SGH | Energy

VICL29 (Longtom) Oil Pollution Emergency Plan

LT-OPS-PL-0026

Rev	Date	Description	Originator	Reviewer	Approved
0	12/03/2013	Issued for Use	LWi	RTy	MHa
1	23/09/2013	Updated for NOPSEMA Submission	LWi	RTy	MHa
2	17/04/2014	Updated to Address NOPSEMA Comments	LWi	RTy	MHa
3	5/11/2014	Updated to reflect changes to Nexus Crisis Management arrangements and to incorporate drilling and other activities	LWi	RTy	JSe
4	11/02/2015	Issued for Use	KMa	RTy	JSe
5	21/10/2016	Updated to SGH Style	KMa	RTy	MHa
6	08/08/2019	Revised for 2019 EP Submission	RTy	RTy	MHa
7	29/05/2020	Revised for May 2020 EP Submission	JAn	RTy	MHa

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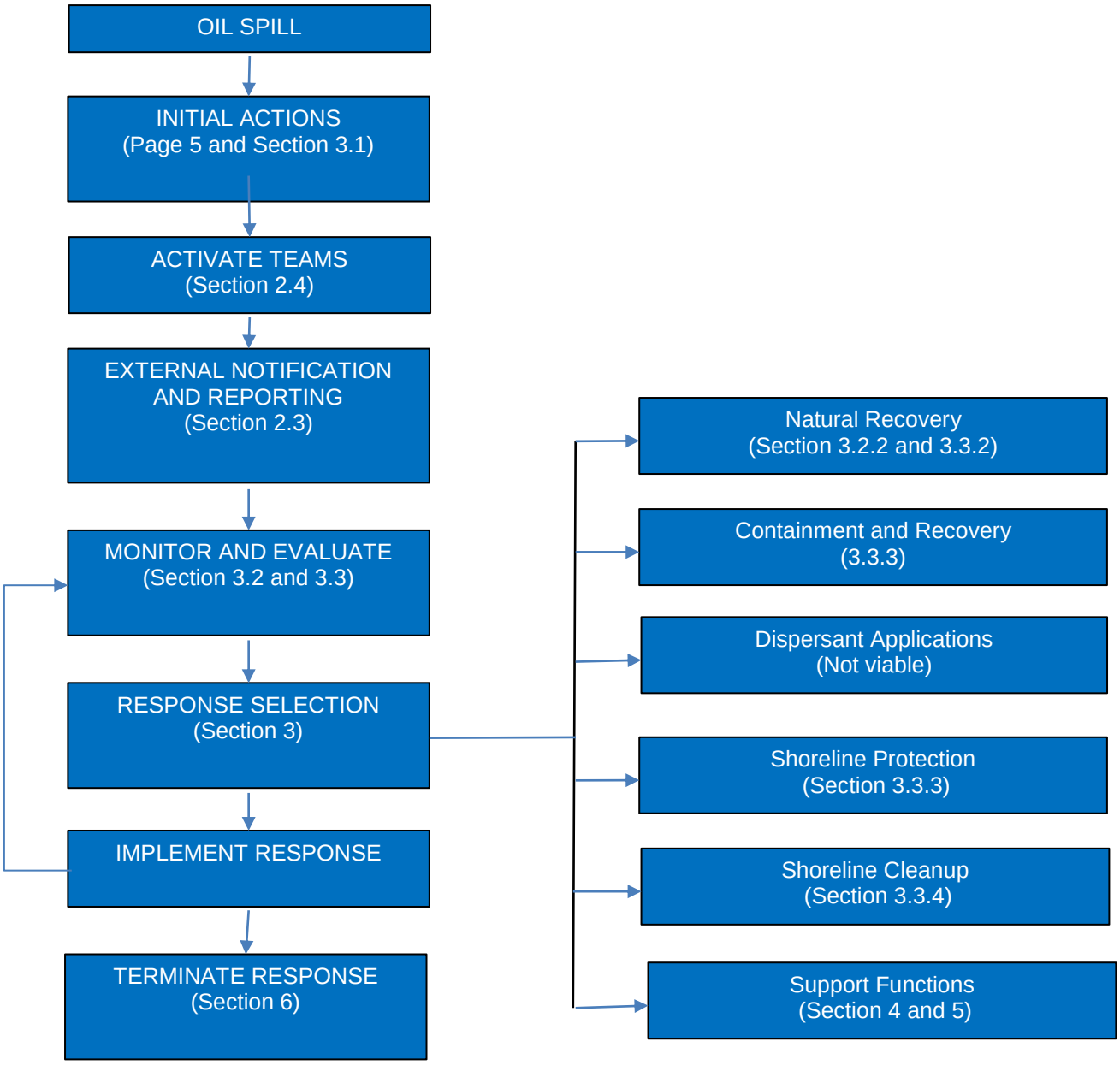

First Strike Response Actions

Action	Responsibility
1. Implement the relevant emergency response procedures to protect human life and equipment particularly, those procedures focused at reducing the risk of fire or explosion (MODU/Vessel ERP and / or SOPEP).	SGHE Offshore Rep, MODU OIM or Vessel Master
2. Identify any potential fire risks and attempt to isolate the supply of oil to the spillage.	SGHE Offshore Rep, MODU OIM or Vessel Master
3. Identify the extent of spillage and the weather/sea state conditions in the area.	SGHE Offshore Rep, MODU OIM or Vessel Master
4. Notify SGHE Offshore Rep/Drilling Supervisor (on-board) of incident.	Vessel Master or MODU OIM
5. Notify and forward POLREP to SGHE Development Manager / Project Manager.	SGHE Offshore Rep/Drilling Superintendent (with input from MODU OIM and/or Vessel Master)
6. Mobilise the SGHE CMT as required and notify SGH Management.	SGHE Development Manager/Project Manager
7. Mobilise a source control team / engage Drilling Incident Management Team to plan and manage the relief well.	SGHE Development Manager/Project Manager
8. Callout the OSRT resources according to spill size.	CMT with input from SGHE Development Manager / Project Manager
9. Notify NOPSEMA verbally **WITHIN 2 HOURS** (written reports to follow within 3 days)**.**	SGHE Development Manager/Project Manager
10. Notify AMSA verbally with follow up via POLREP describing the spill, cause of the spill, damage arising and remedial action taken.	OSRT Incident Controller
11. Determine/confirm appropriate response Level and confirm supplementary resources required. If Level 2 Spill or greater, request AMSA and DEDJTR/DoT to provide liaison representative to SGHE OSRT.	OSRT Incident Controller
12. Request assistance from AMOSC if required.	SGHE AMOSC Callout Authority per SGHE Crisis Management Plan
13. Notify and engage 3rd party service providers for OSMP activities if required.	OSRT Operations Section Chief
14. Liaise with AMSA to ensure that any unauthorised craft maintain a minimum distance of 5 nautical miles from the location of the leak.	OSRT Operations Section Chief

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APPENDICES

Abbreviations

Term	Description
ADIOS	Automated Data Inquiry for Oil Spills
AGR	AGR Australia Pty Ltd
AIIMS	Australasian Inter-Service Incident Management System
AMOSC	Australian Marine Oil Spill Centre
AMOSPlan	Australian Marine Oil Spill Centre Plan
AMSA	Australian Maritime Safety Authority
API	American Petroleum Institute
bbl	Barrels
CA	Combat Agency
CMP	SGH Crisis Management Plan
CMT	SGH Crisis Management Team
cSt	Centistokes
DEPI	Department of Environment and Primary Industry (Vic) (formerly DSE and DPI) – now DELWP
DEDJTR	Department of Economic Development, Jobs, Transport and Resources (Vic) –formerly DSBBI and DTPLI – now called DJPR
DELWP	Department of Environment, Land, Water and Planning (formerly DEPI)
DIMT	Drilling Incident Management Team
DIMTL	Drilling Incident Management Team Leader
DJPR	Department of Jobs, Precincts and Regions (Vic) –formerly DEDJTR, DSBBI and DTPLI
DoT	Department of Transport (responsible for oil spill response in Vic State waters)
DSDBI	Department of State Development Business and Innovation (Vic) – now DEDJTR
DSE	Department of Sustainability and Environment (Vic) now DEPI
DSV	Drilling Supervisor (MODU)
EMLO	Emergency Management Liaison Officer
EMMV	Emergency Management Manual Victoria
EP	Environment Plan
EPA	Environmental Protection Authority (Vic)
ERP	Emergency Response Plan
ERR	Emergency Response Room (also referred to as ICC)
ERT	Emergency Response Team
ESC	Environmental and Scientific Coordinator
HIPPS	High-integrity Pressure Protection System
HMA	Hazard Management Agency
hr	Hour
IC	Incident Controller
ICC	Incident Control Centre (also referred to as ERR)
ICS	Incident Control System

Term	Description
IMT	Incident Management Team
JSCC	Joint Strategic Coordination Committee
kg	Kilograms
km	Kilometres
KOH	Potassium Hydroxide
kPa	kilopascals
L	Litres
LAT	Lowest Astronomical Tide
lb	Pound
MAC	(AMOSC) Mutual Aid Contact
MC	Marine Coordinator
MDO	Marine Diesel Oil
MGO	Marine Gas Oil
MJ	Megajoules
MMbbl	Million Barrels
MODU	Mobile Offshore Drilling Unit
MOP	Marine Oil Pollution
MOSES	Marine Oil Spill Equipment System
MSDS	Material Safety Data Sheet
MSL	Mean Sea Level
NatPlan	National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances
NEBA	Net Environmental Benefit Analysis
nm	Nautical Miles
NOAA	National Oceanographic & Atmospheric Administration (USA)
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OH&S	Occupational Health and Safety
OIM	Offshore Installation Manager
OPGGSA 2006	*Offshore Petroleum and Greenhouse Gas Storage Act 2006*
OSCP	Oil Spill Contingency Plan
OPEP	Oil Pollution Emergency Plan (has replaced OSCP)
OSRA	Oil Spill Response Atlas
OSRC	Oil Spill Response Coordination
OSRT	Oil Spill Response Team
OSTM	Oil Spill Trajectory Modelling
PIC	Person In Charge
POLREP	Pollution Report (Form)
POWBONS	*Pollution of Waters by Oil and Noxious Substances Act 1987*
ppb	Parts per billion

Term	Description
ppm	Parts per million
PSI	Pounds Per Square Inch = 0.068 atmospheres
RCC	Rescue Coordination Centre
ROV	Remotely Operated Vessel
SA	Statutory Agency
SC	Shoreline Coordinator
SECC	State Emergency Coordination Centre
SEMC	State Emergency Management Committee
SEMD	Security and Emergency Management Division
SES	State Emergency Service
SITREP	Situation Report (Form)
SMPC	State Marine Pollution Controller
SOPEP	Shipboard Oil Pollution Emergency Plan
t	Tonnes
v/v	By volume
VicPlan	Victorian Plan for Maritime Environmental Emergencies 2014()
wgt	Weight

1 Overview

1.1 Introduction

This document is an operations focused Oil Pollution Emergency Plan (OPEP) for SGH Energy VICP54 Pty Ltd (SGH Energy or SGHE). It covers all SGHE activities occurring within production licence VIC/L29 in the Commonwealth waters of the Victorian Gippsland Basin that could result in an oil spill. The VIC/L29 lease is located approximately 36 km southeast of the town of Lakes Entrance and 45 km southwest of Orbost (Figure 1.1). SGHE has 100% ownership of the permit block which encompasses the Longtom Field and Gemfish prospect.

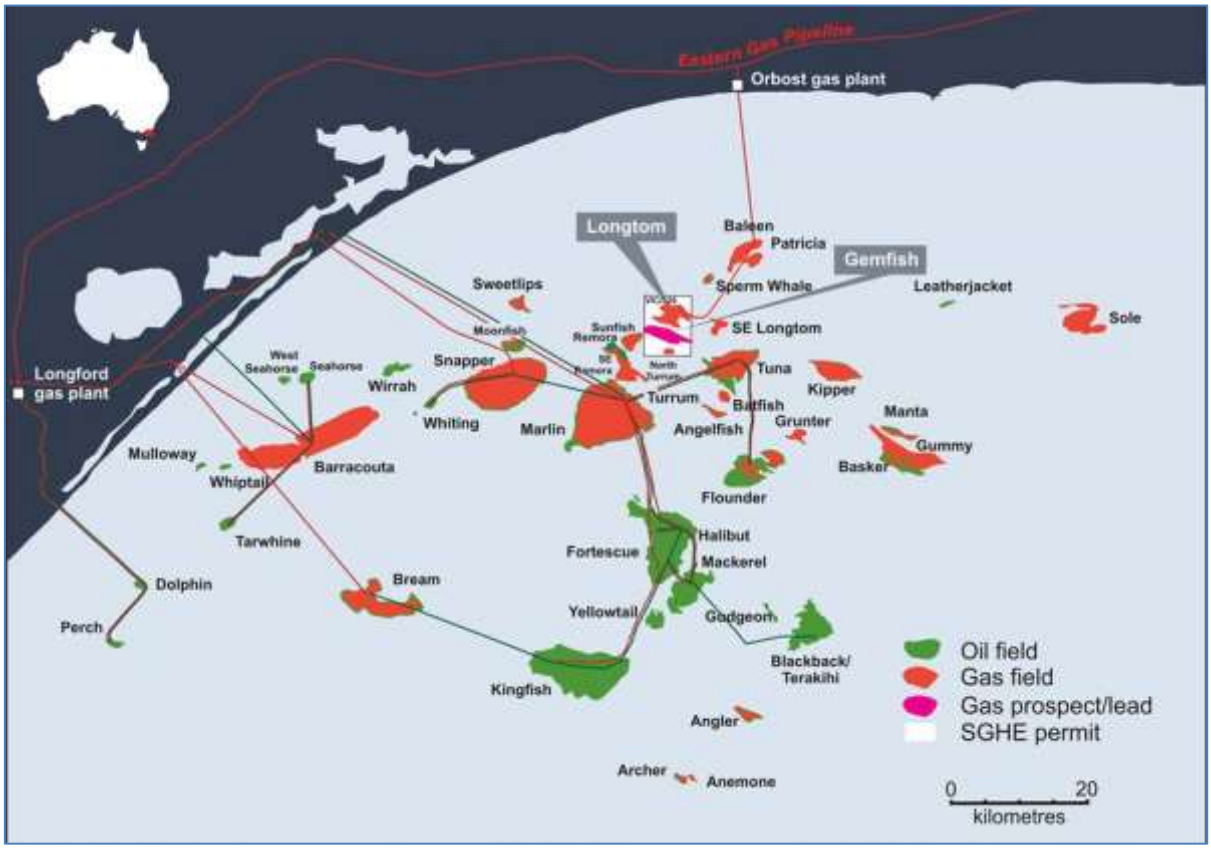

Figure 1.1 Longtom field Location

1.2 Objectives

The objectives of this plan are to:

- Provide operational guidance for managing effective response and recovery to oil spill emergencies;
- Define roles and responsibilities;
- Describe the SGHE Incident Command System
- Outline the procedures for mobilising company, industry and national support resources
- Integrate SGHE's response with relevant government and industry plans:
  - National Plan for Maritime Environmental Emergencies ('National Plan')
  - Victorian Maritime Emergencies (Non-Search & Rescue) Plan, and
  - Australian Industry Cooperative Oil Spill Arrangements (AMOSPlan).

1.3 Scope

This OPEP covers SGHE activities associated with the drilling, operation, intervention and maintenance of the Longtom and other fields within the VICL29 permit block and the Longtom pipeline from the wells to the Patricia Baleen tie-in from where the pipeline is owned and operated by Cooper Energy. These activities are described in the associated Environment Plans (EPs) and are generically referred to herein as “Longtom activities”.

While an Offshore Support Vessel (OSV) or Mobile Offshore Drilling Unit (MODU) is undertaking a petroleum activity for SGHE, SGHE is responsible for incident control when the Navigation Act 1912 (the Navigation Act) does not apply. The Australian Maritime Safety Authority (AMSA) is responsible for the control of incidents in offshore areas involving ships whenever the Navigation Act applies. This is regardless of whether ships are conducting an offshore petroleum activity under the OPGSS Act or not.

In essence, this means that spills specifically associated with an OSV or MODU when directly involved with SGHE petroleum activities such as drilling, intervention or maintenance are covered by this OPEP, however, when not directly involved with SGHE petroleum activities e.g. while in transit, spills from an OSV or MODU are not covered under this OPEP. Vessels remain under the control of the respective Masters and are subject to the requirements of the Navigation Act 2012 with respect to in-force Marine Orders and the Protection of the Sea (Prevention of Pollution by Ships) Act 1983 with respect to notification of spills and requirements for Shipboard Oil Pollution Emergency Plans (SOPEPs). SGHE will render all assistance necessary to manage any spills associated with vessels but SGHE acknowledges that the Combat Agency responsibilities for spills not associated with their petroleum activities rest with AMSA.

1.4 Health, Safety and Environment Policy

Oil spill response activities shall be implemented in accordance with SGHE’s Health Safety and Environmental policies. Ensuring the safety and health of workers and the public is paramount, and a response to oil pollution should be carried out without undue safety risks. Safety risk mitigation measures, such as establishing controlled entry at polluted sites, wearing personal protective equipment and the use of safe working practices supported by suitable training, is an integral part of response operations.

In cases where available measures to reduce the risk of injury or detrimental health implications cannot achieve tolerable levels of safety, the use of a response strategy may be not viable until conditions change. Examples include situations where fresh oil is releasing vapours, or where sea conditions prevent safe working on the deck of a vessel. Where there are security threats to response personnel, limitations on operations may also need to be imposed.

Prioritisation of decisions shall be guided by the PEAR principle:

P • Protection of people;

E • Protection of the environment;

A • Protection/minimisation of damage to financial/material assets; and

R • Protection of reputation.

1.5 Interfaces with Other Documentation and Plans

This OPEP interfaces with the following internal and external plans:

Internal

- Longtom Field Operations Environment Plan (EP)
- Longtom Well Operations Management Plan (WOMP)

- Longtom Operational and Scientific Monitoring Program (OSMP)
- Longtom Safety Case
- Offshore Support Vessel (OSV), intervention and maintenance vessel and MODU ERPs and SOPEPs;
- SGHE Crisis Management Plan (CORP-HSE-045); and
- SGHE Longtom Subsea Intervention Plan (LT-OPS-PL-0005)
- SGHE Integrity Management Plan for Patricia Baleen – Longtom Offshore Facilities
- Orbost gas plant ERP

External

- National Plan for Maritime Environmental Agencies (National Plan) (AMSA, 2014)
- Victorian Emergency Management Manual Victoria (EMMV)
- Victorian Maritime Emergencies (Non-Search & Rescue) Plan
- AMOSPlan

1.6 Hydrocarbon Types

The hydrocarbons produced by the VIC/L29 wells are mostly gas (92% methane) with less than 10 bbls/million scfd of condensate. In addition to a loss of well fluids this OPEP covers vessel releases of Marine Diesel Oil (MDO) or Marine Gas Oil (MGO).

A summary of the properties of the Longtom condensate and marine diesel oil is shown in Table 1 below.

Table 1 Hydrocarbon Properties

Parameter	Measurement	
	Longtom-4 Condensate	**Marine Diesel Oil[#1]**
Density	0.7744 kg/L @ 15°C	0.860 kg/l @ 15.6^0 C
API gravity	51.2	55
Dynamic viscosity	-	2.5 – 4.5 @ 40 ^{o}C cP
Kinematic viscosity	1.397 cSt @20°C	-
Pour point	-	-50^{o}C max.
Wax content	<5%	Low to Moderate
Aromatics content	12%vol	-
Flash point	<17°C	68.3^{o}C
ITOPF[#2] oil type	Group I (non-persistent)	Group II-III (persistent)

#1 MGO is a slightly lighter form of MDO
#2 ITOPF - International Tanker Owners Pollution Federation

1.7 Oil Spill Modelling

Oil spill modelling has been conducted for two worst case scenarios associated with Longtom operations, these were considered to be;

- Stochastic subsea blowout of condensate from a Longtom well of 81,000 bbl over 90 days halted after relief well drilling; and
- Stochastic marine diesel (MDO) spill 80 m^3 surface release over 6 hours in the event of containment loss from a vessel and ADIOS modelling of 220m^3.

The oil spill modelling is separately documented and is also described within the EP. In summary the spill modelling for a subsea blowout of condensate indicates that less than 20% of blowouts will impact the shoreline with hydrocarbon loads above 10g/m^2 and that the time to shore is over 6 days. No significant surface oil (>10g./m^2) is anticipated however visible oil is likely to be present between Lakes entrance and Marlo and up to 100km offshore. In addition, dissolved and entrained oil levels above water quality guidelines could extend west of Wilsons Promontory, up the east coast to Tuross heads and 500 km offshore. It is important to note that this is based on entrained oil thresholds above 10ppb instantaneous and at this level no environmental impact is anticipated. Given the transient nature of waters containing > 10ppb instantaneous and difficulty testing for oil at this level it is unlikely that sampling will detect the majority of areas where this may be temporarily exceeded.

The MDO modelling predicts no shoreline impact above 10g/m^2. Surface oil levels above 10g/m^2 will be limited to within 6km of the release and visible levels above 0.5 g/m^2 up to 50km from the release, but not within state waters. Dissolved and entrained levels above water quality guidelines could extend up to 100km west of the release and impact state waters from around Marlo and along the coast east to Eden.

1.8 Responsibilities of Personnel

It is the responsibility of key SGHE personnel working on Longtom activities to:

- Be familiar with the contents of the Crisis Management Plan and OPEP;
- Know their designated oil spill response role; and
- Know the reporting and immediate response requirements.

In addition to the above, Vessel Masters must ensure that the following are also adhered to in the field as per Pollution of Waters by Oil and Noxious Substances Act 1987 (POWBONS):

- Any vessel with a gross tonnage of more than 400 tonne (t) must maintain an Oil Record Book;
- If any oil or oily ballast water leaks or spills onto the deck, the scupper plugs are not to be removed and steps are to be taken to prevent oil or oily ballast water going overboard;
- Vessel masters must prevent escape or discharge of hydrocarbons to water; and
- In the event of an overboard hydrocarbon spill, the vessel SOPEP must be implemented.

SGHE personnel, MODU Offshore Installation Manager (OIM) and Vessel Masters involved in Longtom activities are made aware of the existence and location of Emergency Response Plans and OPEP documents in the office, on the rig or on the vessel as part of their inductions. The induction covers their required actions such that the initial response to an oil spill can be carried out efficiently and in line with this OPEP.

2 OPEP Activation

This section outlines the SGHE arrangements in place to ensure a rapid response to any oil spills and how / when these would be activated.

SGHE would raise a Crisis Management Team (CMT) and / or an Oil Spill Response Team (OSRT) depending on the nature and extent of the potential spill. The first step in the event of a spill is to make the incident safe and to then implement the OPEP arrangement. The first step in the OPEP is to assess the spill size its classification and the potential for the spill to escalate.

2.1 Incident Classification and Escalation

The following section provides guidance on the categorisation of the spill from an SGHE perspective and is consistent with the Incident classification in VicPlan.

- Level 1 – Small localised spill, which can be dealt with at a local site level, i.e. by the offshore vessel monitoring the slick size, location and implementation of its SOPEP. SGHE CMT is sufficient and call out of a SGHE OSRT is unlikely to be required.
- Level 2 – Moderate spill, likely to impact other marine users, potential for low level oiling of shoreline, requires trajectory analysis and monitoring. SGHE OSRT and State resources may be required, DEDJTR State Duty Officer (SDO) should be notified.
- Level 3 – Major spill, oil impacts shore and requires a physical response using external resources to respond, samples collected for monitoring purposes. SGHE OSRT, AMOSC and State required and likely to require additional national and potentially international resources. Note that based on the modelling and the status of the existing Longtom wells (low likelihood of shoreline impact at actionable levels, the condensate will rapidly weather to waxy flakes and the existing wells are pressure depleted and hence unlikely to maintain the blowout rates for any significant duration) a level 3 response is unlikely to be required

The decision to escalate from a Level 1 incident to a Level 2 incident will be based on consideration of the criteria listed in Table 2.1. Note that some of these criteria are more stringent than the definitions provided in the National Plan.

Table 2.1: Incident Level Classification Criteria

Characteristic	Level 1	Level 2	Level 3
Location	Confined to Commonwealth waters	Commonwealth and state waters and possibly shoreline	Commonwealth and state waters, marine protected areas and shoreline
Potential environmental impact	Low Localised short term exposure to low levels of sea-surface oiling and/or hydrocarbons in the water column. Physical operational on-water response is of limited or no benefit.	Moderate Broad area of potential exposure to low levels of sea-surface oiling and /or hydrocarbons in the water column. Sparse patches of weathered hydrocarbon on shoreline.	High Potential for long-term exposure to sea-surface oiling and / or moderate to high concentrations of hydrocarbons in the water column. Potential for extensive areas of shoreline loading >100g/m^2.
Incident response	First strike initial actions only	First strike initial actions followed by Incident Action Plan outline	First strike initial actions followed by detailed Incident Action Plan
Resources	Vessel SOPEP, SGHE with minimal support from AMOSC, aerial and/or vessel surveillance providers	SGHE and SGHE contractors, AMOSC with Mutual Aid resources and state resources in consultation with DoT	As per Level 2 with additional national and potentially international resources
Applicable contingency plan/s*	SGHE OPEP	SGHE OPEP SGHE OSMP VicPlan**	SGHE OPEP SGHE OSMP VicPlan National Plan
Corporate implications	Local and regional media coverage	National Media coverage	International media coverage

* SGHE acknowledges that as titleholder it retains responsibility for oil pollution incidents that may result from its activities even though other parties may assume Incident Control within their jurisdiction.
** VicPlan is the State Maritime Emergencies (non-search and rescue) Plan, a sub plan of the Emergency Management Manual Victoria (EMMV) Part 3.

2.2 Jurisdictional Authority and Control Agency

For Longtom activities, the relevant Jurisdictional Authority and Control Agency will depend on the source of the spill, the nature of the activities being conducted and the impacted areas. A summary of the various JA's and Combat Agency's for the various spill types and locations are summarised in Table 2.2 below.

2.2.1 Jurisdictional Authority

The Jurisdictional Authority (JA) is the agency which has responsibility to verify that an adequate spill response plan is prepared and, in the event of an incident, that a satisfactory response is implemented. The Jurisdictional Authority is also responsible for initiating prosecutions and the recovery of cleanup costs on behalf of all participating agencies.

2.2.2 Combat/Control Agency

Primary responsibility for ensuring the implementation of an appropriate and adequate response rests with the Combat/Control Agency (CA). The National Plan defines the Combat Agency as the agency having the operational responsibility for responding to marine oil or chemical spills in the area in which the pollution incident occurs, or for ensuring that an adequate response is undertaken.

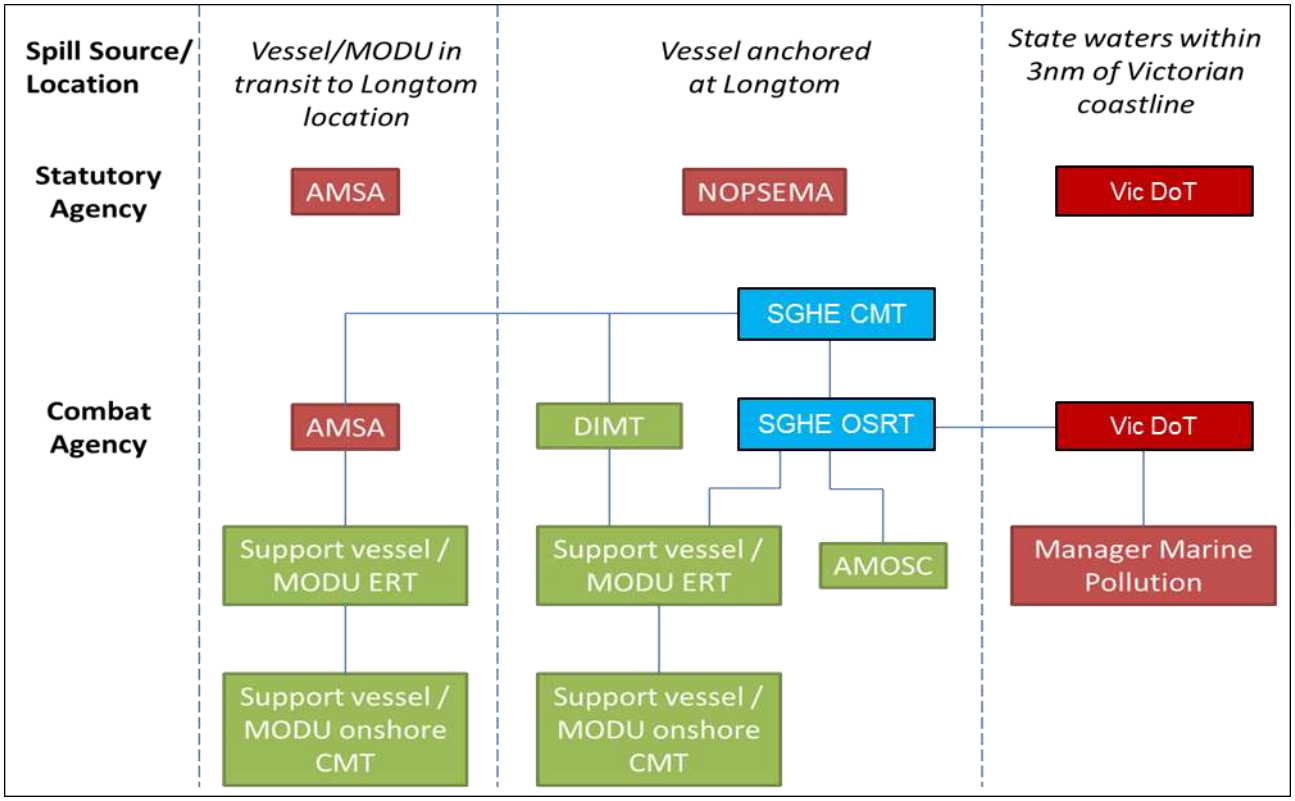

Figure 2.1 SGHE Longtom Combat/Control Agency Interfaces

Table 2.2: Summary of the various Jurisdictional and Combat Agencies for the various spill types and locations associated with the Longtom activities

Location	Spill Source	Jurisdictional Authority	Control Agency		Legislation	Relevant documentation
			Level 1	Level 2/3		
Commonwealth Waters	Petroleum Facility [1]	NOPSEMA	SGHE		OPGGS Act 2006	Activity OPEP
	Vessel [2]	AMSA	AMSA		Protection of the Sea (Prevention of Pollution by Ships) Act 1983	Vessel OPEP National Plan
State Waters	Vessel or MODU	DoT	Vessel Owner	DoT [3]	Emergency Management Act 1986 POWBONS 1986	Vessel or MODU SOPEP Victorian State Maritime Emergencies (non-search and rescue) Plan

[1] A 'Facility' is a fixed platform, FPSO/FSO, MODU, subsea infrastructure, or a construction, decommissioning and pipelaying vessel (Schedule 3, Part 1, Clause 4 of the OPGGSA 2006)

[2] Vessels are defined by Australian Government Coordination Arrangements for Maritime Environmental Emergencies (AMSA, 2017) [Ref 8] as a seismic vessel, supply or support vessel, or offtake tanker.

[3] Vic DoT will be the Control Agency but will be supported by the Titleholder and AMOSC if required.

2.3 Spill Reporting

Reporting, response actions, instructions and the use of chemicals and equipment will be documented throughout a spill response, and subsequently filed for reference. Oil spill notification and reporting requirements are outlined in the following sections.

2.3.1 Internal Notifications and Responsibilities

The key internal reporting requirements and responsibilities for oil spills are outlined below and summarised in Figure 2.1.

- Observer - Any person who sees a slick, spill or a potential spill must report this immediately to the Vessel Master, Rig OIM or the designated SGHE Offshore Representative;
- Vessel Masters - If the spill is from an OSV the Vessel Master is responsible for reporting spills directly to the designated SGHE Offshore Representative or the rig Barge Master (Marine) who in turn notifies the Rig OIM during a drilling campaign. The Vessel Master is responsible for initiating the vessel SOPEP and maintaining the safety of the vessel at all times.
- Rig OIM – The Rig OIM is to notify the SGHE Drilling Supervisor of any incident immediately. The Rig OIM is responsible for initiating the MODU SOPEP and maintaining the safety of the MODU at all times.
- Drilling Supervisor - The Drilling Supervisor assumes the role of site leader for offshore response during a drilling campaign. The Drilling Supervisor is to notify the Project Manager via the Drilling Superintendent and Drilling Manager of the incident as soon as possible.
- The designated SGHE Offshore Representative assumes the role of site leader for offshore response when the incident is not a drilling or vessel-related incident. The designated SGHE Offshore Representative will notify the SGHE Development Manager (via the Onshore Construction Manager if appointed) and continue liaison with the Oil Spill Response Team (OSRT) once established.
- The SGHE Development Manager / Project Manager will activate the SGHE Crisis Management Team (CMT) as required. The CMT will determine whether the Oil Spill Response Team (OSRT) is to be mobilised.
- If the OSRT is mobilised, the CMT will continue to operate with additional external resources mobilised to support the MODU, OSV or intervention and maintenance contractor in managing any safety related issues arising from the incident as well as any pipeline intervention requirements.

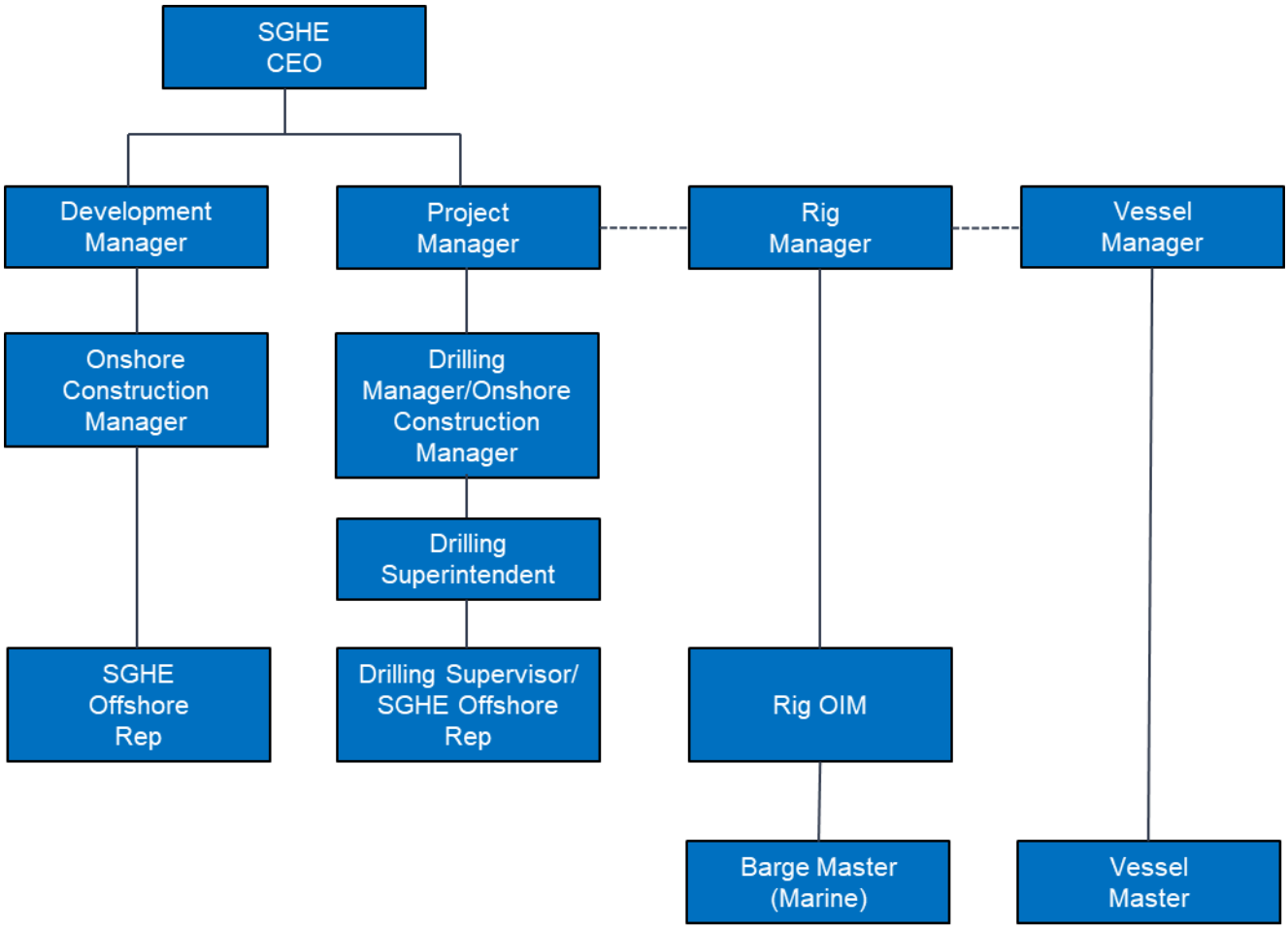

Figure 2.1 SGHE internal reporting schematic for routine operations and projects

2.3.2 External Reporting

Spills to the sea must be reported as follows:

- An incident relating to the activity that has caused or has the potential to cause moderate to significant environmental damage MUST be verbally reported to NOPSEMA within two (2) hours of the spill occurring or SGHE becoming aware of the spill, then followed up with a written report within 3 days as per Clause 82 of Schedule 3 to the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) and as outlined in NOPSEMA Guidance notes N-03000-GN0099 and N-03000-GL0926.
- All oil slicks trailing from a vessel, all spills in the marine environment (notwithstanding the size or amount of oil or sheen) and all spills where National Plan equipment is used in a response are to be reported to AMSA at the first available opportunity as per the Marine Pollution Report form (POLREP - Appendix 7 of the National Plan).
- For an incident with the potential to affect Victorian coastal waters SGHE will notify the DEDJTR State Duty Officer of the incident as soon as practicable.
- For an incident with the potential to affect Marine National Parks SGHE will notify the Director of National Parks as soon as practicable.

Notification to NOPSEMA, DEDJTR and Marine National Parks is the responsibility of the SGHE Energy Development Manager or Project Manager during petroleum activities. Additionally, the Drilling IMT Leader and/or the Vessel Master will notify AMSA if the spill occurs from a MODU or an OSV.

