

Introduction

Woodside Energy Ltd proposes to undertake a 3 dimensional (3D) marine seismic survey, the Aragorn 3D Marine Seismic Survey (MSS), over an area of approximately 1,200 km² within the Commonwealth Petroleum Permit Areas T/30P and T/34P. The survey will be conducted by the Petroleum Geo Services (PGS) seismic survey vessel MV *Ramform Victory*. Arrays of acoustic energy sources will be used to produce acoustic pulses that will be recorded by a hydrophone array and processed to provide an image of the subsurface.

An Environment Plan has been prepared for the Aragorn 3D MSS in accordance with the Commonwealth regulatory requirements of the [*Petroleum \(Submerged Lands\) \(Management of Environment\) Regulations 1999*](#). All activities will comply with legislative requirements established under the Australian Commonwealth Government regulatory framework

Woodside is committed to protecting the environment and consequently has a written corporate Environment Policy (see overleaf) that provides a public statement of the corporate commitment to protecting the environment during offshore exploration operations such as seismic surveys.

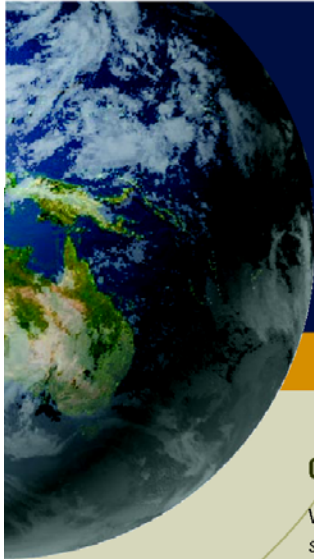
Location

The survey area lies in Commonwealth waters approximately 80km west of Tasmania's King Island as shown by **Figure 1**. At its closest point the proposed survey area is approximately 80km from the nearest coastline, King Island.

Survey Locality Bounding Coordinates (GDA 1994 MGA Zone 54)

Latitude	Longitude
39° 07' 30.00" S	142°36' 00.00" E
39° 07' 30.00" S	142°48' 00.00" E
39° 12' 00.00" S	143°06' 00.00" E
39° 25' 00.00" S	143°15' 00.00" E
39° 38' 00.00" S	143°15' 00.00" E
39° 50' 00.00" S	143°05' 00.00" E
39° 50' 00.00" S	142°46' 00.00" E
39° 27' 00.00" S	142°30' 00.00" E

There are no World Heritage, Ramsar or Marine Protected Areas within survey area. The area to be used for vessel turns (to the south of the data acquisition area for the survey) overlaps a small portion of the Zeehan candidate Marine Protected Area (see Figure 1). A major shipping lane passes to the north of the proposed survey area, although there is little shipping activity within the survey area.



The Woodside Group of Companies Environmental Policy

General Policy Objectives

Woodside is an oil and gas exploration and production company. Our vision is to provide for society's energy needs in ways that make us proud. While recognising that the world's hydrocarbon reserves are finite, we share the desire of the community to develop these resources in ways that meet the needs of the present, without compromising the environment for future generations.

At all stages of our business, we plan and perform activities so that adverse effects on the environment are avoided or kept as low as reasonably practicable.

Strategies

To implement this Policy we will:

- Delay or stop activities where effective environmental controls are not in place.
- Comply with all applicable laws and regulations while aspiring to higher standards.
- Apply responsible standards where laws and regulations do not exist.
- Apply and demonstrate a systematic approach to environmental management to ensure compliance and achieve continuous performance improvement.
- Set and regularly review environmental objectives and targets.
- Strive to prevent pollution, and seek improvement with respect to emissions, discharges, wastes, energy use, resource consumption and ecological footprint.
- Monitor the effects of our activities on the environment and take action to address effects where necessary.
- Openly communicate our environmental performance with our workforce, Government and the wider community.
- Foster a culture that empowers and rewards everyone to act in accordance with this Policy.

