Section

2

Non-operational Section

1 Introduction

1.1 OPEP Design

This Oil Pollution Emergency Plan (OPEP) has been prepared to provide BP Exploration Operating Company Limited (hereinafter referred to as 'BP') offshore response personnel with the information and processes necessary to implement an effective and proportionate response in the event of hydrocarbon release (and appropriate notification of a chemical release) originating from the Clair Ridge Platform and associated facilities.

In accordance with UK regulatory requirements and relevant guidance[4], this OPEP details a three-tiered response capability based on the following key factors:

- Hydrocarbon types
- Hydrocarbon properties
- Potential quantities
- Metocean data (meteorological and oceanographic)
- Environmental and economic sensitivities
- The combined response capabilities of both BP and their contractors

1.2 OPEP Structure and Use

The response arrangements covering a hydrocarbon release from the Clair Ridge platform and associated infrastructure are detailed in two separate OPEPs:

1. **Offshore Asset-specific OPEP:**

   Designed specifically for use by the offshore response personnel, this OPEP has been sub-divided into three sections to fulfil its operational as well as mandatory requirements:

   - Section 1 Operational Section:

     This section details all the necessary operational information and guidance that may be required by responding personnel offshore to determine and enact an appropriate response. The information is presented in a sequence expected to be followed in the event of a release and is concise in content to facilitate clear focus on the required actions to be undertaken offshore.

4 SI 1998/No 1056 The Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation Convention) Regulations 1998, SI 2002/No 1861 The Offshore Installations (Emergency Pollution Control) Regulations 2002 and Guidance Notes for Preparing Oil Pollution Emergency Plans For Offshore Oil & Gas Installations and Relevant Oil Handling Facilities, dated May 2015.

- Section 2 Non-operational Section:

  This section details the supporting Clair Ridge Platform information necessary to align the document with the regulatory planning requirements[5]. In order to streamline the document non-operational sections are supported by information detailed within the operational section and will require an element of cross-referencing by the reader.

- Section 3 Response Justification:

  This section details provides supporting information to justify the levels of response preparedness specified in the OPEP for operations in the Clair Field, situated in the United Kingdom Continental Shelf (UKCS) and operated by BP on behalf of itself and its partners as licensees of the field.

2. **Onshore Oil Pollution Emergency Plan (UK-PLN-4.6-1002)**:

   The Onshore OPEP is designed to be used by the Dyce Incident Management Team (IMT) and cross-referenced/interfaced with the offshore OPEPs, such as this document, where necessary.

To assist in referencing between the two documents, the following navigation key has been developed.

Onshore OPEP	ROn 1 Refers to Operational Response section detailed within the Onshore OPEP. 1 # Numbering refers to the Non-Operational section of the Onshore OPEP.
Offshore OPEP	**ROff 1 Refers to Operational Response section detailed within the relevant Offshore OPEP.** **1 # Numbering refers to the Non-Operational section of the Offshore OPEP.**

5 SI 1998/No 1056 The Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation Convention) Regulations 1998, SI 2002/No 1861 The Offshore Installations (Emergency Pollution Control) Regulations 2002 and Guidance Notes to Operators of UK Offshore Oil and Gas Installations (including pipelines) on Oil Pollution Emergency Plan Requirements.

In addition, where a Non-Production Installation (NPI) is due to operate at Clair Ridge, the following additional documentation will be required:

1. **Communication and Interface Plan:**

   The Communication Interface Plan (CI Plan) details the communication pathways to be followed, as well as the respective roles of those on board both the Clair Ridge and the NPI in the event of a hydrocarbon release from said NPI. The CI Plan also defines the primacy arrangements between BP and the NPI in various scenarios.

2. **Non Production Installation OPEP:**

   The NPI OPEP shall apply to the NPI whilst it operates as a separate entity, and is independent in function from the Clair Ridge. When the NPI is on station at Clair Ridge, the NPI OPEP is superseded by the CI Plan and this OPEP.

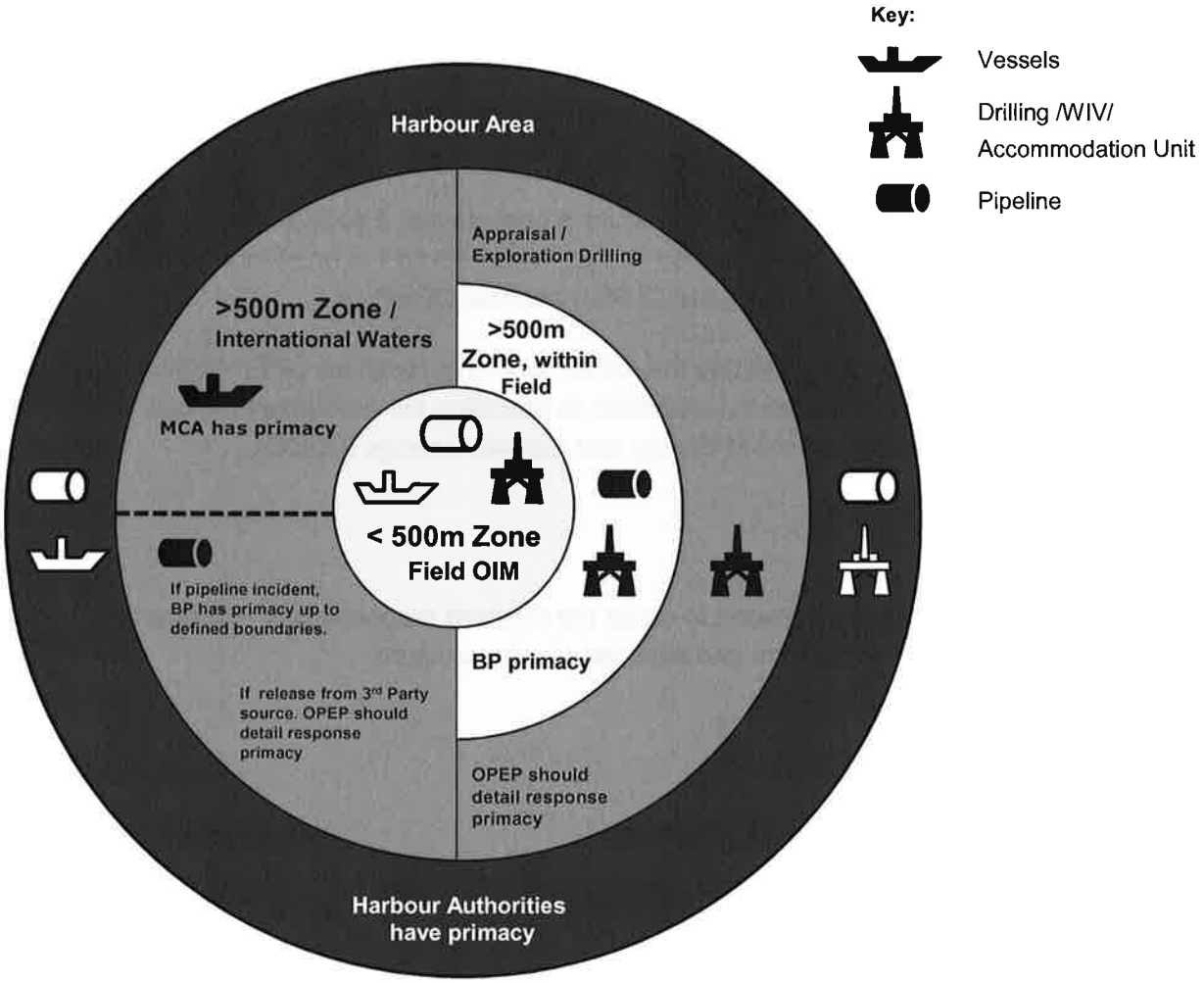
All personnel expected to access and use this OPEP will have received OPEP familiarisation training covering its use and application, in addition to attending the mandatory Oil Spill Response courses stipulated by the Department of Energy and Climate Change (DECC).

1.3 Scope of OPEP

This Offshore OPEP has been prepared to cover the offshore response to a hydrocarbon release from the Clair Ridge Platform and associated infrastructure.

2 Roles and Responsibilities

The figure below illustrates the boundaries of Primacy between various parties, and in various scenarios.



2.1 Hydrocarbon Release within 500m Safety Zone of the Clair Ridge Platform

In the event of a release occurring within the 500m safety zone of the Clair Ridge Platform, the OIM will initially assume the role of On-scene Commander (OSC) and is responsible for undertaking all possible measures to control the release, notifying all relevant statutory and corporate entities and mobilising Tier 1 response resources as deemed necessary. Further assistance can be provided through the Dyce IMT if required.

2.2 Hydrocarbon Release outwith 500m Safety Zone of the Clair Ridge Platform from a BP-operated source

If a release occurs out with the 500m safety zone of the Clair Ridge Platform from a BP-operated source, BP will co-ordinate the response using both offshore and onshore response teams as required. The OIM will undertake the necessary actions to secure the safety of personnel and locate/shut down the source of a release. The Dyce IMT will then take the lead in co-ordinating and mobilising a response thereafter.

2.3 Hydrocarbon Release outwith 500m Safety Zone from an Unknown Source

Where the source of a release is unknown, BP will mobilise the appropriate emergency response and make all relevant notifications. As soon as the source is identified, the relevant asset Operator will be notified by BP and expected to lead the response thereafter. BP will then revert to a supporting role.

2.4 Hydrocarbon Release from a Pipeline

BP operates a number of offshore pipelines, which are either buried, trenched or lying proud of the seabed. Each pipeline is covered by an emergency plan which details actions to be taken should a release be discovered or suspected. In the event of an incident concerning the Clair Ridge oil pipelines, **WOS and Clair Gas Pipelines Emergency Procedures Manual (WOSPS-EM-001)** or **Clair Oil Pipeline Emergency Procedures Manual (CLA-PLNE-PR-0165)** respectively should be referred to for specific technical support information.

2.5 Hydrocarbon Release from the Clair Ridge Platform Approaching Waters Outside the UKCS

In the event of a hydrocarbon release from the Clair Ridge Platform crossing, or being predicted to cross, over the Faroe Islands' Median line, the Dyce IMT should inform the MCA. Co-ordination of the response strategy with other member states will be facilitated through the MCA.

In the event of a hydrocarbon release crossing, or being predicted to cross, over the median line into another country's jurisdiction (other than the Faroe Islands'), the Bonn Agreement may be activated.

The Bonn Agreement is a mechanism by which the North Sea States namely, Belgium, France (Manche Plan), Norway (NORBRIT Agreement), Denmark, Germany, Ireland, the United Kingdom, the Netherlands and Sweden co-operate to combat pollution in the North Sea Area. The Agreement recommends the command structure and operational co-ordination maintained

between the parties. Co-ordination of the response strategy with the relevant authorities will be facilitated through the MCA.

2.5.1 Hydrocarbon Release Approaching Shetland Waters from the WoS Fields

In the event of a major hydrocarbon release which approaches Shetland from the Clair Ridge installation and associated infrastructure, a number of oil spill emergency plans are in place that may be triggered. These are in addition to resources located in Shetland for coastal response. The main plans in place are:

- **This document – Clair Ridge OPEP**
- **BP Shetland Coastal Protection Strategy**
- **BP Shetland Coastal Response Resource (with call-out procedure)**
- **Sullom Voe Harbour Area (SVHA) Oil Spill Plan for spills occurring within SVHA harbour area (or entering the area)**
- **Shetland Islands Council (SIC) Shetland Marine Pollution Contingency Plan**

For oil spills entering the SVHA, the **Sullom Voe Harbour Oil Spill Plan** will be enacted under the auspices of the SIC, who will become the lead organisation. BP will provide support using extensive equipment and personnel resources based at Sullom Voe Terminal (SVT).

