



WA North West Shelf Activities
East Spar Facility (Permit WA-13-L)
Environment Plan: Public Summary
April 2007

This summary of the East Spar Facility (Permit WA-13-L) EP has been submitted to comply with Regulation 11(7)(8) of the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999.

Introduction

Apache Energy Ltd (AEL), on behalf of the joint venture participants, Apache Oil Australia Pty Ltd (55%) and Santos (BOL) Pty Ltd (45%), operates the East Spar field located in permit area WA-13-L, in 94m of water approximately 40km off the west coast of Barrow Island and 63km west of Varanus Island (Figure 1).

The objectives of the Environment Plan (EP) are to:

- Undertake a risk-based environmental assessment of the operation of the facility to identify potential risks and management measures;
- Outline procedures to minimise environmental impacts;
- Outline the implementation of management strategy and responsibilities;
- Meet environmental legislative requirements; and
- Demonstrate Best Practice Environmental Management (BPEM).

The East Spar Facility Environment Plan has recently been revised to comply with the 5 year revision requirement of Regulation 19 of the *Petroleum (Submerged Lands) (Management of Environment) Regulations 1999* (as amended).

Project Description

The function of the East Spar Development is to produce and transport reservoir fluids from the East Spar Field to Varanus Island. The products, sales gas and condensate, are piped from the East Spar field to Varanus Island where the condensate and gas are separated and processed. The East Spar field is managed and maintained through the Varanus Island production facility.

Gas and condensate have been produced from three production wells; East Spar #1, East Spar #3 and East Spar #6. Historically, only occasional small volumes of water were produced from these wells. During production up to 1,000kl of condensate was produced by the wells each day.

The facility comprises a subsea production system, a surface Navigation Communication Control (NCC) Buoy, and subsea export pipeline.

The main components of the subsea system include:

- Stainless steel tie-in spool from the well heads to the heat exchangers;
- Subsea heat exchangers for cooling the produced fluids;
- Control pods containing chokes for regulating the flow from the wells;
- Flexible flowlines from the heat exchangers to the distribution manifold;
- Manifold for combining the flows from the wells in the production pipeline;
- Umbilicals for carrying corrosion inhibitor from the NCC buoy to the subsea infrastructure.

