Sea Eagle-1 and Tahbilk-1 Vessel Based Activity OPEP

TM-50-PLN-I-00005

Rev 0

	TM - Montara Field
REVIEW INTERVAL	30 Months

Rev No	Date	Approval		
		Owner	**Reviewer**	**Approver**
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REVISION HISTORY

Revision	Author / Editor	Amendment
0	C. Holyoake and L. Sands	Prepared for assessment by NOPSEMA

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[This document] **Sea Eagle-1 and Tahbilk-1 Vessel Based Oil Pollution Emergency Plan(OPEP)** TM-70-PLN-I-00005	• Resource Requirements • Response Strategies: • Source Control • Operational Monitoring • Chemical Dispersant • Containment and Recovery • Protection and Deflection • Shoreline Clean-up • Oiled Wildlife Response • Controls • Response • Appendices: • - A1. Observer logs • - A2. Bonn Agreement Oil Appearance Code • - A3. Shoreline Assessment Form • - A4. Effectiveness of Dispersant Operations • - A5. Montara Crude Assay • - A6. Regulatory Notifications • - A7. Incident Management Guidance

QUICK REFERENCE INFORMATION

Parameter	Information		Further Information
Facility Name	Sea Eagle and Tahbilk Vessel Based Activity		Section 3 of EP
Location (Lat/Long and Easting Northing)	Refer to Table 3-1		
Title/s (Block/s)	Production Licence AC/L7 and AC/L8		Section 3 – Scope
Water Depth	78-89 m		Section 3 – Scope
Hydrocarbon Type/s	Marine Diesel Oil (MDO) Montara Crude Oil		Section 4.1 - Hydrocarbon Characteristics and Behaviour
International Tanker Owners Pollution Federation (ITOPF) Classification	Marine Diesel Oil (MDO): Group 2 Montara Crude Oil: Group 2 (AMSA)		Section 4.1 - Hydrocarbon Characteristics and Behaviour, Appendix A5
Worst Case Spill Scenarios	**Scenario**	**Worst case spill volume**	Section 7.5 of the EP
	Loss of well control – subsea (Sea Eagle-1 well)	47 364 m^3	
	Loss of well control – subsea (Tahbilk-1 well)	236 149 m^3	
	Vessel collision	906 m^3 released over 5 hours	
Weathering Potential	**NORNE (1998-13) (Montara Crude Oil analogue)** Under low wind speeds (1 m/s) approximately 23% of the hydrocarbon would evaporate over the first 5 days. Under moderate wind speeds of 5 m/s, approximately 30% of the surface slick evaporates after 5 days, while a further ~12% is dispersed by wind. High wind speeds of 10 m/s are predicted to disperse ~66% of the surface oil and evaporate ~30%, with only a small portion (~4%) of the oil remaining as a surface emulsion (GHD 2021). **MDO** is a mixture of volatile and persistent hydrocarbons with low viscosity. It will spread quickly and thin out to low thickness levels, thereby increasing the rate of evaporation. Up to 60% will generally evaporate over the first two days. Approximately 5% is considered "persistent hydrocarbons", which are unlikely to evaporate and will decay over time. MDO has a strong tendency to entrain into the upper water column (0–10 m) (and consequently reduce evaporative loss) in the presence of moderate winds (> 10 knots) and breaking waves. MDO re-surfaces when the conditions calm. It does not form mousse.		Section 4.1 - Hydrocarbon Characteristics and Behaviour and Appendix A5
Priority Receptors	• Scott Reef*		Sections 12.4 and 13.4 of OPEP and 7.6.8 of EP

Parameter	Information	Further Information
	• Seringapatam Reef* • Ashmore / Cartier • Cassini Island • Adele Island • Clerke Reef* • Imperieuse Reef* • Kimberley Coast • Joseph Bonaparte Gulf (NT) • Indonesia • Timor-Leste	

*Predominantly intertidal receptor apart from small dry emergent areas such as Sandy Islet on South Scott Reef, Cunningham Islet on Imperieuse Reef, and Bedwell Islet on Clerke Reef

In the event of an incident where human safety is at significant risk, tasks included in this OPEP may not be implemented, and the International Convention for the Safety of Life at Sea (SOLAS) 1974 may take precedence.

PART A – REGULATORY

1. PURPOSE

The purpose of this Oil Pollution Emergency Plan (OPEP) is to detail Jadestone Energy (Eagle) Pty Ltd (Jadestone Energy) oil pollution preparedness and response arrangements for Sea Eagle-1 and Tahbilk-1 Vessel Based Activity Environment Plan TM-70-PLN-I-00004 (the EP hereafter).

2. OBJECTIVES

The objectives of this OPEP in relation to the unplanned release of hydrocarbons are:

- To safely limit the adverse environmental effects to the marine environment;
- To define the capability requirements for response activities;
- To demonstrate arrangements for sufficient capability to respond in a timely manner and for the duration of the oil pollution incident; and
- To provide guidance to the IMT in relation to spill response implementation.

3. SCOPE

This OPEP applies to oil spill risks associated with vessel based activities and the possibility of a loss of well control (LOWC) event for Sea Eagle-1 and Tahbilk-1 during the period of the EP. Sea Eagle-1 is in Production Licence AC/L7 and Tahbilk-1 in Production Licence AC/L8 in Commonwealth waters of the Timor Sea, approximately 690 km west of Darwin (Figure 3-1) as described in Section 2 of the EP.

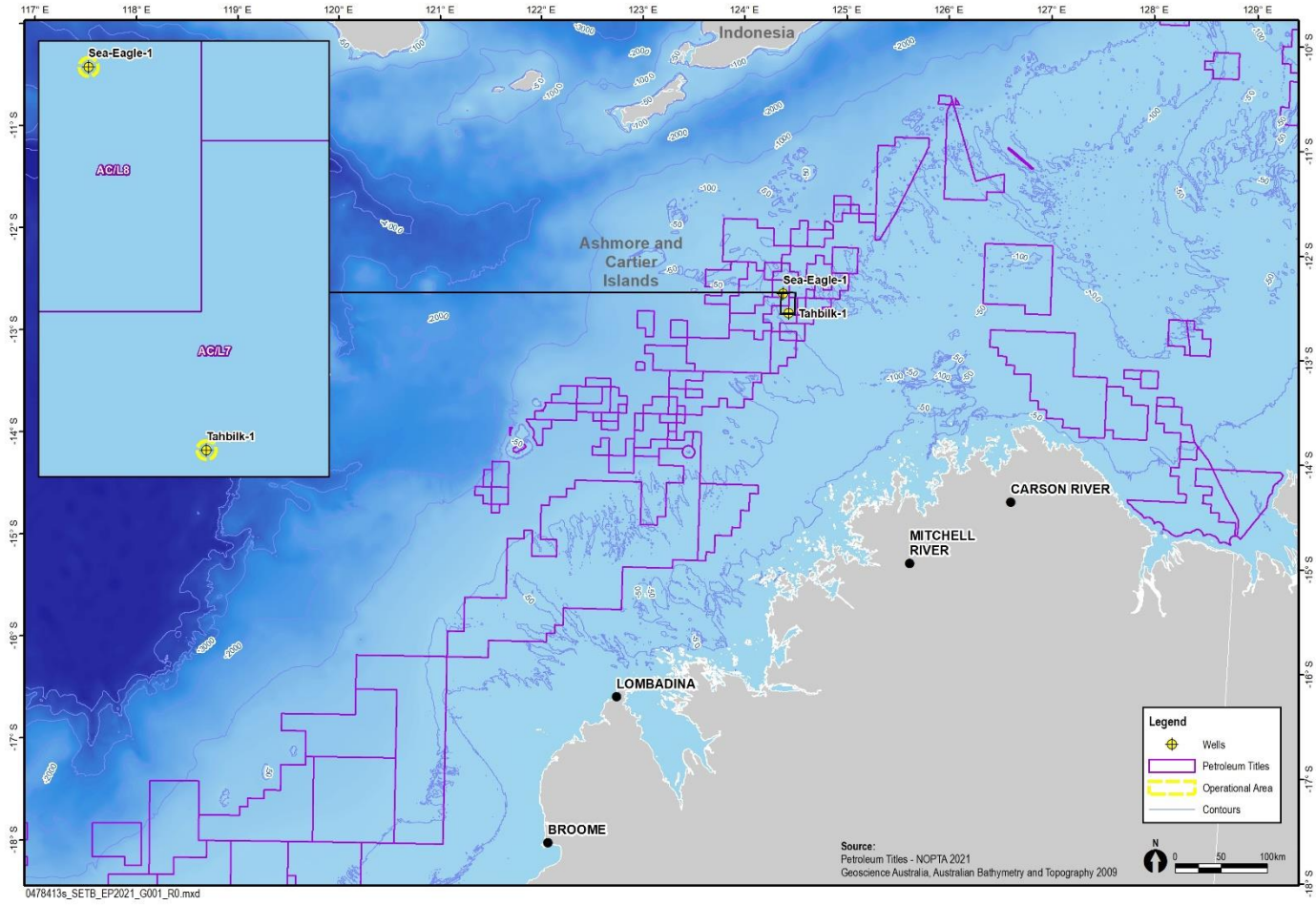


Figure 3-1: Sea Eagle-1 and Tahbik-1 Locations

Location details of the activities in this drilling campaign are as follows:

Table 3-1: Location of Activities

Site	Sea Eagle-1	Tahbilk-1
Licence/Permit	AC/L8	AC/L7
Water depth m	78	89
Location	12° 32' 45.22'' S 124° 26' 47.56'' E	12° 43’ 57.93” S 124° 30’ 14.32” E

Section 3 of the EP includes a comprehensive description of the existing environment in the Operational Area and Appendix C of the EP describes the existing environment and locations of key environmental sensitive receptors within the potential spill trajectory area (as predicted by spill fate modelling).

4. SPILL SCENARIOS AND CONTEXT

An environment risk assessment (ERA) was undertaken as part of developing the EP. Workshops were conducted that identified possible hazards with the potential for non-routine (unplanned) loss of hydrocarbons to the marine environment considered. The hazards were assessed with selected control

measures to reduce the likelihood and consequence of hydrocarbon losses to the marine environment to ALARP.

Refer to Section 7.5 of the EP which contains a summary of all the spill scenarios identified and assessed.

This OPEP has been prepared for the spill scenarios as summarised in the EP with a focus on the Level 3 LOWC scenario. The scenarios modelled represent the worst case scenarios as defined by the AMSA (2015) Guideline*: Technical guideline for preparing contingency plans for marine and coastal facilities*, however Jadestone Energy understands that other scenarios are possible, such as a level 2 diesel spill, and as such Jadestone Energy has made provisions in spill response to guide decision makers for all types of hydrocarbon spillages at any level.

4.1 Hydrocarbon Characteristics and Behaviour

During the monitoring activities, the following hydrocarbons may be unintentionally released to the marine environment: oily water, marine diesel, hydraulic oils and lubricating fluids, or crude oil. The following two hydrocarbons are the key considerations for this OPEP

- Marine diesel; and
- Montara crude oil.

For details relating to the specific properties of the hydrocarbons refer to Appendices A5.

4.1.1 Marine Diesel

In the marine environment, marine diesel will behave as follows:

- Spread rapidly to low thickness levels in the direction of the prevailing wind and waves;
- Evaporation is the dominant process contributing to the fate of spilled marine diesel from the sea surface and will account for 60 to 80% reduction of the net hydrocarbon balance within 48 to 72 hours;
- The evaporation rate of marine diesel will increase in warmer air and sea temperatures such as those present in the region; and
- Due to the low specific gravity of marine diesel, it does not sink and accumulate on the seafloor as pooled or free oil unless adsorption occurs with sediment. However, it is possible for the diesel oil that is dispersed by wave action to form droplets that are small enough to be kept in suspension and moved by the currents.

ITOPF (2015) categorises diesel as a light Group II hydrocarbon. In the marine environment, a 5% residual of the total quantity of marine diesel spilt will remain after the volatilisation and solubilisation processes associated with weathering.

4.1.2 Montara Crude Oil

Montara crude is considered a Group 2 persistent hydrocarbon, as per the grouping classification presented by ITOPF (2015). However, it has a high wax content (14.3%) which yields a high pour point >18°C (Intertek 2014) due to the propensity for the wax to solidify when cooled below this temperature. ITOPF (2015) recommends that Group 2 hydrocarbons with a high pour point should be treated as Group 4 oils below their pour point. Further properties include that Montara crude has moderate residual components of approx. 33.2% (Intertek 2014). The volatile component of Group 2 hydrocarbons tend to dissipate through evaporation within a few hours to several days (ITOPF 2015).

Oil spill modelling was carried out with SINTEF's Oil Spill Contingency and Response (OSCAR) system (version 12.0) and required the use of a hydrocarbon analogue. SINTEFs hydrocarbon analogue 'NORNE (1999-13)'

was selected as a suitable match for Montara crude (GHD 2021). The chemical properties of both hydrocarbons are outlined in Table **4-1**.

Based on modelling results, under low wind speeds (1 m/s) approximately 23% of the hydrocarbon would evaporate over the first 5 days. Under moderate wind speeds of 5 m/s, approximately 30% of the surface slick evaporates after 5 days, while a further ~12% is dispersed by wind. High wind speeds of 10 m/s are predicted to disperse ~66% of the surface oil and evaporate ~30%, with only a small portion (~4%) of the oil remaining as a surface emulsion (GHD 2021).

NORNE (1998-13) has a strong tendency for emulsion formation, with the water content of the surface slick stabilising at 50% under the wind conditions assessed. The emulsification occurs more rapidly under higher wind speeds due to the elevated oil-water interaction generated by wind stress on the sea surface.

Table 4-1: Hydrocarbon Characteristics

Hydrocarbon type	**Specific gravity**	**Kinematic Viscosity (cST)**	**API**	**Component**	**Volatile (%)**	**Semi-volatile (%)**	**Low-volatility (%)**	**Residual (%)**
				BP (°C)	**<190**	**190-280**	**280-342**	**>342**
Montara	0.8301	3.164 @30°C	39.0	% of total (vol)	26.4	21.3	19.1	33.2
NORNE (1983-13)	0.86	1968 @13°C	32.5	Data not available				

5. PREDICTED SPILL TRAJECTORY AREA, SENSITIVITIES AND RESPONSE PRIORITIES

Potential shoreline contacts and protection priorities were identified using spill modelling results. This information has been used to inform the spill assessment process and will support the response process and development of an Incident Action Plan (IAP) in the unlikely event of a spill.

Shoreline locations that were identified as priority protection areas based on modelling thresholds described in the EP are shown in Figure 5-.5-1.

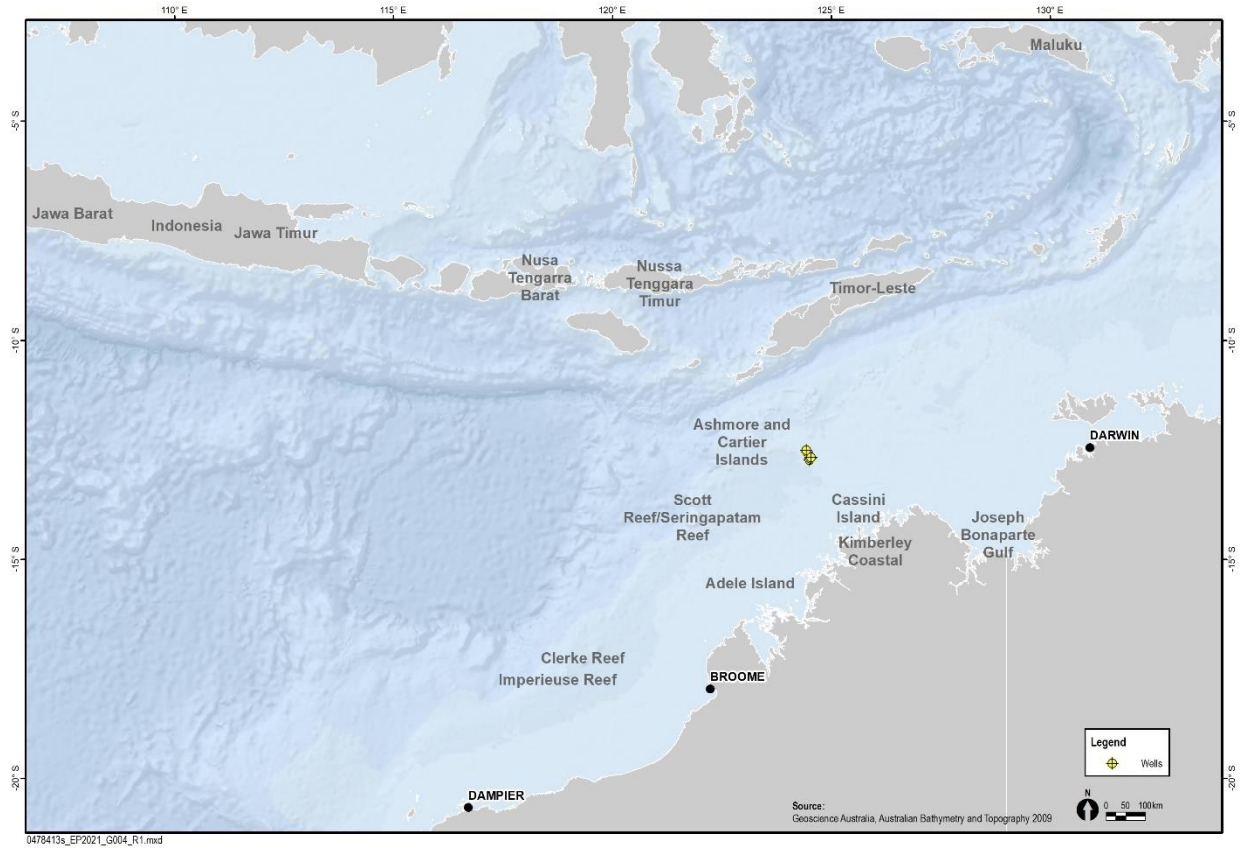


Figure 5-.5-1: General Location of Protection Priorities

The response strategies identified in this OPEP will be adopted in the IAP process as required to protect the environmental values of these areas. Refer Section 7.6.8. of the EP for priority receptors and spill modelling summary including impact descriptions of sensitive locations from surface oil, entrained and dissolved aromatic threshold concentrations. Section 3 of the EP describes the existing environment at the Operational Area and Appendix B describes the environment within the potential spill trajectory area, and, identifies the protected areas and fauna that may be impacted by a spill. Appendix G of the EP provides an overview of the Protected Priority areas.

6. APPLICABILITY OF RESPONSE STRATEGIES

The response strategies outlined in this OPEP have been developed by Jadestone Energy utilising risk assessments to identify credible worst-case spill scenarios, expected/calculated release rates, known information of hydrocarbon types and behaviour, and expected partitioning of the hydrocarbon within the marine environment with an estimate of the volume of persistent oil.

This information has been modelled to give a theoretical zone of spread that is used to identify potential sensitive receptors and response strategies required to reduce the consequences of a spill to ALARP. The response strategies are assessed using a NEBA process so the most effective response strategies with the lowest environmental consequences can be identified, documented and prepared for.

Table 6.1 below describe the decision to adopt or omit spill response strategies, and the potential environmental benefit of each strategy. An ALARP discussion regarding each oil spill response strategy is provided in the EP (Sections 6.8.4 and 7.6.12).

Table 6-1 shows the operational considerations for response strategies, applicability to the two potential oil types that could be spilled and operational considerations for incident action plans (IAPs).

The response strategies described in Sections 8 to 0 contain both a description of the response strategy and decision-making criteria and guidance for implementation of the response strategy.

Action Plans and mobilisation of resources to respond to the spill is presented in Part B of this OPEP.

Appendix A7 (Incident Management Guidance) of this document provides a summary of Jadestone Energy's Incident Management Team and guidance on the incident response and management. The response and management are fully detailed in the Incident Management Team Response Plan (JS-70-PLN-F-00008).

Table 6-1: Oil Spill Response Strategy Operational Considerations

OSR strategy	Scenario			Operational Considerations
	Sea Eagle-1 LOWC	Tahbilk-1 LOWC	Surface release MDO	
Source Control	Primary response strategy	Primary response strategy	N/A	*LOWC* Relief well drilling is the primary method for killing the blowing well with the activation and implementation of the Sea Eagle-1 and Tahbilk-1 Addendum to Blowout Contingency Plan (Appendix- G [TM-50-PLN-W-00001]). The use of a Capping Stack is not a viable option for Sea Eagle-1 and Tahbilk-1 wells due to insufficient water depth. In addition, Sea Eagle-1 is anticipated to have insufficient bending strength capacity and fatigue life due to the 13-5/8" wellhead system and slimline well design used in conjunction with a 105 t Capping Stack. *Vessel collision* In the event of a vessel spill, the Vessel Master would revert to the Ship Oil Pollution Emergency Plan (SOPEP), which is a MARPOL requirement for applicable vessels. The SOPEP may include guidance for securing cargo via transfer to another storage area on-board the vessel, transfer to another vessel, or through pumping in water to affected tank to create a water cushion (tank water bottom). Trimming the vessel may also be used to avoid further damage to intact tanks.
Subsea Dispersant Application	Secondary response strategy	Secondary response strategy	Not recommended	Subsea dispersant injection typically uses smaller volumes of dispersant to treat the oil than surface dispersant and is not constrained to daylight hours. Application is also less affected by adverse metocean conditions. A potential drawback of this response tactic is that it will result in smaller droplet sizes and entrainment of hydrocarbons into the water column, which may affect some oceanic and benthic organisms (e.g. fish, plankton). However, this is likely to be temporary and restricted to the top ~3m of the water column whilst SSDI is being used (RPS, 2019). This increase in entrainment is partially offset by significant increases in biodegradation rates. Application must be accompanied with subsea dispersant effectiveness monitoring to confirm efficacy and any modifications that may be required to application methods or Dispersant to Oil application rates.
Operational	Primary response	Primary response	Primary response	Surveillance actions are used to monitor and evaluate the dispersion of the released

OSR strategy	Scenario			Operational Considerations
	Sea Eagle-1 LOWC	Tahbilk-1 LOWC	Surface release MDO	
Monitoring	strategy	strategy	strategy	hydrocarbon, and to identify and report on any potential impacts to flora and fauna that may occur while the spill disperses. This strategy has several tactics (e.g. tracking buoys, aerial surveillance, shoreline assessment) and is scalable according to the nature and scale of a spill. There are clear benefits in maintaining situational awareness throughout the duration of a spill event and little or no environmental impact associated with its implementation. Operational monitoring results can also be used to assist in escalating or de-escalating response strategies as required.
Chemical Dispersion (Surface)	Primary response strategy	Primary response strategy	Not recommended	The previous Titleholder, PTTEP AA, commissioned dispersant testing on Montara oil to assess the efficacy of Dasic Slickgone NS (and Nalco Corexit 9500A) dispersant in conditions representative of winter and summer seasons. The results indicated that dispersant efficacy is a minimum of 73% at 12 hours and remains a minimum of 68% for summer and winter within 24 hours. After 24 hours the efficacy decreases due to the weathering (increased pour point and viscosity) of the oil (Leeder, 2013). The summer and winter seasons were tested for efficacy as they were representative of the minimum and maximum conditions (water, air temperature and wind speed) in the Timor Sea. Dispersants can be effective to reduce floating slick, and therefore the potential for shoreline contact and oiled wildlife. The decision for application of this response will be subject to an operational NEBA given dispersant addition may increase the concentration of entrained oil near sensitive receptors in some environmental conditions **MDO:** is not considered a persistent hydrocarbon and has high natural dispersion rates in the marine environment. Chemical dispersant application is not recommended as a beneficial option for MDO as it has a low probability of increasing the dispersal rate of the spill while introducing more chemicals to the marine environment.
Containment and Recovery	Primary response strategy	Primary response strategy	Not recommended	**Montara Crude:** Applicable for Montara crude if the sea state is acceptable and the oil can be corralled into sufficient volumes for collection. The drawbacks of this strategy include production of significant volumes of waste due to the collection of water with floating oil, however this can be mitigated to some extent if decanting is permitted.

OSR strategy	Scenario			Operational Considerations
	Sea Eagle-1 LOWC	Tahbilk-1 LOWC	Surface release MDO	
				MDO: Given the fast spreading nature of MDO, and the expected moderate to high sea states of the area causing the slick to break up and disperse, this response is not considered to be effective in reducing the net environmental impacts of an MDO spill. The ability to contain and recover spreading MDO on the ocean water surface is extremely limited due the very low viscosity of the fuel and the inability to corral the hydrocarbon to a sufficient thickness for skimmers to be effective at removal.
Nearshore and Shoreline Protection and Deflection	Secondary response strategy	Secondary response strategy	Not recommended	**Montara Crude**: Will be considered if a spill is predicted to contact sensitive shorelines and resources can be deployed effectively, safely and would not result in more harm than if the product was left to degrade naturally. Given tidal influences, lack of access, lack of anchoring points and subsequent distance for effective placement, this strategy would be unsuitable in many locations. This is not considered to be a primary response strategy. If selected, preparations for this strategy should be made as soon as predictions indicate a possible shoreline impact. DoT IC (as Control Agency) approval is required before commencing protect and deflect activities in State waters. **MDO**: Modelling indicates no shoreline contact above moderate shoreline accumulation thresholds (>100 g/m^2).
Shoreline Clean-up	Secondary response strategy	Secondary response strategy	Not recommended	Intrusive response that requires careful site-specific planning in order to reduce secondary impacts of physical disturbance and secondary contamination to intertidal and shoreline habitats. Flushing may be considered if the oil enters high priority/ slow recovery habitats such as mangroves. Natural dispersion will occur as the hydrocarbon is remobilised from rock shelves and hard substrates, while residual oil will biodegrade. Due to these disturbances, this response has potential to cause more harm than light oiling, so must be carefully considered under a shoreline assessment and NEBA. If selected, preparations for this strategy should be made as soon as predictions indicate a possible shoreline impact. Shoreline clean-up is part of an integrated nearshore/ shoreline response to be managed by the relevant Control Agency. Where JSE is not the Control Agency approval is required before commencing clean-up activities.

OSR strategy	Scenario			Operational Considerations
	Sea Eagle-1 LOWC	Tahbilk-1 LOWC	Surface release MDO	
Oiled Wildlife Response	Primary response strategy	Primary response strategy	Primary response strategy	Applicable for marine animals that come close to the spill when on the water and shorelines. Care to be taken not to drive marine animals into spill or split up the pods, schools, and flocks. Applicable for oiled marine animals. Difficult to do for large marine animals or poisonous animals such as sea snakes, however this response must always be assessed.
Scientific Monitoring (See IMTRP Appendix A)	Primary response strategy	Primary response strategy	Primary response strategy	Applicable for marine environment contacted by hydrocarbons either by floating, dissolved or entrained.

6.1 Operational NEBA

Following implementation of the initial (first strike) response, the information in **Error! Reference source not found.** will aid in the development of the initial Operational NEBA. The Action Plan tables in Section **Error! Reference source not found.** include considerations to help complete the Operational NEBA.

It should be noted that the initial Operational NEBA may be based on limited information; however, the overall response effort should not be delayed due to a lack of some information. The Operational NEBA can always be revised when more information is provided to the Planning Lead.

The Planning Lead is responsible for completing the Operational NEBA and to determine if outputs from the Strategic NEBA are still appropriate. The Operational NEBA should incorporate post-spill trajectory modelling data, surveillance data, operational monitoring data and should be incorporated into the IAP.

6.2 Response Resource Planning

Spill response planning to identify a suitable combination of response strategies involves estimating required resources and an assessment of the capability required to support the response. Capability to support the minimum resources required has been planned for and is presented in **Table** 7-1.

The spill is predicted to contact both Australian and international shorelines. The remoteness and nature of the shorelines contacted in Australia places a priority on offshore response strategies that reduce the volume of oil to shore. The primary response strategies will be:

- Source Control (relief well) will reduce the length of time the oil is released into the marine environment;
- Operational monitoring is the first response strategy implemented to enable JSE to gain and maintain situational awareness;
- Surface chemical dispersant application implemented because of the benefit demonstrated during the response to the Montara wellhead platform incident in 2009; and
- Containment and recovery operations complement the dispersant strategy by being able to target areas of floating oil that have not dispersed.

The mix of resources presented provides a basis from which complementary response strategies can be undertaken for priority receptors with a reasonable prospect for positive outcomes.

- Spill response planning assumptions take into consideration:
- The weathering properties of Montara oil are well understood, however this does not negate the influence of real time variables on the rate of evaporation and dispersion;
- Review of the response operations for the Montara 2009 spill event; and
- Oil properties as described in Section 4.1 and Appendix C of the IMT Response Plan.

An overview of the equipment and dispersant available to Jadestone Energy from national and international stocks and approximate mobilisation times is provided in Table 6-2.

Table 6-2: Oil Spill Response Equipment

Agency	Stockpile Locations	Equipment
Jadestone	• Darwin Supply Base • Supply vessel	Computerised Management Maintenance System (CMMS) provides up-to-date equipment lists for the various stockpile locations
AMOSC	• Broome • Exmouth • Fremantle • Geelong • Industry Mutual Aid register	AMOSC equipment and dispersant lists are available via the Member Login webpage: • AMOSC website: https://amosc.com.au/member-login/ AMOSC can arrange for transport of their equipment and dispersant to Darwin FOB.
AMSA	• ACT • Adelaide • Brisbane • Dampier • Darwin • Devonport • Fremantle • Gladstone • Horn Island • Karratha • Melbourne • Sydney • Townsville	AMSA equipment and dispersant lists are available on the AMSA website via the following links: • Equipment: https://amsa-forms.nogginoca.com/public/equipment.html?loc=%2Fapi%2Fv1%2Fasset%2F2616201 • Dispersant: https://amsa-forms.nogginoca.com/public/dispersant.html?loc=%2Fapi%2Fv1%2Fasset%2F2544502 • Fixed Wing Aircraft: https://amsa-forms.nogginoca.com/public/aircraft-avilability.html
OSRL	• Global	OSRL equipment and dispersant lists are available on the OSRL website via the following link: • OSRL website: https://www.oilspillresponse.com/activate-us/equipment-stockpile-status-report/
Waste Management Contractor	• Darwin • Broome • Port Hedland • Karratha • Perth	Waste management contractor's waste management equipment are summarised in its - Spill Response Waste Management Plan.

7. RESOURCES REQUIRED FOR A WCS SPILL EVENT AT MONTARA

Table 7-1: Resources Required for a WCS Spill Event Involving a LOWC at Sea Eagle-1 and Tahbilk-1

Response Strategy	Capability Details	Week 1(total)	Week 2 (total)	Week 3 (total) onwards	Providers and quantities	Arrangement
Source Control						
Subsea dispersant application	Subsea First Response Toolkit and dispersant	None	One toolkit – up to 500m^3 available	One toolkit – up to 5,984m^3 dispersant available	AMSA 355 m^3 AMOSC 261 m^3 AMOSC SFRT stockpile 500 m^3 OSRL 5,368 m^3	AMSA MOU AMOSC SFRT membership OTA with Oceaneering OSRL
	Construction class vessel	None	1	1	Clarksons Platou (Vessel Broker)[1]	Contract / Subscription
	ROV	None	2	2	Vertech	Contract
Operational Monitoring						
Satellite tracking buoy	Satellite tracking buoy	2	4	4	Jadestone (4 Off) Satellite buoy provider AMOSC	FastWave AMOSC
Satellite imagery	Synthetic Aperture Radar	7 images/week	7 images/week	7 images/week	KSAT	AMOSC MSC OSRL
Modelling	OSTM	7 trajectory and weathering models	7 trajectory and weather models	7 trajectory and weather models per week	RPS APASA	RPS APASA AMOSC MSC
Aerial surveillance	Aircraft	1 aircraft	2 aircraft	2 aircraft	Jadestone aviation contract	Babcock / Air North / Hardy Aviation
	Aerial observers	1 observer	2 observers	2 observers	AMOSPlan – Core Group	AMOSC
Vessel surveillance	Vessel of opportunity	1 vessel	1 vessel	1 vessel	Jadestone marine contracts	MSAs with vessel providers subject to availability
Fluorometers	Towable fluorometers	5 fluorometers	5 fluorometers	5 fluorometers	Jacobs Environmental or CSIRO	Scientific Monitoring Plan PO and CSIRO via AMSA MOU
UAVs	Short range UAVs with cameras/video	2 UAVs	2 UAVs	4 UAVs	Approach service providers at the time when required	Readily sourced and mobilised
Shoreline and coastal habitat assessment	Trained team leaders and team members trained on site.	1 team leaders, 2 team members (total 3 people).	4 team leaders, 9 team members (total 12 people).	16 team leaders and 32 team members (total 48 people)	DoT, OSRL, AMOSC and AMSA trained shoreline assessment team leaders. Labour hire contract	AMOSplan, DoT State Response Team, AMSA MOU, and OSRL Access Human Talent

[1] Jadestone subscription to Clarksons Seanet (AIS) system which provides access to vessels meeting required technical specifications to support offshore C&R operations.

Response Strategy	Capability Details	Week 1(total)	Week 2 (total)	Week 3 (total) onwards	Providers and quantities	Arrangement
Chemical Dispersant						
Dispersant volumes required based on daily calculations of oil able to be treated on the surface Average daily rate = 95 m^3 (Day 1 – 7) Minimum daily rate = 87 m^3 (Day 77)		611 m^3	588 m^3	4,750 m^3 Plus manufacture production capacity (if required) between 54m^3/day to 100m^3/day within 1-2 weeks of notification	Jadestone 15 m^3 AMSA 355m^3 AMOSC 761m^3 OSRL 5,368m^3	BASSNet CMMS AMSA MOU AMOSC membership SFRT membership OSRL
	FWADC	6 spray aircraft	5 spray aircraft	5 spray aircraft	FWADC contractor	AMSA, AMOSC, Aerial Operation Plan for Oil Spills off the Northern Coastline of Australia
	OSRL	1 x Hercules or 1 x Boeing 727	1 x Hercules or 1 x Boeing 727	1 x Hercules or 1 x Boeing 727	OSRL	OSRL Agreement
	Air attack supervisor (AAS)	1 aircraft 1 AAS	1 aircraft 1 AAS	2 AAS	FWADC contractor	AMSA, AMOSC membership
	Spray vessels	5 spray vessels	2 spray vessels	2 spray vessels	Jadestone marine contracts	MSAs with vessel providers subject to availability
	Spray systems afedo spray system per vessel	4 (2 systems per vessel)	4 (2 systems per vessel)	4 (2 systems per vessel)	AMOSC	AMOSC membership
	Search and Rescue	1 aircraft	1 aircraft	1 aircraft	Jadestone aircraft contracts	Babcock
Containment and Recovery						
Containment and Recovery[23]	Offshore system (as per Section 11.3.2)	15 (1 x Jadestone) (12 x AMOSC) (2 x AMSA)	15	14 ongoing	AMOSC AMSA OSRL Clarksons Platou (Vessel Broker)[4]	AMSA MOU AMOSC membership OSRL membership Contracts MSA Call off contracts Jadestone marine broker Clarksons
Personnel	2 x Trained oil spill responders per system	30 (AMOSC/CG/AMSA)	30 (AMOSC/CG/AMSA/OSRL)	28 ongoing	AMOSC core group AMSA NRT OSRL	AMSA MOU AMOSC membership OSRL membership
Vessels	Containment and recovery vessels	30	30	28	MSAs with vessel providers subject to availability	
Waste storage	ISO tanks, IBCs, bladders, vessel tanks	Up to 4200 m3	Up to 4200 m3	Up to 3920 m^3	Waste management contractor NWA	

Response Strategy	Capability Details	Week 1(total)	Week 2 (total)	Week 3 (total) onwards	Providers and quantities	Arrangement
Protection and Deflection						

	Protection and Deflection systems	1,200m Shoreline protection boom 1,200m Intertidal protection booms 600m solid flotation boom Shoreline and intertidal boom ancillaries	5,250m Shoreline protection boom 2,900m Intertidal protection booms 1,800m solid flotation boom Shoreline and intertidal boom ancillaries	9,950m booms	AMOSC AMSA OSRL	AMSA MOU AMOSC membership OSRL membership Labour Hire
Vessels	Small support craft	One vessel	10 vessels	10 vessels	Jadestone marine contracts	MSAs with vessel providers subject to availability
Personnel	Trained oil spill responders	4 trained responders 10 labour hire	12 trained responders 30 labour hire	20 trained responders 50 labour hire	AMOSC core group AMSA NRT OSRL	AMSA MOU AMOSC membership OSRL membership Labour hire contract
Shoreline Clean-up						
Personnel	1 x Trained oil spill responder (team leader) and 10 labourers per team	1 Team (1 trained shoreline team leader and 10 labourers) on site	4 Teams (4 trained shoreline team leaders and 40 labourers) on site	19 Teams (19 trained shoreline team leaders and 190 labourers) on site	Labour hire contract Global Spill Control AMOSC core group DoT AMSA	Access Human Talent Global Spill Control AMSA MOU AMOSC membership OSRL membership
Waste	Bins, containers, bags	Bins, containers, bags	Bins, containers, bags	44 x 3 kL Waste skips 44 x 1kL IBCs Up to 10 x 20kL ISO Tanks	Waste contractor	Waste management contractor NWA
Shoreline clean up equipment	Kits	Kits	Kits	Shoreline Clean-up Kits (Decontamination, Beach Wash Down, Initial IAP Support and Beach Clean-up Kits)	AMOSC AMSA	AMSA MOU AMOSC membership OSRL membership
Oiled Wildlife Response						
Oiled wildlife response	Refer to section 14				AMSA AMOSC D OSRL	AMSA MOU AMOSC membership OSRL membership DBCA and DBCA network

[2] Equipment no.s based on availability from AMOSC (Sept 2020), AMSA (Sept 2020) and OSRL (50% - Sept 2020) availability reports

[3] Waste capacity will be dependent on vessels being used, waste management (ashore) will be managed and coordinated through contracted waste service provider. Offshore waste to be managed using Montara FPSO and/or Stag facility.

[4] Jadestone subscription to Clarksons Seanet (AIS) system which provides access to vessels meeting required technical specifications to support offshore C&R operations.

Personnel required to support the IMT functions and response strategies are grouped according to source and skill base.

- Jadestone group are sourced directly from within Jadestone.
- AMOSC and AMOSC Core Group members are specifically trained in oil spill response and are identified as those who fulfil team leader roles and who can train team members if required.
- National Response team (NRT) include trained personnel from AMSA and State/Territory response teams.
- OSRL trained oil spill responders.
- Mutual Aid / contractors / service providers group is made up of industry members, i.e. staff of other Titleholders; contract personnel; or service providers who can fulfil team member roles and don't necessarily have oil spill response training, for example labour hire.

Table 7-2 provides a summary of the cumulative personnel resource requirement across the sources.

Table 7-2: Indicative Cumulative Personnel Requirement Across Response Activities and Source

Function	TOTAL Personnel required – team & labour hire	Jadestone	AMOSC & AMOSC Core Group	OSRL	Contractors / Service providers
IMT functions	**38**	21 (3 x 7)	8 (2 x 4)	8 (2 x 4) + 1	-
WA DoT IMT (IGN)	**11**	3	8	-	-
Source control	**40**	2	-	-	38 WWC / Oceaneering / Provider
Monitor and evaluate	**52**	-	16 SCAT Team Leaders	-	4 (2 x 2) Air Obs 32 Labour Hire for SCAT surveys
Chemical dispersant operations	**18**	-	10 (5 x 2) Vessel Ops	-	2 AAS 3 AFR 3 AMSA
Containment and recovery	**30**	-	20 (10 x 2)	10 (5 x 2)	-
Protection and deflection	**70**	-	12 (6 x 2)	-	8 (4 x 2) NRT 50 Labour Hire
Shoreline clean-up	**209**	-	14	5	190 Labour Hire
Oiled wildlife	**122**	Sourced as per the requirements set out in the WA/NTWORP (Level 6)			
TOTAL personnel required and source	**589**	**26**	**87**	**23**	**330**

8. SOURCE CONTROL STRATEGY

The initial and highest priority response to an oil spill incident is to prevent or limit further oil loss into the marine environment, if safe to do so. In most circumstances, the net benefit of source control outweighs impacts of further oil being released into the marine environment. However, further risks may arise due to increased vessels and rigs and the associated increased health and safety risks for the teams involved in the response.

8.1 Initiation and Termination Criteria

Tactic	Initiation criteria	Termination criteria
Implementation of SOPEP	Notification of spill	Release of oil ceased, spilled oil that has been contained is cleaned up and disposed of.
Relief well		

The IMT will gather surveillance information from those involved in preventing further release of hydrocarbons to the marine environment and ensure that the appropriate source control actions are being undertaken.

8.2 Tactics

Source Control response plans, to cover the spill scenarios identified, are provided for:

- Vessel releases - minor spills with small volumes of hydrocarbons such as bilge/oily wastewater, hydraulic fluids, or Diesel;
- Vessel release - Fuel tank release from vessel collision (Diesel); and
- Subsea well release – release of oil.

8.3 Tasks for Vessel Collisions and minor vessel releases

Accidental release of hydrocarbons from support vessels to the marine environment is managed the Vessel Master in accordance with MARPOL 73/78 Annex 1 – Prevention of Pollution by Oil under the Protection of the Sea (Prevention of Pollution from Ships) Act 1983.

8.4 Relief well

Relief wells are a proven strategy to successfully intercept and kill a well blow out, so that plug and abandonment activities can be safely performed. This technique requires personnel with demonstrated experience in relief well planning and drilling.

8.4.1 Initiation and Termination Criteria

Tactic	Initiation Criteria	Termination Criteria
Mobilise relief well	Immediately when a subsea Level 3 spill incident is confirmed	When relief well drilling is complete and well is successfully killed

8.4.2 Tactics

The following tactics are included for relief well operations:

- Mobilise for relief well

The Source Control Plan (Section 16.5) is activated at the initial stage of the incident so that resources can be mobilised and ready for use.

8.4.3 Relief well

To kill a well where control has been lost, and make it safe, a suitable Mobile Offshore Drilling Unit (MODU) is required to transit to the well location and drill an intercept (relief) well. It is estimated that a relief well could drill down to the required intercept point within 54 days. To mobilise a rig and complete the relief well installation and well kill operations is estimated to be done within 77 days (refer EP Section 7.5.3).

Appendix G of the Blowout Contingency Plan (TM-50-PLN-W-00001), provides details of reservoir and wellbore data, reservoir and wellbore geometry, kills weights and pumping rates and equipment requirements. This information will be used to finalise a detailed relief well plan should an incident occur.

To help facilitate securing a suitable rig in the shortest timeframe possible, Jadestone Energy is a signatory to the APPEA MOU for mutual assistance to facilitate and expedite the mobilisation of a MODU for a relief well. The MoU commits the signatories to share rigs, equipment, personnel and services to assist another operator in need. JSE will also monitor external drilling programs to gauge MODU availability throughout the life of the EP. When selecting a suitable rig, the MODU's Safety Case should be considered, therefore JSE will continue to monitor the status of Registered Operators with approved Safety Case rigs.

To ensure personnel with specialist technical knowledge and experience are engaged throughout the relief well operations, JSE will maintain a Contract and Equipment Access Agreement with Wild Well Control (WCC) throughout the life of the EP. This is embedded in the Blowout Contingency Plan.

9. OPERATIONAL MONITORING STRATEGY

A combination of methods has been identified as appropriate to characterise the released hydrocarbon, estimate the extent of the spill, measure oil volume and concentration on or in the water and locate oil along shorelines.

Understanding the behaviour and likely trajectory of an oil spill is critical to evaluate the appropriate response strategy. In some situations, after operational monitoring activities have been employed, leaving the oil to naturally dissipate and degrade may be considered the most appropriate option if any further response is a risk to increasing the environmental impact, or presents a significant safety risk.

9.1 Common Operating Picture (COP)

The ability of the IMT to manage and coordinate response operations will be heavily reliant on being able to compile and effectively manage all the information and data provided as part of the operational monitoring strategy. To achieve this a Common Operating Picture (COP) will be utilised, consisting primarily of geographical and geospatial information.

9.2 Operational Monitoring Plan

The IMT will coordinate the operational monitoring requirements, ensure that all monitoring activities are conducted safely and effectively.

9.3 Initiation and Termination Criteria

Tactic	Initiation Criteria	Termination Criteria
Tracking buoys	Immediately once oil spill is confirmed	Tracking buoy no longer required to inform common operating procedure.
Vessel surveillance	Immediately once Level 2/3 oil spill is confirmed	Vessel surveillance reports no longer required to inform common operating picture
Aerial surveillance	Immediately once Level 2/3 oil spill is confirmed	IAP no longer requires aerial surveillance to inform common operating picture; and Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response
Satellite imagery	Immediately once Level 2/3 oil spill is confirmed	Satellite imagery no longer required to inform common operating picture
Oil Spill Trajectory Modelling (OSTM)	Immediately once Level 2/3 oil spill is confirmed	Modelling no longer required to inform common operating picture; and Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response
Fluorometry	Dispersant application has occurred	Dispersant application no longer being undertaken; and

Tactic	Initiation Criteria	Termination Criteria
		Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response
Shoreline and coastal habitat assessment	Immediately once Level 2/3 oil spill is confirmed	When all shoreline segments have reached status of no further action be taken (NFA); and Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response
UAV deployment	OSTM predicts shoreline impact to inaccessible area not able to be covered by aerial or vessel surveillance tasks.	UAV surveillance no longer required to inform common operating picture.

9.4 Tactics

The following tactics are sufficient for supplying all required information to inform response decisions to reduce impacts resulting from the worst-case potential spill to ALARP:

- Tracking buoys;
- Vessel surveillance;
- Aerial surveillance;
- Satellite imagery;
- OSTM;
- Fluorometry; and
- Shoreline and coastal habitat assessment using Shoreline Clean-up Assessment Technique (SCAT) surveys; and
- UAVs.

9.4.1 Tracking Buoy Deployment

Satellite tracking buoy deployment is to be initiated within three hours of spill notification and placed within or as close as is safely allowable to the plume to follow the movement of a surface spill in the marine environment.

Note: Buoys are not to be dropped from a height of greater than 10m to water surface.

Tracking buoys are available from the Montara Venture Floating production storage and offtake facility (FPSO) and would be loaded onto a support vessel for deployment

The time taken to deploy the tracking buoys will depend on the location they are sourced from and transit time for the vessels to deploy or retrieve. After initial deployment additional buoys will be deployed on a regular basis as determined by the IMT to best support the building and maintenance of situational awareness.

Tracker buoys are deployed under the direction from the IMT Leader, by following the appropriate standard operating procedure (SOP). Once deployed it is essential that confirmation of a successful deployment is provided back to the IMT.

Deployed buoys will be tracked online by the IMT and spill fate modelling service provider. On completion of spill monitoring using tracking buoys, the buoys are to be retrieved by vessel.

Normal procedure will be for the deployment of a single tracking buoy on Day 1 and the second approximately 24 hours later. On being deployed all buoys will be checked to be operational through the online website. All buoy data will be used to assist with understanding the local metocean conditions. Additional buoys will be sourced as part of the response, however if required buoys can be collected and redeployed.

9.4.2 Vessel Surveillance

Direct observations from Montara Operations field support vessels or other incidental vessels can be used to assess the location and visible extent of the spill from hydrocarbon incidents, to verify modelling predictions and trajectories, and to support other response strategies.

Note: Vessel-based surveillance is only effective if sea state conditions are calm and the spill is observable.

A decision on the suitability of the metocean conditions will be made (Vessel Master / IMT) and direction provided to available vessels. Vessel surveillance is to be instructed by the IMT (Level 2 or 3). Vessel surveillance observations will be used by the IMT in conjunction with all other operational monitoring information (Level 2 or 3) to confirm location and extent of the spill, which will in turn assist with the development of appropriate response strategies.

The nearest support vessel to the release location will be mobilised upon notification of incident. Vessels currently on hire to Jadestone Energy will be initially selected for vessel surveillance duties with other vessels provided from Jadestone Energy's contracted vessel providers.

Reporting requirements will be as follows:

- Information to be provided to the IMT (Level 2 or 3);
- Essential information to be reported will include:
  - Spill location (latitude & longitude);
  - Length and width of slick;
  - Visual appearance of the slick (colours, emulsification etc);
  - Associated weather conditions in vicinity of the spill (wind speed/direction, sea state, swell);
  - Any marine fauna or other activities observed; and
  - Photographic images.
- All information is to be compiled into a Vessel Surveillance Log (refer Appendix A1.) which will be sent to the IMT within an hour of the observations being taken.

9.4.3 Aerial Surveillance

Direct observations from aircraft can be used to assess the location, estimated volume and visible extent of the spill from hydrocarbon incidents, in order to verify modelling predictions and trajectories, and to support other response strategies.

Trained Aerial Observers will be sourced through the AMOSplan arrangements and deployed to the response location, however, should a delay in their arrival be anticipated, a surveillance flight will be conducted utilising available aircraft crew.

A decision on the suitability of the meteorological conditions will be made by the aircraft captain, who will relay this decision to the IMT to receive appropriate tasking. Aerial surveillance observations will be used by the IMT in conjunction with all other operational monitoring information to confirm location and extent of the spill, which will assist with the development of appropriate response strategies or modification to existing strategies.

Note: Specific meteorological limits will vary depending on the type of aircraft being flown.

Reporting requirements will be as follows:

- Information to be provided to the IMT;
- Essential information to be reported will include:
  - Spill location (latitude & longitude);
  - Length and width of slick;
  - Visual appearance of the slick (colours, emulsification etc) using the Bonn Oil Appearance Code (refer to Appendix A2);
  - Associated weather conditions in vicinity of the spill (wind speed/direction, sea state, swell);
  - Any marine fauna or other activities observed; and
  - Photographic images.

All information is to be compiled into an Aerial Surveillance Log (refer Appendix A1) which will be sent to the IMT within an hour of the aircraft returning to its operating base. Where possible, a verbal report via radio/telephone en route providing relevant information should be considered if the aircraft has long transits from the spill location to base.

Flight Schedules are to be developed in support of response operations. The frequency of flights will be sufficient to ensure the information collected during each flight (i.e. observer log and spill mapping) meets the information needs of the IMT to validate spill location, dispersion and the information needs of fate modelling.

Note: Flights will only take place during daylight under visual flight rules (VFR).

A recording of the spill extent is made by outlining the approximate two-dimensional extent of the slick(s) on a map template, including GPS coordinates of extent, the time observations were made and date noted on the map template. Photographic images are to be taken of the slick and sent to the IMT.

The trained Aerial Observer or the IMT will make estimations of thickness based on visual sighting or the photographic images respectively. Thickness estimates are to be based on the Bonn Agreement Oil Appearance Code.

Photographic or video records taken by the Aerial Observers for each fauna sighting and the location and details of each sighting are recorded with a cross-reference to photographic imagery captured. The Aerial Surveillance Marine Fauna Sighting Record Sheet is provided in Appendix A1.

9.4.4 Satellite imagery

Satellite imagery uses Synthetic Aperture Radar (SAR) to detect oil spills by emitting a radar pulse and measuring the 'backscatter' from the earth. It is a cost effective and proficient surveillance technique, as it is not reliant on daylight, cloud cover and can survey large areas of ocean in a single satellite pass. It is a useful surveillance tactic to help quantify data received from other optical-based surveillance tactics (e.g. aerial and vessel surveillance).