For oil spills outside SVHA, the **Shetland Marine Pollution Contingency Plan** will be enacted. BP's Shetland response trailers and equipment will be provided in support of SIC-led operations.

2.6 Hydrocarbon Release with Potential or Actual UK Shoreline Impact

In the event of a release which results in hydrocarbons beaching, or having the potential to beach, on the UK shoreline, the responsibility for dealing/responding to any pollution of the shoreline rests principally with the local authorities. In the event of a release approaching the Shetland shoreline, BP should alert the authorities of the coastal administrations who are responsible for the areas which are likely to be affected. The contact details of the relevant authorities can be found in **ROn 1.11 Emergency Contacts Directory**.

2.7 Hydrocarbon Release from Vessels and Rigs in Transit

The vessel or rig owners or operators are responsible for reporting and dealing with any hydrocarbon release or pollution from any vessel or rig when en route to the location or prior to establishing the 500m safety zone around the chartered destination.

In the event of hydrocarbon release during transit, reporting to government agencies and to BP rests with the vessel or rig owner who will implement the appropriate International Convention for the Prevention of Pollution from Ships (MARPOL) approved Shipboard Oil Pollution Emergency Plan (SOPEP)[6]. BP will support the response as appropriate.

2.7.1 Hydrocarbon Release from a Vessel outwith the 500 m Safety Zone, with BP Interest

If a spill occurs from a vessel with a BP interest, eg shuttle tanker, outwith the 500m safety zone, the shuttle tanker owner will lead the response using its own oil release response plan, albeit with support from BP if required.

If BP Shipping owns the ship, and the MCA agrees, BP Shipping will lead the response with its own IMT. BP Dyce would support where required.

3 Response Interfaces

3.1 Platform Drilling and Well Intervention

Platform drilling and well intervention operations undertaken from the Clair Ridge Platform are a possibility within the lifespan of the Clair Ridge within the Clair Field. Although the exact timings of such operations are not detailed within this document, the risks associated with a hydrocarbon release event arising from such operations and the environmental consequences are taken in to consideration in the development of the response strategy.

3.2 Well Intervention Operations at the Clair Ridge within the Clair Field

The work activities for well intervention operations at the Clair Ridge within the Clair Field conducted from a Well Intervention Vessel (WIV) will be detailed in a Communication and Interface Plan (CI Plan), which will be appended to this document. The CI Plan will detail the roles and responsibilities of concerned contractors, in addition to those detailed in this document, and the communication pathways to be followed in the event of hydrocarbon release resulting from well intervention operations. The CI Plan will refer to the relevant NPI OPEP specific to that WIV.

6 This plan is approved by a classification society or Flag State and is required under Regulation 26, Annex 1 of MARPOL 73/78.

3.2.1 WIV Offshore Communications

In the event of a hydrocarbon release involving a WIV undertaking well intervention operations at the Clair Ridge Installations, the WIV Master/OIM will undertake communications as detailed in the well intervention CI Plan and this document. This will take precedence over the vessel's SOPEP.

3.3 Accommodation Units Operating at the Clair Ridge within the Clair Field

When an accommodation unit is associated with the Clair Ridge platform, the work activities will be detailed in a CI Plan, which will be appended to this document. The CI Plan will detail the roles and responsibilities of concerned contractors, in addition to those detailed in this document, and the communication pathways to be followed in the event of a hydrocarbon release from the accommodation unit. The CI Plan will refer to the relevant NPI OPEP specific to that accommodation unit.

3.3.1 Accommodation Unit Communications

In the event of a hydrocarbon release involving an Accommodation Unit associated with the Clair Ridge Installations, the Accommodation Unit Master/OIM will undertake communications as detailed in the Accommodation Unit CI Plan and this document. This will take precedence over the Accommodation Unit's SOPEP.

3.4 Mobile Offshore Drilling Units Operating at the Clair Ridge within the Clair Field

When a mobile offshore drilling unit (MODU) is associated with the Clair Ridge platform, the work activities will be detailed in a CI Plan, which will be appended to this document. The CI Plan will detail the roles and responsibilities of concerned contractors, in addition to those detailed in this document, and the communication pathways to be followed in the event of a hydrocarbon release resulting from MODU operations. The CI Plan will refer to the relevant NPI OPEP specific to that MODU.

3.4.1 Mobile Offshore Drilling Unit Communications

In the event of a hydrocarbon release involving a MODU operating in conjunction with the Clair Ridge Installations, the MODU OIM will undertake communications as detailed in the MODU CI Plan and this document. This will take precedence over the MODU SOPEP.

4 Field Information

4.1 Field Information and Diagram

Refer to **Section 1 ROff 1.5 Platform Information** and **ROff 1.6 Field Diagram**.

4.1.1 Subsea Wells and Pipelines

Refer to **Section 1 ROff 1.7 Hydrocarbon Inventories and Well Data**.

4.2 Hydrocarbon Inventories

To assist in assessing the potential/actual release volumes associated with the Clair Ridge within the Clair Field, the inventories have been identified and documented. These are detailed in **Section 1 ROff 1.7 Hydrocarbon Inventories and Well Data** alongside detailed volumes, locations, length, diameters and shutdown times for subsea facilities and pipelines.

4.2.1 Initiating Events

Initiating events can have a major influence on the volume of hydrocarbon that may be released to sea. Being able to identify these events and the potential containing systems that are at risk early can provide an indication as to the potential worst-case scenarios.

The following table identifies such initiating events and the respective containing systems at risk at Clair Ridge within the Clair Field.

Initiating Events	Containing Systems at Risk
External corrosion (weathering)	Subsea pipelines, risers
Internal corrosion	Subsea, topside pipelines, risers and topside vessels
Erosion	Pipework
Impact damage (from vessel/MODU)	Pipelines, subsea infrastructure, risers,
Over pressurisation	Topside vessels
Fire and explosion	Topside vessels and pipework
Vibration	Topside vessels and pipework
Structural failure	Subsea and topside containing systems
Hose rupture/failure	Bunker system
Material defects/maintenance	Subsea and topside containing systems
Loss of well control (drilling or intervention operations)	Reservoir and well
Extreme weather	Topsides and risers

4.3 Hydrocarbon Characteristics and Fate of Hydrocarbon

A key contributing factor influencing the ultimate fate of released hydrocarbon is the various weathering processes that may be experienced. Hydrocarbons weather differently depending on their type, so an understanding of this relationship and the impact weathering may have on the hydrocarbon's properties over a period of time is important when determining an appropriate response strategy. Clair Ridge crude has been analysed and a description of its anticipated behaviour detailed in the following tables. Refer to **Section 1 ROff 1.5.1 Hydrocarbon Properties** for a breakdown of the associated field hydrocarbon properties.

4.3.1 Clair Ridge Crude

Fate of Hydrocarbon
The Specific Gravity (SG) of oil is its density in relation to pure water. Most oils are lighter than water, which has a specific gravity of 1. Clair Ridge crude has an SG of 0.9095, suggesting that the oil is likely to be neutrally buoyant, especially in winter months. This can have repercussions on mechanical recovery of the spilled oil at sea.
There will be very low evaporative losses; around 15% after 4 to 5 days at sea under wind speeds of 10 knots. Evaporation is dependent on wind speeds.
The water uptake rate is rapid, especially with higher wind speeds. The maximum water content is 70 to 75%.
Asphaltene content indicates the oil's ability to absorb water (emulsification). Clair Ridge crude has an asphaltene content of 1.5, indicating that water in oil emulsions will be formed fairly rapidly, especially with higher wind speeds. Water in oil emulsions formed are of extremely high viscosity (around 10,000cP after 10 hours and up to 40,000cP after 5 days weathering in a 10-knot wind).
Using the ITOPF classification key for oil types[7], Clair Ridge crude has been classified as a Group III oil.

4.3.2 Diesel Oil

Fate of Hydrocarbon
Diesel has very high levels of light ends, evaporating quickly on release. The low asphaltene content prevents emulsification reducing its persistence in the marine environment. Due to its characteristics and subsequent behaviour when released, diesel oil is not considered to offer a significant threat to the environment in comparison with the risks posed from a release of Clair Ridge crude.

7 The International Tanker Owners Pollution Federation Limited Handbook 2014/15

5 Receiving Environment

5.1 Environmental and Commercial Sensitivities

This section contains a summary of the environmental and commercial sensitivities, on a seasonal basis, in the immediate vicinity of the Clair Ridge within the Clair Field. This information will be supported by actual observations from the site and used by the Dyce IMT when determining the most appropriate response strategies with the relevant external agencies[8].

Environmental and Commercial Sensitivities												
Seabirds[9]	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Block 206/8	4	1	2	3	2	3	1	4	4	3	3	4
Block 206/9	4	1	2	3	2	3	1	4	4	3	3	4
Block 207/6	3	2	2	2	1	2	1	3	2	3	3	4
Block 207/7	3	2	2	2	1	2	1	3	2	3	3	4
Block 207/8	3	2	1	1	1	1	1	2	2	2	2	3
Block 207/9	3	2	1	1	1	1	1	2	2	2	2	3
Block 207/14	4	2	1	1	1	1	1	3	2	2	2	4
Key	1 – Very high		2 - High		3 - Moderate			4 – Low		Blank – No data		
Fisheries[10]	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
The below table gives information on fish spawning and nursery periods in the vicinity of UKCS block 206/8.												
Norway Pout	S	S	S	S	S	N	N	N	N	N	N	N
Mackerel	M	M	N	N	N	N	N	M	M	N	M	M
Blue Whiting	N	N	N	N	N	N	N	N	N	N	N	N
Key	M - Migratory		N - Nursery			S - Spawning			Blank – No data			

8 In the event of a hydrocarbon release, the most up-to-date information on sensitivities will be advised on the day via relevant authorities.

9 Seabird vulnerability data taken from MAGIC, 'Interactive environmental information' available from http://magic.defra.gov.uk/.

10 Fisheries data taken from Coull, KA, Johnstone, R, and SI Rogers. (1998) 'Fisheries Sensitivity Maps in British Waters' UKOOA Ltd.

5.1.1 Marine Mammal Sensitivities

Marine Mammal Sensitivities[11]												
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
White sided dolphin	2	2	2	2	1	1	1	1	1	1	2	2
White beaked dolphin	2	2	2	2	2	1	1	1	1	1	2	2
Harbour porpoise	2	2	2	2	2	2	2	2	2	2	2	2
Minke whale	3	3	3	3	1	2	2	2	1	3	3	3
Killer whale	2	2	2	2	1	1	2	2	2	2	2	2
Risso's dolphin	2	2	3	3	3	3	1	1	2	2	2	2
Key	1 - High				2 - Moderate				3 - Low			

The Clair Ridge lies within Quadrant 206, which is frequently used by several species of marine mammal. Furthermore, additional cetacean species, including large migrating baleen whales and sperm whales utilise the deeper waters of the Faroe-Shetland Channel to the north-west[12]. Several Annex II species[13] such as harbour porpoises, grey seals and harbour seals have been sighted in Quadrant 206 throughout the year. In addition, six Annex IV species[14] have been sighted in the area. The seasonal variation in the frequency of their sightings is detailed in the table above.

5.1.2 Shipping Activities

Shipping activity in the area comprises of two comparatively minor shipping routes with traffic primarily consisting of cargo vessels, tanker and fishing vessels with a limited number of seasonal ferries and cruise liners.

