

APPENDIX L

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APPENDIX L1

Non-fatal traffic accidents

L1.1 INTRODUCTION

L1.1.1 AIM

The aim of this technical report is to provide additional information on the road safety impacts of the proposed Olympic Dam expansion by considering impacts on non-fatal vehicle accidents. This note complements the work in the Draft EIS which has already provided an overview of the anticipated impacts on fatal vehicle accidents.

This technical report:

- presents a summary of the information provided in the Draft EIS
- provides a broad picture of non-fatal vehicle accidents in South Australia
- considers casualty crash data from the Australian Road Assessment Program (AusRAP 2008) as the basis of determining potential additional non-fatal casualty crash impacts.

In compiling this note, an error was identified in the some figures presented in the Draft EIS, and these are identified and amended figures are presented.

L1.1.2 BACKGROUND

The assessment of traffic accident impacts undertaken for the Draft EIS was based solely on fatal accidents. The main reason for focusing on fatal accident impacts was that the 'impact indicator' (i.e. a fatality) is a standard measure and information on fatality statistics is readily available. Other impact measures, such as serious injury or number of accidents, are generally available; however, definitions tend to differ across the states and territories, making comparisons and analysis difficult.

The Draft EIS took a broad approach to assessing impacts of additional traffic volumes from the proposed expansion and inferred that increases in accident numbers would be directly proportional to the related increases in traffic volumes. The Draft EIS provided a breakdown of the proportional increases in volumes by traffic types for relevant sections of roads. The Draft EIS noted that there should be no increases in accident rates (where 'rate' was measured in accidents per population or per distance), but that the number of accidents would potentially increase because the population base and distances would increase. The Draft EIS also noted that this was a conservative approach and that the assumed increase in impact (through accidents) does not consider mitigation measures (such as drivers adapting to changed traffic volumes).

Non-fatal accidents were not considered as part of the Draft EIS because it was reasoned that the proportional increases in the number of fatal accidents would be the same as for non-fatal accidents.

Investigating the impacts of the proposed expansion on non-fatal accidents requires a more detailed assessment of the available information and, in some cases, interpretation of that information. It requires a consideration of the differences between rural and urban statistics and the effects of additional accidents involving trucks.

L1.1.3 METHOD

The method for this broader assessment is consistent with the Draft EIS assessment and involved identifying or determining various non-fatal accident statistics for similar sections of road and applying a scaling factor proportional to the anticipated increase in traffic volumes due to the proposed Olympic Dam expansion.

The main assumption is that the additional impact is proportional to the predicted traffic increases due to the expansion.

Traffic accident studies were also reviewed to help identify relevant trends to support or elaborate on the statistics.

This assessment does not consider the impacts of over-dimensional loads (i.e. those traffic movements that require transport permits).

L1.2 INFORMATION REVIEW

L1.2.1 DRAFT EIS PROCESS

Information presented in the Draft EIS

The traffic impact information provided in the Draft EIS is a summary of information from a specific traffic impact study, the ARUP Transport Impact Assessment (see Appendix Q9 of Draft EIS).

In compiling this technical report, an error was detected relating to the relative increases in bus and light truck movements on Olympic Way. Summarising the information resulted in an error in the Draft EIS which led to an over-reporting of the increase in movements during initial construction and an under-reporting of movements during later phases of the project.

The differences can be seen in Table 1.

Table 1: Comparison of reported and actual percentage changes in bus and light truck traffic movements on Olympic Way

	Reported in Draft EIS	Amended
Initial construction (referred to as Phase 1)	250%	70%
Construction with intermodal (referred to as Phase 2)	50%	170%
Ongoing operations (referred to as Phase 3)	60%	190%

Despite the changes, by far the major vehicle movements on Olympic Way remain personal vehicle movements. It is also noted that the figures supplied in the Draft EIS are conservative, (i.e. the level of impact is overestimated).

The information provided in the Draft EIS (including amendment) is summarised in Table 2 and 3 below.

Some additional information is provided in Table 2 of this technical report; this is the total distance predicted to be travelled by particular vehicle types as a result of the expansion. The source of the additional information is the Transport Impact Assessment (see Q9 of Draft EIS). Total distance travelled per year has been calculated by multiplying the number of vehicles per day by the nominal distance of that road sector by 350 days a year.

Table 2: Traffic increase due to expansion of Olympic Dam

First figure is percentage increase over base case; second figure (in brackets) is estimated additional annual distance travelled in millions of kilometres (mkm) – based on data from ARUP Traffic Impact Assessment (Appendix Q9 of Draft EIS) and assuming distance travelled is double (i.e. allows for ‘up and back’).

% (mkm/y)	Two Wells to Port Augusta	Stuart Hwy (Port Augusta to Pimba)			Olympic Way		
	Heavy vehicles (HV)	HV	Light trucks & buses	Personal vehicles	HV	Light trucks & buses*	Personal vehicles
Phase 1	5 (3.21)	30 (3.00)	50 (2.07)	50 (19.4)	50 (1.96)	70 (0.97)	70 (9.13)
Phase 2	8 (5.62)	40 (6.00)	100 (5.13)	130 (48.2)	80 (3.47)	170 (2.41)	200 (22.7)
Phase 3	4 (0.20)	20 (2.82)	100 (5.62)	130 (53.0)	30 (1.50)	190 (2.65)	150 (24.9)

* amended percentage increases.

Note 1: mkm/y – million kilometres per year.

Note 2: For the purposes of this technical report, the total construction period has been broken down into phases as follows: Phase 1 – road only to Olympic Dam; Phase 2 – use of Pimba intermodal facility; Phase 3 – Ongoing operations (with rail line) and traffic volumes have been averaged for these periods.

Table 3: Personal vehicle fatal accident rates

Fatalities per 100,000 population		Fatalities per 100 million km travelled	
SA	Australia	SA	Australia
9.4	8.3	1.0	0.8

Basis of Draft EIS assessment method

The Draft EIS noted that the fatality rates would not necessarily change as a result of the increase in traffic volumes. The reason for this is that accident rates are averages and reflect the chance (or probability) that an individual would be fatally injured in an accident and are dependent on the number of people and the individual distances travelled. However, given that the total distances travelled would be higher, the potential number of fatalities may increase proportionally.

A review of the literature indicates that there are differing views on the relationship between increased traffic volumes and accident rates. Elvik and Vaa (2003) conducted a meta-analysis of a large number of studies on road safety measures and describe an almost linear relationship between the frequency of accidents and the traffic volumes. On the basis of this relationship, it can be said that increased traffic volumes lead to an increase in the number of accidents.

However, other works (Blauwens et al. 2004) have noted that accident rates (measured in accidents per vehicle kilometre) decrease with an increase in traffic volume and also note that increasing volumes primarily result in higher risks to pedestrians and cyclists. Lord (2001) conducted an extensive review of traffic accident risk studies and also noted the non-linear relationship between traffic volume and accident rate.

For the purposes of the Draft EIS, the conservative linear model was used to estimate the impact of additional road traffic. Using the same model, this technical report has extended the impact assessment and considered the impact on non-fatal casualty accident rates.

The quantitative risk assessment undertaken for the increased traffic as a result of the proposed expansion is reported in Appendix C of the Draft EIS. The analysis is based on the linear model, which reports a direct proportional relationship between fatal accidents and traffic volume. The assessment results for the transport options are also provided and show that BHP Billiton has selected the optimum transport option. With the early installation of an intermodal facility and then a rail spur, the predicted number of potential fatal accidents across the whole of the construction period is more than halved.

L1.2.2 NON-FATAL ACCIDENT DATA

Data to determine the impact of additional traffic on non-fatal accident derived from a number of sources is provided below and includes:

- a broad study on South Australian rural road accidents
- South Australian Police accident data and Australian Bureau of Statistics information
- statistics from AusRAP 2008.

CASR study

The Centre for Automotive Safety Research (CASR), conducted an in-depth study of rural road accidents in South Australia during March 1998 and February 2000.

This study investigated 236 rural accidents, of which 32% required hospitalisation and 23% involved fatalities. Almost half the accidents involved single vehicles, while trucks were involved in less than 9%.

It was noted that accidents tend to occur on roads with a high speed limit, with the majority occurring on straight sections and involving young drivers, particularly those on provisional licences. Unsealed road shoulders were implicated in 21% of crashes.

South Australian Police Department data

The South Australian Police Department (SAPOL) collates data on vehicle accidents across the state. Data is available for accidents involving heavy vehicles (trucks) and for all vehicles and also for fatal and serious accidents (non-fatal accidents). Some information on location, contributing factors and vehicles involved is also available.

SAPOL defines a 'serious accident' as one requiring hospitalisation.

The SAPOL fatal and serious accidents data for 2008 was summarised and can be seen in Tables 4 to 7.

It is noted that a similar number of accidents occur on urban/metropolitan roads as on rural roads. It is also noted that accidents predominantly involve private vehicles or cars.

Table 4: Number of fatal and serious accidents (2008) – all vehicles (by region)

Number	Rural	Adelaide	Adelaide to Woomera
Fatal	44	42	n/a
Serious	438	564	n/a

Table 5: Number of fatal and serious accidents (2008) – truck-related (by region)

Number	Rural	Adelaide	Adelaide to Woomera
Fatal	11	4	1
Serious	44	31	5

Table 6: Percentage of fatal and serious accidents (2008) – all vehicles (by vehicle)

%	Cars	Motorcycle	Trucks	Utility	Other
Fatal	60	14.2	10.2	9.5	6.1
Serious	75	12.9	3.0	4.2	4.9

Table 7: Percentage of fatal and serious accidents (2008) – truck-related (by vehicle)

%	Cars	Motorcycle	Trucks	Pedestrians	Other
Fatal	50	12.5	6.3	15.5	15.7
Serious	46	7.4	14.7	10.3	21.6

The SAPOL data concurs with the CASR study, showing that the majority of fatal and serious accidents involve cars. Trucks are involved in 10 per cent of all fatal and 3% of all serious accidents.

Survey of motor vehicle use (ABS 2008)

The Survey of Motor Vehicle Use – ABS 9208.0 (ABS 2008) – can be used to determine the distances travelled in South Australia by vehicle type.

Table 8 from ABS 2008 shows that over that during 2006 and 2007 there was a relatively constant volume of traffic and distances travelled in South Australia. For the purposes of this technical report, this has been used as the basis for assuming that data from within this period is generally applicable across the whole period.

Table 8: Survey of motor vehicle use – ABS 2008 (12 months ending 31 October 2007) Report date 28 August 2008. Table 3

SA	2003	2004	2005	2006	2007
Kilometres travelled (millions)	14,963	15,241	14,533	15,535	14,212
Number of vehicles	1,075,855	1,082,691	1,107,910	1,139,681	1,147,367

Table 9 shows vehicle use data from South Australia for the year under review (year ending October 2007).

Table 9: South Australian vehicle use by vehicle type (2007). Table 4 of ABS 2008

	Passenger vehicle	Motorcycle	Light commercial	Rigid truck	Articulated truck	Non-freight truck	Buses
Kilometres travelled (millions)	10,684	106	2,230	476	575	14	127
Number of vehicles	925,709	36,264	147,001	26,253	6,401	1,684	4,054

However, the ABS report does not provide a breakdown of distances travelled by vehicle types in rural and urban areas.

The report does provide the breakdown at a national level and for this technical report it has been assumed that the national figures are representative of the South Australian situation.

The national figures, for total distances travelled in urban and rural areas, are presented in Table 10.

Table 10: Breakdown of distances travelled (national) by vehicle type (2007)

	Capital city (%)	Non-capital city (%)
Personal vehicles/cars	78	59.7
Light commercial	15.4	24.7
Trucks	4.7	13.0
Other	1.9	2.6

For the reporting year, the ABS report notes that within South Australia, 9,233 million kilometres were travelled in the urban area of Adelaide and 4,282 million in the rest of the state.

Therefore, combining the national breakdown of vehicle use and the total distances travelled in South Australian urban and rural areas, an estimate of the distances (in millions of kilometres) by vehicle type in South Australia is calculated and presented in Table 11.

Table 11: Calculated distances travelled in South Australian by vehicle type (2007)

	Distance (millions of kilometres)	
	Urban	Rural
Personal vehicles/cars	7,201 (78%)	2,556 (59.7%)
Light commercial	1,442 (15.4%)	1,058 (24.7%)
Trucks	434 (4.7%)	557 (13%)
Other	175 (1.9%)	111 (2.6%)

The figures show that cars are the predominant vehicles used in both urban and rural areas. Trucks account for 13% of the distances travelled in rural area.

Key points

The following observations are made from the data:

- most rural accidents predominantly involve cars travelling at high speeds
- cars are involved in 60 per cent of fatal accidents and 75% of all serious accidents
- private vehicles and cars dominate road use
- most truck accidents (61%) occur in rural areas
- most truck accidents (up to 50%) involve cars
- 7% of the fatal and serious crashes involving trucks in 2008 occurred between Adelaide and Woomera
- in 2007, 56% of truck travel in SA was in rural areas
- trucks are involved in more than 10% of all fatal accidents on South Australian roads and less than 3% of serious accidents.

L1.2.3 AUSRAP INFORMATION

The AusRAP 2007 information provides fatality and casualty crash information on stretches of road across Australia. It is independent of vehicle type and focuses on the number and severity of crashes. However, it does provide an indication of both the fatal and 'casualty' accident rates on different stretches of roads, thereby providing the means to estimate the impact of the Olympic Dam expansion on the number of non-fatal accidents.

The casualty and fatality figures are based on five years of data between 2000 and 2004 and are presented in Table 12.

Table 12: AusRAP information results for South Australia

	Vehicles per day	Casualty crashes 2000 to 2004	Fatalities 2000 to 2004	Collective risk (casualty crash per km) (*1)	Individual risk (casualty crash per 100 mkm) (*1)
Port Augusta to Pimba	750	46	2	0.05 (L/M)	19.77 (H)
Port Augusta to Port Wakefield (*2)	2,900	72	5	0.11 (M)	11.06 (M)
Port Wakefield to Adelaide	8,250	103	1	0.30 (H)	10.09 (M)

* Note 1 – H, high; M, medium; L low (AusRAP 2008 definitions)

* Note 2 – This stretch of road is not represented in the statistical tables provided in AusRAP 2007. Two stretches of road are identified: Port Augusta to Port Pirie and Bute to Port Wakefield. For the figures in this table, the higher of the two figures has conservatively been used.

