

Vincent Subsea Control System Repair Environment Plan Summary

Subsea and Pipelines

Date: April 2012

Status: Final

1. INTRODUCTION

Woodside Energy Ltd (Woodside) proposes to undertake subsea activities to repair a leak in part of the subsea control system in the Vincent Field. The system forms part of the subsea system tied back to the *Ngujima-Yin* Floating Production, Storage and Offloading facility (FPSO) in the Exmouth Sub-Basin in Commonwealth waters in permit WA-28-L.

The *Vincent Subsea Control System Repair Environment Plan* (EP) has been prepared in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Environment Regulations). The EP has been assessed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

This EP summary has been prepared as per the requirements of Regulation 11(7) and (8) of the Environment Regulations.

2. LOCATION OF THE ACTIVITY

The Vincent field is located within the Production License Area WA-28-L (previously exploration permit WA-271-P) approximately 40 km offshore, north-west of Australia's North West Cape (Figure 2-1). The water depth across the permit varies from 200 m in the east to over 2000 m in the west.

The *Ngujima-Yin* FPSO is located 42 km north of the North West Cape, east of the Vincent reservoir, and is in approximately 350 m water depth. It is 26 km from the Commonwealth boundary of the Ningaloo Marine Park and 32.5km from the boundary of the Muiron Islands Marine Management Area.

Production well VNA-H3 is connected by a spool to the DCA subsea manifold which is located 2.3 km west of the *Ngujima-Yin* FPSO in approximately 364 m water depth. The DCA manifold is connected to the FPSO via a subsea flowline. Table 2-1 summarises the details of the location including surface coordinates and permit area for the proposed activities.

Table 2-1: Vincent Subsea System Locations and Permit Area

Structure	Water Depth (m LAT)	Latitude	Longitude	Title
VNA-H3 Well	364	21° 26' 22.196" S	114° 02' 48.137" E	WA-28-L
DCA Manifold	364	21° 26' 22.751" S	114° 02' 48.265" E	WA-28-L

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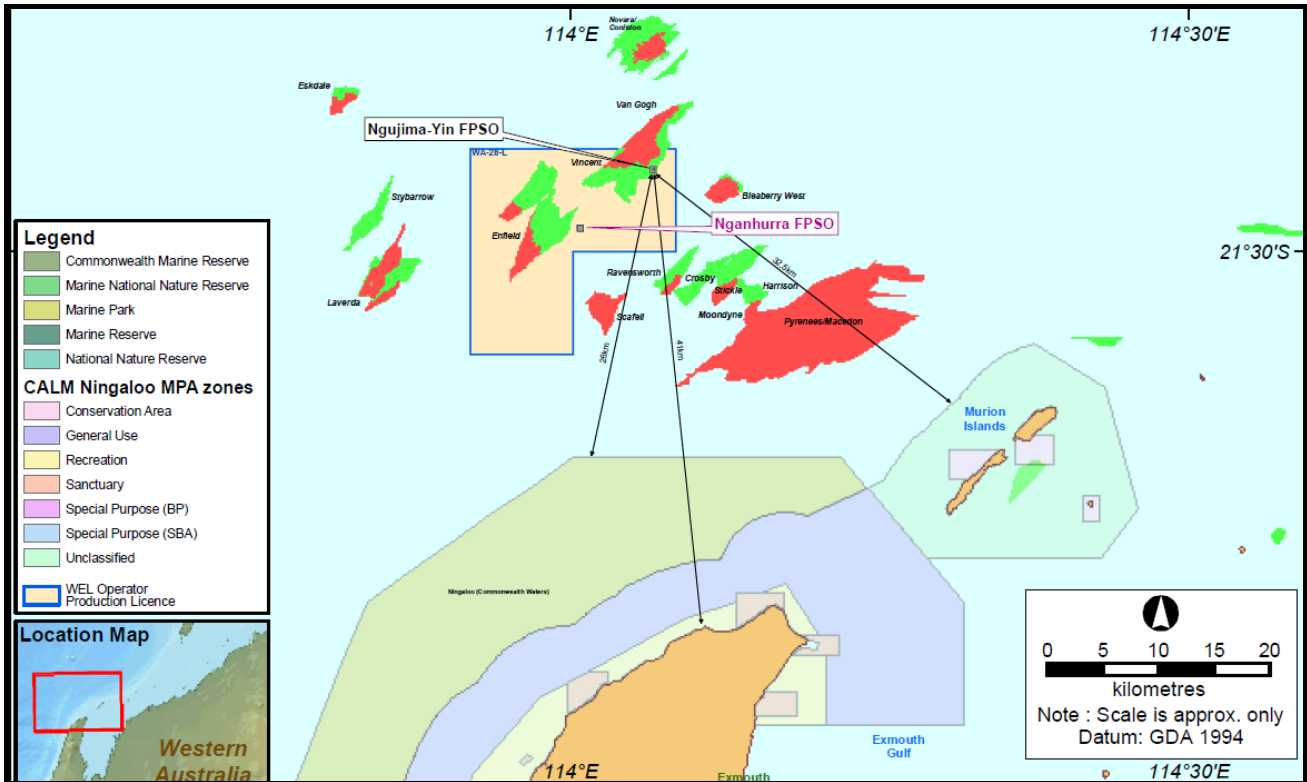