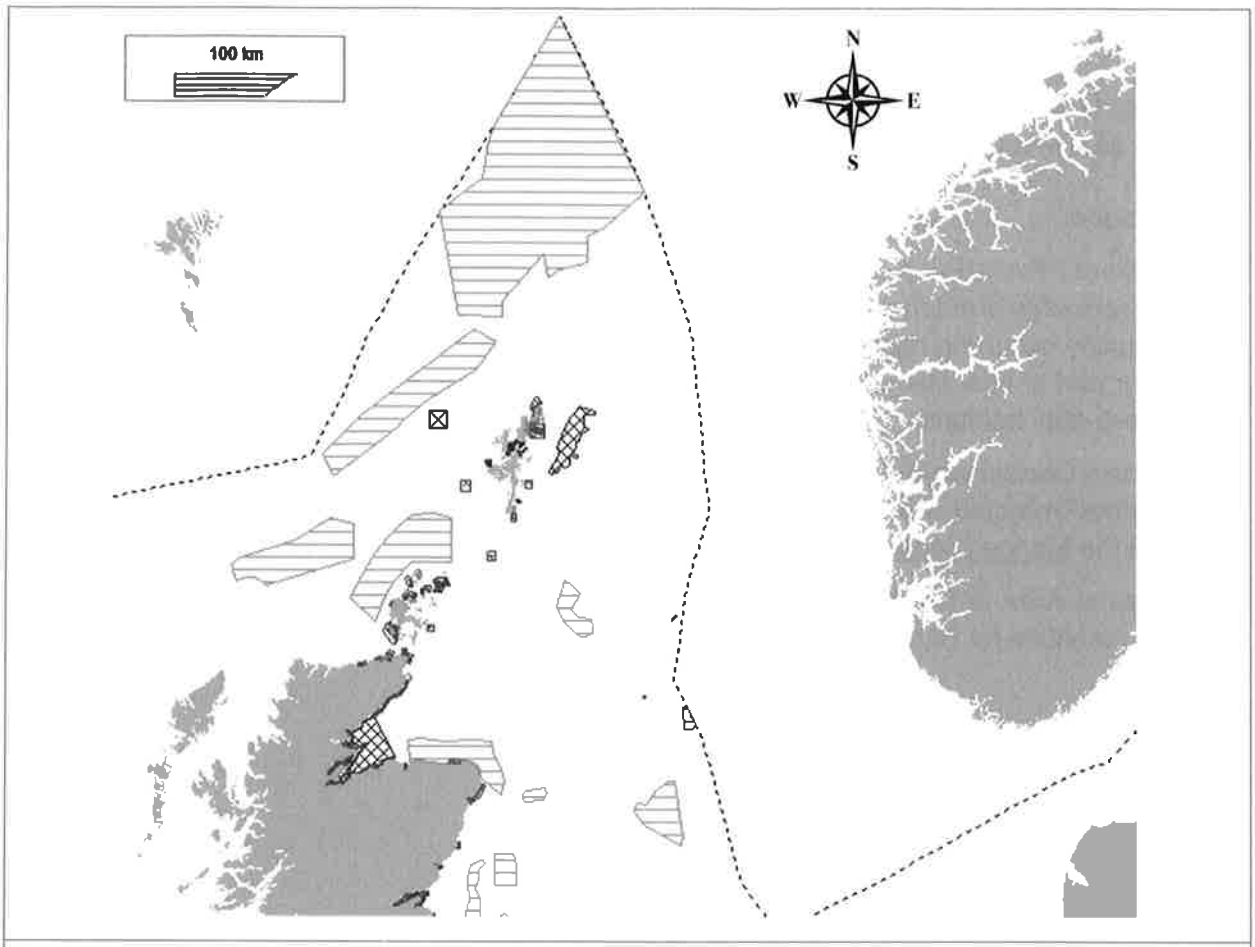
11 Cetacean data taken from JNCC, (2003) 'Atlas of Cetacean distribution in north-west European waters' available from http://jncc.defra.gov.uk/page-2713.
12 Sperm whale distribution and seasonal density in the Faroe Shetland Channel (2003) Hastie et al., Journal of Cetacean Research and Management
13 http://jncc.defra.gov.uk/ProtectedSites/SACselection/SAC_species.asp
14 http://jncc.defra.gov.uk/page-4063

5.2 Marine Protected Areas

A number of marine protected areas have been identified that may have the potential to be impacted as a result of a hydrocarbon release from the Clair Ridge within the Clair Field.

These include:

- **Special Protection Area (SPA) with Marine Components:** SPAs with Marine Components are defined as those sites with qualifying Birds Directive Annex I species or regularly occurring migratory species that are dependent on the marine environment for all or part of their lifecycle, where these species are found in association with intertidal or sub-tidal habitats.
- **Nature Conservation Marine Protected Area (NCMPAs):** NCMPAs are a statutory Marine Protected Area designated under the UK Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010.
- **Special Area of Conservation (SAC) with Marine Components:** SACs are sites that are identified for habitats and species listed on the EC Habitats Directive.



More information can be accessed from the JNCC website at http://jncc.defra.gov.uk/default.aspx?page=5201&LAYERS=TwelveTS,UKCS,BFL,InSAC,OFFcSAC

6 Hydrocarbon Pollution Modelling

This section identifies the potential worst case hydrocarbon release scenarios in order to establish the potential impact to the marine environment. The hydrocarbon types represent those from the largest inventories as well as the most persistent hydrocarbons that could potentially be released from the Clair Ridge.

6.1 Stochastic Modelling

Stochastic modelling was carried out using SINTEF's Oil Spill Contingency and Response (OSCAR) model, version 6.5.1. 100 trajectories were run for each of the four seasons to create the stochastic results for Scenario 1. 100 trajectories were run for each of the four seasons to create the stochastic results for Scenario 2.

Paragraph 6.2 Stochastic Modelling Outputs provides a detailed breakdown of the likely fate of the hydrocarbon for the selected scenarios. The results have been used to ensure that BP's response capability aligns with the response requirements as stipulated by DECC guidance[15].

An explanation for the quantities and rates used in the scenarios is detailed within **Section 3**.

Scenario 1: Clair Ridge Well Blowout, subsea release – 8235.7m^3/day for 140 days (343.1m^3/hr for 3360 hours)

Scenario 2: Clair Ridge platform leg diesel release – 720m^3 instantaneous

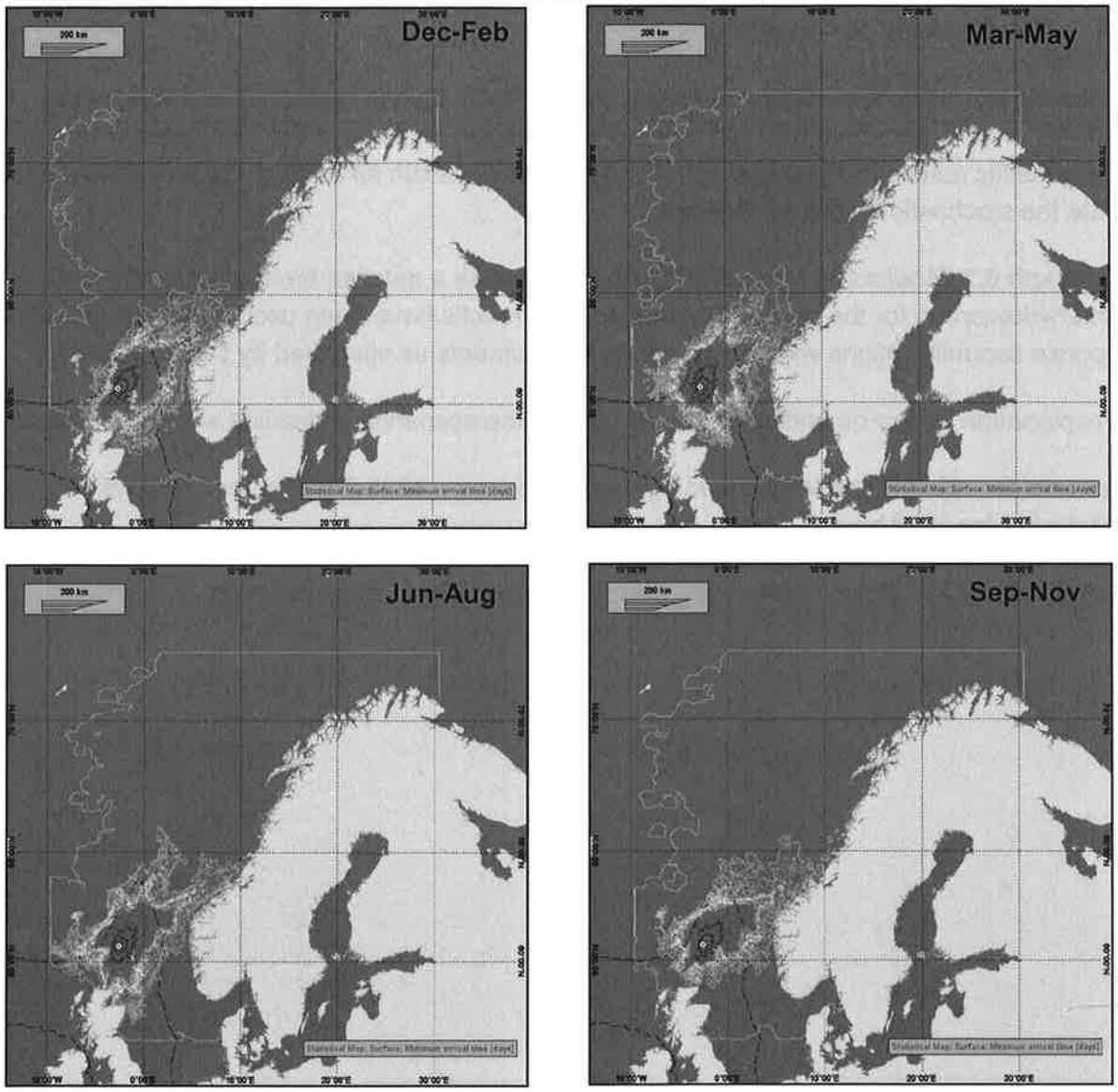
15 Guidance Notes for Preparing Oil Pollution Emergency Plans For Offshore Oil & Gas Installations and Relevant Oil Handling Facilities, dated May 2015.

6.2 Stochastic Modelling Outputs

6.2.1 Stochastic Scenario 1: Well Blowout, Subsea Release

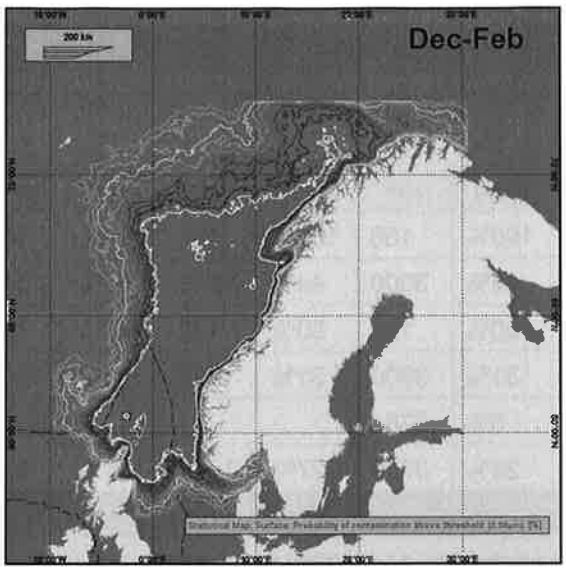
Scenario 1: Clair Ridge Well Blowout - 343.1 m^3/hr for 3,360 hours (140 days)

