

DEEP WATER NORTHWEST SHELF AUSTRALIA MC2D SURVEY PUBLIC SUMMARY

COORDINATES OF THE PETROLEUM ACTIVITY

Table I: Survey Area Coordinates

ZONE 1		
NWS-24	14 42 06.45S	119 50 22.93E
NWS-25	13 55 17.35S	119 38 40.84E
NWS-34	11 01 1 8.58S	122 25 51.81E
NWS-38	12 26 57.78S	124 29 36.40E
NWS-34	13 32 50.03S	124 15 01.09E
NWS-24	15 59 28.62S	121 27 24.86E
Back to NWS 24	14 42 06.45S	119 50 22.93E
ZONE 2		
NWS-20	19 21 39.19S	118 41 23.16E
NWS-20	16 12 56.18S	115 45 19.81E
NWS-24	14 42 0 6.45S	119 50 22.93E
NWS-24	15 59 28.62S	121 27 24.86E
NWS-23	18 01 22.67S	120 26 38.14E
NWS-21	19 01 58.57S	119 13 07.58E
Back to NWS20	19 21 39.19S	118 41 23.16E
ZONE 3		
NWS-09	20 53 00.22S	115 15 03.79E
	Intersection of NWS 9 and NWS 4	
	Intersection of NWS 4 and NWS20	
NWS-20	19 21 39.19S	118 41 23.16E
NWS-12	20 27 35.77S	116 18 54.18E
NWS-11	20 28 44.69S	115 53 09.14E
	Following the northern and eastern boundary of the Montebello / Barrow Islands Marine Conservation Reserve back to	
NWS-09	20 53 00.22S	115 15 03.79E
ZONE 4		
NWS-04	22 05 23.32S	112 11 48.35E
NWS-06	19 02 32.00S	110 24 14.67E
NWS-13	17 27 51.87S	111 32 35.55E
NWS-16	16 52 14.42S	112 34 37.47E
NWS-20	16 12 56.18S	115 45 19.81E
NWS-20	19 21 39.19S	1184123.16E
NWS-06	21 46 08.12S	1133622.24E
Back to NWS-04	22 05 23.32S	1121148.35E

DESCRIPTION OF THE RECEIVING ENVIRONMENT

The survey area is located in waters ranging from 18 to 5000 m in depth, on Australia's western continental shelf. Due to the majority of the survey being proposed for deep water, the benthic assemblages in the survey area are expected to comprise predominantly soft-bottom infauna communities. The most important factor in determining the diversity and abundance of species in the benthic environment is the composition of the seabed floor substrate.

Shallow Water Depth

Soft substrates on the shallower portion of the survey area are likely to comprise fine to medium grained sands with shell/coral fragments and would be frequently resuspended by moderate to large swell events. These sediments are expected to be relatively depauperate of attached organisms and support only low to moderate abundances and diversities of invertebrate infauna communities including polychaete worms, small crustaceans and gastropods. The dynamic nature of the sediments reduces the abundance and diversity of organisms utilising these habitats and therefore they are generally free of attached biota.

Remote Operated Vehicle (ROV) surveys at shallower locations on the North West Shelf, indicated variously bioturbated sediments supporting a diverse burrowing infauna and sparse epifauna mainly comprising sea pens (*Virgularia* spp). Benthic communities were generally sparse with low densities of molluscs, crustaceans and worms (polychaete, sipunculid and platyhelminth).

The bathymetry in the central part of the survey area indicates the presence of raised seafloor features which include temporary and / or permanent areas of exposed limestone pavement or high profile reefs. These areas may be inhabited by filter-feeding invertebrates, macroalgae, encrusting sponges and invertebrate fauna, dependent on wave action, current regime and light penetration.

