MEO AUSTRALIA LIMITED

AUSTRALIAN DRILLING ASSOCIATES

SONGA VENUS

WA-360-P ARTEMIS-1

DRILLING OPERATIONS

ENVIRONMENT PLAN SUMMARY

2010

1 MEO Artemis-1 Drilling Operations

1.1 The Proponent

MEO Australia Limited (MEO) is the proponent for the Artemis-1 Drilling Operations. Australian Drilling Associates (ADA) is an international well engineering and project management company, conducting the drilling operations on behalf of MEO.

1.2 The Proposal

MEO is proposing to undertake an exploration drilling operation with the drilling of the Artemis-1 well within the Petroleum Exploration Area WA-360-P, in Commonwealth waters (**Figure 1**).

The operations will utilise the Songa Venus semi-submersible drilling rig (Rig). Coordinates of the well location are listed in **Table 1** below. Drilling will occur 24 hours per day and are scheduled to commence in November 2010 with an expected total duration of approximately 33 days.

The main two Offshore Support Vessels (OSV) that service the Rig will each make an estimated 10 return trips to Dampier Port for the duration of the Artemis-1 drilling operations. There will be helicopter support to the drill Rig.

At the Artemis-1 location, the well will be drilled vertically to an approximate total depth of 3500 metres Total Vertical Depth Subsea. The well will be drilled primarily using a combination of seawater and water based mud (WBM) i.e. environmentally acceptable ULTRADRIL from M-I SWACO. No synthetic based mud will be used. Overall, the quantity of cuttings discharged will be approximately 430m^3.

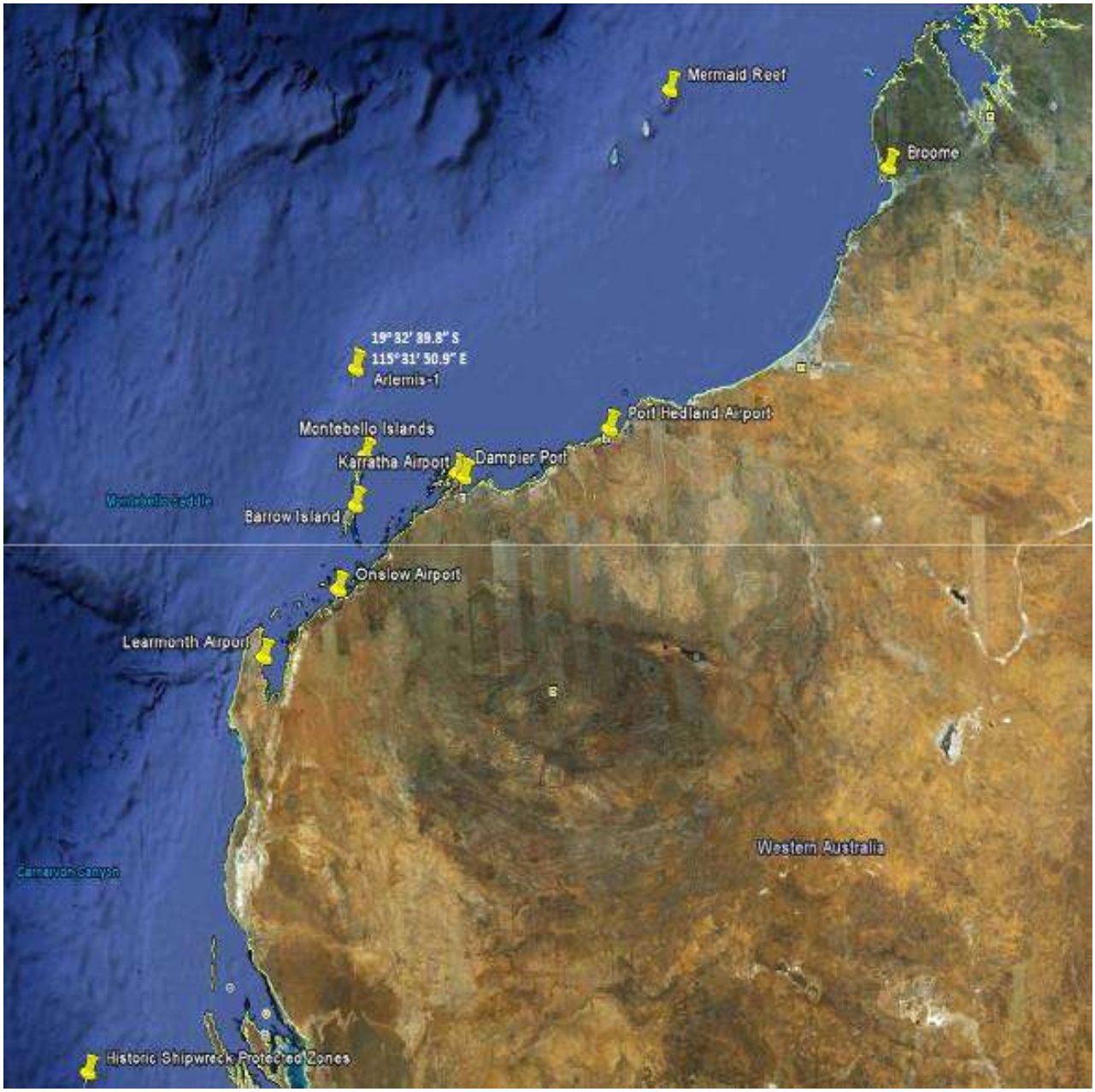
This MEO Artemis-1 Environment Plan was approved by the Department of Mines and Petroleum (DMP) on the 17th September 2010. The Commonwealth Department of Environment, Water, Heritage and Arts (DEWHA) assessed a Referral under the Environment Protection and Biodiversity Conservation Act 1999 as 'not a controlled action' on the 9th June 2010.

