BHP

MINERVA
OIL POLLUTION EMERGENCY PLAN

Document No: MN/HSEC/14/020

REVISION RECORD					
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5	31/10/2019	Issued to NOPSEMA for Cessation EP
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A	15/10/2010	Update as part of the 5 yr resubmittal to NOPSEMA

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Oil Pollution Emergency Plan Layout

1 Introduction

1.1 Purpose

This Minerva Oil Pollution Emergency Plan (OPEP) has been developed to establish the processes and procedures within BHP Billiton Petroleum Pty Ltd (BHP) to ensure a constant vigilance and readiness is maintained to prevent and, where required, respond to and effectively manage incidents that may occur during the Cessation phase in permit areas VIC/L22 and VIC PL33, offshore Victoria over a 5 year period.

This OPEP is an appendix to the Minerva Cessation Environment Plan (EP) (Commonwealth) (MN/HSEC/04/021) and is required under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations* (OPGGS (E) Regulations) for approval to undertake petroleum activities in Commonwealth waters.

The Minerva Gas Plant development was assessed as a joint Commonwealth / State Environmental Impact Statement (EIS) – Victorian Environment Effects Statement (EES) under the *Commonwealth Environmental Protection (Impact of Proposals) Act 1974* and the Victorian *Environment Effects Act 1978*. The Victorian Government approved the Environmental impact assessment (EIA) in March 2000 and approval from the Federal Government was granted in March 2001.

1.2 Scope

This OPEP shall apply to Minerva cessation activities, which include:

- Offshore activities including subsea flow line disconnection/cutting and plugging;
- Inspection Maintenance and Repair (IMR) of subsea infrastructure (wellheads, flow lines, umbilical, manifold, pipeline); and
- Environmental monitoring.

Vessels are required to perform the above activities.

Specifically in reference to oil spill preparedness, this OPEP contains:

- A summary description of the activity and locations (Section 1.4);
- A list of the spill scenarios that may occur during the activity (Section 2);
- Outline of activities associated with a First Strike Response to an oil spill (Section 3.1); and
- Details associated with each of the response strategies (Section 4).

The *Offshore Petroleum and Greenhouse Gas Storage* Act (OPGGS Act) provides the regulatory framework for all offshore petroleum exploration and production and greenhouse gas activities in Commonwealth waters (those areas more than 3 nm from the Territorial sea baseline and within Commonwealth Petroleum Jurisdiction Boundary).

Victoria has specific emergency management legislation, and during a spill this legislation takes precedence. The scope of this plan includes oil spills that may cross jurisdictional boundaries and assumes that if a spill occurs, agencies will respond in a manner consistent with their legislation and advice provided during consultation.

1.3 Environmental Performance Outcomes

Environmental Performance Outcomes	Measurement Criteria
Prevent impact to extreme and highly sensitive environmental receptors from a worst-case hydrocarbon spill and manage to as low as reasonably practical (ALARP) impact to other ecosystems.	Monitoring report results. Outcome of operational NEBAs recorded during an incident response.

No effects on water quality, marine biota or sensitive habitats or Aboriginal registered sites of cultural heritage after termination of the spill response.	Sampling analysis reports.
As per Stakeholder Management Plan (SMP), keep stakeholders informed of status of the hydrocarbon spill response to aid in the mitigation of impacts to social and economic activities.	Communication log indicating stakeholders have been advised as per the SMP.

BHP aims to achieve the primary Environmental Performance Outcomes (EPO) of this OPEP by maintaining a constant vigilance and readiness to prevent and, where required, respond to and effectively manage incidents via the following strategies:

- Initiating source ***Control*** activities as soon as reasonably practicable in order to minimize the spread of oil to the sea surface.
- ***Assessing*** spill characteristics in order to ***Report*** clear and accurate information.
- ***Monitoring*** the spill in order to identify key marine and coastal resources in need of protection.
- ***Responding*** to the spill using response strategies which are efficient and do not, themselves, damage the environment.

1.4 Activity Location

The Minerva gas field is located approximately 10 km offshore from Port Campbell, Victoria, in the VIC/L22 permit area (Table 1-1 and Figure 1-1).

Table 1-1: Minerva offshore locations

LOCATION DETAILS	
Location:	(VIC/L22), approximately 10 kms offshore • Latitude 38° 42’ 31.5”S • Longitude 142° 57’ 43.1”E
Water Depth:	Well site in approximately 86 m depth

1.4.1 Operations Area

The Operations Area defines the geographical boundary of the cessation activities and is shown on Figure 1-1. It includes the Petroleum Safety Zone (PSZ) which extends to a distance of 500 metres (m), measured from each point of the outer edge of each of the wells and subsea equipment in the field, and a 100 m wide corridor extending either side of the outermost asset along the pipeline route to the Commonwealth-State waters boundary.

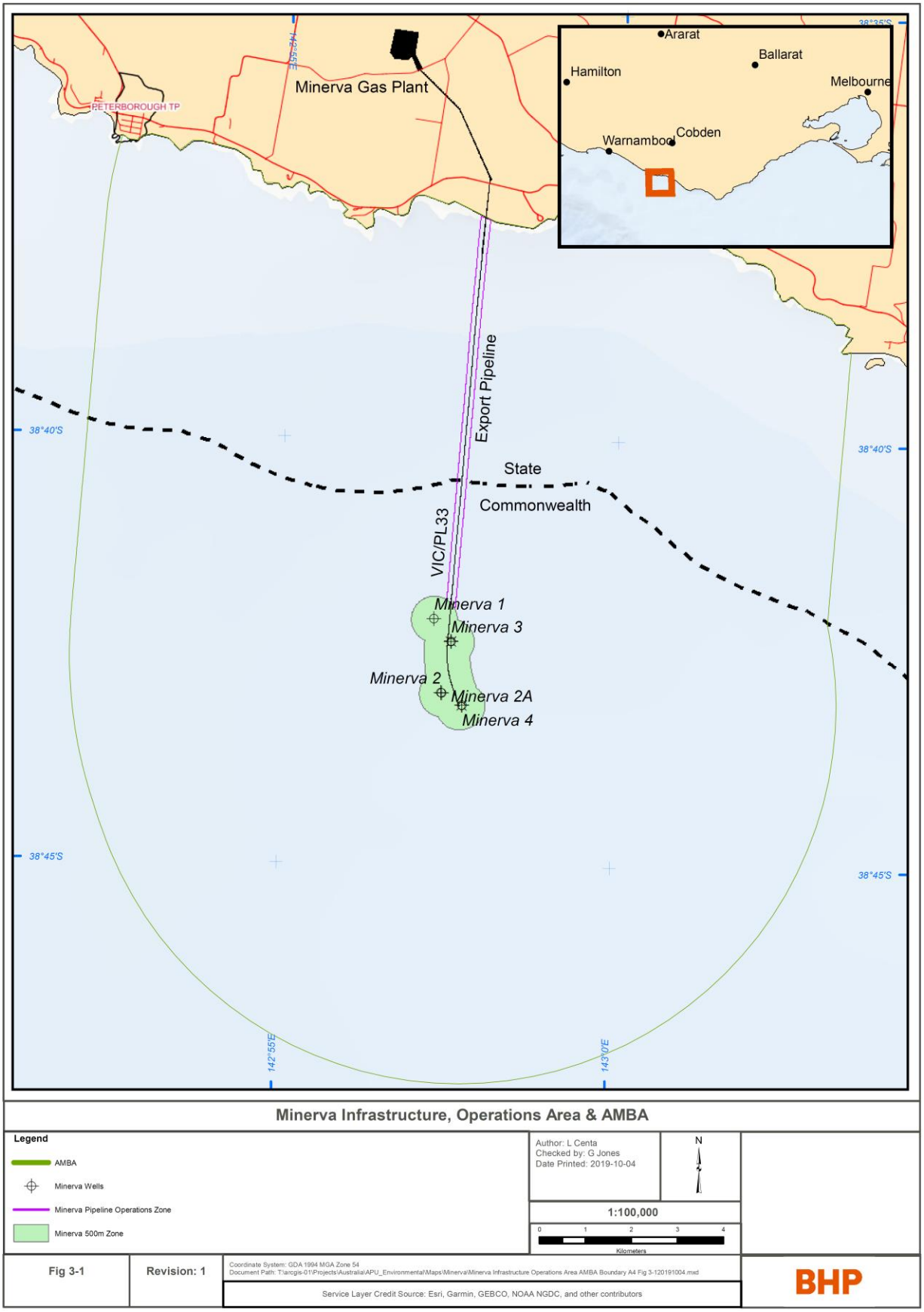


Figure 1-1: Minerva Gas Field Location and Operations Area

2 Identified Risks

2.1 Credible Spill Scenarios for Minerva Operations

The spill scenarios in which hydrocarbons may be released to the marine environment during cessation activities are provided in Table 2-1. The justification for the selection of these spill scenarios are described in the Minerva Cessation EP (Section 8).

For response purposes, this OPEP is based on a–100 m^3 diesel spill from a vessel, determined as the worst case credible spill scenario from the cessation activities.

Table 2-1: Hydrocarbon Spill Scenarios

Hydrocarbon	Source	Scenarios	Volume	Duration	Likelihood
Hydraulic Oils and Lubricating Fluids	Vessel	Burst hose on vessel / ROV	<1 m^3	Instantaneous	Possible
Gas and condensate	Closed Valve Leak from Minerva- 3 or 4	External impact resulting in loss of the flowline or umbilical/flying lead small bore fittings connecting to the Subsea tree	Condensate (1 STB / 0.16 m^3) Gas (0.3024 MMscf / 0.0085 ksm^3)	14 days	Unlikely
	Well leak as a result of corrosion of casing	Failure of casing due to corrosion over time	Condensate (1 STB / 0.16 m^3) Gas (0.3024 MMscf / 0.0085 ksm^3)	Period until detection during monitoring	Highly Unlikely
	Period until detection during monitoring	Failure of well barrier integrity over time	Condensate (1 STB / 0.16 m^3) Gas (0.3024 MMscf / 0.0085 ksm^3)	Period until detection during monitoring	Highly Unlikely
Marine Diesel	Vessel – tank rupture	Vessel collision resulting in a ruptured fuel tank	Up to 100 m^3	24 hours	Highly Unlikely

Note: Spills less than 80 L are managed by vessel Shipboard Oil Pollution Emergency Plan (SOPEP) and not covered in this OPEP.

2.2 Area That May Be Affected

Definition of the Area that may be Affected (AMBA) for hydrocarbon spills from the Minerva Operations cessation activities is included in Section 4.1 of the Minerva Cessation EP.

The Area that may be Affected (AMBA) for hydrocarbon spills (Figure 2-2) was determined by a weathering study for a diesel spill (100 m^3) associated with vessel operations (Section 2.2.1). The output of the modelling showed that the maximum distance that a 100 m^3 spill of diesel was 8.2 km in any direction (BHP, 2014) (Section 2.2.1).

A closed valve leakage from the Minerva-3 or 4 gas well due to external impact would involve a gas comprised almost entirely of methane (93.5 %) and other small chained gases (5.5%), with any hydrocarbons that could form a condensate remaining in vapour phase. The leak would result in small loss of 0.16 m^3 condensate and 8,552 m^3 gas over a 14 day period before the leak is controlled once detected. There would not be any liquid hydrocarbons on the sea surface.

Impacts to seabed biota in the vicinity of the wells are negligible in the absence of any significant habitat. Any release will rapidly dilute, with effects localised to the release point and within the AMBA (Figure 2-2).

2.2.1 Diesel Weathering Study

A weathering study was carried out on the release of 100 m^3 diesel in the environment encountered at the Minerva well site using the ADIOS2 (Automated Data Inquiry for Oil Spills) software. ADIOS2 incorporates a database containing more than a thousand crude oils and refined products, and provides quick estimates of the expected characteristics and behaviour of oil spilled into the marine environment.

To inform the setup of ADIOS2, climate data was taken from Section 4 of the Minerva Cessation EP and multiple scenarios where run to assess the characteristic weathering outcomes of releasing 100 m^3 into the environment. The data selected is outlined in Table 2-2.

Table 2-2: Input data for ADIOS2 scenarios

Oil Type	Wind Speed (Knots)	Wind Direction	Wave Height (m)	Temperature	Salinity	Current speed (m/sec)	Current direction
Marine Diesel (API 31.6, Pour Point -12º)	Average 11-12 Max 36-39	Onshore	Average 2-3.5 Max 7.6	Winter 9-12 Summer 15-18	32 g/kg	0.1	East-south-east

The purpose of the ADIOS2 study was to understand how a 100 m^3 release to the environment under consideration would act and how soon a diesel release would reach a stage where it was considered removed from the surface environment.

It should be noted, that ADIOS2 does not provide information on sea surface thickness nor concentrations of entrained or dissolved fractions in the water column. Therefore, an 'end point' of when visible diesel is removed from the sea surface is difficult to ascertain. For the purposes of this exercise it was considered that when the dispersed fraction had reached >70% and remaining oil was <15%, that the majority of the diesel had become weathered and removed from the sea surface. A summary of the results include:

- By running multiple scenarios it was found that wave height was the dominant factor in assisting in dispersion and evaporation of the release volume;
- Dispersion was the main pathway of removal of the diesel components;
- While events with wave heights of 7.6 m were considered, the outcome was not carried forward, as operational restrictions would prevent a vessel being in the field at this time; and,
- Based on the inputs and outputs selected, the time for the diesel to become predominantly weathered was between 3-8 hours.

Using these results, a further step was taken to estimate how far a diesel slick would travel, using the time to the predominant weathered stage, the current speed and direction and wind speed and direction. As a rule of thumb oil will move on water with 3% of the wind's energy and 100% of the current speed. A resultant trajectory can be calculated for the expected location of the oil spill as per example in Figure 2-1.

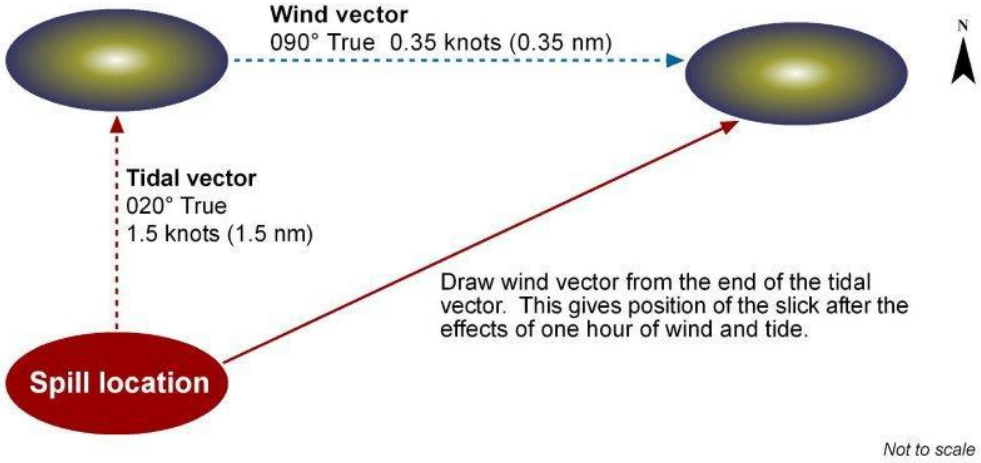


Figure 2-1: Manually predicting spill movement

By using the outputs of the ADIOS2 weathering study, it was possible to calculate how far a diesel slick would travel based on the inputs discussed above. The conclusion of which identified that the furthest distance that may be covered by a 100 m^3 diesel slick from within the Operations Area in any direction would be 8.2 km, the results can be seen in Table 2-3 and the resultant AMBA in Figure 2-2. From these calculations it is determined that a diesel spill of 100 m^3 from the Minerva Operations Area may contact the shoreline after 6 hours, however contact would be a very low volume of highly weathered diesel (<20 m^3).