Satellite imagery can be obtained through AMOSC via AMOSPlan arrangements. OSRL also provides access to this service. Satellite data is available within 24 hours, then every 6 to 24 hours thereafter depending on satellite positions.

9.4.5 Oil Spill Trajectory Modelling

OSTM provides a simulated trajectory of the spill based on historic and actual metocean data. This modelling will be provided in the form of a geospatial information system (GIS) format so that it can be easily integrated into the COP.

OSTM will be provided by RPS APASA via AMOSC. The IMT will contact AMOSC and confirm request of modelling services. OSTM will start within two hours of submission of the request.

On a daily basis, RPS APASA will provide three day forecast outputs to Jadestone Energy. More frequent updates can be provided if weather conditions are highly variable or change suddenly. Data from aerial surveillance is to be provided to RPS APASA who are contracted to undertake modelling 24/7 to verify and adjust fate predictions of the spill and improve predictive accuracy.

9.4.6 Fluorometry

Fluorometry surveys are used to inform the presence of oil in water near sensitivities. Surveys will be run across the expected plume extent, as well as vertically through the water column. This allows a far greater area of coverage than discrete sampling, aiding in the detection and delineation of entrained oil.

This will allow continuous monitoring of entrained oil covering a large area and will provide near real-time three-dimensional data on the distribution of entrained oil to enable decision making within the IMT. Similarly, other sources of monitoring data (e.g. spill fate modelling) can be used in near real-time to inform the path of the sub surface glider.

In the event that sub surface fluorometers are unavailable or cannot cover the required scale of operation, towed fluorometers towed behind vessels will be used as an alternative or complementary approach. Jadestone Energy has engaged Jacobs Environmental as a supplier of sub surface gliders with fluorometer sensors for the monitoring of entrained oil following an oil spill. Multiple towed fluorometers are also available from CSIRO. If required, within 24 hours, 5 fluorometers could be mobilised to support monitoring of chemical dispersant program.

9.4.7 Shoreline and Coastal Habitat Assessment

Shorelines are highly variable and some (i.e. non-rocky shores and medium- to high-energy shorelines) can be quite dynamic. To assist in determining which clean-up methods are most appropriate for those areas exposed to hydrocarbons, it is necessary to obtain information about shoreline character (topography, complexity, exposure etc.), source oil characteristics and distribution, and shoreline processes and redistribution of any oil.

Shoreline clean-up assessment technique (SCAT) surveys provide a mechanism by which to record shoreline exposure to stranded oil (see Appendix A3 for shoreline assessment forms). The outcome of SCAT surveys is to provide a rapid assessment of:

- Shoreline character;
- Distribution of coastal habitat/fauna;
- Level of oil contamination and oil characteristics (if oil present); and
- Any constraints to responding to shoreline (e.g. access and safety constraints).

The information collected through SCAT surveys is used to inform appropriate shoreline response strategies, in particular termination criteria for response actions.

A shoreline assessment comprises the following tasks:

- Assessment of shoreline character, habitats and fauna including:
  - shoreline structured biotic habitats;
  - distribution of fauna;
  - shoreline energy and processes;
  - shoreline substrate;
  - shoreline form; and
  - access/ safety constraints.
- Assessment of shoreline oiling (if present):
  - surface distribution and cover;
  - subsurface distribution;
  - oil type, thickness, concentration and physical character; and
  - sampling of oil for laboratory analysis.

9.4.8 Resource Rationale for Operational Monitoring

Aerial surveillance, tracking buoys and oil spill trajectory modelling are the primary operational monitoring tactics used to determine the extent of the spill. They are designed to provide real time observational data for the IMT and to validate response planning. Resources allocated for these tasks are sufficient to provide observations and predictions to the IMT within a reasonable timeframe. Vessel surveillance, UAVs, satellite imagery and fluorometry are secondary tactics which can be used to complement the information gathered through the primary tactics.

SCAT is made up of 3 members per team and are assumed to be able to cover at least 10 km per day. This distance may be more, especially if UAVs are employed to cover shorelines that have access limitations. Jadestone Energy has used the OSTM data for shoreline contact to plan worst case shoreline and habitat assessment personnel requirements. In this case, the Joseph Bonaparte Gulf (NT) presents the greatest resource requirement of 18 personnel (6 teams of 3 members each) (refer to Table 9-1) and Cartier presents the minimum contact time, presented in Table 9-1. Team leaders will be sourced from AMOSC and OSRL and will be trained in shoreline assessment techniques. Team members can include personnel who have completed basic training prior to mobilisation.

It should be noted that a single spill will not contact all shorelines listed in Table 9-1 and Table 9-2. In preparing for this capability, Jadestone Energy will be able to meet lesser shoreline assessment requirements for other locations.

Table 9-1: Resource Rationale for Shoreline Assessment Personnel (based on OSTM for Tahbilk-1)

Receptor	Minimum time to shoreline oil at >100g/m² (days)	Oiled shoreline at concentrations >100 g/m² worst replicate simulation (km)	Number of SCAT teams required
Cartier	3.6	0.6	1[5]
Ashmore	7	5.0	
Scott Reef South	15.3	52.2	3
Cassini Island	22.2	3.9	1
Kimberley Coast	47.6	26.1	2
Adele Island	51.6	3.2	1
Joseph Bonaparte Gulf (NT)	52	191.5	6
Clerke Reef	54.2	17.4	2
Imperieuse Reef	69.7	26.1	
Indonesia	14.6	591.9	TBA
Timor-Leste	30.8	330.8	TBA

Note: SCAT numbers not to be added up as spill will not contact all receptors modelled. Number required based on direction of spill and timeframes to contact.

[5] SCAT at Ashmore/Cartier will need to be performed by Unmanned Aerial Vehicles (UAV) as it is prohibited to anchor anywhere in Cartier Island Commonwealth Marine Reserve due to the risk of Unexploded Ordnances (UXO) – Refer to Section 13.4.1

Table 9-2: Resource Rationale for Shoreline Assessment Personnel (based on OSTM for Sea Eagle-1)

Receptor	Minimum time to shoreline oil at >100g/m² (days)	Oiled shoreline at concentrations >100 g/m² in worst replicate simulation (km)	Number of SCAT teams required
Cartier	1.9	0.6	1[6]
Ashmore	4.3	5	
Scott Reef North	10.4	26.1	5
Scott Reef South	11.8	52.2	
Seringapatam Reef	11	8.7	
Indonesia	14.9	922.7	TBA
Timor-Leste	31	121.9	TBA

Note: SCAT numbers not to be added up as spill will not contact all receptors modelled. Number required based on direction of spill and timeframes to contact.

[6] SCAT at Ashmore/Cartier will need to be performed by Unmanned Aerial Vehicles (UAV) as it is prohibited to anchor anywhere in Cartier Island Commonwealth Marine Reserve due to the risk of Unexploded Ordnances (UXO) – Refer to Section 13.4.1

10. CHEMICAL DISPERSION STRATEGY

10.1 Subsea Dispersant Application Strategy

Dispersants should only be used when the risks associated with their use to the environment as a whole have been analysed, and it has been determined that there would be a net environmental benefit from their use. The type of dispersant that will be effective is influenced by the oil type and metocean conditions (Hook and Lee, 2015).

Most of the knowledge on the biological impacts of dispersants has been developed via laboratory experiments (Quigg et al. 2021) rather than from in-situ use. This is also the case for those dispersants listed as approved in the National Plan for Maritime Environmental Emergencies Register of Oil Spill Control Agents (OSCA). Before a dispersant can be considered for use by AMSA, its toxicological impact must be tested on a diverse range of aquatic taxa, including algae, invertebrates and fish (Hook and Lee, 2015). This screening process ensures that these compounds have comparatively low toxicity (according to US Environmental Protection Agency criteria; Hemmer et al, 2011) and that they are much less toxic than oil (Hook and Lee, 2015).

Of the dispersants listed on the OSCA Register, only Corexit 9500A and 9527 (the latter is only on the transitional acceptance list) have been used in response to a large-scale spill and during subsea application, which was during the Macondo oil spill (Gulf of Mexico) in 2010.

A detailed oil fate and mass balance assessment completed by French-McCay, et al. (2021) on the Macondo spill indicated on average, there was 9% less floating oil during the duration of the release due to subsea dispersant application. This assessment also showed subsea application was increasingly effective over the course of the spill in reducing VOC exposures in the immediate area of the wellhead by up to 27% (French-McCay, et al. 2021), making source control operations safer for responders.

However, water depth may be a limitation to the effectiveness of SSDI for VOC control; shallower depths may not be sufficient to enable VOCs to be reduced to a point which ensures a safe operating environment on the surface (OSRL, 2017). Some research suggests this may be around 500 metres (Adams & Socolofsky, 2005, in: IPIECA, 2015) however there is currently no definitive recommended minimum water depth for SSDI use. Water depth at the Sea Eagle-1 and Tahbilk-1 well sites is 78 m and 89 m respectively, compared to 1,500 m where SSDI was used during the Macondo spill.

Despite the considerable amount of research, modelling and experimental work done to study the effects of subsea dispersant application, there is conflicting evidence as to the efficacy of the use of subsea dispersants (Quigg et al. 2021). However, NASEM (2020) found no compelling evidence that at low to moderate oil concentrations that chemically dispersed oil was any more toxic than oil alone. However, at high concentrations the combination of oil and dispersant appeared more toxic (Quigg et al. 2021), suggesting caution should be applied when considering dispersant application rates and volumes. This also shows the importance of ongoing dispersant effectiveness monitoring (Section 10.2.4) and its use through the operational NEBA process.

Through its membership with AMOSC, and also by joining the SFRT Committee, Jadestone Energy has access to the Subsea First Response Toolkit (SFRT) which includes manifolds, jumpers, wands and a dedicated dispersant stockpile, including Dasic Slickgone NS and Nalco Corexit 9500A. Jadestone Energy can access a suitable vessel for transportation of the subsea dispersant injection system and ancillary equipment including ROVs through the contracted vessel broker. The location of suitable vessels is checked every 2 weeks during “at risk” drilling operations.

Coiled tubing is not required for subsea dispersant injection at depths <150m.

It is assumed the dispersant to oil ratio (DOR) would commence at 1:100 and would be modified based on the results of the effectiveness monitoring. Research conducted by Brandvik et al., 2014 indicated that DORs

of 1:50, 1:100 may be sufficient to cause substantial additional dispersion, particularly if the dispersant is injected close to the nozzle. To achieve a DOR of 1:100, IPIECA & IOGP 2015 recommend for a flow rate of 20,000 bbl./day, a dispersant pump rate of 22L/min is required.

Subsea dispersant application will not commence until Day 10, due to transportation of the equipment to site (Refer to Section 10.1.2).

The worst case discharge scenario for Sea Eagle-1 was modelled to self-kill after 22 days. The flow rate of Sea Eagle-1 by day 1 has been calculated to be 1,296 m^3/day or 8,152 bbl/day and by day 10 this has reduced to ~346m^3/day or 2,174 bbl/day. For planning purposes Tahbilk-1 has been used for the worst case scenario given Sea Eagle-1 has been modelled to self-kill and has a lower flow rate by Day 10 (when subsea dispersant application would commence). The flow rate for Tahbilk-1 by Day 10 has been calculated to be 3,197 m^3/day or 20,108 bbl/day and there is only a marginal decline in the flow rate by week 11 (2,938m^3/day or 18,479 bbl/day [GHD 2021]). Using the recommended IPIECA/IOPG flow rates for a DOR of 1:100, a flow rate of 20,108 bbl/day has been used to calculate dispersant volumes required and equates to **~32 m^3/day** (22.2 L/min).

10.1.1 Initiation and Termination Criteria

Tactic	Initiation Criteria	Termination Criteria
Mobilise Subsea First Response Toolkit	Immediately when a subsea Level 3 spill incident is confirmed	When there is no net environmental benefit of continuing dispersant application
Mobilise vessel and ancillary equipment	Immediately when a subsea Level 3 spill incident is confirmed	When there is no net environmental benefit of continuing dispersant application

10.1.2 Tactics

The following tactics are included for subsea dispersant operations:

- Subsea First Response Toolkit; and
- Vessel and ancillary equipment

The Source Control Action Plan (**Section 16.5**) is activated at the initial stage of the incident so that resources can be mobilised and ready for use. As the incident progresses, chemical dispersant use is continually reassessed through the NEBA and IAP processes.

10.1.2.1 Subsea First Response Toolkit

The subsea first response toolkit (SFRT) was built by Oceaneering and resides in Jandakot, Western Australia. The SFRT comprises:

- Debris clearance equipment;
- BOP intervention equipment;
- Dispersant equipment (pumps, flying leads, coiled tubing head, dispersant wands); and
- Ancillary tools.

Supporting this there is 500m^3 of Dasic Slickgone NS dispersant which is dedicated to SFRT and resides in Fremantle. This stockpile is managed by AMOSC.

If the SFRT is required, notification and activation is made through AMOSC. The SFRT and dispersant would be transported via road from Jandakot and Fremantle to Darwin (10 hours to arrange and up-to 7 days to transport). Once the SFRT is loaded onto the vessel in Darwin and the vessel transits out to the well location, the vessel and equipment would be infield within 9 days of the spill and commencing subsea dispersant application by day 10 (Refer to **Section 16.5**).

The AMOSC SFRT Package can deliver up to 110 L/min which is suffice for the worst case scenario in which a delivery of 22.2 L/min is required for Tahbilk-1.

10.1.2.2 Vessels and Ancillaries

The SFRT does not include vessels or ROV equipment. The SFRT requires a suitable construction class vessel for deployment. It is expected that this class of vessel would be available from the Singapore region and could transit and be available for onloading of the SFRT in Darwin by day 7. Vessel availability shall be monitored monthly via Jadestone energy's contracted vessel broker Clarksons.

ROVs would be supplied from Vertech under existing contractual arrangements.

10.1.2.3 Dispersant Selection

PTTEP AA, commissioned dispersant testing on Montara oil to assess the efficacy of Dasic Slickgone NS and Nalco Corexit 9500A dispersant in conditions representative of winter and summer seasons. The results indicated that dispersant efficacy is a minimum of 73% at 12 hours and remains a minimum of 68% for summer and winter within 24 hours. After 24 hours the efficacy decreases due to the weathering (increased pour point and viscosity) of the oil (Leeder, 2013). The summer and winter seasons were tested for efficacy as they were representative of the minimum and maximum conditions (water, air temperature and wind speed) in the Timor Sea.

The response to the Montara wellhead platform incident in 2009 showed that dispersants were 'highly effective in assisting the natural process of biodegradation and minimising the risk of oil impacts to reefs or shorelines' (AMSA, 2010) (Refer to Appendix A4 for additional information). Six types of dispersant were used on the surface slick, including Slickgone NS, Corexit 9500, Corexit 9527, Slickgone LTSW, Ardrox 6120 and Tergo R40. Subsequent 3D modelling of the eleven 'worst case dispersant application events' undertaken by APASA (2010), found that the addition of dispersant to the spill caused elevations in hydrocarbon concentrations in the water column that were extremely localised and short term, including at nearby shoals. These 3D modelling results were consistent with laboratory results from the AMSA (2009) report.

Given these results, Jadestone Energy has prioritised the use of Dasic Slickgone NS and Corexit 9500 which have shown efficacy in both laboratory conditions and on the Montara spill in 2009. There are sufficient stockpiles of Slickgone NS and Corexit 9500 to sustain subsea dispersant application for the entire predicted spill duration of 77 days.

In addition, any subsea dispersant application will be subject to effectiveness testing, as described below.

10.1.3 Subsea Dispersant Effectiveness Monitoring

Subsea dispersant effectiveness monitoring is required as part of this response strategy. Prior to any application of subsea dispersants, initial monitoring should be conducted at the release point to determine the nature of the release, characterise the properties and behaviour of the oil and estimate the oil and gas flow rates. This information will inform the initial choice of dispersant injection methods (e.g. number of nozzles, nozzle sizes) and application rates.

Subsea dispersant monitoring will include monitoring 'phases', as per the Industry Recommended Subsea Dispersant Monitoring Plan (API 2020). Results from the monitoring will feed into the operational NEBA assessment used for decision-making regarding the continuation or termination of subsea dispersant use.

10.1.4 Chemical dispersant stocks

Refer to Section 10.2.5 for information relating to dispersant stockpiles.

10.1.5 Resource Rationale for Chemical Dispersant Application

Calculations - Volume of oil to be treated

- Assume 100% available to be dispersed due to location of wands next to well head.

Calculations - Volume of dispersant required

- For planning purposes, a DOR of 1:100 is used because it is a broadly accepted ratio and can be adjusted depending on effectiveness

Assumptions – SFRT operations

Once operational, subsea dispersant operations can continue 24 hours per day / 7 days per week as it is not constrained by daylight hours, as with most other response operations. However, extreme weather events such as a cyclone would require the subsea dispersant vessel and supply shuttle vessels to cease operations and transit to a safe location.

10.1.6 Dispersant budget

The total amount of dispersant required for subsea application is 2,090 m^3 which can be achieved using the dispersant stock available in Australia and from OSRL (including dispersant available via the SLA and GDS) (Table 10-3). The assumptions above have been factored into these calculations. It is also assumed that once subsea dispersant application commences, surface dispersant application would be scaled down, or ceased, depending upon the results of subsea dispersant effectiveness monitoring.

A dispersant budget has been prepared considering the daily / weekly application requirements, daily volume of dispersant arriving in Darwin and balance on hand after each day. It also accounts for the depletion of the reservoir over the duration of the release. See Table 10-1 for these details.

Jadestone Energy will review the dispersant application plan daily and modify according to the NEBA and operational feedback.

National logistics arrangements for mobilisation of dispersants to deployment locations within the required timeframes have been confirmed.

Table 10-1: Subsea dispersant delivery budget

Day	Maximum volume of dispersant required for subsea application (m^3)	Dispersant arrived in Darwin m^3	Balance on hand m^3
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	500	500
6	0	90	590
7	0	90	680
8	0	80	760
9	0	80	808
10*	32	80	856
11	32	80	904
12	32	80	952
13	32	80	1000
14	32	80	1048
Week			
3	217.7	Access to balance on hand and the OSRL Global Dispersant stockpile to meet remaining need of 1,911 m^3 dispersant required Dispersant delivery and supply will be continually assessed and administered as required.	
4	217.7		
5	217.7		
6	211.7		
7	211.7		
8	211.7		
9	211.7		
10	205.6		
11	205.6		

*subsea dispersant injection commences

10.2 Surface Dispersant Application Strategy

Evidence from the Montara oil spill in 2009 from AMSA reported that 'based on experienced personnel during the response the use of dispersant was highly effective in assisting the natural process of biodegradation and minimising the risk of oil impacts on reefs and shorelines' (Refer Appendix A4 . If there are weather conditions that prevents the application of dispersant (which is unusual for the environment around the Montara facility), this in itself aids natural dispersion.

Dispersants are chemicals sprayed onto oil spills from aircraft or vessels to accelerate the process of natural dispersion. They are designed to separate the oil particles on surface waters and help dispersion in the water column (as small droplets) to speed up the process of natural biodegradation. Chemical dispersants can also be used to:

- Decrease volume of floating oil;
- Reduce the impact to shorelines; and
- Reduce the quantity of waste created.

For the WCS surface release, Jadestone Energy will apply surface chemical dispersants as soon as practically possible to maximise the application of dispersant to the freshest oil (<24 hours old). Dispersant is most effective on oil that is of a thickness between 50g/m^2 and 100g/m^2.

For dispersant planning purposes, Jadestone Energy has the ability to deliver chemical dispersants to any threshold and has targeted visible oil closest to the source . The dispersant budget has accounted for this option which shows that Jadestone Energy are able to exceed and deliver the maximum volume of surface dispersant required from Day 4 onwards for Tahbilk-1 LOWC scenario and from Day 4 onwards for Sea Eagle-1 LOWC scenario.

Jadestone Energy will monitor the effectiveness of dispersant application to assess whether to continue planned volumes through the NEBA process. For a subsea release, Jadestone Energy will initially mobilise the surface dispersant capability as required until the AMOSC SFRT is operational.

Chemical dispersants can decrease the risk of oil impact to shorelines but can increase the risk to pelagic wildlife through entrained oil. NEBA will be used to assist in assessing the exchange of one risk to another. The Planning Team will be required to complete the Risk Assessment step in the IAP process before proceeding.

10.2.1 Initiation and Termination Criteria

Table 10-2: Initiation and Termination Criteria Surface Chemical Dispersant Tactics

Tactic	Initiation criteria	Termination criteria
Mobilising dispersant	Immediately when Level 2 or 3 spill incident is confirmed; and Net Environmental Benefit Assessment (NEBA) demonstrate beneficial use of dispersant prior to application that is likely to result in a net environmental benefit	When there is no net environmental benefit of continuing dispersant application; and Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response
Aerial application of dispersant	Immediately when a Level 2 or 3 spill incident is confirmed	When there is no net environmental benefit of continuing dispersant application; and Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response
Vessel based application of dispersant	Immediately when Level 2 or 3 spill incident is confirmed	When there is no net environmental benefit of continuing dispersant application; and Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response

10.2.2 Tactics

The following tactics are considered for surface chemical dispersant operations:

- Aerial application of dispersant; and

- Vessel based application of dispersant.

The Surface Chemical Dispersion Action Plan (Section 16.7) is activated at the initial stage of the incident so that resources can be mobilised and ready for use. As the incident progresses, chemical dispersant use is continually reassessed through the NEBA and IAP processes.

10.2.2.1 Aerial Application of Chemical Dispersants

Fixed Wing Aerial Dispersant Capability (FWADC) – notification and activation are made through AMOSC (on behalf of industry) who will liaise directly with AMSA with respect to the activation of the contract and associated aircraft. In addition, where necessary, Jadestone Energy will utilise deployment of aircraft from designated airfields (e.g. Darwin/Truscott) and arrange for pilots (Jadestone Energy -AMSA MOU 2016). Arrival time of the aircraft will depend on flight time and will include a four-hour lead time for 'wheels up' from initial request. Two aircraft are stationed in the Northern Territory with one based in Darwin.

OSRL shall be activated and have the capability to send a Hercules C-130 or Boeing 727 aircraft to apply chemical dispersants. The Hercules C-130 is made ready in 6 hours which includes fuelling and if required, dispersant loading. The flight time from Senai, Malaysia to Darwin is 8 hours, with 1 technical stop at Bali/Makassar. This includes dispersant fully loaded on the plane. The flight time could be reduced to 7 hours with dispersant at half capacity.

The Boeing 727 has a 4-hour mobilisation time. The flight time from the United Kingdom to Darwin is 40 hours, with one overnight stop in Dubai .

Jadestone Energy plan to mobilise one of the OSRL aircraft to Darwin without dispersant and use stock in Darwin to supply the aircraft until the OSRL stockpile is approved to arrive.

For OSRL, Jadestone Energy will:

- Apply for permit to spray and low-level flying;
- Provide aircrew with accommodation and transport to/from airport; and
- Ensure immigration clearance for the aircrew is completed after initial 72 hours in country.

Aerial chemical dispersant application will commence within 3 days (using worst case response time) of initial AMSA and OSRL notification (daylight and weather condition dependent).

AMOSC, with support from the IMT, is to develop an "Air Operations Plan" in accordance with the Aerial Operational Plan for Oil Spills off the Northern Coastline of Australia which is to be submitted to AMSA prior to commencement of any National Plan Fixed Wing Aerial Dispersant Contract (FWADC) aircraft operations.

10.2.2.2 Vessel-Based Application of Chemical Dispersant

Vessel based chemical dispersant application is activated within 6 hours of spill notification, due to the time it takes for the vessel to arrive at the spill location within 42 hours (using worst case response time). Jadestone Energy uses a contracted infield support vessel (ISV) as the Montara operations supply vessel, to assist with vessel dispersant application. The trained crew aboard can mobilise to Darwin (depending on location, the vessel may be in field or in transit to/from Darwin) for pick-up of dispersant and equipment. This is likely to be the first vessel on-site applying dispersants.

In addition to this resource, the following activations may apply:

- Jadestone Energy mobilises an additional suitable vessels through existing contracts to carry vessel-based dispersant equipment;
- Mobilise supply vessels to Darwin Port to receive dispersant, load and ship to the dispersant spray vessels at the spill location; and

- Maintain chemical dispersant supplies to dispersant application vessels at spill location until dispersant application terminated.

Spraying systems deliver chemical dispersant uniformly to the floating oil to maximise dispersant/oil mixing and minimise wind drift. As such, if mixing is evident in sea surface waters, this will improve the effectiveness of chemical dispersant applied to floating oil. Where sea surface conditions are calm, agitation of the sea surface will be undertaken by vessels to create mixing. Where this is not successful, a reduction in oil/water mixing will result and containment and recovery operations are to be implemented instead.

Vessel based dispersant operations require two afedo spray systems per vessel. Spray arms need to be secured to vessel by welding or chains as determined by the vessel master. One spray system consumes approximately 500L/hr of dispersant meaning that every vessel spraying for 8 hours per day (daylight 10 hours operation to include travel to site), with two spray systems per vessel, can spray up to 8 m^3 of dispersant.

One trained responder is to be dispatched to each vessel to oversee operations. This person shall be trained in the operation of vessel-based dispersant systems and monitoring dispersant effectiveness.

The effectiveness of the vessel based chemical dispersion strategy is communicated to the IMT via Core Group Responders on-board the vessels. The Operations Lead is responsible for terminating application when chemical dispersants are no longer effective.

Chemical dispersants will be applied in conjunction with other response strategies. After the decision is made by the IMT to apply chemical dispersant, ongoing monitoring will be necessary to ensure that dispersant has been and will continue to be effective. This will be achieved by using visual observations during the Operational Monitoring activities.

During ongoing operations, if the currents are directed toward the shallow parts of the coast, the application area must be far enough away to allow for sufficient chemical dispersal before contact with the 20 m contour. This is to be evaluated through RPS modelling requests for chemical dispersion characteristics throughout the application operation. The HMA will be notified of dispersant operations and predicted application area by the IMT so that an assessment of movement of dispersed oil into State Waters can be made.

Small breakaway patches of oil identified by surveillance operations are ideally treated by vessel-based chemical dispersant systems, whereas the larger slicks of oil are more suitably targeted by the aerial application systems.

Note: All surface chemical dispersant operations will occur during daylight hours only.

At no time, can chemical dispersant be applied:

- Within 10 km of water shallower than 20 m;
- Within exclusion zones for offshore facilities;
- Within an Australian Marine Park boundary or its buffer; or
- Within State Waters unless approved by the HMA.

10.2.3 Dispersant Selection

PTTEP AA, commissioned dispersant testing on Montara oil to assess the efficacy of Dasic Slickgone NS and Nalco Corexit 9500A dispersant in conditions representative of winter and summer seasons. The results indicated that dispersant efficacy is a minimum of 73% at 12 hours and remains a minimum of 68% for summer and winter within 24 hours. After 24 hours the efficacy decreases due to the weathering (increased pour point and viscosity) of the oil (Leeder, 2013). The summer and winter seasons were tested for efficacy

as they were representative of the minimum and maximum conditions (water, air temperature and wind speed) in the Timor Sea.

In addition to this effectiveness testing conducted by Leeder (2013), the response to the Montara wellhead platform incident in 2009 showed that dispersants were 'highly effective in assisting the natural process of biodegradation and minimising the risk of oil impacts to reefs or shorelines' (AMSA, 2010) (Refer to Appendix A4 for additional information). Six types of dispersant were used on the slick, including Slickgone NS, Corexit 9500, Corexit 9527, Slickgone LTSW, Ardrox 6120 and Tergo R40. Subsequent 3D modelling of the eleven 'worst case dispersant application events' undertaken by APASA (2010), found that the addition of dispersant to the spill caused elevations in hydrocarbon concentrations in the water column that were extremely localised and short term, including at nearby shoals. These 3D modelling results were consistent with laboratory results from the AMSA (2009) report.

Given these results, Jadestone Energy has prioritised the use of Dasic Slickgone NS and Corexit 9500 which have shown efficacy in both laboratory conditions and on the Montara spill in 2009.

AMSA has advised that the dispersants on the OSCA cover all dispersant reasonably available to Australia for a campaign surface response program associated with a LOWC. The nature of the OSCA tests does not reflect the expected nature of the cause of the incident (i.e. the source or nature of the oil) but does reflect the response (i.e. the application of dispersant to surface floating oil), to induce it to mix into the water column and eventually biodegrade. Hence, all approved dispersants are required to be significantly (orders of magnitude) less toxic than any likely spilled oil, and fully biodegradable as a mixture of components. (personal comment, P. Irving 2020).

If additional dispersant types are likely to be required, Jadestone Energy will prioritise the use of dispersants using the following criteria:

- Dispersant type used on Montara oil during the spill in 2009 and was shown to be effective in dispersing hydrocarbons;
- Dispersant type listed as approved in the National Plan for Maritime Environmental Emergencies Register of Oil Spill Control Agents (OSCA); and
- Jadestone Energy's Chemical Selection Evaluation and Approval Procedure (JS-70-PR-I-00033).

Following this, any dispersant applied to the spill will be subject to in-field efficacy testing, as described below.

10.2.4 Dispersant Effectiveness Monitoring

If dispersants are applied to the spill, in-field efficacy testing will be conducted to ensure the product is amenable to dispersants. Jadestone Energy will conduct in-field efficacy testing in accordance with the Special Monitoring of Applied Response Technologies (SMART) monitoring protocol (NOAA, 2006). This protocol is commonly used to measure the efficacy of dispersants, as it allows for rapid quantification of data to enable the IMT to make decisions about continuation of dispersant application. It also allows for the acquisition of more robust data using fluorometry.

The first stage of the monitoring protocol is referred to as Tier 1 Visual Monitoring. This monitoring involves experienced personnel conducting visual observations (aerial and vessel) of small direct applications on the hydrocarbon slick, adjusting the dispersant dilution ratio and loading through direct observations. Tier II and III of the SMART monitoring protocols involve on-water monitoring, which combine visual monitoring with on-water teams conducting real-time water column monitoring (using a fluorometer). Tier II and III use the same procedures, but Tier III often extends the monitoring to multiple depths and durations. This process will be continued throughout the response.

Chemical dispersant effectiveness is shown in Figure 10-1. The effectiveness of the aerial based chemical dispersion strategy is communicated to the IMT via the Air-Attack Supervisors, who are supplied by AMSA through the FWADC. Air-Attack Supervisors will advise the IMT if chemical dispersant application operations are to be terminated.

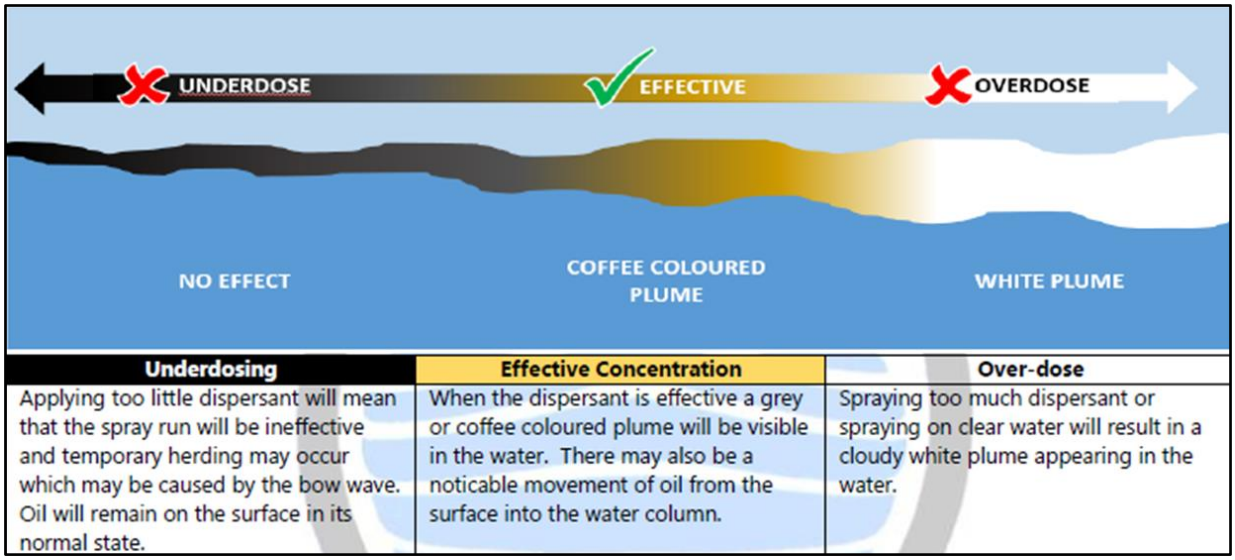


Figure 10-1: Effective and Ineffective Dispersant Application

Ongoing chemical dispersant application is to be determined using a the IAP process which involves a NEBA assessment, through the visual and on-water monitoring of the effectiveness of chemical dispersant applied, oil characteristics, predicted fate of the plume (updated daily), environmental conditions (sea state and weather) and surrounding environmental/ social/ cultural sensitivities. The NEBA will be re-evaluated daily during an incident to assess varying net benefits and impacts. Chemical dispersants are only to be applied if there is net benefit to priority resources.

10.2.5 Stocks of Chemical Dispersants

Access to the National Plan stockpiles is via AMOSC and AMSA. Jadestone Energy will additionally access the Global Dispersant Stockpile via the OSRL membership. The IMT will request the delivery of chemical dispersant stocks to Darwin Port (vessel-based application) and Darwin airport (Aerial Dispersant application) from AMOSC, OSRL and AMSA stockpiles.

There are sufficient dispersant stocks in Australia and globally to sustain the response at the required application rates for the majority of the response as per the dispersant plan (refer Table 10-4 and Table 10-5**Error! Reference source not found.**). The OSRL SLA stock and the GSD will begin arriving from Day 5-7.

Under the MOU between AMSA and Jadestone Energy, AMSA will provide all resources available through the National Plan in support of a Jadestone Energy spill response, which includes all logistical services to transport chemical dispersants from National Plan stockpiles to Darwin. All stockpiles are deliverable to any other stockpile location in Australia within 48 hours.

Table 10-3: Chemical Dispersant Inventory as at September 2021

Owner	Stockpile Locations	Dispersant Volume (m^3)	Dispersant Type	Total Volume (m^3)
Jadestone	Darwin Supply Base	13	Slick Gone NS	15
	Montara FPSO	2	Slick Gone NS	
AMSA	Adelaide	10	Slick Gone EW	355

Owner	Stockpile Locations	Dispersant Volume (m^3)	Dispersant Type	Total Volume (m^3)
		10	Slick Gone NS	
	Brisbane	10	Slick Gone NS	
		10	Slick Gone EW	
	Townsville	10	Slick Gone EW	
		15	Slick Gone NS	
	Dampier	10	Slick Gone EW	
		10	Slick Gone NS	
	Darwin	10	Slick Gone EW	
		10	Slick Gone NS	
	Devonport	10	Slick Gone NS	
		10	Slick Gone EW	
	Fremantle	48	Slick Gone NS	
		52	Slick Gone EW	
	Horn Island	10	Slick Gone NS	
	Melbourne	10	Slick Gone EW	
		10	Slick Gone NS	
	Sydney	45	Slick Gone NS	
		55	Slick Gone EW	
AMOSC	Broome	14	Ardox 6120	511 (surface use) 761 (subsea use)
	Exmouth	75	Slick Gone NS	
	Fremantle	8	Slick Gone NS	
		27	Corexit 9500	
		500 (SFRT stockpile* 50%)	Slick Gone NS	
	Geelong	75	Slick Gone NS	
		62	Corexit 9500	
OSRL (Jadestone has access up to 50% of SLA stocks)	Various: • Singapore • Southampton (UK) • Bahrain • France • Fort Lauderdale (USA)	779 (50% = 389)	Slick Gone NS Slick Gone EW Slickgone LTSW Finasol OSR 52 Corexit 9500 Corexit 9527	389
TOTAL (access agreements in place)				**1,270 (surface)** **1,520 (subsea)**
OSRL Global Dispersant Stockpile (GDS) (Jadestone to request access to GDS at the time of an event)	Various: • Singapore • Southampton (UK) • Vatry (France) • Cape Town (South Africa) • Fort Lauderdale (USA)	5,000	Slick Gone NS Finasol OSR 52 Corexit 9500	5,000

Owner	Stockpile Locations	Dispersant Volume (m^3)	Dispersant Type	Total Volume (m^3)
	• Rio de Janeiro (Brazil)			
TOTAL (including additional ORSL 50% SLA and GDS stocks)				**6,270 (surface) 6,520 (subsea)**

Note: All dispersants listed above are on the AMSA Oil Spill Control Agents (OSCA) acceptance list or transitional acceptance list.

*: As per the AMOSPlan, there is a provision made by the SFRT Steering Committee to provide up to 250m^3 of dispersant into a surface spill response, given certain provisions are met in the first instance by AMOSC (AMOSC, 2017).

10.2.6 Resource Rationale for Chemical Dispersant Application

An estimation of the resources required for the chemical dispersant strategy was undertaken and the analysis provided below.

10.2.6.1 **Calculations** - Volume of oil to be treated

The amount of oil available to be dispersed is considered approximately 74% of the total daily available volume. This is based on the weathering properties of the analogue within the first 24 hours and at winds of 5 m/s where there is 22% evaporation and 2% dispersion (Appendix A5).

10.2.6.2 **Calculations** - Volume of dispersant required

- The Dispersant to Oil Ratio (DOR) can range from 1:10 through to 1:50 or even less depending on the oil and dispersant types; and
- For planning purposes, a DOR of 1:25 is used because it is an accepted ratio to start with and can be adjusted depending on effectiveness.

10.2.6.3 **Assumptions** - Fixed wing aerial dispersant (Air Tractor) operations

- Operations will be conducted out of Truscott to the Montara field. Based on standard aircraft endurance of 4 hours;
- All dispersant required will be mobilised to Darwin and then Truscott in support of ALL aerial dispersant operations;
- Two hours (approx.) required to complete each flight operation (dispersant loading/aircraft refuelling/transit to-from spill location);
- Operations to be conducted during daylight hours only – therefore based on an estimated 10 hours daylight each aircraft will conduct approximately three sorties each day; and
- Various aircraft types are included under the provision of the FWADC. For planning purposes, a minimum payload of 3,000 litres (3 m^3) will be used with respect to aircraft to be mobilised in support of the response.

10.2.6.4 **Assumptions** - Hercules aerial dispersant operations

- Hercules C-130 aircraft will be mobilised to Darwin on activation (note: only one aircraft is available from OSRL under the SLA);
- First sortie conducted on Day 3;
- All dispersant required will be mobilised to Darwin in support of ALL aerial dispersant operations;

- Operations will be conducted out of Darwin, directly to the Montara field;
- Hercules dispersant operations to be conducted during daylight hours only – based on an estimated 10 hours daylight each aircraft will conduct approximately three sorties each day; and
- Hercules C-130 aircraft has a payload capacity of 13 m^3, although 12 m^3 is typically loaded (and is used for these planning purposes) due to safety considerations.

10.2.6.5 **Assumptions** – Boeing 727 aerial dispersant operations

- Boeing 727 aircraft will be mobilised to Darwin on activation (note: only one aircraft is available from OSRL under the SLA);
- All dispersant required will be mobilised to Darwin in support of ALL aerial dispersant operations;
- Operations will be conducted out of Darwin, directly to the Montara facility;
- 727 dispersant operations to be conducted during daylight hours only – based on an estimated 10 hours daylight each aircraft will conduct approximately three sorties each day; and
- 727 has a payload capacity of 15 m^3.

10.2.6.6 **Assumptions** - Vessel based dispersant operations

- Vessels fitted with two spray systems = 1,000 L/hr spray rate (dispersant diluted with sea water);
- Dispersant operations to be conducted during daylight hours only – based on an estimated 8 hrs spraying = 8,000 L/vessel (sea water and dispersant); and
- Vessels will require 8 m^3 dispersant, therefore = 16 m^3/day of dispersant required for twovessels.

10.2.7 Dispersant budget

10.2.7.1 Dispersant Budget for Tahbilk-1 LOWC

The total amount of dispersant required for surface application for the Tahbilk-1 LOWC scenario over 77 days is 6,981 m^3, although it is only possible to apply 6,796 m^3 due to the time involved in transporting national stockpiles to Darwin and limitations associated with available aircraft and vessels. Application can meet demand by Day 4.

This volume can be met using the dispersant stock available in Australia and the OSRL GDS (Table 10-3) up until week 10, when additional dispersant is predicted to be required. OSRL dispersant providers are able to manufacture dispersant requirements within 1-2 weeks of notification. Manufacturing capacity ranges from 54 m^3/day to 100 m^3/day. Expected dispersant volumes required by week 10 are ~65 m^3/day which are predicted to be met by the volumes that can be manufactured.

A combination of delivery systems was assessed and the optimum to meet the need most efficiently was by utilising:

- Five FWADC air tractors;
- One OSRL Hercules aircraft or One OSRL Boeing 727 aircraft; and
- Two vessels.

Jadestone Energy will review the dispersant application plan daily and modify according to the NEBA and operational feedback.

The FWADC aircraft and vessels are considered the primary platform for dispersant application operations because of the ability to treat specific areas of oil with dispersant at the required dosage and droplet size.

Either the Hercules or 727 will also be utilised to meet the required delivery amount, as they can take a larger payload than the FWADC aircraft.

National logistics arrangements for mobilisation of dispersants to deployment locations within the required timeframes have been confirmed.

A dispersant budget has been prepared taking into account the daily application requirements, daily volume of dispersant arriving in Darwin, cumulative totals and balance on hand after each day. See

Table 10-4 for these details. It is clear that dispersant stockpiles are sufficient and are not the limiting factor for dispersant operations. The limiting factor during the first week of operation is the capacity of available platforms to apply enough dispersant.

Table 10-4: Dispersant delivery budget for Tahbilk-1 LOWC

Day	Maximum volume of dispersant required m^3 based on volume of oil released	Arrival of dispersant in Darwin m^3	Aerial application m^3	Vessel application m^3	Total predicted dispersant application (m^3)/day	Balance on hand m^3
1	95	33	0	0	0	33
2	95	16	0	8	8	41
3	95	95	39	16	55	81
4	95	155	81	16	97	139
5	95	20	81	16	97	62
6	95	162	81	16	97	127
7	95	130	81	16	97	160
8	95	200	81	16	97	263
9	95	168	81	16	97	334
10	95	20	81	16	97	257
11	95	0	81	16	97	160
12	95	0	81	16	97	63
13	95	200	81	16	97	166
14	95	0	81	16	97	69
Week						
3	644	Access to the OSRL GDS stockpile will meet the remaining dispersant delivery requirements until week 10, whereby, 839 m^3 of dispersant will be required to be manufactured to meet the volume of dispersant required for weeks 11 and 12.				
4	644					
5	644					
6	627					
7	627					
8	627					
9	627					
10	609					
11	609					

10.2.7.2 Dispersant budget for Sea Eagle-1 LOWC

The total amount of dispersant required for surface application for the Sea Eagle-1 LOWC scenario over 22 days is 1,338 m^3. As a worse case scenario only 807 m^3 would be applied due to initial logistical constraints associated with aircraft and vessel availability in the first three days (when the oil flow rate is at its greatest). Application can meet demand by Day 4.

This volume can be met using the dispersant stock available in Australia and some of the OSRL dispersant stockpile included under the SLA (Table 10-3).

A combination of delivery systems was assessed and the optimum to meet the need most efficiently was by utilising:

- Six FWADC air tractors;
- One OSRL Hercules aircraft or One OSRL Boeing 727 aircraft; and
- Five vessels.

Jadestone Energy will review the dispersant application plan daily and modify according to the NEBA and operational feedback.

A dispersant budget has been prepared taking into account the daily application requirements, daily volume of dispersant arriving in Darwin, cumulative totals and balance on hand after each day. See Table 10-5 for these details. It is clear that dispersant stockpiles are sufficient and are not the limiting factor for dispersant operations. The limiting factor during the first week of operation is the capacity of available platforms to apply enough dispersant.

Table 10-5: Dispersant delivery budget for Sea Eagle-1 LOWC

Day	Maximum volume of dispersant required m^3 based on volume of oil released	Arrival of dispersant in Darwin m^3	Aerial application m^3	Vessel application m^3	Total predicted dispersant application (m^3)/day	Balance on hand m^3
1	322	33	0	0	0	33
2	202	16	0	8	8	41
3	148	95	39	40	79	57
4	118	155	90	40	130	82
5	95	25	81	16	97	10
6	79	157	72	16	88	79
7	64	130	54	16	70	139
8	54	20	45	16	61	98
9	43	0	36	8	44	112
10	38	0	27	8	35	77
11	31	0	27	8	35	42
12	26	0	18	8	26	16
13	20	120	18	0	26	110
14	18	0	18	0	18	92
15	15	0	18	0	18	74

Day	Maximum volume of dispersant required m^3 based on volume of oil released	Arrival of dispersant in Darwin m^3	Aerial application m^3	Vessel application m^3	Total predicted dispersant application (m^3)/day	Balance on hand m^3
16	13	0	18	0	18	56
17	10	0	9	0	9	47
18	10	0	9	0	9	38
19	8	0	9	0	9	29
20	8	0	9	0	9	20
21	8	0	9	0	9	11
22	8	0	9	0	9	2

11. CONTAINMENT AND RECOVERY STRATEGY

Booms and skimming equipment can be used to create physical barriers on the water surface to contain and recover the oil spill where information and predictive spill fate modelling indicate a likely threat to environmental, social and cultural sensitivities. Effective containment and recovery provides significant environmental benefit by removing floating oil and thereby decreasing the likelihood of oiling wildlife and reducing the amount of oil reaching shorelines.

Jadestone containment and recovery planning is to be a primary response around the source (with dispersant application) and a secondary response targeting priority receptors.

Containment is the name for using booms (inflatable or solid) to corral oil usually in the offshore environment near the hydrocarbon source. Once contained, an attempt to recover the hydrocarbons from the surface waters can be undertaken. The response is only feasible in certain conditions that include:

- Weather and sea state: containment and recovery equipment is only effective in calm conditions. Effectiveness is variable depending on equipment type, but is generally only considered effective below 20 knots of wind, wave heights less than 1.5 m and currents less than 2 knots (Stevens & Aurand, 2008);
- Based on discussions with RPS APASA, the normal weather/sea conditions in the vicinity of the Montara field (100nm) outside of cyclones will not normally exceed conditions that will directly impact vessel operations based on safety concerns;
- Adequate surface thickness of hydrocarbons: containment and recovery is more effective when a sufficient oil thickness can be achieved by the containment booms (minimum of 50 g/m^2), which is often limited to Group 3 and 4 (ITOPF) hydrocarbons; and
- Suitable oil type and characteristics: containment of fresh, volatile oil should not be attempted due to its low flash point. No attempt should be made until the safety of the area has been established. Containment of lighter oils such as diesel is often not viable because they evaporate and dissipate quickly.

If this option is deemed suitable through assessments and situational awareness (NEBA, trajectory to sensitivities, weather, seas state, oil type), significant logistical support will be required that will include suitable vessels, experienced crew, booms and skimmers, pumps, on-board storage for recovered oil and aircraft to direct the vessel to the areas with the thickest floating oil. In addition to logistical support requirements, containment activities are inherently inefficient due to the spreading characteristics of oil on water.

11.1 Initiation and Termination Criteria

Tactic	Initiation criteria	Termination criteria
Offshore containment and recovery	Immediately when Level 2 or 3 spill incident is confirmed	When boom encounter rate (BER) is less than 10m^3 per hour
Offshore waste storage and collection	When offshore containment and recovery is initiated.	When all oily waste water temporarily stored offshore has been transferred to intermediate waste storage on land.

11.2 Tactics

- Offshore containment and recovery; and

- Offshore waste storage and collection.

11.2.1 Containment and Recovery

In the initial response, Jadestone Energy will mobilise offshore booms and hydraulic power pack equipment from AMSA Darwin/Dampier, then from AMOSC in Fremantle/Exmouth. This provides the shortest timeframe for implementation. Requirements for additional resources will be assessed during the spill. If conditions and equipment are proving successful, then further activity will be implemented with vessels on contract to Jadestone Energy using booms and pumping equipment from AMOSC, (AMSA) National Plan equipment, OSRL equipment, and personnel from the AMOSC core group, OSRL and National and State Response team personnel through AMSA.

Each vessel conducting containment and recovery is to have at least one trained Oil Spill Responders who will be tasked with controlling the operations and implementing in a safe and responsible method. The Team Leader has the responsibility of evaluating the effectiveness of the containment and recovery operations and communicating the information to the IMT. The IMT has the authority to demobilise or stand vessels off in the event of ineffective operations.

11.2.2 Offshore Waste Storage and Collection

Activation of the Jadestone Energy waste management contract will enable waste to be collected, stored, and disposed of. Waste management is discussed in the Jadestone Incident Management Team Response Plan (JS-70-PLN-F-00008).

Assuming favourable conditions, containment and recovery vessels operating offshore will collect floating oil using booms and skimmers. Skimmers will pump collected oily waters to IBCs or Iso-containers, where oily water will be allowed to settle such that the water phase will be suitable for over board discharge (decanting) back into the collected oil behind the boom (to prevent secondary impacts of low concentration oil in water)(Refer to Section 11.2.3.).

Oily waste water recovered through skimming is estimated to be 40 m^3 per team per day. Decanting into boomed areas has the potential to reduce the volume of waste water collected.

Jadestone Energy's waste management contractor has sufficient IBC and Iso-containers in Northern Australia to contain offshore oily waste water for the first few days of the response. The waste management contractor can mobilise a 300 m^3 capacity of offshore storage to Darwin within 24-48 hours' notice, for loading on to containment and recovery vessels. This volume will sustain the initial containment and recovery operation until additional vessels are acquired and additional temporary storage is sourced from the waste management contractor's Southern Australia locations. Temporary storage is also available to Jadestone Energy through its membership with AMOSC and OSRL, who have multiple bladder vessels and inflatable storage bags which vary in capacity (individually) from 25 m^3 to 500 m^3.

Oily waste water may be collected by vessels transiting the operational area and/or transferred to the Montara Venture FPSO, which can accommodate up to 31,000 m^3 of oily waste water into its cargo system. This volume could be greater, depending on tank availability and volume of crude onboard but is sufficient to accommodate up to 4 weeks' worth of predicted recovered oil volumes.

In addition, there is an ability to let the oily waste water to settle in the cargo tanks, enabling the water to separate out from the crude. The decanting of this separated water will be discussed with the relevant regulatory authority at the time of the incident but would enable additional volumes of oily waste water to be treated and reduce volumes needing to be offloaded for transit, treatment and disposal.

If decanting is not permitted, support vessels will periodically offtake oily waste water from Montara FPSO for transit back to onshore facilities in Darwin. Jadestone Energy's waste management contractor has the ability to source multiple tankers within 24-48 hours to transport waste to an approved waste management facility for treatment and disposal.

600 m^3 of oily water is estimated to be the worst-case average to be recovered per day using 15 containment and recovery systems. This would be significantly reduced in volume if decanting is permitted.

11.2.3 Requirements for Offshore Decanting of Waste Water

During offshore containment and recovery operations there is generally a large amount of water that is collected with the oil. This water can be decanted back into a boomed area to reduce waste and create more valuable storage area. The reduction of overall waste in some circumstances can create an environmental benefit which outweighs the minimal impact caused by the release of water with very low concentrations of oil.