Figure 2-1: Location Map

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1 Physical Environment

The North West Cape is situated in a subtropical environment with tropical cyclone activity from November to May. The summer and winter seasons fall into the periods September-March and May-July, respectively. The major current in the area is the Leeuwin Current, which flows southwards along the continental slope of Western Australia during the cooler months of the year. Vincent is situated in an area with water depths ranging between 100 m and 2,000 m, with most of the area having depths in excess of 1,000 m. The Vincent VNA-H3 spool is situated on a flat, gently sloping area at approximately 364 m water depth. The majority of the seabed within the permit area is generally featureless and consists of fine to medium sediment (silts and sands).

3.2 Biological Environment

The deep water, soft sediment benthic communities at the VNA-H3 spool location are likely to contain a range of widespread and well-represented infauna (dominated by mobile burrowing species, including molluscs, crustaceans and worms) and isolated larger fauna (free swimming cnidarian, demersal fish and benthic crustaceans). Significant benthic communities such as seagrass, algae and scleractinian (reef building) corals are absent from this area.

The region contains a diverse range (approximately 1,400 species) of fish of tropical Indo West Pacific affinity with the greatest proportion of species found in shallow water areas. Reef fish occur mainly on the coral reefs and broken ground around islands and offshore rises. The inshore waters of the Ningaloo Marine Park are reported to support some 500 species of fish.

Whale Sharks aggregate in the waters off Exmouth during late March to early May, with the largest numbers being recorded in April. The timing coincides approximately with the coral mass spawning period, when there is an abundance of food (krill, planktonic larvae and schools of small fish) in the waters adjacent to the reef.

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Hawksbill, flatback, green and loggerhead turtles may pass through the permit area on their way to and from nesting beaches on the mainland and adjacent islands. At sea, the concentration of these animals is low. Turtles are expected to occur mainly in the shallow coastal areas of the region. Aerial surveys across the North West Cape region showed that the vast majority of turtles observed during the surveys were in water depths of less than 50 m. The Green Turtle is known to breed in large numbers on Serrurier Island. Nesting has been recorded as early as August and has been known to continue to late March. Both green and loggerhead turtles are recorded as nesting on the Muiron Islands.

Humpback whales are the most common large whale species sighted around the permit area, with sperm and blue whales likely to be present from time to time. The majority of the whales occur in depths less than 500 m, with the greatest density of whales concentrated in water depths of 200–300 m. Only small numbers of whales have been observed to occur in the deeper offshore waters. The northern migration of Humpback Whales typically commences in June.