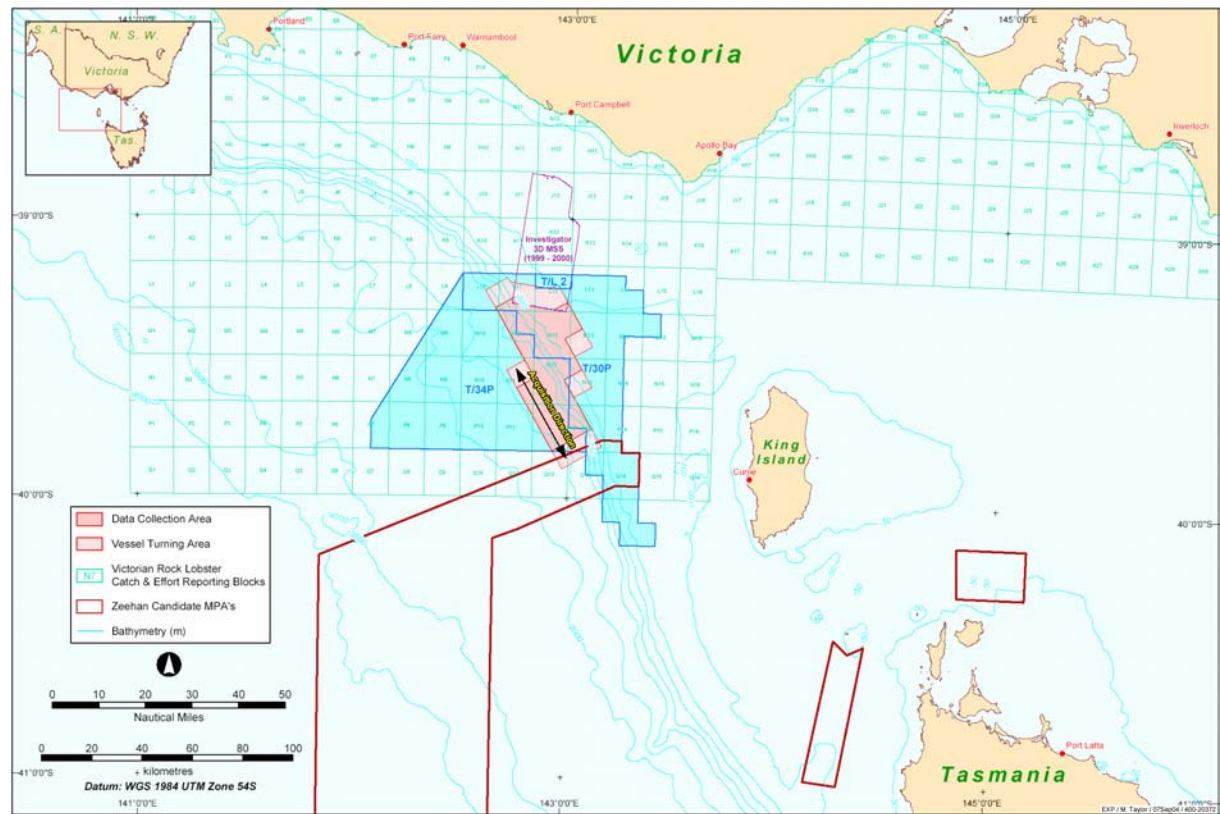
Application

The Managing Director of Woodside Energy Ltd. is accountable to the Board of Directors for ensuring this Policy is implemented. This Policy will be reviewed every three years.

This Policy applies to all personnel, contractors and joint venturers engaged in activities under Woodside's operational control. Responsible Woodside managers will use their influence to promote this Policy in non-operated ventures.

Don Voelte
Managing Director & CEO
April 2004

Figure 1: Location Diagram



Survey Details

Acquisition of seismic data is expected to occur over about 40 days. However, it is expected that the vessel will be within the survey area for a total of approximately 60 days, allowing for some downtime due to inclement weather. The survey is scheduled to occur between early January 2006 and 30 May 2006.