Table 2-3: Calculation of trajectory results

Current Vector distance	Wind Vector Distance	Wind Speed (Knots)	Wave Height (m)	Current Speed	Time to predominant Dispersion (hrs)	Distance covered by slick trajectory (km)
1.08	5.99	36	3.5	0.1m/sec	3	7.07
2.16	3.66	11	3.5	0.1m/sec	6	5.82
2.88	5.33	12	2.0	0.1m/sec	8	8.21
1.08	6.49	39	2.0	0.1m/sec	3	7.57

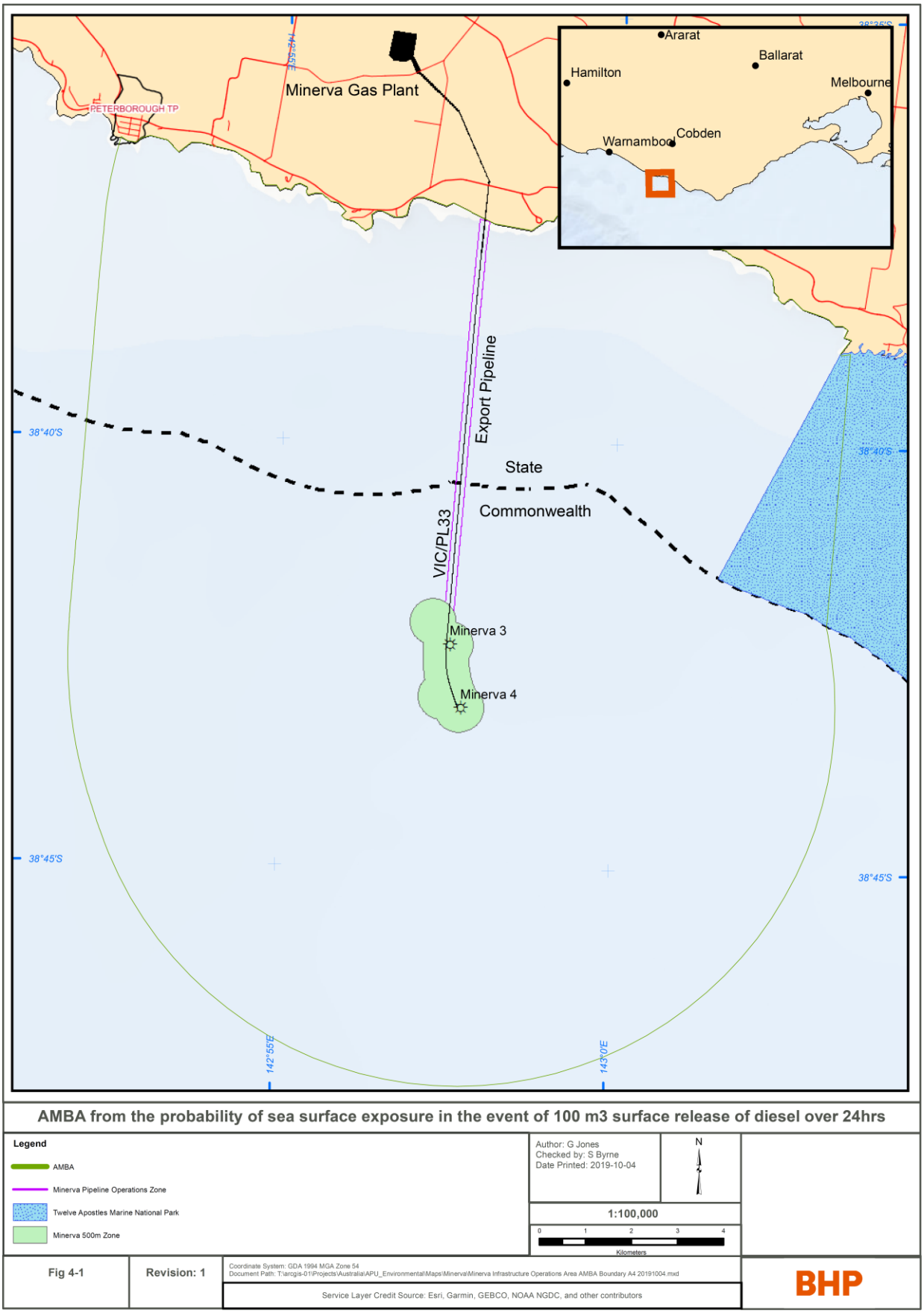


Figure 2-2: AMBA from the probability of sea surface exposure in the event of a 100 m^3 surface release of diesel over 24 hours

2.3 Sensitivity of Resources

A full description of the biological environment is given in Section 4 of the Minerva Cessation EP. To develop a spill response plan, resources need to be ranked based on their sensitivity. The ranking can then be used to prioritise oil spill response techniques or allocation of resources. As described in Section 2.2 a diesel spill may reach the shallow waters of the Victorian coast.

Table 2-4: Summary of Receptors and Sensitivity Ranking. Adapted from IPIECA, 1996

Sensitivity	Open Ocean	Shallow Water	Response
Extreme	Migratory shorebirds and their habitat	Migratory shorebirds and their habitat	The AMBA intersects with migratory shorebirds and their habitats. The purpose of the response measures will be to manage these impacts through monitor, evaluate, and source control responses. Oiled wildlife response may be initiated.
	Threatened Ecological Community (TEC)	TEC	There are giant kelp marine forests in South Eastern Australia that may occur within the AMBA during a spill. The best-assessed course of action for remediation of microalgae from smothering is to allow natural wave energy to assist in the natural dispersion of weathered hydrocarbon; any mechanical recovery or dispersant use may only increase the impact to the reef system (IPIECA, 1990-2005 Volume 3).
High	Twelve Apostles Marine National Park	Twelve Apostles Marine National Park	There are unique limestone formation including the twelve apostles, and a range of marine habitats mainly subtidal soft sediments or sand supporting communities of bivalves, polychaetes and amphipods with the AMBA. Due to the nature of marine diesel in the environment (rapid evaporation) and the low volumes predicted, response strategies will be limited and the best assessed course of action for remediation is through natural dispersion / recovery.
	N/A	Arches Marine Sanctuary	There are underwater limestone formations of arches and canyons that support giant kelp hard, and associated fauna communities such as seastars, sponges, gorgonians, hydroids and bryozoans. Due to the nature of marine diesel in the environment (rapid evaporation) and the low volumes predicted, response strategies will be limited and the best assessed course of action for remediation is through natural dispersion / recovery.
	Marine mammals (whales, seals, dolphins) and sharks	Marine mammals (whales, seals, dolphins) and sharks	It has been identified that marine mammals and sharks may be present within the AMBA. The purpose of the response measures will be to manage these impacts through monitor and evaluate and source control responses. Oiled wildlife response may be initiated.
	Marine reptiles (e.g. turtles)	Marine reptiles (e.g. turtles)	No natal beaches, mating areas nor feeding areas fall within the AMBAs, however there may be some marginal feeding and pelagic habitats. The purpose of the response measures will be to manage these impacts through monitor, evaluate, and source control responses. Oiled wildlife response may be initiated.
	Avifauna	Avifauna	There are many species of seabirds within the AMBA that could be affected by an oil spill. The purpose of the response measures will be to manage these impacts through monitor, evaluate, and source control responses. Oiled wildlife response may be initiated.
Moderate	N/A	Tourism and Recreational Fishing	There are fish and fish habitat and human usage along much of the coastline within the AMBA that could be affected by an ~~oil~~ hydrocarbon spill. The purpose of the response measures will be to manage these impacts through monitor and evaluate and source control responses. Environmental Monitoring may be undertaken to assess lasting impact.

Sensitivity	Open Ocean	Shallow Water	Response
	Commercial Fisheries	Commercial Fisheries	Commercial fishery activity within the AMBA is low, however could be affected by a hydrocarbon spill. The purpose of the response measures will be to manage these impacts through monitor, evaluate, and source control responses. Environmental monitoring may be undertaken to assess lasting impact.
Low	N/A	Exposed Rocky Shores and Cliffs	Within these areas the natural degradation of oil would be rapid due to strong wave action. Beaching of oil residue may result in the mortality of the marine fauna (e.g. seabirds) and crustaceans inhabiting the shores. Recovery rates are considered moderate to fast.

Adapted from IPIECA 1996

3 First Strike Response

3.1 First 24 Hours of an Incident

The following First Strike Plan provides guidance to the BHP Incident Management Team (IMT) in the first 24 hours of the spill to respond to a loss of hydrocarbons. Operational phases are listed in 2, 8, 16 and 24 hour periods post-mobilisation of the IMT. In some cases there may be no specific actions described for an activity period.

Post 24 hours, the BHP IMT will develop Incident Action Plans and Operational NEBAs, which are described further in Section 3.2.

The time-steps provided in the First Strike Plan for each response strategy that follow are consistent with achieving the OPEP Performance Outcomes that are described in previous Section 1.3.

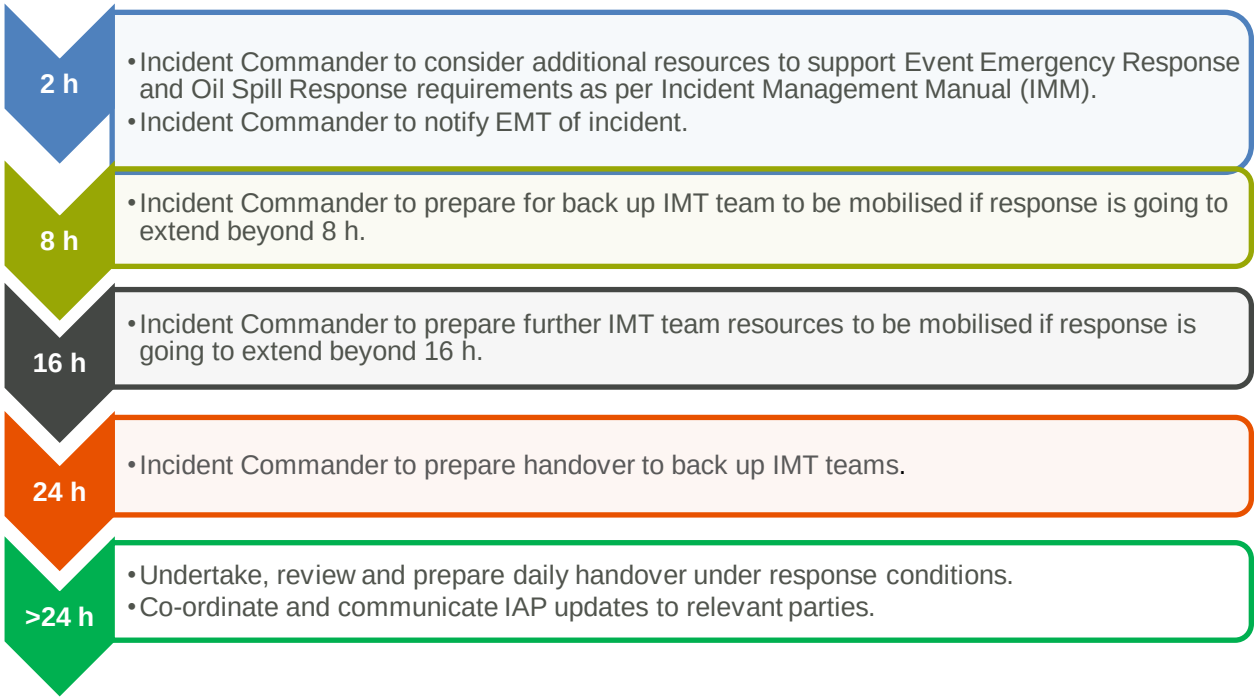
Table 3-1: IMT actions in first 24 hours of a spill

Response Strategy	Response Activity	Level 1	Level 2	Level 1- Valve Leak
		10 m^3 diesel spill	100 m^3 diesel spill	0.16 m^3 condensate
Notification & Establish Response Organisation	IMT	Notify*	Activate*	Notify*
	Emergency Management Team (EMT)	Notify*	Notify*	Notify*
	Regulatory Agency	Notify*	Notify*	Notify*
	Technical Support	Notify*	Notify*	Notify*
Source Control	Source control	Activate	Activate	Activate (Note1)
Determine Potential Impacts	Oil Spill Trajectory Modelling	No	Activate	No
	Monitor and Evaluate - Aerial Surveillance	Optional	Activate	No
	Monitor and Evaluate - Marine Surveillance	Activate	Activate	Optional
Offshore Response	Mobilise Dispersant	No	No	No
	Aerial Dispersant Application	No	No	No
	Marine Dispersant Application	No	No	No
	Marine Recovery	No	No	No
	Mechanical Dispersion	No	No	No
	Natural Recovery	Yes	Yes	Yes
Shoreline Response	Forward Command Post	No	Standby	No
	Shoreline Protection	No	No	No
	Shoreline Clean-up	No	No	No
	Environmental Monitoring Procedures	No	Standby	No
	Oiled Wildlife Response	No	Standby	No
	Waste Management Plan	No	No	No

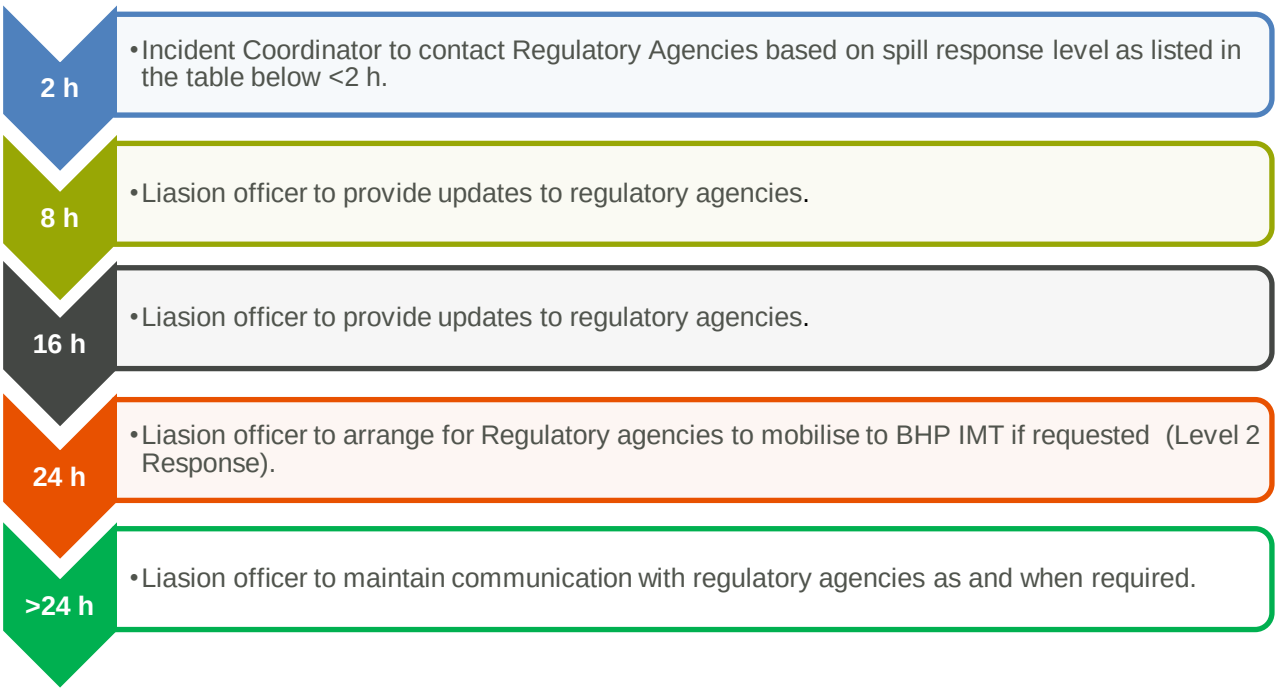
* Process described in detail in the BHP Incident Management Manual

(Note 1) Source control includes subsea intervention from vessel for valve leakage

3.1.1 IMT Mobilisation



3.1.3 Notifications



Supporting Information

Agency	Pollution Report (POLREP)* required	Level 1	Level 2	Level 1 - Valve Leak	Telephone
NOPSEMA	Yes	Notify	Notify	Notify	08 6461 7090
Australian Maritime Safety Authority (AMSA)	Yes	No	Notify	No	1800 641 792
Vic Department of Transport (DoT)	Yes	No	Notify and Mobilise	No	(03) 9208 3404 (03) 5525 0900 (24 hours)
Victorian Fisheries Authority	Yes	No	Notify	No	1800 226 226
Department of Jobs, Precincts and Regions (DJPR)	No	No	Notify	No	(03) 9651 9999 State Animal Welfare Commander 136186
Department of the Environment and Energy (DoEE)	No	No	Notify	No	02 6274 1372 1800 110 395
Director of National Parks (DNP)	No	No	Notify	No	0419 293 465 (24 hours).

*refer to Appendix A.

3.1.4 Technical Resource Support

2 h
- Operations to advise AMOSC of incident, request for technical assistance to be mobilised into the IMT Room.

8 h
- AMOSC and OSRL Technical Support available to Perth IMT Leader either in person (AMOSC) or via Video Conference or telephone (OSRL).
- IMT to advise OSRL and request for technical assistance in Perth and onsite at the forward command post.

16 h
- AMSOC / OSRL develop Technical Support Roster to IMT for next 72 h.

24 h
- IMT and OSRL develop mobilisation plan for OSRL specialists to Perth.
- Mobilise OSRL Specialists to Perth.

