ENVIRONMENT PLAN

FUR SEAL-1

EXPLORATION DRILLING PROGRAM

COMMONWEALTH WATERS

GIPPSLAND BASIN - VICTORIA

Document No. EA-70-RI-003
Revision 0

Distribution List:

Department of Primary Industries
South-east Trawl Fishing Industry Association
Lakes Entrance Fisherman's Co-op
South-east Fishery Association
San Remo Fisherman's Co-op
Senior Drilling Engineer
Apache Drilling Supervisor
MODU Person in Charge
Marine Manager – Workboats x 2
Environment Library
Main Library

August 2005

TABLE OF CONTENTS

APPENDICES

TABLES

FIGURES

1 INTRODUCTION

1.1 Background

Apache Energy Ltd (Apache) is the operator of permit VIC/P54, located in Commonwealth waters in the Gippsland Basin, offshore from the State of Victoria (Figure 1).

Apache is an international oil and gas production and exploration company. The Company was founded in 1954 and is today ranked among the world's top independent oil and gas companies.

Apache Energy Ltd, a subsidiary of Apache Corporation, has been operating in Western Australia (WA) for over 12 years. The Company is a significant producer of oil and gas in WA, operating numerous monopods, conventional platforms and gas plants. Acreage in WA totals over 8.6 million acres, including exploration permits and production licences in predominantly the offshore Carnarvon Basin. Drilling activity is focussed on the Carnarvon Basin, Exmouth Sub Basin and the Perth Basin. Apache is an active exploration company, having drilled the following development and exploration wells in Australia over the last six years:

- 27 wells in 2000;
- 27 wells in 2001;
- 25 wells in 2002;
- 34 wells in 2003;
- 23 wells in WA and 2 wells in Victoria in 2004; and
- 20 wells in WA to date in 2005.

Apache acquired a majority interest in the exploration permit VIC/P54 on the 1st April 2004 and became the operator of the permit. Apache holds a 62.5% interest with its joint venture participant Nexus, which holds the remaining 37.5% interest. Apache drilled Longtom-2 and Grayling-1 wells between November 2004 and January 2005 using the Ocean Patriot semi- submersible drilling rig.

Apache are now proposing to drill Fur Seal-1 in VIC/P54. This Environment Plan (EP) has been prepared for submission to the Victorian Department of Primary Industries (DPI), in accordance with the provisions of the Petroleum (Submerged Lands) Act 1967 and the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999.

This EP details the planned drilling program for Fur Seal-1, describes the surrounding environment within the exploration permit, identifies and risk ranks potential environmental hazards, and details the management controls to ensure the listed environmental performance objectives and standards are implemented.

The proponent's address is:

Apache Energy Ltd
Level 3, 256 St Georges Terrace
Perth Western Australia 6000

Contact Person for these wells is:

Libby Howitt
Senior Environmental Scientist
Ph: (08) 9422 7481

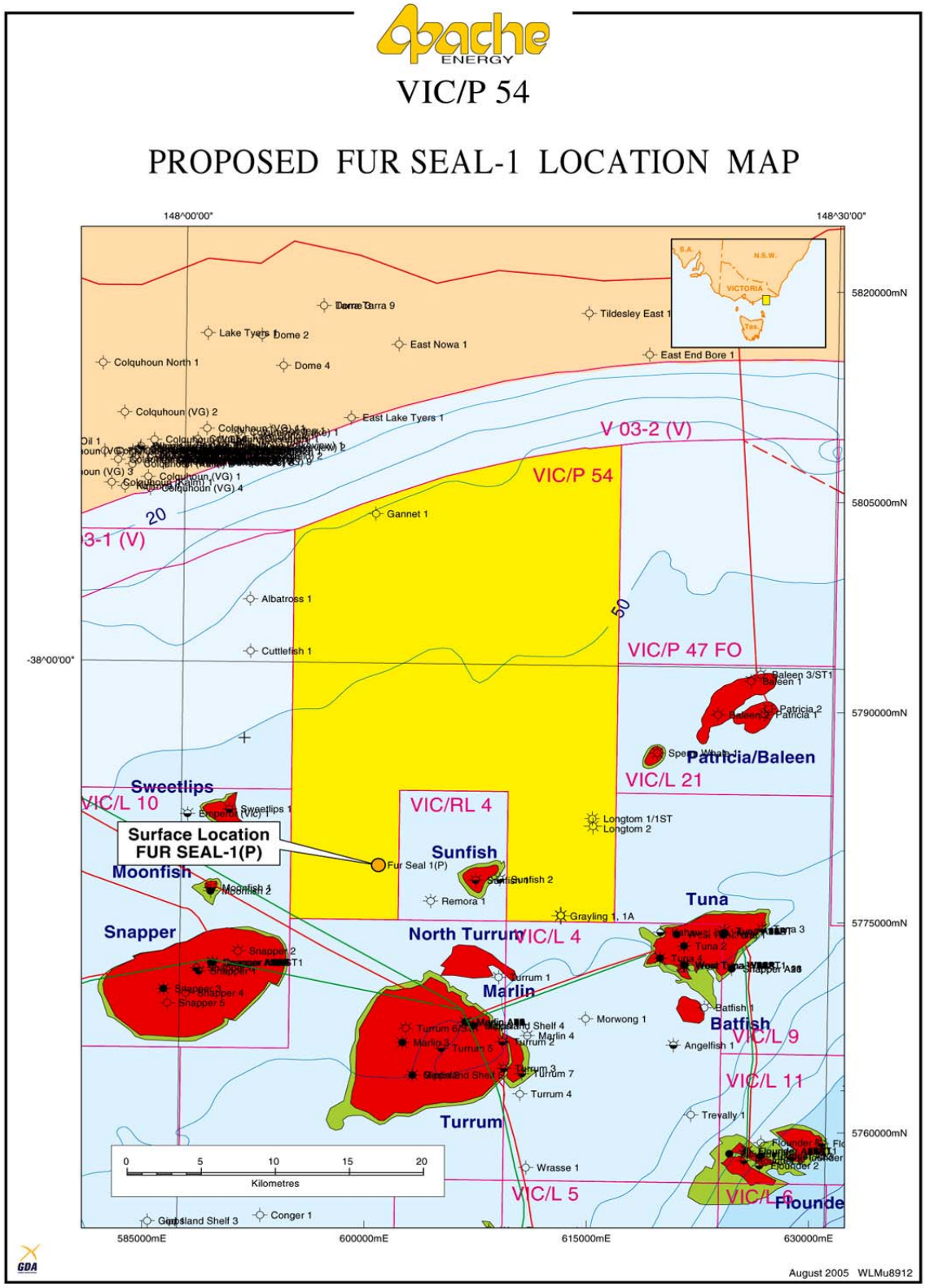


Figure 1: Location of the proposed Fur Seal-1 well in Permit VIC/P54

1.2 Project Description

Apache is proposing to drill Fur Seal-1 exploration well from mid October 2005. The drilling program is expected to take approximately 20 days to complete, based on a dry hole scenario. The well is located in permit area VIC/P54 in the Gippsland Basin in relatively deep (58m) Commonwealth waters off the Victorian Coast (Figure 1).

The details for Fur Seal-1 are given in Table 1.

Table 1: Well Details

Well Name	Fur Seal-1
Surface hole location	38° 07' 47.82" S 148° 09' 08.53" E GDA '94
Type of well	Exploration
Approximate water depth	58 m
Approximate length of drilling period	20 days (dry hole)
Proposed total depth of well	2,612 m
Drilling rig	Ocean Patriot
Drilling fluid	top hole – SW/High Viscosity Sweeps 311 mm & 216mm hole – WBM
Volume of cuttings (estimate only)	280 m^3 (includes 20% excess)
Annular disposal?	No
Volume of WBM cuttings disposed to sea floor	280 m^3
Scheduled commencement date	mid October 2005
Distance to nearest land or reef system	Approximately 30 km south from the Victoria coastline
Oil Spill Modelling	Undertaken for Oct/Nov weather conditions from Longtom-2 (14.7 km to east southeast)

The wells will be drilled using the semi-submersible drilling rig Ocean Patriot. The rig will be towed into position by one or two support vessels. When in position, the rig will be held on location by an eight point anchor spread.

Support vessels will also supply the rig with fresh water, food, fuel, bulk drilling fluid materials and drilling hardware. These vessels will operate between the rig and the Port of Melbourne. The two nominated support vessels for the drilling campaign are the Far Grip (call sign LGRO) and the Pacific Wrangler (call sign 9V6218).

The drilling rig and support vessel crews will be accommodated aboard their respective vessels. Marine crew changes will involve transfer from the vessel when it is in Port.

Crew changes for the drilling rig will be out of Essendon airport via helicopter to the drill rig. The helicopter will also undertake transit trips from West Sale for either passenger pickup, or a refueling stop on return flights to the Essendon airport.

1.3 Drilling Procedure

The drilling procedure will be to drill a 914 mm hole to a depth of approximately 27m below the seabed and then install a 762 mm x 508 mm conductor casing. A 406mm hole will then be drilled to a depth of 800 m BRT (below rotary table) using sea water (90%) and high viscosity gel (10%) sweeps, with returns to the seabed. A 340 mm casing string is then cemented in position. The blow out preventers (BOP's) will then be installed and pressure tested and drilling will continue with 311 mm hole to ~2100 m, where a 245 mm casing string will be run and cemented. After pressure testing the BOP, 216 mm hole will be drilled to TD (2612 m). Testing may be conducted upon encountering commercially viable hydrocarbon volumes.

All work on the well will be undertaken in accordance with the regulations and guidelines set out in the *Petroleum (Submerged Lands) Acts, Schedule: Specific Requirements as to Offshore Petroleum Exploration and Production – 199*5.

The wells will be drilled with water based drilling fluid. All the cuttings will be discharged to the seabed.

Formation pressures within the well bore and the volume of returned drilling fluid will be continuously monitored. If a flowing formation is detected, the drilling fluid density will be increased proportionately to provide primary well control. The BOP is used to seal the well in the event of a fluid flow from the well that cannot be controlled by the existing mud density.

At the completion of drilling a well, electric logging tools are run over the length of each well to evaluate the reservoir. Regardless of whether the wells are assessed as being commercial or not, they will be abandoned in accordance with DPI approved programs. Cement plugs will be set at various depths in each well bore to seal the wells and the casings will be cut off below the surface of the seabed and all the seabed obstructions will be removed. A remotely operated vehicle will then be used to survey the seabed at each location to ensure that no debris remains from the drilling operations.

On completion of the well, the rig will retrieve its anchors and be towed away to its next drilling location.

1.4 Safety Precautions

Before drilling operations commence, routine precautions will be undertaken by the drilling contractor to ensure the stability of the drilling rig and to minimise the risk of movement during storm conditions. Extensive previous drilling in the region has provided information on the nature and stability of the seabed and the underlying strata.

During drilling, a 500m radius temporary exclusion zone around the rig will be declared under legislation and gazetted accordingly. Vessels that operate in these waters will be informed on approach by radio about the exclusion zones applying around the rig.

The well will be designed and engineered to standards approved by DPI to ensure that well pressures remain under control. Annular, ram and drill string BOP's will be used. A typical BOP stack design system would incorporate the following:

- double ‘U’ ram, 15,000 psi working pressure;
- single ‘U’ ram, 15,000 psi working pressure; and
- an annular preventer, 10,000 psi working pressure.

The BOP system will be able to contain pressure far in excess of pressures (3,308 psia) encountered in reservoirs generally found in the Gippsland Basin.

Casing sizes and lengths and the intervals where the hole is cement-sealed around the casing will be selected to maximise well control. Apache’s experience gained from the numerous wells previously drilled in the Commonwealth water region will facilitate well design. Well design is conservative, to ensure a margin of safety to control any higher than expected pressures.

An Emergency Response Manual (AE-00-ZF-033) and an Oil Spill Contingency Plan (AE-00-EF-013) specific to the Gippsland environment, both detailing safety procedures in the event of an accident or emergency situation, will be available on the drilling rig and support vessels. Copies of these documents are introduced in the Environmental and Safety induction process and are made available to crew members prior to the commencement of any work.

2 REGIONAL DESCRIPTION OF THE ENVIRONMENT

2.1 Metocean Conditions

Climate and Oceanography

The climate of the Gippsland Basin can be described as moist cool temperatures with warm summers, with a regular winter-spring rainfall. The region is located on the northern edge of the westerly wind belt known as the roaring forties. Winds often freshen to gale force from the north and north-west, ahead of approaching fronts during all seasons. Once the fronts have passed they then swing abruptly south-west behind the front at similar speeds and abate until they again freshen ahead of the next front. Additionally, low pressure systems can generate wind systems known as the "East Coast Lows", which consist of strong south easterly winds. The currents within the area include components due to tides and wind stress. As a function of this in the open waters, tides generally result in an elliptical movement of the water mass (URS, 2003).

The East Australian current brings warmer waters into Bass Strait and influences water temperatures. Sea surface temperatures for Bass Strait range from 16 to 18^{o}C in February and 12 to 14^{o}C in August (Middleton, 1995).

Wave energy is relatively low, particularly in the broader shelf area in the Gippsland Basin. However, stalled low-pressure systems in the Tasman Sea during the summer can generate higher wave energy at this time. Intermittent upwellings occur along parts of the east Gippsland coast (URS, 2003).

Bathymetry

VIC/P54 is located in relatively shallow water depths in relation to other offshore permits within Bass Strait. Water depth ranges from 40m in the northern section of the permit to 60m in the southern portion of the permit, with a gradual gradient from shallow to deeper waters.

2.2 Biological Environment

The near shore fauna of Bass Strait is characterised by distinct species assemblages of reef fishes, echinoderms, gastropods and bivalves (URS, 2003). Deeper waters biological assemblages of Bass Strait are poorly known. Between 1979 and 1984 the Museum of Victoria sampled benthic organisms and infauna in eastern Bass Strait. Three hundred and fifty three species of invertebrates were collected, half of which were crustaceans and the rest polychaetes and molluscs (Poore, 1995).

As part of the Patricia-Baleen development for VIC/L21, located approximately 15km NW of the Fur Seal-1 drill site, CEE Consultants (2001) undertook a marine seabed survey and described four general seafloor habitat types.

These included:

- medium sand and shell grit supporting sea pens, occasional sponges and colonial ascidians;
- shell accumulations consisting of large predominantly bivalve shells including scallops;
- sponge garden consisting of large sponges and bryozoans at approximately 50m water depth; and
- introduced New Zealand screw shell aggregations.

CEE (2001) concluded that these habitat types are likely to be widespread in eastern Bass Strait.

Fish

The pelagic water species found in Bass Strait are largely of cool temperate water species, common to Southern Australian seas (ANZECC, 1998).

Many commercially important fish species are found in Bass Strait. Some of the common species caught by commercial fisherman in Bass Strait are listed in Table 2 below. Many of these commercial catch species are fished in waters much deeper than that found within the permit area.

Table 2: Commercially significant fish species for Bass Strait

Fish Species	Depth predominantly fished at
Orange roughy (*Hoplostethus atlanticus*)	>500m
Eastern gemfish (*Rexea solandri*)	200 – 500m
Tiger flathead (*Neolpatycephalus richardsoni*)	<50 – 250m
Blue grenadier (*Macruronus novaezelandiae*)	300 – 600m
Redfish (*Centroberyx* spp.)	<50 – 300m
School whiting (*Sillago* spp.)	<50-150m
Warehou (*Seriolella* spp.)	50 – 550m
Ling (*Genypterus* spp.)	250 – 550m
John dory (*Zeus faber*)	50 – 200m
Silver trevally (*Pseudocaranx dentex*)	<50 – 150m
Ocean perch (*Helicolenus percoids*)	350 – 550m
Various shark species	<50 - >500m

Cetaceans and Seals

Forty three species of whales and dolphins occur in Australian waters (Bryden et al. 1998), with approximately 50% of these reported in Victorian waters.

Southern right whales (*Eubalaena australis*), migrate from sub-Antartic feeding grounds to their breeding grounds close to Victoria and other areas of Southern Australia. Bass Strait is a known migration pathway for this species (EA, 2001).

A localised, seasonal aggregation of the Blue whale (*Balaenoptera musculus*) has been reported off the Victorian and South Australian coasts (Gill, 2000). Observations from this work suggest that the blue whales aggregate in this area during summer and autumn to feed on krill associated with the cool-water upwelling along the continental shelf. This species migrates through Bass Strait in November and December (EA, 2001).

Little is known of the distribution of feeding grounds, migration paths and calving areas of the other species of whales and dolphins found in Bass Strait. Humpback whales have been reported in the Bass Strait, and pass through the Strait on their way to calving areas off Queensland or to their sub-Antarctic feeding areas (EA, 2001).

The Australian fur-seal (*Artocephalus pusillus*) occurs throughout Bass Strait. There are numerous breeding colonies near Wilson Promontory, Philip Island and King Island. There are no breeding grounds within VIC/P54 or in the immediate surrounding waters (Bryden *et al.* 1998).

The seals moult, breed and rest on land, and tend to come ashore on rock platforms, reefs or rocky beaches. They utilise artificial structures including Bass Strait oil and gas infrastructure and mooring buoys, as resting locations.

Endangered and Vulnerable Species

A search of the EPBC Act Protected Search Tool identified that a total of potentially 5 marine species were listed under the EPBC Act database as being endangered or vulnerable that may occur within the proposed permit. These are listed in Table 3 below. The proposed drilling site is not considered a habitat that is critical to the survival of these species. Similarly there are no listed threatened ecological communities as defined in the EPBC Act in the vicinity of the drill sites. There are, however, numerous species of listed threatened fish species and listed migratory marine species that may be found within the region of VIC/P54.

Table 3: Endangered and vulnerable species under the EPBC Act that may occur within VIC/P54

Species	Listing	Likely presence in the Area
Blue whale (*Balaenoptera musculus)*	Endangered marine species	Possible (passing through area)
Southern right whale (*Eubalaena australis*)	Endangered marine species	Possible (passing through area)
Humpback whale (Megaptera novaeangliae)	Vulnerable marine species	Possible (passing through area)
Grey white shark (*Carcharodon carcharias*)	Vulnerable marine species	Possible
Whale shark (*Rhincodon typus*)	Vulnerable marine species	Unlikely

Some of the species listed above may migrate through or temporarily forage within VIC/P54, however, it is unlikely that the drilling programme will adversely affect populations of this species. The small area in which the drilling will take place is unlikely to function as a critical habitat for any of these listed species.

Of the whales listed in Table 3, the Southern right whale is known to calve close to the western Victorian coast between May and September (EA, 2001). Blue whales aggregate and feed in waters off the western Victorian coast and individuals of both species may pass through VIC/P54.

Listed and Migratory Species

The Blue and Southern right whales are two species, listed under the EPBC Act, which migrate through eastern Bass Strait (EA, 2001). Other migratory marine species that may migrate through the area according to the EPBC Act Protected Search Tool are listed in Table 4 below. It is highly unlikely that the proposed drilling programme will have a detrimental effect on any of these species because of the temporary nature of the drilling program and its distance from recognised calving and feeding grounds.

Migratory seabirds listed under the EPBC Act are know to occupy the islands of Bass Strait and the nearby coastline and may pass through VIC/P54 during the time of the drilling program. However, due to the lack of suitable roosting and breeding habitats they are not expected to occur within the permit. Foraging activities are undertaken by these species on the open ocean throughout Bass Strait. Seabirds that may migrate through the permit area are also listed in Table 4.

The little tern (*Sterna albifrons*) is a listed migratory species under the EPBC act that has rookeries near Tamboon Inlet and Sydenham Inlet located approximately 65km and 80km NE respectively from the Fur Seal-1 drill site.

