Sauropod 3D Marine Seismic Survey (WA-527-P)

Oil Pollution Emergency Plan

16 July 2019

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ERM

CONTENTS

List of Tables

List of Figures

Acronyms and Abbreviations

Name	Description
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
CA	Control Agency
CEMT	Crisis and Emergency Management Team (3D Oil)
DBCA	Department of Biodiversity Conservation and Attractions
DMIRS	WA Department of Mines, Industry Regulation and Safety
DNP	Director of National Parks
DoEE	Department of Energy & Environment
DoT	WA Department of Transport
EMBA	Environment that maybe affected
EP	Environment Plan
ERG	Emergency Response Group (Shoreside Vessel Contractor)
ERM	Environmental Resources Management
ERP	Emergency Response Plan (Vessel Emergency Response)
ERT	Emergency Response Team (Vessel Response Group)
HSE	Health Safety & Environment
IAP	Incident Action Plan
IMO	International Maritime Organisation
ITOPF	International Tanker Owners Pollution Federation
JA	Jurisdictional Authority
JRCC	Joint Rescue Coordination Centre
MDO	Marine Diesel Oil
MFO	Marine Fauna Observer
MOP	Marine Oil Pollution
MSS	Marine Seismic Survey
NEBA	Net Environmental Benefits Assessment
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
OPEP	Oil Pollution Emergency Plan
OSMP	Operational & Scientific Monitoring Plan
POLREP	Pollution Report
SITREP	Situation Report
SOPEP	Shipboard Oil Pollution Emergency Plan
WA	Western Australia

Reference Documents

Jurisdiction	Plan Title	Function / Application
Commonwealth of Australia (Commonwealth Waters)	National Plan for Maritime Environmental Emergencies (NatPlan)	The NatPlan sets out an effective response to marine pollution events in Commonwealth waters through an integrated arrangement between the Federal, State and Northern Territory and the petroleum industry. There are national guidelines for the development of marine oil pollution (MOP) contingency plans. Under the NatPlan States / Territories are required to develop operational and tactical plans to deal with oiled wildlife in their jurisdiction.
Western Australia (State waters)	State Hazard Plan for Maritime Environmental Emergencies (State Hazard Plan)	Replaced the WestPlan – Marine Oil Pollution (MOP) and the WestPlan Marine Transport Emergency. Details the management arrangements for the prevention, preparation, response and recovery for MOP minimise the impacts of marine oil pollution from vessels, offshore petroleum activities and other sources. The rehabilitation of oil-affected wildlife is a recognised response activity under WestPlan-MOP.

FIRST STRIKE RESPONSE

Detailed below is the checklist of first strike response actions in the event of a marine diesel spill (Level 1 or Level 2[1]) from vessels undertaking the Sauropod 3D MSS activity in Exploration Permit WA-527-P.

In a spill event, a response will be activated commensurate to the size and level of risk. Note – as the Sauropod 3D MSS activity is vessel-based in Commonwealth waters, the **Control Agency (CA)** (i.e. organisation in control of oil spill response) is the **Australian Maritime Safety Authority (AMSA).** *3D Oil and the Vessel Contractor will support the oil spill response activities*.

This OPEP is activated on the release of any hydrocarbon substance from MSS vessels to the marine environment during survey activities in the Sauropod 3D MSS Operational Area. This OPEP does not apply to vessel spills during transit activities to/from the Sauropod 3D MSS Operational Area, which will be managed via the vessel's Shipboard Oil Pollution Emergency Plan (SOPEP).

The 3D Oil Project Manager is responsible for activating this OPEP. Notification and callout responsibilities are summarised in Table 0-1. Contact details for these groups/organisations are provided in Appendix 1.

Table 0-1: Notification & Call-out Authorities

Group/Organisation	Notified/Mobilised by:	Method:	Assembly Point
Vessel Response Crew	Vessel Master	Internal (phone/radio/alarm)	As Directed
Vessel Management Emergency Support Group	Vessel Master	Telephone	-
3D Oil Project Manager	3D Oil Offshore Representative	Telephone	3D Oil Board Room
3D Oil Emergency/ Crisis Management Team (*Level 2 spill*)	3D Oil Project Manager	Telephone	3D Oil Board Room
AMSA	Vessel Master	AMSA JRCC (Phone)	-
NOPSEMA (*Reportable spill*)	3D Oil Managing Director	Telephone	-
NOPTA, DNP & DMIRS (*Reportable spill*)	3D Oil Managing Director	Email	-
DoT (*State waters – Level 2 spill*)	3D Oil Project Manager	Telephone	-
Stakeholders	3D Oil Project Manager	Telephone	-

[1] Guidance on spill level classification is provided in Table 2-3 in this OPEP.

Table 0-2: Spill Response Action List – MDO Spill

Response Action (Note: 3D Oil in support role only)

Action	Responsibility	Timing
Initial Emergency Actions		
1. Sound relevant alarm. Vessel Master is notified of spill in accordance with SOPEP	Crew member discovering leak	ASAP
2. Manage safety of all vessel personnel. Secure sources of ignition and alert all personnel (appropriate to level of spill). Implement the relevant emergency response procedures to protect human life and equipment and in particular, those procedures focused at reducing the risk of fire or explosion (i.e. Shipboard Oil Pollution Emergency Plan (SOPEP/ERP)) or equivalent)	Vessel Master	ASAP Refer SOPEP
3. If safe, stop spill through source control actions. Minimise loss overboard utilising available spill prevention/clean-up equipment on-board.	Vessel Master (or delegate)	ASAP (Refer SOPEP)
4. After safety measures have been implemented, identify the damage, location of incident, proximity to land, other navigational hazards, other traffic in the area, extent of spill (rate/volume) and the weather/current conditions in the area. Estimate the quantity of oil released and provide initial incident information.	Vessel Master (or delegate)	ASAP Refer Section 4.2
5. Notify AMSA immediately and confirm response actions (**AMSA JRCC Phone: +61 2 6230 6811 or 1800 641 792**). Issue POLREP to AMSA	Vessel Master	ASAP Refer Section 2.5.2
6. As appropriate, issue emergency call-out on marine radio **VHF Channel 16** to warn other vessels in the immediate path of the spill. *Warning should include the type of accident, such as collision or leak; where the accident has occurred; possible hazards such as risk of fire or explosion; where the slick is moving and recommended actions, for example leaving the area, staying 500m up-current, up-wind from the spill site and no naked flames.*	Vessel Master	ASAP
7. Notify the 3D Oil Project Manager with spill incident details	3D Oil Offshore Rep.	ASAP
8. Notify NOPSEMA verbally WITHIN 2 HOURS of a reportable spill (**Ph: (08) 6461 7090**) and provide written record of notification to NOPSEMA, NOPTA and DMIRS. Notify Director of Marine Parks on **Ph: 0419 293 465** (24 hr Marine Compliance Officer) if the spill is likely to impact on Australian Marine Parks. Notify: DoT on **Ph: (08) 9480 992** (24hr Duty officer) if the spill is within or impending on WA State waters.	3D Oil Managing Director (or delegate)	Within 2 hrs Refer Section 2.5.2
Level 2 Spill:		
9. On advice from AMSA, initiate response strategy.	Vessel Master	-
10. Deploy oil spill tracking buoy to track spill. Provide data to AMSA and DoT (if required).	3D Oil Offshore Rep.	Within 30 minutes of spill Refer Appendix 2

Response Action (Note: 3D Oil in support role only)

Action	Responsibility	Timing
11. As directed, monitor leak size, changes to the physical/chemical character of the slick, direction, weather and sea-state conditions providing this information to AMSA & 3D Oil. Formally log and record this data on a time basis. Activate OSMP Vessel Surveillance & SSM4 (Marine Fauna Monitoring using MFOs) (as directed by AMSA)	Vessel Master / 3D Oil Offshore Rep.	Refer Section 4.2
12. Undertake other stakeholder notifications (as necessary)	3D Oil MD or 3D Oil Project Manager	Refer Stakeholder Contacts Directory
13. Based on an agreed timeframe with AMSA forward regular SITREPs details to AMSA (cc. 3D Oil)	Vessel Master / 3D Oil Offshore Rep.	-
14. Forward copies of SITREPs to NOPSEMA and DoT (if required).	3D Oil Project Manager	-
15. Continue to implement OPEP (or equivalent) procedures	3D Oil Project Manager	Ongoing
16. As directed by AMSA, undertake spill surveillance by support vessel (as appropriate). Continue to monitor the spill providing information on spill amount, trajectory, weather, area of coverage and spill appearance. Information to be provided back to AMSA & 3D Oil. Provide DoT with the information (if required).	Vessel Masters / 3D Oil Offshore Rep.	Ongoing
17. Confirm trajectory (weather conditions and vector analysis) and area impacted. If drifting to WA State waters, request RPS modelling if not requested by AMSA. Identify additional scientific monitoring required and mobilise resources.	Vessel Masters / 3D Oil Offshore Rep.	Refer Section 4.2 Refer Section 4.3
18. Consult with DNP, DoEE and DoT (as appropriate) on: a. Scope of scientific monitoring; and b. Definition of impact and reference sites	3D Oil Project Manager (or delegate)	Refer OSMP
19. As directed by AMSA, continue routine surveillance to monitor the effectiveness of **natural weathering strategy** (i.e. monitoring and surveillance strategy) utilising the following effectiveness criteria: a. Trajectory is in line with manual estimates & predicted weathering; b. No new environmental sensitivities are being threatened	Vessel Master / Support Vessel Master	
20. If natural weathering strategy is determined as not effective, confirm with AMSA the revised response strategy based on environmental resources at risk (as appropriate). Provide support where directed	Vessel Master / 3D Oil Offshore Rep.	
21. Coordinate oil spill response activities (response equipment deployment, aerial surveillance, oil spill trajectory modelling (as necessary).	AMSA	
22. Continue to advise marine stakeholders on the progress of the spill response	Vessel Master / 3D Oil Project Manager (CEMT) / AMSA	Refer Section 2.5.3

Response Action (Note: 3D Oil in support role only)		
Action	**Responsibility**	**Timing**
23. Advise AMSA of any observed changes or increased threats to environmental sensitivities (as relevant).	Vessel Master	
Response Termination		
24. The oil spill response termination criteria will be determined and advised by AMSA. Water monitoring (oil-in-water sheen) will continue until termination criteria are achieved. AMSA will advise Vessel Master and 3D Oil when the response is terminated	AMSA	
25. 3D Oil to advise NOPSEMA of spill response termination	3D Oil MD (or delegate)	
26. Continue with scientific monitoring until OSMP termination criteria has been met for individual studies	3D Oil Project Manager	Refer OSMP

1. INTRODUCTION

1.1 Purpose, Scope & Objectives

This OPEP details the oil spill response arrangements to be undertaken by 3D Oil to mitigate impacts and risks to the marine environment arising from an oil spill incident from the Sauropod 3D MSS located in Exploration Permit WA-527-P.

