La Rocca-1
(Commonwealth Waters, WA-388-P)

Exploration well

BRIDGING DOCUMENT to the Generic Environment Plan (EP) for Apache's drilling activities on the North West Shelf 2007-2011 (EA-00-RI-164)

17th January 2011

Introduction

Apache proposes to drill La Rocca-1 as an exploration well in permit area WA-388-P in Commonwealth waters within the Carnarvon Basin off Western Australia. Drilling is proposed to commence early February 2011 (dependent on rig availability; and weather conditions permitting) using the *Stena Clyde* semi-submersible drill rig.

Distances from the following key regional features to the well are listed below:

- Closest Apache offshore platform:	Legendre Platform, 119 km SE
- Closest Montebello Island:	125 km S
- Closest Lowendal Island:	150 km S
- Varanus Island:	155 km S
- Closest mainland point (Devil Creek):	184 km SSE
- Closest island in Dampier archipelago:	165 km SE

The location of the well is shown in **Figure 1**.

The Generic Environment Plan (EP) for Apache's drilling activities on the North West Shelf 2007-2011 (EA-00-RI-164) will be used to drill the well, as it covers the expected environmental risks and control measures to be undertaken during the drilling programme.

The well details for La Rocca-1 are summarised in **Table 1**. The well will be drilled with seawater and prehydrated gel sweeps (SW/PHG) and water based mud (WBM) only.

The *Stena Clyde* is the proposed rig to drill the La Rocca-1 and has been used by Apache for previous drilling campaigns.

Drilling Programme

La Rocca-1 drilling will commence once the drill rig has moved onto location and rigged up. A 914 mm (36”) hole will be drilled down to 75 m (from 432 m to 507 measured rotary table (mRT)) using seawater and prehydrated gel sweeps (SW/PHG). A 762 mm (30”) casing will then be run and cemented with the permanent guide base.

A 406 mm (16”) hole will be drilled down from 507 m to 2,525 mRT using water based muds (WBM). A 340mm (13-3/8”) casing will then be run and cemented. At this point the blow-out preventor (BOP) and marine riser will be installed. A full BOP pressure test will be conducted.

A 311mm (12-1/4”) directional assembly will then be used to drill from 2,525 m to 4,025 mRT using water based muds (WBM). Then a 244 mm (9-5/8”) casing will be run and cemented in place.

A 216 mm (8-1/2") directional assembly will then be used to drill to a total depth (TD) of 4,528 m MDRT using WBM. At this stage the decision will be made to set a 178 mm (7") contingent Drilling Liner depending on the pore pressure gradient. Prior to running the 178 mm (7") contingent Drilling Liner, the primary objective will be evaluated using wireline logs including Vertical Seismic Profiling (VSP) being contingent for the exploration well.

On intersecting the target (total depth), the well will be evaluated using wire-line logs and then abandoned appropriately. After abandoning the well the anchors will be pulled up and the drill rig moved off location.

Any production/well testing is contingent on discovery of hydrocarbons from the exploration well.

All work on the well will be undertaken in accordance with the regulations and guidelines set out in the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (*OPGGSA*) and the associated *OPGGS(E) Regulations 2009* and *Petroleum (Submerged Lands) Act Schedule of Specific Requirements as to Offshore Petroleum Exploration and Production (2005)*.

Table 1: Well details for La Rocca-1

Parameter	La Rocca-1
Surface hole location (GDA 94, Zone 50)	19^0 14' 38.36" S (Lat) 115^0 41' 10.70" E (Long)
Type of well	Exploration well
Approximate water depth (m)	407 m AHD
Approximate length of drilling period (days)	40.7 days (dry hole)
Proposed total depth of well (m)	4,875 m MDRT
Drilling rig	*Stena Clyde* semi-submersible rig
Drilling fluid	SW and PHG sweeps (SW/PHG); and KCL/ Klastop (i.e. WBM)
Volume of cuttings (estimate only)	311.2 m^3 - SW/PHG 145.3 m^3 - WBM
Cuttings management	Disposed to seabed
Site survey undertaken	Yes, survey report will be available prior to the commencement of the drilling programme (see section Seabed Survey)
Scheduled commencement date, weather pending	9th February 2011 (dependant on rig availability)
Nearest land or reef system (km)	Montebello Islands, 125 km south
Oil Spill Modelling	Using proposed Julimar B manifold point in WA-356-P for 3 seasons (approximately 115 km SW of La Rocca-1)