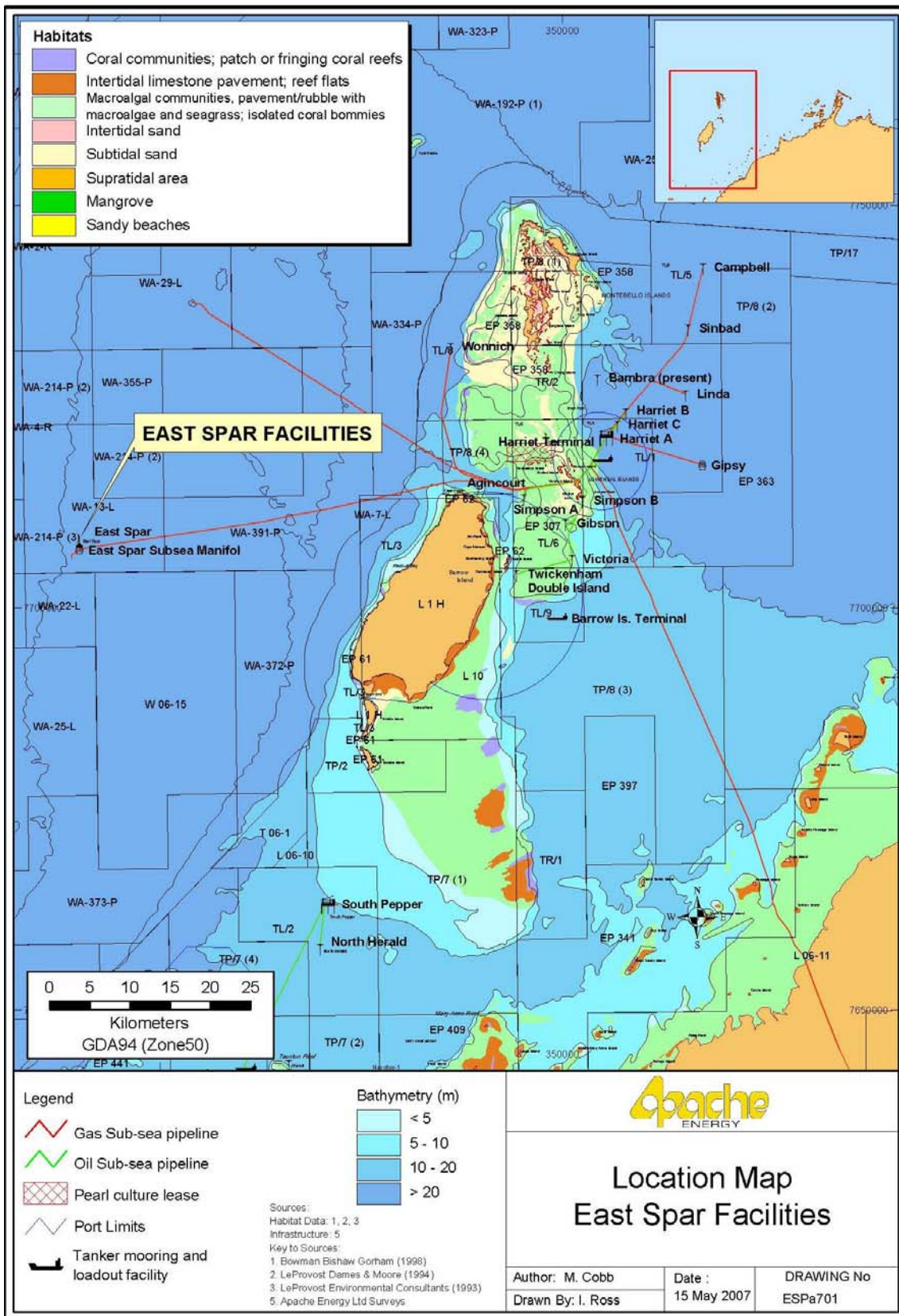


Figure 1 : Location of East Spar Facilities

The NCC Buoy provides a support base for control of the subsea wells; corrosion and hydrate inhibitor storage and injection; and relay of operating data from the subsea facilities to the control room on Varanus Island. Facilities provided on the buoy include:

- Corrosion and hydrate inhibitor storage tanks and injection pumps;
- Hydraulic power unit for subsea control system;
- Diesel storage tanks to fuel the power generators;
- Electric power unit for subsea control system;
- Control system for interfacing with subsea controls and data gathering;
- Communications system for relaying controls and data to shore; and
- Power generations and support facilities.

Production from the manifold at the East Spar location is transported to Varanus Island via a 355mm (14"), 62.5 km long, concrete coated pipeline. The pipeline crosses the western shoreline of Varanus Island at Mangrove Beach.

Receiving Environment

Physical Environment

The NWS lies in the arid tropics region of Australia, which experiences high summer temperatures and periodic cyclones (with associated rainfall). Rainfall is generally low, with evaporation exceeding rainfall. Due to the low rainfall there is little freshwater run-off from the adjacent mainland and shelf waters are usually thermally stratified with a marked change in water density at approximately 20 m. Sea surface temperatures vary annually, being warmest in March (32°C) and coolest in August (19°C). Seawater salinity is a relatively uniform 34-35 parts per thousand throughout the water column and across the North West Shelf (NWS).

Wind patterns are monsoonal with a marked seasonal pattern. From October to March, the prevailing non-storm winds are from the south-west, west and north-west at an average speed of less than 10 knots. From June to August, winds are generally lighter and more variable in direction than in spring and summer. Non-storm winds prevail from north-east through to south-east at average speeds of 5-6 knots. Transitional wind periods, during which either pattern may predominate, can be experienced in April, May and September each year. Extreme wind conditions may be generated in the area by tropical cyclones, strong easterly pressure gradients, squalls, tornadoes and waterspouts.