Moderate Water Depth

The benthic assemblages in the survey area are expected to comprise predominantly soft-bottom infaunal communities. The diversity and abundance of large encrusting species in the region is generally low, probably as a result of the instability of the sediments, the lack of exposed reef structures and the low levels of organic food sources. The North West Shelf supports a low abundance but high diversity of invertebrate fauna comprised largely of burrowing polychaete worms and crustaceans with echinoderms and molluscs also significant to the faunal composition of the area. Previous ROV videography at depths of approximately 100 to 300 m on the North West Shelf showed fine-grained, cohesive, mud-clay sediments which are variously bioturbated, indicating the presence of a variety of infauna. Isolated larger fauna comprised free swimming Cnidaria, demersal fish and scattered benthic crustaceans.

Deep Water

Sediments in deeper water are subject to lower energy regimes and usually comprise finer grained sands and silts with varying proportions of mud and shell fragments. These habitats are favourable for burrowing organisms, particularly polychaete worms and smaller crustaceans. Attached benthic organisms are likely to be sparse, however any areas of exposed hard substrate are likely to be colonised by deep-water filter feeding organisms, such as soft corals, gorgonians, bryozoans, hydroids and sponges.

In the Timor Sea region the predominant animals living within seabed sediments on the Sahul Shelf are polychaetes and crustaceans (e.g. prawns, shrimp, crabs) and to a lesser extent echinoderms (e.g. sea stars, sea urchins, feather stars), molluscs, ribbon worms, sponges and fish.

Macrofauna

A number of sharks and pelagic finfish, including mackerels, tunas and billfishes, occur in the waters of the North West Shelf and would be expected in the survey area. The deep offshore environment of the proposed survey area is typical of broad expanses of the continental slope and is not expected to represent habitat of particular significance to sharks and finfish.

Six species of sea turtle occur in north-western Australian waters including the green, hawksbill, leatherback, flatback, loggerhead and olive ridley turtles. The nearest areas to the survey lines known to support turtle nesting (green, flatback and hawksbill turtles) are the beaches of islands in the Barrow-Montebello Island complex, approximately 9 km from the closest survey line. The seismic survey will be managed to avoid the mating aggregation period for these species. The seismic survey is proposed to occur within the last month of the nesting periods identified for the region, however, the survey will be managed to avoid the internesting turtle habitat and minimise potential interactions with turtle hatchlings.

Several species of whale and dolphin are known to frequent the waters of the North West Shelf. The humpback is the most common whale species in the Pilbara region. Humpbacks migrate between Antarctic waters and the Kimberley each winter to mate and breed. The main migration path is centred along the 200 m bathymetric contour with migrating humpbacks passing the Montebello Islands between late July and early September. The proposed survey will be managed to avoid peak migration periods for humpback whales throughout all zones of the survey area.

Sperm whales have been observed off the west coast of Western Australia however the only key locality recognised in Western Australia is along the southern coastline. The survey area includes deeper waters and bathymetric features characteristic of sperm whale aggregation areas and the presence of sperm whales within the survey area is possible. However, the presence of these cetaceans within the study area would be expected to be in low numbers and randomly transiting through the area. Therefore the likelihood of significant numbers of cetaceans being present in the vicinity of seismic operations is low.

Whales with widespread or tropical deep water distributions that may occur in the region, including Antarctic minke, Bryde's, killer, sperm, fin, sei and false killer whales are not expected to occur in significant numbers in the survey area. The survey area does not represent any recognised breeding, feeding or migratory areas for any other cetacean species.

Dugong are highly migratory and known to occur around the islands of the North West Shelf, Shark Bay, Exmouth Gulf and the Dampier Archipelago where seagrass beds occur. Dugong are generally found in shallow waters protected from large waves or storms and have been observed in the shallow waters along the east coast of Barrow Island and Varanus Island. Major recognised dugong aggregation (feeding) areas include Shark Bay, Exmouth Gulf and Ningaloo Reef, and near islands of the Dampier Archipelago and a population has been sighted at Ashmore Reef. However, the planned survey zones occur at depths ranging from 18m to in excess of 5000m and sea grass habitat would be expected to be sparse or absent and therefore, the survey area is unlikely to contain critical feeding grounds for dugong.