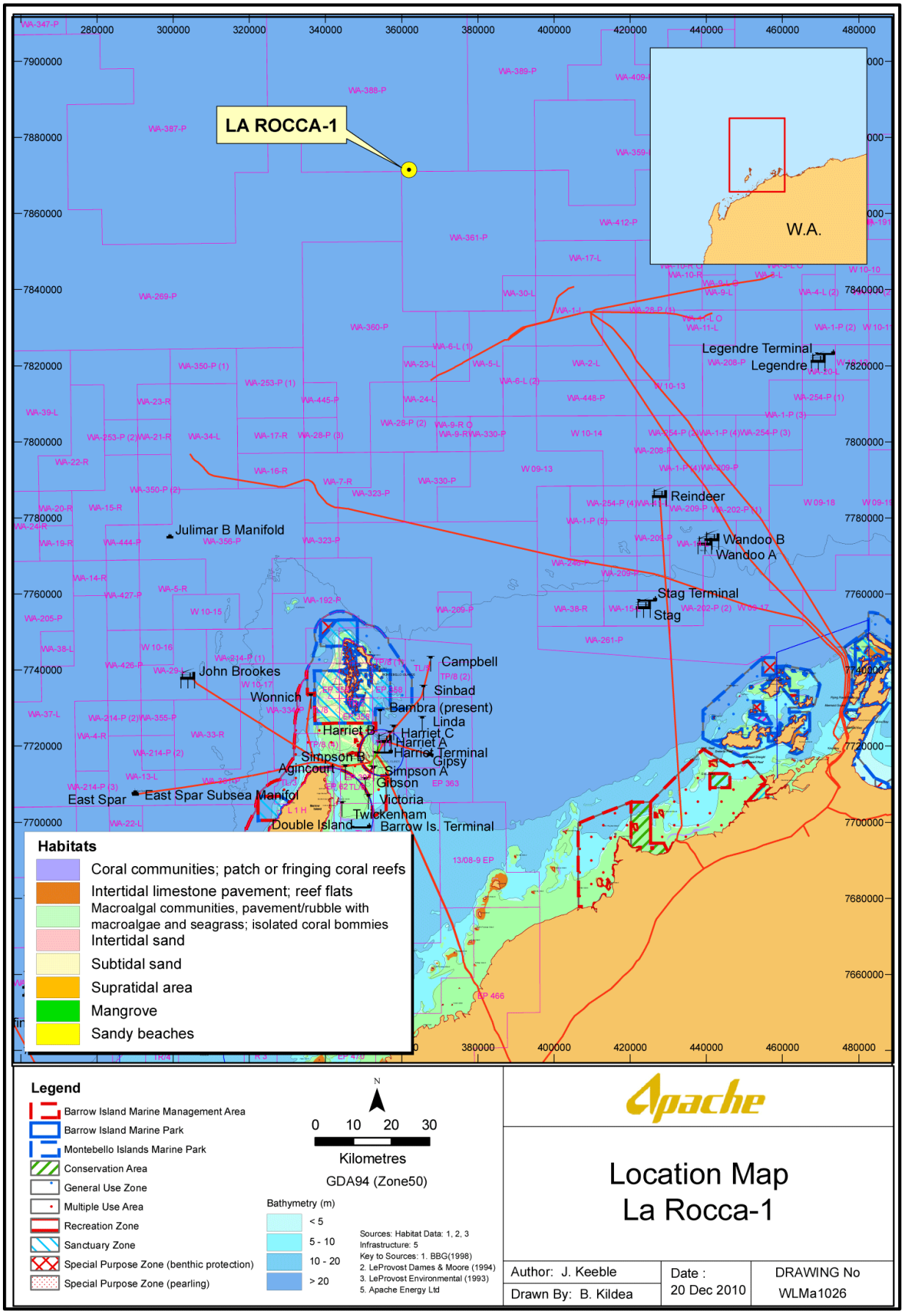

Figure 1: Location of the proposed La Rocca-1 drilling location

Seabed Survey

Neptune Geomatics Pty Ltd (Neptune) was contracted by Apache Energy Ltd (AEL) to conduct a geophysical site survey of the proposed La Rocca-1 drilling location using the Mermaid marine vessel *Mermaid Voyager* during the period 12th – 15th December.

Survey equipment used during the La Rocca-1 site survey included a multi-beam echo sounder, sidescan sonar, and sparker sub-bottom profiler, survey positioning and acquisition software in an area of 4 km x 4 km surrounding the surface location.

Overall, the seabed within the survey area was found to be gently sloping to the west at a gradient of less than 1^0. The water depth at the proposed La Rocca-1 drilling location is 399.3 m LAT. Water depths within the La Rocca-1 survey area ranges from 374.5 m LAT in the east and 431.2 m LAT in the west of the survey area. Within 1250 m radius of the proposed La Rocca-1 drilling location, the water depth ranges from 385.7 m LAT to 416.3 LAT.