>24 h
- Maintain and log channels of communication with OSRA's.
- Complete daily debriefing with OSRA's and outline IAPs.

Supporting Information

Key Contacts

Australian Marine Oil Spill Centre (AMOSC)	Tel: 03 5272 1555
The Response Group (TRG) 24-Hr Support contact	Tel: +1 (281) 880-5000
Oil Spill Response Limited (OSRL Duty Manager)	Tel: +65 6266 1566

AMOSC Call out Phases

AMOSC Advice Level	Status	AMOSC Requirements
Level 1	Forward Notice	Advise a potential problem. Provide or update data on oil spill. Update information on spill and advise 4 hourly.
Level 2	Standby	AMOSC resources may be required. Assessment of resources and destination to be made. Update information on spill and advise 2 hourly.
Level 3	Callout	AMOSC resources are required. Detail required resources and destination.

BHP OSRA Activation Authorities

Oil Spill Response Agency (OSRA)	BHP Activation Authority
AMOSC	Incident Commander / IMT Leader / EMT Leader / Power of Attorney (POA) Execution Authority / Senior Drilling and Completions Manager
OSRL	

3.1.5 Source Control

2 h
- Operations to confirm spill status with OIM.
- Vessel spill / release from fuel tanks: transfers from damaged fuel tank to alternative tanks or other vessel. Vessel SOPEP enacted.

8 h
- Update IMT on spill size, volume and situation.

16 h
- Update IMT on spill size, volume and situation.

24 h
- Establish plan for source control of diesel spills up to 100 m^3, within 24 h.
- Establish plan for source control of leak, within 24 h

>24 h
- Complete daily safety analysis for the next 24 h period.
- Carry out source control requirements as per IAP.

3.1.6 Forward Command Post

2 h
- Inform Minerva Fas Plant forward command post to be set up.
- Logistics Coordinator to determine what BHP resources can be mobilised to Warrnambool (or Melbourne).

8 h
- Secure accommodation and rental vehicles in Warrnambool (or Melbourne).

16 h
- Confirm IT connection to Forward Command Post is up and running.

24 h
- BHP representative on site in Warrnambool (or Geelong).
- BHP representative establishes ground logistics plan with Warrnambool Light Industrial.

>24 h
- Complete daily safety analysis and NEBA for next 24 h period.
- Carry forward logistics requirements as per IAP.

Supporting Information

Forward Command Post	
City of Warrnambool Contact	Tel: 03 5559 4800

3.1.7 Monitor and Evaluate

3.1.7.1 Aerial Surveillance

2 h
- Arrange Helicopters from Warrnambool or Tooradin and provide spill location.
- Mobilise trained aerial surveillance people.

8 h
- Complete first aerial observation flights (daylight hours).
- Aerial surveillance observer logs (Appendix C) to be submitted to IMT.

16 h
- Planning second flight based on oil spill trajectory modelling.

24 h
- Establish long term aerial observation plans with additional aircraft and trained observers from AMOSC or OSRL.

>24 h
- Complete daily safety analysis for the next 24 h period.
- Complete surveillance requirements as per IAP.

3.1.7.2 Vessel Surveillance

2 h
- Planning Section Chief request for fast response vessel in the area the need to mobilise for oil spill response.
- Advise surveillance of location of spill and any safety precautions.

8 h
- Spill location information and observations reported to IMT.

16 h
- Spill location information and observations reported to IMT.

24 h
- Continue to provide surveilance until directed by IMT.

>24 h
- Complete daily safety analysis for the next 24 h period.
- Complete surveillance requirements as per IAP.

3.1.7.3 Oil Spill Trajectory Modelling

2 h
- Planning Section Chief to contact AMOSC, activate RPS-APASA OSTM contract.
- Planning Section Chief to obtain and communicate necessary modelling input data to RPS-APASA.

8 h
- Oil spill trajectory modelling report received.
- Provide trajectory modelling results to logistics for aerial surveillance planning.
- Identify AMBA and determine areas for 'post-spill / pre-impact' monitoring.
- Confirm hydrocarbon characteristics and confirm with RPS-APASA.

16 h
- Obtain spill tracker data.
- Correlate spill trajectory modelling with real time data and communicate to RPS-APASA for update of trajectory modelling.
- Determine need and, if required, frequency of additional tracker buoy deployments.

24 h
- Obtain most recent spill trajectory modelling and communicate to logistics for planning.

>24 h
- Complete daily safety analysis for the next 24 h period.
- Complete modelling requirements as per IAP.

Supporting Information

AMOSC	Tel: 03 5272 1555
RPS-APASA Contact Details:	RPS-Asia-Pacific Applied Science Associates (RPS-APASA)* p: 07 5574 1112 | | www.apasa.com.au
Data Needed for Initial Modelling	Hydrocarbon type, discharge rate / volume
	Discharge release point - coordinates and depth
	Wind conditions (strength and direction)

*Oil spill modelling contractor may vary depending operational needs during a spill response.

3.1.7.4 Satellite Imagery

2 h
- Planning Section Chief request to OSRL for provision of satellite images.

8 h
- Planning Section Chief and Incident Commander to determine image acquisition frequency e.g. daily.

16 h
- Third party satellite imagery provider to inform OSRL of the first available satellite image acquisition time and advise BHP IMT accordingly.

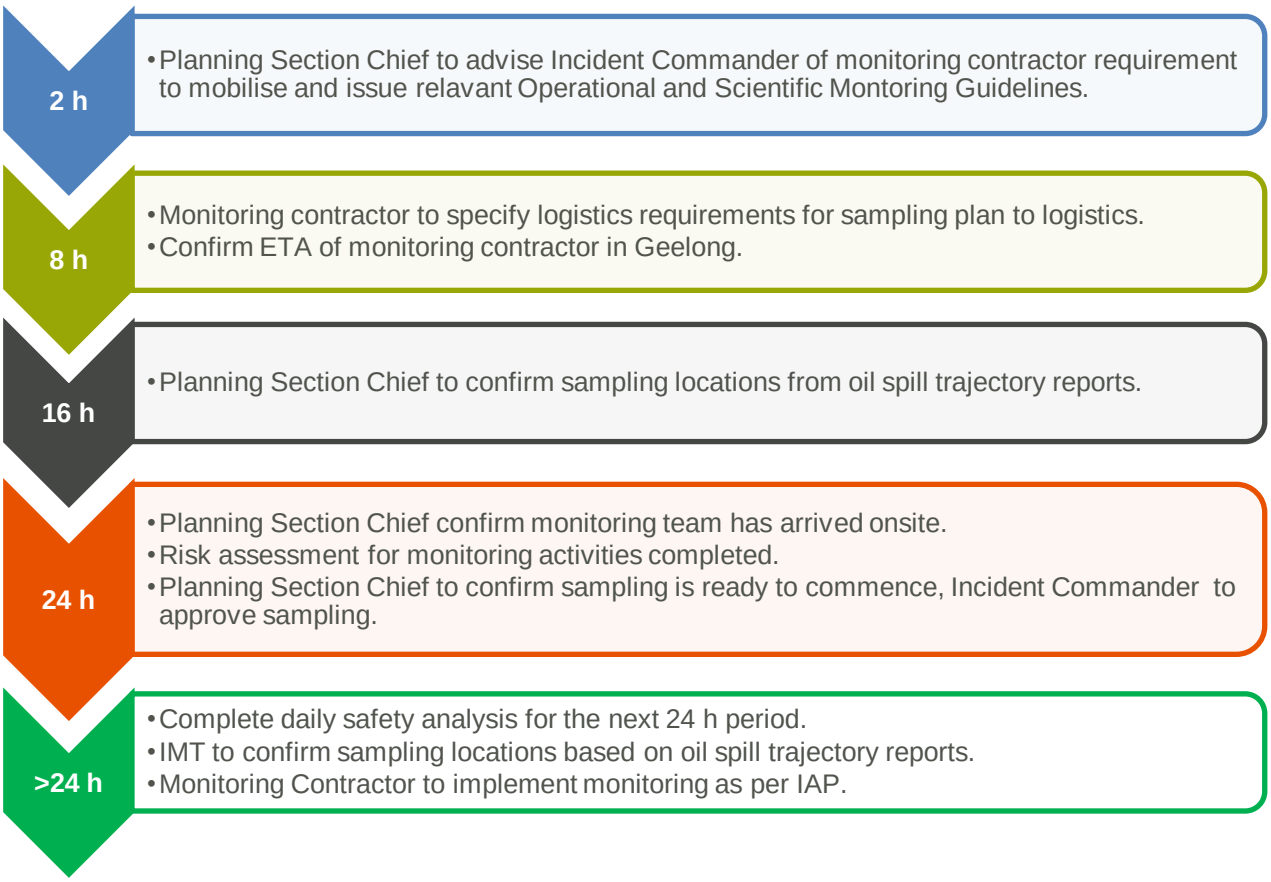
24 h
- OSRL / third party satellite imagery provider deliver satellite image.
- Satellite imagery showing oil spill trajectory used in development of the IAP to inform all response strategies, and used as an input to any OSTM.

>24 h
- Communicate satellite imagery requirements to OSRL for the next 24 h period.
- Complete surveillance requirements as per IAP.

Supporting Information

Details	Satellite Imagery
Contact	Tel: +65 6266 1566 OSRL Notification Form - Appendix B
Location	OSRL Singapore
Response Time	< 24 hours
Tasks	• Determine the Area of Interest (AOI)/coordinates; • Select image acquisition frequency e.g. daily; • Client contact person and email address who wish to receive the image; and • Vendor to inform OSRL of the first available satellite image acquisition time and advise IMT accordingly.

3.1.8 Environmental Monitoring



Supporting Information

Post-spill pre impact environmental monitoring will be initiated. The sampling procedures to assess water and sediment quality, benthic habitats and marine wildlife are described in BHP Australian Production Unit (APU) Environmental Monitoring Procedures. These documents outline work instructions for external consultant(s) undertaking the work noting that the same company may not necessarily be contracted for all monitoring scopes.

	Environmental Monitoring Contractors
Monitoring Contractor – 24/7 Standby Agreement	**SGS Australia Pty Ltd** 10 Reid Road Newburn, Perth Airport, WA 6105 Tel: 1300 487 706
Avifauna – Standby Notification	**Bennelongia** Refer to Appendix C – Contact Directory
Marine fauna, benthic habitats, marine reptiles, and commercial/ recreational fisheries and fishes – Standby Notification	**GHD Pty Ltd** Refer to Appendix C – Contact Directory

3.1.9 Oiled Wildlife Response

2 h
- Advise AMOSC wildlife recovery equipment and team to be placed on standby.

8 h
- Advise Vic DoT / DJPR if oiled wildlife response is necessary, and obtain ETA of equipment and personnel.

16 h
- Monitor progress of oiled wildlife response logisitics.

24 h
- Monitor progress of oiled wildlife response logisitics.

>24 h
- Complete daily safety analysis for the next 24 h.
- Carry out wildlife response as per IAP under advisement of wildlide response experts.

Supporting Information

Advise AMOSC to mobilise oiled wildlife kit, and wildlife response experts.

Notification and Logistics for Oiled Wildlife Response	
AMOSC	Tel: 03 5272 1555
Vic DoT	Tel: 03 9208 3404
DJPR	Tel: 03 9651 9999 Sate Animal Welfare Commander 136186

3.2 Decision Making Criteria for Response Strategy Selection

For oil spill response, the Incident Action Plan (IAP) response strategies are identified through a process that involves the review of key decision making criteria the outcome if which are used as inputs to the Operational NEBA, as outlined in Figure 3-1. This ensures the most effective response strategies with the least detrimental impacts can be selected and implemented.

The IMT must first gain situational awareness by obtaining answers to the following key questions, which are fundamental to any oil spill response:

1) What type of oil has been released?
2) What is the expected behaviour of the oil that has been released?
3) What volume has been released?
4) Is the source under control?
5) Where is the oil going?
6) What environmental receptors/sensitivities are in the path of the predicted oil trajectory?
7) Can the oil be approached or are there safety concerns?
8) Can the oil be contained?
9) Can the oil be dispersed?
10) Will shoreline impact occur and clean-up be required?

To answer these questions, the Incident Commander must review key information such as Engineering advice on the volume and characteristics of the oil released, Oil Spill Trajectory Modelling, Oil Spill Tracker Buoys (OSTB), the weather forecast, AIS vessel feed, aircraft data feeds, operational reports from field teams and environmental monitoring teams to determine presence and/or extent of environmental receptors, advice from the State Government Environmental Scientific Coordinator, any other external advice, the window of Ecological Sensitivity (Section 4.2.6 of Minerva Cessation EP), oil spill reference documents (as detailed in each response strategy within the EP) and any other Daily Field Reports.

The outcome of this data review step is then used as input to the Operational NEBA process, which assesses the impacts and risks of response strategy options on environmental sensitivities. The spill response risk assessment applies pre-defined assessment classifications (3P to 3N), as shown in Table 3-2, assess the potential “impact” for the receptor sensitivities for each response option (Table 3-3). To aid interpretation where both positive and negative impacts have been indicated for a spill response in Table 3-3, cross-referencing potential impacts with the receptor’s protection priority can be used to weight benefit/risk to receptors; and those with higher protection priorities can be weighted as of greater importance than risk to lower priorities for the determination of net environmental benefit.

Where a response has “zero” scores for all receptors and sensitivities, this may still be assessed as being of Net Environmental Benefit (or carried forward to ALARP assessment) based on potential for indirect (rather than direct) reduction in risk. For example, Response Strategy (RS) 2 Monitor and Evaluate has no direct impact on the spill due to implementation of this strategy, but the situational awareness gained from the response allows proactive and effective application of other response strategies thereby contributing to reduction of risk to ALARP.

The NEBA Matrix (Table 3-3) prioritises environmental sensitivities, and assesses the individual net effect that each response option may have on it allowing informed decision to be made. If there are conflicting outcomes for a particular response option then the sensitivity with the higher priority becomes the preferred response option. A NEBA is a decision-making process and will ultimately result in a trade-off of priorities and response strategies. It is possible for a response strategy to be used for one sensitivity, even if it has been identified that this response option may not benefit one or several other sensitivities. The final outcome of the response, however, should result in an overall net environment benefit. Spill response options identified by BHP are outlined in Section 4. An evaluation of the impacts and risks of the spill response options is provided in Section 8 of the Minerva Cessation EP.

The IMT will apply the Operational NEBA process to identify the response options that are preferred for the situation, oil type and behaviour, environmental conditions, direction of plume, and protection priority of sensitive receptors.

The steps in the Operational NEBA aim to identify:

1. Key ecological values, environmental, socioeconomic and cultural heritage receptors (Table 3-3, Section 4.2.6 of the Minerva Cessation EP, Geographical Information Systems (GIS) datasets / maps) within the plume path and predicted AMBA based on oil spill modelling;
2. Protection priorities of either High, Medium or Low and determine if receptor is listed as Endangered (E), Threatened (T) or Migratory (M) under the EPBC Act Section 4.2. of the EP) for the period of the oil spill;
3. New situational awareness information that becomes available such as updated spill trajectory models, observations of oil on the water and/or shorelines, locations of sensitive receptors, effectiveness of implemented response strategies, Daily Field Reports, any updated advice from the Emergency and Crisis Centre (ECC) / other external sources for inclusion into daily updates of the Operational NEBA to optimise the IAP. Some sensitive receptors are mobile (e.g. fish, mammals, birds) and may move in and out of the predicted oil path on numerous occasions throughout the response, requiring frequent review of the NEBA table and selection of response techniques documented in IAPs by the IMT; and
4. Select response strategies to be included in the IAP work instruction

The Planning Section Chief will supervise the development of the IAP by the oil spill technical team. The Incident Commander authorises the IAP prior to releasing it to the Operations Section Chief.