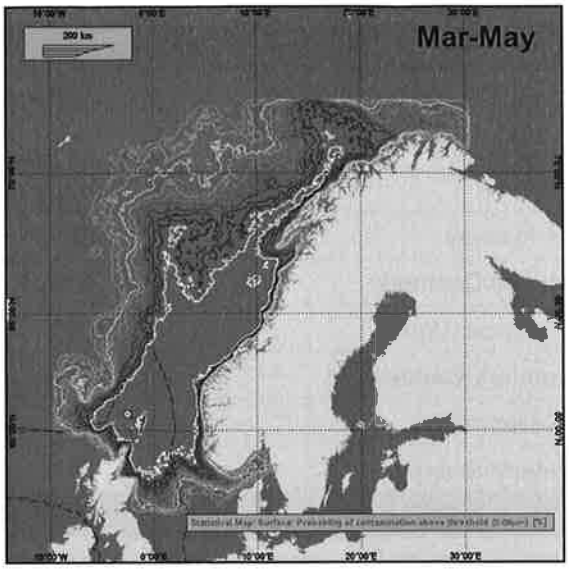
Hydrocarbon Type	Clair Ridge 2011	Model Output	Surface Oiling Arrival Time

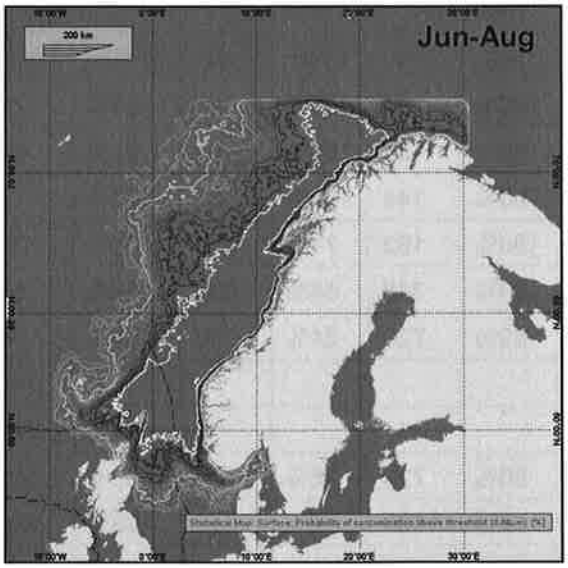


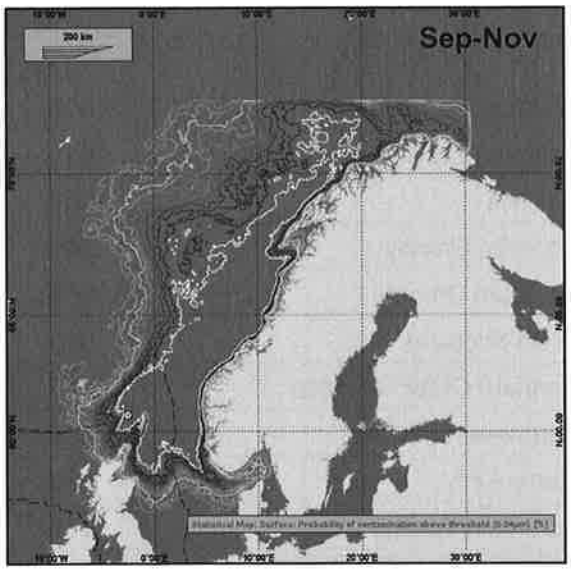
Scenario 1: Clair Ridge Well Blowout – 343.1 m^3/hr for 3360 hours (140 days)

Hydrocarbon Type	Clair Ridge 2011	Model Output	Probability of Surface Oiling









Map Key

Probability of Surface Oiling (%)

5 - 10	20 - 30	40 - 50	60 - 70	80 - 90
10 - 20	30 - 40	50 - 60	70 - 80	90 - 100

Release Site ⊠

Median Line —— ⌐

Oil Spill Modelling Summary								
Spill scenario/descriptor	Scenario 1: Well Blowout – 343.1m^3/hr for 140 days							
Median Crossing								
Identified median line	Probability (>5%) of crossing and minimum time to reach (hrs)							
	Dec-Feb		Mar-May		Jun-Aug		Sep-Nov	
	Prob	Hrs	Prob	Hrs	Prob	Hrs	Prob	Hrs
UK-Norway	100%	168	100%	156	100%	168	100%	180
Norway-Denmark	51%	1368	42%	3000	44%	1776	57%	1344
UK-Faroe Islands	100%	216	100%	120	90%	120	92%	156
Denmark-Sweden	31%	3336	31%	3000	31%	1992	18%	1848
UK-Denmark			5%	3264				
Norway-Sweden	31%	3216	28%	3000	27%	1848	25%	1920
Landfall								
Predicted locations	Probability of beaching and minimum time to beach (hrs)							
	Dec-Feb		Mar-May		Jun-Aug		Sep-Nov	
	Prob	Hrs	Prob	Hrs	Prob	Hrs	Prob	Hrs
Western Shetland	100%	36	100%	54	100%	48	30%	744
Eastern Shetland	100%	120	100%	120	100%	72	24%	816
Fair Isle	100%	144	100%	144	100%	168	100%	96
Northern Orkney	99%	144	100%	192	71%	132	90%	384
Southern Orkney	95%	216	99%	348	54%	204	64%	516
North Scotland	59%	240	62%	720	31%	216	56%	552
Northern Outer Hebrides	1%	1944					1%	3432
Northwest Scotland	20%	408					4%	2736
Moray Firth	53%	768	50%	720	35%	336	40%	1488
Northeast Scotland	21%	936	17%	1560	7%	648	28%	2328
Forth Estuary and Southeast Scotland	1%	3624	1%	3672			1%	4272
Denmark (inc North Frisian Islands)	9%	2880	1%	2520	4%	4080	6%	2184
Northern Denmark	20%	2808	12%	2976	16%	2232	18%	1656
Western Sweden	28%	2784	23%	3096	12%	2646	17%	1896
Southern Norway	16%	2856	15%	2784	20%	1848	10%	2184
Southwest Norway	86%	984	84%	864	94%	1272	90%	840
Western Norway	100%	432	100%	528	100%	456	100%	456
Northern Norway	84%	1728	87%	2328	94%	2088	88%	1752
Faroe Islands	47%	720	58%	360	44%	696	30%	744
Volume beached (worst case)	36,325m^3		42,760m^3		40,790m^3		28,785m^3	

Key Sensitivities at Risk

For the well blowout scenario described in **6.1 Stochastic Modelling (Scenario 1)**, there are multiple environmentally sensitive/protected areas that are predicted to have a likelihood of surface oiling of >5%.

In the United Kingdom, the categories of protected area with a possibility of greater than 5% of surface oiling are: Ramsar site, Marine Conservation Zone, National Nature Reserve/Nature Reserve (IUCN I), Special Area of Conservation/Candidate Special Area of Conservation, Site of Special Scientific Interest, Special Protected Area, and Marine Protected Area.

In Denmark, the categories of protected area with a possibility of greater than 5% of surface oiling are: Special Area of Conservation/Candidate Special Area of Conservation.

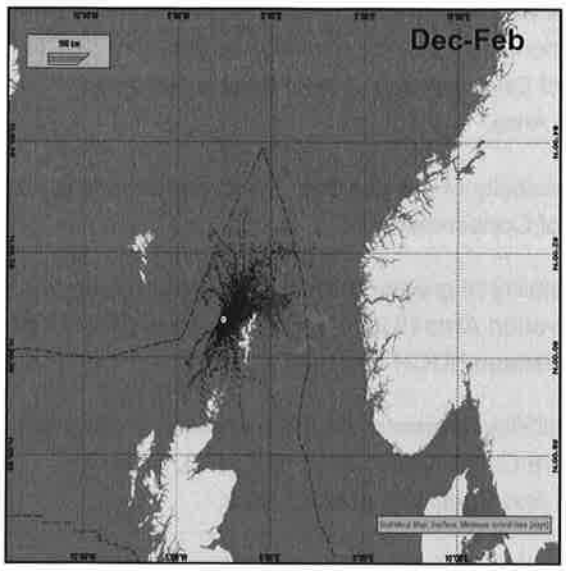
In Norway, the categories of protected area with a possibility of greater than 5% of surface oiling are: Ramsar site, Nature Reserve (IUCN I), Wildlife Conservation Area (IUCN I), National Park (IUCN II), Botanical Conservation Area (IUCN IV), Protected Landscape (IUCN V).

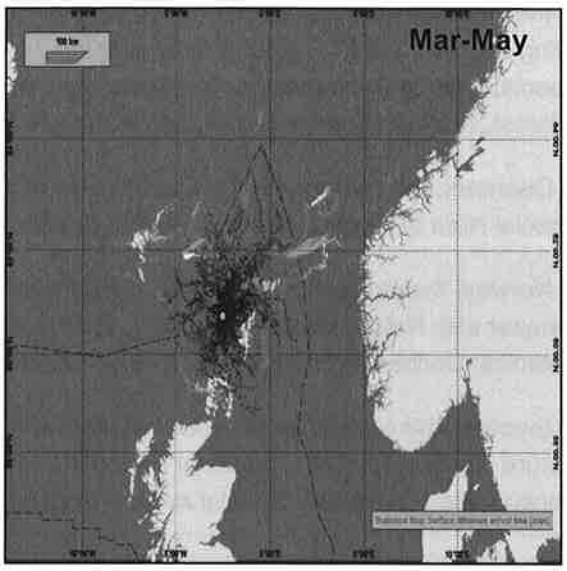
In Sweden, the categories of protected area with a possibility of greater than 5% of surface oiling are: Nature Reserve (IUCN I), National Park (IUCN II), Nature Conservation Area (IUCN V), Area of Conservation/Candidate Special Area of Conservation, and Special Protected Area.

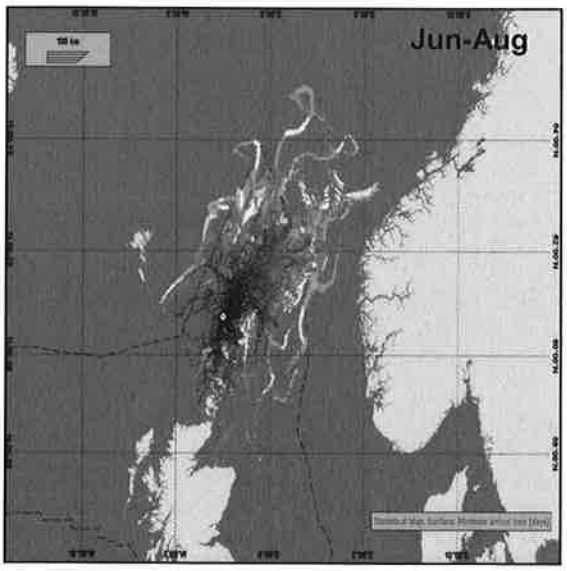
6.2.2 Stochastic Scenario 2: Diesel Instantaneous Release

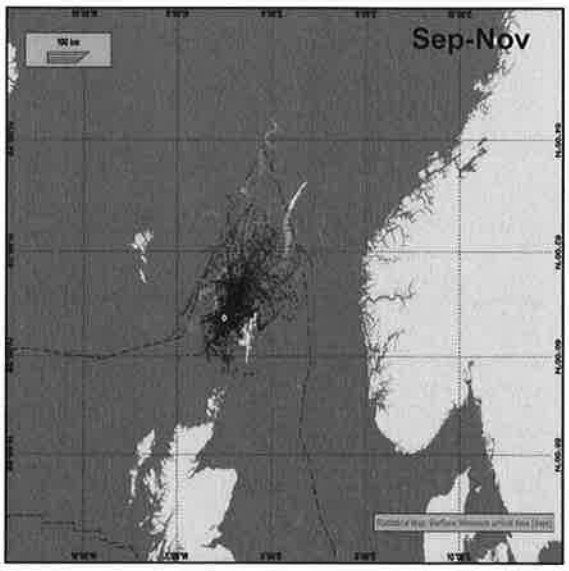
Scenario 2: Clair Ridge platform leg diesel release – 720m^3 instantaneous

