



Stybarrow Operations Management System

Environment Critical Plan

Stybarrow Operations Environment Plan Summary

Document Number: HSE-E-0001-0001

Parent Document: Operations Environment Plan

Document Compliance

Internal Requirements

Refer to BHP Billiton Petroleum HSE Management System

Statutory Regulations:

OPGGS Act and OPGGS Env Regulations, EPBC Act

REV	DATE	Originator	Reviewer	Approver
0	26/11/2010	R Smith	OIM	N Ross

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1. FACILITY DESCRIPTION

BHP Billiton Petroleum (BHP Billiton) is operator of the Stybarrow Development, which covers the Stybarrow and Eskdale fields in WA-32-L.

The Stybarrow Development consists of six production wells, two gas lift wells, one gas injection and two water injection wells. These wells are connected to an offshore Floating Offloading, Production and Offloading (FPSO) facility, which has a design life of 15 years. The coordinates of the wellheads and FPSO are listed in Table 1 below.

The Stybarrow FPSO is located approximately 40 km from the Ningaloo Marine Park, approximately 53km north-west of Australia's North West Cape and 55km west-north-west of Exmouth (Figure 1). Water depth varies from approximately 700 m in the east of the permit to 1,000 m in the west. The FPSO is located in approximately of 850 m water.

The Stybarrow FPSO is a new build double-hulled tanker. It is equipped with a disconnectable mooring and propulsion system, which will allow evasion of cyclones. The topside processing facilities consist of oil/water/gas separation systems, water injection, and gas compression equipment.

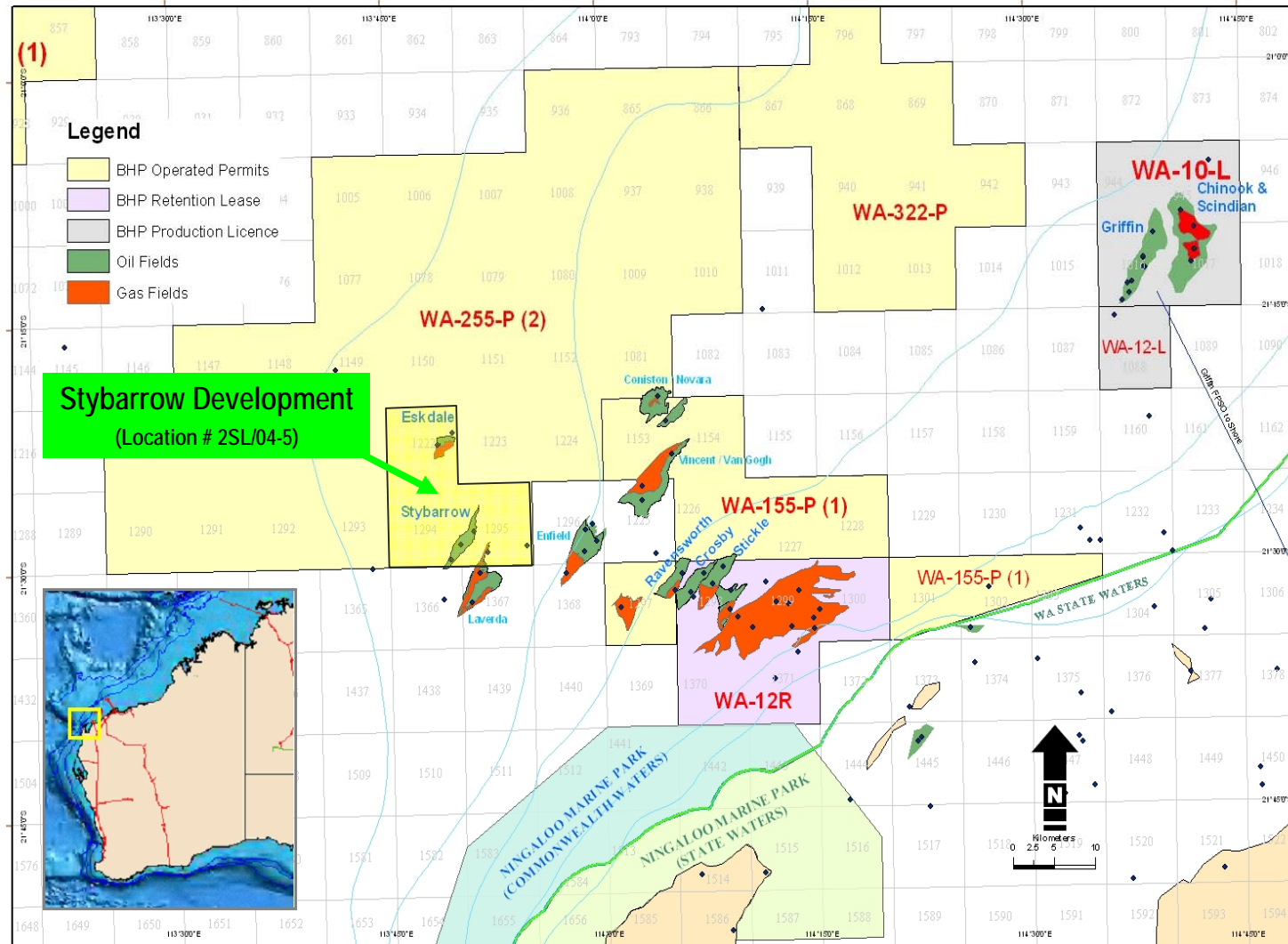
Once separated from gas and water, crude oil will be exported from the FPSO onto trading tankers. During normal operations, gas and produced water will be reinjected into field reservoirs.