2.4 Response Teams Involved in Spills

2.4.1 Vessel Emergency Response Team (ERT)

If the incident involves a vessel, the Vessel Master(s) will lead the vessel's response in accordance with its SOPEP. SGHE will render whatever assistance it can provide to the Vessel ERT and its onshore support team to ensure an effective response is undertaken. The role of the Vessel ERT is to:

- Manage the immediate response to oil spill;
- Follow the prescribed actions within the Vessel SOPEP & ERP; and
- Notify the SGHE Offshore Representative of the incident as soon as possible.

It should be noted that the Vessel Master is in charge of the vessel response at all times and the key response document is the Vessel SOPEP.

ERT role checklists for the Support/supply Vessel Master and SGHE Offshore Representative are provided in Appendix A.

2.4.2 MODU ERT

In the event of a spill while the MODU is anchored or jacked up on location, the MODU ERT, under the charge of the OIM, will provide the initial response supported by the SGHE Drilling Supervisor. The role of the MODU ERT is to:

- Manage the immediate response to oil spill which is to take actions to stop the source of the leak and ensure the facility is safe; and
- Follow the prescribed actions within the MODU SOPEP, this OPEP & the project-specific bridging ERP.
- Notify the SGHE Drilling Supervisor of the incident as soon as possible.

If the MODU is in transit to the location, in the event of spill, SGHE will render whatever assistance it can provide to the MODU ERT and the onshore MODU support team in managing the effects of the spill. While the MODU is not in drilling mode the Rig OIM is in charge of the response and the key response document is the MODU SOPEP.

ERT role checklists for the MODU OIM and SGHE Drilling Supervisor are provided in Appendix A. These will be checked and updated prior to any drilling campaign.

2.4.3 Drilling Incident Management Team (DIMT)

In the event of a drilling campaign the Drilling Incident Management Team (DIMT) will manage the ongoing safety and well integrity issues of the well, and liaise directly with the OSRT with information on well flow rates, support vessel issues, etc. A detailed discussion on the DIMT structure and roles will be included in the project-specific bridging ERP to be developed once a Drilling Company has been appointed. The DIMT will plan and manage the relief well in the event of a blowout.

During normal operations if a blowout occurs then a Source Control Team / DIMT will be formed to also plan and manage the relief well in the event of a blowout.

2.4.4 SGHE Crisis Management Team (CMT)

The Crisis Management Team (CMT) is shown in green in Figure 2.2 i.e. CMT Leader and Corporate Communications and Operations Sections. The CMT will manage the response to any spill considered

to exceed the resources immediately available to the SGHE Development Manager / Project Manager. The CMT will coordinate the First Strike Response and activate the OSRT for a spill greater than Level 1. Once the OSRT is established, the CMT will focus on the strategic response and overall direction to a large-scale incident that could affect the corporate interests of SGHE. In particular, the CMT would manage interfaces with SGHE external interests including media, Australian Stock Exchange (ASX), Joint venture partners, investors and Government. The SGHE CMT is based in the SGH office at 160 Harbour Esplanade, Docklands, Melbourne.

2.4.5 SGHE Oil Spill Response Team (OSRT)

In the event of a Level 2 or Level 3 spill, SGHE will mobilise its Oil Spill Response Team (OSRT) via the CMT. The OSRT will coordinate the overall oil spill response and provide specialist advice and support to the MODU/Vessel ERT. The OSRT will be led and directed by an Incident Controller as nominated by SGHE. The OSRT will initially be set up in the SGHE ERR in Melbourne at 160 Harbour Esplanade, Docklands.

The SGHE OSRT is structured in accordance with the Oil Spill Response Incident Response System (OSRICS) and is scalable depending on the size of the spill and the likelihood of hydrocarbon contact on environmental resources. The OSRT structure is shown in Figure 2.2 below. The OSRT will be staffed by a combination of SGHE employees, SGHE “hat” contractors and external resources sourced through AMOSC core group.

For small, short term spills the OSRT may be limited to the green positions shown in Figure 2.2, as the spill size increases and a greater OSRT is required the orange positions will be filled. The number of blue positions required to support these section chiefs (green and orange positions) will also be dependent of the nature and scale of the spill and its trajectory.

2.5 Response Structure

The response structure for spills will depend on the source of the spill. The SGHE CMT will manage SGHE’ response to a Level 1 spill generated from the Longtom pipeline, while vessels are undertaking inspection, maintenance or repair for SGHE and during SGHE drilling campaigns while the MODU is in drilling mode (anchored or jacked on location). For a Level 2 or 3 spill, the SGHE OSRT will be mobilised. SGHE will provide strategic support to both the OSRT and DIMT and will manage all non-spill response aspects of the incident.

If the spill occurs from either the MODU while not in drilling mode or a vessel not directly involved in intervention or maintenance activities for SGHE, the onshore vessel or rig management company will manage any spill response with SGHE providing assistance as required. As spills from vessels come under AMSA’s Jurisdictional agency response function, the vessel company concerned may elect to request AMSA to take over as the Combat Agency.

Figure 2.2 shows the SGHE OSRT and CMT structure. OSRT role checklists for the Incident Controller and Operations, Planning, Logistics and Finance/Admin Section Chiefs and Unit coordinators are provided in Appendix A.

Further details on the jurisdictional authority and the combat agency is provided in the next chapter.

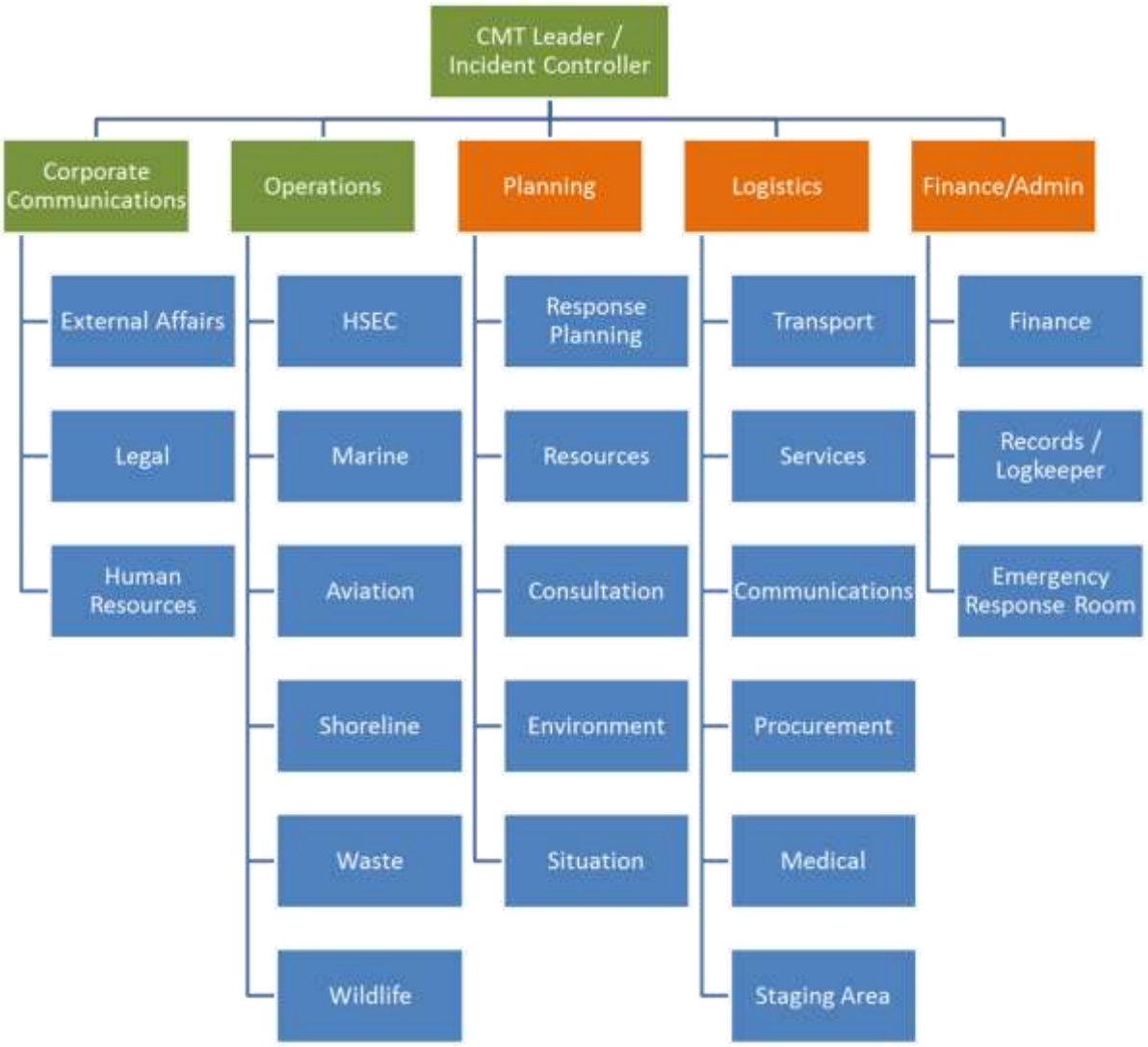

Figure 2.2 SGHE CMT and OSRT organisation structure

Note in the event of a major offshore campaign such as drilling this structure will be expanded to include key offshore personnel and ERP roles.

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2.6 OPEP Interfaces

2.6.1 Australian Maritime Safety Authority (AMSA)

Due to the potential involvement of AMSA with respect to CA (see section 2.2) in any offshore diesel spill from an OSV, MODU, intervention or maintenance vessel under tow, SGHE has consulted with AMSA and the Victorian DoT to confirm the proposed response arrangements and interfaces outlined in this document. AMSA do not require title holders to consult on EPs for offshore petroleum activities and have produced an advisory note https://www.amsa.gov.au/safety-navigation/navigating-coastal-waters/offshore-activities/offshore-petroleum-industry-advisory. SGHE are working with AMSA to enter into a Memorandum of Understanding (MOU). This MOU is expected to set out an understanding of respective roles and responsibilities when responding to ship-sourced and non-ship-sourced marine pollution incidents similar to those already described in this OPEP. Note AMSA have previously reviewed and provided input into this OPEP.

Spills from vessels in Commonwealth Waters while not undergoing petroleum activities come under AMSA as the statutory agency and AMSA may be requested by the vessel operator to take over as the Combat/Control Agency for the spill.

Apart from notification of all spills to AMSA, any additional NatPlan support for SGHE' petroleum activities will be called in by the SGHE OSRT Incident Controller. SGHE will utilise AMOSC to provide equipment and resources to support the response. Based on the current AMOSC equipment stocks and the spill modelling conducted for the proposed VICL29 drilling campaign including the nature / weathering of the condensate, it is expected that AMOSC resources and equipment will be adequate.

To ensure efficiency of communications in the event of a spill offshore whether from a vessel or pipeline at a Level 2 or above, SGHE will request an AMSA representative join the SGHE OSRT as a liaison officer. This will assist in calling out of any NatPlan resources if they are required and will also facilitate any transfer of Combat Agency should it occur.

2.6.2 Victorian DoT

SGHE has consulted with the DOT (formally DJPR, DEDJTR, DTPLI), the Victoria Environment Protection Agency (EPA), DELWP and Parks Victoria and discussed the OPEP arrangements.

Following the Machinery of Government (MoG) changes that came into effect 1 January 2019, the former DEDJTR was split into two departments: Department of Transport (DoT) and the Department of Jobs, Precincts and Regions (DJPR). The Marine Pollution Team has been transferred to DoT, effective 1 July 2019. Interim arrangements for the DEDJTR State Duty Officer (SDO) continue to provide a shared service to DJPR and DoT until further notice. As such, any emergency notifications to the state should still go to the DEDJTR SDO with contact details as 0409 858 715 and sccvic.sdo.dedjtr@scc.vic.gov.au . Any incident notifications including POLREPS and SITREPS should also go to the semdincidentroom@ecodev.vic.gov.au mailbox.

In Victoria, DoT will assume responsibility for marine pollution incidents in coastal waters, up to 3 nautical miles. The titleholder is the control agency for marine pollution incidents in Commonwealth waters resulting from an offshore petroleum activity. However, in the event of a marine pollution incident originating in Commonwealth waters that impacts or threatens State waters, DoT assumes jurisdictional control for such incidents within coastal waters from a State consequence management perspective. Titleholders should work with DoT to ensure an adequate response. DoT's role of control agency will not extend to response operations in Commonwealth waters including those directly associated with source control or relief well drilling; management of these operations will be performed by the titleholder. In such instances, deployment of Emergency Management Liaison Officers (EMLOs) may be required between DoT's and titleholder's Incident Management Team (IMT).

DoT as the control agency for marine pollution in State waters does not negate the requirement for titleholders to have appropriate plans and resources in place to adequately respond to an incident in State waters which originates from petroleum activities in Commonwealth waters. It is an expectation that the titleholder will conduct initial necessary response actions in State waters, in accordance with the OPEP and continue to manage those operations until formal incident control can be established by DoT.

Upon establishment of incident control by DoT, the titleholder is expected to continue to provide planning and resources in accordance with the OPEP. This includes response assets and contracts specified in the OPEP, such as those pertaining to equipment, waste management, transport and personnel (operational and IMT staff) as well as their arrangements with third-party response service providers (e.g. Australian Marine Oil Spill Centre (AMOSC), Oil Spill Response Limited (OSRL) etc). For response in State waters, DoT will use this OPEP as a starting point for a response. DoT reserves the right to deviate from the OPEP in circumstances where there is a justifiable cause, in consultation with the titleholder. In this instance, the titleholder may consult with NOPSEMA and/or DJPR Earth Resources Regulation (ERR, which remains in DJPR post MoG) on any possible compliance ramifications.

A cross-jurisdiction marine pollution incident is one that originates in Commonwealth waters and results in DoT exercising its control agency obligations in State waters. Transboundary arrangements from state to state is covered by the National Plan. Where State waters are impacted by cross-jurisdictional marine pollution incidents, DoT will only assume the role of control agency for response activities occurring in Victorian State waters, in accordance with the State Maritime Emergencies (non-search and rescue) Plan. In this instance, the titleholder and DoT should work collaboratively, sharing response resources and providing qualified personnel to the DoT IMT. To facilitate effective coordination between the two control agencies and their respective IMTs, a Joint Strategic Coordination Committee (JSCC) will be established. The control and coordination arrangements for cross-jurisdictional maritime emergencies is outlined in the below figure.

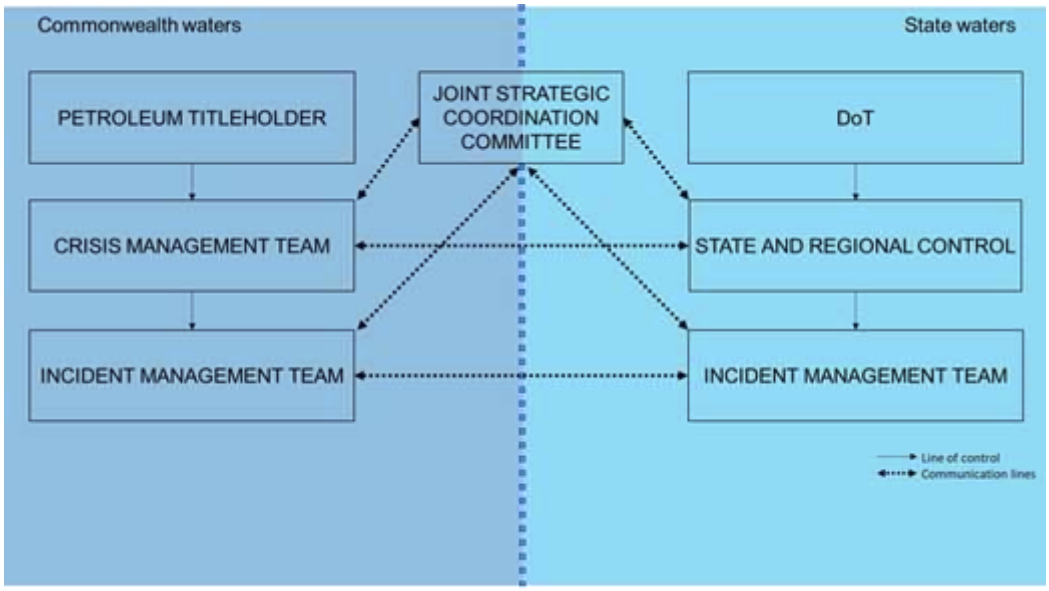


Figure 2.3 JSCC structure

The role of the JSCC is to ensure appropriate coordination between the respective IMTs established by multiple control agencies. The key functions of the JSCC include:

- Ensuring key objectives set by multiple IMTs in relation to the marine pollution incident are consistent and focused on achieving an effective coordinated response.
- Resolving competing priorities between multiple IMTs.
- Resolving competing requests for resources between the multiple IMTs, including those managed by Australian Maritime Safety Authority (AMSA), such as national stockpile equipment, dispersant aircraft and the National Response Team.
- Resolution of significant strategic issues as they arise during the incident response.
- Ensuring that there is a shared understanding of the incident situation and its meaning amongst all key stakeholders.
- Ensuring there is agreement on how information is communicated to the public, particularly those issues that have actual or perceived public health implications.
- Ensuring adequate coordination and consistency is achieved in relation to access and interpretation of intelligence, information and spill modelling to promote a common operating picture.

It is important to note that the JSCC is a committee, not a team operating from a specified location. The JSCC will be administered by DoT and the inaugural JSCC meeting will be convened by the State Controller Maritime Emergencies (SCME) once both the titleholder and DoT formally assume the role of control agency in respective jurisdictions.

The JSCC will be jointly chaired by the SCME and the titleholder's nominated senior representative, who will determine whom will sit in the committee for a coordinated response. As the relevant jurisdictional authority in Commonwealth waters, NOPSEMA may opt to participate in the JSCC as they see fit.

In a cross-jurisdictional marine pollution incident, DoT and titleholder will each deploy an Emergency Management Liaison Officer (EMLO) to corresponding IMTs for effective communication between DoT and titleholder. The role of the DoT EMLO includes, but is not limited to:

- Represent DoT and provide the primary contact for the titleholder, inter-agency and/or inter-State coordination.
- Facilitate effective communications between DoT's SCME and Incident Controller and the titleholder's appointed Crisis Management Team (CMT) Leader and Incident Controller.
- Provide enhanced situational awareness to DoT of the incident and the potential impact on State waters.
- Facilitate the delivery of technical advice from DoT to the titleholder Incident Controller as required.

3 Response Implementation

As summarised in the NEBA (Appendix G) and based on the oil spill modelling the response strategies for Longtom related spills are expected to be focused on:

Offshore:

- Slick trajectory monitoring including aerial and satellite tracking buoys;
- Natural weathering (evaporation) and dispersion;
- Water sampling and laboratory analysis for Total Petroleum Hydrocarbon (TPH) concentration in the water column (at both impacted and control sites).

Onshore (subject to DOT assessment and direction):

- Aerial monitoring and coastline visual monitoring;
- Natural weathering (evaporation) and dispersion;
- Water sampling and laboratory analysis for TPH concentration in the water column;
- Sediment sampling and analysis for PAH concentration;
- Deflection and where deemed appropriate possible recovery of weathered condensate / diesel near inlets to estuarine areas;
- Manual and mechanical beach cleanup if amenity of the shoreline affected.

3.1 Initial Response and Actions

The response actions to execute the above strategies are summarised in Figure 3.1 and are detailed in the sections below.

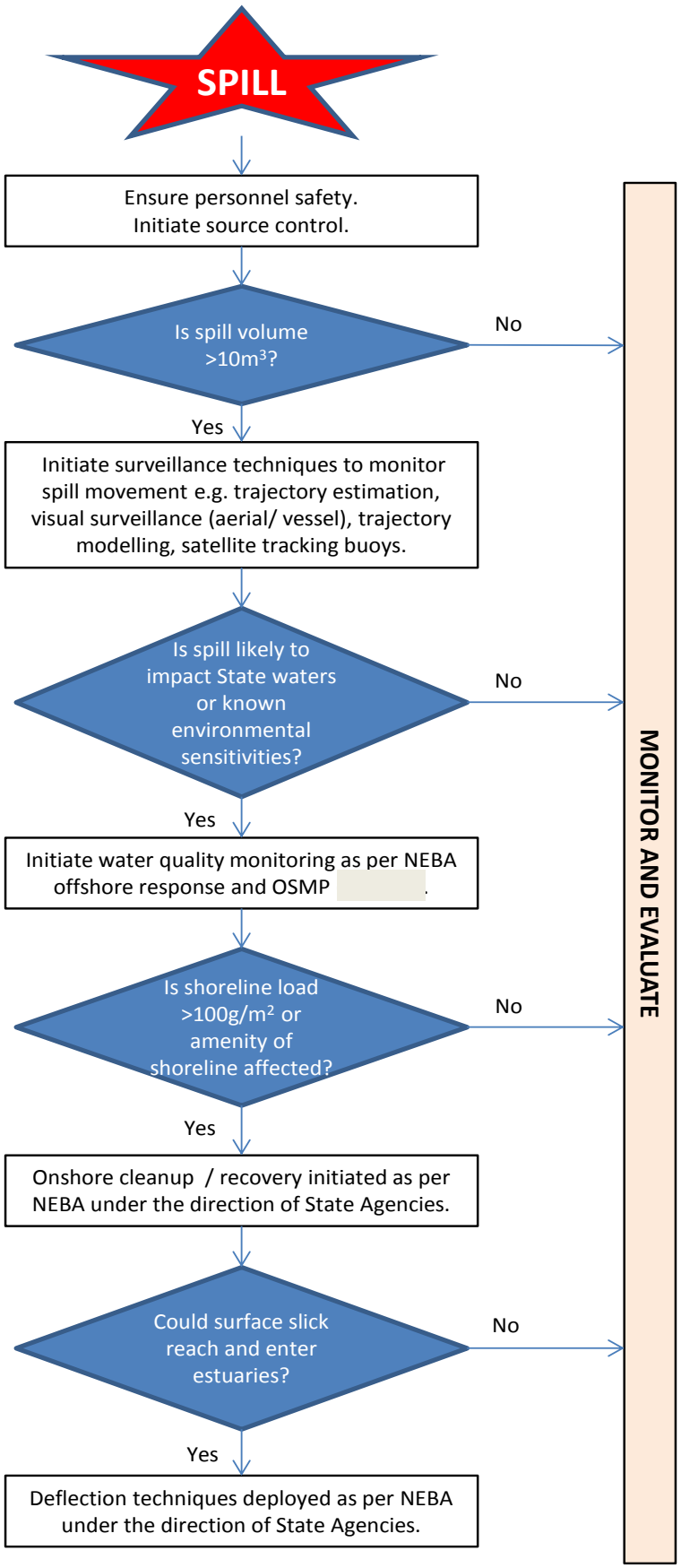


Figure 3.1 Initial Response Decision Tree

Table 3.1: Initial Actions

Action	Responsibility
Initial Emergency Actions	
1. Implement the relevant emergency response procedures to protect human life and equipment and in particular, those procedures focused at reducing the risk of fire or explosion (MODU/Vessel ERP and / or SOPEP).	SGHE Offshore Rep, MODU OIM or Vessel Master
2. Identify any potential fire risks and attempt to isolate the supply of oil to the spillage.	SGHE Offshore Rep, MODU OIM or Vessel Master
3. Identify the extent of spillage and the weather/sea state conditions in the area.	SGHE Offshore Rep, MODU OIM or Vessel Master
4. Notify SGHE Offshore Rep/Drilling Supervisor (on-board) of incident.	Vessel Master or MODU OIM
5. For large spill (>10 tonnes) contact SGHE Development Manager / Project Manager to initiate mobilisation of satellite tracking buoys.	SGHE Offshore Rep/Drilling Supervisor (via Drilling Superintendent/Drilling Manager), MODU OIM or Vessel Master
6. For spills >10 tonnes, organise surveillance by support vessel or aircraft (Ref Section 4.2.1), initiate spill trajectory modelling via AMOSC and logistics for deployment of satellite tracking buoys from AMOSC.	OSRT Operations Section Chief
7. Notify and forward POLREP to SGHE Development Manager / Project Manager.	SGHE Offshore Rep/Drilling Superintendent (with input from MODU OIM and/or Vessel Master)
8. Notify the SGHE CMT and mobilise as required.	SGHE Development Manager/Project Manager
9. Mobilise a source control team / engage Drilling Incident Management Team to plan and manage the relief well.	SGHE Development Manager/Project Manager
10. Callout the OSRT resources according to spill size.	CMT with input from SGHE Development Manager / Project Manager
11. Notify NOPSEMA verbally WITHIN 2 HOURS (written reports to follow within 3 days).	SGHE Development Manager/Project Manager
12. Notify AMSA verbally with follow up via POLREP describing the spill, cause of the spill, damage arising and remedial action taken.	OSRT Incident Controller
13. Notify DEDJTR State Duty Officer with follow up via POLREP describing the spill, cause of the spill, damage arising and remedial action taken.	OSRT Incident Controller
14. Determine/confirm appropriate response Level and confirm supplementary resources required. If Level 2 Spill or greater, request AMSA and DEDJTR/DoT to provide liaison representative to SGHE OSRT.	OSRT Incident Controller
15. Request assistance from AMOSC if required.	SGHE AMOSC Callout Authority per SGHE Crisis Management Plan

Action	Responsibility
Initial Emergency Actions	
16. Notify and engage 3rd party service providers for OSMP activities if required.	OSRT Operations Section Chief with input from Planning
17. Establish Forward Controller roles for Offshore and Onshore if required.	OSRT Incident Controller
18. Consult NEBA (Appendix E) and develop Incident Action Plan.	OSRT Incident Controller
19. Forward regular SITREPs to Incident Controller.	OSRT Offshore Forward Controller
20. Consult NEBA (Appendix E) and determine and implement appropriate spill response strategies including: • Collection of samples of product that has been spilt where safe to do so • Initiation of water quality monitoring program (Ref Section 3.2.1).	OSRT Operations Section Chief with input from Planning
21. Liaise with AMSA to ensure that any unauthorised craft maintain a minimum distance of 5 nautical miles from the location of the leak.	OSRT Operations Section Chief
22. Determine the likelihood for an oil slick to reach shoreline and identified sensitive habitat locations taking necessary action to prevent shoreline impact. Initiate onshore monitoring (Ref Section 3.3.1)	OSRT Planning Section Chief
23. Interrogate NEBA (Refer to App E) and spill trajectory estimations and models once available. Determine at-risk environmental sensitivities in consultation with DOT and State Marine Pollution Committee. Liaise with DOT representative on required shoreline and intertidal zone monitoring to identify areas affected by the oil spill and to determine the nature of the impact	OSRT Planning Section Chief

3.2 Offshore Response Strategy

Modelling [Ref 7] indicates that there will be no surface oil above 25g/m^2 for either diesel or the blowout scenario. Oil levels above 10g/m^2 will be confined to within a few kilometers of the Longtom location. Visible oil (>0.5g/m^2) may however extend from Lakes Entrance to Sydenham inlet and extend up to 60km offshore. The MDO spill may remain at visible levels for up to 5 days.

3.2.1 Monitor and Evaluate

SGHE has in place an Operational and Scientific Monitoring Program (OSMP) that could be deployed in the event of a spill (ref LT-REG-PL-012). The OSMP outlines the systems, practices and procedures to be used to carry out environmental monitoring, in the event of and post-spill. Roles, responsibilities and arrangements for implementation of the OSMP are also defined in the OSMP.

The OSMP includes a broad range of parameters or indicators that are appropriate for two types of oil spill related monitoring (Hook *et al*., 2016) [Ref 5]:

- Operational monitoring (Type I) – Provides information of direct relevance to spill response operations. The objectives of Type I monitoring include:
  - Collating information required to forecast the movement, fate and behaviour of the spill;
  - Inform decision making about proposed response activities and their effectiveness;

- Inform decision making about terminating the response.

- Scientific monitoring (Type II) – is focused on non-response objectives such as estimating environmental damage and post response recovery.

The OSMP establishes a staged approach to monitoring as follows:

- Stage 1: operational monitoring (as described below) to visually assess the extent of spill volumes and slick area, trajectory estimation, water quality and sediment sampling from both within the spill and waters outside the spill. Water quality samples and /or sediment samples, will be used to establish a pre-spill benchmark (in the event that conditions in the ZPI exceed relevant water quality / sediment guideline values prior to a spill).
- Stage 2: scientific monitoring will be implemented only in the event that water quality and / or sediment guideline values are exceeded, or levels above benchmark concentrations are recorded in proximity to environmental benefits and values. This will include:
  - Post spill - pre-impact: To establish baseline conditions and set a benchmark against which impacts and recovery can be assessed (this will establish termination criteria for scientific monitoring);
  - Impact: To quantify impacts to environmental benefits and values; and if impacts are detected
  - Recovery: To determine if and when baseline conditions are established and monitoring can cease.

The following sections outline the proposed operational monitoring that could be deployed in the event of spill. Potential scientific monitoring activities are detailed in the OSMP.

3.2.1.1 Aerial Surveillance

While estimates of spill trajectory can be made from a stationary vessel, it is difficult to estimate spill volumes or slick area. Vessels can be mobilised to monitor an oil slick but estimation of slick size can be difficult.

Should a spill > tier 1 i.e. >10 tonnes of hydrocarbon occur, aviation services would be contracted by SGHE and deployed to provide details of the slick size and trajectory in the offshore environment. AMOSC has advised that it can provide trained observers to be used on helicopter and fixed wing resources sourced by SGHE.

SGHE has identified aerial resources in Marlo (Shoreland Aviation) which can be deployed to undertake the aerial surveillance.

Aerial observers will use the methodology outlined in the ITOPF Aerial Observation of Marine Oil Technical Information Paper No. 1 [Ref. 1] unless instructed to do otherwise by AMOSC.

3.2.1.2 Manual Slick Trajectory Estimation

Spill trajectory can be predicted via manual estimation techniques or computer modelling. The following gives guidelines on using vectorial plotting to estimate slick trajectories.

Oil spill trajectory can be roughly calculated by adding the surface current velocity to 3% of the wind velocity. This is illustrated in Figure 3.2.

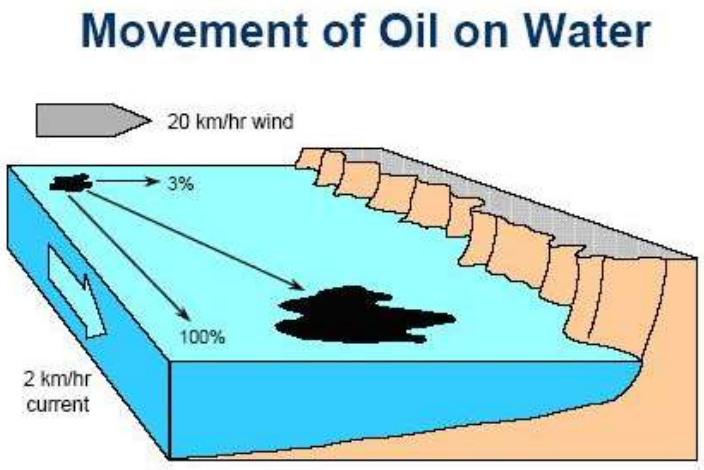


Figure 3.2: Calculation of Oil Trajectory using Wind and Current Vectors (ITOPF)

Calculations:

- On a map or chart, mark the location of the spill;
- Determine the present water current direction and speed (consult with standby vessel if present, Bureau of Meteorology or with APASA for metocean data);
- Draw a scaled line from the spill origin in the compass direction of the current;
- Length = distance travelled in time interval (in 1 hour = approximately 1800m x current velocity in knots);
- Determine the wind direction and speed;

  http://www.bom.gov.au/vic/observations/vicall.shtml,
  http://www.bom.gov.au/australia/meteye/?loc=VIC_FA001
  http://www.gippslandports.vic.gov.au/weather_lake_entrance.php
- Draw a second scaled line, starting from the end of the current vector, in the compass direction of the wind;
- Length = 0.03 x 1800m x wind velocity in knots;

Draw a line from the origin of the spill to the end of wind vector. This is oil movement in 1 hour.

Manual Trajectory estimates will be used by the SGHE OSRT to provide an early estimate of trajectory prior to the availability of visual aerial surveillance and satellite monitoring data.

3.2.1.3 Satellite Tracking Buoys and Satellite Monitoring

To accurately position oil slick locations and trajectory, two satellite tracking buoys sourced from AMOSC will be deployed – one at the centre of the slick and one at the leading edge of the slick. This will provide continuing information on the slick trajectory at night when aerial surveillance is unavailable. AMOSC have confirmed that satellite tracking buoys are available as part of SGHE' AMOSC membership. These buoys are located in various locations around Australia depending on AMOSC operational requirements and may be stored on board the OSV or MODU for the duration of a drilling campaign. They would be available within 24 hours if necessary. SGHE OSRT Operations Section Chief supported by the Logistics Section Chief would initiate logistics arrangements for deployment of the satellite tracking buoys into Bass Strait utilising resources identified in the Contacts Directory (Appendix B).

Note that the buoy location is generally only accurate to 500 m and that recovery of the buoy may need to rely on the attached beacon. Lack of satellite coverage may also interrupt buoy signals for periods of up to three (3) hours.

In addition to the use of buoys, satellite monitoring of the spill is also available via AMOSC.

3.2.1.4 Oil Spill Fate Prediction

In the event of a spill, the movement, fate and behaviour of an oil slick may be estimated in real time using computerised oil spill trajectory models available via AMOSC. AMOSC have arrangements in place with RPS utilising the RPS OSTM software to provide initial spill modelling within 2 hours. AMOSC will be contacted in the event of a significant spill to run further oil spill modelling as required (See Contacts Directory in Appendix B).

Trajectory modelling can also be managed through AMSA who also source their trajectory modelling from RPS. This request can be made via an online form available on the AMSA website.

3.2.1.5 Automated Data Inquiry for Oil Spill (ADIOS)

The Automated Data Inquiry for Oil Spill (ADIOS) is a computer-based oil spill response tool that was developed by US National Oceanic and Atmospheric Administration (NOAA). ADIOS uses mathematical equations and information from the database to predict changes over time in the density, viscosity, and water content of oil or product, the rates at which it evaporates from the sea surface and disperses into the water, and the rate at which an oil-in-water emulsion may form.

ADIOS information may be obtained from AMOSC under existing arrangements.

3.2.1.6 Water Sampling

In accordance with initiation criteria in the OSMP, SGHE will undertake water sampling and conduct TPH analysis in both offshore spill areas and selected control sites unaffected by the spill. The purpose of this sampling is to ascertain dissolved hydrocarbon concentrations to compare against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) (the ANZECC Guidelines) and thus inform response activities and provide baseline information for impact assessment. Refer to the NEBA in Appendix E for threshold levels.

The water sampling results will also be used for determining acceptable offshore response termination criteria. The process for setting acceptable termination criteria is discussed in Section 7.2.

Water sampling protocols will be in accordance with the ITOPF Sampling and Monitoring of Marine Oil Spills [Ref. 4].

3.2.2 Natural Weathering and Dispersion

3.2.2.1 Condensate Weathering

The physical and chemical nature of the hydrocarbon composition of the Longtom condensate has been analysed by chemical assay. The condensate has a density of 777.4 kg/m^3 at 25 ºC (API gravity of 51.2), a dynamic viscosity of 1.081 cP at 20ºC and a pour point of -9 ºC (when fresh). When released into the environment, this condensate is expected to evaporate quickly and not persist on the water surface.

Figure 3.3 shows an example of a weathering and fates graph for a 900 bbl/day sub-surface release of Longtom condensate over 90 days (tracked for 100 days).

The volumes of persistent and non-persistent components of the oil types used for this assessment are shown in Table 3.2. Longtom condensate contains 61.5% volatiles, 35.5% semi- to low-volatiles and only 3% of persistent residues.

Advice provided by APASA (Refer Appendix G) is that once spilled and available to the atmosphere on the water surface, Longtom condensate would evaporate the majority of the lighter hydrocarbons within the first day of release. The residues, after one day weathering at sea, were estimated at about 3% by volume and would be semi-solid in nature at the average sea surface temperature of Bass Strait (15°C) and pose no environmental concern.

The paraffin residues in Longtom condensate oil will always remain afloat (density of 0.8273 for the boiling point fraction > 290°C) as the oil spreads out and thins while it weathers at sea. As the residues become semi-solid (freezing point above sea temperature) and is no longer liquid it will begin to form thin clear sheets and white crystalline pancakes. These waxy sheets / pancakes will then begin to break up into small white waxy flakes due to the action of the waves and wind over time.

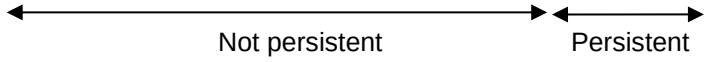
Weathered residues of Longtom condensate will comprise mostly normal and iso-alkanes (paraffins) between n-C22 to n-C27 in carbon chain length.

Hydrocarbons that cause most of the “aquatic toxicity” in oil spills are usually the smaller aromatic and soluble components of oil (1 and 2 ring aromatics) or the persistent poly aromatic hydrocarbons (PAHs). The weathered residues of Longtom condensate are unlikely to have levels of these aromatic components present that would pose a significant aquatic toxicity problem.

The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) rating for paraffin waxes (CAS 8002-74-2) show them to be “readily biodegradable” (A2=R), no acute toxicity (B1=0), no acute mammalian toxicity (C) and low ratings for human health. For further details refer to the APASA memos in Appendix G.