Table 1 Well Location and Permit Area

Location Name	Permit Area	Latitude	Longitude
Artemis-1	WA-360-P	19°32'39.8" S	115°31'50.9" E

Projection: GDA94

Figure 1 Artemis-1 Well Drilling Location



2 Description of the Environment

Australia's North West Shelf is ecologically diverse and complex. Its seabed habitats support the greatest recorded marine biodiversity in the world; including a remarkable array of marine fauna including tropical fish, turtles, hard and soft corals, sponges, and crustaceans (NWSJEMS, 2007).

Physical Environment

The proposed Artemis-1 well is located in Commonwealth Waters within Exploration Permit WA-360-P in the northern Carnarvon Basin, Western Australia (refer **Figure 1**). Water depth at the Artemis-1 location is approximately 425 metres.

The closest marine conservation reserve locations to the proposed project area are:

- Dampier Archipelago, located approximately 164 km to the south-west;
- Monte Bello islands, located approximately 112 km to the south-west; and
- Barrow Island, located approximately 140 km to the south.

Main marine protected areas in the North West Shelf which include Ningaloo Reef and Mermaid Reef, are respectively located 400 km south west and 500 km north east from the proposed project area. Based on the Hydrocarbon Spill Modelling Study for Artemis-1, none of the diesel or condensate trajectories were predicted to reach the shore line or sensitive areas from the well during summer season.

The climate within the vicinity of the drilling program shows two distinct seasons, "winter" or "dry" from about April to September and "summer" or "wet" from about October to March, with very rapid transition seasons, generally in March / April and September / October, between the two main seasons. Cyclone season in the project area is between the months of November through to April. Cyclone management arrangements will be implemented in accordance with the NOPSA - approved Songa Venus ADA MEO Vessel Safety Case Revision (MetOcean, 2008).

Biological Environment

The benthic habitats of primary interest on the North West Shelf are epibenthos, seagrass and mangroves and the habitat structure has a significant influence on the fish community structure on the North West Shelf (CSIRO, 2007).

