Intermodal Logistics Centre at Enfield Environmental Assessment

CHAPTER 20

HAZARD, RISK AND INCIDENT MANAGEMENT

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20. Hazard, Risk and Incident Management

This chapter addresses the Director-General's requirement to assess hazards and risks associated with the proposal. It provides a description of the Preliminary Hazard Analysis (PHA) undertaken by Qest Consulting for the intermodal terminal activities on the Intermodal Logistics Centre (ILC) site. The full report is provided as Appendix K to the Environmental Assessment. The PHA study identifies the potential hazards on-site to determine potential for off-site impacts and has been prepared in accordance with Department of Planning's Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis (DUAP, 1996) and Multi-Level Risk Assessment (DUAP, 1997). The PHA provides a range of assumptions relating to dangerous goods, which are likely to be handled on site, and the quantities involved based on current Port Botany operations. The location of activities within the ILC have been reviewed and considered against similar operations to develop a range of scenarios which could result in the release of potentially hazardous materials. Consideration was also given to the risk associated with material released as a result of container transport to and from the site via road and rail. The likelihood of release and consequences in terms of impacts on human and environmental health were modelled using SAFETI software to identify the risks. Risks are presented as location specific fatality and injury contours around the site.

The emergency response and incident management procedures required for operation of the ILC form the second half of this chapter. Details of the management structure, content and implementation of the Emergency Response and Incident Management Plan (ERIMP) and sub plans is outlined. Preparation of an ERIMP would need to be undertaken by the ILC operator in consultation with Sydney Ports Corporation prior to operation of the site.

20.1 Introduction

During operation the intermodal terminal which forms part of the Intermodal Logistics Centre (ILC) at Enfield would handle a range of goods including dangerous goods. In order to assess the potential risk of these materials to the surrounding community a Preliminary Hazard Analysis (PHA) was prepared by Qest Consulting (Appendix K). This assessment excludes activities and operations of other areas of the ILC, namely empty container storage yards, and warehouse and light industrial areas, as the detailed nature of activities in these areas has yet to be identified. Should the future operations of those facilities involve the likely handling of dangerous goods, separate assessment and approvals will be required on a case by case basis.

This assessment is based on the assumption that dangerous goods will not be handled outside the terminal area in the warehouses or associated buildings. The assessment uses the type and quantities of materials passing through Port Botany to determine those to be handled in the intermodal terminal at Enfield. This information was used to develop the incident management requirements both on and off the site to minimise the risks to a range of receptors.

20.2 Preliminary Hazard Assessment

The PHA provides an assessment of risk from the activities within the intermodal terminal area of the ILC site and the transportation of dangerous goods along the existing freight line from Botany to Enfield and on the roads close to the ILC.

The assessment is based on the intermodal terminal site operating at full throughput capacity (approximately 300,000 TEU per annum) and assumes that dangerous goods would be equally distributed amongst the container stacks. Based on the 2004 level of dangerous goods passing through Port Botany approximately 2-3% of containers contain some dangerous goods. Most containers holding dangerous goods only contain a relatively small quantity, although some carry solely dangerous goods.

Traffic and transport studies have shown that the intermodal terminal will generate between 10 and 20 train movements per day (most likely 16). Road traffic would be predominantly through the western entrance to the site (Wentworth Street), although there may be some trucks carrying dangerous goods that access the site via Cosgrove Road. An average of 15 containers with dangerous goods would be transported to or from the site by road per day, representing an average of 9 truck movements per day.

20.2.1 Process

The PHA has been prepared in accordance with the guidance provided by the NSW Department of Planning (DoP)[1] in Hazardous Industry Planing Advisory Paper (HIPAP) No 6 – Guidelines for Hazard Analysis (DUAP, 1996). The assessment of risk has been undertaken in accordance with criteria published in HIPAP No.4 – Risk Criteria for Land Use safety Planning (DUAP, 1990). Hazard Screening methodology is consistent with the principles of the Multi-Level Risk Assessment guidelines (DUAP, 1997). The steps followed in the assessment are outlined in **Table 20-1**.