Table 3.2: Physical characteristics and boiling ranges of the Longtom condensate

Characteristic	Volatiles (%)	Semi-Volatiles (%)	Low Volatility (%)	Residual (%)	Density at 25°C (kg/m^3)	Viscosity (cP)
Boiling point (°C)	**<180**	**180 – 265**	**265 – 380**	**>380**		
Longtom conden-sate	61.5	14.3	21.2	3	777.4	1.081@20°C



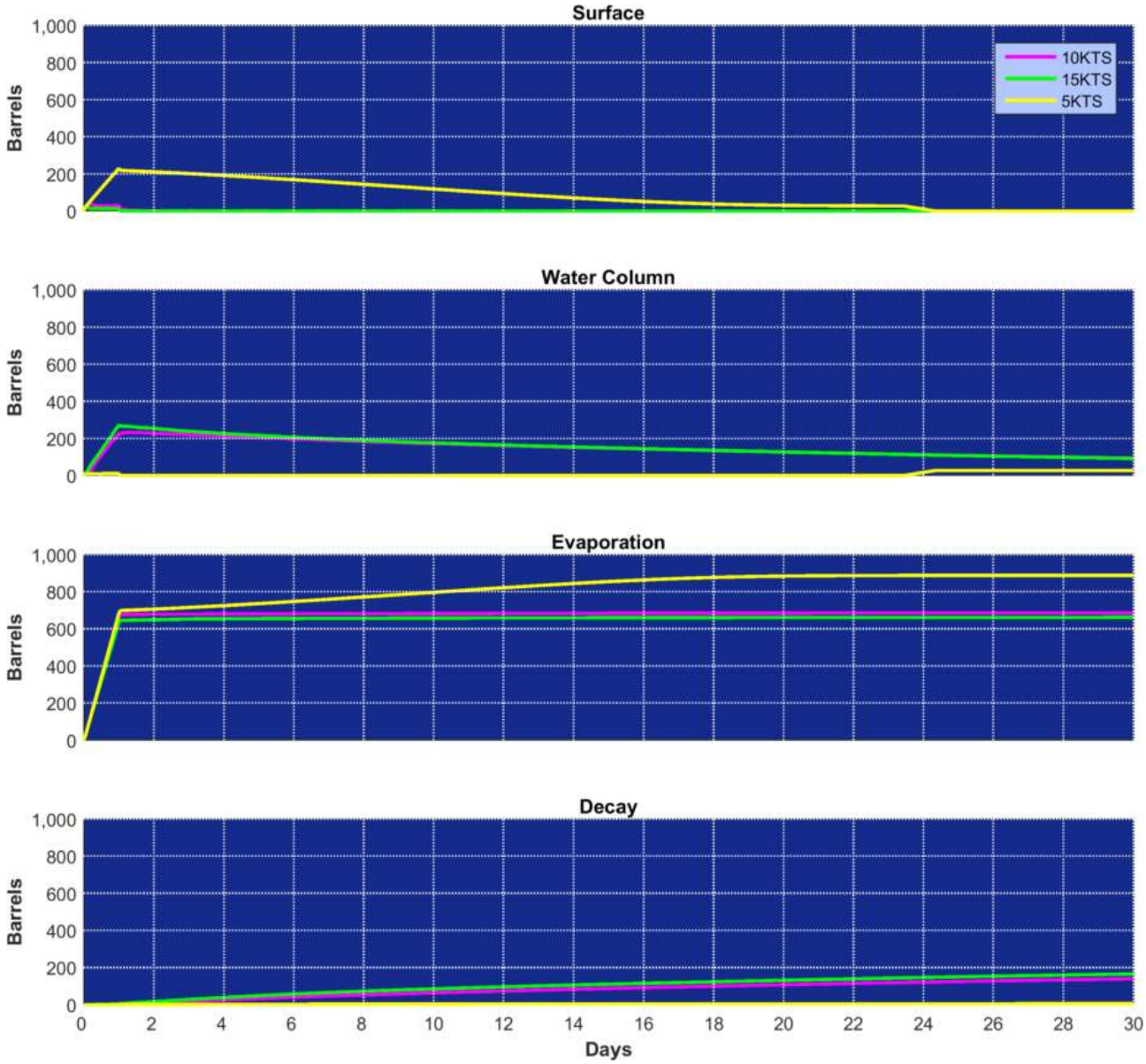


Figure 3.3: Predicted weathering and fates graph for a single spill trajectory simulated under three static wind conditions (5, 10 and 15 knots). Results are based on a 900 bbl subsea release of Longtom Condensate over 24 hours, tracked for 30 days

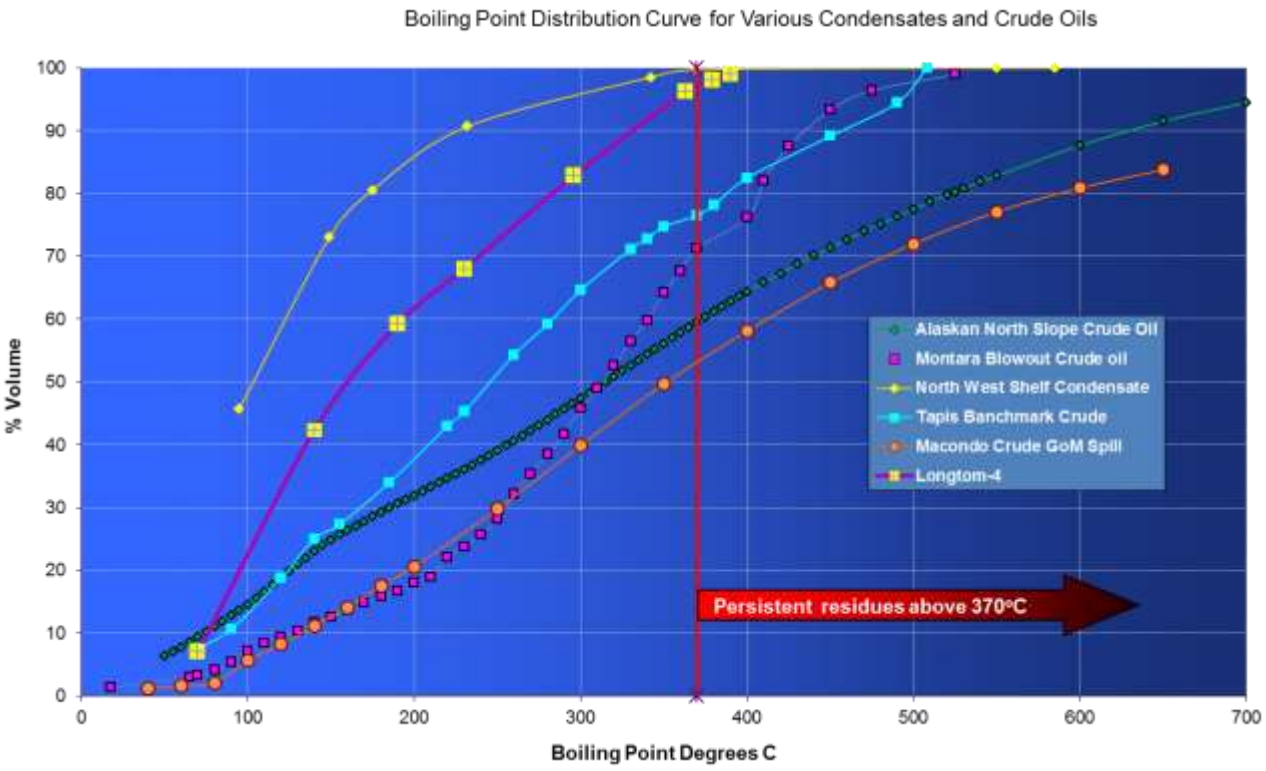


Figure 3.4 Boiling Point distribution curve for Longtom-4 versus other crudes

3.2.2.2 Diesel Weathering

Diesel fuel oils are dominated by n-alkane hydrocarbons that give diesel its unique compression ignition characteristics. Marine Diesel Oils (MDOs) usually consist of carbon chain C11-C28 but may vary depending upon specifications (e.g. winter vs. summer grades).

Figure 3.5 shows the weathering and fates graph for an 80 m^3 diesel spill over 6 hours tracked for 175 hours.

When spilt at sea, MDOs will spread and thin out quickly and more than half of the oil volume can be lost by evaporation within 12 hours depending upon sea temperature and winds.

MDOs have low viscosities and can be physically dispersed as fine droplets into the water column when winds exceed 10 knots. Natural dispersion of MDOs will reduce the hydrocarbons available to evaporate.

Different MDO products, and different environmental conditions such as sea temperature, wind and sea states can influence the quantities of hydrocarbons lost during marine spills to the atmosphere due to evaporation (40-65%), dispersion into the sea by the action of wind and waves (25-50%) and dissolution (solubility of hydrocarbons) (1-10%).

It is common for the residues of diesel spills after weathering to contain n-alkanes, iso-alkanes and naphthenic hydrocarbons. Minor quantities of PAHs will be present in the weathered diesel.

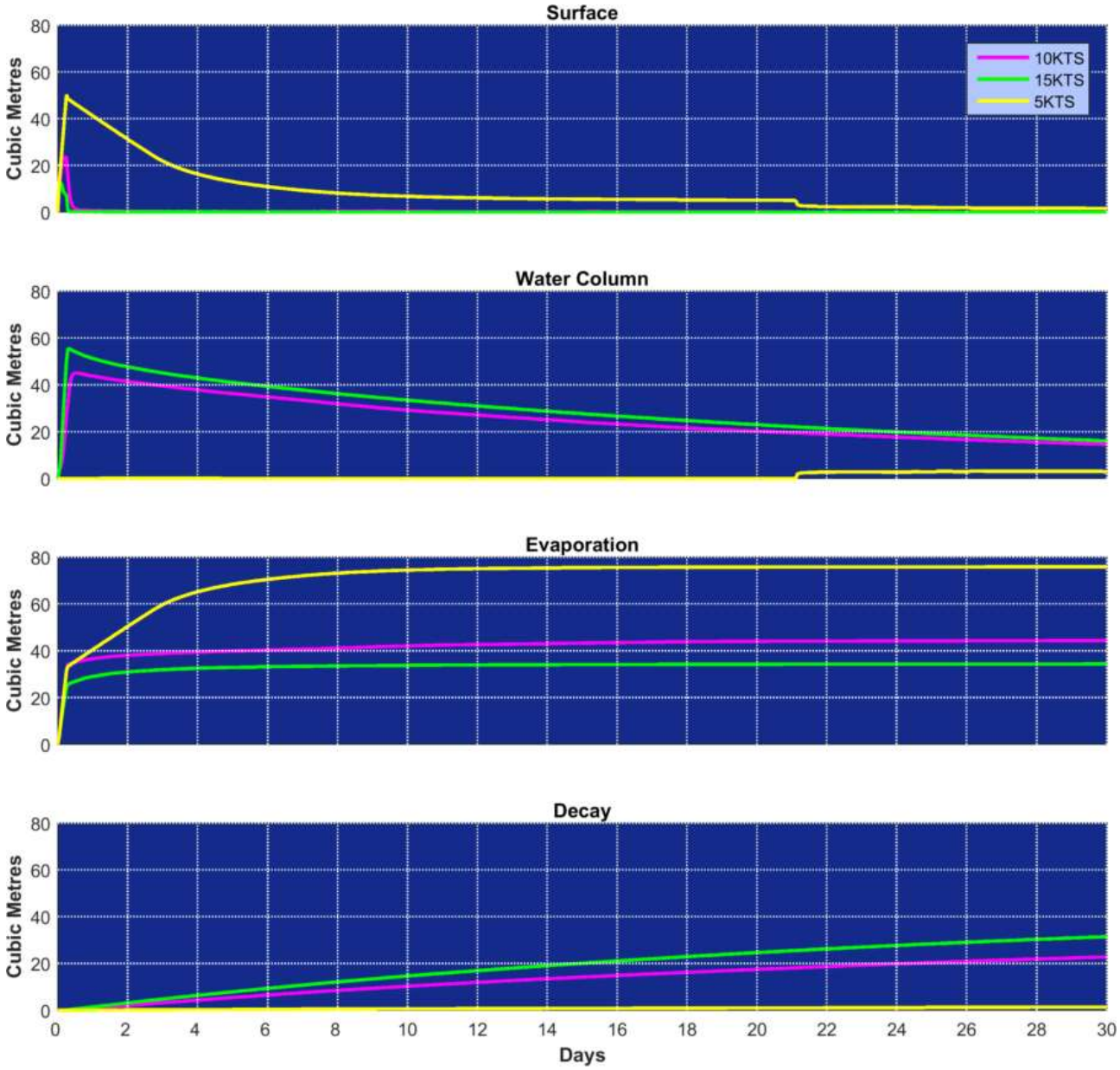


Figure 3.5 Predicted weathering and fates graph for a single spill trajectory simulated under three static wind conditions (5, 10 and 15 knots). Results are based on an 80 m^3 surface release of Marine Diesel Oil over 6 hours, tracked for 30 days

3.2.3 Alternatives considered

Due to the high volatility and potentially flammable and hazardous nature of fresh condensate spills, personnel are unlikely to be able to safely work in close proximity to fresh condensate to contain and recover condensate at sea. Additionally, in the high energy state of Bass Strait at most times of the year it is likely that conventional offshore booming and skimming would not be practicable and of limited effectiveness.

In-situ burning at the blowout location may be a viable option and could have environmental benefits for a sustained blowout, this option would however need careful examination and assessment on a case by case basis.

The use of dispersants is not considered to be a useful option in this scenario due to the distance from the nearest coastline (approximately 30 kilometres), the high volatility of the condensate and the ability of the condensate to disperse, weather and biodegrade naturally without intervention. The application of dispersant has the potential to expose pelagic and benthic organisms to toxic components within the entrained mixture of hydrocarbons and dispersant. Given these considerations, the use of dispersant is not considered further as a potential spill response strategy for a release of Longtom condensate.

Although the modelling indicates the probability of seals or migratory birds encountering a slick greater than 10 g/m^2 to be low, should it present a significant concern, additional response strategies could be considered in consultation with a specialist ecologist, the DELWP and SEWPAC for matters of National Environmental Significance. These response options could include consideration of hazing to deter wildlife from the slick or the activation of a DELWP wildlife response centre and rescue plan for oiled wildlife as per VicPlan. These resources will be accessed via the Victorian DOT EMLO on the SGHE OSRT. For the scenarios outlined in Section 2 and due to the nature of the products addressed by this OPEP (see Sections 3.2.2.1 and 3.2.2.2), the need for extensive oiled wildlife response is not anticipated.

Surface oil slicks tend to dissipate naturally and rapidly. The rate of dissipation depends on:

- Oil type (light, low wax oils, such as condensates, and diesel fuel oil, dissipate and break up rapidly);
- Sea state (high sea states favour break up); and
- Winds (high winds are favourable).

Weathering and fate analysis have been performed for Longtom condensate (Figure 3.3) and diesel spills (Figure 3.5).

Natural weathering and dispersal is the preferred response option for both a condensate spill and a diesel spill as determined by the NEBA (refer to Appendix E). However this strategy will be confirmed in the event of an actual spill to confirm that an appropriate response is carried out.

3.3 Onshore Response Strategy

Modelling [Ref 7] indicates a relatively low level of shoreline impact, no diesel at actional levels is predicted and even in the event of a blowout the area impacted will be small. There is a 10% chance in the event of a blowout that oil above 100g/m^2 will be experienced and that this will only occur after 2 weeks. The maximum length of shore impacted at levels above 100g/m^2 is estimated to be 14km.

3.3.1 Monitor and Evaluate

As described in section 3.2.1, a two-staged approach to monitoring will be implemented. Stage 1 (operational monitoring) will directly monitor and quantify the physical and chemical characteristics of the spill and in the event that water and sediment quality guideline values are exceeded, stage 2 (scientific monitoring) will be implemented. The following sections outline the proposed near shore operational monitoring that could be deployed in the event of spill. The proposed scientific monitoring program is detailed in the OSMP.

3.3.1.1 Aerial Surveillance

The aerial surveillance, satellite tracking buoy data and satellite monitoring data outlined in section 3.2 will be used to inform the onshore and nearshore response strategies for any large spills. This will be supplemented with further helicopter aerial surveillance using SGHE contracted resources to enable closer inspection of coastline, rocky shorelines and estuarine inlet areas if required.

3.3.1.2 Ground Level Monitoring

SGHE will deploy ground level monitoring personnel depending on the slick trajectory and estimated shoreline contact times. As any shoreline responses fall under the Vic DOT as Combat Agency, SGHE will make its resources available to the Manager – Marine Pollution to ensure effective resource deployment as well as discuss any potentially sensitive areas where there is shorebird nesting or roosting areas. These sensitive areas are identified in the NEBA (Appendix E).

Estimates of oil amounts and type will be in accordance with the ITOPF Recognition of Oil on Shorelines Technical Information Paper No. 6 [Ref.2].

For shoreline monitoring personnel, SGHE will provide members of the Industry Core Group via its AMOSC Membership or via a third-party service provider for OSMP monitoring. AMOSC and a third-party service provider have confirmed that it can supply the personnel within the designated timeframe of the projected earliest contact with shorelines (6 days).

3.3.1.3 Water Sampling

Onshore and nearshore water sampling will be conducted as per Section 3.3.1.3.

3.3.1.4 Mollusc / Fish Sampling

As there is a potential for shoreline fish and mollusc species to be exposed to moderate levels of dissolved aromatic compounds, SGHE will arrange for sampling of representative mollusc and fish species in both exposed control, site areas and conduct histo-pathological sampling and analysis.

SGHE has identified potentially suitable laboratories (National Measurement Institute (NMI), Port Melbourne and DTS Food Laboratories, Kensington) capable of this form of analysis. Sampling protocols will be as outlined in the OSMP.

3.3.1.5 OSMP – Onshore Monitoring

As mentioned in Section 3.2.1, SGHE has developed an OSMP that can be deployed in the event of a spill. In addition to the indicators for offshore water quality monitoring described in Section 3.3.1.3, the OSMP addresses indicators for Type I shoreline assessment based on the ITOPF Recognition of Oil on Shorelines Technical Information Paper No. 6 [Ref.2] and National Oceanic and Atmospheric Administration Shoreline Assessment Manual (NOAA, 2000) [Ref.6].

The OSMP also addresses Type II monitoring for the assessment of hydrocarbons in sediment and short-term and long-term impacts on flora and fauna. The OSMP includes an overview and description of the key features of each of the scientific monitoring modules to enable prompt deployment of the relevant scientific modules in the event of a spill. Rather than detailed procedures such as those provided for the Type I monitoring, these Type II modules include links to standard and recognised methods and key organisations or personnel who could implement the specific monitoring program. These modules provide sufficient detail for a qualified and experienced marine scientist with expertise in the relevant field to immediately implement the relevant module when mobilized.

3.3.2 Natural Weathering and Dispersion

As with the offshore response strategy, the primary onshore response strategy will be to allow natural weathering and dispersion of any spills outlined in Section 1.6 as it has been assessed to provide the most beneficial environmental outcome. For further details on the nature of the weathered hydrocarbon residues if they reach the Victorian coastline refer to Section 3.2.2 above.

3.3.3 Deflection and Recovery

The OSTM results indicate that there is the potential for spills to be visible (silvery or rainbow sheens or waxy flakes) on the water surface along some areas of the Victorian coastline between Lakes Entrance and Croajingolong (west). Although the weathered hydrocarbon is unlikely to cause any significant environmental impacts, there is potential for impacts to amenity (e.g. recreational fishing, boating and swimming), particularly in the Lake Tyers estuarine inlet and similar areas. Where real-time trajectory modelling indicates that slicks may reach sensitive areas such as estuaries, SGHE may look to deploy deflection booms and recovery equipment to primarily divert any hydrocarbons towards areas of lower environmental sensitivity (e.g. high energy beaches) as outlined in the NEBA (Appendix E). Deflection booms and recovery equipment is available in the AMOSC Geelong warehouse stocks and in sufficient quantities for the expected response.

Whilst not recommended absorbent booms, matting, and pads are also available from AMOSC Geelong stocks to deploy within the deflection booms.

Protection and Deflection, and Containment and Recovery as primary strategies would be managed using equipment available through both the AMOSC stockpiles as well as via Mutual Aid agreements under AMOSPlan.

3.3.4 Mechanical and Manual Beach Cleanup

SGHE has discussed with AMOSC the possibility of using polypropylene snare mops and booms for absorbing and snaring semi-solid weathered oil residues such as the floating waxy flakes of paraffin residues predicted to develop from the Longtom-4 condensate on the sea surface closer to shore. These are not a recommended strategy.

Due to the predicted low level of residual loading on all types of shorelines, and the relatively low toxicity nature of the weathered diesel and condensate, the NEBA concluded that shoreline cleanup is not a preferred response strategy for the identified spill scenarios.

Manual or mechanical shoreline cleanup would be recommended if required by shoreline impact and subsequent NEBA output. During shoreline cleanup snares or sorbents could be used, but in minimalist fashion to avoid creation of unnecessary contaminated waste (Other options should be considered which avoid the use of sorbents).

3.4 Objectives, Standards and Measurement Criteria

Sections 7 and 8 of the relevant Longtom Environment Plan specify the requirements for Longtom activities. Some of these relate to emergency response training, awareness and preparedness for implementation of this OPEP, testing of the emergency response plan(s) no less than annually and reporting of spills. Table 7.1 of the EP presents the Environmental objectives, standards and measurement criteria associated with general operations while Table 7.2 of the EP presents the high level objectives, standards and measurement criteria for the oil spill response.

The NEBA attached in Appendix E includes specific and detailed objectives, standards, measurement criteria and termination criteria for the proposed spill response strategy for each resource type. The NEBA performance standards can be summarised as follows:

- Natural physical and biological degradation of spilt hydrocarbon in water to a concentration below the TPH trigger levels outlined in ANZECC Water Quality Guidelines;
- Natural physical and biological degradation of spilt hydrocarbon in sediment to a concentration below the PAH trigger levels outlined in ANZECC Water Quality Guidelines
- No visible hydrocarbon sheen;
- When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH (7 µg/L).
- When hydrocarbons in sediment samples are below ANZECC Water Quality Guideline trigger value for PAH (4 mg/kg).
- No toxic response above background levels.
- Flora and fauna populations and feeding activity within pre-spill range of natural variability
- No hydrocarbons attributable to hydrocarbon spill detected in fish;
- No physical disturbance of shipwrecks associated with any response activity.

As discussed in Section 3.3, the primary proposed response strategies of monitoring, natural weather and dispersion, are non-invasive and due to the nature and scale of the defined scenarios and potential consequences of these scenarios, the risk posed by this “hands-off” approach are considered to be ALARP and acceptable. Where physical intervention such as shoreline cleanup is warranted, this will be controlled and conducted under the direction of the Incident Controller and the State Marine Pollution Committee. This will ensure that any risks posed by these activities are ALARP and acceptable.

4 Health and Safety

4.1 General

As discussed throughout this OPEP, the proposed response strategies for the diesel and condensate scenarios are limited in nature and do not involve extensive manual labour or heavy equipment. This section provides general background on health and safety issues that could be encountered if the proposed response strategies are escalated.

Issues commonly associated with a spill are:

- Slips, trips and falls at oily sites;
- Working near water or on uneven terrain;
- Exposure to oil and other chemicals;
- Handling unfamiliar equipment;
- Fatigue;
- Inhalation of toxic components;
- Equipment handling; and
- Thermal stress (hot or cold).

The Operations Section Chief must ensure that steps are taken to minimise risk by ensuring that responders are competent to undertake the tasks required and that they wear personal protective equipment (PPE) appropriate to the tasks they are undertaking.

Personnel involved in monitoring are required to wear:

- Light-weight hat;
- Safety glasses (standard issue);
- Sturdy shoes or boots;
- Protective clothing (disposable “paper” overalls adequate);
- Protective gloves with PVC lining; and
- Lifejackets (if working near water).

All personnel who are likely to handle equipment used to isolate any spills will require additional protective equipment, particularly when working from marine vessels. This includes:

- Safety rubber boots;
- Work gloves;
- Safety hard hats; and
- Life jackets

4.2 First Aid

Where necessary, a first aid contractor will provide field first aid services. This will be arranged by the person filling the First Aid / Medical Liaison role on the OSRT.

5 Waste Disposal

5.1 Hydrocarbon based waste

As the preferred response strategy is natural recovery and monitoring, it is not anticipated that hydrocarbon-based waste will be generated from the offshore response actions other than small volumes of water samples that will be disposed of in accordance with analytical laboratory protocols.

For the onshore response, the NEBA has identified that there is a possibility that manual or mechanical beach cleanup could be carried out. Although this is not a recommended response action, if in consultation with the DEDJTR as Combat Agency a confirmatory NEBA recommends that these actions take place, there is the potential for oily sandy waste to be generated that will require disposal at an appropriately licensed site.

In addition, waste may also be generated from use of absorbent material used inside pre-deployed deflection booms and contaminated PPE.

On-site waste management plans should be developed to ensure secondary contamination following a spill is minimised where appropriate.

The principal disposal methods are:

- Oil reclamation - liquid oil recovered for further use.
- Stabilisation - oily wastes treated so they no longer constitute a threat to the environment
- Bioremediation/biodegradation - the breakdown or transformation of a chemical substance or substances by microorganisms using the substance as a carbon and/or energy source. (refer to http://www.epa.gov/OEM/docs/oil/edu/Landfarming.pdf)
- Direct Disposal - untreated oily wastes are disposed of in pre-designated and properly regulated sites.
- Destruction - oil content in oily waste is destroyed by incineration or broken down by biodegradation.

As the anticipated waste volumes are likely to be very small, the preferred option will be direct disposal.

Note any deceased wildlife is to be retained for DELWP assessment.

5.2 Putrescible waste, green waste and recycling materials

Putrescible waste, green waste and recycling materials can be disposed of to one or more of East Gippsland Shire's landfill and transfer station sites. These facilities are located at:

- Bairnsdale Landfill and Transfer Station, 200 Johnsons Road, Forge Creek.
- Benambra Landfill, Tip Road, Benambra, Unmanned Site.
- Bendoc Landfill, Clarkeville Road, Bendoc, Unmanned site.
- Bonang Landfill, 16 Mailing Road, Bonang, Unmanned site.
- Cann River Landfill, Coast Road, Cann River, Unmanned site.
- Lakes Entrance Landfill and Transfer Station, Thorpes Lane, Lakes Entrance.
- Mallacoota Landfill, Betka Road, Mallacoota.
- Orbost Landfill, Bonang Road, Orbost.

Figure 6.1 East Gippsland Shire Council – Waste Management Facilities

6 Response Termination

Cleanup end points must be defined so that responders know when their response aims have been achieved. For the Longtom spill scenarios, key end points for cleanup are outlined in sections 7.1 to 7.5.

6.1 Offshore Response Termination

- No visible sheen from spilt diesel or condensate on the water surface;
- When hydrocarbons in water samples are below ANZECC Water Quality Guideline limits i.e. 0.005 mg/L condensate and 0.003 mg/L for diesel as trigger value (determined in accordance with Table 8.3.24 of ANZECC Water Quality Guidelines).

6.2 Nearshore and Onshore Response Termination

For nearshore areas, clean up end points will be determined by SGHE in conjunction with the DOT and JSCC. However in general this requires:

- All accessible shorelines are clean (i.e., free of oil);
- Cleanup is having no further net beneficial effect or is having a deleterious effect on the shoreline or associated plants or animals; or
- Remaining oil is judged to be acceptable or of little or no adverse effect.

Specifically, endpoint criteria for coastline types are presented in the NEBA, these include:

Shoreline Type	Shoreline Cleanup Endpoints - if Conducted.
Exposed rocky shores and wave cut platforms	No visible hydrocarbon sheen at intertidal zone.
Solid man-made structures	No visible hydrocarbon sheen adjacent to structure. For high use public areas: cleanup until oil no longer rubs off on contact.
Sandy Beaches	No visible hydrocarbon sheen along coastline. No visible hydrocarbon debris on sandy beaches / hydrocarbons below actionable levels
Exposed and sheltered tidal flats and marshes	No visible hydrocarbon sheen in estuaries in proximity to marshes or intertidal flats. No hydrocarbons in molluscs attributable to condensate spill. Concentration of hydrocarbon in molluscs do not exceed control sites or acceptable global concentrations.

6.3 Termination of SGHE OSRT

The response will be terminated when all spill response operations have ceased and all equipment is recovered, cleaned and returned to its source. Support personnel, undertaking functions such as finance, may continue until all claims are processed and costs are determined. Following the decision to terminate the response, the SGHE OSRT IC will ensure that:

- All Personnel are accounted for;
- Equipment is retrieved for cleaning, repair, or replacement;
- Equipment including vessels are returned to the correct owner/location; Shorelines are left free of litter or other refuse;
- All vessels are returned to their respective berths; and
- All deployed equipment is logged and returned to the correct owner/location.

6.4 Incident Follow-up

A “hot” debrief of key lessons learned should be undertaken within 48 hours of the response termination. Representatives from each group should be represented and provide input.

A formal debrief is to be held within 14 days of the response termination to address:

- Spill causes (if known);
- Speed of response activation;
- Effectiveness of tactics and strategies;
- Equipment suitability;
- Health and Safety issues (if any);
- Communications;
- Plan integration with other response agencies; and
- Improvements in procedures strategies or response.

A formal incident investigation will be initiated per the SGHE Incident Investigation procedure CORP-HSE-003.

6.5 Consultation

Consultation involving discussion and agreement on ‘end point criteria’ will be undertaken with affected stakeholders prior to terminating the oil spill response. These stakeholders may include representatives from the following organisations as appropriate:

- AMSA
- AFMA
- NOPSEMA
- AMOSC
- DJPR/DOT
- DELWP
- EPA
- Various fisheries representatives
- Local community

7 Referenced Documents

Number	Reference
1	ITOPF, 2011. Aerial Observation of Marine Spills, Technical Information Paper 1.
2	ITOPF, 2011. Recognition of Oil on Shorelines, Technical Information Paper 6.
3	USEPA, 2010. Characteristics of Response Strategies: A Guide for Spill Response Planning in Marine Environments, A joint publication of: U.S. Department Of Commerce, U.S. Coast Guard, U.S. Environmental Protection Agency, American Petroleum Institute, 2010.
4	ITOPF, 2012. Sampling and Monitoring of Marine Oil Spills, Technical Information Paper 14.
5	Hook, S., Batley, G., Holloway, M., Irving, P. and A. Ross, 2016. Oil Spill Monitoring Handbook. CSIRO Publishing.
6	NOAA. 2000. Shoreline Assessment Manual, Third Edition. HAZMAT Report 2000-1. Seattle: Office of Response and Restoration, National Oceanic and Atmospheric Administration, Seattle.
7	SGH Longtom Field Oil Spill Modelling, RPS Report MAQ0802J, 31 May 2019.
8	NP-GUI-020: National Plan Australian Government coordination arrangements for maritime environmental emergencies. National Plan Strategic Coordination Committee. Available at https://www.amsa.gov.au/sites/default/files/2014-10-np-gui020-amsa1092-aust-gov-coord-arrangements.pdf

Appendix A - OSRT Role Checklists

ERT 01	SUPPLY/SUPPORT VESSEL MASTER	Location	Vessel
Responsibilities: Supply/Support Vessel Masters are responsible for the safety of crew and vessels. They will provide onsite support as required and may, upon the direction of the OSRT IC (DSV / OIM), monitor the slick or deploy satellite tracking devices.			
Response Phase	**Action**		**Status/Time**
Reporting	If spill report is received from crew: • Verify report and obtain details (see OPEP Form E2). • Report spill to SGHE Offshore Rep, Development Manager / Project Manager (MODU OIM or SGHE Drilling Supervisor for drilling campaign).		
	If spill is, or may be from vessel, report spill to:		
	• Commonwealth waters:	AMSA	
	• Permit Area:	SGHE / NOPSEMA	
	• Victorian waters:	DJPR	
	• Port waters:	Port Authority	
Immediate Actions Response	Take steps to stop any release of oil from the vessel.		
	Monitor slick and update SGHE Development Manager / Project Manager.		
	Respond in accordance with vessel SOPEP and SGHE Bridging ERP.		
	Undertake actions as directed by SGHE Development Manager / Project Manager / Rig OIM.		
	Maintain a personal log.		
Termination	On notification by the SGHE Development Manager / Rig OIM/ Project Manager, stop operations.		
	Recover any deployed equipment and check against deployment log.		
	Undertake a roll call.		
	Clean deck and crew.		
	Proceed to nominated stand-down area.		
	Debrief crew.		
	Submit records to the OIM upon request.		

ERT 02	SGHE OFFSHORE REP. / DRILLING SUPERVISOR *(APPLICABLE FOR INTERVENTION, DRILLING AND OTHER CAMPAIGNS)*	Location	MODU
Designated Function: Field Response			
Responsibilities: The SGHE Offshore Rep./ Drilling Supervisor (supported by the Drilling Superintendent, Drilling Manager, and Project Manager during drilling campaigns) is responsible for all field activities, and to mount an immediate on-scene response. This may involve duties such as ensuring the safety of personnel, necessary action to limit the spillage of oil and restrict its spread, collection of oil samples. The Drilling Supervisor and OSV must work closely with the MODU OIM in recognition that the OIM has ultimate responsibility for MODU integrity and personnel safety.			

Response Phase	Action	Status/Time
Reporting	Receive spill report.	
	Undertake immediate response as required (see below).	
	Determine with OIM who will undertake notification to NOPSEMA and other procedures.	
	If report is from Vessel Master, report spill to AMSA/DEDJTR if Vessel Master or OIM are unable to.	
	Report spills to the SGHE Development Manager / Project Manager (Verbal).	
	Confirm spill details and initiate a POLREP Form for the SGHE Development Manager / Project Manager.	
	Assist OIM to ensure vessels in the area of spill are advised of spill and any hazards, and that Navigation Warning is issued, if needed.	
Immediate Response Actions	Obtain details of the spill. Nominate a person to investigate the report.	
	Assist OIM to ensure staff and MODU/Vessel safety.	
	Assist OIM to halt the release of oil, if possible.	
	If possible, prevent spread of spilt oil.	
	Maintain a log of events (OPEP Form 003).	
Incident Assessment	In conjunction with the OIM/Vessel Master, assess whether spill can be managed by MODU or shore-based staff, i.e. is it a Level 1, 2 or 3 response? Determine: • What has been spilt? • How much has been spilt? • What is the location? • How is the material behaving? • Where is it going? • What is in the path of the spill? • How long will it take to get there? • What is the appropriate response?	
	In consultation with the OIM/Vessel Master, assess the incident and determination of response Level. Inform the Project Manager of assessment.	
	Keep personnel informed of the spill status.	
	Monitor movement of spill (use available support vessels if safe to do so).	

ERT 02	**SGHE OFFSHORE REP. / DRILLING SUPERVISOR** *(APPLICABLE FOR INTERVENTION, DRILLING AND OTHER CAMPAIGNS)*	**Location**	**MODU**
Response	*Maintain contact with SGHE Development Manager /Project Manager / IC and keep abreast of:*		
	• Weather, sea state, trajectory.		
	• Condition of slick.		
	• Response actions.		
	Issue SITREPs (OPEP Form 002).		
	On direction from the IC and following interrogation of the NEBA undertake response as appropriate.		
	Monitor spill and reassess response Level. Notify IC of any change.		
Escalation to Level 2/3	Note: The IC may direct that all SITREPs (OPEP Form 002) are sent, or copied to, the OSRT IC.		
	Follow spill response directives of nominated IC.		
	Keep OSRT IC informed of all actions taken.		
Termination	Stand-down crew as directed by IC (for Level 2/3).		
	Inform OIM/Vessel Master of stand-down.		
	Debrief crew as necessary.		
	Compile an Incident Report and transmit to the IC.		

ERT 03	MODU OIM *(APPLICABLE DURING DRILLING CAMPAIGNS ONLY)*	Location	MODU
Designated Function: MODU ERT Leader (OIM)			
Responsibilities: The OIM is responsible for ensuring the safety of personnel and the MODU. The OIM has the authority to direct the actions of all personnel on board during an emergency. The OIM will take all necessary action to limit the spillage of oil, to restrict its spread and to mount an immediate response			
Response Phase	**Action**		**Status/Time**
Reporting/ Activation	Receive report from on site vessels, or from MODU personnel.		
	Verify the safety of personnel, the MODU and affected vessels.		
	Take action to control the spill.		
	Notify OSV and decide on who will undertake notification to NOPSEMA and other procedures.		
	Dispatch a person to verify the report (in consultation with the OSV).		
	Ensure that relevant emergency procedures are followed (refer to the bridging ERP).		
	Inform vessels in the area of spill and advice on any other hazards. Ensure that an appropriate Navigation Warning is issued.		
	Obtain details of spill (complete and issue POLREP to AMSA / Drilling Supervisor).		
	Report event to the rig manager		
Immediate Response	Maintain a personal log.		
	Take appropriate immediate actions to control spill. Refer to NEBA for preferred offshore response strategies.		
	Keep personnel informed of the spill status via the public address system if practicable.		
	Monitor movement of spill (use available support vessels if safe to do so).		
Response	Keep Drilling Supervisor on board informed (via SITREPs) of: • Weather, sea state, trajectory; and • Condition of slick.		
	Assist DSV as required.		
	Maintain a log of events.		
Termination	Obtain permission to stand-down from the SGHE OSRT IC.		
	Announce response termination.		
	Attend debrief.		
	Assist to compile an Incident Report.		

OSRT	INCIDENT CONTROLLER (IC)	ONSHORE

The IC is responsible for the management of the incident response and control of the SGHE OSRT. This extends over all phases of the response from the initial assessment to response termination and demobilisation.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the CMT, SGHE Development Manager, Project Manager or OIM:		
		a	Proceed to ERR	
		b	Inform CMT Leader of incident	
		c	Confirm notifications to NOPSEMA, AMSA, DJPR / DOT	
		d	Maintain communications with DSV offshore on incident status	
		e	Mobilise OSRT members depending on scale of incident and where required mobilise AMOSC resources	
	2	Start Personal Log.		
Assuming Control	**3**	Arrive at ERR (if not first reporting location) and log time.		
	4	Review ERR layout.		
	5	Review OSRT staffing.		
Initial Assessment	**6**	Obtain details of spill and any actions taken by the OSV or other Agency (via POLREP; OPEP Form 001). Check the following:		
		a	Time of initial (this) call.	
		b	Name/title of caller.	
		c	Location of incident.	
		d	Nature of incident.	
		e	Time of incident/incident report.	
		f	Source of the report.	
		g	Volume of oil spilled.	
		h	Type of oil spilled.	
		i	Wind and current data.	
	7	Determine trajectory (or direct Planning Section Chief):		
		a	Manual estimate.	
		b	Commission trajectory computer modelling (APASA).	
		c	Consult with Operations Section Chief regarding initiation of OSMP including collection of water and oil samples where safe to do so.	
	8	Determine resources at risk (Planning Section Chief).		
	9	Determine Response Level in consultation with the SA.		
	10	If the Vic State response is required (Coastline and state water impacts anticipated) establish communications with DJPR and DOT to provide EMLO for SGHE OSRT.		

