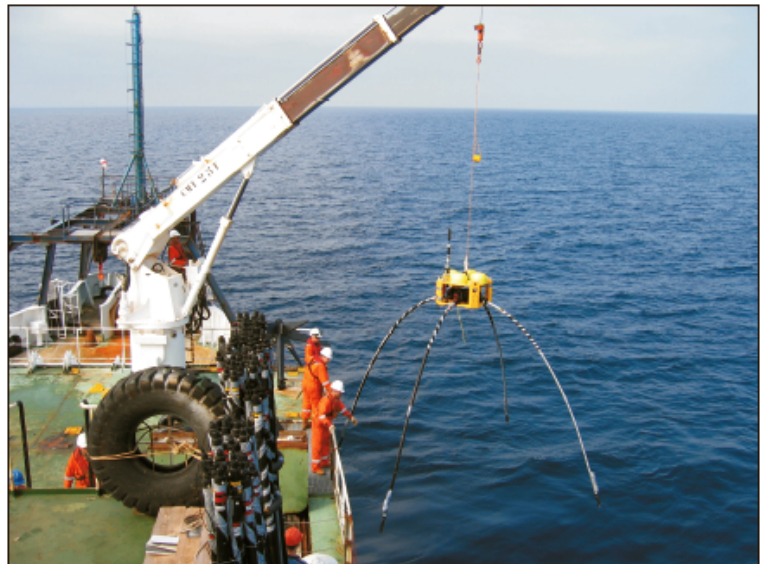


# Controlled Source Electromagnetic Survey



CSEM SURVEY ENVIRONMENT PLAN - SUMMARY

- Rev 1
- 12 March 2007



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## Document history and status

Revision	Date issued	Reviewed by	Approved by	Date approved	Revision type
A	30/01/07	P. Mende	P. Mende	07/02/07	First Draft
0	11/03/07	P. Mende	T. Al-Hashimi	12/03/07	Final Draft
1	12/03/07	T. Al-Hashimi	Jon Nicholls	14/03/07	Final

## Distribution of copies

Revision	Copy no	Quantity	Issued to
0	1	1 (electronic)	Jon Nicholls
1	1	1 (electronic)	Michael Gartrell
1	1	1 (electronic)	Jon Nicholls
1	1	1 (electronic)	SKM Library