Table 20-1: Steps Involved in the 'Classical' Form of Risk Analysis.

Hazard Identification	Includes consideration of the events on the site and related off site activities which may lead to the release of hazardous material
Frequency Estimation	Consideration of the frequency or likelihood of an accidental release
Consequence Analysis	Consideration of the consequences of a release event
Risk Calculation	Involves combination of the frequencies and consequences of each event to determine the levels of risk
Risk Assessment	Comparison of the risk assessment against risk criteria

Qest used the software SAFETI (Software for the Assessment of Fire, Explosion and Toxic Impact) to undertake the assessment.

[1] DoP was previously named Department of Urban Affairs and Planning

20.2.2 Hazard Identification

Location

The proposed operations on the site were reviewed with reference to similar port and container operations to identify hazards. Consideration was given to the location of activities involving dangerous goods. These were identified to be:

- The gantry cranes;
- Loading and unloading of road vehicles; and
- General storage areas.

The only other hazardous material associated with the intermodal terminal is diesel fuel for the locomotives, which is to be stored in 3 tanks. The locations of these tanks are shown in **Figure 4-2a**. Two tanks are to be located at the empty container storage areas, one at either side of the intermodal terminal (25,000 litres each) and a third located near the maintenance building (10,000 litres). The loss of containment of a diesel fuel storage tank may lead to a pool fire. Modelling of this scenario identified that the potential consequences would have negligible off-site impacts provided that the tanks were located more than 16m from the site boundary.

Material

Materials likely to be handled on site, which could potentially be involved in an accident, and the potential scenarios are shown in **Table 20-2**.

Table 20-2: Potential Hazard Scenarios

Material Class	Description	Potential Scenario
1	Explosives	Explosion of part or all of a container
2.1	Flammable gases	Jet fire, flash fire, Vapour Cloud Explosion or BLEVE[2]
2.3	Toxic gases	Toxic gas cloud
3	Flammable liquids	Jet fire, pool fire or flash fire
4	Flammable solids, spontaneously combustible or Dangerous When Wet	Explosion or fire
5	Oxidising Agents or Organic Peroxides	Fire or explosion
6.1	Toxic Materials	Fire involving this material
7	Radioactive	Spill causing contamination
8	Corrosives	Spill causing injury

A breakdown of the quantities of dangerous goods is provided in Appendix K – Preliminary Hazard Analysis. Isotanks of Class 2.3 materials would not be handled at the intermodal teminal.

Methods of Release

Potential on-site methods of release as identified within the PHA are shown in **Table 20-3**.

[2] Boiling Liquid Evaporating Vapour Explosion

Although the likelihood of fires and smoke hazards on the site was considered to be rare it was included in the risk modelling, particularly if fires were associated with toxic materials. Pool fires resulting from diesel leakage were also included.