The primary seabed sediment within the La Rocca-1 survey area consists of low relief unconsolidated calcareous silty fine sand. No significant bathymetric, seabed features or shallow geological hazards associated with drilling rig positioning were observed within the La Rocca-1 survey area.

General Environmental Considerations

The drilling programme occurring predominantly in February does not coincide with the peak migration of humpback whales (*Megaptera novaeangliae*) in the Exmouth to Port Hedland region (see **Table 3**). The humpback whale is a cetacean listed as 'threatened' under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*.

The humpback whale migrates between the Antarctic waters and the Kimberly region of Western Australia. The peak of the northerly migration occurs around June – July, while the southerly return migration peaks around September – October. Northbound whales tend to remain on or within the 200 m contour passing to the west and north of Serrurier Island, westward of Barrow Island and north of the Montebello Islands whereas the southern migration route is more variable and often in shallower waters to the east of the Montebello/Lowendal/Barrow region.

Whale sharks (*Rhincodon typus*), the world's largest fish (up to 12 m in length), are oceanic and cosmopolitan in their distribution. During autumn (late March to June) they aggregate in and near the waters of the Ningaloo Marine Park (a distance of greater than 200 km from La Rocca-1 drill site), with the largest numbers being recorded in April.

The proposed La Rocca-1 drilling location is approximately 125 km distant from the nearest island (Montebello islands) and 150 km from the nearest Lowendal Island; however management measures will be in place throughout the drilling programme to avoid potential impact on cetaceans (see Environmental Guidelines and Commitments).

Dugongs (*Dugong dugon*) occur across the tropical coastal waters of Australia from Shark Bay to Queensland and are protected under national legislation and international agreements. They are generally restricted to coastal or shallow water habitats with sufficient seagrass, on which they feed and large populations are known to occur in coastal waters of northern Western Australian(1)

[1] Prince, R.I.T. (2001) *Aerial survey of the distribution and abundance of dugongs and associated macroinvertebrate fauna- Pilbara Coastal and Offshore Region, W.A*. Report to Environment Australia; and

Dugongs are herbivorous and are generally associated with seagrass beds, upon which they feed, and are therefore most commonly found in shallow sheltered areas (less than 5 m deep) in state waters, and often near islands or large bays[(2)] and sandy lagoonal areas that provide a valuable food source.

It is unlikely dugongs will be encountered in the deeper waters of the survey area primarily due to their preference for shallower waters.

VSP will be undertaken as part of the drilling programme; however this is of short duration (generally less than 8 hours per well) therefore this source of underwater noise will be limited. To mitigate any potential impacts on humpback whales from VSP, DMP's Guidelines on Minimising Acoustic Disturbance to Marine Fauna (1997) will be followed when undertaking VSP. All cetacean sighting records will be reported to Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) at the end of the drilling programme. Using the DMP guidelines, the following measures will be undertaken on the rig at the commencement of the VSP:

- Not commencing VSP unless whales and whale sharks are a minimum distance of 3 km from the rig;
- Soft-start over a 20 minute period;
- Rig crew being alert for whales and whale sharks during VSP, with a dedicated watcher on post if a whale (or whale shark) is sighted with 3-5 km of the rig; and
- Shut down of VSP if whales (or whale sharks) are observed within 1.5 km of the rig.

Table 3: NWS biological and human activity seasons

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dugong breeding	breeding								breeding			
Hawksbill turtle nesting												
Flatback turtle nesting												
Green turtle nesting												
Loggerhead turtle nesting												
Coral spawning												
Whale migration						north			south			
Whale sharks												
Algae	growing				Shedding fronds				growing			
Seabird nesting												
Prawn trawling												
Tourism												
La Rocca-1												

Key

- Peak activity, presence reliable and predictable
- Low level of abundance/activity/presence
- Activity not occurring within the area
- Proposed Drilling Programme

Marsh, H., H. Penrose, C. Eros & J. Hugues (2002*). Dugong Status Report and Action Plans for Countries and Territories*. United Nations Environment Programme, Nairobi.

[2] CALM & MPRA. (2005). *Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005-2015 (Management Plan No. 52)*. Department of Conservation and Land Management and Marine Parks and Reserves Authority.

Oil and Diesel Spill Modelling

This section details the results of oil spill modelling during three different seasons, using the spill point (namely Julimar B Manifold) within WA-356-P (for the proposed Julimar Development Project) (APASA, November 2010[3]) located approximately 115 km southwest of the La Rocca-1 drill site (see **Figure 1**). Given La Rocca-1's distance from offshore islands and the mainland, the modelling outlined below can be considered as a worst-case scenario. Spill modelling data has been extrapolated to ascertain the potential impacts of a spill that may occur at the La Rocca-1 drill site during the summer period.