Hydrocarbon Type	Marine Diesel	Model Output	Surface Oiling Arrival Time









Map Key

Arrival Time (days)

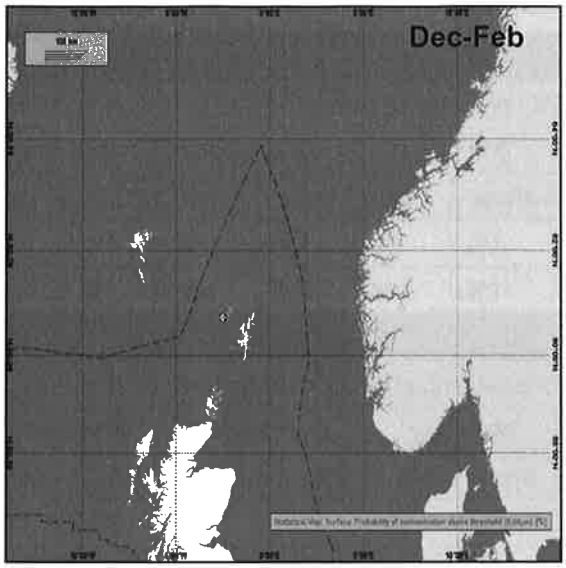
1 2 4 7 10 14 17 20 25 30 > 30

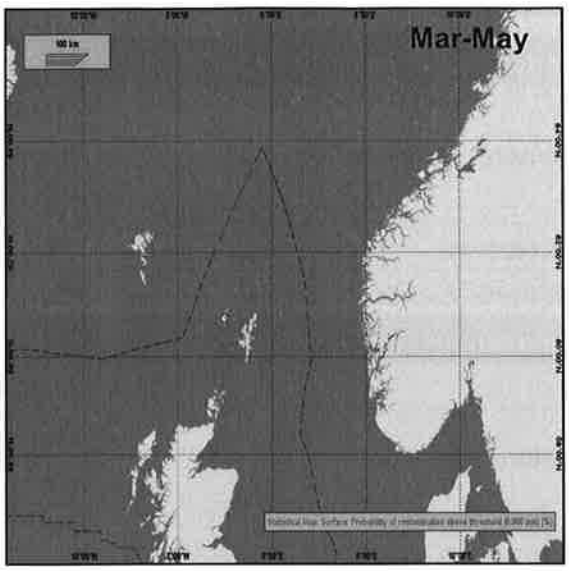
Release Site

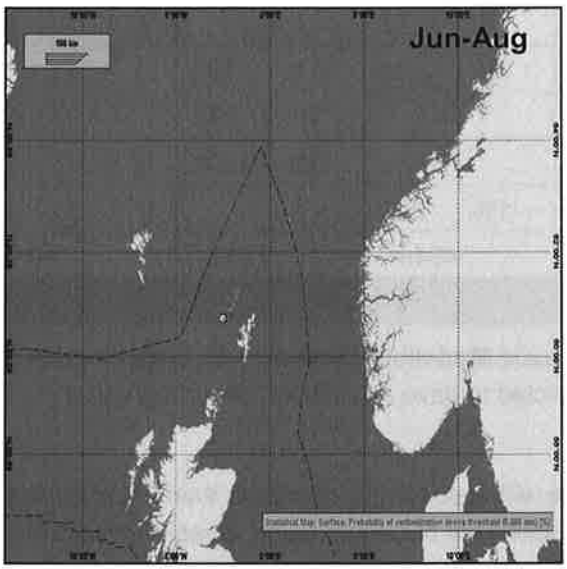
Median Line

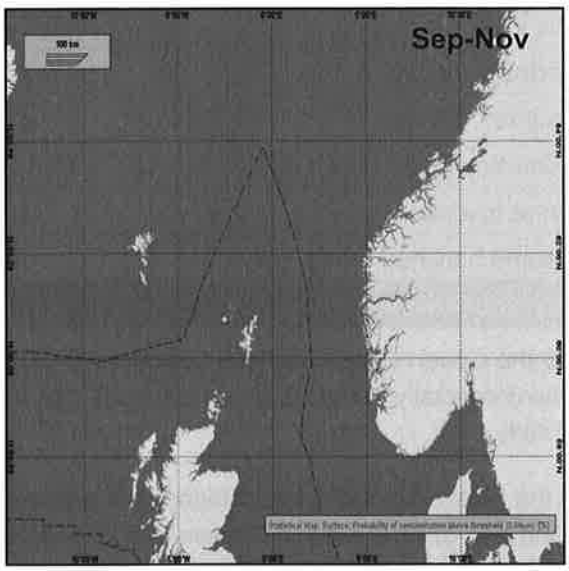
Scenario 2: Clair Ridge platform leg diesel release - 720m^3 instantaneous

Hydrocarbon Type	Marine Diesel	Model Output	Probability of Surface Oiling









Map Key

Probability of Surface Oiling (%)

5 - 10	20 - 30	40 - 50	60 - 70	80 - 90
10 - 20	30 - 40	50 - 60	70 - 80	90 - 100

Release Site ⊠

Median Line

Oil Spill Modelling Summary								
Spill scenario/descriptor	Scenario 2 – Clair Ridge diesel release. 720m^3 instantaneous							
Median Crossing								
Identified median line	Probability (>5%) of crossing and minimum time to reach (hrs)							
	Dec-Feb		Mar-May		Jun-Aug		Sep-Nov	
	Prob	Hrs	Prob	Hrs	Prob	Hrs	Prob	Hrs
UK-Norway	1%	108	1%	90	5%	84	1%	96
UK-Faroe Islands	1%	180	1%	198	1%	132	1%	132
Landfall								
Predicted locations	Probability of beaching and minimum time to beach (hrs)							
	Dec-Feb		Mar-May		Jun-Aug		Sep-Nov	
	Prob	Hrs	Prob	Hrs	Prob	Hrs	Prob	Hrs
Western Shetland	2%	26	4%	36	3%	72	2%	30
Eastern Shetland	1%	106	1%	240	1%	240		
Fair Isle	1%	108	1%	72				
Northern Orkney	1%	192	3%	84	1%	120		
Southern Orkney					1%	252		
North Scotland	1%	216			1%	204		
Faroe Islands			1%	264				
Volume beached (worst case)	433m^3		484m^3		610m^3		196m^3	
Key Sensitivities at Risk								
For the diesel release scenario described in **6.1 Stochastic Modelling (Scenario 2)**, there are multiple environmentally sensitive/protected areas that are predicted to have a likelihood of surface oiling of >5%. In the United Kingdom, the categories of protected area with a possibility of greater than 5% of surface oiling are: Special Area of Conservation/Candidate Special Area of Conservation, Special Protected Area, and Marine Protected Area.								

7 Response Procedures and Guidance

7.1 Initial Offshore Notification Requirements

It is the responsibility of the Clair Ridge OIM to initially report a hydrocarbon release from the Clair Ridge within the Clair Field to the regulatory authorities and Dyce IMT (PON1s will be submitted from offshore, however, the IMT may be tasked by the OIM to respond accordingly). The offshore notification matrix and PON1 reporting requirements specific to the OIM are detailed in **Section 1 ROff 1.2 Notifications**.

7.2 Tier Response Classification

To enable the Clair Ridge OIM to identify the correct level of response, a tier selection guide has been developed to assist the OIM/offshore personnel and the Dyce IMT in the decision-making process, refer to **Section 1 ROff 1.4 Tier Selection Guide**.

7.3 Estimating Release Size

In order to ensure that the operational response plan being formulated is commensurate to the size of the release, it is imperative to determine, as accurately as possible, the quantity of hydrocarbon released to sea. In the event that offshore estimation measures are unsuccessful, the Dyce IMT has the capability to mobilise a dedicated aerial surveillance aircraft through their response contractor OSRL to assist with this exercise.

Two effective techniques have been identified to estimate spill size:

1. Report the known quantity from the correctly identified containing system.
2. Visual estimation of the hydrocarbon on the sea surface using the Bonn Agreement table which details the relationship between hydrocarbon colour, thickness and area covered. This method can be achieved from either the platform, PSV/ERRV, infield crew change helicopter, or a dedicated aerial surveillance aircraft as appropriate dependant on the release. A full description of the process to be followed is detailed in **Section 1 ROff 1.8 Release Size Estimation Guide**.

7.4 Estimating Release Movement

It is important to determine the direction in which the release will move in order to assess the potential impact on any other installations and any potential environmental sensitivities. Offshore efforts will focus on the short-term migration of the hydrocarbon, requiring a longer term prediction to be undertaken by the onshore team to establish its ultimate fate. This can be achieved by manual tracking, as detailed in **Section 1 ROff 1.11 Manual Release Tracking**.

Longer-term prediction will be undertaken by the Dyce IMT to establish the ultimate fate of the hydrocarbon. Computer modelling accessed through the Environment Unit Lead (EUL) and/or OSRL will indicate the direction and persistency of the hydrocarbon in the marine environment, based on the hydrocarbon's characteristics and metocean conditions. Analysis of the results will be undertaken by BP and OSRL before being shared with the relevant agencies as part of the response planning process.

7.5 Computer Prediction of Release Movement

Computer-based predictions of the movement of the release will be undertaken by the onshore team through OSRL. Hydrocarbon type, weather forecast, water depth, estimated quantity of release and initial position will be the minimum information required to conduct a prediction.

BP has access to OSIS modelling within the Dyce IMT. It may also be run in the background at the same time as the OSRL oil spill modelling referred to above.

7.6 Response Strategy Operational Guidelines

7.6.1 Selecting an Initial Offshore Response Strategy

The hydrocarbon type present within the field is Clair Ridge crude. The fate of hydrocarbons within the environment can be affected by a number of factors including the actual weather conditions at the time. Consequently, a number of response strategies may be required to manage operations. To assist the OIM and onshore team in identifying the most effective and environmentally beneficial response, BP has devised a field-specific response strategy flowchart. The offshore response strategy flowchart is located in the **Section 1 ROff 1.13 Response Strategy Options**.

7.6.2 Installations in Any Block Wholly or Partly Within 40km of the Shoreline

Additional requirements may be required for installations operating within 40km of the shoreline.

- The presence near the facility at all times of a vessel with:
  - The capability of spraying dispersant within 30 minutes of an oil pollution incident notification, which has stock of dispersant sufficient to deal with an oil pollution incident of 25 tonnes, and, if required, will have the capability of recovering any oil likely to be lost from the installation under a Tier 1 scenario. The Clair Field has a dedicated ERRV which carries sufficient dispersant suitable for use on Clair Ridge crude. This can provide an immediate dispersant response in the event of a spill. Refer to **Section 1 ROff 1.14 Tiered Response Resources** and **ROff 1.15 Emergency Response Coverage for BP Assets** for detailed information of resources available.

- In the event of a Tier 2 incident, local resources will be mobilised in order to provide a timely response to an incident. Refer to **Section 1 ROff 1.14 Tiered Response Resources** and **ROff 1.15 Emergency Response Coverage for BP Assets** for detailed information of resources available.
  - Stochastic modelling (refer to **Section 3**) indicates that a spill from the Clair Ridge Platform would beach on Shetland in 32 hours (worst case). The dedicated response trailers located on Shetland ensure that the availability of Tier 2 response resources would be available in an appropriate length of time, allowing a proactive response.
- Details of resources available to deal with a Tier 3 incident. Refer to **Section 1 ROff 1.14 Tiered Response Resources** and **ROff 1.15 Emergency Response Coverage for BP Assets** for detailed information of resources available.
- A shoreline protection plan. There are a number of documents in place which detail BPs West of Shetland shoreline protection strategy plans. For further details refer to **Section 3 Paragraph 2.6 UK Shoreline Response and Chemical Dispersant**.