Whale sharks are generally found between latitudes 30°N and 35°S in both oceanic and coastal waters. The movements of whale sharks are not well known, however they are known to seasonally aggregate (March / May) in shallow tropical waters off the North West Cape in Western Australia. The waters of the survey area are approximately 40km from the nearest recognised whale shark aggregation area at Ningaloo and whale sharks may potentially be within the survey area during the aggregation period. However, operations have been scheduled to survey the zone adjacent to the Ningaloo Marine Park late in the project's time frame (late June) to minimise the potential for disruption during the Whale Shark's aggregation period.

Description of the Action

PGS Geophysical (PGS) proposes to undertake a 2D seismic survey named the "Deep Water North West Shelf MC2D Survey" in Commonwealth waters offshore of northern Western Australia. The survey will commence in early March 2007 and be completed by the end of June 2007. Seismic data will be acquired by PGS using a purpose built vessel towing a conventional array of airguns and hydrophones.

Details of Major Hazards and Controls

Risk analysis has been undertaken for all aspects of the proposed seismic acquisition program, in accordance with the procedures outlined in the Australian and New Zealand Standard AS/NZS 4360:1999 (Risk Management). The analysis indicates that the risk of significant adverse environmental effects from the survey is low. A summary of the environmental hazards, potential effects and management approaches adopted during the proposed programme are indicated in Table 2.

Summary of the Management Approach

PGS's operations are conducted within a comprehensive Health, Safety, Environment and Quality (HSE&Q) management framework. This framework ensures a systematic approach to environmental management, with the environmental aspects of each project addressed from project conception, throughout project planning and as an integral component of implementation.

Consultation Details

Consultations with government and industry groups regarding seismic surveys at the proposed location have included:

- Department of Fisheries Western Australia (DoF)
- Australian Fisheries Management Authority (AFMA)
- Western Australian Fishing Industry Council (WAFIC)

State Fisheries

- Onslow Prawn Managed Fishery
- Wet Line Fishing
- Pilbara Demersal Finfish Fisheries
- Northern Shark Fisheries
- Northern Demersal Scalefish Managed Fishery
- Nickel Bay, Broome, and Kimberley Prawn Managed Fisheries
- Kimberley Gillnet and Barramundi Fishery

- Pearl Oyster Managed Fishery
- Mackerel (Interim) Managed Fishery
- Beche-de-mer Managed Fishery.

Commonwealth Fisheries

- North-west slope trawl;
- Skipjack Tuna (western);
- Southern Blue Fin Tuna;
- Western Tuna and Billfish Fishery;
- Western Deepwater Trawl.
- Western Australian Fishing Industry Council (WAFIC)
- Recfishwest
- Western Australian Game Fishing Association (WAGFA)
- Northwest Game Fishing Association (NWGFA)

These consultations have indicated that the proposed seismic program is unlikely to conflict with commercial or recreational fishing as few operators are active in the offshore waters of the proposed survey area and there are large distances between the proposed survey transect lines. Tourism in the region is seasonal and few game fishing operators utilise the area of the proposed seismic program due to the predominantly deep water (>1000m) to be targeted by the survey.

The particular environmental issues or sensitivities relevant to the proposal are:

- The presence of inter-nesting marine turtles and turtle hatchlings in the vicinity of operations;
- Aggregation of Whale Sharks to Ningaloo Reef; and
- Humpback Whale northern migration along the west coast of Western Australia.

Whilst key stakeholders will be advised of the start date of the survey prior to commencement, there are no plans for further consultations due to the short duration of the program.