The objectives of this OPEP are to ensure that:

- The oil spill response processes/structures used by 3D Oil are consistent with those used in applicable plans such as the NatPlan and the State Hazard Plan;
- 3D Oil has assessed the potential support required during a Sauropod 3D MSS spill event and has timely access to appropriately trained people and resources in order to assist with an effective response;
- There is effective integration and use of industry/government response efforts and resources in responding to a Sauropod 3D MSS spill.

This OPEP covers hydrocarbon spills from vessels involved in the Sauropod 3D MSS located in WA-527-P. This OPEP is to be read in conjunction with the Sauropod EP when considering the existing environment, environmental impacts, risk management, performance standards, reporting compliance, and the decision processes that will apply in the event that a spill occurs.

Any spill originating from vessels outside the Sauropod 3D MSS Operational Area or when transiting to or from the project are managed via their respective Shipboard Oil Pollution Emergency Plans (SOPEPs) as regulated by The Australian Maritime Safety Authority (AMSA) under the *Commonwealth Protection of the Seas (Prevention of Pollution by Ships) Act 1983*.

1.2 Activity Overview and Location

The Sauropod 3D Marine Seismic Survey (MSS) will take place within Commonwealth waters off the north-west Western Australian (WA) coast within the Roebuck Basin in exploration permit area WA-527-P.

The survey will be undertaken within an ‘Acquisition Area’, where seismic data acquisition will occur. The Acquisition Area will be located within a broader ‘Operational Area’, which includes additional space for vessel activities such line turns, run-ins, run-outs, soft-start procedures and seismic source testing.

The Acquisition Area will be up to a maximum of approximately 3,500 km^2, with an Operational Area of approximately 6,000 km^2 (Figure 1.1). At its closest point the Operational Area is approximately:

- 63 km and 67 km from Clerke Reef and Imperieuse Reef respectively (the Rowley Shoals)
- 90 km from Bedout Island
- 120 km from the WA coast at Eighty Mile Beach;
- 190 km from Port Hedland;
- 230 km from Broome.

Water depths in the Acquisition Area range from approximately 95 to 172 m.

The 3D seismic survey will take a maximum of 60 days to acquire, and will be undertaken within the period of January to April 2020 or January to April 2021.

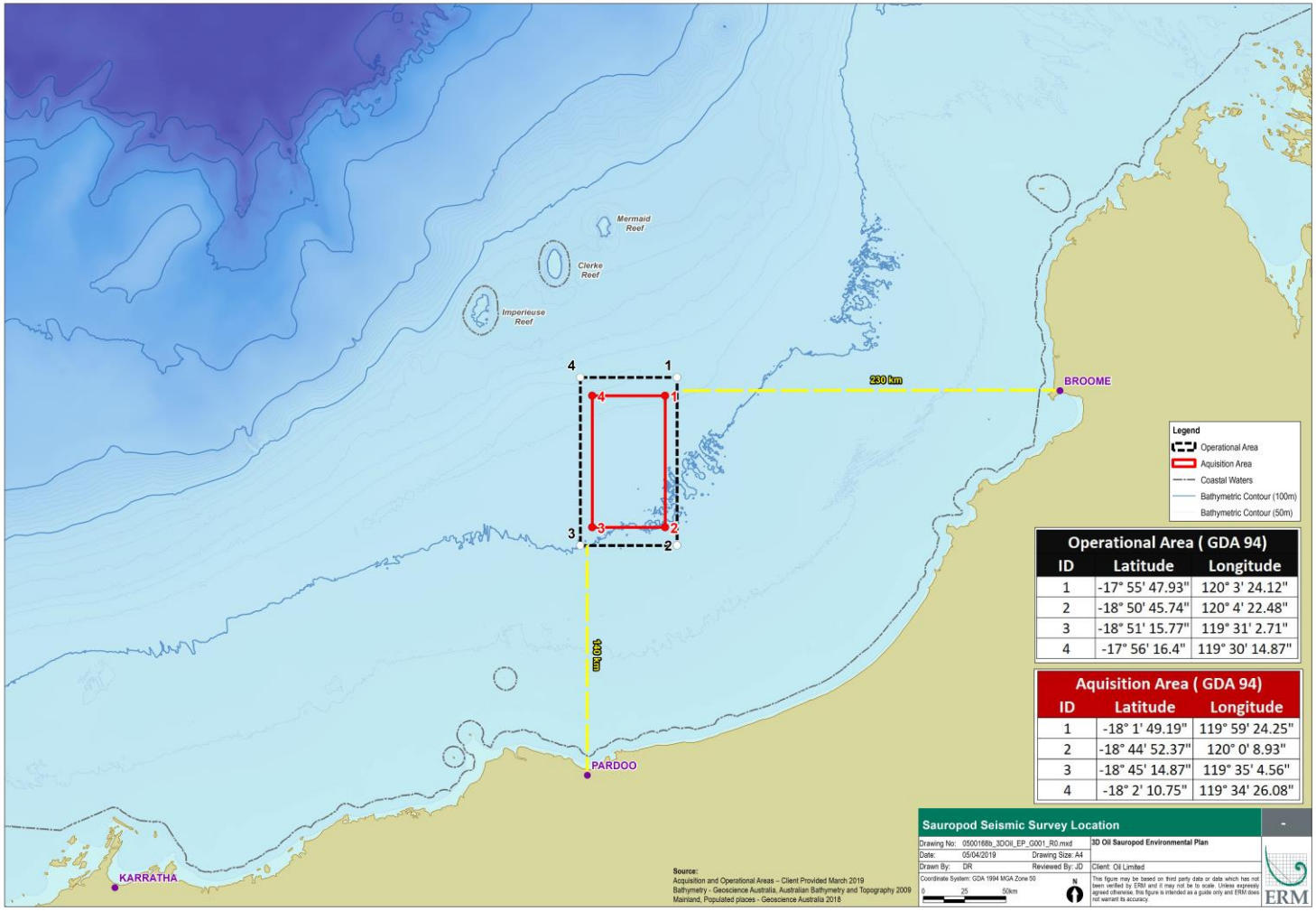

Figure 1.1 Location of Sauropod 3D Marine Seismic Survey

1.3 Relationship to Other Plans

Oil spill response arrangements detailed in this OPEP integrate with the following 3D Oil and seismic contractor plans, which support the Sauropod 3D MSS activities (refer

Figure 1-2):

- Vessel-specific Crew HSE Plan which includes Emergency Response Procedures;
- Sauropod 3D MSS Project Specific HSE Plan[2];
- Vessel's SOPEP; and
- Seismic Contractors' Emergency Response/Crisis Plans.

The support and chase vessels will have SOPEP or SOPEP–equivalent documents according to the size and classification of the vessel. These plans ensure timely response to emergencies and effective management of oil spills.

In addition, this OPEP is consistent with the following government response plans:

- National Plan for Maritime Environmental Emergencies (NatPlan);
- WA State Hazard Plan for Maritime Environmental Emergencies (State Hazard Plan);
- WA Oiled Wildlife Response Plan.

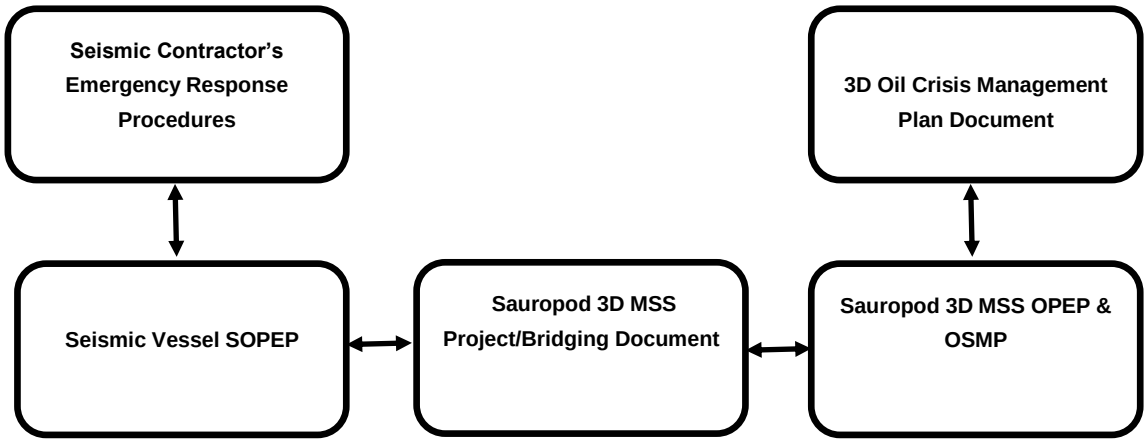

Figure 1-2: Inter-relationship between 3D Oil & Seismic Contractors Emergency Plans

1.3.1 Vessel SOPEP

As required under MARPOL 73/78 Annex I (Regulation 37), all ships greater than 400 gross tonnes must carry a shipboard oil pollution emergency plan (SOPEP), as required by the International Maritime Organisation (IMO). For all ships in Australian waters, the NatPlan also applies. The SOPEP recognises the divisions of responsibility as defined under NatPlan to provide effective response to marine pollution incidents.

[2] A project-specific bridging document will include relevant 3D Oil and Seismic Contractor contacts for any emergency (including oil spills). This also includes the relevant government/regulator contact numbers (e.g. AMSA, NOPSEMA). These contact details will be verified as part of the pre-MSS oil spill response exercise planned for the Sauropod 3D MSS (refer Section 5).

SOPEP's, the principal working document for vessel and crew in the event of a marine oil spill, provides for the following specific management response provisions to mitigate and combat oil spills originating from vessels:

- The procedure to be followed by the Vessel Master to report an oil spill incident, the list of authorities to be contacted (i.e. AMSA JRCC) and the oil spill details to be provided (i.e. forms);
- A detailed description of action to be taken by the personnel on board to reduce or control the discharge (actual or probable) following the incident (i.e. operational spill prevention);
- Roles and responsibilities of all personnel (Master, Radio Officer, Chief Officer, Chief Engineer, etc.,) with respect to the particular oil spill incident experienced;
- Procedures and point of contact on the ship for coordinating shipboard activities with National and Local Authorities;
- Details of SOPEP equipment held on board the vessel;
- Vessel drawings (drainage and layout); and
- SOPEP testing and drill requirements.

The SOPEP also includes specific emergency procedures including steps to control discharges for bunkering spills, hull damage, grounding and stranding, fire and explosions, collisions, tank failure, sinking and vapour release. The typical structure and content of a SOPEP is provided in Table 1-1.

3D Oil, as part of seismic contractor selection, will confirm the vessel has an IMO certified SOPEP (or equivalent document according to vessel class); equipment and resources as described in the SOPEP are available; and that all scheduled drills and exercises have been undertaken against the documented testing program in the SOPEP.