Other listed species identified by the EPBC Act Protected Search Tool that may inhabit the area includes:

- 20 species of Pipefish
- 4 species of Seahorse
- 1 species of Seadragon (*Phyllopteryx taeniolatus*)
- 2 species of Pipehorse
- 1 species of fur seal (*Arctocephalus pusillus*)
- 19 other species of cetaceans (whales and dolphins)

Table 4: Migratory Species under the EPBC Act that may occur within VIC/P54

Species	Listing	Likely presence in the area during the time of drilling
Antartic Minke Whale, Dark-shouldered Minke Whale (*Balaenoptera bonaerensis*)	Migratory marine species	Possible
Brydes's whale (*Balaenoptera edeni*)	Migratory marine species	Possible
Pygmy Right Whale (*Caperea marginata***)**	Migratory marine species	Possible
Killer whale, Orca (*Orcinus orca*)	Migratory marine species	Unlikely
Sperm whale (*Physeter macrocephalus*)	Migratory marine species	Possible
The little tern (*Sterna albifrons*)	Migratory seabird species	Possible
Amsterdam Albatross (*Diomedea amsterdamensis)*	Migratory seabird species	Unlikely
Antipodean Albatross (*Diomedea antipodensis)*	Migratory seabird species	Unlikely
Tristan Albatross (*Diomedea dabbenena)*	Migratory seabird species	Unlikely
Southern Royal Albatross (*Diomedea epomophora)*	Migratory seabird species	Unlikely
Wandering Albatross (*Diomedea exulans)*	Migratory seabird species	Unlikely
Gibson's Albatross (*Diomedea gibsoni)*	Migratory seabird species	Unlikely
Northern Royal Albatross (*Diomedea sanfordi)*	Migratory seabird species	Unlikely
(*Macronectes halli)* Northern Giant-Petrel	Migratory seabird species	Unlikely
Buller's Albatross (*Thalassarche bulleri)*	Migratory seabird species	Unlikely
Shy Albatross (*Thalassarche cauta)*	Migratory seabird species	Unlikely
Grey-headed Albatross (*Thalassarche chrysostoma)*	Migratory seabird species	Unlikely
Campbell Albatross (*Thalassarche impavida)*	Migratory seabird species	Unlikely
Black-browed Albatross (*Thalassarche melanophris)*	Migratory seabird species	Unlikely
Salvin's Albatross (*Thalassarche salvini)*	Migratory seabird species	Unlikely
White-capped Albatross (*Thalassarche steadi)*	Migratory seabird species	Unlikely

Areas of Environmental Significance

The Victorian coastline, approximately 30km from the drilling site, is described as having extensive beaches interrupted by occasional rocky headlands such as Point Hicks and Cape Conran. Immediately to the north of the permit is the eastern extremity of Ninety Mile Beach. There are no mangrove forests, coral reefs or extensive wetland lagoons along the exposed coastline directly opposite the proposed drill location.

There are no known areas of regional environmental significance in the immediate vicinity of the proposed drill location. There are some environmentally sensitive areas situated in, or adjacent to, estuaries located along the Gippsland coastline. These areas on the coastline are listed below and shown in Figure 2. They include:

- Gippsland Lakes, which are designated Ramsar wetland. The lakes are estuarine and linked to the ocean via a narrow opening at Lakes Entrance
- Point Hicks Marine National Park
- Croajingolong National Park
- Australian fur seal colony near Little Ram Head
- Australian fur seal haul out site at Beware Reef
- Ninety Mile Beach Marine National Park near Seaspray
- Ewing Morass State Game Reserve
- Little Tern Rookery sites at Tamboon and Sydenham Inlet

Heritage

There are no areas listed, or proposed for nomination, on the Register of the National Estate in the immediate vicinity of VIC/P54. Similarly there are no World Heritage Properties nearby. The closest World Heritage Property is located in south-western Tasmania. The nearest Ramsar wetland is located at Lakes Entrance approximately 40km NW from Fur Seal-1.

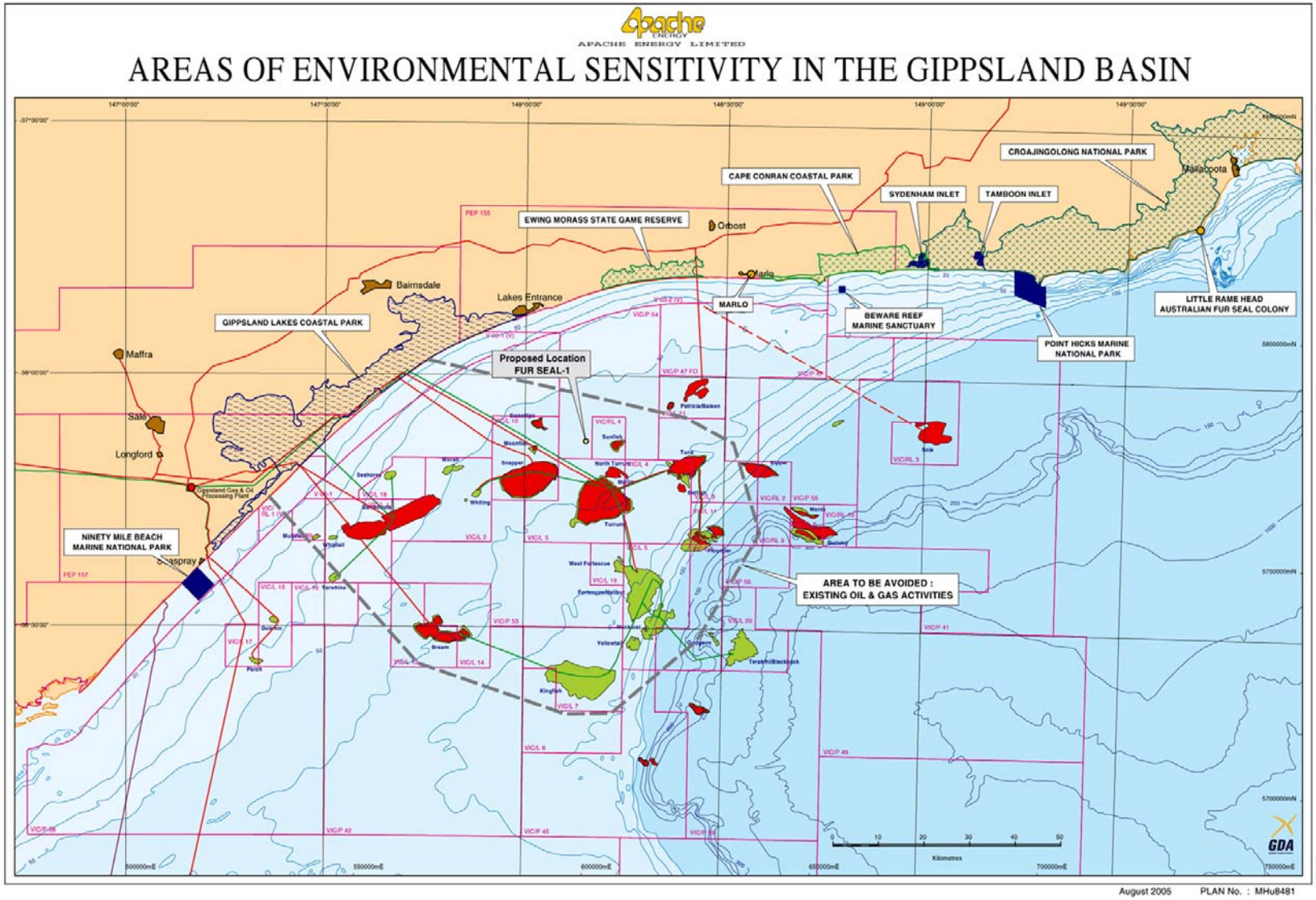


Figure 2: Areas of environmental significance in the vicinity of VIC/P54

2.3 Socio-Economic Environment

Fisheries

No recreational fishing activity is undertaken in the permit area as recreational fishing activity is restricted to the coastal waters of the near shore area.

Advice on commercial fishing activities undertaken within Commonwealth managed fisheries was requested from the Australian Fisheries Management Authority (AFMA). Historical AFMA logbook data for 2002 and 2003 indicated that vessels in the Gillnet, Hook and Trap (GHT) and the South East Trawl (SET) fisheries reported operating in the area of the proposed wells. The data indicated that up to 27 vessels reported deploying fishing gear up to 486 times during one calendar month in the area (pers. comm. John Adams AFMA, 2004)

The GHT fishery covers the taking of Commonwealth managed species of demersal scalefish and demersal shark species off south-eastern Australia and within VIC/P54. Operators in the GHT fishery use a variety of fishing methods including demersal gillnets, drop lines, demersal longlines and traps. Scalefish hook operators use various hook and line methods to target scalefish, principally blue eye trevalla, ling and blue warehou.

The SET fishery consists of trawl and non trawl components. The SET fishery covers the area of the Australian Fishing Zone extending southward from around NSW, Victorian and Tasmanian coastlines to Cape Jervis in South Australia. The main markets is fresh fish supplied to the eastern seaboard and some export components. The main fishing methods are Otter trawl, Danish seine, and some midwater trawl.

The SET fishery is one of Australia's oldest commercial fisheries. Many species taken routinely in the SET fishery have distributions that extend well beyond the management boundaries. Around 400 species are caught in the SET fishery and over 120 species of finfish and invertebrates are routinely landed, reflecting the variety of different habitats in which the fishery operates.

The following commercial fishing interest groups have been nominated by AFMA as being active within the waters of VIC/P54:

- South East Trawl Fishing Industry Association
- Lakes Entrance Fisherman's Co-operative
- South East Fishery Association
- San Remo Fishermans Co-operative

Apache will consult with these fishing groups to notify them of the proposed drilling program.

Oil and Gas Industry

Since the discovery in 1965 of hydrocarbons in the offshore Gippsland Basin, the region has continued to be a significant petroleum province supplying both Victoria's domestic gas demand and the nation's oil requirements. Oil production from the Gippsland Basin peaked in 1985 at a production rate of 450,000 barrels of oil per day. Presently, oil production from the Gippsland Basin accounts for 17% of Australia's crude oil production (DPI website).

The Esso and BHP Joint Venture has been the dominant oil and gas producer in the Gippsland Basin since the early successful discoveries in the mid 60s. Their major oil and condensate producers include the Bream, Flounder, Fortescue, Halibut, Kingfish, Tuna, West Kingfish and the West Tuna fields (Figure 1). These eight fields are now responsible for producing more than 67% of liquid hydrocarbons in the Gippsland Basin. The Barracouta, Marlin, and Snapper fields (Figure 1) are the key natural gas fields within the Basin. All of these production fields are joined by a network of pipelines to the eighteen offshore production facilities and transported via pipelines to the Longford gas processing and oil stabilisation plants near Sale.

Other producers in the Basin include OMV Australia with its Patricia – Baleen gas fields in the VIC/L21 production license, adjacent to the proposed drill sites. The Patricia – Baleen development was commissioned in December 2002. Natural gas is transported from this offshore development via a subsea pipeline to an onshore gas plant. Anzon Australia is proposing to develop the Basker, Manta and Gummy oilfields to the south east of Fur Seal-1 using a mini-FPSO.

Seismic and drilling activities are undertaken as a regular occurrence within the Gippsland Basin. In 2003, the Esso/BHP joint venture completed a large 3D seismic survey over its northern section of acreage, resulting in further exploration drilling being undertaken in the Basin (BHP website). Apache completed a large 3D seismic survey in VICP58 and on behalf of other companies in VICP42, VICP53, VICP41, VICP47 in early 2005.

Shipping

The southern section of Bass Strait is heavily utilized by passing shipping traffic, emanating from either Port Phillip Bay or the Southern Australian waters as well as vessel traffic sailing from Eastern Australian waters. Shipping traffic traversing the Tasmania/eastern seaboard route also passes by this area.

An "Area to be Avoided" exists around the current operating petroleum facilities (Figure 2). Under the Petroleum (Submerged Lands) Act, 1967, unauthorized vessels larger than 200 tons gross tonnage are not permitted within this area. Designated shipping traffic channels occur to the south of this exclusion zone. To the south of Esso/BHP's Kingfisher B platform a Traffic Separation Scheme exists which delineates ship traffic into separate one direction lanes for vessels heading north eastwards and those heading south westwards.

Fur Seal-1 is located to the north of any major vessel channels and is within the "Area to be Avoided".

Population Centres

The closest population centers to the drill site are the coastal towns of Marlo, some 50km to the north east of Fur Seal-1 and Lakes Entrance, approximately 30km north of Fur Seal-1. The small tourism townsite of Marlo has an estimated population base of about 300 residents with Lakes Entrance, one of the largest fishing ports of the region, has a population of some 5,300.

3 MODELLING OF OIL SPILLS

3.1 Background

The interaction of the prevailing tide and wind at the time of a spill is fundamental in determining the oil spill trajectory. Factors controlling hydrodynamic flow in the region are used to model spill trajectories. For the Gippsland Basin, Apache has used a 3-dimensional ocean current model (HYDROMAP) to predict currents within the vicinity of the proposed well. An oil spill behaviour model (OILMAP) has then been used to predict the fate of hydrocarbon spills as they are transported by the modelled currents and prevailing winds. A geographic information system within OILMAP maintains information on the spill trajectory path and its impact on any areas of environmental significance in the region.

The modelling system forms part of Apache's oil spill contingency plan and response system. Should a spill occur, the model would be run in conjunction with field surveillance to provide forewarning of the habitats that may be contacted.

In order to conduct a thorough environmental impact assessment it is necessary to model the behaviour of potential oil spill scenarios associated with the drilling program. Oil spill modelling is done as a standard component of Apache's environmental risk assessment process prior to the drilling of all wells. The results of the oil spill modelling process are used in conjunction with the project description (Section 1.0) and the environmental description (Section 2.0) to identify the risks associated with an accidental discharge of hydrocarbons. The risk matrix for these accidental discharges is discussed further in Section 4.0. The methods and criteria used in modelling a spill from the well location is discussed below.

3.2 The Characteristics of Oil

As part of Apache's responsibilities to assess risks associated with the drilling program and to develop management practices and contingency plans to limit environmental impacts, Apache has sought to quantify risks of exposure to surrounding environmental resources from accidental oil spills from the proposed drilling site. To this end, oil spill modelling done from Longtom-2 drilling location, 14.7 km to the east south east of Fur Seal-1 is representative.

If oil is encountered at Fur Seal-1 it is expected to be of a similar nature to the surrounding producing oil fields. Oil qualities used in the oil spill modelling were sourced from the Automated Data Inquiry for Oil Spills (ADIOS) from the Australian Maritime Safety Authority (AMSA) with the modelled crude oil having an ^{o}API gravity of 46.4.

As well as the potential from an oil spill resulting from an oil discovery, there is also the possibility of a diesel spill resulting from the use of diesel on the drilling rig and support vessels. Diesel fuel is a middle distillate fuel with an ^{o}API gravity of 33.2. About 23% of the mass of Australian diesel fuel spilt on water in tropical conditions will weather within five days on the sea surface (Neff *et al.* 2000). During evaporative weathering, low molecular weight aliphatic and aromatic hydrocarbons and phenols are lost from the oil, leaving higher concentrations of less volatile, higher molecular weight hydrocarbons. Diesel does not form stable oil in water emulsion and is amenable to dispersants.

Toxicity testing has identified diesel as being toxic to the marine species tested, with some species of sea urchin larvae and crustaceans being the most sensitive. Diesel fuel appears to retain its toxicity during weathering due to the slow loss of light ends. In addition, the additives used to improve certain properties of diesel (e.g. ignition quality, flow improvers) contribute to the toxicity of the diesel oil.

Any oil or diesel spilled into the ocean at Fur Seal-1 is likely to undergo significant weathering prior to making landfall contact and is therefore unlikely to seriously impact any sensitive marine habitats.

3.3 Modelling Criteria

Apache conducted a quantitative assessment of the risk of exposure to the adjacent shorelines from defined hydrocarbon spills, accounting for seasonal environmental conditions (winds, currents, temperature) that have historically occurred in the locality during the proposed drilling period of October to November.

The risk assessment made use of the ocean-circulation model, HYDROMAP, to represent surface circulation over the drill site area under the influence of winds and tides, which would be the major forces acting over the inner shelf location of the well. Data from HYDROMAP were used as input to modelling of the trajectories and fates of defined oil spills, using the OILMAP spill trajectory and fates model. The modelling took into account the specific characteristics of diesel and the modelled crude.

OILMAP model generates 100 hypothetical spills for each scenario. Each individual spill ran under randomly selected conditions of wind and sea-surface current conditions taken from the appropriate 2 month HYDROMAP run. The trajectory and fate of each spill was used to generate statistical probabilities that locations on the water surface or shoreline would be contacted by oil (based on the proportion of spills arriving) and the minimum time before this may occur (the shortest time for any of the spills).

A stochastic (random-sampling) process was followed to identify potential and more likely outcomes from the defined spills and discharges. This involved random sampling from 3 years of historic records of the wind conditions, hind-casts of corresponding tidal currents for the study region during the months of October to November and allowance for larger-scale drift currents that occur in the study area.

HYDROMAP is an ocean/coastal circulation model that simulates the flow of ocean currents within a model region due to forcing by astronomical tides, wind stress and bottom friction, efficiently anywhere on the globe. HYDROMAP employs a step-wise-continuous-variable-rectangular griding strategy, allowing up to six levels of resolution. The term “step-wise-continuous” means that calculation of current vectors across boundaries between successively smaller and larger grids is managed in the same model time step.

To simulate ocean circulation over any area of interest, the model must be provided with the following basic data:

1. Measured bathymetry for the area on a dynamic nested grid of variable resolution, which defines the shape of the seafloor; and
2. The amplitude and phase of tidal constituents, which are used to calculate sea heights over time at the open boundaries of the model. Changes in sea heights are used, in turn, to calculate the propagation of tidal currents through the model region.

A more detailed presentation of the model can be found in Isaji and Spaulding (1984) and Owen (1980).

HYDROMAP was set up to simulate water circulation over a model domain that extended from 146° 20' E to 152° E and from 14° 35' S to 37° 29' S (Figure 3).

Figure 3: NCEP wind stations used to provide input data to the hydrodynamic and spill models

Bathymetric data were derived from the Geoscience Australia 15-arcsecond national database, which has a nominal resolution of approximately 250 m.

Tidal heights at the open boundaries of the model were calculated for real times using the latest Schwiderski Global tidal constituents, which provide worldwide estimates of the dominant tidal constituents at a horizontal scale of 1 degree. The model then calculated sea heights and resulting tidal currents for locations within the region by propagation of constant water mass over the three-dimensional shape of the domain.

HYDROMAP predictions for tidal propagation were verified by comparison to sea height elevations predicted for Lakes Entrance by the National Tidal Facility from measurements made directly at that site. The predictions were found to be in very close agreement with the expected variation in tides (Figure 4). Table 5 shows the settings that were used to model the hydrodynamic circulation.