7.7 Available Response Strategy Options

Section 1 ROff 1.13 Response Strategy Options identifies both counter-pollution and source-control response strategy options.

7.7.1 Counter-pollution Response Strategy Options

There are three potential counter-pollution response options that can be implemented in the event of a hydrocarbon release to sea.

1. **Surveillance and monitoring:** This strategy is to be implemented for light hydrocarbons releases such as diesel, condensate and small crude releases where the prevailing weather conditions are conducive to natural dispersion of the hydrocarbon into the environment. Strategy also to be implemented to monitor the movement of larger or more persistent hydrocarbon releases.
2. **Chemical dispersant spraying:** This strategy is to be considered for larger, more persistent crude releases that may pose a threat to the personnel onboard the platform or have the potential to impact either environmental sensitivities or the shoreline. As the regulatory authority on the use of dispersants within the UKCS, DECC will provide guidance to BP on the use of dispersants based on the advice from the relevant environmental advisor(s) (Marine Scotland for Scotland and the Marine Management Organisation for England and Wales).

   Approval from DECC must be obtained prior to the use of dispersant.

   In the event of a force majeure situation where there is a genuine risk to human life or to the safety of the platform from the released hydrocarbon (for example from fire or explosion), approved dispersants may be used without prior guidance or approval from DECC. In those circumstances, DECC should be informed as soon as possible after use.

3. **Mechanical containment and recovery:** This is considered ineffective on light hydrocarbons, condensates and diesel. The considerations given for the use of mechanical containment and recovery equipment (booms and skimmers) would depend on circumstances such as specific hydrocarbon properties and metocean conditions.

The Clair Ridge OIM has the ability to implement surveillance and monitoring plus initiate a limited dispersant response. The latter will be done in conjunction with the Dyce IMT unless the personnel or asset are considered at risk.

Mechanical containment and recovery operations will be co-ordinated by the onshore IMT. Details can be found in the **UK-PLN-4.6-1002 ROn 1.7 Tiered Response Resources**.

7.7.2 Source-control Response Strategy Options

The formulation of a source-control response strategy where the release is from a well will always involve discussions between the BP Global Wells Organisation (GWO) and BP Global Operations Organisation (GOO), well control advisors, well partners and relevant UK authorities. The source control options available are:

- **Well capping:** If appropriate this is to be implemented in the event of a catastrophic well failure, and resulting in an uncontrollable flowing well
- **Relief well drilling:** This is to be implemented in the event of a catastrophic well failure, and resulting in an uncontrollable flowing well

Additional details can be found in **Paragraph 7.9 Well Operations**.

In the event that a release is ongoing from a pipeline/subsea infrastructure a specialist technical advisor/team if required will be mobilised as part of the expanded Dyce IMT utilising relevant pipeline emergency procedures documentation.

7.8 Tiered Response Resources

BP has in place the resources necessary to provide a commensurate level of response proportionate to the size and type of hydrocarbon release that may be encountered and are compliant with the requirements as detailed within the DECC OPEP guidance notes[16]. The response is based upon the standard three-tiered system and is defined as follows:

Tier 1 (Local)	Resources onsite that can control small releases or releases that will disperse naturally. Tier 1 releases do not require onshore support.

16 Guidance Notes for Preparing Oil Pollution Emergency Plans For Offshore Oil & Gas Installations and Relevant Oil Handling Facilities, dated May 2015.

Tier 2 (Regional)	Larger releases that cannot be managed by the resources onsite and require support from a regional location provided by OSRL. It should be noted that for all Tier 2 and above releases, the incident response co-ordination is conducted by the Dyce IMT with additional support from the Business Support Team (BST) if required.
Tier 3 (National)	A major or significant ongoing release requiring mobilisation of the Dyce IMT and BST and is likely to require response assistance at a national/international level.

A detailed matrix containing the OPEP-specific tiered response resources can be found in **Section 1 ROff 1.14 Tiered Response Resources**.

7.9 Well Operations

7.9.1 Well Control Response Guide

BP's response to a well control event and any subsequent escalation to a loss of well control are provided in the **GWO North Sea Guidance Compendium (GWONS-GU-002)** which defines roles and responsibilities for persons at the wellsite, within BP's Emergency Response Centre and within the various areas of well incident response. The guide provides details on how to conduct operational and technical support for various situations including dealing with a blowout.

7.9.2 Well Capping

The suitability of a capping device strategy will be significantly dependent on the scenario encountered. During drilling, intervention, and construction operations at Clair Ridge it is likely to be a considered response option. Once the high pressure risers to the topsides are installed and for future platform drilling operations, a capping device would not be suitable, therefore alternative tooling methods and relief well operations would be the main basis for response.

In the event that a capping device is selected as the most appropriate well control technique BP has access to a number of capping devices suitable for use on the wells covered by this document. These capping devices are either owned or available to BP through its membership of OSRL.

Should a capping strategy be selected as the most appropriate well control technique, the selection of a particular cap will be based on the specific well scenario encountered. The caps are stored at locations in Aberdeen, Stavanger and Houston and could be mobilised in conjunction with the debris clearance equipment required to prepare the wellsite for deployment of the cap. BP also has access to specialist knowledge and additional equipment from the BP Global Deep Water Project Team based in Houston. The technical decision of whether or not to cap the well will be taken by the WIG (the responsibility for making the final decision resides with the Vice President (VP) Wells (Offshore)).

The estimated best-case and worst-case times to mobilise and deploy a capping device are detailed below:

Activity	OSPRAG Cap Aberdeen		SWIS Cap Stavanger		BP CRS Cap Houston	
	Best Case (days)	Worst Case (days)	Best Case (days)	Worst Case (days)	Best Case (days)	Worst Case (days)
Carry out pre-mobilisation modifications and system integrity tests	4	7	4	7	N/A	N/A
Transport to loadout port	1	1	N/A	N/A	3	10
Load onto subsea support vessel	1	2	1	2	1	2
Clear debris and remove Lower Marine Riser Package	0	5	0	5	0	5
Wait on weather to install cap	0	15	0	15	0	15
Well capping operations	3	3	3	3	3	3
Total estimated days	9	33	8	32	7	35

7.9.3 Relief Well Plan

A relief well plan will be in place before starting well operations which will provide details of preparedness with respect to initiation of a relief well in a blowout situation. Areas addressed within the relief well plan include:

- **Organisational capability:** Information on how to mobilise the Dyce IMT and links to relevant documents. Contact details for Wild Well Control and information on setting up a team of specialists in well control
- **Field and well data:** Contains field data, location maps, pour pressure fracture gradient data, lithology column, well schematic, well integrity, reservoir characteristics and blowout modelling
- **Common process and project management:** Information on the process for delivering a relief well plan, ie the process from initiation document to execution plans
- **Relief well planning basis of design:** Includes wind and wave data, currents, subsea infrastructure and mooring considerations, shallow hazards, potential relief well surface locations, wellbore positioning, trajectory, kill modelling, kill design, intercept design and kill point and casing design
- **Well-specific planning:** Contains an estimated timeline for the execution of the relief well (refer to the summary table in **Paragraph 7.9.4 Relief Well Drilling Estimated Timings**)

- **Major equipment and services contingencies:** A number of rigs operating in the North Sea Region suitable for drilling at this location are identified in the relief well plan. Typically these would be fourth generation semi-submersible rigs. BP would first consider mobilising suitable rigs already on contract to BP in the region. If none were able to mobilise as required, then BP would contact the Clair Ridge partners to seek use of any suitable rig under contract to any of these partners. Finally, a suitable rig would be sought from another operator under the terms of the 'Operators Co-operative Emergency Services' agreement. Also, information is listed on stimulation vessels, seismic vessels and logistical availability
- **Equipment availability:** This section contains information on contingency equipment such as wellheads and casing that has been identified and will be available to drill a relief well if needed. Note that all contingency casing and consumables have been secured

The technical decision of whether or not to drill a relief well will be taken by the WIG with the responsibility for making the final decision residing with the position of VP Wells North Sea Region, who will consult the relief well plan.

7.9.4 Relief Well Drilling Estimated Timings

Event	Best Case (Days)	Worst Case (Days)
Suspend previous well, rig move to relief location	11.0	21.0
Prep	2.0	2.0
Spud well and drill tophole	0.7	0.8
Set and cement conductor	1.1	1.3
Drill 26in hole	2.1	3.4
Set, cement surface csg and Blowout Preventer (BOP)	4.5	6.8
Drill 17 1/2in hole to top sand	2.6	3.9
Set and cement intermediate casing	1.9	2.4
Drill 12 1/4in hole	10.6	25.2
Set and cement production casing	1.9	2.2
Drill 8 1/2in hole	10.4	34.8
Set and cement drilling liner	3.8	4.2
Ranging runs and 6in intercept	11.4	29.0
Well kill	1.0	3.0
Total Days	65	140

7.9.5 Total Quantity of Hydrocarbon Released During Well Blowout

In the event of a well blowout from the worst-case well as described in **Section 1 ROff 1.7.4 Well Data** at a rate of 8235.7m^3/day, the worst-case potential is that the well could flow for the maximum period of 140 days which is assessed as the maximum period of time it would take to drill a relief well, it is estimated the maximum worst-case volume of hydrocarbon that could be released into the environment over this time is 1,152,998m^3 (7,252,139 barrels).

8 Training and Exercises

8.1 Resource Maintenance, Training and Testing

This section describes the training programme in place to ensure personnel with responsibilities for a hydrocarbon release event response are competent and that associated response equipment is fully operational at all times.

A record of all exercises undertaken will be maintained at the location where the exercise was conducted. Records will contain details of:

- Scenario details
- Exercise participants
- Log of actions undertaken
- Copies of any PON1 notifications
- Copies of other documents generated during exercise (calculations of oil quantities, response checklists etc)
- Debrief report
- Details of any actions/improvements resulting from the exercise

Records will be retained for 5 years and available upon request by DECC.

8.1.1 Training and Exercise Programme[17]

Personnel	Training
OIM	• Offshore OSC (OIM) DECC Level 1 training repeated every 3 years • OPEP familiarisation training
ERRV staff	• Initial training in the use of the dispersant equipment and regular refreshers (every 3 years)
Personnel	**Exercises**
Installation staff	• The OPEP is to be exercised by every OIM at a minimum of one per shift per year, using a hydrocarbon release of at least 1 tonne • All relevant personnel should participate in an exercise at the earliest opportunity following approval of this OPEP • The deliverables to include are: – Completed exercise report form – Completed action checklists – Log of events/actions • Deliverables to be submitted into Tr@ction under Events and OPEP Training • Hard copies are to be stored offshore
ERRV	• Dispersant application kit (not dispersant) to be tested every month • Records to include: – Date when test was undertaken – Name of person(s) undertaking test – Details of actions identified during test

17 This OPEP covers offshore training and exercise requirements only. Onshore requirements are covered in the Onshore OPEP.

OPEP Drill/Exercise Form

Exercise Plan

<table>
<tr><th>Date</th><th>Time</th><th colspan="2">OIM Name</th><th>HSEA Name</th></tr>
<tr><td></td><td></td><td colspan="2"></td><td></td></tr>
<tr><th>Asset Name</th><td colspan="2"></td><th colspan="2">Exercise Details</th></tr>
<tr><th colspan="2">Responding Emergency Response (ER) Team</th><td colspan="3" rowspan="5">Exercise Scenario</td></tr>
<tr><th>Name</th><th>ER Position</th></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="3" rowspan="4">Exercise Objectives</td></tr>
<tr><th colspan="2">Personnel in Training</th></tr>
<tr><th>Name</th><th>ER Position</th></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="3" rowspan="2">Equipment to be Utilised (Include ERRV/PSV Name)</td></tr>
<tr><td></td><td></td></tr>
</table>

Exercise Closeout

Debrief Points	Action Required
Exercise Learning/Procedure Amendments	

Tr@ction Number				**Action Checklists Completed?**	**Yes**	☐	**No**	☐
Exercise PON1 submitted?	**Yes**	☐	**No**	☐	**Incident Log Completed?**	**Yes**	☐	**No**	☐
Action Required from Dyce Emergency Response Team (ERT)?	**Yes**	☐	**No**	☐	**Communication of Learnings Required to OIM Network?**	**Yes**	☐	**No**	☐

OIM Signature:		**Date:**		**HSEA Signature:**	**Date:**

Note: Completed Exercise Form and Action Checklists to be submitted into Tr@ction, refer to **Exercise Reporting Requirements**.