Table 1-1: Contents of a Typical SOPEP

Section	Section Title	Content
1	General Purpose & Introduction	Details the custodian of the Manual and its purpose
2	Reporting Requirements	Details: Reporting Procedures, when and what to report Information requirements, actual/probable discharges Lists of people to contact including coastal ports; coastal state and vessel interested contacts
3	Steps to control/prevent discharges	Details: Types of operational spills (pipes, tank leakage, spills from equipment) and types of spills from accidents and groundings (prevention of fire/explosion, extent of damage containment, reduction of spill volumes, securing the vessel). Priority actions followed by mitigation actions, transfer of bunker/lightering, hull stress assessment Responsibilities of the Master and designated Officers General Responsibilities of crew
4	National & Local Coordination	Master to coordinate all activities with the coastal state Communication procedures for assistance/liaison with the coastal state
5	Other Relevant Information	Local Requirements Insurance Policy Details Owner/Operator Policies Reference material
Appendices		Appendix 1: Initial Notification

	Appendix 2: Coastal State Contacts (Focal Points) Appendix 3: Port Contacts Appendix 4: Ship Interest Contacts Appendix 5: Ship Plans and Drawings Appendix 6: On-board Spill Equipment Appendix 7: Records on Oil Pollution Drills

1.3.2 NatPlan

The National Plan for Maritime Environmental Emergencies (NatPlan) sets out national arrangements, policies and principles for the management of maritime environmental emergencies.

The NatPlan integrates Commonwealth and State Government response oil spill response frameworks to facilitate effective response to marine pollution incidents. AMSA manages NatPlan, working with State Governments (*who have equivalent state plans which integrate into NatPlan*); the shipping, petroleum, chemical industries; and emergency services to maximise Australia's marine pollution response capability to incidents.

NatPlan applies to all hydrocarbon spills in Commonwealth waters seaward of the State waters limit and the State Hazard Plan applies in State waters within 3nm of the territorial sea baseline.

1.3.3 State Hazard Plan

The State Hazard Plan for Maritime Environmental Emergencies (State Hazard Plan) provides an overview of arrangements for the management of marine oil pollution and marine transport emergencies in Western Australia and contains information on prevention, preparedness, response and recovery.

The State Hazard Plan prescribes the management arrangements for the prevention of, preparation for, response to and recovery from a MOP incident in order to minimise the impacts of MOP from vessels, offshore petroleum activities and other sources in State waters.

In accordance with the Plan, where State waters are impacted by a Level 2/3 MOP incident resulting from an offshore petroleum activity in Commonwealth waters, the Western Australia Department of Transport (DoT) will assume the role of CA for the portion of the response activity that occurs within State waters.

Note that oil spill modelling results indicate a low likelihood of oil spill residue intersection with Western Australian State waters.

1.3.4 WA Oiled Wildlife Response Plan

Oiled wildlife response is an integral part of a Maritime Environmental Emergency response. The Western Australian Oiled Wildlife Response Plan for a Maritime Environmental Emergency is administered by the Department of Biodiversity, Conservation and Attractions (DBCA).

During a Maritime Environmental Emergency, DBCA will lead the oiled wildlife response under the control of the appointed CA.

1.4 Review and Update

This OPEP is required to be reviewed, and if applicable updated, to ensure that all relevant information is accurate and that new information or improved technology is evaluated and used to adapt and improve the management of spills.

Any revisions to this OPEP will be undertaken utilizing 3D Oil's Management of Change process observing the EP revision triggers in the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.*

Trigger thresholds for an EP revision include:

- Inclusion of a new activity;
- If there is a significant modification or new stage to an activity;
- If a significant new environmental impact or risk, or significant increase in existing environmental impact or risk identified for the Sauropod 3D MSS activity;
- If there is a series of new environmental impacts or risks or a series of increases in existing environmental impacts or risks, which when taken together, results in a significant new environmental impact or risk; or a significant increase in existing environmental impact or risk no provided for in the EP; or
- If there is a change in titleholder that results in a change in the manner in which environmental impacts and risks are managed.

This OPEP will be distributed to all relevant 3D Oil Sauropod 3D MSS participants, the seismic contractor and relevant government authorities after acceptance of the Sauropod 3D MSS EP.

2. RESPONSE ARRANGEMENTS

2.1 Jurisdictional Authority and Control Agency

The NatPlan defines two levels of responsibility:

- Jurisdictional Authority (JA), having the jurisdictional or legislative responsibility to ensure there is adequate prevention of, preparedness for, response to and recovery from an oil spill incident; and
- Control Agency (CA) having the responsibility to take operational control and respond to an oil spill in the marine environment.

Table 2-1 provides details of the JA and CA with respect to a marine oil spill from vessels and petroleum activities in Commonwealth waters. A spill from Sauropod 3D MSS activities would be classed as an offshore petroleum vessel-based incident, as shaded in the table.

Table 2-1: Jurisdictional Authority and Control Agency (source: AMSA 2018)

Spill Location	Spill Source	Jurisdictional Authority	Control Agency
Commonwealth Waters	Vessel-based Incident	AMSA	AMSA
	Offshore petroleum vessel-based incident (including seismic and support vessels)	NOPSEMA and AMSA *	AMSA
	Petroleum activity – Facility or infrastructure	NOPSEMA	Petroleum titleholder

* NOPSEMA has legislative responsibilities for oversight of offshore petroleum activities. AMSA has legislated responsibility for all vessels in Commonwealth waters.

3D Oil recognises the legislated responsibility of AMSA as CA for vessel-based marine oil spills in Commonwealth waters, and AMSA will assume control of the incident as CA for vessel-based spills associated with the Sauropod 3D MSS. However, 3D Oil will monitor and liaise with AMSA, the Vessel Master and Seismic Contractor and provide assistance as required.

AMSA will implement NatPlan in the event of a vessel based spill in Commonwealth waters in accordance with the spill level descriptions contained in Table 2-3.

AMSA will maintain control of the response until relevant termination criteria are achieved, or in the event that the spill enters State waters, CA responsibility may transfer to DoT.

2.1.1 Commonwealth Waters

AMSA is both the JA for ensuring suitable vessel-sourced spill response arrangements and the CA responsible to respond to vessel-based spills in Commonwealth waters in accordance with the NatPlan. For the purposes of oil spill contingency planning, vessels are considered part of the 'petroleum activity' while they are in the Sauropod 3D MSS Operational Area. If a vessel-sourced spill occurs when undertaking MSS activities, this OPEP will be activated to support the spill, however AMSA, as CA, will remain in control of the response activities with 3D Oil providing available support to AMSA.

Any spill originating from vessels outside the Sauropod 3D MSS Operational Area or when transiting to or from the area are not 'petroleum activities;' and are managed via their respective Shipboard Oil Pollution Emergency Plans (SOPEPs) as regulated by AMSA under the Commonwealth *Protection of the Seas (Prevention of Pollution by Ships) Act 1983*.

2.1.2 State Waters

DoT is the JA and CA responsible for managing MOP emergencies in State waters, in accordance with the State Hazard Plan. The CA has overall responsibility for ensuring there is an adequate response to a MOP incident in State waters, including those from a petroleum activity originality in Commonwealth waters. If a vessel-based spill occurs during the Sauropod 3D MSS (and enters State waters), this OPEP will be activated to support the spill, however DoT, as CA, will remain in control of the response activities within the portion of the response in State waters. 3D Oil will provide support to DoT (as necessary).

2.2 Emergency Response Organisation

Figure 2-1 provides the Sauropod 3D MSS emergency reporting structure for marine emergencies/oil spills. Table 2-2 details the responsibilities of response teams with regard to oil spill response. Notification responsibilities are contained in Section 2.5.