By using the AusRAP 2007 data combined with data on the anticipated additional vehicle volumes due to the Olympic Dam expansion (as seen in Table 2 of this report), it is possible to estimate the number of potential additional casualty crashes that may occur on particular stretches of road. Note that for the purposes of this technical report, the following assumptions have been made:

- individual risk for Olympic Way has been assumed to be equal to that for the Port Augusta to Pimba road
- the individual risk for the Two Wells to Port Augusta section has been assumed to be the average of the Port Wakefield to Adelaide and the Port Augusta to Port Wakefield stretches
- truck (heavy vehicle) traffic includes Olympic Dam expansion-specific freight and additional freight for expanded townships and surrounds.

Table 13 shows the calculated number of additional casualty crashes due to the expanded road use from the proposed Olympic Dam expansion (compared to the calculated existing number). The figures should be used with caution as they are based on 'scaling up' existing accident rates with no consideration for changed road conditions or changed driver behaviours. The figures should be used for indicative purposes only.

Table 13: Calculated potential additional casualty crashes due to expanded Olympic Dam traffic volumes (compared to existing situation)

	Potential additional casualty crashes per year (existing casualty crashes per year)						
	Two Wells to Port Augusta	Stuart (Port Augusta to Pimba)			Olympic Way		
	Heavy Vehicles	Heavy vehicles	Light trucks and buses	Cars	Heavy vehicles	Light trucks & buses	Cars
Phase 1	0.3 (13.3)	0.6 (2.4)	0.4 (0.8)	3.8 (7.8)	0.4 (0.7)	0.2 (0.3)	1.8 (2.4)
Phase 2	0.6 (14.3)	1.2 (2.9)	1.0 (0.9)	9.5 (8.3)	0.7 (0.9)	0.5 (0.3)	4.5 (2.9)
Phase 3	0.02 (15.1)	0.6 (3.1)	1.1 (1.1)	10.5 (8.7)	0.3 (0.9)	0.5 (0.3)	4.9 (3.1)

L1.3 SUMMARY

This technical paper has provided additional information on the potential impacts of additional traffic volumes on road safety and the potential increases have been presented in Table 13 of this report.

The impact has been determined by identifying the current road safety statistics (fatal accident rates and casualty crash rates) and scaling the figures in proportion to the proposed additional traffic volumes.

L1.4 REFERENCES

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APPENDIX L2

USG marine safety

Public Maritime Safety Review – Upper Spencer Gulf



- Final Report
- 26 October 2010



Public Maritime Safety Review – Upper Spencer Gulf

FINAL REPORT

- 26 October 2010

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Executive Summary

BHP Billiton engaged SKM to review the safety of proposed maritime operations in the Upper Spencer Gulf as part of the expansion of Olympic Dam operations. The review forms part of the Supplementary Environmental Impact statement required following review of the draft EIS prepared as part of the approval process for the expansion project (BHP Billiton 2009).

As part of BHPB's expansion at Olympic Dam, substantial quantities of new equipment and materials will be required on site. Some components for the expansion would be prefabricated as large modules elsewhere, before delivery and installation on site. Because of their bulk and large dimensions (up to 15 m wide by 15 m high and up to 500 tonnes in weight) delivery by sea would be the most effective and least disruptive approach. A landing facility would be needed at the coast to unload these modules prior to transporting them to Olympic Dam by road. Forecast shipping volume is around 300 vessel calls over the first seven years of the expansion, with 100 arrivals in the first two years and 200 in the following five years. This translates to one visit per week for the first two years, and one visit each 9 days for the following five years.

The preferred location for the landing facility is around 12 km south of Port Augusta on the western shore of Upper Spencer Gulf at Snapper Point, north of O'Connell Court.

The waters of the USG are declared as a Marine Park¹ and the area is environmentally sensitive. In particular the giant cuttlefish breeding grounds around Point Lowly and the presence of extensive snapper fishing grounds attract increased boating activity. The conduct of commercial operations as proposed in the draft EIS must be carefully managed to ensure risks are identified and appropriately managed.

This review has considered the proposed marine operations against the backdrop of regulatory requirements and examined the risk to public safety, in particular to small recreational and pleasure craft.

A quantitative assessment of data relevant to the interaction between large commercial ships and small recreational craft was intended. However, this was not possible due to limited available data with uncertain completeness covering both Upper Spencer Gulf and comparable areas elsewhere in Australia. It was concluded that the data did not permit definitive conclusions on the trends associated with the interaction of commercial shipping and small recreational craft.

Nevertheless, there are issues which arise because small recreational craft operators do not always know or follow the applicable regulations. Since a quantitative analysis was not possible, a

¹ http://www.environment.sa.gov.au/marineparks/pdfs/MP_Park_Description_10.pdf



qualitative assessment of the risks and possible mitigation measures has been undertaken, presented in the table below in Table 1. The Likelihood and Consequence Rating Matrix is also shown below in Table 2.

This review has concluded that both commercial shipping and recreational craft movements can co-exist with appropriate management plans being followed by BHPB Marine Operations and subject to all vessel operators following regulatory compliance requirements and appropriate risk management procedures.

The risk table summarised on the following page sets out the evaluation and mitigation measures and is provided in more detail in sections 5 and 6 of this report. The following strategies are suggested for inclusion in the management plans to improve safety and reduce interactions of commercial and recreational vessels in the vicinity of the landing facility:

- Requirement for commercial vessels to have pilot guidance with onboard pilots with extensive local experience and knowledge of relevant waters
- Scheduling commercial shipping movements to avoid the most popular times of small pleasure craft operation as far as possible
- Application of speed limits for commercial vessels
- Communication of regulations for commercial vessel operation, including speed limits, ballast water exchange and procedures if small craft stray into their path.
- Establishment of an exclusion zone around cargo exchange locations
- Establishment of an exclusion zone around the facility excluding all other vessels and people when barge operations are occurring.
- Establishment response resources and equipment for rapid response in the event of fuel or oil spill.

The effectiveness of the above measures will be influenced by BHP Billiton working cooperatively with the SA Government authorities to ensure the communication and enforcement of laws and regulations for both commercial shipping and recreational craft operation.

■ **Table 1 Risk and Mitigation Measures assessment summary**

Risk	Without mitigation strategies			Mitigation strategies	With mitigation strategies		
	Likelihood	Conse-quences	Rating		Likelihood	Conse-quences	Revised rating
Collision between vessels	Very unlikely	1	Medium	Communication and enforcement of operating procedures for small craft Appropriate pilot guidance for commercial vessels Exclusion zone around cargo transfer point and landing point facilities	Very unlikely	2	Medium
Collision – fixed object	Unlikely	2	Medium	Communication and enforcement of operating procedures for small craft Appropriate pilot guidance for commercial vessels Exclusion zone around cargo transfer point and landing point facilities	Very unlikely	2	Low
Grounding	Unlikely	4	Low	Communication and enforcement of operating procedures for small craft Appropriate pilot guidance for commercial vessels	Unlikely	4	Low
Fuel or oil spill	Very unlikely	2	Medium	Clean up response plans and resources Appropriate pilot guidance for commercial vessels Exclusion zone around cargo transfer point and landing point facilities	Unlikely	3	Low
Sinking	Very unlikely	3	Low	Communication and enforcement of operating procedures for small craft Salvage response resources and equipment Appropriate pilot guidance for commercial vessels	Very unlikely	4	Low
Loss of cargo SINCLAIR KNIGHT MERZ	Unlikely	3	Medium	Communication and enforcement of operating procedures for small craft Salvage response resources and equipment Exclusion zone around cargo transfer point and landing point facilities	Very unlikely	4	Low

Wake or wash damage	Unlikely	3	Medium	Communication and enforcement of operating procedures for small craft Speed limits for commercial vessels Avoidance of popular times for small recreational craft usage Exclusion zone around cargo transfer point and landing point facilities	Very unlikely	4	Low
Ballast water contamination	Unlikely	2	Medium	Communication and enforcement of operating procedures for commercial vessels Appropriate pilot guidance for commercial vessels	Very unlikely	2	Low

The ratings shown above are based on the commonly used likelihood x consequences approach, with category pairs giving ratings as shown in the table below.

■ **Table 2 Likelihood Consequences Matrix Assessment**

			Consequence (C)				
			5	4	3	2	1
			No injuries	Minor injury	Injury requiring medical treatment	Single fatality	Multiple fatalities
			Property damage < \$1,000	Property damage < \$10,000	Property damage < \$100,000	Property damage < \$500,000	Property damage > \$1,000,000
			No environmental impact	Slight environmental impact	Environmental impact requiring clean up	Substantial environmental impact	Catastrophic environmental impact
Likelihood (L)	A	Almost certain	Medium	High	Very High	Very High	Very High
	a)	Probable	Medium	Medium	High	Very High	Very High
	b)	Possible	Low	Medium	Medium	High	Very High
	c)	Unlikely	Low	Low	Medium	Medium	High
	d)	Very unlikely	Low	Low	Low	Medium	Medium



1. Introduction, background and objectives

1.1. This report

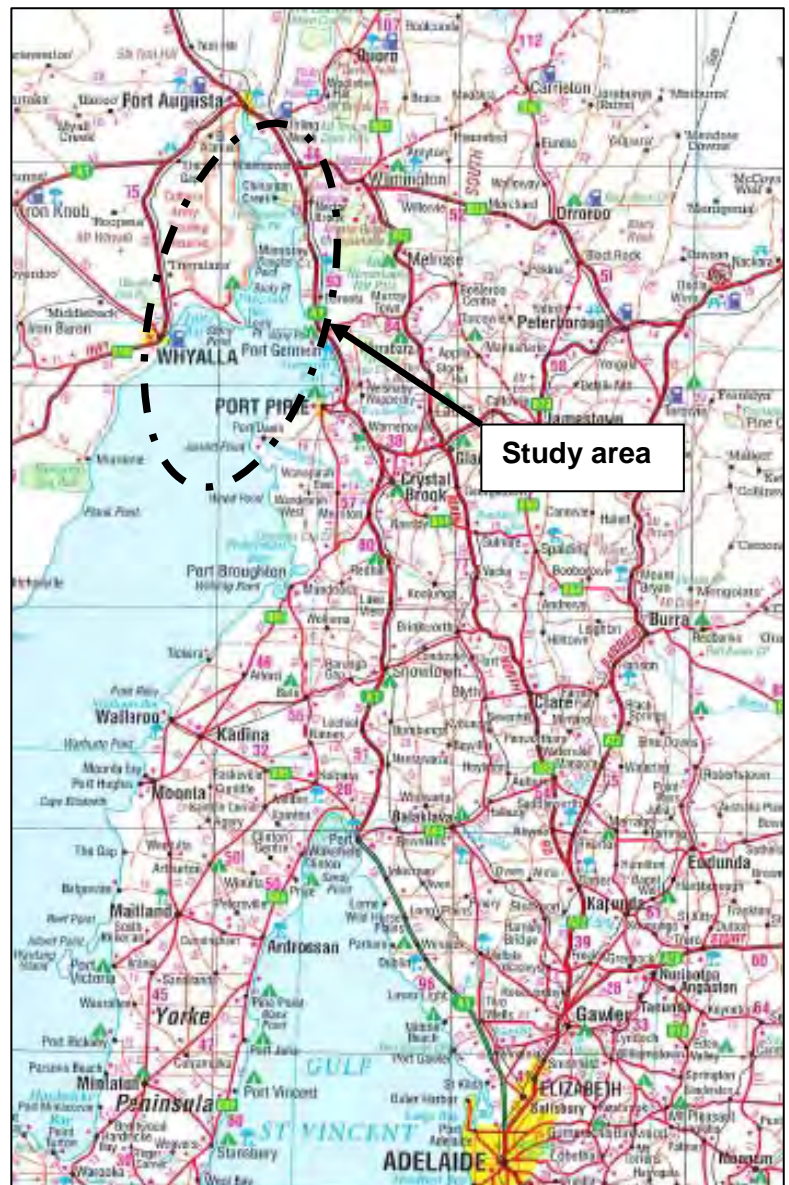
BHP Billiton (BHPB) engaged SKM to review the safety of maritime operations proposed for the Upper Spencer Gulf (USG) as part of the expansion of its Olympic Dam operations. The overall area is shown in figure 1.

Figure 1 Spencer Gulf Area

1.2. Background

BHPB is planning to expand the mining and metal processing operations very substantially at the Olympic Dam site. The company prepared a draft Environmental Impacts Statement (EIS) reporting on the assessed impacts anticipated from the project.

A number of issues requiring further investigation and were identified as a result of submissions received during the public consultation period for the draft EIS. An issue identified from submissions was the potential safety impacts on existing marine craft and operations in the Upper Spencer Gulf from the shipping movements proposed for delivery of infrastructure and materials required for the expansion project.





1.3. Objectives and approach

The objectives set for this review were:

- 1) Review existing Federal and South Australian legislation governing navigation and maritime safety in State controlled waterways, listing the obligations and responsibilities of operators of various classes of vessels.
- 2) Review available statistical information regarding vessel collisions, near misses, oil spills, groundings and previous safety audits conducted in the USG.
- 3) Provide qualitative assessment of the public safety impacts of additional shipping and wharf operations in the USG, including impact on other vessel operators and recreational craft.
- 4) Provide a quantitative assessment of the risks from additional Olympic Dam related shipping in relation to:
 - Shipping collisions, incidents and near misses
 - Fuel and oil spills
 - Ship and barge groundings on sand and mud banks.
- 5) Assess similar port, navigation and landing arrangements in confined waterways to determine safety impacts.
- 6) Report on how interaction between commercial vessels and recreational craft is managed in other similar locations to minimise the risk of maritime incidents.
- 7) Report gaps and shortfalls where insufficient information from desktop investigation is available to adequately address EIS questions.

The approach consisted primarily of desktop research, supplemented with discussions with a range of people and organisations with knowledge and experience of Spencer Gulf marine operations and comparable locations elsewhere.



2. Marine regulation and legislative provisions

2.1. The structure and principles of marine regulation

Marine regulation in Australia is a product of Australia's constitutional structure and International Law obligations relating to the law of the sea.

The Australian Constitution defines Australia's overall governmental and legislative structure and responsibilities. It defines commonwealth powers and areas of responsibility, through the granting of powers, which can be exclusive to the commonwealth, or concurrent, where powers are shared between the commonwealth and the states and territories. Exclusive commonwealth powers include areas such as defence, migration and customs; and examples of concurrent powers include banking and taxation. Where there is inconsistency between state and commonwealth law, the commonwealth provisions prevail to the extent of the inconsistency. The Constitution also imposes some restrictions on the states, such as interstate trade being unimpeded and free of duties.