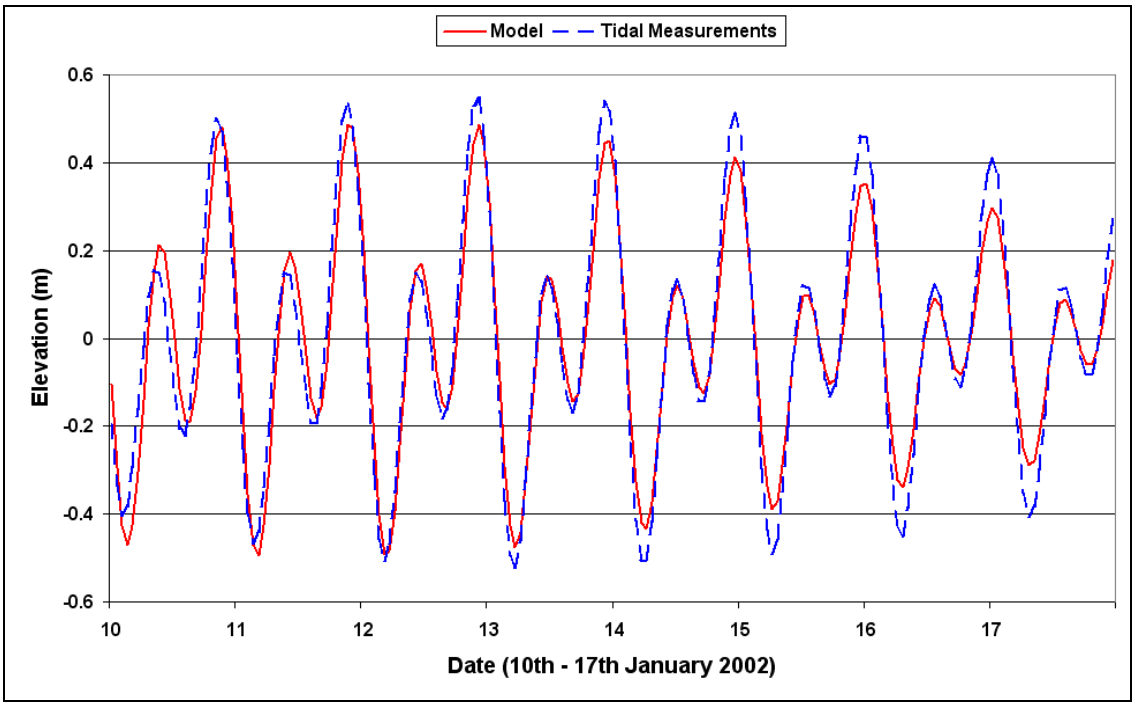


Figure 4: Comparison between the predicted (blue line) and measured (red line) tidal variation at Lakes Entrance, as reported by the National Tidal Facility, between the 10th – 17th January, 2002

Table 5: Summary of model settings used to model hydrodynamic circulation

Model dimensions	3 (latitude, longitude and depth).
Output depth layer	Surface layer
Model domain size	470 km (N-S) x 500 km (E-W)
Resolution	Variable, step-wise: see Table 2
Bathymetric data	15 arc seconds (derived from Geoscience Australia data set)
Tidal data	8 tidal constituents: M2, S2, K1, O1, N2, K2, P1, Q1 from the Schwiderski Global data set

Historic wind conditions for the region were derived from archived data from the NCEP model re-analysis program, which is operated by NOAA. These data are output of a global atmospheric model which uses real observations for local correction. The data is output for stations located approximately 160 km apart. Data from multiple stations (Figure 3) surrounding Longtom-2 covering a 10-year period (1994-2003) were input to represent the temporal and spatial patterns in wind conditions.

Figure 5 shows yearly and monthly wind roses of the NCEP data at station 7335 used in this study. Winds during October to November periods are typically strong and variable in direction but most frequently from the west to southwest. The most common wind speeds from any direction are in the 25-30 knot range. Maximum and average recorded wind speeds over the sample period were similar for all months of the drilling window at 38-41 knots and 13-14 knots, respectively.

An assessment of geostrophic (density driven) currents affecting the area (source: Global Ocean Observation System web-site) indicated that these currents are dynamic and variable within and between years for October to November. In addition, the area experiences significant wave energy and frequent storms. The contribution of these sources to the potential spread and trajectory of oil slicks was accounted for by using a relatively high horizontal dispersion rate (an index of the physical turbulence) of $10m^2/s$. This conservatively high rate would ensure that the area affected by individual slicks would not be underestimated.

Mean sea temperatures in the drilling area range between 13° C in winter to 18° C in summer (Australian Oceanic Data Centre website - www.aodc.gov.au.). A temperature of 16° C was used to represent October to November conditions.

3.4 Oil Spill Modelling

Oil spill trajectories have been run for the largest spill volume of diesel and crude, being 80,000 L of diesel from a ruptured fuel tank and 600,000 litres of crude oil from a blow out, respectively. These two scenarios are representative of the worst-case situation. The spill location is the surface location of the Longtom-2 well. For the 80,000 L diesel scenarios, the spill is instantaneous whereas for the 600,000 L crude spill the spill release time is 6 hours. For scenarios, the trajectory and fate of diesel or crude is modelled for 96 hours. A representative crude has been used as the simulated oil for the crude oil spill.

The trajectory, weathering and dispersion of oil spills were predicted using the OILMAP model. OILMAP is a computerised modelling system for predicting the physical and chemical fates and effects of hydrocarbon spills on the ocean. OILMAP incorporates a suite of models that predict the behaviour of hydrocarbon slicks on the sea surface. The OILMAP model simulates the transport of the hydrocarbon slicks within a model domain using time- and space-varying data for the speed and direction of water currents, and time-varying data for the speed and direction of the wind. The distribution and mass balance of particular hydrocarbon types are predicted over time based on the physical characteristics of the specific oil type and the prevailing weather conditions. For this latter purpose, OILMAP includes algorithms that account for hydrocarbon spreading, evaporation, emulsification, entrainment, and shoreline interactions. If hydrocarbon strands on shorelines (as defined in the OILMAP GIS), details are recorded on the quantity, time to contact and resources at the strand location. Predictions of the OILMAP model have been

validated worldwide and in Australia by field observations and by hind-casting past hydrocarbon spills.

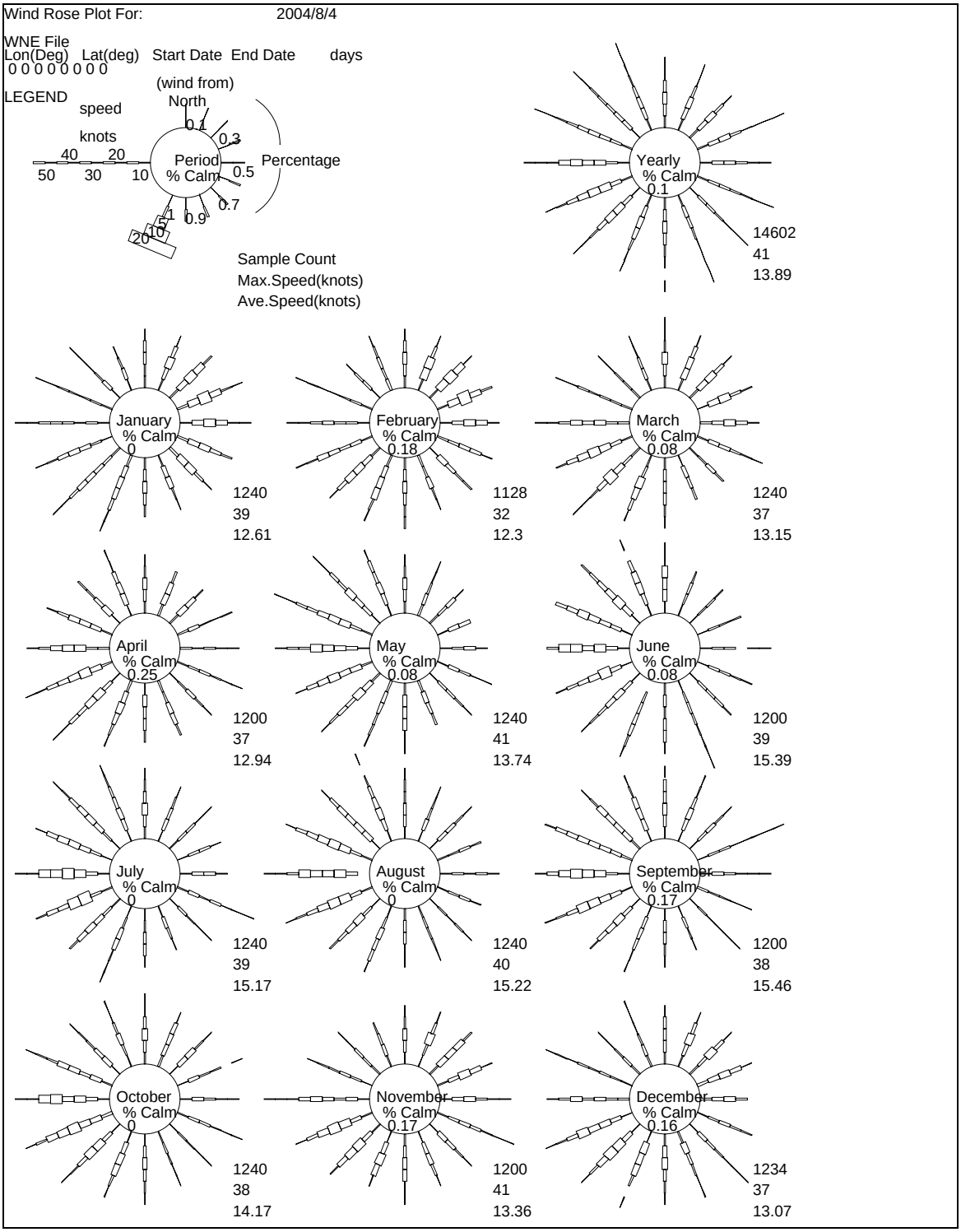


Figure 5: Monthly and yearly wind rose diagrams for NCEP station 7355 (1994 – 2003)

The analysis considered the following spill scenarios:

1. 600,000 L of generic Gippsland crude (source ADIOS database, registered by AMSA) released over 24 hours to represent a loss of well control;
2. 80,000 L of marine diesel (source ADIOS database, registered by AMSA) spilled at the surface over 6 hours, to represent a ruptured fuel tank of a support vessel; and
3. 8,000 L of marine diesel (source ADIOS database, registered by AMSA) spilled at the surface as an instantaneous release, representing a refuelling incident.

Each spill was modelled 100 times under randomly selected sequences of the current and wind data for the study area for October-November. A threshold thickness of 100 nm was defined as the minimum thickness for contact episodes to be counted in calculating episodes of water and shoreline exposure. This thickness would appear as a silvery sheen.

3.5 Consequences of an Oil Spill

The stochastic modelling indicated that contact by some part of a slick with the Victorian shoreline was a relatively likely event, if a major oil spill occurred at Longtom-2 during October-November. The most likely path of a slick was predicted to be to the east-northeast and the probability of contact with this shore by some portion of a slick was predicted to be 80% at this time of year, given a duration of up to 7 days (Figure 6; Table 6). Locations along the Victorian shoreline between Wingan Inlet and Ninety Mile Beach were predicted to be at >1% risk of contact within the first week as a result of such an incident. Shorelines that were most likely to receive some oil were those between Marlo and Sydenham Inlet, including Cape Conran.

Oil was predicted to take at least 36-43 hours to reach any part of the coast (Figure 7; Table 6). Some degree of weathering would be expected prior to grounding so that some loss of the more toxic light ends could occur prior to contact. However, the formulation of this oil indicates that it is also likely to emulsify (take up water to form a water in oil emulsion), given the strong wind conditions and associated wave action at the location. Emulsification would slow the rate of evaporative loss. The modelling indicated that about 6% of the initial spill could come ashore in the first week under worst-case conditions. This would approximate about 42 tonnes of oil. About 30% of the initial spill would still remain on the water surface after the first week so that additional oil could come ashore over longer durations.

Large Diesel Spill

Surface slicks generated by a large diesel spill, such as from the rupture of a fuel tank on a service vessel, were predicted to persist for up to 48 hours before evaporating, dispersing and entraining. Within that time, slick material was predicted to have the potential to drift onto the Victorian coast (Figures 8 & 9). The risk that some diesel would contact any part of the shore was predicted to be about 25%, with individual locations predicted to have up to 6% chance (at Cape Conran). As for the crude spills, the most likely path of slicks was to the east north-east. However, the tendency for diesel to disperse and entrain reduced the length of coastline that was predicted to be at risk of oil contact (at >100 nm) within the first few days. The worst-case incident, in terms of potential volume on shore was predicted to be about 6

tonnes.

Small Diesel Spill

Surface slicks generated by a small diesel spill were predicted to evaporate, entrain and disperse prior to landfall on any coastline (Figures 10 & 11). Therefore, risks of shoreline contact were predicted to be <1%.

Table 6: Predicted risks to shoreline from spill scenarios from Longtom-2 during October-November

Spill Scenario	Shoreline sections at risk of contact at > 1%	Probability of contact with any shore from a spill (%)	Minimum Time before shore contact (hr)	Worst case volume on any shoreline (T)	Percentage of initial spill (%)
600,000 L Gippsland Crude	Wingan Inlet to Ninety-Mile Beach, west of Lakes Entrance	80	43	42.5	6.2
80,000 L Diesel	Cape Conran to Lake Tyers	25	36	5.8	6.4
8,000 L Diesel	No contact	< 1	No contact	No contact	No contact

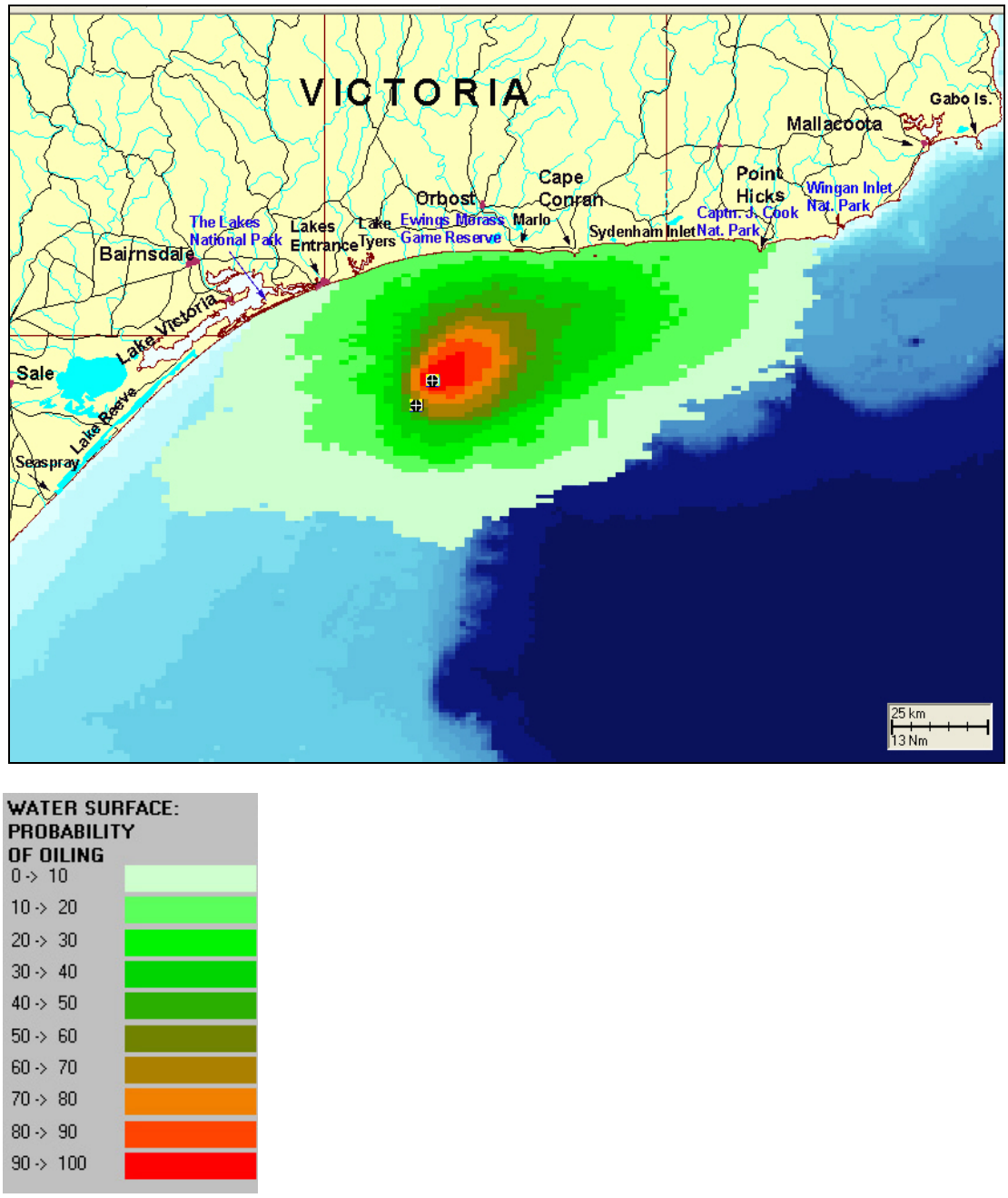
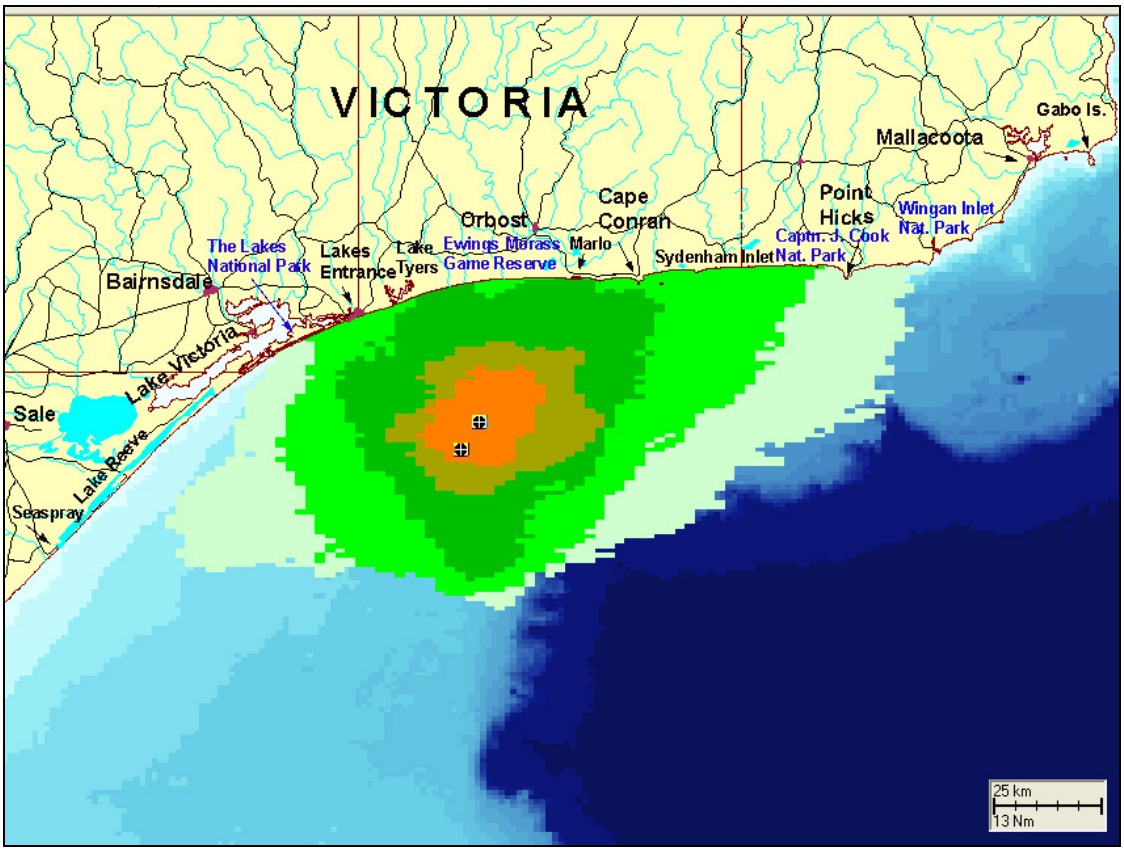


Figure 6: **Probability of contact by surface slicks (at > 100 nm), in the event of a 600,000L spill of Gippsland Crude from Longtom-2 in October-November. Results summarise 100 independent simulations.**



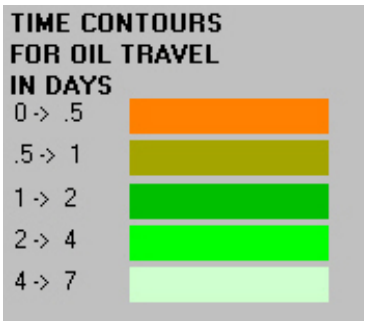


Figure 7: **Predicted minimum time before contact by surface slicks (at > 100 nm), in the event of a 600,000L spill of Gippsland Crude from Longtom-2 in October-November. Results summarise 100 independent simulations.**