According to the EPBC Online Database (DEWHA,2010) there are 29 species of pipefish, 5 species of seahorse, 15 species of seasnake and a species of pipehorse within the vicinity of the drilling program. However the area is not likely to be a breeding habitat for these species.

Five species of marine turtle occur in the general area of the drilling program and they are listed in the National List of Threatened Species. These are the GreenTurtle (*Chelonia mydas),* Flatback Turtle *(Natator depressus),* Hawksbill Turtle (*Eretmochelys imbricata*), Loggerhead Turtle (*Caretta caretta*) and the Leathery Turtle (*Dermochelys coriacia*). The Green, Flatback and Hawskbill Turtles exhibit a summer nesting period on deep sandy beaches (Pendoley, 2005). The drilling location does not contain any emergent land or shallow reef in which the turtles usually breed and reside in. The likelihood of encountering significant numbers of turtles at the drilling location is low.

Whales and Dolphins are common to the Western Australian coast. Whales common to the region include the Humpback Whale *(Megaptera novaeangliae)*, Antarctic Minke Whale *(Balaenoptera bonaerensis)*,

Bryde's Whale *(Balaenoptera edeni)*, Blue Whale *(Balaenoptera musculus)*, Killer Whale *(Orsinus orca)* and the Sperm Whale *(Physeter macrocephalus)*. However, the project area resides in offshore waters where there is small potential for interaction between drilling-related activities and whales, particularly due to the short period required for the Artemis-1 operations (33 days) and the stationary nature of the activity. The Artemis-1 operations will be undertaken in the fourth quarter of 2010, which is on the outskirts of the calving periods and entering the migratory periods for the Blue Whale and Humpback Whale, where the whales will be heading south or sighted in southern Australian waters.

Heritage, Conservation and Areas of Cultural Significance

The drilling activities are unlikely to have significant impacts on threatened or migratory species or the environment in closest marine national reserve i.e. Mermaid Reef Marine National Nature Reserve, located approximately 500 kilometres northeast from the drill location.

There are no listed National Heritage Places and World Heritage Properties with no Indigenous or European sensitivities within or adjacent to, the proposed project area based on a search using the Department of Environment, Water, Heritage and the Arts EPBC Act Protected Matters Search Tool (DEWHA, 2010).

According to the DEWHA National Shipwreck Database (DEWHA, 2010), the project area does not reside within a shipwreck protected zone and there are no known shipwrecks that will be impacted by the drilling operation.

Socio-economic Environment

Western Australia's Northwest Shelf is one of the most economically significant coastal and sea regions in Australia. It produces the majority of Australia's domestic and exported oil and gas, and its ports carry most of the nation's iron ore exports. The infrastructure supporting these and other industries is concentrated along the coastal fringe or in offshore facilities (CSIRO, 2007). The main activities in the project area include recreational fishing and tourism, petroleum exploration and production, commercial shipping; and commercial fishing.

3 Stakeholder Consultation

MEO and ADA have advised relevant stakeholders of the Artemis-1 operations and will respond to any feedback and provide direct updates of field activities, including transit vessel movements during the Artemis-1 program. Ongoing contact with these groups will continue up to and during the drilling operations to update them on the drilling operations, timing and locations.