Commonwealth powers are limited to those defined in the Constitution, and all other powers reside with the states. Inter governmental agreements set out arrangements for arms of government to have carriage of particular government functions and responsibilities. In some areas state law will mirror commonwealth law as a result of such agreement, such as marine oil pollution. Part 13 of the South Australian Harbours and Navigation Act makes specific reference to agreements between the commonwealth and SA and to the application of international conventions.

2.2. Commonwealth powers

Commonwealth powers of particular interest to marine operations in the Upper Spencer Gulf include:

- Trade and commerce with other countries and between states
- Naval and military defence, lighthouses, beacons and buoys
- Quarantine, customs and excise
- Foreign corporations and external affairs
- Matters referred to the commonwealth by the states.

The degree of co operation and co ordination between state and commonwealth is generally high, particularly on marine safety regulation and enforcement. In areas of law of low alignment, state jurisdiction can coexist with commonwealth jurisdiction. In this case there may be a requirement for ships to comply with both commonwealth and state legislation on the same or similar matters concurrently. However even in areas of lower legislative alignment, strong working relationships are generally evident between the commonwealth and the states, which will include agreement as



to which authority will take the lead on any matter. Such agreements may be defined in a memorandum of understanding between the states and commonwealth. One area where regulation is not particularly well aligned for ships as yet is occupational health and safety.

The commonwealth Navigation Act (1912) is essentially voyage based legislation which applies to those parts of a ship's voyage within Australian waters, potentially from the beginning of a ship's voyage at one port to the end of the voyage at another port. The Navigation Act does not apply to vessels on intrastate voyages unless owners opt to remain under the Navigation Act and make a section 8AA declaration accordingly.

Under international law Australia has the right to impose laws and regulations on maritime activities in Australian waters. The 1982 United Nations Convention on the Law of the Sea (LOSC) sets out the rules for application of jurisdiction by member States and generally defines international responsibilities.

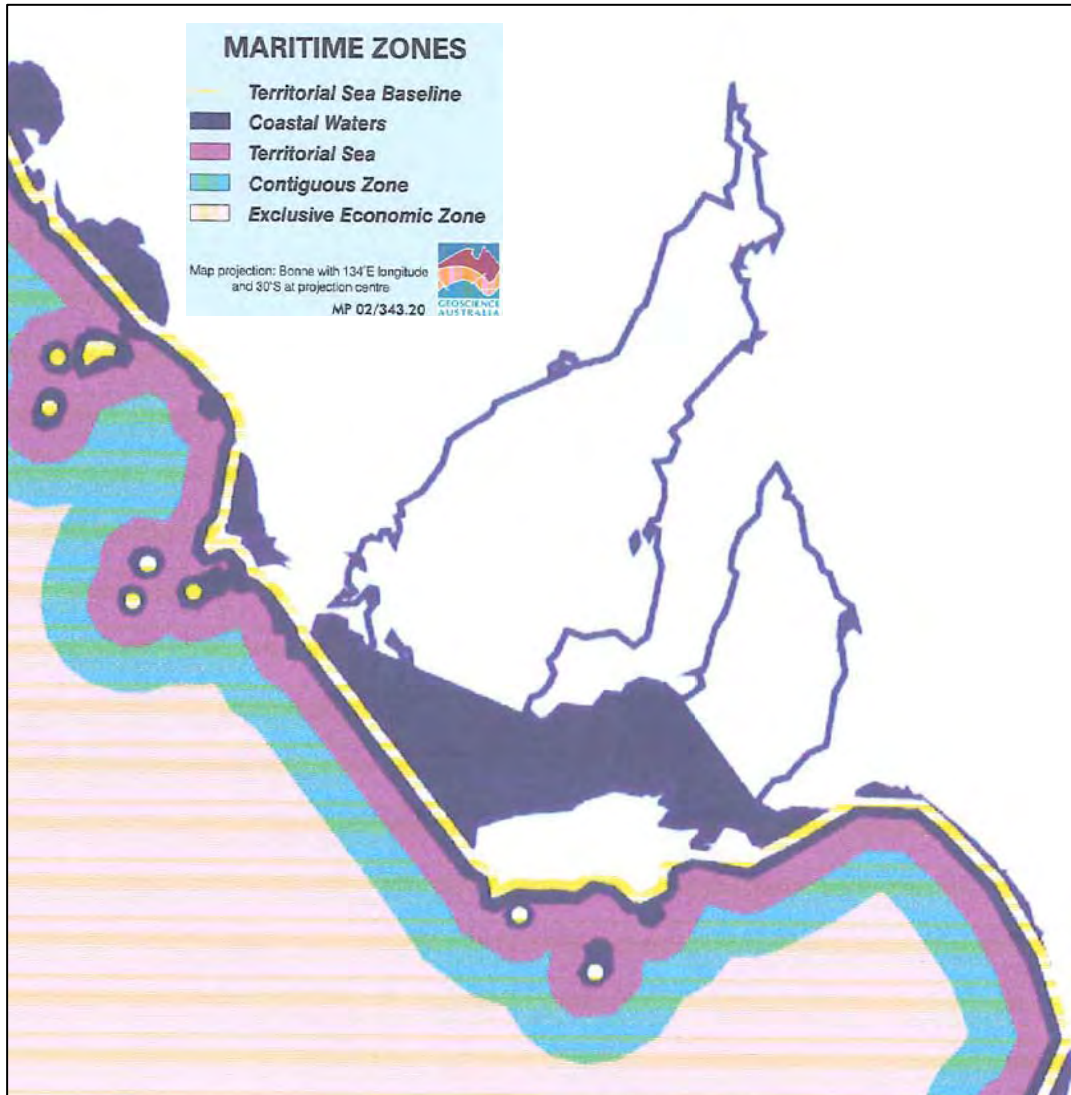
Maritime boundaries are defined by the LOSC and reflected in Australian law. In summary the Maritime Zones are:

- **Coastal Waters** – includes waters three nautical miles seaward of the Territorial baseline. Jurisdiction is vested in the adjacent state or territory. Territorial baselines are drawn across the natural entrance points of bays or rivers.
- **Inland Waters** - are waters landward of Territorial baselines. In the case of the Spencer Gulf, the baseline extends from Cape Carnot near Port Lincoln to Vennachar Point on Kangaroo Island, thereby including all the waters of Spencer Gulf. Waters to landward of baselines are Internal Waters under international law.
- **Territorial Waters** – includes waters 12 nautical miles seaward of Territorial baselines. Australia has full sovereignty over Internal Waters and Territorial Waters (which includes Coastal Waters) but must respect the right of innocent passage for foreign vessels through Territorial Waters. No right of innocent passage applies to Internal Waters.
- **Contiguous Zone** – is the area between 12 and 24 nautical miles seaward of territorial baselines, in which Australia has some defined jurisdiction relating to customs, sanitary, fiscal and immigration matters.

The arrangements for these waters in the Spencer Gulf area are shown in Figure 2.

Australia has a range of obligations for Coastal, Territorial and Contiguous Waters under international law as well as the various conventions and treaties relating to the law of the sea, maritime law, and the environment. These obligations are supported by policy and political mechanisms as well as regulation.

■ **Figure 2 Spencer Gulf Territorial Water classifications and areas**



The waters of Spencer Gulf are classified as Internal Waters, shown white, being inland of the Territorial Sea Baseline.

Shipping is a global industry and the regulatory framework is wide reaching and complex, from high level international regulation, to commonwealth, state and local government regulation.

Australian shipping regulation is heavily influenced by international law which is reflected in the Navigation Act. Australia is a signatory to many International Maritime Organisation conventions which regulate shipping and general marine activities.



2.3. State government powers

South Australian legislation applies to every area of law not under commonwealth jurisdiction as provided either under the constitution or by way of cooperative agreement between South Australia and the commonwealth. The South Australian Department of Transport, Energy and Infrastructure (DTEI) is the primary government agency with responsibilities for marine regulation.

2.4. Obligations on operators of various classes of vessel

This section summarises the most pertinent requirements placed on operators of large commercial and small recreational craft in relation to the marine safety and vessel interaction issues under consideration here. It does not attempt to examine all requirements. Relevant regulation is summarised in Appendix A.

2.4.1. Large commercial vessels

Trading vessels must comply with the Navigation Act when proceeding on international and interstate voyages within Australian waters (Australian vessels are always under Australian jurisdiction). They must also comply with the SA legislation (primarily the Harbors and Navigation Act) on matters not covered by the Navigation Act eg SA port regulations. Trading vessels on intrastate voyages are not subject to the Navigation Act (unless the owner opts to declare under section 8AA) and must therefore comply with the South Australian legislation (primarily the SA Harbors and Navigation Act).

2.4.2. Small recreational craft

These craft must comply with all SA legislation including the SA Harbors and Navigation Act and, when in prescribed ports, with specific port regulations. In addition to the relevant legislation and regulation, the South Australian government, through the DTEI, issues various codes of practices (eg the Recreational Boating Safety Handbook) to assist vessel operators understand their obligations under regulation.

More detail is provided in section 7, describing specific legislative provisions.



3. Shipping and boating operations in Upper Spencer Gulf

3.1. Boat usage and numbers of boats nationally

National boating usage survey by the NMSC in 2009 indicates that there are approximately 1 million recreational craft using Australian waterways. The survey found that usage was highly seasonal, with around 95% of recreational craft being used at least once in December and January but only 33% in June and July.

Weekends are the most popular times and Christmas, New Year and Easter the most popular holiday periods.

Almost 40% of boat owners use their boats 2-3 times per month, an additional 30% use their boats more frequently. Approximately 30% use their boats once per month or less.

3.2. Boat numbers in the Spencer Gulf

The precise number of boats in operation in the Spencer Gulf at any particular time is not known and will vary widely according to season, holiday periods, weather, time of day, boating conditions and the conduct of competitions such as fishing, racing, etc. Boats are frequently concentrated around particular areas of interest and move to specific locations and areas due to sea, weather and fishing conditions. It is not possible to conduct statistical risk analysis.

Anecdotal information and observation suggests significant numbers of recreational craft are in operation in the waters of all ports in Australia at different times.

Nearly 56,000 recreational craft are registered in South Australia. Of these, 1,035 (1.8%) are registered within the postcodes of Port Augusta, Andamooka, Roxby Downs, Leigh Creek, Coopers Creek and environs.

Given the numbers of recreational craft in South Australia the incidence of damage and/or injury arising from the interaction of commercial vessels and recreational vessels in SA waters is remarkably low. This outcome is a tribute to the active management programmes in place by DTEI, port operators, volunteer rescue groups, boating, sailing and fishing clubs, SA Police and vessel operators.

A volunteer Coastal Guard is in operation at Port Augusta, however it is not yet common practice for recreational craft to lodge voyage reports by radio and so this does not provide a method to estimate numbers of recreational craft on the water at any time. The Port August volunteer coast



guard (VCG) facilities are currently being upgraded and a new radio room installed which will assist communications with recreational boats in the future.

3.3. Marine accidents and incidents in Upper Spencer Gulf

Enquiries were made to relevant commonwealth and state authorities to which marine incidents are required to be reported. These are:

- Department of Transport, Energy and Infrastructure (maritime incidents in South Australian waters)
- National Maritime Safety Council (analyses incident data from state maritime authorities)
- Australian Transport Safety Bureau (incidents involving collisions and incidents in Australian waters)
- Australian Maritime Safety Authority (incidents involving oil pollution of Australian waters)

Available data is somewhat limited, qualified and from some sources is fairly general. Attempts were made to interrogate data down to interaction between commercial and recreational craft to the extent possible. Enquiries were also made to port operators with activities considered to be relevant to the proposed marine operators in the USG.

Available data on maritime incidents reported is summarised in Table 3.

3.3.1. Flinders Ports

Flinders Ports operates the South Australian ports of Adelaide, Port Lincoln, Port Price, Klein Point, Port Giles, Thevenard and Wallaroo. Flinders Ports also conduct operations at Port Bonython under contract.

The presence of recreational craft in shipping channels is an ongoing risk which Flinders Ports actively manages. Flinders Ports were not aware of any actual incidents of injury or damage as a result of interaction between commercial and recreational craft. However, recreational craft are regularly directed to move out of shipping channels by Flinders Ports. Flinders Ports mentioned recording a total of 21 incidents since 2007 where small pleasure craft were reported as being too close to commercial vessels, all in or near Port Adelaide.

Flinders Ports was unable to release statistics and referred our questions to the Department of Transport Energy and Infrastructure. In addition to South Australia reporting requirements, incidents involving commercial vessels must be reported to the Australian Transport Safety Bureau.

■ **Table 3 Maritime incident data - DTEI**

Department of Transport, Energy and Infrastructure marine incident data										
Year	Region	Incident type	Fatal	Serious Injury	Minor injury	Vessel lost	Vessel damage	Property damage	No damage	Total incidents
2006	Metro	Collision of vessels	0	0	1	0	0	2	0	3
		Grounding unintentional	0	0	0	0	0	1	0	0
		Hit by vessel or propeller	0	2	0	0	0	0	0	2
	Spencer North	Collision of vessels	1	0	0	0	0	0	0	1
2007	Metro	Collision of vessels	0	0	1	0	0	1	0	1
		Collision with fixed object	0	1	0	0	0	1	0	2
		Grounding unintentional	0	1	0	0	0	1	0	2
		Swamping	0	0	0	0	0	1	0	1
2008	Metro	Collision of vessels	0	0	3	0	3	1	0	7
		Collision with floating object	0	0	1	0	0	0	0	1
		Collision with fixed object	0	0	2	0	0	0	0	2
		Grounding intentional	0	0	1	0	0	0	0	1
		Grounding unintentional	0	0	1	0	0	0	0	1
		Sinking	0	0	1	0	0	0	0	1
		Swamping	0	0	0	0	1	0	0	1
2009	Metro	Collision of vessels	0	0	1	0	3	1	0	5
		Collision with fixed object	0	0	0	0	1	0	0	1
		Grounding unintentional	0	0	0	0	1	0	0	1
		Other on board injury	0	0	1	0	0	0	0	1
		Swamping	0	0	0	0	1	0	0	1
	Spencer Gulf	Collision of vessels	0	0	1	0	0	0	0	1
2010	Metro	Capsizing	0	0	1	0	0	0	0	1
		Collision with fixed object	0	0	0	0	0	0	0	1
		Grounding unintentional	0	0	1	1	0	0	0	1
		Hit by vessel or propeller	0	0	1	0	0	0	0	1



3.3.2. Whyalla port

At Whyalla, a dedicated port is operated by OneSteel under a long term indenture from the SA government. Whyalla is a significant port with five berths handling vessels up to 65,000 tonnes DWT. In addition OneSteel operate two transfer point moorings in deep water off the port, where iron ore transported by barge from Whyalla is loaded at the mooring to Panamax and Capesize vessels, which require greater draft than the port provides. Over 1,000 barge movements and vessel movements take place each year.