OSRT		INCIDENT CONTROLLER (IC)		ONSHORE
	11	If impacts to Marine National Parks is possible (Blowout only) contact 24 hour Marine Compliance Duty Officer		
Planning	**12**	Arrange aerial surveillance (or direct Planning Section Chief).		
	13	Convene planning meeting:		
		a	Determine Incident Response Aim (Policy).	
		b	Determine Priorities and Objectives.	
		c	Determine Strategies.	
	14	Determine preliminary resources list (labour, equipment, transport and other support) and give to Logistics Section Chief.		
	15	Direct Section Chiefs to develop Tactics/Methods to implement Strategies.		
	16	Liaise with CMT Leader to develop Media Plan.		
	17	Direct Planning Section Chief to compile Incident Action Plan.		
	18	Monitor the response by scheduling and undertaking regular briefings/debriefings of OSRT.		
	19	If necessary call for additional resources:		
		a	AMOSC via Authorising Officer as per SGHE Crisis Management Plan.	
		b	AMSA (National Plan resources).	
	20	Issue regular SITREPs:		
		a	SREC (DoT).	
		b	AMSA.	
		c	Section Chiefs.	
		d	Other (log).	
	21	Monitor OH&S performance.		
	22	Monitor waste volumes and management through Operations Section Chief/Waste Management Coordinator. If necessary, arrange for the development of a Waste Management Plan. Confirm that this complies with relevant State standards.		
	24	If a Level 2 that impacts Victorian Coastline, designate a SGHE resource as advisor to SREC (DoT) response team.		
	25	Liaise with DoT on beach monitoring, manual cleanup or any wildlife resource rescue requirements.		
	26	Arrange relief for OSRT members.		
	27	Continue to monitor slick (position, trajectory, behaviour) through the Planning Section Chief.		
Response Termination	**28**	Terminate response on instruction of SA or designated CA.		
	29	Ensure that all OSRT members and Agencies are informed of stand-down (issue SITREP).		
	30	Monitor, and ensure a safe and complete demobilisation.		
	31	Debrief OSRT.		

OSRT		INCIDENT CONTROLLER (IC)	ONSHORE
Post Response	**32**	Lead incident debrief.	
	33	Ensure that all records are retrieved, collated and stored.	
	34	Provide schedule of costs/supporting documents to AMSA/DoT.	

OSRT	OPERATIONS SECTION CHIEF	ONSHORE

The Operations Section Chief is responsible for ensuring that the Objectives and Strategies outlined in the Incident Action Plan are carried out effectively. The Operations Section Chief is responsible for determining how resources are distributed amongst the units in the Section and for coordinating joint activities.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to IC or other nominated officer and upon arrival confirm assigned tasks with the IC.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Assessment	**4**	Obtain available data re:		
		a	Weather.	
		b	Tides and currents.	
		c	Topography and shoreline character (from OSRA).	
		d	Environmental sensitivity data (OSRA).	
		e	Spill trajectory (observed or by modelling).	
		f	Oil data (character and behaviour).	
		g	Action taken to date.	
		h	Consult NEBA and determine and implement appropriate spill response strategies via Logistics Section Chief including: • Organising surveillance by support vessel, aircraft, satellite tracking buoys. • Collection of samples of product that has been spilt • Initiation of water quality monitoring program (Ref Section 3.2.1).	
	5	In consultation with the IC determine level of response and staffing requirements. Assess requirement and activate a third party service provider to conduct OSMP activities.		
Establishing Section	**6**	Determine need for Advance Operations Centre.		
	7	Establish Advance Operations Centre if needed (liaise with IC and Logistics Section Chief).		
	8	Call in required staff.		
	9	Allocate tasks.		
	10	Brief Section personnel.		
	11	Notify the Planning Section of the names and locations of Section personnel.		
Planning	**12**	Attend initial planning meeting with IC and other Section Chiefs, and record:		
		a	Incident Response Aim (Policy).	
		b	Priorities and Objectives.	

OSRT		OPERATIONS SECTION CHIEF		ONSHORE
		c	Strategies.	
	13	Develop and collate Operations Sub-Plan, encompassing:		
		a	Marine Response Sub-Plan.	
		b	Aviation Sub-Plan.	
		c	Shoreline Response Sub-Plan.	
		d	Waste Management Sub-Plan.	
		e	Wildlife Sub-Plan (this should be done in consultation with or by DELWP or other Government officers).	
	14	Supply Operations Sub-Plans to Planning Section Chief, as developed and amended.		
	15	For each of the Operational Sub-Plans, advise Logistics Section Chief and Planning Section Chief of :		
		a	Equipment needs.	
		b	Labour needs (numbers, training level).	
		c	Transport requirements.	
		d	Any other needs.	
Ongoing Response	**16**	Coordinate and monitor performance of Operations Section Functional Units.		
Response Termination	**17**	Inform all Operations Section Unit Coordinators of response termination.		
	18	Debrief Operations Unit Coordinators.		
	19	Attend IC debrief.		
	20	Ensure that all Field Teams return safely.		
	21	Ensure that all equipment is returned to Logistics Section.		
	22	Ensure that all records are given to Finance and Administration Section Chief.		

OSRT		HEALTH AND SAFETY (HSEC) OFFICER		ONSHORE
The Health and Safety (HSEC) Officer is responsible for the development and implementation of the OH&S Sub-Plan.				
Response Phase		**Action**		**Status/Time**
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to ERR or other nominated location.	
		b	Report to Operations Section Chief and upon arrival confirm assigned tasks with the Operations Section Chief.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Develop a site OH&S Plan.		
	5	Implement OH&S induction process for all personnel.		
	6	Ensure that proper OH&S procedures have been implemented for the response.		
	7	Rectify any practices which breach the OH&S procedures implemented for the response.		
Response Termination	**8**	Inform all OH&S Unit personnel of response termination.		
	9	Ensure that all Field Teams return safely.		
	10	Attend Operations Section debrief if required.		
	11	Ensure that all equipment is returned to Logistics Section.		
	12	Ensure that all records are given to Operations Section Chief.		

OSRT		MARINE COORDINATOR		ONSHORE
The Marine Coordinator is responsible for coordination of activities undertaken by waterborne craft and equipment.				
Response Phase		**Action**		**Status/Time**
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to Operations Section Chief and upon arrival confirm assigned tasks with the Operations Section Chief.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Develop and update a Marine Sub-Plan to implement the marine response strategies in the Incident Action Plan.		
	5	Calculate marine response equipment/ labour/ transport requirements and request through Operations Section Chief.		
	6	Obtain regular (daily) data:		
		a	Location of slick: aerial surveillance reports.	
		b	Condition of the oil (field reports, modelling).	
		c	Sea state and weather.	
	7	Prepare work-orders for marine response teams.		
	8	Ensure that Marine Response Teams receive required:		
		a	Information, i.e. Briefings/ Inductions/ Weather.	
		b	Personal protective equipment.	
		c	Supplies.	
	9	Monitor activities of non-response craft and request (via Operations Section Chief) an exclusion zone if necessary.		
	10	If permission is given to use dispersants, coordinate vessel based dispersant operations.		
	11	Arrange for aerial observer support including associated logistics for slick monitoring, containment and recovery operations, and for vessel dispersant spraying operations, (with Aviation Coordinator via Logistics Section Chief).		
	12	Inform Waste Management Coordinator (via Operations Section Chief) of anticipated waste volumes and type.		
Response Termination	**13**	Inform all Marine Unit personnel of response termination.		
	14	Ensure that all Field Teams return safely.		
	15	Debrief Unit Team Leaders.		
	16	Attend Operations Section debrief if required.		
	17	Ensure that all equipment is returned to Logistics Section.		
	18	Ensure that all records are given to Operations Section Chief.		

OSRT	AVIATION COORDINATOR	ONSHORE

The Aviation Coordinator is responsible for the coordination and direction of all activities undertaken utilising aircraft, e.g. aerial dispersant spraying, aerial surveillance and transport.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to Operations Section Chief and upon arrival confirm assigned tasks with the Operations Section Chief.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Develop and update an Aviation Sub-Plan to implement aviation response strategies in the Incident Action Plan.		
	5	Calculate equipment/labour/transport requirements and request through Operations Section Chief.		
	6	Obtain data (daily) re:		
		a	Weather.	
		b	Slick location (modelling data).	
	7	Coordinate aerial transport operations as required.		
	8	Coordinate aerial surveillance operations on behalf of the Operations Section Chief.		
	9	Coordinate aerial dispersant operations.		
Response Termination	**10**	Inform all Aviation Unit personnel of response termination.		
	11	Ensure that all Aircraft and support crew return safely.		
	12	Debrief pilots if required.		
	13	Attend Operations Section debrief if required.		
	14	Ensure that all equipment is returned to Logistics Section.		
	15	Ensure that all records are given to Operations Section Chief.		

OSRT		SHORELINE COORDINATOR (SC)		ONSHORE
The SC is responsible for planning and coordination of shoreline assessment and cleanup activities. Note that this is likely to be managed and conducted by State resources under the VIC Plan.				
Response Phase		**Action**		**Status/Time**
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to Operations Section Chief and upon arrival confirm assigned tasks with the Operations Section Chief.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Develop and update a Shoreline Sub-Plan to implement the Incident Action Plan and shoreline response strategies.		
	5	Calculate shoreline response equipment/labour/transport requirements and request through Operations Section Chief.		
	6	Obtain regular (daily) data:		
		a	Location of oil: aerial surveillance reports and Shoreline Assessment Team data.	
		b	Condition of the oil (field reports, modelling).	
		c	Sea state and weather.	
	7	Prepare work-orders for shoreline response teams.		
	8	Ensure that Shoreline Teams receive required:		
		a	Information, i.e. Briefings/ Inductions/ Weather.	
		b	Personal protective equipment.	
		c	Communications equipment (in accordance with the Communications Sub-Plan).	
		d	Supplies.	
	9	Monitor activities of non-response personnel and request (via Operations Section Chief) security or an exclusion zone if necessary.		
	10	If permission is given to use dispersants, ensure that all OH&S Sub-Plan procedures are followed.		
	11	Coordinate land transport for shoreline cleanup and assessment teams (obtain resources via Logistics Section Chief).		
	12	Coordinate Shoreline Assessment Teams.		
	13	Coordinate Shoreline Cleanup Teams.		
Response Termination	**14**	Inform all Shoreline Unit personnel of response termination.		
	15	Ensure that all Field Teams return safely.		
	16	Debrief Team Leaders if required.		
	17	Attend Operations Section debrief if required.		
	18	Ensure that all equipment is returned to Logistics Section.		
	19	Ensure that all records are given to Operations Section Chief.		

OSRT	WASTE MANAGEMENT COORDINATOR	ONSHORE

The Waste Management Coordinator is responsible for the coordination of the containment, storage, transport and disposal of recovered oil and oily waste. Also instruction in on-site handling, storage and/or separation and treatment.

Response Phase		Action	Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:	
		a Proceed to SGHE ERR or other nominated location.	
		b Report to Operations Section Chief and upon arrival confirm assigned tasks with the Operations Section Chief.	
	2	Start Personal Log.	
	3	Attend Initial Briefing.	
Response	**4**	Develop and update a Waste Management Sub-Plan to support the Incident Action Plan.	
	5	Advise Planning Section Chief (via Operations Section Chief) of waste volumes and transport and disposal costs.	
	6	Advise marine and shoreline response field teams on the temporary storage of collected oil.	
	7	Coordinate the transport of oil and oiled debris to central storage, or permanent disposal sites.	
Response Termination	**8**	Inform all Waste Management Unit personnel of response termination.	
	9	Ensure that all Field Teams return safely.	
	10	Debrief Team Leaders if required.	
	11	Attend Operations Section debrief if required.	
	12	Ensure that all equipment is returned to Logistics Section.	
	13	Ensure that all records are given to Operations Section Chief.	

OSRT	PLANNING SECTION CHIEF	ONSHORE

The Planning Section Chief is responsible for managing the Planning Section of the OSRT. The Planning Section is responsible for the preparation of an Incident Action Plan on behalf of the IC. It is also responsible for the collation and interpretation of required data.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to IC or other nominated officer and upon arrival and assigned tasks to the IC.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Assessment	**4**	Obtain available data re:		
		a	Weather.	
		b	Tides, currents.	
		c	Topography and shoreline character (from OSRA).	
		d	Environmental sensitivity data (OSRA).	
		e	Spill trajectory (observed or by modelling).	
		f	Oil data (character and behaviour).	
		g	Community issues.	
		h	Action taken to date – refer to NEBA App G.	
	5	In consultation with the IC determine level of response and staffing requirements.		
		Confirm status of offshore monitoring with Operations Section Chief (Ref Section 3.2.1). Initiate onshore monitoring where required in consultation with state departments (Ref Section 3.3.1).		
Establishing Section	**6**	Call in required staff (Obtain authority of IC and recruit via, or notify, the Logistics Section Chief).		
	7	Allocate tasks.		
	8	Verify that the ERR Coordinator has posted appropriate Status Boards and Maps.		
Planning	**9**	Attend initial planning meeting with IC and other Section Chiefs, and record:		
		a	Incident Response Aim (Policy).	
		b	Priorities and Objectives.	
		c	Strategies.	
	10	Distribute draft Incident Action Plan to Section Chiefs and Media Liaison Officer (External Affairs).		
	11	Obtain and collate Sub-Plans:		
		a	Communications Sub-Plan from Communications Coordinator, via Logistics Section Chief.	

OSRT		PLANNING SECTION CHIEF		ONSHORE
		b	OH&S Sub-Plan from Health & Safety Coordinator via Operations Section Chief	
		c	Operations Sub-Plans from the Operations Section Chief.	
	12	Present Incident Action Plan to IC for approval and distribute as directed.		
Ongoing Response	**13**	Issue regular SITREPs to the IC for authorisation and despatch.		
	14	Monitor status boards, maps and charts. Liaise with ERR Coordinator.		
	15	Monitor response: Update Incident Action Plan if needed.		
	16	Advise IC of need for Planning Meetings.		
	17	Monitor performance of Planning Section staff.		
Response Termination	**18**	Inform all Planning Section staff of response termination.		
	19	Debrief Planning Unit coordinators.		
	20	Attend IC debrief.		
	21	Ensure that all records are given to Finance and Admin Officer.		

OSRT		RESOURCES COORDINATOR		ONSHORE
The Resources Coordinator is responsible for tracking of the deployment of resources.				
Response Phase		**Action**		**Status/Time**
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to Planning Section Chief and upon arrival confirm assigned tasks with the Planning Section Chief.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Maintain information summaries on the types and location of resources deployed in the response.		
	5	Maintain status information of resources (e.g. deployed, available, en-route, unserviceable).		
	6	Prepare and maintain the incident organisation chart (supply to ERR Coordinator for display in ERR).		
	7	Monitor rosters for all response personnel (from Section Chiefs).		
Response Termination	**8**	Inform all Unit staff of response termination.		
	9	Attend Planning Section debrief.		
	10	Ensure that all records are collated and given to the Planning Section Chief.		

OSRT		CONSULTATION AND LIAISON COORDINATOR		ONSHORE
The Consultation and Liaison Coordinator is responsible for community and commercial consultation.				
Response Phase		**Action**		**Status/Time**
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to nominated location.	
		b	Report to Planning Section Chief and upon arrival confirm assigned tasks.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Identify community and commercial groups that may be affected by the incident.		
	5	Develop and implement consultation campaigns specific to the affected community or commercial group.		
	6	Input information developed within the consultation process into response planning.		
Response Termination	**7**	Inform all Unit staff of response termination.		
	8	Attend Planning Section debrief.		
	9	Ensure that all records are collated and given to the Planning Section Chief.		

OSRT	ENVIRONMENT COORDINATOR	ONSHORE

The Environment Coordinator is responsible for the collection and collation of environment data/advice from OSRA maps, AMSA and local sources.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to Planning Section Chief and upon arrival confirm assigned tasks with the Planning Section Chief.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Collect and collate environment and socioeconomic resource information using OSRA and OSMP output.		
	5	Rank environmental resources for protection and cleanup with reference to NEBA App G.		
	6	Provide advice on the environmental implications of proposed response and cleanup measures.		
	7	Provide advice on temporary and permanent waste management.		
	8	Provide advice on post spill monitoring and resource rehabilitation.		
	9	Coordinate advice from on site environmental specialists including OSMP providers.		
Response Termination	**10**	Inform all Unit staff of response termination.		
	11	Attend Planning Section debrief.		
	12	Ensure that all records are collated and given to the Planning Section Chief.		

OSRT	SITUATION COORDINATOR	ONSHORE

The Situation Coordinator is responsible for monitoring the progress of the response and keeping the IC informed (via the Planning Section Chief).

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to Planning Section Chief and upon arrival confirm assigned tasks to the Planning Section Chief.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Obtain, interpret and supply data to the ERR Manager for update of Status Boards:		
	5	Commission the OSTM and monitor output.		
	6	Obtain pollution fate and behaviour predictions (ADIOS Model).		
	7	Provide mapping and photographic services.		
	8	Issue SITREP.		
Termination	**9**	Inform all Unit staff of response termination.		
	10	Attend Planning Section debrief.		
	11	Ensure that all records are collated and given to the Planning Section Chief.		

OSRT	LOGISTICS SECTION CHIEF	ONSHORE

The Logistics Section Chief is responsible for activating and managing the Logistics Section of the OSRT. The Logistics Section is responsible for ensuring that the OSRT is provided with adequate resources to enable an effective response. This encompasses facilities, services, equipment and materials. The Logistics Section Chief participates in the development and implementation of the Incident Action Plan.

Response Phase		Action	Status/Time
Mobilisation	**1**	On mobilisation by the IC:	
		a Proceed to nominated location.	
		b Report to IC on arrival and confirm assigned tasks.	
	2	Start Personal Log.	
	3	Attend Initial Briefing.	
Assessment	**4**	In consultation with the IC determine level of response/staffing needs.	
Establishing Section	**5**	Call in required staff.	
	6	Allocate work locations and Tasks to Section personnel.	
	7	Notify the Planning Section of the names/locations of personnel.	
	8	Brief Section personnel.	
Planning	**9**	Attend initial planning meeting with IC and other Section Chiefs.	
	10	Identify service and support requirements for planned operations.	
	11	Develop a Communications Sub-Plan.	
	12	Develop Logistics Sub-Plan to cover any Logistics Strategies identified in the Incident Action Plan and submit to the Planning Section Chief.	
Ongoing Response	**13**	Coordinate and process requests for resources.	
	14	Prepare and record all procurement documents and service contracts.	
	15	Liaise with Finance and Administration Section Chief.	
	16	Establish staging areas, transport, and equipment storage facilities as required.	
	17	Keep the Planning Section Chief apprised of service and support capabilities.	
	18	Liaise with the Planning Section Chief to calculate future service and support requirements.	
	19	Ensure safety and welfare of all Section personnel.	
	20	Maintain a Log of all Section activities.	
	21	Coordinate and monitor performance of Logistics Section.	
Response Termination	**22**	Inform all Logistics Section Unit Coordinators of termination.	
	23	Debrief Logistics Unit Coordinators.	
	24	Attend IC debrief.	
	25	Ensure that all equipment is returned to Logistics Section.	

OSRT		LOGISTICS SECTION CHIEF	ONSHORE
	26	Ensure that equipment is cleaned, repaired, returned to owner/supplier.	
	27	Compile final list of consumed, lost or damaged equipment.	
	28	Ensure that all records are given to Finance and Administration Section Chief.	

OSRT	TRANSPORT COORDINATOR	ONSHORE

The Transport Coordinator is responsible for the location, acquisition and scheduling of aviation, land and sea transport services for the OSRT. The Transport Coordinator may need to develop a Transportation Sub-Plan.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to and on arrival confirm assigned tasks with Logistics Section Chief.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Arrange for supply of transport to meet operational requirements.		
	5	Arrange for the supply of fuel.		
	6	Arrange for the maintenance of all forms of transport.		
Response Termination	**7**	Inform all Unit members of termination.		
	8	Attend Logistics Section debrief if required.		
	9	Ensure that all equipment is returned.		
	10	Compile final list of consumed, lost or damaged equipment.		
	11	Ensure that all records are given to Logistics Section Chief.		

OSRT	SERVICES COORDINATOR	ONSHORE

The Services Coordinator is responsible for the location and acquisition of services for the response. As such, the Services Coordinator will locate predominantly private sector contractors such as catering, accommodation and other personnel support needs.

Response Phase		Action	Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:	
		a Proceed to SGHE ERR or other nominated location.	
		b Reports to Logistics Section Chief and on arrival confirm assigned tasks.	
	2	Start Personal Log.	
	3	Attend Initial Briefing.	
Response	**4**	Provide shelters and amenities for response personnel.	
	5	Provide accommodation for all response personnel.	
	6	Provide catering services.	
	7	Provide decontamination facilities for personnel and equipment.	
	8	Provide security for all areas of the response.	
Response Termination	**9**	Inform all Unit members of termination.	
	10	Attend Logistics Section debrief if required.	
	11	Ensure that all equipment is returned.	
	12	Compile final list of consumed, lost or damaged equipment.	
	13	Ensure that all records are given to Logistics Section Chief.	

OSRT	COMMUNICATIONS COORDINATOR	ONSHORE

The Communications Coordinator is responsible for the preparation of Communications Sub-Plan and for ensuring the provision of communications services and support.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to Logistics Section Chief and on arrival confirm assigned tasks.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Develop and maintain a Communications Sub-Plan.		
	5	Acquire and distribute appropriate communications equipment to meet operational requirements.		
	6	Ensure appropriate communications and support facilities as required to meet operational requirements.		
	7	Provide technical support for all response communications.		
Response Termination	**8**	Attend Logistics Section debrief if required.		
	9	Ensure that all equipment is returned.		
	10	Compile final list of consumed, lost or damaged equipment.		
	11	Ensure that all records are given to Logistics Section Chief.		

OSRT	SUPPLY AND PROCUREMENT COORDINATOR	ONSHORE

The Supply and Procurement Coordinator is responsible for the location and acquisition of personnel (labour) and equipment for the response. As such, the Supply and Procurement Coordinator will liaise with AMSA EPR, AMOSC and State Government agencies with regard to resources.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or nominated location.	
		b	Report to Logistics Officer and upon arrival confirm assigned tasks.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Procure personnel and equipment as directed.		
	5	Provide adequate storage for equipment.		
	6	Delivery of resources.		
Response Termination	**7**	Inform all Unit members of termination.		
	8	Attend Logistics Section debrief if required.		
	9	Ensure that all equipment is returned.		
	10	Compile final list of consumed, lost or damaged equipment.		
	11	Ensure that all records are given to Logistics Section Chief.		

OSRT	STAGING AREA COORDINATOR	ONSHORE

Staging Area Coordinator is responsible for the running of Staging Areas. These are generally field facilities that undertake specific functions such as equipment maintenance, storage and deployment.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Arrange travel to site and accommodation near site and inform IC of details.	
		b	Proceed to nominated location.	
		c	Report to Logistics Section Chief	
		d	Report arrival and assigned tasks.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Provide check in/out procedures and records for personnel.		
	5	Provide check in/out procedures and records for equipment.		
	6	Refurbish equipment for return or redeployment.		
Response Termination	**7**	Attend Logistics Section debrief if required.		
	8	Ensure that all equipment is returned.		
	9	Compile final list of consumed, lost or damaged equipment.		
	10	Ensure that all records are given to Logistics Section Chief.		

OSRT	FINANCE AND ADMINISTRATION SECTION CHIEF	ONSHORE
The Finance and Administration Section Chief is responsible for managing the Finance and Administration Section. The Finance and Administration Section is responsible for the provision of administrative services to the IC and for the management of financial (costs) information.		

Response Phase		Action	Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:	
		a Proceed to SGHE ERR or other nominated location.	
		b Report to IC and on arrival confirm assigned tasks with the IC.	
	2	Start Personal Log.	
	3	Attend Initial Briefing.	
Assessment	**4**	In consultation with IC determine response level and staffing needs.	
Establishing Section	**5**	Call in required staff.	
	6	Allocate work locations and Tasks to Section personnel.	
	7	Notify the Planning Section of names/locations of Section personnel.	
	8	Brief Section personnel.	
Planning	**9**	Attend initial planning meeting with IC and other Section Chiefs.	
	10	Identify service and support requirements for planned operations.	
	11	Develop Finance and Administration Sub-Plan.	
	12	Ensure that the IC and Section Chiefs are aware of the administrative arrangements in place.	
Ongoing Response	**13**	Log all procurements and, where appropriate, commence payment/cost recovery procedures.	
	14	Overview legal requirements and take action/advice IC as appropriate.	
	15	Review Incident Action Plan on a regular basis and estimate future Section needs.	
	16	Record and process all damage claims.	
	17	Record and process all workers compensation claims.	
	18	Ensure safety and welfare of all Section personnel.	
	19	Maintain a Log of all Section activities for Administrative Support Report.	
	20	Continually monitor expenditure and estimate costs and report these to the Planning Section Chief.	
	21	Coordinate and monitor performance of Operations Section Units.	
Response Termination	**22**	Inform all Finance and Administrations Section Unit Coordinators of response termination.	
	23	Debrief Finance and Administration Unit Coordinators.	
	24	Attend IC debrief.	
Post Spill	**25**	Assist IC/OFM in documentation and compilation of insurance claims and other cost recovery.	

OSRT	FINANCE COORDINATOR	ONSHORE

The Finance Coordinator provides accounting and contracting services. The Finance Coordinator is responsible for ensuring that all expenditure is documented and collated and that a running account is available to the Finance and Administration Section Chief and the IC.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to Finance and Administration Section Chief and upon arrival confirm assigned tasks.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Administer contracting services.		
	5	Pay all accounts and costs associated with the incident.		
	6	Collate expenditure records for cost recovery.		
Response Termination	**7**	Inform Unit members of response termination.		
	8	Attend Finance and Administration Section debrief if required.		
	9	Collate records and give to Finance and Administration Section Chief.		

OSRT	RECORDS / LOGKEEPER COORDINATOR	ONSHORE

The Records / Logkeeper Coordinator is responsible for the collation and filing of records and forms including time sheets, equipment use and personnel records.

Response Phase		Action		Status/Time
Mobilisation	**1**	Upon mobilisation by the IC:		
		a	Proceed to SGHE ERR or other nominated location.	
		b	Report to Finance and Administration Section Chief and upon arrival confirm assigned tasks.	
	2	Start Personal Log.		
	3	Attend Initial Briefing.		
Response	**4**	Collate response personnel time sheets.		
	5	Collate equipment usage records.		
	6	Collate personal log sheets and records of response personnel.		
	7	Implement a records management system for the response.		
Response Termination	**8**	Inform Unit members of response termination.		
	9	Attend Finance and Administration Section debrief if required.		
	10	Collate records and give to Finance and Administration Section Chief.		

Appendix B - Contact Directory

The Contacts Directory is located in the SGHE Crisis Management Plan CORP-HSE-045 and includes contact details for:

- SGHE CMT/ERG/OSRT Emergency Response Rooms
- OSV and its shore-based management (during intervention campaigns only)
- Regulators /Statutory Authorities (including NOPSEMA, AMSA, DJPR, DoT, Gippsland Ports) and Wildlife rescue (DELWP)
- AMOSC
- RPS APASA
- Other support services such as aviation service providers and vessel operators
- Waste Contractors

Project-specific contact details will be contained within project-specific bridging ERPs to be developed as required. These will include contact details for:

- DIMT members
- MODU and its shore-based management
- OSV and its shore-based management

Appendix C - Forms

Appendix 7 – POLREP Format

Marine Pollution Report (POLREP)

NOTE: Incidents to be reported are outlined on page 3

Send completed form to: **AMSA Environment Protection**
Fax: **(02) 6230 6868** Email: **rccaus@amsa.gov.au**

Date of incident

C.C.

Time of incident

Location name / Description

Incident coordinates

Format of coordinates used (select one)	Latitude of spill	Longitude of spill
Degrees & decimal degrees	. º	. º
Degrees, minutes & decimal minutes	º ‘ . ‘	º ‘ . ‘
Degrees, minutes & seconds	º ‘ . “	º ‘ . “

Description of incident

POLLUTION SOURCE

☐ Vessel ☐ Land ☐ Other ☐ Unknown → Details

Vessel Details: Type (if known): ☐ Tanker ☐ Container ☐ Bulk Cargo ☐ Fishing ☐ Defence ☐ Recreational

☐ Other vessel type (specify): .....

Vessel name | Flag state / callsign | Australian vessel? ☐ Yes ☐ No

POLLUTANT

☐ **Oil** → ☐ Bilge ☐ Diesel bunker ☐ HFO Bunker ☐ Crude ☐ Unknown
☐ Other — Specify

☐ **Chemical** → Name | MARPOL Cat. / UN Nos

☐ **Garbage** →
☐ **Packaged** →
☐ **Sewage** →
☐ **Other** →
Details / description

EXTENT

Size of spill (length & width in metres)

Amount of pollutant, if known (litres)

ADDITIONAL INFORMATION

Has the discharged stopped? ☐ Yes ☐ No ☐ Unknown
Response action undertaken? ☐ Yes ☐ No If yes, provide details below, please include any environmental impact

Weather conditions at site

☐ Photos taken ▶	Details	Held by
☐ Video taken ▶	Details	Held by
☐ Samples taken ▶	Description	Held by
☐ Items retrieved ▶	Description	Held by

Original report source

Name	Position	Phone

Combat agency

Statutory agency

Equipment used
☐ AMSA ☐ State / NT

Possible further action
☐ Legal ☐ AMSA assistance ☐ Other

SENDER DETAILS

Name	Agency	Date
Phone	Fax	Email

PRIVACY STATEMENT

The Australian Maritime Safety Authority (AMSA) is collecting the information on this form to enable it to carry out its role as managing agency of the National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances.

AMSA may give some or all of this information to other government bodies, non-government organisations who have responsibilities under the National Plan, and law enforcement agencies.

SUMMARY OF INCIDENTS TO BE REPORTED

All slicks, including deck washings, that can be seen trailing a vessel should be reported. The type of substance contained in the slick may not be able to be determined until further investigation has been undertaken by enforcement agencies.

REPORTABLE	NON-REPORTABLE
Oil - All slicks trailing from a vessel. All spills in the marine environment (notwithstanding the size or amount of oil or sheen). All spills where National Plan equipment is used in a response. *Note: If oil or sheen is "visible" then it is an illegal discharge MARPOL permitted oily discharges are at 15 parts of oil to one million parts of water (15ppm). Oil discharges at sea cannot be visually observed until at least 50ppm and even that may not be readily discernable depending upon the observation platform, sea state, weather conditions etc.*	• Coral spawning. • Algal bloom. • Oil spills specifically known to be from land sources (eg drains, road tanker accidents) and where there is no response using National Plan equipment or resources used. • Exploration/production associated discharges where there is no response and National Plan equipment or resources used. (these are reportable to the relevant authority eg: Mines Department or Department of Science Industry and Resources).
Chemicals – All sightings of slicks/discolourations trailing vessels. All odorous discharges from a vessel.	
Harmful Packaged Substances - All packages associated with a vessel.	
Sewage – All slicks seen trailing from a vessel.	
Garbage – All sightings of garbage being disposed from a vessel. Any type of garbage found that can be specifically tied to a specific vessel such as garbage with printing showing a vessel name (eg Quarantine bonded plastic bags with identifier tag).	• Dumping at sea that requires a permit (EPA or EA) • Dumped dredge spoil. • Floating logs.

Marine Pollution Situation Report (SITREP)

Incident name / Description

Date | Time | Sitrep No

Priority ☐ Urgent ☐ Immediate

Final Sitrep? ☐ Yes ☐ No Next Sitrep on: .....

Description of incident and impact

Overall weather conditions

Summary of response actions to date

Current Strategies

Summary of Resources available/ deployed

Other information

SITREP prepared by

Name	Agency	Role
Phone	Fax	Email

Attachments | No of pages attached

SBoard 1 - Incident Details (POLREP Information)

Date and Time of Report	
Date and Time of Incident	
Location of Incident	
Spill Source	
Status of Discharge	
Oil Type or Discription	
Rate and Direction of Movement	
Incident Controller	
Statutory Agency	
Combat Agency	
Additional Relevant Information	

Present Weather Conditions

Wind Speed		Humidity	
Wind Direction (From)		Visibility	
Current Speed		Water Temerature	
Current Direction (To)		Ambient Temperature	
High Tide		Sunrise	
Low Tide		Sunset	

SBoard 2 - Initial Assessment

7 Questions of Spill Assessment

What is it?	Oil Type Oil Name Oil Properties Specific Gravity/Viscosity/Pour Point/Ashphaltines/Wax Content/Boiling Point @ 200C
Where is it?	Lat/Long Distance and Bearing
How big is it?	Area Volume Colour Appearance
Where is it going?	Weather Conditions Currents and Tides
What is in the way?	Resources at Risk
When will it get there?	Weather Conditions
What's happening to it?	Weathering Processes

Worst Case Scenarios	'What If?'	'So What?'

Commonwealth Government Agencies:

Organisation Name	Time Notified	Person Notified	Status/Follow Up	Notified By

State Government Agencies:

Organisation Name	Time Notified	Person Notified	Status/Follow Up	vNotified By

Local Stakeholders:

Organisation Name	Time Notified	Person Notified	Status/Follow Up	Notified By

Industry Agencies

Organisation Name	Time Notified	Person Notified	Status/Follow Up	Notified By

Other Agencies

Organisation Name	Time Notified	Person Notified	Status/Follow Up	Notified By

Date/Time	Action	Completed / Notes

SBoard 5 - Resources at Risk / Protection Priorities and Strategy Selection

Sentitivity	Description	Location	Priority Number
Ecological? Economical? Sociological?			

Strategy Selection

Response Strategy	Strategy Viable?	Strategy Selected?	Strategy Implementation
Monitor and Evaluate			
Chemical Dispersion			
Protection			
Containment and Recovery			
Shoreline Cleanup			
In Situ Burning			

REMEMBER TO CHECK OBJECTIVES ARE S.M.A.R.T

Specific Measurable Achievable Relevant Timeframed

Response Priorities (P.E.A.R)
People
Environment
Assets
Reputation

Response Aim:

Response Objective 1:

Response Objective 2:

Response Objective 3:

Response Objective 4:

Response Objective 5:

Response Objective 6:

S.M.E.A.C.S BRIEFING

Situation

Current Situation
Details of Incident
Life and property at risk
Location
Weather
Resource Deployment

Missions

What are we trying to achieve?
Incident Objectives

Execution

How are we going to achieve these objectives?
Sectorisation
Strategies
Tasks
Resources
Timings

Administration

Logistics
Timing
Reporting

Command & Communications

Incident Management Structure
Communications Plan
Radio Channels
Key Contacts

Safety

Weather
Hazards
Watchout scenarios
Dress code (PPE)
Tasking
Questions

Status Board Guidance Tool

- This is a guide to the first hour of any oil spill response
- This document should be used in conjuction with a planning process (Planning 'P')

STATUS BOARD 1

SITUATION
- Incident
- Weather

OPERATIONS

STATUS BOARD 2

INITIAL ASSESSMENT
- 7 Questions
- Worst Case Scenario
- 'So What' & 'What If' Questions

PLANNING

STATUS BOARD 3

NOTIFICATIONS + CONTACTS
- Government
- OSRO's
- Internal
- Stakeholders

ADMINISRATION

STATUS BOARD 4

INITIAL ACTIONS
- Safety
- Containment
- Complete Actions

OPERATIONS

STATUS BOARD 9

MAP
- Planning Maps & Status Maps
- Sectorised
- Spill location
- Spill direction

ALL

STATUS BOARD 5

RESOURCES AT RISK
- Ecological
- Economical
- Sociological

NEBA

PRIORITIES FOR PROTECTION
- Response Strategy Selection

PLANNING

STATUS BOARD 6

INCIDENT ACTION PLAN
- Aim
- Objectives

PLANNING

STATUS BOARD 7

TASKS
- SMEACS briefing
- Location
- Who
- Reporting

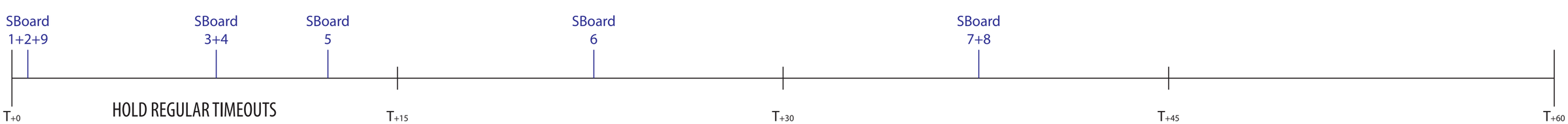
OPERATIONS

STATUS BOARD 8

RESOURCES
- Equipment (Costs)
- Personnel

LOGISTICS

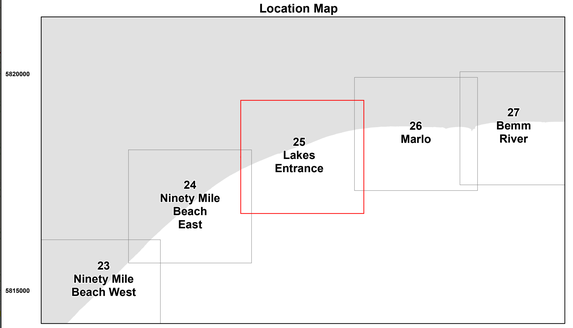
Possible SBoard Start Times



Appendix D - Environmental resource info - OSRA Maps

25 Lakes Entrance
Coastal Habitat and Assets Map

Location Map



Legend

- Helipads
- Airports and Airfields
- Potential ICC Locations
- Marine Pollution Equipment Storage
- Fire Station
- Surf Life Saving Club
- Police Station
- Estuarine Fish Habitats
- Dolphin Habitat
- Hooded Plover Habitat
- Shorebird Roosting Sites
- Tern Sites
- River Entrance - Continuously Open
- River Entrance - Intermittently Open
- Boat Mooring
- Boat Launch
- Boat Ramp
- Boat Slipway
- Breakwater
- Pier, Jetty, Wharf
- BOM Observation Station
- Coastal Bird Habitat
- Victoria - 3nm Boundary
- Oil/Gas Pipeline

Geological Sites
- Regional, State, Unknown Significance

- Highway
- Other Roads
- Tracks
- Walking Path
- Watercourse

Shoreline Type
- Mixed Sand Beach/Shore Platform
- Sand Beach
- Saltmarsh
- Water Body
- Swamp
- Tree Cover
- Parks and Reserves
- Offshore Gas Field
- Offshore Oil Field

Substrate Type
- Reef/Sediment
- Reef

Hydrographic Charts for this area include:
East Point to Point Hicks (Image: A0000357.tif)

Note: Symbols on the map for biological resources (bird and mammal species) are indicative of the resource being in the general vicinity only

Map not suitable for navigation purposes

0 2.5 5 10 Kilometers

0 1.25 2.5 5 Nautical Miles

Conversions:
1 nm = 1.852 km
1 km = 0.540 nm

EMV EMERGENCY MANAGEMENT VICTORIA

GDA

COORDINATES SYSTEM
Map Grid of Australia
GDA 1994 MGA Zone 55
Projection: Transverse Mercator (UTM)
Datum: GDA 1994 (AHD)

Scale 1:50,000

N

VICTORIA State Government

1 Spring Street, Melbourne | ph 03 8392 6505
marine.pollution@ecodev.vic.gov.au

Template updated August 2016 | Exported to PDF February 2017

Appendix E – Example Response Strategy NEBA

This NEBA should be reviewed and adjusted for the specific circumstances of the release.