Table 1 - Wellhead & FPSO Locations

Well name	Shortened	Drill Centre	Well Type		Easting	Northing
Stybarrow FPSO	FPSO	-	-	-	170853.5	7624805.2
Stybarrow 5	I-3	A	Vertical	Water Injector	173119	7622683.9
Stybarrow 6	I-2	A	Vertical	Water Injector	173143.9	7622636.2
Stybarrow 7H	H-2	C	Horizontal	Producer	171413.3	7619728.6
Stybarrow 8H	H-1	C	Horizontal	Producer	171403.1	7619659.9
Stybarrow 9	I-1	B	Vertical	Water Injector	171032.3	7621985.6
Stybarrow 10H	H-3	B	Horizontal	Producer	170958.1	7621964.1
Stybarrow 11H	H-4	B	Horizontal	Producer	170980.5	7622056.3
Stybarrow 12H	H-5	A	Horizontal	Producer	173174.2	7622561.3
Eskdale 3H	EH-1	D	Horizontal	Producer	170065	7632345.3
Eskdale 4	EG-1	D	Vertical	Gas Injector	170024.5	7632318.2

Eastings & Northerlies in Universal Transverse Mercator (UTM) Projections, Zone 50, Central meridian 117 °.

Figure 1: Stybarrow Field Location



2. RECEIVING ENVIRONMENT

The Stybarrow Environmental Impact Statement included a full description of the physical, social and biological environment around the Stybarrow Development Area, which is summarised below.

The results of high-resolution geophysical surveys, video surveys and seabed sampling indicate that the seafloor at the well locations is predominantly featureless and consists of soft fine sediments (clay/silts). Seabed surveys have indicated a low abundance and patchy distribution of fauna dominated by echinoderms. While some unusual species were recorded, the same general collection of species is widespread and well represented along the continental shelf and upper slope in this region.

A variety of whale and dolphin species have been recorded during offshore surveys in the vicinity of the development. Some species have regular and predictable seasonal presence while others have less well known migratory patterns or are transient at all times of the year.

Humpbacks are the most abundant whale species and are present between June and November. Individuals were recorded up to 80km offshore. A peak in average numbers was recorded over a three-week transition period commencing in late August, when northern and southern migrations overlap. Overall, the highest concentrations of pods were observed south and east of the Stybarrow Development in water depths of around 200 m during the northern migration, 200 to 300 m during the transition period, and in waters shallower than 200 m during the southern migration.

Whale shark aggregations off Ningaloo Reef generally occur between April and June and encounters mainly take place within a few kilometres of the reef.

The closest population centre to the Stybarrow Development is the town of Exmouth. Exmouth is a popular tourist centre, based in large part on the natural resources contained in the Cape Range National Park and Ningaloo Marine Park. Other commercial activities in the Exmouth region include prawn fisheries and defence related activities.

An active community consultation programme was first initiated by BHP Billiton during the initial exploration activities in the permit area. This programme remains in operation and is continuously being updated to ensure that issues of concern are identified, discussed and where possible resolved.