A significant number of recreational craft operate at and from the port, including those using the boat ramps provided which have separate facilities to those of OneSteel. OneSteel actively manages the interaction of commercial and recreational craft to ensure safety.

Since 2007 port records show only two incidents involving recreational craft. In one, a commercial vessel movement was delayed until a recreational craft could be moved out of its way, and in the other a recreational craft in distress collided with the ore jetty.

3.4. Port Pirie

Port Pirie is situated opposite Port Bonython, southeast of Point lowly in the Upper Spencer Gulf. The entrance channel to Port Pirie has been dredged through shallow water in Germein Bay for over seven nautical miles. In common with the waters of USG in general, recreational boating and fishing is popular. Commercial vessels safely transit in and out of Port Pirie on a regular basis, with Flinders Ports (the port operator) reporting 92 commercial vessel calls in 2009.

3.4.1. Department of Transport, Energy and Infrastructure (SA)

DTEI is responsible for administration of South Australia's many ports and extensive inland and coastal waters, including Spencer Gulf. DTEI actively manages recreational and commercial marine safety, license and certifying boat operators, mates, masters and pilots. DTEI publicises issues facing operators of small craft and their requirements through the *Big ships, little boats* publication (DTEI and Flinders Ports, 2006), a copy of which is in Appendix B.

All marine accidents are required by law to be reported to a Transport Safety Compliance Officer Marine or a Police Officer.

DTEI has recorded 21 incidents in the Port of Adelaide since 2007 in which recreational vessels were either too close to commercial vessels and/or anchored in shipping channels. DTEI was not aware of any incidents of injury or damage resulting from interaction between commercial and recreation vessels.



Since 2006 only two incidents have been reported in the Upper Spencer Gulf, both involving collision of vessels. One incident resulted in minor injury; neither resulted in damage. Both incidents were believed to be between recreational craft, rather than interaction with a commercial vessel.

DTEI cautions that a number of incidents may not be reported however it would seem that this comment relates to recreational craft, as incident reporting by commercial vessels is believed to be generally comprehensive.

3.4.2. National Marine Safety Council (NMSC)

The NMSC collects national incident data relating to recreational boating from all states and territories and has commissioned or conducted a number of reports relating to boat usage and marine incidents.

There are an estimated 1 million recreational craft using Australian waterways. An analysis of 2,572 incidents of serious injury due to boating from 1999 to 2003 covering all of Australia considered that injuries mostly arose from incidents on board the craft, and were rarely due to collision, drowning or submersion.

From 1 January 2005 to 20 September 2009 NMSC data shows 1,452 collision incidents. Of these, 272 incidents involved a collision between commercial vessels and recreational craft. Of these, four incidents resulted in fatalities and five incidents resulted in serious injury.

NMSC was unable to separate data into specific regions or waters.

NMSC believes that many incidents remain unreported, although it would seem that this would relate more to minor incidents, with good reporting rates for serious incidents involving insurance claims.

3.4.3. Australian Transport Safety Bureau (ATSB)

The ATSB investigates accidents and serious incidents involving Australian and foreign flag ships in Australian waters and must be notified of all marine accidents and incidents. Table 4 contains a summary of available incident data held by ATSB.

Since 1991, 21 collisions have been reported Australia wide between ships and commercial fishing vessels or pleasure craft. A search of ATSB investigation reports shows only one collision took place in South Australia, between the Panamax bulk carrier “Silky Ocean” and the Australian fishing vessel “Peter Crombie” in December 2007. Of the six other incident investigation reports for South Australia waters since 1995, two related to groundings in Thevenard, one grounding in



Wallaroo, one ship boiler fire in Adelaide and one contact between a bulk vessel and the wharf at Wallaroo.

3.5. Australian Maritime Safety Authority (AMSA)

AMSA's Marine Environment Division is responsible for management of the National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances, the National Maritime Energy response arrangements and IMO representations for Marine Environments. AMSA publishes an annual report on activities under the National Plan including pollution incidents statistics. Table 5 contains a summary of oil spill data from AMSA Annual Reports. This shows a steady decline in the number of reported and identified spills, although there is considerable variability from year to year in many aspects, suggesting that criteria and reporting classes may have changed.

No significant incidents were recorded for South Australia in the 2008-09 or 2007-08 reports. AMSA reports are available since 1970, and two major oil spills are recorded: one at Port Stanvac in metropolitan Adelaide in 1982 and one at Port Bonython in 1992. In the latter incident the fuel tank of the 'ERA' was ruptured by the bow of a tug during berthing operations in high winds. Some 300 tonnes of fuel oil escaped and containment operations were hampered by high winds. Significant loss of bird life resulted and clean up of the mangroves proved to be difficult. Table 5 contains a summary of oil spill data from AMSA Annual Reports.

■ **Table 4 Maritime incident data – ATSB**

Australian Transport Safety Bureau data								
Investigation Number	Status	Occurrence Date	Release Date	Location	State	Title	Occurrence Category	Injury Level
240	Final	23-Apr-2007	20-Dec-2007	Off Cape Martin (near Robe)	SA	Collision between the Panamanian registered bulk carrier Silky Ocean and the Australian fv Peter Crombie	Incident	None
207	Final	28-Sep-2004	10-Nov-2006	Thevenard	SA	Grounding of the ship Mellum in the port of Thevenard	Incident	None
192	Final	01-Mar-2003	30-Jun-2004	Thevenard	SA	Grounding of the Liberian flag bulk carrier Pactrader	Incident	None
157	Final	10-Apr-2000	18-Dec-2000	Wallaroo	SA	Contact between the Maltese flag bulk cargo vessel Amaranthos	Incident	None
118	Final	08-May-1997	13-Jan-1998	Wallaroo	SA	Grounding of the bulk carrier Western Winner	Incident	None
97	Final	17-Aug-1996	28-Feb-1997	Great Australian Bight	SA	Fatality aboard the Matilda Bay	Serious Incident	Fatal
85	Final	09-Sep-1995	01-May-1996	Adelaide	SA	Boiler fire aboard the livestock carrier Mawash AL Gasseem	Incident	None
207	Final	28-Sep-2004	10-Nov-2006	Thevenard	SA	Grounding of the ship Mellum in the port of Thevenard	Incident	None

■ **Table 5 Australian Maritime Safety Authority – pollution and oil spill data**

Year	Incidents		Source of spill					Type of vessel (where identified) (2)													Un-known unident	Total vessels
	Total	National Plan response req'd (1)	Un-known source	Exploration	Shore based	Ship	Other	Bulk carrier	Live-stock carrier	Con-tainer ship	Fishing vessel	General / multi purpose	Offshore / FPSO / MODU (3)	Oil, chem tankers	Ro-ro pass	Ro-ro cargo	Pass	Special purpose	Service vessels, tugs	Other (incl rec craft, barges)		
2000-01	335	7	175	5	54	96	5	5	0	3	20	12	0	7		3	3	5	3	28	7	96
2001-02	345	9	181	1	38	117	8	11	1	7	8	7	0	9	0	1	0	2	12	27	32	117
2002-03	300	77	154	6	35	104	1	9	3	1	13	4	7	13	0	0	0	0	9	3	42	104
2003-04	322	118	134	3	55	130	0	10	1	12	19	8	1	10	0	0	1	0	12	24	32	130
2004-05	288	172	168	3	26	85	6	9	0	6	7	2	6	3	0	0	3	0	5	30	14	85
2005-06	227	106	103	5	25	94	0	7	0	1	14	4	6	7	0	1	5	0	4	33	12	94
2006-07	174	82	53	7	11	103	0	4	0	8	6	4	6	4	2	0		0	6	56	7	103
2007-08	170	88	45	2	27	95	1	3	0	2	0	2	0	3	2	1	2	1	4	0	75	95
2008-09	140	70	75	18	18	26	3	3	1	0	0	4	4	1	2	1	2	3	5	0	0	26

Notes:

- (1) Definition of whether response required changed from 2001-02 to 2002-03
- (2) Many changes in classes reported over the time period
- (3) Floating Production Storage and Offloading facility / Mobile Offshore Drilling Unit



4. Information on marine incidents in comparable locations

4.1. Port of Hastings (Victoria)

The Port of Hastings is a busy commercial port situated in Western Port in Victoria, handling around 400 commercial vessel movements each year. Large numbers of recreational craft operate throughout Western Port and in the shipping channels. Patrick Ports actively manage the risk of recreational craft interaction with commercial craft. Port records show three to four incidents a year in which recreational craft have been directed to clear the channels and avoid impeding commercial vessel movements. No actual incidents or collisions have been recorded in the last three years, the period over which data was available.

4.2. Ports of Melbourne and Geelong (Victoria)

Both Melbourne and Geelong are located at the ends of extensive ship channels and large numbers of recreational craft are in operation within the channels. Risk of interaction between commercial and recreational craft is managed by Port of Melbourne Corporation and the Victorian Regional Channels Authority. Enquiries made to both organisations revealed no recollection of incidents of injury or damage. There are a number of reports of recreational craft being too close to commercial vessels. Both Victorian Regional Channels Authority and Port of Melbourne referred to Marine Safety Victoria as the appropriate source for data.

4.3. Marine Safety Victoria (MSV)

MSV collates data on reported marine incidents in Victoria. From 1 July 2002 to 1 May 2010 there have been 83 close quarter reports for the waters of Port Phillip and Corio Bay, averaging about 10 per year or a little less than one per month. When the number of commercial vessel movements in Melbourne and Geelong is combined and the very large numbers of recreational craft using Port Phillip Bay are considered, the incident frequency is very low.

There have been five recorded collisions over this period involving commercial vessels and recreational craft. In three of the collisions the commercial vessels involved were locally registered workboats or locally registered passenger vessels.

Two of the collisions involved large commercial vessels and in both incidents the commercial vessel was an Australian vessel under the Navigation Act (ie not a foreign registered vessel). Details of the incidents were not provided by MSV to maintain confidentiality.

One of the collisions is still under investigation. The other incident report did not suggest significant damage, and no injuries were reported.



5. Public safety assessment of proposed shipping operations

This section provides a qualitative assessment of the risks posed by the proposed additional shipping operations, particularly on recreational craft and operators of yachts and small vessels.

5.1. Overview of BHPB's proposed additional shipping arrangements

As part of BHPB's expansion at Olympic Dam, substantial quantities of new equipment and materials will be required on site. Some components for the expansion would be prefabricated as large modules in other parts of Australia or overseas. Because of their bulk and irregular dimensions (up to 15 m wide by 15 m high and up to 500 tonnes in weight) delivery by sea would be the most effective and least disruptive approach. A landing facility would be needed at the coast to unload these modules prior to transporting them to Olympic Dam by road.

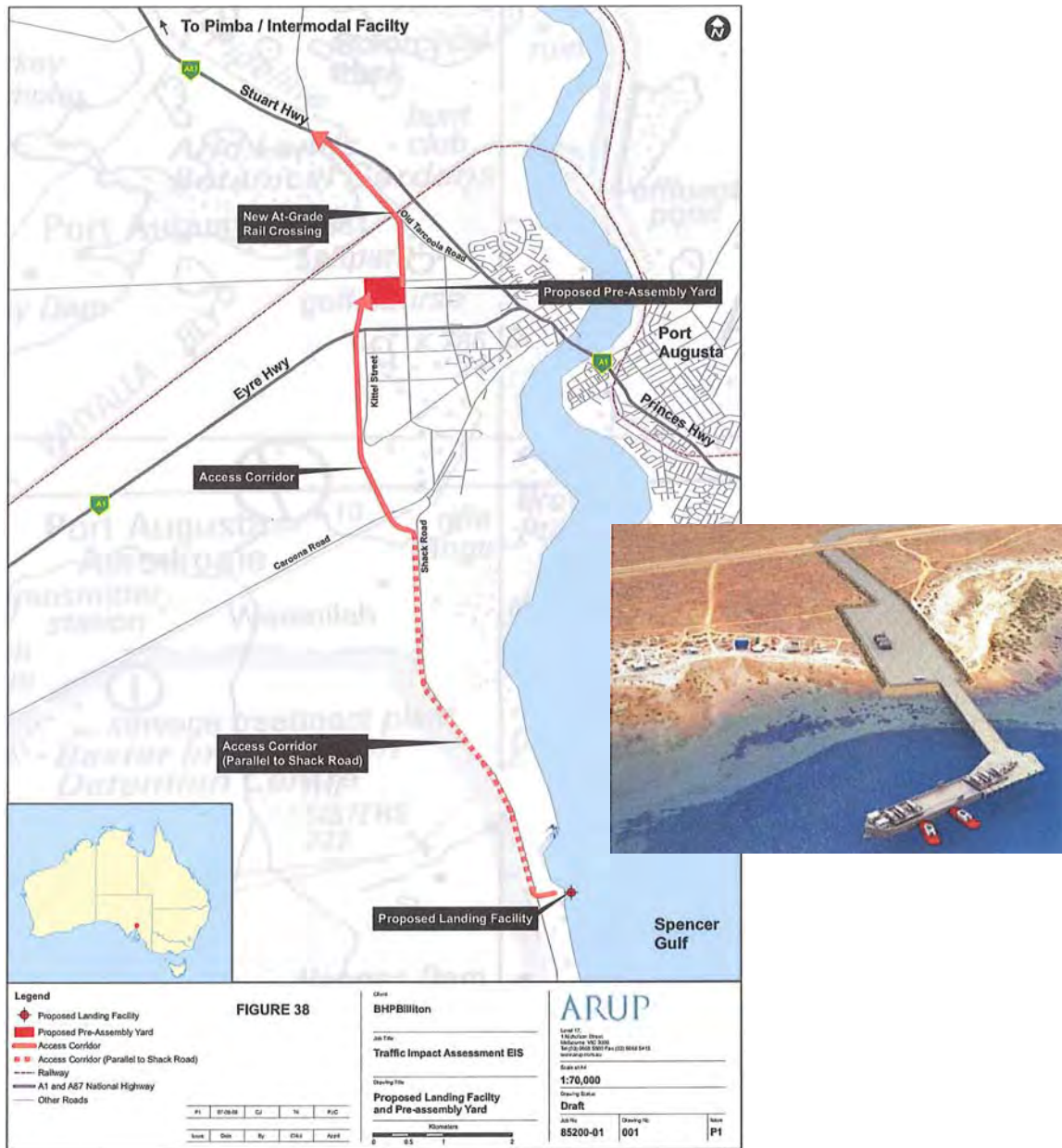
The preferred location for the landing facility is around 12 km south of Port Augusta on the western shore of Upper Spencer Gulf at Snapper Point, north of O'Connell Court. The preferred site avoids the need for dredging a navigation channel, avoids impact on the mangroves, and limits disturbance to owners of coastal homes. The facility would be a pier, rather than a causeway, to ensure minimal impact of tidal flow, wave propagation and shoreline stability.