Under the POWBONS Act; s. 8 allows for decanting for combating specific pollution incidents. Additionally, Annex 1 of MARPOL (Regulation 9) allows for decanting for combating specific pollution events to minimize the damage from pollution. Under both MARPOL and POWBONS decanting must be approved by the government in whose jurisdiction the discharge will occur. In WA State waters this is DoT (as the Hazard Management Agency under the Emergency Management Act 2005) and in Commonwealth waters this is the Australian Maritime Safety Authority (AMSA).

To minimise the potential for recovered oil being released while the water is decanted, the following practices are recommended (IPIECA/OGP, 2013):

- The temporary storage device should, prior to use, be checked to ensure that it is not contaminated with residues from any products or substances that may previously have been stored in that device, to ensure no unauthorised discharges occur;
- Appropriate settling time should be allowed to enable gravity separation to occur prior to decanting. Settling times will vary depending on the oil type. Studies have shown that settling times for different oil types ranges from 30–60 minutes;
- Where possible, employ the use of internal baffles in the temporary storage device to help speed up the separation and prevent re-mixing of the oil and water;
- Water should be discharged either into a secondary storage container (if available) or within a boomed area with a recovery device (skimmer) so that any residual oil can be recovered;
- Visual monitoring should be undertaken at the discharge point whilst decanting to ensure that only water is released. If possible, the oil/water interface in the storage container should be monitored to ensure that only the water is being drawn; and
- Dependent on the environmental and socio-economic sensitivity of the area affected by the spill, and any other response activities that are taking place, it is advised to identify the area(s) that decanting will be undertaken.

The scale of the oil present at sufficient concentrations, coupled with the volatile nature of the fresh oil and the chemical dispersant operations, are likely to prevent effective containment and recovery close to the release location. This will be validated through operational monitoring in a response.

11.3 Resource Rationale for Containment and Recovery

This strategy will mobilise containment and recovery teams available to Jadestone Energy by arrangements with AMOSC and AMSA. Worst case spill modelling indicates that these teams would initially be deployed from Darwin, Dampier or Broome for rapid response close to the spill site.

Boom encounter rate (BER) is a concept used in response planning to estimate the amount of oil that may be encountered by booming arrays and contained ready for recovery by skimmers. The formula for estimating BER is described in the AMSA Technical Guideline for the Preparation of Marine Pollution Contingency Plans

for Marine and Coastal Facilities (2015). The BER has been used to inform containment and recovery planning for the OPEP.

11.3.1 Amount of oil available to recover

Containment and recovery operations are recognised to have low recovery rates in the emergency spill response industry when compared against estimated total spill volumes; the Macondo incident in 2009 (Gulf of Mexico) had an estimated containment and recovery rate of approximately 4% of the total volume of oil spilled, and the MV *Erika* oil tanker spill in 1999 (Atlantic Ocean) had an estimated containment and recovery rate of 6% (IPIECA, 2015c). The Montara well blowout of 2009 had a higher recovery rate due to calm metocean conditions - 10% of the total oil spilled was estimated to be contained and recovered (Montara Commission of Enquiry, 2010) and with only two units in operation throughout the duration of the response (AMSA, 2010).

For planning purposes the amount of oil that could possibly be recovered by containment and recovery was conservatively assessed at 20% of the total spill volume (after 22 % evaporation and 2 % dispersion based on the weathering properties of the analogue within the first 24 hours and at winds of 5 m/s [Appendix A5]).

11.3.2 Containment of oil

Containment calculations have been made using the AMSA Boom Encounter Rate formula:

$$\mathbf{BER} = (\mathbf{LB} \times \mathbf{0.3}) \times \mathbf{V} \times \mathbf{T}$$

Where:

- BER is the boom encounter rate (BER);
- LB is the length of boom deployed (200 m);
- 0.3 represents the opening of boom array (also called the swathe) and is considered to be 30% of the total boom length;
- V is the velocity of the vessel and is assumed for planning purposes to be 1 knot; and
- T is the average thickness of oil (mm) from indicative planning targets table. Assuming 50g/m^2 (0.047).

Therefore:

- BER = (200 x 0.3) x 1 x 0.047 = 2.82 m^3 per operation/hour x 12 hours of operation = 33 m3/operation/day

Under ideal metocean conditions we would expect a single operational unit (two vessels and 200 m of boom) to cover approximately 22 km in a 12 hour window recovering approximately 33 m^3 per day.

Surface oil above 50 g/m^2 was predicted from the stochastic modelling of the Tahbilk LOWC to occur primarily within 100 km of the release location (no priority receptors were predicted to be contacted by floating oil > 50 g/m^2) (GHD 2021).

Surface oil above 50 g/m^2 for the Sea Eagle-1 LOWC was predicted from the stochastic modelling to primarily extend up to 200 km from the release location, with a low probability of surface contact above 50 g/m^2 predicted for Cartier Island (4.7%) and Ashmore Reef (2%) (GDH 2021). The extent of floating oil above 50 g/m^2 is however likely to reduce significantly even within the first 48 hours of a LOWC for Sea Eagle-1 with flow rates dropping from 10,886 m3 on Day 1 to 6,826 on Day 2, and the well self-killing by Day 22.

Given that stochastic modelling is generated from the full suite of 150 realisations for the LOWC scenarios over their duration, the extent of surface oil above 50 g/m^2 is likely to be less than that predicted for Tahbilk-1 and Sea Eagle-1 LOWC scenarios.

11.3.3 Resources

For planning purposes, it has been assumed that at most only 20% of non-weathered oil could be recovered by containment and recovery, and a single unit can remove 33m^3 per day (231 m^3 per week). For the Tahbilk LOWC scenario, 15 to 14 units would be required for the duration of the spill (Table 11-1). The daily required containment and recovery units for the Sea Eagle-1 LOWC scenario are outline in Table 11-2.

Jadestone Energy can mobilise up to 15 containment and recovery units within Week 1 which will meet the demand for the duration of the Tahbilk-1 LOWC scenario, and from Day 5, for the Sea Eagle-1 LOWC scenario. Implementation of the 15 containment recovery units will require 30 vessels with at least one trained Oil Spill responder on each vessel. These personnel will be sourced from:

- AMOSC core group minimum 84 (as per monthly availability);
- 18 (SLA) + 70 (Contracted) OSRL personnel; and
- 63 National Response Team personnel to be accessed through AMSA

The vessels and crew are accessed from a combination of companies that Jadestone Energy currently holds MSA's with, call-off contracts and in consultation with Jadestone Energy's approved marine broker.

Jadestone Energy is a small company and it is considered disproportional to purchase and maintain equipment to be on standby when there is access to sufficient vessels and equipment. Vessels and people are more effective undertaking targeted C&R as determined through the IAP and NEBA.

Active booming systems are deployed to allow containment and recovery operations without the need for an additional skimming system (where deployed). This allows for greater effectiveness and continued skimming operations. Active booming systems are available through AMOSC and OSRL and would be prioritised for mobilisation. Rapid sweep systems are also deployed, which allow containment and recovery operations to be undertaken at speeds of up to 3 knots. This allows for greater encounter rates and surface coverage.

For planning purposes, the vessel speed of 1 knot was chosen as this allows for more manoeuvrability and targeting of oil windrows.

In support of containment and recovery operations it is intended to establish a Logistics Base in Darwin utilising support provided by the current contracted Jadestone Energy logistics support service provider.

Table 11-1: Containment and Recovery Plan Calculations for Tahbilk-1 LOWC

Week	Oil available to recover (m^3) following 22% evaporation and 2% dispersion	Amount of oil that could possibly be recovered by containment and recovery (assuming 20% recovery rate)	C&R systems*
1	16,559	3312	15
2	16,559	3312	15
3	16,112	3222	14
4	16,112	3222	14
5	16,112	3222	14
6	15,664	3133	14
7	15,664	3133	14
8	15,664	3133	14
9	15,664	3133	14
10	15,217	3043	14
11	15,217	3043	14

*Green indicates that Jadestone would be able to meet the demand for required units

Table 11-2: Containment and Recovery Plan Calculations for Sea Eagle-1 LOWC

	Oil available to recover (m^3) following 22% evaporation and 2% dispersion	Amount of oil that could possibly be recovered by containment and recovery (assuming 20% recovery rate)	C&R systems*
1	8056	1611	50
2	5051	1010	31
3	3708	742	23
4	2941	588	18
5	2366	473	15
6	1982	396	12
7	1598	320	10
8	1343	269	9
9	1087	217	7
10	959	192	6
11	767	153	5
12	639	128	4
13	511	102	4
14	448	90	3
15	384	77	3
16	320	64	2
17	256	51	2
18	256	51	2
19	192	38	2
20	192	38	2
21	192	38	2
22	192	38	2

*Red indicates that Jadestone Energy would not be able to meet the demand for the required units, while green indicates that it can

12. PROTECTION AND DEFLECTION STRATEGY

Booms can be used to create physical barriers to protect sensitive receptors. This option is often used in nearshore environments in close proximity to the area requiring protection. It can be installed in deeper water further from the protection priority with the intent of taking the oil off its trajectory path to the sensitive receptor.

This strategy involves a combination of nearshore booming using vessel-based operations ('nearshore operations') while the spill remains on a predicted shoreline impact trajectory, and the placement of shoreline boom to:

- Protect sensitive shorelines;
- Deflect the oil back to ocean or to easier locations for shoreline clean-up;
- Reduce the volume of oil impacting sensitive shoreline habitats to ALARP; and
- Align the response strategy with NEBA.

In all areas, the primary shoreline priority receptors are mangrove environments and identified turtle nesting beaches during nesting and hatching seasons. The effectiveness of a protection and deflection response will be dependent on sea, current and wind conditions. Much of the potential deployment locations are characterised with large tidal movements (>10m), which would result in tidal currents exceeding boom capabilities. Protection booms will only be installed in areas where the tidal currents are below 0.75 knots.

Protection and deflection activities are advised for slicks greater than 100g/m^2. Modelling shows that the oil decreases below the 100g/m^2 threshold rapidly when the oil is at the surface, thereby constraining minimum arrival times to relatively low values or no contact for this threshold (i.e. low oil persistence at concentrations >100g/m^2 due to evaporative losses and spreading).

It should be noted that operationally the effectiveness of this strategy will vary depending on the level of contact at different locations. Operational monitoring data will provide important information for response decision making. If a tangible, positive outcome is demonstrated, and if health and safety risks are not disproportionate to the environmental benefit achieved in mobilising the response, a protect and deflect operation may be possible. Jadestone have provided guidance within this OPEP in the event the IMT is required to mobilise equipment and personnel to potentially contacted shorelines, prior to that identified in the oil spill modelling.

12.1 Initiation and Termination Criteria

Tactic	Initiation criteria	Termination criteria
Nearshore booming	When OSTM indicates shoreline contact.	When shoreline receptors no longer able to be protected by nearshore booming.

12.2 Tactics

Given the remoteness and nature of the shorelines potentially contacted, Jadestone Energy has prepared a protection and deflection response that caters for the priority receptors and can move to other locations as required. Deployment is subject to safety concerns of operations in high tidal influence and shallow waters; and possible grounding issues of small vessels, so must therefore be assessed under a NEBA.

The locations for initial nearshore protection and deflection operations will be evaluated by the IMT through observations and modelling during the incident response. Locations identified for potential shoreline impact

are to be cross-referenced with the shoreline sensitivity and feature mapping data available through the DoT Oil Spill Response Atlas (OSRA).

As deflection and protection operations will occur in State/Territory Waters, the Hazard Management Agency (HMA) will direct the response operations to locations identified in the Jadestone Energy OPEP or as determined by real time data and State/Territory priorities receptors.

If deployment of protection and deflection booms is considered feasible and effective, inspections and maintenance of the booms are to be timed based on tidal cycles and are to be undertaken by response personnel to ensure locations and formations are maintained so that they remain effective in achieving objectives.

The range of protection and deflection methods include nearshore booms (beach guardian, zoom boom, short curtain boom and sorbent boom) anchored close to the identified priority receptor areas, or open water booms (deep curtain ocean boom) placed at significant distances from shorelines to deflect the open water pathway of the oil to force the oil to miss the predicted shoreline requiring protection.

Operational monitoring and Incident Action Planning will guide the response to prioritise protection of sensitive key features. The protection and deflection response are to be scaled to be commensurate to the risk posed by an actual incident. The results of spill fate modelling will provide the accumulated oil and shoreline contact information which will enable calculation of the required amount of protection and deflection equipment.

Initial deployment of equipment and personnel is to be from the AMSA, State/Territory and AMOSC stockpiles and Core Group. Depending on actual conditions and possible responses to the reduce impacts to ALARP, further deployments of resources can be implemented through OSRL and the AMSA National Plan shoreline response equipment stockpiles and NRT personnel, as agreed with by AMSA and Jadestone Energy and implemented by the relevant Incident Management Team.

While equipment and personnel mobilisation are occurring, operational monitoring is continuing and the results sent to the IMT within two hours of teams returning to their operating base. The most up-to-date information will then be communicated to the protection and deflection teams to guide the selection of the operational locations.

The HMA will advise on priority receptors aided by the oil spill trajectory modelling to locations with the most likely impact. Deployment locations will be selected from the closest facilities to where priority receptors are identified.

The effectiveness of the protection and deflection strategy to achieve performance objectives against the IAP objectives is to be communicated to the IMT by a nominated Shoreline Response Team Leader. The IMT has the responsibility to extend or terminate the response in consultation with the HMA.

A Kimberley Shoreline Response Plan (AMOSC, 2019a) has been prepared to assist in the planning and safe execution of an oil spill response at the Kimberley coast (or other remote shorelines). Jadestone Energy will review this plan at the time of a spill, to assist in the preparation of an appropriate shoreline response plan and capability to match the need for other remote shorelines. This will be undertaken in consultation with OSRL/AMOSC and State/Territory, considering the practicalities, likely success and risks associated with a shoreline operation in remote locations.

12.3 Resource Rationale for Protection and Deflection

OSTM outputs assisted in identifying priority receptors. Pre-deployment of resources at locations in which priority receptors are identified in modelling would not be practical as:

- OSTM outputs show shoreline contact for 150 spill simulations, meaning that not all shorelines contacted in modelling will be contacted in an actual spill event dependent upon the direction of the spill movement;
- There are no facilities for storage and maintenance of booms and ancillaries, vessels, waste storage and PPE at the priority receptors;
- The time for oil to contact priority receptors provides sufficient time to access regional and local resources based on real time modelling; and
- The effectiveness of the dispersant strategy and containment and recovery strategy will inform the nature and scale of protection and deflection activities through the IAP process.

For planning purposes, **one protection and deflection operation** consist of:

- Boom (shore sealing, self-inflating and solid flotation);
- Ancillary equipment and vessels (if required);
- 2 trained oil spill responders; and
- 5 personnel / labour hire to deploy the booms.

Jadestone has access to the required resources via AMOSC, AMSA and OSRL (refer Table 6-2: Oil Spill Response Equipment).

12.4 Priority Receptors

In locations along the Kimberley coast, access to shorelines is typically restricted to boat and long-distance steam times from launching, so it will be very difficult to get to suitable locations to install protection booms. For these areas the removal of oil using offshore Containment and Recovery, together with the application of dispersants, is the key strategy for preventing shoreline impacts.

In some offshore locations the water may be sufficiently calm to install fixed booms in deep water to assist in the protection of highly sensitive areas where shoreline clean-up may be very difficult to effectively achieve. This will be considered to protect large mangrove stands that are difficult to access, however, the large tidal range will result in high velocity water and may exceed the operating parameters of booms.

For the Tahbilk-1 LOWC scenario the minimum time for oil contact at a priority receptors at >100 g/m^2 is 3 days with most areas on a scale of more than 2 weeks (Table 12-1). For the Sea Eagle-1 LOWC scenario the minimum time for oil contact at priority receptors at >100 g/m2 is 1 day with most other areas being contacted in more than 10 days (Table 12-2). Apart from those priority receptors predicted to be contacted within 5-7 days, there is enough time before contact for pre-assessment of shoreline areas for which oil may contact, noting sensitive receptor locations, fauna presence (e.g. nesting turtles and birds) and morphology of shorelines/creek systems. These aspects change seasonally, and a pre-assessment window provides the ability for up to date information to be considered when formulating a specific plan for shoreline protection.

Table 12-1: Priority Receptors Associated with the Tahbilk-1 LOWC

Priority receptor	Minimum time to shoreline oil at >100g/m^2 (days)	Oiled shoreline length at concentrations >100 g/m^2 in worst replicate simulation (km)
Cartier Island	3.6	0.6

Priority receptor	Minimum time to shoreline oil at >100g/m² (days)	Oiled shoreline length at concentrations >100 g/m² in worst replicate simulation (km)
Ashmore Reef	7	5
Scott Reef South*	15.3	52.2
Seringapatam Reef*	16.5	8.7
Scott Reef North*	17.8	26.1
Cassini Island	22.2	3.9
Kimberley Coast	47.6	26.1
Adele Island	51.6	3.2
Joseph Bonaparte Gulf	52	191.5
Clerke Reef*	54.2	17.4
Imperieuse Reef*	69.7	26.1
Indonesia	14.6	591.9
Timor-Leste	30.8	330.8

*Predominantly intertidal receptor apart from small dry emergent areas such as Sandy Islet on South Scott Reef, Cunningham Islet on Imperieuse Reef, and Bedwell Islet on Clerke Reef

Table 12-2: Priority Receptors Associated with the Sea Eagle-1 LOWC

Priority receptor	Minimum time to shoreline oil at >100g/m² (days)	Oiled shoreline length at concentrations >100 g/m² in worst replicate simulation (km)
Cartier Island	1.9	0.6
Ashmore Reef	4.3	5
Scott Reef North*	10.4	26.1
Seringapatam Reef*	11.8	52.2
Scott Reef South*	11	8.7
Indonesia	14.9	922.7
Timor-Leste	31	121.9

*Predominantly intertidal receptor apart from small dry emergent areas such as Sandy Islet on South Scott Reef, Cunningham Islet on Imperieuse Reef, and Bedwell Islet on Clerke Reef

13. SHORELINE CLEAN-UP STRATEGY

13.1 Initiation and Termination Criteria

Tactic	Initiation criteria	Termination criteria
NEBA of shoreline response strategies	When SCAT surveys recommend shoreline clean-up activities.	When SCAT surveys recommend no further action be taken (NFA).
Shoreline clean-up and waste management	When NEBA of shoreline strategies recommends shoreline clean-up activities.	When SCAT surveys recommend no further action be taken (NFA); and Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response

13.2 Tactics

Jadestone will:

- Undertake a NEBA of shoreline response strategies utilising findings from SCAT surveys; and
- Implement shoreline clean-up and waste management at the direction of the Control Agency.

For planning purposes, Jadestone uses a minimum threshold of 100 g/m^2 (concentration of accumulated hydrocarbons on shorelines) to determine the lower limit for effective clean-up operations.

Once SCAT surveys of key shorelines have been completed, the results would help inform an operational NEBA and suitable response tactics for that location. Response tactics may include manual bagging of stranded oil where access can be gained, surf washing where wave action and sandy beaches are accessible by machinery, tilling and turning the sand to aid bioremediation where wave action is not strong enough to drive surf washing, rock flushing with high volume low pressure sea water, or leaving the weathered oil in-situ to breakdown where access for man or machinery is not possible.

Shoreline habitats in the region predominantly comprise of high relief rocky shoreline, sandy beaches, inter-tidal reefs, and mudflats/mangrove habitats. Macroalgal and seagrass beds will be avoided when assessing shoreline clean-up response tactics and the less intrusive options of natural attenuation and bioremediation will be preferred.

Information on shoreline type obtained from SCAT surveys will contribute toward the NEBA process. Each likely shoreline impact will be evaluated through observations and modelling, and shoreline response teams will be deployed and positioned as per those observations. Through information gathered and assessed by the IMT and HMA, the movement of floating oil towards shorelines is to be identified and clean-up tactics implemented to reduce the consequences to shoreline habitats to ALARP. A summary of shoreline clean-up techniques is provided at Table 13-1.

Intrusive shoreline clean-up techniques have the potential to damage sensitive shorelines. Given that the majority of the mainland shoreline contacted consists of tidal mangroves and saltmarshes, the appropriateness of clean-up will be determined as opposed to natural attenuation. Selection of the shoreline clean-up methods and controls to prevent further damage from the clean-up activities are to be undertaken in consultation with the HMA and selected based on NEBA.

Jadestone will have an agreed process which allows for stakeholder input into the termination criteria as per AMSA Guidance NP-GUI-025 2015. The degree of damage from shoreline clean-up activities is to be managed to ALARP, considering net environmental benefit of the clean-up activity.

AMOSC Core Group Responders may be substituted with NRT personnel as agreed by AMSA with Jadestone. AMSA will be a member of the IMT and will confirm and approve NRT personnel deployment as they deem necessary to reduce impacts to ALARP.

Table 13-1: Shoreline clean-up techniques

Method	Description
Mechanical clean-up	Mechanical clean-up techniques may utilise several equipment types. It is best to use equipment in the way for which it was designed. Front end loaders, bulldozers and elevating scrapers can all be used to rework beach sediment (e.g. cobble, pebble, and boulder) or to push such sediments into the shoreline for cleaning by waves. Note: Vehicles should not be allowed to pass over oiled sediment since this tends to result in the burial of oil into sediment.
Manual clean-up	Manual clean-up is the preferred option for cleaning inaccessible shorelines or those where mechanical clean- up is undesirable. Manual clean-up is slower than mechanical clean-up but generally results in the removal of much less sediment. Hence disposal requirements are reduced. Equipment is usually basic and consists of wheelbarrows, rakes, buckets, shovels, plastic bags (industrial strength) or other temporary storage. The requirements for manual beach clean-up are highly variable but generally a 10-person team, plus 1 supervisor is required to recover 10 m^3 of oil in one day.
Low pressure flushing	Low pressure flushing can be used, with care, to remove surface oils from most beach type surfaces. It is important that refloated oil is collected in booms or other containment devices and recovered using skimmers or sorbents. Generally low-pressure flushing does not result in the emulsification of oils and so sorbents may be used. It is preferable to check the condition of refloated oil and choose a suitable skimming device and pump. It is important also that refloated oil does not pass over clean sediment.
High pressure flushing	High-pressure washing is to be used only on artificial surfaces such as wharves, jetties etc. This method tends to emulsify oil and consequently the use of sorbents to collect refloated oil is not recommended. Oil, which is removed from surfaces, can be collected within light inshore booms or onshore using Shore Guardian or a similar boom. Oil can be recovered using vacuum systems or skimmers. Material and labour requirements are highly variable and will depend on the extent of oiling, the speed with which cleaning is expected to proceed, the type of substrate and the ease with which containment can be achieved.
Enhanced bioremediation (sediment reworking)	Machinery is used to breakup large paddies of stranded oil on beaches and to till and turn the oiled sands to aerate the sandy sediment and enhance the biological breakdown of the oil. This can be applied to oil that has deposited on sands above the normal high-tide area, typically during large storms, and there is little likelihood of the water reaching the stranded deposits.
Monitoring of natural attenuation and bioremediation (natural recovery)	By implementing shoreline clean-up methods described above, the amount of oil remaining stranded on shorelines will be reduced to ALARP; the remaining oil will be very difficult to access or remove and the activity is no longer preferred under NEBA when compared to the impacts of the intrusive clean-up methods. In addition, and assessed under NEBA, some areas of coastline will not be subjected to any clean-up methods due to access issues or possible impacts from the clean-up activities. It's at this point that monitoring of natural attenuation and bioremediation become the selected clean-up methods under a NEBA assessment. These areas will be monitored until no visible oil is remaining in the impacted area.

Method	Description
Supplementary equipment	
Sorbents	Two types of sorbent materials can be used; (1) loose, powdered or granular sorbents, or (2) solid, pads, rolls or sheets. Each of these may be either of synthetic or natural fibre. As a general rule, loose sorbent materials are not used because they are difficult to recover. However, there are occasions when this is not considered to be a problem, such as in high-energy areas where oily sorbent materials can be expected to be washed from surfaces and dissipated to sea. Of course, oil too is likely to be washed off such shorelines, to dissipate. Solid sorbents may be used in the form of sorbent booms to recover light oil films or as pads or rolls to absorb free oil from the surface of sediments in cases where vacuum systems cannot gain access or where oil is too fluid for manual recovery.
Vacuum systems	Vacuum systems may be portable hand operated systems or vacuum trucks. Vacuum systems tend to pick up large volumes of water with the oil and so it is preferable to use them on oil pooled on the sediment surface or to remove oil from containers or dams in which the water has been decanted. One method to minimise the amount of water removed from the beach is to use light, portable vacuum systems to deposit oil-water into temporary storage containers on the beach, allow settling time and to decant the water. Large units can then be used to collect the oil from these containers and transport oil to storage sites. Vacuum systems can also be used in association with deflection booms to recover oil from the sea surface. It is advisable in this case to fit the hose with a broad Manta Ray head.

13.3 Resource Rationale for Shoreline Clean-Up

The combination of machinery for mechanical removal of oil (bulldozers/ scrapers/ front end loaders) and personnel requirements have been considered for each priority receptors area based on opportunities for use and sensitivity of shoreline (i.e. may not be used for small offshore islands or for remote, rocky or mangrove lined shorelines). Therefore, it is the opportunity for use rather than the availability of machinery and personnel which is considered the limiting factor.

Shoreline clean-up requirements per Priority Receptor have been determined from the stochastic modelling for the Tahbilk-1 LOWC (Table 13-2), which was the worst-case scenario in terms of having the greatest Australian shoreline accumulation of oil and the most receptors impacted. The results represent the worst loading contact probability for each receptor from all stochastic modelling runs (150 simulations) across all seasons and in the event of a spill not all receptors would be contacted. Therefore, using the stochastic results is a very conservative means to estimate the number of shoreline clean-up responders required and waste requirements for shoreline clean-up.

Jadestone has planned for a trained oil spill responder and 10 personnel in each shoreline clean-up team and assume that each team can recover 10 m^3 per day. Actual personnel numbers will vary according to the shoreline clean-up techniques recommended by SCAT teams during their field assessment of affected shorelines and the operational NEBA assessment, which will be performed prior to a Shoreline Clean-up Plan (IAP Sub-plan) (Refer to Section 0) being developed. The locations and numbers below are presented for capability analysis only and will be revisited should a spill occur.

A Kimberley Shoreline Response Plan (AMOSC, 2019) has been prepared to assist in the planning and safe execution of an oil spill response along the Kimberley coast (or other remote shorelines). Jadestone would review the Kimberley Shoreline Response Plan at the time of a spill, to assist in the preparation of an appropriate Shoreline Clean-up Plan (IAP Sub-Plan) and capability to match the need for remote shorelines. This will be undertaken in consultation with OSRL/AMOSC and State/Territory, considering the practicalities, likely success and risks associated with a shoreline operation in remote locations.

Considerations for selecting and applying clean-up tactics, based on shoreline types, are shown in

Table 13-3. Clean-up endpoints should be established in consultation with key stakeholders (including Parks Australia for Ashmore and Cartier Islands) early in the clean-up process.

Table 13-2: Resource Rationale for Shoreline Clean-up Personnel Per Priority Receptor

Priority receptor	Probability (%)	Maximum accumulated volume (m^3) on shoreline in worst replicate simulation	Minimal arrival time (days)	Maximum daily accumulated oil ashore (m^3)	Potential waste generated per day (worst case bulking factor of 10) (m^3)	Number of shoreline clean-up teams recommended (1 team per 10 m^3/day)
Scott Reef South	78	1,108*	15.3	11.5	115	1
Kimberley Coast	5.3	22.6	47.6	0.4	4	1
Adele Island	11.3	29.1	51.6	0.5	5	1
Cassini Island	10	104.9	22.2	1.2	12	2
Joseph Bonaparte Gulf NT	5.3	1453	52	24.2	242	10
Cartier Island	95.3	24	3.6	0.2	2	1
Ashmore Reef	90.7	268.8	7	2.6	26	1
Clerke Reef	9.3	21.2*	54.2	0.4	4	1
Imperieuse Reef	11.3	26.5*	69.7	0.6	6	1
Indonesia	70	2283	14.6	23.4	234	TBA
Timor Leste	28	869	30.8	10.7	107	TBA

*Shoreline accumulation for these locations is simulated on the basis that the entire intertidal reef is permanently exposed and not just the small dry emergent areas present (Sandy Islet on South Scott Reef, Cunningham Islet on Imperieuse Reef, and Bedwell Islet on Clerke Reef). Hence the shoreline accumulation for these areas is an overestimate.

Table 13-3: Shoreline Clean-up Selection Factors by Shoreline Type, Oil Type and Degree of Oiling

Shoreline Type	Type of Oil	Degree of Oiling*	Shoreline Clean-up Tactic			
			Natural Recovery	Manual and Mechanical	Sediment Reworking	Flooding and Flushing
Exposed Rocky Shores	1	Light	☑	☑	☑	☑
		Moderate	☑	☑		☑
		Heavy	☑			☑
	2	Light	☑	☑	☑	☑
		Moderate	☑	☑		☑
		Heavy	☑	☑		☑
	3	Light		☑		☑
		Moderate		☑		☑
		Heavy				☑
Sandy Shores and Beaches	1	Light	☑	☑	☑	☑
		Moderate	☑			☑
		Heavy				☑
	2	Light	☑	☑	☑	☑
		Moderate	☑	☑		☑
		Heavy		☑		☑
	3	Light		☑		
		Moderate		☑		
		Heavy		☑		
Artificial Structures	1	Light	☑	☑		☑
		Moderate	☑	☑		☑
		Heavy		☑		☑
	2	Light	☑	☑		☑
		Moderate	☑	☑		☑
		Heavy		☑		☑
	3	Light		☑		☑
		Moderate		☑		☑
		Heavy		☑		☑
Sheltered Rocky Shores	1	Light	☑	☑	☑	☑
		Moderate	☑	☑	☑	☑
		Heavy				☑

Shoreline Type	Type of Oil	Degree of Oiling*	Shoreline Clean-up Tactic			
			Natural Recovery	Manual and Mechanical	Sediment Reworking	Flooding and Flushing
	2	Light	☑	☑	☑	☑
		Moderate	☑	☑	☑	☑
		Heavy		☑		☑
	3	Light	☑	☑	☑	☑
		Moderate	☑	☑	☑	☑
		Heavy		☑		☑
Mud and Tidal Flats	1	Light	☑	☑		☑
		Moderate	☑			☑
		Heavy				☑
	2	Light	☑	☑		☑
		Moderate	☑	☑		☑
		Heavy				☑
	3	Light	☑	☑		☑
		Moderate	☑			☑
		Heavy				☑
Mangroves and Wetlands	1	Light	☑	☑		☑
		Moderate	☑			☑
		Heavy				☑
	2	Light	☑	☑		☑
		Moderate	☑	☑		☑
		Heavy				☑
	3	Light	☑	☑		☑
		Moderate		☑		☑
		Heavy				☑

13.4 Priority receptor

A number of the priority receptors predicted to be contacted include tropical environments with extensive mangrove communities, deltas and tidal wetlands. The tidal ranges in this region are large (7-8m) and much of the coastline is remote and inaccessible via road, making many of the shoreline clean-up techniques described in Table 13-1 unsuitable (e.g. mechanical removal, enhanced bioremediation, vacuum trucks, high pressure flushing) and their use is likely to result in greater environmental impacts than the oil itself. In addition, the remote nature, presence of dangerous fauna (i.e. Saltwater crocodiles and Irukandji jellyfish) present significant safety risks to responders working in these environments.

Large scale operations involving large numbers of personnel may cause adverse environmental impacts at many of these sensitive shoreline locations. The constant removal of oil, even via manual removal can result in a removal of substrate (e.g. sand, pebbles). If intrusive clean-up is conducted frequently, over a long period of time and along contiguous lengths of coastline, this may result in geomorphological changes to the shoreline profile and adverse impacts to shoreline invertebrate communities which provide an array of ecosystem services (Michel, et al., 2017).

Given the safety constraints and ecological sensitivities of these shorelines, shoreline clean-up operations should be conducted by smaller teams (max 10 people/team) for a longer period. Intermittent manual treatment (<20 visits/month) and use of passive recovery booms is likely to be more effective than intrusive methods (e.g. intrusive manual removal >20 visits/month). Although this may take longer to undertake the clean-up, it is considered that the benefits outweigh the impacts as smaller teams are more targeted, recovering more oil and less sand and debris, reducing trampling of oil into the shore profile and will minimise ecological impacts on the shorelines and their sensitive species.

Table 13-2 presents the maximum daily accumulated oil (m^3) and a worst-case bulking factor for waste for the identified priority receptors. The number of shoreline clean-up teams recommended to treat these shorelines is not based on extensive, intrusive and contiguous removal of oil and waste along all shorelines, but rather use of smaller teams and at lower frequency of visits. Where shoreline based manual removal is safe and deemed advantageous by SCAT teams and operational NEBA, this should be conducted via land access (if possible) or via suitable vessels. However, it should be noted that it is generally not feasible to move response equipment into and out of mangroves, tidal flats and delta environments without causing excessive damage. Even foot traffic must be minimised, either by laying down wooden walkways or relying on vessel-based activities as much as possible (API, 2020).

13.4.1 Ashmore Reef and Cartier Island

Due to the sensitivity of shoreline receptors and safety issues outlined below, the merits of shoreline clean-up at Ashmore Reef and Cartier island will be discussed in consultation with Parks Australia whilst preparing an Operational NEBA for these priority receptors, which would document this decision-making process.

Cartier Island and the surrounding marine area within a 10 km radius was a gazetted Defence Practice Area up to 20 July 2011. Although no longer used, there is a substantial risk that Unexploded Ordnances (UXO) remain in the area. Landing or anchoring anywhere within the Cartier Island Commonwealth Marine Reserve is strictly prohibited. Therefore, shoreline clean-up assessment of these islands should be conducted via UAVs for Cartier Island. Onshore clean-up assessment is likely to be suitable for Ashmore Island.

Ashmore Reef comprises of a shelf-edge reef system with small islands and associated sandbars within the reef rim. Ashmore Reef Ramsar site is located within the boundary of the Marine Park. Shoreline clean-up activities would result in more damage to the environmental values than the oil. Focus for protection is offshore strategies and scientific monitoring.

Ashmore and Cartier Island are of ecological significance and present environmental and safety constraints for shoreline clean-up activities which must be taken into account when developing the operational NEBA. These include:

- Ashmore Reef Marine Park and Cartier Island Marine Park are assigned IUCN category 1a Sanctuary Zoning and are afforded the highest level of protection;

- In 1986, a campaign was conducted to remove UXO from Cartier Island, however, the sands were found to be highly mobile and the crew had difficulty clearing the reef. Therefore, the island and adjacent shallow intertidal areas cannot be considered free of UXO;
- Remote location presenting logistical challenges and safety concerns for landing vessels, people and equipment;
- Small sand islands within a submerged and emergent reef system presenting challenges for personnel to work with suitable facilities and waste storage; and
- Landing and undertaking shoreline clean-up activities is likely to result in damage of any turtle and bird nesting sites that may be present.

13.4.2 Indonesia and Timor Leste

Although not within the bounds for acceptance of activities in Commonwealth Waters, a response to International shorelines has been considered to ensure that sufficient capability is available for a LOWC. Jadestone will be responsible for activating and overseeing capability engaged to manage shoreline response activities on international shorelines through the arrangements detailed in the OSR Arrangements. OSRL has been engaged as a response agency and will be mobilised to provide SCAT surveys and shoreline response activities within this timeframe in consultation with the appropriate authorities.

Oil spill modelling predicts most of the shoreline accumulation in Indonesia to occur in Nusa Tenggara Timur (2,205 m^3) and Maluku (1,287 m^3) with the shortest contact time occurring in Nusa Tenggara Timur (14.6 days).

Assuming a worst-case shoreline contact of approximately 24 m^3/day, the capability required to respond to an event of this nature and scale will depend on the shoreline clean-up tactics recommended by the SCAT teams guiding shoreline response activities.

OSRL has the capability required to respond to a spill event of this nature and scale as demonstrated through their online equipment resource lists. Jadestone has signed an APAC Associate Agreement with OSRL to hire oil spill response equipment, vessels and vehicles, as well as to engage dedicated response personnel. Personnel are on standby and available 24/7 with equipment and logistics support to initiate, mobilise and sustain a response comprising of up to 18 fully trained and competent response personnel.

Typical initial roles of the team may include, but are not limited to the following tasks:

- Technical advice and incident management coaching within the command centre;
- Development of an Incident Management Plan;
- In country logistics planning and support for inbound equipment;
- Impact assessment and advice on response strategy selection;
- SCAT and aerial surveillance; and
- Tactical response planning.

OSRL maintains a minimum pool of 80 dedicated response staff which Jadestone can access for an international response.

13.5 Shoreline Clean-up Waste

Shoreline clean-up waste will consist of oil, oiled substrate (e.g. sand, pebbles), oiled debris, oiled sorbents, PPE and animal carcases. Activation of the Jadestone waste management contract will enable clean-up waste to be collected, transported, stored and disposed of. Waste management is also addressed in the IMTRP.

Jadestone's waste management contractor has sufficient onshore temporary waste storage in the form of different volume skip bins, lift bins and hook lift bins, all of which can be mobilised and made available in Darwin within 24-48 hours of activation. Jadestone can also access temporary onshore storage tanks, bladders and containers through its membership with AMOSC and OSRL.

13.5.1 Accessible shorelines

Along the affected accessible shorelines, temporary waste storage will be distributed by telehandlers and readily accessible by clean-up crews. Wastes will then be either collected by operating mobile plant such as excavators, or through manual waste removal (bagged waste), and deposited into these bins.

Waste-related telehandlers will operate collection services along the hot zone, picking up filled bins while returning empty bins for further collection. Wastes collected will initially be consolidated into 10 m^3 skips located within the warm zone. These skips will then be removed from the warm-zone to the temporary holding facility located within the operational areas, for loading onto semi-trailers or road trains pending final disposal to landfill.

For accessible shorelines, the IMT will determine the most suitable method of shoreline clean-up (Refer to Table 13-1) through an Operational NEBA assessment.

13.5.2 Remote Locations/Islands Waste Management

As described in Section 13.4, the majority of shorelines predicted to be impacted from a worst-case credible spill are in areas with limited to no access. Manual removal is the preferred method of clean-up for these areas and will be supported using vessels capable of shoreline landings, smaller machinery (where appropriate) and helicopters to deliver equipment and personnel and remove collected waste.

Access and all clean-up activities will be conducted via vessels or helicopters in front of the primary dune of the impacted shoreline. Jadestone will not access any areas behind the primary dune of impacted offshore islands during any stage of the clean-up operation.

Equipment delivery - If the impacted shoreline can be accessed with a barge and landing craft, crew on the barge will deliver an appropriate number of Clean-up packs (to cater for the number of response personnel defined in the IAP) onto the impacted shoreline above the high tide mark. A helicopter will deliver the appropriate number of clean-up packs if barge access is not possible.

Personnel - Response personnel may be transported to the impacted shoreline on a barge. If access is not possible by barge, helicopters may be used to transport personnel. Response personnel will not camp on the islands due to potential for additional impacts from this activity.

Initially, response personnel will shovel the oily waste into small manageable bags (weighing 20–30 kg when full) which will be stored in a lined, temporary storage area until they are removed from the island. The temporary storage area will be located at the bottom of the primary dune and above the Highest Astronomical Tide (HAT) mark.

Waste collection – Response personnel will transfer the small bags of solid oily waste and small drums of liquid waste from the temporary storage area to a container within the barge. ATV's and bobcats may also be used for the same purpose where appropriate. The barge will then steam to the closest service wharf and transfer the waste onto a waste truck supplied by Jadestone's waste management contractor. In areas where a barge cannot access the shoreline, oily waste will be placed in an underslung load and transferred by helicopter to the closest land-based point that has vehicle access for onward movement.

14. OILED WILDLIFE RESPONSE

If a spill occurs in WA State waters or enters State waters, Department of Biosecurity and Conservation and Attractions (DBCA) is the Jurisdictional Authority for wildlife, and for level 2/3 spills, will also lead the oiled wildlife response under the control of the Department of Transport (DoT). For level 1 spills, Jadestone will be the Control Agency, including for wildlife response. It is however also an expectation that for level 2/3 petroleum activity spills, Jadestone will conduct the initial first-strike response actions for wildlife and continue to manage those operations until DBCA is activated as the lead agency for wildlife response.

The key plan for OWR in WA is the Western Australian Oiled Wildlife Response Plan (WAOWRP). The WAOWRP establishes the framework for preparing and responding to potential or actual wildlife impacts during a spill and sets out the management arrangements for implementing an OWR in conjunction with the State Hazard: SHP-MEE. It is the responsibility of DBCA to administer the WAOWRP under the direction of the DoT. The Kimberley Region OWRP, which sits under the WAOWRP provides operational guidance to respond to injured and oiled wildlife in the Kimberley region and covers the areas potentially contacted by oil from the Tahbilk-1 LOWC scenario.

For level 2/3 spills that contact NT shorelines the NT IC will assume the role of Control Agency with support from Jadestone. AMOSC on behalf of AMOSC Titleholder Members ConocoPhillips, Inpex and Shell Australia have developed a Northern Territory Oiled Wildlife Response Plan (NTOWRP) (AMOSC, 2019b), this plan also has application for other titleholders as it provides operational guidance to respond to injured and oiled wildlife along the NT coastline and island groups.

In the event of a spill that will or could potentially oil wildlife, the Planning Team Lead will activate the Industry (AMOSC) Oiled Wildlife Advisors (OWA) as stipulated in Jadestone's IMT Response Plan. This role along with the Government OWA ensure minimum standards for Oiled Wildlife Response (OWR), as outlined within the WA/NT OWRP, are met and ensure timely mobilisation of appropriate resources (equipment and personnel) through communication with the wildlife logistics team.

Timely provision of equipment and personnel will be provided by AMOSC through a combination of owned and operated equipment, call-off contracts with suppliers, and the management of industry OWR response personnel (refer IMTRP). Under the WA/NT OWRP arrangement, the AMOSC OWA may request further assistance from State/Territory in the form of trained personnel, and vice versa, if their own expertise has been exhausted.

14.1 Initiation and Termination Criteria

Table 14-1: Initiation and Termination Criteria

Tactic	Initiation criteria	Termination criteria
Wildlife first response Mobilisation of resources Wildlife reconnaissance	Immediately when Level 2 or 3 spill incident is confirmed.	When transition into oiled wildlife IAP subplan is complete.
IAP wildlife subplan Wildlife rescue and staging Oiled wildlife response facility Oiled wildlife rehabilitation Oiled wildlife response termination	When oiled wildlife first response has transitioned to IAP subplan development.	When the NEBA for oiled wildlife response activities indicates no further action required (NFA).

14.2 Wildlife first response

The most effective means of preventing wildlife from being impacted by the spill is through the spill response actions taken to minimise the impact area (e.g. containment, clean-up and preventing further discharge of hydrocarbons).

OWR includes wildlife surveillance/reconnaissance, wildlife hazing, pre-emptive capture and the capture, cleaning, treatment, and rehabilitation of animals that have been oiled. In addition, it includes the collection, post-mortem examination, and disposal of deceased animals that have succumbed to the effects of oiling.

Wildlife surveillance/reconnaissance is a critical component of an oiled wildlife first response. Table 14-2: Wildlife Reconnaissance Considerations (adapted from the WAOWRP)

Species	Life Cycle	Risk period	Reconnaissance Considerations
Birds			
Migratory and resident shorebirds	Foraging, roosting	Migratory shorebirds: Sept-Mar Resident shorebirds and some juvenile migrants remain year-round (Migratory shorebirds do not nest in Australia)	Migratory shorebirds mostly feed on intertidal mud flats during mid to low tides, roosting at high tide Surveys for roosting shorebirds should be conducted as close to high tide as practicable and no more than two hours either side of high tide (unless local knowledge indicates a more suitable time) Surveys for foraging shorebirds should be conducted as close to low tide as practicable and no more than two hours either side of low tide (unless local knowledge indicates a more suitable time)
Resident shorebirds	Nesting	Peak nesting August to February	Nest on coastal beaches, wetland fringes and islands, above the high-water mark Surveys need to be undertaken to determine nest locations adjacent to and along impacted shorelines
Seabirds- sea forages that utilise islands and coasts such as terns, gulls, boodies, gannets, noddies, shearwaters	Foraging, roosting	Year-round	Can forage long distances from nesting and roosting sites Birds oiled during feeding may be unable to flyback to shore so aquatic patrols of feeding areas and shorelines should be considered Show a preference for roosting on sandy points, spits and low rocky bars near the ocean Birds lightly oiled or coated with light oils may be able to fly back to roosts, which may be up to 50 km from oiling Searches and monitoring should include roosting sites
	Nesting	September to March	Nest on islands or the mainland coast either on the surface (e.g. terns), rock crevices, in vegetation or in burrows (e.g. shearwaters) Monitor nesting adults and nestlings for oiling impacts

Species	Life Cycle	Risk period	Reconnaissance Considerations
Seabirds- cormorants and darters all species	All	Year-round	Predisposed to oiling as they will readily swim through heavy oils May travel large distances from roosting sites but feed close to shore Cormorants saturate their feathers to hunt and will look wet after foraging when drying wings for flight (may be confused with light oiling) Roosting sites may vary according to wind conditions and food availability Cormorants prefer roost on elevated coastal headlands or trees to assist take off Nest on elevated coastal headlands and vegetation or in vegetation in freshwater swamps
Waterbirds	All	Year-round	Found in freshwater brackish and coastal habitats Herons and Egrets tend to forage amongst mangroves and on intertidal flats or shallow pools near roosting sites Pelicans prefer shallow protected waters for feeding. Pelicans can travel very large distances from roost or breeding sites to foraging areas Herons and egrets nest sparsely in coastal vegetation Pelicans nest in colonies on inland lake and coastal islands
Marine birds of prey	All	Year-round	Ospreys often plunge into water to hunt fish, while white-bellied sea eagle plucks fish from water on the wing Elevated perch with view of ocean are preferred Make large nests comprised of sticks on tall structures (trees, mangrove, man-made) or rocky headlands Monitoring of local raptors should be undertaken, focusing on known nest sites and perches
Sirenians and cetaceans			
Dugongs			Population data limited Aerial surveillance Dugongs spend most of their time in less than 3 meters of water
dolphins and whales			Population data limited Aerial surveillance
Marine turtles			
	Foraging	Year-round	Within Australian waters, most juvenile and sub-adult turtles show strong fidelity to chosen feeding grounds and do not move large distances

Species	Life Cycle	Risk period	Reconnaissance Considerations
			There are current knowledge gaps regarding foraging sites for many turtle species in Australian waters Aerial surveys are applicable to turtles in-water as they must periodically surface to breathe, and a fraction of the turtles in an area will be on the surface and available for counting at any given time Turtles smaller than 60 cm in carapace length are difficult to detect by aerial surveillance
	Nesting and nests	Approximately October to February (species differences exist)	For nesting, nesting beaches should be patrolled (on-foot) nightly between approximately 17:00 hours and 04:00 hours Day-time surveys for tracks and other evidence left on the beach after a marine turtle has emerged (crawls) can be used to identify the species and the location of turtle nests
	Hatchlings	Approximately January to March (species differences exist)	Sea turtle hatchlings typically emerge at night

outlines species, life-cycle stages, and key risk periods to consider when developing a wildlife reconnaissance plan. Wildlife reconnaissance should be undertaken in close consultation with personnel undertaking relevant operational monitoring activities. The information gathered from wildlife reconnaissance and all relevant pre-existing wildlife data/information should be used to inform decisions and aid the development of the Wildlife portion of the IAP.

Table 14-2: Wildlife Reconnaissance Considerations (adapted from the WAOWRP)

Species	Life Cycle	Risk period	Reconnaissance Considerations
Birds			
Migratory and resident shorebirds	Foraging, roosting	Migratory shorebirds: Sept- Mar Resident shorebirds and some juvenile migrants remain year-round (Migratory shorebirds do not nest in Australia)	Migratory shorebirds mostly feed on intertidal mud flats during mid to low tides, roosting at high tide Surveys for roosting shorebirds should be conducted as close to high tide as practicable and no more than two hours either side of high tide (unless local knowledge indicates a more suitable time) Surveys for foraging shorebirds should be conducted as close to low tide as practicable and no more than two hours either side of low tide (unless local knowledge indicates a more suitable time)
Resident shorebirds	Nesting	Peak nesting August to February	Nest on coastal beaches, wetland fringes and islands, above the high-water mark Surveys need to be undertaken to determine nest locations adjacent to and along impacted shorelines
Seabirds- sea forages that utilise islands and coasts such as terns, gulls, boodies, gannets, noddies, shearwaters	Foraging, roosting	Year-round	Can forage long distances from nesting and roosting sites Birds oiled during feeding may be unable to flyback to shore so aquatic patrols of feeding areas and shorelines should be considered Show a preference for roosting on sandy points, spits and low rocky bars near the ocean Birds lightly oiled or coated with light oils may be able to fly back to roosts, which may be up to 50 km from oiling Searches and monitoring should include roosting sites
	Nesting	September to March	Nest on islands or the mainland coast either on the surface (e.g. terns), rock crevices, in vegetation or in burrows (e.g. shearwaters) Monitor nesting adults and nestlings for oiling impacts
Seabirds- cormorants and darters all species	All	Year-round	Predisposed to oiling as they will readily swim through heavy oils May travel large distances from roosting sites but feed close to shore

Species	Life Cycle	Risk period	Reconnaissance Considerations
			Cormorants saturate their feathers to hunt and will look wet after foraging when drying wings for flight (may be confused with light oiling) Roosting sites may vary according to wind conditions and food availability Cormorants prefer roost on elevated coastal headlands or trees to assist take off Nest on elevated coastal headlands and vegetation or in vegetation in freshwater swamps
Waterbirds	All	Year-round	Found in freshwater brackish and coastal habitats Herons and Egrets tend to forage amongst mangroves and on intertidal flats or shallow pools near roosting sites Pelicans prefer shallow protected waters for feeding. Pelicans can travel very large distances from roost or breeding sites to foraging areas Herons and egrets nest sparsely in coastal vegetation Pelicans nest in colonies on inland lake and coastal islands
Marine birds of prey	All	Year-round	Ospreys often plunge into water to hunt fish, while white-bellied sea eagle plucks fish from water on the wing Elevated perch with view of ocean are preferred Make large nests comprised of sticks on tall structures (trees, mangrove, man-made) or rocky headlands Monitoring of local raptors should be undertaken, focusing on known nest sites and perches
Sirenians and cetaceans			
Dugongs			Population data limited Aerial surveillance Dugongs spend most of their time in less than 3 meters of water
dolphins and whales			Population data limited Aerial surveillance

Species	Life Cycle	Risk period	Reconnaissance Considerations
Marine turtles			
	Foraging	Year-round	Within Australian waters, most juvenile and sub-adult turtles show strong fidelity to chosen feeding grounds and do not move large distances There are current knowledge gaps regarding foraging sites for many turtle species in Australian waters Aerial surveys are applicable to turtles in-water as they must periodically surface to breathe, and a fraction of the turtles in an area will be on the surface and available for counting at any given time Turtles smaller than 60 cm in carapace length are difficult to detect by aerial surveillance
	Nesting and nests	Approximately October to February (species differences exist)	For nesting, nesting beaches should be patrolled (on-foot) nightly between approximately 17:00 hours and 04:00 hours Day-time surveys for tracks and other evidence left on the beach after a marine turtle has emerged (crawls) can be used to identify the species and the location of turtle nests
	Hatchlings	Approximately January to March (species differences exist)	Sea turtle hatchlings typically emerge at night

14.3 Oiled Wildlife Response Levels and Personnel Requirements

The WA/NT OWRP nominates oiled wildlife response incident Levels based on the scale and severity of oiled wildlife impacts.