The *Ramform Victory* will tow ten hydrophone streamers each of which will be 4,500 m in length. These will be towed at a depth of approximately 9 m beneath the sea surface. The vessel will traverse a series of pre-determined survey lines within the nominated area at a speed of approximately 9 km/hr. The survey lines have been defined to provide uniform data coverage over the survey area. Seismic array details are summarised in the following table (**Table 1**):

Table 1: Seismic Array Details

Parameter	Value
No of streamers	10
Streamer length	4,500 m
Streamer depth	9 m
Number of source arrays	2
Source array total volume	0.051 m ³ (3,090 cui)
Operating pressure	13,789 kPa (2,000 psi)
Source array depth	7 m
Shotpoint interval	18.75m (~7.5 seconds)
Peak source sound pulse	220-240 dB re 1µPa-m
Frequency range	10 to 110 Hz

Description of Surrounding Environment

The survey area is situated where the Southern Ocean meets the Australian continental shelf and frequently experiences periods of rough weather. Severe storms occur all year round though more often during the winter months. Westerly winds are dominant for most of the year, the windiest months being June to October.

The survey area is located near the outer edge of the Australian Continental Shelf slope, Tasmania, in water depths of 100 to 2,000 m. This area lies within the Otway Province 1 region of the Interim Marine and Coastal Regionalisation for Australia (IMCRA, 1998). The seabed sediment in the survey area is likely to consist of calcarenite, limestone, sandstone, marl and granite, with areas of sand of varying grain size. Benthic substrate can be expected to consist of sand, silt, gravel, calcareous gravel and calcareous ooze (Environment Australia, 2003). Deep rocky reefs that may occur in the area (but more likely to occur in much shallower waters east of the survey area) are likely to be inhabited by invertebrates such as sponges, bryozoans, corals, sea whips and ascidians. There are no marine reserves or marine national parks in the survey area.

There have been no detailed studies of the infaunal communities within this area. Considering the depth, seabed contours and oceanography it is expected that the infaunal community will be patchy and variable depending on sediment characteristics and the occurrence of hard substrate. In areas of soft substrate it is expected that the invertebrate assemblage will consist of molluscs, crustaceans and polychaete worms and, in areas of hard substrate, sponges, seapens, bryozoans and molluscs.

At least 27 species of cetaceans (whales and dolphins) and one species of fur seal are known to occur in the survey area from time to time. Most of the cetaceans are wide ranging oceanic species and are expected to pass through the survey area either seasonally, due to migration, or occasionally and irregularly due to feeding movements. All species have vastly greater migratory, breeding and foraging geographic ranges than the survey area. In the context of the proposed seismic survey the marine mammals that may occur in the survey area, including occurrences at times of the year outside of the proposed survey period (as determined by a search of the *EPBC Act* Protected Matters Interactive Search Tool) are listed in **Table 2**.

Table 2: Marine Mammals Potentially Present in the Survey Region

Species	Common Name	Conservation Status*	Occurrence in Region	Likely Occurrence in Survey Area
Baleen Whales				
<i>Balaenoptera acutorostrata</i>	Minke Whale	NCA (a)	Occasional	Possible
<i>Balaenoptera bonaerensis</i>	Antarctic Minke Whale	NCA (a)	Rare	Unlikely
<i>Balaenoptera borealis</i>	Sei Whale	V	Occasional	Possible
<i>Balaenoptera edeni</i>	Bryde's Whale	NCA (a)	Rare	Unlikely
<i>Balaenoptera musculus</i>	Blue Whale	EN	Rare	Unlikely
<i>Balaenoptera musculus beviscauda</i>	Pygmy Blue Whale	NCA (a)	Occasional	Likely
<i>Balaenoptera physalus</i>	Fin Whale	V	Rare	Possible
<i>Caperea marginata</i>	Pygmy Right Whale	NCA (b)	Rare	Unlikely
<i>Eubalaena australis</i>	Southern Right Whale	V	Occasional	Possible
<i>Megaptera novaeangliae</i>	Humpback Whale	V	Occasional	Possible