Some ocean going ships would moor in deep water in the region around Upper Spencer Gulf nearby Point Lowly and offload the modules onto barges to bring them to a landing facility while others would directly transit to the landing facility. The landing facility is expected to offload around 300 vessels in the first seven years of the expansion, with 100 arrivals in the first two years and 200 in the following five years. The facility and would be used occasionally after that to meet the requirements of the ongoing operation at Olympic Dam. These vessel call rates suggest a ship call on average once per week for the first two years and one each 9 days for the following three years. There are likely to be periods of more intense shipping activity, and others with little or no activity over the seven years of the expansion project. A barge would take about three days to unload.

Aspects of these arrangements are shown in Figure 3.



■ Figure 3 Proposed arrangements in Upper Spencer Gulf



5.2. Risks posed and to whom

Risks posed by the activities proposed have been assessed under the approach set out in the Australian standard for Risk Management (AS/NZS/ISO 31000:2009), and Table 6 contains a summary of the evaluation, including mitigation measures proposed to mitigate risk.

■ **Table 6 Risk management assessment**

Risk	Without mitigation strategies			Mitigation strategies	With mitigation strategies		
	Likelihood	Consequences	Rating		Likelihood	Consequences	Revised rating
Collision between vessels	Very unlikely	1	Medium	Communication and enforcement of operating procedures for small craft Appropriate pilot guidance for commercial vessels Exclusion zone around cargo transfer point and landing point facilities	Very unlikely	2	Medium
Collision – fixed object	Unlikely	2	Medium	Communication and enforcement of operating procedures for small craft Appropriate pilot guidance for commercial vessels Exclusion zone around cargo transfer point and landing point facilities	Very unlikely	2	Low
Grounding	Unlikely	4	Low	Communication and enforcement of operating procedures for small craft Appropriate pilot guidance for commercial vessels	Unlikely	4	Low
Fuel or oil spill	Very unlikely	2	Medium	Clean up response plans and resources Appropriate pilot guidance for commercial vessels Exclusion zone around cargo transfer point and landing point facilities	Unlikely	3	Low
Sinking	Very unlikely	3	Low	Communication and enforcement of operating procedures for small craft Salvage response resources and equipment Appropriate pilot guidance for commercial vessels	Very unlikely	4	Low
Loss of cargo	Unlikely	3	Medium	Communication and enforcement of operating	Very	4	Low

Risk	Without mitigation strategies			Mitigation strategies	With mitigation strategies		
	Likelihood	Consequences	Rating		Likelihood	Consequences	Revised rating
			Medium	procedures for small craft Salvage response resources and equipment Exclusion zone around cargo transfer point and landing point facilities	unlikely		Low
Wake or wash damage	Unlikely	3	Medium	Communication and enforcement of operating procedures for small craft Speed limits for commercial vessels Avoidance of popular times for small recreational craft usage Exclusion zone around cargo transfer point and landing point facilities	Very unlikely	4	Low
Ballast water contamination	Unlikely	2	Medium	Communication and enforcement of operating procedures for commercial vessels Appropriate pilot guidance for commercial vessels	Very unlikely	2	Low

The ratings shown above are based on the commonly used likelihood x consequences approach, with category pairs giving ratings as shown in Table 7.

■ **Table 7 Likelihood – Consequence – Rating matrix**

			Consequence (C)				
			5	4	3	2	1
			No injuries	Minor injury	Injury requiring medical treatment	Single fatality	Multiple fatalities
			Property damage < \$1,000	Property damage < \$10,000	Property damage < \$100,000	Property damage < \$500,000	Property damage > \$1,000,000
			No environmental impact	Slight environmental impact	Environmental impact requiring clean up	Substantial environmental impact	Catastrophic environmental impact
Likelihood (L)	A	Almost certain	Medium	High	Very High	Very High	Very High
	e)	Probable	Medium	Medium	High	Very High	Very High
	f)	Possible	Low	Medium	Medium	High	Very High
	g)	Unlikely	Low	Low	Medium	Medium	High
	h)	Very unlikely	Low	Low	Low	Medium	Medium



5.3. Risks posed by additional shipping

This section provides a quantitative assessment (to the extent possible given limitations in available data) of the risks as a result of project related maritime traffic in the USG.

5.4. Collisions and similar incidents

5.4.1. Ocean going ship movements to and in Upper Spencer Gulf

It is assessed that the impact from the additional ocean going ship movements to and in the Upper Spencer Gulf will be negligible, provided that the following mitigation strategies are put in place:

- Communication and enforcement of regulations for small pleasure craft operation
- Requirement for commercial vessels to have pilot guidance with onboard pilots with extensive local experience and knowledge of relevant waters
- Scheduling commercial shipping movements to avoid the most popular times of small pleasure craft operation as far as possible
- Application of speed limits for commercial vessels
- Communication and enforcement of regulations for commercial vessel operation, including ballast water exchange.

5.4.2. Ship to barge transfer arrangements

It is assessed that the impact from the ship to barge transfer in the Upper Spencer Gulf will be negligible, provided that the following mitigation strategies are put in place:

- Communication and enforcement of regulations for small pleasure craft operation
- Requirement for commercial vessels to have pilot guidance from pilots with extensive local experience and knowledge of relevant waters
- Application of speed limits for commercial vessels
- Establishment of an exclusion zone around cargo exchange locations and barge landing point facilities
- Communication and enforcement of regulations for commercial vessel operation, including ballast water exchange.

5.4.3. Barge movements to landing facility

It is assessed that the impact from the barge movements to the landing facility in the Upper Spencer Gulf will be negligible, provided that the following mitigation strategies are put in place:

- Communication and enforcement of regulations for small pleasure craft operation



- Requirement for commercial vessels to have pilot guidance from pilots with extensive local experience and knowledge of relevant waters
- Application of speed limits for commercial vessels
- Establishment of an exclusion zone around cargo exchange locations and barge landing point facilities
- Communication and enforcement of regulations for commercial vessel operation, including ballast water exchange.

5.4.4. Arrangements at the landing facility

- Establishment of an exclusion zone around the facility excluding all other vessels and people when barge operations are occurring (or at all times??)

5.5. Fuel and oil spills

The presence of more commercial vessels will increase the risk from fuel and oil spills, and it is assessed that with appropriate regulation, enforcement and the availability of response teams and equipment the risk is low. The consequences could be severe however due to the environmental sensitivity of the area. The sand and mud sea floor reduces the chance of damage leading to fuel or oil spills in the event of grounding. The following mitigation strategies are recommended:

- Communication and enforcement of regulations for commercial vessel operation, including fuel and oil spill procedures
- Requirement for commercial vessels to have pilot guidance from pilots with extensive local experience and knowledge of relevant waters
- Application of speed limits for commercial vessels
- Establishment response resources and equipment for rapid response in the event of a spill.

5.6. Other pollution

The risk of other pollution is assessed as very low, as it is unlikely that commercial vessels will be carrying substantial quantities of chemicals or other pollutants with potentially significant impact. The impact from sewage and garbage release is low, despite being unsightly.

The following mitigation strategies are recommended:

- Communication and enforcement of regulations for commercial vessel operation, including fuel and oil spill procedures



- Requirement for commercial vessels to have pilot guidance from pilots with extensive local experience and knowledge of relevant waters
- Application of speed limits for commercial vessels
- Establishment response resources and equipment for rapid response in the event of a spill.

5.7. Swamping of small craft from wash or wake

There is a risk posed to small craft from swamping from wash or wake from commercial vessels. The following are recommended to minimise the risk:

- Application of speed limits for commercial vessels
- Communication and enforcement of regulations for commercial vessel operation, including speed limits and procedures if small craft stray into their path
- Requirement for commercial vessels to have pilot guidance from pilots with extensive local experience and knowledge of relevant waters
- Establishment of an exclusion zone around cargo exchange locations and barge landing point facilities

5.8. Groundings

The likelihood of groundings is assessed as very low, and recovery in sheltered shallow water with sand or mud bottom almost certain, so the overall risk is assessed as very low. Sand or mud sea floor reduces the likely damage severity and also chances of oil spill.

5.9. Loss of cargo

The likelihood of loss of cargo is assessed as very low, and recovery in sheltered shallow water with sand or mud bottom almost certain, so the overall risk is assessed as very low. Sand or mud sea floor reduces the likely damage severity.



6. Risk control measures

The waters of the USG are declared as a Marine Park and the area is environmentally sensitive. In particular the giant cuttlefish breeding grounds north of Point Lowly and the presence of extensive snapper fishing grounds attract increased boating activity. The conduct of commercial operations in the USG should be carefully managed to ensure risks are identified and appropriately managed.

A number of risk control measures (summarised previously in the executive summary) have been identified to ensure the safety of marine operations and compliance with regulation and are detailed here:

- Establishment of arrangements to effectively manage the movement of the various vessels, tugs, barges, anchorages and the landing facilities required for the task in compliance with regulation including the Maritime Transport Security Act 2003. Flinders Ports are the only known supplier of registered marine pilots for vessels (with Masters who do not hold pilotage exemptions) for Port Pirie/Bonython and the USG (vessels must transit the waters of Port Pirie or Port Bonython to access the USG). Flinders Ports currently manage the overall movement of vessels in the Spencer Gulf providing radio tracking, communication and scheduling services thereby ensuring effective communication and planning between vessels, authorities and ports.
- A round table review of the proposed operations with key Government agencies and Ports who are variously responsible for regulation and safety of marine operations in SA waters. This discussion is best conducted as soon as the options for movement of modules are scoped in detail. Obtaining the support and involvement of SA authorities who will be the front line of interaction with government and the community is advisable. Organisations initially should include:
 - DTEI (multiple facets including exclusion zones, compliance/enforcement)
 - SES (managing marine rescue groups)
 - Flinders Ports (movement management, local conditions and pilotage)
 - Towage operator(s)
 - PIRSA (fisheries and aquaculture)
 - Dept of Environment and Heritage (marine parks)
 - Port Augusta Council
 - SA Water Police
 - BHPB



Development of detailed management plans to ensure operational efficiency, reliability, safety, regulatory compliance and positive relationships with other users of the waters and coasts of the Spencer Gulf.

Issues for consideration would include:

- Confirming adequacy of hydrographic data and navigation marks
- Confirming the detail of the operations, towage procedures, routing, vessel size and characteristics
- Confirming the declaration (and cooperative enforcement) of exclusion zones around vessel movements and landing operations in the Spencer Gulf. These are declared and promulgated by DTEI, and will also be established by way of Port Security Plans required for both the marine operations and the landing facility.
- Reviewing the need for escort craft with authorized officers to manage interaction of project vessels with other recreational craft and commercial vessels in the area.
- Review of timing of vessel movements in consideration of periods of peak recreational activity, tidal conditions, and weather/sea conditions in the confined waters of the USG.
- Development of communications and engagement programmes with local community groups to inform all marine interests, (commercial and recreational), of the project and the management procedures to be applied.
- Ballast water management plans
- Incident management plans and resources
- USG EIS requirements
- Requirements for vessel registration in SA
- Defence exercises and exclusion zones



7. Management of interaction between commercial vessels and recreational craft

This section specifically examines how interaction between commercial shipping and recreational vessels is managed in confined waterways in other locations, recognising that the pertinent issues are not unique to the USG.

As indicated the incidence of damage and injury in SA waters resulting from interaction of commercial and recreational vessels is low. This is no doubt a result of the rigorous management practices adopted by a range of organisations and operators. The main organisations involved, and the most relevant structures and approaches in place are outlined below.

7.1. South Australia

7.1.1. DTEI

Under the Harbors and Navigation Act (SA) a vessel of more than 35 m in length is required to have a licensed pilot when navigating within a harbour. Pilots are closely familiar with local conditions and circumstances and keep up to date with harbour developments and activities which may affect safe navigation. Pilots have certain obligations under the Act and Regulations.

Under the Maritime Transport and Offshore Facilities Security Act of 2003 a 50 m enforceable restricted area is in place around all commercial shipping in the waters of the Spencer Gulf. Authorised Officers under the Act are empowered to enforce this restriction (Notice to Mariners #4 of 2010).

The Harbors and Navigation Act (SA) incorporates the International Prevention of Collisions at Sea Regulations and includes requirements for:

- Vessels engaged in fishing may not impede vessels navigating within a channel
- Vessels which can navigate outside a channel must not impede navigation within the channel
- A vessel shall not cross a channel or fairway if such crossing impedes another vessel
- Vessels not to anchor in a channel
- Recreational vessels must be registered

- Operators and water craft must meet minimum safety standards; operators must not be under the influence of drugs or alcohol and may be subject to random testing.

The DTEI publishes a Recreational Boating Safety Guide which sets out safety requirements which includes steering and sailing rules.



DTEI works closely with port operators, to monitor marine safety and inform and educate all parties on safe practices. In conjunction with Flinders Ports, DTEI has developed a “Big Ships Little Boats” campaign designed to communicate the rules and dangers of navigating in the vicinity of commercial vessels.

DTEI publishes a quarterly newsletter “On Deck” aimed at informing the recreational boating community. The 2010 autumn issue includes a reminder of the ‘big ships little boats don’t mix’ messages, as included in Appendix C.

DTEI also publishes Notices to Mariners informing the marine community of dangers.

DTEI conducts community workshops for various sailing clubs as part of their safety education campaign. Boating safety signage is erected at all launching ramps.

7.1.2. Flinders Ports

Flinders Ports works closely with DTEI and community groups to encourage education and safety programmes. Flinders Ports sponsors various organisations including yacht clubs. Flinders Ports provides pilotage services and traffic management to all South Australian commercial ports. Vessel movements are reported via website and newspapers.

