manual.	Not completed. Last review was July 2015. Next review in March 2017 yet to be done.	Open. Carried forward 3/17
7/15	Prepare a Hazard Register for BLBs based on an identification of overlaps with BLBs in the User Companies Hazard Registers.	A hazard register has been compiled dated 6/11/2017. Closed.	Closed
8/15	The review of any incident at the BLBs must be part of the agenda of meeting between NSW Ports and BLB users.	Completed	Closed
9/15	Develop a risk review procedure for capital projects.	Included in MOC procedure	Closed
10/15	Include questions on the Permit to Work system in the induction quiz questionnaire.	Not done	Open. Carried forward 9/17

No.	Recommendation	Finding	Status
11/15	For any work on User Company equipment by contractors, include in the "Permits" section of the *Induction Manual*, the requirement for obtaining the permit to work from User Company before obtaining NSW Ports overarching work permit.	Completed	Closed
12/15	Update the section on "Possible Types of Emergencies" in the Induction Manual to describe emergencies associated with each User Company Operation.	Completed	Closed
13/15	The ERP does not contain an organisation chart for emergency management. This needs to be included in the next revision.	Not done	Open. Carried forward 13/17
14/15	Conduct an emergency drill for BLB2, jointly with Vopak and Terminals Pty Ltd, and review the Emergency Plan based on lessons learnt.	Drill carried out 11/8/2017. Focus was on environmental spill. Fire emergency drill has not been carried out.	Partial. Carried forward 14/17
1/16	A BLB2 emergency exercise by Terminals in relation to a flammable/ toxic cargo (e.g. benzene) release at BLB2 involving Terminals and NSW Ports is recommended.	Not carried out with flammable materials and fire scenario	Open. Carried forward 19/17
2/16	Ensure that NSW Ports is involved in all future emergency exercises carried out by Vopak at the BLB.	Completed	Closed
3/16	Vopak to Include implementation and closeout of internal and external audit covering BLB2 MLA operations	Completed	Closed

6 AUDIT FINDINGS

This section contains the findings and recommendations from the Hazard Audit of NSW Ports' BLB2 at Port Botany. The recommendations are listed in the Summary section of this document.

The findings are summarised in Tables 4, 5-6 and 7-8 for NSW Ports, Vopak and Terminals respectively.

Table 4 – Audit Findings for NSW Ports Operations

Item	Question	Findings	Recommendations
Element 1 – S&HE Management Commitment			
1.1	Is there a current safety policy at the site?	The NSW Ports WHS Policy is dated 27 April 2016, and forms Appendix 1 of the SMS manual. It covers a goal of zero harm to staff, contractors, and visitors. This Policy is signed by the NSW Ports Managing Managing Director.	
1.2	How is the Policy communicated?	The policy is in Appendix 1 of the SMS manual. It is displayed on the notice boards. It is also available in the NSW Ports Intranet. The personnel interviewed acknowledged that they are familiar with the Policy.	1/17 The intranet version of the policy does not specify zero harm. Needs to be amended to be consistent with WHS Policy.
1.3	Has safety objectives and targets been defined for the site and do they include process safety?	Performance standards and KPIs have been set for safety performance. Both lead and lagging indicators have been set. Lag indicators are LTI, MTI first-aid injuries and loss of containment incidents. Process safety aspects of user operations are covered by the Terminal Companies (Vopak, Terminals Pty Ltd).	
1.4	Have performance standards been defined and implemented?	Lead and lag Key Performance Indicators (KPIs) have been defined and progress monitored monthly. The lead indicators include: • % of safety meetings (e.g. toolbox talks) held against the plan • % of planned workplace inspections completed	2/17 Include the following lead indicators for safety performance and set KPIs: (a) % of conforming PTWs as one more lead indicator (b) Management of change process correctly implemented and drawings

Item	Question	Findings	Recommendations
		• % of accident and incident investigations completed on-time • % planned audits and the resulting actions closed out on time	updated (c) Number of emergency exercises completed versus planned (d) % of planned maintenance completed on schedule
1.5	Have responsibilities and accountabilities for safety been defined and implemented?	Roles and responsibilities are outlined clearly in Table 1 of the SMS manual.	
1.6	Is the Safety Management System documented and integrated?	The SMS is a stand-alone document is no longer a paper document and is available on-line to all employees. All the elements of the SMS are clearly described.	3/17 The SMS was due for review in March 2017 was not completed. The review is overdue and must be undertaken as soon as possible.
1.7	Is the management system readily accessible to employees?	The SMS manual is available in the Intranet at both BLBs. The SMS requirements are included in the contractor induction. The hard copy is kept at BLB1 office is outdated. Contractors have no direct access to SMS.	4/17 Keep a hard copy of the current SMS at BLB1 office as contractors have no access to the intranet.
Element 2 – Safety Information			
2.1	What information is available to ensure the safe operation of plant (e.g. process manual, basis of design information etc.)?	The operations manual is on the Intranet. Detailed drawings of layout and P&IDs are kept in the BLB1 office. The design basis document for BLB2, produced by Worley Parsons is kept in BLB1 office.	

Item	Question	Findings	Recommendations
2.2	What operating procedures are available and are they up-to-date?	The operations manual was last updated in April 2016. The contents cover the following topics: • BLB 1 & 2 Mandatory Requirements for Booking & Use • Duties of the Operating Company • Access to and from the Vessel • Bunker Barge Operations (carried out by Terminals Pty Ltd) • Cargo Handling Operations (carried out by Vopak or Terminals) • Entry of Persons to the Wharf or Berth Area • Entry of Vehicles to the Berth • Work Carried Out at the Berth or in the Pipeline Corridor including issue of Work Permits • Spillage Retrieval System • Wharf Emergency Systems • Fire Protection System • Emergency Procedures It was found that some of the operating procedures are not relevant to NSW Ports in its governance role as similar procedures are used by BLB2 user companies.	5/17 Undertake a review and update of BLB Operations Manual which was due in March 2017 6/17 Review the list of user company procedures in the Operations Manual for relevance to NSW Ports' governance role.
2.3	How are operations log recorded and communicated?	All operational information is recorded in an Excel spreadsheet, and updated every shift by the operator. Paper based log book has been superseded by the spreadsheet system. A new software "Advent" is planned to be implemented in 2018 for online recording and report generation.	
2.4	What process and site drawings are available and how are these kept up-to-date?	The 'as built' drawings of BLB2 are kept at the BLB1 office building. Any changes arising from potential modifications are captured in the MOC procedure, which requires relevant update of the drawings affected.	