Table 14-3 provides the indicative level descriptions for Level 1 to Level 6 incidents in WA. The WAOWRP also nominates indicative personnel numbers and role requirements for each OWR Level as shown in

Table 14-4**.**

Jadestone is approaching oiled wildlife preparedness in a conservative manner by preparing for an OWR Level 6. The number of personnel may change depending on the complexity of the response (spatial scale and variety of wildlife impacted). Additional personnel will be required as scribes/PAs for key functional positions. The skill level required is indicated as OWR 1-4, these correspond to competency-based levels that ensure personnel have adequate knowledge to effectively perform the indicated roles/functions. These tables are used to guide the planning process; actual resourcing requirements will be guided by situational awareness on the complexity, scale and fauna types involved.

Table 14-3: WA Oiled Wildlife Response Levels (WAOWRP)

OWR level	Duration of OWR	Birds general	Birds OWR complex #	Turtles - hatchlings / juveniles / adults	Dolphins / Whales	Pinnipeds	Mammals terristrial	Reptiles	Dugongs
Level 1	<3 days	1-2 birds per day or < 5 total	No complex birds	None	None	None	None	None	None
Level 2	4-14 days	1-5 birds per day or <20 total	No complex birds	< 20 hatchlings no Juveniles or adults	None	None	None	None	None
Level 3	4-14 days	5-10 birds per day or < 50 total	1-5 birds per day or <10 total	< 5 juv/adults, < 50 hatchlings	None	< 5 seals	< 5	< 5 - no crocodiles	None
Level 4	>14 days	5-10 birds per day or < 200 total	5-10 birds p/day	< 20 juv/adults < 500 hatchlings	< 5 or known habitats affected	5-50 seals	5-50 mammals	5-50 reptiles	Dugong habitat affected only
Level 5	>14 days	10-100 birds per day or > 200 total	10-50 birds per day	>20 juv/adults, > 500 hatchlings	>5 dolphins	> 50 seals	> 50 mammals	>50 reptiles	Dugongs oiled
Level 6	>14 days	>100 birds for day	10-50 birds per day	>20 juv/adults, > 500 hatchlings	>5 dolphins	> 50 seals	> 50 mammals	>50 reptiles	Dugongs oiled
# Threatened species, protected by treaty, or specialist feeders									

Table 14-4: WA OWR Response Level and Personnel Numbers (WAOWRP)

SKILL REQUIREMENT	OWR RESPONSE LEVEL & PERSONNEL NUMBERS					
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
OWR 4	1	1	3	2	2	2
OWR 3	2	0	4	4	4	4
OWR 2	4	9	15	17	18	18
OWR 1	0	14	33	47	84	90
Technicians (i.e Vets)	0	1	2	4	4	4
Other Specified Skills	0	0	2	3	4	4
Total	**7**	**25**	**59**	**77**	**116**	**122**

It is expected that Jadestone may require 122 level 5 personnel. Personnel at skill levels 2 - 4 and those with specialised skills are expected to be sourced through AMOSC, OSRL, DBCA, Universities and contractors.

Roles could be filled by wildlife carers known to State/Territory government and through labour hire agencies that can provide field workers that undergo an induction and basic training. Basic training (over 1 day) for OWR personnel can be delivered as just-in-time training through an arrangement with the relevant State/Territory agency.

In the event of a spill impacting wildlife, Jadestone will commence arrangements to mobilise personnel and equipment to fill positions and implement strategies within the WAOWRP and NTOWRP. Further information describing oiled wildlife response arrangements is provided at Appendix A of the Incident Management Team Response Plan (JS-70-PLN-F-00008).

15. CONTROLS

Environmental performance outcomes (EPOs) of the response strategies, control measures, performance standards presented in Table 15-1 are:

- Reduce oil volumes from reaching the shoreline to as low as reasonably practicable; and
- Reduce impacts to marine and coastal fauna through the implementation of the WA/NT Oiled Wildlife Response Plan.

Table 15-1: Operational Performance Standards and Measurement Criteria

Response Elements	Control Measures	Performance Standards	Measurement Criteria
Notifications and Activations	AMOSC activation	Verbal notification/activation of AMOSC within 60 mins of IMT activation	Incident Log
	OSRL activation	Verbal notification/activation of OSRL within 60 mins of IMT activation	Incident log
	AMSA activation	Verbal notification/activation of AMSA within 60 mins of IMT activation	Incident log
	WWC activation	Verbal notification/activation of WWC within 60 mins of IMT activation	Incident log
	IMTRP	Complete regulatory notification within designated timeframes	Incident log
	Jacobs activation	Verbal notification/activation of Jacobs within 24 hours of IMT activation	Incident log
Overall spill response	Sea Eagle-1 and Tahbilk-1 Vessel Based Activity OPEP (TM-50-PLN-I-00005) provides for NEBA, notifications and consultation requirements to ensure net	NEBA undertaken every operational period and considered in development of following period Incident Action Plan.	Incident log
		OPEP activated as per OPEP notification table	Incident log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
	environmental benefit from response		
	Jadestone Energy Incident Management Team Response Plan (JS-70-PLN-F-00008) procedure details IMT Core team members, resource pool and responsibilities	Jadestone IMT comply with Jadestone Energy Incident Management Team Response Plan (JS-70-PLN-F-00008)	Incident log
Source Control Action Plan	Shipboard Oil Pollution Emergency Plan (SOPEP)	SOPEP activated within 60 minutes of spill incident	Incident log
	Blowout Contingency Plan	Blowout Contingency Plan activated within 60 minutes of LOWC incident	Incident Log
	LOWC notification	Complete notification and activation of AMOSC, Oceaneering, WWC and relevant others within 60 minutes of IMT activation	Incident Log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
	SFRT activation	SFRT equipment and vessel in Darwin within seven days SFRT Vessel loaded and commence transit within 7.5 days SFRT equipment infield within nine days of activation	Incident Log
	Relief Well	Commence drill rig contracting within 24 hours of activation	Incident Log
		Rig infield within 23 days of activation	Incident Log
		Finalise relief well plan within 23 days of spill notification	Incident Log
		Commence drilling relief well activities within 24 days of spill notification	Incident Log
		Finalise relief well kill plan prior to drilling into reservoir.	Incident Log
		Commence kill operations within 77 days of spill notification, based on offset experience	Incident Log
	Survey and Planning	Commence site survey to inform source control options within 11 days of spill notification	Incident Log
	Well Debris Removal (if applicable)	Develop debris removal plan within 12 days of activation	Incident Log
		Commence debris removal within 13 days of activation (using SFRT) and 21 days for heavy debris removal (WWC)	Incident Log
	SSDI	Commence subsea dispersant injection within ten days of spill using SFRT	Incident log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
		Conduct daily re-evaluation of subsea dispersant effectiveness monitoring data to determine efficacy of response strategy and include the results in the operational NEBA and IAP	Incident log/ Incident Action Plan
Operational monitoring	Operational Monitoring Plan	Activate Operational Monitoring Action Plan within 60 minutes of IMT activation	Incident Log
	Vessel Surveillance	Vessel Surveillance initiated within 24 hours following request from IMT.	Incident log
		Observation reports submitted to IMT within 60 mins of completing surveillance	Incident log
	Aerial Surveillance	Aerial Surveillance mobilised within 6 hours following request from IMT.	Incident log
		Trained Aerial Observers supplied within 48 hours of notification.	Incident log
		Flight schedules are maintained throughout response.	Incident Action Plan
		Observers completed aerial surveillance observer log following completion of flight.	Aerial Observer Logs
		Aerial surveillance continues until termination criteria are met.	Incident log
	Tracking Buoys	Tracking buoys deployed within 3 hours of request from IMT or OIM, subject to vessel availability and weather conditions.	Incident log
		Tracking buoys utilised until termination criteria met.	Incident log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
	Satellite imagery	Satellite imagery commissioned within 6 hours of a Level 2 or 3 spill notification	Incident Log
		Satellite imagery delivered to IMT within 24 hours of request to service provider	Incident Log
		Satellite imagery continues until termination criteria are met.	Incident Log
	Oil Spill Modelling	Oil Spill modelling commissioned within 24 hours for a Level 2 or 3 spill notification.	Incident Log
		OSTM to commence within approximately three hours of request submission.	Incident Log
		Modelling continues until termination criteria are met.	Incident Log
	Fluorometry	Jadestone will conduct in-field efficacy testing in accordance with the Special Monitoring of Applied Response Technologies (SMART) monitoring protocol (NOAA, 2006)	Incident Log
		Visual monitoring surveys of dispersant effectiveness conducted from initial dispersant application	Incident Log
		Fluorometry surveys mobilised within 7 days of initiation.	Incident Log
		Daily report including fluorometry results provided to IMT within 24 hours of completing daily survey.	Incident Log
	SCAT	Commence deployment of SCAT Teams within 48 hours of becoming aware of potential impacts to state / territory waters	Incident Log
		Completed SCAT surveys are delivered to IMT within two hours of the Survey Team returning to its operating base	Incident Log
		SCAT surveys undertaken daily at priority locations	Incident Log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
Surface Chemical Dispersion	Chemical Dispersion Action Plan (Surface)	Activate Chemical Dispersant Action Plan within two hours of IMT activation	Incident Log
		NEBA undertaken within two hours of spill and daily thereafter to determine if chemical dispersion will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan	Incident Log
		Develop a Surface Dispersant Application Plan (IAP Sub-Plan) within 12 hours of NEBA confirming an overall environmental benefit	Incident Log
		Commence mobilisation of resources (equipment, stock, platforms) to support dispersant operations within four hours of IMT activation	Incident Log
		Activate Darwin logistics support arrangements within six hours of IMT activation	Incident Log
		Prioritise the mobilisation and application of dispersants Dasic Slickgone NS and Corexit 9500 prior to other dispersant types	Incident Log
		If additional dispersant types (other than Slickgone NS and Corexit 9500) are likely to be required, prioritise the use of dispersants using the following criteria: • Dispersant type used on Montara oil during the spill in 2009 and was shown to be effective in dispersing hydrocarbons; • Dispersant type listed as approved in the National Plan for Maritime Environmental Emergencies Register of Oil Spill Control Agents (OSCA); and • Jadestone's Chemical Selection Evaluation and Approval Procedure (JS-70-PR-I-00033)	Incident Log
		NEBA undertaken within two hours of spill and daily thereafter to determine if chemical dispersion will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan.	Incident Log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
		The NEBA for dispersant application will consider the following inputs: • Trajectory of spill and sensitive receptors within EMBA • Forecast spill modelling of naturally and chemically dispersed oil • Ecotoxicity data (species protection trigger levels) for dispersed oil (including chemically dispersed oil) (once available) • Consultation with the HMA	Incident Log
		Commence aerial chemical dispersant application within 3 days of initial AMOSC notification (daylight and weather condition dependent)	Incident Log
		Commence mobilisation of Montara Infield Support Vessel (ISV) to conduct initial vessel dispersant application within 2 hours of spill notification	Incident Log
		Commence vessel chemical dispersant application within 42 hours of initial IMT activation (daylight and weather condition dependent)	Incident Log
		Each vessel shall have one person who has been trained in the operation of vessel-based dispersant systems and monitoring dispersant effectiveness	Incident Log
		Chemical dispersant applied in consultation with relevant statutory agencies & HMA.	Incident Log
		AMOSC, in consultation with IMT to complete an Air Operations Plan and submit to AMSA within 6 hours of initial activation to enable activation of the FWADC	Incident Log Air Operations Plan

Response Elements	Control Measures	Performance Standards	Measurement Criteria
		All surface chemical dispersant operations will occur during daylight hours only. At no time can chemical dispersant be applied: • In waters shallower than 20 m; • Within exclusion zones for offshore facilities; • Within an Australian Marine Park boundary or its buffer; • Over responders; and • Within State Waters.	Incident Log
		Application rates and dilution ratio monitored and adjusted daily based upon operational monitoring reports.	Incident Log
		The effectiveness of the aerial based chemical dispersion strategy is communicated to the Operations Lead via the Air-Attack Supervisors	Incident Log
		Response to continue until NEBA demonstrates no environmental benefit to use chemical dispersants.	Incident Log
Shoreline Protection and Deflection	Shoreline Protection and Deflection Action Plan	Activate Protection and Deflection (P&D) Action Plan within 24 hours of IMT activation	Incident Log
		NEBA undertaken within two hours of spill and daily thereafter to determine if protection and deflection will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan	Incident Log
		IMT to confirm priority receptors in consultation with the Control Agency	Incident Log
		Develop a P&D Plan (IAP Sub-Plan) (if required) within 12 hours of NEBA confirming an overall environmental benefit	Incident Log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
		IMT to refer to Kimberley Shoreline Response Plan (AMOSC, 2019a) when developing IAP sub-plan to assist in determining suitable tactics and capability	Incident Log
		Obtain regulatory approvals to access locations for P&D operations within 3 days of spill or 48 hours prior to estimated shoreline contact	Incident Log
		Commence deployment of personnel, equipment and vessels within 24 hours of completion of Protection and Deflection Plan	Incident Log
		Nearshore booming and skimming operations conducted during daylight hours only to minimise impacts from light emissions	Incident Log
Offshore Containment and Recovery (C&R)	Containment and Recovery Action Plan	Activate Containment and Recovery Action Plan within three hours of IMT activation	Incident Log
		NEBA undertaken within two hours of spill and daily thereafter to determine if containment and recovery will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan.	Incident Log
		Develop a Containment and Recovery Plan (IAP Sub-Plan) within 12 hours of NEBA confirming an overall environmental benefit	Incident Log
		Commence mobilisation of personnel, equipment and vessels within 12 hours of IMT activation	Incident Log
		Commence C&R operations within 48 hours of IMT activation	Incident Log
		Containment and recovery operations to be managed by a minimum of two trained Oil Spill Responders (per system)	Incident Log
		Review waste management options for C&R within 48 hours of IMT activation	Incident Log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
		Obtain approvals from relevant Jurisdictional Authority prior to commencing decanting operations	Incident Log
		Oily water collected during offshore containment and recovery to be decanted (if approved) behind boom.	Incident Log
		Offshore Equipment wash-down confined to hot zone.	Incident Log
Shoreline Clean-up	Shoreline Clean-up Action Plan	Activate Shoreline Clean-up Action Plan within 2 hours of potential shoreline contact within State/Territory	Incident Log
		NEBA undertaken within two hours of spill and daily thereafter to determine if shoreline clean-up will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan.	Incident Log
		IMT to confirm priority receptors in consultation with the Control Agency	Incident Log
		IMT to refer to the Kimberley Shoreline Response Plan (AMOSC, 2019a) when developing IAP sub-plan to assist in determining suitable tactics and capability	Incident Log
		Develop a Shoreline Clean-up Plan within 12 hours of NEBA confirming an overall environmental benefit	Incident Log
		Obtain regulatory approvals to access land within three days of spill or 48 hours prior to estimated contact with shoreline	Incident Log
		Commence deployment of personnel, equipment and vessels within 24 hours of completion of Shoreline Clean-up Plan	Incident Log
		Shoreline Team Lead to consult with SCAT Team and confirm shorelines for appropriate clean-up techniques prior to undertaking clean-up	Incident Log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
		Selection of the shoreline clean-up technique appropriate to shoreline type is to be undertaken in consultation with the Control Agency and selected based on SCAT surveys and NEBA.	Incident Log
		Shoreline clean-up team members are briefed by shoreline team leads on how to implement the shoreline clean-up techniques including how to prevent damage to shoreline habitat and surrounding laydown/staging areas.	Operational Orders
		Clean-up activities in sensitive environments shall be conducted in front of the primary dune and crews will not access behind the primary dune.	Incident Log
		Temporary waste storage on remote beaches should be located at the bottom of the primary dune and above the Highest Astronomical Tide (HAT) mark.	Incident Log
		Clean-up strategies will be implemented under the direction of the HMA (where relevant).	Incident Log
		A shoreline/ nearshore habitat/ bathymetry assessment is conducted prior to nearshore activities	Incident Log
		Demarcation zones to be established for shoreline operations involving vehicle and personnel movement considering vegetation, bird nesting/roosting areas and turtle nesting timeframes	Incident Log
		Access plans for shoreline operations will prioritise use of existing roads and tracks	Incident Log
		Terrestrial vehicle and equipment deployment via landing barges where there is no existing track access	Incident Log
		A Specialist Advisor is consulted if shoreline operations overlap with areas of cultural or heritage significance.	Incident Log
		Vehicles and equipment are verified as clean and invasive species free prior to deployment to site	Incident Log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
		Onshore equipment wash-down occurs in a decontamination area	Incident Log
		Shoreline team leads shall verify clean-up effectiveness and conduct final evaluations in consultation with SCAT Teams.	Incident Log
Oiled Wildlife Response (OWR)	Oiled Wildlife Response Action Plan	Activate OWR Action Plan within 24 hours of IMT activation	Incident Log
		NEBA undertaken within 24 hours of spill and daily thereafter to determine if OWR will have a net environmental benefit. NEBA is to be included in development of following period Incident Action Plan.	Incident Log
		OWR undertaken in accordance with the NT and WA Oiled Wildlife Response Plans and the Regional Oiled Wildlife Response Plans	Incident log
		Establish OWR structure within IMT within 24 hours of OWR risk being identified	Incident Log
		Stand-up OWR capability within 48 hours of OWR risk being identified, and onsite within seven days	Incident Log
		Commence mobilisation of OWR resources within 48 hours of OWR risk being identified	Incident Log
		Prepare IAP oiled wildlife response sub-plan within 24 hours of wildlife reconnaissance confirming potential or realised impacts to wildlife	Incident Log
		Mobilise trained oiled wildlife responders and relevant equipment to the nearest port to conduct pre-emptive capture and hazing operations, within 2 hours of operational NEBA confirming these tactics would result in a net benefit.	Incident Log
		Establish OWR facility (staging, rehab) to be onsite within seven days of OWR risk being identified	Incident Log

Response Elements	Control Measures	Performance Standards	Measurement Criteria
Waste Management	Waste Management Plan	Activate Waste Management Plan within 12 hours of IMT activation	Incident Log
		Request to stand up Waste Contractor to arrange waste pickup and transport undertaken immediately following assessment of need for waste management in the response.	Incident Log
		All decisions to escalate and de-escalate waste management equipment and personnel shall be approved by the IMT Leader	Incident Log
		The IAP process is to be used to determine the required level of response and the quantities and types of waste management equipment required.	Incident Log
		DoT OSCP 2015 Waste Management Sub-Plan Guidance considered as part of Jadestone's Waste Management Plan – Oil Spill Response Support (JS-70-PR-I-00037)	Incident Log
		All waste associated with oil spill response activity transported and disposed of in accordance with Environmental Protection (Controlled Waste) Regulations 2004, EP Act 1986 and associated regulations	Waste tracking records
		All waste associated with oiled wildlife facilities captured and disposed of in accordance with the NTOWRP and WAOWRP	Incident log
		Compliance with local government municipal waste requirements	Waste consignment records
		Onsite inductions include municipal waste requirements (how to manage domestic waste)	Incident log
		Reduce/ Reuse/ Recycle assessment of collected waste conducted by waste contractor.	

Response Elements	Control Measures	Performance Standards	Measurement Criteria
		The Waste Management Operations Team Leader shall communicate daily reports to the Logistics Team Leader to inform of required resources and response effectiveness.	Incident Log
		The Logistics Lead shall monitor and record the response to demonstrate all waste management legislative requirements are met.	Incident Log
		The State/Territory Waste Management Plan must be considered in development of the waste management plan by the Waste Contractor	Incident Log
		Demobilisation of the Waste Management Plan will be guided by IAP.	Incident Log
		Waste contractor shall track all wastes from point of generation (Warm-zones and Marinas) to final destination.	Waste contractor records
Scientific Monitoring	Scientific Monitoring Plan (GF-70-PR-I-00035)	Activate Scientific Monitoring Action Plan within 24hours of IMT activation	Incident Log
		An Environmental service provider is in place	Contract with Environmental service provider
		A Scientific Monitoring Implementation Plan is in place	
		Annual audit of capability and readiness as described in the Implementation Plan and SMP Framework is conducted by Jadestone	Audit Manual (JS-90-PR-G-00003)
		Participation in a Jadestone annual exercise for a spill response scenario by the Environmental service provider is undertaken	Emergency exercise

Response Elements	Control Measures	Performance Standards	Measurement Criteria
			evaluation report
		12 monthly review of SMPs post OPEP exercise. Six monthly external legislative review of environmental matters to ensure currency of information	Audit Manual (JS-90-PR-G-00003) Notification of membership Contract with external environmental consultancy
Activation of IMT	Competency and Training Management System [JS-60-PR-Q-00014]	IMT members are competent to undertake IMT role as defined by the Competency and Training Management System	Skills matrix and annual audit of Competency and Training Management system.
	Incident Management Team Response Plan [JS-70-PLN-F-0008]	IMT members available for an initial IMT briefing within 30 minutes of receiving the activation notification	Incident Log
		IMT members located in Perth will meet physically at the office within 3 hours of receiving the activation notification	Incident Log
		IMT Core Members will be maintained at numbers capable of responding defined in Table 7-2.	Skills matrix and annual audit of Competency

Response Elements	Control Measures	Performance Standards	Measurement Criteria
			and Training Management system.
General oil spill response activities	Sea Eagle-1 and Tahbilk-1 Vessel Based Activity OPEP (TM-50-PLN-I-00005) provides for task description for response activities to manage lighting during spill response	Nearshore booming and skimming operations conducted during daylight hours only	Incident Log
		Vessels to maintain minimal lighting required for safety and navigation requirements	Incident Log
	Vessels align with Montara Marine Facility Manual (MV-90- PR-H-00001) details vessel and helicopter operating requirements to reduce interactions with cetaceans	Spill response vessels and aircraft comply with EPBC Act Regulation 8 (cetacean interaction). Performance requirements as per Section 6.3 of EP	Incident Log
	International Air Pollution Prevention (IAPP) Certificate valid to certify measures	If required under MARPOL, vessels have a current IAPP Certificate.	IAPP or vessel inspection document

Response Elements	Control Measures	Performance Standards	Measurement Criteria
	are in place to reduce air emissions		
Operational discharges and wastes	Vessels comply with MARPOL and Protected Area sewage disposal requirements	Vessel sewage disposal will meet MARPOL Annex IV requirements. If vessel activities occur within protected areas, discharges will meet marine park management plan requirements and the DoT sewage strategy7	Vessel checklist or other confirmation from vessel master that requirements will be met
	Vessels comply with MARPOL requirements for oily water (bilge) discharges	Vessel oily water disposal will meet MARPOL Annex I requirements.	
	Vessels IMS management comply with the Biosecurity Manual (JS-70-MN-G-00001) which provides IMS prevention requirements	All vessels demonstrate compliance with the biosecurity manual requirements	Documented evidence of compliance with DAWE ballast water management requirements.
			Documented evidence of effective management of ship biofouling management, consistent

7 http://www.transport.wa.gov.au/mediaFiles/marine/MAC-IS-SewageStrategy.pdf

Response Elements	Control Measures	Performance Standards	Measurement Criteria
			with National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (2009).
Disruption to other users of marine and coastal area townships	Consultation undertaken in accordance with Jadestone Energy Consultation of Relevant Persons Procedure (JS-70-PR-I-00034) prior to deployment in populated areas	Consultation is undertaken with relevant stakeholders prior to deployment of resources to townships and marine/coastal areas	Consultation records
	Localised Risk Management Assessment undertaken to minimise potential impacts on populated areas	A Risk Management Assessment is undertaken prior to large scale deployment to populated areas	Risk Management Assessment

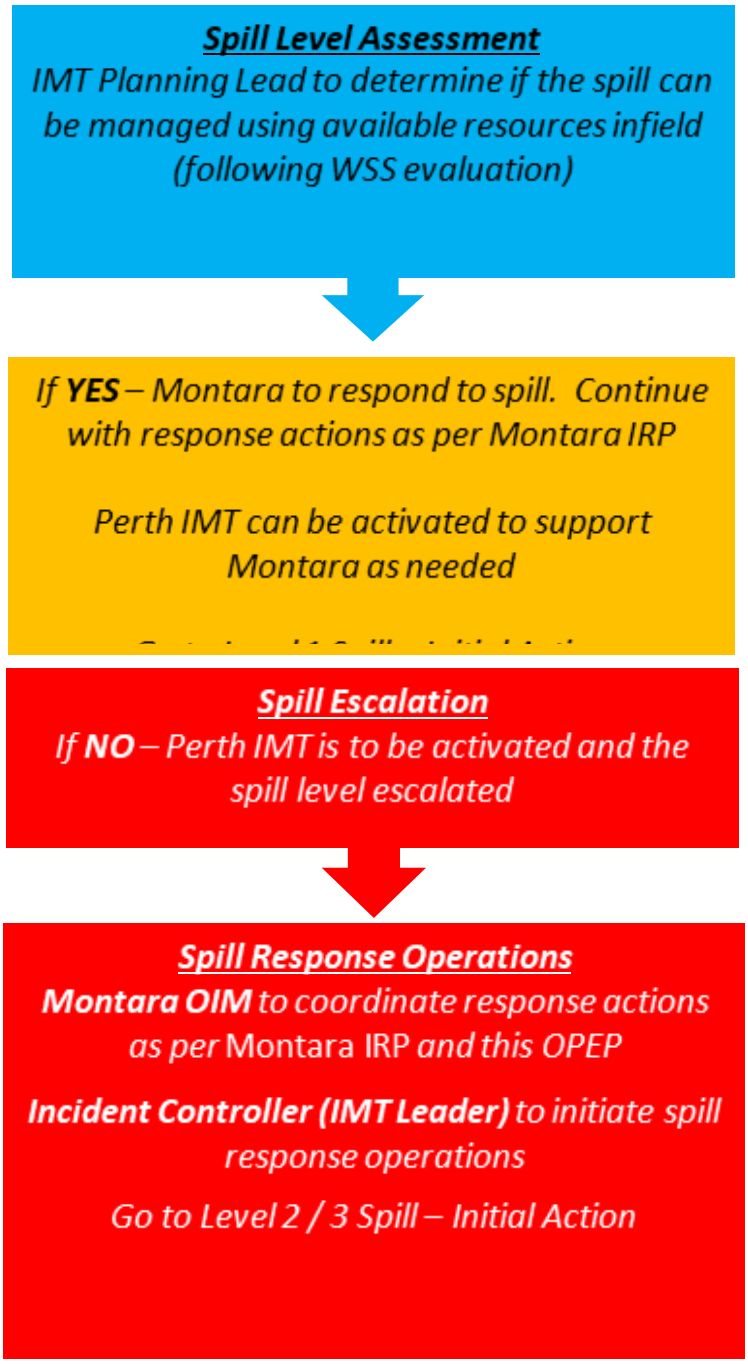
PART B – RESPONSE

16. RESPONSE ACTIONS

16.1 Initial Actions

The following sections within this OPEP are provided in order to assist and aid the Jadestone Incident Management Team (IMT) and wider organisation in reacting to and coordinating the ongoing requirements of an oil spill incident from Sea Eagle-1 or Tahbilk-1, within the Montara Field, as outlined in Part A.

The following initial actions tables provide broad guidance which is to be followed on activation of the IMT and need to stand up the organisations oil spill response arrangements.



16.2 Level One Spill – Initial Actions

LEVEL ONE SPILL - INITIAL ACTIONS	
Primary Objectives:	1. Gain control of the spill source (stop or minimise further loss) 2. Build and maintain situational awareness
Priority receptors:	**Spill Response Strategies:**
• N/A	1. Source Control 2. Operational monitoring

INITIAL ACTIONS			
Timeframe	**Strategies**	**Tactics (what is to be done)**	**Reference (how to do it)**
60 mins	Activate **Source Control** – fuel tank rupture from vessel collision	Isolate hydrocarbon leak source and control source of the spill	Shipboard Oil Pollution Emergency Plan (SOPEP) Montara Incident Response Plan
60 mins	Activate **Operational Monitoring**	Deploy tracking buoys Conduct visual surveillance Report weather information to IMT Determine extent of spill (volume, size, movement)	Section 16.6
2 Hours	Commence **Notifications**	Complete all relevant verbal & written notifications to regulatory agencies and support organisations. IMT to assist if required	Section **Error! Reference source not found.** Appendix A6 Regulatory Notifications

16.3 Level Two / Three – Initial Actions

LEVEL 2 / 3 SPILL - INITIAL ACTIONS	
Primary Objectives	1. Gain control of spill source (stop or minimise further loss) 2. Build and maintain situational awareness 3. Minimise oiling of priority receptors
Priority Receptors:	**Spill Response Strategies:**
• Scott Reef* • Seringapatam Reef* • Ashmore / Cartier • Cassini Island • Adele Island • Clerke Reef* • Imperieuse Reef* • Kimberley Coast • Joseph Bonaparte Gulf (NT) • Indonesia • Timor-Leste	1. Source control 2. Operational Monitoring 3. Chemical Dispersion 4. Containment and Recovery 5. Protection and Deflection 6. Shoreline Clean-up 7. Oiled Wildlife Response 8. Scientific Monitoring

*Predominantly intertidal receptors apart from small dry emergent areas such as Sandy Islet on South Scott Reef, Cunningham Islet on Imperieuse Reef, and Bedwell Islet on Clerke Reef

LEVEL 2/3 SPILL: INITIAL ACTIONS			
Timeframe	**Strategies**	**Tactics (what is to be done)**	**Reference (how to do it)**
60 mins	Activate Source Control – fuel tank rupture from vessel collision	Isolate hydrocarbon leak source/shut down equipment as per normal operating practice.	Shipboard Oil Pollution Emergency Plan (SOPEP) Montara Incident Response Plan
60 mins	Activate Operational Monitoring Action Plan	Deployment of resources to build and maintain situational awareness	Section 16.6
2 hours	Commence Notifications Plan	Complete all relevant verbal & written notifications to regulatory agencies and support organisations. IMT to assist if required	Section **Error! Reference source not found.** Appendix A6 Regulatory Notifications
2 hours	Activate Surface Chemical Dispersion Action Plan	Mobilisation and deployment of vessel/aerial dispersant	Section 16.7

LEVEL 2/3 SPILL: INITIAL ACTIONS			
Timeframe	**Strategies**	**Tactics (what is to be done)**	**Reference (how to do it)**
		equipment, dispersant stockpiles and resources to reduce the impact of the oil on the priority receptors	
3 hours	Activate Containment and Recovery Action Plan	Mobilisation and deployment of vessels, personnel and equipment to reduce volume of oil impacting priority receptors	Section 16.8
24 hours	Activate the nearshore Protection and Deflection Strategy Action Plan	Booming configurations to protect sensitivities or deflect oil away from sensitivities	Section 16.9
24 hours	Activate Scientific Monitoring Plan	Scientific monitoring plans to be conducted throughout spill response activities as directed by ongoing IAPs.	Operational and Scientific Monitoring Program
2 hours of potential shoreline contact with State/Territory	Activate the Shoreline Clean-Up Strategy Action Plan	Shoreline assessment and selection of suitable clean-up techniques. Deployment of personnel and resources to clean-up impact locations	Section 0
24 hours	Activate the Oiled Wildlife Response Action Plan	Mobilisation of support and resources to manage and coordinate oiled wildlife response operations	Section 16.11 WA/NT OWRP / IMTRP
24 hours	Activate the Waste Management Plan to prepare for managing waste & safe treatment and disposal of oily contaminated materials	Activation of initial waste collection, storage, and transport options.	IMTRP Waste Management Contractor Oil Spill Waste Management Plan
As the situation dictates	Commence transition to pro-active incident management by completing the IAP process.	Develop IAPs for subsequent operational periods. Document 'Performance Objectives' and 'Measurement Criteria' against actions in IAPs, and feed performance data into the development of subsequent IAPs. Manage the response documentation and records to ensure sufficient information is available to post-incident cost recovery and litigation processes.	Incident Management Team Response Plan (IMTRP)

16.4 Notification and Activation

ACTION PLAN: INITIAL NOTIFICATIONS & ACTIVATIONS				
Aim: To provide early notification (and activation if required) to essential support organisations & regulatory agencies.				
Task		**Actions**	**Resources**	**Timeframe**
1. Contact and provide incident information to support and regulatory organisations Responsible Person: IMT Leader to delegate task				
Note: - Notification and/or activation of these support organisations is to be clearly annotated in the IMT Incident Log, additionally, all associated contracts/forms are to be filed. - To reduce confusion, IMT (Log or Ops) is to assume **PRIMARY** point of contact with AMOSC and OSRL (+ AMSA if resources are required)				
INITIAL RESPONSE ACTIO NS	**Initial Response (Support Organisations)** IMT Leader to direct designated IMT staff to conduct "initial" notifications to relevant support organisations.	**Australian Marine Oil Spill Centre (AMOSC)** <u>Verbal</u> Call AMOSC Duty Officer and provide initial incident notification. An initial call should be completed as soon as possible so that AMOSC can start their own internal preparations for activation. This initial call can be followed up once more information is known and a decision has been made as to what spill response equipment / personnel are going to be required. <u>Signed Contract Note</u> After verbal notification AMOSC will email a copy of Contract Note which will formalise activation. The CN must be signed by an authorised member of staff and returned to AMOSC. **Note:** may also include requirement to access SFRT (see Source Control)	For all - Contact details as per Jadestone Phone Book : 24hr Phone: 0438 379 328 Office Phone : (03) 5272 1555 Email: <u>amosc@amosc.com.au</u> JADESTONE call out authorities to AMOSC are the following: • Country Manager (Australia); • Operations Manager (Australia); • Finance Manager (Australia); • Maintenance & Engineering Manager; and • Incident Management Team (IMT) Leader.	ASAP (< 60 mins)

		Oil Spill Response Ltd (OSRL) Verbal Call OSRL Duty Manager and provide initial incident notification Call is to be followed up with the OSRL Notification form and signed Mobilisation Authorisation form which are to be sent to OSRL once signed by an authorised member of staff.	24hr Phone: +65 6266 1566 Email: dutymanagers@oilspillresponse.com JADESTONE authorised signatories (above)	ASAP (< 60 mins)
		Australian Marine Safety Authority (AMSA) Verbal Call AMSA and provide initial incident notification. An initial call should be completed as soon as possible for two reasons: a) Incident notification; and b) So that Jadestone can request mobilisation of AMSA resources as quickly as possible. This initial call is to be followed up with a written POLREP	Primary contact (Canberra) 1800-641-792 (02)6230-6811	ASAP (< 60 mins)
		Wild Well Control (WWC) Verbal If loss of control of a well had occurred, then notifications should be done as per the Jadestone Notification Process provided in the Blowout Contingency Plan (JS-70-PLN-D-00001) and included in Section 16.5. After verbal notification JADESTONE to complete and sign the appropriate WWC Data Acquisition Form (see Appendix G of the BCP) and submit it via email to WWC	Primary contact (Houston) 24hr Phone: +1 281 784 4700 Secondary contact (Aberdeen) 24hr Phone: +44 (0) 1224 215380 Email: wellcontained@wildwell.com Jadestone IMT Leader, Drilling Manager or Drilling Superintendent	ASAP (< 60 mins)
ONGOING RESPONSE	**Notification of Regulatory Organisations** IMT Leader to direct IMT staff to complete required	Complete all relevant verbal and written regulatory notifications listed in Appendix A6 – Regulatory Notifications	Appendix A6 – Regulatory Notifications	To be commenced as soon as practicable,

	regulatory/compliance notifications.			and no later than 2 hours of spill occurring
	Secondary Response (Support Organisations) IMT Leader to direct designated IMT staff to conduct notification/activation of secondary support organisations	**Jacobs (Scientific Monitoring Programme)** Call to be made to Jacobs providing them with information relating to the incident and intention with respect to activation of the SMP. Call is to be followed up with written confirmation **Waste Management Contractor (Oil Spill Response Waste Management Plan)**	**<u>Refer IMT Contact List</u>** 24 hr Contact details Contact details as per Jadestone Phone Book	Jacobs: within 6 hours of spill notification Waste management contractor: within 12 hours of spill notification

16.5 Source Control Action Plan

For a total loss of well control event (blowout), a Blowout Contingency Plan (BCP) (JS-70-PLN-D-00001) has been developed to cover the management of Source control actions. These actions apply only to a LOWC Level 3 spill. Source control actions related to other credible scenarios will be managed in accordance with the vessel SOPEP and Jadestone ERPs as described in Section 8.

The Initial Jadestone Notification Process for a loss of well control is shown below, and as provided in the BCP, Figure 1.

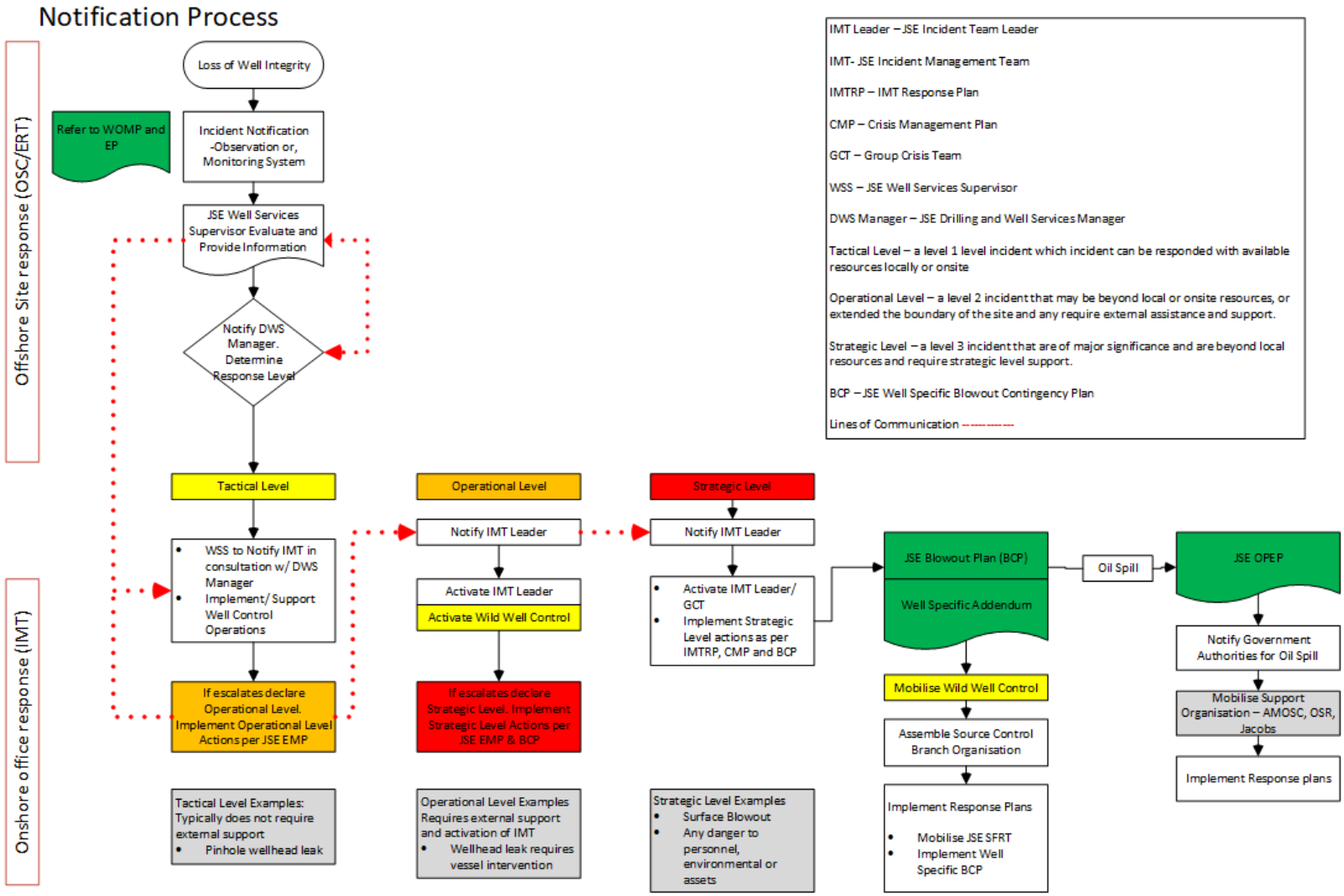


Figure 16-1 : Blowout Contingency Plan - Notification Process

ACTION PLAN: SOURCE CONTROL			
1. Commence initial response actions Responsible Person: IMT Leader (to delegate)			
Task		**Resources**	**Timeframe**
INITIAL RESPONSE ACTIONS	The following actions will be undertaken as an initial response to any source control incident: 1. Vessel to undertake initial response actions as per their IRP / SOPEP.	Shipboard Oil Pollution Emergency Plan (SOPEP)	Immediately
2	**LOWC Incident Level 3 Only** **Source control actions relating to other credible scenarios such as surface release from vessel collision will be managed in accordance with the vessel ERP / SOPEP.**		

INITIAL RESPONSE ACTIONS	The following actions will be undertaken as an initial response to a LOWC incident resulting in a Level 3 spill: 1. Initiate first response actions as per the Blowout Contingency Plan; and 2. Notify / mobilise specialist personnel: a) AMOSC / Oceaneering Australia; b) Wild Well Control (WWC); and c) Others (OSRL, consultants etc as required)	**Personnel** Specialist personnel (i.e. from WWC, AMOSC / Oceaneering Australia etc) **Forms and Guidance** AMOSC General and SFRT Service Contracts Oceaneering Australia Master Contract WWC Master Service Agreement and Equipment Access Agreement Blowout Contingency Plan Notification / activation forms **Deliverables** Completed Drilling and Production Incident Data Checklist; Technical Data Archive Checklist; Personnel Debriefing Checklist.	ASAP: Notifications within 60 minutes of spill Initial source control response actions within 12-24 hours
2. Mobilise source control resources (as appropriate – subsea LOWC) Responsible Person: Operations Lead			

INITIAL RESPONSE ACTIO NS	Mobilise AMOSC Subsea First Response Toolkit (SFRT) (for subsea LOWC): 1. Activate SFRT mobilisation with AMOSC (~2 hours) a. Jadestone provides AMOSC with proof of insurance and a copy of its Operations, Training and Advice (OTA) Agreement in place with Oceaneering b. Execute SFRT Contract Note between AMOSC and Jadestone 2. Contract suitable construction class vessel capable of deploying SFRT equipment (allow 7 days for vessel readiness in Darwin); 3. Arrange road freight of SFRT equipment from Jandakot to Darwin (10 hours to arrange, up to 7 days to transport depending on the time of year); 4. Arrange road freight of initial AMOSC SRFT dispersant from Hamilton Hill (60 hours) followed by ongoing supply; 5. Arrange load out of SFRT equipment and dispersant onto vessel in Darwin (8 hours); 6. Transit to field (36 hours); and 7. Mobilise trained personnel from Oceaneering Australia (Jandakot) to be in Darwin for loadout of vessel (5 above).	**Requirements** AMOSC SFRT equipment (Jandakot) and Dispersant (Fremantle) 1 x construction class vessel to deploy SFRT equipment 1 x vessel for WROVs & tooling - 2 x WROVs Jadestone contracted logistics provider (Road Transport) Toll Logistics (Darwin Supply Base) **Personnel** Oceaneering Australia personnel Construction class vessel crews ROV vessel crews Jadestone/Toll Logistics staff **Forms and Guidance** AMOSC SFRT Contract Note AMOSC SFRT Mobilisation Procedure Oceaneering Australia procedures	Commence activation of SFRT and contracting a vessel within 24 hours of spill notification SFRT equipment and vessel in Darwin within 7-days of spill notification Vessel loaded and commence transit within 7.5 days of spill notification Equipment infield within 9 days of spill of spill notification

3. Commence survey and planning – subsea LOWC Responsible Person: Site Survey Unit Leader			
ONGOING RESPONSE ACTIONS	1. Undertake site survey to inform source control options: a) Deploy ROVs to inspect well site; b) Test surface air quality; c) Map debris field; d) Determine wellhead damage, subsea structure integrity and wellhead inclination; e) Determine source(s) of hydrocarbon release and geometry of release point(s); and f) Provide continuous ROV video and data feed to support facilities (intervention vessels, EMT etc.).	**Equipment** AMOSC SFRT survey equipment ROVs SFRT construction class vessels **Personnel** Site Survey Unit (WWC / Oceaneering Australia) **Forms and Guidance** Source Control Plan Site Survey Unit Source Control Response Decision Tree Site Survey Unit Leader Checklist Site Survey Procedure Well Control Data Sheet Site Survey Data checklist Oceaneering Australia procedures **Deliverables** Air quality results Infrastructure status reports Debris maps ROV video and data feed Completed Well Control Data Sheets Completed Site Survey Data checklists	Commence within 10 days of spill notification

4. Undertake well debris removal (if applicable – subsea LOWC) Responsible Person: Debris Removal Unit Leader			
	A. Develop a debris removal plan.	**Personnel** Debris Removal Unit (WWC / Oceaneering Australia) **Deliverables** Debris Removal Plan	Commence within 12 days of spill notification
	B. Commence debris removal: a) Clear any debris that could impede well control operations (guideposts or guidebase); b) Identify the chain of custody for any debris recovered; and c) Identify and maintain a "wet store" area.	**Equipment** AMOSC SFRT debris removal equipment WWC debris removal equipment: SFRT construction class vessels **Personnel** Debris Removal Unit (WWC / Oceaneering Australia) Drill rig contractor / Construction class vessel crews **Forms and Guidance** Source Control Plan Oceaneering Australia procedures **Deliverables** Daily Operations Report	Commence light debris removal within 13 days of spill notification using AMOSC SFRT equipment Commence heavy debris removal within 21 days of spill notification using WWC equipment
5. Commence subsurface dispersant injection (SSDI) (if applicable) Responsible Person: Subsea Dispersant Unit Leader			
	1. Commence subsurface dispersant injection (SSDI): a) Develop dispersant application and monitoring plan to include detail on rates, injection location(s) and monitoring requirements; b) Commence subsea dispersant injection (ongoing); c) Conduct monitoring (ongoing); and d) Replenish dispersant stocks (ongoing).	**Equipment** AMOSC SFRT dispersant injection equipment Dispersant ROVs SFRT construction class vessels **Personnel**	Commence within 10 days of spill notification using AMOSC SFRT equipment

	2. Conduct daily re-evaluation of subsea dispersant effectiveness monitoring data to determine efficacy of response strategy and include the results in the operational NEBA and IAP. Modify dispersant delivery rates and/or application method according to monitoring data (if applicable).	Subsea Dispersant Unit (Oceaneering Australia) Construction class vessel crews **Forms and Guidance** Oceaneering procedures Subsea Dispersant System Installation and Operation Manual Source Control Plan Subsea Dispersant Unit Leader Checklist Dispersant System Deployment Procedure Subsea dispersant effectiveness monitoring data NEBA	
6. Relief well Responsible Person: Relief Well Group Leader			
INITIAL RESPONSE ACTIONS	1. Mobilise a drill rig, support vessels and equipment for relief well drilling (for surface and subsea LOWC): 2. Source and contract a drill rig and support vessels to drill the well(s); a) Available to Jadestone via the AMOSPlan. Additionally, Jadestone monitors the availability of suitable drill rigs and support vessels during drilling campaigns and has signed the APPEA MOU for mutual assistance for relief well drilling. 3. Source and mobilise associated drilling consumables.	**Equipment** Drill rig Support vessels Wellhead and casing Kill fluid, cement and other bulk supplies Ranging equipment Drilling assemblies and steering tools **Personnel** Relief Well Group **Forms and Guidance** Source Control Plan Well Specific Addendum	Commence contracting drill rig within 24 hours of spill notification Estimated to have rig infield within 23 days of spill notification

	1. Finalise Relief Well Plan: a) Determine if impacted rig may be used for relief rig; b) Determine number of relief wells to be drilled; c) Update information on reservoir and wellbore geometry; d) Confirm available resources (i.e. rig, tubular goods, pumping fluids etc); e) Finalise surface location and rig move plan; f) Confirm any permit requirements and obtain (if applicable); and g) Issue Relief Well Drilling Program.	**Personnel** Relief Well Group (WWC / direction drilling contractor / drill rig contractor / other third parties) **Forms and Guidance** Blowout Contingency Plan Well Specific Addendum Preliminary Relief Well Plan **Deliverables** Relief Well Drilling Program Completed Information Needed for Preliminary Relief Well Planning and Dynamic Kill Strategy Checklists	Commence development within 48 hours of spill notification Plan finalised prior to drilling into reservoir
	1. Drill a relief well: a) Mooring and rig positioning; and b) Drill relief well.	**Equipment** Drill rig Support vessels Wellhead and casing Kill fluid, cement and other bulk supplies Ranging equipment Drilling assemblies and steering tools **Personnel** Relief Well Group (WWC / direction drilling contractor / drill rig contractor / other third parties) Drill rig and support vessel crews **Forms and Guidance** Relief Well Drilling Program Blowout Contingency Plan Relief Well Group Relief Well Group Leader Checklist	Commence drilling relief well activities within 24 days of spill notification

		Relief Well **Deliverables** Daily Operations Report Well Construction Report	
4. Complete well kill Responsible Person: Well Kill Unit Leader			
	1. Finalise Relief Well Kill Plan: a) Review reservoir and wellbore data; b) Review kill weights and pumping rates; c) Assess options for well kill using capping stack (if applicable); d) Finalise the Well Kill Plan; and e) Finalise equipment and consumable requirements.	**Personnel** Well Kill Unit (WWC) **Forms and Guidance** Source Control Plan Well Specific Addendum Preliminary Relief Well Kill Plan **Deliverables** Relief Well Kill Plan Capping Stack Kill Plan (if applicable) Completed Information Needed for Preliminary Relief Well Planning and Dynamic Kill Strategy Checklists	Commence within 7 days of spill notification
	A. Conduct kill operations: i) Well Kill.	**Equipment** Drill rig Support vessels Capping stack construction class vessel (if applicable) Pumping vessel / equipment (if applicable) Kill fluid **Personnel** Well Kill Unit (WWC / drill rig contractor / other third parties)	Commence within 77 days of spill notification for relief well kill

		Drill rig and support vessel crews Construction class vessel crew (if applicable) **Forms and Guidance** Blowout Contingency Plan Capping Stack Kill Plan (if applicable) **Deliverables** Daily Operations Report Well Construction Report	
5. Decontaminate and demobilise Responsible Person: Decontamination and Demobilisation Unit Leader			
	1. Develop decontamination and demobilisation plan. 2. Undertake decontamination activities: a) Offshore decontamination of drill rig / facility / support vessels; b) Final decontamination at shipyards where required; and c) Hazardous waste disposal. 3. Demobilise drill rig / construction class vessels / support vessels / equipment / personnel as applicable.	**Equipment** Decontamination equipment **Personnel** Decontamination and Demobilisation Unit (WWC) Decontamination contractors Waste contractors **Forms and Guidance** Blowout Contingency Plan Decontamination and Demobilisation Unit Decontamination and Demobilisation Unit Leader Checklist Decontamination and Demobilisation Plan **Deliverables** Waste and decontamination records	Ongoing throughout and after response until all equipment is decontaminated and demobilised