7.1.3. OneSteel Whyalla

OneSteel works closely with DTEI and community groups to encourage boating safety and inform recreational boat operators of safety requirements, particularly in the vicinity of Whyalla port and OneSteel’s offshore vessel loading points. Publications include educational materials and games.

7.2. Other locations and jurisdictions

7.2.1. Port of Hastings Corporation

The Port of Hastings Corporation produced a “Keep clear of big ships” campaign in 2008 in conjunction with Patrick Stevedores, which provides stevedoring services at this port – details in Appendix D.

7.2.2. Victorian Regional Channels Authority

The VRCA relaunched the “Keep Clear of Big Ships” campaign in 2008 (see Appendix E) to inform recreational boat operators of navigation rules, restricted areas and safe boating practices. The VRCA provides a range of promotional materials to boat clubs and volunteer groups to assist with promotion of the campaign. The VRCA makes directions for channels and Geelong Port, publishes a handbook for all operators and maintains a website (<http://www.regionalchannels.vic.gov.au/>) providing a wide range of safety information including



notices to mariners and an educational portal. One VRCA pilot boat at Geelong monitors recreational boating movements, and clears small craft from channels in advance of commercial vessel movements. VRCA works closely with Marine Safety Victoria.

7.2.3. Port of Melbourne Corporation

The Port of Melbourne manages the port waters of Port Phillip and extensive shipping channels from the Heads at the entrance to Port Phillip to the Yarra River docks, in which there are over 3,000 vessel movements per annum. PoMC publish a Port Operators handbook, “Harbour Masters Directions” and maintains a website with up to date shipping movement, tidal and weather information, notices to mariners and a recreational boating section. Anchoring or drifting of boats is prohibited in declared Transit Only Zones. PoMC developed a “Steer Clear” campaign in 2006 which included a brochure outlining recommendations and requirements in port waters – see Appendix F. The “Steer Clear” campaign is conducted in conjunction with Victorian Water Police and Marine Safety Victoria. PoMC briefs various community groups on the safety campaign and has conducted commercial radio advertising. PoMC is currently resourcing authorised officers and patrol boats to assist Victoria Water Police with enforcement of port rules.

7.2.4. Marine Safety Victoria

Data from MSV covering almost eight years to May 2010 shows 5 collisions and 83 close encounter reports in Port Phillip and Western Port between commercial vessels and recreational craft. Three of the collisions involved locally registered workboats or passenger ferries or boats.

When the numbers of commercial vessel movements and numbers of recreational craft are considered, the number of incidents is very low.



8. Conclusion

The waters of the Upper Spencer Gulf are confined, environmentally sensitive and are used extensively for recreational boating activities, including fishing. Recreational boat operators are not necessarily familiar with safe navigation procedures required when in proximity to large vessels in confined waters and may have incomplete recollection of basic boating rules in force.

Despite this, incident data shows very few reported incidents between small recreational craft and commercial vessels.

The safe movement of commercial vessels in areas of high intensity recreational use is achieved at other ports in South Australia, at ports in other states, and at ports around the world. Given the high number of commercial vessel movements through South Australian ports the avoidance of injury and damage resulting from interaction between recreational and commercial vessels is a tribute to the careful management procedures conducted by port operators, DTEI, SA Police, SES, boating clubs and vessel operators.

With appropriate risk management, drawing on the experience of other South Australian ports, commercial vessel movements in the USG can be conducted safely in conjunction with recreational boating activity.



Appendix A Relevant legislation

A.1 International Law

UN Convention on the Law of the Sea (LOSC)	1982
Intervention convention on marine casualties (Commonwealth to intervene to manage casualties)	1969
International convention for prevention of pollution of the sea by oil (OILPOL)	1954
International convention for prevention of marine pollution (MARPOL) Regulatory control of oil, sewage, chemicals, garbage, engine emissions	1973
International convention for safety of life at sea (SOLAS)	1974
Standards of training certification and watchkeeping for seafarers (STCW)	1978
Oil pollution preparedness (National Plan – AMSA)	1990
Commonwealth preparedness to deal with oil spills	
Protocol to the London convention (Movement and dumping of waste at sea and incineration)	1996
London convention	1972
Basel convention	1989
Civil liability for oil pollution damage (CLC) (Compulsory insurance for pollution liability)	1969
Liability and compensation for damage – carriage of hazardous and noxious substances (HNNS)	1996

A.1.1 International institutions

International Maritime Organisation (IMO)
International Labour Organisation (ILO)

A.2 Commonwealth legislation

United Nations convention on the law of the sea (LOSC) (General framework of responsibilities and jurisdictions)	1982
Seas and Submerged Lands Act (Reconciling international law obligations with the constitution)	1973
Maritime Legislation Amendment Act Bringing offshore practice in line with obligations	1994
Offshore Constitutional Settlement Act (OSC) (Shipping and Navigation agreement between states and commonwealth)	



Navigation Act	1912
(Regulates a multitude of ship related activities)	
Environmental Protection (Sea Dumping) Act	1981
Protection of the Sea (Prevention of Pollution from Ships)	1983
Environmental and Heritage Legislation Amendment	2000
Control of Naval Waters Act	1918
Defence Act	1903
Migration Act	1958
Fisheries Management Act	1991
Customs Act	1901
Quarantine Act	1908
Crimes at Sea Act	2000

A.2.1 Commonwealth government Institutions

Department of Infrastructure Transport Regional Development and Local Government

IMO, oversight of AMSA, AMSC, Transport Security (MSIC, ISPS, security plans)

Australian Maritime Safety Authority

National Plan to Combat Oil Pollution

Australian Transport Safety Bureau

Environment Australia

Australian Quarantine and Inspection Service (AQIS)

Australian Customs

Department of Agriculture, Fisheries and Forestry

National Marine Safety Committee

Department of the Environment, Water, Heritage and the Arts

(Marine protected areas, protection of cetaceans)

A.3 State legislation (South Australian unless otherwise noted)

Offshore Constitutional Settlement Act	1979
Coastal Waters (State Powers) Act	1980
Coastal Waters (State Title) Act	1980
Harbors and Navigation Act	1993
(Safe navigation in SA waters administration development and management of harbours)	
Harbors and Navigation Regulations	2009



Port Regulations (eg Flinders Ports)	
Alcohol and Drug Testing Regulations	2009
Protection of Marine Waters (Prevention of Pollution from Ships) Act	1987
Protection of Marine Waters Regulations	2001
SA Maritime Services (Access) Act	2000
SA Environmental Protection Act	1993
SA Environmental Protection Regulations	2009
SA Codes of Practice	
Notices to Mariners	
Coast radio navigation warnings	

A.3.1 State government agencies

- Department of Transport, Energy and Infrastructure (DTEI)
Safety and regulation, transport services, policy and planning, major projects
- Department of Primary Industries and Resources
(Includes fisheries and aquaculture)
- Department of Environment and Heritage
Coast protection, marine conservation, marine parks
- Environment Protection Agency
(Includes water quality marine codes of practice)
- Flinders Ports
Private operator of ports including Port Pirie
- Services SA
Provision of services associated with government (eg Notices to Mariners)
- SA Tourism Commission
Promotion of marine related tourist activities
- State Emergency Services
- Volunteer marine rescue groups



Appendix B DTEI Flinders Ports ***Big ships little boats***



BIG SHIPS LITTLE BOATS

**Safety advice for recreational boaters
regarding their responsibility to keep out
of the way of large commercial vessels.**



Government of South Australia
Department for Transport,
Energy and Infrastructure

What recreational boaters should know...

- Commercial vessels operate 365 days a year, 24 hours a day.
- **The speed of a ship or tug can be deceptive.** Large vessels may travel at speeds in excess of 20 knots. It generally takes one to two kilometres for a large ship to stop (even with its engines going full astern).
- **Large vessels must maintain speed to steer,** and in most cases they must stay in the channel – it's the only place deep enough for them to operate. On some waterways, the channel extends bank-to-bank, so expect vessel traffic on any portion of the waterway (e.g. Outer Harbour and upper sections of the Port River).
- A ship's **'blind spot'** can extend for many hundreds of metres in front of large vessels (even up to one kilometre for some vessels!).
- In rivers and port zones, a ship or tug's powerful engines can cause a smaller vessel to be pulled toward the vessel when passing alongside. This can also happen when passing close amidships of large ships.
- **'Prop' or 'Wheel' wash** is a strong underwater current caused by tug or ship engines that can result in severe water turbulence hundreds of metres behind a large vessel.
- **'Bow Waves'** are large surface waves caused by the bow of a ship pushing through the water. A bow wave can swamp small craft hundreds of metres away from the ship.
- **Never pass closely behind a tugboat.** A tug could be towing a barge, or other objects on a long submerged line. This tow line may lie low in the water and be difficult to see.
- **Sailing near large vessels can be hazardous.** Yacht skippers and windsurfers should know that a large vessel can *'steal your wind'* – so you won't have the same ability to manoeuvre near a large vessel.





**DON'T BOAT, JET SKI, SAIL OR WINDSURF
IN AND AROUND LARGE VESSELS**

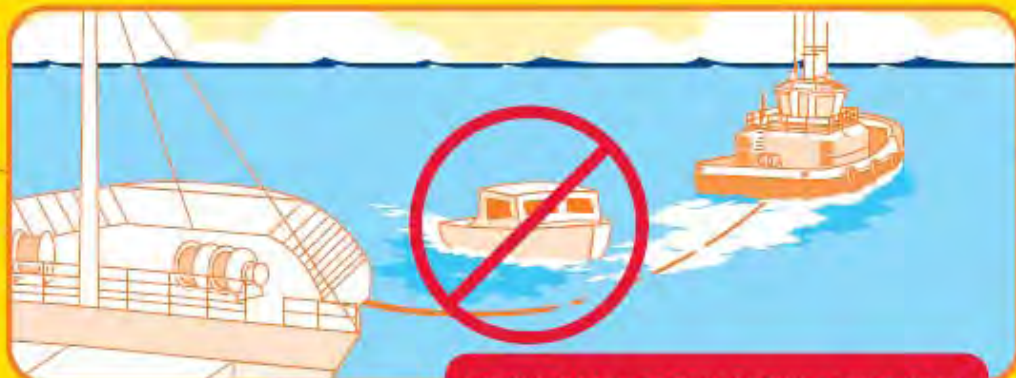
- Ships, tugboats and Port Control use **VHF radio** to communicate.
 - **Port operations** and ship-to-ship traffic is conducted on VHF Channel 6, 8 and 12.
 - **Emergency communication** is conducted on VHF Channel 16 within Port limits.
 - If you are unsure of your situation, or a vessel's intentions, feel free to contact them.
- Large vessels approaching bridges, bends in the channel and leaving and approaching their wharf must be lined up and committed to their approach well ahead. It is dangerous and difficult for them to change course. **For safety's sake, stay out of their path.**



**IT IS ILLEGAL AND DANGEROUS TO TIE UP TO
NAVIGATIONAL AIDS AND TO ANCHOR IN CHANNELS**

What recreational boaters can do...

- **Yachts must keep clear of large vessels at all times** – even when racing. In most instances, large vessels have right of way as they may be restricted in their ability to manoeuvre or constrained by their draft.
- **Designate a lookout.** Assign one person on your boat to maintain a lookout, particularly for large vessels.
- **Understand whistle signals.** Five short blasts (about one second duration) on the whistle indicates that the vessel is unsure of your intentions or doubts that you are taking enough action to avoid collision. Move clear of vessels sounding this signal.
- **Don't boat, jet ski, sail or windsurf in and around large vessels.** Jumping wakes, riding close alongside, or cutting under the bow of a large vessel could cause a boat or skier to be sucked through the vessels large propellers and bow or stern thrusters.
- **Avoid 'parked' or moored vessels.** Stay clear of large vessels when they are berthed at wharves or loading areas, turning areas or 'terminals'.
- **Watch for large vessels lighting at night.** Don't rely on trying to hear a vessel approaching. If you see both sidelights (red and green), you're dead ahead, and in the path of danger.
- **Use safe anchorages.** It is illegal and dangerous to tie up to navigation aids, like buoys and channel marks, and to anchor in channels.
- **Cross channels only when safe to do so.** Do not impede the passage of a vessel which can safely navigate only within a shipping channel. Endeavour to cross the channel at the shortest possible distance.
- When operating at night or in times of restricted visibility, **ensure that your boat displays appropriate navigation lights.** The radars of large vessels are limited in their ability to detect small craft and do not detect wooden or fibreglass vessels.
- **Be aware of local rules.** Restrictions and port operating rules may differ at each port. It is your obligation to be aware of any local restrictions or rules when you are boating in or near harbours and ports.



NEVER PASS CLOSELY BEHIND A TUG BOAT

Responsibilities between vessels

A vessel under power gives way to:

- a vessel not under command
- a vessel unable to manoeuvre easily
(including large vessels navigating in or near a channel or fairway)
- a vessel engaged in fishing
(with apparatus such as trawling gear restricting its ability to manoeuvre)
- a sailing vessel (but see below).

A sailing vessel must keep clear of:

- a vessel not under command
- a vessel unable to manoeuvre easily
(including large vessels navigating in or near a channel or fairway)
- a vessel engaged in fishing
(with apparatus such as trawling gear restricting its ability to manoeuvre).

Remember...

- large vessels cannot alter course quickly and cannot stop quickly
- small craft may be hard to see from the bridge of a large vessel
- small craft should not always assume that they have been seen
- in shallow waters (such as gulf water, channels, rivers and entering harbours) large vessels may not be able to deviate from their course and small sailing craft should be prepared to avoid these large vessels and make it clear that they are avoiding them.



LARGE VESSELS CANNOT ALTER COURSE QUICKLY AND CANNOT STOP QUICKLY



Government of South Australia

Department for Transport,
Energy and Infrastructure



Flinders Ports

SOUTH AUSTRALIA

www.dtei.sa.gov.au
www.flindersports.com.au

All information is current at the time of printing (May 2006) and is provided as a guide only. For full details refer to the Harbors and Navigation Act 1993 and Harbors and Navigation Regulations 1994. For a free copy of the South Australian Recreational Boating Safety Handbook call **13 10 84** or visit www.dtei.sa.gov.au

MR 165 04/06



Appendix C DTEI *On Deck* Autumn 2010

On Deck

AUTUMN 2010 – ISSUE 16

and MarineBiz

**Drug testing
on vessels**

**Why do
we drown?**

**Maintain
your boat**

**Avoid a
floating fireball**



Government of South Australia
Department for Transport,
Energy and Infrastructure



Big Ships and little boats don't mix

Taking a little boat near a big ship for a look is like standing on the runway to watch a jumbo jet take off – dangerous for all involved.