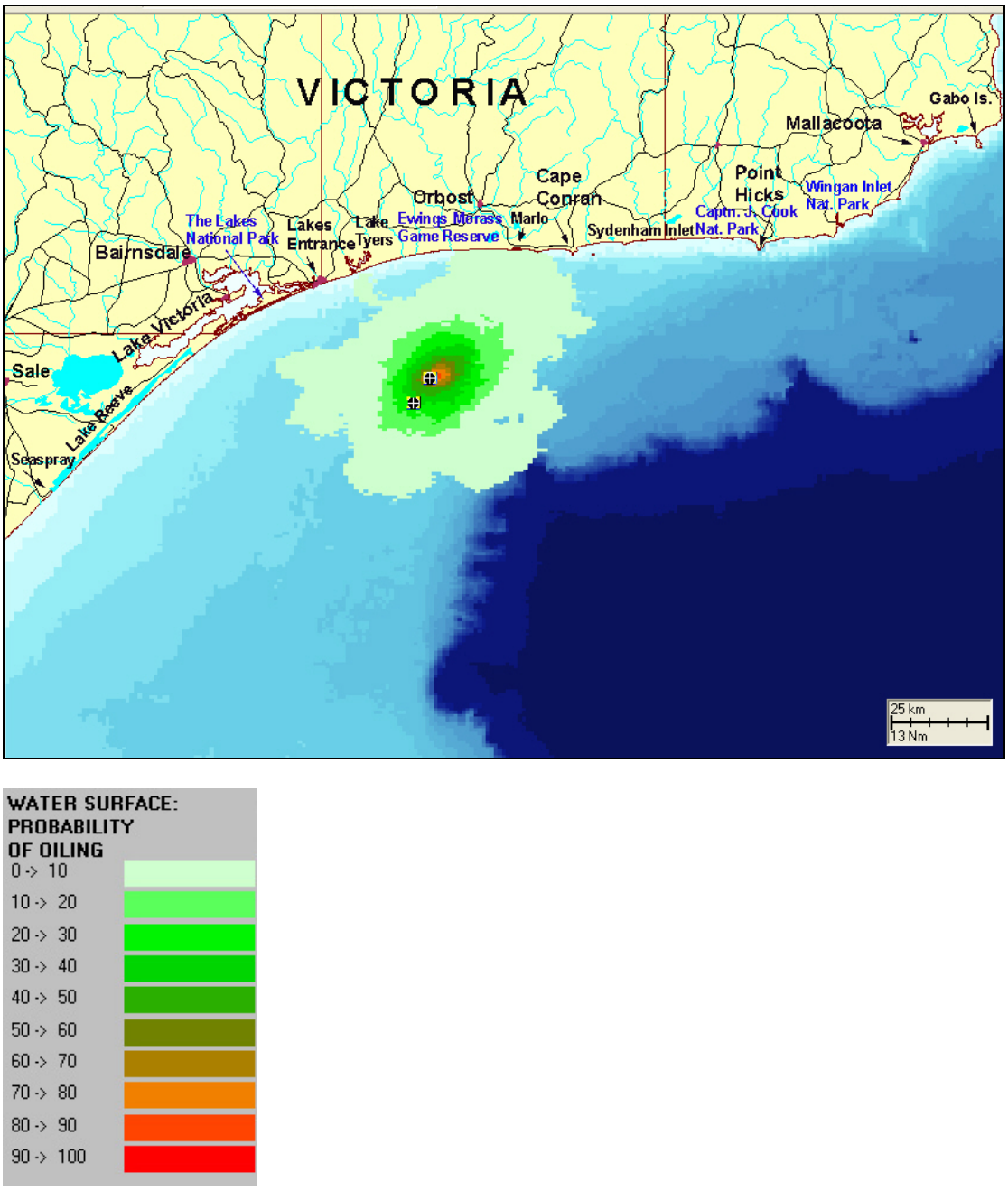
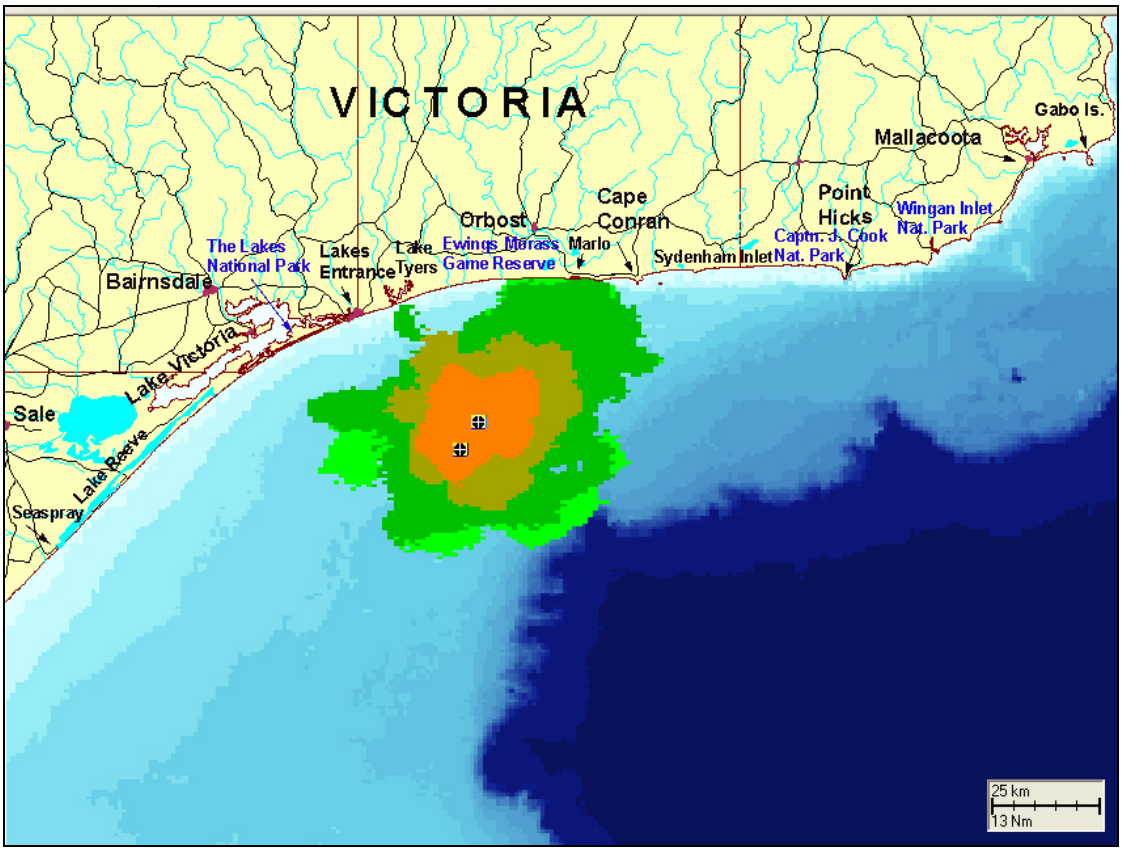


Figure 8: **Probability of contact by surface slicks (at > 100 nm), in the event of an 80,000L spill of Marine Diesel from Longtom-2 in October-November. Results summarise 100 independent simulations.**



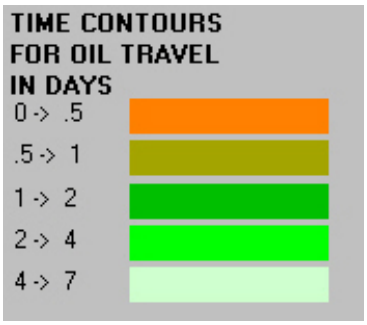
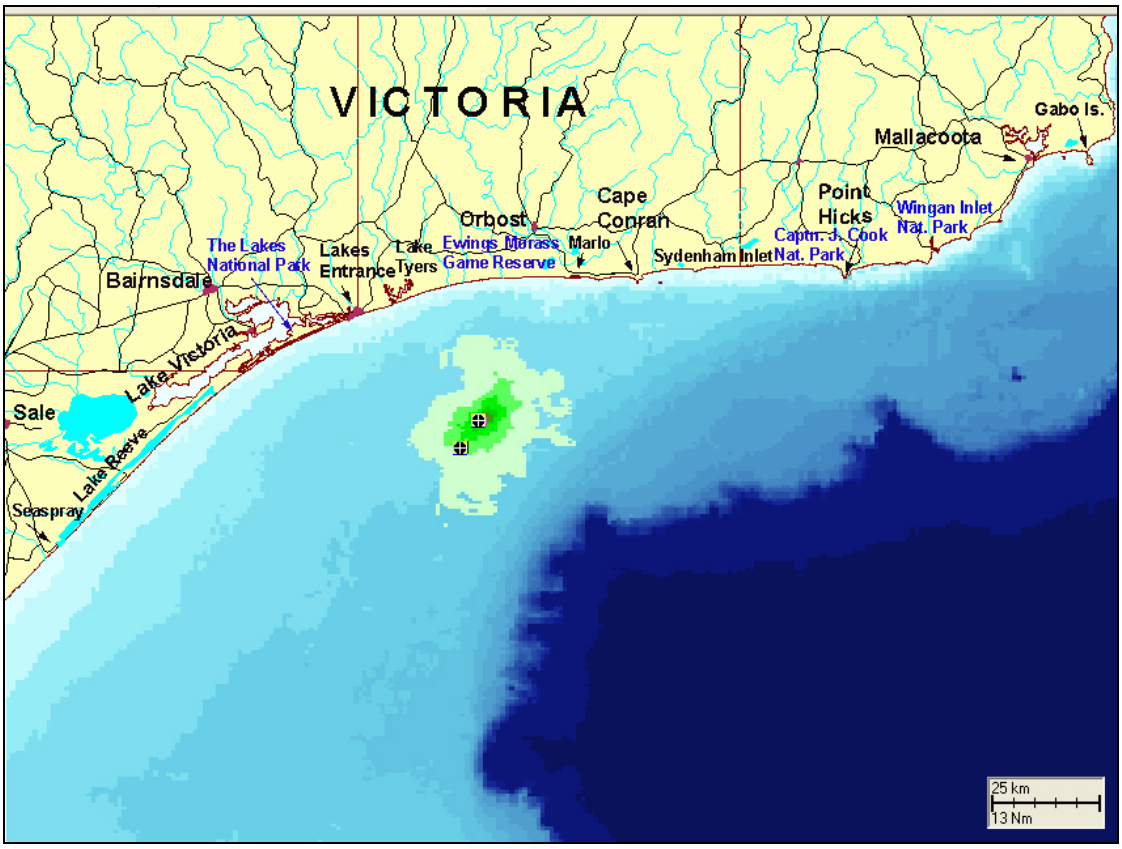


Figure 9: **Predicted minimum time before contact by surface slicks (at > 100 nm), in the event of an 80,000L spill of Marine Diesel from Longtom-2 in October-November. Results summarise 100 independent simulations.**



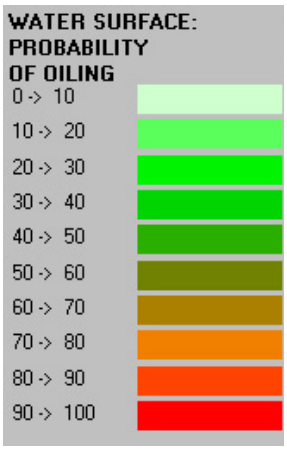
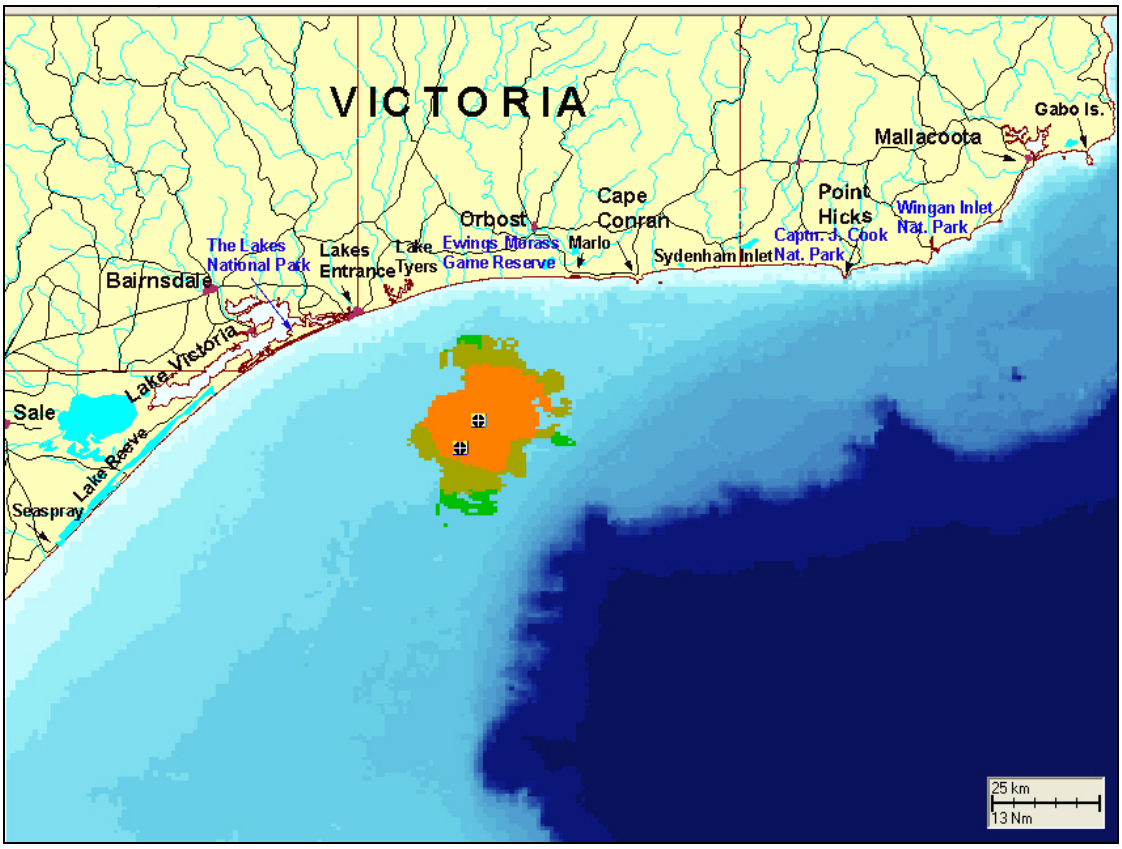


Figure 10: **Probability of contact by surface slicks (at > 100 nm), in the event of an 8,000L spill of Marine Diesel from Longtom-2 in October-November. Results summarise 100 independent simulations**



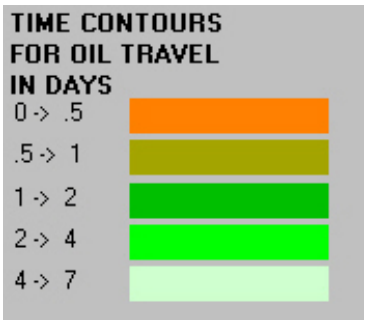


Figure 11: **Predicted minimum time before contact by surface slicks (at > 100 nm), in the event of an 8,000L spill of Marine Diesel from Longtom-2 in October-November. Results summarise 100 independent simulations**

4 ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

This section describes the risk assessment methods used for analysing the environmental impact during drilling activities. The purpose of this analysis is to identify risks and develop risk-reducing measures for preventing and mitigating impacts from the project.

The risk assessment has been carried out on both routine and non-routine sources of impact. In determining the risk, consideration was made of the distance between the well location and nearshore sensitive resources, the relatively low density of marine life in deep offshore waters, the toxicity of the oil, the results of oil spill trajectory analysis and the standard industry safeguards that are in place, e.g. BOP's.

Environmental risk assessment consists of four broad steps (Standards Australia 1999):

- Identify the risk;
- Analyse the risk;
- Evaluate and prioritise the risks; and
- Treat the risks.

These steps are described briefly below.

Risk Identification

Risk identification involves identifying the sources of risk, i.e. those activities or incidents that could result in an environmental impact. Risks are categorised into those arising from routine operations and those arising from incidents that are not part of routine operations.

Risk Analysis

Risk analysis determines the likelihood of an activity or event occurring, and the consequences of that activity or event on the environment. The risks associated with potential oil spills as they apply to the proposed well were analysed quantitatively using hydrodynamic modelling.

The criteria used to determine likelihood is given in Table 7. Likelihood is based on the existing controls that are in place to prevent the impact, the nature of materials or substances that contribute to the impact, and the frequency with which the activity may occur.

The consequence of the identified hazard is rated according to definitions given in Table 8. The consequence is dependent on the potential impact of the event in the first instance. Quantities and concentration released, time scale of release and regulatory requirements are considered.

Risk Evaluation

Risk evaluation helps to prioritise the risks, i.e. determining if the risk of an activity or incident is acceptably low, or if management actions are required to reduce the risk to as low as reasonably practicable (ALARP).

The risk matrix (Tables 8 and 9) has been created for the analysis of impact arising from drilling activities associated with the VIC/P54 wells. The environmental risk ranking is determined by a combination of the expected frequency of the hazard occurring (likelihood) and the consequence of its occurrence to arrive at a risk level from the risk matrix given in Table 8.

The descriptions for the categories of risk and the associated management requirements are listed in Table 9.

The results of the risk evaluation are summarised in Table 10 for risks associated with routine operations and in Table 11 for risks associated with incidents resulting from accidental discharges.

Risk Treatment

Management actions to treat the risks are incorporated into Table 10 and Table 11. Apache's management actions aim to reduce the environmental risks of the drilling program to as low as reasonably practical.

Table 7: Guidance for determining likelihood and consequence

LIKELIHOOD OF RISK OCCURRING	
Expected to occur	Is expected to occur in most circumstances during the life cycle of an individual item or system.
Probably will occur	Will probably occur in most circumstances during the life cycle of an individual item or system.
May occur	Likely to occur at sometimes during the life cycle of an individual item or system.
Unlikely to occur	Unlikely, but possible to occur in sometime in the life of an individual item or system.
Rare	May occur, but in exceptional circumstances.
CONSEQUENCE	
Serious	Large scale detrimental effect that is likely to cause a highly significant effect on local ecosystem factors such as water quality, nutrient flow, community structure and food webs, biodiversity, habitat availability and population structure (e.g. abundance, fecundity, age structure). Long-term recovery period measured in decades.
Significant	Detrimental effect that will cause a significant effect on local ecosystem factors. Recovery period measured in years to decades.
Moderate	Impact that will cause a detectable effect in local ecosystem factors. Recovery period measured in months to years.
Minor	Incidental changes to abundance/biomass of biota in the affected area, insignificant changes overall ecological function. Recovery measured in months.
Negligible	Short-term, localized and insignificant impacts to habitat or populations. Rapid recovery measured in days to months.

Table 8: Risk Matrix

		CONSEQUENCES				
		Serious	Significant	Moderate	Minor	Negligible
LIKELIHOOD	Expected to Occur	Unacceptable	Unacceptable	Unacceptable	B	Negligible
	Probably will Occur	Unacceptable	Unacceptable	A	B	Negligible
	May occur	Unacceptable	A	B	B	Negligible
	Unlikely to occur	A	A	B	Negligible	Negligible
	Rare	A	B	Negligible	Negligible	Negligible

Table 9: Definitions of risk category and management response

CATEGORY	DESCRIPTION and RESPONSE
Unacceptable	Immediate changes to design or procedures are required (e.g. hazardous discharge, large volumes of contaminant).
A	Risk reduction measures are required.
B	Acceptable risk, risk reduction measures should be considered depending on proximity to sensitive resources.
Negligible	Risks are sufficiently low to be acceptable.

5 RISK ASSESSMENT OF ROUTINE DRILLING OPERATIONS

A number of routine activities associated with exploration and appraisal drilling may result in minor impacts to the environment. These activities and the actions to mitigate impacts are presented in Table 10 and are discussed below.

5.1 Physical Impacts

Rig Positioning and Anchoring

Disturbance to the seabed by the drilling rigs anchors is the main source of physical impact associated with drilling operations. The area of the anchor disturbance to the seafloor will be dependent on the substrate type. Once the drilling rig is moved from site, the anchor depressions will act as traps for marine detritus and sand. These depressions will eventually fill and therefore the effect is temporary, as re-colonisation by benthic organisms is likely to be rapid.

Artificial Lights

Due to safety regulations, lights on the drilling rig must be kept on 24 hours per day. These lights are an attractant to marine life and seabirds and depending on the foraging range of the particular species, may result in a short-term concentration of animals in the immediate vicinity of the rig. With the great distance from shorelines and short duration of the drilling program, the effect on marine life is expected to be minimal.