Species	Common Name	Conservation Status*	Occurrence in Region	Likely Occurrence in Survey Area
Toothed Whales				
<i>Berardius arnuxii</i>	Arnoux's Beaked Whale	NCA (a)	Rare	Unlikely
<i>Feresa attenuata</i>	Pygmy Killer Whale	NCA (a)	Rare	Unlikely
<i>Globicephala macrorhynchus</i>	Short-finned Pilot Whale	NCA (b)	Rare	Unlikely
<i>Kogia breviceps</i>	Pygmy Sperm Whale	NCA (a)	Occasional	Unlikely
<i>Kogia simus</i>	Dwarf Sperm Whale	NCA (a)	Rare	Unlikely
<i>Mesoplodon densirostris</i>	Blainville's Beaked Whale	NCA (a)	Rare	Unlikely
<i>Orcinus orca</i>	Killer Whale	NCA (c)	Occasional	Unlikely
<i>Physeter macrocephalus</i>	Sperm Whale	K	Occasional	Possible
<i>Pseudorca crassidens</i>	False Killer Whale	NCA (a)	Rare	Possible
<i>Ziphius cavirostris</i>	Cuvier's Beaked Whale	NCA (b)	Rare	Unlikely
<i>Globicephala melas</i>	Long-finned Pilot Whale	NCA (b)	Rare	Unlikely
<i>Mesoplodon bowdoini</i>	Andrew's Beaked Whale	NCA (a)	Rare	Unlikely
<i>Mesoplodon grayi</i>	Gray's Beaked Whale	NCA (b)	Rare	Unlikely
<i>Mesoplodon hectori</i>	Hector's Beaked Whale	NCA (a)	Rare	Unlikely
<i>Mesoplodon layardii</i>	Strap-toothed Beaked Whale	NCA (b)	Rare	Unlikely
<i>Mesoplodon mirus</i>	True's Beaked Whale	NCA (a)	Rare	Unlikely
Dolphins				
<i>Delphinus delphis</i>	Common Dolphin	NCA (b)	Occasional	Possible
<i>Grampus griseus</i>	Risso's Dolphin	NCA (a)	Rare	Unlikely
<i>Lagenodelphis peronii</i>	Southern Right Whale Dolphin	NCA (b)	Rare	Unlikely
<i>Lagenorhynchus obscurus</i>	Dusky Dolphin	NCA (a)	Rare	Unlikely
<i>Tursiops truncatus</i>	Bottlenose Dolphin	NCA (a)	Rare	Unlikely
Seals				
<i>Arctocephalus pusillus</i>	Fur Seal	Lower Risk/Least Concern	Occasional	Likely

* Conservation status as outlined in Bannister *et al.* (1996): EN – Endangered; V – Vulnerable; K – Insufficiently Known; NCA – No Category Assigned (a) because of insufficient information; (b) but possibly secure; (c) but probably secure.

The survey area overlaps a number of commercial fishing grounds, these being:

- Ocean Fishery (Victoria)
- Inshore Scale Fishery
- Gillnet Fishery
- Dropline and Bottom Longline Fishery
- Rock Lobster Fishery
- Giant Crab Fishery
- South East Trawl Fishery

Of the fish species expected to occur in the survey area, one species, the grey nurse shark (*Carcharias taurus*) is listed under the *EPBC Act* as Critically Endangered and one species, the great white shark (*Carcharodon carcharias*) is listed as Vulnerable. Another 26 fish species

(all of which are members for the Syngnathid family, the seahorses and pipefish) listed for conservation concern under the *EPBC Act*, may occur in the survey area.

Environmental Risks and Effects

The components of the seismic survey that may result in environmental effects have been determined through an evaluation of the proposed activity, the surrounding environment and the legislative requirements. The activities with potential to cause environmental effect include:

- Disturbance to marine fauna
- Interference with other users
- Routine waste discharges from the survey vessel
- Accidental fuel and oil spills from the survey vessel
- Accidental loss of streamers and associated equipment.