Item	Question	Findings	Recommendations
2.5	How is safety information communicated to personnel (staff, contractors)	A hazard register has been compiled by NSW Ports for BLB operations. An induction manual is kept in the BLB1 office. This manual contains information on hazardous substances handled at the BLBs. Communications on safety is through inductions and tool box meetings.	
2.6	Are Safety Data Sheets (SDSs) available and current?	SDS register for all products handled in the BLBs are kept in BLBs in a file. Terminals provides copies of SDS of all products handled to NSW Ports, for each shipment. SDS provided by Vopak are on file. It was found that some of the SDS issued by United Petroleum are out of date. These need to be updated.	7/17 Update out of date Safety Data Sheets to current ones. Vopak to supply current SDS.
2.7	How is the inventory of hazardous materials managed and recorded?	There is no hazardous material inventory at the BLB for the site. All pipelines are pigged after cargo transfer, with the exception of jet fuel pipeline. This jet fuel line is kept isolated when not in use.	
2.8	Has the hazardous area classification requirements been identified and implemented?	A review of the hazardous area drawings showed that the BLB2 area is classified as either Zone 1 or Zone 2 hazardous area, under IEC 60079.10.1	

Item	Question	Findings	Recommendations
2.9	What safety critical operating parameters have been defined and how are they monitored?	There are two main safety critical elements under the responsibility of NSW Ports: (a) BLB firewater system. The FW main must be kept at 1200 kPag pressure and firewater must be available at 700 kPag at the hydrant. The foam induction system must produce a 3% AFFF foam solution, when required. The firewater system maintenance contractor checks that these parameters are met and the information is logged. Log books were inspected during the audit. (b) Wharf structural integrity. This is checked and maintained by chloride penetration test. Up to 0.4% chloride in cement is considered acceptable. In the test carried out in 2016, the chloride in cement was < 0.1%.	
Element 3 – Standards, Codes and Regulations			
3.1	Which licenses have been obtained and are they current?	The development consent for BLB2 is the main document. No EPA licence is required for BLB. Terminal Companies have their own EPA and MHF licences.	
3.2	How is compliance with relevant Codes and Standards achieved?	The main governing standards are: AS 3846 – Handling of hazardous substances in Ports IEC 60079.10.1 – Hazardous area classification The audit found that the fire protection system conforms to Section 10.5 of AS 3846. Hazardous area drawings exist for BLB2 (sighted during the audit). A review of the integrity of electrical equipment to comply with the area identified a few areas of non-compliance mainly due to the harsh marine environment. Remedial works are ongoing.	8/17 Complete the identified non-compliant elements in the hazardous area compliance survey for BLB2.

Item	Question	Findings	Recommendations
Element 4 – Risk Management			
4.1	How are hazards identified?	There is a hazard register for BLBs, compiled from the safety reports of the users. See recommendation 7 above.	
4.2	What is the process for risk management?	There is a high level risk register in the induction book. A risk review is conducted for capital projects, but no formal procedure exists.	9/17 Develop a risk review procedure for capital projects, as part of MOC process.
4.3	What system is used to ensure potentially hazardous activities are undertaken in a safe manner (i.e. safe work practices)	In Section 14 of the Operating Manual, the PTW system is described in detail. This is used for all work by NSW Ports in the BLBs. For any work on the Terminal Company owned asset (e.g. marine loading arms), a PTW is issued by the user Company. NSW Ports then issues an overarching PTW before the work is undertaken. Details are given in Section 7.7 of the SMS. Appendix K of the Operating Manual displays a copy of the PTW.	
4.4	How are ignition sources controlled?	BLBs are hazardous area classified. PTW controls portable electrical equipment, hot work. The induction describes the BLBs as 'dematched' areas.	
4.5	How have hazardous zones been defined?	BLB2 hazardous area classification diagrams were sighted during the audit. Zone 1 and Zone 2 areas have been marked on the layout.	
4.6	What process is used to ensure safe isolation of plant and equipment?	Process equipment isolation is the responsibility of the User Company. For NSW Ports controlled equipment, any isolation should follow the lock out and tag out procedure.	
4.7	What housekeeping program is in place?	Housekeeping is covered in Appendices G and H of the Operations Manual (Ship pre-arrival and post-departure checklist). The housekeeping standards at BLB2 were found to be of high quality.	

Item	Question	Findings	Recommendations
4.8	How are waste management requirements complied with?	Any product spill is contained in the spill collection tank at the BLB. The product is then removed by vacuum sucker road tankers for safe disposal.	
4.9	Is there a list of confined spaces?	A list of 10 confined spaces have been compiled in the Induction Manual. These refer to various access pits within BLB boundaries. Each confined space has been risk assessed and a risk ranking ascribed. Access to pipe tunnels under the road, under roof pipe gallery areas, diesel tank access and drain/sullage access points have been rated 'extreme' and others vary from significant to moderate and low. A confined space entry permit is required for entry, in addition to the PTW form.	
Element 5 – Equipment Integrity			
5.1	How is preventive maintenance managed?	NSW Ports uses the MEX asset management software for maintenance management. All equipment all entered into the database and critical items are flagged. The software automatically generates work orders for preventive maintenance from pre-programmed schedule. This has been a significant development implemented successfully.	
5.2	What is the process for ensuring mechanical integrity of process equipment?	Not applicable for NSW Ports' role at BLBs.	
5.3	What is the process for ensuring mechanical integrity of rotating equipment?	The only rotating equipment of relevance are the firewater pumps. These are located in BLB1. The pumps are tested with freshwater for 30 minutes as part of preventive maintenance program.	

Item	Question	Findings	Recommendations
5.4	What is the process doe ensuring integrity of mobile plant and equipment?	There is no installed crane at BLB2. The only mobile equipment is a diesel forklift. The exhaust is fitted with water scrubber to comply with hazardous area classification requirements.	
5.5	What is the process for ensuring integrity of structures?	The BLB2 wall is a critical structure. A chloride penetration test has been carried out by Arup in August 2016. The results showed <0.1% chloride levels in cement and structural integrity is considered good. The next test is due in 2019.	
5.6	What is the system for ensuring that trip and interlock testing is adequate?	Trip and interlock testing on process equipment is carried out by the BLB2 user companies. This is not applicable for NSW Ports activities.	
Element 6 – Training and Performance			
6.1	How are new employees inducted?	There is a safety induction manual (PowerPoint slides), updated to reflect up to date conditions. This is presented to the employees by BLB Manager, along with the Operations Manual and the SMS Manual to give an overall picture of safety and job requirements. Each person then has to answer a written induction quiz and pass the test. It was found that the induction questionnaire did not contain any questions on Permit to Work. This needs to be rectified.	10/17 Include questions on the Permit to Work system in the induction quiz.
6.2	How are contractors inducted?	Contractors have to undergo the same induction procedure as employees. In the section on work permits in the induction slides, the requirement of the User Company's work permit in order to obtain NSW Ports overarching work permit is also mentioned.	

Item	Question	Findings	Recommendations
6.3	Is the induction manual sufficient to gain an understanding of the emergencies at the BLB?	The manual lists possible types of emergencies, which are general and non-specific. The section on "Possible Types of Emergencies" needs to be improved to describe emergencies associated with each User Company Operation. This information is provided in the User Company Emergency Plan, available to NSW Ports.	
6.4	How is the competency of personnel ensured?	A written quiz is to be answered by all inducted personnel for testing their understanding and competence.	
Element 7 – Management of suppliers/third party services			
7.1	How are contractors selected and engaged?	BLB officers are contactors, provided by OPEC Pty Ltd. The level of training/ induction required is specified in the contractor service agreement (sighted during audit). For other service providers, a selection criterion has been developed that includes professional competence, safety performance record, and contractor's safety management system.	
7.2	How are contractors managed on site?	The BLB officer/ coordinator supervises the contractors. Sometimes User Company representative may be present if contractor were to work on the User Company's equipment. During ship/shore transfer, there is a representative from the user (Vopak/ Terminals) at the wharf besides the NSW Ports operator who patrols the area.	