Figure 3-1: IMT Oil Spill Response Strategy Decision Tree

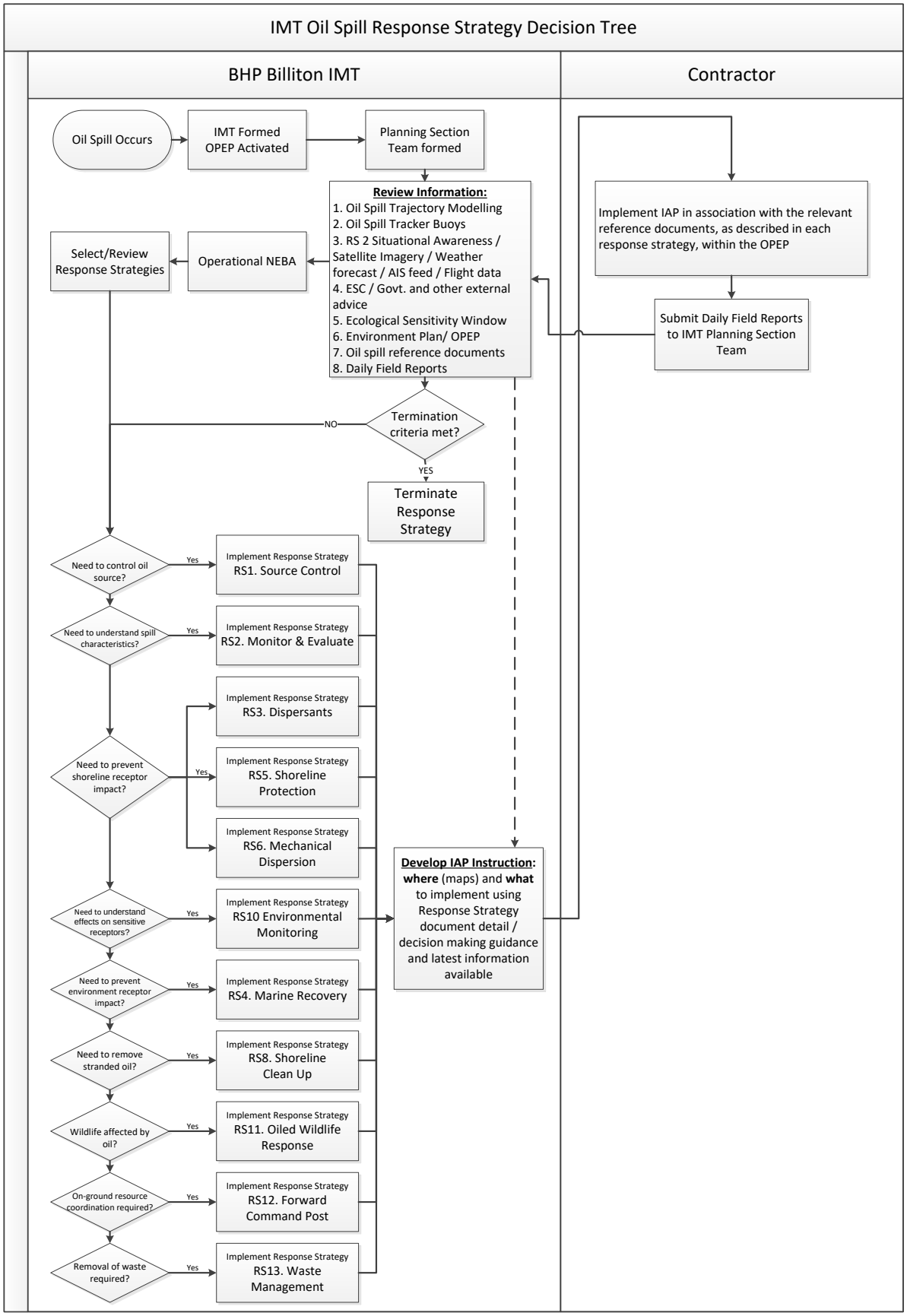


Table 3-2: NEBA impact categories. Categories identify potential change in impact due to response strategies, relative to the impact of the spill

NEBA Categories			Degree of Impact	Potential Duration of Impact	Equivalent BHP Severity Risk Matrix Consequence Level
Positive	3P	Major	Likely to prevent: • Behavioural impact to biological receptors; • Behavioural impact to socio-economic receptors, e.g. changes day-to-day business operations, public opinion/behaviours (e.g. avoidance of amenities such as beaches), or regulatory designations.	Decrease in duration of impact by > 5 years	N/A
	2P	Moderate	Likely to prevent: • Significant impact single phase of reproductive cycle for biological receptors; or • Detectable financial impact, either directly (e.g. loss of income) or indirect (e.g. via public perception), for socio-economic receptors. This level of negative impact is recoverable and unlikely to result in closure of business/industry in the region.	Decrease in duration of impact by 1-5 years	N/A
	1P	Minor	Likely to prevent impact to: • Significant proportion of population or breeding stages, for biological receptors; or • Significant impact to the sensitivity of protective designation for socio-economic receptors; or significant long term impact to business/ industry.	Decrease in duration of impact by several seasons (< 1 year)	N/A
	0	Non-mitigated spill impact	**No detectable difference to unmitigated spill difference**		
Negative	1N	Minor	Likely to result in: • Behavioural impact for biological receptors; • Behavioural impact for socio-economic receptors, e.g. changes day-to-day business operations, public opinion/behaviours (e.g. avoidance of amenities such as beaches), or regulatory designations. **[Note 1]**	Decrease in duration of impact by several seasons (< 1 year)	Minor impact/s (<3 months) to land biodiversity, ecosystem, services, water resources or air. BHP Risk Matrix Severity Level 2, Non Material Risk
	2N	Moderate	Likely to result in: • Significant impact single phase of reproductive cycle for biological receptors; or • Detectable financial impact, either directly (e.g. loss of income) or indirect (e.g. via public perception), for socio-economic receptors. This level of negative impact is recoverable and unlikely to result in closure of business/industry in the region.	Increase in duration of impact by 1-5 years	Major impact/s (<5 years) to land biodiversity, ecosystem, services, water resources or air. BHP Risk Matrix Severity Level 4, Non Material Risk
	3N	Major	Likely to result in impact to: • Significant proportion of population or breeding stages, for biological receptors; or • Significant impact to the sensitivity of protective designation for socioeconomic receptors; or • Significant long term impact to business / industry for socioeconomic receptors.	Increase in duration of impact by > 5 years or unrecoverable	Severe (>20 years) to permanent impact/s to land biodiversity, ecosystem, services, water resources or air. BHP Risk Matrix Severity Level 6-7, Material Risk
[Note 1]			Behavioural impacts tend to be short-term and limited in their impact (even on a regional scale). The maximum likely should be considered if a response strategy directly impacts behaviour that results in an impact to reproduction and/or the breeding population, e.g. failure of fish spawning aggregations, then score should be a 2 or 3 rather than 1.		

Table 3-3: Operational NEBA – Response Strategy Selection

Sensitivity	Protection Priority* (based on severity of impact and recovery time)	Seasonal presence on Continental Shelf												Response Strategy										
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	RS1 Source Control	RS2 Monitor and Evaluate	RS3 Dispersant Application	RS4 Marine Recovery	RS5 Shoreline Protection	RS6 Mechanical Dispersion	RS7 In situ Burning	RS8 Shoreline Clean-up	RS10 Environmental Monitoring	RS11 Oiled Wildlife Response	RS13 Waste Management
Ecological																								
Whales	High (T, M)	Y	N	N	N	N	N	Y	Y	Y	Y	Y	Y	2P	0	1N	1N	0	1N	2N	0	0	0	0
Seals	High	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	1N	0	1N	2N	0	0	0	0
Dolphins	High (M)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	1N	0	1N	2N	0	0	0	0
Sharks	High (T, M)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	1N	0	1N	2N	0	0	0	0
Fishes (resident, demersal, pelagic)	High	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	1N	0	1N	2N	0	0	0	0
Turtles (foraging, pelagic habitats)	High (T, M)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	1N	0	1N	2N	0	0	1P	0
Migratory birds	Extreme (T, M)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	1N	0	0	2N	0	0	1P	0
Seabirds	Medium	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	1N	0	0	2N	0	0	1P	0
Shorebirds	Medium	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	1N	0	0	2N	0	0	1P	0
Habitat/Ecosystem																								
Threatened Ecological Community (TEC)	Extreme	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	0	0	0	2N	0	2P	0	0
Twelve Apostles Marine National Park	Medium	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	0	0	0	0	2N	0	2P	0	0
Arches Marine Sanctuary	Medium	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	0	0	0	0	2N	0	2P	0	0
Sandy beaches	Low	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	0	0	0	0	1P	0	2P	0	0
Rocky shore	Low	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	0	0	0	0	1P	0	2P	0	0
Open waters	Low	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	0	0	1N	2N	0	2P	0	0
Socio-economic																								
Tourism	Low	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	0	0	0	2N	0	0	0	0
Fisheries	Low	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	2P	0	1N	0	0	1N	2N	0	0	0	0
Response strategy provides Net Environmental Benefit?														Yes	Yes	No	No	No	No	No	No	Yes	Yes	No
Response strategy feasible?														Yes	Yes	No	No	No	No	No	No	Yes	Yes	No
Is response strategy recommended (and ALARP assessment required)?														Yes	Yes	No	No	No	No	No	No	Yes	Yes	No

***Protection priority**: This ranking is based on a combination of factors including the likelihood of impact (time of year), severity of impact (type of exposure to the sensitivity, where the sensitivity is listed as Threatened (T) or Migratory (M) under the EPBC Act) and recovery time after exposure to hydrocarbons).

Shoreline response: Where shoreline clean-up has been given a negative score, this indicates that the use of equipment, machinery and personnel in that environment is likely to have negative effect, potentially causing more damage and prolonging the recovery and environmental benefit to that sensitivity.

3.3 IMT Incident Briefing Documents and Task Checklists

The purpose of the IMT is to gain control of an incident or event and bring it to a safe resolution whilst minimising the impact on personnel, the environment, assets and reputation. The key to achieving control of an incident is successful transition from an initial reactive mode to a proactive planning mode. This can be achieved through a series of iterative stages that create and refine an IAP as summarised in Figure 3-2.

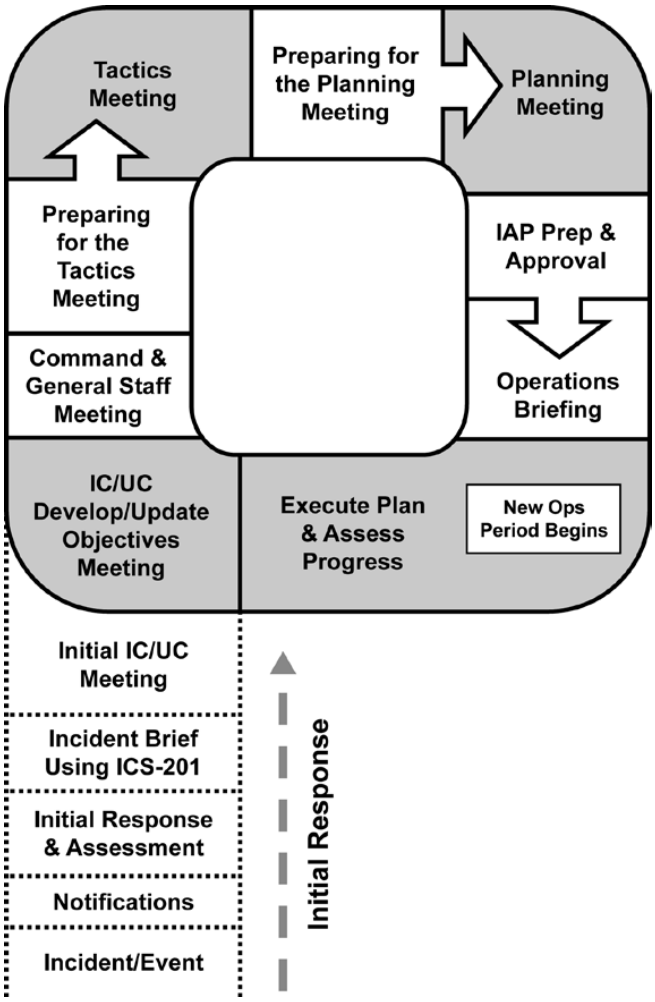


Figure 3-2: Planning cycle used by BHP IMT

The Incident Briefing Checklist acts as the IAP for the initial response (i.e. within the first 24 hours of the incident) and is used and updated until Planning prepares the first incident IAP that is approved by IMT Leader. This checklist also acts as a permanent record of the initial response to the incident.

The BHP Incident Management Manual (AOHSE-ER-0001) provide IMT members task checklists and guidance on systems, processes and procedures to establish the IMT during first hours of the response

4 Response Strategies

A summary of the strategies selected during the NEBA process for each specific scenario assessed is presented in Table 4-1. Further description of each strategy includes a risk assessment on carrying it out, the control options and a conclusion as to how the strategy demonstrates ALARP and BHP acceptability criteria.

Table 4-1: Summarised Response Strategies for the Minerva Cessation Activities

Response Strategy		10 m^3 Diesel (Level 1)	100 m^3 Diesel (Level 2)	Valve Leak (Level 1)
RS1.1:	Source Control – Vessel Control	✓	✓	
RS1.2:	Source Control – Valve leak			✓
RS2:	Monitor and Evaluate	✓	✓	✓
RS3:	Dispersant Application			
RS4:	Marine Recovery			
RS5:	Shoreline Protection			
RS6:	Mechanical Dispersion			
RS7:	In-Situ Burning			
RS8:	Shoreline Clean-up			
RS9:	Natural Recovery	✓	✓	✓
RS10:	Operational and Scientific Monitoring		*	
RS11:	Oiled Wildlife Response		*	
RS12:	Forward Command Post		*	
RS13:	Waste Management			

* Potentially activated depending on reports/observations of RS2 Monitor and Evaluate.

Each option has advantages and disadvantages with regard to effectiveness, operational constraints, and environmental impacts. Consequently, spill response strategies need to be assessed on a case by case basis, taking into account the nature of the spill, Oil Spill Trajectory Modelling (OSTM), the weather conditions, and the advantages and disadvantages of each response strategy.

4.1 RS1.1 Source Control – Vessel

1. Response Strategy	Source Control – Vessel
2. Objective	To prevent the impact on water quality and marine biota resulting from Level 1 and 2 spills by reducing, controlling or halting the discharge of hydrocarbons to the marine environment to ALARP by the implementation of the vessel-specific MARPOL-compliant SOPEP.
3. Rationale	Source control is a priority for any loss of hydrocarbon containment. Managing control of the source will contribute to the broader aim of preventing impacts to sensitive environmental receptors.
4. Initiation Criteria	Level 1: 10 m^3 diesel spill Level 2: 100 m^3 diesel spill
5. Activation Time	Level 1/2: < 2 hours following a diesel spill.

6. Course of Action

Number	Action	Responsible person	Action status
1.	Shut down cessation activity operations, and ensure all Safety actions have taken place.	Vessel Master	
2.	Relocate away from sensitive areas.	Vessel Master	
3.	Where practicable, using oil spill kits (SOPEP) located on board vessel to minimise hydrocarbons entering the marine environment.	Vessel Master	
4.	Pump out any leaking tanks, ensuring vessel remains in a stable condition.	Vessel Master	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Personnel	Vessel Master	All available resources on vessel involved in source control activities

8. Supporting Documentation

Document title	Reference No.	Notes
Support vessel SOPEP		Per Vessel used in the Cessation activities

9. Generic work assignments

N/A

10. Termination Criteria

The source of hydrocarbon spill is under control, the site is safe and the release of hydrocarbons to the marine environment has ceased;
Deemed unsafe to continue implementing RS1 activities;
Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response.

4.2 RS1.2 Source Control – Valve Leak

1. Response Strategy	Source Control –Valve Leak
2. Objective	To prevent the impact on water quality and marine biota resulting from LOWC spills by reducing, controlling or halting the discharge of hydrocarbons to the marine environment to ALARP
3. Rationale	Source control is a priority for any loss of hydrocarbon containment. Managing control of the source will contribute to the broader aim of preventing impacts to sensitive environmental receptors.
4. Initiation Criteria	Level 1: - Valve Leak
5. Activation Time	Level 1: Valve Leak: < 24 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible person	Action status
1.	Upon notification, identify and task a subsea support vessel with ROV (vessel of opportunity) to Barry Beach marine terminal, Victoria.	IMT Marine/Aviation Coordinator	
2.	Transit to spill location	Vessel Master	
3.	Set up exclusion zone around spill location	Vessel Master	
4.	Deploy ROV to inspect, confirm any leaks, and rapidly respond	Vessel Master	
5.	If required, identify and mobilize specialized ROV tooling. Airfreight to pick up point. (available within Australia / SE Asia)	Vessel Master/IMT Logistics Section	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Personnel	Vessel Master	All available personnel resources on subsea support vessel involved in response
Equipment	IMT Logistics	• ROV Plus tooling • Specialized tooling once identified from inspection available Australia/SE Asia
Vessel	Vessel Master	• Subsea Support Vessel Capable of deploying ROV • Vessel of opportunity in Victoria Region

8. Supporting Documentation

Document title	Reference No.	Notes
Petroleum Australia Incident Management Plan	AOHSE-ER-001	Base Incident Management Plan

9. Generic work assignments

N/A

10. Termination Criteria

The source of hydrocarbon spill is under control, the site is safe and the release of hydrocarbons to the marine environment has ceased; Deemed unsafe to continue implementing RS1 activities; Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response; and When control of the well leak has been re-established.