Table 20-3: Hazard Identification Summary

Activity	Hazard	Cause	Consequence
Truck/train unloading via forklift, reach stacker and/or crane gantry.	Loss of containment of dangerous goods during unloading	Loss of control of container due to operator error	Container drops or impact with ground, train, truck or other obstacle. Potential loss of containment of dangerous goods leading to possible fire, explosion or toxic gas release
		Impact with other container, train or gantry structure	
Transportation of container on-site via forklift and/or reach stacker.	Loss of containment of dangerous goods during transport	Container handling vehicle accident (traffic), impact with other vehicle	Container drop or impact with ground, train, truck or other obstacle. Potential loss of containment of dangerous goods leading to possible fire, explosion or toxic gas release
		Forklift, reach stacker and/or crane gantry failure	
		Impact with other container during manoeuvring	
Stacking of containers via forklift, reach stacker and/or crane gantry.	Loss of containment of dangerous goods during stacking operations	Unstable container stack	Container drop or impact with ground, stack or other obstacle. Potential loss of containment of dangerous goods leading to possible fire, explosion or toxic gas release
		Impact with other container during manoeuvring	
		Misalignments with lower containers	
Loading of dangerous goods onto truck via forklift, reach stacker and/or crane gantry.	Loss of containment of dangerous goods during truck loading operations	Forklift, reach stacker and /or crane gantry car failure	Container drop or impact with ground, truck or other obstacle. Potential loss of containment of dangerous goods leading to possible fire, explosion or toxic gas release
		Container handling vehicle accident (traffic), impact with other vehicle	
		Misalignment with truck (operator error, truck move)	
Loading of trucks and rail cars via forklift, reach stacker and/or crane gantry.	Loss of containment of dangerous goods during loading	Loss of control of container due to operator error	Container drop or impact with other obstacle. Potential loss of containment of dangerous goods leading to possible fire, explosion or toxic gas release
		Impact with other container, or gantry structure	
Transportation on-site via trucks and rail cars	Loss of containment of dangerous goods during transportation on site	Truck accident (traffic). (Excessive speed, drugs, fatigue, inexperience)	Truck impact with other vehicle or other obstacle. Potential loss of containment of dangerous goods leading to possible fire, explosion or toxic gas release
Diesel fuel storage	Loss of containment	Tank failure, over filling, operator error, equipment failure plus others	Pool fire
Vehicle movements on site	Vehicle fire	Electrical fault, overheating of brakes, fuel leaks	Vehicle fire that could involve containers of dangerous goods

Off-site methods of release include rail and road transport of goods to and from the intermodal facility. An analysis of the road transportation risks associated with the movement of dangerous goods was

also undertaken for the areas immediately around the site. This identified that the only area where the increase in truck numbers would be significant was Wentworth Street/Norfolk Road where there would be a total of 9[3] truck movements (inwards plus outwards) carrying dangerous goods per day (5,600 containers per annum). For the rail route to and from Port Botany, there will be 15.4[4] container movements each day.

20.2.3 Likelihood/Frequency Analysis

Release of potentially hazardous materials would occur as a result of accidents most likely due to human error. The likelihood of an accident as a result of human error was given a probability. For example, simple tasks that are frequently performed were less likely to result in an accident and had a low probability rating, whilst highly complex tasks, which needed to be performed in little time under high stress conditions were given a higher probability of resulting in an accident. Intermodal terminal operations, which dominate the potential for loss of containment of dangerous goods, fall into the task types of 'simple, frequently performed, minimal stress' or 'some care needed' were identified as having the lowest probabilities for human error. Further details are provided in Section 7 of Appendix K – Preliminary Hazard Analysis.

20.2.4 Consequence

Risks to People are presented in terms of individual[5] and societal risks[6] of

- Fatality;
- Injury including acute toxic exposure (serious injury, irritation or other physiological response), heat radiation or explosion overpressure; and
- Property damage and accident propagation;

Risks to the biophysical environment are presented in terms of long term threats to the viability of a species or ecosystem.

A series of risk criteria have been developed which represent maximum acceptable levels of risk (fatalities per million per year) for a range of land uses. Residential development has a lower criterion,

[3] 5,600 containers per annum, 15.4 containers per day, 1.65 containers per truck gives 9.3 truck movements per day. These 9 truck movements per day of dangerous goods are inclusive of deliveries to and removals from the intermodal terminal. See Section 5.6 of Appendix K – Preliminary Hazard Analysis.

[4] 5,600 containers per annum 15.4 containers per day, inclusive of deliveries to and removals from the intermodal terminal. See Section 5.5 of Appendix K – Preliminary Hazard Analysis.

[5] Individual risk refers to the individual risk experienced by a single individual in a given time period reflecting the severity of the hazard and amount of time the individual is exposed to it. This is expressed as risk of fatality per year. Further details are provided in Sections 8, 9 and 10 of Appendix K – Preliminary Hazard Analysis.