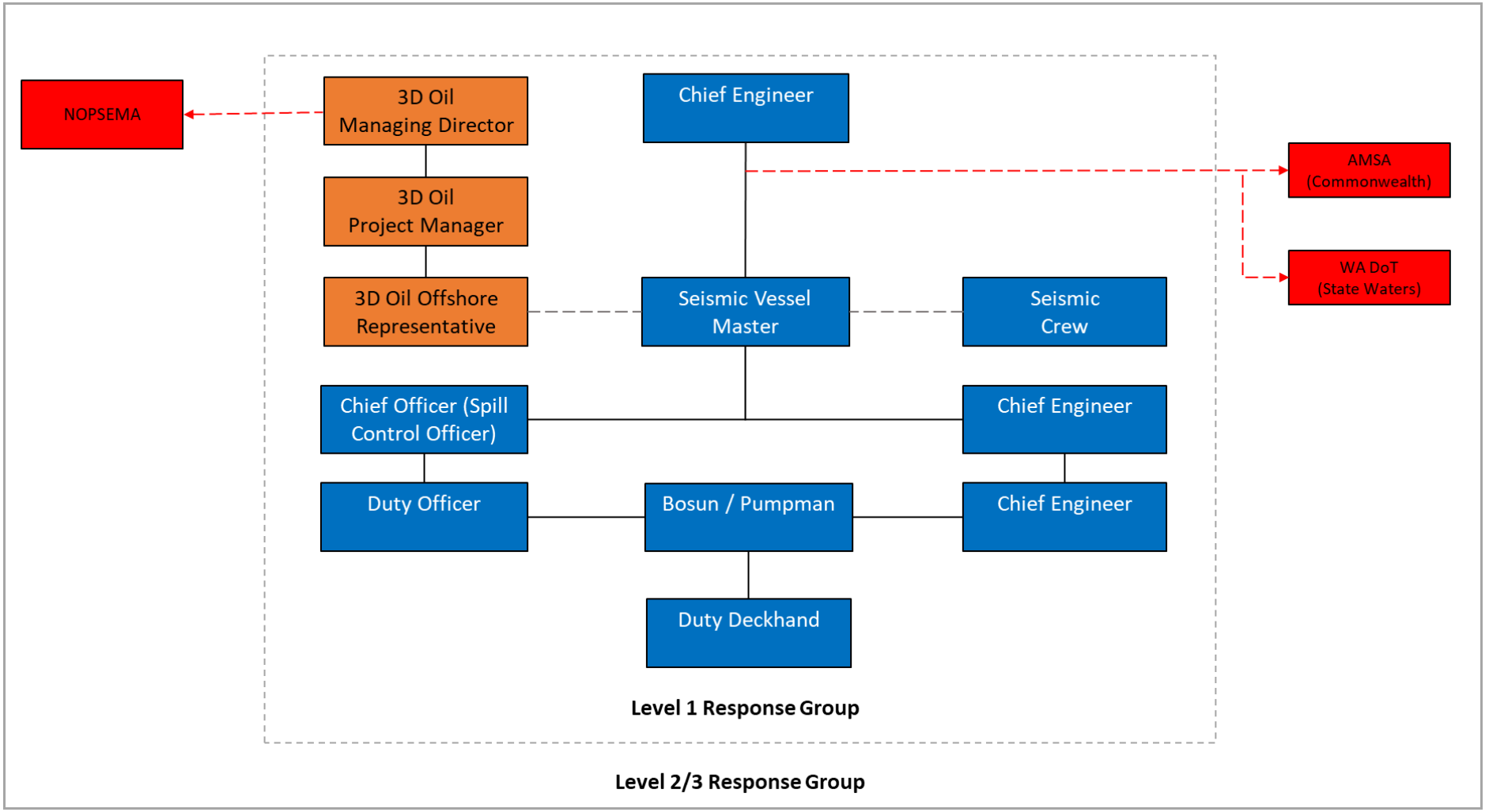

Figure 2-1: Sauropod 3D MSS Emergency Reporting Structure

Table 2-2: Response Teams and Responsibilities

Team	Responsibility
MSS Vessel Emergency Response Team (ERT)	The ERT is responsible for initiating the Incident Action Plan (refer Immediate Actions – **First Strike Response**) and emergency procedures as detailed in the Vessel's SOPEP. The major roles within the ERT are as follows: ■ The Vessel Master has overall control of the on-board operations and has the responsibility of reporting the incident, without delay, to AMSA. The Master oversees any stability computations/evaluations, direct damage controls; initiates incident investigations and coordinates response activities with AMSA (as appropriate); ■ The Chief Engineer, in charge of the engine room and bunkering activities, coordinates spill response activities within the engine room and ensures that all available engine room staff are mobilised for containment and clean-up activities; ■ The Duty Engineer ensures engine room services are available to deck personnel engaged in clean-up operations (e.g., air, water, power etc.); ■ The Chief Officer is responsible for containment and clean-up activities, checking stability criteria and keeping the Master informed and updated; ■ The Duty Officer assists the Chief Officer as required, and alerts and mobilises all off-duty personnel; ■ The Duty Deckhand alerts all personnel as soon as possible and will attempt to contain any oil spill on deck, and prevent oil from going over the side by using available sorbents or sawdust, rags, scuppers etc.; ■ Duty Rating(s) alerts Officer(s) on Duty immediately of an oil leakage. Positions sorbent materials/clean-up material to prevent any oil from escaping over-board and commences clean-up by using the available equipment on-board the vessel; and ■ Other crew responsibilities follow the instructions of the Chief Officer and carry out containment and clean-up operations as directed
Seismic Contractor Company Emergency Response Group (ERG)	Primary duty is to ensure that the Master is fully supported and to engage with regulatory authorities and relevant resources as detailed in the SOPEP. This may include logistics support and telecommunications; safety; planning; finance; insurance and legal support. The Seismic Vessel Manager normally represents the ERG.
3D Oil Crisis and Emergency Management Team (CEMT):	The 3D Oil Managing Director normally represents the 3D Oil CEMT and maintains contact with NOPSEMA after initial incident notification (& provides regular interval updates). The CEMT monitors the incident and provides support (as required). The CEMT also provides updates to affected stakeholders (as necessary). *Note, in the event of a Level 2 oil spill from Sauropod 3D MSS vessels, 3D Oil will monitor for oil impacts to environmental sensitivities and if oil is detected at levels which may cause environmental impact to the particular sensitivity, and will undertake any additional scientific monitoring considered necessary (e.g. wildlife monitoring).*

2.3 Spill Level Classification

The level of spill response depends on the nature and scale of the spill, whether on-site resources can manage the response or additional support resources are required, and the environmental sensitivities at risk. Table 2-3 provides NatPlan guidance for spill level classification. The 3D Oil Project Manager shall make an initial assessment of the spill level based upon the initial guidance information provided and NatPlan criteria.

Table 2-3: NatPlan Guidance on Spill Level Classification

Characteristic	Level 1	Level 2	Level 3
MANAGEMENT			
Jurisdiction	Single jurisdiction	Multiple jurisdictions	Multiple jurisdictions, including international
Delegation	Incident Controller responsible for all functions	Some functions delegated or Sections created	All functions delegated and/or divisions created
Number of agencies	First-response agency	Routine multi-agency response	Agencies from across government and industry
Incident Action Plan	Simple/Outline	Outline	Detailed
Resources	Resourced from within one area	Requires intra-state resources	Requires national or international resources
TYPE OF INCIDENT			
Type of response	First-strike	Escalated	Campaign
Duration	Single shift	Multiple shifts Days to weeks	Extended response Weeks to months
Hazards	Single hazard	Single hazard	Multiple hazards
RESOURCES AT RISK			
Human	Potential for serious injuries	Potential for loss of life	Potential for multiple loss of life
Environment	Isolated impacts or with natural recovery expected within weeks	Significant impacts and recovery may take months. Remediation required	Significant area and recovery may take months. Remediation required
Wildlife	Individual fauna	Groups of fauna or threatened fauna	Large numbers of fauna
Economy	Business level disruption	Business failure	Disruption to a sector
Social	Reduced services	Ongoing reduced services	Reduced quality of life
Infrastructure	Short term failure	Medium term failure	Severe impairment
Public Affairs	Local and regional media coverage	National media coverage	International media coverage

For a Level 1 response:

- The spill can be managed by the Vessel Master with on-board equipment and trained vessel crew members. These are small spills which will not impact shorelines or other sensitive resources.
- The Vessel Master is responsible for notifying the JA (AMSA). The Vessel Master (or delegate) shall monitor the spill and notify AMSA of the situation status. AMSA, as CA for Level 1 spills in Commonwealth Waters will monitor and continue to assess this level of spill.

For a Level 2/3 Response:

- A Level 2/3 spill cannot be managed by the Vessel Master or may have serious impacts on the environment.
- The Vessel Master will notify AMSA as soon as possible. AMSA will assume control of the spill incident and respond. The responsibilities of the CA under a Tier 2/3 spill scenario include:

- Monitoring the spill, its weathering and proximity to environmentally sensitive locations and developing an oil spill response strategy to mitigate impacts to protection priorities in the spill-affected area;
- Undertaking oil spill trajectory modelling (as necessary) to predict slick movement; and
- As required, and after a NEBA assessment, deploy appropriate resources or equipment to protect identified sensitive environmental resources (i.e. primarily marine fauna).

Onsite resources will continue to provide status updates (SITREPs), regardless of the spill level, at the direction of AMSA, throughout the response activity.

2.4 Spill Response Management Team – Level Structures

2.4.1 Level 1 Structure

The Vessel Master will mount the first response to the spill incident in accordance with the vessel's SOPEP using the resources immediately available to the vessel. The Master will also immediately notify any spill to the Rescue Coordination Centre (AMSA). Refer to Section 2.5 for regulatory notification responsibilities.

The 3D Oil Offshore Representative is responsible for notifying the 3D Oil Project Manager of the spill. For this spill level, while the 3D Oil Managing Director will be internally notified, full mobilisation of the 3D Oil CEMT is not anticipated.

The Vessel Master (or delegate) shall monitor the spill and provide updated reports to AMSA of the spill situation to inform AMSA on the adequacy of the spill response strategy. Updates will occur at frequencies determined by AMSA, until the spill is effectively dispersed or evaporated, with oversight by, and in close cooperation with, AMSA.

AMSA, as CA for Level 1 spills in Commonwealth Waters will monitor and continue to assess this level of spill. Note that AMSA can reassess the response at any time and escalate the Level as required.

2.4.2 Level 2/3 Structure

A Level 2 spill cannot be managed by onsite resources and/or could have serious impacts on the environment.

The Vessel Master, after ensuring safety of crew, fire prevention and notification to AMSA JRCC, will implement the SOPEP and consider actions to reduce the oil volume released to the environment (refer Section 5.1 for typical SOPEP responses to vessel spill scenarios). AMSA will assume control of a Level 2/3 spill incident and response in Commonwealth waters. If the spill enters State waters, DoT will assume the role of CA for the portion of the response activity that occurs within the State waters. A high level coordination between DoT, AMSA and 3D Oil would be required in the event of cross jurisdictional incidents.

The 3D Oil Offshore Representative will notify the 3D Oil Project Manager of the spill. Full mobilisation of the 3D Oil CEMT may occur as a result of a Level 2 spill. 3D Oil will notify NOPSEMA, NOPTA, DMIRS, DNP and DoT (for State waters) of the incident.

AMSA (CA) will determine the appropriate response strategies depending upon the protection priorities at risk within the affected spill area. AMSA will determine the need for oil spill trajectory modelling (OSTM) to confirm areas at risk from the spill; and initiate possible sea/aerial surveillance to confirm/inform trajectory predictions. All selected response strategies will be in accordance with NatPlan and a Net Environmental Benefits Assessment (NEBA) for the specific spill scenario. This will include an assessment of all available response strategies, the effectiveness of the response for the oil type, and their associated risk to protection priorities in the affected area. 3D Oil will consult with AMSA during this assessment.

The Vessel Master is responsible for providing SITREPs to AMSA to inform the spill response strategy.

AMSA will maintain CA responsibility for the response until relevant termination criteria are achieved[3].

A Level 3 spill response is not considered credible for the Sauropod 3D MSS activities, due to the limited spill size, fuel type and location of activity.

2.5 Notification and Reporting Requirements

This section provides a summary of the internal and external notifications for any hydrocarbon release from vessel activities in the Sauropod 3D MSS Operational Area.

The Vessel Master shall ensure that all port and emergency agency contact lists are complete, listed and posted in key locations on the vessel and that all relevant notifications have been provided to these agencies prior to the survey commencement.

2.5.1 Internal

Spill Notification: All spill events to the marine environment will be notified to the 3D Oil Project Manager regardless of the volume. Information to be supplied with the notification to allow the 3D Oil Project Manager to assess the response level is contained in Table 2-4.

Table 2-4: Notification Information

Details
■ What is the source of the spill and the location of the spill?
■ What type of hydrocarbon has been released?
■ How much material has been released (e.g. estimated size based on a 'known' hydrocarbon inventory or an estimate based upon the appearance and area of oil on the sea surface (refer **Section 5.2**);
■ Has the SOPEP been implemented and has the source been contained or is it continuing?
■ What is the worst-case scenario?
■ What are the weather conditions – wind speed and direction, swell and current speed and direction.

2.5.2 External

Regulatory Authorities: All Level 2 spills must be notified to the relevant JA as soon as practicable but within 2 hours of the event (or becoming aware of the event). Regulatory notification and reporting requirements for vessel spills are provided in Table 2-5.

It is important that information generated during an initial response is accurately recorded, transmitted, acted upon and ultimately stored for future use. The information most important to capture is:

- Incident details – where, what, when, how, why (where possible);
- Extent of spill (volume, hydrocarbon type, continuing release);
- Immediate actions taken.

Table 2-5: Notification Requirements for a Vessel Spill

From	To	Method	Timing	Additional Information
3D Oil Offshore Representative	3D Oil Project Manager	Verbal	Immediately	Details in Table 2.1

[3] For a Level 2 MDO spill in marine waters it is expected that a criterion of 'no visible sheen' according to the Bonn Convention will be applied.