Several recent near miss incidents in and approaching the Port River between commercial shipping vessels (big ships) and yachts or tinnies (little boats) have raised safety concerns.

It's important to remember that big ships can only traverse in a channel. They cannot move out of your way or stop before they reach you. It is your legal responsibility to keep away from them.

Remember the following points to stay safe.

- Shipping has right of way over any other vessel that is not dependant on depth of water (channel).
- If you can't see the bridge of a ship the master or pilot can't see you.
- The speed of a ship or tug can be deceptive. It generally takes one to two kilometres for a large ship to stop (even with its engines going full astern). And a big ship's 'blind spot' can extend for many hundreds of metres in front of large vessels (even up to one kilometre for some vessels).
- Venturing near large vessels can be hazardous. Yacht skippers and windsurfers should know that a large vessel can 'steal your wind' – so you won't have the same ability to manoeuvre near a large vessel.
- It is illegal and dangerous to tie up to navigation aids, like buoys and channel markers, and to anchor in channels.
- Commercial vessels operate 365 days a year, 24 hours a day, so before going out check www.flindersports.com.au for up-to-date shipping movements.

If you obstruct a commercial vessel that can only navigate within the channel, you could be facing an on-the-spot fine of \$315 or be prosecuted with fines as high as \$5,000. You could also be charged with dangerous operation of a vessel that has a penalty of up to two years imprisonment. So play safe and stay well clear of any commercial vessels.

In addition, enforceable restricted zones exist around all commercial shipping (in particular fuel tankers and passenger vessels) in the waters of Gulf St Vincent and Spencer Gulf. Exercise caution in the vicinity of these vessels and maintain a clearance distance of at least 50 metres from them at all times.

More information

- via www.sa.gov.au/boatingmarine
- in the *Recreational Boating Safety Handbook* (available free from Service SA customer service centres)
- at community workshops held at various sailing clubs that can be organised by telephone: (08) 8348 9575 or email: DTEI.CommercialMarineServices@sa.gov.au

Can I fillet my fish at sea?

Anglers often ask fisheries officers if they can fillet their fish at sea.

You cannot cut up, fillet or otherwise mutilate fish on a boat (except for scaling and gutting) unless the fish or crabs are to be eaten on board within 24 hours.

This rule applies to fish and crabs that are subject to legal minimum lengths.

For shark species, you can only remove the pelvic fins, claspers and also the tail at the 'sub-terminal notch'.

Removing the tail at the 'sub-terminal notch' means that you can remove the tail, but do not cut into the trunk of the shark. The sub-terminal notch is the point where the trunk of the shark ends and the tail of the shark begins. This applies to all species of shark, including those without size limits.

Article courtesy of Primary Industries and Resources SA.



Appendix D Port of Hastings and Patrick – *Keep clear of big ships!*



Port of Hastings Corporation
ABN 94 997 016 180
Unit 2, 184 Salmon Street, Hastings, Victoria 3915
PO Box 129, Hastings, Victoria 3915
Telephone +61 3 5979 5500

Port of Hastings Corporation



MEDIA RELEASE

11 June 2008

KEEP CLEAR OF BIG SHIPS IN WESTERN PORT

The Port of Hastings Corporation, in partnership with the port managers, Patrick Ports, has produced a brochure to help Western Port recreational fisherman, sailors and boaters *'Keep Clear of Big Ships'*.

One of PoHC's and Patrick Ports' principal functions is to exercise general direction and control of the movement of vessels. The safety of all vessels, including recreational craft and big ships, in Western Port is a priority.

Around 200 commercial ships visit the Port of Hastings each year, ranging in size up to 165,000 tonnes. These large commercial vessels operate 24 hours a day, 365 days of the year and are instructed to keep within the marked channels or anchorages. They have right of way in the Western Port channels.

"The brochure has been produced to help us to keep everybody safe," said PoHC Chief Executive Officer, Ralph Kenyon. "Although the port has been operational since the early 1930s and, fortunately, we have not experienced any major incidents, the escalation of recreational craft in Western Port over the past few years means we have an increased need to keep navigation in the channels and port waters safe for all vessels."

Harbour Master, Patrick Ports – Hastings, Captain Dick Cox, advises recreational boaters to keep a constant lookout for big ships. "They may not hear the approach of a vessel over the noise of their engine or the noise of wind and waves and, after a ship passes, there will be waves that may catch them unawares and swamp or capsize their boat if they are not prepared.

"If they hear five short blasts on the whistle of an approaching big ship, they need to get out of the way. Big ships can't alter course quickly and certainly can't stop quickly, so small recreational craft must take care in port waters," said Captain Cox.

Tim Warner, President of Volunteer Marine Rescue Mornington and Hastings said that the VMR Group fully support the PoHC's and Patrick's concerns about small recreational vessels and big ships in Western Port.

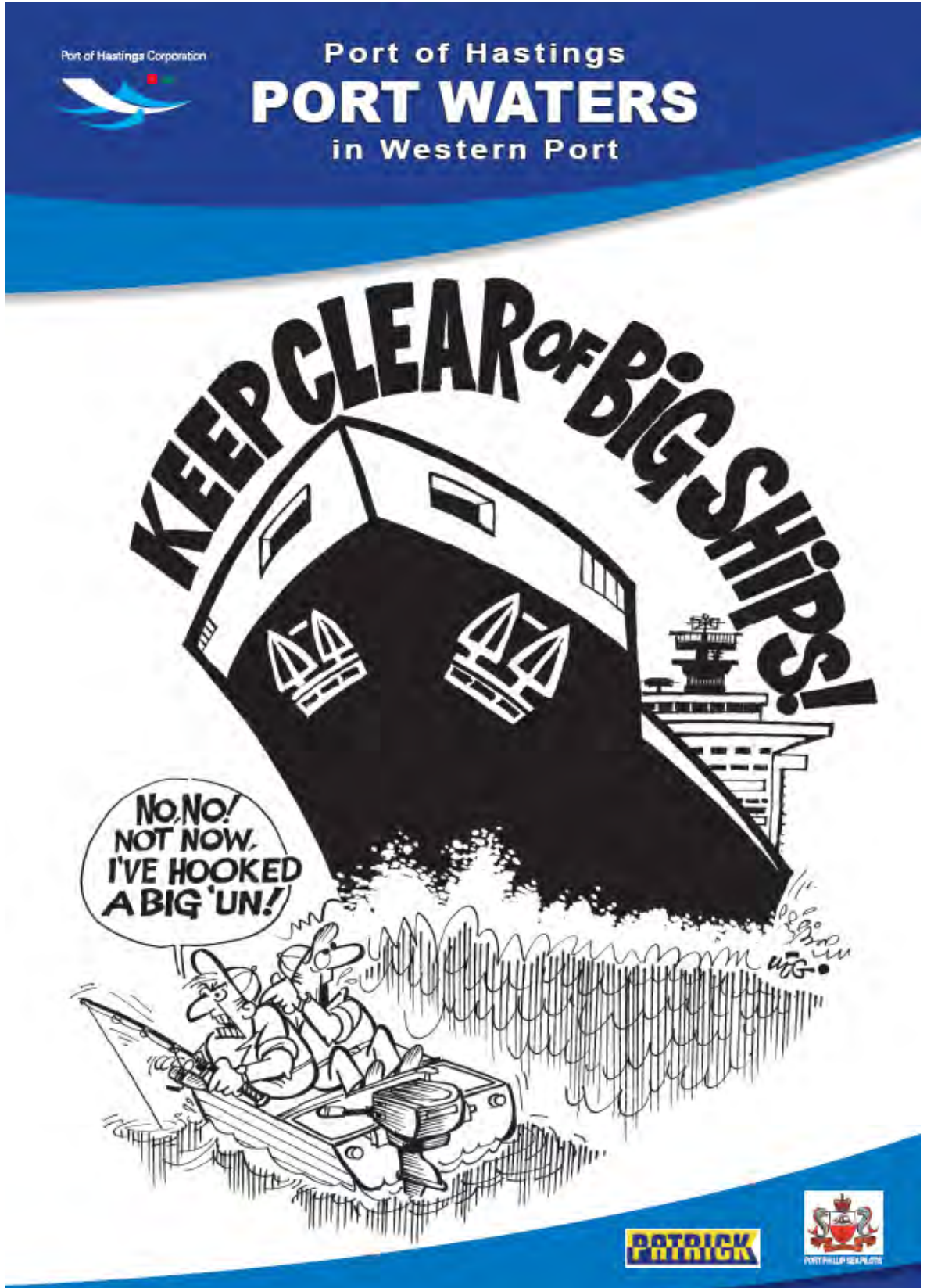
"Although we do not have any authority to request recreational craft to move, we are continually reminding boat owners of the inherent risks of crossing or anchoring in channels," said Mr Warner. "Not only is it extremely dangerous, it is illegal."

The Australian Volunteer Coast Guard also supports the *'Keep Clear of Big Ships'* brochure. "We are very happy to see this publication," said Michael Ling, Flotilla Commander, Coast Guard Westport. "It is vital to marine safety that boat users take their own safety seriously. This brochure gives the community another tool to ensure they come home safely without our assistance."

In addition to handy safety tips, the easy-to-read brochure also contains a map of the Port of Hastings clearly identifying port waters and channels.

The brochure, *'Keep Clear of Big Ships'* is being distributed to local councils, yacht clubs and recreational fishing and boat clubs and is also available at the Port of Hastings Corporation office at 184 Salmon Street, Hastings. Further information can also be found on the website at www.portofhastings.vic.gov.au.

Media Contact: Port of Hastings Corporation Ralph Kenyon CEO 5979 5500



KEEP CLEAR OF BIG SHIPS

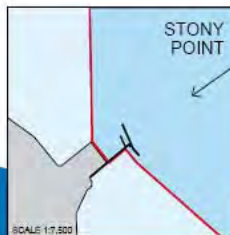
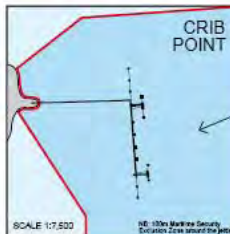
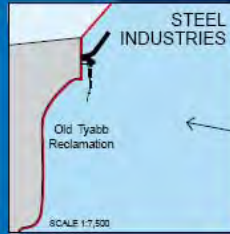
In the shipping channel, large vessels have right of way

Don't boat, jet-ski or sail around large vessels

BIG SHIPS make **BIG WAVES**

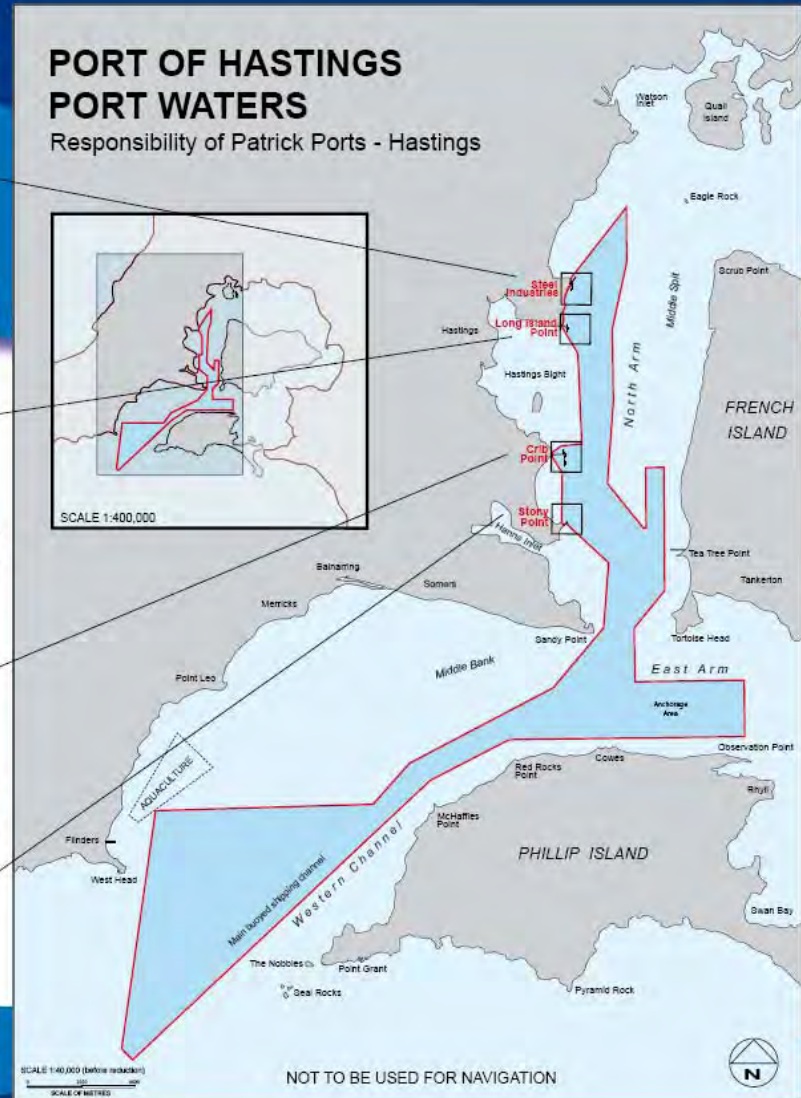
Yachts & recreational craft must keep clear of large vessels **AT ALL TIMES** in port waters - even when racing

Five short blasts of a ship whistle means **"GET OUT OF THE WAY"**



PORT OF HASTINGS PORT WATERS

Responsibility of Patrick Ports - Hastings





Appendix E VRCA – *Keep clear of big ships!*



Home Port Operations Geelong Port Regional Ports Shipping Services VRCA News & Publications Quick Links Contact VRCA



VRCA – Safety of navigation is our priority

One of VRCA's principal functions is to exercise general direction and control of the movement of vessels. The safety of all vessels in port waters is a priority