16.6 Operational Monitoring Plan

ACTION PLAN: MONITOR AND EVALUATE				
Aim: To build and maintain the most accurate picture regarding the spill and oil lost into the marine environment in the most effective and efficient manner				
Task		**Actions**	**Resources**	**Timeframe**
1. Deployment of satellite tracking buoy (TB) Responsible Person: OIM / IMT (Planning)				
INITIAL RESPONSE ACTIONS	**Deploy and access tracking buoy information** OIM to direct crew to mobilise buoy from the facility to a vessel for deployment as close as is safe to the leading edge of the spill.	1. OIM (or Rep) to report to IMT as soon as TB has been deployed 2. OIM (or Rep) to provide IMT with current weather conditions at Montara (wind, sea state, current direction) – IMT to log information and add to Common Operating Picture (COP) **3.** IMT to confirm deployment via TB website using associated login information (ensure IMT Leader is briefed). **Refer IMT OneNote for FastWave- Login details for Tracker Buoys.** 4. IMT to ensure TB location is added to the COP 5. IMT to ensure deployment of TB is captured in Incident Log **Note:** Buoys are not to be dropped from a height of greater than 10m to water surface.	Satellite tracking buoys - FPSO Support vessel if available	Deploy within 3 hours of spill (subject to vessel availability and weather conditions.) and continually track thereafter
ONGOING ACTIONS	**Deployment of additional tracking buoy** OIM/Vessel Masters to liaise with IMT with respect to the continued deployment of TB.	1. As part the ongoing response the IAP is to include guidance to the OIM (of vessels) with respect to the continued deployment of available TB in support of operational monitoring of the spill 2. Deployed TB are to be continually monitored by the IMT (Planning) and added to the COP as a regular action 3. Deployment of the TB's to captured in Incident Log	Incident Action Plan (IAP)	As detailed within the IAP
2. Commencement of aerial surveillance operations (for Level 2 / 3 spills) Responsible Person: IMT				

INITIAL RESPONSE ACTIONS	**Activation of initial aerial surveillance flights** Source and mobilise available aircraft to commence aerial surveillance of the spill	1. IMT (Log) to contact Babcock to confirm availability of a helicopter to conduct an initial surveillance flights in vicinity of the spill a. Confirm approx. time flight can depart (or be re-tasked) b. Confirm crew composition – likely a trained observer will not be available. Flight can be conducted using a standard crew and should be flown as soon as practicable. 2. IMT (Plan or Ops) to contact AMOSC (requesting assistance with sourcing trained observers) 3. IMT (Ops) to liaise with the OIM regarding approval to commence surveillance flight in vicinity of the facility 4. IMT (Log/Ops) – once aircraft and crew have been confirmed, IMT Leader is to be updated. 5. IMT (Ops) ensure flight details are captured in the incident log (all details pertaining to the flight) 6. IMT (Ops) to assume primary coordination for flight. Provide Babcock with tasking information 7. IMT (Ops) to contact Babcock and confirm that all safety requirements have been met. Capture in incident log. 8. IMT (Ops) to monitor flight with Babcock ensuring that the IMT are briefed regularly. Once complete ensure that all relevant information is provided back to the IMT so that it can be assessed, included into the COP and further flights determined. 9. All information should be entered into an Aerial Surveillance Observation Log (refer Appendix A1) which will be sent to the IMT within an hour of the aircraft returning to its operating base. Where possible, a verbal report via radio/telephone en-route providing relevant information should be considered if the aircraft has long transits from the spill location to base.	**Equipment** Babcock helicopters (Truscott) Air North or other provider fixed wing aircraft (Darwin) **Personnel** 1 x Trained Aerial Observer (sourced from AMOSC, AMSA or OSRL). **Note:** Initial reconnaissance may be completed by an untrained observer while waiting for trained observers to arrive. **Forms and Guidance** Aerial Surveillance Tasking Form Aerial Surveillance Observation Log (refer Appendix A1) Aerial Surveillance Marine Fauna Sighting Record Sheet (refer Appendix A1) **Deliverables** Completed Aerial and Fauna Surveillance Forms Photographs / video footage	Mobilisation of initial surveillance within 6 hours of spill notification (At least 1 aircraft available at airbase within 24 hours of mobilisation request) Trained aerial observers within 48 hours of notification

ACTION PLAN: MONITOR AND EVALUATE				
		10. Aerial Observers shall note fauna sightings in the Aerial Surveillance Marine Fauna Sighting Record Sheet. The location and details of each sighting should be recorded with a cross-reference to photographic imagery captured. The Aerial Surveillance Marine Fauna Sighting Record Sheet is provided in Appendix A1. **Note:** if Infield Support Vessel (ISV) is onsite and tasked to commence dispersant operations all surveillance flights are to be tasked to provide updates of spill location when operating in the same operational zone		

ACTION PLAN: MONITOR AND EVALUATE				
ONGOING RESPONSE ACTIONS	**Ongoing coordination of aerial surveillance flights** Development and coordination of surveillance flights **Note:** Coordination of aviation operations is essential. Therefore, flight-schedule is to cover ALL planned aviation operations on a daily basis.	IMT (Ops) to develop a flight schedule for ongoing surveillance as required: 1. Source fixed wing aircraft from Air North to commence aerial surveillance operations from Day 2 **Note:** A second fixed wing aircraft will be requested from Air North to support aerial dispersant operations from Day 3 2. Develop aerial surveillance flight schedule which includes the following operations: a. Aerial surveillance utilising Babcock helicopters (Truscott) - Day 1 & 2 b. Aerial surveillance using fixed wing (Air North) from Darwin – Day 2 onwards c. Aerial dispersant operations from Darwin (Hercules) and Truscott (Air Tractor) d. Aerial Spotter flights in support of the dispersant application 3. The frequency of flights will be sufficient to ensure that the information collected during each flight (i.e. observer log and spill mapping) meets the information needs to validate dispersion of the spill and supports ongoing response operations 4. Flight schedule is to ensure that ALL aircraft operations are conducted safely and support “other” response operations where necessary 5. Aerial surveillance to continue daily until termination criteria are met	Incident Action Plan (IAP)	As per operational period

ACTION PLAN: MONITOR AND EVALUATE				
INITIAL RESPONSE ACTIONS	**3. Commencement satellite imagery acquisition (for Level 2 / 3 spills)** Responsible Person: IMT (Planning)			
	Provision of satellite imagery to the IMT Mobilise KSAT (through AMOSC) to produce daily satellite images	1. IMT (Planning) to notify AMOSC Duty Officer to request initiation of satellite services via KSAT (OSRL subscription available as a secondary option) and provision of daily imagery 2. IMT (Planning) to combine satellite data with optical imagery (e.g. aerial surveillance, vessel-based observations) to mitigate issues these optical imagery results may present with angle of insolation, thick cloud cover and night **Ongoing Response Actions** 3. Request satellite imagery be provided daily throughout the duration of the response until termination criteria are met. Integrate data into COP. Receipt of all daily imagery is to be captured in the incident log. Note: Satellite data imagery will depend on satellite availability and location in orbit	AMOSC Activation to be completed Contract note executed Mobilisation of AMOSC resources needs to be coordinated across all response strategies where support is required. **Deliverables** Daily satellite images	Request within 6 hours of spill notification Satellite imagery delivered to IMT within 24 hours of request to service provider Daily data acquisition

ACTION PLAN: MONITOR AND EVALUATE				
4. Oil spill trajectory modelling (OSTM) Responsible Person: IMT (Planning)				
INITIAL RESPONSE ACTIONS	**Provision of OSTM to the IMT** Mobilise RPS APASA via AMOSC to produce three day forecast model outputs.	1. IMT (Plan) to contact AMOSC and arrange for oil spill trajectory modelling to be provided by RPS APASA. Will require completion of the RPS spill modelling request form 2. IMT (Plan) update incident log with request for OSTM and estimated time of delivery. 3. Provide RPS with data from aerial surveillance so that they can verify and adjust fate predictions of the spill and improve predictive accuracy. **Ongoing Response Actions** 4. IMT (Plan) to request ongoing OSTM to be provided on a daily basis. To ensure that COP is updated when provided. Receipt of all daily OSTM is to be captured in the incident log. 5. OSTM to continue daily until termination criteria are met	**Forms and Guidance** RPS trajectory modelling request form in One Note Email: Response@apasa.com.au Mobile: 0407 477 196 **Deliverables** OSTM three day forecast outputs daily	Within 24 hours of spill notification OSTM to commence within approximately three hours of request submission Repeat as required

ACTION PLAN: MONITOR AND EVALUATE				
5. Vessel surveillance Responsible Person: OIM or IMT (Operations & Logistics)				
INITIAL RESPONSE ACTIONS	**Mobilisation of vessels to conduct surveillance** Source and mobilise available vessels to commence surveillance of the spill	1. IMT (Ops & Log) to source available vessels to commence surveillance of the spill a) Contracted vessels b) Vessels of opportunity 2. IMT to liaise with OIM with respect to vessels operating in and around the facility 3. Vessels to be tasked to gather the following information about the spill: a) Location (latitude and longitude); b) Size and volume; c) Direction of movement; d) Visual appearance of the slick (colours, emulsification etc); e) Associated weather conditions in vicinity of the spill (wind speed/direction, sea state, swell); f) Any marine fauna or other activities observed; and g) Photographic images. 4. Vessel Master to provide information back to the IMT within 60 mins of completing surveillance: a) Complete Vessel Surveillance Observation Log b) Email completed logs to the IC within an hour of completion. Include photographs and GPS data where available.	**Deliverables** Completed Vessel Surveillance Observation Log and Marine Fauna Sighting Record Sheet (refer Appendix A1) Photographs / video footage	Vessel surveillance initiated within 24 hours of spill notification Vessel surveillance reports submitted to IMT within 60 mins of completing surveillance

ACTION PLAN: MONITOR AND EVALUATE				
6. Fluorometry Responsible Person: IMT (Planning & Logistics)				
	Mobilise fluorometry via Jacobs Environmental and CSIRO	1. IMT (Plan) to contact Jacobs Environmental and activate services. To confirm what logistical requirements will be required to support. 2. IMT (Logistics) to discuss with Planning requirements. Action as required. 3. IMT (Plan) discuss need for additional fluorometers (multiple towed fluorometers are available from CSIRO) 4. Jacobs Environmental to provide daily fluorometry results to IMT **Note**: Fluorometry surveys are used to inform the ongoing dispersant decision-making process and the techniques used will be consistent with the Special Monitoring of Applied Response Technologies (SMART) monitoring protocol (NOAA, 2006).	**Personnel and equipment** 1 x person trained to interpret data 5 x fluorometers **Logistics** Specific requirements to be discussed and confirmed with CSIRO	Mobilised within 7 days of spill notification Fluorometry results provided to IMT within 24 hours of completion of daily survey
7. Shoreline and Coastal Habitat Assessment Responsible Person: IMT (Planning & Logistics)				
	Mobilisation of personnel to conduct Shoreline and Coastal Habitat Assessment Surveys Source and mobilise available personnel and equipment to commence shoreline and coastal habitat assessment	1. IMT (Log) to contact AMOSC and OSRL to confirm availability of personnel to conduct assessment surveys 2. IMT (Plan or Ops) to contact vessel and equipment providers to support assessment surveys 3. IMT (Ops) to arrange all safety requirements for shoreline assessment survey deployment. Capture in incident log. 4. IMT (Plan) to identify priority locations to deploy shoreline assessment survey teams by consulting the NEBA (e.g. location of priority receptors, seasonal presence) and existing operational monitoring data that will help confirm locations that will be/have been contacted by hydrocarbons.	**Equipment** Vessels Aircraft Aerial survey equipment (e.g. UAVs) All-terrain vehicles **Personnel** Trained Personnel (sourced from AMOSC and/or OSRL) **Forms and Guidance**	Commence deployment of SCAT Teams within 48 hours of becoming aware of potential impacts to state /

ACTION PLAN: MONITOR AND EVALUATE				
		IMT (Ops) to mobilise Survey Teams to commence assessment surveys prior to shoreline contact to obtain pre-contact data, where possible **Note:** Unmanned Aerial Vehicles (UAVs) may be necessary for some sensitive environments and where personnel safety is at risk (e.g. UXO's at Cartier Island, dangerous fauna in remote locations)	Shoreline and Coastal Habitat Assessment Survey Form (refer Appendix A3) **Deliverables** Completed Shoreline and Coastal Habitat Assessment Survey Form Photographs / video footage	territory waters
	Commence Shoreline and Coastal Habitat Assessment Surveys	1. Undertake shoreline assessment (SCAT) ground / aerial survey (depending on access) and sampling as per AMSA / ITOPF / NOAA guidelines (included in Key References above): • Undertake pre-impact survey to obtain baseline information, where possible • Undertake post-impact survey to confirm: i) Levels of oil stranding; ii) Actual impacts to environmental sensitivities; iii) Priorities for clean-up; iv) Resources required to implement a clean-up operation; v) Appropriate cleaning methods according to shoreline conditions and oil loading, i.e.: (1) Natural recovery with monitoring; (2) Beach pre-cleaning; (3) Low pressure flushing; (4) Manual oil/sediment removal; and (5) Vacuum pumping. vi) Safe access locations. 2. Undertake routine surveys during shoreline clean-up operation to assess effectiveness of response.	**Equipment** Camera GPS Spades Tape measures Sampling equipment Vehicles (as required) Aerial survey equipment (e.g. Unmanned Aerial Vehicles (UAVs)) **Personnel** Trained Shoreline Responder Team Leads (one per team) Labourers (9 per team) **Forms / Guidance** Shoreline Assessment Ground Survey Shoreline Assessment Guideline – Ground Surveys AMSA / ITOPF / NOAA guidelines and forms (included in Key References above) Shoreline Clean-up Methods table (below)	Completed surveys sent to IMT within two hours of the Survey Team returning to its operating base

ACTION PLAN: MONITOR AND EVALUATE				
		3. IMT (Ops) to monitor assessment survey operations ensuring that the IMT are briefed regularly. Once initial surveys are complete ensure that all relevant information is provided back to the IMT so that it can be assessed, included into the COP and further surveys determined. 4. IMT to update IAP with survey information, as appropriate. 5. All information should be entered into a Shoreline and Coastal Habitat Assessment Survey Form (refer Appendix A3) which will be sent to the IMT within two hours of the Survey Team returning to its operating base. **Ongoing Response Actions** 6. IMT (Plan) to arrange for ongoing Shoreline and Coastal Habitat Assessment Surveys for priority locations to be provided on a daily basis. To ensure that COP is updated when provided. Receipt of all daily Survey Forms are to be captured in the Incident Log.	**Deliverables** Shoreline assessment survey reports Lab reports	

16.7 Surface Chemical Dispersant Action Plan

ACTION PLAN: DISPERSANT APPLICATION			
Task		**Resources**	**Timeframe**
NOTE: WA DoT must approve of dispersant application prior to commencement in WA state waters. Also notify WA DoT if any dispersant applied in Commonwealth waters are likely to enter WA waters.			
Task	**Actions**	**Resources**	**Timeframe**
1. **Mobilise dispersant resources** Responsible Person: IMT (Logistics and Operations)			
Aim: To mobilise equipment and resources in support of dispersant operations into Darwin			
INITIAL RESPONSE ACTIONS	**Conduct NEBA**	Conduct operational NEBA to determine if dispersant application is likely to result in a net environmental benefit. The initial operational NEBA for dispersant application shall consider the following inputs: a) Trajectory of spill and sensitive receptors within EMBA b) Forecast spill modelling of naturally and chemically dispersed oil c) Ecotoxicity data (species protection trigger levels) for dispersed oil (including chemically dispersed oil) (once available) d) Consultation with the HMA **Ongoing Actions** Daily re-evaluation of NEBA to assess varying net benefits and impacts of continuing to apply dispersants and consideration of application rates, dilution rates and dispersant effectiveness. Dispersants should continue to be used until operational NEBA demonstrates net benefit is no longer being achieved through application.	Operational NEBA form Environment Unit Lead	Within 2 hours of spill notification Daily NEBA re-evaluation

	Develop Surface Dispersant Plan	1. If NEBA indicates that there is an overall environmental benefit develop a Surface Dispersant Plan (IAP sub-plan) to include the following data: a) Operational zones for application; b) Exclusion zones; c) Locations to deploy personnel and equipment; d) Frequency of application (sorties/day); e) List of resources (personnel and equipment) required; f) Logistics involved in deploying equipment and personnel; g) Timeframes to undertake deployment; h) Effectiveness monitoring; and i) Health and Safety constraints. **Note:** All surface chemical dispersant operations will occur during daylight hours only. Dispersants Dasic Slickgone NS and Corexit 9500 shall be mobilised and applied prior to other dispersant types. If additional dispersant types are likely to be required, IMT shall prioritise the use of dispersants using the following criteria: • Dispersant type used on Montara oil during the spill in 2009 and was shown to be effective in dispersing hydrocarbons; • Dispersant type listed as approved in the National Plan for Maritime Environmental Emergencies Register of Oil Spill Control Agents (OSCA); and • Jadestone's Chemical Selection Evaluation and Approval Procedure (JS-70-PR-I-00033).	**Personnel** Environmental Advisor / AMOSC /OSRL to assist with development of Surface Dispersant Plan (IAP sub-plan) **Deliverables** Surface Dispersant Plan (IAP sub-plan)	Develop a plan, if required, within 12 hours of NEBA confirming an overall environmental benefit

ACTION PLAN: DISPERSANT APPLICATION				
Task			**Resources**	**Timeframe**
INITIAL RESPONSE ACTIONS	**Mobilise resources to support dispersant operations** Commence mobilisation of ALL required resources to Darwin to support vessel/aerial dispersant operations	AMOSC Resources 2. Contact AMOSC Duty Officer (once notification/activation has been completed) and discuss the following support: a) Access to and mobilisation of ALL AMOSC dispersant stocks and associated equipment into Darwin (AMOSC will arrange through their contracted transport provider); b) Activation of the Fixed Wing Aerial Dispersant Capability (FWADC) from AMSA (AMOSC will activate this on behalf of Jadestone and assume operational control); and c) Provision of trained spill responders to support operations (AMOSC Staff and Core Group). Each vessel shall require one person who has been trained in the operation of vessel-based dispersant systems and monitoring dispersant effectiveness. 3. Ensure that all actions/details are captured in the Resource tracking and Incident log 4. Ensure wider IMT are briefed on actions Ongoing Response Actions Following initial activation/mobilisation of support as detail above: 1. Contact AMOSC Duty Officer and request update on all requested actions. 2. Ensure that ALL logs are updated based on revised information See “Commence vessel dispersant operations” below for ongoing operational guidance	AMOSC Activation to be completed Contract note executed Mobilisation of resources needs to be coordinated across all **PRIMARY** response strategies where support is required. Dispersant Stocks – Refer to Table 10-3	Within 4 hours of spill notification

ACTION PLAN: DISPERSANT APPLICATION				
Task			**Resources**	**Timeframe**
INITIAL RESPONSE ACTIONS		AMSA Resources 1. Contact AMSA and request mobilisation of dispersant stocks from ALL locations into Darwin (will likely require Jadestone to make transport arrangements) 2. Request AMSA assistance with mobilisation of Air Attack Supervisors into Darwin (AMSA has responsibility for sourcing a suitable aircraft for Air Attack Supervisor. Jadestone to arrange logistical support if required) 3. Ensure that all actions/details are captured in the Resource tracking and Incident log 4. Ensure wider IMT are briefed on actions **Ongoing Response Actions** Following initial activation/mobilisation of support as detail above: 5. Contact AMOSC Duty officer and request update on all requested actions. 6. Ensure that ALL logs are updated based on revised information Note: : Aircraft requiring two pilots are not suitable for air attack operations as the Air Attack Supervisor function needs to be conducted from the co-pilot's seat.	AMSA Initial notification to be competed FWADC Aerial Operation Plan for Oil Spills off the Northern Coastline of Australia (Air Ops Plan Template) Mobilisation of AMSA resources needs to be coordinated across all **PRIMARY** response strategies where support is required **Dispersant Stocks** – Refer to Table 10-3	Within 4 hours of spill notification

ACTION PLAN: DISPERSANT APPLICATION				
Task			**Resources**	**Timeframe**
		OSRL Resources 1. Contact OSRL Duty Manager to commence mobilisation of the following support: a) Dispersant stocks (as per SLA and GDS) into Darwin b) Hercules aircraft or Boeing 727 into Australia (Darwin) 2. Ensure that all actions/details are captured in the Resource tracking and Incident log 3. Ensure wider IMT are briefed on actions **Ongoing Response Actions** Following initial activation/mobilisation of support as detail above: 4. Contact OSRL Duty Manager and request update on all requested actions. 5. Ensure that ALL logs are updated based on revised information	OSRL Activation to be competed Contract requirements complete Mobilisation of OSRL resources needs to be coordinated across all **PRIMARY** response strategies where support is required	Within 4 hours of spill notification

ACTION PLAN: DISPERSANT APPLICATION				
Task			**Resources**	**Timeframe**
INITIAL RESPONSE ACTIONS	**Mobilise vessels and aircraft to support dispersant operations**	Aerial dispersant mobilisation 1. AMOSC, in consultation with the IMT prepare an Air Operations Plan in accordance with the Aerial Operational Plan for Oil Spills Off the Northern Coastline of Australia and submit to AMSA prior to commencement of any FWADC aircraft operations 2. Confirm progress of FWADC activation from AMSA following activation by AMOSC 3. Ensure in-field efficacy testing is conducted in accordance with the Special Monitoring of Applied Response Technologies (SMART) monitoring protocol (NOAA, 2006)	Operational Plan for Oil Spills Off the Northern Coastline of Australia – primary reference	Air Operations Plan submitted to AMSA within 6 hours of initial activation

ACTION PLAN: DISPERSANT APPLICATION				
Task			**Resources**	**Timeframe**
		<u>Vessel dispersant mobilisation</u> IMT (Ops) to complete following actions: 1. Contact ISV – confirm location and ETA to spill location (maximum timeframe is 36 hours if alongside Darwin) a) If alongside, ISVs to be directed to sail and head directly to spill location (confirm with IMT Leader) b) To test and prepare dispersant application system enroute c) Tasking to be provided to ISV prior to arriving on location 2. Liaise with IMT (Log) to commence sourcing of additional vessels into Darwin to support dispersant operations. 3. Ensure in-field efficacy testing is conducted in accordance with the Special Monitoring of Applied Response Technologies (SMART) monitoring protocol (NOAA, 2006) **Ongoing Response Actions** 4. Arrange for vessels to be loaded with equipment, dispersant and trained spill responders from AMOSC/AMSA once alongside Darwin. 5. All vessels to be designated with operational zones to conduct dispersant operations 6. Aerial surveillance sorties to provide vessels with updated locations for spills within operational zones.	**Dispersant Stocks** – Refer to Table 10-3 See Commence Vessel Dispersant Operations below **Incident Action Plan (IAP)** – to detail tasking for vessel dispersant operations	Commence mobilisation of ISV within 2 hours of spill notification Commence initial vessel dispersant application within 42hours of IMT activation

ACTION PLAN: DISPERSANT APPLICATION				
Task			**Resources**	**Timeframe**
Ongoing Actions	**Activate Darwin logistic support arrangements**	Logistics Yard (Darwin) activation 1. Contact Logistics Yard (Darwin) and stand-up staff/facilities to support resource mobilisation. Provide relevant information regarding estimated arrival times/dates into Darwin once confirmed with service providers 2. Confirm all arrangements with respect to loading equipment/dispersant and embarking spill response personnel aboard vessels alongside Darwin. **Note**: ALL other response equipment required will be coordinated from the Logistics Yard (Darwin) throughout the response.	**Logistics Yard (Darwin)**	Within 6 hours of spill notification

Task			Resources	Timeframe
2. Commence vessel dispersant operations Responsible Person: IMT (Operations and Logistics)				
Ongoing Actions	**Conduct of vessel dispersant operations** Following initial activation/mobilisation of required resources ongoing operations are to be commenced in support of the response	Ongoing vessel dispersant operations 1. Support vessel (ISV) – If not already on station conducting dispersant operations vessel tasking is to be included in IAP for Day 2 2. Confirm build-up of dispersant stocks at Toll Yard in accordance with the Dispersant Mobilisation Plan. 3. Coordinate arrival and availability of vessels as they arrive in Darwin in accordance with Dispersant Mobilisation Plan. 4. Arrange and coordinate transport arrangements to mobilise dispersant and equipment to Darwin port 5. Ensure additional dispersant vessels (once operationally ready) become available from Darwin are to be included in the IAP for each operational period. **Note**: Clear guidance to be provided in IAP with respect to: 6. Vessel will be "operationally ready" once dispersant/equipment loaded and trained spill responders are embarked. 7. Focus on application to windrows / spots of surface slick which threaten priority environmental sensitivities. 8. Conduct of visual monitoring to assess effectiveness 9. Completion of dispersant application logs 10. Daily reporting back to IMT on conduct of operations	**Incident Action Plan (IAP)** – Task Assignment to be developed and disseminated in order to commence vessel dispersant operations **Dispersant Stocks** – Refer to Table 10-3	Ongoing from next Operational Period
3. Commence aerial dispersant application Responsible Person: IMT (Operations and Logistics)				

Ongoing Actions	**Conduct of aerial dispersant operations** Following initial activation/mobilisation of required resources ongoing operations are to be conducted in support of the response	<u>Aerial dispersant operations commencement</u> 1. Confirm status of Air Operations Plan implementation in consultation with AMOSC 2. Liaise with Western Australian Department of Transport prior to commencing aerial dispersant application in Commonwealth waters that could impact upon State waters; and/or liaise with Northern Territory DEPWS prior to commencing aerial dispersant application in Commonwealth waters that could impact upon Territory waters 3. Upon agreement of suitability of Air Operations Plan from AMOSC commence aerial dispersant application 4. Air Attack Supervisors to ensure IMT Operations Lead is informed on effectiveness of surface aerial dispersant application 5. Confirm build-up of dispersant stocks at Toll Yard in accordance with the Dispersant Mobilisation Plan 6. Coordinate arrival and availability of additional aircraft as they arrive in Darwin in accordance with Dispersant Mobilisation Plan 7. Arrange and coordinate transport services to mobilise dispersant to Darwin airport 8. Support development of flight schedule (see Monitor & Evaluation Action Plan) to ensure inclusion of aerial dispersant operations and deconfliction from other planned operations (operational zones allocated). 9. Support ongoing coordination of aviation operations as response continues. **Note**: Air Operations Plan and IAP must ensure the following restrictions are adhered to for dispersant application: a) No application in waters shallower than 20 m; and	**Air Operations Plan** – to be implemented for Darwin **Incident Action Plan (IAP)** – Task Assignment to be developed and disseminated to commence vessel dispersant operations **Daily Flight Schedule** – for all aviation operations **Dispersant Stocks** – Refer to Table 10-3	Commence air operations and dispersant application within 3 days of spill notification

Task			Resources	Timeframe
		b) No application within exclusion zones for offshore facilities; and c) No application within an Australian Marine Park boundary or its buffer; and d) No application over in-field responders. Clear guidance to be provided in IAP with respect to: e) Focus on application to windrows / spots of surface slick which threaten priority environmental sensitivities. f) Conduct of visual monitoring to assess effectiveness after sorties g) Completion of dispersant application logs h) Daily reporting back to IMT on conduct of operations		

16.8 Containment and Recovery Action Plan

ACTION PLAN: CONTAINMENT AND RECOVERY				
Task		**Actions**	**Resources**	**Timeframe**
1. Mobilise containment and recovery resources Responsible Person: IMT (Logistics and Operations)				
Aim: To mobilise equipment and resources to Darwin in support of containment and recovery (C&R) operations				
INITIAL RESPONSE ACTIONS INITIAL RESPONSE ACTIONS	**Conduct NEBA**	Conduct operational NEBA to determine if C&R is likely to result in a net environmental benefit. **Ongoing Actions** Daily re-evaluation of NEBA to assess varying net benefits and impacts of continuing to conduct C&R activities	Operational NEBA form Environment Unit Lead	Within 2 hours of spill notification Daily NEBA re-evaluation
	Develop Containment and Recovery Plan	2. If NEBA indicates that there is an overall environmental benefit develop a Containment and Recovery Plan (IAP sub-plan) to include the following data: j) Operational zones; k) Locations to deploy personnel and equipment; l) List of resources (personnel and equipment) required; m) Logistics involved in deploying equipment and personnel; n) Timeframes to undertake deployment; o) Health and Safety constraints.	**Personnel** Environmental Advisor / AMOSC /OSRL to assist with development of Containment and Recovery Plan (IAP sub-plan) **Deliverables** Containment and Recovery Plan (IAP sub-plan)	Develop a plan, if required, within 12 hours of NEBA confirming an overall environmental benefit

ACTION PLAN: CONTAINMENT AND RECOVERY				
Task		**Actions**	**Resources**	**Timeframe**
	Mobilise containment and recovery resources IMT to commence mobilisation of C&R resources into Darwin	1. Contact Darwin Supply Base and arrange for mobilisation of C&R equipment to Darwin port. <u>AMOSC/AMSA Resources</u> 2. Liaise with AMOSC / AMSA / OSRL to commence mobilisation of containment and recovery equipment and personnel into Darwin. 3. Ensure each vessel has a minimum of two trained personnel onboard who are responsible for controlling operations, ensuring they are implemented safely and effectively **Note:** Ensure ALL equipment mobilisation is coordinated noting need for AMOSC/AMSA equipment in support of other response strategies 4. Commence mobilisation of vessels to support C&R operations into Darwin. a) Mermaid, Swire, Bhagwan Marine, Farstad, GO, Maersk and Siem will provide vessels under current Master Service Agreement (MSA) b) Additional vessels to be sourced through Jadestone approved broker (Clarksons) 5. Mobilise waste management contractor and request all available IBCs and Iso-containers be sent to Darwin 6. Coordinate and activate arrangements to support loading and embarkation of equipment/personnel from Darwin port 7. Ensure that all actions/details are captured in the <u>Resource tracking</u> and <u>Incident</u> log 8. Ensure wider IMT are briefed on actions	**Equipment** Vessels Booms, skimmers, ancillary equipment Waste storage **Personnel** Trained Personnel (sourced from AMOSC, AMSA and/or OSRL) – 2 per vessel **Forms and Guidance** Vessel Mobilisation Guide – to be used to support sourcing of vessels into Darwin	Commence mobilisation within 12 hours of spill notification

ONGOING RESPONSE OPERATIONS	**Commence containment and recovery operations** Following initial activation/mobilisation of required resources ongoing operations are to be commenced in support of the response	Containment and Recovery operations commencement IMT (Log): 1. Confirm build-up of C&R resources in Darwin (Toll Yard and Port). 2. Coordinate arrival and availability of vessels in Darwin. 3. Arrange and coordinate transport arrangements to mobilise equipment and personnel to Darwin port IMT (Ops and Plan) 4. Ensure additional vessels (once operationally ready) become available from Darwin are included in the IAP for each operational period. 5. Coordinate operational surveillance support to vessels to ensure they are being directed to priority locations 6. Assess daily operational surveillance information to drive future operational guidance 7. Coordinate vessel operations to support management of oily/water waste recovered by vessels 8. Support development and promulgation of the IAP to meet operational requirements 9. Coordinate daily operations in support of ongoing response. 10. Ensure that all actions/details are captured in the Resource tracking and Incident log 11. Ensure wider IMT are briefed on actions on a daily basis **Note**: Clear guidance to be provided in IAP with respect to: - Vessel movements to/from port as required to assist with resupply/waste management/operational maintenance - Vessel will be "operationally ready" once equipment loaded and trained spill responders are embarked. - Operations to be conducted in operational zones beyond dispersant operations and in areas which threaten priority environmental sensitivities.	**Equipment** Vessels Booms, skimmers, ancillary equipment **Personnel** Trained Personnel (sourced from AMOSC, AMSA and/or OSRL) – 2 per vessel **Incident Action Plan (IAP)** – Task Assignment to be developed and disseminated in order to commence containment and recovery operations	Commence C&R operations within 48 hours of IMT activation

ACTION PLAN: CONTAINMENT AND RECOVERY				
Task		**Actions**	**Resources**	**Timeframe**
		- Daily reporting requirements back to IMT on conduct of operations and operational status		
	Manage waste from containment and recovery operations	<u>IMT to assess viability of following options:</u> 1. Option 1 (Preferred option): Subject to approvals from the relevant Jurisdictional Authority (refer to Section 11.2.3) and weather permitting, decant oil from water in tanks onboard the recovery vessels and discharge the water component overboard within the apex of the containment booms. Then transfer remaining product to Montara FPSO for temporary storage 2. Option 2: Transfer oily waste water (not decanted) to tanks onboard the Montara Operations FPSO or other recovery vessels for storage and possible treatment **Note**: Environmental approvals must be obtained prior to liquid waste discharge to the environment. Records are to be retained of volumes discharged. 3. Manage solid waste generated: a. Can be temporarily stored on-board the support vessel or facility for transfer to mainland for disposal by a licensed contractor. 4. Ensure washdown of offshore equipment is conducted in hot zone's only	**Waste Management Plan** **IMT support** – to be provided by Waste management contractor **Waste Management** – controlled waste tracking to be managed throughout	Review options within 48 hours of IMT activation

16.9 Protection and Deflection Action Plan

ACTION PLAN: PROTECTION AND DEFLECTION				
Task		**Actions**	**Resources**	**Timeframe**
1. Engage with relevant stakeholders and develop plan to conduct protection and deflection operations Responsible Person: IMT (Planning)				
ONGOING RESPONSE ACTIONS	**Commence stakeholder engagement**	Notify WA DoT / NT DEPWS if there are likely to be any impacts on state / territory shorelines. Refer to IMTRP for detail on regulatory notifications. **Note:** All shoreline clean-up operations conducted within WA state waters (includes waters around islands) fall under the remit of WA DoT's IMT and associated IAP's. Priority receptors and strategies will be confirmed/implemented under the direction of the Control Agency. Refer to IMTRP for further information on cross jurisdictional arrangements and arrangements with NT's DEPWS.	**Personnel** WA DoT IMT / NT IMT **Forms and Guidance** WA DoT Offshore Petroleum Industry Guidance Note - Marine Oil Pollution: Response and Consultation Arrangements (WA DoT, 2020)	Within 2 hours of becoming aware of potential impacts to state / territory waters
NOTE: All protection and deflection activities in the following steps are indicative only – at the direction of the state / territory IMT who will be the Control Agency for the spill in State /Territory waters				
	Conduct SCAT	1. Conduct an initial shoreline assessment (ie SCAT) (ground / aerial survey depending on access)	Refer to Section 9.4.7 for detail.	Commence deployment of SCAT Teams within 48 hours of becoming aware of impacts to state / territory waters

	Conduct NEBA	2. Using the latest results of operational monitoring activities, conduct operational NEBA to determine if protection and deflection is likely to result in a net environmental benefit. **Ongoing Actions** Daily re-evaluation of NEBA to assess varying net benefits and impacts of continuing to conduct protection and deflection activities	Operational NEBA form Environment Unit Lead	Conduct within 2 hours of becoming aware of potential impacts to state / territory waters Daily NEBA re-evaluation
	Develop Protection & Deflection Plan	3. If NEBA indicates that there is an overall environmental benefit of applying this strategy, develop a Protection and Deflection Plan (IAP sub-plan) to include the following data: a) Priority near-shore and shoreline areas for protection (liaise with HMA to confirm priority locations and consult latest operational monitoring data, including SCAT surveys); b) Locations to deploy protection and deflection equipment; c) Method of deployment for each location i.e., exclusion, diversion, river, shore-line sealing booing etc) d) List of resources (personnel and equipment) required; e) Timeframes to undertake deployment; f) Access / egress locations from land or sea; g) Frequency of boom inspections and maintenance (noting tidal cycles). **Note**: Refer to the Kimberley Shoreline Response Plan (AMOSC, 2019a) when developing IAP sub-plan to assist in determining suitable tactics and capability. Consult OSRL/AMOSC and State/Territory, considering the practicalities, likely success and risks associated with a shoreline operations in remote locations.	**Personnel** Environmental Advisor / OSRL / AMOSC to assist with state / territory IMT with development of Protection and Deflection Plan (IAP sub-plan) **Deliverables** Protection and Deflection Plan (IAP sub-plan)	Develop a plan, if required, within 12 hours of NEBA confirming an overall environmental benefit

		4. Obtain approvals to access the following areas if response activities are required within: a) World Heritage Areas (from DAWE); b) Commonwealth reserves including AMPs (from DAWE / Parks Australia); c) State/Territory reserves (from WA DBCA / NT DEPWS); d) Aboriginal heritage areas (from WA Department of Aboriginal Affairs / NT Aboriginal Areas Protection Authority); and e) International waters (from DFAT). 5. Refer IMTRP Arrangements for regulatory notification and reporting requirements.	**Deliverables** Copy of access approvals	Within 3 days of spill or 48 hours prior to estimated contact with shoreline environment

2. Mobilise protection and deflection resources Responsible Person: IMT (Logistics and Operations)				
	Mobilisation of resources to support operations	1. Commence mobilising protection and deflection equipment in readiness for potential use.	**Equipment** Booming systems Sorbent materials PPE	Commence deployment within 24 hours of completion of Protection and Deflection Plan (IAP sub-plan)
		2. Mobilise support vessels with capabilities to deploy protection and deflection teams and equipment to remote locations via: a) Vessel deployment; and b) Land-side deployment.	**Equipment** <u>Vessels:</u> Flat bottomed or vessels with tenders Capable of accommodating vessel crew plus 12 additional personnel and equipment Capable of deploying booms in waterways and shallow seas **Personnel** <u>Per vessel:</u> Vessel crew 2 x Trained operator / Team Leader(s) (AMOSC, AMSA, OSRL) 5 x Labourers	Commence deployment within 24 hours of completion of Protection and Deflection Plan (IAP sub-plan)
3. Commence protection and deflection operations Responsible Person: IMT (Operations)				

	Conduct Protection and Deflection operations	1. Commence on-site protection and deflection activities as per the P&D Plan (IAP sub-plan) 2. Nominated Shoreline Response Team Leader to report back on effectiveness to IMT Leader	**Equipment** Booming systems Sorbent materials PPE Vessels **Personnel** Per vessel: Vessel crew 2 x Trained operator / Team Leader(s) (AMOSC, AMSA, OSRL) 5 x Labourers **Deliverables** Records of equipment used and personnel employed	Commence deployment of personnel, equipment and vessels within 24 hours of completion of Protection and Deflection Plan

16.10 Shoreline Clean-up Action Plan

ACTION PLAN: SHORELINE CLEAN-UP				
Task		**Actions**	**Resources**	**Timeframe**
1. Engage with relevant stakeholders and develop plan to conduct shoreline clean-up if appropriate Responsible Person: IMT (Planning)				
ONGOING RESPONSE ACTIONS	**Commence stakeholder engagement**	Notify WA DoT / NT DEPWS if there are likely to be any impacts on state / territory shorelines. Notify Parks Australia if there are likely to be any impacts to Australian Marine Parks. Refer to IMTRP for detail on regulatory notifications. **Notes:** • All shoreline clean-up operations conducted within WA state waters (includes waters around islands) fall under the remit of WA DoT's IMT and associated IAP's. Priority receptors and clean-up strategies will be confirmed/implemented under the direction of the Control Agency. • Refer to IMTRP for further information on cross jurisdictional arrangements and arrangements with NT's DEPWS . • Ashmore Reef Marine Park and Cartier Island Marine Park are assigned IUCN category 1a Sanctuary Zoning and are afforded the highest level of protection. Shoreline clean-up tactics and applicability must be discussed in consultation with Parks Australia whilst preparing an Operational NEBA for these priority receptors.	**Personnel** WA DoT IMT / NT IMT **Forms and Guidance** WA DoT Offshore Petroleum Industry Guidance Note - Marine Oil Pollution: Response and Consultation Arrangements (WA DoT, 2020)	Within 2 hours of becoming aware of potential contact to state / territory waters
NOTE: All shoreline clean-up operations in the following steps are indicative only – at the direction of the State / Territory IMT who will be the Control Agency for the spill in State /Territory waters				

	Conduct shoreline assessment	1. Conduct an initial shoreline assessment (i.e. SCAT) (ground / aerial survey depending on access) **Note:** Unmanned Aerial Vehicles (UAVs) may be necessary for some sensitive environments and where personnel safety is at risk (e.g. UXO's at Cartier Island, dangerous fauna in remote locations)	Refer to Section 13.	Commence deployment of SCAT Teams within 48 hours of becoming aware of impacts to state / territory waters
	Conduct NEBA	1. Using the latest results of operational monitoring activities, (with a focus on SCAT surveys), conduct operational NEBA to determine if shoreline clean-up is likely to result in a net environmental benefit. **Ongoing Actions** 2. Daily re-evaluation of NEBA to assess varying net benefits and impacts of continuing to conduct shoreline clean-up activities. **Note:** Shoreline clean-up tactics and applicability must be discussed in consultation with Parks Australia whilst preparing the Operational NEBA for Ashmore Reef Marine Park and Cartier Island Marine Park. These Marine Parks have an IUCN category 1a Sanctuary Zoning and are afforded the highest level of protection. Therefore, clean-up tactics should consider the ability to remediate impacted areas to the zone objectives of these Marine Parks[8].	Operational NEBA form Environment Unit Lead	Conduct within 2 hours of becoming aware of potential impacts to state / territory waters

[8] The zone objective of Ashmore Reef Marine Park and Cartier Island Marine Park is that they are '*managed to conserve ecosystems, habitats and native species in as natural and undisturbed a state as possible*'.

	Develop Shoreline Clean-up plan	3. If NEBA indicates that there is an overall environmental benefit develop a Shoreline Clean-up Plan (IAP sub-plan) to include the following information: p) Priority near-shore and shoreline areas for protection (liaise with HMA for direction on locations and consult latest operational monitoring data, including SCAT surveys); q) Locations to deploy shoreline clean-up personnel equipment; r) Method of deployment for each location ie, exclusion, diversion, river, shore-line sealing booming etc) s) Frequency of clean-up (to minimise impacts to geomorphology, receptors) t) List of resources (personnel and equipment) required; u) Logistics involved in deploying equipment and personnel (i.e. vessel-based accommodation, use of barges, landing craft and helicopters in remote environments); v) Timeframes to undertake deployment; w) Health and Safety constraints; x) Access / egress locations from land or sea; and y) Waste management. (see note below). **<u>Plan shall address the following:</u>** • Clean-up activities in sensitive environments shall be conducted in front of the primary dune and crews will not access behind the primary dune • Temporary waste storage on remote beaches should be located at the bottom of the primary dune and above the Highest Astronomical Tide (HAT) mark • Demarcation zones to be established for shoreline operations involving vehicle and personnel movement considering vegetation, bird nesting/roosting areas and turtle nesting timeframes • Access plans for shoreline operations will prioritise use of existing roads and tracks	**Personnel** Environmental Advisor / AMOSC / OSRL to assist with state / territory IMT with development of Shoreline Clean-up Plan (IAP sub-plan) **Deliverables** Shoreline Clean-up Plan (IAP sub-plan)	Develop a plan, if required, within 12 hours of NEBA confirming an overall environmental benefit

		• Terrestrial vehicle and equipment deployment via landing barges where there are no existing track access • Vehicles and equipment are verified as clean and invasive species free prior to deployment to site • A Specialist Advisor is consulted if shoreline operations overlap with areas of cultural or heritage significance • Onshore equipment wash-down occurs in a decontamination area **Note**: Refer to the Kimberley Shoreline Response (AMOSC, 2019a) when developing IAP sub-plan to assist in determining suitable tactics and capability. Consult OSRL/AMOSC and State/Territory, considering the practicalities, likely success and risks associated with a shoreline operations in remote locations.		
		4. Obtain approvals to access the following areas if response activities are required within: a) World Heritage Areas (from DoEE); b) Commonwealth reserves including AMPs (from DAWE / Parks Australia); c) State reserves (from WA DBCA / NT DEPWS); d) Aboriginal heritage areas (from WA DAA / NT APAA); and e) International waters (from DFAT). 5. Refer OSR Arrangements for regulatory notification and reporting requirements.	**Deliverables** Copy of access approvals	Within 3 days of spill or 48 hours prior to estimated contact with shoreline environment

2. Mobilise shoreline clean-up resources Responsible Person: IMT (Logistics and Operations)				
	Mobilisation of all required resources	1. Commence mobilising shoreline clean-up equipment in readiness for potential use.	**Equipment** Manual equipment (ie shovels, rakes, buckets, wheelbarrows etc) Mechanical equipment (ie tiller, skid steer etc) Sorbent materials Decontamination kit Access vehicles (if required) (i.e. quad bikes, 4WD's etc) Personnel facilities (i.e. PPE, food, water, temporary accommodation, communications network, amenities etc) Waste storage (i.e. portable tanks, IBC's, plastic bags, skip bins etc) and transport **Forms and Guidance** Shoreline Clean-up Plan (IAP sub-plan)	Commence deployment within 24 hours of completion of Shoreline Clean-up Plan
		2. Commence mobilising shoreline clean-up teams: a) Clean-up teams to consist of 10 responders, including one trained Shoreline Responder to act as Team Lead 3. Contact labour hire agencies in Darwin to source labour hire personnel.	**Personnel** Trained Shoreline Responder Team Leads (one per team) Labourers (9 per team) **Forms and Guidance** Shoreline Clean-up Plan (IAP sub-plan)	Commence deployment within 24 hours of completion of Shoreline Clean-up Plan

		4. Mobilise transport with capabilities to deploy shoreline clean-up teams and equipment to remote locations.	**Equipment** Vessels: Flat bottomed or vessels with tenders Capable of accommodating vessel crew plus a minimum of 10 additional personnel and equipment Helicopters **Personnel** Vessel crew Clean-up team as stated above **Forms and Guidance** Shoreline Clean-up Plan (IAP sub-plan)	Commence deployment within 24 hours of completion of Shoreline Clean-up Plan

3. Coordinate shoreline monitoring Responsible Person: IMT (Operations)				
	Prepare to commence Shoreline Clean-up operations	1. Shoreline Team Lead to liaise with SCAT Team to confirm suitable clean-up techniques for surveyed shorelines prior to undertaking clean-up activities 2. Shoreline Team Lead and IMT (Plan) to liaise with HMA to confirm shoreline clean-up techniques based on NEBA and SCAT surveys 3. Shoreline clean-up team members are briefed by Shoreline Team Leads on how to implement the shoreline clean-up techniques including how to prevent damage to shoreline habitat and surrounding laydown/staging areas 4. Shoreline Team Leads shall verify clean-up effectiveness and conduct final evaluations in conjunction with SCAT Teams. **Note:** Clean-up activities shall be implemented under the direction of the HMA (Refer to IMTRP for further information on cross jurisdictional arrangements and HMAs)	**Equipment** Camera GPS Spades Tape measures Sampling equipment Vehicles (as required) Aerial survey equipment (e.g. Unmanned Aerial Vehicles (UAVs)) **Personnel** Trained Shoreline Responder Team Leads (one per team) Labourers (9 per team) **Forms / Guidance** Shoreline Assessment Ground Survey Shoreline Assessment Guideline – Ground Surveys AMSA / ITOPF / NOAA guidelines and forms (included in Key References above) Shoreline Clean-up Methods table (below) **Deliverables** Shoreline assessment survey reports Lab reports	

5. Set up shoreline clean-up operations Responsible Person: IMT (Operations)				
	Complete preparations for Shoreline Clean-up operations	1. Establish base: a) Set up shelter, communications, amenities, food, water etc; b) Organise equipment and PPE; c) Deliver inductions and training to all personnel as appropriate; d) Define pathways for access / egress to minimise damage to the environment.	**Equipment** As per Shoreline Clean-up Plan (IAP sub-plan) **Personnel** Shoreline clean-up assessment team Government specialists Labour hire **Forms and Guidance** Shoreline Clean-up Plan (IAP sub-plan) **Deliverables** Induction records	Commence deployment within 24 hours of completion of Shoreline Clean-up Plan
5. Commence shoreline clean-up operations Responsible Person: IMT (Operations)				

	Implement plan and conduct Shoreline Clean-up operations	1. Commence shoreline clean-up activities as per the Shoreline Clean-up Plan (IAP Sub-plan) ensuring that the following will occur: a) Adequate supervision of teams; b) Minimise damage to flora and fauna; c) Schedule oil removal activities for cooler times of the day when it is more solid / waxy to minimise the amount of waste that is generated; d) Site is set up suitably to minimise secondary contamination; and e) Correct waste management is implemented.	**Personnel** Shoreline clean-up team leaders and crews WA DoT specialists / NT DEPWS specialists Labour hire	Commence deployment within 24 hours of completion of Shoreline Clean-up Plan
		2. Monitor the following parameters during implementation to assess effectiveness: a) Ongoing shoreline monitoring; b) Ongoing availability on sufficient resources (personnel and equipment); and c) Waste management (ie predicted volumes, minimisation, temporary storage, transport and waste disposal). d) Report back on effectiveness to IMT Leader.	**Deliverables** Progress reports Records of equipment used and personnel employed Records of waste generated Waste disposal receipts	Ongoing until termination of response

16.11 Oiled Wildlife Plan

ACTION PLAN: OILED WILDLIFE RESPONSE				
Task		**Actions**	**Resources**	**Timeframe**
1. Make regulatory notifications and activate the Oiled Wildlife Response Division Responsible Person: IMT (Planning)				
INITIAL RESPONSE ACTIONS	**Complete initial notifications**	Notify WA DBCA / NT EPA / DAWE if there are likely to be any impacts on wildlife. Notify Parks Australia if there are likely to be any impacts on wildlife in Ashmore Reef Marine Park and Cartier Island Marine Park.	**Forms and Guidance** Refer to OSR Arrangements for detail on regulatory notifications	<2 hours of becoming aware of potential impacts to wildlife
	Activate OWR capability	1. Activate the oiled wildlife response sub-division within the Operations Division with the support of the IMT Leader: a) IMT Operations Co-ordinator to appoint a Jadestone Oiled Wildlife Advisor (OWA) to be part of the EMT. b) Government resources: i. WA jurisdiction: WA DBCA will appoint a WA DBCA OWA to be embedded within the WA DoT IMT to assist the Jadestone OWA. ii. NT jurisdiction: Jadestone IMT OWA to liaise with NT DEPWS Oiled Wildlife Co-ordinator (OWC). iii. Commonwealth jurisdiction: DAWE rely on support from respective state / territory statutory authority. 2. Refer to OSR Arrangements for further information on cross jurisdictional arrangements. 3. Refer to Appendix A in the WA OWRP for a description of roles and responsibilities for all positions in the OWR division.	**Personnel** OWA from Jadestone staff or AMOSC WA DBCA OWA (if in WA State waters) NT NRETAS **Forms and Guidance** WA OWRP NT OWRP Kimberley OWRP (in draft)	<2 hours of becoming aware of potential impacts to wildlife