Noise

Drilling activities, machinery, helicopters and boat engines will cause noise during the drilling operation. The impact of noise to resources such as birds and whales will be minimal due to the distance of the well locations to the mainland and breeding/feeding grounds.

5.2 Liquid and Solid Wastes

Drilling Fluids and Cuttings

Drill cuttings will be continuously discharged overboard after separation from the water based drilling fluid. Although the drilling fluid will be recirculated, some drilling fluid adheres to the discharged cuttings and is disposed overboard.

Residual water based drilling fluid remaining at the end of each well will be discharged overboard just below sea level to aid in dilution and dispersion. Due to the high energy state of the ocean in this region, the turbidity plume is likely to disperse quickly.

The potential impacts arising from routine discharge of drilling fluids and cuttings are listed below. These impacts are expected to be localised and transient:

- burial of benthos;
- alteration of the benthic substrate; and
- increased turbidity in the water column.

The drilling fluid to be used will be water based (WB) fluid consisting of a potassium chloride (KCl) base with partially hydrolyzed polyacrylamide (PHPA) polymer water based fluid systems. Water is used as the base fluid and additives such as barite, bentonite, vegetable fibres, calcium chloride, lime and starch can be used to aid in lubrication, cooling and density of the drill fluid.

Based on extensive studies, these impacts are expected to be localised and transient. The following observations and results are pertinent to assessing the impacts from the discharge of water based mud drilling cuttings and fluids:

- Drilling fluid chemicals dilute rapidly in the water column and, in all but very deep or high energy environments, much of the drilling fluid and cuttings solids settle rapidly to the bottom near the rig site (Boehm *et al.,* 2001).
- Concentrations of barium, as a tracer for drilling effluents, may be 10 to 20 times above background in surficial sediment near the discharge and decrease to background within 2,000 m down current (Neff, 1987).
- Most of the ingredients of drilling fluid chemicals have a low toxicity to marine organisms, but the fluids and cuttings that settle on the seabed can significantly alter the benthic sedimentary regime (Boehm *et al.*, 1996).
- Studies in the Gulf of Mexico (GOOMEX) were intended to test and evaluate a range of biological, biochemical and chemical methodologies to detect and assess chronic sublethal biological impacts in the vicinity of long duration activities associated with oil and gas exploration and production. Contaminant concentrations at most locations were below levels thought to induce biological responses (Kennicutt *et al*. 1996).
- A discharge of barite was modelled and the results indicated that the highest predicted exposure concentration in the modelled plume would be at least two orders of magnitude lower than the toxic concentrations reported in the literature for marine species. From this it was concluded that barite has a very low toxicity (Boehm *et al.,* 2001).
- The physical impacts associated with drilling fluid discharge are typically manifested in a change in composition of infaunal species and/or abundance in close proximity to the drilling location (10's of meters) with recovery expected within 6 months (IRCE, 2003a).
- The turbidity plume disperses quickly and cuttings mounds in shallow waters (< 10 m) are usually no longer visible after 6 months (IRCE, 2003a).
- Corals adapted to clear water environments may be particularly susceptible to high sediment loading in the water column. On the North West Shelf, however, the marine waters are regularly subjected to high sediment loads, for instance, during spring tidal cycles (twice a month), high winds and storms. Studies commissioned by Apache during the drilling of Simpson-3 concluded that there were no adverse impacts on nearby corals (IRCE, 2004a; Radford and Saunders, 2004).
- For Apache's East Spar Development in Commonwealth Waters, the area of impact from WBM discharges was not more than 100 m from the drill site and short lived (recovery in less than 18 months) (Sinclair Knight Merz 1996,

1997; Kinhill 1997).

- An infauna survey at Apache's Stag Platform undertaken two years after commissioning of the installation indicated that the distribution of drilling cuttings were mostly restricted to within 50m of the platform, with minor impact up to 1000m (IRCE, 2001). Stag is a production platform with 12 producing wells.

The cuttings are inert rock particles and are not expected to exceed 1 - 1.5 cm in size. The expected volume of cuttings which will be disposed onto the seabed for Fur Seal-1 is 280 m^3 respectively. Drill cuttings are heavy and will drop out of the water column and settle to the seabed rapidly, resulting in the formation of a small mound. Due to the open ocean currents in the area, it is expected that the cuttings mound will erode away and be dispersed through time. While present, the mound may be colonised by fish and other fauna.

Sewage and Putrescible Domestic Wastes

Discharge of sewage and food scraps will comply with Clause 222 (Housekeeping) of the Schedule to the *Petroleum (Submerged Lands) Act*, which requires sewage and food scraps be ground to less than or equal to 25 mm prior to discharge overboard in waters more than 12 nm from shore. The Ocean Patriot is equipped with a sewage treatment unit which will treat this wastewater stream prior to its discharge thereby complying with Clause 222. The grey water from showers and the laundry are discharged directly overboard.

The crew numbers about 100 persons at any one time. Approximately 20,000L of domestic discharges will be generated per day. The discharge of these wastes will temporarily add to the nutrient load of the surrounding waters.

Deck Drainage

Under routine conditions, deck drainage from the Ocean Patriot discharges to the sea. Discharge is via the flume lines which also contain return seawater. Housekeeping practices on the Ocean Patriot ensure that decks are kept clean during drilling operations.

The drainage system on the Ocean Patriot is configured such that in the event of a hydrocarbon spill, drainage can be diverted to on-board containment tanks for treatment. The main deck drains can be routed to a contaminated water tank, which is connected to an oily water separator (designed to treat to 15mg/L). Treated water discharges to the flume lines and oil is directed to a waste oil tank. Fluid collected in the waste oil tank would be pumped into drums for disposal onshore.

Drains from the rig floor can be routed to the mud spill tank, which can be pumped to the mud return line. The cement unit engine compartment drains are routed to the hazardous drains tank which is also connected to an oily water separator.

Chemicals and Waste Materials

Chemicals used or stored on board the drilling rig will be managed so as to prevent damage to the containers and thus reduce the likelihood of any leaks or spills either onto the deck or into the ocean.

Chemicals that may be found on-board include:

- drilling fluid additives such as biocides, corrosion inhibitors, viscosity, weighting and fluid loss control chemicals;
- cementing and drilling fluid chemicals such as cement, inorganic salts, bentonite and barite; and
- miscellaneous chemicals, e.g. pipe dope, lubricating oils, cleaning and cooling agents.

Chemicals will be stored such that spills and leaks are contained. Any spills or leaks will be cleaned up immediately using absorbent material. Waste oils are collected for disposal or recycling onshore. The minimum volume of chemicals will be used.

Drums and scrap metal are re-used or recycled, and non-reusable solids will be placed in skips and returned to the mainland for disposal by a licensed waste contractor at an appropriate industrial disposal site.

All other wastes will be segregated and stored on the rig, and transported to Melbourne for disposal at an industrial waste disposal facility unless special disposal methods are required.

5.3 Production Testing

Should drilling at Fur Seal-1 identify an oil bearing zone, the hydrocarbons in the reservoir may need to be tested to appraise their type, quantity and flow rate. To do this, the hydrocarbon from the reservoir is flowed at varying rates for periods ranging from a few hours to a few days. As there are no production handling facilities on the drilling rig, it is customary to dispose of the produced gas and/or oil by burning.

The main impact from production testing could be oil fallout during burning due to incomplete combustion. This aspect is addressed in section 6.1.

5.4 Socio-Economic Environment

The standard 500 m^2 exclusion zone will be established around the platform. This will cause a temporary restriction to marine vessel movement in the vicinity of the platform. The rig is well lit at night and during times of poor visibility.

5.5 Marine Operations of the Drilling Rig

The drilling rig is required to comply with the applicable international maritime laws when underway, consequently the regulations for any normal ocean going vessel will apply (e.g. MARPOL, AQIS, AMSA regulations).

5.6 Summary of Effects of Routine Operations

The environmental impact arising from routine drilling activities carried out in deep, offshore waters is expected to be minimal and confined to the immediate vicinity of the drilling rig.

At the well location, there will be a minor disturbance to benthic organisms due to the placement of the drilling rigs anchors. The sediment plumes and increased turbidity during the drilling period will be localized and transitory. The discharge of drill cuttings and residual water based drilling fluid will also cause short term, localized impacts. The high energy of the open ocean will disperse the drilling fluid quickly and the impact is expected to be minimal.

Previous studies of drilling operations indicate that the disposal of cuttings may result in the localised smothering of infauna living in the area receiving the discharge. This will not cause any permanent degradation to water quality or the condition of the seabed and no extensive, permanent change in the population of any marine plant or animal is expected to result.

The nearest landfall to the drilling location is 30 km away. Noise and light from the drilling rig are not likely to impact any birds or marine fauna. Marine fauna such as whales and dolphins may avoid the rig during drilling operations, but otherwise will not be affected. Drilling will occur outside the humpback whale southern migration season when humpbacks have been observed entering the Bass Strait area. Movements of supply vessels will be indistinguishable from vessels plying the regular shipping routes along this section of the Victorian coastline.

Domestic waste consisting of treated sewage, shower and laundry water will be rapidly dispersed in the open ocean conditions and will not contribute to excess nutrient input or eutrophication.

The area is not favoured for recreation due to distance from shore, deep waters, existing petroleum developments and oceanic seastate. Similarly, no impact on commercial or recreational fishing activity is anticipated. Commercial fishing and all shipping are required to comply with the 500m exclusion zone around the drilling rig.

Table 10: Environmental analysis of impact during routine activities

Risk ID	Hazard	Causes	Potential Environmental Impact	Existing controls	Likelihood	Consequence	Risk Ranking	Comments
R1	Positioning of drilling rig & platform unit	Anchors of rig forming depressions into seabed. Approximately 15 m^2 per anchor	No impact until rig has been removed from site. Remaining depressions will act as traps for detritus and sand. Will eventually fill with sand and become unrecognisable. Limited damage expected to seabed	Anchor placement will avoid sensitive habitats	Expected to occur	Negligible	Negligible	Positioning of rig reliant on data on substrate type and seabed features
R2	Artificial lights	Lights on rig must be left on at all times due to safety regulations. Lights are an attractant to marine life and some birds	May result in a concentration of some animals. Any animal aggregating will be short-term	Fluorescent lights meeting safety standards	Expected to occur	Negligible	Negligible	Drilling will occur outside of the southern humpback whale migration season
R3	Drilling fluids (WBM)	Drilling fluids are a by-product of drilling operations. WBM is discharged directly to ocean on completion of drilling program	Dispersion of fluid will be rapid in open ocean. Drilling is of short duration and turbidity plume will dissipate rapidly. Limited and short term impact expected to water column and seabed	• Use of water based fluid • Solids control equipment optimised to ensure maximum separation of fluid from cuttings and minimum loss of fluid during drilling	Expected to occur	Minor	B	WBM lower marine toxicity that other drilling fluids

Risk ID	Hazard	Causes	Potential Environmental Impact	Existing controls	Likelihood	Consequence	Risk Ranking	Comments
R4	Drill cuttings	Generation of coarse to fine rock and sand chips cut out of formation by drill bit. Estimate 280 m^3 will be discharged to the seabed for Fur Seal-1	Potential for smothering biota, change in the particle size, minor heavy metal contamination. Dispersion of cuttings will be rapid in open ocean conditions. Rapid recovery of benthos	Cuttings to be treated in solids control equipment prior to discharge	Expected to occur	Minor	B	Discharge to seabed via a pipe to minimise dispersion and turbidity during drilling
R5	Cooling water	Diesel fuelled power generators discharge water at a temperature slightly above ambient seawater (~3 ^oC)	Localised small increase in water temperature	Water will be discharged above sea level to facilitate cooling and oxygenation	Expected to occur	Negligible	Negligible	
R6	Oil contaminated drainage water	At present, deck drainage water directed to containment tank. Hydrocarbons and contamination emptied into drums and shipped to shore	Potential for localised impact on water quality. Discharge will have very low concentration of hydrocarbons, which will evaporate and dissipate very rapidly	Regularly checked and drained. Oil transfer register kept, complies with international shipping regulation	Unlikely to occur	Negligible	Negligible	
R7	Galley wastes - rig and support vessels	Generation of kitchen wastes (putrescible and burnable wastes) Putrescibles on rig are macerated to statutory size prior to discharge to sea	Potential for localised impact on water quality. Rapid dilution will ensure that eutrophication will not occur	Separation of putrescible wastes from solids (i.e. tins cans) by using clearly marked bins in the galley	Expected to occur	Negligible	Negligible	Support vessels abide by MARPOL regulations

Risk ID	Hazard	Causes	Potential Environmental Impact	Existing controls	Likelihood	Consequence	Risk Ranking	Comments
R8	Sewage, grey water - rig and support vessels	By-product of human habitation. Wastes (approx. 20,000 L per day on rig) will contain biodegradable dishwashing detergent, and soap.	Potential for localised impact on water quality. Detergents will break down rapidly and dilution will ensure eutrophication will not occur	• Biodegradable soaps to be used on the rig. • Sewage will be treated via the sewage treatment plant and discharged above sea level. • Sewage treatment plant to be maintained to ensure effective treatment.	Expected to occur	Negligible	Negligible	Support vessels abide by MARPOL regulations
R9	Waste oil	Hydraulic and lubricating oils are required for machinery. Used oil will be contained in drums and returned to mainland for recycling	Potential for localised impact on water quality. Small volumes would disperse and weather rapidly	Drums containing oil will be stored within a bunded area on the rig until transported to the mainland for recycling as per Apache guidelines	Unlikely to occur	Negligible	Negligible	
R10	Solid wastes	By-products of drilling activities such as paper, wood, steel, and drums. Disposal via landfill or recycling	Indiscriminate dumping of wastes causing contamination	Waste will be segregated on the rig into clearly marked skips for appropriate waste disposal method	Expected to occur	Negligible	Negligible	

Risk ID	Hazard	Causes	Potential Environmental Impact	Existing controls	Likelihood	Consequence	Risk Ranking	Comments
R11	Pipe dope	Pipe dope is used as a sealant, lubricant, and for cleaning of pipestring. Contains heavy metals and grease. Approx. 75 L per well. Pipe dope is amalgamated with the drill fluid and retained on drill cuttings and dispersed in open ocean conditions	Localised impact on water quality. Will disperse in open ocean conditions	Use pipe dope that has lowest concentration of heavy metals and hydrocarbons but still meets safety and performance criteria	Expected to occur	Minor	B	
R12	Fishing	Workforce fishing from rig or supply vessels	Removal of marine fauna	No fishing is allowed from the drilling rig	Rare	Negligible	Negligible	
R13	Atmospheric emissions	Combustion of fuel in fuel burning equipment, and production testing. If Fur Seal-1 well intersects a hydrocarbon reservoir, a maximum of 4,000 - 7,000 bbls per day will be combusted during production testing	Combustion products to atmosphere. Generation of black smoke during operational upsets. Contribute small amount to total greenhouse loading in atmosphere	• Engines will be tuned to run at the most efficient capacity to minimise volume of emissions • Green burners to be used to minimise black smoke • Technical experts to be on the rig at all times during testing	Expected to occur	Negligible	Negligible	

Risk ID	Hazard	Causes	Potential Environmental Impact	Existing controls	Likelihood	Consequence	Risk Ranking	Comments
R14	Anchoring of support vessels	Lowering of anchor onto seabed floor	Damage to seabed structures and disturbance to seabed	No known sea bed features of high conservation value likely to be impacted by anchors	Expected to occur	Negligible	Negligible	
R15	Noise	Noise from drilling activities, machinery, helicopters and boat engines	Potential disturbance to animals such as birds	Drilling duration at each location short, great distance to land	Expected to occur	Negligible	Negligible	

6 RISK ASSESSMENT OF ACCIDENTAL DISCHARGES

6.1 Sources of Spills

The sources of potential spillage from exploration and appraisal drilling are summarised in Table 11. The main potential spill sources are:

- leakage or spillage of diesel or lubricating oil from engines;
- leakage or spillage from the diesel transfer hose;
- leakage of chemicals from drums stored on the drilling rig;
- accidental discharge of drilling fluid from the shakers or transfer hoses;
- accidental discharge of oil during production testing;
- rupture of a fuel tank; and
- uncontrolled discharge at surface due to loss of control of a well.

The discharge of main concern is accidental spillage of oil and the potential sources that may give rise to the largest spills. These are listed in Table 11 and are discussed below.

Refuelling

Spills of diesel fuel during refuelling can be caused by hose breaks, coupling failures or tank overfilling, and generally involve volumes less than 2,500 L. Quantities are minimised by prompt shutdown of pumps by automatic safety valves.

In order to minimise the risk of spillage, a refuelling procedure has been developed (Appendix 1) which includes the following measures:

- the transfer hoses will be fitted with ‘dry’ couplings;
- a vacuum breaking system will be in place to drain the fuel left in the hose after completing the transfer, back to the supply vessel tanks;
- drip trays will be provided beneath the refuelling hose connections on the supply vessel and the rig;
- refuelling will occur only at times when sea conditions are sufficiently calm for there to be minimal risk to the transfer lines;
- crew of both the rig and the workboat will stay in continuous contact during the whole of the operation via handheld radios and will actively monitor the operation for its entire duration; and
- suitable absorbent material will be held on the supply vessel and the rig to mop up any small spills.

Well Control

Extensive training, procedures and equipment are in place to maintain well control and prevent blowouts. Blowouts would not only impact the environment, but could also result in loss of life and property.

During drilling, kicks can occur. A kick is defined as a flow of formation fluids or gas into the well bore. If the pressure within the formation being drilled is greater than the hydrostatic pressure of the drilling fluid acting on the well bore, an influx of formation fluids (oil, gas, water) into the well bore can occur. The severity of the kick will depend on the porosity and permeability of the formation (i.e. how it allows fluid to flow through it), and the difference between the formation pressure and drilling fluid

pressure.

A blowout is an uncontrolled kick and can take place at the surface or underground between two separate permeable bodies of rocks (formations). Kicks are prevented by maintaining the correct density of the drilling fluid down the well bore. This is achieved by adjusting the concentration of various components of the drilling fluid so that the fluid hydrostatic pressure is greater than the formation pressure.

There are a number of warning signs which indicate that a kick is taking place. These include an increase in drilling fluid flow rate, an increase in the drilling bit penetration rate (indicating a change in the type of rock being drilled) and the presence of gas bubbles in the returned drilling fluid. If one or more warning signs of a kick are observed, steps are taken to check for flow from the well and the well is immediately shut-in. The well can then be easily brought under control by adjusting the density and weight of the drilling fluid.

Any wells drilled to intersect a reservoir can be controlled utilizing properly weighted drilling fluids. Drilling fluids, along with use of up-to-date drilling equipment, and regulated “best practice” drilling practices, ensures that the risk of a blowout is very small.

The requirements associated with any drilling program include detailed procedures for all drilling activities, blowout prevention equipment maintenance, regular (minimum weekly) blowout prevention drills and table-top oil spill exercises.

Oil Fallout during Production Testing

Well testing is conducted to evaluate any hydrocarbon-bearing formations for possible flow characteristics. Oil fallout during production testing could result in the loss of small volumes of oil from the burner to the ocean surface.

Oil burners that atomize the hydrocarbons are used to ignite and burn the mixture. Fallout of free oil can occur if improper combustion occurs or if the burners become plugged by well debris (i.e. sediment).

Volumes of oil involved in such a spill would not be large, 500L or less. Measures taken to minimise this risk include continuous monitoring of the test equipment and using specialised ‘green’ burners that will allow the optimisation of the burning process by:

- incorporating sensors to monitor fluid pressure, temperature and flow rate;
- combining sufficient quantities of compressed air and water with the oil to allow an optimal burn; and
- incorporating remote control operation of the burner panels that allows the optimisation of the atomisation process and the orientation of the burners in all weather conditions.

Operational guidelines have been developed to avoid fallout from production testing (Appendix 2).

6.2 Real Time Modelling of Oil Spills

The modelling system forms part of Apache's oil spill response system. In the event of a spill occurring, the model would be run in conjunction with field surveillance to predict the trajectory and fate of spilled hydrocarbons, thereby providing forewarning of the habitats that may be affected.