Item	Question	Findings	Recommendations
7.3	How is the quality of work carried out verified?	Contractors at the site generally work under a work permit. Once the contractor has finalised the work, the completeness and quality are inspected by BLB officer. Once this is done, the work permit is signed off by the contractor and BLB personnel. The review of work permits observed a very high degree of compliance (nearly 100%). It was found that the completed work was not signed off by NSW Ports operator in some cases.	11/17 NSW Ports to ensure that returned work permit forms be signed off by the permit authority noting the work as complete or incomplete as the case may be.
Element 8 – Management of Change			
8.1	How are changes/ modifications controlled and assessed?	There is a formal change management procedure (plant/ equipment/ alarm setting changes, changes to procedures and organisation changes). The form has to be filled and authorised prior to implementation. User Companies have their own MOC procedures.	
8.2	How are changes/ modifications recorded?	There is a modification register for all relevant documentation. Since the last audit, there have been three significant modifications: (a) the provision of a telescopic access gangway from the firefighting tower for crew access to ship's deck. The previously used ladder type gangway has been retained as a backup. The new gangway has reduced the potential for fall injuries significantly. (b) Remote operation switches for spill collection sump pumps from BLB1 control room. (c) Installation of cabinets and 70 kg powder fire extinguishers on trolleys to meet the requirements of Australian Standards. No modification form was sighted for any of the above.	12/17 The modification form is not being effectively used and there is inadequate documentation for changes that have occurred at the BLB. This is a serious non-conformance and should be remedied.

Item	Question	Findings	Recommendations
Element 9 – Emergency Preparedness and Response			
9.1	Is there an emergency response plan for the site?	There is no independent emergency response plan (ERP). It forms Chapter 18 of the BLB Operations Manual. The latest issue of the ERP is dated April 2016, and due for review in 2018.	13/17 The ERP Section does not contain an organisation chart for emergency management. This needs to be included in the next revision.
9.2	Are emergency drills carried out?	The procedure calls for 2 drills/year as a desk top exercise. Only a single drill was planned with Vopak on 5th December 2016 as a desk top review. The scenario was to simulate a spill of diesel from ship 'Gulf Cobalt', and deployment of booms to prevent spread of spill on water. The exercise, however, was not carried out. On 11 August 2017, a fuel oil spill from Terminals facility into Botany Bay was simulated as an exercise. Recommendation arose to install ESD valves for the new dock lines in BLB1 office, similar to the fuel oil and bitumen.	14/17 Conduct two emergency drills for BLB2, one jointly with Vopak and the other jointly with Terminals Pty Ltd, for a flammable liquid spill and fire scenario and review the Emergency Plan based on lessons learnt.
9.3	Are personnel adequately trained in emergency preparedness and procedures?	Not enough emergency drills have been conducted to evaluate the effectiveness of the training. See recommendation 13.	

Item	Question	Findings	Recommendations
9.4	What emergency alarm/ shutdown systems are in place?	A push button wharf alarm is installed, and tested before every ship/shore transfer. The alarm sounds at the wharf and at BLB office. The alarm is treated as site alarm for both BLBs, The break glass fire alarm automatically calls the fire brigade and alarms at the DA Fire monitoring centre. The ESD system is associated with each user company asset. This is tested by the user company prior to each ship/shore transfer. Note: for Terminals, there is no ESD valve on the dock line for chemicals transfer, only for bunker fuel, bitumen and the new refined petroleum product lines. The ESD valves for bunker fuel and bitumen can be remotely operated from BLB1 control room.	
Element 10 - Incident reporting and investigation			
10.1	How are incidents reported?	All BLB incidents are reported in a form designed for this purpose. Any incidents relating to User Company operations are separately reported by the User Company, a copy of which is made available to NSW Ports. All reported incidents are entered into a computer database STEMS. There was one incident of a trip and fall injury during the audit period.	
10.2	How are incidents investigated?	Unless the incident is related to assets controlled by NSW Ports, or an injury is sustained, NSW Ports does not get involved in the User Company incident investigation. A copy of the incident investigation report is sent by BLB User Company to NSW Ports. This report is reviewed by NSW Ports for assurance of due process.	
10.3	What incidents have occurred at BLB2 since last audit?	A number of minor spills were reported by user companies. Spills contained on the wharf and there was no fore or environmental incident. Details given in Tables 5 and 7.	

Item	Question	Findings	Recommendations
10.4	Is there a system to capture and action findings from incident investigation?	The procedure specifies that all actions arising from investigations of incidents under the direct responsibility of NSW Ports must be implemented and closed out by the specified date. This is a performance standard.	
Element 11 – Audits and Corrective Actions			
11.1	How often are internal audits undertaken? Who conducts these audits?	The main internal audit is a walk-through inspection conducted every 3 months by the General Manager Operations. Other managers may participate in the inspection. The focus is mainly on Workplace Health and Safety. A corporate audit is conducted annually. This audit which also covers governance issues.	
11.2	How often external audits are undertaken? Who undertakes these?	The previous hazard audit was conducted by Arriscar in November 2015. The present audit is the second audit in accordance with the 3-yearly audit schedule, required by development consent conditions. The BLB User Companies may conduct their own audits.	
11.3	What system is used to capture audit findings and to ensure these are actions?	THE SMS procedure requires that all recommendations arising from audits are captured in an action plan, with a schedule for implementation. To date the actions arising from the hazardous area compliance audit are progressively being implemented. Table 3 summarises the status of the recommendations of the previous audit.	
Element 12 – Security Management			
12.1	Has a security plan been prepared for the BLB?	A Maritime Security Plan has been prepared for BLB1 and BLB2. This addresses access issues and provisions to prevent unauthorised access. The Security Plan has been developed with and approved by the Office of Transport Security. The procedure requires annual review and update of the plan.	

Item	Question	Findings	Recommendations
12.2	How is security managed at the site?	The BLB has security cameras installed and monitored from the BLB1 security gatehouse. The gatehouse is manned 24/7. The BLB is completely fenced and access is only through a turnstile at the security gatehouse to authorised persons.	

Table 5 – Audit Findings for Terminals Pty Ltd

Item No	Question	Findings	Recommendations
Element 1 - Structure, responsibility and accountability			
1.1	Is there a current safety policy at the site?	Group policy adopted. Not site specific.	
1.2	How is the Policy communicated?	Policy signed by CEO displayed on the wall. Included in inductions and training manuals. Latest date June 2017.	
1.3	Have safety objectives and targets been defined for the site and do they include process safety?	Terminal operations objectives applies to BLB1 and BLB2 ship/shore transfer operations. The KPIs are occupational health & safety (OHS) related and do not address process safety. Need to develop process safety specific KPIs for safety performance monitoring. See Recommendation 1 below.	
1.5	Have responsibilities and accountabilities for safety been defined and implemented?	Organisation chart covers safety responsibilities. National HSE manager's role includes Port Botany operations. Operations managers (site A and Site B/C) are responsible for safety of Terminals' respective part of BLB2. Shift controller/ Operator made responsible and chair safety committee meetings under WHS regulations.	
1.6	Is the Safety Management System documented and integrated?	Safety Management System manual covers operations at BLB1 and BLB2. The SMS has 14 elements and covers all the 12 elements framework used this audit.	
1.7	Is the management system readily accessible to employees?	On-line access available	
Element 2 – Process Safety Information			
2.1	Is there a process manual for the operation of the plant?	Not applicable	
2.2	Are process hazards identified and	The ship unloading and loading procedures cover the hazards of the	

Item No	Question	Findings	Recommendations
	communicated to operators?	operations. Operators trained in procedures.	
2.3	Are Safety Data Sheets (SDSs) available and current?	A set of SDS is given to Ports by the ship every time a cargo unloading occurs. SDS for all products are available on-line, provided by the chemicals supplier.	
2.4	Is there a material inventory at the site?	No inventory at BLB2, apart from the pipeline to Terminals inventory during transfer.	
2.5	Have the hazard area classification (HAC) requirements been identified and implemented?	All of BLB2 berth area is classified into Zone 1 and Zone 2 hazardous areas and all electrical equipment managed by Terminals were reported to be in compliance.	
2.6	Are process and site drawings current and available on the site?	Up to date drawings are maintained. Sighted by auditor during the audit.	
2.7	Are there site wide SOPs in place?	There are SOPs for (a) product unloading from ship to Terminal and (b) Product loading to ship. Sighted during the audit. Separate procedures exist for different groups of products (Section 5.8.2 of the Operating Procedures Manual). Last date of review 25/10/2015. Job Hazard Analysis (JHA) has been conducted for each procedure. This is applicable at all times unless modified due to change in procedure.	
2.9	Have safety critical operating parameters been defined?	(a) Integrity of the ESD valves at the berth for each dock line. (b) Integrity of the hoses used for transfer.	
Element 3 - Standards, Codes and Regulations			
3.1	Have the required licenses been obtained and are they current?	Section 2.2 of the EPA licence for BLB2 covers the infrastructure owned by Terminals. The EPA licence for Terminals covers the storage areas and not the BLB.	