4.3 RS2 Monitor and Evaluate

1. Response Strategy	Monitor and Evaluate
2. Objective	Monitor and Evaluate capability will be maintained to prevent spill impacts to extreme and highly sensitive environmental receptors and to maintain situational awareness throughout emergency response activities.
3. Rationale	This strategy includes assessment of the location, volume, weathering state, and trajectory of spills. The spill will be monitored constantly and evaluated by surveillance. The results of surveillance operations are crucial for implementing further strategies for responding to and managing a spill event. Additionally this response strategy will provide information in support of the decision-making process of whether natural dispersion is an appropriate strategy.
4. Initiation Criteria	Level 1: 10 m^3 diesel spill Level 1: Valve leak Level 2: 100 m^3 diesel spill
5. Activation Time	< 2 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible Person	Action Status
1.	Deploy OSTB if present.	Vessel Master BHP HSR	
2.	Mobilise helicopters with trained aerial oil spill observers.	IMT OSC	
3.	Develop a schedule of aerial surveillance flights.	IMT PSC	
4.	When practicable to do so, activate aerial surveillance of spill area using aerial surveillance logs.	IMT OSC	
5.	Submit aerial surveillance logs to BHP IMT.	Aerial observer	
6.	Activate marine surveillance via mobilisation of BHP contracted fast response vessels	IMT OSC	
7.	Activate OSTM through AMOSC to oil spill modelling agency (RPS-APASA). Advise oil spill modellers to use model settings contained in Table 9.6 of the EP.	IMT PSC	
8.	Provide any aerial surveillance logs or oil spill trajectory data obtained from the OSTBs to oil spill modelling agency.	IMT PSC	
9.	On receipt of the OSTM, provide updates on predicted oil spill trajectories and/or shoreline contact areas to IMT.	IMT PSC	
10.	Activate satellite imagery acquisition via contract with OSRL.	IMT PSC	
11.	Activate RS10 Environmental Monitoring if aerial observers report that Extreme or High Sensitivity receptors (Table 2-4) are at risk of being impacted by hydrocarbons.	IMT PSC	

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks

Vessels	BHP contracted vessel Master	Contracted-vessels (or other vessels of opportunity)
Helicopters	Operations Manager	Warrnambool or Tooradin
Personnel	AMOSC Core Group	Standby aerial observers
OSTM	RPS-APASA	Principal oceanographer
OSTBs	Preferred vendor	Surface tracking of oil spill via satellite-linked buoys
Satellite Imagery	OSRL	Large-scale monitoring capability

7. Supporting Documentation

Document Title	Reference No.	Notes
APU Operational Response Guideline 4 – Oil Spill Tracking - Buoy Deployment / Tracking).	AOHSE-ER-0033	N/A
APU Operational Response Guideline 1 – Aerial Surveillance. Confirmation, Quantification and Monitoring of Oil Spills.	AOHSE-ER-0041	Potential for contact with sensitive receptors to serve as potential triggers for Operational and Scientific Monitoring Guidelines: seabirds, marine mammals/whale sharks, benthic habitats, marine reptiles, commercial/recreational fish species and fishes (RS10).
APU Oil Spill Response Strategy – RS2 Monitor and Evaluate	AOHSE-ER-0053	N/A

8. Generic Work Assignments

Monitor and Evaluate:

- Oil spill characteristics – location, dimensions, oil thickness, direction, weather conditions;
- Oiled wildlife; and
- Shoreline contact, accumulation.

9. Termination Criteria

Hydrocarbons not detected by any of the 'Monitor and Evaluate' surveillance techniques;

Deemed unsafe to continue implementing RS2 activities; and

Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response.

4.4 RS10 Environmental Monitoring

Environmental monitoring response strategies covered below are:

- Water Quality, Sediment Quality and Benthic Infauna;
- Benthic Habitats and Benthic Primary Producers;
- Seabirds and Migratory Shorebirds;
- Marine Mammals and Megafauna;
- Marine Reptiles;
- Commercial and Recreational Fish Species; and
- Effects of an Oil Spill on Fishes.

4.4.1 Water Quality, Sediment Quality and Benthic Infauna

1. Response Strategy	Environmental Monitoring – Water Quality, Sediment Quality and Benthic Infauna
2. Objective	Identify areas potentially impacted by the oil spill and prioritise sensitive areas at highest risk of oil spill effects to maximise effectiveness of first response; Initiate environmental monitoring programs to support and inform spill response planning; assess the effects of spills and monitor post-spill recovery of sensitive environmental receptors.
3. Rationale	Environmental monitoring will be initiated to support the oil spill response strategies and to understand any effects of an oil spill on sensitive receptors. The sampling instructions to assess the effects of a spill on environmental receptors are described in BHP environmental monitoring procedures. These documents outline details such as equipment lists and analytical requirements, chain of custody templates and reporting of results. Monitoring reports will use standard statistical techniques based on 'Beyond BACI' principles (level of statistical significance $p<0.05$) to assess the environmental effects of the incident as well as effectiveness of the response strategies. Outcomes of the statistical analyses will be used to determine if termination criteria have been achieved. Termination Criteria will be developed in conjunction and consultation with Regulatory agencies. The decision to terminate environmental monitoring sits with the BHP IMT.
4. **Initiation Criteria**	Level 2: 10 - 100 m^3 diesel spills
5. **Activation Time**	< 8 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible person	Action status
1.	Activate contractual agreement with SGS to mobilise personnel and equipment on 'next flight' to Melbourne.	IMT OSC	
2.	Review the IMT Oil Spill Response Strategy Decision Tree (Figure 3-1) and use all relevant and up-to-date information streams in adapting the Day 1 IAP work instructions. Key Information: a) Oil Spill Trajectory Modelling; b) Oil Spill Tracker Buoys; c) RS 2 Situational Awareness / Satellite Imagery / Weather forecast / AIS feed / Flight data; d) ESC / Govt. and other external technical advice; e) Ecological Sensitivity Window; f) Environment Plan; g) Oil spill reference documents; and	IMT PSC & Technical Specialist (Environment)	

	h) Daily Field Reports		
3.	Sampling designs in the environmental monitoring procedures require the selection of Impact and Reference Locations: **Impact Location** –use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. BIAs, GIS datasets) and Daily Field Reports to identify oiled areas. Impact Location is any location that is currently being affected by released oil (i.e. within the plume of surface / entrained / dissolved / shoreline accumulated oil) or will be in the pathway of released oil in the future. **Reference Location** – use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. BIAs, GIS datasets) and Daily Field Reports to identify locations that are not affected by oil. Reference Locations should not be impacted by the oil spill, i.e. outside of the plume and the predicted oil spill trajectory. They need to have equivalent characteristics to Impact Locations, e.g. similar depth, aspect, benthic habitats, distance offshore for whales, beach profile for nesting turtles, intertidal zones for birds etc. Seek specialist advice in selecting Reference Locations.	IMT PSC & Technical Specialist (Environment)	
4.	**Sampling design: Water Quality – Physical and Biological** The sampling design for water quality (physical parameters) at minimum to include collection of 2 replicate water profiles from 3 Zones (nearshore, lagoon, offshore) at 3 Sites within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined in Step 3. 5 Locations x 3 Sites x 3 Zones x 2 replicates = 90 samples Parameters to be recorded using a water quality profiler are to include salinity, conductivity, dissolved oxygen, pH, turbidity, algae, chlorophyll-a, phytoplankton.	IMT PSC & Technical Specialist (Environment)	
5.	**Sampling design: Water Quality – Chemical** The sampling design for water quality (chemical parameters) at a minimum to include collection of 2 replicate samples from 3 depths (surface, mid-water, near bottom) from 3 Zones (nearshore, lagoon, offshore) at 3 Sites within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined in Step 3. 5 Locations x 3 Sites x 3 Depths x 3 Zones x 2 replicates = 270 samples Water quality samples will be analysed for recoverable hydrocarbons (further details in AOHSE-ER-0037) at NATA accredited analytical laboratory.	IMT PSC & Technical Specialist (Environment)	
6.	**Sampling design: Sediment Quality** The sampling design for sediment quality at a minimum to include collection of 2 replicate samples at 3 Sites at 2 Zones (inshore and offshore) within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined in Step 3. 5 Locations x 3 Sites x 2 Zones x 2 replicates = 60 samples Sediment samples will be analysed for recoverable hydrocarbons (further details in AOHSE-ER-0037) at NATA accredited analytical laboratory.	IMT PSC & Technical Specialist (Environment)	
7.	**Sampling design: Benthic Infauna** The sampling design for intertidal benthic infauna at a minimum to include collection by hand held corer of 5 replicate samples from 2 Zones perpendicular to the shoreline (upper-, lower intertidal) at 3 Sites within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which have been defined in Step 3. 5 Locations x 3 Sites x 2 Zones x 5 replicates = 150 cores	IMT PSC & Technical Specialist (Environment)	

	At the same time of collecting the intertidal benthic infauna cores, 2 replicate samples will also be taken for determination of sediment characteristics (particle size distribution and total organic carbon). In summary, the sampling design for intertidal benthic macroinvertebrate sediment characteristics is to comprise: 5 Locations x 3 Sites x 2 Zones x 2 replicates = 60 sediment samples		
8.	Assign GIS Specialist to make a map showing sampling design and sampling locations. Map to be saved in a format that can be cut and pasted into the IAP.	IMT PSC & Technical Specialist (Environment)	
9.	Issue IAP to Operations Section. This is an ongoing step during all phases of the incident including clean-up.	IMT PSC & Technical Specialist (Environment)	
10.	Additional sampling will be undertaken as required if the sampling design is insufficient to detect environmental impacts.	IMT PSC & Technical Specialist (Environment)	
11.	Ensure all environmental monitoring contractors use appropriate PPE at all times.	ALL	
12.	The sampling design and frequency will be determined at the time of the commencement of the study using technical and Government advice and reviewed for appropriateness after 12 months. This monitoring is to be conducted every quarter from the commencement for the first 12 months. After the initial 12 month period, the sampling will be conducted on an annual basis until the termination triggers have been met.	IMT PSC & Technical Specialist (Environment)	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Equipment Water quality sampling equipment Sediment quality sampling equipment Benthic infauna sampling equipment As described in AOHSE-ER-0037 – procedure for resourcing and implementation of Environmental Monitoring	SGS	1300 487 706 Mobilised from Perth
Personnel	SGS	1300 487 706
Helicopters	Operations Manager	Warrnambool or Tooradin

8. Supporting Documentation

Document title	Reference No.	Notes
Monitoring of Oil Hydrocarbons in Marine Waters, Sediments and Effects on Benthic Infauna	AOHSE-ER-0037	Work instructions to assess effects of hydrocarbons on marine waters, sediments and benthic infauna; and Equipment lists, analytical and reporting requirements.
APU Oil Spill Response Strategy – RS10 Environmental Monitoring	AOHSE-ER-0060	

9. Generic work assignments
Environmental Monitoring: • SGS Team 1: Impact Locations - collect water, sediment and benthic infauna samples at locations as described in the IAP; • SGS Team 2: Reference Locations - collect water, sediment and benthic infauna samples at locations as described in the IAP; • All samples to be stored and shipped following SGS protocols.
10. Termination Criteria
Oil concentrations in marine waters must not exceed normal background concentrations; (if activated) No statistical difference in hydrocarbon concentrations in sediments between impact and reference locations; (if activated) No statistical difference in benthic infauna abundance and diversity between impact and reference locations; Deemed unsafe to continue implementing RS10 activities; and Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response.

4.4.2 Benthic Habitats and Benthic Primary Producers

1. Response Strategy	Environmental Monitoring – Benthic Habitats and Benthic Primary Producers
2. Objective	Identify areas potentially impacted by the oil spill and prioritise sensitive areas at highest risk of oil spill effects to maximise effectiveness of first response; Initiate environmental monitoring programs to support and inform spill response planning; assess the effects of spills and monitor post-spill recovery of sensitive environmental receptors.
3. Rationale	Environmental monitoring will be initiated to support the oil spill response strategies and to understand any effects of an oil spill on sensitive receptors. The sampling instructions to assess the effects of a spill on environmental receptors are described in BHP environmental monitoring procedures. These documents outline details such as equipment lists and analytical requirements, chain of custody templates and reporting of results. Monitoring reports will use standard statistical techniques based on 'Beyond BACI' principles (level of statistical significance $p<0.05$) to assess the environmental effects of the incident as well as effectiveness of the response strategies. Outcomes of the statistical analyses will be used to determine if termination criteria have been achieved. Termination Criteria will be developed in conjunction and consultation with Regulatory agencies. The decision to terminate environmental monitoring sits with the BHP IMT.
4. Initiation Criteria	If surveillance from RS2 reports that benthic habitats (e.g. corals, seagrasses and macroalgae) or benthic primary producers (e.g. mangroves) will be affected by a Level 2 diesel spill.
5. Activation Time	< 8 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible person	Action status
1.	Advise GHD to arrange to mobilise field teams and equipment to Melbourne.	IMT OSC	
2.	Review the IMT Oil Spill Response Strategy Decision Tree (Figure 3-1) and use all relevant and up-to-date information streams in adapting the Day 1 IAP work instructions. Key Information: a) Oil Spill Trajectory Modelling; b) Oil Spill Tracker Buoys; c) RS 2 Situational Awareness / Satellite Imagery / Weather forecast / AIS feed / Flight data; d) ESC / Govt. and other external technical advice; e) Ecological Sensitivity Window; f) Environment Plan; g) Oil spill reference documents; and h) Daily Field Reports	IMT PSC & Technical Specialist (Environment)	
3.	Sampling designs in the environmental monitoring procedures require the selection of Impact and Reference Locations: **Impact Location** –use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. within BIAs, GIS datasets) and Daily Field Reports to identify oiled areas. Impact Location is any location that is currently being affected by released oil (i.e. within the plume of surface / entrained / dissolved / shoreline accumulated oil) or will be in the pathway of released oil in the future. **Reference Location** – use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. within BIAs, GIS datasets) and Daily Field Reports to identify locations that are not affected by oil. Reference Locations should not be impacted by the oil spill, i.e. outside of the plume	IMT PSC & Technical Specialist (Environment)	

	and the predicted oil spill trajectory. They need to have equivalent characteristics to Impact Locations, e.g. similar depth, aspect, benthic habitats, distance offshore for whales, beach profile for nesting turtles, intertidal zones for birds etc. Seek specialist advice in selecting Reference Locations.		
4.	**Sampling design: Benthic Habitats** The sampling design for monitoring the effects of oil spills on benthic habitats (e.g. corals, macroalgae, seagrass, benthic filter feeders, coral recruitment surveys) at a minimum to be based on observations of percent cover, species diversity, abundance and community composition of benthic habitats within a minimum of at least 5 transects (between 50 – 100 m long) at a minimum of 3 Sites at 2 Depths (Shallow and Deep) within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined in Step 3. 5 Locations x 3 Sites x 2 depths x 5 transects = 90 replicates (tiles for coral recruitment)	IMT PSC & Technical Specialist (Environment)	
5.	**Sampling design: Mangroves** For benthic primary producers, the sampling design is to be based on counts within a minimum of at least 5 quadrats (1 m^2 for **Faunal Burrows and Pneumatophore Counts**; 4 m^2 **Leaf Health Status**) at a minimum of 3 Sites within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined in Step 3. 5 Locations x 3 Sites x 5 quadrats = 45 replicates	IMT PSC & Technical Specialist (Environment)	
6.	Issue IAP to Operations Section. This is an ongoing step during all phases of the incident including clean-up.	IMT PSC & Technical Specialist (Environment)	
7.	Additional sampling will be undertaken as required if the sampling design is insufficient to detect environmental impacts.	IMT PSC & Technical Specialist (Environment)	
8.	Ensure all environmental monitoring contractors use appropriate PPE at all times.	ALL	
9.	The sampling frequency will be determined at the time of the commencement of the study and reviewed for appropriateness after 12 months. This monitoring is to be conducted every quarter from the commencement for the first 12 months. After the initial 12 month period, the sampling will be conducted on an annual basis until the termination triggers have been met.	IMT PSC & Technical Specialist (Environment)	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Equipment Field sampling equipment Field safety kit As described in AOHSE-ER-0040 – procedure for resourcing and implementation of Environmental Monitoring	GHD	Mobilised from Perth
Personnel	GHD	Trained field specialists

8. Supporting Documentation

Document title	Reference No.	Notes

Monitoring Effects of an Oil Spill on Benthic Habitats and Benthic Primary Producers	AOHSE-ER-0040	Work instructions to assess effects of hydrocarbons on benthic habitats and benthic primary producers; and Equipment lists and reporting requirements.
APU Oil Spill Response Strategy – RS10 Environmental Monitoring	AOHSE-ER-0060	

9. Generic work assignments

Environmental Monitoring:

- Benthic surveys at locations as described in the IAP.