[6] Societal risk refers to the risk experienced in a given time period by the whole group of personnel exposed. It reflects the severity of the hazard and the number of people exposed to it. It is usually expressed as a risk per year. Further details are provided in Sections 8, 9 and 10Appendix K – Preliminary Hazard Analysis.

where an acceptable risk is considered to be less than 1 per million per year ($1x10^{-6}$). For industrial development an acceptable risk is considered to be less than 50 per million per year ($50x10^{-6}$).

20.2.5 Risk Assessment

The modelling results include contours of risk levels around the site for individual and societal risks providing a figure for the likelihood of a fatality or injury at different distances from the intermodal terminal facility. These contours showed that the risk of fatality at the site boundary (which is within industrial development) does not exceed 50 in a million per annum. The contours prepared for injury show that the 10 in a million contour does not extend to residential zoned land or to residences. Similarly for irritation, the risks do not exceed acceptable criterion.

The societal risk assessment concluded that there is a very low likelihood of killing a person not on the site due to a dangerous goods incident. The societal risks associated with the operations at the proposed intermodal terminal are considered negligible.

The modelled risks for road and rail transportation of goods to and from the site were also very low for rail (did not exceed $5x10^{-8}$ around the rail corridor) and low for road transport (did not exceed $5x10^{-6}$ at any location).

The range of accident scenarios was also considered in terms of potential long term effect on the biophysical environment. The range of scenarios including loss of containment, diesel spill and fire were considered. The on-site drainage system, which has been designed so that a spill of up to 20,000 litres could be contained within the first flush containment basin, means that materials would be captured before reaching Coxs Creek or off site receptors. As a result, the risks to the biophysical environment are considered to be very low.

20.2.6 Conclusions

Dangerous goods would only be handled within the intermodal terminal facilities within the ILC. The majority of activities are routine low stress activities with a low probability of human error. Calculations undertaken as part of the PHA estimated approximately 5600 containers of dangerous goods per year once the maximum capacity is reached. This will include approximately 15 container movements on trains and 9 truck movements per day. Class 2.3 isotanks would not be handled through the intermodal terminal.

The PHA concluded that the operations within the intermodal terminal and transportation of the containers with dangerous goods by road and rail to and from the site contributed an acceptably low level of risk. Providing the risks to operation are managed effectively to ensure that they are kept as low as reasonably practicable, the operation would meet the criteria published by the Department of Planning.

20.3 Emergency and Incident Management

Potential incidents which may lead to the release of potentially hazardous materials are described in **Table 20-3**. Measures to minimise the potential for incidents arising from release of potentially hazardous goods include:

- First flush containment system;
- Traffic management measures;
- Operational procedures to minimise the likelihood of dropping or impacting containers carrying dangerous goods;
- Bunding around fuel storage areas; and
- Location of fuel storage areas away from vehicle activities to minimise the chances of collision.

An Emergency Response and Incident Management Plan (ERIMP) would also provide a means of identifying and reacting to incidents or potential incidents.

20.3.1 Emergency Response and Incident Management Plan

An Emergency Response and Incident Management Plan (ERIMP) would be prepared for the site. This would:

- Ensure that the appropriate emergency response equipment is provided;
- Ensure staff understand their roles and responsibilities and undergo training as required;
- Put specific procedures in motion to manage an incident or emergency;
- Establish an emergency response team;
- Ensure that an emergency or incident is managed in a systematic way;
- Deal with inquiries from the public and staff;
- Allow the continued delivery of essential services during an incident or emergency situation without increasing risk;
- Establish procedures for interaction with other agencies and neighbouring facilities throughout an incident or emergency situation;
- Clearly define responsibility for emergency and incident management, including clear lines of accountability throughout the organisation;
- Validate emergency preparedness through exercises and testing of emergency procedures;
- Allow for monitoring and review to continually update and improve the system; and
- Allow for independent auditing.

The ERIMP would differentiate between minor and major incidents, with a nominated Emergency Management Officer (EMO) making the decision on the magnitude of the incident.

The EMO would be a person nominated by the operator(s) of the ILC to act as an emergency management officer and provide advice to the relevant emergency services representatives during an emergency.