From	To	Method	Timing	Additional Information
Vessel Master	Vessel Manager	Verbal	Immediately	-
	AMSA	Verbal	Immediately	Report verbally to AMSA: Ph: +61 2 6230 6811
		Written Notification (POLREP)	ASAP	Online: https://amsa-forms.nogginoca.com/public/
		Written Updates (SITREP)	As requested, or every 24 hours	Online: https://amsa-forms.nogginoca.com/public/
3D Oil Project Manager	3D Oil Crisis/ Emergency Management Team (CEMT)	Verbal	ASAP	CEMT Callout List (Refer Appendix 1)
3D Oil Managing Director (or delegate)	For Level 2 (Reportable) Spill: NOPSEMA	Verbal	ASAP but not later than 2 hrs of the incident occurring	Notify Verbally: Ph: +61 8 6461 7090
		Written Notification	ASAP after verbal notification	NOPSEMA Form N-3000-FM0831 available at https://www.nopsema.gov.au/environmental-management/resources/ Email: submissions@nopsema.gov.au
		Written Incident Report	Within 3 Days of Incident	Written Incident Report: submissions@nopsema.gov.au
	For Level 2 (Reportable) Spill: NOPTA	Written Notification	As soon as practicable after NOPSEMA notification	Copy of NOPSEMA Form N-3000-FM0831 Email: reporting@nopta.gov.au
		Written Incident Report	Within 7 days of written report submission to NOPSEMA	Written Incident report: reporting@nopta.gov.au
	For Level 2 (Reportable) Spill: DMIRS	Written Notification	As soon as practicable after NOPSEMA notification	Copy of NOPSEMA Form N-3000-FM0831 Email: petroleum.environment@dmirs.wa.gov.au
		Written Incident Report	Within 7 days of written report submission to NOPSEMA	Written Incident report: petroleum.environment@dmirs.wa.gov.au
	Director of National Parks	Verbal	ASAP - For any spill release within a marine park or likely to	Notify Verbally: PH: 0419 293 465 (24 hr Marine Compliance Duty Officer Information to include: Title holder details Time and location of incident (including marine park likely to be affected)

From	To	Method	Timing	Additional Information
			impact on a marine park:	Proposed response Contact details of the response coordinator Email: marineparks@environment.gov.au
	For Level 2 Spill: DoT	Verbal	Within 2 hours – for all actual or impending spill incidents that are in, or may impact, State waters	Verbal notification to Maritime Environmental Emergency Response (MEER) Duty Officer via the 24-hour reporting number (08) 9480 9924.
		Written Notification (POLREP)	Following verbal notification	Initial notification to be followed by detailed MOP Incident Report Form (POLREP) accessed at: www.transport.wa.gov.au/imarine/report-marine-oil-pollution.asp Report submitted to: marine.pollution@transport.wa.gov.au

2.5.3 Supplementary

Table 2-6 also provides additional external notifications (excluding response resources) which may be required depending upon the nature and scale of the spill incident (specified scenarios).

Table 2-6: Additional External Notifications

Stakeholder	Issue	Spill Level	Timeframe	References
Commercial Fishing Licence Holders	Protection from spill impacts	Level 2/3	Within 4 hours	Refer Stakeholder Contacts Directory
Adjacent Petroleum Titleholders	Spill notification	Level 2/3	Within 4 hours	Refer Appendix 1
Department of Energy & Environment	Damage to wildlife of national environmental significance	Any	Within 72 Hours	Refer Appendix 1

2.6 Oil Spill Response Resources

2.6.1 Seismic and Support Vessels

General Equipment: The response equipment for the prevention / minimisation of loss of oil to sea during the proposed Sauropod 3D MSS will include the vessel's on-board spill response kit equipment. Typical contents include:

- Absorbent materials and kits;
- Scupper and drain plugs;
- Hand shovels and scoops;

- Protective clothing;
- Portable pumps;
- Portable containers;
- Portable radios.

This equipment is stored in dedicated lockers located on the vessel and identified as spill equipment (as outlined in the Vessel's SOPEP).

All relevant crew are trained in the use of the vessel equipment listed above and the PPE required to appropriately respond to the spill (as contained in Safety Data Sheets).

Sauropod Resources: For the Sauropod 3D MSS, the following additional resources are also available to assist in oil spill response activities:

- A support and scout vessel (slick monitoring);
- Marine Fauna Observers (MFOs) on the MSS vessel to monitor for oil spill impacts on fauna;
- An oil spill trajectory monitoring buoy to be released from the MSS vessel in the event of a level 2 spill to assist with slick monitoring;
- Access to OSTM services (not 24 hour/emergency); and
- Scientific monitoring resources.

2.6.2 NatPlan Resources

AMSA as CA in Commonwealth waters has the capability of mobilising resources for the following activities:

- Trained personnel to support oil spill response activities;
- NatPlan equipment (Dampier is the closest national equipment stockpile) ;
- Oil-industry based Australian Marine Oil Spill Centre (AMOSC) equipment and 'core-group' personnel;
- Oil spill trajectory modelling services;
- Aerial surveillance via Dornier aircraft (if no conflict with search and rescue activities); and
- OSRA resources.

2.6.3 State Hazard Plan

The DoT maintains a database of Maritime Environmental Emergency response equipment managed by DoT, the Port Authorities, Port Facility Operators and Boat Harbour Operators.

Each Port, Port Operator, Port Facility Operator and Boat Harbour Operator is required at a minimum to hold and maintain a stockpile of Level 1 response equipment commensurate with their identified risk.

3. RESPONSE OPTION ASSESSMENT

3.1 Hydrocarbon Spill Scenarios

Credible spill scenarios identified for the Sauropod 3D MSS activity are broadly divided into two categories:

- Small spill quantities from uncontained deck spills/leaks or refuelling to the marine environment; and
- Larger spills resulting from vessel failure (e.g. vessel collision).

In accordance with NatPlan/State Hazard Plan, the following strategy should be adopted by the CA, depending on the circumstances of the spill and the conditions prevailing:

- If possible, control or stop the outflow of oil from the source;
- If coastal or marine resources are not threatened or likely to be threatened, monitor the movement and behaviour of the spill;
- If coastal and marine resources are threatened, where practicable, activate response operations to protect sensitive resources;
- If possible, contain the spread of oil; and
- If, due to weather and se conditions, response at sea is not feasible or protection of sensitive areas is not feasible, or these have already been affected, determine appropriate clean-up priorities and other response measures.

3.2 Hydrocarbon Characteristics (MDO)

Physical Properties: Vessels engaged in the Sauropod 3D MSS will use marine diesel oil (MDO) which is classified as Group II oil.

MDO has the following behaviour at sea:

- The hydrocarbon spreads very rapidly to thin thicknesses elongated in the direction of the wind and current;
- Evaporation is the dominant process contributing to the removal of spilled MDO from the sea surface and can account for 60-70% loss (depending upon wind conditions and sea temperature);
- MDO residues usually consist of heavy components which may persist for longer and tend to disperse as oil droplets in the upper layers of the water column in the presence of waves but can re-float to the surface if wave energies abate.

Table 3-1: MDO Fuel Properties (ITOPF, 2011)

Oil type	SG (@ 25ºC)	Viscosity (cP @ 25ºC)	Pour Point (ºC)	Flash Point (ºC)	API Gravity	Oil Persistence Category/ Classification
MDO	0.83	4.0	-14.0	61.5	37.6	Group II (Light Persistent Oil)

Fate and Weathering: The prevailing weather conditions will influence the weathering and fate of the MDO. Under lower wind-speeds (5 knots), the MDO will remain on the surface longer, spread quicker, and in turn increase the evaporative process. Conversely, sustained stronger winds (>15 knots) will generate breaking waves at the surface, causing a higher amount of MDO to be entrained into the water column and reducing the amount available to evaporate. Figure 3-1 provides the predicted weathering and fate graphs as a percentage of a single instantaneous surface spill of 280m^3 MDO under three static wind conditions (5, 10 and 15 knots).

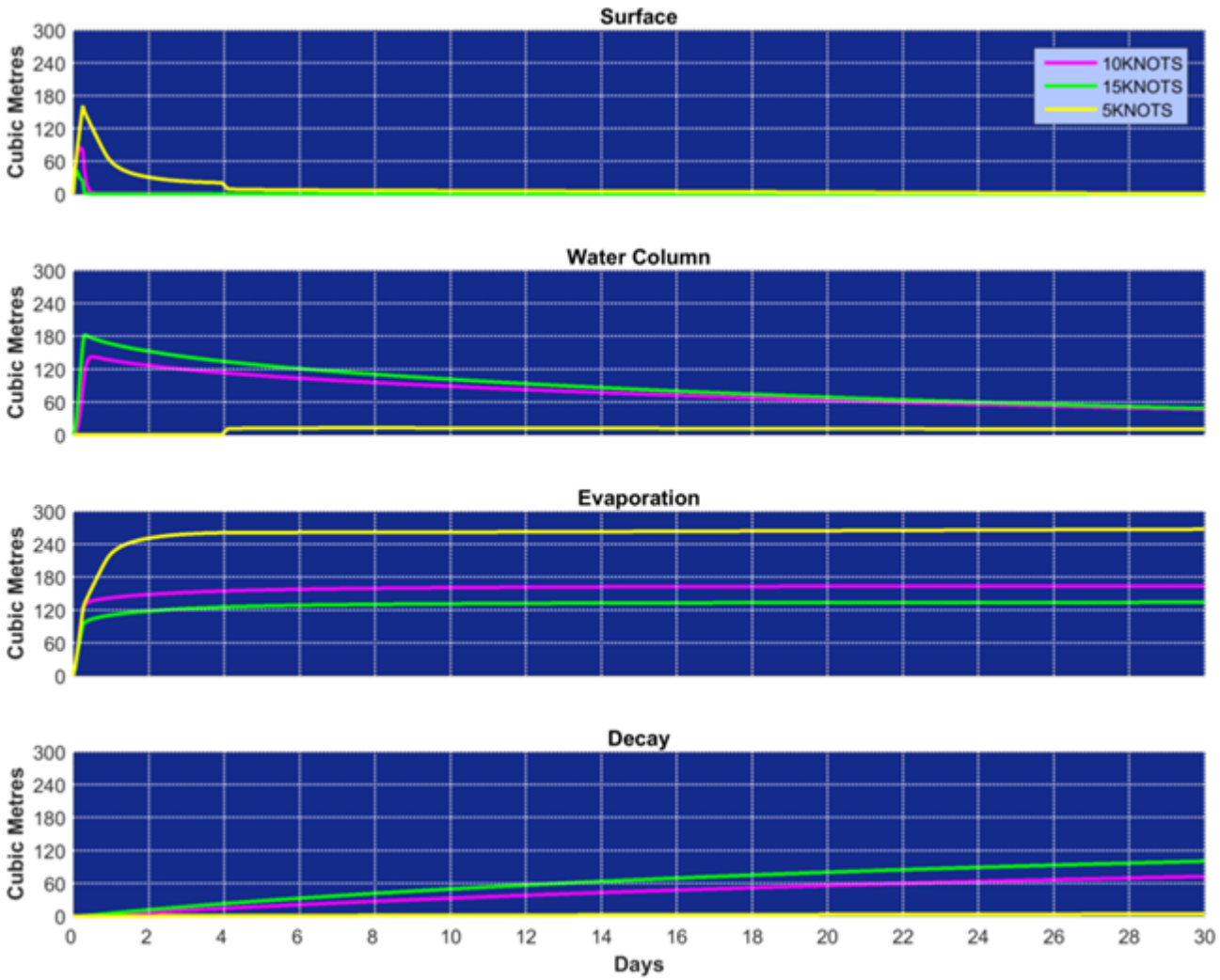

Figure 3-1: Weathering of MDO under three static winds conditions (5, 10 and 15 knots). The results are based on a 280 m^3 surface release of MDO over 6 hours and tracked for 30 days.