Table 2 Stakeholder Consultation

Stakeholder	Contact	Date	Matters Discussed
WA DMP (Department of Mines and Petroleum)	Laura McCarthy, Environmental Assessor Laura.MCCARTHY@dmp.wa.gov.au Ph: (08) 9222 3095	18/06/10 Ongoing	EP and OSCP approval & compliance requirements.
DEWHA (Department of Environment, Water, Heritage & Arts)	Michelle Glover, EPBC Michelle.glover@environment.gov.au Ph: (02) 6274 1652	9/06/10 Ongoing	Conduct & maintenance of measures in accordance with EPBC 2010/5432.
AMSA (Australian Maritime Safety Authority)	James Bond james.bond@amsa.gov.au Ph: (02) 6279 5000.	19/04/10	Shipping routes.
AMOSC (Australian Marine Oil Spill Centre)	Ivan Skibinski iskibinski@amosc.com.au 0418 398 363	29/09/10 Ongoing	Oil Spill Response readiness
AFMA (Australian Fisheries Mgt. Authority)	Mallory Terwijn, Environment Officer mallory.terwijn@afma.gov.au Ph: (02) 6225 5345	14/04/10 Ongoing	Advice on locations and fisher groups contact.
Department of Fisheries, Env. Branch	Michelle Hanlon, Sr. Management Officer Michelle.Hanlon@fish.wa.gov.au Ph: (08) 9482 7377	27/04/10 Ongoing	Advice on locations and fisher groups contact
CFA (Cmwlth. Fisheries Association)	Mr Allan Crosthwaite (CEO) Ph: (04) 18 164 740 ceo@comfish.com.au	15/04/10 Ongoing	Advice on locations. Ongoing field activity advice as follow up.
Western Australia Fishing Industry Council (WAFIC)	Valerie Sheahan (Project Officer) vals@wafic.org.au Ph: (08) 9492 8819	15/04/10 Ongoing	Advice on locations. Ongoing field activity advice as follow up.
Western Australian Northern Trawl Owners Assoc. (WANTOA)	Mr Norm Peovitis (President) normp@waseafoods.com.au Ph: (08) 9444 6999	15/04/10 Ongoing	Advice on locations. Ongoing field activity advice as follow up.

Northern Fishing Companies Association	Mr Andy Prendergast (GM) Austral Fisheries Pty Ltd aprendergast@australfisheries.com.au Ph: (08) 9202 2444	15/04/10 Ongoing	Advice on locations. Ongoing field activity advice as follow up.
A Raptis and Sons	Mr Mike O'Brien mobrien@raptis.com.au Ph: (07) 3249 7814	15/04/10 Ongoing	Advice on locations. Ongoing field activity advice as follow up.

4 Environmental Impact Assessment, Management and Mitigation

The main environmental hazards associated with the MEO Artemis-1 drilling operations include:

- Presence of drill rig and support vessels;
- Well equipment remaining on seabed after drilling (Rig to be removed from location at end of drilling);
- Drilling operations (i.e., lost equipment);
- Discharge of sewage and putrescible wastes, deck drainage oily wastes;
- Management of solid and hazardous materials and waste;
- Freight Transfer;
- Ballast water discharge and hull cleaning;
- Deck drainage discharge from drill rig and vessels;
- Exhaust and well testing emissions; and
- Accidental spills.

The Environment Plan provides a detailed assessment of potential impacts. The key points of the assessment, management & mitigation measures and risk ranking are summarised in **Table 3**. All of the potential environmental risks have been assessed during the Artemis-1 Environmental Hazard Assessment session held on the 23rd June 2010, as having low risk.