Contact Details

Further information may be obtained by writing to:

Contact: Nick David
Area Manager – PGS Exploration
Level 4 IBM Building
1060 Hay Street
WEST PERTH WA 6005

Table 2: Summary of Environmental Hazards, Potential Effects and Management Approach

Environmental Aspect and Incident	Potential Environmental Effect	Management Approach	Risk
Acoustic impulse from air-guns.	Potential physiological effects or disruption to behaviour patterns of marine fauna.	Survey will be managed to avoid peak migration periods of the humpback whale. Comply with DEH guidelines for minimising possible disturbance to cetaceans, including: <ul style="list-style-type: none"> • Visual observations during pre-start procedures and during survey; • Use of soft start procedures; and, • Delay start up procedures/ shut down any operating acoustic source if whales are within 3km of survey vessel • No discharge of seismic source if turtle mating aggregations within 200m of seismic source. Vessel to avoid all mating aggregations, where practicable • Survey adjacent to the Ningaloo Marine Park to be undertaken in late June to minimise disruption of the Whale Sharks aggregation period. • Use of scout vessel to act as advance warning deterrent for cetaceans, turtles and whale sharks. 	Low risk
Grey water/ sewage disposal.	Potential localised reduction in water quality - nutrient enrichment.	Treat in accordance with P(SL)A clause 222 and MARPOL 73/78 prior to discharge. Offshore discharge (>12 nm from land) only. High dispersal/dilution factor. Approved onboard sewage treatment plant. Biodegradable detergents only.	Low risk.
Discharge of oily water from bilges.	Potential localised and temporary acute toxic effects.	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. Low volumes and rapid dilution/dispersal.	Low risk.
Putrescible galley wastes disposal.	Potential localised reduction in water quality - nutrient enrichment.	Low volumes and rapid dispersal/dilution. Maceration to <25 mm prior to discharge or incineration. Discharge only when >12nm from shore. Discharges in accordance with MARPOL 73/78 and P(SL)A Schedule Clause 222.	Low risk.
Solid wastes disposal.	Potential environmental degradation from incorrect disposal.	Incineration or onshore disposal of solid wastes in accordance with EP, Waste Management Plan and MARPOL 73/78.	Low risk.

Environmental Aspect and Incident	Potential Environmental Effect	Management Approach	Risk
Waste oil disposal.	Potential localised chronic/acute toxic effects.	No waste oil disposed at sea. All waste oils collected and returned to shore for recycling/disposal in accordance with EP, WMP and MARPOL 73/78.	Low risk.
Atmospheric emissions.	Potential increase in greenhouse effect.	Engines maintained to operate at optimum efficiency to minimise emissions.	Low risk.
Artificial lighting.	Potential attractant/ disturbance to marine life.	Lighting minimum required for navigation and safety requirements. Extent of lightspill limited. Survey in remote location beyond the distance at which nesting turtles on the Montebello/ Barrow Islands may be affected. Hatchlings in water unlikely to follow seismic vessel for extended periods.	Low risk.
Anchoring activity.	Potential localised disturbance to benthos.	No anchoring on location except in emergency. No sensitive benthos.	Low risk.
Vessel collision.	Potential acute toxic effect on marine organisms from oil spill.	Vessel equipped with sophisticated navigation aids and competent crew maintaining 24 hour visual, radio and radar watch for other vessels. Other vessels made aware of seismic vessel's restricted ability to manoeuvre. Survey vessel carries navigation lighting. OSCP in place. Adhere to maritime standards requiring notification of vessel presence via notice to mariners. Seagoing movements of vessel will comply with maritime standards and AMSA standards.	Low risk.
Fuel loss during transfer	Potential acute toxic effect on marine organisms.	Not expected during survey. Strict adherence to refuelling procedures. OSCP in place. Small volume. Survey timed so that wind conditions would cause diesel to move away from land and be subject to very rapid evaporation.	Low risk.
Displacement of other users of marine environment.	Potential disruption to commercial fishing/vessel operations	Liaise with relevant authorities. Fishermen and other commercial mariners alerted of vessel presence. Notice to Mariners posted.	Low risk.