ACTION PLAN: OILED WILDLIFE RESPONSE				
Task		**Actions**	**Resources**	**Timeframe**
ONGOING RESPONSE ACTIONS	**Assess potential impact of OWR operations**	1. Conduct a NEBA based on available information to determine if there is an overall environmental benefit in conducting oiled wildlife response activities. This will depend on the following: a) Conservation status of fauna likely to be affected; b) Relevant EPBC Management Plans and specific protection measures for wildlife protected under Part 3 of the EPBC Act, including their habitat; c) Number of wildlife likely to be affected; d) Estimated success of oiled wildlife response activities; and e) Regulator and community expectations. **Note:** Ashmore Reef Marine Park and Cartier Island Marine Park are assigned IUCN category 1a Sanctuary Zoning and are afforded the highest level of protection. Oiled wildlife response tactics must be discussed in consultation with Parks Australia whilst preparing an Operational NEBA for these priority receptors.	**Personnel** OWAs to assist with NEBA **Forms and Guidance** NEBA template WA OWRP NT Emergency Plan Wildlife reconnaissance data **Deliverables** NEBA report	Conduct NEBA within 24 hours of potential impacts to wildlife being identified Ongoing every 24 hours thereafter or as required

ACTION PLAN: OILED WILDLIFE RESPONSE				
Task		**Actions**	**Resources**	**Timeframe**
	Establish OWR structure within IMT	1. If NEBA determines that there is an overall benefit to activating an oiled wildlife response, OWA(s) to assign a Wildlife Division Co-ordinator to establish an appropriately sized OWR division within the IMT: a) Refer to Oiled Wildlife Command Structure b) Consult with OWA on State/Territory protection priorities c) Refer to Table 7 in the WA OWRP for indicative wildlife response personnel resourcing. d) Refer to Attachment A in the WA OWRP for a description of roles and responsibilities for all positions in the OWR Division. **Note:** the NT OWC may establish a NT Wildlife Unit with support from Jadestone/ AMOSC. The command structure and functions will be similar to that detailed in the WA OWRP.	**Personnel** Wildlife Division Co-ordinator (WA) Wildlife Division Personnel (WA) Wildlife Unit (NT) **Forms and Guidance** WA OWRP NT Oil Spill Contingency Plan	Within 24 hours of risk being identified

2. Wildlife first strike response Responsible Person: Oiled Wildlife Advisor with assistance from Wildlife Division Co-ordinator				
	Stand up OWR capability	1. Refer to Section 4.1 of the WA/NT OWRP: a) Assess the situation; b) Determine the potential response level (refer to Table 6 Indicative Oiled Wildlife Response Levels in the WA OWRP); c) Determine resources required and available; and d) Mobilise first strike OWR kits.	**Equipment** First strike OWR kits **Forms and Guidance** WA/NT OWRP	Commence within 48 hours of risk being identified Onsite / infield within 7 days of risk being identified

3. Mobilisation of wildlife resources Responsible Person: Wildlife Division Co-ordinator / Wildlife Logistics Co-ordinator				
	Mobilisation of required resources to support OWR operations	1. Refer to Section 4.2 of the WA OWRP: a) Mobilise key personnel within the OWR Division: b) Wildlife Planning Officer to lead planning the OWR response. c) Wildlife Operations Officer to lead the mobilisation of operational resources on site where oiled wildlife is present. d) Wildlife Logistics Officer to mobilise equipment as appropriate for the scale of incident 2. Refer to WA OWRP Section 7 for indications of resources needed for each stage of the OWR.	**Equipment** WA ORWP **Personnel** Wildlife Planning Officer Wildlife Operations Officer Wildlife Logistics Officer **Forms and Guidance** WA OWRP	Mobilise key personnel and commence mobilising equipment within 48 hours of risk being identified

4. Coordinate wildlife reconnaissance Responsible Person: Wildlife Operations and Planning Officer				
	Conduct ALL preparations in support of OWR operations	1. Refer to Section 4.3 of the WA OWRP: a) Wildlife Operations Officer to oversee the Wildlife Reconnaissance Unit and determine the best means for monitoring fauna (via plan, vessel or shoreline survey). b) Wildlife Planning Officer to create a geo-plot of all known wildlife communities in the local area that may be affected. 2. The shoreline clean-up assessment team may be able to have a dual function as the wildlife reconnaissance team.	**Equipment** <u>General:</u> Handheld GPS unit / Digital Camera Binoculars / Spotting scope Field notebook and pencil Geo-plot output including animal communities at risk. <u>Transport:</u> Quad motorbikes or 4wd vehicles Small vessels (less than 12m length) Aerial support (fixed wing or helicopter) **Personnel** Wildlife Reconnaissance Unit **Forms and Guidance** WA OWRP **Deliverables** Survey logs	Commence within 7 days of risk being identified
5. Develop IAP subplan for oiled wildlife response Responsible Person: Wildlife Planning Officer with assistance from Wildlife Division Coordinator				
	Incident action planning to support OWR operations	1. Refer to Section 4.4 of the WA OWRP: a) Based on information from wildlife reconnaissance develop the IAP oiled wildlife response sub-plan including information on: i. Wildlife priorities for protection from oiling; ii. Deterrence measures;	**Personnel** • Wildlife Division Co-ordinator **Forms and Guidance** • WA OWRP **Deliverables**	Within 24 hours of wildlife reconnaissance confirming potential or realised

		iii. Recovery and treatment of oiled wildlife; and iv. Resourcing of equipment and personnel.	IAP	impacts to wildlife
6. Wildlife rescuing and staging Responsible Person: Wildlife Operations Officer and Wildlife Logistics Officer				
		1. Refer to Section 4.5 of the WA OWRP: a) Wildlife Operations Officer to oversee the Wildlife Rescue and Wildlife Staging / Holding Units to undertake the following: i. Pre-emptive capture (refer to Appendix H in WA OWRP) ii. Hazing; and iii. Oiled wildlife rescue, transport and staging (refer to Appendix B, C and D in the WA OWRP). 2. Any deterrence / hazing / pre-emptive capture activities will require licensing authority from WA DBCA / NT DEPWS / DAWE through the OWA.	**Equipment** Wildlife capturing equipment Hazing equipment Staging site Oiled wildlife facility Transport for personnel and wildlife **Personnel** Wildlife Rescue Unit (minimum 3 people) Wildlife Staging / Holding Unit **Forms and Guidance** Wildlife SITREP Form (WA OWRP Appendix J) **Deliverables** Wildlife handling licences / approvals	Wildlife to be transported to the oiled wildlife facility within 4 days of being captured
		3. Record keeping is a critical part of the management of captured wildlife whether pre-emptive or following oiling. Records must be kept from the point of capture and travel with each individual animal. On arrival at the rehabilitation centre the wildlife should be tracked through the system on the treatment record.	**Forms and Guidance** Wildlife Status / SITREP Form (WA OWRP Appendix J)	Ongoing after commencement of capturing wildlife
7. Establishment of an oiled wildlife facility Responsible Person: Wildlife Operations Officer				

		1. Refer to Section 4.6 of the WA OWRP: Wildlife Operations Officer to oversee the Wildlife Facilities Team to undertake the following: a) Install the oiled wildlife containers (suitable for <50 animals per day). b) Establish an oiled wildlife facility (on land or on vessel) if the response is escalated > 50 animals per day. The procedure for setting up and using an oil wildlife facility is in Appendix E of the WA OWRP. 2. Broome, Derby and Wyndham are the most suitable locations for large scale OWR Facilities in the Kimberley region. On water facilities utilising barges may be established to service more remote areas including the offshore islands.	**Equipment** Refer to WA OWRP Section 7 **Personnel** Wildlife Facilities Unit (minimum 6 people) to include facility development specialist and trades (plumber, electrician and carpenter) **Forms and Guidance** WA OWRP	Initial oiled wildlife containers to be onsite / infield within 7 days of risk being identified Oiled wildlife facility to be established ASAP, time will vary depending on response level
8. Wildlife rehabilitation Responsible Person: Wildlife Operations Officer				
		1. Refer to Section 4.7 of the WA OWRP: Wildlife Operations Officer to oversee the Wildlife Rehabilitation Unit to treat undertake the following: a) Initial treatment of oiled wildlife using the oiled wildlife containers (suitable for <50 animals per day). b) Treat oiled wildlife using oiled wildlife facility. Refer to: i. Figure 12 in WA OWRP: Overview of Oiled Wildlife Rehabilitation ii. Appendix F: Triage and First Aid SOP iii. Appendix G: Cleaning and Drying Wildlife SOP. 2. Release rehabilitated fauna back to their natural habitat.	**Equipment** Oiled wildlife containers Oiled wildlife facility **Personnel** Wildlife Rehabilitation Unit **Forms and Guidance** WA OWRP Wildlife Status / SITREP Form (WA OWRP Appendix J)	Ongoing during response

		3. Maintain records of fauna treatment and release.	Wildlife Rescue and Release Form (WA OWRP Appendix J) **Deliverables** National Plan OWR Database (NPOWRD)	
9. Oiled wildlife response termination Responsible Person: IMT Leader				
		1. Refer to Section 4.8 of the WA OWRP: Once the decision has been made to terminate oiled wildlife operations (as per termination criteria), the EMT Leader will initiate a staged stand down of functions through the Wildlife Division Co-ordinator in the following order: a) Termination of Wildlife Rescue Unit. b) Termination of Wildlife Staging / Holding Unit. c) Termination of Rehabilitation Unit. d) Dismantling or demobilisation of or from temporary oiled wildlife facilities by Wildlife Facilities Unit. 2. Termination of Wildlife Facilities Unit.	**Personnel** Wildlife Facilities Unit (minimum 6 people) to include trades (plumber, electrician and carpenter) **Forms and Guidance** WA OWRP	When termination criteria have been met
		3. Once the Wildlife Division has been demobilised, the Wildlife Division Co-ordinator will arrange a hot debrief to analyse their involvement in the wildlife response. Once the major operational phase of the response is completed an 'all agencies' debrief will be organised followed up with a formal report.	**Deliverables** Incident specific OWR report	After termination of oiled wildlife response

2. Wildlife first strike response Responsible Person: Oiled Wildlife Advisor with assistance from Wildlife Division Co-ordinator				
	Stand up OWR capability	1. Refer to Section 4.1 of the WA/NT OWRP: a) Assess the situation; b) Determine the potential response level (refer to Table 6 Indicative Oiled Wildlife Response Levels in the WA OWRP); c) Determine resources required and available; and d) Mobilise first strike OWR kits.	**Equipment** First strike OWR kits **Forms and Guidance** WA/NT OWRP	Commence within 48 hours of risk being identified Onsite / infield within 7 days of risk being identified
3. Mobilisation of wildlife resources Responsible Person: Wildlife Division Co-ordinator / Wildlife Logistics Co-ordinator				
	Mobilisation of required resources to support OWR operations	1. Refer to Section 4.2 of the WA OWRP: a) Mobilise key personnel within the OWR Division: b) Wildlife Planning Officer to lead planning the OWR response. c) Wildlife Operations Officer to lead the mobilisation of operational resources on site where oiled wildlife is present. d) Wildlife Logistics Officer to mobilise equipment as appropriate for the scale of incident 2. Refer to WA OWRP Section 7 for indications of resources needed for each stage of the OWR.	**Equipment** WA ORWP **Personnel** Wildlife Planning Officer Wildlife Operations Officer Wildlife Logistics Officer **Forms and Guidance** WA OWRP	Mobilise key personnel and commence mobilising equipment within 48 hours of risk being identified

4. Coordinate wildlife reconnaissance Responsible Person: Wildlife Operations and Planning Officer				
	Conduct ALL preparations in support of OWR operations	1. Refer to Section 4.3 of the WA OWRP: a) Wildlife Operations Officer to oversee the Wildlife Reconnaissance Unit and determine the best means for monitoring fauna (via plan, vessel or shoreline survey). b) Wildlife Planning Officer to create a geo-plot of all known wildlife communities in the local area that may be affected. 2. The shoreline clean-up assessment team may be able to have a dual function as the wildlife reconnaissance team.	**Equipment** <u>General:</u> Handheld GPS unit / Digital Camera Binoculars / Spotting scope Field notebook and pencil Geo-plot output including animal communities at risk. <u>Transport:</u> Quad motorbikes or 4wd vehicles Small vessels (less than 12m length) Aerial support (fixed wing or helicopter) **Personnel** Wildlife Reconnaissance Unit **Forms and Guidance** WA OWRP **Deliverables** Survey logs	Commence within 7 days of risk being identified
5. Develop IAP subplan for oiled wildlife response Responsible Person: Wildlife Planning Officer with assistance from Wildlife Division Coordinator				
	Incident action planning to support OWR operations	1. Refer to Section 4.4 of the WA OWRP: a) Based on information from wildlife reconnaissance develop the IAP oiled wildlife response sub-plan including information on: i. Wildlife priorities for protection from oiling; ii. Deterrence measures;	**Personnel** • Wildlife Division Co-ordinator **Forms and Guidance** • WA OWRP **Deliverables**	Within 24 hours of wildlife reconnaissance confirming potential or realised

		iii. Recovery and treatment of oiled wildlife; and iv. Resourcing of equipment and personnel.	IAP	impacts to wildlife
6. Wildlife rescuing and staging Responsible Person: Wildlife Operations Officer and Wildlife Logistics Officer				
		1. Refer to Section 4.5 of the WA OWRP: a) Wildlife Operations Officer to oversee the Wildlife Rescue and Wildlife Staging / Holding Units to undertake the following: i. Pre-emptive capture (refer to Appendix H in WA OWRP) ii. Hazing; and iii. Oiled wildlife rescue, transport and staging (refer to Appendix B, C and D in the WA OWRP). 2. Any deterrence / hazing / pre-emptive capture activities will require licensing authority from WA DBCA / NT DEPWS / DAWE through the OWA.	**Equipment** Wildlife capturing equipment Hazing equipment Staging site Oiled wildlife facility Transport for personnel and wildlife **Personnel** Wildlife Rescue Unit (minimum 3 people) Wildlife Staging / Holding Unit **Forms and Guidance** Wildlife SITREP Form (WA OWRP Appendix J) **Deliverables** Wildlife handling licences / approvals	Wildlife to be transported to the oiled wildlife facility within 4 days of being captured
		3. Record keeping is a critical part of the management of captured wildlife whether pre-emptive or following oiling. Records must be kept from the point of capture and travel with each individual animal. On arrival at the rehabilitation centre the wildlife should be tracked through the system on the treatment record.	**Forms and Guidance** Wildlife Status / SITREP Form (WA OWRP Appendix J)	Ongoing after commencement of capturing wildlife
7. Establishment of an oiled wildlife facility Responsible Person: Wildlife Operations Officer				

		1. Refer to Section 4.6 of the WA OWRP: Wildlife Operations Officer to oversee the Wildlife Facilities Team to undertake the following: a) Install the oiled wildlife containers (suitable for <50 animals per day). b) Establish an oiled wildlife facility (on land or on vessel) if the response is escalated > 50 animals per day. The procedure for setting up and using an oil wildlife facility is in Appendix E of the WA OWRP. 2. Broome, Derby and Wyndham are the most suitable locations for large scale OWR Facilities in the Kimberley region. On water facilities utilising barges may be established to service more remote areas including the offshore islands.	**Equipment** Refer to WA OWRP Section 7 **Personnel** Wildlife Facilities Unit (minimum 6 people) to include facility development specialist and trades (plumber, electrician and carpenter) **Forms and Guidance** WA OWRP	Initial oiled wildlife containers to be onsite / infield within 7 days of risk being identified Oiled wildlife facility to be established ASAP, time will vary depending on response level
8. Wildlife rehabilitation Responsible Person: Wildlife Operations Officer				
		1. Refer to Section 4.7 of the WA OWRP: Wildlife Operations Officer to oversee the Wildlife Rehabilitation Unit to treat undertake the following: a) Initial treatment of oiled wildlife using the oiled wildlife containers (suitable for <50 animals per day). b) Treat oiled wildlife using oiled wildlife facility. Refer to: i. Figure 12 in WA OWRP: Overview of Oiled Wildlife Rehabilitation ii. Appendix F: Triage and First Aid SOP iii. Appendix G: Cleaning and Drying Wildlife SOP. 2. Release rehabilitated fauna back to their natural habitat.	**Equipment** Oiled wildlife containers Oiled wildlife facility **Personnel** Wildlife Rehabilitation Unit **Forms and Guidance** WA OWRP Wildlife Status / SITREP Form (WA OWRP Appendix J)	Ongoing during response

		3. Maintain records of fauna treatment and release.	Wildlife Rescue and Release Form (WA OWRP Appendix J) **Deliverables** National Plan OWR Database (NPOWRD)	
9. Oiled wildlife response termination Responsible Person: IMT Leader				
		1. Refer to Section 4.8 of the WA OWRP: Once the decision has been made to terminate oiled wildlife operations (as per termination criteria), the EMT Leader will initiate a staged stand down of functions through the Wildlife Division Co-ordinator in the following order: a) Termination of Wildlife Rescue Unit. b) Termination of Wildlife Staging / Holding Unit. c) Termination of Rehabilitation Unit. d) Dismantling or demobilisation of or from temporary oiled wildlife facilities by Wildlife Facilities Unit. 2. Termination of Wildlife Facilities Unit.	**Personnel** Wildlife Facilities Unit (minimum 6 people) to include trades (plumber, electrician and carpenter) **Forms and Guidance** WA OWRP	When termination criteria have been met
		3. Once the Wildlife Division has been demobilised, the Wildlife Division Co-ordinator will arrange a hot debrief to analyse their involvement in the wildlife response. Once the major operational phase of the response is completed an 'all agencies' debrief will be organised followed up with a formal report.	**Deliverables** Incident specific OWR report	After termination of oiled wildlife response

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18. ABBREVIATIONS

AIIMS	Australian Inter-Service Incident Management System
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
ALARP	As Low As Reasonably Practicable
AMOSPLAN	A voluntary oil industry mutual aid plan intended to supplement the National Plan, administered by Australian Institute of Petroleum through AMOSC
Approved Dispersant	Means dispersant approved by the National Plan
ATV	All-Terrain Vehicles
BCP	Blowout Contingency Plan
CPF	Central Processing Facility
Dispersant	Chemical used to “break up” surface oil slicks
DAA	Department of Aboriginal Affairs
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity Conservation and Attractions
DMIRS	Department of Mines, Industry Regulation and Safety (Previously Department of Mines and Petroleum)
APAA	Aboriginal Areas Protection Authority
DPIRD	Department of Primary Industry and Regional Development Fisheries
DoT	Department of Transport
ERT	Emergency Response Plan
EP	Environment Plan
FWADC	Fixed Wing Aerial Dispersant Contract
GIS	Geographic Information System
HAT	Highest Astronomical Tide
HMA	Hazard Management Agency
IAP	Incident Action Plan

IBC	Intermediate Bulk Container
IMO	International Maritime Organisation
ICT	Incident Command Team
IMT	Incident Management Team
ITOPF	International Tanker Owners Pollution Federation
JSA	Job Safety Analysis
kL	Kilo-litres
NEBA	Net Environmental Benefit Assessment
NRT	National Response Team – a group of interstate based individuals with spill response experience across all areas of response activities available to provide support to an Incident Controller
NATPLAN	National Plan, to Combat Pollution of the Sea by Oil and Noxious and other Hazardous Substances.
NOPSEMA	National Offshore Petroleum Safety and Environment Management Authority
OIM	Offshore Installation Manager
OIW	Oil in Water
OPEP	Oil Pollution Emergency Plan
OSRA	Oil Spill Response Atlas. National CRA, developed by various State agencies. In WA, WA Transport holds the State OSRA
OSTM	Oil Spill Trajectory Model
OWR	Oiled Wildlife Response
OWRP	Oiled Wildlife Response Plan
POLREP	Pollution Report. A report, reporting a pollution incident
PPE	Personal Protective Equipment
ppm	Parts per million
RCC	Rescue Coordination Centre (Canberra, Australia)
SCAT	Shoreline Clean-up Assessment Techniques
SFRT	Subsea First Response Toolkit. A system available ex Perth to provide an initial response to a Macondo style of blowout (subsea wells and subsea flows). Primarily debris clearance and delivery of dispersant at the point of loss of containment under water.
SITREP	Means a Situation Report on an actual or potential marine oil pollution incident or response.
SMP	Scientific Monitoring Program
SOPEP	Ship Onboard Pollution Emergency Plan
SRT	State Response Team
Staging Area	A prearranged strategically placed area at which response personnel and equipment are located
WWC	Wild Well Control – A specialist worldwide Blowout Response organisation with whom Jadestone have a contract to cover support in the event of a blowout.

19. APPENDICES

- A1. Observer Logs (vessel, aerial, shoreline)
- A2. Bonn Agreement Oil on Water Classification
- A3. Shoreline Assessment Form
- A4. Effectiveness of dispersant operations
- A5. Montara Crude Assay
- A6. Skua Crude Assay
- A7 Regulatory Notification
- A8. Incident Management Guidance

Appendix A1 – Observer Logs

Vessel visual observer log

Survey Details						
Date	Start time	End Time	Observers			
Incident			Area of Survey			
Vessel type	Call sign					
Weather Conditions						
Wind speed (knots)			Wind direction			
Cloud cover (%)			Visibility			
Time high water			Current direction			
Time low water			Current speed (nM)			
Slick Details						
Slick grid parameters by lat/long			Slick grid parameters (vessel speed)		Slick grid dimensions	
Length Axis	Width Axis		Length Axis		Width Axis	Length nm
Start Latitude	Start Latitude		Time (seconds)		Time (seconds)	Width nm
Start Longitude	Start Longitude					Length nm
End Latitude	End Latitude		Vessel Speed (knots)		Vessel Speed (knots)	Width nm

End Longitude	End Longitude				Grid area	km^2
Visual appearance slick						
Colours, emulsification etc.						
Any marine fauna or other activities observed						

Aerial surveillance observation log

Date	Incident	Aircraft type	Call sign	Start time	End time	Av altitude/ air speed
Wind speed (kts)	**Wind direction**	**Visibility (nm)**	**Cloud base (ft)**	**Sea state**	**Observer name/s**	**Spill source**
Survey start /end coordinates	**Survey start time**	**Survey end time**	**Time high tide**	**Time low tide**	**Current speed (nm)**	**Current direction**
Notes (e.g. remote sensing used, wildlife or sensitive receptors observed, any response activities observed):						

Slick details

Slick	Time local	Slick (centre or start)		Slick (end)		Slick Orient Degrees	Oil slick length			Oil slick width			Area km^2	Coverage %	Oiled area km^2
		LAT N/S	LONG E/W	LAT N/S	LONG E/W		SOG KT	Time seconds	Distance km	SOG KT	Time seconds	Distance km			
A															
B															
C															
D															
E															

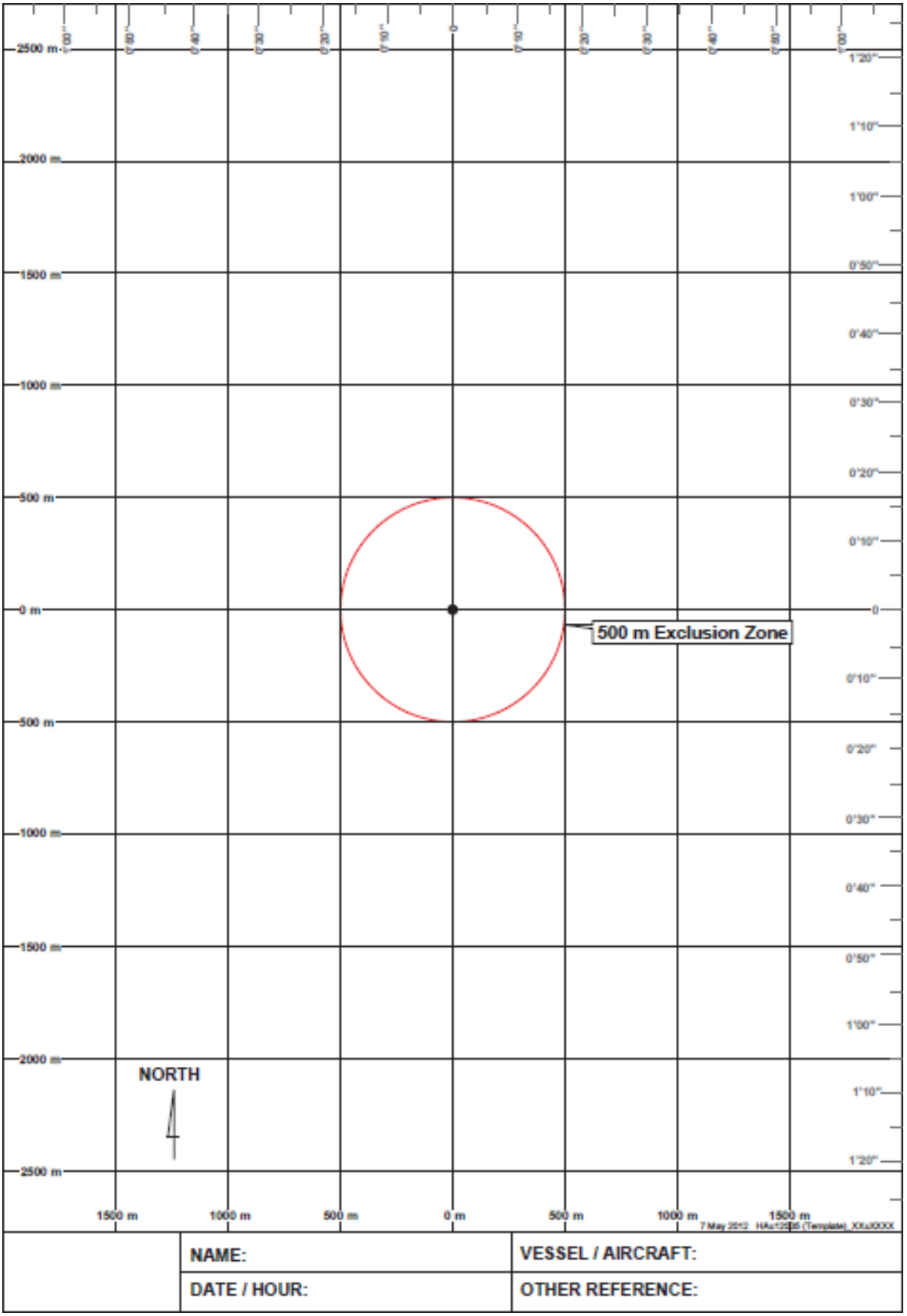
Slick	Oil appearance coverage - %						Minimum volume - m^3	Maximum volume - m^3	Type of detection (etc. visual, IR)	Edge description (clear or blurred)	General description (windrows/patches)
	1	2	3	4	5	other					
A											
B											
C											
D											
E											

NOTE: Ground Speed (SOG) is the speed of the aircraft 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 = 0.03 km (31 m) per minute = 0.0005 km per second

The Bonn Agreement Oil Appearance Code (BAOAC)

No	Oil appearance	Min. Volume m^3 / km^2	Max. Volume m^3 / km^2
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

AERIAL SURVEILLANCE SURFACE SLICK MONITORING DIAGRAM


500 m Exclusion Zone
NORTH
2500 m
2000 m
1500 m
1000 m
500 m
0 m
1500 m
1000 m
500 m
0 m
500 m
1000 m
1500 m
NAME:
VESSEL / AIRCRAFT:
DATE / HOUR:
OTHER REFERENCE:

AERIAL SURVIELLANCE MARINE FAUNA SIGHTING RECORD SHEET

Receptor	Type/species	Number	Location	Behaviour / Comments
Cetaceans				
Turtles				
Dugongs				
Sharks				
Sea snakes				
Seabirds				
Vessels				
Other details for each observation location				
Ambient conditions at each location	Date		Photographic record (to include photo ID No., date and time of each photo or video clip, brief description):	
	Time			
	Weather Conditions			
	Visibility (atmospheric)			

	Water turbidity		

Marine Megafauna Assessment Surveys

Triggers

1. Observed proximity of marine megafauna to oil slick or response operations combined with suggestion of significant harm (i.e. not an isolated incident), or
2. Observed incident of harm attributable to oil or theresponse.

Objectives

1. To quantify the presence of megafauna in the response area (i.e. near the oil slick, response vessels or aircraft) or wider region in order to determine the level of potential exposure to oil.
2. To observe and if possible quantify exposure of megafauna to surface oil or to the response.
3. To detect and quantify lethal effects.
4. Observe and to assess the significance of sub-lethal effects (e.g. avoidance behaviour) of this exposure or interactions.

Data Collection and Management

Data to be recorded from aerial megafauna surveys is outlined in the table below.

Resource	**Species**	**Numbers observed**	**Location**	**Behaviour/Comment**
Cetaceans		Adult_____ Juvenile_____ Calf_____	Lat_____ Long____	Direction of movement Proximity to oil Proximity to vessels Identify marks Aversion or other behaviour Carcases
Birds			Lat_____ Long____	Direction of movement Proximity to oil Proximity to vessels Identify marks Aversion or other behaviour Carcases
Other Details for each Observation Location				
Ambient Conditions at Each Location	Date		Photographic/Video Record	Date and time of each
	Time			Photo/video clip number
	Weathering conditions			Brief description
	Visibility			GPS link

Methodology

It is proposed that observations are made during dedicated monitoring flights supported where necessary by ground (vessel-based) surveys. Flights would normally be dedicated to the monitoring of only one fauna group but multi-objective flights may be required.

Observers must have relevant skills and expertise in the identification of the subject fauna and in interpreting their behaviour. Aircraft must have adequate downward visual capability.

A photographic or video record should be taken of each sighting and precise locations recorded on GPS.

A detailed methodology must be developed prior to commissioning this study. The scope and design of the detailed must include the following:

- State objectives;
- Reflect the level and distribution of observed or anticipated exposure and effects i.e.;

  - Geographic distribution

  - Study duration
- Stipulate replicate sampling, statistical analyses, and scientific rigour;
- Stipulate the expected flight frequency; and
- Indicate comparison to be made between impacted and unimpacted (control) habitats/biota, before and after spill observations.

The plane should follow line transects which are surveyed in passing mode (e.g. the plane did not deviate from the flight path.

Pre-implementation Actions

- Identify personnel or agencies with skills to design and undertake scientific monitoring of cetaceans, dugongs, birds, turtles;
- Undertake detailed study including design, budget, schedule and resourcerequirements;
- Identify and assign responsibilities for management of the study; and
- Secure identified resources.

Resource Requirements Checklist

- ¨ Aircraft
- ¨ Species identification manuals
- ¨ Aerial camera (still and video). Video to be GPS linked
- ¨ Expert megafauna observers

Supporting Documents

AFMA Protected Species Identification Guide: http://www.afma.gov.au/wp-content/uploads/2010/06/id_guide.pdf

Shoreline observation log

Survey Details				
Incident	Date	Start time	End Time	Observers
Area of Survey				
Start GPS: LAT_____deg._____LONG_____deg._____min		End GPS: LAT_____deg._____LONG_____deg._____min		
Aircraft type	Call sign	Average Altitude	Remote sensing used (if any)	
Weather Conditions				
Sun/Cloud/Rain/Windy	Visibility	Tide Height L/M/H		
Time high water	Time low water	Other		

Shoreline Type - Select only ONE primary (P) and ANY secondary (S) types present					
	Rocky Cliffs		Boulder and cobble beaches		Sheltered tidal flats
	Exposed artificial structures		Riprap		Mixed sand and gravel beaches
	Inter-tidal platforms		Exposed tidal flats		Fine-Medium sand grained beaches
	Mangroves		Sheltered rocky shores		Other

	Wetlands		Sheltered artificial structures		
Operational Features (tick appropriate box)					
	Direct backshore access		Alongshore access		Suitable backshore staging
Other					

Appendix A2 - Bonn Agreement Oil Appearance Code

Volume Estimation - Oiled Area Measurement

6.1 Trials have shown that both oiled area and specific oil appearance area coverage measurement is the main source of error in volume estimation. Therefore observers should take particular care during this part of the volume estimation process.

6.2 Estimating or measuring the oiled area can bedone either by:

- Visual estimation
- Measurement of sensor images

6.3 Estimations of oiled slick area based on visual observations are likely to be less accurate than estimates based on measurements made of remote sensing images.

6.4 If possible, the whole slick should be visible in one image for ease of area measurement. Area calculations using accurate measurements of SLAR images will be more appropriate for large oil slicks, while measurements of UV images will be more suitable for smaller slicks.

6.5 Most modern SLAR systems incorporate electronic measuring devices; areas can be measured by drawing a polygon around the detected slick. It is recommended that these devices be used where at all possible as they will provide the most accurate measurement within the confines of the aircraft during flight. Alternatively the overall length and width can be measured electronically and the oiled coverage estimated visually.

6.6 It should be remembered that because of the resolution of the SLAR (generally 20 metres) small areas of less than 20 metres NOT covered with oil but within the overall area would not show on the SLAR. However, oil patches of less than 20 metres will show up as patches of 20 metres.

6.7 The recommended procedure for visual observation is to estimate the length and width of the slick by making time and speed calculations. This forms an imaginary rectangle that encloses the slick. The coverage of the oil slick (expressed as a percentage or proportion) within this imaginary rectangle is then used to calculate the oiled area of the slick. Inevitable inaccuracies in dimension estimates and estimated coverage within these dimensions can give rise to high levels of error in area estimation.

6.8 When determining the oiled area coverage it is essential to remember that the main body of an oil slick may have 'areas' of clear water, especially near the trailing edge of the slick. For compact slicks, there may be only a few ‘clear water’ areas but for more diffused oil slicks there could be several which would lower the overall coverage percentage significantly. More accurate assessments of the oiled area can be made by a thorough analysis of the SLAR or UVimages.

Volume Estimation - Specific Appearance Area Coverage Measurement

6.9 The ‘oiled’ area should be sub-divided into areas that relate to a specific oil appearance (see BAOAC). This can be achieved using the recorded data from the vertical sensors and the noted visual observations.

6.10 This part of the volume estimation is mainly subjective, so great care should be taken in the

allocation of coverage to appearance, particularly the appearances that relate to higher thicknesses (**discontinuous true colour and true colour**).

6.11 The vertical camera data (if available in flight) and the visual observations should be compared with the IR data, which will give an indication of the thickest part of the slick.

6.12 Thermal IR images give an indication of the relative thickness of oil layers within a slick. Relatively thin oil layers appear to be cooler than the sea and relatively thick oil layers appear to be warmer than the sea in an IR image. There is no absolute correlation between oil layer thickness and IR image because of the variable heating and cooling effects caused by sun, clouds and airtemperature.

6.13 The presence of any area within the slick shown as warm in an IR image indicates that relatively thick oil (Code 4 or 5 in the BAOAC) is present. Since these areas may only be small, but will contain a very high proportion of oil volume compared to the much thinner areas, their presence should be correlated with visual appearance in the BAOAC assessment.

6.14 The Volume Estimation Procedure is illustrated at AnnexB.

6.15 It is generally considered that 90% of the oil will be contained within 10% of the overall slick (normally the leading edge (up wind side) of the slick), within a few hours after the release.

Oil Volume Estimate Usage

9.1 Using the BAOAC to estimate oil volume gives a maximum and minimum quantity. It is suggested that in general terms the maximum quantity should be used together with other essential information such as location to determine any required response action.

BONN CP agreed that the minimum volume estimate should be used for legal purposes. Reference is made to Bonn Agreement Contracting Parties Meeting Summary Record 2003 Page 5, Para. 2.4 (f) which states “When the BAOAC is used to estimate the quantity of oil released at sea, the lower limit of the range in the code for each coded appearance should be used for estimating the amount of oil present in the slick for enforcement purposes and for statistical reporting”. However, it is emphasised that each national authority will determine how to use the BAOAC volume data within its own area.

9.2 It is emphasised that extra caution should be used when applying the BAOAC during major incidents involving large quantities of thick oil and / or heavy oils or when emulsion is present. Aircrews should use all the available information or intelligence; such as oil thickness measurements taken by surface vessels, to estimate the volume.

The Bonn Agreement Oil Appearance Code

11.1 The Theory of Oil Slick Appearances

1. The visible spectrum ranges from 400 to 750 nm (0.40 – 0.75 µm). Any visible colour is a mixture of wavelengths within the visible spectrum. White is a mixture of all wavelengths; black is absence of all light.
2. The colour of an oil film depends on the way the light waves of different lengths are reflected off the oil surface, transmitted through the oil (and reflected off the water surface below the oil) and absorbed by the oil. The observed colour is the result ofa combination of these factors; it is also dependant on the type of oil spilled.
3. An important parameter is optical density: the ability to block light. Distillate fuels and lubricant oils consist of the lighter fractions of crude oil and will form very thin layers that are almost transparent. Crude oils vary in their optical density; black oils block all the wavelengths to the same degree but even then there are different ‘kinds of black’, residual fuels can block all light passing through, even in thin layers.

The Bonn Agreement Oil Appearance Code

4. Since the colour of the oil itself as well as the optic effects are influenced by meteorological conditions, altitude, angle of observation and colour of the sea water, an appearance cannot be characterised purely in terms of apparent colour and therefore an 'appearance' code, using terms independent of specific colour names, hasbeen developed.
5. The Bonn Agreement Oil Appearance Code has been developed as follows:
   - In accordance with scientific literature and previously published scientific papers,
   - Its theoretical basis is supported by small scale laboratory experiments,
   - It is supported by mesoscale outdoor experiments,
   - It is supported by controlled sea trials.
6. Due to slow changes in the continuum of light, overlaps in the different categories were found. However, for operational reasons, the code has been designed without these overlaps.
7. Using thickness intervals provides a biased estimation of oil volumes that can be used both for legal procedures and for response.
8. Again for operational reasons grey and silver have been combined into the generic term 'sheen'.
9. Five levels of oil appearances are distinguished in the code detailed in the following table:

Code	Description - Appearance	Layer Thickness Interval (µm)	Litres per km^2
1	Sheen (silvery/grey)	0.04 to 0.30	40 – 300
2	Rainbow	0.30 to 5.0	300 – 5000
3	Metallic	5.0 to 50	5000 – 50,000
4	Discontinuous True Oil Colour	50 to 200	50,000 – 200,000
5	Continuous True Oil Colour	More than 200	More than 200,000

10. The appearances described cannot be related to one thickness; they are optic effects (codes 1 - 3) or true colours (codes 4 - 5) that appear over a range of layer thickness. There is no sharp delineation between the different codes; one effect becomes more diffuse as the other strengthens. A certain degree of subjective interpretation is necessary when using the code *and any choice for a specific thickness within the layer interval MUST be explained on the Standard Reporting Log*.

Description of the Appearances

Code 1 – Sheen (0.04 µm – 0.3 µm)

11. The very thin films of oil reflect the incoming white light slightly more effectively than the surrounding water (Figure 1) and will therefore be observed as a silvery or grey sheen. The oil film is too thin for any actual colour to be observed. All oils will appear the same if they are present in these extremely thin layers.

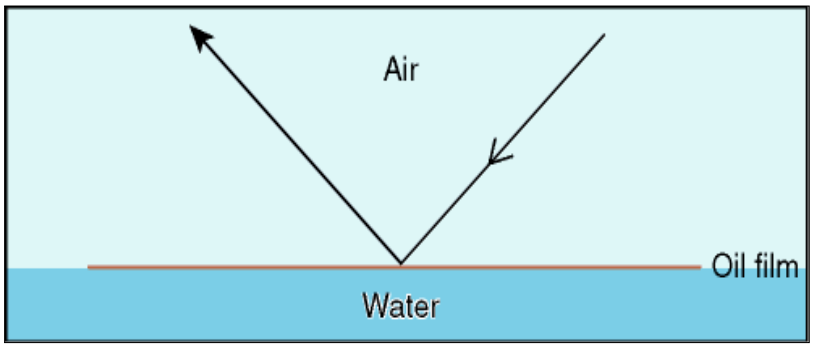


Figure 1. Light Reflecting From Very Thin Oil Films

12. Oil films below approximately 0.04-µm thickness are invisible. In poor viewing conditions even thicker films may not be observed.
13. Above a certain height or angle of view the observed film may disappear.

Code 2 – Rainbow (0.3 µm – 5.0 µm)

14. Rainbow oil appearance represents a range of colours: yellow, pink, purple, green, blue, red, copper and orange; this is caused by constructive and destructive interference between different wavelengths (colours) that make upwhite light. When white light illuminates a thin film of oil, it is reflected from both the surfaces of the oil and of the water (Figure 2).

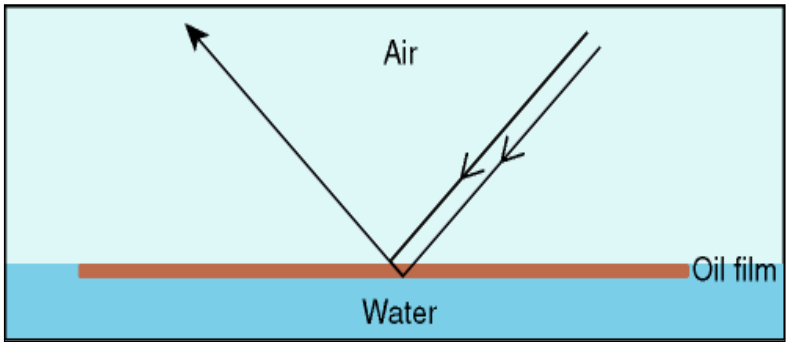


Figure 2. The Rainbow Region

15. Constructive interference occurs when the light that is reflected from the lower (oil / water) surface combines with the light that is reflected from the upper (oil / air) surface. If the light waves reinforce each other the colours will be present and brighter (Figure 3).

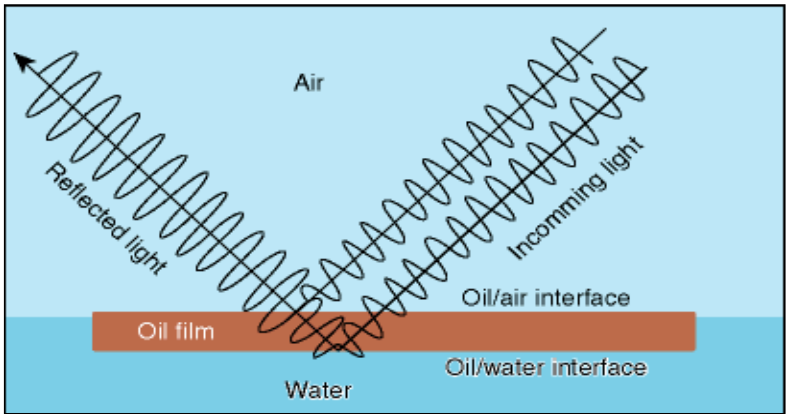


Figure 3. Constructive Interference

16. During destructive interference the light waves cancel each other out and the colour is reduced in the reflected light and appears darker (Figure 4).

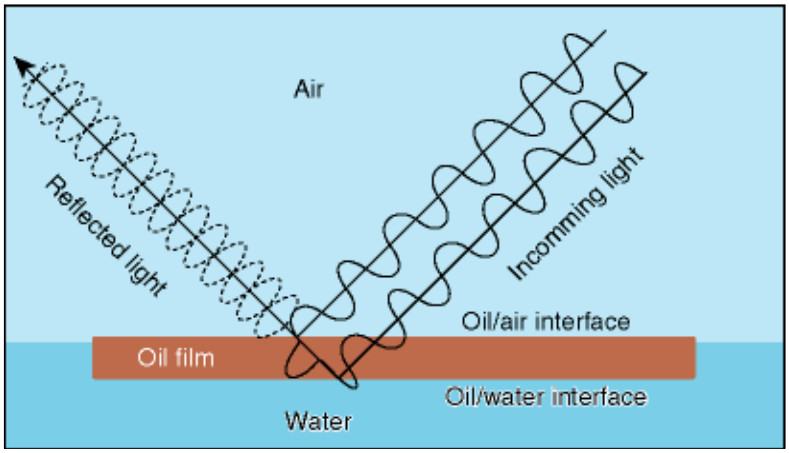


Figure 4. Destructive Interference

17. Oil films with thicknesses near the wavelength of different coloured light, 0.2 µm – 1.5 µm (blue, 400nm or 0.4 µm, through to red, 700nm or 0.7 µm) exhibit the most distinct rainbow effect. This effect will occur up to a layer thickness of 5.0 µm.

18. All oils in films of this thickness range will show a similar tendency to produce the 'rainbow' effect.

19. A level layer of oil in the rainbow region will show different colours through the slick because of the change in angle of view. Therefore if rainbow is present, a range of colours will be visible.

Code 3 – Metallic (5.0µm – 50 µm)

20. The appearance of the oil in this region cannot be described as a general colour. The true colour of the oil will not be present because the oil does not have sufficient optical density to block out all the light. Some of the light will pass through the oil and be reflected off the water surface. The oil will therefore act as a filter to the light (Figure 5).

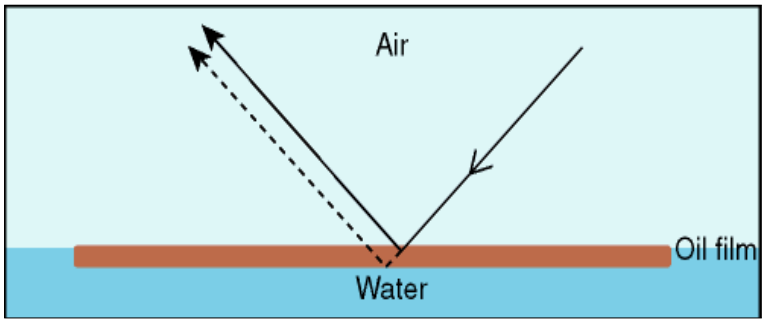
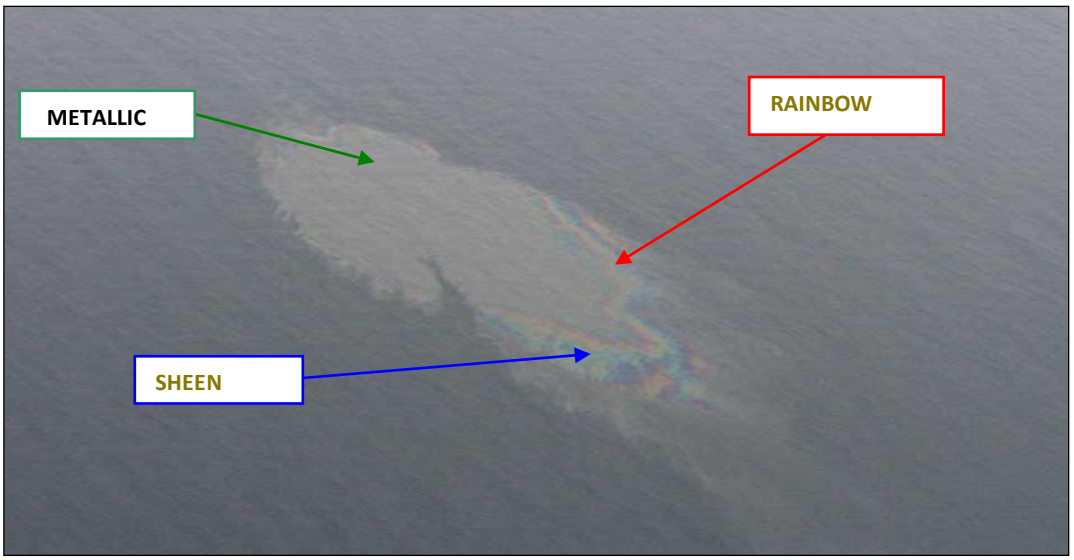


Figure 5. The Metallic Region

21. The extent of filtering will depend on the optical density of the oil and the thickness of the oil film.
22. The oil appearance in this region will depend on oil colour as well as optical density and oil film thickness. Where a range of colours can be observed within a rainbow area, metallic will appear as a quite homogeneous colour that can be blue, brown, purple or another colour. The 'metallic' appearance is the common factor and has been identified as a mirror effect, dependent on light and sky conditions. For example blue can be observed in blue-sky.



***Code 4 – Discontinuous* <u>True Colours (50 µm – 200 µm)</u>**

23. For oil films thicker than 50 µm the light is being reflected from the oil surface rather than the sea surface (Figure 6).

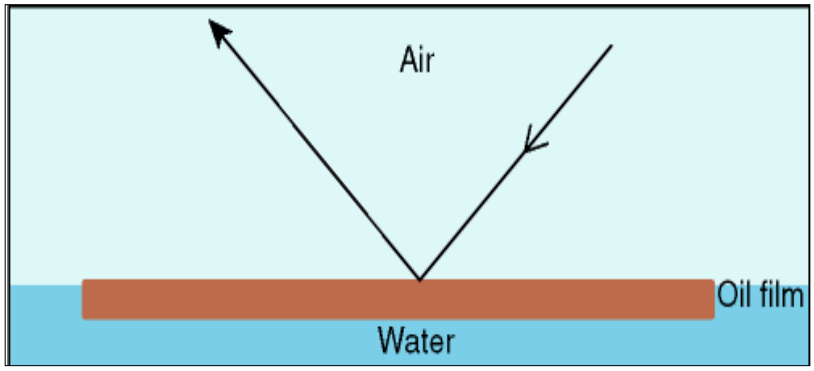
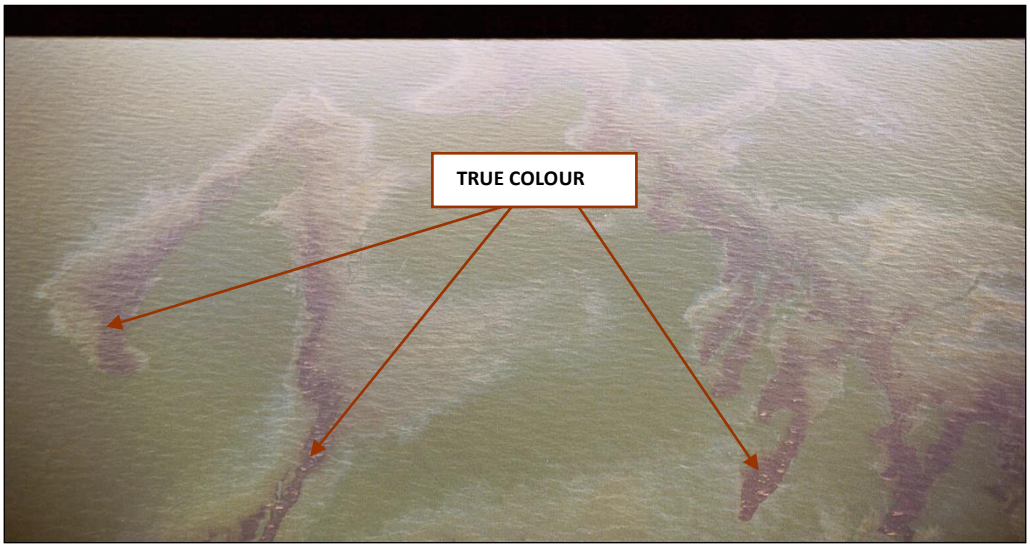


Figure 6. Thick Oil Films

24. The true colour of the oil will gradually dominate the colour that is observed. Brown oils will appear brown, black oils will appear black.
25. In this appearance category the broken nature of the colour, due to thinner areas within the slick, is described as discontinuous. This is caused by the spreading behaviour under the effects of wind and current.
26. 'Discontinuous' should not be mistaken for 'coverage'. Discontinuous implies colour variations and not non-polluted areas.
27. 'Discontinuous true colour' appeared to be a difficult appearance to describe and through imagery it may be possible to get a clearer picture of what is meant. For now the best result of the elaborations is: "**true oil colour against a background of metallic**".
28. When oil is moved by waves, the oil layer obviously is thicker in the wave-trough than on the wave-top. This variation of the "oil appearance" may be understood by indicating "discontinuous".