Table 3 Summary of Environmental Impact Assessment Results

Impact Assessment	Management and Mitigation	Risk Ranking
Presence of drilling rig and offshore support vessels: rig positioning and anchoring. Disturbance to seabed habitat.	• Pre and post mobilisation survey of well location will be conducted by the contracted ROV contractor. • Adherence to anchoring procedures to minimise chain and anchor drag will be adhered to by the Rig and OSV.	Low
Presence of drilling rig and support vessels: interference with other activities. Interference with commercial fishing and shipping, cumulative effects of offshore oil and gas activities and risk of collision with other vessels leading to oil spills.	• Liaison and communication with stakeholders regarding schedules and work plans will be continuously undertaken during the well operations. • Vessel presence will be communicated via Notice of Mariners. • Remote offshore distance, short duration will reduce the extent of inconvenience. • All OSV operations will be conducted in compliance with the AMSA OSV Code 2002 (e.g., radar monitoring, vessel communications). • 500m safety zone to protect Rig infrastructure. • Navigation lights are present on the Rig. • Continuous OSV surveillance. • Commercial shipping lanes through the WA-360-P permit area (if any), will be managed by liaison with AMSA.	Low
Presence of drilling rig and support vessels: artificial lighting. Attraction of seabirds and other marine life and the safety need to other vessels visibility at night.	• Standard maritime safety procedures will be adopted (AMSA). Lighting selected to meet safety requirements. • Crew to record observations of whales and other mega fauna. These will be provided to DEWHA when sighted.	Low
Presence of drilling rig and support vessels: noise from drill rig, drilling vessels and support vessels, helicopters. Behavioural changes to marine mammals.	• Application of DEWHA VSP guidelines – Pre-start up visual observations by a qualified Baker Hughes observer during VSP operations (Records on Offshore Protected Species Observer Training or similar) to be reviewed prior to operation; – Soft-start up procedure (specific Baker Hughes Procedures on Borehole Seismic Survey for Marine Environment in Australian Waters)to be pre - reviewed; – Operating procedures including: i. Visual observations of the *observation zone* must be maintained continuously to identify if there are any whales present. ii. If a whale is sighted within the *observation zone* the operator of the acoustic source must be placed on stand-by to power down the acoustic source. iii. If a whale is sighted within the *shut down zone* the acoustic source must be shut down completely.	Low

	– Low visibility operating procedures. – ***Observation zone*****:** A 3 km horizontal radius from the VSP acoustic source. – ***Shut down zone*****:** A 500 meter horizontal radius from the VSP acoustic source. • Application of DEWHA guidelines for cetacean observation and recording will be adhered to by Rig and OSV. • Operations will be undertaken on the outskirts of the calving period and at the beginning of the migratory, periods for whale species that are likely to occur in the region. • Operations of short duration (approximately 33 days at the Artemis-1 well site). • Noise produced from the drilling Rig (low-level, low-frequency tones), and accompanying OSV in the order of magnitude of noise produced by commercial shipping. • Adoption of encroachment distances from whales by OSV (300 m) and helicopters (500 m) (Australian National Guidelines for Whale and Dolphin Watching 2005).	
Presence of drilling infrastructure and support vessels: impact to visual amenity. Visual impact in near shore areas.	• Proposed operation is of short duration (33 days). • Distance from nearest shoreline (Dampier) is 164 km away.	Low
Drilling discharges: discharge of water based drilling cuttings and muds to sea. Disturbance to water column and benthic communities in immediate area of discharge.	• Drill cuttings will be treated on the shale shaker prior to disposal to maximise recovery and reuse of drill muds. • WBM i.e. environmentally acceptable ULTRADRIL from M-I SWACO is low toxicity, low dilution, lower waste volumes (rapidly disperses) and excellently recyclable. • Drilling mud spills will be prevented by containment facilities surrounding the main deck and mud handling area.	Low
Drilling discharges: discharge of oily water from bilges. Potential localised toxic effects.	• All bilge water passes through an oil / water separator prior to discharge. • All bilge discharges treated to < 15ppm hydrocarbons; MARPOL 73/78 standard for oil water discharge. • Rig preventive maintenance will be audited. • Discharge quality automatically will be monitored with alarm.	
Drilling operations: lost equipment and well completion Disruption to commercial fishing operations.	• Drilling activity is short duration. • Equipment retrieval at end of drilling program. • Record to be kept of any lost equipment overboard. • Consultation to explain drilling program to stakeholders and means to avoid/record/retrieve equipment. • Well plugged and abandoned below seabed.	Low

