

CGGVERITAS 2D MARINE SEISMIC SURVEY EXPLORATION PERMIT AREA W09-I, BROWSE BASIN, WESTERN AUSTRALIA

ENVIRONMENT PLAN: PUBLIC SUMMARY

This document is a summary of the Environment Plan (EP) in support of the Veritas DGC Australia Pty Ltd (CGGVeritas) two dimensional (2D) marine seismic survey in Permit Area W09-I, Browse Basin, Western Australia. The Public Summary is submitted to the Department of Mines and Petroleum (DMP), as required by Regulations 11(7) and 11(8) of the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999 as amended 2005 (P(SL) (MoE) Amended Regulations).

Introduction

CGGVeritas proposes to undertake a two dimensional (2D) marine seismic survey within Western Australia in Permit Area W09-I. The survey area is located in the offshore marine waters of the Browse Basin in northern Western Australia.

Permit Area W09-I is approximately 323 km northwest of Broome and 213 km northwest of the Lacepede Islands. The nearest emergent landmass is Sandy Islet at Scott Reef located 140 km northeast of the Permit Area. Water depths within Permit Area W09-I range from 800 m to 2000 m.

The survey is scheduled to commence in November 2009 and will take no longer than four weeks to complete. The survey will be conducted using the *M/V Veritas Voyager*, a specialist seismic survey vessel, towing an array of airguns and streamers.

Coordinates of the Proposed Activity

The survey area is bounded by the coordinates listed in Table I.

Table I: Coordinates of Permit Area W09-I

Location Point	Longitude (East)			Latitude (South)		
	degrees	minutes	seconds	degrees	minutes	seconds
A	120	0	4.599	14	49	55.048
B	120	45	4.559	14	49	55.031
C	120	45	4.587	15	24	55.040
D	120	25	4.578	15	24	55.047
E	120	25	4.578	15	14	55.046
F	120	0	4.587	15	14	55.056

Description of the Receiving Environment

Physical Environment

Data and information from the region is limited. However, it is expected that the substrate across the survey area is typical of that found on the North West Shelf (NWS) specifically comprising loose, silty carbonate sands in the flat or gently sloping areas, with exposed hard substrate where seabed bathymetry is more locally variable or steeper (AIMS 1998).

The region is characterised by two seasons: a wet 'summer' between September and April, and dry 'winter' between May and August. The climate in winter is dominated by intense anti-cyclonic belts generating strong winds, predominantly from the east to southeast, and infrequent rain. Summer winds are more variable, with south westerly winds being the most common. Transitional conditions, with variable and/or reduced winds, may occur over short periods between seasons, generally in September and April–May.

Tropical cyclones typically occur in the region three to four times per year, bringing strong winds, heavy rain and high seas. These cyclones are unpredictable in occurrence, intensity and behaviour, but are most common between December and March.

Water circulation in the region is dominated by the generally southward flowing Leeuwin Current. The Leeuwin Current is strongest in winter, flowing steadily to the south-west at speeds of up to 0.3 m/s (Holloway and Nye, 1985).

Biological Environment

Benthic Assemblages

There is limited information concerning the benthic communities of the survey area due to depth and remoteness. However, the biological productivity of the benthic environment is expected to be limited due to high light attenuation and limited exposed hard substrates. The water depths generally preclude photosynthetic benthic habitats that might form significant fauna habitats such as coral reefs, seagrasses or algal communities.

The seafloor is likely to comprise mainly soft sediments with sparse communities of the larger benthic species (sea urchins, sea stars and crustaceans). Infaunal communities are likely to comprise smaller burrowing invertebrates (Woodside, 2007), including polychaetes, crustaceans, and molluscs. Any areas of exposed hard substrate are likely to support more diverse assemblages, including deepwater epibenthic filter feeding organisms such as hydroids, bryozoans, soft corals and sponges.