There are four sections;

1. Offshore condensate response strategies
2. Onshore condensate response strategies. This primarily deals with shoreline loads and the strategies are unlikely to have any significant impact on the impact from dissolved or entrained hydrocarbons. Modelling indicates that it will be 6 days (plus) for any shoreline loading to be seen and based on the Longtom condensate and its weathering characteristics this is expected to take the form of relatively benign waxy flakes.
3. Offshore diesel response strategies
4. Onshore diesel response strategies. Note that based on the modelling there will be no visible oil in state waters and no shoreline loading from a diesel spill. Dissolved diesel levels above water quality guidelines are predicted to be confined to commonwealth waters and only low levels of entrained hydrocarbons may be experienced.

							Offshore response strategies for a CONDENSATE spill emanating from Longtom-5							Performance Measures		Monitoring and surveillance options		
Reference	**Offshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of condensate[3] on sensitive resource / beneficial use**	**Protection Priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Exclusion zone**	**Hazing to deter wildlife**	**Monitoring and natural dispersion**	**Physical / mechanical agitation**	**Containment and recovery**	**Chemical treatment, e.g. Dispersant application (Corexit 9527[5])**	**In situ burning**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring and surveillance**	**Termination criteria[6]**
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Nintely Mile Beach, Bass Strait Islands, Hogan Group of Islands. ERIN[11] map of Beagle Commonwealth Marine Reserve	1. Open marine environment	<u>Sea surface oiling</u>: Stochastic modelling shows a small possibility of discontinuous and sparse moderate oiling (10 µm thickness) typically confined to within 50 km of the well location. Modelled zones of light (1µm thickness) or very light oiling (0.1µm thickness) include Beagle Commonwealth Marine Reserve, Kent Island Group Marine National Park, Cape Howe Marine National Park, Gabo Island Harbour Special Management Area, The Skerries Special Management Area, Point Hicks Marine National Park, Beware Reef Marine Sanctuary, Ninety Mile Beach Marine National Park (near Seaspray).	Pelagic ecosystem. Marine species including marine mammals (cetaceans, seals), marine reptiles (turtles), fish, plankton, seabirds (including penguins) etc., some of which are protected under the EPBC Act 1999 (Cth) or FFG Act 1989 (Vic). Ecosystem protection - Largely unmodified ecosystem. Primary contact recreation. Secondary contact recreation. Aquaculture. Fish, crustacean and molluscs for human consumption. Commercial - Offshore oil industry platforms, vessels.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling of seabirds and mammals - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae and other marine organisms.[3, 12] Interference with primary and secondary contact recreation activities such as swimming, kayaking, recreational snorkeling / diving, sailing, fishing. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Contamination of seawater intakes for cooling water systems. Oiling of vessels.	1. Human health and safety 2. Habitat and cultural resources 3. Rare and/or endangered flora and fauna. 4. Commercial resources 5. Amenity **Medium**	Consider whale migration patterns - Southern Right and Humpback whales pass through the area during winter and spring. Australian fur seals are mating and pupping in summer.	Establish an Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Viable Deploy vessels / aircraft to deter wildlife from EMBA (only on specialist ecological advice). Constraints Areas where surface oil layers are >10 µm thick (level at which wildlife impacts are predicted) are sparse and sporadic. Strengths Can reduce wildlife exposure to condensate / residues. Weakness Distress caused to wildlife.	**PREFERED RESPONSE STRATEGY** **Strengths** Avoids the release of additional chemicals to the environment for little benefit. No risk to personnel. **Weakness** Perception of lack of response.	**Not recommended.** **Constraints** Volatility of condensate presents unsafe conditions[3]. Sea state and rapid speadability of condensate. **Strengths** Increases evaporation of condensate and dilution in the water column. Reduces likelihood of condensate residue contact on shoreline. **Weakness** Hazardous activity. Toxic components become entrained in water column and increases exposure of fish to toxicants.	**Not recommended.** **Constraints** Volatility of condensate presents unsafe conditions. Sea state and rapid speadability of condensate[3]. **Strengths** Removes hydrocarbon from the environment. **Weakness** Hazardous activity. Labour intensive and towing large booms between vessels in open ocean presents its own safety risks.	**Not recommended for condensate.** **Constraints** Limited time window for use. **Strengths** Quick to activate and can be used in high seas. Increases the surface area to volume of hydrocarbon to enhance natural degradation. Reduces the impact of leaving the oil to recover naturally, particularly where physical containment and recovery is unlikely to effectively mitigate spill impacts. **Weakness** Potential to expose pelagic and benthic organisms to toxic components within the entrained mixture of hydrocarbons and dispersant. Condensate is quick to evaporate and / or degrade without intervention so does not warrant additional chemical application. May lead to an increase in dissolved / entrained hydrocarbons.	Offshore containment and burning **Not viable** as no specialist equipment available. Ignition of the blowout may be viable and could provide benefits **Stength** light hydrocarbons would burn - less greenhouse gas implications and may also burn off some of the condensate. **Weakness** - may be extinguished, safety and public perception implications	No visible hydrocarbon sheen. Natural phsical and biological degradation of spilt condensate.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Thickness of hydrocarbon on water surface and surface area of sheen as noted in visual surveillance records.	Aerial / Vessel visual surveillance.	No visible hydrocarbon sheen.
		<u>Dissolved hydrocarbons</u>: Low exposure zones [3] to 5m below water surface were predicted in a south easterly direction, a south westerly direction towards islands south west of Longtom-5, including Hogan Island, Kent Island Group, as well as in a north easterly direction towards Lakes Entrance and Mallacoota. Predicted zones of moderate impact were restricted to regions along the Victorian mainland coastline, including; Lakes Entrance, Marlo, Cape Conran, Sydenham Inlet and Mallacoota. No potential zones of major impact were predicted.	Pelagic ecosystem. Marine species including marine mammals (cetaceans, seals), marine reptiles (turtles), fish, plankton, seabirds (including penguins) etc., some of which are protected under the EPBC Act 1999 (Cth) or FFG Act 1989 (Vic). Ecosystem protection - Largely unmodified ecosystem. Secondary contact recreation. Aquaculture. Fish, crustacean and molluscs for human consumption.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Ingestion by seabirds and marine mammals, during feeding or preening, leading to poisoning - Pathological effects to fish larvae and other marine organisms.[3, 12] - Loss of planktonic primary producers and food source for other marine organisms. Interference with primary and secondary contact recreation activities such as swimming, kayaking, recreational snorkeling / diving, sailing, fishing. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption.	1. Human health and safety 2. Habitat and cultural resources 3. Rare and/or endangered flora and fauna. **Medium**	As above	Not applicable	Not applicable.	**PREFERED RESPONSE STRATEGY** **Strengths** Exposure and impact risks of dissolved aromatics are low. **Weakness** Perception of lack of response.	Not applicable.	Not appplicable.	**Not recommended for condensate.** **Constraints** Limited time window for use. **Strengths** Increases the surface area to volume of hydrocarbon to enhance natural degradation. Reduces the impact of leaving the oil to recover naturally. **Weakness** Subsea application of chemical not warranted. Potential to increase exposure of pelagic and benthic organisms to toxic components within the entrained mixture of hydrocarbons and dispersant.	As above	Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines Table 8.3.24. Water Quality Monitoring Program (in prep.).	Records of water quality sampling and analysis for TPH concentration entrained in water column.	Sampling and analysis of surrogate TPH concentration in the water column within the EMBA and at nominated control sites as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance, Ninety Mile Beach, Bass Strait Islands. ERIN[11] map of Beagle Commonwealth Marine Reserve.	2. Seabed	From inshore state waters seaward. Includes Beagle Commonwealth Marine Reserve, Kent Island Group Marine National Park, Cape Howe Marine National Park, Gabo Island Harbour Special Management Area, The Skerries Special Management Area, Point Hicks Marine National Park, Beware Reef Marine Sanctuary, Ninety Mile Beach Marine National Park	Benthic communities. Bottlom-dwelling fish, crustacean and molluscs for human consumption.	As the modelled dissolved aromatics to 5m depths were so low, potential seabed impacts beyond inshore areas are likely to be minimal. Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Pathological effects to fish larvae and other marine organisms.[3, 12] - Loss of planktonic primary producers and food source for other marine organisms. - Contamination of benthic communities. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption.	1. Human health and safety 2. Habitat and cultural resources **Low**	Not applicable.	Not applicable.	Not applicable.	As above	As above	As above	As above	As above	Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels for TPH of 7 µg/L. (ANZECC Water Quality Guidelines)[3].	ANZECC Water Quality Guidelines Table 8.3.24. Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH3 (7 µg/L).	Sampling and analysis of surrogate TPH concentration in the water column within the EMBA and at nominated control sites as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).

							Offshore response strategies for a CONDENSATE spill emanating from Longtom-5							Performance Measures		Monitoring and surveillance options		
Reference	**Offshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of condensate[3] on sensitive resource / beneficial use**	**Protection Priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Exclusion zone**	**Hazing to deter wildlife**	**Monitoring and natural dispersion**	**Physical / mechanical agitation**	**Containment and recovery**	**Chemical treatment, e.g. Dispersant application (Corexit 9527[5])**	**In situ burning**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring and surveillance**	**Termination criteria[6]**
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach. ERIN[11] map of Beagle Commonwealth Marine Reserve.	3. Subtidal rocky reefs	Beagle Commonwealth Marine Reserve, Kent Island Group Marine National Park, Cape Howe, Conference Point. Cape Howe Marine National Park, Gabo Island Harbour Special Management Area, Bastion Point, Quarry Beach, Little Rame Head, Long Reef, Wingan Point, The Skerries Special Management Area, Rame Head, Petrel Point, Thurra River, Point Hicks Marine National Park, Pearl Point, Yeerung River Estuary (Intermittently open), Cape Conran (East Cape, Cowrie Bay, Flat Rocks), Beware Reef, Point Ricardo, Ricardo Beach.	Fish habitat, seabird feeding sites. Ecosystem protection - Largely unmodified ecosystem. Primary contact recreation. Secondary contact recreation. Aesthetic enjoyment.	Condensate residues and dissolved aromatics causing changes to biochemical composition of water column e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Ingestion by seabirds and marine mammals during feeding or preening, leading to poisoning - Pathological effects to fish larvae and other marine organisms.[12] - Loss of planktonic primary producers and food source for other marine organisms. - Impact reduced if reef remains submerged and surface oil floats over it, though dissolved aromatics may still have chronic effects. Interference with primary and secondary contact recreation activities such as recreational snorkeling / diving, sailing, fishing and aesthetic enjoyment.	1. Human health and safety 2. Habitat and cultural resources 3. Rare and/or endangered flora and fauna 5. Amenity **High**	Consider marine mammal, seabird and shorebird migratory patterns.	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	**PREFERED RESPONSE STRATEGY** **Strengths** Avoids dispersing hydrocarbon into the water column in the proximity of the reef. **Weakness** Perception of lack of response.	As above. **Weakness** Vessel activity could physically impact reef structure.	As above. **Weakness** Vessel activity could physically impact reef structure.	**Not recommended** in shallow water over reef. **Weakness** Exposes pelagic, benthic and reef dwelling organisms to toxic components of entrained hydrocarbons and dispersant. Reduces effectiveness of inshore absorbant techniques.	As above	Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines Table 8.3.24. Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH3 (7 µg/L).	Sampling and analysis of surrogate TPH concentration in the water column within the EMBA and at nominated control sites as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for condensate[3] i.e. 0.005 mg/L.
														No visible hydrocarbon sheen.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Thickness of hydrocarbon on water surface and surface area of sheen as noted in visual surveillance records.	Aerial / Vessel visual surveillance.	No visible hydrocarbon sheen.
														Assessment of impacts to flora and fauna populations of subtidal rocky reefs attributable to spill.	Stage 1: TPH 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between flora and fauna populations of subtidal rocky reefs from post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded)	Quadrat surveys in EMBA.	Flora and fauna populations of subtidal rocky reefs reefs within pre-spill range of natural variability.
Longtom EP	4. Shipwrecks.	Shipwrecks: Beware Reef Marine Sanctuary: - SS Ridge Park, - SS Auckland, - Albert San. Point Hicks Marine National Park: - SS Kerangie, - SS Saros. Seaspray - P.S. Paynesville, - Trinculo, - Unidentified wreck 7542 located 22 miles southeast of Seaspray.	Artificial reef - marine habitat. Non-indigenous cultural heritage values.	Condensate residues and dissolved aromatics causing changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community living off the artifical reefs including: - Ingestion by seabirds and marine mammals during feeding or preening, leading to poisoning - Loss of planktonic primary producers and food source for other marine organisms. - Pathological effects to fish larvae and other marine organisms.[12] Interference with primary and secondary contact recreation activities such as diving, sailing, fishing. Disturbance to shipwrecks during monitoring or surveillance activities. No anticipated impacts to shipwreck cultural heritage values.	2. Habitat and cultural resources. **High**	As per "Subtidal reefs"	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Subtidal reefs"	As per "Subtidal reefs"	As per "Subtidal reefs"	As per "Subtidal reefs"	As above	No physical disturbance of shipwrecks.	Heritage Act 1995 (Vic).	Consultation with Heritage Victoria to confirm location of shipwrecks. Strict avoidance of shipwrecks by spill response vessel activity.	Daily review of spill response vessel activity plans and records.	Cessation of spill response vessel activity.
														No visible hydrocarbon sheen in proximity of shipwrecks.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Visual surveillance of hydrocarbon sheen in location of known shipwrecks.	Review of Aerial / Vessel visual surveillance records against location of known shipwrecks.	No visible hydrocarbon sheen in proximity of shipwrecks.
														Assessment of impacts to flora and fauna populations of artificial reefs attributable to spill.	Stage 1: TPH in water in proximity to the reef < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between flora and fauna populations of artificial reefs from post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded)	Quadrat surveys in EMBA .	Flora and fauna populations of artificial reefs reefs within pre-spill range of natural variability.
Longtom EP	5. Fisheries: Southern shark	Out to continental shelf, depth to 2,000 m.	Fish for human consumption. Industrial and commercial use.	Condensate residues and dissolved aromatics causing changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Pathological effects to shark larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	As per "Open Marine Environment"	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As above	No hydrocarbons attributable to spill detected in fish.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in fish from impact areas to acceptable global concentrations[15]	Concentration of hydrocarbons in fish (wet weight)[10] (only if stage 1 physical / chemical trigger values are exceeded).	Histopathological analysis of fish from impact sites[10].	No hydrocarbons in fish attributable to spill. Concentration of hydrocarbon in fish below acceptable global concentrations.
														Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines Table 8.3.24. Water Quality Monitoring Program (in prep.).	Records of water quality sampling and analysis for TPH concentration entrained in water column.	Sampling and analysis of condensate or surrogate TPH concentration in the water column within the EMBA and at nominated control sites as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).

							Offshore response strategies for a CONDENSATE spill emanating from Longtom-5							Performance Measures		Monitoring and surveillance options		
Reference	**Offshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of condensate[3] on sensitive resource / beneficial use**	**Protection Priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Exclusion zone**	**Hazing to deter wildlife**	**Monitoring and natural dispersion**	**Physical / mechanical agitation**	**Containment and recovery**	**Chemical treatment, e.g. Dispersant application (Corexit 9527[5])**	**In situ burning**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring and surveillance**	**Termination criteria[6]**
														No visible hydrocarbon sheen.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Thickness of hydrocarbon on water surface and surface area of sheen as noted in visual surveillance records.	Aerial / Vessel visual surveillance.	No visible hydrocarbon sheen.
Longtom EP	6. Fisheries: Southeast fishery	Out to continental shelf, depth to 200 m (generally).	Fish for human consumption. Industrial and commercial use.	Condensate residues and dissolved aromatics causing changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Pathological effects to fish larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	As per "Open Marine Environment"	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As above	As for "Southern shark".	As for "Southern shark".	As for "Southern shark".	As for "Southern shark".	As for "Southern shark".
Longtom EP	7. Fisheries: Southern scallop	Inshore, 20 to 50 m water depth.	Fish, crustacean and molluscs for human consumption. Industrial and commercial use.	Condensate residues and dissolved aromatics causing changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of benthic communities. - Pathological effects to scallop larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	Scallop spawning occurs early spring.	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As above	No hydrocarbons attributable to condensate spill detected in scallops.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in scallops from impact areas to nominated control sites[10].	Concentration of hydrocarbons in scallops (wet weight)[10] (only if stage 1 physical / chemical trigger values are exceeded).	Histopathological analysis of scallops from impact sites[10].	No hydrocarbons in scallops attributable to condensate spill.
														Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels for condensate as outlined in Table 8.3.24 of ANZECC Water Quality Guidelines[3].	ANZECC Water Quality Guidelines Table 8.3.24. Water Quality Monitoring Program (in prep.).	Records of water quality sampling and analysis for TPH concentration entrained in water column.	Sampling and analysis of TPH concentration in the water column within the EMBA as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
														No visible hydrocarbon sheen.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Thickness of hydrocarbon on water surface and surface area of sheen as noted in visual surveillance records.	Aerial / Vessel visual surveillance.	No visible hydrocarbon sheen.
Longtom EP	8. Fisheries: Southern rock lobster	Out to continental shelf, depth to 150 m, but mostly within State Waters.	Fish, crustacean and molluscs for human consumption. Industrial and commercial use.	Condensate residues and dissolved aromatics causing changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Contamination of benthic communities. - Pathological effects to lobster larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	Rock lobster spawning occurs around June to mid-November.	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As above	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".
Longtom EP OSRA map Point Hicks-Cape Howe.	9. Fisheries: Abalone	Gabo Island. Tullaberga Island. Out to 2 km, depth to 20 m along rocky coastlines and reefs.	Fish, crustacean and molluscs for human consumption. Industrial and commercial use.	Condensate residues and dissolved aromatics causing changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of benthic communities. - Pathological effects to abalone larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	No abalone ranching is known to occur in the EMBA.	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Intertidal Rocky Shores"	As per "Intertidal Rocky Shores"	As per "Intertidal Rocky Shores"	As per "Intertidal Rocky Shores"	As above	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".

1 EP Selection of response strategy will be determined by conditions at the time.
2 SEPP WoV (State Environment Protection Policy - Waters of Victoria)Table 1
Beneficial uses for Marine and Estuarine "Open Coasts" (Refer to SEPP WoV Schedule F3 for Gippsland Lakes)
Ecosystem protection - Largely unmodified ecosystem.
Primary contact recreation - e.g. swimming, beaches, kayaking, recreational snorkeling / diving.
Secondary contact recreation e.g. Sailing, fishing
Aesthetic enjoyment e.g. Walking tracks, campsites, boat ramps, dive sites.
Indigenous culture and spiritual values
Non-indigenous cultural and spiritual values

							Offshore response strategies for a CONDENSATE spill emanating from Longtom-5							Performance Measures		Monitoring and surveillance options		
Reference	Offshore resource type	Segment / Location	Environmental Sensitivities and Beneficial Uses[2]	Potential impact of condensate[3] on sensitive resource / beneficial use	Protection Priority (Low, Medium High)[4]	Temporal / seasonal implications	Exclusion zone	Hazing to deter wildlife	Monitoring and natural dispersion	Physical / mechanical agitation	Containment and recovery	Chemical treatment, e.g. Dispersant application (Corexit 9527[5])	In situ burning	Objectives	Standard	Measurement criteria / key indicators for monitoring	Means of monitoring and surveillance	Termination criteria[6]

Aquaculture
Industrial and commercial use e.g. Harbours and jetties, commercial fishing.
Fish, crustacean and molluscs for human consumption

3 Gas condensate toxicity range (LC_{50}) for marine organisms (Source: ANZECC Table 8.3.24):

Fish (n=3)	Not available
Crustaceans (n=8)	0.5-0.6 mg/L
Molluscs (n=1)	Not available
Annelids (n=6)	Not available
Algae (n=6)	10.6-11.5 mg/L

The low reliability trigger value for condensate can be calculated by applying an Assessment Factor (AF) of 100 to the lowest acute figure outlined above i.e. for crustaceans. Once the AF is applied, the trigger value for condensate is 0.005 milligrams per litre.
A low reliability trigger value for Total Petroleum Hydrocarbons (TPH) of 7 ug/L *ANZECC 2000)

Dissolved aromatic dosage used in the modelling and their potential level of impact to sensitive species (Source: APASA Table A).

Trigger value for dissolved aromatic concentrations for a continuous 96 hour exposure ppb (mg/L)	Equivalent dosage of dissolved aromatics (ppb.hrs)	Range of sensitive species potentially impacted from acute exposure	Reported zones
6 (0.006)	576	Sensitive species (99th percentile)	Low exposure
50 (0.05)	4,800	Average species(95th percentile)	Moderate exposure
400 (0.4)	38,400	Tolerant species(50th percentile)	High exposure

Estimates for the minimal thickness of oil that will result in harm to seabirds through ingestion from preening of contaminated feathers, or the loss of thermal protection of their feathers, has been estimated by different researchers at 10 µm (French 2000) to 25 µm (Kroops et al., 2004). Refer to APASA Report for references.

Longtom condensate contains 61.5% volatiles, 35.5% semi- to low volatiles and approximately 3% persistent hydrocarbons. Due to the low percentage of persistent hydrocarbons the Longtom-4 condensate is considered to be a non-persistent oil.

Condensate residues after one day weathering at sea are estimated to be about 3% by volume and would be a semi-solid sticky waxy residue with no acute mammalian toxicity (GESAMP Classification and Hazard Profile of Paraffin Wax (2010) Annex 7).

4 Decisions on protection priorities at specific geographic locations need to be based on OSTM and the specific conditions at the time.

5 Corexit 9527 is a water-dilutable concentrate with an LC_{50} range of >100-<1000 mg/L (Source: ANZECC Table 8.3.25)

This includes a "moderate reliability" marine trigger value of 1100ug/L with 95% species protection.

6 Once any operation has been shown to be ineffective, likely to cause unacceptable additional damage to environmental or economic resources, or if the costs far exceed any possible benefits, it should be stopped (Source: ITOPF Response Strategies).

7 ITOPF (2011/2012) Aerial Observation of Marine Spills, Technical Information Papers 1, 6 and 14

8 NOAA (2001) Technical Memorandum NOS OR&R 9 Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill, Seattle, Washington

9 ANZECC (2000) Water Quality Guidelines s. 8.3.5.3 Sampling, analysis and interpretation

10 Paasiverta, J., Herzschuh, R., Lahtipera, M., Pellinen, J. and Sinkkonen, S. (1981) Oil residues in Baltic sediment mussel and fish. Development of the analysis method. *Chemosphere.* 10. 919-928.

11 ERIN Environmental Resources Information Network http://www.environment.gov.au/coasts/mpa/southeast/beagle/pubs/southeast-beagle-map.pdf

12 Ecos Consulting (Aust) Pty Ltd (2001) National Oceans Office South East Regional Marine Plan – Impacts on the Natural System Chapter 4, Impacts of Petroleum

13 Volkman, J.K., Miller, G.J., Revill, A.T. And Connell, D.W., (1994) 'Oil Spills'. In Swan, J.M., Neff, J.M. and Young, P.C., (Eds.), Environmental implications of offshore oil and gas development in Australia – the findings of an independent scientific review, pp 509-695; Australian Petroleum Exploration Association, Sydney.

14 The Australian Whale Sanctuary includes all Commonwealth waters from the three nautical mile state waters limit out to the boundary of the Exclusive Economic Zone (i.e. out to 200 nautical miles and further in some places).

15 Government of British Columbia (1993) Ambient Water Quality Criteria for Polycyclic Aromatic Hydrocarbons (PAHs) accessed at http://www.env.gov.bc.ca/wat/wq/BCguidelines/pahs/pahs_over.html#toc on 9 June 2012 (in the absence of any Australian or international standard for hydrocarbon in fish.)

16 Protection booming of Lakes Entrance mouth not viable due to tidal flows of >4 knots. Priority for Lakes Entrance is to prevent or minimise oil entering Cunninghame Arm and North Arm.

References:

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) (the ANZECC Guidelines)
National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances (NatPlan)
State Environment Protection Policy (Waters of Victoria) (Victoria Government Gazette No. S 107 4 June 2003) (SEPP WoV)

							Onshore response strategies for a CONDENSATE spill emanating from Longtom-5											Performance Measures		Monitoring and surveillance		
Reference	**Inshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of condensate[3] on sensitive resource / beneficial use**	**Protection priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Deflection**	**Monitoring and natural dispersion**	**Manual cleanup**	**Absorbent material**	**Mechanical debris and sediment removal**	**Washing (deluge, high/low pressure, hot/ambient water**	**Sandblasting / steam cleaning**	**Vacuum recovery**	**Chemicals e.g. dispersants[5]**	**Bioremediation**	**Vegetation removal**	**Hazing to deter wildlife**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring & surveillance**	**Termination criteria[6]**
Longtom EP. OSRA maps: Point Hicks- Cape Howe, Marlo- Point Hicks, Bass Strait Islands, Hogan Group of Islands.	1. Intertidal rocky shores	Iron Prince. Bastion Point. Quarry Beach. Shipwreck Creek. Seal Cove. Little Rame Head. Sandpatch Point. Petrel Point. Thurra River. Clinton Rocks. Cloke Rock. Tamboon Inlet. Shelley Beach. Hogan Group of islands.	Mollusc or other invertebrate beds. Ecosystem protection - Largely unmodified ecosystem. Secondary contact recreation. Aesthetic enjoyment.	Condensate residues and dissolved / entrained hydrocarbons causing changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of intertidal ecosystems. - Oiling of seabirds, penguin colonies and marine mammals[3]. - Ingestion by seabirds and marine mammals, during feeding or preening, leading to poisoning. - Pathological effects to fish larvae.[12] - Loss of planktonic primary producers and food source - of particular importance for migratory shorebirds and seabirds. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to primary and secondary contact recreation activities e.g. diving, snorkeling, fishing, and aesthetic enjoyment.	1. Human health and safety 2. Habitat and cultural resources 5. Amenity **High**	Beach nesting birds are breeding in summer. Consider weather conditions e.g. rough seas will facilitate re-working of oil.	**Viable** - surface oil only **Strength** Minimises surface condensate residue contact with shoreline. **Weakness** Damage caused by poor accessability which may be limited. No benefit for dissolved or entrained hydrocarbons.	**PREFERED RESPONSE STRATEGY** **Strength** Wave reflections can help to keep oil offshore. **Weakness** Perception of lack of response.	**Viable** - shoreline loading only. **Strength** Removes debris and hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance associated with cleanup crew and traffic. Access may be limited and dangerous (slippery rocks). Generates additional waste. No benefit for dissolved or entrained hydrocarbons.	**Viable** Polypropylene snare mops and booms for absorbing and snaring semi-solid weathered oil residues (floating waxy flakes of paraffin residues). **Strength** Removes hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance associated with cleanup crew and traffic. Access may be limited and dangerous (slippery rocks). Generates significant additional waste. No benefit for dissolved or entrained hydrocarbons.	**Viable** - shoreline loading only. **Strength** Removes debris and hydrocarbon from the environment. **Weakness** Access may be limited. Increases physical disturbance associated with traffic. No benefit for dissolved or entrained hydrocarbons.	**Viable** - shoreline loading only. **Strength** Removes hydrocarbon from the immediate wash zone. **Weakness** Unable to recover hydrocarbon from high energy shores. Dislodges sessile fauna and other marine organisms on rocky substrates. No benefit for dissolved or entrained hydrocarbons.	**Viable** - shoreline loading only. **Strength** Removes hydrocarbon from the immediate blast zone. **Weakness** Dislodges sessile fauna and other marine organisms on rocky substrates. Spreads oil into the water column. No benefit for dissolved or entrained hydrocarbons.	**Viable** - shoreline loading only. **Strength** Removes hydrocarbon from the environment. **Weakness** Dislodges sessile fauna and other marine organisms on rocky substrates. No benefit for dissolved or entrained hydrocarbons.	**Not recommended.** **Strength** Helps to break down hydrocarbon. **Weakness** Reduces effectiveness of deflection techniques. Exposes inshore marine organisms to toxic components of entrained hydrocarbons and dispersant. No benefit for dissolved or entrained hydrocarbons and may make situation worse.	**Not recommended**	**Not recommended**	**Not recommended** **Strengths** Can reduce direct wildlife contact with condensate / residues. **Weakness** Distress caused to wildlife. Condensate residues onshore are unlikely to cause harm to wildlife.	Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] prior to it reaching intertidal rocky shores.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water around intertidal rocky shores.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																		No visible hydrocarbon sheen reaching intertidal zones.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7] and on shore in accordance with Shoreline Assessment Field Guide.	Visual aerial / vessel / land based inspection of shorelines for evidence of hydrocarbon contamination of intertidal zone.	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen at intertidal zone.
																		Assessment of impacts to flora and fauna populations of intertidal rocky reefs attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between flora and fauna populations of intertidal rocky reefs i from post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Quadrat surveys in EMBA.	Flora and fauna populations of intertidal rocky reefs within pre-spill range of natural variability.
																		Assessment of impacts to shorebird feeding habits attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding habits from post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, numbers and foraging ecology of shorebirds.	Shorebird populations and feeding activity within pre-spill range of natural variability.
																		No hydrocarbons attributable to condensate spill detected in molluscs.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in molluscs from impact areas to control sites or acceptable global concentrations[15]	Concentration of hydrocarbons in molluscs (wet weight)[10] (only if stage 1 physical / chemical trigger values are exceeded).	Histopathological analysis of molluscs from impact sites[10] and control sites.	No hydrocarbons in molluscs attributable to condensate spill. Concentration of hydrocarbon in molluscs do not exceed pre-impact concentrations or acceptable global concentrations.
Longtom EP. OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach, Bass Strait Islands. Gippsland Lakes Ramsar Site Strategic Management Plan.	2. Intertidal, emergent, subtidal aquatic vegetation e.g. seagrass and kelp communities.	Mallacoota and Mallacoota Inlet Special Management Area. Tamboon Inlet. Cann River Estuary (continuously open). Sydenham Inlet. Snowy River Estuary. Yeerung River Estuary (intermittently open). Lake Tyers estuary (intermittently open). Inside Lakes Entrance - Gippsland Lakes Ramsar Site. Hogan Group of Islands.	Estuarine fish habitat. EPBC Act listed threatened ecological community - Giant Kelp Marine Forests. Shorebird/Seabird Roosting Site. Shorebird/Seabird Colony (Roosting, Nesting and/or Feeding). Ecosystem protection - Largely unmodified ecosystem. Primary contact recreation. Secondary contact recreation.	Condensate residues and dissolved / entrained hydrocarbons causing changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of intertidal ecosystems - intertidal seagrass beds most vulnerable to damage. - Ingestion by seabirds and marine mammals during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] - Loss of planktonic primary producers and food source - of particular importance for migratory shorebirds and seabirds, fish and turtles. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to primary and secondary contact recreation activities e.g. diving, snorkeling, fishing, and aesthetic enjoyment.	1. Human health and safety 2. Habitat and cultural resources 3. Rare and/or endangered flora and fauna 5. Amenity **High**	Consider migratory bird patterns and beach-nesting birds breeding in summer. Determine whether inlets are open and if so, whether they can be "boomed off") or closed with minimal safety and consequential environmental risk.	**Viable** Boom off entrance to potentially exposed inlets where possible[16]. **Strength** Minimises condensate residue contact with sensitive resources. **Weakness** Accessability may be limited. Limited benefit for dissolved and entrained hydrocarbons.	**PREFERED RESPONSE STRATEGY** **Strengths** Causes least additional damage to highly productive aquatic environment. Oil will float over submerged vegetation. **Weakness** Low wave action. Hydrocarbon may persist for extended period. Emergent vegetation will continue to be exposed to reactivated hydrocarbon. Perception of lack of response.	**Viable** **Strengths** Removes debris and hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance to vegetation due to inaccessibility and handling of vegetation.	**Viable** Polypropylene snare mops and booms for absorbing and snaring semi-solid weathered oil residues (floating waxy flakes of paraffin residues). **Strength** Removes hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance associated with deployment of booms and traffic. Access may be limited and dangerous. Generates additional waste.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Viable** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Distributes oil amongst seagrass and kelp. Unable to recover oil.	**Viable** **Strengths** Removes hydrocarbon from the immediate blast zone. **Weakness** May dislodge emergent seagrass and kelp. Access can be difficult.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** May dislodge emergent seagrass and kelp. Access can be difficult.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Not recommended**	**Not recommended**	**Not recommended** **Strengths** Can reduce direct wildlife contact with condensate / residues. **Weakness** Distress caused to wildlife. Condensate residues onshore are unlikely to cause harm to wildlife.	Natural physical and biological degradation of spilt condensate in water to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] prior to it entering estuaries and reaching intertidal, emergent, subtidal aquatic vegetation.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water within estuaries.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																		No visible hydrocarbon sheen within estuaries, particularly around intertidal, emergent and sub-tidal vegetation communities.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Visual aerial / vessel / land based inspection of estuaries and shorelines for evidence of hydrocarbon contamination.	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen.
																		Assessment of impacts to intertidal, emergent, subtidal aquatic vegetation attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between flora and fauna populations of intertidal, emergent, subtidal aquatic vegetation from post spill-pre-impact survey with spill afffected surveys.	Quadrat surveys in EMBA	Intertidal, emergent, subtidal aquatic vegetation within pre-spill range of natural variability.
																		Assessment of impacts to shorebird feeding habits attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding habits from post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, numbers and foraging ecology of shorebirds.	Shorebird populations and feeding activity within pre-spill range of natural variability.
																		No hydrocarbons attributable to condensate spill detected in fish.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in fish from impact areas to control sites or acceptable global concentrations[15]	Concentration of hydrocarbons in fish (wet weight)[10] (only if stage 1 physical / chemical trigger values are exceeded).	Histopathological analysis of fish from impact sites[10].	No hydrocarbons in fish attributable to condensate spill. Concentration of hydrocarbon in fish do not exceed pre-impact concentrations or acceptable global concentrations.

							Onshore response strategies for a CONDENSATE spill emanating from Longtom-5											Performance Measures		Monitoring and surveillance		
Reference	**Inshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of condensate[3] on sensitive resource / beneficial use**	**Protection priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Deflection**	**Monitoring and natural dispersion**	**Manual cleanup**	**Absorbent material**	**Mechanical debris and sediment removal**	**Washing (deluge, high/low pressure, hot/ambient water**	**Sandblasting / steam cleaning**	**Vacuum recovery**	**Chemicals e.g. dispersants[5]**	**Bioremediation**	**Vegetation removal**	**Hazing to deter wildlife**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring & surveillance**	**Termination criteria[6]**
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach.	3. Bare sediment	Mallacoota Inlet Special Management Area. Wingan Inlet. Sydenham Inlet - Bemm River and Mud Lake	Infauna communities. Food resource.	Condensate residues and dissolved / entrained hydrocarbons causing changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of intertidal ecosystems - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] Loss of food source - of particular importance for migratory shorebirds and seabirds. Infauna burrows may act as pathways for hydrocarbon residues, assisting penetration.	1. Human health and safety 2. Habitat and cultural resources **Low**	Consider migratory bird patterns and beach-nesting birds breeding in summer. Determine whether inlets are open and if so, whether they can be "boomed off") or closed with minimal safety and consequential environmental risk.	**Viable** Boom off entrance to potentially exposed inlets where possible[16]. **Strengths** Minimises condensate residue contact with sensitive resources. **Weakness** Accessability may be limited.	**PREFERED RESPONSE STRATEGY** **Strengths** Avoids dealing with accessibility issues and additional disturbance of infauna habitat. **Weakness** Low wave action. Condensate residue may persist for longer periods. Perception of lack of response.	**Viable** **Strengths** Removes debris and hydrocarbon from the environment. **Weakness** Risk of increased damage to fauna and habitat due to accessibility issues.	**Viable** Polypropylene snare mops and booms for absorbing and snaring semi-solid weathered oil residues (floating waxy flakes of paraffin residues). **Strength** Removes hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance associated with deployment of booms and traffic. Access may be limited and dangerous. Generates additional waste.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Dislodges infauna and other marine organisms from sediment / mud flats.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Not recommended.**	**Not applicable**	**Not recommended** **Strengths** Can reduce direct wildlife contact with condensate / residues. **Weakness** Distress caused to wildlife. Condensate residues onshore are unlikely to cause harm to wildlife.	Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] prior to it entering estuaries and reaching bare sediment patches and infauna communities.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water within estuaries.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																		No visible hydrocarbon sheen in estuaries in proximity to bare sediment patches.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7] and on shore in accordance with Shoreline Assessment Field Guide.	Visual aerial / vessel / land based inspection of shorelines and estuaries for evidence of hydrocarbon contamination within estuaries. Percentage surface area covered. Thickness of oil above and below sediment surface (including any subsurface lens).	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen.
																		Assessment of impacts to infaunal communities attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between infaunal communities from post spill-pre-impact survey with spill affected surveys. (only if stage 1 physical / chemical trigger values are exceeded).	Quadrat surveys in EMBA	Infauna communities within pre-spill range of natural variability.
																		Assessment of impacts to shorebird feeding habits attributable to spill.	Stage 1: TPH < 7 µg/L in water and Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding habits from post spill-pre-impact survey with spill affected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, numbers and foraging ecology of shorebirds.	Shorebird populations and feeding activity within pre-spill range of natural variability.
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach. Gippsland Lakes Ramsar Site Strategic Management Plan.	4. Marshes	Behind Mallacoota Entrance to Lake Barracoota. Wingan Inlet. Inside Cann River Estuary. Tamboon Inlet. Sydenham Inlet (Bemm River Estuary and Mud Lake). Dock Inlet. Inside Snowy River Estuary. Inside Lakes Entrance - Gippsland Lakes Ramsar Site.	Vegetation. Ecosystem protection - Largely unmodified ecosystem. Aesthetic enjoyment.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of intertidal ecosystems - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] - Loss of planktonic primary producers and food source - of particular importance for migratory shorebirds and seabirds.	1. Human health and safety 2. Habitat and cultural resources **High**	Consider migratory bird patterns and beach nesting birds breeding in summer. Determine whether inlets are open (can be "boomed off") or closed (no risk).	**Viable** Boom off entrance to potentially exposed inlets where possible. **Strengths** Minimises condensate residue contact with sensitive resources. **Weakness** Accessability may be limited.	**PREFERED RESPONSE STRATEGY** **Strengths** Avoids dealing with accessibility issues and additional disturbance of flora and fauna. **Weakness** Low wave action. Condensate residue may persist. Clean up may do more damage. Perception of lack of response.	**Viable** **Strengths** Removes debris and hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance to vegetation due to inaccessibility and handling of vegetation.	**Viable** Polypropylene snare mops and booms for absorbing and snaring semi-solid weathered oil residues (floating waxy flakes of paraffin residues). **Strength** Removes hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance associated with deployment of booms and traffic. Access may be limited and dangerous. Generates additional waste.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Viable** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Unable to recover hydrocarbon / wash water. Dislodges sessile fauna and other marine organisms on rocky substrates.	**Viable** **Strengths** Removes hydrocarbon from the immediate blast zone. **Weakness** Dislodges sessile fauna and other marine organisms. Spreads condensate residue into the water column.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Dislodges vegetation, sessile fauna and other marine organisms.	**Not recommended.** **Strengths** Helps to break down hydrocarbon. **Weakness** Reduces effectiveness of deflection techniques. Exposes inshore marine organisms to toxic components of entrained hydrocarbons and dispersant.	**Not recommended**	**Not recommended**	**Not recommended** **Strengths** Can reduce direct wildlife contact with condensate / residues. **Weakness** Distress caused to wildlife. Condensate residues onshore are unlikely to cause harm to wildlife.	Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] prior to it entering estuaries and reaching marshes.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water within estuaries.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																		No visible hydrocarbon sheen in estuaries in proximity to marshes.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7] and on shore in accordance with Shoreline Assessment Field Guide.	Visual aerial / vessel / land based inspection of shorelines and estuaries for evidence of hydrocarbon contamination within estuaries. Percentage surface area covered. Thickness of oil above and below sediment surface (including any subsurface lens).	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen.
																		Assessment of impacts to shorebird feeding habits attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding habits from post spill-pre-impact survey with spill affected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, numbers and foraging ecology of shorebirds.	Shorebird populations and feeding activity within pre-spill range of natural variability.