Discharge of sewage and putrescible wastes, deck drainage, oily wastes: Waste discharge to sea. Disturbance to marine environment.	• Solid waste discharges to sea will be limited to food scraps and sewerage. • Sewerage will be treated through an on-board effluent treatment plant prior to being discharged to sea in accordance with MARPOL regulations (Annex IV). • Macerated to less than 25 mm diameter prior to disposal (sent ashore normally). • All waste oils will be collected and returned to EPA approved shore facility for recycling / disposal. • Disposal in accordance with MARPOL 73 / 78 and Western Australia Environmental Protection (Controlled Waste) Regulations 2004.	Low
Discharge of solid and hazardous materials and waste: Waste discharge to sea. Disturbance to marine environment.	• All OSV will comply with State and Commonwealth legislation for the control of pollution and dumping at sea. • Solids will be returned to shore for disposal. • All hazardous materials will be stored in appropriately bunded/ contained areas. • Wastes will be segregated as required and stored in storage areas and transferred to onshore licensed materials handlers for disposal to a licensed depot. • Waste register will be maintained to record waste management practices and audited to verify compliance. • Records of unplanned emissions and discharges will be kept and maintained. • Induction training will be provided for waste and spill management onboard the Rig. • Disposal in accordance with MARPOL 73/78 and Western Australia Environmental Protection (Controlled Waste) Regulations 2004.	Low
Freight Transfer. Introduction of potential pests such as vermin, species competition, spread of disease.	• Freight transfers from the shore to the Rig will be managed by inspection at the shore base. Equipment including chemical drums arriving packaged to the shore base will be inspected and loaded onto the OSV prior to loading onto the Rig.	Low
Ballast water discharge and hull cleaning: Introduction of marine pests. Marine species will compete for food.	• Ballast water will be exchanged as per vessel procedures, if required. • Rig / OSV to comply with Australian Ballast Water Management Requirements by Australian Quarantine & Inspection Service (AQIS) and the Commonwealth National Biofouling Management Guidance for the Petroleum Production and Exploration Industry. • Rig / OSV to comply with the AQIS.	Low
Deck drainage discharge from drill rig and vessels: waste discharge to sea. Disturbance to marine environment.	• In the event of a condensate / diesel / hazardous substance spill, absorbent materials will be used to remove spill material prior to any washing activities. • The used absorbent material will be containerised and sent to shore as hazardous waste to ensure that no contaminated waste streams are routinely discharged from the deck drainage system. • Shore base waste management / handlers will be audited to ensure requirement compliance. • MSDS forms will be made available for all hazardous substance.	Low

	• Use of oil detection monitoring equipment (OMD-2005 scattered light sensor) for treated oily water, which is maintained under the routine maintenance system will be maintained and kept in place. • Deck treatment systems (separators) for oily wastes and discharge of separated water will be inspected.	
Exhaust and well testing emissions: Emission to atmosphere. Pollution of atmosphere.	• Emissions will be minimised by ensuring that all engines and generators are serviced to manufacturer's specifications. Audits will be undertaken to ensure preventive maintenance requirement compliance. • Fuel consumption will be routinely monitored. • Compliance with MARPOL 73/78 regulations for the Prevention of Air Pollution from Ships.	Low
Accidental spill: fuel spill, condensate spill. Disturbance to marine environment.	• Rig / OSV will implement the approved Shipboard Oil Pollution Emergency Plan (SOPEP) and train the crew appropriately; • Rig / OSV will implement Artemis-1 operation OSCP (Oil Spill Contingency Plan) and train the crew appropriately including monthly oil spill drills. • Rig / OSV will conduct weekly inspections to maintain functional fuel spill equipment and accessibility. • Rig / OSV will not permit fuel to be transferred during inappropriate weather conditions. (Only during daylight hours and under favourable sea conditions only). • Rig / OSV will use appropriate equipment and procedures for transferring fuel from vessel to Rig (e.g., 'Dry-Break' hose couplings and fail-safe fittings); conform to the Australia Offshore Support Vessel Code of Safe Working Practice including maintenance of radar monitoring, vessel communications etc. • Deck scuppers are to be plugged at all times during normal operations to contain any inadvertent spill incident and avoid hazardous waste discharges to the environment. Regular Environmental Audit will be undertaken. • Continual visual monitoring of hoses, couplings, fuel – flow gauges on board and the sea surface during refuelling will be conducted. • Continual radio contact / communication between the OSV and the Rig radio operator will be maintained. • OSV will cease operating and seek safe harbour (or deep water) where conditions make it unsafe, in the view of the OSV Masters, to continue drilling operations support. • Spill modelling has been undertaken to enable oil spill contingency planning and management arrangements. • Incident reporting obligations will be emphasized during Rig specific inductions and meetings. • Rig / OSV will communicate the existence and location of the Environment Plan, Oil Spill Contingency Plan, SOPEP, Vessel Safety Case and Emergency Response Plan documents for open review and reference.	Low