Exercise Reporting Requirements

- Frequency – All OIMs are required to complete one OPEP exercise per year
- Tr@ction entry: Once an exercise is complete it must be entered into Tr@ction in the following location:
  1. Click Create 'New Other Event'.
  2. Identify responsible Business Unit.
  3. Click 'Next'.
  4. Event type: 'OPEP Training'.
  5. Then complete other fields and click 'Finish'.
  6. Supporting evidence must be included with the Tr@ction entry, to attached files click 'Attached Files'.
- Required documentation: The following documentation should be submitted for each OPEP exercise:
  - Completed record of OPEP exercise form
  - Scanned copies of completed action checklists
  - DECC portal exercise PON1 print out
  - Completed incident log

Please contact *****REDACTED*****for further information (*****REDACTED*****).

Section

3

Response Justification

1 Introduction

1.1 Scope

This section provides supporting information to justify the levels of response preparedness specified in the Oil Pollution Emergency Plan (OPEP) for assets located in the United Kingdom Continental Shelf (UKCS) operated by BP Exploration Operating Company Limited (hereinafter referred to as 'BP') or affiliates on behalf of itself and its partners and co-licensees in the Field Licence. It has been prepared in accordance with guidance provided by DECC, namely Guidance Notes for Preparing Oil Pollution Emergency Plans For Offshore Oil & Gas Installations and Relevant Oil Handling Facilities, dated May 2015.

This document specifically applies to the Clair Ridge within the Clair Field, its associated subsea structures including any associated appraisal/development drilling and well intervention operations at the Clair Ridge within the Clair Field.

2 Field Response Justification

2.1 Containing Systems and Release Sizes

2.1.1 Diesel

The largest single diesel store associated with the Clair Ridge facility is 720m^3, stored in the platform leg. Stochastic modelling has been undertaken to identify any areas at risk. Catastrophic failure due to ship collision has been analysed and a survey undertaken by Anatec indicates there may be one collision every 5000 years.

2.1.2 Wells

The wells with the highest production flowrate at Clair Ridge are S2U3P4 and S2U3P3, each with a rate of 8235.7m^3/day. However these wells will not flow unless gas lift is in operation. The 8235.7m^3/day figure was arrived at following reservoir engineering work which utilised the most current data obtained during drilling of the two wells. It has been estimated that it would take 140 days worst case for a relief well to be drilled. A stochastic model has been run to identify the areas which could be affected by a worst-case loss of containment.

If such a scenario were to occur, the oil spill response contractor (Oil Spill Response Limited (OSRL)) would provide assistance by running real-time oil spill modelling with real input data.

2.2 Modelling Justification

The selected scenarios represent potential releases from the largest and most persistent crude inventories from the Clair Ridge platform. Scenario 1 describes the worst case ongoing release scenario, a well blowout releasing Clair Ridge crude at a rate of 8235.7m^3/day. Scenario 2 is an instantaneous release of the largest single hydrocarbon store associated with the Clair Ridge facility is 720m^3 diesel, stored in the platform leg.

The results of the selected modelling scenarios can be found in **Section 2 Paragraph 6 Hydrocarbon Pollution Modelling**.

2.2.1 Stochastic Modelling

Three years of hydrodynamic data (sourced from Oil & Gas UK) were used as model inputs and the following scenarios were modelled:

- Scenario 1: Clair Ridge Well Blowout, subsea release – 8235.7m^3/day for 140 days (343.1m^3/hour for 3360 hours)
- Scenario 2: Clair Ridge platform leg diesel release – 720m^3 instantaneous release

2.2.2 Stochastic Modelling Input Data

The input data used for the models are detailed below.

Scenario 1: Oil Spill Modelling Parameters Well Loss Parameters			
Loss from well/FPSO/rig/other	Well	Instantaneous loss?	No
Worst case volume	1,152,998m^3	Will the well self-kill?	No
Flowrate	343.1m^3 per hr	If yes then when?	
Justification for predicted worst case volume	140 days (estimated worst case for relief well to be drilled), at highest unconstrained flowrate of any one well in the field		

Location				
Spill source point	Latitude	60° 44′ 12.835″ N	Longitude	02° 29′ 32.798″ W
Installation/Facility name	Clair Ridge		Quad/block	206/8

Hydrocarbon Properties			
Hydrocarbon name	Clair Ridge 2011		
Assay available	Yes	Was an analogue used for spill modelling?	No

	Name	ITOPF category	Specific gravity	API	Viscosity (temp °C)	Asphaltene content (%)	Wax content (%)	Pour point (°C)
Hydrocarbon	Clair Ridge 2011	Group III	0.909	24.2	54.72cP (30)	1.5	5.1	-18

Metocean Parameters			
Air temperature		Sea surface temperature	10°C (at 10m)
Wind data	Data period:	2004 to 2006 (3 years)	
Wind data reference	Imperial College London ReEMS		
Current data	Data period:	2004 to 2006 (3 years)	
Current data reference	Imperial College London ReEMS		

Modelled Release Parameters			
Surface or subsurface	subsurface	Depth	158m
Release duration	140 days	Instantaneous?	No
Persistence duration	300 days	Release rate	343.1m^3/hr
Total simulation time	300 days	Total release	1,152,998m^3

Oil Spill Modelling Software			
Name of software	MEMW (OSCAR)	Version	6.5.1

Scenario 2: Oil Spill Modelling Parameters								
Inventory Loss Parameters								
Loss from well/FPSO/rig/other	Platform			Instantaneous loss?	Yes			
Worst case volume	$720m^3$			Will the well self-kill?	N/A			
Flowrate	N/A			If yes then when?				
Justification for predicted worst case volume	Instantaneous loss of largest diesel inventory							
Location								
Spill source point	Latitude	60° 44′ 12.835″ N		Longitude	02° 29′ 32.798″W			
Installation/Facility name	Clair Ridge			Quad/block	206/85			
Hydrocarbon Properties								
Hydrocarbon name	Marine Diesel							
Assay available	Yes	Was an analogue used for spill modelling?			No			
	Name	ITOPF category	Specific gravity	API	Viscosity (temp °C)	Asphaltene content (%)	Wax content (%)	Pour point (°C)
Fuel loss	Marine diesel	Group II	0.843	36.4	9.2cP (10)	N/A	N/A	-36
Metocean Parameters								
Air temperature		Sea surface temperature		10°C (at 10m)				
Wind data	Data period:	2004 to 2006 (3 years)						
Wind data reference	Imperial College London ReEMS							
Current data	Data period:	2004 to 2006 (3 years)						
Current data reference	Imperial College London ReEMS							
Modelled Release Parameters								
Surface or subsurface	Surface/subsurface/both			Depth	0m			
Release duration	N/A			Instantaneous?	Yes			
Persistence duration	32 days			Release rate	Instantaneous			
Total simulation time	45 days			Total release	$720m^3$			
Oil Spill Modelling Software								
Name of software	MEMW (OSCAR)			Version	6.5.1			

2.3 Receiving Environment

The document describes a high-level overview of the local environmental conditions. The main potential impacts are:

- Seasonal seabird vulnerability
- Seasonal fisheries sensitivities
- Seasonal cetacean sensitivities

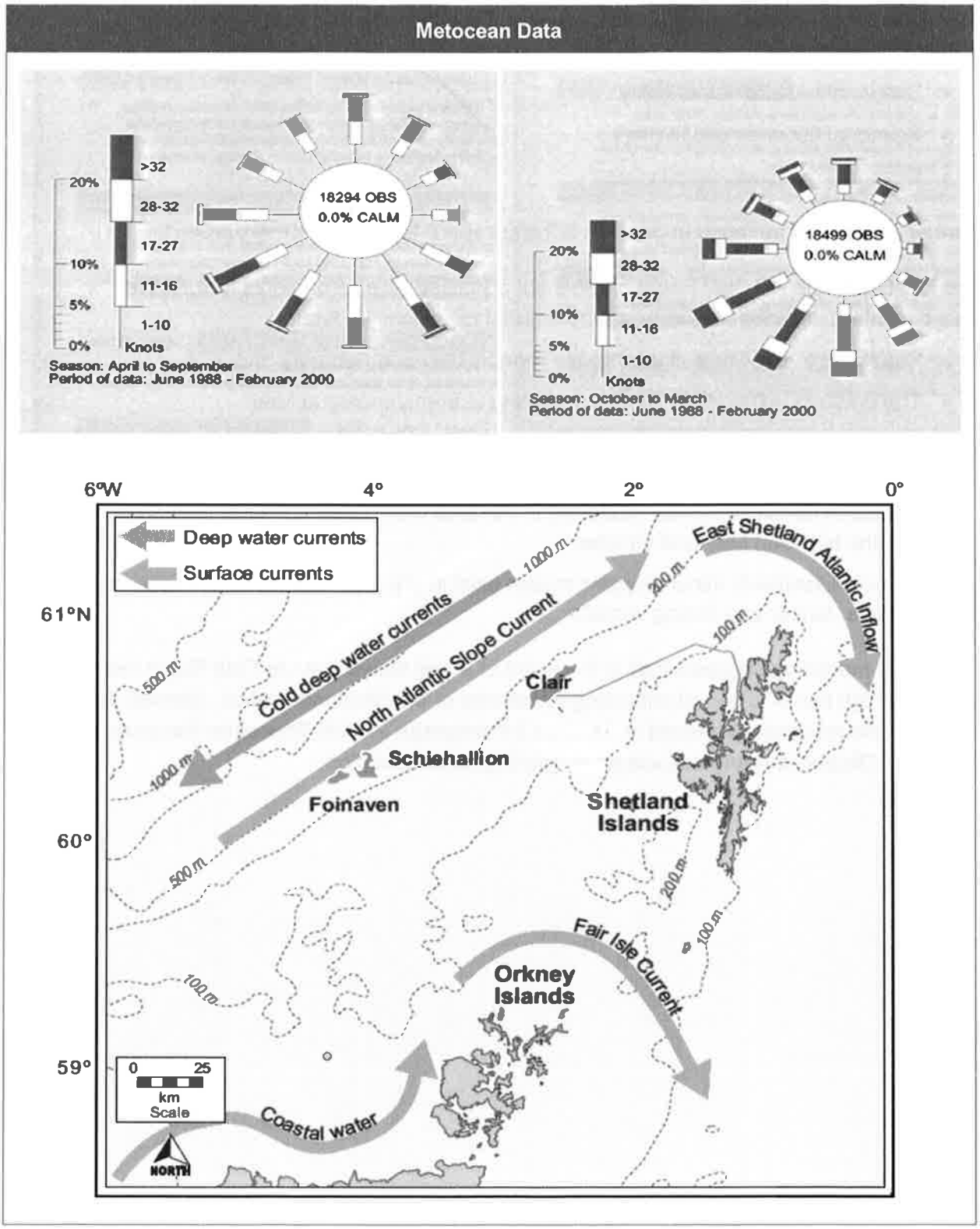
Further details can be found in **Section 2 Paragraph 5 Receiving Environment.**

The location of the BP Clair Ridge block is not classified as environmentally sensitive.
This document describes the local environmental conditions in detail:

- Seabird vulnerability is highest in the months between February and July
- The greatest vulnerability for fish spawning is from January to May
- Commercial fishing activity is relatively low in the area surrounding Clair Ridge, with deep sea fishing increasing in interest in the Faroe-Shetland Channel
- Cetacean densities appear moderate in the area with higher numbers present in the months between May and October
- Two comparatively minor shipping routes exist in the area with traffic consisting of cargo vessels, tanker and fishing vessels

Stochastic modelling suggests that in the event of a well blowout at the Clair Ridge installation there is a high risk of crude oil impacting the shores of the Shetland Islands. Specific details of the shoreline response are found in **Section 3 Paragraph 2.6 UK Shoreline Response and Chemical Dispersant** and associated supporting documentation.