Oil spill modelling was undertaken using a three-dimensional oil spill trajectory and weathering model (SIMAP) designed to simulate the transport, spreading and weathering of specific oil types under the influence of changing meteorological and oceanographic forces. Modelling scenarios considered during the spill assessment were a surface diesel spill of a total of 80,000 L (large volume, worst case during construction activities) and an uncontrolled subsea blowout (with a release rate of 4,200 barrels per day) for a period of ten weeks[4].

Modelling was carried out using current and wind data sampled from the APASA data archive for the regional area based on periods corresponding to summer (December to February), winter (June to August) and transitional periods (autumn and spring) to quantify risks of contact at surrounding locations during each of these seasons. Risks of contact with surrounding shorelines are assessed in terms of threshold levels of oil concentration. Indicative thresholds of oil mass per surface area were applied for surfaced oil – equivalent to oil films displaying dull metallic colours (5 g/m^2), rainbow sheen (0.15 g/m^2) and silver sheen (0.15 g/m^2).

Table 4 outlines the predicted risks to sensitive shorelines from potential oil spills at the proposed Julimar B Manifold point (in WA-356-P) under summer, winter and transitional season conditions. It is noted that the La Rocca-1's drilling programme will be undertaken during the summer season.

Summer Season (October to March)

Under summer conditions, the predominant winds (those that will be experienced during this drilling campaign) are to the northeast, forcing the majority of simulated spills in that direction. Stochastic modelling indicated that spills during the summer season are unlikely to drift onto land as winds at the spill site will predominantly be from the southwest and spills are most likely to travel to the northeast (**Figures 2 - 3**).

A low probability (5%) of shoreline contact by condensate films of concentrations > 0.15 g/m^2 was indicated at Barrow Island, the Murion Islands and North West Cape. The earliest (minimum) time for oil of any concentration to arrive at this shoreline is 730 hrs. The Montebello Islands was the shoreline predicted to have the highest probability (10%) of exceeding the 0.15 g/m^2 threshold, with a minimum time to shoreline of 1,015 hrs (**Table 4**).

Surface probability contours of diesel oil indicates a ≤ 20% chance of exceeding the 1 g/m^2 concentration threshold up to 20 km to the north and up to 30 km to the south west of the spill site. For the 5 g/m^2 threshold, the extent of the 20% probability contour is reduced to no further than 5 km form the spill site in any direction. Overall, there is a 2% probability of

[3] Julimar Development- Hydrocarbon Spill Risk Assessment, November 2010. Prepared by Asia Pacific Applied Science Associates (APASA) on behalf of Apache Energy Ltd (AEL).

[4] A leak frequency analysis conducted by Bureau Veritas in October 2010 (on behalf of AEL), predicts the probability of a blowout occurring at the proposed Julimar B manifold is 4.9 x 10-4 per year, or approximately 1 in every 2,000 years. Applying this probability reduces the risk of most of the outcomes of the blowout simulations to less than 1 in every 5,000 years.

surface diesel oil contacting any shoreline during summer, with a minimum drift time of 100 hours (**Table 4**).

Transitional Season (April and September)

Winds during the transitional months particularly during autumn tend to be weaker and more variable than during summer or winter. Wind is predominantly from the southwest sector particularly during the spring period. As a result, surface probability contours for both thresholds indicate similar results to the summer simulations, although 10% probability contours do not extend as far to the southwest.

At the 1.0 g/m^2 threshold, the high likelihood zone (> 90% probability) is reduced to 25 km to the north and 50 km to the south west (**Figure 4**). There is a moderate probability (> 40%) of surface condensate contacting waters 55 km to the north and 130 km to the southwest of the spill site.

The probability of surface condensate >0.15 g/m^2 contacting any of the shorelines (see **Table 4**) is <1% during the transition period (**Figure 4**). Overall, there was a low probability (5%) of surface condensate of any concentration contacting any shoreline during this period, with a minimum drift time prior to contact of 1,310 hours (**Table 4**).

No surface diesel > 0.15 g/m^2 was predicted to contact any nearby shoreline during this period. Overall, modelling indicated there was a very low (1%) probability of surface oil of any concentration contacting any shoreline during transitional periods.

Winter Season (May to August)

Winds during the winter season are predominantly from the southwest; however there is a north north-easterly component.

Probability contours indicate a greater bias to the north than in the summer and transitional periods. The high likelihood zone (>90%) for the 0.15 g/m^2 threshold lies within 35 km to the north and 55 km to the southwest of the spill site. Lower probabilities are found over similar distances to the west and east. The spill trajectory indicates at that threshold a moderate likelihood (> 40%) of contacting waters up to 100 km in both the north and southwest directions (**Figure 5**).