Accidental spill: Chemical spill. Impacts to water quality and marine life.	• Minimisation of chemical usage, storage and waste generation will be carried out where applicable. • Rig will conduct weekly environmental audits and regular maintenance to maintain the containment facilities including spill kit, bunding and drain plugs. • Rig will communicate on waste handling procedures during transfer and operational usage for relevant personnel during the Rig specific induction.	Low
Accidental spills: Blow out, uncontrolled release of reservoir fluids. Impacts to marine fauna.	• Shallow gas survey to understand risk of intersecting hydrocarbon bearing zone while drilling before BOPs will be conducted. • An offset well review will be done to understand likelihood of intersecting over-pressured strata. • Maintenance of all well control equipment will be conducted including routine maintenance of choke and kill line hoses and other fittings to the BOP, and other well control equipment. • Installation of blowout preventers – There will be a BOP on the wellhead during the drilling of the potential reservoirs evaluation hole, which is capable of completely sealing the well if there is the possibility of loss of control. • Routine monitoring of pressure within the drilling fluid system will be conducted. • Rig / OSV will implement Artemis-1 operation OSCP (Oil Spill Contingency Plan) including training of the crew appropriately during monthly oil spill drills and communicating the key environmental expectations during weekly Rig safety meeting.	Low

Management and mitigation measures that will be monitored during the project are provided in the MEO Artemis-1 Environment Plan. The implementation strategy for the Environment Plan specifically details the measures needed to ensure that the environmental performance objectives and standards are met, and identifies:

- Systems, practices and procedures;
- Specific roles and responsibilities;
- Employee training;
- Monitoring, auditing and recording requirements;
- Emergency response planning; and
- Consultation with government and stakeholders.

5 Contact Details

Please direct all queries, comments or request for a copy of the approved MEO Artemis-1 Drilling Operations Environment Plan to:

Mr Texas Richards (Email: T.Richards@australiandrilling.com.au)
Drilling Superintendent,
Australian Drilling Associates Pty Ltd,
Level 5, Rialto North Tower,
525 Collins Street, Melbourne VIC 3000. (Contact no.: 03 8610 3000)

6 Reference

CSIRO 2007.Trophic systems of the North West Marine Region. A WWW publication accessed on 3rd May 2010 at: http://www.environment.gov.au/coasts/mbp/publications/north-west/nw-trophic-systems.html;

Department of Environment, Water, Heritage and the Arts (DEWHA) 2010. *(Recently named as Department of Sustainability, Environment, Water, Population and Communities).* EPBC Act Protected Matters Report. A WWW database accessed on 3rd May 2010 at: http://www.environment.gov.au/;

Department of Environment, Water, Heritage and the Arts (DEWHA).2010. *(Recently named as Department of Sustainability, Environment, Water, Population and Communities).* Historic Shipwreck Protected Zones. A WWW publication accessed on 12th May 2010 at: http://www.environment.gov.au/heritage/shipwrecks/index.html;

Metocean Engineers. 2008 Preliminary Metocean Conditions Report for MEO Australia Ltd Permit WA-361-P on the North West Shelf;

NWSJEMS. 2007. North West Shelf Joint Environment Study. A WWW publication accessed on 15th April 2010 at: http://www.cmar.csiro.au/nwsjems/consultation/factsheet/factsheet.html.