On-Site Incident Strategy

Minor incidents may be defined as those that can be contained and managed by terminal personnel without exposing them to significant risks. An example would be the spill of a material, such as an oil leak from machinery, which because of the nature of the material and the amount spilt, would not pose a significant risk to personnel. For minor incidents, the attendance of external emergency services would not be required.

Major incidents, such as a significant fire or toxic gas release, would be managed by emergency services. The EMO would liaise with emergency services to facilitate assistance by the terminal personnel, without compromising their safety by:

- Providing information on the type and quantity of material involved;
- Moving containers and equipment as required; and
- Providing access to spill control, fire fighting and other emergency equipment and supplies available on site as required.

Off-Site Incident Strategy

Management of all off-site incidents, both minor and major, would be the responsibility of the emergency services. Site personnel would extend assistance by:

- Providing information on the material involved; and
- Assisting in managing loss of containment at source.

Incident Reporting System

The ERIMP would include an incident reporting system. Specific incidents and corrective action taken (where required) shall be registered. If an incident occurs that had caused or would be likely to cause harm to the environment, the terminal operator(s) would report the event to the relevant authority and Sydney Ports as soon as practicable.

Incident Management Plans

The ERIMP would include a number of specific sub-plans including:

Spill Containment and Management

The proposed ILC would be equipped with emergency response equipment typically comprising absorbent materials, absorbent pads to block drainage points and protective equipment consisting of gloves, rubber boots, eye protection etc.

Accidents resulting in liquid spills would be contained within the ILC's first flush system. Following containment, the spill would be disposed of in an appropriate manner. For large incidents involving dangerous goods, external emergency services would be contacted and control of the incident would pass to the emergency services on arrival at the ILC.

Fire Fighting

The fire fighting system would be designed to meet the requirements of the NSW Fire Brigade, Australian Building Standards and the Building Code of Australia. A Fire Management Plan would be developed and implemented at the site, which would incorporate signage and training requirements for all personnel at the site.

20.3.2 Security

Security at the ILC would include monitoring and controlling access, monitoring the activities of people and cargo, and ensuring security communications are readily available.

20.3.3 Access

Rail and Road

Measures to control access to the site will be based on the operational needs of the ILC tenants. It is expected that the access control to the site will be augmented from time to time, in response to changes in security status of the site. Generally, east and west access to the site from Wentworth Street and Cosgrove Road can be controlled using boom gates. Further details are provided in Chapter 4 – Project Description.

Visitors

Visitors could access the site from Wentworth Street or Cosgrove Road. Procedures would be put in place to monitor visitors. The ILC would be secured from unauthorised access from adjoining lands using security fences at least 2m high. Noise barriers would perform security tasks along part of Cosgrove Road and Wentworth Street.

Community and Ecological Area

Access to the Community and Ecological Area would be managed.

20.3.4 Conclusions

The future operator(s) of the proposed ILC, with advice from Sydney Ports, would need to prepare an ERIMP prior to operations commencing. The purpose of the ERIMP would be to provide an organised and practised response to incidents and emergency situations to protect employees, the public and the environment.

The ERIMP would differentiate between minor and major incidents, with a nominated EMO making the decision on the magnitude of the incident.

Minor incidents with no off-site impacts, not requiring emergency services, would be handled by personnel on site. Major incidents, such as a significant fire or toxic gas release, would be managed by emergency services. The EMO would liaise with emergency services to facilitate assistance by terminal personnel, without compromising their safety. This would be achieved by way of providing information on the type and quantity of material involved, moving containers and equipment as

required, and providing access to the spill control, fire fighting and other emergency equipment and supplies available on site.

The fire fighting system at the new site would be designed to meet the requirements of the NSW Fire Brigade, Australian Standards and the Building Code of Australia. A Fire Management Plan would be developed and implemented at the site, which would incorporate signage and training requirements for all personnel on the ILC.

The combination of the internal and external emergency response and incident management resources that would be available would adequately minimise the risk to employees, the public and the environment from potential on-site emergencies and incidents.