At the 1.0 g/m^2 threshold the highest probability contact zone (> 90%) is reduced to within 25 km to the north and 35 km to the southwest of the spill site, with low probabilities (< 10%) extending 350 km to the northwest.

A low probability (5%) for surface condensate > 0.15 g/m^2 reaching the shoreline at North West Cape was predicted. The minimum time for condensate of any concentration to reach this shoreline was 610 hours, with a maximum shoreline concentration of 1.2 g/m² predicted in the worst case scenario (**Table 4**).

As shown in **Table 4**, diesel surface films >0.15 g/m^2 were not expected to contact any of the shoreline locations. Overall, there was a very low probability (< 1%) of surface oil of any concentration contacting any shorelines during winter. Entrained diesel > 10 ppb could occur at North West Cape during winter; however the probability is very low (1%), with concentrations potentially reaching 610 ppb as the worst case scenario (**Figure 6**).

Table 4: Predicted risks to shorelines from oil spills under summer, winter and transitional conditions at La Rocca-1 (using the proposed Julimar B Manifold location spill modelling, located 115 km southwest of drill site)

Season	Spill Scenario	Shoreline	Probability of surface oil > 0.15 g/m^2 at shorelines (%)	Minimum time to shoreline before exposure (hrs)	Mean expected max. shoreline concentration (g/m^2)	Max. shoreline concentration (g/m^2)
Summer	294,000 bbls Condensate	Montebello Islands	10	1,015	0.3	5
Summer	294,000 bbls Condensate	Barrow Island	5	835	LT	0.5
Summer	294,000 bbls Condensate	Murion Islands	5	970	0.4	8
Summer	294,000 bbls Condensate	North West Cape	5	730	3	50
Summer	80,000L Diesel	Montebello Islands	0	190	LT	LT
Summer	80,000L Diesel	Barrow Island	0	-	0	0
Summer	80,000L Diesel	Murion Islands	0	100	LT	LT
Summer	80,000L Diesel	North West Cape	1	100	LT	14
Winter	294,000 bbls Condensate	Montebello Islands	0	-	0	0
Winter	294,000 bbls Condensate	Barrow Island	0	-	0	0
Winter	294,000 bbls Condensate	Murion Islands	0	-	0	0
Winter	294,000 bbls Condensate	North West Cape	5	610	LT	1.2
Winter	80,000L Diesel	Montebello Islands	0	-	0	0
Winter	80,000L Diesel	Barrow Island	0	-	0	0
Winter	80,000L Diesel	Murion Islands	0	-	0	0
Winter	80,000L Diesel	North West Cape	0	-	0	0
Transition	294,000 bbls Condensate	Montebello Islands	0	-	0	0
Transition	294,000 bbls Condensate	Barrow Island	0	1,310	LT	LT

Season	Spill Scenario	Shoreline	Probability of surface oil > 0.15 g/m^2 at shorelines (%)	Minimum time to shoreline before exposure (hrs)	Mean expected max. shoreline concentration (g/m^2)	Max. shoreline concentration (g/m^2)
Transition	294,000 bbls Condensate	Murion Islands	0	-	0	0
Transition	294,000 bbls Condensate	North West Cape	0	-	0	0
Transition	80,000L Diesel	Montebello Islands	0	-	0	0
Transition	80,000L Diesel	Barrow Island	0	-	0	0
Transition	80,000L Diesel	Murion Islands	0	-	0	0
Transition	80,000L Diesel	North West Cape	0	-	0	0

LT: some concentrations predicted but these are lower than the threshold of 0.15 g/m^2.
Zero: does not necessarily indicate absolutely "no risk" of an event, denotes a generally low risk.
Shading = period for scheduled drilling
(Source: APASA, 2010).

Environmental Guidelines and Commitments

A summary of the environmental guidelines and commitments for La Rocca-1 is outlined in **Table 7.**

In addition to compliance with the relevant regulatory requirements, Apache and its Contractors' are continually reviewing their drilling procedures, including inspection of survey equipment, to mitigate any environmental impact associated with drilling activities undertaken in the NWS.

Table 7: Apache Environmental Guidelines and Drilling Rig Environmental Commitments for La Rocca-1

(La Rocca-1 drilled under NWS 2007-2011 Generic Drilling EP: Doc EA-00-RI-164)

Activity	Requirement
Disposal of drilling fluid and drilling cuttings	• Dispose of WBM coatings directly to the seafloor. • Optimise solids control equipment to ensure maximum separation of fluid from cuttings. • Follow Apache refuelling procedures (AE-91-IQ-098). • Record volume of drilling cuttings and fluid disposed into the ocean on environmental spreadsheet. Record retort figures for percentage of fluid-on-cuttings and report results to the Apache Environmental Department at the end of the well.