6.3 Oil Spill Response Actions and Strategies

An accidental spillage of hydrocarbons may occur during operations. Emergency response manuals have been prepared and the relevant documents are shown in Table 12.

Should an oil spill occur, Apache would immediately take the following actions as detailed in the Gippsland Oil Spill Contingency Plan (AE-00-EF-013):

- Follow procedures to protect human life and equipment. Implement procedures to reduce the risk of fire or explosion.
- Cut of the supply to the spillage.
- Identify the extent of spillage and the weather/current conditions in the area.
- Implement offshore and onshore actions for oil spill tracking, dispersion, containment, collection, treatment and clean-up as appropriate.
- Response actions will be coordinated in accordance with the three tiers of Oil Spill Control depending on the size of the spill, the proximity to environmentally sensitive areas and the resources available to control the spill. Response team members and responsibilities are set out in the Oil Spill Contingency Plan.
- If an oil slick is likely to reach a shoreline, advise fisheries companies, and wildlife agencies. Advise appropriate agencies to assume responsibility for wildlife rehabilitation activities.
- Monitor affected shoreline and intertidal zones to determine environmental effects of spill impact and clean up operations.

Response strategies to spillage include the following principal options:

- Take no action other than surveillance.
- Combat the slick at sea.
- Shoreline deflection and/or clean-up.

The implementation of a strategy or combination of strategies is dependent upon physical conditions prevalent at the time. The speed and direction of winds and currents, general sea conditions and the type of oil spilt will determine which option or combination of options is suitable.

Given the location of the wells and the amount of time that will be required for the oil to hit any land, the main response strategy will be to take no action except continual surveillance and allow the oil to degrade and disperse naturally. The response will be directed at monitoring the slick for as long as necessary via surface and aerial surveillance, and by the computer tracking model to ensure that no danger to sensitive environmental resources arises.

Containment and recovery, and shoreline deflection and/or clean-up will be used in the event that the oil approaches or reaches sensitive resources.

Table 11: Environmental analysis of accidental discharges

Risk ID	Hazard	Causes	Potential Environmental Impact	Existing controls	Likelihood	Consequence	Risk Ranking	Comments
NR1	Leakage from engines or machinery	Engine oil, hydraulic fluid and diesel, 20 – 50L	Localised impact on water quality. Containment on rig, therefore unlikely to reach ocean. Should small amounts of hydrocarbon reach the environment, it would dissipate and evaporate very quickly	• Drip trays and sumps placed under all engines • Oil collected in deck sump, emptied on regular basis and stored in containment tank prior to shipping to shore • no open drains leading into the marine environment • daily inspections	Probably will occur	Negligible	Negligible	
NR2	Production testing - oil fallout	If well intersects a hydrocarbon reservoir, A maximum of 4,000 - 7,000 bbls per day will be combusted during production testing. Oil fallout during production testing could result in the loss of 500L of moderately heavy to light weight crude oil from the burner	Localised impact on water quality. This volume would dissipate and evaporate with no potential contact to shorelines	• 'Green' burners to be used to minimise potential hydrocarbon fallout • incorporate sensors to monitor fluid pressure, temperature and flow rate • combine sufficient quantities of compressed air and water with the oil to allow an optimal burn • incorporate remote control operation of the burner panels that allows optimisation of the atomisation process and orientation of the burners in all weather conditions. • trained operators to be on site at all times • shutdown of testing if excessive fallout occurs	May occur	Negligible	Negligible	

Risk ID	Hazard	Causes	Potential Environmental Impact	Existing controls	Likelihood	Consequence	Risk Ranking	Comments
NR3	Spillage or leakage of drilling fluid from transfer hose	Drilling fluid, 2,000L (13 bbls)	Fluid would cause short term turbidity but would disperse rapidly. Smothering unlikely due to dispersion	• Only dry materials for water based fluid passed from support vessel to the rig. Fluid is mixed in bulk tanks located within the hull of the drilling rig • Mud tanks are bunded and master valve of mud pits padlocked at al times and, • Drill floor sealed, not draining to marine environment	May occur	Negligible	Negligible	
NR4	Spillage of chemicals from drums	Light oils, treatment chemicals, 1,500 L	Localised impact on water quality. Spills should be contained on decks with closed drain system or in bunded areas and then directed to containment tanks for disposal in drums onshore	• Quantity on rig small • Drums are stored on pallets and in bunded areas away from open grates wherever possible. Injection chemicals placed on skids	May occur	Negligible	Negligible	
NR5	Leakage or spillage of diesel from transfer hose (refuelling accident)	Diesel, 2,500L, (15 bbls)	Impact on water quality. Sensitive habitats distant, chance of reaching shorelines is very low	• Detailed refuelling procedures developed and followed • Refuelling only during suitable weather and sea-state conditions • refuelling only to occur at the discretion of the skipper of the vessel and master of the rig • hose and couplings checked for integrity prior to refuelling • oil spill contingency plan (OSCP) approved by the DP. • OSCP has strategies for managing a spill. • oil spill model used for spill prediction.	May occur	Negligible	Negligible	Modelling of an 8,000L diesel spill indicated that spills were likely to entrain and disperse prior to landfall on any coastline

Risk ID	Hazard	Causes	Potential Environmental Impact	Existing controls	Likelihood	Consequence	Risk Ranking	Comments
NR6	Rupture of drilling rig fuel tank or support vessel fuel tank due to impact.	Diesel, 80,000 L (503 bbls)	Sensitive habitats distant, chance of reaching shorelines is very low. Some risk of fire	• Rig fuel tanks on the rig are located above the surface of the water and are contained within the hull of the rig. • hull of drilling rig is double skinned • fuel tanks also protected by ballast tanks • radio contact between rig and supply vessel at all times • support vessel stands away crane arm distance from rig during offloading and onloading • work near drilling unit only in suitable seastate - to the discretion of the skipper of the vessel and master of the rig • weather forecasts sent directly to the rig by the met bureau twice a day. Can be increased to hourly basis in emergencies • oil spill contingency plan (OSCP) approved by the DPI	Rare	Moderate	Negligible	See comment NR5
NR7	Blow-out during drilling	Moderately heavy to light weight crude oil, 600,000 L (36,000 bbls)	Sensitive habitats distant, chance of reaching shorelines is very low. Could impact the marine resources if winds and currents carry the oil towards the shallow marine areas adjacent to the mainland. Oil will be weathered	• International, National and State legislation to be complied with • all management procedures specified in Vessel Safety Case must be approved by DPI • only trained, certified personnel (assistant drillers, drillers, tool pushers) used on rig floor • three blow-out preventors (BOPs) used • routine pressure testing of BOPs and casing to legislative standards • utilize drilling fluid weight designed to known reservoir pressure • oil spill contingency plan (OSCP) approved by the DPI.	Rare	Moderate	Negligible	Modelling of an 600,000L crude spill indicated that any oil was expected to take 36-40 hours to reach any part of the coast. The most likely path for a slick was predicted to be the east-northeast with the probability of any contact predicted to be 80%. Modelling indicated that about 6% of the initial spill could come ashore in the first week of a spill under worst case conditions

7 ENVIRONMENTAL IMPLEMENTATION STRATEGY

The objectives of this Environment Plan are:

- to achieve and demonstrate sound environmental practice at the level of international best practice by managing all activities of the drilling program which may have an impact on the natural environment; or
- where an impact is unavoidable, minimise, ameliorate and manage the damage.

In accordance with these objectives, the following components will be used for the management of the drilling program for Fur Seal-1. These components comprise the implementation strategy.

- Key roles, responsibility and environmental policy
  Addresses the top down commitment and responsibilities, and that the policy is in place to ensure the protection of the environment.
- Legislation, conditions and commitments
  Identifies relevant legislation, conditions and commitments applicable to the environmental aspects of the program.
- Environmental risk assessment
  Identifies the potential environmental risks and hazards for the program (refer to Sections 5.0 and 6.0).
- Routine operations and emergency response procedures
  Generates risk reduction measures including asset integrity inspections, work instructions, procedures and emergency response plans.
- Performance objectives, standards and criteria
  Defines the environmental performance objectives, standards and criteria that need to be met to ensure environmental protection.
- Communication and education
  Ensures the knowledge, acknowledgment and advice of the environmental conditions and surrounding resources to the workforce and the community.
- Incident reporting, recording and reporting, and audits
  Ensures the reporting and investigation of environmental incidents and reporting requirements, and is used as a basis for continual improvement. Addresses the assessment of performance and compliance.

At a broad scale, the program will be managed to comply with the Apache Environmental Policy, which is given in Appendix 3.

7.1 Key Roles, Responsibilities and Environmental Policy

It is important that the responsibilities of Apache personnel and relevant contractors are understood and followed during all operations. The key roles for ensuring the protection of the environment and associated responsibilities for each role are listed below.

Managing Director

- Ensure compliance with Apache's Environmental Policy.
- Assume responsibility for providing adequate resources for environmental management.
- Implement an emergency response strategy in the case of an incident.
- Maintain communication with company personnel, government agencies and the media.

Operations Manager

- Ensure compliance with the Apache's Environmental Policy.
- Ensure overall compliance with the Environment Plan with advice and guidance from the Drilling Manager, the MODU Person in Charge and the Environmental Manager.
- Report environmental incidents to the Environmental Manager.
- Assist the Managing Director in the development of a response strategy in the event of a spill incident.

Drilling Manager

- Ensure overall compliance with the Environment Plan with advice and guidance from the Senior Drilling Engineer and Environmental Manager.
- Report environmental incidents to the Environmental Manager.
- Assist the Operations Manager in the development of a response strategy in the event of a spill incident.

Senior Drilling Engineer

- Ensure compliance to all relevant environmental legislative requirements, commitments, conditions and procedures as given in this Environment Plan.
- Maintain clear communication with the Drilling Supervisor.
- Report environmental incidents to the Drilling Manager and ensure follow-up actions are carried out.
- Assist the Drilling Manager and Drilling Supervisor in the event of an oil spill incident.
- Ensure follow-up actions from environmental audits have been carried out.

MODU Person in Charge

- Implement and ensure compliance to all relevant environmental legislative requirements, commitments, conditions and procedures as given is this Environment Plan.
- Communicate hazards and risks to the workforce and their implications, and the importance or following good work practices.
- Apply appropriate enforcement mechanisms to prevent breaches of the Environment Plan.
- Develop a response plan in the event of an incident in close liaison with the Apache Drilling Supervisor.
- Carry out follow-up actions from environmental audits.

Apache Drilling Supervisor

- Monitor that the relevant environmental legislative requirements, commitments, conditions and procedures are being followed on the drilling rig and support vessels.
- Maintain clear communication between the company and the drilling contractor on environmental issues.
- Report environmental incidents and ensures follow-up actions.

Environmental Manager

- Liase with the Drilling Manager and Senior Drilling Engineer to ensure compliance to legislation, procedures, standards and commitments.
- Carry out environmental education and inductions.
- Participate in the oil spill response strategy.
- Develop and implement a relevant environmental monitoring program.
- Conduct environmental audits of the drilling rig to ensure compliance.

Masters of Support Vessels

- Implement and ensure adherence to all relevant environmental legislative requirements, commitments, conditions and procedures on-board the vessel.
- Maintain clear communication with the crew.
- Communicate hazards and risks to the workforce and their implications, and the importance or following good work practices.
- Maintain the vessels in a state of preparedness for emergency response.
- Report environmental incidents to the MODU Person in Charge and ensure follow-up actions are carried out.
- Apply appropriate enforcement mechanisms to prevent breaches of the Environment Plan.

Apache personnel and contractors / Crew of support vessels

- Apply this management plan in letter and in spirit.
- Follow good housekeeping procedures and work practices.
- Encourage improvement wherever possible.
- Report incidents to the MODU Person in Charge or the Drilling Supervisor.

7.2 Legislation, Condition and Commitments

Commonwealth Environmental Legislation

The Fur Seal-1 well site is located entirely offshore in Commonwealth waters and are controlled by the *Commonwealth Petroleum (Submerged Lands) Act 1967* (Cth) and the *Petroleum (Submerged Lands) (Management of Environment) Regulations 1999*. The Act and its regulations are administered by the Joint Authority, which consists of:

- the Commonwealth Minister for Primary Industries and Energy, advised by the Commonwealth Department of Industry, Sciences and Resources; and
- the Victorian Minister for Energy Industry and Resources, advised by the Victorian Department of Primary Industries.

The principal Commonwealth legislative requirements that are relevant to the well are summarised below:

Environment Protection and Biodiversity Conservation Act 1999
Under this legislation all activities that will, or have the potential to, affect matters of "National Environmental Significance" are prohibited except; when undertaken in accordance with approval by the Minister for Environment, or when approved through a Bilateral Agreement with a State or Territory, or when approved through a process accredited by the Minister.

Matters of "National Environmental Significance" are:

- World Heritage Areas
- Wetlands Of International Importance
- Listed Threatened Species And Communities
- Listed Migratory Species
- Nuclear Actions
- Commonwealth Marine Areas

Petroleum (Submerged Lands) Act 1967
This Act relates to the exploration and exploitation of petroleum resources in the area of the continental shelf of Australia and certain Territories of the Commonwealth. Commonwealth law applies to lands beneath waters that are beyond the outer limits of the territorial sea adjacent to the States and the Northern Territory.

The *Petroleum (Submerged Lands)(Management of Environment) Regulations 1999* are applicable to petroleum exploration and production activities in Commonwealth waters. The objective of these regulations is to ensure that petroleum activities are carried out in a manner that is consistent with the principles of ecologically sustainable development and in accordance with an approved 'Environment Plan' that has appropriate performance objectives and standards as well as measurement criteria for determining whether the objectives and standards are met.

Subregulation (26) requires an operator to give notice of a reportable incident within 2 hours of the incident, or of its detection, and provide a written report within 3 days of the incident or its detection.

The *P(SL)A Schedule Specific Requirements as to Offshore Petroleum Exploration and Production 1995* clauses applicable to the VIC/P54 wells are listed below:

Emergency Response Manuals, Clause 202:
Operations shall not be carried out without an Emergency Response Manual, approved by DPI which sets out procedures for emergencies including the escape or ignition of petroleum.

Oil Spills, Clause 220:
Take action as necessary to minimize the loss of petroleum and the pollution of the area… shall be taken.

No chemical dispersants shall be used on oil spills without approval.

Housekeeping, Clause 222:
(1) Decks and floors of a platform shall be kept clean and free of oil and grease.
(2) Adequate storage space for tools and equipment shall be provided on a platform.
(3) No waste materials other than other than food scraps, sanitary effluents, drilling fluid or formation water conforming tot he requirements of sub clause 616(6) shall be released into the sea.
(4) Food scraps, and from 1 January 1992, sanitary effluents may only be released into the sea where a platform is located more than 12nm from land and after the material has passed through a comminuter or grinder such that the material to be released is capable of passing through a screen with openings no greater than 25mm.
(5) Waste materials other than the waste materials which by sub-clause (3) may be released into the sea shall be stored on the platform in suitable metal containers or in

some other approved way and returned to shore for disposal.
(6) Adequate space shall be provided around equipment on a platform to ensure safe working conditions.
(7) Drum stocks of fuel or lubricating oil on a platform shall be stored as far as reasonably practicably possible from areas where drilling operations are being carried out.
(8) Gas cylinders on a platform shall be properly secured.
(9) Liquefied gas cylinders on a platform shall be in an upright position.
(10) No flammable liquids with a flashpoint below 38degC shall be kept on a platform without approval.
(11) The stairways and walkways of a platform shall be kept free from obstruction.

Reporting escape or ignition of petroleum or other material, Clause 285.
(1)Report forthwith to an inspector of:

(a) oil in water >50mg/l
(b) 80L or greater of oil
(c) uncontrolled escape of petroleum or other flammable or combustible material

(2) A report in writing of any occurrence referred to in subclause (1) shall be submitted to the Director as soon as practicable after the occurrence specifying:

(a) the date, time and place of the occurrence
(b) the quantity or approximate quantity of liquid that escaped or burned
(c) particulars of damage caused by the escape or ignition
(d) the events so far as they are known or suspected that caused or contributed to the escape or ignition
(e) particulars of methods used to control the escape or ignition
(f) particulars of methods used or proposed to be used to repair property damaged by the escape or ignition, and
(g) measures taken or to be taken to prevent a possible recurrence of the escape or ignition

Pollution, Clause 616:
(1) Every reasonably precaution shall be taken to avoid pollution of the environment
(2) Waste gas from vents and pressure vessels shall be disposed of using safe methods
(3) Subject to sub-clause (6) the flow into the sea of crude oil, oil sludge or an emulsion of petroleum and water, shall be prevented

Approval to Flare, Clause 615;
Except in an emergency, the flaring or venting of petroleum shall not be carried out without approval.

Australian Heritage Commission Act 1975
This Act identifies areas of heritage value - listed on the Register of the National Estate.

Historic Shipwrecks Act 1976
This Act protects shipwrecks, which have lain in Territorial waters for 75 years or more. It is an offence to interfere with any shipwreck covered by the Act.

Wildlife Protection (Regulation of Exports and Imports) Act 1982
This Act is concerned with control over the movement of Australian wildlife (fauna and flora) in or out of the country, together with the movement of exotic (non-indigenous) flora and fauna out of the country, as well as various other matters relating to quarantining.

Hazardous Waste (Regulation of Exports and Imports) Act 1989
This Act regulates the import and export of hazardous waste. Permits are required to dispose of waste overseas or to import waste into Australia.

Ozone Protection Act 1989
This Act regulates the import, export and manufacture of ozone depleting substances such as fire fighting equipment and refrigerants. The use of these substances is being phased out in Australia.

Navigation Act 1912
This Act requires that ships carrying oil and chemical tankers conform with Annex I of the MARPOL convention for the Prevention of Pollution from Ships.

Protection of the Sea (Civil Liability) Act 1981
This Act imposes civil liability for pollution damage and requires ships carrying more than 2,000 tonnes of oil in bulk as cargo to maintain insurance to cover liability for pollution damage.

Protection of the Sea (Oil Pollution Compensation Fund) Act 1993
This Act establishes a Commonwealth Fund to provide compensation and indemnification for certain oil pollution damage. The Fund can recover contributions on behalf of the Commonwealth.

Protection of the Sea (Prevention of Pollution from Ships) Act 1983
Provides for penalties of up to $220,000 for individuals and $1.1 m for corporations not complying with the International Convention for the Prevention of Pollution form Ships 1973/78 (MARPOL 73/78 and Annexes).

Protection of the Sea (Powers of Intervention) Act 1981
This Act regulates discharges from ships to protect the sea from pollution. The Act gives powers to the Australian Maritime Safety Authority to take appropriate measures to protect the Australian coastline.

Pollution of Waters by Oil and Noxious Substances Act 1986
Refers to oil and oily substances discharged from vessels into Victorian and Commonwealth waters within 50 nautical miles of the coastline.

Marine Act 1988
Gives responsibility for combating oil spills in Victorian waters to Marine Safety Victoria (MSV). The MSV has “Primary Agency” status under the National Plan for the combat of oil spills within state waters. For spills in Commonwealth waters, the Victorian DPI would be the primary agency.

International Environmental Legislation

In addition to relevant legislation and regulations, Australia is signatory to a number of international conventions and agreements which oblige the Commonwealth government to take various actions to prevent pollution and to protect specified habitats, flora and fauna. Those which are relevant to the drilling of Fur Seal-1 are summarised below.

Climate Change Convention (1992)
The objective of the convention is to stabilise greenhouse gas concentrations in the

atmosphere at a level that would prevent dangerous interference with the climate system. Australia ratified the convention in December 1992 and it came into force on 21 December 1993.

Vienna Convention on the Protection of the Ozone Layer and the Montreal Protocol; on Substances that Deplete the Ozone Layer (1987)
The convention (ratified by Australia in 1987) and the Protocol (ratified in 1989) concern the phasing out of ozone depleting substances.