Item No	Question	Findings	Recommendations
3.2	How is compliance to relevant codes and standards achieved?	The main applicable Australian Standard is: AS 3846 –2005, The handling and transport of dangerous cargoes in port areas Compliance assessment is provided in Table 6.	
Element 4 – Risk Management			
4.1	How are hazards identified?	BLB hazards are included in the Terminals site hazard identification list. Risk assessment procedure.	
4.2	What is the process for risk management?	Terminals site risk management procedures in Section 3.3 of the Risk Assessment Guidelines apply to BLB operations. Applied through the SMS and procedures. Risk matrix is used for risk ranking.	
4.3	Is there a process for controlling ignition sources?	Hazardous area classification and complying electrical equipment. Permit to work (hot work permits issued by Terminals and countersigned by NSW Ports). Appropriate “no smoking” signs. Whole of BLB is a dematched area.	
4.4	How is fire detection and protection integrity managed?	Maintenance of fire protection equipment is under the management of NSW Ports, and covered in Table 4 – Audit Findings for NSW Ports.	
4.5	Is there an emergency shutdown system in place?	The chemicals dock lines have only manual isolation valves. The fuel oil dock line and the bitumen dock line both have ESD valves that can be locally and remotely operated (from BLB1 office).	
Element 5 –Equipment Integrity			
5.1	How is preventive maintenance managed?	The maintenance database software MEX is used at the Terminal for preventive maintenance scheduling and data management. MEX also covers the BLB operations of Terminals.	

Item No	Question	Findings	Recommendations
5.2	What is the process for ensuring mechanical integrity of pressure vessels?	Not applicable	
5.3	What is the process for ensuring mechanical integrity of pressure safety valves?	Not applicable	
5.4	What is the process for ensuring mechanical integrity of rotating equipment?	Not applicable	
5.5	What is the process for ensuring mechanical integrity of atmospheric storage tanks?	Applicable only to Terminals. Not applicable for BLB.	
5.7	What is the process for ensuring integrity of structures?	Not applicable	
5.8	What is the system for ensuring trip and interlock testing and process control is adequate?	There are 7 dock lines including the fuel oil and bitumen lines. The two latter lines have an emergency shutdown (ESD) valve each installed at the berth. The actuating motive power for the pneumatically actuated valves is nitrogen. Each ESD valve is tested for reliability prior to commencement of a transfer, and recorded in the wharf isolation valve checklist (sighted).	
5.9	How is other safety equipment (e.g. fire detection and protection equipment) inspected and maintained?	Maintained by NSW Ports.	
5.10	How is progress of maintenance activities monitored?	Through MEX database, which can track and report outstanding items, and behind schedule items.	

Item No	Question	Findings	Recommendations
5.11	Is there a permit to work system in place?	A combined Safe work/ Hot work form exists for the Terminal and also used for BLB related work. For hot work the PTW is countersigned by NSW Ports, who issue their own overarching PTW. A confined space entry from is separately issued with the PTW form. The hot wok permit number is cross-referenced in the confined space entry permit form.	
5.12	Is there an isolation process in place?	Manual isolation valves for all routine operations. ESD valves on FO and bitumen lines in an emergency.	
5.13	What housekeeping program is in place?	The procedures require the berth to be left clean and any spills clean-up at the end of a cargo transfer. This is being followed. Site visit indicated that housekeeping standard are well maintained.	
Element 6 – Training Management			
6.1	Is there an induction program for new and transferred employees?	There is a Ports induction program run by NSW ports and all Terminals personnel involved in BLB operations must have completed it in order to obtain entry passes.	
6.2	Is there an induction program for contractors?	The Ports induction program applies to contractors as well. In addition, Terminals has an induction program specific to dock lines and cargo transfer operations.	
6.3	Is there a competency based training program at the site?	Modular competency training program exists for Ship Loading (Unit 10), unloading (Unit 7), HFO loading (Unit 8). A questionnaire based competency assessment exists.	
Element 7 - Management of suppliers/third party services			
7.1	How are contractors selected and engaged?	Cargo discharge from the ship is managed by contract labour. Similarly, any maintenance requirement is serviced by a contractor. All contractors are inducted in safety and trained in the operating procedures.	

Item No	Question	Findings	Recommendations
7.2	How are contractors managed while on site?	Terminals personnel oversee the contractor work through routine communications during cargo transfer. The workforce is supplied by Workforce Recruitment & Labour Services Pty Ltd. The contractors are supervised and helped by Terminal staff.	
Element 8 – Management of Change			
8.1	Is there a management of change (MoC) process in place?	There is a formal MoC form at Terminals for all changes, as part of the SMS 3.14 dated 13/10/2017). Any changes to dock lines and associated equipment is initiated and managed by Terminals, in liaison with NSW Ports.	
8.2	How are changes/ modifications recorded?	Terminals reported that this is achieved through the site modification control system.	
8.3	What changes have been recorded since the last Hazard Audit?	Terminals is constructing a bulk refined petroleum products bulk storage tanks in Area C of the Terminals site. The tanks will receive flammable and combustible products from ships to BLB2, and transported 2x 350mm by dock lines to storage. The changes in BLB2 consist of a wharf manifold with 2 connections to the ship using flexible hoses and two 350mm dock lines to storage. ESD valves are installed on both lines. The audit found that there is no modification form associated with the wharf modifications, and the project has been carried out under the Area C development. A HAZOP study of the dock lines to tanks in Area C was found to be inadequate and there has been no review or assessment of loss of containment potential and the adequacy of firefighting capability for the 2x350mm hose connections and dock lines. Terminals reported that no development consent was considered necessary under the 3 Ports SEPP 33 as the changes in the wharf were only extensions to existing pipelines. There was no evidence	15/17 NSW Ports, in liaison with Terminals must undertake a review of the 2011 Fire Safety Study to ensure that the existing fire protection system at BLB2 can adequately protect against loss of containment and fire scenarios of the new refined petroleum products import modifications.