Macrofauna

Some marine migratory species with broad distributions such as cetaceans, fish, sharks, marine turtles and seabirds may traverse the proposed survey area, at least on occasion. The EPBC Protected Matters Database (DEWHA, 2009) lists eight threatened and 14 migratory species that could occur in the area comprising:

- Whale sharks,
- Five marine turtle species comprising green, leatherback, flatback, loggerhead and hawksbill turtles,
- Seven cetacean species including humpback and blue whales,
- One bird species- the streaked shearwater.

The deep offshore environment of the survey area is typical of the NWS and does not contain recognised critical habitat for any threatened or migratory species.

Further details on the main fauna groups that could occur in the survey area are provided below.

Sharks

Whale sharks are listed as vulnerable and migratory under the EPBC Act and may be found in the vicinity of the survey area. Whale sharks are broadly distributed in tropical and temperate seas, primarily between latitudes of 30°N and 35°S. Whale sharks aggregate seasonally between March and June to feed in the coastal waters of Ningaloo Reef, approximately 1,100 km southwest of the survey area (Wilson et al., 2005). After the aggregation period the whale sharks disperse broadly but mainly in a northward direction. The likelihood of encountering significant numbers during the survey period is low.

Finfish

A number of demersal and pelagic finfish including mackerel, cod, tuna and billfish are expected to occur in the survey area. Although not listed under the EPBC Act, these are still ecologically important species. The deep offshore environment of the survey area is typical of the region, being devoid of complex bathymetry or emergent land features and is not expected to represent habitat of particular significance to finfish.

Turtles

Green and hawksbill turtles are known to nest at Sandy Islet near Scott Reef (140 km north east from the survey area), whilst flatback and green turtles are known to nest at the Lacepede Islands (213 km to the northwest). Nesting activity off northern Western Australia generally occurs year-round in low numbers, peaking between February and July (Waayers, 2003; Pendoley, 2005).

Marine turtles, particularly green turtles, undertake extensive migrations after nesting and may pass through the survey area. Given that the nearest emergent land is 140 km away and the timing of the survey is outside of the peak nesting period, it is expected that only very small numbers of marine turtles are likely to transit the area during the survey.

Cetaceans

Several species of whale and dolphin are known to occur in the survey area, including the pygmy blue whale (*Balaenoptera musculus brevicauda*), which is listed as endangered, and the humpback whale (*Megaptera novaeangliae*), which is listed as vulnerable under the EPBC Act.

The humpback whale is the most common whale species in the region during the Australian winter. Humpbacks migrate annually between summer feeding grounds in the waters of Antarctica to winter breeding and calving grounds in the sub-tropical and tropical inshore waters of northern Western Australia (Jenner, 2001). The survey period, scheduled between November and January, will not overlap with the humpback migration period.

Blue whale migration patterns are similar to those of humpback whales, with the species feeding in mid-high latitudes (in Antarctic waters) during the summer months, and spending the winter in temperate-tropical waters for mating and breeding (Bannister, 1996). However, blue whales tend to be more widely dispersed and rarely present in large numbers outside aggregation areas. The survey area does not overlap any recognised blue whale migratory routes or known feeding, breeding or resting areas; hence the likelihood of encountering significant numbers of blue whales during the survey period is low.

Five additional cetacean species listed as migratory species under the EPBC Act may occur in the survey area: the Antarctic minke whale (*Balaenoptera bonaerensis*), Bryde's whale (*Balaenoptera edeni*), killer whale (*Orcinus orca*), the sperm whale (*Physeter macrocephalus*) and the spotted bottlenose dolphin (*Tursiops aduncus*). The survey area is considered unlikely to represent an important habitat for any of these species due to its lack of bathymetric features.

Seabirds

The streaked shearwater is a very large shearwater accustomed to long distance oceanic flight and tends to occupy pelagic seas and shelf waters but is not common in coastal habitats. This species is known for following fishing vessels as solitary individuals or in small groups or mixed with other species (Morcombe, 2000).