Code 5 – True Colours (>200 µm)

27. The true colour of the specific oil is the dominant effect in this category.
28. A more homogenous colour can be observed with no discontinuity as described in Code 4.
29. This category is strongly oil type dependent and colours may be more diffuse in overcast conditions.



Note: all documentation on the study can be downloaded from the Bonn Agreement web-site under publications, at: www.bonnagreement.org

ANNEX A

THE VOLUME ESTIMATION PROCEDURE

1. Oiled Area Measurement

Area from SLAR Data	12 km^2
Length and Width (SLAR Image or Time and Distance)	
Length – 12 km x Width – 2 km (Imaginary Rectangle) Area	
Covered with oil (Coverage) – 50%	
Oiled Area 12 x 2 x 50%	12 km^2

2. Appearance Coverage Allocation

Appearance Code 1 (Sheen)	50%
Appearance 2 (Rainbow)	30%
Appearance 3 (Metallic)	15%
Appearance 5 (True Colour)	5%

3. Thickness Band for Allocated Appearance

Sheen	0.04 µm – 0.3
µm Rainbow	0.3 µm – 5.0µm
Metallic	5.0 µm – 50 µm
True Colour	More than 200
µm	

4. Minimum Volume Calculation

Oiled Area x Area Covered with Specific Appearance x Minimum Thickness Appearance 1 (Sheen)

$$12\ km^2 \times 50\% \times 0.04\ \mu m = 0.24\ m^3$$

Appearance 2 (Rainbow)

$$12\ km^2 \times 30\% \times 0.3\ \mu m = 1.08\ m^3$$

Appearance 3 (Metallic)

12 km^2 x 15% x 5.0 µm = 9 m^3

Appearance 5 (True Colour)

12 km^2 x 5% x 200 µm = 120.0 m^3

Minimum Volume = 0.24 + 1.08 + 9 + 120 = 130.32 m^3

6. ***Maximum Volume Calculation***

Oiled Area x Area Covered with Specific Appearance x Maximum Thickness Appearance 1 (Sheen)

12 km^2 x 50% x 0.3 µm = 1.8 m^3

Appearance 2 (Rainbow)

12 km^2 x 30% x 5 µm = 18 m^3

Appearance 3 (Metallic)

12 km^2 x 15% x 50 µm = 90.0 m^3

Appearance 5 (True Colour)

12 km^2 x 5% x (more than) > 200 µm = > 120.0 m^3

Maximum Volume = 1.8 + 18+ 90.0 + > 120 = > 229.8m^3

Appendix A3 – Shoreline Assessment Form

Department of Transport

Shoreline Assessment Form

This form should be submitted to the Shoreline Division Coordinator (SC). A summary of the information will be forwarded by the SC to the Operations Officer, Planning Officer and Management Support Unit.

Purpose

This form is for shoreline responders who are required to complete a shoreline assessment.

It is recommended that such responders have completed oiled shoreline training as a minimum. This form is not intended to be used in isolation.

Purpose

Human health and safety is **always** the number one priority in any incident.

Priorities

Protection priorities under Australia's National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances (The National Plan) are:

- Human health and safety
- Habitat and cultural resources
- Rare and/or endangered flora and fauna
- Commercial resources
- Recreational and amenity areas

Complete

- Take Five and
- Job Safety Analysis (JSA)

Prior to and as part of your operations

What is a shoreline assessment?

A shoreline assessment:

- Is a simple and comprehensive survey of a shoreline
- Provides data to enable decision making for shoreline protection, clean-up and monitoring and
- Employs a systematic approach using standardised terminology

What information needs to be gathered?

Purpose

- Shoreline description
  - Shoreline type, substrate and energy
  - Biological character of shoreline
- Oil description
- Oil location, character and behaviour

Additional information that may be required:

- Access
- Site hazards and constraints
- Sensitive areas
- Features/landmarks
- Potential sites for
  - Decontamination/waste
  - Helicopter landing

Dividing the shoreline

Sectors

Where there is a geographical barrier and restricted access between two areas, they will be split into separate sectors. Different sectors may have separate field command centres, catering, ablutions, decontamination, etc. Sectors will be further spilt into segments.

Segments

A segment is a piece of shoreline that's a workable size for a team and could be defined based on:

- Shoreline type
- Substrate type
- Access points
- Features e.g. breakwater
- Jurisdiction e.g. shire boundaries
- Presence of particular flora and/or fauna
- Distance e.g. every 50m

Item Category	Item	Check
Recording	Camera	☐
Navigation	Maps and charts	☐
	GPS	☐
	Compass	☐
Communication	Mobile phone	☐
	Radio	☐
	Confirm phone/radio coverage	☐
Personal	First aid kit	☐
	Hat	☐
	Sun-cream	☐
	Drinking water	☐
	Rubber boots (non-slip)	☐
	Wet weather gear	☐
Documentation	Field booklet	☐
	Shoreline assessment forms	☐
	JSA forms	☐
	Log	☐
Other	Tape measure	☐
	Shovel	☐
	Sampling kit	☐

Ensure you advise command of your planned operation and establish reporting expectations for while you are in the field.

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Shoreline descriptors:

Shoreline Type	Abbr.		Note
Cliff	Cl		Height and slope
Platform	Pl		Height relative to tide
Reef	Re		Reef is an intertidal platform
Beach	Be		
Dune	Du		
Flats	Fl		
Artificial	A		e.g. wharf, sea wall
Shoreline substrate	**Abbr.**	**Size**	**Note**
Bedrock or rock	R		
Boulder	B	Larger than head	
Cobble	C	Fist to head size	
Pebble	P	Pen diameter to fist size	
Gravel	G	2-4mm diameter	
Mud/silt/clay	M	Less than 0.6mm	Mix with water, if it goes cloudy = mud, if it sinks = sand
Earth	E		Usually cliffs only
Shellgrit	Sh		Usually with sand (i.e. Sh/S)
Coral	Co		Dead coral, i.e. coral rubble *(if corals are live, record as coral in both substrate type and biological character)*
Artificial	A		e.g. rip-rap

Note: S/B would indicate boulders and sand in equal amounts. S(B) would indicate sand was the dominant substrate.

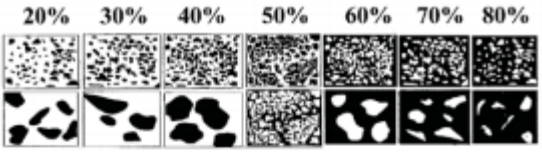
Biological character

This is flora and fauna living on the shoreline. Document this and indicate location on sketch map.

Oil description/character

- **Colour**
- **Viscosity: Solid** *(doesn't flow)*, **Viscous** *(flow slowly)*, **Fluid** *(flows easily)*
- **Stickiness: Very sticky** *(can't be wiped/washed off)*, **Sticky** *(partly removed by wiping/washing)*, **Non sticky** *(wipes of easily)*

Percentage oil cover

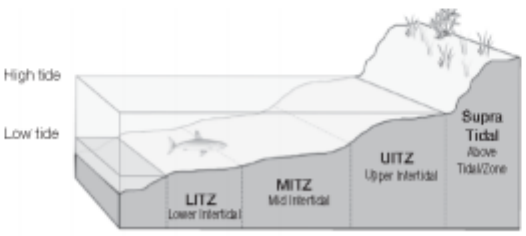


Oil thickness

Name	Abbr.	Thickness	Description
Pooled	Po	Can be measured in mm or cms	Pooled fresh or emulsified oil
Cover	Co	Over 1mm	Coverage of oil of measurable thickness but not pooled
Coat	Ct	Less than 1mm	This coach of oil that masks colour of substrate and can be scratched off with fingernail.
Stain	St	Less than 1mm	Very thin stain of oil which cannot be scratched off substrate with fingernail
Film or sheen	Fi or Shn	Extremely thin film or sheen	Substrate can usually be seen through oil. Can be described as brown, rainbow or silver.
Tar balls	Tb	Variety of sizes	Ball or clumps of weathered oil.

- To describe thickness of subsurface oil:
  - Depth = distance from substrate surface to top of buried layer
  - Thickness of lens = distance between top and bottom of buried layer

Shoreline tidal zones



Objective ID: A8525747 Page 2 of 4

Incident		**Ref No.**	
REPORTING DETAILS			
Assessment Team Leader		**Position/ Organisation**	
Team Members (name/org)			
Date Completed		**Time Completed**	
Reporting to		**Position/ Organisation**	
Date Received		**Time Received**	
LOCATION DETAILS			
Sector		**Segment**	
Name of Beach/Location		**Description (e.g. slope)**	
Topography/ Other Map		**Map Reference**	
Access Via	☐ Foot Only ☐ Road ☐ 4WD ☐ Boat ☐ Helicopter ☐ Gator/OUV		
Hazards			
TIMING			
First Assessment	☐ Yes ☐ No	**Last Assessment**	☐ Yes ☐ No
Timing	☐ Pre Impact ☐ Post Impact Before Clean-Up ☐ Post Impact After Clean-Up		
Time Since	Impact (days/hrs.):	Last Clean-up (days/hrs.):	

ASSESSMENT				
Parameter	**LITZ**	**MITZ**	**UITZ**	**Supratidal**
Shoreline Description				
Shoreline type				
Substrate type				
Length of shoreline				
Width of shoreline				
Biological character				
Oil Distribution and Character				
Oil band length				
Oil band width				
% cover in band				
Surface oil thickness				
Oil appearance/character				
Depth of buried oil (from surface)				
Description of buried oil				
Other				
Un oiled debris				
Oiled debris				

Sketch Map

Please include North point and scale

Notes

Appendix A4 - Effectiveness of Dispersant Operations

The following information is provided to support the use and effectiveness of dispersant in the event of a spill from the Montara field. Noting the unique circumstances associated with the Montara, in that a large scale oil spill response operation led by AMSA was undertaken in 2009, there is evidence in support of the use of dispersant.

In 2010 AMSA released a report into the incident:

"The Response to the Montara Wellhead Platform Incident Report of the Incident Analysis Team - March 2010" *https://www.amsa.gov.au/marine-environment/incidents-and-exercises/response-montara-wellhead-platform-incident*

The report provided favourable feedback relating to the dispersant operations undertaken (see extract below):

Dispersant spraying operations commenced on 23 August 2009 and continued until 1 November 2009:

- the Hercules C-130 sprayed a total of 12,000 litres of dispersant on 23 and 24 August;
- aircraft contracted to AMSA as part of Australia's Fixed Wing Aerial Dispersant Capability continued spraying operations based out of Truscott-Mungalalu aerodrome from 25 August until 2 September, spraying 32,000 litres of dispersant; and,
- vessel spraying operations were carried out from 30 August to 1 November, with 118,000 litres of dispersant sprayed.

Courtesy Mark Hamilton photography

Based on comments provided to the IAT, observations made by experienced personnel during the response indicated that the use of dispersant was highly effective in assisting the natural process of biodegradation and minimising the risk of oil impacts on reefs or shorelines. The six types of dispersant used, Slickgone NS, Slickgone LTSW, Ardrox 6120, Tergo R40, Corexit 9500 and Corexit 9527 were all prior approved for use within Australian waters, having passed laboratory acute toxicity testing requirements applied under the National Plan arrangements.

An additional factor that supports the use of dispersant relates directly to sea state. The following extract is from the IPIECA – Dispersants surface application (Good Practice Guide) - http://www.ipieca.org/resources/good-practice/dispersants-surface-application/

The information discusses the limitations caused by prevailing conditions. A key point of information is the following:

"Rapid dispersion of dispersant-treated oil begins at a wind speed of approx. 7 knots (3m/s, a light gentle breeze) with wave heights of 0.2-0.3 metres."

Limitations caused by prevailing conditions

Sea state

The prevailing sea conditions have a great influence on the effectiveness of response techniques.

The effectiveness of booms used to corral floating oil prior to recovery with skimmers or ignition in controlled in-situ burning is greatly reduced in rougher seas. Booms can be overwhelmed by waves, related to the size (draft and freeboard) of the boom as well as its buoyancy and ability to respond to, or ride on, waves. Even large sea booms can become ineffective at wave heights of approximately 1.4 to 1.8 metres and wind speeds in excess of around 20 knots. Many skimmers are limited by sea state, with some types becoming increasingly ineffective at wave heights greater than 0.6 to 1 metres.

Rapid dispersion of dispersant-treated oil begins at a wind speed of approximately 7 knots (3 m/s, a light to gentle breeze) with wave heights of 0.2 to 0.3 metres. However, dispersants can be sprayed onto floating oil in flat calm conditions, and dispersion will begin when appropriate sea conditions occur. Gale-force winds with speeds greater than 35 knots (18 m/s) and wave heights of 5 metres are generally the upper limits for spraying dispersant from aircraft, although dispersants have been applied from aircraft in winds greater than 50 knots (ESGOSS, 1994). Also, targeting the dispersant becomes challenging in high winds, and floating oil will be over-washed or temporarily submerged in rough seas. The limiting conditions for spraying dispersants from ships will be less for the same reasons.

Extremely rough sea conditions may prevent any at-sea oil spill response. However, these conditions can cause extensive natural dispersion of lighter spilled oils.

Based on the historic wind conditions used in determining the OSTM, it is also highly likely that the prevailing sea state will greatly enhance dispersant operations.

Wind Conditions – from Jadestone OSTM

Summer approx. 74% @ 4m/s up to 12-14m/s (20+knots) = Beaufort Scale 5

Transition approx. 50% @ 6-8 m/s (12+knots) = Beaufort Scale 4

Winter approx. 80% @ 4m/s up to 10-14 m/s (20+knots) = Beaufort Scale 5

(See Beaufort Scale descriptions below)

		Wind Speed	Wave height			
3	Gentle breeze	7–10 knots 8–12 mph 12–19 km/h 3.4–5.5 m/s	2–4 ft 0.6–1.2 m	Large wavelets; crests begin to break; foam of glassy appearance; perhaps scattered white horses	Leaves and small twigs in constant motion; light flags extended.	
4	Moderate breeze	11–16 knots 13–18 mph 20–28 km/h 5.5–7.9 m/s	3.5–6 ft 1–2 m	Small waves becoming longer; fairly frequent white horses	Raises dust and loose paper; small branches moved.	
5	Fresh breeze	17–21 knots 19–24 mph 29–38 km/h 8–10.7 m/s	6–10 ft 2–3 m	Moderate waves taking a more pronounced long form; many white horses are formed; chance of some spray	Small trees in leaf begin to sway; crested wavelets form on inland waters.	

Appendix A5 – Montara Crude Assay

Intertek

Properties of Whole Crude Oil

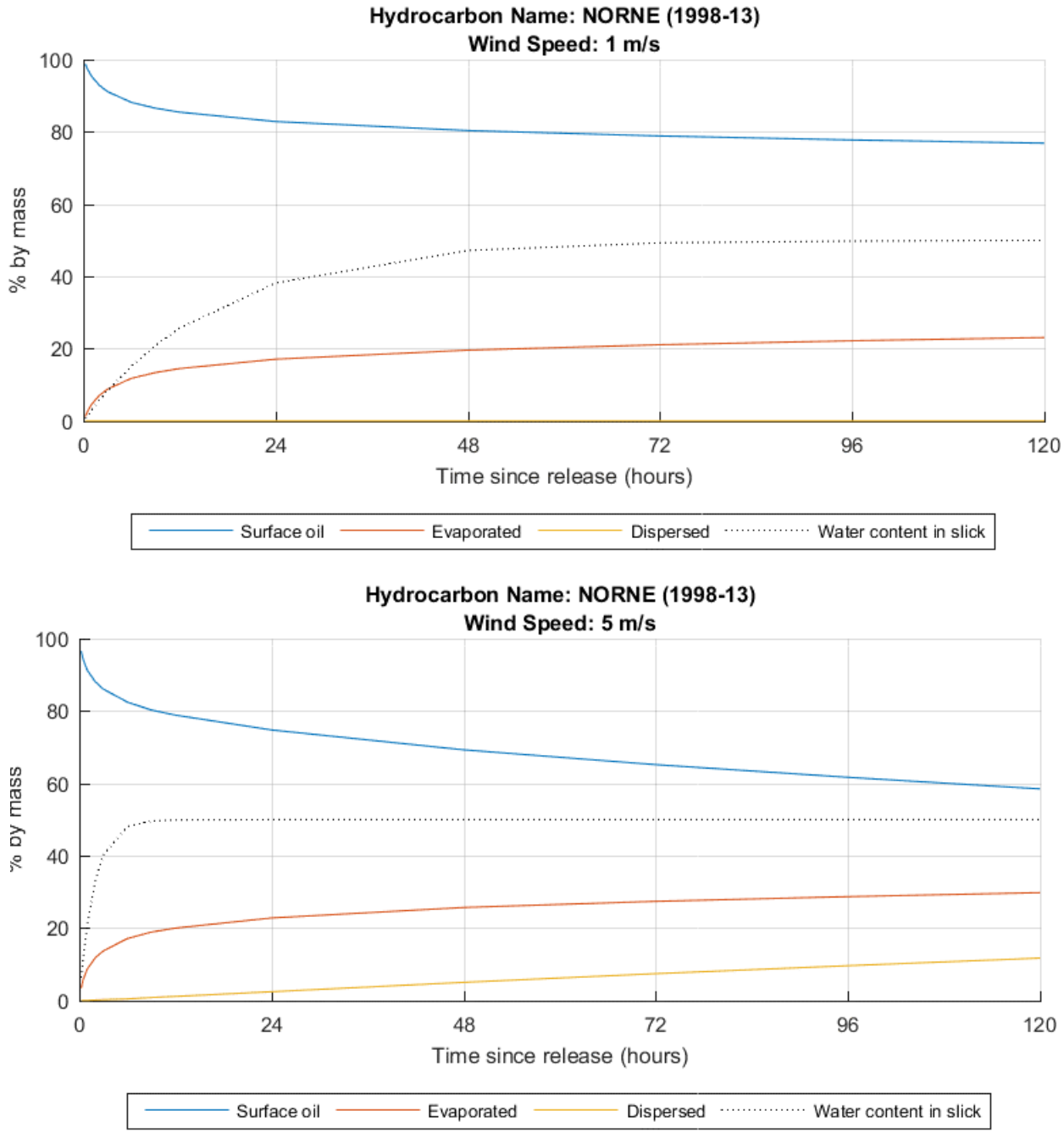
Report ID	AU710-675/14		Whole Crude Oil
Crude ID	MONTARA (COMBINE) CRUDE OIL		
Client ID	PTTEP		
Date	25th July 2014		
Test	Method	Units	
Density @15°C	ASTM D5002	kg/L	0.8296
Specific Gravity @ 60/60F		kg/L	0.8301
API Gravity		°API	39.0
Rapid Yield Analysis	ASTM D7169+LE	°C	Pg 3 & 6
Arsenic	ICPMS	wt ppb	<5
Ash	ASTM D482	% Mass	0.007
Asphaltenes	IP143	% Mass	<0.50
Carbon Residue - Micro	ASTM D4530	% Mass	0.13
Characterisation Factor	UOP375	-	11.9
Chloride - Inorganic	UOP 588	ppm	110
Chloride - Organic	UOP 588	ppm	56
Flash Point	ASTM D93	°C	< 18.0 (note 3)
Hydrogen Content	ASTM D5291	% Mass	13.0
Hydrogen Sulphide	UOP163	wt ppm	<1
Kinematic Viscosity @20°C	ASTM D445	cSt	N/A
Kinematic Viscosity @30°C	ASTM D445	cSt	3.164
Kinematic Viscosity @40°C	ASTM D445	cSt	2.553
Kinematic Viscosity @50°C	ASTM D445	cSt	2.157
Lead	ICPMS	wt ppb	<5
Mercury Content	UOP938	wt ppb	9 (note 6)
Metal - Nickel	ICPOES	wt ppm	<1
Metal - Sodium	ICPOES	wt ppm	5
Metal - Iron	ICPOES	wt ppm	<1
Metal - Copper	ICPOES	wt ppm	<1
Metal - Vanadium	ICPOES	wt ppm	<1
Nitrogen - Total	ASTM D4629	wt ppm	89
Nitrogen - Basic	UOP269	wt ppm	37
Pour Point - Upper	ASTM D5853	°C	+18
Reid Vapour Pressure	ASTM D323	kPa	61.00 (note 7)
Salt Content	ASTM D3230	PTB	71
Sediment By Extraction	ASTM D473	% Mass	0
Sulphur - Mercaptan	UOP163	wt ppm	<1
Sulphur - Total	IP336	% Mass	0.067
Total Acid Number	ASTM D664	mg KOH/g	<0.10
Water by Distillation	ASTM D4006	% Volume	0.050
Wax Appearance Temp	CPM	°C	31.7
Wax Content	UOP46	% Mass	14.3

Notes:

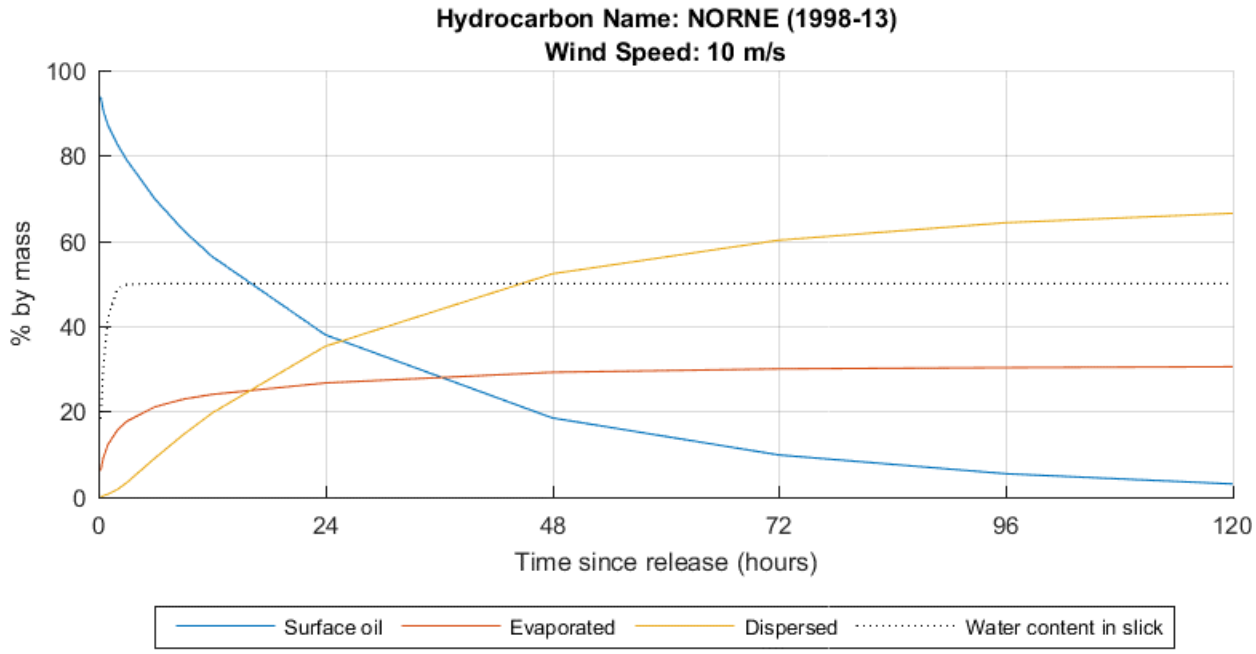
3) Sample flashed at ambient. Unable to perform lower flashpoint due to pour point temperature of sample.

6) Mercury analysis performed on a subsample from 20L epoxy lined container supplied by the client for assay.

7) RVP analysis was performed on a subsample from 20L epoxy lined container supplied by the client for assay.



Simulated weathering of the SINTEFF NORNE (1998-13) hydrocarbon for constant wind speeds of 1m/s (top), 5m/s (middle) and 10m/s (bottom)


Hydrocarbon Name: NORNE (1998-13)
Wind Speed: 10 m/s
% by mass
100
80
60
40
20
0
0
24
48
72
96
120
Time since release (hours)
Surface oil
Evaporated
Dispersed
Water content in slick

Appendix A6 – Regulatory Notifications

Agency / Authority	Notification Type & Timing	Legislation / Guidance	Reporting Requirements	Responsibility	Forms
NOPSEMA Reportable Incidents					
NOPSEMA (Incident Notification Office)	Verbal notification within **2 hours** Written report as soon as practicable, but no later than 3 days	*Petroleum & Greenhouse Gas Storage Act 2006* Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations 2009 (as amended 2020)	A spill associated with the activity that has the potential to cause moderate to significant environmental damage[9]	Jadestone IMT Planning Lead	Incident reporting requirements: https://www.nopsema.gov.au/environmental-management/notification-and-reporting/
National Offshore Petroleum Titles Administrator (NOPTA) (Titles Administrator)	Written report to NOPTA within 7 days of the initial report being submitted to NOPSEMA	Guidance Note (N-03000-GN0926) Notification and Reporting of Environmental Incidents	Spill in Commonwealth waters that is reportable to NOPSEMA	Jadestone IMT Planning Lead	Provide same written report as provided to NOPSEMA
TIER 1-3 Spills					
AMSA (Rescue Coordination Centre (RCC))	Verbal notification without delay to include: • name of ship/s involved • time, type and location of incident • quantity and type of harmful substance • assistance and salvage measures	National Plan for Maritime Environmental Emergencies	• All slicks trailing from a vessel • All spills to the marine environment All spills where National Plan equipment is used in a response	Vessel Master	Incident reporting requirements: https://www.amsa.gov.au/marine-environment/marine-pollution/mandatory-marpol-pollution-reporting Online POLREP - https://amsa-forms.nogginoca.com/public/

[9] A reportable incident is defined by the OPGGS (E) Regulations as 'an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage'. For the purpose of determining whether an incident is a reportable incident, the Titleholder considers any incident that causes, or has the potential to cause, a consequence severity rating of 3 or greater to be a reportable incident.

Agency / Authority	Notification Type & Timing	Legislation / Guidance	Reporting Requirements	Responsibility	Forms
	• any other relevant information Written POLREP form, within 24 hours of request from AMSA				
Commonwealth Department of Agriculture, Water and the Environment (DAWE) (Director of Monitoring & Audit)	Email notification as soon as practicable	*Environment Protection and Biodiversity Conservation Act 1999*	If Matters of National Environmental Significance (MNES) are considered at risk from a spill or response strategy, or where there is death or injury to a protected species	Jadestone IMT Planning Lead	N/A
Parks Australia (24 hour Marine Compliance Officer)	Verbal notification as soon as practicable	*Environment Protection and Biodiversity Conservation Act 1999*	All actual or impending spills which occur within a marine park or are likely to impact on an Australian marine park	Jadestone IMT Planning Lead	Not applicable, however the following information should be provided: • Titleholder's details • Time and location of the incident (including name of marine park likely to be affected) • Proposed OPEP response arrangements • Details of the relevant IMT contact person.
Australian Fisheries Management Authority (AFMA)	Verbal phone call notification within 8 hours		• Fisheries within the environment that may be affected (EMBA) • Consider a courtesy call if not in exposure zone	Jadestone IMT Planning Lead	N/A

Agency / Authority	Notification Type & Timing	Legislation / Guidance	Reporting Requirements	Responsibility	Forms
Northern Territory Waters					
NT Regional Harbourmaster	**Immediate** verbal notification Follow up with POLREP as soon as practicable after verbal notification and email POLREP.	Northern Territory Oil Spill Contingency Plan. As per State legislation (i.e. *Marine Pollution Act 1999*)	All actual or impending spills in NT waters, regardless of source or quantity Notify if spill has the potential to impact wildlife in Territory waters (to activate the Oiled Wildlife Coordinator)	Notification by Jadestone IMT Planning Team	Marine Pollution Reports (POLREPs) are to be emailed to rhm@nt.gov.au (Regional Harbourmaster) Instructions for submitting POLREPs (including a POLREP Template) are provided on the NT Government webpage https://nt.gov.au/marine/marine-safety/report-marine-pollution
NT Department of Environment, Parks and Water Security (DEPWS) (DEPWS) (Pollution Response Hotline; Environmental Operations)	Verbal notification as soon as practicable Written report to be provided as soon as practicable after the incident, unless otherwise specified by the Minister	Northern Territory Oil Spill Contingency Plan. As per State legislation (i.e. *Marine Pollution Act 1999*)	All actual or impending spills in NT waters	Jadestone IMT Planning Lead	Marine Pollution Reports (POLREPs) are to be emailed to pollution@nt.gov.au (Environmental Operations) Instructions for submitting POLREPs (including a POLREP Template) are provided on the NT Government webpage https://nt.gov.au/marine/marine-safety/report-marine-pollution
NT Department of Primary Industry and Fisheries (DPIF)	Verbal phone call notification within 8 hours		Fisheries within the EMBA Consider a courtesy call if not in exposure zone	Jadestone IMT Planning Lead	N/A

Agency / Authority	Notification Type & Timing	Legislation / Guidance	Reporting Requirements	Responsibility	Forms
Western Australia Waters					
WA Department of Transport (WA DoT) (Maritime Environmental Emergency Response (MEER) Duty Officer)	Verbal notification within two hours Follow up with Pollution Report (Appendix C) as soon as practicable after verbal notification If requested, submit Situation Report (Appendix D) within 24 hours of request	Emergency Management Regulations 2006 State Hazard Plan: Maritime Environmental Emergencies Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements	Notify of actual or impending Marine Pollution Incidents (MOP) that are in, or may impact, State waters. Emergency Management Regulations 2006 define MOP as an actual or impending spillage, release or escape of oil or an oily mixture that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment.	Jadestone IMT Planning Lead	WA DoT POLREP (Appendix C): https://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-PollutionReport.pdf WA DoT SITREP (Appendix D): https://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-SituationReport.pdf
WA Department of Mines, Industry Regulation and Safety (DMIRS) (Petroleum Environment Duty Officer)	Verbal phone call within 2 hours of incident being identified Follow up written notification within 3 days	Guidance Note on Environmental Non-compliance and Incident Reporting	A spill incident associated with the activity that has the potential to cause an environmental impact that is categorised as moderate or more serious than moderate1	Jadestone IMT Planning Lead	Environmental and Reportable Incident/ Non-compliance Reporting Form http://www.dmp.wa.gov.au/Environment/Environment-reports-and-6133.aspx
Department of Biodiversity Conservation and Attractions (State Duty Officer)	Verbal notification within 2 hours	Western Australian Oiled Wildlife Response Plan	Notify if spill has the potential to impact or has impacted wildlife in State waters (to activate the Oiled Wildlife Advisor)	Jadestone IMT Planning Lead	N/A
Department of Primary Industry and Regional	Verbal phone call notification within 8 hours		Fisheries within the EMBA	Jadestone IMT Planning Lead	N/A

Agency / Authority	Notification Type & Timing	Legislation / Guidance	Reporting Requirements	Responsibility	Forms
Development (DPIRD) Fisheries			Consider a courtesy call if not in exposure zone		
Department of Water and Environmental Regulation (DEWR) Pollution Watch Hotline	Next working day		Courtesy call to advise of pollution incident	Jadestone IMT Planning Lead	N/A
International Waters					
Department of Foreign Affairs and Trade (DFAT) (24-hour consular emergency centre)	Verbal phone call notification within 8 hours, if the spill is likely to extend into international waters		Notify DFAT that a spill has occurred and is likely to extend into international waters Inform DFAT of the measures being undertaken to manage the spill, e.g. implementation of any operational and scientific monitoring plans that have been triggered, e.g. modelling studies, aerial surveillance to predict and monitor the spill extent and potential impact fishing activities	Jadestone IMT Planning Lead	N/A
Autoridade Nacional do Petróleo e Minerais (ANPM) Spill has potential impact on Timor Leste.	Verbal notification, as soon as practicable Follow up with written report (e.g. POLREP) within 48 hours of incident.	Interim Regulations issued under Article 37 of the Interim Petroleum Mining Code	All actual or impending spills in Timor-Leste offshore waters, regardless of source or quantity	Jadestone IMT Planning Lead	Report must contain a pollutant description (including estimated volume and distribution), spill tier, proposed response; and the pollution cause.

Appendix A7 - Incident Management Guidance

The purpose of this section is to provide guidance on the implementation and management of emergency response at Jadestone Energy with respect to the Sea Eagle-1 and Tahbilk-1 Vessel Based Activity. This section summaries the key aspects of the Incident Management Team Response Plan (IMTRP) (JS-70-PLN-F-00008). For further details of Jadestone incident management team, refer to the IMTRP.

1. Purpose

The purpose of the Incident Management Team Response Plan (IMTRP) is to provide the Jadestone Energy (Australia) Pty Ltd, (JSE) organisation with the necessary information to respond to incidents affecting operations or business interruptions.

2. Scope

The scope of the IMTRP covers incidents involving facilities, offices or sites operated by Jadestone and where Jadestone has responsibility for organising incident and/or emergency response. It outlines incident activation procedures, incident management structures, communication arrangements, emergency response roster arrangements, information management procedures during incidents and IMT training and competency requirements.

3. Principles

Jadestone aligns with Australian Inter-Service Incident Management System (AIIMS) arrangements and uses five fundamental principles to guide and test the organisations incident management systems against:

- **Flexibility** – ensuring that the system can be applied across the full spectrum of incidents and hazards associated with Jadestone operations and activities;
- **Management by objectives** – the clear determination and communication of desired outcomes (objectives) to ensure that all parts of the incident management system understand the direction being taken;
- **Functional management** – the ability to delegate defined tasks across to groups able to effectively undertake actions in support of achieving objectives;
- **Unity of command** – the principle of management where there is a single Incident Controller providing direction and coordinating all actions; and
- **Span of control** – management of the number of individuals/groups within the structure that can be effectively supervised by one person.

Risk Management, Crisis and Incident Management and Business Continuity Management are a seamless continuum. Within Jadestone a high level of planning, preparation and practice is maintained through:

- **procedures** and **guidance** to manage and coordinate incidents;
- implementation and use of **incident response systems**;
- **training** and **management of competencies** across all elements of incident response;
- **drills** and **exercises** to test procedures / systems and to maintain competency; and
- **audits** and **inspections** of systems and capabilities.

Continuous improvement is also a vital part of the organisations incident management system. All opportunities to identify, capture and effectively "learn" from lessons are recommended and there is a

continual drive to improve our ability to prepare for, respond to and recover from any incident that is experienced.

4. Interface with External Plans

Jadestone oil spill response arrangements have been developed to meet all relevant requirements of the OPGGS (E) Regulations. It is consistent with the national system for oil pollution preparedness and response; the National Plan for Maritime Environmental Emergencies (NatPlan) managed by the Australian Maritime Safety Authority (AMSA); the WA Department of Transport (WA DoT) Industry Guidance Note (September 2018) and the NT Department of Environment, Parks and Water Security (NT DEPWS) and Environment Protection Agency (NT EPA) for offshore oil spill response and consultation.

Table A7-1 summarises regulatory involvement in spill scenarios from Jadestone Facilities.

Table A7- 1: Jurisdictional and Control Agencies for Hydrocarbon Spills for Commonwealth & International Waters[10]

Jurisdictional boundary	Spill source	Hazard Management Agency	Jurisdictional authority	Control agency		Relevant documentation
				Tier 1	Tier 2/3	
International waters (>200 nautical miles from territorial/state sea baseline)	Montara	For a Jadestone incident from the Montara facility the company will work directly with respective governments to support response operations. Primary engagement would be through Jadestone Corporate Headquarters (Singapore). Any engagement with Australian Government will be through Department of Foreign Affairs & Trade (DFAT), however will be determined at the time of the incident.				
Commonwealth waters (three to 200 nautical miles from territorial/state sea baseline)	Vessel[11]	N/A	AMSA	AMSA		Vessel Ship Oil Pollution Emergency Plan National Plan
	Petroleum activities[12]	N/A	NOPSEMA	Jadestone		Activity OPEP

Information from the following external documents have been used or referred to within this document:

- AMOSPlan – Australian Industry Cooperative Spill Response Arrangements

[11] Vessels are defined by Australian Government Coordination Arrangements for Maritime Environmental Emergencies (AMSA, 2017) as a seismic vessel, supply or support vessel, or offtake tanker.

[12] Includes a 'Facility', such as a fixed platform, FPSO/FSO, MODU, subsea infrastructure, or a construction, decommissioning and pipelaying vessel. As defined by Schedule 3, Part 1, Clause 4 of the OPGGSA 2006.

- NatPlan – National Marine for Maritime Environmental Emergencies
- State Hazard Plan (MEE) - – Western Australia State Hazard Plan for Maritime Environmental Emergencies
- NT Government – Territory Emergency Plan
- NT Oil Spill Contingency Plan
- WAOWRP – Western Australia Oiled Wildlife Response Plan
- NTOWRP – Northern Territory Oiled Wildlife Response Plan

4.1 AMOSPlan

The AMOSPlan is a voluntary mutual aid plan which is administered and funded by the oil industry through AMOSC. The principle of the AMOSPlan is that, to assist in a local response to an incident, individual company resources are available under co-operative arrangements through the AMOSC hiring agreements. Jadestone is a participating company of AMOSC and as such has access to AMOSC's Level 2 and 3 oil spill recovery and response equipment, dispersant and technical (human) capabilities, as outlined in the AMOSPlan. AMOSC manages a core group of personnel for oil spill response that can be made available for Jadestone requirements, as outlined in Jadestone's Master Service Contract with AMOSC.

4.2 National Plan (NatPlan)

A Memorandum of Understanding (MOU) has been established between Jadestone and AMSA, outlining respective roles and responsibilities when responding to vessel-sourced marine pollution incidents and petroleum activity related marine pollution incidents.

AMSA manages the National Plan for Maritime Environmental Emergencies (National Plan), Australia's key maritime emergency contingency and response plan. All resources under the National Plan are available to Jadestone through request to AMSA under the arrangements of the MoU.

For any oil pollution event, Jadestone Energy agrees to notify AMSA immediately in the interests of facilitating the most efficient and effective response to the incident.

In the instance of vessel sourced marine oil pollution events, Jadestone Energy has agreed with AMSA that:

- AMSA is the designated Control Agency for oil spills from vessels within the Commonwealth jurisdiction. Upon notification of an incident involving a ship, AMSA will assume control of the incident and respond in accordance with the National Plan;
- The National Plan and its supporting documents provide direction for the operational management and response of ship-sourced incidents; and
- AMSA is to be notified immediately of all ship-sourced incidents through RCC Australia.

Jadestone acknowledges that in addition to marine pollution incidents, AMSA has specific national interest responsibilities regarding the management of maritime casualties (as defined within the National Plan for Maritime Environmental Emergencies and International Convention on the High Seas in Cases of Oil Pollution Casualties) and specifically regarding the application of the Protection of the Sea (Powers of Intervention) Act 1981. AMSA and Jadestone Energy agree to work cooperatively to manage maritime casualty incidents in accordance with the arrangements within the National Plan for Maritime Environmental Emergencies.

AMSA will coordinate the resources of the National Plan for Maritime Environmental Emergencies on the formal request of the IMT Leader. Jadestone agrees to provide all available support to AMSA in AMSA's performance of its Control Agency responsibilities.

The AMSA National Plan Policy number NP-POL-003 National Plan Incident Management System describes the incident management system which is applied by AMSA, State/NT Control Agencies and the offshore industry Australia wide for all marine oil spill response incidents and implemented through the National Plan for Maritime Environmental Emergencies. The Jadestone Incident Management System is based on AIIMS which is consistent with the AMSA system.

4.3 WA DoT & State Hazard Plan (MME)

The State Emergency Management Plans (State Hazard Plan)) enable the Western Australian Government to prevent, prepare for, respond to and recover from all different types of emergencies in the State.

The State Emergency Management Committee (SEMC) is the body with overall responsibility for emergency planning. SEMC is responsible for the development and review of several emergency plans for the Department of Transport.

These include:

- *Maritime Environmental Emergency (State Hazard Plan).*

Other State Hazard Plans include:

- *MARSAR (Marine Search and Rescue).*
- *MOP (Marine Oil Pollution).*
- *HAZMAT (Hazardous Materials).*
- *NPW (Nuclear Powered Warships).*
- *Health.*

The State Hazard Plan - Maritime Environmental Emergencies (MEE) covers:

- Prevention and mitigation responsibilities and strategies .
- Responsibilities for preparedness and planning arrangements.
- Responsibilities and arrangements for responding to maritime emergencies.
- Information on recovery arrangements.

Copies of the respective WA Plans can be found at: https://www.transport.wa.gov.au/imarine/state-hazard-plan.asp

Table A7-2 Western Australian DoT Response Requirements

Jurisdictional boundary	Spill source	Hazard Management Agency	Jurisdictional authority	Control agency	
				Tier 1	Tier 2/3
Western Australian	Vessel #	WA DoT	WA DoT	WA DoT	WA DoT
	Petroleum activities*	WA DoT	WA DoT	Jadestone	WA DoT

If a Level 2/3 spill arises within, or has potential to enter Western Australian State waters, the HMA (DoT Marine Safety General Manager or proxy) will take on the role as the State Maritime Environmental Coordinator (SMEEC) and DoT will take on the role as a Controlling Agency.

Jadestone Energy will notify the DoT Maritime Environmental Emergency Response (MEER) unit as soon as reasonably practicable (within 2 hours of spill occurring). On notification, the HMA will activate their Maritime Environmental Emergency Coordination Centre (MEECC) and the DoT Incident Management Team (IMT). Relevant State Response Team members would also be activated by DoT.

Jadestone is required to work in coordination with DoT during such instances, as outlined within the DoT's *Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020)*.

For Level 2 spills that cross from Commonwealth waters to State waters, there will be two Controlling Agencies. Jadestone will retain Control Agency responsibility for Commonwealth waters, whilst DoT will assume Control Agency responsibility for the portion of the response in State waters. For a cross-jurisdictional response, there will be a Lead IMT (DoT or Jadestone) for each spill response activity. Appendix 2 within *Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020)* provides guidance on the allocation of a Lead IMT to response activities for a cross jurisdictional spill. Figure A7-1 shows the cross jurisdictional arrangements and Control Agency structure for a Facility spill entering State waters.

To facilitate effective coordination between the two Controlling Agencies and their respective IMT's during a cross-jurisdictional response, a Joint Strategic Coordination Committee (JSCC) will be established. The JSCC will be jointly chaired by the SMEEC and Jadestone's nominated senior representative and will comprise of individuals deemed necessary by the chairs to ensure an effective coordinated response across both jurisdictions. Additional detail on the JSCC's key functions are outlined in *Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020).*

At the request of the SMEEC, Jadestone Energy will be required to provide all necessary resources, including personnel and equipment, to assist the DoT's IMT in performing duties as the Controlling Agency for State waters response. This includes providing an initial 11 personnel to work within the DoT Incident Control Centre located at Marine House, Fremantle, no later than 8 am following the day of the request. It also includes providing personnel to serve in DoT's Forward Operating Base no later than 24 hours following formal request by the SMEEC. The roles and responsibilities of these positions are outlined in Table A7-8.

As a minimum, the Deputy Planning Officer and Deputy Logistics Officer supporting the WA DoT IMT will be filled by Jadestone IMT personnel familiar with relevant Jadestone systems and processes and trained as per role specific training and competency requirements outlined in Table A7-10.

Two DoT personnel will be provided from DoT's command structure into Jadestone's GCT/ IMT as GCT/ Media Liaison Officers. The roles and responsibilities of these roles are outlined in Table A7-9.

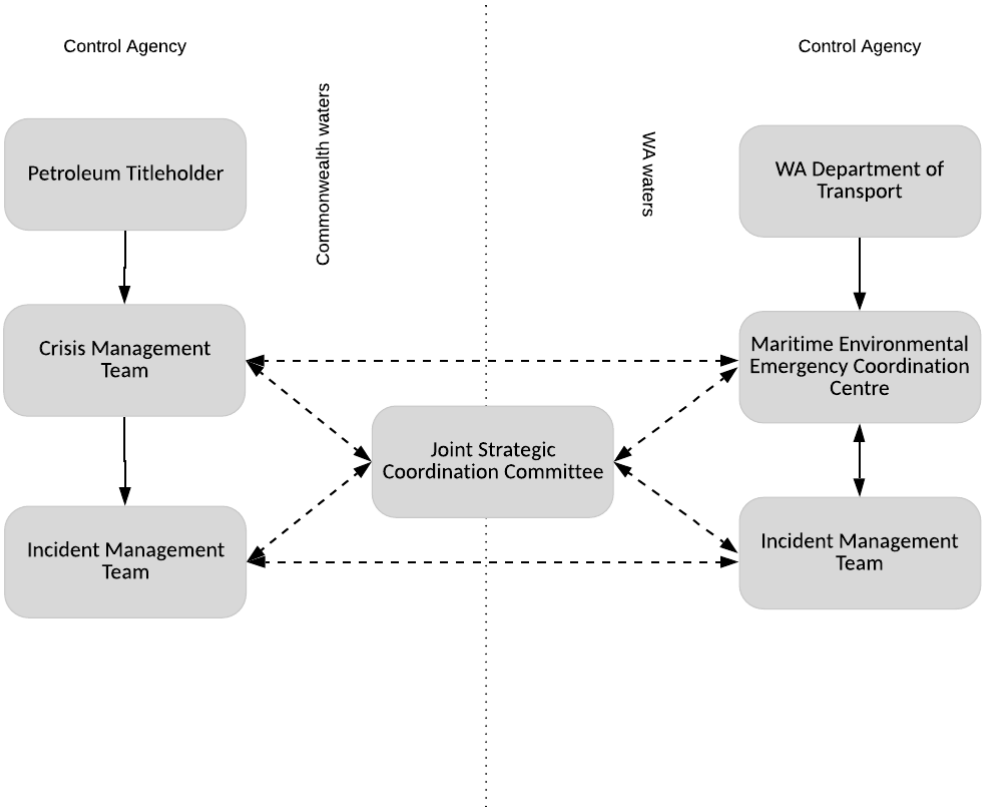


Figure A7- 1: Cross Jurisdictional Control Agency Arrangements (WA waters)

4.4 NT Government – Territory Emergency Plan

The NT Government emergency plan outlines and describes the NT governments approach to ALL emergency and recovery operations, the governance and coordination arrangements and roles and responsibilities of relevant NT agencies. The plan is supported by regional, local and hazard-specific plans and functional sub-groups. The primary objectives of the plan are to:

- Describe the principles for emergency management, response and recovery operations in the Northern Territory;
- Identification of the control and coordination roles and responsibilities related to the functions in the emergency response and recovery operations across ALL levels and agencies;
- Provision for the coordination of activities of other agencies in the Northern Territory in support of a lead agency in the event of an emergency; and
- Identification, in relation to different hazards, the lead agency primarily responsible for controlling a response to an emergency event.

More specific information relating to the plan can be found at:
https://pfes.nt.gov.au/sites/default/files/uploads/files/2019/TEP%20April%202019.pdf

4.4 NT Oil Spill Contingency Plan

The primary function of the Northern Territory Government Oil Spill Contingency Plan (OSCP) is to enable NT Government responders to take the actions required to minimise the environmental and economic effects

of any marine pollution incident in NT waters. This aim is achieved through rapid, effective and appropriate response procedures.

The primary objectives of the OSCP are to ensure the following:

- The health and safety of both responders and members of the public is protected during a marine pollution response;
- That NT Government agencies respond according to the priorities of:
    - Human health and safety;
    - Habitat and cultural resources;
    - Rare and/or endangered flora and fauna;
    - Commercial resources; and
    - Recreational and amenity areas.

  or according to the response aims and priorities set by an Incident Controller during a response.
- A full and effective integration and utilisation of NT and national response efforts and resources;
- Procedures are consistent with those set out within relevant government guidance; and
- Protection and cleanup priorities are identified and considered in the response.

More specific information can be found at:
https://dipl.nt.gov.au/__data/assets/pdf_file/0006/165462/northern-territory-oil-spill-contingencyplan.pdf

5. Risks

The Jadestone incident management process is based around the organisation being able to understand and respond to all hazards, natural and human-induced incidents, including those which may not have been experienced by the organisation. Hazards and safeguards are identified and recorded within respective risk registers. Potential causes and preventative measures are identified for each hazard; qualitative assessments of the consequences and likelihood are undertaken, and detection, protection, mitigation and recovery systems are defined.

In addition, the risk management process will also define and describe the following:

- Major Accident Events (MAE);
- Safety Critical Elements (SCE); and
- Performance Standards (PS).

6. Incident Management Structure

Jadestone utilizes a tiered incident response structure to deal with and manage "incidents" associated with each of the organisation's risks. This structure is activated progressively, from business as usual, facility-based Incident Response Team (IRT), shore-based Incident Management Team (IMT), then if required to the corporate Group Crisis Team (CGT).

The incident management process and structure support all of Jadestone's activities and provides guidance to the IMT when activated. Figure A7-2 illustrates this structure and the primary areas of focus at each level.

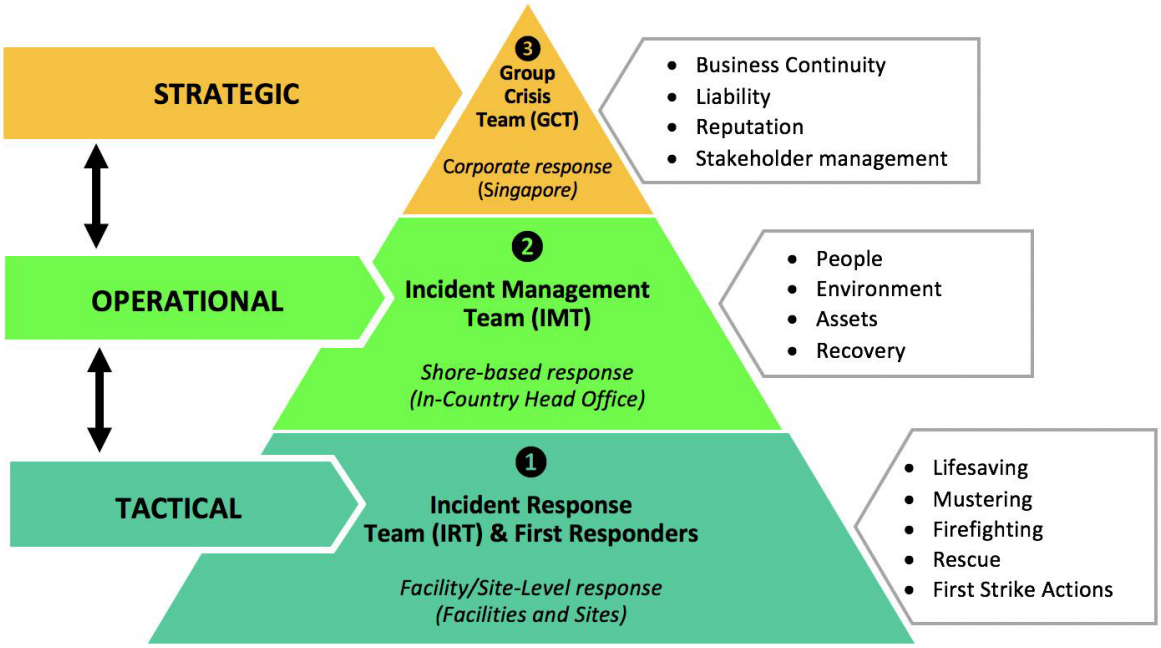


Figure A7-2 : Jadestone Incident Response Structure

The Jadestone incident response structure is based on the Australasian Inter-Service Incident Management System (AIIMS), which consists of a standard management hierarchy and procedures for managing incidents of any size. The use of AIIMS principles drives consistent response operations through a set of common terminology, procedures and processes to:

- Organise personnel and skills necessary for a safe, secure and compliant response;
- Allow personnel from a wide variety of agencies to meld rapidly into a common management structure; and
- Provide a unified, centrally authorised emergency organisation.