3.3 Oil Spill Modelling

3D Oil commissioned RPS APASA to model the worst case (credible) oil spill scenario for the Sauropod 3D MSS, using the oil spill dispersion model SIMAP. SIMAP's stochastic model was used to quantify the probability of exposure to the sea surface and water column and probability of shoreline contact from hypothetical spill scenarios.

The model considered the following hypothetical, yet plausible scenario:

- A 280 m^3 release of marine diesel oil resulting from a vessel collision incident at the closest point of the operational area to the Rowley Shoals

The key findings of the modelling, included:

- No shoreline contact above the low (10 g/m^2) threshold was predicted for the scenario;
- Modelling results demonstrated that surface oil at low (1 g/m^2), moderate (10 g/m^2) and high (25 g/m^2) exposure levels could potentially travel greater distances during the transitional period, compared to the summer and winter periods. The maximum distance travelled by surface oil for the low, moderate and high threshold was 66 km, 14 km and 7 km, respectively.

- While the low exposure surface oil was predicted to travel in any directions from the release site, surface oil above the moderate and high exposure levels remained along the northwest to southeast axis across all seasons.
- The modelling results demonstrated a low likelihood (1-2%) of low surface oil exposure to the Argo-Rowley Terrace Australian Marine Park.
- The maximum time-averaged exposure to dissolved hydrocarbon at the depths of 0-10 m remained less than 1 ppb for the winter and transitional seasons while reaching 4 ppb for the summer and winter seasons for various receptors. The maximum instantaneous exposure to dissolved hydrocarbons ranged from 6 ppb to 73 ppb for the transitional and summer seasons, respectively.
- There were no zones of potential time-averaged exposure to dissolved hydrocarbon above the low exposure threshold (6 ppb).
- The maximum time-averaged exposure to entrained hydrocarbons ranged from 4 ppb to 499 ppb for the transitional and winter seasons respectively.
- The maximum instantaneous exposure to entrained hydrocarbon was 6,287 ppb for the Northwest Shelf

3.3.1 Geographic Response Area

The environment that may be affected (EMBA) and geographic response area is based on spill modelling for the worst case credible spill scenario during the Sauropod 3D MSS. Modelling was conducted for a spill scenario at the north-west corner of the Operational Area. The EMBA is defined by the furthest extent that may be reached by entrained hydrocarbons (>10 ppb) in the event of a surface release of 280 m^3. It is important to note that the EMBA covers a much larger area than the area that is likely to be affected during any one single spill event. The modelling was run for a variety of weather and metocean conditions (300 simulations in total), and the resulting EMBA for the north-west corner of the Operational Area was extrapolated to the three other corners.

Figure 3-2 provides the predicted geographic area covered by this OPEP based upon the environment which may be affected (EMBA) from spills during Sauropod 3D MSS activities.

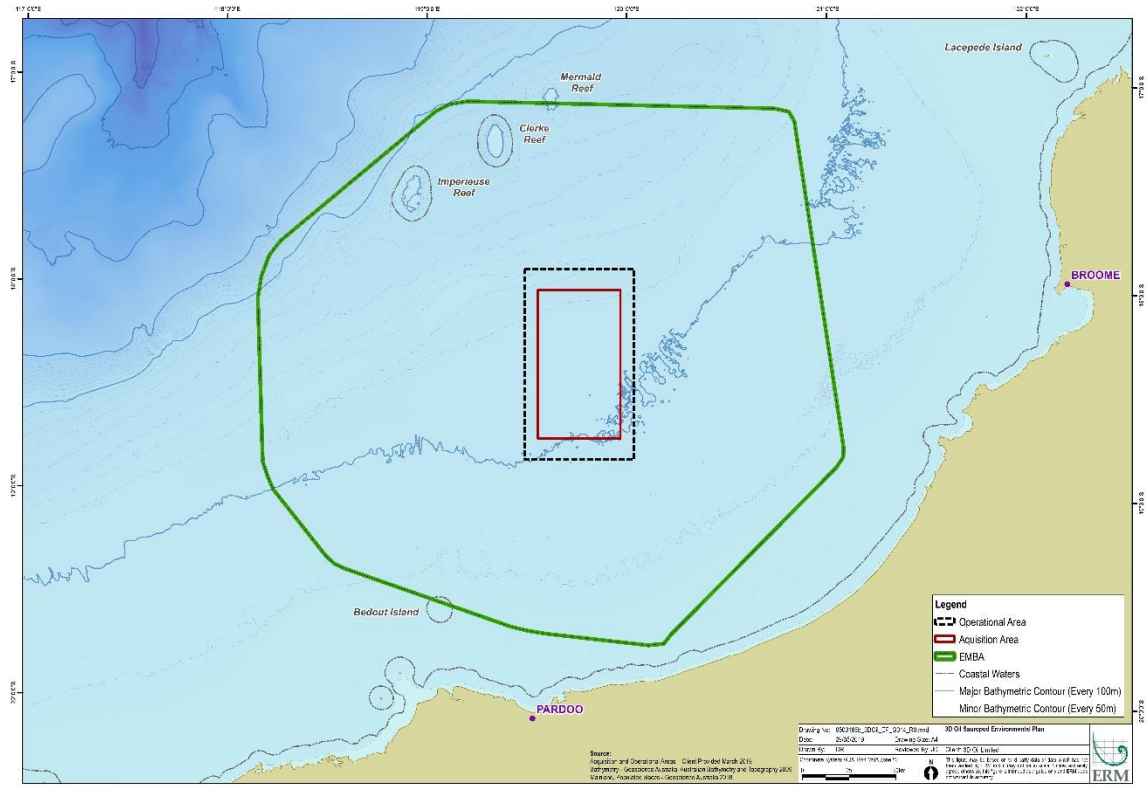

Figure 3-2: Predicted Geographic EMBA

3.4 Response Option Effectiveness

A preliminary assessment of the suitability and operational effectiveness of response options to MDO has been undertaken in Table 3-2.

Given the rapid evaporation/volatilisation of MDO when released, the rapid spreading rate of MDO, and the small amounts of residual hydrocarbon reaching shorelines, the primary response strategy is to initiate source control and then monitor and evaluate the spill (natural weathering). Additional measures may be adopted to protect specific environmental sensitivities within the spill response EMBA.

The response strategy selected during a real-life spill event will be determined by the CA (AMSA in Commonwealth waters and DoT in State waters).

Table 3-2: Preliminary Response Option Assessment

Response Option	Description	Sauropod 3D MSS MDO Assessment	Suitability
Source control	Stop or limit flow of oil to the environment.	Achievable in accordance with vessel-specific SOPEP.	✓
Monitor and Evaluate	Direct Observation (Aerial or Marine) Spill trajectory / vector calculations; Oil spill trajectory modelling; Satellite tracking buoys.	To maintain situational awareness all monitor and evaluate options are suitable. Aerial is more effective than vessel surveillance to inform spill response. MSS vessels may provide support with observations.	✓
Natural Weathering	This response option is adopted with a monitor and evaluate surveillance strategy when sensitive environmental	MDO evaporates rapidly leaving only small levels of persistent residues after 24-48 hrs of weathering. No toxic	✓

Response Option	Description	Sauropod 3D MSS MDO Assessment	Suitability
	resources are not considered 'at risk' from a marine oil spill, or where other response options are not practicable or will not achieve a net benefit.	components are predicted to be present in concentrations which would affect marine fauna after approximately 24 hours. Response option is preferred for MDO spills as it avoids other additional hazards associated with intervention.	
Dispersant Application	Application (i.e. spraying) of oil dispersant agents onto oil from an aircraft or vessel may breakdown surface oil slicks and draw droplets into upper layers of water column. Increases biodegradation and weathering.	MDO is not amenable to dispersant application. MDO, while having a small persistent fraction, spreads rapidly to thin layers. Dispersant application can result in punch-through where dispersant passes into the water column without breaking oil layer down. This response option is unsuitable for MDO.	X
In-situ Burning	Controlled in-situ burning involves the controlled burning of hydrocarbons in order to rapidly reduce the volume of oil on the water's surface, thereby reducing its potential to spread to sensitive receptors.	In-situ burning is only suitable for use on hydrocarbons >1-2 mm think with calm sea and light winds. It also requires fire-resistant booming. MDO spreads rapidly to less than 10 g/m^2 (0.01mm) which makes this response option unsuitable for MDO.	X
Contain and Recover	Booms and skimmers to contain surface oil for mechanical or manual recovery and disposal. Relies on calm conditions and thicknesses > 10g/m^2 in order to be effective.	MDO spreads rapidly to less than 10g/m^2 thicknesses within 24-48 hours. Given the time to mobilise resources to the spill site (> 24 hrs), this response option is unsuitable for an MDO spill.	X
Protect and Deflect	Booms deployed to protect environmental sensitivities. Environmental conditions (e.g. currents and waves will limit application)	MDO spreads rapidly to less than 10g/m^2 thicknesses within 24-48 hours. Given the time to mobilise resources to the spill site (> 24 hrs), booms will have limited, if any, effect. Surface / shoreline receptors within the EMBA are limited. Shorelines or emergent reefs are not predicted to be exposed to MDO from a spill during the Sauropod 3D MSS. Booms have the potential to damage coral reef during deployment.	X
Shoreline Assessment and Clean-up	Where shoreline impacts are predicted or have occurred, a shoreline assessment may be initiated. Note shoreline assessment will depend on the mobilisation and safety of trained personnel in remote locations. Subject to the outcome of a shoreline assessment and a NEBA, shoreline	No shorelines are predicted to be contacted by MDO from a spill during the Sauropod 3D MSS. In the highly unlikely event that a real-life spill event results in oil contacting shorelines / emergent reef at the Rowley Shoals or Bedout Island, quantities will be small and the state of	X

Response Option	Description	Sauropod 3D MSS MDO Assessment	Suitability
	clean-up may be initiated. This may include manual or mechanical removal of oiled substrate, physical washing or jetting of shorelines, or chemical cleaning.	weathering of the MDO will be advanced. Leaving remaining traces of MDO to weather and disperse is likely to have a greater net environmental benefit than clean-up, which may remove or disturb shoreline habitats. The remote locations also limit the ability for this option to be initiated safely and effectively.	
Oiled Wildlife Response	Consists of capture, cleaning and rehabilitation of oiled wildlife. May include hazing or pre-spill captive management. In WA this is coordinated by DoT and DBCA.	Given limited spill volume and rapid spreading and weathering of MDO, a large scale wildlife response is not predicted. There is potential for a small number of individual birds or other fauna to be affected in the immediate vicinity of the spill. Mobilisation and safety of trained personnel in remote locations, as well as the limited potential to recover wildlife from the water, significantly limit the potential effectiveness of this option.	**Limited**

3.5 Net Environmental Benefits Assessment

This section provides details on the environmental sensitivities at specific locations within the Sauropod 3D MSS EMBA where spill response may offer a net environmental benefit. Based upon this assessment, protection priorities and preliminary location-specific response strategies have been identified.