Streaked shearwaters breed on islands offshore from Japan and Korea and are a common summer and autumn visitor to the northwest and east coasts of Australia (Morcombe, 2000). Whilst solitary individuals or small groups of this species may be sighted during the survey high numbers are not anticipated.

Socio-Economic Environment

There are no fixed petroleum infrastructure or major shipping routes located in the survey area. Given the remote location, tourism operations, including recreational fishing, are unlikely to be affected by the survey.

The survey area overlaps with fishing zones for the both Commonwealth and State managed fisheries:

- North-west Slope Trawl Fishery (Commonwealth),
- Western Skipjack Fishery (Commonwealth),
- Southern Bluefin Tuna Fishery (Commonwealth) – migratory route only,
- Western Tuna and Billfish Fishery (Commonwealth),
- Mackerel Managed Fishery (WA).

Consultations conducted with Commonwealth and State fishing authorities regarding the seismic survey have indicated that fishing activity is likely to be low due to the remote location and distance offshore.

The survey area is located within the North-west Slope Trawl Fishery, which is worth approximately \$5.2 million per annum to local fishers. Seven licences operate this fishery which targets scampi and deepwater prawns. It lies between the 200 m isobath and the edge of the Australian Fishing Zone, and is active throughout the year, but is mainly fished when the Northern Prawn Fishery is closed from the end of May to mid August.

There are no Marine Protected Areas (MPAs) listed under Commonwealth or State legislation within or adjacent to Permit Area W09-1. The closest Commonwealth EPBC Act listed MPA is the Mermaid Reef Marine National Nature Reserve which is located approximately 200 km southwest of Permit Area W09-1. The closest Western Australian listed MPA is the Scott Reef Nature Reserve which is approximately 120 km to the northeast of Permit Area W09-1. Due to distance, the Mermaid Reef Marine National Nature Reserve and the Scott Reef Nature Reserve are unlikely to be affected by the seismic survey.

Description of the Action

Two dimensional (2D) seismic data will be acquired by CGGVeritas to assess alternative methods of data acquisition. The seismic survey will involve a specialised survey vessel towing seismic equipment in a predetermined pattern within Permit Area W09-1.

The seismic survey will be conducted using the *M/V Veritas Voyager* operated by CGGVeritas. The seismic energy source for the seismic survey will be provided by Bolt 1500LL and 1900LL-XT airguns, in a single array of 3255 cubic inches and operating at 2000 psi. The airgun array will be towed from the *M/V Veritas Voyager* and discharged at intervals of approximately 9 seconds, resulting in a seismic pulse interval of approximately 25 m. Seismic reflections from subsurface layers will be detected by hydrophones inside a Sercel Sentinel digital solid streamer of 8100 m in length, towed behind the survey vessel.

A supply vessel will be used for logistical, safety and equipment management support during the seismic survey. Seismic operations will occur 24 hours per day, with the vessels operating out of

the Port of Broome. Due to the short duration of the seismic survey, refuelling offshore will not be required. The vessels will not anchor at sea unless required in an emergency.

Major Environmental Hazards and Controls

Risk analysis has been undertaken for all aspects of the survey, in accordance with the procedures outlined in the Australian and New Zealand Standard AS/NZS 4360:2004 (Risk Management) and HB 203:2006 (Environmental Risk Management – Principles and Process). The results of the risk analysis have been used to determine risk likelihood and severity and to evaluate the environmental risks and effects (Table 2).

The risk analysis indicates that the risk of significant adverse environmental impact from the proposed survey is low and likely effects are limited to:

- Temporary and localised increase in ambient underwater noise levels as a result of acoustic discharges,
- Temporary disruption to behaviour patterns of sensitive listed marine fauna,
- Temporary and localised changes in water quality from routine discharges of grey water, sewage and putrescible wastes during the survey,
- Collision or entanglement with a marine mammal or turtle,
- Temporary displacement of commercial fisheries operations.