3.3 Socioeconomic Environment

There are a number of operational oil and gas fields in the NW Cape region including the Vincent and Enfield and Stybarrow fields. There are a variety of facilities positioned on the fields such as in-situ Floating Production and Storage Offtake facilities, which are accessed regularly by tankers and support vessels that may be anchored or moving through the area.

While there are no defined shipping lanes in the NW Cape region, there are general shipping routes running in a north-south direction along the coast that become north to easterly to the north of Exmouth.

The main marine nature-based tourist activities are snorkelling and scuba diving, Whale Shark encounters and whale watching. Most diving takes place relatively close to shore, e.g. Ningaloo and Bundegi Reefs, and around the reefs fringing the offshore islands, e.g. Muirons and Serrurier Island. There is no recreational diving in the deep waters of the permit area.

The VNA-H3 spool is located within the two Commonwealth fisheries management areas that cover large areas between from the 200 m isobath out to the outer limit of the Australian Fishing Zone and include the Western Deepwater Trawl Fishery and the Western Tuna and Billfish fishery. Total fishing effort is low; typically targeting species in depth ranges of 200 to 700 m water depth and fishing effort is very low in the vicinity of the VNA-H3 Spool.

The VNA-H3 spool is approximately 26 km from the outer boundary of Ningaloo Marine Park (Commonwealth waters) and approximately 32 km from the Muiron Islands Marine Management Area (State waters). There are no known areas of cultural heritage significance in this area.

4. DESCRIPTION OF THE ACTION

The Vincent subsea system includes two identical hydraulic control systems (Systems 1 and 2) for the actuation of subsea valves from the FPSO. The system uses a water-based subsea control fluid 'Oceanic HW443'. The use of two identical systems provides redundancy should one system become inoperable.

A leak has been identified in a System 2 subsea hydraulic control line for the Vincent production well VNA-H3. Consequently System 2 was shut in to stop the hydraulic leak. However this removed the redundancy of the subsea control system. Therefore the scope of work for this project is to isolate the leak on System 2 at VNA-H3 by installing a modified seal plate where the spool couples to the production manifold. The modified seal plate will incorporate a blind connector which will isolate the System 2 line to VNA-H3. This will remove the system redundancy from VNA-H3; however will allow redundancy to be re-instated to the rest of the field. This work will necessitate the opening of the spool to the ocean. Prior to opening, the spool will be flushed to remove liquid hydrocarbons. Some residual hydrocarbons may remain in the spool.

The repair is scheduled for April and May 2012 and will be undertaken over a period of approximately 7 days. The activity will be carried out as a 24 hour a day operation onboard the *Nor Australis* installation support vessel (ISV) mobilised from Dampier. This schedule is subject to change due to operational requirements, vessel availability and external influences such as unfavourable weather and cyclones.

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5. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with the Vincent subsea control system repair (routine and non-routine) to ensure they are reduced to as low as reasonably practicable and will be of an acceptable level using a method consistent with the *Australian/New Zealand Standard AS/NZS ISO 31000:2009 Risk Management* and *HB 203:2006 Environmental Risk Management – Principles and Process*.

The key environmental hazards and control measures to be applied to the Vincent subsea control system repair are shown in **Appendix A**. These are consistent with Woodside corporate and project-specific objectives, standards and criteria. All commitments associated with these will be used to ensure environmental risks are reduced to as low as reasonably practicable and will be of an acceptable level.

6. MANAGEMENT APPROACH

The Vincent subsea control system repair activity will be managed in compliance with the *Vincent Subsea Control System Repair Environment Plan* (accepted by NOPSEMA under the Environment Regulations), other relevant environment legislation and Woodside's Management System (e.g. Woodside Environment Policy).

The objective of the EP is to ensure that potential adverse impacts on the environment associated with the Vincent subsea control system repair activity, during both routine and no-routine operations, are identified, will be reduced to as low as reasonably practicable and will be of an acceptable level.