10. Termination Criteria

Oil concentrations in marine waters must not exceed normal background concentrations;

No statistical difference in species diversity, abundance, distribution and percentage cover of benthic habitats (e.g. corals, macroalgae and seagrasses) between impact and reference locations; (if activated)

No statistical difference in mangrove bioindicators (e.g. faunal burrows, pneumatophore counts, leaf health status) between impact and reference locations;

Deemed unsafe to continue implementing RS10 activities; and

Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response.

4.4.3 Seabirds and Migratory Shorebirds

1. Response Strategy	Environmental Monitoring – Seabirds and Migratory Shorebirds
2. Objective	Identify areas potentially impacted by the oil spill and prioritise sensitive areas at highest risk of oil spill effects to maximise effectiveness of first response; Initiate environmental monitoring programs to support and inform spill response planning; assess the effects of spills and monitor post-spill recovery of sensitive environmental receptors.
3. Rationale	Environmental monitoring will be initiated to support the oil spill response strategies and to understand any effects of an oil spill on sensitive receptors. The sampling instructions to assess the effects of a spill on environmental receptors are described in BHP environmental monitoring procedures. These documents outline details such as equipment lists and analytical requirements, chain of custody templates and reporting of results. Monitoring reports will use standard statistical techniques based on 'Beyond BACI' principles (level of statistical significance $p<0.05$) to assess the environmental effects of the incident as well as effectiveness of the response strategies. Outcomes of the statistical analyses will be used to determine if termination criteria have been achieved. Termination Criteria will be developed in conjunction and consultation with Regulatory agencies. The decision to terminate environmental monitoring sits with the BHP IMT.
4. **Initiation Criteria**	If surveillance from RS2 reports that seabirds have been oiled and/or migratory shorebird habitat will be affected by a Level 2 diesel spill.
5. **Activation Time**	< 8 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible person	Action status
1.	Advise Bennelongia to make arrangements to mobilise field teams and equipment to Melbourne.	IMT OSC	
2.	Review the IMT Oil Spill Response Strategy Decision Tree (Figure 3-1) and use all relevant and up-to-date information streams in adapting the Day 1 IAP work instructions. Key Information: a) Oil Spill Trajectory Modelling; b) Oil Spill Tracker Buoys; c) RS 2 Situational Awareness / Satellite Imagery / Weather forecast / AIS feed / Flight data; d) ESC / Govt. and other external technical advice; e) Ecological Sensitivity Window; f) Environment Plan; g) Oil spill reference documents; and h) Daily Field Reports	IMT PSC & Technical Specialist (Environment)	
3.	Sampling designs in the environmental monitoring procedures require the selection of Impact and Reference Locations: **Impact Location** –use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. BIAs, GIS datasets) and Daily Field Reports to identify oiled areas. Impact Location is any location that is currently being affected by released oil (i.e. within the plume of surface / entrained / dissolved / shoreline accumulated oil) or will be in the pathway of released oil in the future. **Reference Location** – use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. BIAs, GIS datasets) and Daily Field Reports to identify locations that are not affected by oil. Reference Locations should not be impacted by the oil spill, i.e. outside of the plume and the predicted oil spill trajectory. They need	IMT PSC & Technical Specialist (Environment)	

	to have equivalent characteristics to Impact Locations, e.g. similar depth, aspect, benthic habitats, distance offshore for whales, beach profile for nesting turtles, intertidal zones for birds etc. Seek specialist advice in selecting Reference Locations.		
4.	**Sampling design: Birds** The sampling design for monitoring the effects of oil spills on seabirds and migratory shorebirds is to be based on 5 surveys (species abundance and diversity) at a minimum of 3 Sites within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined in Step 3. 5 Locations x 3 Sites x 5 surveys = 45 replicate surveys	IMT PSC & Technical Specialist (Environment)	
5.	Assign GIS Specialist to make a map showing sampling design and sampling locations. Map to be saved in a format that can be cut and pasted into the IAP.	IMT PSC & Technical Specialist (Environment)	
6.	Issue IAP to Operations Section. This is an ongoing step during all phases of the incident including clean-up.	IMT PSC & Technical Specialist (Environment)	
7.	Additional sampling will be undertaken as required if the sampling design is insufficient to detect environmental impacts.	IMT PSC & Technical Specialist (Environment)	
8.	Ensure all environmental monitoring contractors use appropriate PPE at all times.	ALL	
9.	The sampling frequency will be determined at the time of the commencement of the study and reviewed for appropriateness after 12 months. This monitoring is to be conducted every quarter from the commencement for the first 12 months. After the initial 12 month period, the sampling will be conducted on an annual basis until the termination triggers have been met.	IMT PSC & Technical Specialist (Environment)	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Equipment Field sampling equipment Field safety kit As described in AOHSE-ER-0038 – procedure for resourcing and implementation of Environmental Monitoring	Bennelongia	Mobilised from Perth
Personnel	Bennelongia	Trained field specialists

8. Supporting Documentation

Document title	Reference No.	Notes
Monitoring Effects of an Oil Spill on Birds	AOHSE-ER-0038	Work instructions to assess effects of hydrocarbons on seabirds and migratory shorebirds; and Equipment lists and reporting requirements.
APU Oil Spill Response Strategy – RS10 Environmental Monitoring	AOHSE-ER-0060	

9. Generic work assignments
Environmental Monitoring: • Field Team: seabird and migratory shorebird surveys at locations as described in the IAP.
10. Termination Criteria
Oil concentrations in marine waters must not exceed normal background concentrations; No statistical difference in oiled seabird or migratory shorebird abundance and diversity between impact and reference locations; Deemed unsafe to continue implementing RS10 activities; and Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response.

4.4.4 Marine Mammals and Megafauna

1. Response Strategy	Environmental Monitoring – Marine Mammals and Megafauna
2. Objective	Identify areas potentially impacted by the oil spill and prioritise sensitive areas at highest risk of oil spill effects to maximise effectiveness of first response; Initiate environmental monitoring programs to support and inform spill response planning; assess the effects of spills and monitor post-spill recovery of sensitive environmental receptors.
3. Rationale	Environmental monitoring will be initiated to support the oil spill response strategies and to understand any effects of an oil spill on sensitive receptors. The sampling instructions to assess the effects of a spill on environmental receptors are described in BHP environmental monitoring procedures. These documents outline details such as equipment lists and analytical requirements, chain of custody templates and reporting of results. Monitoring reports will use standard statistical techniques based on 'Beyond BACI' principles (level of statistical significance $p<0.05$) to assess the environmental effects of the incident as well as effectiveness of the response strategies. Outcomes of the statistical analyses will be used to determine if termination criteria have been achieved. Termination Criteria will be developed in conjunction and consultation with Regulatory agencies. The decision to terminate environmental monitoring sits with the BHP IMT.
4. **Initiation Criteria**	If surveillance from RS2 reports that marine mammals and megafauna will be affected by a Level 2 diesel spill.
5. **Activation Time**	< 8 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible person	Action status
1.	Advise GHD to make arrangements to mobilise field teams and equipment to Melbourne.	IMT OSC	
2.	Review the IMT Oil Spill Response Strategy Decision Tree (Figure 3-1) and use all relevant and up-to-date information streams in adapting the Day 1 IAP work instructions. Key Information: a) Oil Spill Trajectory Modelling; b) Oil Spill Tracker Buoys; c) RS 2 Situational Awareness / Satellite Imagery / Weather forecast / AIS feed / Flight data; d) ESC / Govt. and other external technical advice; e) Ecological Sensitivity Window; f) Environment Plan; g) Oil spill reference documents; and h) Daily Field Reports	IMT PSC & Technical Specialist (Environment)	
3.	Sampling designs in the environmental monitoring procedures require the selection of Impact and Reference Locations: **Impact Location** –use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. BIAs, GIS datasets) and Daily Field Reports to identify oiled areas. Impact Location is any location that is currently being affected by released oil (i.e. within the plume of surface / entrained / dissolved / shoreline accumulated oil) or will be in the pathway of released oil in the future. **Reference Location** – use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. BIAs, GIS datasets) and Daily Field Reports to identify locations that are not affected by oil. Reference Locations should not be impacted by the oil spill, i.e.	IMT PSC & Technical Specialist (Environment)	

	outside of the plume and the predicted oil spill trajectory. They need to have equivalent characteristics to Impact Locations, e.g. similar depth, aspect, benthic habitats, distance offshore for whales, beach profile for nesting turtles, intertidal zones for birds etc. Seek specialist advice in selecting Reference Locations.		
4.	**Sampling design: Marine Mammals and Megafauna** The sampling design for monitoring the effects of oil spills on marine mammals and megafauna is to be based on aerial surveys (species abundance and diversity) within a minimum of at least 5 transects at a minimum of 3 Sites within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined in Step 3. 5 Locations x 3 Sites x 5 transects = 45 replicate counts	IMT PSC & Technical Specialist (Environment)	
5.	Assign GIS Specialist to make a map showing sampling design and sampling locations. Map to be saved in a format that can be cut and pasted into the IAP.	IMT PSC & Technical Specialist (Environment)	
6.	Issue IAP to Operations Section. This is an ongoing step during all phases of the incident including clean-up.	IMT PSC & Technical Specialist (Environment)	
7.	Additional sampling will be undertaken as required if the sampling design is insufficient to detect environmental impacts.	IMT PSC & Technical Specialist (Environment)	
8.	Ensure all environmental monitoring contractors use appropriate PPE at all times.	ALL	
9.	The sampling frequency will be determined at the time of the commencement of the study and reviewed for appropriateness after 12 months. This monitoring is to be conducted every quarter from the commencement for the first 12 months. After the initial 12 month period, the sampling will be conducted on an annual basis until the termination triggers have been met.	IMT PSC & Technical Specialist (Environment)	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Equipment Field sampling equipment Field safety kit As described in AOHSE-ER-0039 – procedure for resourcing and implementation of Environmental Monitoring	GHD	Mobilised from Perth
Personnel	GHD	Trained field specialists
Helicopters	Operations Manager	Warrnambool or Tooradin

8. Supporting Documentation

Document title	Reference No.	Notes
Monitoring Effects of an Oil Spill on Marine Mammals and Megafauna	AOHSE-ER-0039	Work instructions to assess effects of hydrocarbons on marine mammals and megafauna; and Equipment lists and reporting requirements.

APU Oil Spill Response Strategy – RS10 Environmental Monitoring	AOHSE-ER-0060	

9. Generic work assignments

Environmental Monitoring:

- Marine Fauna Team: marine fauna surveys at locations as described in the IAP.

10. Termination Criteria

Oil concentrations in marine waters must not exceed normal background concentrations;

No statistical difference in marine mammal, whale shark abundance between impact and reference locations;

Deemed unsafe to continue implementing RS10 activities; and

Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response.

4.4.5 Marine Reptiles

1. Response Strategy	Environmental Monitoring – Marine Reptiles
2. Objective	Identify areas potentially impacted by the oil spill and prioritise sensitive areas at highest risk of oil spill effects to maximise effectiveness of first response; Initiate environmental monitoring programs to support and inform spill response planning; assess the effects of spills and monitor post-spill recovery of sensitive environmental receptors.
3. Rationale	Environmental monitoring will be initiated to support the oil spill response strategies and to understand any effects of an oil spill on sensitive receptors. The sampling instructions to assess the effects of a spill on environmental receptors are described in BHP environmental monitoring procedures. These documents outline details such as equipment lists and analytical requirements, chain of custody templates and reporting of results. Monitoring reports will use standard statistical techniques based on 'Beyond BACI' principles (level of statistical significance $p<0.05$) to assess the environmental effects of the incident as well as effectiveness of the response strategies. Outcomes of the statistical analyses will be used to determine if termination criteria have been achieved. Termination Criteria will be developed in conjunction and consultation with Regulatory agencies. The decision to terminate environmental monitoring sits with the BHP IMT.
4. **Initiation Criteria**	If surveillance from RS2 reports that marine reptiles will be affected by a Level 2 diesel spill.
5. **Activation Time**	< 8 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible person	Action status
1.	Advise GHD to make arrangements to mobilise field teams and equipment to Melbourne.	IMT OSC	
2.	Review the IMT Oil Spill Response Strategy Decision Tree (Figure 3-1) and use all relevant and up-to-date information streams in adapting the Day 1 IAP work instructions. Key Information: a) Oil Spill Trajectory Modelling; b) Oil Spill Tracker Buoys; c) RS 2 Situational Awareness / Satellite Imagery / Weather forecast / AIS feed / Flight data; d) ESC / Govt. and other external technical advice; e) Ecological Sensitivity Window; f) Environment Plan; g) Oil spill reference documents; and h) Daily Field Reports	IMT PSC & Technical Specialist (Environment)	
3.	Sampling designs in the environmental monitoring procedures require the selection of Impact and Reference Locations: **Impact Location** –use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. within BIAs, GIS datasets) and Daily Field Reports to identify oiled areas. Impact Location is any location that is currently being affected by released oil (i.e. within the plume of surface / entrained / dissolved / shoreline accumulated oil) or will be in the pathway of released oil in the future. **Reference Location** – use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. within BIAs, GIS datasets) and Daily Field Reports to identify locations that are not affected by oil. Reference Locations should not be impacted by the	IMT PSC & Technical Specialist (Environment)	

	oil spill, i.e. outside of the plume and the predicted oil spill trajectory. They need to have equivalent characteristics to Impact Locations, e.g. similar depth, aspect, benthic habitats, distance offshore for whales, beach profile for nesting turtles, intertidal zones for birds etc. Seek specialist advice in selecting Reference Locations.		
4.	**Sampling design: Turtles** The sampling design for monitoring the effects of oil spills on turtles is to include counts and observations (e.g. Nesting abundance and spatial distribution, population dynamics and turtle morphology) at a minimum of 3 Sites within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined in Step 3 5 Locations x 3 Sites = 15 surveys	IMT PSC & Technical Specialist (Environment)	
5.	Issue IAP to Operations Section. This is an ongoing step during all phases of the incident including clean-up.	IMT PSC & Technical Specialist (Environment)	
6.	Additional sampling will be undertaken as required if the sampling design is insufficient to detect environmental impacts.	IMT PSC & Technical Specialist (Environment)	
7.	Ensure all environmental monitoring contractors use appropriate PPE at all times.	ALL	
8.	The sampling frequency will be determined at the time of the commencement of the study and reviewed for appropriateness after 12 months. This monitoring is to be conducted monthly for a total of 4 months during nesting season from the commencement for the first 12 months. After the initial 12 month period, the sampling will be conducted on an annual basis during nesting season until the termination triggers have been met.	IMT PSC & Technical Specialist (Environment)	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Equipment Field sampling equipment Field safety kit As described in AOHSE-ER-0043 – procedure for resourcing and implementation of Environmental Monitoring	GHD	Mobilised from Perth
Personnel	GHD	Trained field specialists

8. Supporting Documentation

Document title	Reference No.	Notes
Monitoring Effects of an Oil Spill on Marine Reptiles	AOHSE-ER-0043	Work Instructions to assess effects of hydrocarbons on marine reptiles; and Equipment lists and reporting requirements.
APU Oil Spill Response Strategy – RS10 Environmental Monitoring	AOHSE-ER-0060	

9. Generic work assignments

Environmental Monitoring:

- Marine Reptile Field Teams: turtle surveys at locations as described in the IAP.

10. Termination Criteria

Oil concentrations in marine waters must not exceed normal background concentrations;

No statistical difference in turtle nesting abundance and spatial distribution, population dynamics and turtle morphology between impact and reference locations;

Deemed unsafe to continue implementing RS10 activities; and

Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response.