6.1 Incident Response Team– Tactical Level

The Incident Response Team (IRT) and First Responders function at the tactical level and are responsible for the provision of immediate response to incidents in order to preserve safety of life, minimise damage (where possible) to the environment and protect property or assets.

Each facility/site/office will have a tactical level capability responsible for dealing with any emergency or hazard that may be foreseen as a function of its operations and to provide basic first aid and account for personnel. In addition, communicating of information will be a key requirement from the tactical level upwards to ensure that all levels within the are able to build and maintain situational awareness and provide guidance and/or support as necessary.

Offshore Facility emergencies and incidents will be managed and coordinated by an On-Scene Commander (OSC); usually supported by an Incident Controller (IC) – *specific details relating to the Incident Response Team (IRT) is contained within respective facility response procedures or plans.*

6.2 Incident Management Team – Operational Level

An operational level response, and an IMT will generally be required for the following:

- To provide additional support to an IRT (facility or site) during an incident; or
- To develop and implement response actions/plans when an incident escalates to a level that the IRT can no longer effectively manage or coordinate response activities (example: Level 2/3 oil spill incident).

The IMT is led by the IMT Leader, who will lead the IMT to address the organisations "key priorities". The IMT is responsible for coordinating operational advice and functional support to the IRT and early liaison/notification of the Group Crisis Team (GCT) and external authorities if required.

The IMT will develop and implement operational plans to mitigate or respond to the incident and provide technical and logistic support as required.

6.3 Group Crisis Team – Strategic Level

Strategic level responses support the management of significant events that threaten the organisation and its stakeholders. At Jadestone these types of incidents will be managed by the Group Crisis Team (GCT); whose primary objectives will be to:

- Develop strategies and plans to manage reputation, operability, licence to operate, liabilities and/or potential financial loss;
- Provide technical, operational and communications advice to the in-country IMT and ensure it is adequately resourced;
- Identify, monitor, prioritise and manage domestic and global issues, gaining a deep understanding of perceptions and expectations of response and behaviour;
- Liaise and interface with high level government agencies including host country government authorities and elected/appointed political leaders; and
- Review and approve external and internal engagement strategies/plans and statements at global and country levels.

7. Incident Management

Effective incident management requires the ability to establish command and control, gain and maintain situational awareness and then develop, implement and monitor response activities either in support of a Jadestone facility/site or directly.

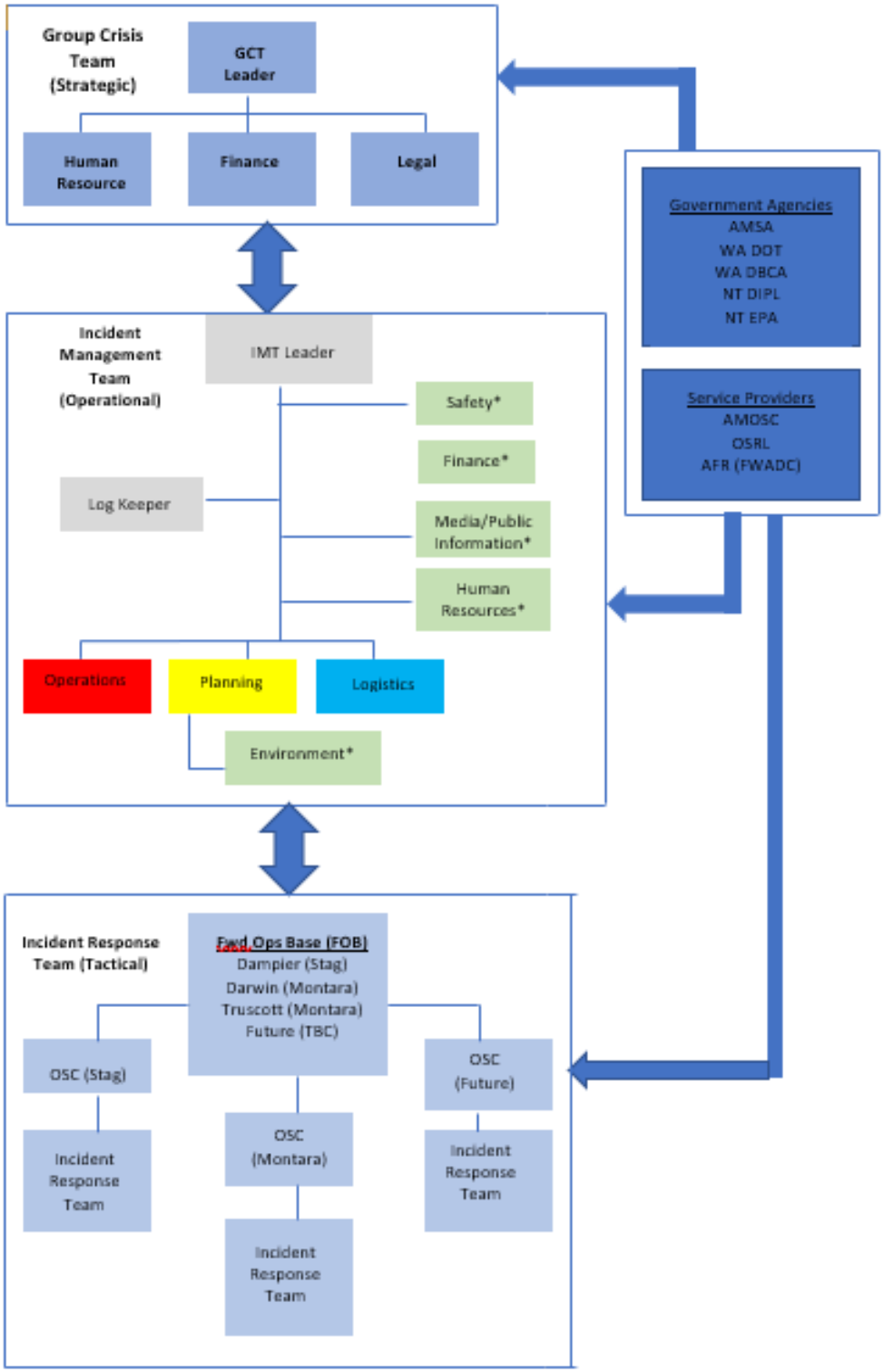
The Jadestone incident management system defines and standardises the organisational processes and structures to enable transition from reactive to proactive and ensure integration of the organisation and all other stakeholders while promoting successful incident management and coordination.

The IMT Leader will decide whether a full or partial mobilisation is required depending on the nature of the incident and the level of support required by the OSC during the initial period of the incident. The standard Jadestone incident management organisational structure is shown in Figure A7-3.

In support of response operations, an Incident Control Centre (ICC) will be established within the Jadestone Offices in Perth. The ICC will have adequate facilities for the IMT to function and coordinate response operations. The main conference room shall be the ICC with meeting rooms used as breakout for backup as required.

Jadestone will also consider the activation of regional operational centre or a Forward Operations Base (FOB) to assist with oil spill response. The local of a regional operational centre or FOB will depend upon the nature, direction and extent of any spill. The preferred regional operational centre or FOB would be Darwin as it has an excellent port, and ready access to airport and medical facilities, however Broome and potentially Truscott could be used as regional centres or FOBs.

In accordance with the Jadestone IMT structure, the FOB will be subordinate to the IMT Operations function, and will be responsible for the coordination of personnel, resources, material, equipment and localised activities as directed by the IMT.



*Note: Key support functions to the IMT (Environment, Safety, HR, Finance and Public Information) are activated if required and coordinated by a suitable qualified/competent lead or outsourced to a third-party provider

Figure A7-3: Jadestone Incident Management Structure

7.1 IMT Activation Process

The notification and activation of IMT members is by direct telephone call to the individual, following declaration by the IMT Leader. The IMT Leader will specify the location and the time at which the team is to convene. The activation process is illustrated in Figure A7-4.

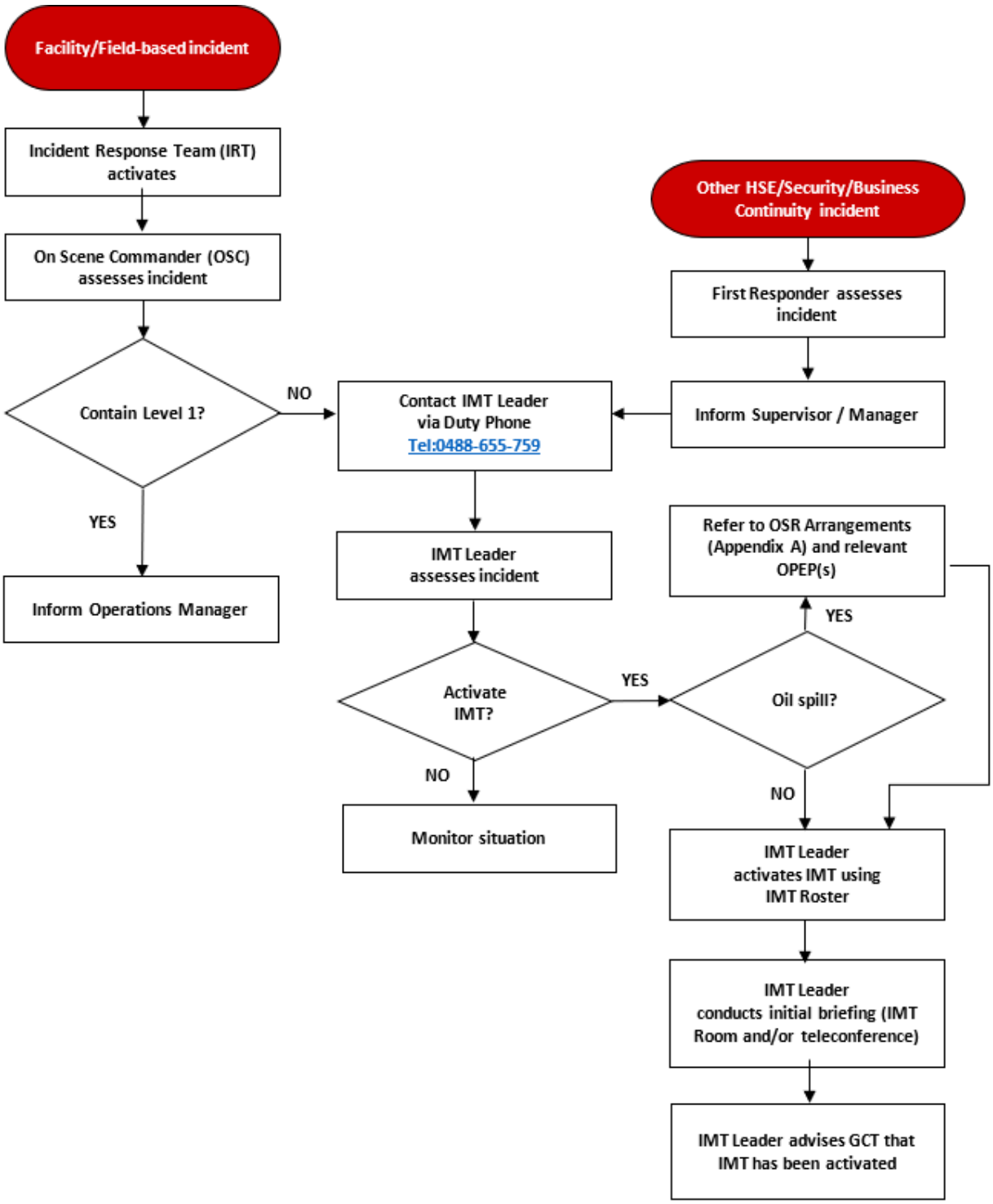


Figure A7-4: Incident activation process

7.2 Forward Operating Base (FOB)

In the event of a major incident, it is intended that facilities to support the Command & Control of response operations will be required in designated locations relevant to the respective Jadestone operation or location of the incident. Depending on the nature and scale of the incident, a Forward Operating Base (FOB) can be established in close proximity to the incident. The generic structure for the establishment of an FOB will be as shown in Figure A7-5.

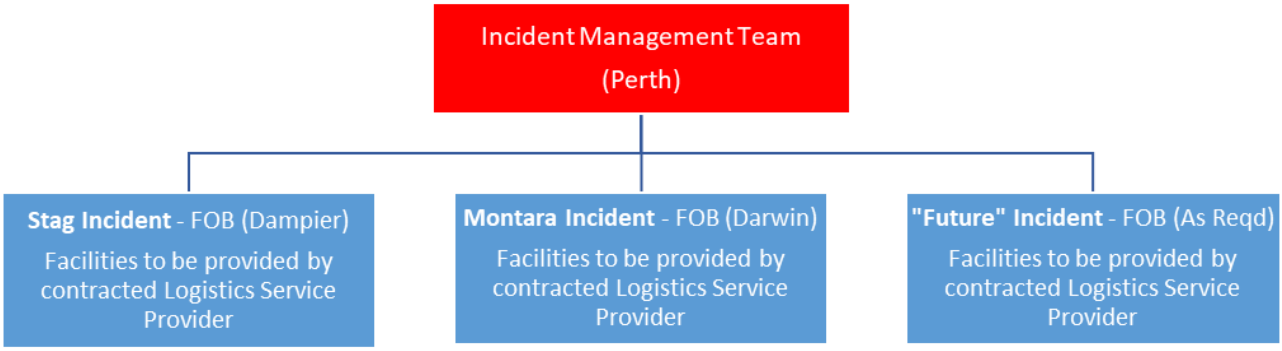


Figure A7-5: Guidance on the establishment of an FOB for an incident

The following facilities and services will be required to support the establishment of the FOB:

Forward Operating Base Supported by the Jadestone contracted logistic service provider (Dampier/Darwin)	• Conference room facilities for briefings/meetings • Telephone/Video conference capability • Communication facilities (radio/sat phone) • Break-out room facilities • Provision of internet/Wi-Fi access • Ability to access Jadestone IMS • Catering and domestic services • Access to logistical lay-down area • Access to marine/port service providers

In accordance with the Jadestone IMT structure, the FOB will be subordinate to the IMT Operations function, and will be responsible for the coordination of personnel, resources, material, equipment and localised activities as directed by the IMT.

A dedicated communication strategy in support of response operations will also be developed to support the functionality of the FOB.

FOB Integration with State/Territory - Depending on the nature of the incident, the FOB may be co-located with a State/Territory FOB activated in response to the incident. Information with respect to cross-jurisdictional arrangements are provided in the IMTRP Appendix A**.**

Personnel requirements to support the functionality of the FOB will be determined at the time and will be based around the nature of the incident, location and any requirements associated with State/Territory interaction.

7.3 IMT and FOB External Support Arrangements

The IMT Leader may activate external support if required, to assist with Jadestone incident response activities. Support to the IMT and/or FOB can be provided by the external agencies/organisations listed in Table A7-3.

Table A7-3 External support agencies/organisations for the IMT

Organisation	Types of services available	Arrangement
Australian Marine Oil Spill Centre (AMOSC)	Oil spill response resources (IMT/FOB staff, equipment, technical advice) – Australian based	Master Service Contract
Oil Spill Response Ltd (OSRL)	Oil spill response resources (IMT/FOB staff, equipment, technical advice) – Internationally based	Master Service Contract
Other Operators	Trained personnel in support of IMT/FOB (Mutual Aid)	AMOS Plan
Environmental Support Provider	Implementation of the Scientific Monitoring Plan (oil spill response)	Contract
Aviation Service Provider	Provision and coordination of aviation support	Contract
Transport Service Provider	Provision of logistical support (road transport)	Contract
Waste Contractor	Provision of waste management support	Contract
Australian Maritime Safety Authority (AMSA)	Access to National Plan resources (personnel, equipment, technical advice) for oil spill response	MOU
Oceaneering	Specialist technical services to support deployment and operation of the Sub-Sea First Response Tool Kit and dispersant injection	OTA Agreement
Wild Well Control	Specialist technical services to support planning and conduct of well blow out operations	OTA Agreement

8. IMT Roles and Responsibilities

The following tables (Tables A7-4 to Tables A7-7) describe the roles and responsibilities of IMT Lead roles. Specific information relating to the Group Crisis Team (GCT) and the Incident Response Team (IRT) roles and responsibilities are provided in respective crisis management and incident response plans.

Table A7-8 outlines the key roles and responsibilities of Jadestone personnel required to be positioned in the State Maritime Environmental Emergency Coordination Centre (MEECC)/ DoT IMT in the event of a Level 2/3 spill. Table A7-9 outlines the roles and responsibilities of DoT personnel to be positioned within Jadestone's IMT. Duty Cards for all roles are provided in the IMTRP Appendix B – IMT Duty Cards.

Table A7-4: IMT Leader Key Roles and Responsibilities

DUTY CARD 1: IMT LEADER
ROLE
The IMT Leader has overall responsibility for the management the incident response. **The IMT Leader will be the initial point of contact for the Corporate Office.**
RESPONSIBILITIES
• Take charge and exercise leadership, including the establishment of the incident management structure • Set objectives for the incident response, considering the safety of all personnel as a priority • Develop and approve plans and strategies to control the incident • Implement the IAP and monitor its progress • Provide information and warnings to communities so that they can make informed decisions • Establish effective liaison and cooperation with all relevant agencies, affected communities and others external to the IMT • Obtain and maintain human and physical resources required for the resolution of the incident • Apply a risk management approach, and establish systems and procedure for the safety and welfare of all response personnel • Ensure effective communications with the GCT Leader, when activated • Ensure appropriate financial delegations are in place and these delegations are made known to the appropriate response personnel. • Ensure relief and recovery considerations are addressed • Ensure collaborations between all organisations supporting the response
SPECIFIC TASKS
Initial Actions

DUTY CARD 1: IMT LEADER

- ☐ Obtain briefing on incident from the OSC (or IRT contact) and review initial assessment
- ☐ Activate the necessary members of the IMT
- ☐ Proceed to IMT Room
  - ☐ Ensure IMT Room is fully set-up before incident management commences
- ☐ Communicate with Country Manager, as link into Group Crisis Team (GCT) as appropriate
  - ☐ Support Country Manager in seeking GCT guidance/support
  - ☐ Support Country Manager in scheduling ongoing contact
- ☐ If an oil spill, confirm spill level

Determine Incident Objectives & general direction for managing the incident

- ☐ Establish the immediate priorities:
  - ☐ Define IMT aim and objectives
  - ☐ If necessary, confer with government agencies to agree on common incident objectives and priorities
- ☐ Chair initial IMT briefing
  - ☐ Communicate priorities to the IMT
  - ☐ Confirm ongoing means of communications with OSC has been established to Operations function
  - ☐ Confirm which key stakeholders need to be notified, responsibility for notification and ongoing liaison including regulatory authorities
  - ☐ Confirm with Planning Lead that all appropriate log-keeping, issues and actions, and status boards are maintained.
  - ☐ If required, give direction to HR/Admin on HR expectations to: Employee communications, Victim / next of kin support, affected contractors

Ongoing Actions

DUTY CARD 1: IMT LEADER

- ☐ Refer to and follow the Incident Management Process as described at Section 5.0
- ☐ Use the STAKEHOLDER MANAGEMENT Form – Appendix E and in OneNote – to assist with tracking stakeholder contact.
- ☐ Hold regular IMT updates
    - Time out, phones switched to time out mode
    - Every 30 minutes initially (as a guide)
    - Monitor effectiveness of response and review issues & actions and priorities.
    - With Planning Lead, establish short-term/long-term recovery goals, milestones and resource requirements
    - Brief Corporate Office as required
- ☐ Delegate Responsibilities
    - Allow yourself to focus on key stakeholder liaison and setting strategic objectives for next operational period
- ☐ Determine duration and structure of incident response operations
    - Decide duration of current operational period (start thinking of when to stand down or next day operations)
    - Identify additional personnel needs to maintain 24-hour support.

Notifications & media strategy

- ☐ Confirm that required notifications are made and updates provided
    - Ensure communications with governments/regulators are regular and proactive
    - Consider need for additional senior management liaison / high level briefing with regulators
    - Ensure that internal notifications are made
- ☐ The Media Support Team decide on the position the asset/company adopts:
    - Ensure an initial pre-approved media holding statement is prepared
    - Agree on message content and timing of release to media, internal audiences, regulators, community leaders etc.
    - Be prepared to deal with rapid media interest and possible presence at scene

Stand Down

DUTY CARD 1: IMT LEADER
☐ Communicate end of IMT response to all relevant internal and external parties
☐ Provide copies of all incident related documents and logs to the Log Keeper
☐ Stand down those people not required in managing ongoing recovery process
☐ Hold debrief of IMT, specialist advisors, support teams and receive feedback
☐ Review any capability gaps and opportunities for improvement in the response
☐ Review and approve the incident report
☐ Commission post-incident investigation
☐ Ensure accepted recommendations have been incorporated into the IMTRP

Table A7-5: Operations Lead Key Roles and Responsibilities

DUTY CARD 2: OPERATIONS
ROLE
Reports to IMT Leader and is responsible for activating and supervising tactical response operations in the field. **Implements the operational plans to achieve response objectives and protect people, the environment and property**
RESPONSIBILITIES
– Obtain a briefing from the IMT Leader or the position that you report to – Establish the Operations Section appropriate to the size and complexity of the incident – Appoint unit coordinators as required and delegate tasks – Manage the personnel within the Operations Section – Develop and maintain an effective register of all resources, required, en route, allocated to and released from the incident – Adjust the structure of the Operations Section throughout the incident – Provide a safe working environment for personnel within the Operations Section – Establish and maintain a log of activities and decisions for the Operations Section – Communicate Section performance to the IMT Leader or the position you report to – Prepare shift handover and brief incoming Operations Lead – Manage the continuity of Operations activities across shift changes – Consider sources of local knowledge and information relevant to the incident. – Identify new and emerging risks for the incident and address these in the IAP – Collect, collate and store incident records – Maintain a personal log of activities and decisions made

DUTY CARD 2: OPERATIONS
• Conduct handover briefing
SPECIFIC TASKS
Initial Actions
☐ Identify and locate OSC - obtain all available information on the situation ☐ Agree call schedule with the OSC ☐ Use the INCIDENT STATUS Form – see Appendix E and in OneNote ☐ Assess incident, including incident potential ☐ Start a personal log
Ongoing Actions
☐ Propose and agree immediate priorities with the IMT Leader ☐ Update Planning Lead on situation for development of the Incident Action Plan ☐ Work with Logistics to identify logistical support requirements ☐ Identify issues and actions required for the next period - mark and track on display boards ☐ Source and provide technical information and support required by the response teams. ☐ Develop strategy (i.e., what we are attempting to achieve) ☐ Identify tactics/breaking down tactics into manageable tasks (i.e., how we are going to implement strategy) ☐ Confer with response contractors / consultants for equipment and techniques ☐ Allocate tactical resources based on strategy requirements ☐ Provide updates to the display boards to reflect current operations in the field ☐ Resource additional technical support as required
Stand Down
☐ Attend the IMT debrief ☐ Provide copies of all incident related documents and logs to the Log Keeper ☐ Monitor the demobilization of response teams

Table A7-6: Logistics Lead Key Roles and Responsibilities

DUTY CARD 4: LOGISTICS
ROLE

DUTY CARD 4: LOGISTICS

Reports to IMT Leader and manages all logistics and procurement requirements for the response

RESPONSIBILITIES

- Assist with setup and coordination of the incident control centre (ICC)
- Obtain a briefing from the IMT Leader or the position that you report to
- Establish the Logistics Section appropriate to the size and complexity of the incident
- Appoint unit coordinators as required and delegate tasks
- Manage the personnel within the Logistics Section
- Provide mobilisation and demobilisation for equipment and services
- Adjust the structure of the Logistics Section throughout the incident
- Provide a safe working environment for personnel within the Logistics Section
- Establish and maintain a log of activities and decisions for the Logistics Section
- Communicate Section performance to the IMT Leader
- Prepare shift handover and brief incoming Logistics Lead
- Manage the continuity of Logistics activities across shift changes
- Consider sources of local knowledge and information relevant to the incident.
- Identify new and emerging risks for the incident and address these in the IAP
    - Collect, collate and store incident records
- Maintain a personal log of activities and decisions made
    - Conduct handover briefing

SPECIFIC TASKS

Initial Actions

- ☐ Mobilize any additional resources or specialist advisors
- ☐ Determine and supply immediate incident resource and facility needs
- ☐ Establish communications, exchange information and coordinate activities with Logistic Supply Base(s)
- ☐ Use and maintain the Resources Summary sheet – Appendix E and in OneNote– to track resources
- ☐ Start a personal log

Ongoing Actions

- ☐ Establish contact & coordinate logistics-related activities with other agency logistics personnel
- ☐ Review logistics requirements for proposed tactics for upcoming operational period
- ☐ Advise other Functions on resource availability to support incident needs
- ☐ Coordinate and process requests for additional resources
- ☐ Work with the Operations Lead to track and display incident resources and facilities
- ☐ Confer with IMT Leader for acquisition or release of major / costly resources or services

DUTY CARD 4: LOGISTICS
☐ Provide responders in the field with adequate food, drink, medical assistance, communications, clothing, transportation (land, water and air), sanitary and sleeping arrangements, security and other requirements ☐ Ensure that responders are supplied with the proper PPE ☐ Provide management and security support for incident facilities such as: ☐ personnel and equipment staging areas ☐ warehouse and maintenance facilities; camps; heli-bases etc. ☐ As appropriate to the incident, work with the Operations & Planning Functions, contractors & government agency personnel to plan, permit and operate waste handling and disposal and injured wildlife rehabilitation facilities ☐ Identify long-term service and support requirements for planned and expected operations ☐ Recommend the reassignment or deactivation of incident resources
Stand Down
☐ Arrange for transportation of equipment and personnel in conjunction with demobilization ☐ Attend the IMT debrief ☐ Provide copies of all incident related documents and logs to the Log Keeper

Table A7-7: Planning Lead Key Roles and Responsibilities

DUTY CARD 3: PLANNING
ROLE
Reports to the IMT Leader and manages the IMT related planning functions for the response
RESPONSIBILITIES
– Assist with setup and coordination of the incident control centre (ICC) – Obtain a briefing from the IMT Leader or the position that you report to – Establish the Planning Section appropriate to the size and complexity of the incident – Appoint unit coordinators as required and delegate tasks – Manage the personnel within the Planning Section – Adjust the structure of the Planning Section throughout the incident – Provide a safe working environment for personnel within the Planning Section – Establish and maintain a log of activities and decisions for the Planning Section – Communicate Section performance to the IMT Leader – Prepare shift handover and brief incoming Planning Lead – Manage the continuity of Planning activities across shift changes Checklist – Consider sources of local knowledge and information relevant to the incident.

DUTY CARD 3: PLANNING

- Identify new and emerging risks for the incident and address these in the IAP
- Monitor effectiveness of risk mitigation strategies
- Provide strategic advice to the IMT based on information received
- Complete the Net Environmental Benefit Analysis (NEBA)
- Prepare the IAP for the next operational period and any longer-term planning required
- Disseminate the IAP throughout the incident management structure
- Develop changeover and demobilisation plans and manage their implementation
- Develop and review the Communications Plan and its implementation
- Regularly communicate progress of strategies and the IAP to the IMT Leader
- Collect, collate and store incident records
- Maintain a personal log of activities and decisions made
    - Conduct handover briefing

SPECIFIC TASKS

Initial Actions

- ☐ Assist the IMT Leader to maintain and use the BRAINSTORMING/PLANNING Form – Appendix E and in OneNote
- ☐ Mobilize any additional resources or specialist advisors immediately required to commence recovery planning
- ☐ Ensure Log Keeper is in place and the IMT is maintaining an auditable documentation trail
- ☐ Consider need to activate Environmental Support
- ☐ Setup and maintain a document retention process for all response documentation
- ☐ Start a personal log

Ongoing Actions

- ☐ Drive and monitor the incident management process – See Section 5.0
- ☐ Oversee and coordinate the actions of the Environmental Support Team.
- ☐ Prepare the Incident Action Plan (IAP) –:
    - ☐ Establish time for next operational period (generally starting the next morning for 24-hour duration)
    - ☐ Create Incident Objectives for next operational period and submit to IMT Leader for approval
    - ☐ Create Meeting Schedule and advise IMT Leader on planning process issues
    - ☐ Develop plans for recovery operations to implement tomorrow, the next day, next week etc.
- ☐ Consolidate the IAP and assemble for final approval and signoff

Stand Down

- ☐ Ensure team members and supports complete any outstanding log/record keeping

DUTY CARD 3: PLANNING
☐ Ensure all log sheets are collected before the team leaves the room. (All notebooks to be copied and / or originals to be retained)
☐ Arrange for copies of all email traffic and incident files to be collated and stored.
☐ Consider need to photograph IMT room and key display boards before it is tidied
☐ Contribute to the development of the incident report.

Table A7-8: Roles and Responsibilities of Jadestone Personnel Positioned in State Maritime Environmental Emergency Coordination Centre (MEECC)/ DOT IMT

Key Roles	Responsibilities
CST Liaison Officer	Provide a direct liaison between the Jadestone and the State MEECC Facilitate effective communications and coordination between the Jadestone CMT Leader and the State Maritime Environmental Emergency Coordinator (SMEEC) Offer advice to SMEEC on matters pertaining to Jadestone crisis management policies and procedures
Deputy Incident Officer	Provide a direct liaison between the DoT IMT and the Jadestone IMT Facilitate effective communications and coordination between the Jadestone IMT (W) Leader and the DoT Incident Controller Offer advice to the DoT Incident Controller on matters pertaining to the Jadestone incident response policies and procedures Offer advice to the Safety Coordinator on matters pertaining to Jadestone safety policies and procedures particularly as they relate to Jadestone employees or contractors operating under the control of the DoT IMT
Intelligence Support Officer	As part of the Intelligence Team, assist the Intelligence Officer in the performance of their duties in relation to situation and awareness Facilitate the provision of relevant modelling and predications from the Jadestone IMT Assist in the interpretation of modelling and predictions originating from the Jadestone IMT Facilitate the provision of relevant situation and awareness information originating from the DoT IMT to the Jadestone IMT Facilitate the provision of relevant mapping from the Jadestone IMT Assist in the interpretation of mapping originating from the Jadestone IMT Facilitate the provision of relevant mapping originating from the Jadestone IMT
Deputy Planning Officer	As part of the Planning Team, assist the Planning Officer in the performance of their duties in relation to the interpretation of existing response plans and the development of incident action plans and related sub plans Facilitate the provision of relevant IAP and sub plans from the Jadestone IMT

Key Roles	Responsibilities
	Assist in the interpretation of the Jadestone OPEP from Jadestone Assist in the interpretation of the Jadestone IAP and sub plans from the Jadestone IMT Facilitate the provision of relevant IAP and sub plans originating from the DoT IMT to the Jadestone IMT Assist in the interpretation of Jadestone's existing resource plans Facilitate the provision of relevant components of the resource sub plan originating from the DoT IMT to the Jadestone IMT (Note this individual must have intimate knowledge of the relevant Jadestone OPEP and planning processes)
Environmental Support Officer	As part of the Planning Team, assist the Environmental Officer in the performance of their duties in relation to the provision of environmental support into the planning process Assist in the interpretation of the Jadestone OPEP and relevant TRP plans Facilitate in requesting, obtaining and interpreting environmental monitoring data originating from the Jadestone IMT Facilitate the provision of relevant environmental information and advice originating from the DoT IMT to the Jadestone IMT
Public Information Support & Media Liaison Officer	As part of the Public Information Team, provide a direct liaison between the Jadestone Media team and DoT IMT Media team Facilitate effective communications and coordination between Jadestone and DoT media teams Assist in the release of joint media statements and conduct of joint media briefings Assist in the release of joint information and warnings through the DoT Information & Warnings team Offer advice to the DoT Media Coordinator on matters pertaining to Jadestone media policies and procedures Facilitate effective communications and coordination between Jadestone and DoT Community Liaison teams Assist in the conduct of joint community briefings and events Offer advice to the DoT Community Liaison Coordinator on matters pertaining to Jadestone community liaison policies and procedures Facilitate the effective transfer of relevant information obtained from through the Contact Centre to the Jadestone IMT
Deputy Logistics Officer	As part of the Logistics Team, assist the Logistics Officer in the performance of their duties in relation to the provision of supplies to sustain the response effort Facilitate the acquisition of appropriate supplies through Jadestone's existing OSRL, AMOSC and private contract arrangements Collects Request Forms from DoT to action via the Jadestone IMT

Key Roles	Responsibilities
	(Note this individual must have intimate knowledge of the relevant Jadestone logistics processes and contracts)
Deputy Operations Officer	As part of the Operations Team, assist the Operations Officer in the performance of their duties in relation to the implementation and management of operational activities undertaken to resolve an incident Facilitate effective communications and coordination between the Jadestone Operations Section and the DoT Operations Section Offer advice to the DoT Operations Officer on matters pertaining to Jadestone incident response procedures and requirements Identify efficiencies and assist to resolve potential conflicts around resource allocation and simultaneous operations of Jadestone and DoT response efforts
Deputy Waste Management Coordinator	As part of the Operations Team, assist the Waste Management Coordinator in the performance of their duties in relation to the provision of the management and disposal of waste collected in State waters Facilitate the disposal of waste through Jadestone's existing private contract arrangements related to waste management and in line with legislative and regulatory requirements Collects Waste Collection Request Forms from DoT to action via the Jadestone IMT
Deputy Finance Officer	As part of the Finance Team, assist the Finance Officer in the performance of their duties in relation to the setting up and payment of accounts for those services acquired through Jadestone's existing OSRL, AMOSC and private contract arrangements Facilitate the communication of financial monitoring information to the Jadestone to allow them to track the overall cost of the response Assist the Finance Officer in the tracking of financial commitments through the response, including the supply contracts commissioned directly by DoT and to be charged back to Jadestone
Deputy On Scene Commander (FOB)	Provide a direct liaison between Jadestone's Forward Operations Base/s (FOB/s) and the DoT FOB Facilitate effective communications and coordination between Jadestone On Scene Commander and the DoT On Scene Commander Offer advice to the DoT On Scene Commander on matters pertaining to Jadestone incident response policies and procedures Assist the Safety Coordinator deployed in the FOB in the performance of their duties, particularly as they relate to Jadestone employees or contractors Offer advice to the Safety Coordinator deployed in the FOB on matters pertaining to Jadestone safety policies and procedures

Table A7-9: Roles and Responsibilities of DoT Personnel to be Positioned in Jadestone's IMT/CMT

Key Roles	Responsibilities
DoT Liaison Officer	Facilitate effective communications between DoT's SMEEC and Incident Controller and Jadestone's appointed CMT Leader and Incident Controller Provide enhanced situational awareness to DoT of the incident and the potential impact on State waters Assist in the provision of support from DoT to Jadestone Facilitate the provision technical advice from DoT to Jadestone's Incident Controller as required
Media Liaison Officer	Provide a direct liaison between Jadestone's Media team and DoT IMT Media team Facilitate effective communications and coordination between Jadestone and DoT media teams Assist in the release of joint media statements and conduct of joint media briefings Assist in the release of joint information and warnings through the DoT Information and Warnings team Offer advice to the Jadestone Media Coordinator on matters pertaining to DoT and wider Government media policies and procedures

9. Incident Assessment & Orientation

The IMT Leader is to lead and manage the IMT in responding to all incidents, with their priority being to provide support and/or assistance to the facility or associated Jadestone activity.

9.1 Understand & Assess the Situation

The IMT Leader is to coordinate personnel in understanding and assessing the situation with consideration given to the following:

- Size, scope, effect, or potential effect of the incident on:

  People, Environment, Assets, Reputation, Livelihood (PEARL)

  Consultation with the GCT with respect to Recovery/Business Continuity;

- Capture information relating to:

  Incident history and responses already taken

  Current response actions

  Confirmation of spill level

  Other response organisations that are activated

9.2 Initial Briefing

The IMT Leader is to conduct an initial briefing to bring key IMT members together to share initial assessment information and to outline the process for initial response activities.

The initial brief is designed to provide all personnel with information about the incident, reason for IMT activation and initial intentions. The objectives of the initial briefing will be to confirm:

- Outline of incident;
- need to confirm spill level;
- Actions taken at the tactical level prior to activation;
- Overarching intention with respect to IMT actions; and
- Provision of initial actions to be taken by the IMT.

If required, the initial briefing may be conducted by teleconference ahead of the IMT arriving at the ICC.

9.3 Notifications

Depending on the type and nature of the incident various internal and external notifications will be required. It is therefore vitally important to ensure that accurate and timely information is captured and that situational awareness is achieved quickly. The IMT Leader must ensure that notifications (where required) are completed and managed as part of an ongoing incident.

IMT Leader should notify the Country Manager of the event within one hour of receiving initial call. As situational awareness id gained, the incident/spill level is reassessed by the IMT Leader. Specific guidance relating to the regulatory notifications required during an oil spill incident are provided at:

- Appendix A of the IMTRP (Oil Spill Response Arrangements); and
- Oil Pollution Emergency Plans (OPEP) (this document).

10. Oil Spill Response Cycle

It is the function of the On-Scene Commander (OIM or Vessel Master for Level 1 incidents) or the IMT Leader (Levels 2) to assess the incident and respond as per the procedures outlined in the Jadestone IMTRP (JS-70-PLN-F-00008). The following sections describe the methods to assess oil spill response priorities.

10.1 Gaining Situational Awareness

The IMT needs to review the applicability of the response strategies contained within OPEPs to the actual incident characteristics. This is achieved using operational monitoring to gain situational awareness and obtain answers to the following:

- What type of hydrocarbon has been spilt?
- What is the expected behaviour of the hydrocarbon that has been spilt?
- How much has been spilt?
- Is the source under control?
- Where is the hydrocarbon going?
- Is there anything in the path of the predicted hydrocarbon travel zones?
- Can the hydrocarbon be approached or are there safety concerns?
- Can the hydrocarbon be contained?
- Can the hydrocarbon be dispersed?
- Will shoreline impact occur and clean-up be required?
- Will wildlife be affected and require response?

10.2 Assess Appropriate Strategies

Identify and assess known response strategy activities against the criteria detailed below using NEBA:

- Applicability of the response strategy to the range of credible spills (as detailed in the OPEP), including the potential effectiveness of the response in managing the environmental risks associated with each spill.
- Acceptability of the response strategy in relation to the potential environmental impact caused by the implementation of the response.

10.3 OPEP Actions Tables

The Action Tables detailed in the facility specific OPEPs have been developed to assist the IMT in commencing an oil spill response. They have been developed utilising risk assessments to identify credible worst case spill scenarios, expected/ calculated release rates, known information of hydrocarbon types and behaviour, and expected partitioning of the hydrocarbon within the marine environment with an estimate of the volume of persistent oil.

Models give a theoretical zone of spread that is used to identify potential sensitive receptors and response strategies required to reduce the consequences of a spill to ALARP. The response strategies described in the facility specific OPEPs are assessed using a NEBA process so the most effective response strategies with the lowest environmental consequences can be identified, documented and prepared for.

Jadestone uses a planning process based on risk-based scenario planning which required the team to:

- Understand the hazard profile;
- Identify parameters to assess applicable response strategies and scale of the event & suitable response strategies;
- Understand the impacts associated with response strategies; and
- Ensure capability supports management of risks to ALARP.

The outcome of this approach is that oil spill hazards associated with Jadestone's activities are addressed and risks are managed to ALARP; and that response strategies and resources are based on the nature and scale of the incident.

Spill response planning to identify a suitable combination of response strategies involves estimating required resources based on potential effectiveness. Capability to support the minimum resources required has been planned for and is presented in each facility specific OPEP**.**

10.4 Incident Action Plan

The Incident Action Plan (IAP) formally documents and communicates the:

- Incident objectives;
- Effectiveness of the response strategies;
- Status of assets;
- Operational period objectives; and
- The response strategies approved by the IMT Leader during response planning.

It is the responsibility of the IMT to evaluate the response strategies provided in the OPEP based on real time information. The actual response may not always adopt all response options; this is outcome based depending on the circumstances that will produce impacts that are ALARP. The process implemented throughout the response by the IMT to assess the appropriate response strategies and implement these in a controlled manner to ensure the health and safety of operational personnel and effectiveness in response is the Incident Action Planning (IAP) process.

Jadestone IMT use the incident management planning process described in Section 5 of the IMTRP to develop IAPs.

The IAP is developed and implemented by the IMT for each defined operational period following the initial first-strike IAP, notifications, and activations defined in OPEPs. An operational period is the period scheduled for execution of actions specified in the IAP. The IAP is refreshed when conditions change and can have multiple objectives, strategies and tactics.

10.5 Monitoring Performance of IAP

As IAPs are implemented their performance is monitored through IMT communication with in-field response personnel (e.g. surveillance personnel, vessel masters, air-attack supervisors, team leaders etc.) who report on the effectiveness of the response strategies. Communication to the IMT is both verbally and through logs/ reports/ photos sent throughout the response.

The performance objectives and standards for response strategies and tactics are documented in the IAP. Performance against the objectives and standards are assessed through field observations and response monitoring and recorded in the IAP in the next operational period. Through this method, the performance measurement results (gathered from scientific reports and verbal communication/ logs/ photos/ reports

provided by response Team Leaders) are fed back into the IMT to provide the IMT with greater situational awareness to enable the effective formulation of following IAPs i.e. the response strategies that are effective in obtaining the IAP objectives are continued or increased, while ineffective strategies are scaled back or ceased.

8.4 Net Environmental Benefit Analysis (NEBA)

The IMT use NEBA to inform the development and refinement of IAPs, so the most effective response strategies with the least detrimental environmental impacts can be identified, documented and executed. The Planning Lead is responsible for reviewing the priority receptors identified within the EP and OPEP and application of the NEBA to identify which response options are preferred for the situation, oil type and behaviour, environmental conditions, direction of plume and priorities for protection. The EP describes the Strategic NEBA which has directed the selection of response strategies in this OPEP to the sensitivities of the priority receptors.

When a spill occurs, NEBA is applied to the current situation, or operationalised, using the Operational NEBA'S provided in the IMTRP Appendix D – Operational NEBA Form.

- All ecological and socioeconomic sensitivities identified within the spill trajectory area are inserted; and
- Potential effects of response strategies on each sensitivity are assessed and assigned a positive, negative or no change rating.

The Operational NEBA Form documents the decisions behind the recommendation to the IMT Leader on which resources at risk to prioritise, and the positives and negatives of response strategies to deploy.

To maintain flexibility, response information is used by the IMT to redefine and revalidate the operational NEBA on a daily basis and is fed into the IAP process. Sources of data for the NEBA include:

- Vessel & aerial surveillance;
- Ongoing operational oil and oil in water monitoring (visual);
- Trajectory modelling;
- Tracking Buoy location updates;
- Satellite imagery (if required);
- UAV imagery (if required);
- Fluorometer readings (Entrained oil monitoring);
- Weather and ocean conditions;
- Source Control reports;
- Megafauna Reports;
- Containment and recovery boom effectiveness (m^3/day);
- Skimmer effectiveness (m^3/day and water cut);
- Nearshore ocean currents and tides (direction & strength);
- Shoreline Assessment reports;
- Oiled wildlife response reports; and
- Scientific monitoring reports.

The NEBA matrix table prioritises environmental sensitivities and assesses the individual net effect that each response option may have on it. This process enables the trade-off effect to be achieved and provides the ability for an informed decision to be made. NEBA is an integral part of the decision-making process and will ultimately result in a trade-off between priorities and response strategies. The outcome of the response however will result in an overall net environment benefit.

10.5 Further IMT Management Guidance

Further guidance on Jadestone IMT and response strategies are detailed in the IMTRP and supporting documentation. This is a controlled document and restricted to Jadestone. Refer to Jadestone Energy management information system for further details.

11. IMT Training and Competency

Internal drills/exercises to demonstrate competency are undertaken as per the Incident Management Exercise and Testing Program (JS-70-PR-F-00001). Jadestone IMT will undertake training in their respective roles and responsibilities as provided by an Australian Registered Training Organisations (RTO) or internationally accredited training provider.

Competencies for IMT members will be maintained and managed by the ER Lead. Training requirements and core competencies for Jadestone key IMT response staff are outlined in Table A7-10.

Table A7-10: IMT Roles – Training and Competency Requirements

IMT Role											
	IMO 3 - Oil Spill Response – Command & Control Priority Level (1)	IMO 2 - Oil Spill Response Management Priority Level (1)	Coordinate Incident Response (PMAOMIR418) Priority Level (1)	Manage Incident Response Information (PMAOMIR320) Priority Level (1)	Jadestone Incident Management Team Introduction (Online Module) Priority Level (2)	IMT Duty Roster Orientation Priority Level (2)	IMT Oil Spill Response Workshop (Annual) Priority Level (3)	*IMT MAE Drill (Quarterly) Priority Level (3)	** Oil Spill Response Functional Exercise (Annual) Priority Level (3)	***Targeted Oil Spill Refresher Workshop (as required) Priority Level (3)	Media Awareness
IMT Leader	M		M		M	M	M	M	M	R	R
Operations Lead		M		M	M	M	M	M	M		
Planning Lead		M		M	M	M	M	M	M	M	
Logistics Lead		M		M	M	M	M	M	M		

Priority Levels - (1) Pre-join; (2) 0-3 months; (3) 0-12 months

Key: M – mandatory R – recommended

***** - to participate **or** be an observer in a minimum of one drill per year

****** - to attend a minimum of one within 3 year IMO certification period

***- to attend a minimum of three per year pro rata from starting time

11.1 IMT Exercise and Testing Program

To maintain the organisation's ability to react to and manage major incidents, a three-year exercise cycle shall be implemented. Over the course of a 3-year period it is intended that all major incident events including key MAEs and oil spills will be exercised using a stand-alone IMT drill or as part of an annual functional exercise.

The exercise cycle shall be planned to include a quarterly MAE scenario, oil spill response workshop and exercises to test the IMT and will alternate between offshore facilities. A quarterly MAE scenario can be substituted for or combined with the Annual Oil Spill exercise. Exercises program shall align with facility exercise programs wherever practical. All completed IMT exercises shall be recorded in BASSNET.

The Incident Management Exercise & Testing Program (JS-70-PR-F-00001) provides information on drill and exercises (types and documentation).

13. Scientific Monitoring

Scientific monitoring activities are the principle tool for monitoring environmental impacts from hydrocarbon exposure and allows operators to determine when their termination goals have been met during a response. Jadestone has prepared the Framework for Scientific Monitoring GF-70-PR-I-00035 (the Framework) to guide scientific monitoring activities in an oil spill response.

12.1 Objectives

The objective of the Framework is to describe scientific monitoring studies to quantify impacts to the environment and their subsequent recovery.

12.2 Industry Guidelines

The NOPSEMA *Information Paper N-04750-IP1349: Operational and Scientific Monitoring Programs (OSMPs)* sets out general principles and practical advice to assist operators in their planning for, and application of, fit-for-purpose SMPs.

Features of these documents have provided the basis for which the Framework has been developed, with specific guidance utilised in the development of the monitoring program designs and application considerations.

12.3 Monitoring Background

Scientific monitoring activities have very different objectives to operational monitoring which significantly influence the monitoring methods likely to be used, the degree of scientific rigour required to meet the monitoring objectives, and the scope of studies.

Operational monitoring is monitoring undertaken in OPEPs to obtain information which will assist in the planning and execution of the oil spill response. Scientific monitoring is undertaken to provide indicative or quantitative data for short term and longer-term environmental effects assessment. Table A7-12 provides the characteristics of each of the monitoring types.

Table A7-12: Characterisation Summary of Spill Monitoring Types

Monitoring Classification	Character / Criteria
Operational	• Results required short term; • Lower requirement for statistical strength; • Lower requirement for the identification of control sites or to demonstrate baseline conditions; • Concentration on key habitats or species that are indicators of biological community health, are of particular value or have slow recovery times; and • Includes monitoring to help predict environmental effects or define the sensitivity of resources to guide spill response actions.
Scientific	• May be longer-term studies and monitoring may extend beyond the time and location of the clean-up response; • Need for high statistical strength (e.g. potentially large number of samples or sample sites); and Need for high quality ‘control’ areas.

12.4 Revision of Monitoring Programs

Following a hydrocarbon spill, subsequent impacts to sensitive receptors will be apparent (e.g. oiling of habitats/fauna visible; surveillance activities confirm contact over time at receptor locations). Therefore, the requirement for long-term monitoring will be based on the nature of the spill and monitoring data collected for the short-term phase on the impact and recovery of sensitivities impacted.

Scientific monitoring activities will be assessed for their applicability and organised by the Environmental Team Lead. Using surveillance and spill fate modelling information collected as part of the operational monitoring, the IMT will assess and decide on the final suite of scientific response monitoring programs. **Table A7-13** describes the linkages between the OMPs and the SMPs.

Table A7-13: Matrix of SMPs Triggered by OMPs

Operational Monitoring Strategy	SMP1	SMP2	SMP3	SMP4	SMP5	SMP6	SMP7	SMP8
Satellite tracking buoy	X	X	X	X	X	X	X	X
Aerial surveillance	X	X	X	X	X	X	X	X
Vessel surveillance		X	X	X	X	X	X	X
OSTM	X	X	X	X	X	X	X	X
Fluorometry	X						X	X
Shoreline habitat assessment		X	X	X	X	X	X	

SMP1 – Water Quality

SMP2 – Sediment Quality

SMP3 – Intertidal Mudflats, Sandy Beaches and Rocky Shores

SMP4 – Mangroves

SMP5 – Benthic Habitats

SMP6 – Marine Fauna

SMP7 – Seafood Quality, Fisheries and Aquaculture

SMP8 – Fish, Invertebrates (Crustaceans and Cephalopods)

12.5 Scientific Response Monitoring Service Providers

During and post a spill requiring scientific response, monitoring activities require resources external to Jadestone which include specialist technical capabilities. Jacobs is Jadestone's primary support agency for scientific response monitoring activities. Jacobs has an Operational and Scientific Monitoring Program – Implementation Plan which outlines how Jacobs will coordinate its response arrangements for Jadestone including procedures, logistics and coordination, resourcing and preliminary study specifications.

Jacobs can increase resourcing for SMPs through the hiring of personnel and equipment through sub-contracted companies, as may be required to provide for the varied disciplines and fields of expertise for each of the SMPs, and to accommodate the scaling up of monitoring that may be required as the spatial extent of a spill increases. This is considered normal practice for environmental monitoring providers given the limited ability of any single provider to provide all expertise and equipment across the multitude of marine and coastal scientific disciplines. In support of this requirement Jacob's provide three monthly reporting of available personnel to support Jadestone.

Vessels to mobilise field teams to monitoring sites or for on-water sampling activities will be mobilised through Jadestone existing MSAs through multiple vessel providers. Given that sampling locations for the SMPs would in many instances be coincident to sites targeted for operational monitoring and spill response strategies, there exists opportunities for shared vessel usage during a spill.