Item No	Question	Findings	Recommendations
		any advice obtained in this regard.	
Element 9 – Emergency preparedness and response			
9.1	Is there an emergency response plan for the site?	The emergency response plan for the Terminal also addressed BLB emergencies (Document EB-0, Issue 5.7, dated 27/11/2015). In an emergency NSW Ports takes control and liaises with NSW FR and the EPA.	
9.2	Are emergency drills carried out?	An emergency exercise was conducted on 11 August 2017. The scenario was simultaneous bunkering at BLB2 and fuel oil spill on water at BLB2. Terminals and NSW Ports participated. There have been no emergency drills involving a flammable liquids fire, which may also emit toxic fumes.	See recommendation 14/2017
9.3	Are personnel adequately trained in emergency preparedness and procedures?	Emergency procedures and response are covered in the inductions. However, effective training is achieved only through emergency exercises. See recommendation 3.	
Element 10 – Incident reporting and Investigation			
10.1	Is there an incident reporting and investigation procedure?	The Terminal incident reporting procedure applies to BLB operations of Terminals.	
10.2	How are incidents reported?	Reporting is through Integram, an on-line reporting system. Eleven (11) incidents at BLB2 involving Terminals operations have been recorded during the audit period: 1. Fuel oil loading and pigging at the same time resulted in overpressuring hose and FO spill. The cause was attributed to ineffective isolation (single manual isolation valve) for simultaneous operations. Procedures were modified (12/2/2015) 2. Small weep through hose connection fitting during liquid product discharge. Was detected by wharf operator, line shutdown and pigged. Hose replaced and pressure tested with nitrogen	

Item No	Question	Findings	Recommendations
		(20/5/2015) 3. Oil leak during HFO discharge. Oil spill on water, < 20L. NSWPA and NSW Ports notified. Flange gasket replaced (9/8/2015) 4. The NRV in line closed during HFO transfer causing hose to overpressurise. This was detected and transfer shut down before any leak. NRV repaired before transfer was completed (28/8/2015) 5. HFO loading valve was opened but position feedback failed due to actuator corrosion. Line was overpressurised as pumping continued against closed valve. Pump tripped on PAH (27/12/2015) 6. During FO loading, pumps were ramped up too fast causing line overpressurisation. PAH in the line tripped he pump (23/3/2016). 7. During pigging in BLB2, pig was received at the Terminal but feedback signal to wharf failed (Zeus operator). As a result, nitrogen was not disconnected resulting nitrogen unavailability in BLB1. No release to environment. The incident was attributed to human error (1/4/2016). 8. Misalignment of Marpol sampler resulted in HFO drip leak from Marpol sampler. No significant leak. Cleaned up (13/5/2016). 9. There was a spray leak into spill tray. Source could not be identified (9/9/3026). 10. There was a valve line up error on the ship side and EHC50 product poured out through the vent on deck. Since the cuppers were closed, there was no spill on water (13/2/2017). 11. Loss of power during bitumen unloading. System shutdown, pumping manifolds closed until power restored. No release of product (29/10/2017).	
10.3	Are incidents investigated to root causes?	All incidents were reported to be investigated to the root causes, as the aim is to prevent a recurrence of the specific event, as well as to	

Item No	Question	Findings	Recommendations
		prevent similar generic occurrences.	
Element 11 – Audits and corrective actions			
11.1	Is there an internal audit program in place?	Routine internal safety inspections carried out.	
11.2	Is there an external audit process in place?	External audits of Terminals are those required by the NSW Department of Planning as a condition of development consent. It is carried out 3-yearly. BLB2 audits are carried out by NSW Ports.	
11.3	Is there a system to capture findings and ensure these are actioned?	All actions arising go into an action plan and tracking.	

Table 6 – Compliance Review of Terminals Operations with AS-3846 -2005

Item No	AS-3846 Clause	Requirement	Findings	Recommendations
1	2.4.4 Trained personnel in attendance	Dangerous cargos should only be handled by persons skilled in handling such cargos and by persons being trained (and who are supervised by a trained person).	Minimum two (2) trained persons are present during connecting the hose to the ship. One additional person for each extra line connected during cargo transfer.	
2	2.4.5 Personal protective equipment	Whenever dangerous cargos are being handled, appropriate personal protective equipment (PPE) shall be readily available in accordance with regulatory requirements and used when necessary.	PPE provided to all personnel. Wearing of PPE mandatory by induction and operating procedure.	
3	2.4.7 Safety showers	Whenever a toxic, corrosive or skin sensitising substance is handled in bulk, a safety shower and eyewash facilities (both using fresh water) shall be provided and kept ready for use. Such equipment may be of a portable type.	Safety shower and eyewash installed at BLB2, and maintained by NSW Ports.	
4	8.2.2.4 Cargo handling plan	A cargo handling plan shall be prepared	Cargo handling plan is prepared and sent to ship before arrival for each cargo. Sample document sighted during audit, and found satisfactory. There were 312 ships during 2017, in both BLB1 and BLB2 delivering cargo to Terminals. Approximately 70% involved fuel oil (bunker fuel).	
5	8.2.2.5 Emergency information	In addition to the cargo handling plan, the Master shall provide the following documents: (a) Information on the characteristics of the cargos on board or to be loaded. (b) Crew list.	This is received by Terminals and shared with NSW Ports in advance of ship's arrival, for each ship arrival. Terminals prepares product discharge plan/ dock line/ hoses required/ destination tank. Typical	

Item No	AS-3846 Clause	Requirement	Findings	Recommendations
		(c) Fire control plan. (d)Ship's emergency management plan.	plan sighted during audit.	
6	8.2.2.7 Ship/ shore checklist	A ship/shore safety checklist shall be completed. All items that are within the responsibility of the ship shall be checked by the ship's representative, and all items that are within the responsibility of the berth operator shall be checked by the berth operator's representative.	A standard ship/shore checklist for bulk cargo transfer has been prepared and issued to Terminals by NSW Ports. This checklist is used by ship and berth representatives and signed off. Typical signed copies of checklist sighted during the audit, and found to be satisfactory. NSW Ports receives a copy. The ship/shore checklist also includes vapour recovery connections for ship loading.	
7	8.2.2.3 Means of escape from ship	Where a fire or explosion in the shore manifold area could block the escape route of persons from the ship, a means of escape shall be available	A new tower bridge has been installed as primary gangway by NSW Ports. An outboard ladder is lowered and kept ready prior to cargo transfer as a backup. This is part of ship/shore checklist.	
8	8.2.12.1 Operation of pipelines, loading arms and flexible hoses	The following procedures and precautions shall be taken upon the completion of every bulk transfer of liquid dangerous cargos: (a) Close dock valves and ship valve and depressure hose (b) Drain hose and depressure prior to disconnecting the hoses from the ship. (c) The seaward end of hose shall be closed liquid-tight	There is no loading arm at the berth used by Terminals for cargo transfer. Flexible hoses are used. Hoses are kept in the Terminal and brought to the berth for each cargo transfer. Pipeline is pigged with foam pigs to clear the liquid to storage tank. A pig receival station is installed at the terminal. Pipeline is cleaned out with solvent or water and left empty. The line can be used for another product without cleaning if the products are compatible. However, fuel oil line and bitumen	

Item No	AS-3846 Clause	Requirement	Findings	Recommendations
			line are dedicated lines. Dock lines can be made free of chemical vapour by nitrogen purging. Piped nitrogen line is proved from the Terminal and connections are provided he dock lines at the berth. Each dock line is isolated by manual valve, and ESD valve prior to disconnection.	
9	8.3.7.3 Control of ignition sources	(a) restriction on the use of non-intrinsically safe radios (b) No ignition sources within 25m from ship and in classified hazardous areas	Intrinsically safe (IS) radios are provided by Terminals at the berth and for the ship's master. Integrity of insulation flanges also tested. Maintained by Sherry Service & Maintenance. Electrical dossier was sighted during audit. Integrity of classified hazardous areas maintained by NSW Ports for BLB2 equipment. Electrical audits carried out by Terminals in BLB1 and BLB2 for hazardous area integrity.	