4.4.6 Commercial and Recreational Fish Species

1. Response Strategy	Environmental Monitoring – Commercial and Recreational Fish Species
2. Objective	Determine the extent and level of hydrocarbon contamination or tainting of fish and shellfish and/ or bioaccumulation of toxins in fish that may impact commercial and recreational fish species; Determine any mortality of fish/ shellfish species and document any fish-kills that occur during a spill event; Determine if seafood from within the spill area meets statutory limits for hydrocarbon residues and is marketable; Provide regulatory agencies, fisheries managers and other spill responders with information to help them to evaluate the likelihood of contamination of seafood (commercial, aquaculture, recreational) from an oil spill event; and assist in the decision-making process to restrict, ban, close or re-open fisheries.
3. Rationale	Environmental monitoring will be initiated to support the oil spill response strategies and to understand any effects of an oil spill on sensitive receptors. The sampling instructions to assess the effects of a spill on environmental receptors are described in BHP environmental monitoring procedures. These documents outline details such as equipment lists and analytical requirements, chain of custody templates and reporting of results. Monitoring reports will use standard statistical techniques based on 'Beyond BACI' principles (level of statistical significance $p<0.05$) to assess the environmental effects of the incident as well as effectiveness of the response strategies. Outcomes of the statistical analyses will be used to determine if termination criteria have been achieved. Termination Criteria will be developed in conjunction and consultation with Regulatory agencies. The decision to terminate environmental monitoring sits with the BHP IMT.
4. **Initiation Criteria**	If surveillance from RS2 Monitor and Evaluate reports that commercial and recreational fisheries will be affected by a Level 2 diesel spill.
5. **Activation Time**	< 8 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible person	Action status
1.	Advise GHD to make arrangements to mobilise field teams and equipment to Melbourne.	IMT OSC	
2.	Review the IMT Oil Spill Response Strategy Decision Tree (Figure 3-1) and use all relevant and up-to-date information streams in adapting the Day 1 IAP work instructions. Key Information: i) Oil Spill Trajectory Modelling; j) Oil Spill Tracker Buoys; k) RS 2 Situational Awareness / Satellite Imagery / Weather forecast / AIS feed / Flight data; l) ESC / Govt. and other technical external advice; m) Ecological Sensitivity Window; n) Environment Plan; o) Oil spill reference documents; and p) Daily Field Reports	IMT PSC & Technical Specialist (Environment)	
3.	Sampling designs in the environmental monitoring procedures require the selection of Impact and Reference Locations: **Impact Location** –use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. within BIAs, GIS datasets) and Daily Field Reports to identify oiled areas. Impact Location is any location that is currently being affected by released oil (i.e. within the plume of surface / entrained / dissolved / shoreline accumulated oil) or will be in the pathway of released oil in the future.	IMT PSC & Technical Specialist (Environment)	

	Reference Location – use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. within BIAs, GIS datasets) and Daily Field Reports to identify locations that are not affected by oil. Reference Locations should not be impacted by the oil spill, i.e. outside of the plume and the predicted oil spill trajectory. They need to have equivalent characteristics to Impact Locations, e.g. similar depth, aspect, benthic habitats, distance offshore for whales, beach profile for nesting turtles, intertidal zones for birds etc. Seek specialist advice in selecting Reference Locations.		
4.	**Sampling design: Commercial and Recreational Fisheries / Seafood** The sampling design for monitoring the effects of oil spills on commercial and recreational fisheries / seafood includes collection of tissue samples (>30 g per sample) from a minimum of 10 specimens from each target species at a minimum of 4 Sites within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined in Step 3. 5 Locations x 4 Sites = 20 tissue samples per target species* *Target species is defined as the species targeted by the fisheries impacted, and as agreed by Victorian Fisheries Authority (VFA).	IMT PSC & Technical Specialist (Environment)	
5.	NATA accredited analytical laboratory is to be used to determine if fish, crustaceans and bivalves have acquired a taint or have accumulated detectable levels of hydrocarbons in edible tissues.	IMT PSC & Technical Specialist (Environment)	
6.	Issue IAP to Operations Section. This is an ongoing step during all phases of the incident including clean-up.	IMT PSC & Technical Specialist (Environment)	
7.	Additional sampling will be undertaken as required if the sampling design is insufficient to detect environmental impacts.	IMT PSC & Technical Specialist (Environment)	
8.	Ensure all environmental monitoring contractors use appropriate PPE at all times.	ALL	
9.	The sampling frequency will be determined at the time of the commencement of the study and reviewed for appropriateness after 12 months. This monitoring is to be conducted every quarter from the commencement for the first 12 months. After the initial 12 month period, the sampling will be conducted on an annual basis until the termination triggers have been met.	IMT PSC & Technical Specialist (Environment)	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Equipment Field sampling equipment Field safety kit As described in AOHSE-ER-0048– procedure for resourcing and implementation of Environmental Monitoring	GHD	Mobilised from Perth
Personnel	GHD	Trained field specialists

8. Supporting Documentation

Document title	Reference No.	Notes

Monitoring Effects of an Oil Spill on Commercial and Recreational Fish Species	AOHSE-ER-0048	Work instructions to assess effects of hydrocarbons on commercial and recreational fisheries / seafood; and Equipment lists and reporting requirements.
APU Oil Spill Response Strategy – RS10 Environmental Monitoring	AOHSE-ER-0060	

9. Generic work assignments

Environmental Monitoring:

- Fisheries Field Teams: fish sample collections at locations as described in the IAP.

10. Termination Criteria

Oil concentrations in marine waters must not exceed normal background concentrations;

Hydrocarbon levels in representative commercial and recreational fish species tissue meet statutory specification for food products as per Yender *et al.* (2002);

No statistical difference in hydrocarbon levels in representative commercial and recreational fish species tissue between impact and reference locations;

VFA is satisfied that levels of hydrocarbons in targeted fish species are no longer related to the oil spill event;

Deemed unsafe to continue implementing RS10 activities; and

Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response.

4.4.7 Effects of an Oil Spill on Fishes

1. Response Strategy	Environmental Monitoring – Effects of an Oil Spill on Fishes
2. Objective	Identify areas potentially impacted by the oil spill and prioritise sensitive areas at highest risk of oil spill effects to maximise effectiveness of first response; Initiate environmental monitoring programs to support and inform spill response planning; assess the effects of spills and monitor post-spill recovery of sensitive environmental receptors.
3. Rationale	Environmental monitoring will be initiated to support the oil spill response strategies and to understand any effects of an oil spill on sensitive receptors. The sampling instructions to assess the effects of a spill on environmental receptors are described in BHP environmental monitoring procedures. These documents outline details such as equipment lists and analytical requirements, chain of custody templates and reporting of results. Monitoring reports will use standard statistical techniques based on 'Beyond BACI' principles (level of statistical significance $p<0.05$) to assess the environmental effects of the incident as well as effectiveness of the response strategies. Outcomes of the statistical analyses will be used to determine if termination criteria have been achieved. Termination Criteria will be developed in conjunction and consultation with Regulatory agencies. The decision to terminate environmental monitoring sits with the BHP IMT.
4. **Initiation Criteria**	If surveillance from RS2 Monitor and Evaluate reports that benthic habitats will be affected by a Level 2 diesel spill.
5. **Activation Time**	< 8 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible person	Action status
1.	Advise GHD to make arrangements to mobilise field teams and equipment to Melbourne.	IMT OSC	
2.	Review the IMT Oil Spill Response Strategy Decision Tree (Figure 3-1) and use all relevant and up-to-date information streams in adapting the Day 1 IAP work instructions. Key Information: a) Oil Spill Trajectory Modelling; b) Oil Spill Tracker Buoys; c) RS 2 Situational Awareness / Satellite Imagery / Weather forecast / AIS feed / Flight data; d) ESC / Govt. and other technical external advice; e) Ecological Sensitivity Window; f) Environment Plan; g) Oil spill reference documents; and h) Daily Field Reports	IMT PSC & Technical Specialist (Environment)	
3.	Sampling designs in the environmental monitoring procedures require the selection of Impact and Reference Locations: **Impact Location** –use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. within BIAs, GIS datasets) and Daily Field Reports to identify oiled areas. Impact Location is any location that is currently being affected by released oil (i.e. within the plume of surface / entrained / dissolved / shoreline accumulated oil) or will be in the pathway of released oil in the future. **Reference Location** – use OSTM, OSTB, situational awareness from field teams, State Govt. ESC, EP (e.g. within BIAs, GIS datasets) and Daily Field Reports to identify locations that are not affected by oil. Reference Locations should not be impacted by the oil spill, i.e. outside of the plume and the	IMT PSC & Technical Specialist (Environment)	

	predicted oil spill trajectory. They need to have equivalent characteristics to Impact Locations, e.g. similar depth, aspect, benthic habitats, distance offshore for whales, beach profile for nesting turtles, intertidal zones for birds etc. Seek specialist advice in selecting Reference Locations.		
4.	**Sampling design: Fishes in Coral Reef Habitat** The sampling design is to be based on 8 replicate deployments of BRUVs in a minimum of 5 habitat-types* within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined Step 3. Locations x 5 habitat types x 8 BRUVs replicate = 200 samples Habitat-types to be included when sampling on coral reefs are defined as: • Algal pavement; • Macroalgal beds; • Channels; • Hard coral areas; and • Sand.	IMT PSC & Technical Specialist (Environment)	
5.	**Sampling design: Fishes in Seagrass, Macroalgal Beds and Deep-Water Sponge Communities** The sampling design is to be based on 8 replicate deployments of BRUVs in a minimum of 3 Sites at 2 Depths (Shallow and Deep to a maximal depth of 100 m) within at least 5 Locations (minimum of 1 Impact Location and 4 Reference Locations), which are defined Step 3. 5 Locations x 3 Sites x 2 Depths x 8 BRUVs replicates = 240 samples	IMT PSC & Technical Specialist (Environment)	
6.	Issue IAP to Operations Section. This is an ongoing step during all phases of the incident including clean-up.	IMT PSC & Technical Specialist (Environment)	
7.	Additional sampling will be undertaken as required if the sampling design is insufficient to detect environmental impacts.	IMT PSC & Technical Specialist (Environment)	
8.	Ensure all environmental monitoring contractors use appropriate PPE at all times.	ALL	
9.	The sampling frequency will be determined at the time of the commencement of the study and reviewed for appropriateness after 12 months. This monitoring is to be conducted every quarter from the commencement for the first 12 months. After the initial 12 month period, the sampling will be conducted on an annual basis until the termination triggers have been met.	IMT PSC & Technical Specialist (Environment)	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Equipment Field sampling equipment Field safety kit As described in AOHSE-ER-0051– procedure for resourcing and implementation of Environmental Monitoring	GHD	Mobilised from Perth
Personnel	GHD	Trained field specialists

8. Supporting Documentation

Document title	Reference No.	Notes
Monitoring Effects of an Oil Spill on Fishes	AOHSE-ER-0051	Work instructions to assess effects of hydrocarbons on species diversity and abundance of fishes associated with coral reefs, seagrasses, macroalgal beds, deep-water sponge gardens and mangroves; and Equipment lists and reporting requirements.
APU Oil Spill Response Strategy – RS10 Environmental Monitoring	AOHSE-ER-0060	

9. Generic work assignments

Environmental Monitoring:

- Fish surveys at locations as described in the IAP.

10. Termination Criteria

Oil concentrations in marine waters must not exceed normal background concentrations;

No statistical difference in species diversity and abundance, of mobile and site-attached fishes between impact and reference locations;

Department of Environment, Land, Water and Planning (DELWP) is satisfied that the patterns of species diversity and abundance of fishes associated with coral reefs, seagrasses, mangroves, macroalgal beds and deep-water sponge gardens (to a depth of 100 m) are no longer related to the oil spill event;

Deemed unsafe to continue implementing RS10 activities; and

Agreement is reached with the jurisdictional authority relevant to the spill to terminate the response.

4.5 RS11 Oiled Wildlife Response

1. Response Strategy	Oiled Wildlife Response
2. Objective	Protect exposed marine fauna by removal and relocation, or treatment and release, during a spill event.
3. Rationale	The DJPR Victorian Emergency Animal Welfare Plan (VEAWP) sets out the minimum standard required for an oiled wildlife response (OWR) in Victoria in both Commonwealth and State waters.
4. Initiation Criteria	If surveillance from RS2 Monitor and Evaluate reports oiled wildlife may be affected by a Level 2 diesel spill.
5. Activation Time	< 24 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible Person	Action Status
1.	Request AMOSC to mobilise OWR first strike response kit and mobilise washing facility from Geelong.	IMT PSC	
2.	Notify Vic DoT Oil Spill Response Coordination Unit (OSRC) and DJPR that OWR equipment is being mobilised.	IMT PSC	
3.	Request AMOSC to mobilise trained OWR responders and resources.	IMT PSC	
4.	Determine size of OWR facility to be established based on estimates of oiled wildlife and initiate construction of the wildlife washing and rehabilitation facility.	IMT PSC	
5.	Pre-emptive capture of turtles (particularly juvenile life stages) if shoreline contact occurs during turtle nesting season should be considered on a case-by-case basis and decided upon following consultation with State regulatory agencies. Auditory hazing techniques may also be useful for moving large flocks of shorebirds out of 'at risk' areas.	IMT PSC	
6.	Oiled wildlife recovery teams deployed to assigned shoreline segments as described in the IAP. Oiled wildlife to be transported from oiled location to a staging area, and then onwards to the wildlife washing and rehabilitation facility.	IMT PSC	
7.	Staging sites will be opportunistically established at existing access points along the coast.	IMT PSC	
8.	Ensure all OWR personnel use appropriate personal protective equipment (PPE) at all times.	ALL	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Equipment OWR First Strike Response kit OWR Container facility PPE	AMOSC	Mobilised from Geelong and Perth (Day 3).
Personnel	AMOSC Core Group	Trained OWR (operations) personnel to act as field supervisors of OWR recovery and rehabilitation teams.

	OSRL	Trained OWR (operations) personnel to act as field supervisors of OWR recovery and rehabilitation teams.
	Sea Alarm	Trained OWR (operations) personnel to act as field supervisors of OWR recovery and rehabilitation teams.
	DJPR	As described in the VEAWP.
	Veterinarians	As described in the VEAWP.
	Wildlife Careers	Volunteers, as described in the VEAWP.
	BHP / Hays	Skilled labour for OWR facility construction and unskilled labour within the washing and rehabilitation teams.

8. Supporting Documentation

Document Title	Reference No.	Notes
Victorian Emergency Animal Welfare Plan (VEAWP)	http://agriculture.vic.gov.au/__data/assets/pdf_file/0003/365088/Victorian-Animal-Emergency-Welfare-Plan_updated.pdf http://www.amosc.com.au/	Custodians – AMOSC / DJPR and Industry.
APU Oil Spill Response Strategy – RS11 Oiled Wildlife	AOHSE-ER-0061	

9. Generic Work Assignments

Oiled Wildlife Response:

- All OWR recovery and rehabilitation activities to be conducted in accordance with procedures and guidelines described in VEAWP.

10. Termination Criteria

No further oiled wildlife recovered from areas affected by the spill.

Rehabilitated wildlife has been returned to the environment.

4.6 RS12 Forward Command Post

1. Response Strategy	Forward Command Post
2. Objective	Forward Command Post maintained during an oil spill response to prevent environmental impact to sensitive environmental receptors.
3. Rationale	The objective of this response strategy is to assist the IMT in planning the oil spill response activities in the spill zone by assisting in the development of incident action plans, oversee field operations, manage rosters and provide situational briefings/debriefings. Personnel within the forward command post will also maintain liaison with local emergency service organisations, industry, and other government departments active in the spill zone. BHP IMT personnel and communications support will be established to enable effective coordination of on-ground resources during an oil spill response. BHP will establish Forward Command Post in either Warrnambool or Geelong.
4. Initiation Criteria	If surveillance from RS2 Monitor and Evaluate reports shoreline environments or oiled wildlife may be affected by a Level 2 diesel spill.
5. Activation Time	< 24 hours after notification from BHP IMT.

6. Course of Action

Number	Action	Responsible Person	Action Status
1.	Mobilise BHP IMT personnel with operations, logistics, oil spill response, finance and external affairs experience.	IMT Leader	
2.	Mobilise BHP APU IT personnel to facilitate all Information Management requirements of the forward command post including telephone / satellite communications and intranet / internet connections.	IMT Leader	
3.	Mobilise AMOSC / OSRL personnel with oil spill response and operations experience.	IMT Leader	

7. Resources

Resource Identifier	Leader	Source / Location, Special Equipment, Remarks
Equipment As described in procedure for resourcing and implementation of the Forward Command Post	BHP IMT	Mobilised from Perth.
Personnel	BHP IMT	Mobilised from Perth.
	AMOSC 03 5272 1555	Mobilised from Geelong or Perth.

8. Supporting Documentation

Document Title	Reference No.	Notes
APU Oil Spill Response Strategy – RS12 Forward Command Post	AOHSE-ER-0062	Procedure to be followed for resourcing and implementation of a Forward Command Post. Contains a pre-populated ICS 204 Form for inclusion in the IAP.

9. Generic Work Assignments
Forward Command Post: • Locate key personnel and communications at a Forward Command Post.
10. Termination Criteria
The source of hydrocarbon spill is under control, the site is safe, the release of hydrocarbons to the marine environment has ceased and the site is free of hydrocarbons.