The EP details for each environmental aspect (identified and assessed in the environmental risk assessment – **Section 5**) specific performance objectives, standards and identifies the range of controls (**Appendix A**) to be implemented (consistent with the standards) to achieve the performance objectives and identifies the specific measurement criteria used to demonstrate that these performance objectives are achieved.

The implementation strategy detailed in the EP identifies the roles/responsibilities and training/competency requirements for all personnel (Woodside and its contractors) in relation to implementing controls, managing non-compliance, emergency response (oil spills) and meeting monitoring, auditing and reporting requirements during the activity. The EP details the types of monitoring and auditing that will be undertaken (including start-up audits and monitoring during the activity) and the reporting requirements for environmental incidents (recordable and reportable incidents) and reporting on overall compliance of the activity with the EP (e.g. report submitted to NOPSEMA within three months of the completion of the activity).

7. CONSULTATION

Relevant stakeholders were identified by Woodside in relation to this activity, as required under Woodside's External Stakeholder Engagement Operating Standard and relevant regulatory requirements. These stakeholders included key Government and non-Government organisations, Federal, State and locally-based emergency response organisations and the wider Exmouth community. Potential external stakeholder issues were reviewed prior to consultation.

As a consequence Woodside prepared and issued to its key stakeholders via email, a fact sheet outlining the proposed activity. The fact sheet included a location map, a summary of the activity scope and approximate duration, the vessel involved and contact details.

Additionally, briefing of Woodside's Exmouth Community Reference Group (CRG), which was also contacted and consulted along with other outlined stakeholders, was held in mid-March (prior to activity) and will be held again in mid-July (post activity) as part of a broader, regular discussion on Woodside's current and future business activities in the area.

Table 7-1 outlines key stakeholders engaged by Woodside in relation to this activity in addition to the approving authority NOPSEMA. Woodside did not receive any feedback, either via email, telephone, text or other communication means, from any of the following stakeholders in relation to this activity.

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Table 7-1: Key Stakeholders – Greater Enfield Area

Organisation	Consultation Method	Date
Shire of Exmouth (Emergency Response)	Email/Fact sheet	22 February 2012
Shire of Exmouth (Staff)	Email/Fact sheet	22 February 2012
Shire of Exmouth (Councillors)	Email/Fact sheet	22 February 2012
Exmouth Chamber of Commerce	Email/Fact sheet	22 February 2012
Gascoyne Development Commission	Email/Fact sheet	22 February 2012
Cape Conservation Group Exmouth (NGO)	Email/Fact sheet	22 February 2012
North West Cape Exmouth Aboriginal Corporation (NWCEAC)	Email/Fact sheet	22 February 2012
Department of Education (Exmouth SHS)	Email/Fact sheet	22 February 2012
Department of Transport (DET) Perth	Email/Fact sheet	22 February 2012
Department of Transport (DET) Exmouth	Email/Fact sheet	22 February 2012
Exmouth Harbour Master	Email/Fact sheet	22 February 2012
Department of Defence	Email/Fact sheet	22 February 2012
Department of Environment and Conservation (DEC) Perth	Email/Fact sheet	22 February 2012
Department of Environment and Conservation (DEC) Exmouth	Email/Fact sheet	22 February 2012
Department of Mines and Petroleum (WA)	Email/Fact sheet	22 February 2012
Australian Maritime Safety Authority (AMSA)	Email/Fact sheet	22 February 2012
Dampier Port Authority	Email/Fact sheet	22 February 2012
Exmouth Police	Email/Fact sheet	22 February 2012
Bristow Helicopters	Email/Fact sheet	22 February 2012
CHC Helicopters	Email/Fact sheet	22 February 2012
WA Fishing Industry Council (WAFIC) Australia	Email/Fact sheet	22 February 2012
RecFish West	Email/Fact sheet	22 February 2012
Fishing (Recreational) Exmouth Game Fishing Club	Email/Fact sheet	22 February 2012
Fishing (Commercial)	Email/Fact sheet	22 February 2012
AMOSC	Email/Fact sheet	22 February 2012
SEWPC	Email/Fact sheet	29 February 2012
Australian Fisheries Management Authority	Email/Fact sheet	29 February 2012
WA Department of Fisheries	Email/Fact sheet	22 February 2012
Exmouth General Community (800 email addresses provided by local service provider)	Email/Fact sheet	23 February 2012