Table 7 – Audit Findings for Vopak Operations

Item No	Question	Findings	Recommendations
Element 1 - Structure, responsibility and accountability			
1.1	Is there a current safety policy at the site?	There is a corporate policy. This has been amplified into a local Health, Safety, Environment and Quality (HSEQ) policy. No change in policy.	
1.2	How is the Policy communicated?	Displayed on the wall. Included in inductions and training manuals.	
1.3	Have safety objectives and targets been defined for the site and do they include process safety?	Globally set Key Performance Indicators (KPIs) apply to the Vopak Terminal and BLB2 operations. Incidents are classified into 3 tiers, depending on cost of the incident. This covers spills and near misses (Failure of safety systems to operate on demand). Tier 1 incidents are classified as minor. The target for Tier 2 and Tier 3 incidents is zero (loss of containment type events). There are also operational and maintenance process safety targets set (see Sections 4 and 5 below)	
1.5	Have responsibilities and accountabilities for safety been defined and implemented?	There is a full time HSEQ manager and a HSEQ coordinator located at Port Botany Terminal, reporting to the Terminal Manager. The Coordinator position is new.	
1.6	Is the Safety Management System documented and integrated?	Safety Management System manual covers operations at BLB2. SHE 14B – Work Health & Safety. Last reviewed May 2016.	
1.7	Is the management system readily accessible to employees?	On-line access available, and regularly updated.	

Item No	Question	Findings	Recommendations
Element 2 – Process Safety Information			
2.1	Is there a process manual for the operation of the plant?	Not applicable. There is no processing at BLB2.	
2.2	Are process hazards identified and communicated to operators?	Vopak Terminal is a licensed Major Hazard Facility (MHF). As part of the Safety Report, the Terminal Operations Major Accident (MA) Register (Table 12 of Safety Report) covers process safety. An additional document also covers occupational health and safety (OHS). BLB2 operations are covered in both.	
2.3	Are Safety Data Sheets (SDSs) available and current?	SDS for all products are available online. Sighted during audit. All were current (< 5 years old).	
2.4	Is there a material inventory at the site?	No inventory at BLB2, apart from the pipeline to Terminals inventory during transfer.	
2.5	Have the hazard area classification (HAC) requirements been identified and implemented?	All of BLB2 berth area is classified into Zone 1 and Zone 2 hazardous areas. Electrical equipment inspection and certification for compliance with hazardous area is carried out at 5-year intervals. BLB1 was done in 2015. BLB2 is not due until 2018. The 2015 BLB1 inspection report was sighted during the audit.	
2.6	Are process and site drawings current and available on the site?	Up to date drawings are maintained. Sighted by auditor during the audit. Drawing No: 5640-86-P&ID-79, BLB2 Wharf Unloading, Rev.2 dated 15/6/2017.	
2.7	Are there site wide SOPs in place?	There are 3 major documents that cover the BLB2 operations: - Ship unloading work instructions - Ship/shore transfer operations task matrix - Loading arm installation operations and maintenance manual	
2.9	Have safety critical operating parameters	A set of parameters have been defined for the Terminal.	

Item No	Question	Findings	Recommendations
	been defined?	Parameters applicable to BLB2 include communications, velocity of flow in the pipeline (maximum 7m/s), power supply to safety instrumentation at berth, instrument air supply pressure.	
Element 3 - Standards, Codes and Regulations			
3.1	Have the required licences been obtained and are they current?	1. The EPA licence for Vopak covers the BLB2 operations and shipping in bulk. Licence valid to 1/7/2018 2. Major Hazards Facility licence issued by SafeWork NSW. Licence valid to 4/11/2020 3. Instrument of development consent from DP&E	
3.2	How is compliance to relevant codes and standards achieved?	The applicable Australian Standard is AS 3846 –2005, The handling and transport of dangerous cargoes in port areas. Compliance assessment is provided in Table 6. 2-yearly ISO 9001/ 14001 certification audits by a 3rd party are commissioned by Vopak. An exhaustive checklist exists (sighted during audit). HIPAP No.5 Hazard Audit undertaken by NSW Ports for BLB2. HIPAPNo.5 Hazard Audit of Vopak Site B undertaken by Vopak – covers BLB2.	
Element 4 – Risk Management			
4.1	How are hazards identified?	Comprehensive hazard identification was carried out in the MHF licensing process. The Safety Report was sighted during audit (Table 12 of Safety Report).	
4.2	What is the process for risk management?	A risk assessment with rule sets is used for assessing risks on site (including BLB2) using in-house workshops. Performance monitoring through leading indicators for process safety. These are: Safety Observation Round (SOR), PTW, unsafe	

Item No	Question	Findings	Recommendations
		acts, unsafe conditions. Number of first aid incidents (personal safety).	
4.3	Is there a process for controlling ignition sources?	Hazardous area classification and complying electrical equipment. Permit to work (hot work permits issued by Vopak and countersigned by NSW Ports). Appropriate "no smoking" signs. Whole of BLB is a dematched area.	
4.4	How is fire detection and protection integrity managed?	Maintenance of fire protection equipment is under the management of NSW Ports, and covered in the main hazard audit. Leak/ fire detection by two operators present at the wharf during cargo transfer, and liaison with deck watch and Vopak central control room.	
4.5	Is there an emergency shutdown system in place?	Local ESD buttons are provided at two locations in the berth (a) near the loading arms at the berth and (b) near exit walkway. The ESD can be either locally operated or remotely from the Vopak Terminal Control Room.	
Element 5 –Equipment Integrity			
5.1	How is preventive maintenance managed?	The maintenance database software INFOR is used. This software is used globally by Vopak in its worldwide Terminal operations. Preventive and corrective maintenance scheduling and data processing is managed by INFOR. It also covers BLB2 operations of Vopak. KPIs have been defined for maintenance: a) PM work orders overdue (must be completed within a month	

Item No	Question	Findings	Recommendations
		of due date, if not completed within due date. Target 2/month. Except for 1 month, 100% compliance during 2017. b) Process safety WOs completed on schedule. Target 100%. Compliance achieved was found to be 100%. c) Corrective maintenance on-time completion target 98%. 100% compliance has been achieved. It was found that performance targets for maintenance planning and management at Vopak are of a high standard and they are being achieved. INFOR raises monthly reports and cumulative report to date listing outstanding tasks for follow up.	
5.2	What is the process for ensuring mechanical integrity of pressure vessels?	Not applicable for BLB2	
5.3	What is the process for ensuring mechanical integrity of pressure safety valves?	Not applicable for BLB2	
5.4	What is the process for ensuring mechanical integrity of rotating equipment?	Not applicable for BLB2	
5.5	What is the process for ensuring mechanical integrity of atmospheric storage tanks?	Applicable only to Terminal tanks. Not applicable for BLB2.	
5.7	What is the process for ensuring integrity of structures?	Not applicable to Vopak. BLB2 structures are maintained by NSW Ports.	
5.8	What is the system for ensuring trip and MLA envelope protection (slew left, slew right, upper tilt) testing and process control is adequate?	The ESD system and loading arms Emergency Release Coupling (ERC) are tested 2-monthly. Schedule generated by INFOR. Last testing was carried out on 1 November 2017. Document was sighted during the audit.	

Item No	Question	Findings	Recommendations
		The ERC is also checked for integrity of the insulating flange in these tests.	
5.9	How is other safety equipment (e.g. fire detection and protection equipment) inspected and maintained?	Maintained by NSW Ports.	
5.10	How is progress of maintenance activities monitored?	Through INFOR database, which can track and report outstanding items, and behind schedule items. INFOR also generates KPIs to compare against targets. The software has been developed by Enterprise Asset Management (EAM).	
5.11	Is there a permit to work (PTW) system in place?	The Vopak Terminal PTW system applies to BLB2 operations. A dedicated Permit Operator prepares the permit. Shift leaders are the permit authorities. A Job Safety Analysis (JSA) form and a tool box form are signed off by permit authority and person doing the work. Permits are not allowed to be carried across shifts. Must be re-approved for the new shift crew. Hot work permits are also approved by NSW Ports. Where a cold work requires gas testing, Vopak issues a hot work permit for the task to ensure that gas testing is carried out. A review of 17 sample work permits issued indicated there were no non-compliances. There were 7 observations, mainly related to not signing off the returned permits by Permit Authority. Old work permits are archived in external storage. Vopak advised that not signing off the work permit does not imply that equipment may not be safe work on, only that the work may not be complete. A recommissioning form is required stating that the equipment is safe to return to duty.	16/17 Vopak to ensure that returned work permits are signed off by the Permit Authority.