These sources of potential impact to the marine environment are limited in duration, scale and intensity. The ecological, social and economical consequences are therefore expected to be insignificant at both local and regional perspectives.

Management Approach

Environmental management used to minimise impacts is listed in Table 2.

Table 2: Environmental Aspects, Potential Environmental Effects and Proposed Management Measures

Environmental Aspect	Potential Environmental Effect	Proposed Management Measures
Acoustic impulse from airguns	Potential physiological effects or disruption to behaviour patterns of marine fauna	Compliance with EPBC Act Policy Statement 2.1 (DEWHA 2008) for minimising disturbance to cetaceans, including: <ul style="list-style-type: none"> ▪ 30 minute visual observations during pre-start procedures and during survey ▪ Use of soft-start procedures ▪ Delay start up procedures/power down any operating acoustic source if whales are within 2 km of the airgun array and shutdown if they approach the airguns within 500 m.

Environmental Aspect	Potential Environmental Effect	Proposed Management Measures
Grey water/ sewage disposal	Potential localised reduction in water quality - nutrient enrichment	<ul style="list-style-type: none"> ▪ Treat in accordance with the OPGGS Act and the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) prior to discharge. ▪ Offshore discharge >12 nautical miles from land only. ▪ MARPOL 73/78 approved onboard sewage treatment plant. ▪ Biodegradable detergents only.
Discharge of oily water from bilges	Potential localised chronic/acute toxic effects	<ul style="list-style-type: none"> ▪ All bilge water passes through an oil/water separator prior to discharge. ▪ All bilge discharges treated to <15 ppm hydrocarbons; MARPOL 73/78 standard for oily water discharge. ▪ Discharge quality automatically monitored with alarm.
Putrescible galley wastes disposal	Potential localised reduction in water quality - nutrient enrichment	<ul style="list-style-type: none"> ▪ Low volumes and rapid dispersal/dilution. ▪ Incineration or maceration to <25 mm prior to discharge. ▪ Discharge only when >12 nautical miles from shore. ▪ Discharges in accordance with MARPOL 73/78 and OPGGS Act.
Solid wastes disposal	Potential environmental degradation from incorrect disposal	<ul style="list-style-type: none"> ▪ Incineration or appropriate onshore disposal of solid wastes in accordance with MARPOL 73/78.
Waste oil disposal	Potential localised chronic/acute toxic effects	<ul style="list-style-type: none"> ▪ All waste oils collected and returned to shore for recycling/disposal. ▪ Disposal in accordance with MARPOL 73/78.
Atmospheric emissions	Potential increase in greenhouse effect	<ul style="list-style-type: none"> ▪ Engines maintained to operate at optimum efficiency to minimise emissions. ▪ Compliance with MARPOL 73/78 regulations for the Prevention of Air Pollution from Ships.
Artificial lighting	Potential attractant/ disturbance to marine life	<ul style="list-style-type: none"> ▪ Lighting shall be kept to the minimum required for navigation and safety requirements.
Anchoring activity	Potential localised disturbance to benthos	<ul style="list-style-type: none"> ▪ No anchoring of vessels except in an emergency.
Vessel collision	Potential localised chronic/acute toxic effects on marine organisms from oil spill	<ul style="list-style-type: none"> ▪ Vessel equipped with appropriate navigational aids. ▪ A 24 hour visual, radio and radar watch will be maintained for other vessels by fully qualified and experienced mariners. ▪ Vessel presence shall be communicated via a Notice to Mariners. ▪ Implementation of the vessel-specific Shipboard Oil Pollution Emergency Plan (SOPEP) and oil spill response resources in the event of collision and fuel loss.
Fuel loss during refuelling transfer	Potential acute toxic effect on marine organisms	<ul style="list-style-type: none"> ▪ No refuelling conducted at sea.
Interaction with other vessels	Potential disruption to commercial fishing/vessel operations	<ul style="list-style-type: none"> ▪ Vessel presence shall be communicated via a Notice to Mariners.