The dominant component of the NWS is the Rowley Shelf, comprising extensive cemented calcareous limestone sediments, forming a shallow, gently inclining seabed extending from the coast to 40 km offshore to a water depth of 20 m. The East Spar wells, at 94 m water depth, are located on the central-continental shelf region (30-100 m water depth), where the benthic habitat consists of thick carbonate sediments with minimal rocky outcrops.

Biological Environment

Investigation of the benthic community in the East Spar field revealed that the soft bottom sediments are typically inhabited by infaunal invertebrates, dominated by polychaete worms and small bided crustaceans. These fauna are expected to occur in soft sediments across the mid and inner shelf as the pipeline approaches the

shallow waters of the Barrow Island/Lowendal Islands. Other taxa recorded included molluscs, echinoderms, nemerteans and sipunculid worms. Sessile fauna such as bryozoans, sponges and cnidarians represent a relatively small proportion of the benthic assemblages.

The demersal habitat (ocean bottom) of the NWS hosts a diverse assemblage of fish, many of which are commercially exploited by trawl and trap fisheries, for example the genera *Lethrinus* (emperor) and *Lutjanus* (snapper). Pelagic fish (those living within the water column) in this area include tuna, mackerel, herring, pilchard and sardine. The inshore habitats in this region are not considered to be significant nursery grounds for commercially important deeper-water fish species.

Whale sharks (*Rhincodon typus*) are oceanic and cosmopolitan in their distribution, however, they aggregate in and near the waters of the Ningaloo Marine Park during autumn, around the Exmouth region.

Four species of marine turtle nest on sandy shore sites of the Dampier Archipelago, Montebello Islands, Lowendal Islands, Barrow Island, and other coastal islands in the Exmouth region. These are the green turtle (*Chelonia mydas*), flatback turtle (*Natator depressus*), hawksbill turtle (*Eretmochelys imbricata*), and the loggerhead turtle (*Caretta caretta*). All four species are on the National List of Threatened Species. The leatherback turtle (*Dermochelys coriacea*) may also visit the open waters of the shelf. The loggerhead, flatback and leatherback turtles are known to feed on mid-water plankton and benthic animals, and can forage in mid-shelf water depths, so may occur around the East Spar facility.

The nationally threatened dugong (*Dugong dugong*) occurs across the tropical coastal waters of Australia from Shark Bay to Queensland. They are herbivorous and are generally associated with seagrass beds, upon which they feed. Dugongs are commonly found in shallow sheltered areas (less than 5 m deep), often near islands or large bays. Dugong have not been sighted around the East Spar facility.

Dolphins are relatively common in the region. Species known to occur in the region are the bottlenose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*), Indo-pacific humpback dolphins (*Sousa chinensis*) and the striped dolphin (*Stenella coeruleoalba*).

A number of whale species, including the short-finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*), tropical byrdes whale (*Balaenoptera edeni*), southern minke whale (*Balaenoptera acutorostrata*) and humpback whale (*Megaptera novaeangliae*), also occur in the region, the most commonly sighted of these being the humpback whale. This species migrates between the Antarctic waters and the Kimberly region of Western Australia. The peak of their northerly migration between the Exmouth Gulf and the Dampier Archipelago occurs around late July to early August, while the southerly return migration peaks around late August – early September. The East Spar facility is located within the migration corridor.

Eighteen species of seabird have been recorded over the NWS waters. These include petrels, shearwaters, tropicbirds, frigatebirds, boobies and terns, and silver gulls. Of these, eight species occur year round and the remaining 10 are seasonal visitors.

Socio-Economic Environment

Dampier and Karratha are the main service and population centres for the region. Although developed initially for the iron ore industry, these towns have expanded to service the oil and gas industry located on the North West Shelf.