Convention On Biological Diversity (1992)
The objectives of the convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (1979)
The Convention of the Conservation of Migratory Species of Wild Animals (Bonn Convention) was concluded in 1979 and came into force on 1 November 1983. The Convention, which arose from a recommendation of the United Nations Conference on the Human Environment (Stockholm 1972), aims to conserve terrestrial, marine and avian species over the whole of their migratory range. This convention commits "Range States" to take action to conserve migratory species, especially those under threat. It is an umbrella agreement under which subsidiary regional agreements are established. For example, an agreement for the conservation of the albatross is currently being formulated for the Asia-Pacific region.

Bilateral Agreements on the Protection of Migratory Birds
Australia has negotiated bilateral agreements with Japan (JAMBA 1974) and China (CAMBA 1986) to protect species of Australian migratory birds.

UN Convention on the Law of the Sea (1982)
Part XII of the convention sets up a general legal framework for marine environment protection. The convention imposes obligations on State Parties to prevent, reduce and control marine pollution from the various major pollution sources, including pollution from land, from the atmosphere, from vessels and from dumping (Articles 207 to 212). Subsequent articles provide a regime for the enforcement of national marine pollution laws in the many different situations that can arise.

London (Dumping) Convention (1972)
Dumping at sea is regulated by the convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972 (the "London Convention"). Article 4 provides a general prohibition on dumping of wastes except as specified in the Convention. The convention has annexed to it two lists of substances, the "black list" of substances which may not be dumped at all, and the "grey list" of substances which may only be dumped under a specific permit.

International Convention for the Protection of Pollution from Ships (1973) and Protocol (1978)
This Convention and Protocol (together known as MARPOL 73/78) build on earlier conventions in the same area. MARPOL is concerned with operational discharges of pollutants from ships. It contains five Annexes, dealing respectively with oil, noxious liquid substances, harmful packaged substances, sewage and garbage. Detailed rules are laid out as to the extent to which (if at all) such substances can be released in different sea areas.

International Convention on Oil Pollution Preparedness, Response and Co-operation (1990)
International Convention on Oil Pollution Preparedness, Response and Co-operation (1990); The convention sets up a system of oil pollution contingency plans and cooperation in fighting oil spills.

International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (1969)
The convention gives States Parties powers to intervene on ships on the high seas when their coastlines are threatened by an oil spill from that ship.

International Convention on Civil Liability for Oil Pollution Damage (1969)
The convention and the associated International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage 1971 set up a system of compulsory insurance and strict liability up to a certain figure for damages suffered as a result of an oil spill accident.

Victorian Legislation

The principal State legislative requirements that are relevant to Fur Seal-1 are summarised below.

- *Petroleum (Submerged Lands) Act 1982;* also known as P(SL)A 1982
- *P(SL) Act Schedule Specific Requirements as to Offshore Petroleum Exploration and Production 1995* (regulates both State and Commonwealth activities)
- *Pipelines Act 1967*
- *Environmental Effects Act 1978*
- *Environmental Protection Act 1970*
- *Planning and Environmental Act 1987*

Industry and Corporate Codes of Practice

The petroleum exploration and production industry operates within an industry code of practice (APPEA Code of Environmental Practice). Apache also has its own corporate performance standards and criteria that must be met internally. These industry and corporate standards provide guidelines for activities that are not formally regulated and have evolved from the collective knowledge and experience of the oil and gas industry both nationally and internationally.

Apaches Environmental Policy (Appendix 3) provides broad guidelines for the environmental responsibilities of all company personnel and the conduct of company activities.

7.3 Routine Operations and Emergency Response Procedures

The major environmental risks associated with the drilling program have been identified in the detailed risk assessment given in Sections 5.0 and 6.0.

Routine Operations

The Drilling Supervisor, MODU Person in Charge, and Masters of the support

vessels are responsible for ensuring that all procedures are available to personnel and that the procedures are carried out properly. The relevant procedures, commitments and guidelines are given in Table 12.

In addition to the procedures, commitments and guidelines in Table 12, the rig may also develop its own job specific work procedures that address environmental management issues.

Table 12: Standard operating guidelines and procedures pertinent to environmental management

Procedure or Guideline	Document Number	Location
Refuelling Management Plan	DR-91-IG-001 (see Appendix 1)	Drilling rig and support vessels
Production Testing Fallout Guidelines	Appendix 2	Drilling rig
Apache Environmental Guidelines: Oil spills Waste management Conservation	Appendix 4	Drilling rig
Incident reporting procedure	AE-91-IF-002	Drilling rig
Summary of Environmental Commitments	Appendix 4	Drilling rig

Emergency Response

An accidental spillage of hydrocarbons may occur during the drilling program. Emergency response manuals have been prepared. The relevant guidelines and documents are shown in Table 13.

Table 13: Emergency response guidelines and manuals

Document Title	Document Number
Gippsland Basin Oil Spill Contingency Plan	AE-00-EF-013
Emergency Response Plan (MODU Operations Gippsland Area)	AE-00-ZF-033
Oil spill guidelines	Appendix 4
Incident Reporting Procedure	AE-91-IF-002

These documents will be held on the drilling rig and will be accessible to all personnel.

7.4 Performance Objectives, Standards and Criteria

The environmental performance of the drilling program can be measured, benchmarked and reported by the development of Environmental Performance standards. These standards are objective and verifiable data that are measured, calculated or estimated providing Apache with the means of:

- demonstrating compliance with regulatory requirements and standards;
- performing against assessment criteria; and
- achieving and demonstrating best practice and continual improvement to the regulators and public.

The environmental performance, objectives, standards and criteria for Fur Seal-1 are listed in Table 14. They are compiled from the environmental risk assessment and include environmental discharges or actions that:

- have a risk ranking of B or greater;
- result in the discharge of a volume of 100 L or more of hydrocarbons into the ocean; or
- have a documented regulatory, industry or company guideline or standard.

Table 14: Environmental Performance Objective, Standards and Criteria

Environmental hazard or aspect (Risk Assessment matrix number, Tables 6 and 7)	Performance Objective	Standards and Procedures	Criteria
Disposal of drilling fluid and drilling cuttings (R3, R4, NR 3)	Minimise the volume of drilling fluid being discharged into the ocean	Record drilling fluid usage	Rig PIC to record volume of drilling fluid disposed into the ocean, as m^3 per well. Results to be reported to the Environmental Manager at the end of the well
Cooling water (R5)	Minimise elevation of water temperature above ambient levels	ANZECC water quality guidelines for protection of aquatic ecosystems, <2°C above ambient.	Audit shows water being discharged at barge level (allows for cooling and oxygenation as it falls to sea level)
Oil in water levels (R6, NR1)	Avoid and minimise impact on water quality	• MARPOL limit of 15ppm on all water discharged from oily water slops tanks or bilges • P(SL)A Clause 222 (1) decks and floors of a platform shall be kept clean and free from oil and grease • P(SL)A Clause 285 (1) (a) any release of oily water with >50mg/L oil in water is to be reported to DPI • P(SL)A Subreg (26) Report incidents within 2 hours • P(SL)A Clause 616 (1) & (3) Pollution	Audit shows: • if oily water separator is operational, it is maintained regularly and 15 ppm limits are being met. If containment tank used, then no contaminated water is discharged to marine environment • good housekeeping being maintained • all releases of oil in water of greater than 50mg/l has been reported • Spills are reported through Apache incident reporting system

Environmental hazard or aspect (Risk Assessment matrix number, Tables 6 and 7)	Performance Objective	Standards and Procedures	Criteria
Pipe Dope (R11)	Avoid and minimise impact on water quality	• Apache environmental guidelines is to use pipe dope that has lowest concentration of heavy metals and hydrocarbons but still meets safety and performance criteria • Record Pipe dope usage	Rig PIC to record volume of pipe dope used on location. Results to be reported to the Environmental Manager at the end of the well
Spillage of diesel fuel (during refuelling from transfer hoses or on board tanks, or rupture of rig or support vessel fuel tank) (NR5, NR6)	Prevent spills of diesel during transfers	• P(SL)A Subreg (26) Report incidents within 2 hours • P(SL)A Clause 220 Oil Spills • P(SL)A Clause 285 (1) (b) all spills >80L to be reported to the DPI • P(SL)A Clause 616 (1) & (3) Pollution • Apache Refuelling Management Procedures • Apache OSP Volumes 1 & 2 • Apache incident reporting system	Audit shows: • compliance with company refuelling procedures • OSCP in place and approved by DPI • all actions taken to control an oil spill were taken and dispersant use was not initiated without DPI approval • spills >80L reported to DPI and Apache within 2 hours of occurrence. • Spills <80L reported through Apache incident reporting system

Environmental hazard or aspect (Risk Assessment matrix number, Tables 6 and 7)	Performance Objective	Standards and Procedures	Criteria
Oil spill (crude) from blowout (NR7)	Prevent crude oil spills into the ocean from a blowout Minimise negative effects on water quality	• Drilling program to meet DPI drilling standards. • Apache OSCP • P(SL)A Clause 220 Oil Spills • Apache to hold a valid Certificate of Currency of Insurance • P(SL)A Clause 285 (1) (b) all spills >80L to be reported to the DPI • P(SL)A Subreg (26) Report incident within 2 hours • P(SL)A Clause 616 (1) & (3) Pollution • Apache incident reporting system	Audit shows: • DPI Application to Drill approved • Approval of OSCP by DPI • Compliance with P(SL)A Clauses 220, 285 & 616 • a Certificate of Currency of Insurance for the well • spills >80L reported within 2 hours of occurrence • Spills <80L reported through Apache incident reporting system
Chemical spill (NR4)	Prevent chemical spills from entering the ocean, minimise negative effects on water quality	• P(SL)A Clause 222 (1) Housekeeping, clean decks • Apache environmental guidelines on good housekeeping • Apache contractor guidelines • Appropriate bunding around chemical storage area • No breaches in chemical container integrity	Audit shows: • chemicals stored in bunded area and chemical containers intact • all chemical spills >20L reported to Apache Perth Office • chemical spills cleaned up according to Apache environmental guidelines • absorbent material is on board to use in soaking up chemical or oil spills

Environmental hazard or aspect (Risk Assessment matrix number, Tables 6 and 7)	Performance Objective	Standards and Procedures	Criteria
Production Testing (R12, NR2)	Avoid and minimise impact on water quality	• P(SL)A Clause 220 Oil Spills • P(SL)A Clause 285 (1) (b) all spills >80L to be reported to the DPI • P(SL)A Subreg (26) Report incident within 2 hours • P(SL)A Clause 616 (1) & (3) Pollution • Apache production testing guidelines • Apache OSP Volumes 1 & 2 • Apache incident reporting system	Audit shows: • compliance with Apache's Production testing guidelines • OSCP in place and approved by DPI • all actions taken to control an oil spill were taken and dispersant use was not initiated without DPI approval • spills >80L reported to DPI and Apache within 2 hours of occurrence. • Spills <80L reported through Apache incident reporting system
Discharge of combustion products from engines and production testing (R13)	Minimise GHG emissions	Federal GHG Challenge Reporting requirements	Audit shows: • greenhouse gas emissions data reported to Federal Govt by the Environmental Manager annually • inspections and tuning of engines and equipment are included on a regular maintenance schedule

Environmental hazard or aspect (Risk Assessment matrix number, Tables 6 and 7)	Performance Objective	Standards and Procedures	Criteria
Solid waste management (R10)	Minimise waste volumes. Avoid and minimise negative effects on water quality. Ensure responsible containment and disposal of wastes	• P(SL)A Clause 222(4) storage of rubbish • Apache environmental policy to reduce, reuse and recycle • Apache environmental guidelines • Industrial waste disposed at appropriate disposal sites	Audit shows: • compliance with PSLA Clause 222 and Apache environmental guidelines • records of the volume and type of waste taken off rig are collated by the rig PIC and forwarded to the Environmental Manager at the end of each well • ROV survey to check no rubbish left on seabed. Any debris will be removed
Waste Oil Management (R9)	Manage waste oils to prevent discharge to the sea	Apache environmental guidelines	• Audit shows compliance with guidelines for waste oil handling and management • Records of volume of waste oil taken off rig forwarded to the Environmental Coordinator at the end of each well
Handling and disposal of kitchen wastes (R7)	Avoid and minimise negative effects on water quality	P(SL)A Clause 222 (4), Food scraps are not to be disposed overboard at all within 12nm of land	Audit shows food wastes are disposed in compliance with P(SL)A clause 224 (4)
Sewage / organic waste discharge (R8)	Avoid / minimise impact on water quality	PSLA Clause 222 (4) treated sewage	Audit shows sewage is treated to a satisfactory level of treatment prior to discharge

Environmental hazard or aspect (Risk Assessment matrix number, Tables 6 and 7)	Performance Objective	Standards and Procedures	Criteria
Environmental Audit	Ensure compliance with audit schedule requirements	Apache commitment drilling rig to be audited every six months whilst under contract to Apache Energy	Audit shows two audit reports per year
Operational Environmental Awareness	All personnel involved in the drilling program to be aware of the environmental sensitivities and requirements of the well	Fur Seal-1 EP On site EH&S induction required for all visitors, biannual induction for all crew members	Audit shows: • personnel are familiar with the environmental requirements of the EP and all guidelines and procedures outlined are being followed • all personnel have signed off the rig register book confirming their induction
Incident Reporting	Report any incidents which may potentially impact the environment	Apache incident reporting system P(SL)A Subreg (26) Report incident within 2 hours	Audit shows Environmental Manager is receiving incident reports
Megafauna Observations	Collate data on the presence and behaviour of whales and sea turtles in the vicinity of the rig	Whale watching procedures & observation sheet	Audit shows observation data sheets are compiled and forwarded to the Environmental Manager for each well

7.5 Communication and Education

Communication

Due to the fishing interests and activity undertaken in the vicinity of the proposed drill site, the following fishing interest groups and government authorities have been informed of the proposal to drill Fur Seal-1:

- South-east Trawl Fishing Association
- Lakes Entrance Fisherman's Co-operative
- South-east Fishery Association
- San Remo Fisherman's Co-operative
- Dr Ian Knuckey from Fishwell Consulting
- Australian Fisheries Management Authority

Consultations have so far consisted of an email with a "Notification of Drilling Program" information pamphlet and follow up telephone calls and messages to discuss the drilling program with senior personnel of the above organisations.

Apache will continue to update these fishing interest groups of the proposal and approval process. To date, no issues were raised by the any of the above groups and no requests for further information have been received.

Copies of this Environment Plan will be distributed to the above organisations as well as the Department of Industry and Resources.

The covering letter for the EP will provide contact details in the event that any of the organisations have questions about the drilling program.

Education

Qualified members of staff (e.g. rig PIC / medic / safety officer) will give personnel and contractors involved in the drilling program an environmental induction. The topics covered will include:

- an overview of this Plan;
- regulatory and procedural requirements;
- environmental policy principles;
- environmental resources at risk; and
- environmental procedures to be used.

Issues Covered at an Induction

Resource Sensitivity

- Resource maps to be put up on the drilling rig.
- Sensitive resources located nearby.
- Numerous animals are found in the open water environment - dolphins, whales, and seabirds.
- Oil can be devastating to marine life. Must avoid any sort of spillage.

Pertinent Legislation

- Everyone must be aware of the legislation that pertains to the development program and where these acts can be found.
- Commonwealth P(SL)A is the main legislation.

- We are working under commitments that are legally binding.
- Environment Plan is legally binding.
- Any spillage of oil or other chemicals is reportable to Apache. Spills >80 L to DPI within 2 hours under the P(SL)A.
- Apache Environmental Policy and Environmental Plan.
- Policy should be displayed.
- Show copy of EP and where it can be found.
- Specific guidelines to be mentioned.
- General housekeeping to be kept to a high standard: keep decks clean of litter, rags etc.
- Nothing is to be thrown or dumped overboard.
- All precautions must be made to avoid spillage of anything into the marine environment. If oil or chemicals are spilt, they must be cleaned up immediately and the soiled clean-up materials disposed of in skips. Don't hose spillage overboard.
- All spillage >80 L must be reported to the drilling supervisor. If smaller spills reach the marine environment, these must also be reported - not to reprimand, but to ensure that procedures are checked to make sure they don't happen again.
- When using pipe doping, use the minimum amount and avoid spillage to the deck floor. Use doping with lowest concentration of heavy metals.
- Emphasise the importance of proper storage of chemicals and drums. The integrity of the drums should be checked to make sure they are not leaking. Drums of liquid must be within bunded areas.
- Put drip trays under anything that may drip oil or chemicals and clean these up on a regular basis.
- Segregate wastes into clearly marked bins/skips and recycle wherever possible. Use minimal volume of chemicals.

7.6 Incident Reporting, Recording and Reporting, and Audits

The people responsible for recording and reporting the various environmental performance standards are listed below.

Incident Reporting

All environmental incidents will be reported in the first instance to the MODU Person in Charge. The Environmental Manager will record all incidents into Apache's Environmental Incidents database as per Apache's Incident Reporting Procedure (Document AE-91-IF-002). Onshore and offshore management will participate in any incident investigations.

In accordance with Apache's spill response procedure, a spill incident will be reported to DPI via the primary contact (ph: 03 9658 4414 fax: 03 9658 4499). If there is no response, then the DPI Environment Section mobile phone will be called (0418 528 420 alternative number is 0408 543 154). Apache's spill response plan also details the relevant personnel that may be required to be notified of a spill incident.

Recording and Reporting

Internal and government reporting on performance standards will be carried out by the Environmental Manager or their delegate, and distributed to the company and government on an annual basis.

Reporting will be as per the requirements of the Petroleum (Submerged Lands)(Management of Environment) Regulations 1999.

Additionally a close out report detailing the performance against the conditions of the EP will be submitted to the DPI within 3 months after the completion of the drilling program.

Audits

The Environmental Manager (or designate) and MODU Person in Charge will carry out an environmental compliance audit of this Environmental Plan. The pro forma used for environmental audits of a drilling rig is given in Appendix 5. The Senior Drilling Engineer will be responsible for any remedial action that needs to be carried out.

8 GLOSSARY OF ACRONYMS

AQIS	Australian Quarantine and Inspection Service
CALM buoy	Canternary Anchor Leg Mooring buoy
DPI	Department of Primary Industries
EP	Environment Plan
Mcf	Million cubic feet
mg/L	Milligrams per litre
OIW	Oil in water
OSCP	Oil Spill Contingency Plan
PIC	Person in Charge
PFW	Produced formation water
ppm	parts per million
PSLA	Petroleum (Submerged Lands) Act
TPH	Total petroleum hydrocarbons
Vic	Victoria
WAF	Water accommodated fraction

9 REFERENCES

ANZECC (1998). Interim Marine and Coastal Regionalisation for Australia: an ecosystem-based classification for marine and coastal environments. Environment Australia, Canberra.

Asia Pacific Applied Science Associates (2004). Assessment of oil spill exposure risks for the Longtom-2 and Grayling-1 exploration wells, VIC/P54 Gippsland Basin. Prepared for Apache Energy Ltd, August 2004.

Battelle (1998) Weathering, chemical composition and toxicity of four Western Australian crude oils. A report to Apache Energy. Project N002239. August 21 1998.

Blaber, S.J.M. & Blaber, T.G. (1980). Factors affecting the distribution of juvenile and inshore fish. *Journal of Fish Biology* 17:143-162.

Boehm P.D., A. Turton, D. Raval, D. Caudle, D. French, N. Rabalaise, R Spies and J. Johnson. 2001. Deepwater Program: Literature Review, Environmental Risks of Chemical Products used in Gulf of Mexico Oil and Gas Operations; Vol 1: Technical Report. OCS Study MMS 2001-011. US Department of the Interior, Minerals Management Service Gulf of Mexico OCS Region, New Orleans, LA 326pp.

Bryden, M, Marsh, H. and Shaughnessy, P. (1998). Dugongs, Whales, dolphins and Seals. A guide to the sea mammals of Australasia. Allen and Unwin.

CEE Consultants (2001). Technical Report Marine Biological Issues. In: Patricia Baleen Gas Field Development Environmental Effects Statement – Public Environment Report – Technical Reports for OMV Australia.

EA (2001). Guidelines on the Application of the Environment Protection and Biodiversity Conservation Act to Interactions between Offshore Seismic Operations and larger cetaceans. Environment Australia, Canberra.