Item No	Question	Findings	Recommendations
5.12	Is there an isolation process in place?	Manual isolation valves for routine operations and ESD valves in an emergency.	
5.13	What housekeeping program is in place?	The procedures require the berth to be left clean and any spills clean-up after the ship leaves. This is being followed. Site visit to BLB2 indicated that housekeeping standard are well maintained.	
Element 6 – Training Management			
6.1	Is there an induction program for new and transferred employees?	There is a Ports induction program run by NSW ports and all Vopak personnel involved in BLB operations must have completed it in order to obtain entry passes.	
6.2	Is there an induction program for contractors?	The Ports induction program applies to contractors as well. In addition, Vopak has an induction program specific to BLB2 and cargo transfer operations.	
6.3	Is there a competency based training program at the site?	All persons working at BLB have to complete a training on safe work instructions. The two applicable modules are BLB1 for bitumen and BLB2 for Bitumen and fuels. These have to be signed off after a competency assessment (questionnaire based). The certification is valid for 2 years before re-induction. The “Task Competency Assessment” register was sighted during the audit. Competency last assessed on 20/9/2017.	
Element 7 - Management of suppliers/third party services			
7.1	How are contractors selected and engaged?	Preventive maintenance relating to mechanical equipment is carried out by PM Installations Preventive maintenance relating to electrical equipment and instrumentation is carried out by Sherry Services Pty Ltd.	

Item No	Question	Findings	Recommendations
		Both contractors operate on an "on-call" basis. All contractors are inducted in safety, and NSW Ports issues Access Control Key, with an expiry date. There is a contractor inductee register. No contractor can access BLB without an access control key.	
7.2	How are contractors managed while on site?	Vopak Terminal personnel oversee the contractor work through routine communications during cargo transfer.	
Element 8 – Management of Change			
8.1	Is there a management of change (MoC) process in place?	There is a formal MoC form at Vopak for all changes, as part of the SMS. This includes a comprehensive checklist, risk assessment, approvals and closeout. The risk assessment determines if a HAZOP is required for the modification. The template of the form was sighted during the audit.	
8.2	How are changes/ modifications recorded?	There is a change control register where the forms are filed.	
8.3	What changes have been recorded since the last Hazard Audit?	There have been no changes to Vopak equipment in BLB2 during the audit period.	
Element 9 – Emergency preparedness and response			
9.1	Is there an emergency response plan for the site?	The emergency response plan for the Vopak Terminal also addresses wharf emergencies. In an emergency NSW Ports takes control and liaises with FRNSW and the EPA.	
9.2	Are emergency drills carried out?	An emergency drill was planned with Vopak for the 5th December 2016 as a desk top review. The scenario was to simulate a spill of diesel from ship 'Gulf Cobalt'. The exercise, however, was not carried out.	See Recommendation 14/2017

Item No	Question	Findings	Recommendations
9.3	Are personnel adequately trained in emergency preparedness and procedures?	Emergency procedures and response are covered in the inductions. However, effective training is achieved only through emergency exercises such as the ones conducted in 2015. Emergency release coupling auto/manual release at the berth is simulated 6-monthly, and records maintained.	
Element 10 – Incident reporting and Investigation			
10.1	Is there an incident reporting and investigation procedure?	The Vopak Terminal incident reporting procedure applies to BLB2 operations. The information is entered on-line in a template and the completed form is printed out. The system also generates the names of people who would receive the report, including NSW Ports.	
10.2	How are incidents reported?	Reporting form was sighted during the audit. There were no incidents reported at BLB2 during the audit period.	
10.3	Are incidents investigated to root causes?	All incidents are investigated to the root causes, and is led by the safety coordinator. For Tier 2 and Tier 3 incidents (none have occurred), the national HSEQ manager/ local HSEQ coordinator would also be involved in the investigation.	
Element 11 – Audits and corrective actions			
11.1	Is there an internal audit program in place?	Vopak conducts 5-yearly internal audits on a rotating basis to cover all its operations. No internal audit has been carried out on BLB2. However, for each ship transfer, a Safety Observation Review (SOR) is conducted and findings recorded. SOR reports were sighted during the audit. There were no issues of concern that would stop a shipping operation.	
11.2	Is there an external audit process in place?	External audits are conducted as follows:	

Item No	Question	Findings	Recommendations
		(a) By Vopak global program (b) By the oil companies whose product is stored at Vopak Terminal (Q8, BP, Mobil, Caltex, United) (c) Required by the NSW Department of Planning as a condition of development consent for BLB2 to NSW Ports. The present audit comes under this category, and commissioned by NSW Ports. An environmental audit of Vopak site was conducted by Sherpa Consultants in August 2016. The audit covered Vopak site B, and did not cover BLB2.	
11.3	Is there a system to capture findings and ensure these are actioned?	All actions arising go into an action plan and tracking. Monthly report on status of action plan and close out generated and discussed in management team meetings.	

Table 8 – Compliance Review of Vopak Operations with AS-3846 -2005

Item No	As-3846 Clause	Requirement	Findings	Recommendations
1	2.4.4 Trained personnel in attendance	Dangerous cargos should only be handled by persons skilled in handling such cargos and by persons being trained (and who are supervised by a trained person).	Two (2) trained persons at all times during cargo transfer (connection/ transfer/ disconnection).	
2	2.4.5 Personal protective equipment	Whenever dangerous cargos are being handled, appropriate personal protective equipment (PPE) shall be readily available in accordance with regulatory requirements and used when necessary.	PPE provided to all personnel. Wearing of PPE mandatory by induction and operating procedure.	
3	2.4.7 Safety showers	Whenever a toxic, corrosive or skin sensitising substance is handled in bulk, a safety shower and eyewash facilities (both using fresh water) shall be provided and kept ready for use. Such equipment may be of a portable type.	Safety showers and eyewash are installed at BLB2, and maintained by NSW Ports. Eyewash checked for functionality during audit.	
4	8.2.2.4 Cargo handling plan	A cargo handling plan shall be prepared	Pre-arrival plan is prepared and sent to ship before arrival for each cargo. Sample document sighted during audit, and found satisfactory. There were 371 ships during 2017, in both BLB1 and BLB2.	

Item No	As-3846 Clause	Requirement	Findings	Recommendations
5	8.2.2.5 Emergency information	In addition to the cargo handling plan, the Master shall provide the following documents: (a) Information on the characteristics of the cargos on board or to be loaded. (b) Crew list. (c) Fire control plan. (d) Ship's emergency management plan.	This is received by Vopak and shared with NSW Ports in advance of ship's arrival, for each ship arrival.	
6	8.2.2.7 Ship/ shore checklist	A ship/shore safety checklist shall be completed. All items that are within the responsibility of the ship shall be checked by the ship's representative, and all items that are within the responsibility of the berth operator shall be checked by the berth operator's representative.	A standard ship/shore checklist for bulk cargo transfer has been prepared and issued to Vopak by NSW Ports. This checklist is used by ship and berth representatives and signed off. Typical signed copies of checklist sighted during the audit (MT Caribbean) and found to be satisfactory. NSW Ports receives a copy. The ship/shore checklist also includes vapour recovery connections for ship loading.	