Table 3-3 provides the sensitivity criteria adopted in the prioritisation of environmental sensitivities.

An assessment of effective spill mitigation techniques and the net benefit they offer to specific environmental sensitivities within the Sauropod 3D MSS EMBA is provided in Table 3-4. This planning NEBA is used to compare the environmental and socio-economic benefits of implementing a response option against a 'do-nothing' (monitor and evaluate and natural weathering) strategy to arrive at a response strategy for the location which results in the lowest overall environmental and socioeconomic impacts.

Table 3-3: Sensitivity Prioritisation

Sensitivity	Code	Criteria
HIGH	S1	Identified marine sanctuary or reserve. Presence of known threatened species feeding, breeding, nesting or aggregation areas. Areas of national significance or biological processes for species of national significance (e.g. breeding sites and National and State Parks, Commonwealth Heritage listed areas).

		Region of known sensitive habitat (coral reef, mangrove, salt marshes, and sheltered tidal flats) which if impacted may have significant impacts and long recovery periods.
MEDIUM	S2	Region of known moderately sensitive habitats (sheltered rocky rubble coasts, exposed tidal flats, gravel beaches, mixed sand and gravel beaches) that have a medium recovery period (~2-5 years). Presence of known threatened species or cultural heritage impacted. Presence of non-threatened species feeding, breeding, nesting or aggregation. Region of significant commercial activity (e.g. fishing, tourism). Places of public interest such as beaches.
LOW	S3	Region of known low sensitivity habitat (fine grained beaches, exposed wave-cut platform and exposed rocky shores) which have a rapid recovery period (~ year). Minimal impact to marine life, business, public areas or cultural heritage items.

Table 3-4: Environmental Sensitivities & NEBA

Receptor	Sensitivity	Environmental sensitivities that may be exposed to a surface MDO spill										Oil Type	Response Option			
		Marine	Mermaid Reef	Clerke Reef	Imperieuse Reef	Bedout Island	Argo-Rowley Terrace AMP	Mermaid Reef AMP	Eighty Mile Beach AMP	Rowley Shoals MP (State)	Mermaid Reef and Cwlth waters KEF		Source Control	Monitor & Evaluate	Natural Weathering	OWR
												MDO	✓	✓	✓	**Limited potential**
Marine Ecology																
Marine Mammals (Protected)	S1	✓											↑	-	-	
Marine Birds (Protected)	S1	✓											↑	-	-	↑
Marine Reptiles (Protected)	S1	✓											↑	-	-	↑
Sharks and Rays (Protected)	S2	✓											↑	-	-	
Fish Assemblages	S3	✓											↑	-	-	
Commercially Targeted Fish Stocks	S3	✓											↑	-	-	
Benthic Communities	S3	✓											↑	-	-	
Plankton Communities	S3	✓											↑	-	-	
Coastal Habitats																
Sandy Islands	S2		✓	✓	✓	✓							↑	-	-	
Coral Reefs	S1		✓	✓	✓	✓							↑	-	-	
Socio-Economic																
Tourism / Recreation	S2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		↑	-	-	
Commercial Fishing	S2	✓	✓	✓	✓	✓	✓	✓	✓		✓		↑	-	-	
Commercial Shipping	S3	✓											↑	-	-	
Petroleum Activities	S3	✓											↑	-	-	
Marine Archaeology (Shipwrecks)	S3	✓	✓			✓				✓			↑	-	-	
Australian Marine Parks	S1	✓					✓	✓	✓				↑	-	-	
State Protected Areas	S1	✓								✓			↑	-	-	
Commonwealth Heritage Site	S1	✓											↑	-	-	
Key Ecological Features	S1	✓									✓		↑	-	-	

Legend:

↑ Net Benefit

- No net benefit or detriment (‘do-nothing’ – monitor and evaluate and natural weathering strategy)

↓ Net detriment

3.6 Protection Priorities and Preliminary Response Strategies

Based on the sensitivity prioritisation and NEBA provided in Table 3-4, protection priorities have been identified as follows:

- Protected marine fauna (e.g. birds, reptiles, mammals);
- Rowley Shoals (comprising emergent coral reef Imperieuse Reef, Clerke Reef, Mermaid Reef) and surrounding Rowley Shoals Marine Park (State), Mermaid Reef AMP, Argo-Rowley Terrace AMP, and the Mermaid Reef and Commonwealth waters KEF; and
- Bedout Island (State) and surrounding Eighty Mile Beach AMP.

Note that the stochastic spill modelling did not predict any shoreline contact at the Rowley Shoals or at Bedout Island. Worst-case predicted hydrocarbon exposures in State waters at these locations include low surface (> 1 g/m^2), dissolved (> 6 ppb) or entrained (>10 ppb) hydrocarbons.

Table 3-5 provides an assessment of the response strategies which might be adopted at sensitive locations and within designated/protected areas affected by MDO residues from a Sauropod 3D MSS MDO spill.

Table 3-5: Protection Priorities and Preliminary Response Strategies

Location	Protection Priority	Source Control	Monitor & Evaluate (Natural Weathering)	OWR
Marine	Protected fauna (birds, turtles, mammals)	✓	✓	✓
Rowley Shoals and surrounding State and Commonwealth waters	Mermaid Reef	✓	✓	✓
	Clerke Reef	✓	✓	✓
	Imperieuse Reef	✓	✓	✓
	Rowley Shoals Marine Park (State)	✓	✓	✓
	Mermaid Reef AMP	✓	✓	✓
	Argo-Rowley Terrace AMP	✓	✓	✓
	Mermaid Reef and Commonwealth waters KEF	✓	✓	✓
	Mermaid Reef – Rowley Shoals Heritage	✓	✓	✓
Bedout Island and surrounding State and Commonwealth waters	Bedout Island	✓	✓	✓
	Eighty Mile Beach AMP	✓	✓	✓

The following response strategies are considered viable and may have a net environmental benefit in a Sauropod 3D MSS MDO spill:

- Source control;
- Monitor and evaluate (via vessel/aerial surveillance, oil spill trajectory modelling, oil spill tracking buoys); and
- Oiled wildlife response (if oiled wildlife is observed and a response is practicable).

The Sauropod 3D MSS Operational and Scientific Monitoring Plan (OSMP) will also be activated in the event of a Level 2 spill incident.

3.7 Operational NEBA, Incident Action Planning & Effectiveness Monitoring

AMSA (for Commonwealth waters) and DoT (for WA State waters) as CA's for these geographical areas are responsible for undertaking a NEBA to determine the appropriate response strategy for a Sauropod 3D MSS Level 2 spill. At the time of the spill, an operational NEBA will be completed to confirm net benefits based upon the spill volume, spill type, spill location, weather conditions, weathering and trajectory predictions (including any surveillance output), and the sensitivities requiring protection. For all response activities the safety and protection of field personnel shall be a primary consideration in implementing response activities for identified protection priorities. When finalised the Incident Controller shall endorse the NEBA. This document shall be used to develop the Incident Action Plan (IAP) for the incident.

The IAP details short-term (i.e. hours to days) operational objectives, response options and priority areas for protection based on the actual circumstances of the event, taking into account weather conditions and safety considerations. The IAP is relevant over a specified, short-term period. Initially this may be for a few hours only, but once the operation is underway it is likely to address the activities required over each of the following 24-hour periods or longer.

During the incident response, the response effectiveness will be assessed by the CA using the NEBA process.

4. RESPONSE STRATEGIES

4.1 Source Control

The Vessel SOPEP contains vessel-specific actions to contain and mitigate oil spills for identified credible oil spill threats. Table 4-1 provides a summary of the typical source control actions to be taken by a vessel master in the event of an oil spill incident. The Vessel SOPEP will be implemented to limit spill volumes and mitigate spill impacts.

Table 4-1: Source Control Actions

Release Type	Action
Bunkering Overflow/Transfer System Leak	Immediately stop the transfer; report the discharge; contain the spill; evaluate the cause and corrective actions to be undertaken; undertake on-board clean-up; and obtain permission to resume operations
Hull Failure/Leak	Where possible stop/reduce outflow; take appropriate safety action; contain the spill (as practical); report the spill/threat; evaluate the cause and corrective actions to be undertaken; initiate on-board clean-up; identify leaking tank (consider internal transfer if leak can be identified, else consider reducing level in all tanks in the vicinity giving careful consideration to hull stress and stability)
Collision:	Immediate notification; determine tanks penetrated (above & below water line) and any other oil spilled by vessel; assess consequences of separating two interlocked vessels causing ignition; reducing buoyancy/sinking; awareness that action may have a larger spill; assess the potential danger to other vessel traffic and manoeuvrability after separation; consider bringing vessel upwind of the oil slick; isolating penetrated tanks; and making ready for towing or lightering
Fire and Explosion	Fight fire; notify incident; bring vessel upwind of oil slick; isolate damaged tanks; undertake damage assessment and repair; initiate on-board clean-up; carryout hull leak prevention; make ready to tow or bunker transfer
Equipment Failure (propulsion, steering	Notify incident; determine cause of failure; determine possibility, methods and duration of repairs; determine proximity of navigational hazards (i.e. shoreline, reefs); determine likely drift due to wind, tide and currents; determine availability of tugs, salvage equipment; asses future weather conditions; consider the potential for pollution; consider the timeframe for assistance to arrive or the possibility of assistance from other nearby vessels

4.2 Monitor & Evaluate

The following section provides details of the techniques which may be utilised to gain situational awareness of a spill, predict the movement of the spill and observe the weathering of the spill material. Monitoring and evaluation will be coordinated by the CA (AMSA or DoT). 3D Oil will participate in monitoring and evaluation, as directed by the CA.

NOTE: All surveillance monitoring results will be provided to both AMSA and DoT (as necessary).

4.2.1 Oil Spill Trajectory Calculation

Spill Movement: The movement and behaviour of an oil slick may be manually estimated by undertaking vector calculations. Manual calculations can commence as soon as the preliminary information on the spill is known. For spills in close proximity to shore and where oil spill tracking buoys are utilised, this method may provide the best option for predicting the likely spill trajectory and timeframes before protection priorities are impacted.

Prior to commencing the calculation, the wind and current data is required. This can be accessed via:

- Currents: Oil Spill Tracking Buoy (operational requirements contained in Appendix 2) or from the vessels in the field;
- Winds: Bureau of Meteorology Met-eye (http://www.bom.gov.au/australia/meteye).

The calculation is based on the spill moving 100% of the current vector and 3% of the wind vector, as shown in Figure 4-1.