5 Response Equipment

5.1 Equipment

Oil spill response equipment from the AMOSC, OSRL, AMSA National Plan can be called upon if required. The National Plan equipment, stored in regional stockpiles around Australia is sufficient to deal with spills of up to 20,000 tonnes. The major Victorian stockpile is in Geelong.

5.1.1 BHP OSRA Spill Response Equipment

Oil spill response equipment maintained by AMOSC (Exmouth, Fremantle and Geelong) and OSRL (Singapore) would be available to BHP during a spill response as part of contractual arrangements that are currently in place with these agencies. A complete list of equipment is maintained by BHP OSRA's, including stockpiles in Geelong from the Marine Oil Spill Equipment System (MOSES) database.

BHP have a entered into a Memorandum of Understanding (MOU) with AMSA. This MOU sets out an understanding of respective roles and responsibilities when responding to ship-sourced and non-ship-sourced marine pollution incidents.

5.1.2 Vessel Support

The marine response strategies outlined in this OPEP can be undertaken independently or concurrently. It is expected that in a Level 2 spill response that marine strategies will be undertaken concurrently. Table 5-1 outlines the multiple expected vessel requirements for the response strategies. During a response, the IMT may determine that additional vessels are either required or are available to be used and therefore can supplement the expected arrangements. BHP has the ability, through supplier contracts, to scale up (or down) the response to meet the needs of the response. BHP have a Marine Focal Point whose role is to contract vessels on short notice and has ability to spot charter vessels. Table 5-1 provides an indication of expected vessel usage across the spill response strategies.

Table 5-1: Response strategy vessel requirements

Response Strategy	Vessel Type	Number	Location	How accessed	Comment	Earliest need
Source Control	Vessel with DP2 and ROV capability	1	Local/ Regional	Vessel on contract /vessel of opportunity	1 initially, ramping to 2 as source control activity develops	As identified
Oiled Wildlife	Small recreational craft	1-2	Local/ Regional	Vessel of opportunity	-	As identified
	Small utility vessels	1-2	Local/ Regional	Vessel of opportunity	Cray boats suitable	As identified
Operational Scientific Monitoring	Small utility vessels	1-2	Local/ Regional	Vessel of opportunity	1 initially, ramping to 2 as spill develops for water quality.	Day 1
	Commercial fishing vessel	1-2	Local/ Regional	Charter	Benthic habitats Trap/line/trawl fishing vessels Fish monitoring	As identified
	Small recreational craft	1-2	Local/ Regional	Vessel of opportunity	Marine mammals	As identified

5.1.3 Aircraft Support

Helicopters from Warrnambool or Tooradin may be accessed through the Aviation / Marine Specialist role within the IMT. AMOSC or OSRL Aerial observers will be utilised via contract callout.

6 References

Australian Maritime Safety Authority (2003). Oil Spill Monitoring Handbook. Prepared by Wardrop Consulting and the Cawthron Institute for the Australian Maritime Safety Authority (AMSA) and the Marine Safety Authority of New Zealand (MSA). Published by AMSA, Canberra. 115 pp.

AMSA (2011) National Plan for the Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances (NATPLAN), http://www.amsa.gov.au/Marine_Environment_Protection/National_plan/

AMOSC (2017) Australian Marine Oil Spill Centre Plan (AMOSPlan), https://amosc.com.au/wp-content/uploads/2018/01/AMOSPlan-2017.pdf

BHP (2018) Incident Management Plan – Australia, Doc No. AOHSE-ER-0001

BHP (2016) APU Monitoring Effects of an Oil Spill on Benthic Habitats and Benthic Primary Producers AOHSE-ER-0040

BHP (2016) APU Monitoring Effects of an Oil Spill on Birds AOHSE-ER-0038

BHP (2016) APU Monitoring Effects of an Oil Spill on Commercial and Recreational Fish Species AOHSE-ER-0048

BHP (2016) APU Monitoring Effects of an Oil Spill on Fishes AOHSE-ER-0051

BHP (2016) APU Monitoring Effects of an Oil Spill on Marine Mammals and Megafauna AOHSE-ER-0039

BHP (2013) APU Operational Response Guideline 1 – Aerial Surveillance. Confirmation, Quantification and Monitoring of Oil Spills AOHSE-ER-0041

BHP (2016) APU Monitoring Effects of an Oil Spill on Marine Reptiles AOHSE-ER-0043

BHP (2013) APU Operational Response Guideline 3 – Oil Spill Trajectory Modelling. Initiation, Data Collection and Progression AOHSE-ER-0044

BHP (2016) APU Monitoring of Oil Hydrocarbons in Marine Waters, Sediments and Effects on Benthic Infauna AOHSE-ER-0037

BHP (2011) Incident Management Manual – Australia (AU IMM), Doc No. AO-HSE-ER-0001

Victoria's Maritime Emergency (non-search and rescue) Plan (MENSAR Plan) (2016). https://files-em.em.vic.gov.au/public/EMV-web/SERP-StateMaritimeEmergenciesPlan.pdf

Glasby, T. M. (2006). Analysing data from post-impact studies using asymmetrical analyses of variance: A case study of epibiota on marinas. *Australian Journal of Ecology*, *22*(4), 448-459.

Underwood, A. J. (1994). On beyond BACI: sampling designs that might reliably detect environmental disturbances. *Ecological applications*, *4*(1), 3-15.

DJPR / DELWP (no date) Victorian Emergency Animal Welfare Plan (Revision 1). Victorian State Government. http://agriculture.vic.gov.au/__data/assets/pdf_file/0003/365088/Victorian-Animal-Emergency-Welfare-Plan_updated.pdf

7 Abbreviations

ADIOS	Automated Data Inquiry for Oil Spills
ALARP	As Low As Reasonably Practical
AMBA	Area that may be affected
AMOSC	Australian Marine Oil Spill Centre
AMOSPlan	Australian Marine Oil Spill Plan
AMSA	Australian Maritime Safety Authority
AOI	Area of Interest
API	American Petroleum Institute
APU	Australian Production Unit (BHP)
AUV	Autonomous underwater vehicles
Bbl/hr	Gallons per hour
BHP	BHP Billiton Petroleum Pty Ltd
DELWP	Department of Environment, Land, Water and Planning
DJPR	Department of Jobs, Precincts and Regions
DoEE	Department of the Environment and Energy
EES	Environment Effects Statement
EIA	Environmental impact assessment
EIS	Environmental Impact Statement
EMT	Emergency Management Team (BHP)
EP	Environment Plan
EPO	Environmental Performance Outcomes
ECC	Emergency and Crisis Centre
GIS	Geographical Information Systems
hrs	hours
HSE	Health Safety And Environment
HSEC	Health, Safety, Environment and Community
IAP	Incident Action Plan
IBC	Intermediate Bulk Containers
IMM	Australia Petroleum Incident Management Manual (BHP)
IMR	Inspection/monitoring, maintenance and repair
IMT	Incident Management Team
km	Kilometre
LOWC	Loss of well control
LSC	Logistics Section Chief
m^3	Cubic metres
MENSAR Plan	Victoria's Maritime Emergency (non-search and rescue) Plan
MOSES	Marine Oil Spill Equipment System
NATPLAN	National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances (sometimes referred to as "National Plan")

NEBA	Net Environmental Benefit Analysis
NOPSEMA	National Offshore Petroleum Safety and Environment Management Authority
OIM	Offshore Installation Manager
OPEP	Oil Pollution Emergency Plan
OPGGS (E) Regulations	*Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OSRA	Oil Spill Response Agency
OSRL	Oil Spill Response Limited
OSTB	Oil Spill Tracking Buoy
OSTM	Oil Spill Trajectory Modelling
POA	Power of Attorney
POLREP	Pollution Report
PPE	Personal Protective Equipment
PSC	Planning Section Chief
ROV	Remote Underwater Vehicle
RPS-APASA	RPS Asia-Pacific Applied Science Associates
RS	Response Strategy
SCAT	Shoreline clean-up and assessment technique
SES	State Emergency Service
SMP	Stakeholder Management Plan
SOPEP	Shipboard Oil Pollution Emergency Plan (MARPOL 73/78 Annex I, Reg 26)
TEC	Threatened Ecological Communities
TJ/d	Tera Joules per day
TRG	The Response Group
VEAWP	Victorian Emergency Animal Welfare Plan
VFA	Victorian Fisheries Authority
Vic DoT	Victorian Department of Transport
VICPLAN	Victorian Marine Pollution Contingency Plan
WOMP	Well Operations Management Plan

8 Key Definitions

Control Agency	Means the agency/company having operational responsibility in accordance with the relevant contingency plan to take action to respond to an oil and/or chemical spill in the marine environment.
Environment	Means: a) ecosystems and their constituent parts, including people and communities; and b) natural and physical resources; and c) the qualities and characteristics of locations, places and areas; and d) the heritage value of places; and includes e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).
Petroleum Instrument	a) means an authority granted by an instrument under the Act for the carrying out of a petroleum activity; and b) includes: i.) a petroleum exploration permit; and ii.) a petroleum retention lease; and iii.) a petroleum production license; and iv.) a petroleum-related pipeline license; and v.) an infrastructure license; and vi.) a petroleum access authority; and vii.) a petroleum special prospecting authority.
Petroleum Instrument Holder	For a petroleum activity, means the registered holder of a petroleum instrument for the activity, and includes a permittee, lessee, licensee, pipeline licensee or registered holder of an access authority or special prospecting authority for the activity.
Recordable Incident	For an operator of an activity, means an incident arising from the activity that: a) breaches a performance outcome or standard in the environment plan that applies to the activity; and b) is not a reportable incident.
Regulator	Means: a) in relation to a petroleum activity – NOPSEMA; or b) in relation to a greenhouse gas storage activity - the responsible Commonwealth Minister.
Reportable Incident	For an operator of an activity, means an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage.
Statutory Agency	Means the State/NT or Commonwealth agency having statutory authority for marine pollution matters in their area of jurisdiction. For offshore petroleum exploration and production in Commonwealth waters, or in State/Territory waters where powers are conferred, the Statutory Agency is NOPSEMA.

Appendix A

OSRL Notification Form

Notification Form

(Initial Incident Information)

Warning! Please telephone the Duty Manager before e-mailing or faxing this completed form

To	Duty Manager		
OSRL Base	Southampton, UK	Loyang, Singapore	Fort Lauderdale, USA
Telephone	+44 (0)23 8033 1551	+65 6266 1566	+1 954 983 9880
Emergency Fax	+44 (0)23 8072 4314	+65 6266 2312	+1 954 987 3001
Email	dutymanagers@oilspillresponse.com		

Safety and Security: Oil Spill Response Limited's safety policy requires us to work closely with the mobilising party to ensure all aspects of safety and security are addressed for our personnel.

Guidance: Please ensure the information given on this form is accurate at the time of completion. This information will be used to develop and recommend the most appropriate response strategy. If new information should become available, or the situation changes, please inform the Duty Manager as soon as possible.

Section 1 – Contact Details	**Mandatory Information Required**
Member Company	
Name of Person Notifying OSRL	
Position in Incident	
Direct Phone Number	
Mobile Number	
Fax Number	
Email Address	
Command Centre Address	
Date and Time of Notification	
Section 2 – Location	
Country / Region of Spill	
Latitude / Longitude of Spill Position	
Area Affected	☐Inland ☐River ☐Estuary ☐Shoreline ☐Port ☐Harbour ☐Offshore ☐Subsea ☐Other
Depth of Water (if applicable)	
Section 3 – Spill Details	
Date and Time (of spill – GMT)	
Source of Spill	
Cause of Spill	
Status of Spill	☐ Secured ☐ Uncontrolled ☐ Unknown

Product Properties	Product Name / Type		**State Units**
	SG or API		Alternatively, provide an Assay sheet
	Pour Point		
	Wax Content		
	Asphaltene		
	Sulphur Content		☐ Assay sheet provided
	Viscosity		

Release Rate	Instantaneous Release						State Units
	OR						
	Continuous Release		per hour for		☐ Hours	☐ Days	

Section 3 – Spill Details cont.		**Mandatory Information Required**
Description of Observed Spill	Estimated Quantity		**State Units**
	Size	
	Appearance	
	Direction of Travel	

Section 4 – Weather		
Wind Direction (wind direction given **from**)		**State Units**
Wind Speed		**Alternatively provide a local weather forecast**
Air Temperature		
Sea Temperature		
Sea State		
Visibility		
Cloud Base		☐ **Weather forecast provided**

Section 5 – Oil Spill Model Request			
Information you supply in Section 3 (Spill Details) and 4 (Weather) will be used for the modelling			
Do you require Oil Spill Trajectory Modelling?	☐ Surface 2D	☐ Sub-surface 3D*	☐Not at this time
Additional Information (please include start date and time)			
*Separate model request form required. Sub-surface models require additional time and costs.			

Section 6 – Safety and Security		
Highlight any known Safety or Security Risks		☐N/A
Describe Security arrangements for OSRL staff (if applicable)		☐N/A

Additional information if available

Section 7 – Resources at Risk	
Environmental or Socio-economic sensitivities that may be impacted (If possible provide the relevant oil spill contingency plan)	
Section 8 – Equipment	

Equipment already deployed or being mobilised (other than OSRL resources)	

http://www.oilspillresponse.com/activate-us/activation-procedures

Mobilisation Authorisation Form

Warning! Please Telephone the Duty Manager before e-mailing or faxing this completed form

To	Duty Manager		
OSRL Base	Southampton, UK	Loyang, Singapore	Fort Lauderdale, USA
Telephone	+44 (0)23 8033 1551	+65 6266 1566	+1 954 983 9880
Emergency Fax	+44 (0)23 8072 4314	+65 6266 2312	+1 954 987 3001
Email	dutymanagers@oilspillresponse.com		

Details of Authorised Contact				
Subject	**Mobilisation of Oil Spill response Limited (OSRL)**			
Incident Name				
Mobilising Company				
Name of Person Authorising OSRL				
Position in Incident				
Direct Phone Number				
Mobile Number				
Fax Number				
Email Address				
Invoice Address				
Purchase Order Number				
I, authorise the activation of Oil Spill Response Limited and its resources in connection with the above incident under the terms of the Agreement in place between above stated Company and Oil Spill Response Limited.				
Signature:		Date / Time:		

If Oil Spill Response Limited personnel are to work under another party's direction please complete details below;

Additional Details	
Company	
Contact Name	
Position in Incident	
Direct Phone Number	
Mobile Number	
Fax Number	
Email Address	

http://www.oilspillresponse.com/activate-us/activation-procedures

Appendix B

OSRL Aerial Surveillance Observer Form

Oil Spill Response

AERIAL SURVEILLANCE OBSERVER LOG

Incident		**Date**		**Observers**	
Aircraft Type		**Call Sign**		**Area of Survey**	
Survey Start Time		**Survey End Time**		**Average Altitude**	Marine fauna, potential for oiled wildlife?
Wind Speed (knots)		**Wind Direction**		**Notes**	
Cloud Base (feet)		**Visibility (nm)**			
Time High Water		**Time Low Water**			
Current Speed (nm)		**Current Direction**			

SLICK DETAILS

Slick	TIME UTC	OIL POSITION (CENTRE)		SLICK ORIENT Degrees	OIL SLICK LENGTH			OIL SLICK WIDTH			AREA km²	AREA COVERAGE %	OILED AREA km²
		LATITUDE NORTH	LONGITUDE EAST / WEST		G/SPEED kt	TIME Seconds	DISTANCE km	G/SPEED kt	TIME Seconds	DISTANCE km			
A													
B													
C													
D													
E													

Slick	OIL APPEARANCE COVERAGE - %						MINIMUM VOLUME - m³	MAXIMUM VOLUME - m³	TYPE OF DETECTION (etc. visual, IR)
	1	2	3	4	5	OTH			
A									
B									
C									
D									
E									

THE BONN AGREEMENT OIL APPEARANCE CODE (BAOAC)			
No	OIL APPEARANCE	MIM. VOLUME m3 / km2	MAX. VOLUME m3 / km2
1	SHEEN	0.04	0.30
2	RAINBOW	0.30	5.00
3	METALLIC	5.00	50.0
4	DISCONTINUOUS TRUE COLOUR	50.0	200
5	TRUE COLOUR	200	>200

NOTE: *Ground Speed (G/SPEED) is the speed of the aircraft (helicopter) relative to the ground (sea) measured in knots (kt). One Knot is one nautical mile (nm) per hour.*

1 kt = 1 nm per hour = 1.85 Kilometres (km) per hour

EXAMPLE: A helicopter, flying at 80 knots, takes 130 seconds to fly along the length of an oil slick. What is the length of the oil slick in km?

(Speed x Time = Distance) 80 knots x 130 seconds // (80*1.85) * (130 / 3600) = 5.34 km

Appendix C

Sensitive Information: Contact Directory