2.4 Metocean Data



Currents	There are complex current patterns with various non-tidal components of current flow interacting with relatively weak tidal flow. The predominant flow in the area is the North Atlantic Slope Current which flows towards the north-east. This slope current branches off over the West of Shetland shelf north of Clair in the form of the East Shetland Atlantic Inflow which flows into the northern North Sea around the north of Shetland. Storm generated currents can create a clockwise rotation in the surface waters in the Clair area.
Tidal Streams	The tidal flow in this area is generally aligned on a north-east to south-west axis along the slope. Mean surface water currents of 0.46 knots and mean currents at seabed of 0.32 knots. The greatest current speeds experienced were in near surface waters at 1.6 knots.
Wind Regime	Winds can occur from any direction with a tendency for winds from the south-south-west, west-south-west and west to be the most frequent during the year. Predominant wind speeds throughout the year vary from moderate to strong breeze (11 to 27 knots) with a frequency of almost 50%. There are seasonal variations with strong winds exceeding 27 knots. These are most prominent during the winter months.
Seabed	The seabed sediments are generally coarse and comprise of sand and gravel. The seabed topography in general is flat and featureless.

2.5 Counter Pollution Response

BP has in place the necessary resources to provide a commensurate level of response to the size of releases they may encounter and are compliant with the requirements as detailed within the DECC OPEP guidance notes[18]. The system is based upon the standard three-tiered system and is defined as follows:

Tier 1: Monitoring and surveillance and dispersant spraying using infield vessels.

Tier 2: Additional aerial surveillance is available within 4 to 6 hours through OSRL, with a 1 m^3 dispersant capability also available.

Tier 3: A full Tier 3 capability is available through OSRL.

2.6 UK Shoreline Response and Chemical Dispersant

The results from the scenarios modelling and set out in **Section 2 Paragraph 6 Hydrocarbon Pollution Modelling** indicate that:

- A potential worst-case diesel release is unlikely to impact the UK shoreline
- A potential worst-case well blowout is predicted to impact the UK shoreline in 36 hours (worst case).

The Clair Ridge within the Clair Field is located in the waters West of Shetland with the Faroe transboundary line being a distance of 94km away. The distances to the nearest points of land are 55km to Shetland Islands and 59km to Papa Stour. In the event of a spill approaching the Shetland shoreline, BP has additional coastal response resources located in Shetland. These additional resources are summarised in **ROn 1.7 Tiered Response Resources**.

Clair Ridge crude oil has an asphaltene content of 1.5%, indicating this oil will quickly form a stable emulsion. In this instance, the use of chemical dispersant would be recommended as part of the response strategy. There are both Tier 1 and 2 levels of response available in the event of a release of Clair Ridge crude oil. The platform ERRV carries between 2 and 10 tonnes of a Type 2/3 dispersant.

Current PON1 guidance[19] requires that any consideration given to the use of dispersant as a response strategy for a release will be done in consultation with DECC.

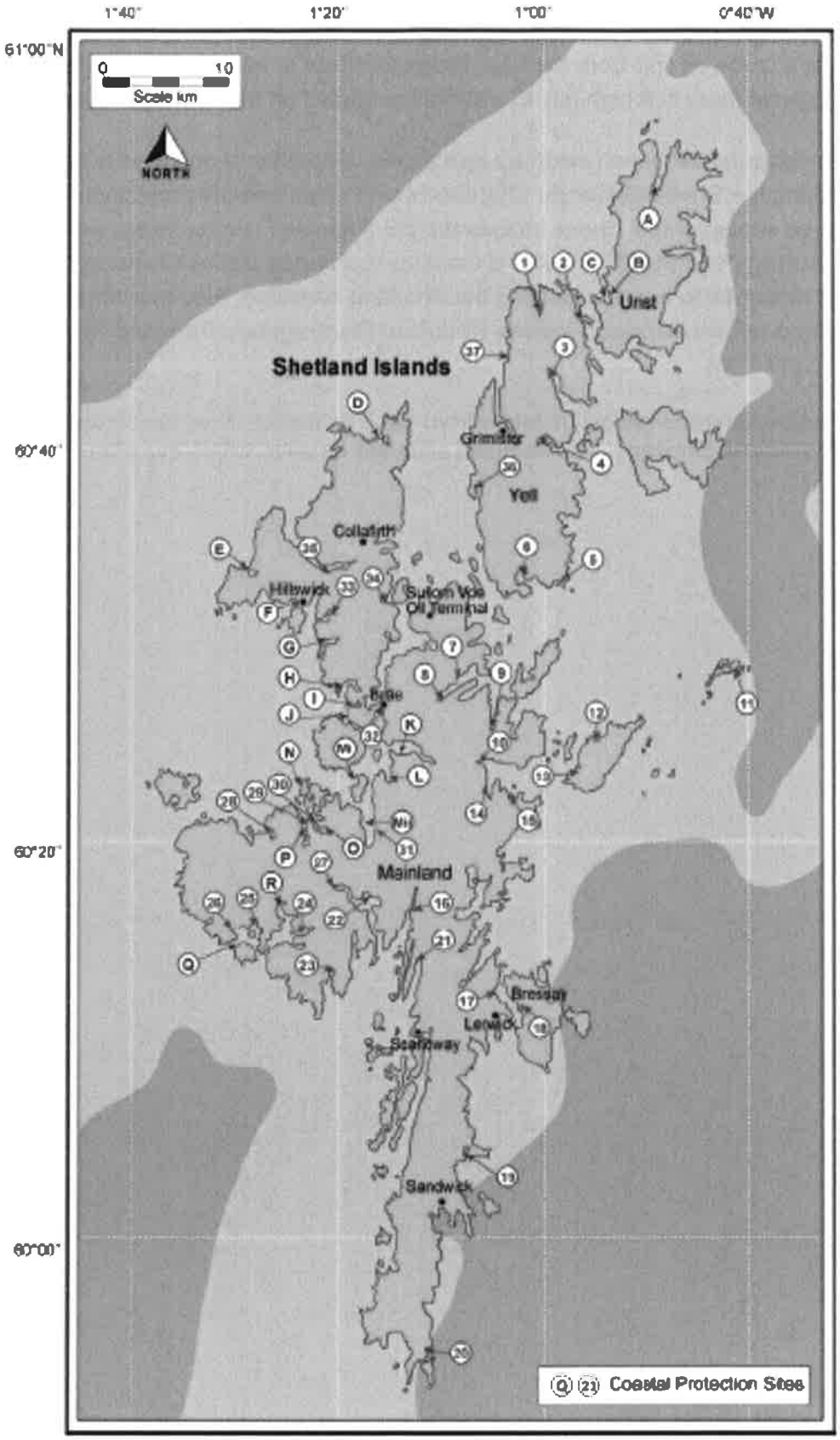
18 Guidance Notes for Preparing Oil Pollution Emergency Plans For Offshore Oil & Gas Installations and Relevant Oil Handling Facilities, dated May 2015.
19 DECC PON1 Guidance Document, 8 November 2011.

2.6.1 Shetland Shoreline Protection Strategy Plan

In the event of a crude oil spill from the Clair Ridge Platform or associated pipeline, stochastic modelling suggests there is a high risk of a shoreline impact on the Shetland Islands.

In preparation for potential beach clean-up operations, a number of documents have been put together detailing the Shetland Islands' shoreline sensitivities and the protective response operations to be implemented. These include the **BP Atlantic Frontier Programme Shoreline Protection Strategy** and the **BP Shetland Coastal Response Callout Strategy** which will be referenced in response to a spill impacting the Shetland coastline. Also available for reference are the **Shetland Islands Council Marine Pollution Contingency Plan** and **Sullom Voe Harbour Oil Spill Plan**.

The coastal protection map (below) is taken from the **BP Atlantic Frontier Programme Shoreline Protection Strategy**. The selected sites are detailed within this plan.


1°40'
1°20'
1°00'
0°40'W
61°00'N
60°40'
60°20'
60°00'
0
10
Scale km
NORTH
Shetland Islands
Unst
Yell
Mainland
Collafirth
Hillswick
Sullom Voe Oil Terminal
Brae
Lerwick
Scalloway
Sandwick
Coastal Protection Sites

2.6.2 Shetland Shoreline Response Plan

BP's offshore assets West of Shetland (Clair field) require an oil spill response capability to be in place, facilitating a rapid near-shore/coastal response should a hydrocarbon release threaten the Shetland coastline.

As part of the overall counter pollution response strategy for spills associated with Clair operations, BP maintain strategically located mobile response packages, and trained response personnel that can be engaged to combat oil spills approaching inshore areas.

The packages are located on the Shetland Islands mainland at Sullom Quarries, Brae and on Yell at Cullivoe. They comprise a number of response trailers loaded with containment booms and ancillary booming support equipment (detailed in the **BP Shetland Coastal Response Callout Strategy**). The operating area excludes Sullom Voe which is covered by the equipment spread held and managed by BP SVT.

The contract arrangements extend to the provision of a pool of trained responders who will mobilise the equipment trailers to a pre-determined location and undertake deployment operations. The responders are sourced from local Contractors RS Hendersons (Yell) and Garriock Brothers (Brae, Mainland) who also provide vehicles for towing the trailers.

During the initial stages of the response, efforts will be co-ordinated by the IMT at SVT supported by the IMT at Dyce. Further support and a supervisory team will be dispatched at the earliest opportunity to Shetland from OSRL in Southampton to support and assist the responders.

It is expected that for large incidents affecting significant areas of the shoreline, control of all resources will fall to the Local Authority operating under the auspices of the Shoreline Response Centre (such arrangements detailed in the **SIC Marine Pollution Contingency Plan** and **Sullom Voe Harbour Oil Spill Plan**).

2.7 Response Contracts

2.7.1 Hydrocarbon Release Response Contractor

BP has a contractual agreement with OSRL to provide assistance with responding to a hydrocarbon release in the UKCS. OSRL will provide aerial surveillance and dispersant spraying capabilities and provide support to BP for a Tier 2 and 3 hydrocarbon release. Should a response be required, OSRL will work with the Dyce IMT and provide services and equipment at the Clair Ridge within the Clair Field as required.

BP has a contractual agreement with Briggs Environmental Services which may be mobilised to assist should further support be required for either offshore or shoreline response operations.

3 Response Conclusion

BP's response capability for both counter pollution and containment, as detailed within this document, reflects that the necessary resources are in place to provide a commensurate level of response to a worst-case release resulting from the Clair Ridge. In addition, BP has considered the technical and operational requirements necessary to support various situations including dealing with a well blowout.

To ensure that the resources and support required are appropriate to the release size that may be encountered, modelling has been undertaken. The scenarios are based on 'worst-case' events to ensure they comply with all the requirements as detailed within the DECC OPEP guidance[20].

20 Guidance Notes for Preparing Oil Pollution Emergency Plans For Offshore Oil & Gas Installations and Relevant Oil Handling Facilities, dated May 2015.