							Onshore response strategies for a CONDENSATE spill emanating from Longtom-5											Performance Measures		Monitoring and surveillance		
Reference	**Inshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of condensate[3] on sensitive resource / beneficial use**	**Protection priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Deflection**	**Monitoring and natural dispersion**	**Manual cleanup**	**Absorbent material**	**Mechanical debris and sediment removal**	**Washing (deluge, high/low pressure, hot/ambient water**	**Sandblasting / steam cleaning**	**Vacuum recovery**	**Chemicals e.g. dispersants[5]**	**Bioremediation**	**Vegetation removal**	**Hazing to deter wildlife**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring & surveillance**	**Termination criteria[6]**
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance. Ninety Mile Beach, Bass Strait Islands, Hogan Group of Islands. Gippsland Lakes Ramsar Site Strategic Management Plan.	5. Sandy beach and dunes	Full extent of SE coastline between Intertidal rocky shores. Extends south from Eden and encompasses Conference Point and Cape Howe Marine National Park, Betka Beach, Secret Beach, Ninety Mile Beach, Point Hicks Marine National Park. Tamboon Inlet Estuary (Intermittently open). Sydenham Inlet Estuary (Intermittently open). Yeerung River Estuary (Intermittently open). Salmon Beach. Ricardo Beach. Mots Beach. Snowy River Estuary (intermittently open). Bunga River Estuary (Intermittently open). Lakes Entrance. Gippsland Lakes Ramsar Site. Hooded plover nesting site on sandy beach adjacent to Lake Reeve. Hogan Group of Islands.	Shorebird/Seabird Roosting Site. Shorebird / seabird colony (roosting, nesting and/ or feeding). Tern nesting site. Hooded Plover nesting site (near Lake Reeve). Australian fur seals resting site and Cape Conran. Ecosystem protection - Largely unmodified ecosystem. Primary contact recreation. Secondary contact recreation. Aesthetic enjoyment.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of nearby offshore islands, coastal reefs and intertidal ecosystems - Oiling of seabirds[3] - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] - Seepage of oily residues may impact infauna. Loss of food source - of particular importance for migratory shorebirds and seabirds. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to primary and secondary contact recreation activities e.g. diving, snorkeling, fishing, and aesthetic enjoyment.	1. Human health and safety 2. Habitat and cultural resources 3. Rare and/or endangered flora and fauna **High**	Consider migratory bird patterns and beach nesting birds breeding in summer. Australian fur seals are mating and pupping in summer.	**Vaible for targetted protection** of particularly sensitive sites e.g. hooded plover nesting sites. Otherwise, generally not recommended. **Strengths** Minimises contact of condensate residue with sensitive resources. **Weakness** Accessability may be limited.	**PREFERED RESPONSE STRATEGY** **Strengths** Low density of biological populations. **Weakness** Hydrocarbon may penetrate coarse grained sand rapidly up to 30cm. Public areas make exclusion difficult. Perception of lack of response.	**Viable** **Strengths** Effective cleanup and readily accessible. **Weakness** Re-working of hydrocarbon on high energy beaches.	**Viable** Polypropylene snare mops and booms for absorbing and snaring semi-solid weathered oil residues (floating waxy flakes of paraffin residues). **Strength** Removes hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance associated with deployment of booms and traffic. Access may be limited and dangerous. Generates additional waste.	Viable **Strengths** Large volumes can be removed. **Weakness** Spread of contaminated material by vehicles and poor waste management. Consider siting of waste collection and vehicle refueling. Impact on sensitive environment behind beach e.g. dunes and lagoons. Not suitable for soft sandy beaches.	**Deluge - Viable** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** High pressure will wash away sand. Unlikely that oil can be recovered. Oil may be removed from beach but re-surface elsewhere.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Non-specific i.e. likely to capture large volumes of sand.	**Not recommended.** **Strengths** Helps to break down hydrocarbon. **Weakness** Reduces effectiveness of deflection techniques. Exposes inshore marine organisms to toxic components of entrained hydrocarbons and dispersant.	**Viable** **Strengths** No additional chemical added to the environment. **Weakness** May require large volumes of material to be collected and relocated to a suitable impervious site. If bioremediation is in-situ, exclusion of public may be problematic. Oil is mobile and may impact other areas if refloated. Effectiveness is weather dependent - May leach after rain.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Interference with sand stability.	**Not recommended** **Strengths** Can reduce direct wildlife contact with condensate / residues. **Weakness** Distress caused to wildlife. Condensate residues onshore are unlikely to cause harm to wildlife.	Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]. or a point to which no visible oil or waxy residue is detectable on sandy beaches. Minimise spread of contamination and beach disturbance.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water along coastline.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																			No visible hydrocarbon sheen on water or on sandy beaches.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7] and on shore in accordance with Shoreline Assessment Field Guide.	Visual aerial / vessel / land based inspection of sandy beaches for evidence of hydrocarbon contamination. Percentage surface area of sandy beach covered with condensate residue. Thickness of hydrocarbon above and below sand surface (include any subsurface lens).	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen along coastline. No visible hydrocarbon debris on sandy beaches.
																			Assessment of impacts to shorebird feeding habits attributable to spill. Minimal disturbance of shorebird feeding habits and nesting success.	Stage 1: TPH < 7 µg/L in water column or visible presence of waxy flakes / oil on sandy beaches. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding / roosting and nesting habitats from post spill-pre-impact surveys, with spill affected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, abundance and foraging ecology of shorebirds, nest success (if correct season).	Shorebird populations, feeding activity and nest occupancy within pre-spill range of natural variability.
																			No hydrocarbons attributable to condensate spill detected in fish.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in fish from impact areas to control sites or acceptable global concentrations[15]	Concentration of hydrocarbons in fish (wet weight)[10].	Histopathological analysis of fish from impact sites[10]	No hydrocarbons in fish attributable to condensate spill. Concentration of hydrocarbon in fish do not exceed pre-impact concentrations or acceptable global concentrations.
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance, Ninety Mile Beach, Bass Strait Isalnds, Hogan Group of Islands.	6. Cliffs / exposed rocky headlands	Behind the Iron Prince, Betka Beach and Secret Beach through to Little Rame Head Sandpatch Point. Wingan Point. Rame Head. Petrel Point. Point Hicks. Clinton Rocks. Tamboon Inlet. Pearl Point. Cape Conran (Needle Rocks, Irvine Rocks, Quincy Rocks Salmon Rocks). Ricardo Point. Hogan Group of Islands.	Ecosystem protection - Largely unmodified ecosystem. Aesthetic enjoyment.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling of littoral zone species. - Oiling of cliff dwelling avifauna plumage[3].	1. Human health and safety 2. Habitat and cultural resources **Low**	n/a	Not recommended	**PREFERED RESPONSE STRATEGY** **Strengths** Minimises worker exposure to highly dynamic environments. Wave reflections can help to keep oil offshore. **Weakness** Potential re-working of oil to more sensitive shoreline. Perception of lack of response.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Dangers associated with high energy dynamic environment.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Generation of wastes.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Not recommended.** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Unlikely to recover condensate residue.	**Not recommended.** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Unlikely to recover condensate residue. Dislodges organisms from cliff surface.	**Not recommended.** Strengths Removes hydrocarbon from the environment. Weakness Dangers associated with high energy dynamic environment.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Not recommended**	n/a	Not recommended Strengths Can reduce direct wildlife contact with condensate / residues. Weakness Distress caused to wildlife. Condensate residues onshore are unlikely to cause harm to wildlife.	Minimise remobilisation of hydrocarbon from exposed cliff faces at the waterline. Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] or a point to which no visible oil or waxy	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water around cliffs and exposed rocky headlands.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																			No visible hydrocarbon sheen in proximity to rocky cliffs.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Visual aerial / vessel / land based inspection of water in proximity to rocky cliffs. Percentage surface area covered.	Visual aerial / vessel / land based surveillance.	No hydrocarbon sheen from condensate spill visible on the water adjacent to exposed cliff faces.
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach.	7. National, State, Regional or Unknown Coastal Sites of Geological Significance	Conference Point. Gabo Island. Tullabergа Island. Inside Mallacoota Inlet. Sandpatch Point. Rame Head. Point Hicks. Clinton Rocks. Cloke Rocks. Pearl Point. Dock Inlet. Yeerung River Estuary. Cape Conran. Jackson Beach.	Coastal rock formations. Non-indigenous cultural and spiritual values. Aesthetic enjoyment.	Visual impact.	1. Human health and safety 2. Habitat and cultural resources **Low**	n/a	**Not recommended**	**PREFERED RESPONSE STRATEGY** **Strengths** No additional disturbance to sites of geological significance. **Weakness** Extended duration of visual impact. Perception of lack of response.	**Viable** **Strengths** Reduces duration of visual impact. **Weakness** Potential for damage to sites of geological significance.	**Viable** **Strengths** Reduces duration of visual impact. **Weakness** Potential for damage to sites of geological significance. Generation of wastes.	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	**Viable** **Strengths** Reduces duration of visual impact. **Weakness** Potential for damage to sites of geological significance. Unlikely to recover condensate residue.	**Not recommended.** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Potential for damage to sites of geological significance. Unlikely to	**Not recommended.** **Strengths** Removes hydrocarbon from the environment. **Weakness** Potential for damage to sites of geological significance. Dislodges organisms from	**Not recommended.** Condensate residues onshore are unlikely to cause harm to wildlife.	Not recommended	n/a	Not recommended Strengths Can reduce direct wildlife contact with condensate / residues. Weakness Distress caused to wildlife. Condensate residues onshore	Minimise remobilisation of hydrocarbon from exposed cliff faces at the waterline. Natural physical and biological degradation of spilt condensate to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water around sites of significance.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).

							Onshore response strategies for a CONDENSATE spill emanating from Longtom-5												Performance Measures		Monitoring and surveillance		
Reference	**Inshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of condensate[3] on sensitive resource / beneficial use**	**Protection priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Deflection**	**Monitoring and natural dispersion**	**Manual cleanup**	**Absorbent material**	**Mechanical debris and sediment removal**	**Washing (deluge, high/low pressure, hot/ambient water**	**Sandblasting / steam cleaning**	**Vacuum recovery**	**Chemicals e.g. dispersants[5]**	**Bioremediation**	**Vegetation removal**	**Hazing to deter wildlife**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring & surveillance**	**Termination criteria[6]**
		Mots Beach. Snowy River Estuary. Lake Tyers. Sperm Whale Head to Boole Pool Peninsula is of National Significance (from Lake Victoria).											recover condensate residue. Dislodges organisms from rock surface.	rock surface.				are unlikely to cause harm to wildlife.	No visible hydrocarbon sheen from condensate spill on water around sites of geological signficance.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Visual aerial / vessel / land based inspection of water around sites of signficance for evidence of hydrocarbon contamination.	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen from condensate spill on or around sites of geological signficance.
OSRA maps: Point Hicks-Cape Howe and Marlo-Point Hicks.	8. Mangroves	Does not occur in EMBA as per Point Hicks-Cape Howe, Marlo - Point Hicks or Lakes Entrance OSRA maps.	Estuarine fish habitat. Vegetation. Ecosystem protection - Largely unmodified ecosystem. Secondary contact recreation. Aesthetic enjoyment.	Potential for promotion of morbidity, acute or chronic pathology or mortality of marine organisms due to: - Oiling of intertidal and littoral zone species. - Inhalation of hydrocarbon vapours by marine mammals. - Oiling of avifauna plumage. - Temporary changes to biochemical composition of water column. e.g. chemical and biological oxygen demand. (Volkman, Miller, Revill and Connell, 1994). Loss of fish nursery habitat. Loss of food source - of particular importance for migratory shorebirds and seabirds. Disruption to secondary contact recreation activities.	Not applicable as habitat type does not occur in EMBA.	Consider migratory bird patterns and beach nesting birds breeding in summer. Determine whether inlets are open (can be "boomed off") or closed (no risk).	Boom off entrance to inlets where possible	Preferred **Strengths** Causes least additional damage to most important marine habitat. **Weakness** Oil may persist for extended period (e.g. 1 year). Cleanup may do more Weakness than good.	Viable Strengths Removes debris and hydrocarbon from the environment. Weakness Potential to increase physical disturbance to vegetation due to inaccessibility and handling of vegetation.	Viable Strengths Removes hydrocarbon from the environment. Weakness Generates additional waste.	Not recommended	Preferred Strengths Removes hydrocarbon from the immediate wash zone. Weakness Unable to recover hydrocarbon / wash water. Dislodges sessile fauna and other marine organisms on rocky substrates.	Viable Strengths Removes hydrocarbon from the immediate blast zone. Weakness Dislodges sessile fauna and other marine organisms. Spreads oil into the water column.	Viable Strengths Removes hydrocarbon from the environment. Weakness Dislodges vegetation, sessile fauna and other marine organisms.	Viable Strengths Helps to break down oil. Weakness Reduces effectiveness of containment and recovery techniques. Exposes inshore marine organisms and mangroves to toxic components of entrained hydrocarbons and dispersant.	Not recommended	Not recommended Weakness Mangroves may be slow to recover.	Not recommended Weakness Mangroves may be slow to recover.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.
OSRA maps: Point Hicks-Cape Howe and Marlo-Point Hicks.	9. Sheltered intertidal flats	Does not occur in EMBA as per Point Hicks-Cape Howe, Marlo - Point Hicks or Lakes Entrance OSRA maps.	Estuarine fish habitat. Shorebird/seabird roosting feeding sites. Ecosystem protection - Largely unmodified ecosystem.	Potential for promotion of morbidity, acute or chronic pathology or mortality of marine organisms due to: - Oiling of intertidal and littoral zone species. - Inhalation of hydrocarbon vapours by marine mammals. - Oiling of avifauna plumage. - Temporary changes to biochemical composition of water column. e.g. chemical and biological oxygen demand. (Volkman, Miller, Revill and Connell, 1994). Loss of fish nursery habitat. Loss of food source - of particular importance for migratory shorebirds and seabirds.	Not applicable as habitat type does not occur in EMBA.	Consider migratory bird patterns and beach nesting birds breeding in summer. Determine whether inlets are open (can be "boomed off") or closed (no risk).	Boom off entrance to inlets where possible	Viable **Strengths** Avoids dealing with accessibility issues and additional disturbance infauna habitat. **Weakness** Low wave action. Oil may persist for long periods.	Viable Strengths Removes debris and hydrocarbon from the environment. Weakness Risk of increased damage to fauna and habitat due to accessibility issues.	Viable Strengths Removes hydrocarbon from the environment. Weakness Generates additional waste.	Not recommended	Not recommended	Not recommended	Viable Strengths Removes hydrocarbon from the environment. Weakness Dislodges infauna and other marine organisms from sediment / mud flats.	Viable Strengths Helps to break down oil. Weakness Reduces effectiveness of containment and recovery techniques. Exposes inshore marine organisms to toxic components of entrained hydrocarbons and dispersant.	Not recommended	Not recommended	Deploy vessels / aircraft to deter wildlife from EMBA (only on specialist ecological advice). Strengths Can reduce direct wildlife contact with condensate / residues. Weakness Distress caused to wildlife.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.
Native Title Services Victoria	10. Native Title held by members of the Gunai / Kurnai people (VID6007/98 and VID482/09).	Native Title Claims VID6007/98 and VID482/09 extends 200 metres offshore along much of the coastline between Lakes Entrance and Marlo.	Indigenous culture and spiritual values. The Native Title determination area covers approximately 45,000 hectares extending from west Gippsland near Warragul, east to the Snowy River and includes 200 metres of offshore sea territory. The determination concluded that Native title exists in non-exclusive native title rights and interests in parts of the determination area.	Loss of amenity and visual impact.	2. Habitat and cultural resources **Medium**	n/a	Viable for specific areas only.	**PREFERED RESPONSE STRATEGY.** **Strengths** Wave reflections can help to keep oil offshore. **Weakness** Perception of lack of response.	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not applicable	Consult with relevant indigenous communities.	Consultation undertaken.	Consultation with indigenous communities.	Evidence of consultation.	Evidence of consultation.

1 EP Selection of response strategy will be determined by conditions at the time.

2 SEPP WoV (State Environment Protection Policy - Waters of Victoria)Table 1
Beneficial uses for Marine and Estuarine "Open Coasts" (Refer to SEPP WoV Schedule F3 for Gippsland Lakes)
Ecosystem protection - Largely unmodified ecosystem.
Primary contact recreation - e.g. swimming, beaches, kayaking, recreational snorkeling / diving.
Secondary contact recreation e.g. Sailing, fishing
Aesthetic enjoyment e.g. Walking tracks, campsites, boat ramps, dive sites.
Indigenous culture and spiritual values
Non-indigenous cultural and spiritual values
Aquaculture
Industrial and commercial use e.g. Harbours and jetties, commercial fishing.
Fish, crustacean and molluscs for human consumption

3 Gas condensate toxicity range (LC_{50}) for marine organisms (Source: ANZECC Table 8.3.24):

Fish (n=3)	Not available
Crustaceans (n=8)	0.5-0.6 mg/L
Molluscs (n=1)	Not available
Annelids (n=6)	Not available
Algae (n=6)	10.6-11.5 mg/L

The low reliability trigger value for condensate can be calculated by applying an Assessment Factor (AF) of 100 to the lowest acute figure outlined above i.e. for crustaceans. Once the AF is applied, the trigger value for condensate is 0.005 milligrams per litre.

Dissolved aromatic dosage used in the modelling and their potential level of impact to sensitive species (Source: APASA Table A).

Trigger value for dissolved aromatic concentrations for a continuous 96 hour exposure ppb (mg/L)	Equivalent dosage of dissolved aromatics (ppb.hrs)	Range of sensitive species potentially impacted from acute exposure	Reported zones
6 (0.006)	576	Sensitive species (99th percentile)	Low exposure
50 (0.05)	4,800	Average species(95th percentile)	Moderate exposure
400 (0.4)	38,400	Tolerant species(50th percentile)	High exposure

Estimates for the minimal thickness of oil that will result in harm to seabirds through ingestion from preening of contaminated feathers, or the loss of thermal protection of their feathers, has been estimated by different researchers at 10 µm (French 2000) to 25 µm (Kroops et al., 2004). Refer to APASA Report for references.

The probability of moderate oiling (10 µm reporting thickness) was typically low (5% or less) and was discontinuous and sparse, typically confined to within 50 km north and south of the well location.

Longtom condensate contains 61.5% volatiles, 35.5% semi- to low volatiles and approximately 3% persistent hydrocarbons. Due to the low percentage of persistent hydrocarbons the Longtom-4 condensate is considered to be a non-persistent oil.

Condensate residues after one day weathering at sea are estimated to be about 3% by volume and would be a semi-solid sticky waxy residue with no acute mammalian toxicity (GESAMP Classification and Hazard Profile of Paraffin Wax (2010) Annex 7).

4 Decisions on protection priorities at specific geographic locations need to be based on OSTM and the specific conditions at the time.

5 Corexit 9527 is a water-dilutable concentrate with an LC_{50} range of >100-<1000 mg/L (Source: ANZECC Table 8.3.25)
This includes a "moderate reliability" marine trigger value of 1100ug/L with 95% species protection.

6 Once any operation has been shown to be ineffective, likely to cause unacceptable additional damage to environmental or economic resources, or if the costs far exceed any possible benefits, it should be stopped (Source: ITOPF Response Strategies).

7 ITOPF (2011/2012) Aerial Observation of Marine Spills, Technical Information Papers 1, 6 and 14

8 NOAA (2001) Technical Memorandum NOS OR&R 9 Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill, Seattle, Washington

9 ANZECC (2000) Water Quality Guidelines s. 8.3.5.3 Sampling, analysis and interpretation

							Onshore response strategies for a CONDENSATE spill emanating from Longtom-5												Performance Measures		Monitoring and surveillance		
Reference	Inshore resource type	Segment / Location	Environmental Sensitivities and Beneficial Uses[2]	Potential impact of condensate[3] on sensitive resource / beneficial use	Protection priority (Low, Medium High)[4]	Temporal / seasonal implications	Deflection	Monitoring and natural dispersion	Manual cleanup	Absorbent material	Mechanical debris and sediment removal	Washing (deluge, high/low pressure, hot/ambient water	Sandblasting / steam cleaning	Vacuum recovery	Chemicals e.g. dispersants[5]	Bioremediation	Vegetation removal	Hazing to deter wildlife	Objectives	Standard	Measurement criteria / key indicators for monitoring	Means of monitoring & surveillance	Termination criteria[6]

10 Paasiverta, J., Herzschuh, R., Lahtipera, M., Pellinen, J. and Sinkkonen, S. (1981) Oil residues in Baltic sediment mussel and fish. Development of the analysis method. *Chemosphere*. 10. 919-928.
11 ERIN Environmental Resources Information Network http://www.environment.gov.au/coasts/mpa/southeast/beagle/pubs/southeast-beagle-map.pdf
12 Ecos Consulting (Aust) Pty Ltd (2001) National Oceans Office South East Regional Marine Plan – Impacts on the Natural System Chapter 4, Impacts of Petroleum
13 Volkman, J.K., Miller, G.J., Revill, A.T. And Connell, D.W., (1994) 'Oil Spills'. In Swan, J.M., Neff, J.M. and Young, P.C., (Eds.), Environmental implications of offshore oil and gas development in Australia – the findings of an independent scientific review, pp 509-695; Australian Petroleum Exploration Association, Sydney.
14 The Australian Whale Sanctuary includes all Commonwealth waters from the three nautical mile state waters limit out to the boundary of the Exclusive Economic Zone (i.e. out to 200 nautical miles and further in some places).
15 Government of British Columbia (1993) Ambient Water Quality Criteria for Polycyclic Aromatic Hydrocarbons (PAHs) accessed at http://www.env.gov.bc.ca/wat/wq/BCguidelines/pahs/pahs_over.html#toc on 9 June 2012 (in the absence of any Australian or international standard for hydrocarbon in fish.)
16 Protection booming of Lakes Entrance mouth not viable due to tidal flows of >4 knots. Priority for Lakes Entrance is to prevent or minimise oil entering Cunninghame Arm and North Arm.

References: **Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) (the ANZECC Guidelines)**
National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances (NatPlan)
State Environment Protection Policy (Waters of Victoria) (Victoria Government Gazette No. S 107 4 June 2003) (SEPP WoV)

							Offshore response strategies for a MARINE DIESEL OIL (MDO) spill emanating from Longtom-5							Performance Measures		Monitoring and surveillance options		
Reference / Source	**Offshore Resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of diesel[3] on sensitive resource / beneficial use**	**Protection Priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Exclusion zone**	**Hazing to deter wildlife**	**Monitoring and natural dispersion**	**Physical / mechanical agitation**	**Containment and recovery**	**Chemical treatment, e.g. Dispersant application (Corexit 9527[5])**	**In situ burning**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring and surveillance**	**Termination criteria[6]**
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach. ERIN[11] map of Beagle Commonwealth Marine Reserve.	1. Open marine environment	Inshore state waters extending seaward. Includes the Australian Whale Sanctuary[14], The Skerries Special Management Area, Point Hicks Marine National Park, Beware Reef Marine Sanctuary, Ninety Mile Beach Marine National Park (near Seaspray). Oil platforms where Australian Fur Seals haul-out.	Pelagic ecosystem. Marine species including marine mammals (cetaceans, seals), marine reptiles (turtles), fish, plankton, seabirds (including penguins) etc., some of which are protected under the EPBC Act 1999 (Cth) or FFG Act 1989 (Vic). Ecosystem protection - Largely unmodified ecosystem. Primary contact recreation. Secondary contact recreation. Aquaculture. Fish, crustacean and molluscs for human consumption.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of nearby offshore islands, coastal reefs and intertidal ecosystems - Oiling of seabirds - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] Interference with primary and secondary contact recreation activities such as swimming, beaches, kayaking, recreational snorkeling / diving, sailing, fishing. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption.	1. Human health and safety 2. Habitat and cultural resources 3. Rare and / or endangered flora and fauna. **Medium**	Consider whale migration patterns - Southern Right and Humpback whales pass through the area during winter and spring. - Australian fur seals are mating and pupping in summer.	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Viable Deploy vessels / aircraft to deter wildlife from EMBA (only on specialist ecological advice. Strengths Can reduce direct wildlife contact with condensate / residues. Weakness Distress caused to wildlife.	**PREFERED RESPONSE STRATEGY** **Strengths** Avoids the release of additional chemicals to the environment. No risk to personnel. **Weakness** Perception of lack of response.	**Viable** for small spills only. **Constraints** Sea state and rapid speadability of diesel. **Strengths** Increases evaporation of diesel and dilution in the water column. Reduces likelihood of diesel contact on shoreline. **Weakness** Remaining diesel gets entrained in water column and increases exposure of fish to toxicants.	**Not recommended.** **Constraints** Sea state and rapid speadability of diesel. **Strengths** Removes hydrocarbon from the environment. **Weakness** Not very efficient at capturing diesel for recovery. Labour intensive and towing large booms between vessels in open ocean presents its own safety risks.	**Not recommended for diesel.** **Constraints** Limited time window for use. Diesel is of low viscosity so the dispersant tends to pass through into the water rather than staying 'resident' with the oil to allow the surfactant to work. **Strengths** Quick to activate and can be used in high seas. Increases the surface area to colume of hydrocarbon to enhance natural degradation. Reduces the impact of leaving the oil to recover naturally, particularly where physical containment and recovery is unlikely to effectively mitigate spill impacts. **Weakness** Difficult to get the correct dispersant:oil ratio for diesel without over dosing. Exposes pelagic and benthic organisms to toxic components of entrained hydrocarbons and dispersant. Diesel will eventually evaporate and / or degrade without intervention.	Not viable as no specialist equipment available.	Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines Table 8.3.24. Water Quality Monitoring Program (in prep.).	Records of water quality sampling and analysis for TPH entrained in water column.	Sampling and analysis of TPH concentration in the water column within the EMBA as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
														No visible hydrocarbon sheen.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Thickness of hydrocarbon on water surface and surface area of sheen as noted in visual surveillance records.	Aerial / Vessel visual surveillance.	No visible hydrocarbon sheen.
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach. ERIN[11] map of Beagle Commonwealth Marine Reserve.	2. Seabed	Extends from inshore state waters seaward. The Skerries Special Management Area, Point Hicks Marine National Park, Beware Reef Marine Sanctuary.	Benthic communities. Bottlom-dwelling fish, crustacean and molluscs for human consumption.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Pathological effects to fish larvae.[12] - Oiling of benthic communities. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption.	1. Human health and safety 2. Habitat and cultural resources **Low**	n/a	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As above	As above	As above	As above	Not viable as no specialist equipment available.	Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines Table 8.3.24. Water Quality Monitoring Program (in prep.).	Records of water quality sampling and analysis for TPH entrained in water column.	Sampling and analysis of TPH concentration in the water column within the EMBA as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
Longtom EP, OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach. ERIN[11] map of Beagle Commonwealth Marine Reserve.	3. Subtidal rocky reefs	Bastion Point, Quarry Beach, Little Rame Head, Long Reef, Wingan Point, The Skerries Special Management Area, Rame Head, Petrel Point, Thurra River, Point Hicks Marine National Park, Pearl Point, Yeerung River Estuary (Intermittently open), Cape Conran (East Cape, Cowrie Bay, Flat Rocks), Beware Reef, Point Ricardo, Ricardo Beach.	Fish habitat, seabird feeding sites. Ecosystem protection - Largely unmodified ecosystem. Primary contact recreation. Secondary contact recreation. Aesthetic enjoyment.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of nearby offshore islands, coastal reefs and intertidal ecosystems - Oiling of seabirds - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] Interference with secondary contact recreation activities such as sailing, fishing and aesthetic enjoyment.	1. Human health and safety 2. Habitat and cultural resources 3. Rare and/or endangered flora and fauna 5. Amenity **High**	Consider marine mammal, seabird and shorebird migratory patterns.	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	**PREFERED RESPONSE STRATEGY** Strengths Avoids dispersing hydrocarbon into the water column in the proximity of the reef. Weakness Perception of lack of response.	**Viable** for small spills only. **Constraints** Sea state and rapid speadability of diesel. **Strengths** Reduces hydrocarbon reaching the shoreline. **Weakness** Disperses hydrocarbon into the water column in the proximity of the reef. Vessel activity could impact reef structure and dynamics.	**Viable** but limited effectiveness with diesel. **Constraints** Sea state and rapid speadability of diesel. **Strengths** Removes hydrocarbon from the environment and reduces hydrocarbon reaching the shoreline. **Weakness** Disperses hydrocarbon into the water column in the proximity of the reef. Cleanup vessel activity could impact reef structure and dynamics.	**Not recommende**d in shallow water over reef. **Weakness** Exposes pelagic, benthic and reef dwelling organisms to toxic components of entrained hydrocarbons and dispersant. Reduces effectiveness of inshore deflection techniques.	**Not viable** as no specialist equipment available.	Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration entrained in water column above reef.	Sampling and analysis of diesel or surrogate TPH concentration in the water column within the EMBA and at nominated control sites as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
														No visible hydrocarbon sheen.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Thickness of hydrocarbon on water surface and surface area of sheen as noted in visual surveillance records.	Aerial / Vessel visual surveillance.	No visible hydrocarbon sheen.
														Assessment of impacts to flora and fauna populations of subtidal rocky reefs attributable to spill.	Stage 1: TPH in water in proximity to the reef < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between flora and fauna populations of subtidal rocky reefs from post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Quadrat surveys in EMBA.	Flora and fauna populations of subtidal rocky reefs reefs within pre-spill range of natural variability.
Longtom EP	4. Shipwrecks.	Shipwrecks: Beware Reef Marine Sanctuary: - SS Ridge Park, - SS Auckland, - Albert San. Point Hicks Marine National Park: - SS Kerangie, - SS Saros. Seaspray - P.S. Paynesville, - Trinculo, - Unidentified wreck 7542 located 22 miles southeast of Seaspray.	Artificial reef - marine habitat. Non-indigenous cultural heritage values.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling of seabirds - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] Interference with primary and secondary contact recreation activities such as diving, sailing, fishing.	2. Habitat and cultural resources. **High**	As per "Subtidal reefs"	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Subtidal reefs"	As per "Subtidal reefs"	As per "Subtidal reefs"	As per "Subtidal reefs"	Not viable as no specialist equipment available.	No physical disturbance of shipwrecks.	Heritage Act 1995 (Vic).	Consultation with Heritage Victoria to confirm location of shipwrecks. Strict avoidance of shipwrecks by spill response vessel activity.	Daily review of spill response vessel activity plans and records.	Cessation of spill response vessel activity.
														No visible hydrocarbon sheen in proximity of shipwrecks.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Visual surveillance of hydrocarbon sheen in location of known shipwrecks.	Review of Aerial / Vessel visual surveillance records against location of known shipwrecks.	No visible hydrocarbon sheen in proximity of shipwrecks.
														Assessment of impacts to flora and fauna populations of artificial reefs attributable to spill.	Stage 1: TPH in water in proximity to the reef < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between flora and fauna populations of artificial reefs from post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Quadrat surveys in EMBA.	Flora and fauna populations of artificial reefs within pre-spill range of natural variability.

							Offshore response strategies for a MARINE DIESEL OIL (MDO) spill emanating from Longtom-5							Performance Measures		Monitoring and surveillance options		
Reference / Source	**Offshore Resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of diesel[3] on sensitive resource / beneficial use**	**Protection Priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Exclusion zone**	**Hazing to deter wildlife**	**Monitoring and natural dispersion**	**Physical / mechanical agitation**	**Containment and recovery**	**Chemical treatment, e.g. Dispersant application (Corexit 9527[5])**	**In situ burning**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring and surveillance**	**Termination criteria[6]**
Longtom EP	5. Fisheries: Southern shark	Out to continental shelf, depth to 2,000 m.	Fish for human consumption. Industrial and commercial use.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Pathological effects to shark larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	As per "Open Marine Environment"	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	Not viable as no specialist equipment available.	No hydrocarbons attributable to spill detected in fish.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in fish from impact areas to acceptable global concentrations[15]	Concentration of hydrocarbons in fish (wet weight)[10] (only if stage 1 physical / chemical trigger values are exceeded).	Histopathological analysis of fish from impact sites[10].	No hydrocarbons in fish attributable to diesel spill. Concentration of hydrocarbon in fish below acceptable global concentrations.
														Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines Table 8.3.24. Water Quality Monitoring Program (in prep.).	Records of water quality sampling and analysis for TPH entrained in water column.	Sampling and analysis of TPH concentration in the water column within the EMBA as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
														No visible hydrocarbon sheen.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Thickness of hydrocarbon on water surface and surface area of sheen as noted in visual surveillance records.	Aerial / Vessel visual surveillance.	No visible hydrocarbon sheen.
Longtom EP	6. Fisheries: Southeast fishery	Out to continental shelf, depth to 200 m (generally).	Fish for human consumption. Industrial and commercial use.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Pathological effects to fish larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	As per "Open Marine Environment"	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	Not viable as no specialist equipment available.	As for "Southern shark".	As for "Southern shark".	As for "Southern shark".	As for "Southern shark".	As for "Southern shark".
Longtom EP	7. Fisheries: Southern scallop	Inshore, 20 to 50 m water depth.	Fish, crustacean and molluscs for human consumption. Industrial and commercial use.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of benthic communities. - Pathological effects to scallop larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	Scallop spawning occurs early spring.	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	Not viable as no specialist equipment available.	No hydrocarbons attributable to diesel spill detected in scallops.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in scallops from impact areas to nominated control sites[10].	Concentration of hydrocarbons in scallops (wet weight)[10] (only if stage 1 physical / chemical trigger values are exceeded).	Histopathological analysis of scallops from impact sites[10].	No hydrocarbons in scallops attributable to diesel spill.
														Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines Table 8.3.24. Water Quality Monitoring Program (in prep.).	Records of water quality sampling and analysis for TPH entrained in water column.	Sampling and analysis of TPH concentration in the water column within the EMBA as per Water Quality Monitoring Program (in prep).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
														No visible hydrocarbon sheen.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Thickness of hydrocarbon on water surface and surface area of sheen as noted in visual surveillance records.	Aerial / Vessel visual surveillance.	No visible hydrocarbon sheen.
Longtom EP	8. Fisheries: Southern rock lobster	Out to continental shelf, depth to 150 m, but mostly within State Waters.	Fish, crustacean and molluscs for human consumption. Industrial and commercial use.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of benthic communities. - Pathological effects to lobster larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	Rock lobster spawning occurs around June to mid-November.	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	As per "Open Marine Environment"	Not viable as no specialist equipment available.	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".
Longtom EP	9. Fisheries: Abalone	Out to 2 km, depth to 20 m along rocky coastlines and reefs.	Fish, crustacean and molluscs for human consumption. Industrial and commercial use.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of benthic communities. - Pathological effects to abalone larvae.[12] Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to commercial fishing activities.	1. Human health and safety 2. Habitat and cultural resources. 4. Commercial resources. **High**	No abalone ranching is know to occur in the EMBA.	Establish Exclusion zone around spill area using notice to Mariners and communciations with existing stakeholder contacts.	Not applicable.	As per "Intertidal Rocky Shores"	As per "Intertidal Rocky Shores"	As per "Intertidal Rocky Shores"	As per "Intertidal Rocky Shores"	Not viable as no specialist equipment available.	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".	As for "Southern scallop".