8. CONTACT DETAILS

Further information about the Vincent subsea control system repair activity can be obtained from:

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APPENDIX A: Summary of Key Environmental Hazards and Control Measures to be Applied to the Vincent Subsea Control System Repair

Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
Disturbance to marine habitats from equipment deployment and sediment relocation around spool	<ul style="list-style-type: none"> Localised physical damage and smothering of seabed habitats 	<ul style="list-style-type: none"> The vessel will remain on location using dynamic positioning and will not use anchors (except if required in emergency) Worksite surveyed via remotely operated vehicle prior to deployment of equipment to seabed to identify suitable locations away from critical habitat Equipment deployed to planned positions on seabed Sediment relocation monitored by remotely operated vehicle video to ensure removal is minimised to that required for the activity
Disturbance to marine fauna from vessel presence, lighting and noise	<ul style="list-style-type: none"> Behavioural and physiological effects on marine fauna 	<ul style="list-style-type: none"> Vessel speed will not be greater than 6 knots within 300 m of a whale (caution zone) and will not knowingly approach closer than 100m of a whale Helicopters shall not operate lower than 1650 ft or within the horizontal radius of 500 m of a cetacean known to be present in the area Sightings of marine mammals and whale sharks will be recorded and reported at 6 monthly intervals to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities at cet.sightings@environment.gov.au
Atmospheric emissions from internal combustion engines	<ul style="list-style-type: none"> Reduced localised air quality from atmospheric emissions. Greenhouse gas emissions resulting in global warming 	<ul style="list-style-type: none"> Use of low sulphur fuel when it is available to minimise emissions from combustible sources Emissions managed by the implementation of a preventative maintenance system to ensure all diesel powered equipment is operating efficiently A valid IAPP (International Atmospheric Pollution Prevention) certificate shall be held by vessels of 400GT or more
Introduction of invasive marine species via ballast water or hull fouling	<ul style="list-style-type: none"> Introduction and establishment of invasive marine species and displacement of native marine species 	<ul style="list-style-type: none"> No discharge of high-risk ballast water within Australian territorial seas (within 12 nautical miles of Australian territories) including Australian ports Woodside's invasive marine species risk assessment will be undertaken for all vessels and immersible equipment planning to enter and operate within nearshore waters around Australia. Nearshore areas include all waters within 12 nautical miles of land and in all

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<p>waters less than 50 metres deep (at Lowest Astronomical Tide)</p> <ul style="list-style-type: none"> Based on the outcomes of each invasive marine species risk assessment, management measures commensurate with the risk will be implemented to minimise the likelihood of IMS being introduced and establishing in Australian waters
Planned discharges of hydrocarbons and chemicals	<ul style="list-style-type: none"> Localised reduction in water quality 	<ul style="list-style-type: none"> Sulphamic acid is diluted with water to a maximum concentration of 20% Adherence to project-specific flushing procedures which specify the optimum time frames, pressures and flow rates for maximum removal of crude oil from the spool based on flushing modelling Prior to disconnection pressure in the spool will be reduced to near ambient pressure to minimise release volumes to as low as reasonably practicable Woodside will only utilise flushing, commissioning and pressure test fluids that have a Gold or Silver CHARM rating, a Group 'D' or 'E' OCNS rating, or are classified as a PLONOR (Poses Little Or No Risk to the environment) chemical
Routine discharges of oily water, sewage and putrescible wastes	<ul style="list-style-type: none"> Localised reduction in water quality 	<ul style="list-style-type: none"> Onboard sewage treatment system is certified by the International Maritime Organisation Moderate rate of sewage discharge while proceeding at >4kn >4nm from land (comminuted and disinfected) or >12nm from land (not comminuted and disinfected) with no visible floating solids or discolouration of the surrounding water A valid ISPP (International Sewage Pollution Prevention) certificate shall be held by vessels of 400GT or more No discharge of putrescible wastes unless ground or comminuted to particles <25mm
Waste management	<ul style="list-style-type: none"> Localised reduction in water quality 	<ul style="list-style-type: none"> All solid, liquid and hazardous wastes (other than sewage, grey water and putrescibles wastes) will be incinerated (in a certified incinerator) or compacted (if possible) and stored in appropriate containers in designated areas and sent ashore for recycling, disposal or treatment by a licensed and approved waste management contractor Disposal of any oil sludges/slops in port must be recorded in the vessel oil record book All storage facilities and handling equipment will be in good working order and designed in such a way as to prevent and contain any spillage as far as practicable Appropriate spill clean-up equipment (e.g. absorbent mats) will be located within or near