Environmental Aspect	Potential Environmental Effect	Proposed Management Measures
Introduction of marine pests into marine environment	Potential negative effects on native organisms from competition, predation or disease	<ul style="list-style-type: none"> ▪ Compliance with Australian Quarantine Inspection Service (AQIS) and Australian Ballast Water Management Requirements (AQIS 2008).

Consultations

Consultations regarding the seismic survey within Permit Area W09-01 have been undertaken with relevant stakeholders, including:

- Australian Fisheries Management Authority (AFMA)
- Australia Maritime Safety Authority (AMSA)
- Commonwealth Fisheries Association
- WA Department of Fisheries (FWA)
- Western Australia Fishing Industry Council (WAFIC)
- Recfishwest
- Northern Fishing Companies Association
- Western Australia Northern Trawl Owners Association
- Raptis and Sons
- Kimberley Marine Tourist Association.

Historical AFMA logbook data for 2007 and 2008 indicated that vessels in the North West Slope Fishery operate in the Permit Area. AFMA had no objections to the survey provided that the above fishing associations were consulted.

The survey area does not overlap with major shipping routes, but some traffic is expected to occur in the general area relating to and offshore oil and gas exploration. This is however is not anticipated to pose any hazard to the seismic survey.

CGGVeritas will continue consultation with stakeholders to ensure minimal disruption to both survey and other operations.

Contact Details

The proponent is Veritas DGC Australia Pty Ltd (CGGVeritas). For further information on this proposal please contact:

Tim Spencer
Business Development Manager, Marine Acquisition
CGGVERITAS
CGGVeritas Centre
38 Ord Street
WEST PERTH WA 6005

References

Australian Institute of Marine Science, 1998. *Big Bank Shoals of the Timor Sea: An environmental resource atlas*. Available at: <http://www.aims.gov.au/pages/reflib/bigbank/pages/bb-11.html>. Last accessed: 7th October 2009.

Bannister, J.L., Kemper, C.M. and Warnecke, R.M. (1996). *The Action Plan for Australian Cetaceans*. The Director of National Parks and Wildlife Biodiversity Group, Environment Australia, September 1996 ISBN 0 642 21388 7.

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2009). EPBC Act Protected Matters Search Tool. Searched 9 October 2009. <http://www.environment.gov.au/erin/ert/epbc/index.html>

Department of Environment, Water, Heritage and the Arts (DEWHA) (2008). EPBC Act Policy Statement 2.1, Interaction between offshore seismic exploration and whales. September 2008.

Holloway, P.E. and Nye, H.C. (1985). Leeuwin Current and wind distribution on the southern part of the Australian North West Shelf between January 1982 and July 1983. *Mar Ecol. Prog. Ser.* 31: 209-222.

Jenner, K.C.S., Jenner, M-N.M. and McCabe, K.A. (2001). Geographical and temporal movements of humpback whales in Western Australian waters. *APPEA Journal* 2001 749.

Morcombe, M. (2000). *Field Guide to Australian Birds*. Steve Parish Publishing. Archerfield Australia.

Pendoley, K.L. (2005). Sea turtles and the environmental management of industrial activities in north-west Western Australia. Ph.D. Thesis. PhD Thesis, Murdoch University: Perth.

Waayers, D.A. (2003). Distribution of green and loggerhead turtles between Carnarvon and Exmouth. Report prepared for CALM. Ecowaays Australia.

Wilson S.G., Polovina J.J., Stewart B.S. and Meekan M.G. (2005). Movements of whale sharks (*Rhincodon typus*) tagged at Ningaloo Reef, Western Australia.

Woodside. (2007). Environment Plan Summary Southern Browse 3D Seismic Campaign. Woodside, 2007.