Item No	As-3846 Clause	Requirement	Findings	Recommendations
7	8.2.2.3 Means of escape from ship	Where a fire or explosion in the shore manifold area could block the escape route of persons from the ship, a means of escape shall be available	An outboard ladder (belonging to the ship) is lowered and kept ready prior to cargo transfer. This is part of NSW Ports ship/shore checklist, Part B question 49. It states; is there provision for an emergency escape? The guidance notes state; Includes provision of a secondary access ladder forward of manifold & lifeboat at embarkation point. In any case, the vessel representative is signing this point to confirm that there is provision for emergency escape AND that it is fit for purpose. If it is unsafe, then there is no provision.	
8	8.2.5 Moorings	All new bulk liquid berths, including bulk gas berths, shall be fitted with quick-release devices.	Quick release couplings fitted. Mooring is not carried out by Vopak, but visually checked by personnel at the berth. If additional tension is required, this is carried out by the ship on request from Vopak.	
9	8.2.9 Operation of sea and overboard discharge valves	All sea and overboard discharge valves that are connected to cargo or ballast pumps, other than those to segregated ballast lines, shall be kept closed, unless permitted by the designated port officer.	Vopak personnel inspect the scupper valves and ensure that they are closed prior to commencing the cargo transfer.	

Item No	As-3846 Clause	Requirement	Findings	Recommendations
10	8.2.12.1 Operation of pipelines, loading arms and flexible hoses	The following procedures and precautions shall be taken upon the completion of every bulk transfer of liquid dangerous cargos: (d) Close cargo line valves and ship valve (e) Drain MLA of all dangerous cargo and depressure prior to disconnecting from the ship.	The MLA outboard is drained by gravity to ship's tank. The MLA in-board is pumped into the pipeline to the Terminal by installed pumps at the BLB. The pipeline is pigged with a solid pig to clear the liquid to storage tank. A pig receival station is installed at the Vopak Terminal. The pipelines are then made free of any fuel vapour by nitrogen purging. Piped nitrogen line is proved from the Terminal and connections are provided to the MLA in-board at the berth. The pneumatic actuated isolation valve is controlled by nitrogen as the motive fluid. Procedure No. OPS005-1B dated June 2017 was sighted during the audit. It is reviewed 3-yearly unless any changes are required prior to the scheduled date.	
11	8.3.7.3 Control of ignition sources	(a) restriction on the use of non-intrinsically safe radios (b) No ignition sources within 25m from ship and in classified hazardous areas	Intrinsically safe (IS) radios are provided by Vopak at the berth and for the ship's master.	

Item No	As-3846 Clause	Requirement	Findings	Recommendations
			Integrity of classified hazardous areas maintained by NSW Ports for BLB2 equipment. Electrical audits carried out by Vopak in BLB1 and BLB2 for hazardous area integrity.	

7 REFERENCES

[1] R.Raman, “NSW Ports 2015 Hazard Audit,” Arriscar Pty Ltd, Report No. J-000108-REP-01-Rev 0, Sydney, 2015.

[2] R.Raman, “NSW Ports - Hazard Audit Extension of BLB2, Port Botany,” Arriscar Pty Ltd, Report J-000187-REP-01-Rev 0, Sydney, 2016.

[3] NSW Government, State Environmental Planning Policy (3 Ports), Sydney, 2013.

[4] G.Draganidis, Sydney Ports Corporation: Fire Safety Study for Bulk Liquids Berth No.2, Sydney: Worley Parsons Resources & Energy, Reort: FG-REP-0001, 2011.

[5] NSW Department of Planning, Hazardous Industry Planning Advisory Paper No.5, Hazard Audit Guidelines, Sydney, 2011.

[6] Standards Australia, AS-3846: The handling and transport of dangerous cargoes in port areas, 2005.

Appendices

Appendix A Summary of Documents Reviewed

Table 9 – NSW Ports Documents Reviewed

Element	SMS Element
Safety Management System Manual, Bulk Liquids Berth 1 and 2, Revision 1.2, March 2017	All
Work Health & Safety Policy – Zero Harm, 27 April 2016	1
NSW Ports organisational chart	1
Port Botany BLB2 Site Plan, 301015-01655-GE-DWG-0006, Rev 0	2
Port Botany BLB2 Hazardous Area Plan, 301015-01655-EL-DWG-0022-01, Rev 0	2
Port Botany Marine Structure Inspection Program (MSIP) 249519-00-Rep-001, 12 August 2016, Arp Pty Ltd	
Port Botany Bulk Liquids Berth 1 and 2 Operations Manual, v 1.2, April 2016	2,3,4
Samples of issued PTW forms	4
Testing records of firefighting system at BLB2, Port Botany by DA Fire Services Fire pump test log sheets	5
Port Botany Bulk Liquids Berth 1 and 2 General Induction, v 5, July 2017	4,6
Skills, Training Requirements extracted from Service provider contract agreement	6, 7
BLB Operator/Contractor/Visitor Quiz (post-induction)	6
Management of Change procedure	8
Bulk Liquids Berths 1 & 2 Emergency Plan – Issue 1.1, 28 August 2013	9
Emergency drill planning brief December 2016	9
Emergency drill planning brief August 2017	9
Incident review forms (BLB1 Incident on 7 March 2014	10

Table 10 - Terminals Documents Reviewed

No.	Document Description
1	Shipping log – cargo transfer, Lists tanks that received the product and times
2	Ship discharge/ Loading Plan. Lists product, ship's tanks, Terminal tanks and parcel size transferred. Signed off by Surveyor, Ship's chief officer and Terminals loading master.
3	List of unusual occurrence and quality non-conformances. The two incidents listed in the audit findings are listed.
6	Cargo planning sheet signed off by Ship's chief officer and Terminals loading master. Lists name of ship, shore tank numbers where product is received, dock line number, and expected duration of transfer at set pumping rate.
7	Health, Safety, Environment and Quality (HSEQ) policy of Terminals Pty Ltd
8	Job Hazard Analysis risk matrix and rule sets and JHA worksheets for various hazards (generic).
10	Operations procedure manual
11	Wharf isolation valve checklist – Lists valve open/ close position for each dock line, prior to transfer. Only the nominated dock lines receiving product are open, the rest closed.
12	P&ID of new refined petroleum product import dock lines
13	Wharf ESD valves test results log sheets

Note: Many of the documents were viewed on-line, assisted by the Operations Manager.

Table 11 - Vopak Documents Reviewed

No.	Document Description
1	Sydney-BLB2 Shipping Operations – Work Instructions, SWI No: SWI005_3.2B, 01/06/2015
2	Quality on-line, Incident Reports relating to BLB
3	Vopak internal briefing note on July 2015 emergency drill and actions planned
4	Extract from Emergency Procedures Plan – Site B, Document No.: OPS09.1B, Issue A, November 2015, Section 6.1.5: Bulk Liquids Berth Complex Wharf Alarm Systems, Section 6.4 and Section 7.4.1.2, Wharf emergency.
5	Copy of work order for ERC testing printed from INFOR
6	Vopak internal briefing note on 3 December 2015 emergency drill.
7	BLB1 Hazardous Area inspection report 2015
8	Wharf drawings
9	Regulatory compliance audit checklist
10	Major Accident Register from MHF Safety Report
11	MLA envelope protection, ERC and import lines ESD test records
12	MoC form template

Note: Many of the documents were viewed on-line, assisted by the HSEQ Coordinator.