The consultation programme has included:

- Liaison by a BHP Billiton External Affairs Advisor and Environmental Specialist to manage the programme
- Face-to-face briefings and discussions;
- Periodic written newsletter updates posted to stakeholders;
- A 1800 toll-free telephone number;
- Community Reference Groups (CRG) established in Exmouth and Perth; and
- Advertising of public comment opportunities in newspapers for activities undergoing EPBC Act processes.

3. ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT

The BHP Billiton HSE Management System is hierarchical, with the BHP Billiton Charter and Sustainable Development Policy providing key guidance regarding business practices.

Under the Charter and Sustainable Development Policy, BHP Billiton has a number of Group Level Documents that are a series of policies, standards and procedures which give effect to the intentions, directions and mandatory requirements arising from the BHP Billiton Operating Model. The BHP Billiton Petroleum HSE Management System has been established to assure compliance with the HSE Group Level Documents and other Petroleum specific requirements. All Petroleum sites must maintain up to date practices that adhere to the requirements contained in the Petroleum HSE Management System.

Stybarrow has a HSE Management System in place, which addresses the requirements of the Petroleum HSE Management System, and is also compliant with ISO 14001 Environmental Management System.

A systematic approach is taken to the management of hazards and risk through the identification and assessment of hazards and risk, the identification of mitigation and control measures, the establishment of objectives, plans and performance standards, and the development of specific documentation. Table 2 summarises the key environmental aspects and the operations related activities that may lead to these aspects being adversely affected.

Table 3 provides a summary of environmental objectives, standards and performance criteria. All staff and contractors taking part in the Stybarrow Operations will be advised of their responsibilities prior to commencement of activities. This will occur through induction and awareness presentations that will be given to all crew.

Further information regarding Stybarrow Operations may be obtained from BHP Billiton's external affairs department via telephone on toll free 1800 110 258 or by writing to:

External Affairs Manager
BHP Billiton Petroleum Pty Ltd
PO Box J668
PERTH WA, 6842.

Table 2 - Environmental Aspects and Operational Activity Interface

Activity	Aspect																							
	Physical presence	Light	Noise	Sediment impacts	Water quality	Biota impacts	General wastes	Hazardous wastes	Gallery scraps	Sewage and grey water	Ballast water	Hydrocarbon / Chemical contamination	Produced water	Deck drainage / oil in water	Desalination brine	Cooling water	Subsea control fluids	Anti fouling	Greenhouse gas	Combustion products	Venting and fugitive emissions	Ozone depleting substances	Onshore waste	
Routine Events																								
FPSO presence	√	√	√	√		√	√		√	√	√							√						
Power generation			√																√	√				
Oil production												√					√				√			
Oil processing					√							√								√				
Water injection												√								√				
Gas injection												√								√				
Seawater treatment					√							√			√	√								
Cooling or heating					√											√								
Flaring and venting												√								√				
Use of safety systems																						√		
Maintenance							√					√											√	
Cargo offloading	√							√				√								√				
Materials loading	√							√				√								√				
Non-hazardous waste disposal							√																	√
Hazardous waste disposal								√				√												√
Sewage and grey water	√				√	√				√														
Food waste disposal	√				√	√		√																
Deck drainage					√							√		√										
Diesel and chemical storage	√											√												
Helicopter operations			√																√	√				
Support vessel services	√	√	√			√	√		√	√	√			√									√	
Non-routine events																								
Well completions	√	√	√				√	√				√												
Well work-overs	√						√	√				√												
Cyclone response			√								√	√							√	√				
Flaring		√																	√					
Produced water discharge												√	√											
Accidental events																								
Hydrocarbon spills	√			√	√	√						√												
Chemical spills	√			√	√	√						√												
Introduced species	√					√					√													