1 EP Selection of response strategy will be determined by conditions at the time.
2 SEPP WoV (State Environment Protection Policy - Waters of Victoria)Table 1

							Offshore response strategies for a MARINE DIESEL OIL (MDO) spill emanating from Longtom-5							Performance Measures		Monitoring and surveillance options		
Reference / Source	Offshore Resource type	Segment / Location	Environmental Sensitivities and Beneficial Uses[2]	Potential impact of diesel[3] on sensitive resource / beneficial use	Protection Priority (Low, Medium High)[4]	Temporal / seasonal implications	Exclusion zone	Hazing to deter wildlife	Monitoring and natural dispersion	Physical / mechanical agitation	Containment and recovery	Chemical treatment, e.g. Dispersant application (Corexit 9527[5])	In situ burning	Objectives	Standard	Measurement criteria / key indicators for monitoring	Means of monitoring and surveillance	Termination criteria[6]

Beneficial uses for Marine and Estuarine "Open Coasts" (Refer to SEPP WoV Schedule F3 for Gippsland Lakes)

a. Ecosystem protection - Largely unmodified ecosystem.
b. Primary contact recreation - e.g. swimming, beaches, kayaking, recreational snorkeling / diving.
c. Secondary contact recreation e.g. Sailing, fishing
d. Aesthetic enjoyment e.g. Walking tracks, campsites, boat ramps, dive sites.
e. Indigenous culture and spiritual values
f. Non-indigenous cultural and spiritual values
g. Aquaculture
h. Industrial and commercial use e.g. Harbours and jetties, commercial fishing.
i. Fish, crustacean and molluscs for human consumption

3 Marine diesel toxicity range (LC_{50}) for marine organisms (Source: ANZECC Table 8.3.24):

Fish (n=3)	1.4-2.2 mg/L
Crustaceans (n=8)	0.3->4.5 mg/L
Molluscs (n=1)	0.6 mg/L
Annelids (n=6)	0.8-3.2 mg/L
Algae (n=6)	0.5->1.6 mg/L

The trigger value (low reliability) for diesel can be calculated by applying an Assessment Factor (AF) of 100 to the lowest acute figure outlined above i.e. for crustaceans. Once the AF is applied, the trigger value for diesel is 0.003 milligrams per litre.

4 Decisions on protection priorities at specific geographic locations need to be based on OSTM and the specific conditions at the time.

5 Corexit 9527 is a water-dilutable concentrate with an LC_{50} range of >100-<1000 mg/L (Source: ANZECC Table 8.3.25)
This includes a "moderate reliability" marine trigger value of 1100ug/L with 95% species protection.

6 Once any operation has been shown to be ineffective, likely to cause unacceptable additional damage to environmental or economic resources, or if the costs far exceed any possible benefits, it should be stopped (Source: ITOPF Response Strategies).

7 ITOPF (2011/2012) Aerial Observation of Marine Spills, Technical Information Papers 1, 6 and 14

8 NOAA (2001) Technical Memorandum NOS OR&R 9 Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill, Seattle, Washington

9 ANZECC (2000) Water Quality Guidelines s. 8.3.5.3 Sampling, analysis and interpretation

10 Paasiverta, J., Herzschuh, R., Lahtipera, M., Pellinen, J. and Sinkkonen, S. (1981) Oil residues in Baltic sediment mussel and fish. Development of the analysis method. *Chemosphere.* 10. 919-928.

11 ERIN Environmental Resources Information Network http://www.environment.gov.au/coasts/mpa/southeast/beagle/pubs/southeast-beagle-map.pdf

12 Ecos Consulting (Aust) Pty Ltd (2001) National Oceans Office South East Regional Marine Plan – Impacts on the Natural System Chapter 4, Impacts of Petroleum

13 Volkman, J.K., Miller, G.J., Revill, A.T. And Connell, D.W., (1994) 'Oil Spills'. In Swan, J.M., Neff, J.M. and Young, P.C., (Eds.), Environmental implications of offshore oil and gas development in Australia – the findings of an independent scientific review, pp 509-695; Australian Petroleum Exploration Association, Sydney.

14 The Australian Whale Sanctuary includes all Commonwealth waters from the three nautical mile state waters limit out to the boundary of the Exclusive Economic Zone (i.e. out to 200 nautical miles and further in some places).

15 Government of British Columbia (1993) Ambient Water Quality Criteria for Polycyclic Aromatic Hydrocarbons (PAHs) accessed at http://www.env.gov.bc.ca/wat/wq/BCguidelines/pahs/pahs_over.html#toc on 9 June 2012 (in the absence of any Australian or international standard for hydrocarbon in fish.)

16 Protection booming of Lakes Entrance mouth not viable due to tidal flows of >4 knots. Priority for Lakes Entrance is to prevent or minimise oil entering Cunninghame Arm and North Arm.

References:

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) (the ANZECC Guidelines)
National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances (NatPlan)
State Environment Protection Policy (Waters of Victoria) (Victoria Government Gazette No. S 107 4 June 2003) (SEPP WoV)

							Onshore response strategies for a MARINE DIESEL OIL (MDO) spill emanating from Longtom-5 - Note that no actional levels (surface or shoreline loads) are anticipated.											Performance Measures		Monitoring and surveillance		
Reference	**Inshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of diesel[3] on sensitive resource / beneficial use**	**Protection Priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Deflection**	**Monitoring and natural dispersion**	**Manual cleanup**	**Absorbent material**	**Mechanical debris and sediment removal**	**Washing (deluge, high/low pressure, hot/ambient water**	**Sandblasting / steam cleaning**	**Vacuum recovery**	**Chemicals e.g. dispersants[5]**	**Bio-remediation**	**Vegetation removal**	**Hazing to deter wildlife**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring & surveillance**	**Termination criteria[6]**
Longtom EP. OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach.	1. Intertidal rocky shores	Bastion Point. Quarry Beach. Shipwreck Creek. Seal Cove. Little Rame Head. Sandpatch Point. Petrel Point. Thurra River. Clinton Rocks. Cloke Rock. Tamboon Inlet. Shelley Beach.	Mollusc or other invertebrate beds. Ecosystem protection - Largely unmodified ecosystem. Secondary contact recreation. Aesthetic enjoyment.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of nearby offshore islands, coastal reefs and intertidal ecosystems - Oiling of seabirds - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] Loss of food source - of particular importance for migratory shorebirds and seabirds. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to primary and secondary contact recreation activities e.g. diving, snorkeling, fishing, and aesthetic enjoyment.	1. Human health and safety 2. Habitat and cultural resources 5. Amenity **High**	Beach nesting birds are breeding in summer. Consider weather conditions e.g. rough seas will facilitate re-working of oil.	**Viable** **Strengths** Minimises diesel contact with shoreline. **Weakness** Damage caused by poor accessability which may be limited.	**PREFERED RESPONSE STRATEGY** **Strengths** Wave reflections can help to keep oil offshore. **Weakness** Perception of lack of response.	**Viable** **Strengths** Removes debris and hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance associated with cleanup crew and traffic. Access may be limited and dangerous (slippery rocks).	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Generates additional waste. Access may be limited and dangerous.	**Viable** **Strengths** Removes debris and hydrocarbon from the environment. **Weakness** Access may be limited. Increases physical disturbance associated with traffic.	**Viable** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Unable to recover hydrocarbon from high energy shores. Dislodges sessile fauna and other marine organisms on rocky substrates.	**Viable** **Strengths** Removes hydrocarbon from the immediate blast zone. **Weakness** Dislodges sessile fauna and other marine organisms on rocky substrates. Spreads oil into the water column.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Dislodges sessile fauna and other marine organisms on rocky substrates.	**Not recommended.** **Strengths** Helps to break down hydrocarbon. **Weakness** Reduces effectiveness of deflection techniques. Exposes inshore marine organisms to toxic components of entrained hydrocarbons and dispersant.	**Not recommended**	**Not recommended**	Viable Deploy vessels / aircraft to deter wildlife from EMBA (only on specialist ecological advice. Strengths Can reduce direct wildlife contact with diesel / residues. Weakness Distress caused to wildlife.	Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] prior to it reaching intertidal rocky shores.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water around intertidal rocky shores.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																		No visible hydrocarbon sheen reaching intertidal zones.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7] and on shore in accordance with Shoreline Assessment Field Guide.	Visual aerial / vessel / land based inspection of shorelines for evidence of hydrocarbon contamination of intertidal zone.	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen at intertidal zone.
																		Assessment of impacts to flora and fauna populations of intertidal rocky reefs attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between flora and fauna populations of intertidal rocky reefs ifrom post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Quadrat surveys in EMBA	Flora and fauna populations of intertidal rocky reefs within pre-spill range of natural variability.
																		Assessment of impacts to shorebird feeding habits attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding habits from post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, numbers and foraging ecology of shorebirds.	Shorebird populations and feeding activity within pre-spill range of natural variability.
																		No hydrocarbons attributable to diesel spill detected in molluscs.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in molluscs from impact areas to control sites or acceptable global concentrations[15].	Concentration of hydrocarbons in molluscs (wet weight)[10] (only if stage 1 physical / chemical trigger values are exceeded).	Histopathological analysis of molluscs from impact sites[10] and control sites.	No hydrocarbons in molluscs attributable to diesel spill. Concentration of hydrocarbon in molluscs do not exceed pre-impact concentrations or acceptable global concentrations.
Longtom EP. OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach.	2. Intertidal, emergent, subtidal aquatic vegetation e.g. seagrass and kelp communities.	Mallacoota and Mallacoota Inlet Special Management Area. Tamboon Inlet. Cann River Estuary (continuously open). Sydenham Inlet. Snowy River Estuary. Yeerung River Estuary (intermittently open). Lake Tyers estuary (intermittently open). Inside Lakes Entrance - Gippsland Lakes Ramsar Site.	Estuarine fish habitat. EPBC Act listed threatened ecological community - Giant Kelp Marine Forests. Shorebird/Seabird Roosting Site. Shorebird/Seabird Colony (Roosting, Nesting and/or Feeding). Ecosystem protection - Largely unmodified ecosystem. Primary contact recreation. Secondary contact recreation.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of intertidal ecosystems - intertidal seagrass beds most vulnerable to damage. - Ingestion by seabirds and marine mammals during feeding or preening, leading to poisoning - Pathological effects to fish larvae.12 - Loss of planktonic primary producers and food source - of particular importance for migratory shorebirds and seabirds, fish and turtles. Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to primary and secondary contact recreation activities e.g. diving, snorkeling, fishing, and aesthetic enjoyment.	1. Human health and safety 2. Habitat and cultural resources 3. Rare and/or endangered flora and fauna 5. Amenity **High**	Consider migratory bird patterns and beach-nesting birds breeding in summer. Determine whether inlets are open and if so, whether they can be "boomed off") or closed with minimal safety and consequential environmental risk.	**PREFERED RESPONSE STRATEGY** Boom off entrance to potentially exposed inlets where possible16. **Strengths** Minimises diesel contact with sensitive resources. **Weakness** Accessability may be limited.	**PREFERED RESPONSE STRATEGY** **Strengths** Causes least additional damage to highly productive aquatic environment. Oil will float over submerged vegetation. **Weakness** Low wave action. Hydrocarbon may persist for extended period. Emergent vegetation will continue to be exposed to reactivated hydrocarbon. Perception of lack of response.	**Viable** **Strengths** Removes debris and hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance to vegetation due to inaccessibility and handling of vegetation.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Generates additional waste.	**Not recommended**	**Viable** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Distributes oil amongst seagrass and kelp. Unable to recover oil.	**Viable** **Strengths** Removes hydrocarbon from the immediate blast zone. **Weakness** May dislodge emergent seagrass and kelp. Access can be difficult.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** May dislodge emergent seagrass and kelp. Access can be difficult.	**Not recommended** **Weakness** Reduces effectiveness of deflection techniques. Exposes marine organisms in seagrass and kelp to toxic components of entrained hydrocarbons and dispersant.	**Not recommended**	**Not recommended**	Viable Deploy vessels / aircraft to deter wildlife e.g. birds from EMBA (only on specialist ecological advice). Strengths Can reduce direct wildlife contact with diesel / residues. Weakness Distress caused to wildlife.	Natural physical and biological degradation of spilt diesel in water to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] prior to it entering estuaries and reaching intertidal, emergent, subtidal aquatic vegetation.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water around intertidal rocky shores.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																		No visible hydrocarbon sheen within estuaries, particularly around intertidal, emergent and sub-tidal vegetation communities.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Visual aerial / vessel / land based inspection of estuaries and shorelines for evidence of hydrocarbon contamination.	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen.
																		Assessment of impacts to intertidal, emergent, subtidal aquatic vegetation attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between flora and fauna populations of intertidal, emergent, subtidal aquatic vegetation from post spill-pre-impact survey with spill afffected surveys.	Quadrat surveys in EMBA .	Intertidal, emergent, subtidal aquatic vegetation within pre-spill range of natural variability.
																		Assessment of impacts to shorebird feeding habits attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding habits from post spill-pre-impact survey with spill afffected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, numbers and foraging ecology of shorebirds.	Shorebird populations and feeding activity within pre-spill range of natural variability.

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Reference	**Inshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of diesel[3] on sensitive resource / beneficial use**	**Protection Priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Deflection**	**Monitoring and natural dispersion**	**Manual cleanup**	**Absorbent material**	**Mechanical debris and sediment removal**	**Washing (deluge, high/low pressure, hot/ambient water**	**Sandblasting / steam cleaning**	**Vacuum recovery**	**Chemicals e.g. dispersants[5]**	**Bio-remediation**	**Vegetation removal**	**Hazing to deter wildlife**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring & surveillance**	**Termination criteria[4]**
																			No hydrocarbons attributable to diesel spill detected in fish.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in fish from impact areas to control sites or acceptable global concentrations[15].	Concentration of hydrocarbons in fish (wet weight)[10] (only if stage 1 physical / chemical trigger values are exceeded).	Histopathological analysis of fish from impact sites[10].	No hydrocarbons in fish attributable to diesel spill. Concentration of hydrocarbon in fish do not exceed pre-impact concentrations or acceptable global concentrations.
Longtom EP. OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach.	3. Bare sediment	Mallacoota Inlet Special Management Area. Wingan Inlet. Sydenham Inlet - Bemm River and Mud Lake	Infauna communities. Food resource.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of nearby offshore islands, coastal reefs and intertidal ecosystems - Oiling of seabirds - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] Loss of food source - of particular importance for migratory shorebirds and seabirds.	1. Human health and safety 2. Habitat and cultural resources **Low**	Consider migratory bird patterns and beach nesting birds breeding in summer.	**PREFERED RESPONSE STRATEGY** Boom off entrance to potentially exposed inlets where possible. **Strengths** Minimises diesel contact with sensitive resources. **Weakness** Accessability may be limited.	**PREFERED RESPONSE STRATEGY** **Strengths** Avoids dealing with accessibility issues and additional disturbance of infauna habitat. **Weakness** Low wave action. Oil may persist for longer periods. High sedimentation rate incorporates oil into sediment. Perception of lack of response.	**Viable** **Strengths** Removes debris and hydrocarbon from the environment. **Weakness** Risk of increased damage to fauna and habitat due to accessibility issues.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Generates additional waste.	**Not recommended**	**Not recommended**	**Not recommended**	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Dislodges infauna and other marine organisms from sediment / mud flats.	**Viable** **Strengths** Helps to break down oil. **Weakness** Exposes inshore marine organisms to toxic components of entrained hydrocarbons and dispersant.	**Not recommended**	**Not recommended**	Viable Deploy vessels / aircraft to deter wildlife from EMBA (only on specialist ecological advice). Strengths Can reduce direct wildlife contact with diesel / residues. Weakness Distress caused to wildlife.	Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] prior to it entering estuaries and reaching bare sediment patches and infauna communities.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water within estuaries.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																			No visible hydrocarbon sheen in estuaries in proximity to bare sediment patches.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7] and on shore in accordance with Shoreline Assessment Field Guide.	Visual aerial / vessel / land based inspection of shorelines and estuaries for evidence of hydrocarbon contamination within estuaries. Percentage surface area covered. Thickness of oil above and below sediment surface (including any subsurface lens).	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen.
																			Assessment of impacts to infaunal communities attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison between infaunal communities from post spill-pre-impact survey with spill affected surveys. (only if stage 1 physical / chemical trigger values are exceeded).	Quadrat surveys in EMBA	Infauna communities within pre-spill range of natural variability.
																			Assessment of impacts to shorebird feeding habits attributable to spill.	Stage 1: TPH < 7 µg/L in water and Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding habits from post spill-pre-impact survey with spill affected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, numbers and foraging ecology of shorebirds.	Shorebird populations and feeding activity within pre-spill range of natural variability.
Longtom EP. OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach maps.	4. Marshes	Behind Mallacoota Entrance to Lake Barracoota. Wingan Inlet. Inside Cann River Estuary. Tamboon Inlet. Sydenham Inlet (Bemm River Estuary and Mud Lake). Dock Inlet. Inside Snowy River Estuary. Inside Lakes Entrance - Gippsland Lakes Ramsar Site.	Vegetation. Ecosystem protection - Largely unmodified ecosystem. Aesthetic enjoyment.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of nearby offshore islands, coastal reefs and intertidal ecosystems - Oiling of seabirds - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] Loss of food source - of particular importance for migratory shorebirds and seabirds.	1. Human health and safety 2. Habitat and cultural resources **High**	Consider migratory bird patterns and beach nesting birds breeding in summer. Determine whether inlets are open (can be "boomed off") or closed (no risk).	**PREFERED RESPONSE STRATEGY** Boom off entrance to potentially exposed inlets where possible. **Strengths** Minimises diesel contact with sensitive resources. **Weakness** Accessability may be limited.	**PREFERED RESPONSE STRATEGY** **Strengths** Avoids dealing with accessibility issues and additional disturbance of flora and fauna. **Weakness** Low wave action. Oil may persist for long periods. Clean up may do more damage. Perception of lack of response.	**Viable** **Strengths** Removes debris and hydrocarbon from the environment. **Weakness** Potential to increase physical disturbance to vegetation due to inaccessibility and handling of vegetation.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Generates additional waste.	**Not recommended**	**Viable** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Unable to recover hydrocarbon / wash water. Dislodges sessile fauna and other marine organisms on rocky substrates.	**Viable** **Strengths** Removes hydrocarbon from the immediate blast zone. **Weakness** Dislodges sessile fauna and other marine organisms. Spreads oil into the water column.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Dislodges vegetation, sessile fauna and other marine organisms.	**Viable** **Strengths** Helps to break down oil. **Weakness** Reduces effectiveness of containment and recovery techniques. Exposes inshore marine organisms to toxic components of entrained hydrocarbons and dispersant.	**Not recommended**	**Not recommended**	Viable Deploy vessels / aircraft to deter wildlife from EMBA (only on specialist ecological advice). Strengths Can reduce direct wildlife contact with diesel / residues. Weakness Distress caused to wildlife.	Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] prior to it entering estuaries and reaching marshes.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water within estuaries.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																			No visible hydrocarbon sheen in estuaries in proximity to marshes.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7] and on shore in accordance with Shoreline Assessment Field Guide.	Visual aerial / vessel / land based inspection of shorelines and estuaries for evidence of hydrocarbon contamination within estuaries.	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen.
																			Assessment of impacts to shorebird feeding habits attributable to spill.	Stage 1: TPH < 7 µg/L. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding habits from post spill-pre-impact survey with spill affected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, numbers and foraging ecology of shorebirds.	Shorebird populations and feeding activity within pre-spill range of natural variability.
Longtom EP. OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach.	5. Sandy beach and dunes	Full extent of SE coastline between Intertidal rocky shores. Includes: Ninety Mile Beach - Point Hicks Marine National Park. Tamboon Inlet Estuary (Intermittently open). Sydenham Inlet Estuary (Intermittently open). Yeerung River Estuary (Intermittently open). Salmon Beach. Ricardo Beach.	Shorebird/Seabird Roosting Site. Shorebird / seabird colony (roosting, nesting and/ or feeding). Tern nesting site. Hooded Plover nesting site (near Lake Reeve). Australian fur seals resting site and Cape Conran. Ecosystem protection - Largely unmodified ecosystem. Primary contact recreation. Secondary contact recreation. Aesthetic enjoyment.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling and contamination of nearby offshore islands, coastal reefs and intertidal ecosystems - Oiling of seabirds - Ingestion by seabirds, during feeding or preening, leading to poisoning - Pathological effects to fish larvae.[12] - Seepage of oily residues may impact infauna. Loss of food source - of particular importance for migratory shorebirds and seabirds. Unacceptable levels of taint or hydrocarbon	1. Human health and safety 2. Habitat and cultural resources 3. Rare and/or endangered flora and fauna **High**	Consider migratory bird patterns and beach nesting birds breeding in summer. Australian fur seals are mating and pupping in summer.	Preferred for targetted protection of particularly sensitive sites e.g. hooded plover nesting sites. Otherwise, generally not recommended. Strengths Minimises diesel contact with sensitive resources.	**PREFERED RESPONSE STRATEGY** **Strengths** Low density of biological populations. **Weakness** Oil may penetrate coarse grained sand rapidly up to 30cm. Public areas make exclusion difficult. Perception of lack of	**Viable** **Strengths** Effective cleanup and readily accessible. **Weakness** Re-working of oil in high energy beaches.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Significant volumes of waste generated.	**Viable** **Strengths** Large volumes can be removed. **Weakness** Spread of contaminated material by vehicles and poor waste management. Consider siting of waste collection and vehicle refueling. Impact on sensitive environment behind beach e.g.	Deluge - **Viable** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** High pressure will wash away sand. Unlikely that oil can be recovered. Oil may be removed from beach but re-surface elsewhere.	**Not recommended**	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Non-specific i.e. likely to capture large volumes of sand.	**Viable** **Strengths** Helps to break down oil. **Weakness** Reduces effectiveness of containment and recovery techniques. Exposes inshore marine organisms to toxic	**Viable** **Strengths** No additional chemical added to the environment. **Weakness** May require large volumes of material to be collected and relocated to a suitable impervious site.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Interference with sand stability.	Viable Deploy vessels / aircraft to deter wildlife from EMBA (only on specialist ecological advice). Strengths Can reduce direct wildlife contact with	Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] or a point to which no visible oil or waxy residue is detectable on sandy beaches. Minimise spread of contamination and beach disturbance.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water along coastline.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).

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Reference	**Inshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of diesel[3] on sensitive resource / beneficial use**	**Protection Priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Deflection**	**Monitoring and natural dispersion**	**Manual cleanup**	**Absorbent material**	**Mechanical debris and sediment removal**	**Washing (deluge, high/low pressure, hot/ambient water**	**Sandblasting / steam cleaning**	**Vacuum recovery**	**Chemicals e.g. dispersants[5]**	**Bio-remediation**	**Vegetation removal**	**Hazing to deter wildlife**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring & surveillance**	**Termination criteria[6]**
		Mots Beach. Snowy River Estuary (intermittently open). Bunga River Estuary (Intermittently open). Lakes Entrance - Gippsland Lakes Ramsar Site. Hooded plover nesting site on sandy beach adjacent to Lake Reeve.		Unacceptable levels of taint or hydrocarbon concentrations in fish, crustacean and molluscs for human consumption. Disruption to primary and secondary contact recreation activities e.g. diving, snorkeling, fishing, and aesthetic enjoyment.			Weakness Accessability may be limited.	response.			dunes and lagoons. Not suitable for soft sandy beaches.				components of entrained hydrocarbons and dispersant.	If bioremediation is in-situ, exclusion of public may be problematic. Oil is mobile and may impact other areas if refloated. Effectiveness is weather dependent - May leach after rain.		diesel / residues. Weakness Distress caused to wildlife.	No visible hydrocarbon sheen on water or on sandy beaches.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7] and on shore in accordance with Shoreline Assessment Field Guide.	Visual aerial / vessel / land based inspection of sandy beaches for evidence of hydrocarbon contamination. Percentage surface area of sandy beach covered with diesel. Thickness of oil above and below sand surface (include any subsurface lens).	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen along coastline. No visible hydrocarbon debris on sandy beaches.
																			Assessment of impacts to shorebird feeding habits attributable to spill. Minimal disturbance of shorebird feeding habits and nesting success.	Stage 1: TPH < 7 µg/L in water column or visible presence of waxy flakes / oil on sandy beaches. Stage 2: Baseline condition benchmarked post-spill pre-impact (only if Stage 1 exceeded)	Comparison of bird feeding / roosting and nesting habitats from post spill-pre-impact surveys, with spill affected surveys (only if stage 1 physical / chemical trigger values are exceeded).	Field survey of diversity, abundance and foraging ecology of shorebirds, nest success (if correct season).	Shorebird populations, feeding activity and nest occupancy within pre-spill range of natural variability.
																			No hydrocarbons attributable to diesel spill detected in fish.	Stage 1: TPH in water in fisheries area < 7 µg/L. Stage 2: Comparison of histopathological data of hydrocarbon concentrations in fish from impact areas to control sites or acceptable global concentrations[15].	Concentration of hydrocarbons in fish (wet weight)[10] (only if stage 1 physical / chemical trigger values are exceeded).	Histopathological analysis of fish from impact sites[10]	No hydrocarbons in fish attributable to condensate spill. Concentration of hydrocarbon in fish do not exceed pre-impact concentrations or acceptable global concentrations.
Longtom EP. OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach.	6. Cliffs / exposed rocky headlands	Behind Betka Beach and Secret Beach through to Little Rame Head Sandpatch Point. Wingan Point. Rame Head. Petrel Point. Point Hicks. Clinton Rocks. Tamboon Inlet. Pearl Point. Cape Conran (Needle Rocks, Irvine Rocks, Quincy Rocks Salmon Rocks). Ricardo Point.	Ecosystem protection - Largely unmodified ecosystem. Aesthetic enjoyment.	Changes to biochemical composition of water column. e.g. chemical and biological oxygen demand[13]. Impacts to the marine community including: - Oiling of littoral zone species. - Oiling of cliff dwelling avifauna plumage.	1. Human health and safety 2. Habitat and cultural resources **Low**	n/a	**Not recommended**	**PREFERED RESPONSE STRATEGY** **Strengths** Minimises worker exposure to highly dynamic environments. Wave reflections can help to keep oil offshore. **Weakness** Potential re-working of oil to more sensitive shoreline. Perception of lack of response.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Dangers associated with high energy dynamic environment.	**Viable** **Strengths** Removes hydrocarbon from the environment. **Weakness** Generation of wastes.	**Not recommended**	**Viable if sheltered. Not recommended if exposed.** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Unlikely to recover oil.	Viable if sheltered. Not recommended if exposed. Strengths Removes hydrocarbon from the immediate wash zone. Weakness Unlikely to recover oil. Dislodges organisms from cliff surface.	**Viable if sheltered. Not recommended if exposed.** **Strengths** Removes hydrocarbon from the environment. **Weakness** Dangers associated with high energy dynamic environment.	**Viable** **Strengths** Helps to break down oil. **Weakness** Reduces effectiveness of containment and recovery techniques. Exposes inshore marine organisms to toxic components of entrained hydrocarbons and dispersant.	**Not recommended**	**Not applicable**	Viable Deploy vessels / aircraft to deter wildlife from EMBA (only on specialist ecological advice). Strengths Can reduce direct wildlife contact with diesel / residues. Weakness Distress caused to wildlife.	Minimise remobilisation of hydrocarbon from exposed cliff faces at the waterline. Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3] or a point to which no visible oil or waxy residue is detectable on shoreline.	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water around cliffs and exposed rocky headlands.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																			No visible hydrocarbon sheen in proximity to rocky cliffs.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7] and on shore in accordance with Shoreline Assessment Field Guide.	Visual aerial / vessel / land based inspection of water in proximity to rocky cliffs. Percentage surface area covered.	Visual aerial / vessel / land based surveillance.	No hydrocarbon sheen from diesel spill visible on the water adjacent to exposed cliff faces.
Longtom EP. OSRA maps: Point Hicks-Cape Howe, Marlo-Point Hicks, Lakes Entrance and Ninety Mile Beach.	7. National, State, Regional or Unknown Coastal Sites of Geological Significance	Inside Mallacoota Inlet. Sandpatch Point. Rame Head. Point Hicks. Clinton Rocks. Cloke Rocks. Pearl Point. Dock Inlet. Yeerung River Estuary. Cape Conran. Jackson Beach. Mots Beach. Snowy River Estuary. Lake Tyers. Sperm Whale Head to Boole Pool Peninsula	Coastal rock formations. Non-indigenous cultural and spiritual values. Aesthetic enjoyment.	Visual impact.	1. Human health and safety 2. Habitat and cultural resources **Low**	n/a	**Not recommended**	**PREFERED RESPONSE STRATEGY** **Strengths** No additional disturbance to sites of geological significance. **Weakness** Extended duration of visual impact. Perception of lack of response.	**Viable** **Strengths** Reduces duration of visual impact. **Weakness** Potential for damage to sites of geological significance.	**Viable** **Strengths** Reduces duration of visual impact. **Weakness** Potential for damage to sites of geological significance. Generation of wastes.	**Not recommended**	**Viable** **Strengths** Reduces duration of visual impact. **Weakness** Potential for damage to sites of geological significance. Unlikely to recover oil.	**Viable if sheltered. Not recommended if exposed.** **Strengths** Removes hydrocarbon from the immediate wash zone. **Weakness** Potential for damage to sites of geological significance. Unlikely to recover oil.	**Viable if sheltered. Not recommended if exposed.** **Strengths** Removes hydrocarbon from the environment. **Weakness** Potential for damage to sites of geological significance. Dislodges organisms from rock surface.	**Viable** **Strengths** Helps to break down oil. **Weakness** Reduces effectiveness of containment and recovery techniques. Exposes inshore marine organisms to toxic components of entrained hydrocarbons	**Not recommended**	**Not applicable**	**Not applicable**	Minimise remobilisation of hydrocarbon from exposed cliff faces at the waterline. Natural physical and biological degradation of spilt diesel to a concentration below the trigger levels for TPH of 7 µg/L (ANZECC Water Quality Guidelines)[3]	ANZECC Water Quality Guidelines[3].	Hydrocarbon concentration in water around cliffs and exposed rocky headlands.	Sampling and analysis of TPH concentration in water within the EMBA sites as per Water Quality Monitoring Program (in prep.).	When hydrocarbons in water samples are below ANZECC Water Quality Guideline trigger value for TPH[3] (7 µg/L).
																			No visible hydrocarbon sheen from diesel spill on water around sites of geological interest.	Visual monitoring of hydrocarbon sheen on water in accordance with ITOPF Technical information papers[7].	Visual aerial / vessel / land based inspection around sites of geological for evidence of hydrocarbon contamination.	Visual aerial / vessel / land based surveillance.	No visible hydrocarbon sheen from diesel spill around sites of geological interest.
OSRA maps: Point Hicks-Cape Howe and Marlo-Point Hicks	8. Mangroves	Does not occur in EMBA as per Point Hicks-Cape Howe, Marlo - Point Hicks or Lakes Entrance OSRA maps.	Estuarine fish habitat. Vegetation. Ecosystem protection - Largely unmodified ecosystem. Secondary contact recreation. Aesthetic enjoyment.	Potential for promotion of morbidity, acute or chronic pathology or mortality of marine organisms due to: - Oiling of intertidal and littoral zone species. - Inhalation of hydrocarbon vapours by marine mammals. - Oiling of avifauna plumage. - Temporary changes to biochemical composition of water column. e.g. chemical and biological oxygen demand. (Volkman, Miller, Revill and Connell, 1994). Loss of fish nursery habitat. Loss of food source - of particular importance for migratory shorebirds and seabirds. Disruption to secondary contact recreation activities.	Not applicable as habitat type does not occur in EMBA.	Consider migratory bird patterns and beach nesting birds breeding in summer. Determine whether inlets are open (can be "boomed off") or closed (no risk).	Boom off entrance to inlets where possible	**Preferred** **Strengths** Causes least additional damage to most important marine habitat. **Weakness** Oil may persist for extended period (e.g. 1 year). Cleanup may do more Weakness than good.	Viable Strengths Removes debris and hydrocarbon from the environment. Weakness Potential to increase physical disturbance to vegetation due to inaccessibility and handling of vegetation.	Viable Strengths Removes hydrocarbon from the environment. Weakness Generates additional waste.	Not recommended	Preferred Strengths Removes hydrocarbon from the immediate wash zone. Weakness Unable to recover hydrocarbon / wash water. Dislodges sessile fauna and other marine organisms on rocky substrates.	Viable Strengths Removes hydrocarbon from the immediate blast zone. Weakness Dislodges sessile fauna and other marine organisms. Spreads oil into the water column.	Viable Strengths Removes hydrocarbon from the environment. Weakness Dislodges vegetation, sessile fauna and other marine organisms.	Viable Strengths Helps to break down oil. Weakness Reduces effectiveness of containment and recovery techniques. Exposes inshore marine organisms and mangroves to toxic components of entrained hydrocarbons	Not recommended	Not recommended Weakness Mangroves may be slow to recover.	Not recommended Weakness Mangroves may be slow to recover.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.

							Onshore response strategies for a MARINE DIESEL OIL (MDO) spill emanating from Longtom-5 - Note that no actional levels (surface or shoreline loads) are anticipated.											Performance Measures		Monitoring and surveillance		
Reference	**Inshore resource type**	**Segment / Location**	**Environmental Sensitivities and Beneficial Uses[2]**	**Potential impact of diesel[3] on sensitive resource / beneficial use**	**Protection Priority (Low, Medium High)[4]**	**Temporal / seasonal implications**	**Deflection**	**Monitoring and natural dispersion**	**Manual cleanup**	**Absorbent material**	**Mechanical debris and sediment removal**	**Washing (deluge, high/low pressure, hot/ambient water**	**Sandblasting / steam cleaning**	**Vacuum recovery**	**Chemicals e.g. dispersants[5]**	**Bio-remediation**	**Vegetation removal**	**Hazing to deter wildlife**	**Objectives**	**Standard**	**Measurement criteria / key indicators for monitoring**	**Means of monitoring & surveillance**	**Termination criteria[6]**
OSRA maps: Point Hicks-Cape Howe and Marlo-Point Hicks	9. Sheltered intertidal flats	Does not occur in EMBA as per Point Hicks-Cape Howe, Marlo - Point Hicks or Lakes Entrance OSRA maps.	Estuarine fish habitat. Shorebird/seabird roosting feeding sites. Ecosystem protection - Largely unmodified ecosystem.	Potential for promotion of morbidity, acute or chronic pathology or mortality of marine organisms due to: - Oiling of intertidal and littoral zone species. - Inhalation of hydrocarbon vapours by marine mammals. - Oiling of avifauna plumage. - Temporary changes to biochemical composition of water column. e.g. chemical and biological oxygen demand. (Volkman, Miller, Revill and Connell, 1994). Loss of fish nursery habitat. Loss of food source - of particular importance for migratory shorebirds and seabirds.	Not applicable as habitat type does not occur in EMBA.	Consider migratory bird patterns and beach nesting birds breeding in summer. Determine whether inlets are open (can be "boomed off") or closed (no risk).	Boom off entrance to inlets where possible	Viable **Strengths** Avoids dealing with accessibility issues and additional disturbance infauna habitat. **Weakness** Low wave action. Oil may persist for long periods.	Viable Strengths Removes debris and hydrocarbon from the environment. Weakness Risk of increased damage to fauna and habitat due to accessibility issues.	Viable Strengths Removes hydrocarbon from the environment. Weakness Generates additional waste.	Not recommended	Not recommended	Not recommended	Viable Strengths Removes hydrocarbon from the environment. Weakness Dislodges infauna and other marine organisms from sediment / mud flats.	Viable Strengths Helps to break down oil. Weakness Reduces effectiveness of containment and recovery techniques. Exposes inshore marine organisms to toxic components of entrained hydrocarbons and dispersant.	Not recommended	Not recommended	Deploy vessels / aircraft to deter wildlife from EMBA (only on specialist ecological advice). Strengths Can reduce direct wildlife contact with condensate / residues. Weakness Distress caused to	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.	Not applicable as habitat type does not occur in EMBA.
Native Title Services Victoria	10. Native Title held by members of the Gunai / Kurnai people (VID6007/98 and VID482/09).	Native Title Claims VID6007/98 and VID482/09 extends 200 metres offshore along much of the coastline between Lakes Entrance and Marlo.	Indigenous culture and spiritual values. The Native Title determination area covers approximately 45,000 hectares extending from west Gippsland near Warragul, east to the Snowy River and includes 200 metres of offshore sea territory. The determination concluded that Native title exists in non-exclusive native title rights and interests in parts of the determination area.	Loss of amenity and visual impact.	2. Habitat and cultural resources **Medium**	Not applicable	Viable for specific areas only.	**PREFERED RESPONSE STRATEGY.** **Strengths** Wave reflections can help to keep oil offshore. **Weakness** Perception of lack of response.	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not recommended	Not applicable	Consult with relevant indigenous communities.	Consultation undertaken.	Consultation with indigenous communities.	Evidence of consultation.	Evidence of consultation.

1 EP Selection of response strategy will be determined by conditions at the time.

2 SEPP WoV (State Environment Protection Policy - Waters of Victoria)Table 1
Beneficial uses for Marine and Estuarine "Open Coasts" (Refer to SEPP WoV Schedule F3 for Gippsland Lakes)
Ecosystem protection - Largely unmodified ecosystem.
Primary contact recreation - e.g. swimming, beaches, kayaking, recreational snorkeling / diving.
Secondary contact recreation e.g. Sailing, fishing
Aesthetic enjoyment e.g. Walking tracks, campsites, boat ramps, dive sites.
Indigenous culture and spiritual values
Non-indigenous cultural and spiritual values
Aquaculture
Industrial and commercial use e.g. Harbours and jetties, commercial fishing.
Fish, crustacean and molluscs for human consumption

3 Marine diesel toxicity range (LC_{50}) for marine organisms (Source: ANZECC Table 8.3.24):

Fish (n=3)	1.4-2.2 mg/L
Crustaceans (n=8)	0.3->4.5 mg/L
Molluscs (n=1)	0.6 mg/L
Annelids (n=6)	0.8-3.2 mg/L
Algae (n=6)	0.5->1.6 mg/L

The trigger value (low reliability) for diesel can be calculated by applying an Assessment Factor (AF) of 100 to the lowest acute figure outlined above i.e. for crustaceans. Once the AF is applied, the trigger value for diesel is 0.003 milligrams per litre.

4 Decisions on protection priorities at specific geographic locations need to be based on OSTM and the specific conditions at the time.

5 Corexit 9527 is a water-dilutable concentrate with an LC_{50} range of >100-<1000 mg/L (Source: ANZECC Table 8.3.25)
This includes a "moderate reliability" marine trigger value of 1100ug/L with 95% species protection.

6 Once any operation has been shown to be ineffective, likely to cause unacceptable additional damage to environmental or economic resources, or if the costs far exceed any possible benefits, it should be stopped (Source: ITOPF Response Strategies).