Disturbance to marine fauna

The response of marine fauna to marine seismic survey sounds will range from no effect to various behavioural changes. Immediate pathological effects are likely to be restricted to very short ranges and high sound intensities and are unlikely to occur for the majority of species, as most free-swimming animals will practice avoidance manoeuvres well before they get within the ranges at which pathological effects may occur.

Fish may possibly be exposed to noise levels sufficient to cause startle response or pathological damage if air-gun arrays start suddenly. In circumstances where arrays are already operating (as a vessel moves along an acquisition line), individuals would be expected to implement avoidance measures before entering ranges at which pathological damage might take place. There are no narrow or restricted areas within the proposed survey areas that could 'trap' fish.

Cetaceans employ an extremely acute acoustic sense to monitor their environment and are correspondingly sensitive to sounds below and, to a lesser extent, above the water surface (Richardson *et al.*, 1995). Noise associated with acoustic energy sources used during seismic surveys can cause significant behavioural changes in whales (McCauley 1994). Behavioural responses to acoustic energy source noise include swimming away from the source, rapid swimming on the surface and breaching (McCauley *et al.*, 1998, 2000). The level of noise at which response is elicited varies between species and even between individuals within a species (Richardson *et al.*, 1995). Stone (2003) suggests that different groups of cetaceans adopt different strategies for responding to acoustic disturbance from seismic surveys with baleen and killer whales displaying localised avoidance, pilot whales showing few effects and sperm whales showing no observed effects.

The main control measures to minimise the survey's potential impacts on cetaceans are temporal and spatial avoidance and the implementation of specific whale encounter procedures.

The survey has been timed to avoid peak periods of southern right, humpback and blue whale migrations. The survey area is located several hundred kilometres to the east of the recognised blue aggregation area along the Bonney upwelling.

In addition to the control measures identified above, Department of Environment and Heritage's '[*Guidelines on the Application of the EPBC Act to Interactions Between Offshore Seismic Operations and Larger Cetaceans, 2001*](#)' procedures shall be applied. These procedures have the following key elements:

- ***Visual observations:*** A visual check for the presence of whales must be made before the commencement of each acquisition line
- ***Delay procedures:*** Acoustic energy source discharge must not begin unless whales are a minimum distance of 3km from the survey vessel

- **Soft start procedures:** A sequential build-up of warning pulses (over a period of 20 minutes) must be made at the start of each acquisition line ('soft start') to warn and deter whales from approaching the survey vessel. 'Soft starts' over a 20 minute period at the start of each new line will also serve to warn and scatter any other free-swimming fauna (ie dolphins, pelagic and demersal fish) in the area, thereby minimising the likelihood of animals being within pathological effects range
- **Whale watch:** A continuous watch for whales must be maintained during 'soft start' sequences and during operations to determine the presence or absence of whales within 3km of the vessel
- **Stop work procedures:** Acoustic energy source array discharge must cease if whales approach within 3km, and are moving towards, the vessel. Operations must not recommence until the animals have moved outside a range of 3km or have not been seen for twenty minutes.

Disturbance to other users

Only limited commercial fishing activity, predominantly for giant crab, takes place in the survey area. It is not expected that the survey will cause any significant disruption to commercial fisheries. Shipping in the area is not significant and it is not expected that the survey will cause any disruption to shipping activity in the region.

Waste disposal

Routine discharges from the seismic survey vessel will be restricted to treated sewage and putrescible wastes (food scraps). The discharge of sewage and putrescible wastes overboard may cause a slight increase in the nutrient content in the water column although the total nutrient loading from the survey vessel is insignificant in comparison to the natural daily nutrient flux that would occur in the region.