Table 3: Summary of Environmental Objectives, Standards and Performance Criteria

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria
Noise	No significant adverse effect on marine biota No significant impact on coastal or island communities	EPBC Act Regulations 2000 Pt 8 OPPGS Env Regs, r.13 and 14 APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	Helicopter flights will be carried out during daylight hours only, except if required during emergencies (and training purposes).
			Helicopter flights routed to avoid sensitive areas (e.g. seabird nesting areas Muiron Island)
			Helicopters will not approach within 500 metres (vertical and horizontal) of any observed whales unless necessary for take off and landings on the FPSO.
			Underwater noise survey during routine operations to be carried out by noise specialist and reported to DMP and SEWPaC
			Vessel-Whale interaction procedures to be implemented to avoid interference with whales
General wastes	Minimise incremental increases in waste production Maximise efficient resource utilisation	EPBC Act 1999 Environmental Protection Act 1986 (WA) APPEA Code of Environmental Practice ICCM Framework BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	Approved Waste Management Plan in place
			Waste Management Audit
			Hazardous material to be properly contained and managed
			Segregation of all waste at site where practicable
			Volumes of wastes transferred ashore will be monitored and recorded
			Induction will cover waste management procedures
			NORM monitoring and handling will be carried out in compliance with NORM management procedure
			NORM disposal will be carried out in compliance with government approved disposal option
Sewage and greywater	No significant reduction in ambient water quality No significant adverse effects on marine biota No significant adverse aesthetic effects.	OPPGS Env Regs, r.29 (1) Protection of the Sea (Prevention of Pollution From Ships) Act 1993, Division 2 APPEA Code of Environmental Practice ANZECC Guideline for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	Volumes of sewage and greywater discharged to sea will be estimated.
			Water treatment facility operating within manufacturer specification
			Sewage and greywater disposed of in accordance with MARPOL 73/78 Annex IV
Slops Discharge	No significant reduction in ambient water quality No significant adverse effects on marine biota No significant adverse aesthetic effects.	EPBC Act 2000 OPPGS Env Regs, r.13, 14 and 29 (1) ANZECC Guidelines for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	Slops and produced water discharged in compliance with technical procedure
			Slops water will be monitored for oil-in-water content during marine mode (≤ 15 mg/L limit). Non-compliance of OIW levels reported to AMSA
			Slops water will be monitored for oil-in-water content when PFW is diverted to the tank (≤ 30 mg/L 24hr average). Non-compliance of OIW levels reported to DMP
			Process and utility equipment integrity checks
			Operating and maintenance procedures audited
			Automatic diversion to holding tanks if concentration oil in water of overboard discharges exceeds 30ppm.

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria
			Batch dosage of production chemicals will be avoided during periods of production water discharge to sea Chemical selection process considers environmental friendly chemicals Checks conducted of the in-line analyser Calibration of the in-line analyser Function tests of the in-line analyser Records of volumes and OIW content of slops discharges maintained
Chemical spills	No significant adverse effect on water quality No significant adverse effects on marine biota	EPBC Act 1999 OPGGS Env Regs r. 13 and r.14 Environmental Protection Act 1986 (WA) APPEA Code of Environmental Practice ICCM Framework ANZECC Guidelines for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	Internal recording and reporting of all spills in accordance with IHR procedures. Inductions to operation personnel covering chemical management Oil Spill Response Plans and associated periodic response exercises Inspections of spill kits conducted to ensure adequate stocks are maintained Certified bulk chemical containers ('bulkies') are used for transportation and storage of chemicals Chemical storage is properly banded Records of chemical consumption rates maintained. No chemical loading/offloading commencing after dark Inspection and integrity maintenance of the chemical injection flow metres and transmitters conducted. Assessments made of chemical dosage rates and effectiveness
Hydrocarbon spills	No significant adverse effect on water quality No significant adverse effects on marine biota	EPBC Act 1999 OPGGS Env Regs r. 13 and r.14 Environmental Protection Act 1986 (WA) APPEA Code of Environmental Practice ICCM Framework ANZECC Guidelines for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	DMP notified and written reports submitted in the event of a spill >80 litres (a Reportable Incident). Internal recording and reporting of all spills in accordance with IHR procedures. Notice to mariners and establishment of exclusion zones Oil Spill Response Plan is in place, reviewed and tested through periodic response exercises. Deployment capability of oil spill equipment within 12 hours Periodic review of trends in spill related incidents. Real-time oil spill fate and trajectory modelling available at all times Stocks of spill response equipment including dispersants on-site and in Exmouth and Dampier are inspected to ensure adequate stocks are maintained Offtake and bunkering operations conducted in accordance with the 'Offtake Operations Manual' and Diesel Oil Bunkering Operations Visual inspections of offtake and bunkering hoses and hose reels conducted. Offloading hose integrity management through periodic pressure testing Support vessel procedures are maintained Threshold sea-state conditions for re-fuelling are maintained as per tanker offtake and bunkering procedures Ongoing critical equipment integrity checks Lifting procedures e.g. to avoid dropped objects are in place. Riser emergency shutdown valve (SDV's and BDV's) testing completed.