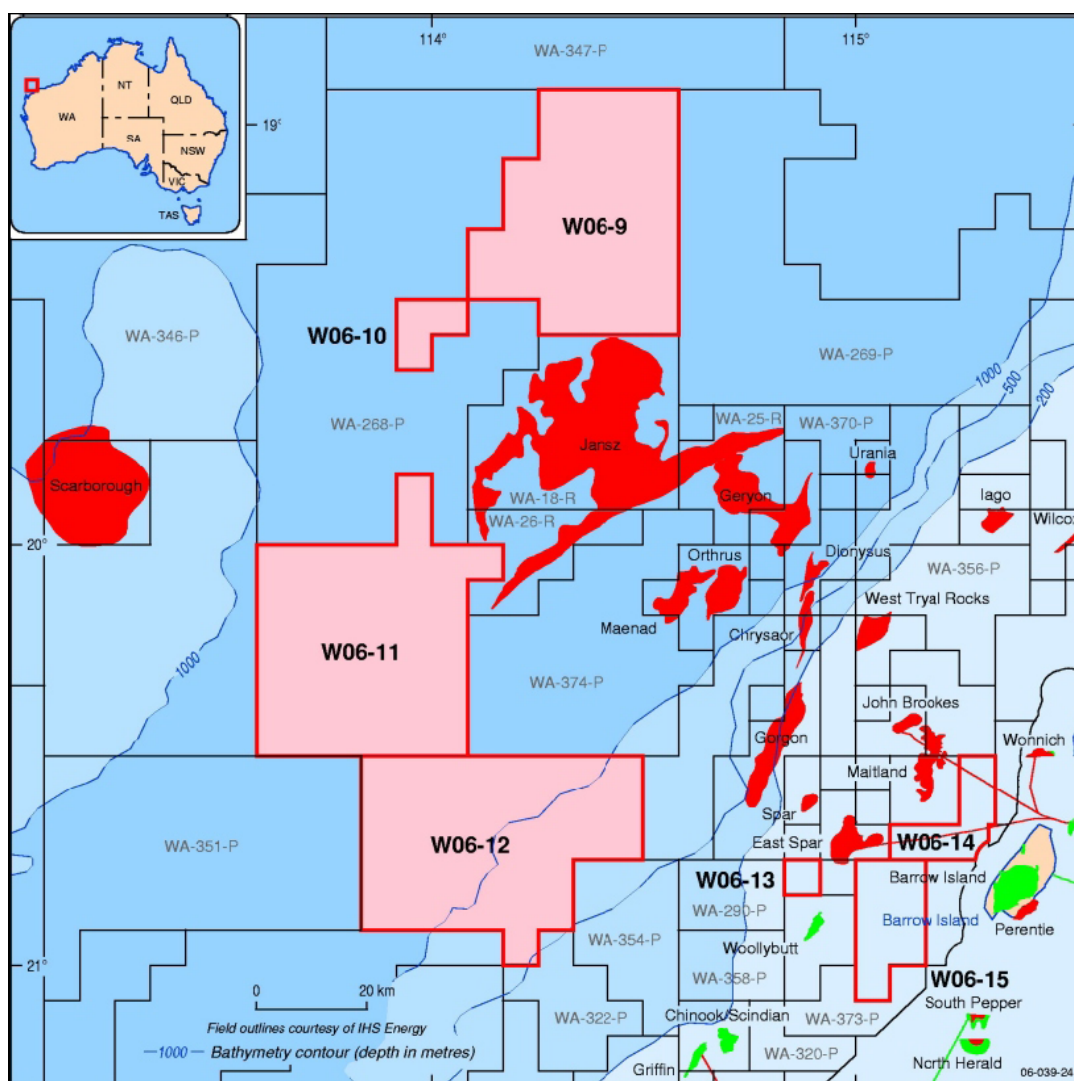
<b>Printed:</b>	14 March 2007
<b>Last saved:</b>	14 March 2007 09:13 AM
<b>File name:</b>	I:\WVES\Projects\WV03282\Deliverables\Summary EP\Rev 1_tah_SummaryEP_Final.doc
<b>Author:</b>	Callum Mair
<b>Project manager:</b>	Tamara Al-Hashimi
<b>Name of organisation:</b>	OHM
<b>Name of project:</b>	Controlled Source Electromagnetic Survey
<b>Name of document:</b>	CSEM Survey Environment Plan - Summary
<b>Document version:</b>	Rev 1
<b>Project number:</b>	WV03196



# 1. Introduction

Offshore Hydrocarbon Mapping (OHM) propose to conduct a Controlled Source Electromagnetic (CSEM) survey in Permit Areas W06-9, W06-10 and W06-11, located approximately 250 km northwest of Dampier, Western Australia.

An Environment Plan (EP) for the CSEM survey was submitted to the Designated Authority, the Department of Industry and Resources (DoIR) in January 2007 and was approved in March 2007. This Summary EP has been prepared in accordance with the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999.



**Figure 1 Location of Permit Areas W06-9, W06-10 and W06-11**

The CSEM Survey will be conducted within Permit areas W06-9, W06-10 and W06-11 (see **Figure 1**). The approximate survey location coordinates are given in **Table 1**. These permits occur in water depths ranging from 800 m to 1600 m on a subsea slope of the “Kangaroo Trough”, which is part of the Exmouth Plateau, in the Northern Carnarvon Basin. The survey will consist of seven survey lines within selected areas of the above permits.

**Table 1 Survey Coordinates for the CSEM Survey**

Permit Area	Latitude	Longitude
W06-9 and W06-10	18.545527S	114.150472E
	18.545526S	114.150472E
	19.345530S	113.550475E
	19.295528S	114.350474E
W06-11	19.595532S	113.350476E
	19.495530S	114.00475E
	19.595530S	114.100476E
	20.295532S	114.50478E
	20.295533S	113.350478E

## 2. Description of Existing Environment

Permit Areas W06-9, W06-10 and W06-11 are located north of the deepwater Janz gas field. Previous studies in this area have shown the seabed to be predominantly flat and composed of loose, silty carbonate sands less than 1 mm in diameter. Only a small component of these sands (<5%) contained shell fragments of greater than 1 mm (URS 2001).

There is no evidence of distinct sea mounts or subsea canyons within the study area. With the extreme water depth (up to 1600 m) and resultant low light levels at the seafloor, the existence of benthic primary producers such as seagrass, kelp and coral is unlikely. The lack of opportunity for photosynthesis, combined with the low nutrient availability and general absence of hard substrates ensures that biological productivity is low.