Sewage and foodscraps disposal will conform to the requirements of MARPOL 73/78 Annex IV and be macerated to a diameter of less than 25 mm, prior to disposal. No sewage or putrescible wastes (ground or unground) is to be discharged within 12 nautical miles of any land unless vessel has a certified approved sewage treatment plant in place under Regulation 8 (1) (b) of MARPOL 73/78 Annex IV. No significant environmental impacts are expected because of the biodegradability of the waste, short period of seismic activities and large dilution factor. Total nutrient (nitrogen and phosphorus) input levels will be insignificant compared with natural nutrient flux in the area.

The survey vessel produces a variety of other solid and liquid wastes including packaging and domestic wastes (such as aluminium cans, bottles, paper and cardboard) and hazardous materials such as acids, solvents and toxic wastes. A variety of chemicals, such as lubricating oils and cleaning chemicals, are also stored and used on the survey vessel. All of these materials could potentially impact the marine environment if discharged in significant quantities; however, routine procedure will be for all wastes (other than sewage and putrescible food scraps) to be returned for recycling/disposal onshore. The survey vessel will have a 'Garbage Management Plan' in place. This plan will be consistent with the requirements of MARPOL 73/78 (Annexe V) and include a list of ship's equipment and will detail arrangements for the handling of garbage.

Fuel and oil spills

The potential for spillage of oil or fuel is similar to the risk associated with normal maritime activities in the area, such as fishing fleet and general transport activities. Due to the short duration of the project it is not expected that refuelling will be necessary. In the event that offshore refuelling is necessary the refuelling operation will be carried out in accordance with AMSA regulations.

The survey vessel will have specific fuel spill contingency procedures and a *Shipboard Oil Pollution Emergency Plan (SOPEP)*. Minor spillages will be managed through housekeeping cleanliness and the use of sorbent materials to clean up any spilled fuel or oils.

Loss of streamer and associated equipment

In the event of damage to or loss of a streamer, potential environmental effects will be limited to:

- Effects on water quality resulting from the release of streamer fluid (ISOPAR M: a mixture of light, hydrotreated petroleum distillates, predominantly C12-C15 isoparaffinic hydrocarbons, very similar to kerosene) to the marine environment.
- Physical impacts on benthic communities arising from the cable and associated equipment sinking to the seafloor. Streamers have automatic flotation devices that activate at a depth of approximately 50 m; therefore, it is unlikely that any physical impacts would occur.
- Potential chemical/biological impacts on demersal and pelagic communities arising from slow leakage of ISOPAR M, as individual sections of the cable are punctured.

Because of the nature of the streamer fluid, expected weather and sea-state conditions, and the relatively small volumes likely to be released (typical release volume on the event of a rupture is in the order of 20 litres), spillages of ISOPARm are likely to disperse and weather rapidly. As a result of this, there will be minimal opportunity for any adverse effects on water quality or biota in the area.

Implementation

All staff and contractors taking part in the survey will be advised of their responsibilities prior to commencement of survey activities. This will occur through meetings with key contractor personnel and an induction and awareness presentation that will be given to all crew (including support vessels).

An environmental management review will be carried out aboard the survey vessel during the survey. This review will include a vessel inspection and an assessment of the environmental components of the contractor's HSE Management System. This review will particularly focus on aspects of applied environmental management aboard the vessel, including waste management, effluent and emission control, transport and materials supply, project management, contingency planning and preparedness and operations effects and control.

Consultation

Woodside has initiated a significant, ongoing stakeholder consultation program as part of its planning for the Aragorn 3D MSS. This initially commenced in 2003 and, due to delay of the survey, has continued into 2006. Groups and individuals contacted to date include:

- Commonwealth and state government departments
- State parliamentarians whose electorates include fishing ports in western Victoria
- Peak fishing industry bodies in Victoria and Tasmania
- Fishing industry associations in Victoria and Tasmania
- Professional fishermen's bodies in King Island, Portland, Apollo Bay and Warrnambool
- Individual giant crab, rock lobster and trawl fishermen
- Fisheries officers in Victorian ports
- King Island fishers and community organisations
- Environment and community groups who have previously expressed interest in Woodside's activities in the Otway Basin

Woodside Contact

Further information can be obtained from:

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