Activity	Requirement
Pipe Dope	• Use pipe dope that has the lowest concentration of heavy metals and hydrocarbons but still meets safety and performance criteria. • Record volume of pipe dope used on location on the environmental spreadsheet. Send results to the Apache Environmental Department at the end of the well.
Deck drainage, chemical storage and management	• Maintain good housekeeping practices. • Store chemicals in bunded areas away from open drains and chemical containers are to be intact. • Use drip trays under all machinery and fuel points and valves. • In the event of a spill, take all actions to control the spill and divert deck drainage to on board containment tanks for treatment through the oil in water separator. • Ensure absorbent material is on board to use in soaking up chemical or oil spills on deck. • Maintain oil water separators regularly to ensure 15 ppm oil concentration alarm is functional. • Report all releases of oil in water > 30 mg/l (over a 24 hour period) to Apache Perth office. • Report all spills >80 L to DMP within 2 hours[5] either directly by contacting the DMP Duty Inspector on 0419 960 621 or via the Apache Perth office. • Report all spills < 80 L through Apache incident reporting system.
Liquid Discharges	• Discharge excess water from the water maker to sea. • Under routine operating conditions, discharge treated sewage, grey water and main deck drainage at sea level. • Discharge cooling water at barge of hull of drilling rig level to allow for sufficient cooling and oxygenation.
Incident Reporting	• Use the Apache incident reporting system to report incidents within 2 hours (OPGGS) (Environment) Regulations 2009, Sub-regulation 26).
Waste Oil Management	• Drum waste oil and grease and return to mainland for recycling. • Record volume of waste oil taken off rig and forward results to the Apache Environmental Department at the end of the well campaign.

[5] Requirement as per the Department of Resources, Energy and Tourism (DRET) *Guidelines for the Preparation and Submission of an Environment Plan*; and Schedule of Specific Requirements as to Offshore Petroleum Exploration and Production as a set of standing directions issued under s574 of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) (OPGGSA).*

Activity	Requirement
Spillage of diesel fuel or oil	• Follow Apache refuelling procedures (AE-91-IQ-098). • Carry out diesel refuelling during daylight hours only, weather permitting. • In event of a spill take all actions to control it. • Do not use dispersant without AMSA approval. • **Report all spills >80 L to DMP within 2 hours[9] either directly by contacting the DMP Duty Inspector on 0419 960 621 or via the Apache Perth office.** • Report all spills <80L through the Apache incident reporting system. • Implement Apache's Oil Spill Contingency Plan (OSCP) if required.
Discharge of combustion products from engines	• Include inspections and tuning of engines and equipment on a regular maintenance schedule. • Optimise combustion or well test fluids and gas.
Solid waste management • Food scraps • Garbage • Litter • Scrap metal and wood etc	• **Macerate all food scraps prior to ocean disposal (rig is 125 km from nearest land mass).** • Do not dispose of debris, garbage or litter into the sea (skips need covers to prevent wind blown rubbish – especially plastics and cups). • Segregate industrial waste (scrap metals / drums etc) wherever possible for appropriate disposal onshore. • Do not use polystyrene cups. • Reduce, reuse and recycle waste wherever practicable. • Record the volume and type of waste taken off rig and forward to the Apache Environmental Department at the end of the well. • Undertake a ROV survey to check that no rubbish is left on seabed. Remove any debris if found.
Sewage discharge	• Treat sewage to secondary level prior to discharge through the sewage plant (aerates, macerates and chlorinates). This unit meets MARPOL 1973/78 requirements. • Maintain the sewage treatment plant in order to ensure effective treatment.
Light Overspill	• Minimise use of non-essential lighting, while maintaining safety standards on the drill rig and support vessel.
Noise	• Minimise noise emissions when drilling near noise-sensitive environments.
Fishing	• No fishing is permitted from the drill rig whilst it is on location.
Anchoring & Disturbance to the seabed	• Side scan sonar survey results used to select a rig approach and drill site location that avoids sensitive seabed features. No sensitive seabed features in immediate vicinity of the well. • No workboats are to anchor in areas where coral reefs occur; a designated area for mooring will be allocated. No sensitive seabed features in immediate vicinity of the well.

Activity	Requirement
Operational Environmental Awareness	• Through inductions and educational material present on the rig, all personnel are familiar with the environmental requirements of the EP to ensure these guidelines and procedures are being followed. • Ensure all personnel sign off on the rig register book confirming their induction.
Vertical Seismic Profiling (VSP)	• Follow DMP (formerly DoIR) *Guidelines on Minimising Acoustic Disturbance to Marine Fauna* (1997) when undertaking VSP: – Do not commence VSP unless whales are a minimum distance of 3 km from the rig. – Soft-start over a 20 minute period. – Ensure rig crew is alert for whales during VSP, with a dedicated whale-watcher on post if a whale is sighted with 3-5 km of the rig. – Shut down of VSP if whales are observed within 1.5 km of the rig.
Large Animal Observations	• Fill in whale and turtle observation data sheets and send to the Apache Environmental Department at the completion of the drilling programme (Appendix in NWS generic drilling EP 2007-2011 (EA-00-RI-164).