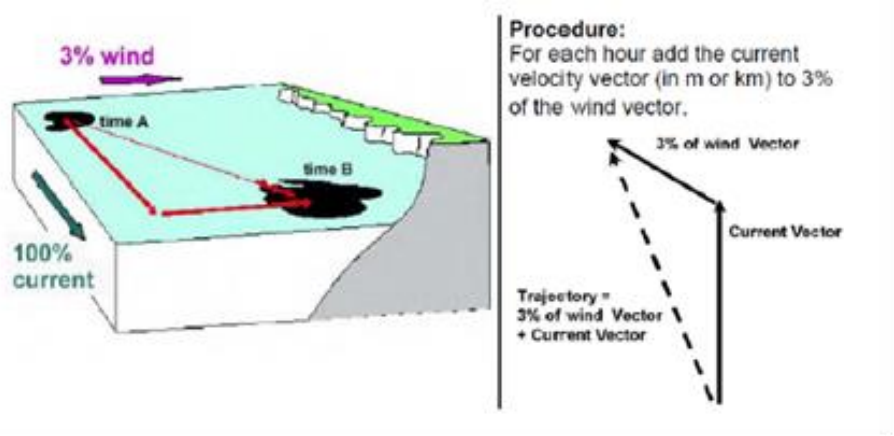

Figure 4-1: Spill Vectoring Overview

Spill Size Estimation: The spill size may be determined based upon the estimated amount of hydrocarbon released from a 'known' hydrocarbon inventory; an estimate of release rates from time of the commencement of the incident; or an estimate of the appearance of oil on the sea surface based upon the likely thickness and type of oil (refer Table 4-2 and Figure 4-2 below).

Hydrocarbon Weathering: The Automated Data Inquiry for Oil Spills (ADIOS) can be used to provide weathering predictions of hydrocarbon types for spill volumes at different wind speeds and water temperatures. This computer-based oil spill response tool is available to download from http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/response-tools/downloading-installing-and-running-adios.html

4.2.2 Visual Monitoring Surveillance (Aerial/Vessel)

To gain situational awareness and inform the spill response, observation should be carried out via aerial surveillance. Aerial surveillance will be commissioned by the Incident Controller. Trained aerial observers may be sourced through AMOSC (staff/core group members) and AMSA (NRT Members) and it is expected that observations will be undertaken over the spill location and any predicted areas of shoreline contact.

3D Oil shall participate in vessel-based surveillance as directed by AMSA or DoT. Monitoring and evaluation will be undertaken to assess the natural weathering process and identify the location of the slick. In all cases this will involve visual monitoring from vessels immediately following a spill incident. Spill observers may include 3D Oil Project team members and vessel crews.

Coarse estimates of spill volume can be made on the basis of its appearance at sea, using the area covered and colour of spill (refer Table 4-2). Examples of appearance are provided in

. AMSA provides guidance called 'Identification of Oil on Water – Aerial Observation and Identification Guide (Jan, 2014)' which can be found at: https://www.amsa.gov.au/marine-environment/pollution-response/identification-oil-water

Table 4-2: Guidelines for Estimating Spill Volume

Code	Description of Appearance	Approximate Thickness (µm)	Approximate litres per km^2
1	Sheen	0.04 to 0.30	40-300
2	Rainbow	0.3 to 5.0	300-5,000
3	Metallic	5.0 to 50	5,000-50,000
4	Discontinuous true oil colour (heavy oil)	50 to 200	50,000 – 200,000
5	Continuous true colour (heavy oil)	>200	>200,000
Other	Mousse or Emulsion		

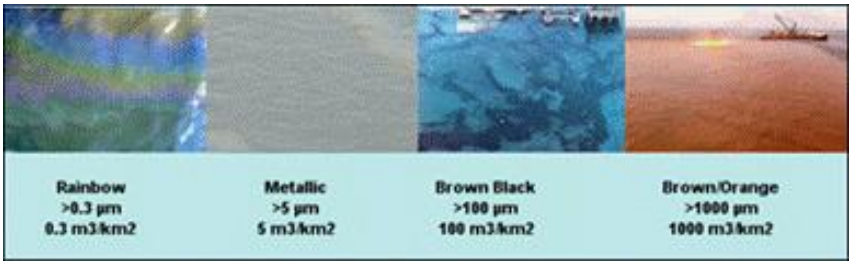

Figure 4-2: Bonn Agreement Oil Appearance Code (Examples)

4.2.3 Satellite Tracking Drifter Buoys

The Sauropod 3D MSS vessel will carry a satellite tracking drifter buoy for deployment in the event of a significant spill. Instructions will be provided for the deployment of the buoy to the vessel master (refer Appendix 2). At the time of a spill, the drifter buoy will be activated and deployed overboard to allow for real-time satellite tracking of the spill direction and speed (Level 2 only). The buoys' location will be monitored real-time and through regular data downloads.

4.2.4 Oil Spill Trajectory Modelling

The movement of a hydrocarbon slick can be estimated in real time using computerised oil spill trajectory modelling (OSTM). Under the NatPlan, AMSA and DoT have 24/7 access to oil spill trajectory modelling (OSTM. The vessel Master / 3D Oil Offshore Representative may assist AMSA / DoT to complete the OSTM request proforma; the by providing observational data on the oil slick behaviour and wind conditions.

3D Oil also have access to OSTM capability, provided by RPS APASA. 3D Oil have utilised RPS APASA to undertake the predictive modelling for the Sauropod 3D MSS. 3D Oil has the capacity to extend the existing contract with RPS to provide deterministic modelling in the event of an oil spill, if required. This capability is not on an emergency callout basis (as per the current AMSA agreement). Preliminary modelling results are generally available within 4 hrs after simulation commencement.

During the spill, RPS APASA will utilise all available information from operational surveillance monitoring and from satellite imagery (as available) to refine forecasts.

4.3 Oiled Wildlife Response

All oiled wildlife response activities will be coordinated and implemented by the CA.

No 3D Oil or MSS crew personnel shall interfere with any oiled wildlife. Oiled wildlife observations will be reported to the CA.

4.4 Scientific Monitoring

4.4.1 Scope of Studies

The Sauropod 3D MSS Operational and Scientific Monitoring Plan (OSMP, supports this OPEP. The OSMP provides a framework for the monitoring programs that may be implemented in the event of a Level 2 spill from the Sauropod 3D MSS activity.

The objectives of the OSMP are to:

- Identify high priority protection areas within the EMBA in real time;
- Specify monitoring methodologies;
- Detail the process 3D Oil will follow to determine the monitoring studies that will be implemented in order to:
- Provide situational awareness and assist in planning and execution of spill response to minimise environmental harm; and
- Provide for short-term and long-term environmental damage and recovery assessments.

4.4.2 Consultation

3D Oil will consult with Commonwealth and State authorities affected by spill residues to ensure that scientific monitoring is undertaken to the satisfaction of the Commonwealth and State.

3D Oil will notify relevant authorities on a Level 2 spill event and provide operational data to the authorities relevant to the spill level. 3D Oil will consult with these authorities at the commencement of a Level 2 spill on any proposed baseline/scientific studies and control sites to allow for feedback and OSMP study modification to fulfil all State requirements (e.g. ‘on-the-day sampling design, modified scope).

Available operational monitoring results collated by 3D Oil resources will be provided throughout the response to allow for continued feedback and modification of baseline/scientific requirements. Other critical liaison points will be established between relevant authorities through the spill consultation process.

4.5 Response Termination

The decision to terminate spill response actions is made by the CA Incident Controller when the response is not returning any tangible benefit. This may include a gradual downsizing of response teams and resources or complete termination of the response. Decision factors to terminate will include:

- The efficacy and benefit of the response options implemented against natural weathering;
- The significance of the environmental receptor impacted;
- Potential for environmental damage due to further clean-up efforts weighed up against other risk factors; or
- Termination criteria, as adopted by the CA, have been met.

The CA Incident Controller will ensure that all relevant organisations, stakeholders and personnel are notified to stand down once the decision to terminate or the termination criteria have been satisfied.

5. RESPONSE TRAINING

5.1 Testing of Response Arrangements

A desktop OPEP drill of the Sauropod MSS OPEP, including the vessel SOPEP, will be conducted to assess the effectiveness of the arrangements, taking into account the nature and scale of the risk of a hydrocarbon prior to the survey commencing.

Specifically, the OPEP drill will test the following:

- Roles and responsibilities of those involved in oil spill response are clear and understood;
- Communication sequence from the vessel master to vessel-contractor onshore management and the CA, including notification of the AMSA JRCC is adequate, current and includes all relevant details;
- Communication between the 3D Oil offshore representative and 3D Oil Project Manager and subsequent notification authorities is adequate and timely;
- Ensures Type 1 operational monitoring such as spill surveillance and tracking is appropriate, understood and practiced; and
- Equipment and procedures intended for source control on-board the vessel are available for use as outlined in the vessel SOPEP.

The outcomes of the Sauropod 3D MSS OPEP drill will be documented, reviewed and improvements identified (as needed). Should any inadequacies, altered contractual arrangements or improvements to arrangements be identified via testing, these corrective actions will be registered as a non-conformance and the EP/OPEP will be amended for these items via a Management of Change process.

The OPEP will be tested on the following triggers:

- Prior to the survey commencing; and
- Following any significant amendment of the arrangements.

These arrangements for testing the OPEP are commensurate with the nature and scale of the worst-case oil spill scenario and the short duration of the MSS activity.

The Vessel Master must ensure that all relevant vessel personnel are inducted and familiar with the contents of this OPEP and accompanying SOPEP; and trained to carry out their individual responsibilities.

6. REFERENCES

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Western Australian Department of Transport (WA DoT). 2018. State Hazard Plan Maritime Environmental Emergencies. Accessed 15 March 2018 at https://www.transport.wa.gov.au/mediaFiles/marine/MAC_P_StateHazardPlanMaritimeEnviroEmergMEE.pdf

APPENDIX 1 CONTACTS DIRECTORY (TO BE COMPLETED ON TENDER AWARD)

Organization	Position	Contact Details	
		Telephone	**Email**
3D Oil	Offshore Representative	TBC	TBC
	Project Manager	TBC	TBC
Seismic Vessel	Vessel Master	TBC	TBC
Support Vessel	Vessel Master	TBC	TBC
Chase Vessel	Vessel Master	TBC	TBC
Seismic Vessel Management	Vessel Manager	TBC	TBC
Regulators			
NOPSEMA		+61 8 6461 7090	submissions@nopsema.gov.au
DMIRS		+61 419 960 621	petroleum.environment@dmirs.wa.gov.au
NOPTA		NA	reporting@nopta.gov.au
DNP		+61 419 293 465	marineparks@environment.gov.au
DoEE		+61 2 6274 1111	EPBC.Permits@environment.gov.au
AMSA		+61 2 6230 6811	https://amsa-forms.nogginoca.com/public/polrep.html
DoT		+61 8 9480 9924	marine.pollution@transport.wa.gov.au
Scientific Resources			
RPS APASA	TBC	+61 8 9211 1111	TBC
ERM	TBC	+61 8 6467 1600	TBC
For other stakeholders – refer to the stakeholder consultation log			

APPENDIX 2 TRACKING BUOY DETAILS (TBC ON RENTAL)

ERM has over 160 offices across the following countries and territories worldwide

Argentina
Australia
Belgium
Brazil
Canada
Chile
China
Colombia
France
Germany
Guyana
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kenya
Malaysia
Mexico
Mozambique
Myanmar
The Netherlands
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