Whale species observed in the Pilbara region include Bryde’s whale (*Balaenoptera edeni*), sperm whales (*Physeter macrocephalus*), humpback whales (*Megaptera novaeangliae*) and blue whales (*Balaenoptera musculus*). While whale species, such as the sperm whale, may utilise submarine canyon systems for feeding (C Jenner [Managing Director, Centre for Whale Research] *pers comm.*, 17 November), no such feeding grounds are known to occur within the study area.

Humpback whales are known to migrate through the area to breeding grounds off the Kimberley coast. Their migratory paths generally follow the 200 m isobath along the continental shelf, resulting in their occurrence in northern Australian waters between June and September. Given



that the CSEM Survey will occur in March to April and in water depths of up to 1600 m, it is doubtful that any humpback whales would be in the vicinity of the survey area.

Sea turtle species such as the green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), flatback turtle (*Natator depressus*) and loggerhead turtle (*Caretta caretta*) may move through the survey area, but there are no known significant turtle habitats in the survey area.

Open water species of the North West Shelf include marlin, sailfish, Spanish mackerel, trevally and sharks. Whale sharks (*Rhincodon typus*) are known to congregate at Ningaloo Reef (200 km south of the survey area) in late March to July, with a previous study from tagged individuals showing the species does travel within the surrounding environs of the CSEM area; this occurs from August to September (Wilson et al 2006).

Four commercial fisheries potentially operate in the CSEM Survey area. These are the Northwest Slope Trawl Fishery, the Western Tuna and Billfish Fishery, the Southern Bluefish Tuna Fishery and the Western Skipjack Fishery (AFMA 2006). Given that the survey area will examine water depths in excess of 800 m and the survey will be undertaken over 60 days in March to April, it is unlikely that major disruptions to commercial fisheries would occur. The bulk of fishing intensity for these fisheries occurs outside the survey area and/or at instances that are outside the period of the survey. No traditional fisheries are known to exist in the CSEM Survey area due to the large distance offshore and deep water.

Shipping routes exist approximately 50 km to the east and west of the survey area. A relatively low number of vessels are observed within the survey area itself (AMSA 2004).

The closest infrastructure to the CSEM Survey is the unmanned John Brookes platform which is located approximately 100 km southeast of Permit Area W06-9. The Goodwyn platform is located over 100 km to the west-southwest of Permit Area W06-9.

No known heritage sites are known to exist within the survey area. Further, there are no World Heritage Properties in or adjacent to Permit Areas W06-9, W06-10 and W06-11.

The Montebello-Barrow Islands Marine Conservation Reserve is the nearest marine park, located 150 km shoreward of the survey area. There is no known established tourism activity in the survey area. Yachts may utilise the wider region for sailing, but in general navigate closer to shore.

### 3. Description of the Action

OHM proposes to conduct the acquisition of electromagnetic survey data in Permit Area W06-9, W06-10 and W06-11, located approximately 250 km north-west of Western Australia. The survey will be approximately 60 days duration (conditions permitting) and is planned to take place in March and April 2007, with completion of the survey by 30<sup>th</sup> April. Five survey lines of 25 km length will be undertaken.

The electromagnetic survey data will be acquired by the vessel *M/V "Mermaid Investigator"*, which will tow a deep towed active source (DASI) and associated 300 m long electric dipole. The DASI and dipole will be towed approximately 30 m above the seabed. The DASI will work in conjunction with receivers deployed on the seabed to record variations in the electromagnetic signal. These will be deployed at 1 km intervals along the survey lines.

The vessel will mobilise and demobilise in Dampier. The operations plan for the CSEM Survey involves no crew changes and no re-supplies. The vessel will have enough fuel for the entire survey and will therefore not require any refuelling at sea.

### 4. Major Environmental Hazards and Controls

A qualitative risk assessment methodology has been adopted for this assessment, based broadly on AS/NZS 4360. The key potential environmental impacts associated with these activities that could represent environmental risk are presented in **Table 2**. Also presented in **Table 2** are key management measures to address these risks.