Perth Office Commitments

Activity	Requirement
Prior to drilling	• NWS generic drilling EP 2007-2011 (EA-00-RI-164) is available to all personnel involved in drilling programme. • Ongoing consultations are part of each drilling campaign. In preparing the Generic NWS Drilling Programme EP, Apache consulted with numerous stakeholder representatives. Key stakeholders representatives such as fisheries will be notified of the La Rocca-1 campaign prior to commencement of drilling.
Discharge of combustion products from engines	• Report greenhouse gas emissions data to Commonwealth Government annually.
Environmental Audit	• Audit drilling rigs every six months whilst under contract to Apache (*Stena Clyde* audit recently conducted mid October 2010). • Review electronic waste and chemical log received from rig at the completion of the drilling programme.

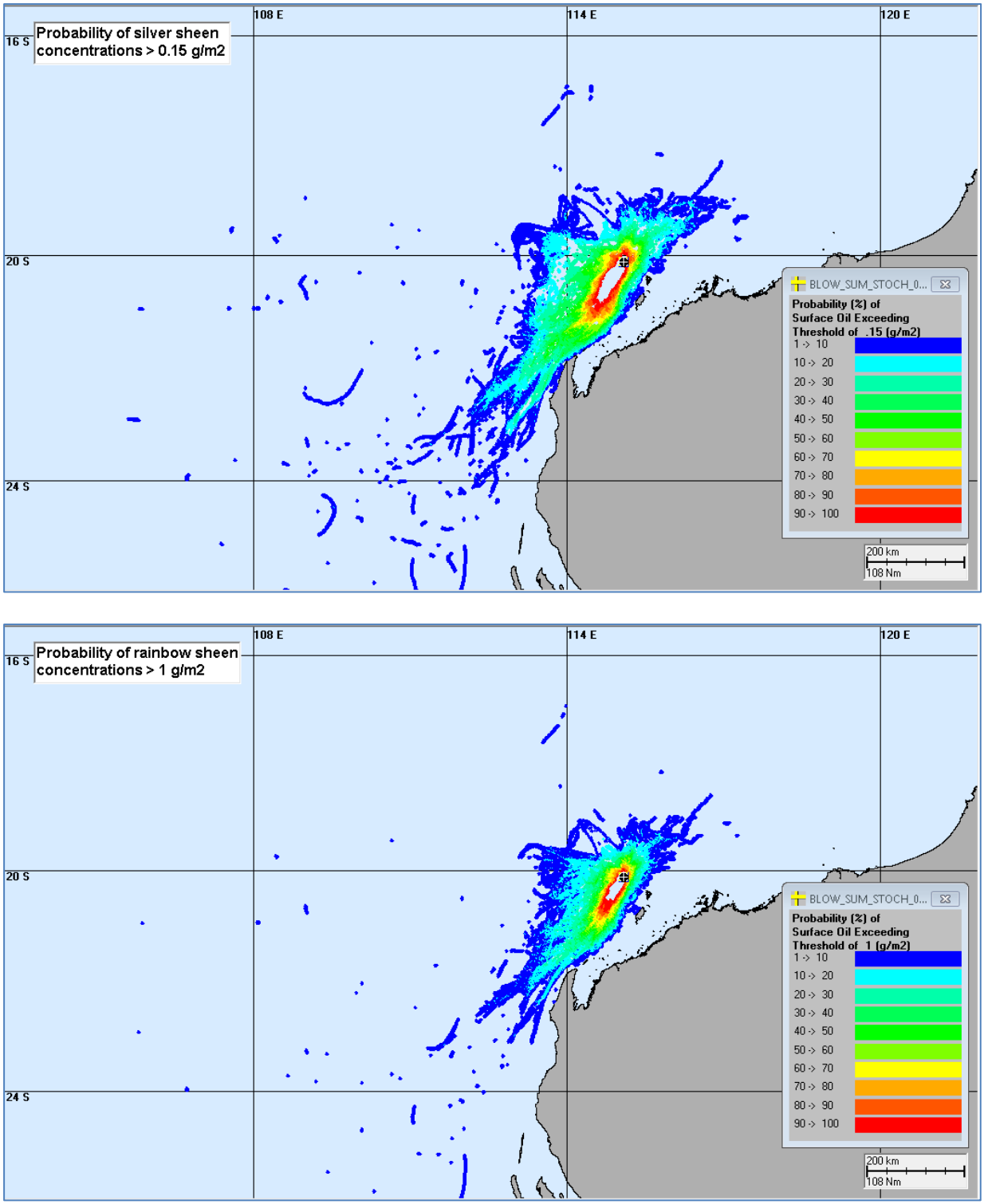

Figure 2: **Predicted probability of contact by surface films exceeding 0.15 g/m^2 (top) and 1.0 g/m^2 (bottom) resulting from a 10 week (294,000 bbl) blowout of condensate at the proposed Julimar B manifold location during summer.**