Local people seeking aquatic recreation such as boating, diving and fishing use the coast and islands of the Pilbara. These activities are concentrated in the vicinity of the population centres such as Dampier, Onslow, Point Samson and Port Hedland. The open waters of the around the East Spar facility do not support significant recreational or tourist activity.

Commercial fisheries are active along the Pilbara coast, however fishing effort in the Commonwealth waters is low, with operators favouring the inshore areas. Pearling is the key industry in the region. Live pearl shell for subsequent use in the pearl culture phase is harvested by divers from several nearshore areas off the Pilbara coast, with pearl culture leases located in the Montebello Islands and the Dampier Archipelago. Prawn trawling activities occur within 5 kilometres of the coastline near Onslow and Nickol Bay, with the major target species being the tiger, western king and banana prawns.

The nearest marine conservation area to the East Spar facility is the Montebello / Barrow Islands Marine Conservation Reserves located approximately 40 km to the east.

Table 1 summarises the biological and socio-economic features of the NWS.

Table 1: Indicative NWS biological and human activity seasons

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dugong breeding	breeding								breeding			
Hawksbill turtle nesting												
Flatback turtle nesting												
Green turtle nesting												
Loggerhead turtle nesting												
Coral spawning												
Whale migration						north			south			
Whalesharks												
Algae	growing				Shedding fronds				growing			
Seabird nesting												
Prawn trawling												
Tourism												

Key

	Peak activity, presence reliable and predictable
	Low level of abundance/activity/presence
	Activity not occurring within the area

Environmental Hazards and Controls

The environmental hazards and controls associated with operating the East Spar Facility are summarised in Table 2 below.

Table 2: Environmental hazards associated with the East Spar Facility

Aspect	Routine / Non-Routine	Hazard	Key Hazard Control and Mitigation Measures
Diesel generators	Routine	Combustion products (CO, CO ₂ , SO _x , NO _x , dark smoke).	Maintenance of generators
Diesel generators	Routine	Potential fauna disturbance from noise	Maintenance of generators. Noise levels low, highly unlikely to disturb marine or avian fauna
Navigation lights	Routine	Light Spill	No evidence flashing lights have a negative impact on marine or avifauna
Liquid emission (~200ml of control fluid released into sea during operation of sub-sea safety valves)	Routine	Impact on water quality and benthos	Low toxicity product (HW525) selected for use
Bilge water removal	Routine	Potentially oil / chemical contaminated water	Bilge pumped out as required to support vessel for treatment / disposal at Varanus Island
Localised heat transfer to water in immediate vicinity of heat exchangers	Routine	Potential benthos disturbance (distribution)	Rapid heat dissipation is expected through the action of conduction and current mixing through the water column
NCC buoy, tethers, sub-sea equipment	Routine	Physical alteration of fauna habitat (obstacles; artificial substrate)	Inspection as per AEL Underwater Inspection Manual (AE-00-MG-005) NCC buoy and sub-sea structures originally coated with a low friction paint
NCC buoy, tethers, sub-sea equipment	Routine	Scouring around seabed structures	Inspection as per AEL Underwater Inspection Manual (AE-00-MG-005)
Transfer of diesel fuel from supply vessel to East Spar Buoy – hose failure or separation	Non-routine	Diesel spillage - 30L max (contents of hose) to marine environment. Contamination / pollution of water column with possible toxic effects	Monitored operations - 2 persons on spar buoy, 2 on deck. 12mins /1000L (refueling frequency is approximately twice a year) JSA's Dry break couplings Vessel moored to buoy during suitable weather conditions Communications between vessel and platform