**Table 2 Summary of Environmental Risk Assessment**

Activity	Potential Environmental Effects	Likelihood	Consequence	Risk Level	Management Measures
Discarding concrete weight to recover seabed receivers	Localised burial and smothering of benthic communities directly under concrete blocks	Virtually Certain	Minor	HIGH	Benthic communities are sparse, of low density and well represented in the region.  Localised impact restricted to exposed surfaces (maximum 1 m <sup>2</sup> ).
	Creation of artificial habitat (exposed surface of concrete blocks)	Virtually Certain	Minor	HIGH	Concrete blocks have been designed to be thin and rough, to minimise potential changes to seabed currents and to facilitate colonisation.  Concrete blocks have been designed to be inert and will have no component that may produce an electrical current potential difference when in seawater.  The blocks are designed with chamfered edges so as to reduce the chance of a trawl net becoming caught.
Generation of waste	Elevated nutrients from waste disposal may cause phytoplankton bloom	Virtually Certain	Negligible	MODERATE	Nutrient output is low concentration, very localised and quickly dispersed.  Sewage and putrescibles waste will be discharged in accordance with MARPOL regulations.  Hazardous wastes will be documented and segregated into clearly marked containers prior to onshore disposal.
	Localised reduction in water quality	Virtually Certain	Negligible	MODERATE	
Artificial lighting	Attraction of marine fauna (e.g. Seabirds, turtles) to vessel	Virtually Certain	Negligible	MODERATE	Survey is located 200 km from coastline and large distance from any fauna breeding/aggregation areas.  The CSEM Survey is temporary.  Lighting will be restricted to that which is required for safe operations.
Accidental small scale spills fuel, oil or other hazardous substance spills (<80 L) from the survey vessel	Non-lethal effects to a listed shark species	Unlikely	Major	HIGH	Potential for impact on whale sharks unlikely given sharks unlikely to be in the survey area and likely to avoid spills. Hydrocarbons generally likely to evaporate and disperse readily.



Activity	Potential Environmental Effects	Likelihood	Consequence	Risk Level	Management Measures
Accidental small scale spills fuel, oil or other hazardous substance spills (<80 L) from the survey vessel  (continued from overleaf)	Non-lethal and lethal effects to a listed cetacean or turtle	Unlikely	Major	HIGH	Potential for impact on cetaceans and turtles unlikely given they are likely to avoid spills. Hydrocarbons generally likely to evaporate and disperse readily.
Accidental medium to large scale spills (>80 L) of fuel, oil or other hazardous substance (eg caused by vessel collision or cyclone)	Harm, injury or death of a listed shark, cetacean or turtle species due to fuel or oil spill	Rare	Major	MODERATE	Navigation and communication procedures minimise risk of vessel collisions.  Vessel will stop work and move away from the survey area if a cyclone occurs.  Some impact on transient sharks, marine mammals and turtles is feasible, but spill response procedures and equipment will localise and minimise impact, and fuel likely to evaporate and disperse readily.
	Disturbance to sensitive habitats such as reefs, mangroves along Barrow Island and the Burrup Peninsula	Rare	Major	MODERATE	Depending on the fate and trajectory characteristics of spilt fuel or oil, sensitive marine habitats in the coastal area or marine parks/reserves could be impacted. However, spill response procedures and equipment will localise and minimise impact, and fuel is likely to evaporate and disperse readily.

## 5. Summary of Management Approach

As well as the management issues that were outlined in Table 2, OHM possesses a Health, Safety and Environment (HSE) Policy outlining HSE plans and requirements at a corporate level. The vessel's daily operations will be in accordance with International Maritime Organisation (IMO) standards for minimisation of environmental impact.

The CSEM Survey will be carried out under the applicable Commonwealth and State legislation, in addition to the appropriate international agreements and conventions. For instance, ballast water procedures must comply with AQIS Australian Ballast Water Management Requirements for international shipping. As part of the management measures contained in these requirements, ballast water discharge must not be undertaken in Australian Territorial Seas (within 12nm of the Australian mainland).

Any incidents that have the possibility of causing significant effects on the environment will be reported and investigated. This will be implemented according to appropriate legislative

requirements and OHM operating procedures. In addition, the Designated Authority will be notified of all reportable and recordable incidents, according to the requirements of Regulation 26 of the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999.

## 6. Consultation

The following organisations have been contacted to date:

- DoIR;
- Department of Environment and Heritage (DEH); and
- Australian Fisheries Management Authority (AFMA).

Consultation will also be sought with the concession holders of other permit areas in the vicinity of the planned CSEM survey to ensure advanced notification and identification of any pertinent issues and mitigation measures. Notification will also be given to the Australian Marine Safety Authority (AMSA) to minimise disruption to shipping and commercial fishing operations.

## 7. Contact Details

For further information, please contact

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