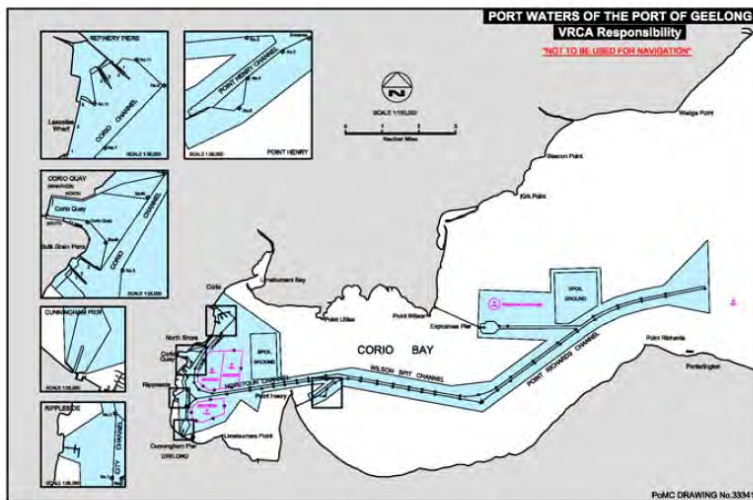
- There are about 1,000 channel transits by large ships every year
- Large vessels-
 - must keep within the marked channels or anchorages
 - they have right of way in the channels
 - they cannot steer if they slow down too much
 - they may not be able to avoid you
- Small recreational craft must take care in port waters
- Help us to keep everybody safe
- Keep clear of big ships
- Keep a lookout - you may not hear the approach of a vessel over the noise of your engine or the noise of wind and waves
- Make sure you show appropriate lights at night
- After a ship passes there will be waves that may catch you unawares and swamp or capsize your boat if you are not prepared

If an approaching big ship is blowing its whistle it means:

'GET OUT OF THE WAY'

Do not anchor in the channels – it's illegal
Please help us to keep navigation in the channels and port waters safe for all vessels

A Current Map of the Port of Geelong Channels





Appendix F Port of Melbourne Corporation – *Steer clear*

STEER CLEAR

SAFETY NOTICE TO ALL BOAT OPERATORS



Port of Melbourne
Corporation





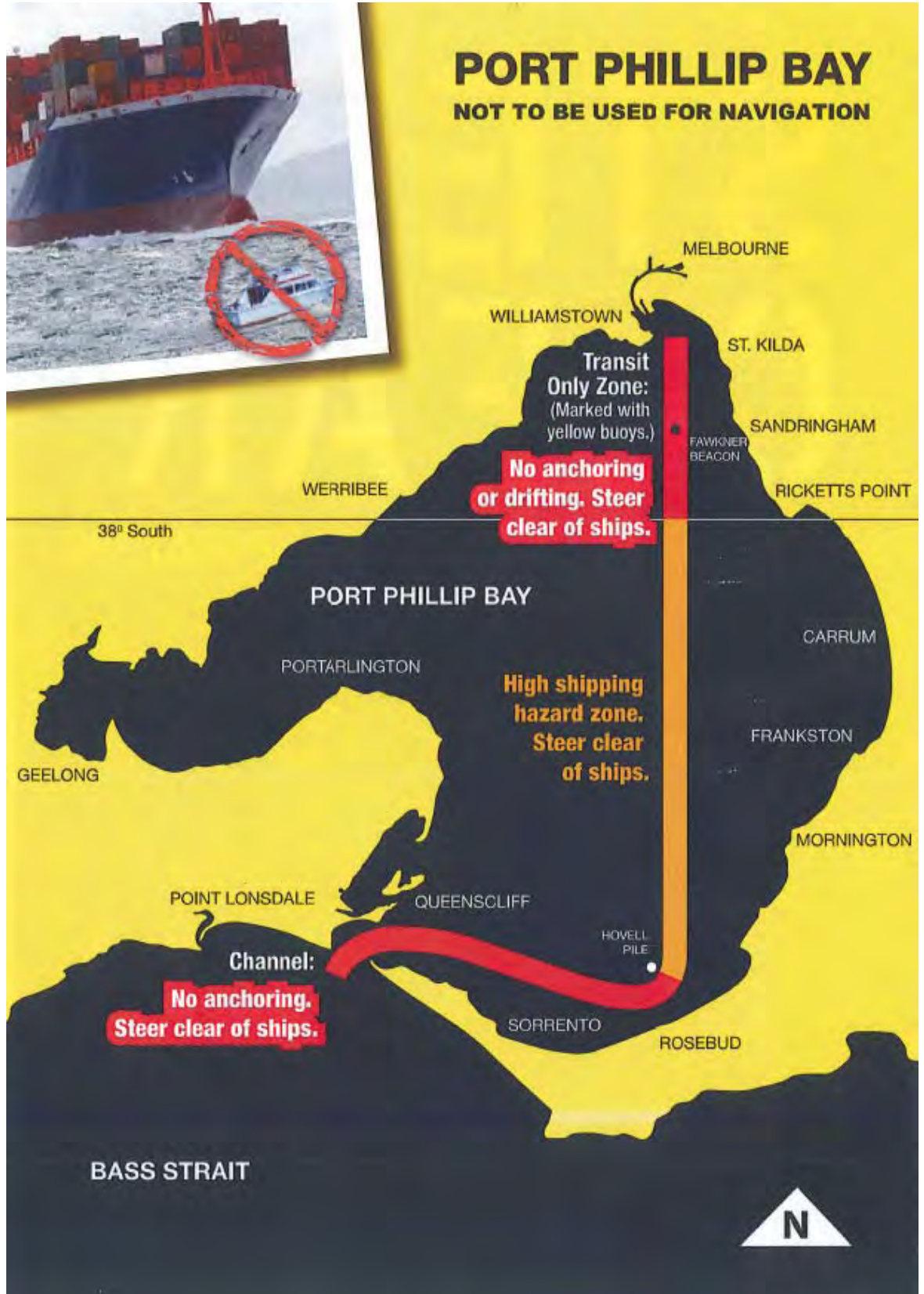
DON'T ANCHOR IN SHIPPING CHANNELS OR TRANSIT ONLY ZONES.

- Don't tie up to navigation aids e.g. buoys or channel markers.
- It is dangerous and illegal. Penalties apply.

ALWAYS STEER CLEAR OF SHIPS.

- Small boats must keep clear of ships.
- It is dangerous, and often impossible, for ships to change course quickly.
- Just because you can see the ship, don't assume the ship can see you.





STEER CLEAR

SAFETY NOTICE TO ALL BOAT OPERATORS

Anchoring in shipping channels and transit only zones is extremely dangerous and illegal.

Ships can weigh up to 100,000 tonnes and do not have brakes. They cannot stop or change course suddenly. They are often travelling faster than you think.

For your own safety, steer clear of ships at all times.

不要在船運航道上或僅限通行區域裡下錨泊船。違者將受處罰。保持遠離這些區域。

لا ترسو أبدا في قنوات الملاحة البحرية أو المناطق المحددة للعبور فقط. أن الإخلاء بذلك يعرضك للعقوبات. قد قاربك بعيدا عن هذه المناطق دائما.

Đừng bỏ neo trong kênh tàu bè giao thông hay các khu vực dành riêng để lưu thông mà thôi. Vi phạm sẽ bị phạt. Luôn luôn tránh xa.

Ticari gemi şeritleri (kanalları) ya da transit bölgelerde (transit only zones) demirlemeyiniz. Cezalar uygulanmaktadır. Daima sakınınız.

For more information contact:
Port of Melbourne Corporation
on 1300 857 662 and ask for Navigation Services.





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APPENDIX L3

Mining and health literature review

L3.1 INTRODUCTION

Chapter 22 of the Draft EIS referred to a paper by Stephens and Ahern (2001¹) (hereafter known as MMSD 2001), which was used as an independent reference for information on possible occupational and community health and safety impacts from mining. MMSD 2001 was a review of scientific literature on worker and community health impacts related to mining. The MMSD 2001 literature review searched a standard health database (PubMed <www.ncbi.nlm.nih.gov/pubmed/>) using a series of key word searches. Three hundred and thirty articles published between 1965 and 2001 were identified, and abstracts were obtained and reviewed for quality and relevance. The articles were then summarised into broad issue-related categories. It was noted that there were relatively few studies from developed countries (as compared to developing countries) and many were retrospective, covering a long period and reflecting earlier conditions in the mining industry that no longer prevail.

While the final MMSD 2001 report provided a broadly negative picture of the industry, it did note that regulations and standards, when actively enforced, provide a means of protecting worker and community health.

For the Supplementary EIS, an update of the MMSD 2001 work has been undertaken.

L3.2 METHOD

Using the methodology of the MMSD 2001 study and PubMed as the data source, papers relevant to mining and mineral processing published between 2001 and 2010 were identified. Abstracts of these papers were reviewed to identify more recent trends and issues that may need to be considered as part of the broader community health impacts of mining in relation to the proposed expansion. This was a broad, qualitative study, intended to update the existing MMSD 2001 work and to identify issues that might require further investigation.

Each abstract was summarised into one or two key findings or statements. The findings were then collated based on:

- mineral mined
- whether the study was occupational or community health
- type of country (developed or developing)
- type of study (health, safety or environmental).

Findings that were not relevant to the proposed Olympic Dam expansion have not been reported (e.g. some studies reported on the findings of long-term health studies where exposures to either workers or the public were high in comparison to today's exposure levels, and particularly higher than the levels predicted for the proposed expansion). The main results reported here are in relation to findings about community health from studies in developed countries related to heavy metal or uranium mining activities.

The statistics of the updated study are as follows:

- papers from between 2001 and April 2010 were identified
- 230 peer-reviewed papers were selected
- 170 abstracts were reviewed because of their potential relevance
- 28% related to community health, 72% to occupational health
- 77% related to health impacts, 23% to safety and environmental impacts
- 55% were studies of developing countries, 45% of developed countries
- 38% of the studies were not mineral-specific and findings could be applied generally to the whole mining industry; 21% of studies refer to coal, 11% gold mining and 7% were related to uranium mining.

Given the broad nature of this review, individual statements are not referenced, however a complete list of references is provided at the end of this technical note.

¹ Stephens, C & Ahern, M 2001, Worker and Community Health Impacts related to Mining Operations Internationally. A Rapid Review of the Literature, report for Mining, Minerals and Sustainable Development (MMSD) project of the International Institute for Environment and Development, London.

L3.3 FINDINGS

Compared to MMSD 2001, this review established a significant difference between impacts in developing and developed countries, with the main differences being that where standards existed and were enforced (mainly in developed countries), health outcomes were better. On the other hand, poor community and occupational health outcomes were partly due to lack of enforcement and adequate government standards, and this was found to occur more often in developing countries.

Another finding is that for both community and occupational situations, smoking remains the major risk factor in developing cancer and heart disease. Smoking multiplies the health impacts of exposure to other atmospheric pollutants. There was no reported difference between the impacts of smoking in developing and developed countries.

Exposure levels were found to increase with residential proximity to the source of emissions, and some work has been done on the relationship between the health of children and the environmental pollution in which they live. A number of studies commented on the long-term impact of heavy metal deposition from airborne dust contamination and water pollution, which under certain conditions and distances from the source can increase soil metal concentrations and can enter the food chain, resulting in increased health risks.

Studies in the United States of America commented on the effectiveness of community education and information programs that demonstrably improved health outcomes by communities actively minimising their exposures. Targeted community clean-up programs were also effective in reducing health risks.

L3.4 APPLICATION TO THE PROPOSED OLYMPIC DAM EXPANSION

The main findings of this review were:

- good robust regulations and their implementation are essential to protect health
- smoking remains a significant health issue
- offsite deposition of heavy metal particulates may result in health impacts
- community education programs are effective health control measures.

Each of these areas is discussed below in the context of the proposed expansion.

L3.4.1 REGULATION

The regulations and standards for air quality in Australia are well established. As noted in Section 13.3.2 of the Draft EIS, BHP Billiton would comply with the National Environmental Protection (Ambient Air Quality) Measure (NEPM) ground-level concentration and the South Australian Environment Protection Agency (SA EPA) Air Quality Policy for airborne particulates. While the air quality modelling indicated that there may be occasions under specific atmospheric conditions when the ground-level concentration standard in Roxby Downs may be exceeded for up to 10 days a year, BHP Billiton has committed to meeting the standards through operational management. The information required for effective operational management would be supplied by the real-time monitoring system that would be installed as part of the proposed expansion.

The regulations relevant to the Olympic Dam expansion are robust and based on National Standards that provide appropriate health protection. BHP Billiton will comply with these regulations and standards.

L3.4.2 SMOKING

Recent health statistics (refer to Appendix J3 of the Supplementary EIS) indicate that the proportion of male smokers in the Roxby Downs population is above the Australian average, consistent with the South Australian average and less than the South Australian country average, while the proportion of female smokers is less than all of the averages.

BHP Billiton's 'Fit for Work – Fit for Life' program includes personal health promotions and provides programs for employees to quit smoking. BHP Billiton maintains a smoke-free work environment and also seeks to extend this healthy living initiative by encouraging healthy life practices outside of work.

BHP Billiton would also continue to provide additional assistance for individuals to stop smoking when requested.

L3.4.3 HEAVY METAL DEPOSITION

Summarised results from BHP Billiton's routine regional soil monitoring for 2010 can be seen in Table 1. The results show that the concentrations of metals in soils are consistent across the broader region. When compared to the regional soil results in table 11.5 of Appendix I of the Draft EIS, it can be seen that even after 20 years of operation at Olympic Dam, elevated metal concentrations in soil are not evident beyond the mine lease boundary. While the levels are slightly elevated in the soil within this footprint, there have been no observable impacts, and the levels remain well below any detectable toxicity levels. Cadmium, which was noted in other studies, is not present in Olympic Dam ore in significant quantities.

Soil concentrations of all heavy metals (including radionuclides) are not elevated in the closest communities of Olympic Dam Village and Roxby Downs after 20 years of operation.

Through ongoing monitoring programs, BHP Billiton would continue to measure heavy metals and radionuclides in air and in soils.

Table 1: Average soil concentrations (mg/kg) from BHP Billiton 2010 soil sampling

mg/kg	Outside Mine Lease	Inside Mine Lease	In Roxby Downs
Copper	4.7	7.7	2.4
Lead	2.6	2.8	1.8
Thorium	1.0	1.0	1.0
Zinc	12.0	12.0	6.4

L3.4.4 EDUCATION PROGRAMS

BHP Billiton has committed to an education program and reporting programs for airborne particulates. Information would be provided to residents of Roxby Downs and the proposed Hiltaba Village on particulate emissions through information packs, web-based information systems and regular feedback to the community on environmental performance.

BHP Billiton conducts regular public information sessions in the Roxby Downs community. These activities would continue for the expanded operation.

L3.5 CONCLUSIONS

This review updated the findings of the MMSD 2001 review and identified potential issues relevant to the proposed Olympic Dam expansion.

L3.6 PUBMED ABSTRACT LIST

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