7 ITOPF (2011/2012) Aerial Observation of Marine Spills, Technical Information Papers 1, 6 and 14

8 NOAA (2001) Technical Memorandum NOS OR&R 9 Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill, Seattle, Washington

9 ANZECC (2000) Water Quality Guidelines s. 8.3.5.3 Sampling, analysis and interpretation

10 Paasiverta, J., Herzschuh, R., Lahtipera, M., Pellinen, J. and Sinkkonen, S. (1981) Oil residues in Baltic sediment mussel and fish. Development of the analysis method. *Chemosphere*. 10. 919-928.

11 ERIN Environmental Resources Information Network http://www.environment.gov.au/coasts/mpa/southeast/beagle/pubs/southeast-beagle-map.pdf

12 Ecos Consulting (Aust) Pty Ltd (2001) National Oceans Office South East Regional Marine Plan – Impacts on the Natural System Chapter 4, Impacts of Petroleum

13 Volkman, J.K., Miller, G.J., Revill, A.T. And Connell, D.W., (1994) 'Oil Spills'. In Swan, J.M., Neff, J.M. and Young, P.C., (Eds.), Environmental implications of offshore oil and gas development in Australia – the findings of an independent scientific review, pp 509-695; Australian Petroleum Exploration Association, Sydney.

14 The Australian Whale Sanctuary includes all Commonwealth waters from the three nautical mile state waters limit out to the boundary of the Exclusive Economic Zone (i.e. out to 200 nautical miles and further in some places).

15 Government of British Columbia (1993) Ambient Water Quality Criteria for Polycyclic Aromatic Hydrocarbons (PAHs) accessed at http://www.env.gov.bc.ca/wat/wq/BCguidelines/pahs/pahs_over.html#toc on 9 June 2012 (in the absence of any Australian or international standard for hydrocarbon in fish.)

16 Protection booming of Lakes Entrance mouth not viable due to tidal flows of >4 knots. Priority for Lakes Entrance is to prevent or minimise oil entering Cunninghame Arm and North Arm.

References: **Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) (the ANZECC Guidelines)**
National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances (NatPlan)
State Environment Protection Policy (Waters of Victoria) (Victoria Government Gazette No. S 107 4 June 2003) (SEPP WoV)

Appendix F – Sampling Guideline

Task			Action	Status
1	Establish reason for sampling and obtain any specific sampling, sample handling requirements or equipment requirements from the receiving laboratory. In particular:			
	a	Number of replicate samples.		
	b	Type of container.		
	c	Volume of sample needed.		
	d	Cooling needs and time needed to get to laboratory.		
2	Sampling from the surface of water:			
	a	Thin films:		
		i	Use sorbent discs/pads made from glass wool, Teflon (PTFE) wool or stainless steel gauze.	
		ii	Applied lightly to the water surface and then placed inside an airtight container (see 5) for transport to the laboratory.	
		ii	The use of synthetic sorbents is not recommended. If used send a clean sample of the sorbent to the laboratory also.	
	b	Thick slicks:		
		i	In the absence of specialised equipment, collect using clean buckets, dustpans and wide-necked jars.	
3	Sampling from solid surfaces:			
	a	Viscous oils and tarballs can be scraped off surfaces using clean steel or wooden spatulas or spoons, and placed into sample containers.		
	b	Oil adhering to sediment, seaweed, small pieces of wood, plastic materials or other debris may be collected by placing the oil and substrate material, into the sample container.		
	c	Note: Oil samples should not be taken by washing oil from surfaces and no attempt should be made to heat or melt samples taken from solid surfaces so as to enable them to flow into a container.		
4	Sampling from wildlife:			
	a	Cut oiled feathers or fur and place in containers.		
	b	Cut un-oiled feathers or fur and send for analysis also.		
	c	Avoid taking samples from specimens that have been stored in plastic containers.		
5	Place each sample into a container:			
	a	Clean glass jars (250-500 ml) with wide mouth should be used		
	b	Caps of the glass jars or bottles should be lined with either metal foil or be made of Teflon (PTFE).		
6	Label each sample container with:			
	a	Identification code or sample number.		
	b	Date and time of sampling.		
	c	Brief description of sample and collection point location.		
	d	Name of person taking sample (and witness).		

7	Complete and attach a Chain of Custody label to each jar. This should contain the information on the label (see 6) and also:			
	a	Signature and printed name of person who collected the sample.		
	b	Signature and printed name of person who witnesses the sample collection.		
	c	Chain of Custody record, i.e. repeated sequence of:		
		i	Sample handed/sent to.	
		ii	Signature.	
		iii	Date.	
		iv	Sample received by.	
		v	Signature.	
		vi	Date.	
8	Separately record the following information on a Sample Record:			
	a	Identification code or sample number.		
	b	Date and time of sampling.		
	c	Description of sample.		
	d	Accurate location from which sample was taken.		
	e	Name, organisation and address of person collecting the sample.		
	f	Name, organisation and address of independent person witnessing sample collection.		
	g	Sample ownership (for who was it collected).		
	h	Method of sampling (describing any special technique or equipment used).		
	i	Particulars of any photographs taken.		
	j	Other relevant information e.g.:		
	k	i	suspected source.	
	l	ii	suspected contamination of the sample i.e. have detergents been used and if known their type and make.	
	m	Chain of Custody record (see 7 above).		
9	Send copy of the sample record to the laboratory.			
10	Store sample:			
	a	In refrigerators or cold rooms (at not more than 5 ^{o}C) and in the dark.		
	b	Ensure that room is secure or else place sample bottles/jars in containers with tamper proof seals.		
	c	For samples that may be stored for more than 24 hrs: To prevent biological degradation of wet samples, the addition of 1 ml of 50% hydrochloric acid per litre of water samples is recommended. Additionally, displacement of air from the container with nitrogen or carbon dioxide can help to prevent degradation of the sample.		
	d	Ensure sufficient space has been allowed in the container for any expansion of the sample that might occur.		
11	Transport samples safely. Contact aerial carrier for specific conditions.			

End of the sampling guideline.

Appendix G - APASA Reports on Longtom Condensate and Diesel Weathering

MEMORANDUM

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TO: Phil Harrick
AGR on behalf of Nexus Energy

DATE: 24th June 2012

FROM: Trevor Gilbert
Director Maritime, Environment and Chemical Services
Asia Pacific ASA

REFERENCE:

RE: ***Marine Diesel Fuel Oil Spills and Weathering***

Mr Phil Harrick of AGR of behalf of Nexus Energy requested that I provide him with a considered opinion to estimate the quantity the extent of oil residues, their physical properties and potential aquatic toxicity of Marine Diesel Oil (MDO) after weathering at sea.

It is my considered opinion that in many circumstances a spill of marine diesel fuel oil is of greater environmental consequence than a spill of a similar quantity of light condensate oils.

Marine Diesel Fuel Oil (MDO)

- MDOs and automotive diesel fuels (ADOs) are usually a dark yellow or clear highly mobile boiling point fraction from crude oil.
- Diesel oil hydrocarbons will depend upon the refining process and the nature of the source crude oils used by that refinery.
- MDOs usually have a very narrow boiling point range unless doctored with heavy fuel oil which in the trade is called “dirty diesel”. Most commercial MDOs supplied to offshore vessels are a kept within a tight technical specification and most operators refrain from using dirty diesel in the off-shore industry.
- Diesel fuel oils are dominated by n-alkane hydrocarbons that give diesel its unique compression ignition characteristics.
- MDOs usually consist of carbon chain C11-C28 but may vary depending upon specifications (e.g. winter vs. summer grades).
- When spilt at sea, MDOs will spread and thin out quickly and more than half of the oil volume can be lost by evaporation within 12 hours depending upon sea temperature and winds.

- MDOs have low viscosities and can be physically dispersed as fine droplets into the water column when winds exceed 10 knots. Natural dispersion of MDOs will reduce the hydrocarbons available to evaporate.

- Different MDO products, and different environmental conditions, sea temperature, wind and sea states; can vary the quantities of hydrocarbons lost during marine spills to the atmosphere due to evaporation (40-65%), dispersion into the sea by the action of wind and waves (25-50%) and dissolution (solubility of hydrocarbons) (1-10%).

- The environmental effects of MDOs are not as visually obvious as those of heavier fuel oils or crude oils.

- MDOs are considered to have a higher aquatic toxicity in comparison to many other crudes oils and condensates.

- Dispersed droplets of diesel are more bio-available to marine organisms than floating diesel spills.

- MDOs (marine diesel oil) are considerably more toxic, with a high potential to bioaccumulate, have high water solubility and a higher potential to naturally entrain into the water column than HFOs (Figure 1 below).

- Diesel spills increase the exposure (in comparison to HFO spills) to sub-tidal habitats, sea-grasses, corals, fish, mari-culture, shellfish, crustaceans and benthic life

- Droplets of diesel oil that are naturally or chemically dispersed will be sub-surface and will behave quite differently to surface oil. Diesel droplets will now move 100% with the currents under water but on the surface are affected by both wind and currents.

- Diesel oil in the water column can adhere to fine-grained suspended sediments which can settle out and result in oiled sediments being deposited on the seabed.

- Subsurface diesel releases are significantly more problematic than surface releases because entrained diesel hydrocarbons increases the aquatic toxicity in the water column and reduces level evaporation of light hydrocarbons.

- MDOs and automotive diesel spills are known to taint seafood.

- Diesel has a greater impact on mangrove systems due to its toxicity and its ability to penetrate protective waxes of the plants.

- MDO spills can still affect seabirds and marine mammals due to the increased hydrocarbon vapour exposure to air breathing mammals, turtles and other marine life.

- MDO spills that reach shorelines are usually still mobile residues and will penetrate shoreline sediments due to the low viscosity of the oil and have direct consequences on in-faunal organisms.

- According to IMO (ESPH 16/6/1 September 2010) diesel oil has a GESAMP rating of 3 for acute toxicity (damage to living organisms) and 4 for bioaccumulation/tainting (4= high potential to bioaccumulate, 5 scale is the highest)

- And finally, although many MDOs and diesel fuels are thought to be non-persistent it is a fact some MDOs can contain approximately 3-7 % by volume of hydrocarbons that are classified as "persistent" under IOPC Fund definition (i.e. greater than 5% boiling above 370C). Only a

full boiling point assay will provide guidance as to the quantity and nature of any persistent residues.

- It is common for the residues of diesel spills after weathering to contain n-alkanes, iso-alkanes and naphthenic hydrocarbons. Minor quantities of PAHs will be present.

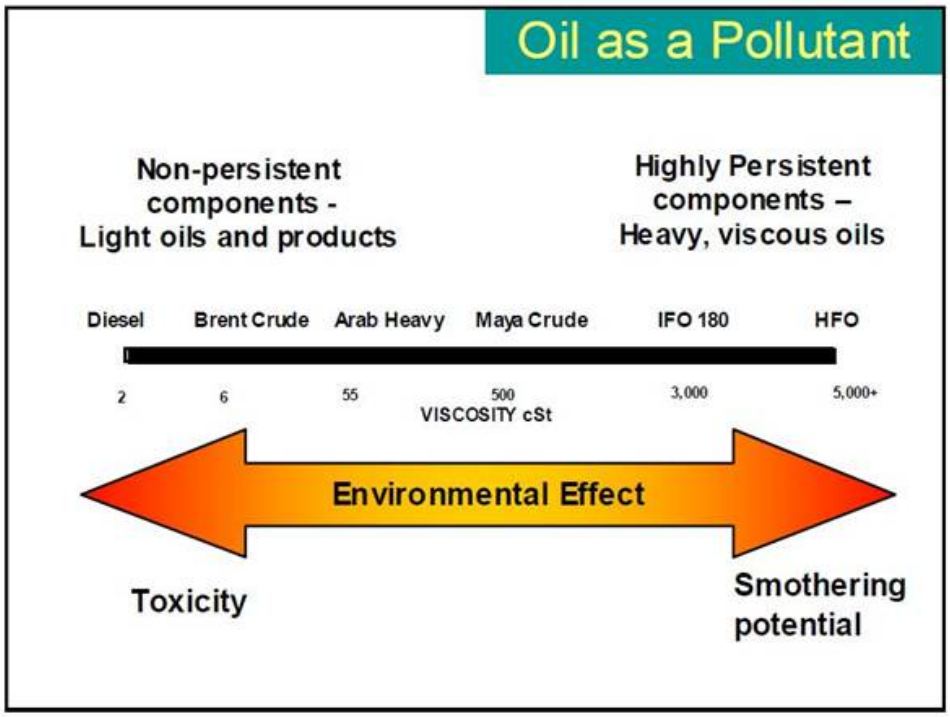

Figure 1 Various oil types persistence and environmental effects.

Appendix 1 – Credentials

My full name is Trevor David GILBERT and I am a Senior Scientist, Maritime, Environment and Chemical Services and Director of the private company Asia Pacific Applied Science Associates (APASA) P/L based in Queensland with 32 years of professional experience as an environmental scientist, marine pollution emergency responder, qualified chemist and oil exploration geochemist.

Prior to joining APASA I was the Chemical and Environment Response Manager in the Emergency Response Division in the Australian Maritime Safety Authority (AMSA) and was employed by AMSA for 12 years at the Canberra headquarters.

Previous to that I held the position of Principal Adviser Scientific and Environment at AMSA. My qualifications are a Degree in Applied Science and Graduate Diploma in Environmental Studies and my professional experience as a qualified chemist and environmental scientist spans over 28 years with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), power and mining industry, United Nations environment agency, State and Commonwealth governments and private industry.

I have authored 103 papers in the international and local scientific literature and have managed a series of projects for oil and chemical spill response and preparedness on behalf of Australia's National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances. At AMSA I was the designated Environment and Scientific Co-ordinator for oil and chemical spills in Commonwealth waters for 12 years and the environmental adviser on the National Response Team and have provided technical advice and support in a number of marine spill incidents in the Pacific, Asia and New Zealand.

A full CV and publication list can be provided on request.

MEMORANDUM

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TO: Phil Harrick
AGR on behalf of Nexus Energy

DATE: 22nd June 2012

FROM: Trevor Gilbert
Director Maritime, Environment and Chemical Services
Asia Pacific ASA

REFERENCE:

RE: ***Weathering Characteristics of Longtom-4 Condensate***

Mr Phil Harrick of AGR of behalf of Nexus Energy requested that I provide him with a considered opinion to estimate the quantity the extent of oil residues, their physical properties and potential aquatic toxicity of the hydrocarbon residues of Longtom-4 condensate after weathering at sea.

My opinion below is based upon the available oil assay data provided by Nexus Energy Service Pty Ltd of the 22nd February 2009 laboratory report from INTERTEK Petroleum Testing Laboratory in South Australia entitled, "*Final Report Longtom-4 Condensate Assay".*

The following are a series of questions and answers related to the chemical and physical nature of the Longtom-4 condensate, predicted behaviour on release at sea, weathering rates and residues. My credentials and qualification for this considered opinion are attached in Appendix 1.

Q1- How much hydrocarbon residues would result from weathered Longtom-4 condensate?

The Longtom-4 condensate is a low viscosity, low pour point and highly evaporative oil with a density of 0.7744 gm/cm^3 at 15^{o}C. On release at sea the Longtom-4 condensate would quickly spread on the sea surface and thin out resulting in a large surface area of oil for evaporation of the lighter hydrocarbon components. A high wind speed prevailing in Bass Strait would lead to increased evaporation and reduction in residues; alternatively lower sea temperature and wind speeds would lower the evaporation rate.

To determine the quantity of residues I have plotted the boiling point distribution, taken from the oil assay of the Longtom-4 condensate, and compared the condensate to a range of oils and condensates (Figure 1). Hydrocarbons boiling above 370^{o}C in temperature are considered "persistent hydrocarbons" for the purposes of oil spill classification in the United States (EPA & Coast Guard Regulations.) and under International Oil Pollution Compensation (IOPC) Fund categorisation. Any more than 5% residues above 370^{o}C would require the oil to be classified as persistent.

Based upon the oil assay provided by Nexus Energy, approximately 3% by volume of the Longtom-4 oil would be considered persistent hydrocarbons under international oil property benchmarks and the Longtom-4 condensate is therefore considered non-persistent oil.

I have also plotted in Figure 1 the boiling point distributions for the Montara oil (Timor Sea), Deepwater Horizon (Gulf of Mexico spill) and the North Slope Alaskan crude (Exxon Valdez oil spill). The Longtom-4 condensate is only slightly heavier in nature than the North West Condensate but significantly lighter in hydrocarbon components than the other crude oils used in this comparison.

Q2 - So what are these Longtom-4 hydrocarbon residues and what are the predicted properties?

Based upon my interpretation of the properties of the Longtom-4 condensate, I would say that the Longtom-4 condensate once spilled and available to the atmosphere on the water surface would evaporate the majority of the lighter hydrocarbons within the first day of release. The residues, after one day weathering at sea, was estimated at about 3% by volume and would be semi-solid in nature at the average sea surface temperature of Bass Strait.

In Figure 2, I have plotted the boiling points and freezing points for the straight chain hydrocarbons (n-alkanes) typically found in oil. The hydrocarbons that would be solid (freezing point) at the temperature of the sea (tropical conditions- approximately 27-30^{o}C) would be above the carbon chain 19 (n-C19 and above). The cut-off for oils that will weather at sea in the period of a few days would be about the same as that of diesel components. So above the 370^{o}C boiling point, the cut-off for persistent hydrocarbon residues is approximately the carbon chain 22. Hence weathered oil residues are usually n-C22 hydrocarbons and above.

In the assay of the Longtom-4 reservoir fluids provided, predominantly n-alkane and iso-alkane hydrocarbons appear to be present in the various condensate fractions (50-60% of the boiling point fractions). The weathered residues of the Longtom-4 condensate will comprise mostly straight chain normal alkane (n-alkane) and branched chain hydrocarbons (iso-alkanes) commonly called “paraffins”. The range of paraffins in the residues is predicted to be between n-C22 to n-C27 in chain length.

The paraffins residues in Longtom-4 condensate oil will always remain afloat (density of 0.8273 for the 290^{o}C+ fraction) as the oil spreads out and thins while it weathers at sea. As the residues become semi-solid (freezing point above sea temperature) and is no longer liquid it will begin to form thin clear sheets and white crystalline pancakes. These waxy sheets/pancakes will then begin to break up into small white waxy flakes due to the action of the waves and wind over time.

I have reproduced in Figure 3 a field survey picture taken from the Montara oil well blowout and spill response and this picture represents what I would expect the waxy weathered residues of Longtom-4 condensate would have the same appearance.

Q3- What might be the environmental impacts of these waxy residues from Longtom-4 Condensate?

As stated previously from the assay report provided, we have deduced that the weathered residues of Longtom-4 condensate will comprise mostly normal and iso alkanes (paraffins) between n-C22 to n-C27 in carbon chain length.

Hydrocarbons that cause most of the “aquatic toxicity” in oil spills are usually the smaller aromatic and soluble components of oil (1 and 2 ring aromatics) or the persistent poly aromatic hydrocarbons (PAHs). The weathered residues of Longtom-4 I believe would not have levels of these aromatic components present that would pose a significant aquatic toxicity problem.

Paraffins are hydrocarbon components that are used in everyday life in households and industry. That is they are ubiquitous in the environment from natural sources as well as man-made sources. Candles, wax seals, cosmetic and medical ingredients, shoe waxes, creams, coatings, waxed drinking cups; lubricants etc are examples of the uses of paraffin waxes in common use.

Paraffins being high molecular weight, odourless and insoluble, the eco-toxicity of these components are negligible. As bacteria preferentially consume these n-alkane hydrocarbons it demonstrates that these components are “food” for the food chain and not toxins or nor poisonous.

The mineralisation (complete biodegradation) of a petroleum molecule in waters and soil is almost always a consequence of microbial activity. The rate of mineralization of petroleum hydrocarbons is a function of the surface area of exposure to bacterial action, the type and quantity of the active microbes. The main physico-chemical factors include the type of hydrocarbons present, the availability of dissolved oxygen, nutrient type and quantity, the microbial populations, the surface area of oil available to microbes, hydrocarbon water solubility, viscosity, diffusivity and surface tension. Predicting biodegradation rates in the field is difficult but most laboratory and scientific studies have shown paraffin hydrocarbons are “readily biodegradable” using the OECD 306 testing protocol.

The EHS Working Group of GESAMP (Group of Experts on the Scientific Aspects of Marine Environmental Protection) strives to evaluate the hazards of bulk chemicals carried by ships to the environment and human health. This became the GESAMP hazard profile which based on the following standard: bioaccumulation, aquatic toxicity, acute toxicity to mammals, skin and eye irritation and interference with amenities (GESAMP, 2007). GESAMP hazard profiles provide an updated set of criteria for evaluating the hazards of chemical substances. In the Table 1 attached I have duplicated the latest GESAMP rating for paraffin waxes (CAS 8002-74-2) which states that they are “readily biodegradable” (A2=R), no acute toxicity (B1=0), no acute mammalian toxicity (C) and low ratings for human health.

Predicting the behaviour of oil residues on the environment and wildlife is always problematic but I can make the following conclusions based upon the oil weathering and properties.

Minor quantities of waxy residues on shorelines would have a minimal impact. Significant quantities of these residues would need to be present on a shoreline to do physical damage to bird life (coating of feathers), turtles breeding etc. Small waxy flakes may be accidentally eaten by sea snakes, turtles or fish mistaking them for food and consumed.

Predicting wildlife impacts are based upon a number of factors including, amount of oil present, region covered by oil, route of exposure and nature of the oily residues. Sticky residues pose a larger threat compared to non-sticky flakes of wax. I would expect that from this quick modelling of oil fate any exposure to sticky (partially fluid) residues within 24 hours would be the window to consider. Using “average sea and wind conditions” in the OILMAP modelling responders would need to consider the footprint of oil that travels within a 24 hour period from the release point as a zone of concern for mobile or sticky fluid residues.

If oil reaches land either on exposed reefs and shorelines waxy oily residues would no longer be cooled by the mass of the sea and could change physical properties as it heats in the sun (i.e. melt in the sun and begin to flow once more). Hence some sticky paraffin wax residues may exist on shorelines until “cooked” by the action of the sun and wind into hard solid residues.

Q3- What might some of the response techniques to mitigate the waxy residues from Longtom-4 Condensate near shorelines?

Due to the high volatility and potentially flammable and hazardous nature of fresh condensate spills personnel would be unlikely to be able to work safely close to fresh condensate spills to contain and recover at sea. Also the nature of the oil residues being semi-solid sticky waxy residues and the high energy state of Bass Strait for most of the year it is likely that conventional offshore booming and skimming would not be wise, nor practical or possible. It is suggested therefore that polypropylene snare mops and booms be considered for absorbing and snaring semi-solid weathered oil residues near shore. These were used successfully during the Macondo spill in the Gulf of Mexico. (Please see photos Figure 4)

Appendix 1 – Credentials

My full name is Trevor David GILBERT and I am a Senior Scientist, Maritime, Environment and Chemical Services and Director of the private company Asia Pacific Applied Science Associates (APASA) P/L based in Queensland with 32 years of professional experience as an environmental scientist, marine pollution emergency responder, qualified chemist and oil exploration geochemist.

Prior to joining APASA I was the Chemical and Environment Response Manager in the Emergency Response Division in the Australian Maritime Safety Authority (AMSA) and was employed by AMSA for 12 years at the Canberra headquarters.

Previous to that I held the position of Principal Adviser Scientific and Environment at AMSA. My qualifications are a Degree in Applied Science and Graduate Diploma in Environmental Studies and my professional experience as a qualified chemist and environmental scientist spans over 28 years with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), power and mining industry, United Nations environment agency, State and Commonwealth governments and private industry.

I have authored 103 papers in the international and local scientific literature and have managed a series of projects for oil and chemical spill response and preparedness on behalf of Australia's National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances. At AMSA I was the designated Environment and Scientific Co-ordinator for oil and chemical spills in Commonwealth waters for 12 years and the environmental adviser on the National Response Team and have provided technical advice and support in a number of marine spill incidents in the Pacific, Asia and New Zealand.

A full CV and publication list can be provided on request.

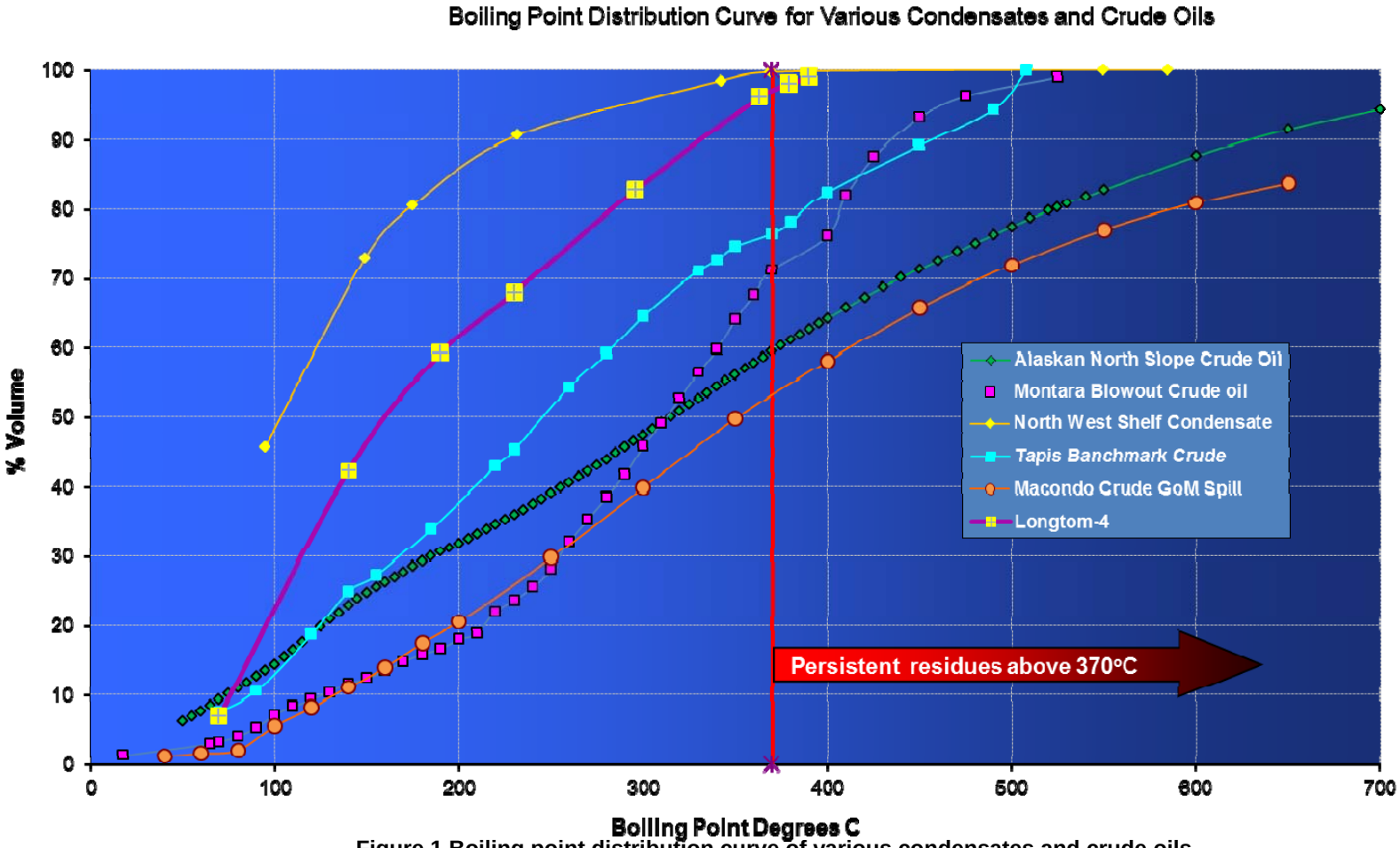

Figure 1 Boiling point distribution curve of various condensates and crude oils

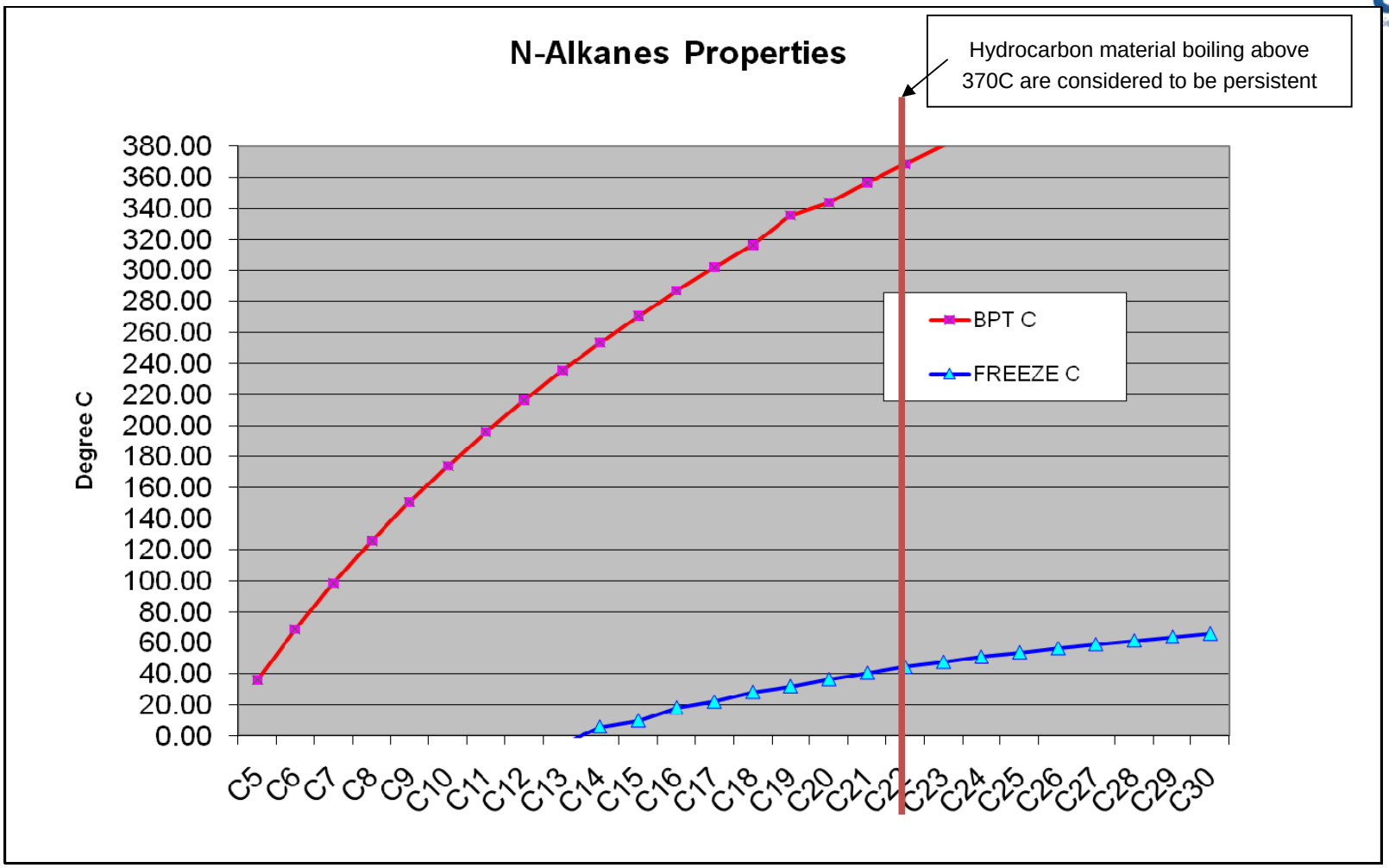

Figure 2 Physical properties of straight chain n-alkanes (paraffins)

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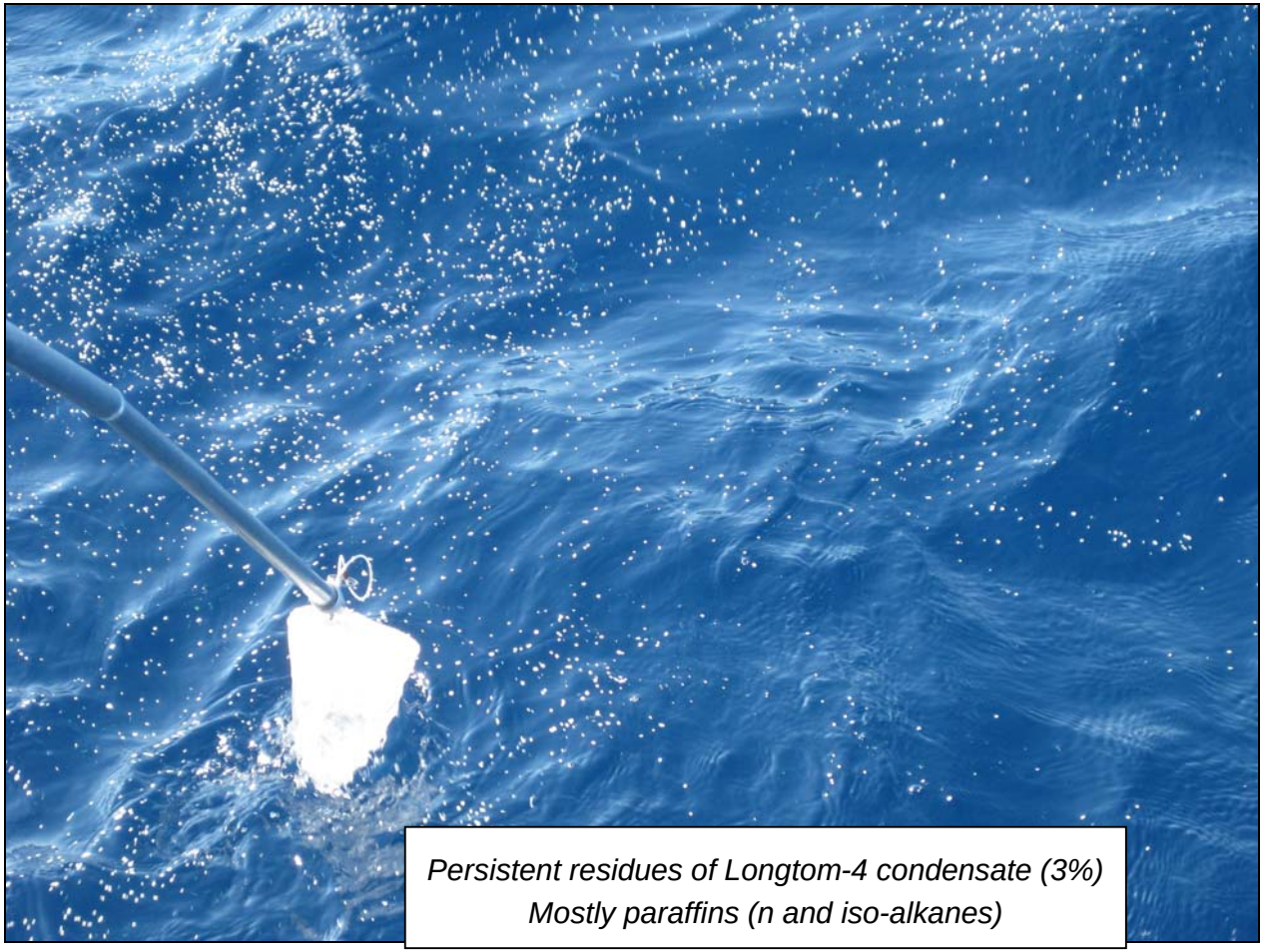

Figure 3: Highly weathered oil residues paraffin wax flakes, approximately 3.5nm NNE of the Montara well head,

Location: 12.6147S 124.5617E on the 3rd October 2009. (Image courtesy of Leeder Consulting.)

Table 1 GESAMP classification and Hazard Profile of Paraffin Wax (2010)

ANNEX 7 - GESAMP/EHS COMPOSITE LIST
GESAMP Hazard Profiles

EHS Name / TRN Name	EHS TRN	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3
Oxygenated aliphatic hydrocarbon mixture	2825		RTECS No						CAS No							
Palm acid oil	2307	(0)	NI	(0)	(R)	(0)	NI	0	(0)	(1)	0	1			Fp	2
Palm acid oil	3037		RTECS No						CAS No							
Palm fatty acid distillate	2310	NI	NI	(0)	(R)	(0)	NI	0	(0)	(1)	0	1			Fp	2
Palm fatty acid distillate	3040		RTECS No						CAS No							
Palm nut oil fatty acid	1095	0	NI	0	R	(3)	NI	0	0	(2)	1	2			Fp	2
Palm kernel acid oil	553		RTECS No						CAS No							
Palm kernel fatty acid distillate	2335	(0)	0	0	R	(3)	NI	0	(0)	(2)	1	2			Fp	2
Palm kernel fatty acid distillate	3111		RTECS No						CAS No							
Palm nut oil	1094	0	NI	0	R	1	NI	(0)	(0)	(1)	(0)	(1)			Fp	2
Palm kernel oil	2766		RTECS No						CAS No							
Palm kernel olein (containing less than 5 % free fatty acids)	2308	(0)	NI	(0)	(R)	1	NI	(0)	(0)	(0)	(0)	(0)			Fp	2
Palm kernel olein	3038		RTECS No						CAS No							
Palm kernel stearin (containing less than 5% free fatty acids)	2309	0	(0)	(0)	(R)	0	NI	(0)	(0)	(0)	(0)	(0)			Fp	2
Palm kernel stearin	3039		RTECS No						CAS No							
Palm Mid Fraction	2363	(0)	NI	(0)	(R)	(0)	NI	0	0	(0)	(0)	(0)			Fp	2
Palm mid-fraction	3126		RTECS No						CAS No							
Palm oil (containing less than 15% free fatty acids)	2249	0	NI	0	R	0	NI	0	(0)	(0)	0	0			Fp	2
Palm oil	2764		RTECS No						CAS No							
Palm oil fatty acid methyl ester	1097	0	NI	0	R	0	NI	0	0	0	0	1			Fp	2
Palm oil fatty acid methyl ester	554		RTECS No						CAS No							
Palm olein	2250	0	NI	0	R	0	NI	0	(0)	(0)	0	0			Fp	2
Palm olein	2765		RTECS No						CAS No							
Palm stearin	2251	0	NI	0	R	0	NI	0	(0)	(0)	0	0			Fp	2
Palm stearin	555		RTECS No						CAS No							
Paraffin wax	1086	0	NI	0	R	0	NI	(0)	(0)	(1)	1	1			Fp	2
Paraffin wax	556		RTECS No		RV0350000				CAS No		8002-74-2					

Figure-4: Examples of polypropylene snare booms and “pom-poms” used to absorb and trap oil in the near-shore zone.