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria
			Production well subsurface safety valves leak-off tests conducted Periodic ROV surveys of flowlines and other sub-sea equipment to ensure integrity Trading tanker certification and vetting system, i.e. no 'ships of shame' Cyclone monitoring and related procedures and disconnection of offtakes in advance of cyclones or above nominated sea-state conditions Operational procedures to avoid potential for spills Compliance with MARPOL requirements when in marine mode Personnel of FPSO and supply vessels training and competency assessment in emergency and oil spill response measures. Scheduled external hull inspections conducted to ensure class requirements are maintained. Class inspections of tanks and void spaces conducted.
Greenhouse Gas	Minimise contribution of greenhouse gases to atmosphere consistent with BHP Billiton's Climate Change Policy Efficient use of resources	APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton Climate Change Policy BHP Billiton Petroleum HSE Management System	Procedures in place for GHG emitting equipment to ensure efficient operation Monitoring procedures in place to detect fugitive emissions Operational management procedures of cargo tank vapour spaces to reduce emissions to ALARP Flaring management plans in place, to define procedures in event of flaring of surplus gas Flared gas intensity limit defined and approved for the facility. Non compliance to be reported to DMP Calculation of flare gas flow rate is pressure and temperature compensated and performed by Flare Gas Flow Computer. Inspection and integrity maintenance conducted of the HP and LP flare gas flow meters and transmitters conducted Inspection of the HP Flare Tip and LP Flare Tip conducted. Inspection and integrity maintenance of the HP and LP Flare Tip sensors conducted. PSV recertification conducted. Stybarrow GHG Management Plan is periodically reviewed, updated and communicated to the workforce. Reporting of volumes of gas flared. Emissions from gas flared calculated using E&P Forum Emission Factors. Periodic review / assessment of actual flaring volumes against predicted volumes.
Marine fauna impacts	No significant adverse effects on marine biota	EPBC Act 1999 OPGGS Env Regs, r.13 and 14 APPEA Code of Environmental Practice MARPOL 73/78 Annexe IV ANZECC Guideline for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	Adherence to EPBC Guidelines for interactions with cetaceans. Visual whale sighting records will be recorded and forwarded to SEWPaC. Boat-based whale surveys will be carried out by cetacean specialists. The need for and frequency of whale monitoring will be reviewed after the first survey in consultation with SEWPaC Cetacean interaction guidelines in place to reduce risk to cetaceans Reduce propeller power to minimum required for safety manoeuvres Noise and light impacts will be limited where possible TBT will not be used in antifouling paint on FPSO AQIS requirements will be followed for ballast water management

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria
Subsea control fluids	No significant adverse effect on water quality No significant adverse effects on marine biota	EPBC Act 1999 OPPGS Env Regs r. 13 and r.14 Environmental Protection Act 1986 (WA) APPEA Code of Environmental Practice ICCM Framework ANZECC Guideline for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	Low environmental impact chemicals selected Tank level detection (offshore) Usage of chemicals is recorded
Multiple Users	No significant impacts upon other users of the sea No significant impact on visual amenity for coastal or island communities	EPBC Act 1999 OPPGS Env Regs r. 13 and r.14 APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System BHP Billiton Petroleum Environment Controls	Flared gas volumes will be recorded Complaints from other users are recorded Application of safety zones around FPSO Radio communication to other users of the sea
Dropped Objects	No significant impact to seabed habitat No significant impact to seabed biological communities No significant adverse effects to marine biota	OPPGS Env Regs, r.13 and 14 APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	Loading / offloading procedures Use fixed moorings and DP where possible
Light	No significant adverse effect on marine biota. No significant impact on visual amenity for coastal or island communities	OPPGS Env Regs, r.13 and 14 APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton Petroleum HSE Management System	Flared gas volumes will be recorded Re-injection of surplus gas will avoid intense flaring during normal operations Light spill to be minimised but kept at sufficient levels for safe operation