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		storage areas where there is the potential for spillage
Unplanned discharges of hydrocarbons and chemicals	<ul style="list-style-type: none"> • Toxic effects on marine fauna and flora • Reduction in water quality 	<ul style="list-style-type: none"> • Proven well and manifold isolations and relevant Woodside engineering operating standards in place prior to spool disconnection and throughout activity • Manifold will be operating below ambient pressure (or wells shut in if cannot be achieved) while spool is disconnected to change out the seal plate • All rigging certified and third party validated by a marine warranty surveyor prior to trial lifts and sail-away • Crane and equipment certified and preventative maintenance undertaken • All lifting appliances such as baskets fully certified and load tested which includes all lifting points prior to mobilisation to the location • Activity specific job hazard analysis (JHA) conducted and permit to work (PTW) obtained for sea fastening and overside lifts. • Vessel off location to designated safe area during deployment/recovery operations • The vessel will return to port for refuelling. There will be no refuelling of the vessel on site under normal operations • Refuelling will not take place in Exmouth Gulf • A vessel bulk transfer procedure will be in place for unforeseen diesel transfers (refuelling) that includes specific control and mitigation measures • Spill kits on board will be well stocked and readily available with personnel trained in their use • The vessel will have a Shipboard Oil Pollution Emergency Plan and a valid IOPP (International Oil Pollution Prevention) certificate for managing spills onboard • Chemical containers and injection package for the possible secondary spool flush will be self-bunded or located in a bunded area on the deck of the vessel • A plan to manage vessel waste will be in place detailing wastes generated and disposal requirements • All chemical and hazardous wastes will be segregated into clearly marked containers

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Source of Risk (Hazard)	Potential Environmental Impact	Control/Mitigation Measures
		<p>prior to onshore disposal.</p> <ul style="list-style-type: none"> All storage facilities and handling equipment will be in good working order and designed in such a way as to prevent and contain any spillage as far as practicable All hazardous substances (as defined in <i>NOHSC: 1008 (2004) – Approved Criteria for Classifying Hazardous Substances</i>) will have a Material Safety Data Sheet (MSDS) readily available on board.
Vessel collision resulting in diesel spill	<ul style="list-style-type: none"> Toxic effects on marine fauna and flora Reduction in water quality 	<ul style="list-style-type: none"> The vessel has valid dynamic positioning certification. Maintain a 500 m safety exclusion zone around the vessel Commercial shipping and other vessels will be advised of the position of the vessel and any exclusion zones around the vessel Spills to sea will be managed as per Woodside Corporate Oil Spill Response Plan in conjunction with the Vincent Subsea Control System Repair Oil Spill Action Plan
Disturbance to social and community values from interaction with fisheries and shipping	<ul style="list-style-type: none"> Disruption to commercial and recreational fishing vessels Disruption to shipping activities 	<ul style="list-style-type: none"> Maintain a 500 m safety exclusion zone around the vessel Marine notices distributed to relevant parties Pre-activity notification/consultation with external stakeholders, as required

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