Aspect	Routine / Non-Routine	Hazard	Key Hazard Control and Mitigation Measures
Transfer of diesel fuel from supply vessel to East Spar Buoy – hose failure or separation	Non-routine	Chemical spillage - 30L max (contents of hose) to marine environment. Contamination / pollution of water column with possible toxic effects	Communications between vessel and platform Stenella hose/pump does not drip Pressure gauge on deck Vessel position maintained by Master or moored to platform in suitable weather conditions
Vessels anchoring in vicinity of subsea pipelines	Non-routine	Oil, water and gas release from pipeline rupture due to anchor damage Contamination / pollution of water column with possible toxic effects	500m Exclusion zone and 3nm Cautionary zone around NCC Buoy Facilities marked on navigational charts Navigational lights on Buoy Passive radar image intensifier fitted to the NCC Buoy AEL Anchor Handling Manual for Vessels Operating in the Vicinity of Submarine Pipelines and Subsea Installations (SP-00-SX-036)
Collision between errant vessel and NCC Buoy	Non-routine	Spillage of chemicals or diesel from on-board storage tanks Contamination / pollution of water column with possible toxic effects	500m Exclusion zone and 3nm Cautionary zone around NCC Buoy Facilities marked on navigational charts Navigational lights on Buoy Passive radar image intensifier fitted to the NCC Buoy
Wells - maintenance, process, or workover operations	Non-routine	Reservoir fluid spills from wells during maintenance, process, or workover operations Contamination / pollution of water column with possible toxic effects	Maintenance procedures and JSA's

Environmental Management

The environmental risks associated with East Spar operations, together with environmental performance standards and procedures relevant to these risks have been identified within the EP.

The Operations Superintendent and the Varanus Island Field Superintendent are responsible for ensuring that all procedures are available to personnel and that the procedures are implemented properly. Operations and maintenance manuals, with numerous sub-procedures and guidelines, control the management of the East Spar Facility. They are reviewed on a regular basis and audited by Apache senior management and DoIR Safety/Engineering staff. A summary of relevant environmental procedures and guidelines is provided below:

- Generator maintenance regime (CMMS)
- East Spar Refuelling and Chemical Transfer Procedures (ES-91-IG-099)
- AEL Underwater Inspection Manual (AE-00-MG-005)
- Anchor Handling Manual for Vessels Operating in the Vicinity of Submarine Pipelines and Subsea Installations (SP-00-SX-036)
- Environmental Requirements for Offshore Marine Vessels (AE-91-IQ-202)

Emergency response manuals have been prepared to cater for non-routine incidents such as oil and chemical spills. These include:

- Emergency Response Management Manual (AE-00-ZF-025);
- OSCP Volume 1 – Operations (NWS) (AE-OO-EF-008);
- OSCP Volume 2 – Resource Atlas (NWS) (AE-OO-EF-008/2);
- NWS Operations Consolidated Cyclone Response Plan (AE-91-IF-010);
- North West Shelf Operations Consolidated Emergency Response Plan (AE-00-ZF-002); and
- Incident Reporting Procedure (AE-91-IF-002).

In addition to Apache's Environmental Management Policy, the following environmental commitments are made within the East Spar Facility EP:

- All East Spar Facility (VI) personnel to be aware of the environmental sensitivities and potential impacts from operations;
- Report any incidents which may potentially impact the environment;
- Collate data on the presence and behaviour of whales, sea turtles and other marine fauna in the vicinity of the Facility; and
- Ensure compliance with audit schedule requirements.

Consultation

In preparing the original EP, Apache consulted with numerous stakeholder representatives, including:

- DoIR
- Department of Environment and Conservation (DEC)(Nature Conservation - Marine branch)
- Department of Fisheries WA
- Marine and Coastal Community Network
- Environment Protection Agency (EPA)
- Marine Parks Reserve Authority (MPRA)
- DEC (Nature Conservation - Environmental protection)
- WA Fishing industry Council

In revising this EP, Apache's environmental specialists consulted with East Spar Facility (VI) staff, specialist contractors and Operations Superintendent. In addition Apache's environmental staff also consulted with representatives of the WA DoIR, Petroleum Branch's Environment Division.

Further Details

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