Gill, P.C (2000). A blue whale feeding ground off southern Australia: preliminary findings. Paper presented at the IWC Conference, Adelaide 200.

IRC (2001). Stag Oilfield Environmental Monitoring 2000 Survey. A report for Apache Energy Limited. 17 September 2001.

Isaji, T. & Spaulding, M. (1984). A model of the tidally induced residual circulation in the Gulf of Maine and Georges Banks, published in: Journal of Phys. Ocean – June pp 1119-1126.

Kennicutt II M.C., P.N. Boothe, T.L. Wade, S.T. Sweet, R. Rezak, F.J. Kelly, J.M. Brooks, B.J. Presely & D.A. Wiesenburg, (1996). Geochemical Patterns in Sediments Near Offshore Production Platforms. Canadian Journal of Fisheries and Aquatic Sciences 53:pp 2254-2566.

King, B. (1994). The application of OILMAP oil spill model for the North West Shelf. A report to Apache Energy.

Kinhill Pty Ltd (1998). East Spar Benthic Survey. Biological Monitoring Program. A report to Apache Energy. October 1998. Report EA-66-RI-006/B

Loneragan, N.R., Kenyon, R.S., Haywood, R.S., Haywood, M.D.E. & Staples, D.A. (1994). Population dynamics of juvenile tiger prawns (*Penaus esculentus* and *P. semisulcatus*) in seagrass habitats of the Western Gulf of Carpentaria, Australia. *Marine Biology* 119:133-143.

Marine Freshwater Research Institute (1996). The effects of laboratory weathering on the chemical composition, physical characteristics and dispersibility of three Western Australian crude oils. A report for Apache Energy. Document H144. August 1996.

Middleton J.H. (1995). The oceanography of Australian seas. In: Zann, L. & Kailola, P. (eds). The State of the Marine Environment Report for Australia. Technical annex: 1. Department of the Environment, Sport and Territories, Canberra.

Neff J.M., (1987). Biological Effects of Drilling Fluids, Drill Cuttings and Produced Waters. 469-538. In D.F. Boesch & N.N. Rabalaise (eds) Long Term Environmental Effects of Offshore Oil and Gas Developments. Elsevier Applied Science Publishers, London, 696pp.

Neff, J.M., Ostazeski, S. & Stejskal, I. (1996). The weathering properties of four crude oils from Australia. *Spill Science & Technology Bulletin*.3(4):203-206.

Neff, J.M. Ostazeski, S. Gardiner, W. & Stejskal, I. (2000). Effects of weathering on the toxicity of three offshore Australian crude oil and a diesel fuel to marine animals. *Environmental Toxicology and Chemistry* 19:1809-1821.

Owen, A. (1980). A three dimensional model of the Bristol Channel. In Journal of Phys. Oceanography, 10 pp 1290-1302.

Poore, G. (1995). Australia's marine ecosystem: the continental shelf and slope. In: Zann, L. & Kailola, P. (eds). The State of the Marine Environment Report for Australia. Technical annex: 1. Department of the Environment, Sport and Territories, Canberra.

RACAL (1994). Analogue site survey report for Apache Energy Ltd. Stag- 8. Report A2267G. December 1994.

Robertson A.I. & Watson, G.F. (1978). Trophic relationships of the macrofauna associated with intertidal seagrass flats in Western Port Bay, Victoria. *Marine Biology* 48:207-213.

Sainsbury K.J., Campbell, R.A. and Whitlaw, A.W (1992). Effects of trawling on the marine habitat on the North West Shelf of Australia and implications for sustainable fisheries management. In: Hancock D. A. (Editor). *Sustainable Fisheries through Sustaining Fish Habitat*. Canberra Australia. Australian Government Publishing Service, 1993, 137-145. Aust Soc. for Fish. Biol. Workshop, Victor Harbour, SA, 12-13 August 1992.

Sinclair Knight Merz (1996). East Spar Gas Field Long Term Environmental Monitoring Program. Pre-production survey. A report for WMC Resources, October 1996.
Standards Australia (1999) Environmental Risk Management Guide – Draft.

Tsvetnenko, Y.B., L.H. Evans and J. Gorrie (1996) Toxicity bioassay with Novaplus drilling fluid and olefin base fluid using three Australian marine species. Report to WAPET Pty Ltd by Curtin University of Technology Ecotoxicology Program.

URS (2003). Draft Environment Plan for Drilling of Moby-A in VIC/P47 Gippsland Basin , Bass Strait.

Veron, J.E.N. (1995). *Corals in Space and Time, The Biogeography and Evolution of the Scleractinia.* University of New South Wales Press, Sydney.

APPENDICES

APPENDIX 1

Refuelling Management Plan

1. Refuelling will be carried out under the direct supervision of the Barge Master.

2. A work permit specific to fuel transfer will be drawn up based on the detailed refuelling procedures.

3. The refuelling hose will be fitted with camlock, dry coupling links.

4. The refuelling hose will be a wire reinforced, floating hose.

5. Refuelling will be carried out in suitable sea conditions to the discretion of the Master of the Supply Vessel and the person in charge (PIC) of the rig.

6. Communications are to be maintained between the rig and the refuelling vessel at all times during refuelling using hand held radios.

7. The refuelling is to be monitored by personnel on watch at appropriate locations on the supply vessel and on the rig.

8. Sufficient oil spill clean-up material will be stored on the drilling rig and support vessel to clean-up small spillage's.

9. Refuelling will be recorded in the logbook of both the supply vessel and the rig. Any difficulties experienced will be entered into the log and reported immediately to the drilling manager.

Refuelling Procedures

- Ensure all personnel are aware of intention to refuel and emergency response procedures.
- Discuss refuelling plan and tank sequence with officers involved.
- Close and blank off all unnecessary manifold valves and connections.
- Place oil absorbent materials in key locations.
- Establish common communication link between bunkering station, duty officer, engine room and refuelling barge.
- Check all bunker tank air pipes are open and unblocked.
- Ensure all sounding pipe caps are tight, except when sounding tank.
- Reconfirm space remaining in all bunker tanks to be filled.
- Check all bunker tank high level alarms are functioning.
- Ensure all fire precautions are observed.
- Check hose is of sufficient length.
- Inspect hose and couplings for damage.
- Check weight of hose does not exceed SWL of vessel's lifting gear.
- Place drip trays under hose couplings and flanges.
- Check delivery note quantity and specification are correct.
- Discuss bunkering plan with supplier.
- Discuss vessel's emergency response procedure with supplier.
- Discuss supplier's own emergency response procedures.
- Establish communication link between vessel and supplier.
- Agree with supplier the quantity of diesel to be pumped aboard.
- Agree unit of measurement (e.g. metric tonnes, cubic metres, barrels).
- Agree maximum pumping rate and pressure.
- Appoint seaman to tend mooring lines during bunkering.
- Ensure designated overflow tank is prepared.
- Prepare filling line and open all relevant valves.
- Commence bunkering at minimum pumping rate.
- Monitor supply line pressure.
- Examine hose connections for leakage.

- Reduce pumping rate and/or open next tank before topping up.
- Close valves as each tank is completed.
- Witness, date, jointly countersign and retain sealed bunker samples.
- Ensure sufficient ullage in final tank for hose draining/line blowing.
- Notify supplier when final tank is reached.
- Give suppliers timely warning to reduce pumping rate.
- Give suppliers timely warning to stop pumping.
- Drain hoses into tanks on completion of bunkering and close all filling valves.
- Ensure hose is fully drained.
- Close and blank off manifold connection.
- Blank off disconnected hose couplings.
- Reconfirm all bunker line and tank filling values are secure.
- Reconfirm all bunker soundings.
- Sight, agree and record barge meter soundings.
- Verify all bunker receipt details are correct.
- Complete entry into barge vessel and rig logs.

APPENDIX 2

Production Testing Fallout Guidelines

It is critical in any testing operation to avoid sea surface pollution by hydrocarbons during flaring and flowback operations.

The following guidelines will be observed by the support vessels and drilling rig:

Support Vessel or Oil Spill Contingency Vessel

- The vessel will position itself downwind from the flare, at a safe distance from the rig. The distance from the rig will be to the discretion of the Master of the vessel.
- A visual on flare dropout will be carried out from the bridge of the vessel, using binoculars.
- A dedicated watcher will be stationed on the vessel whenever burning is carried out.
- If a small sheen occurs, the vessel will be used to break the sheen up.

Drilling Rig

- A dedicated watcher will be stationed on the rig whenever burning is carried out.
- A visual on flare dropout will be carried out from the rig using binoculars.
- There will be radio communication between the watcher on the rig, the well test controller and the vessel – any sheens or fallout sighted by the rig will be radioed to the vessel.

Classification for Flaring

The visual classifications of liquid hydrocarbons flaring and degree of fallout is as follows:

Class	Description
1	Flame producing no smoke, or smoke which dissipates rapidly, no visible liquid hydrocarbon fallout, no surface slick in calm sea/wind conditions.
2	Grey or black smoke which dissipates quickly, no visible hydrocarbon fallout, slight surface "reflection" slick in calm sea/wind conditions, which disappears in slight sea/wind conditions.
3	Grey or black smoke with resists rapid wind dissipation, no visible hydrocarbon fallout, light widespread surface slick due to micron-sized droplets coalescing from the smoke, which disappears in slight sea/wind conditions.
4	Heavy smoke (usually black) which results wind dispersal, small area of brown-stained water beneath the flame but limited to that area, wide droplet-formed surface slick, which dissipates in moderate sea conditions.
5	Heavy persistent black smoke (may carry hydrocarbon odour some distance), brown oil stain on water, which dispenses within 100 m from the flare boom, slick dissipates slowly in moderate sea conditions.
6	Brown or black oil stained slick persists at over 100 m from the flare boom, visible liquid hydrocarbon fallout from the boom, slick requires dispersant and or work boat passage to dissipate.
7	Uncontrolled liquid hydrocarbon flow to the sea resulting in slick conditions more severe than those described, or an appreciable pool of hydrocarbons ignited on the sea surface.
8	Brief interval of entry of non-combustible hydrocarbon liquids to the sea, eg. Due to dilution of flammable materials with rat hole mud, water slug or high level of non-combustible gases, such condition reacted upon immediately and flow either stopped or diverted to a pressurised tank.

Class 1 is the objective level and Class 3 is the minimum acceptable level. Any classification above 3 requires action to be taken to reduce pollution to an acceptable level.

Other action will be carried out as directed by the Apache Drilling Supervisor to ascertain the extent of pollution and report to governing authorities if required. Action to avoid and reduce pollution is the responsibility of the Apache Drilling Supervisor.

APPENDIX 3

ENVIRONMENTAL MANAGEMENT POLICY

Whilst our core business is the development of petroleum resources to meet Australia's energy needs, we share the community's concern for the proper care and custody of our environment for present and future generations. At Apache protecting the environment and valuing cultural heritage are an integral part of the way we do business.

Our objective is to implement best environmental practices wherever possible and practical to do so. We are committed to demonstrating leadership in environmental management and ensuring that our actions are performed in a manner which has minimal impact on the land, sea and air.

We will comply with all applicable environmental legislation and regulations relevant to our business and implement the Australian Petroleum Production and Exploration Association's Code of Environmental Management Practice.

Wherever we operate we will:

- Maintain open community and government consultation regarding our activities and our environmental performance
- Educate, train and encourage our workforce to conduct activities in an environmentally responsible manner
- Identify, assess and manage risks to the environment and the surrounding community in order to prevent pollution and minimise impacts
- Develop and implement systems to manage all activities which have the potential to affect the surrounding natural environment
- Measure our environmental performance and set targets for continual improvement
- Conduct monitoring of the surrounding natural environment thereby contributing to knowledge of natural systems and enabling any impacts to be detected

This policy has been reviewed and endorsed by Apache Energy management who foresee benefits in, and take responsibility for, its successful implementation. By accepting employment with Apache, each employee and contractor acknowledges that he/she is responsible for the application of this policy.

Eve Howell
August 2004

APPENDIX 4

Environmental Guidelines and Drilling Rig Environmental Commitments

(Fur Seal-1 Environment Plan: Doc EA-70-RI-003)

Activity	Requirement
Disposal of drilling fluid and drilling cuttings	• WBM coated cuttings will be disposed directly to the seabed. • Solids control equipment to be optimised to ensure maximum separation of fluid from cuttings. • Follow Apache refuelling procedures and SBM transfer procedure when used (AE-91-IQ-098). • Record volume of drilling cuttings and fluid disposed into the ocean on environmental spreadsheet. Results to be reported to the Environmental Manager at the end of the well.
Pipe Dope	• Use pipe dope that has lowest concentration of heavy metals and hydrocarbons but still meets safety and performance criteria. • Record volume of pipe dope used on location on environmental spreadsheet. Results to be reported to the Environmental Manager at the end of the well.
Deck drainage, chemical storage and management	• Maintain good housekeeping practices • Chemicals are to be stored in bunded areas away from open drains and chemical containers are to be intact • Drip trays are to be used under all machinery and fuel points and valves. • In the event of a spill, all actions are to be taken to control the spill and divert deck drainage to on board containment tanks for treatment through oil in water separator. • Ensure absorbent material is on board to use in soaking up chemical or oil spills. • Maintain oil water separators regularly to ensure 15 ppm oil concentration alarm is functional **• All releases of oil in water of > 50mg/l (instantaneous) or > 30 m/l (over a 24 hour period) are to be reported to Apache Perth office** **• All spills >80L must be reported to DPI within 2 hours either directly by contacting the DPI (primary contact number 03 9658 4414 or the DPI Environment Section mobile phone 0418 528 420. Apache's spill response plan also details the relevant personnel that may be required to be notified of a spill incident** • Report all spills <80L through Apache incident reporting system
Liquid Discharges	• Excess water from the water maker to be discharged to sea • Treated sewage, grey water and main deck drainage under routing operating conditions to be discharged at sea level. •Cooling water to be discharged at barge of hull of drilling rig level to allow for sufficient cooling and oxygenation
Incident Reporting	• Use of the Apache incident reporting system to report incidents within 2 hours (PSLA Subreg 26)
Waste Oil Management	• Waste oil and grease to be drummed and returned to mainland for recycling • Records of volume of waste oil taken off rig forwarded to the Environmental manager at the end of the well.
Spillage of diesel	•Follow Apache refuelling procedures (AE-91-IQ-098)

Activity	Requirement
fuel or oil	•Refuelling of diesel to be carried out during daylight hours only, weather permitting. •In event of a spill take all actions to control the spill. •No dispersant use without DoIR approval • **All spills >80L must be reported to DPI within 2 hours either directly by contacting the DPI (primary contact number 03 9658 4414 or the DPI Environment Section mobile phone 0418 528 420. Apache's spill response plan also details the relevant personnel that may be required to be notified of a spill incident** •Report all spills <80L through Apache incident reporting system •Implement Apache's Oil Spill Contingency Plan if required
Discharge of combustion products from engines	• Inspections and tuning of engines and equipment are included on a regular maintenance schedule. • Optimise combustion or well test fluids and gas
Solid waste management • Food scraps • Garbage • Litter • Scrap metal and wood etc	•**Food scraps to be macerated prior to disposal overboard** •No disposal of debris, garbage or litter into the sea (skips need covers to prevent wind blown rubbish – especially plastics and cups) •Segregate industrial waste (scrap metals / drums etc), wherever possible, for appropriate disposal onshore. •Reduce, reuse and recycle waste wherever practicable. •Record the volume and type of waste taken off rig and forward to the Environmental Manager at the end of the well. •ROV survey to check no rubbish left on seabed. Any debris will be removed.
Sewage discharge	•Sewage is to be treated to secondary level prior to discharge. •Sewage treatment plant is to be maintained to ensure effective treatment
Fishing	• No fishing is permitted from the drill rig whilst it is on location
Anchoring & Disturbance to the seabed	•No workboats are to anchor in areas where sensitive seabed features occur or subsea pipelines occur (none known or likely in immediate vicinity of Fur Seal-1)
Operational Environmental Awareness	• Personnel are familiar with the environmental requirements of the EP and all guidelines and procedures outlined are being followed. • All personnel have signed off the rig register book confirming their induction.
Large Animal Observations	•Fill in whale and turtle observation data sheets and forward to the Environmental Manager at the end of the well (Appendix in EP).

Perth Office Commitments

Activity	Requirement
Prior to drilling	• Make Fur Seal-1 EP available to personnel involved in drilling program.
Discharge of combustion products from engines	• Report greenhouse gas emissions data to Federal Government annually.
Environmental Audit	• Audit drilling rigs every six months whilst under contract to Apache • Review electronic waste and chemical log received from rig.

APPENDIX 5

Drilling Rig Environmental Audit

Drilling Rig Environmental Audit Proforma

DATE:
NAME OF WELL:
NAME OF RIG:
APACHE REPRESENTATIVE:
APACHE AUDITOR:

OBJECTIVES OF THE AUDIT:

1. To ensure compliance with regulations, standards and policies.
2. To review operating practices.
3. To identify areas of actual or potential contamination.
4. To review oil spill contingency procedures.

OVERVIEW OF AUDIT:

1. Identification of hazardous materials, their quantities and storage areas.
2. Identification of waste disposal practices and disposal sites.
3. Observation of general housekeeping.
4. Identification of spill control equipment and containment devices.
5. Identification of training and education given to the workforce.

OUTCOME OF AUDIT: Action sheet for remedial work required.

Audit Table

Are the following readily available?

Aspect	Notes		
1. MANAGEMENT INFORMATION			
Are the following readily available?:	Yes	No	Stored where?
Environmental Policy			
Environment Plan			
Apache Environmental Guidelines			
Oil Spill Contingency Plan			
Incident reporting procedure			
Schedule to Petroleum (Submerged Lands) Act			
2. CHEMICAL STORAGE			
Are liquid and solid chemicals stored on pallets?			
Are liquid chemicals stored away from open grated areas on rig?			
Where are the bulk dry and liquid chemicals stored?			
3. LIQUID WASTES			
3.1 Above decks drain system			
Is there runoff into the ocean?			
Source of runoff.			
Composition of runoff.			
Fate of runoff.			
Remedial action required.			
3.2 Below decks drain system			
Is there runoff into the ocean?			
Source of runoff.			
Composition of runoff.			
Fate of runoff.			
Remedial action required.			

3.3 Waste oil	
Source(s) of oil	
Storage site(s)	
Estimated quantity	
Disposal methods used	
Disposal location	
Is oily water treated before discharge into the ocean?	
What is the oil in water average per day?	
Is there an automatic shut-down facility on the separator (if in use) ?	

3.3 Drill cuttings	
Composition	
Volume disposed	
Disposal method	
Disposal location	

3.4 Drilling fluid	
Composition (list chemical components)	
Volume discharged	
Method of disposal	
Disposal location	

3.5 Liquid chemical wastes

Type	Source	Storage site	Disposal method	Disposal site
Lubricating oil				
Drill cuttings				

3.6 Domestic wastes

Source	Disposal Method
Toilets	
Kitchens	
Laundry	

4. SOLIDS WASTES				
Type	Quantity	Storage site	Disposal method	Disposal site
Plastics				
Industrial Burnable				
Drums				
Litter				
Pipe doping (give trade name)				
Scrap metal				
How is waste being segregated prior to disposal?				

5. REFUELLING PROCEDURES	
Type of fuel.	
Procedure for transfer of fuel - (define as actions for preventing incident from occurring).	
Storage location.	
Spill clean-up procedure.	

6. GENERAL HOUSEKEEPING	
Pipe cleaning facilities.	
Litter bins available?	
Degree of litter on floor.	
Are there drip trays under engines, machinery and valves?	
Are oil or chemical spills cleaned up immediately?	
Degree of spillage of oil or chemicals on the floor of rig.	
What oil/chemical spill facilities available on the rig?	

7. TRAINING, INDUCTIONS AND GUIDELINES	
Has the workforce received an environmental induction?	
What degree of oil spill training have relevant personal received?	
Any other training given?	
What guidelines given to the drilling rig?	

8. REMEDIAL ACTION REQUIRED		
Actions that will require remedial work	Nominated person dedicated to the task	Time frame for completion