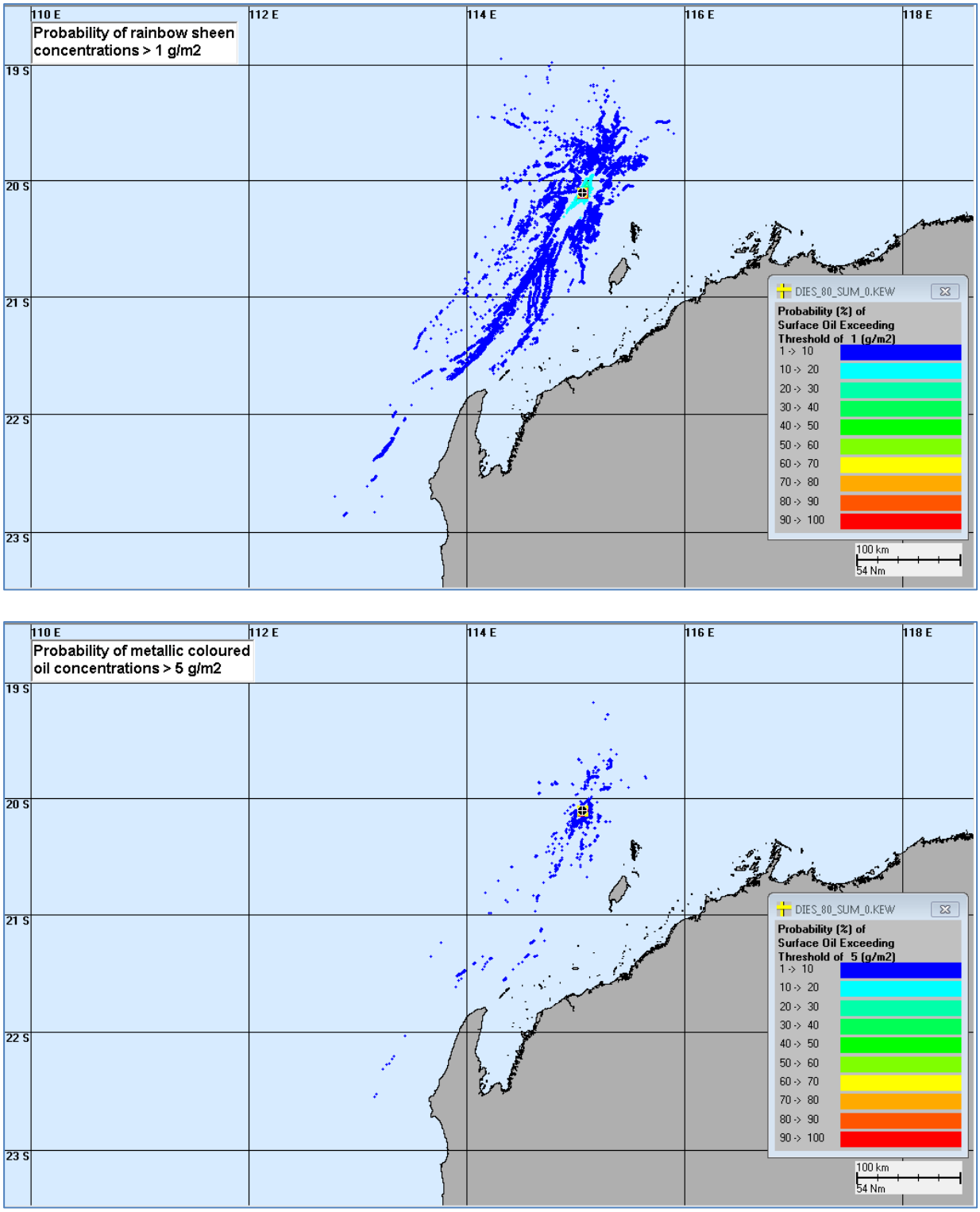

Figure 3: **Predicted probability of sea surface contact to concentrations above 1.0 g/m^2 (top) and 5.0 g/m^2 (bottom) resulting from an 80,000L diesel spill at the proposed Julimar B manifold location under summer currents and wind conditions.**

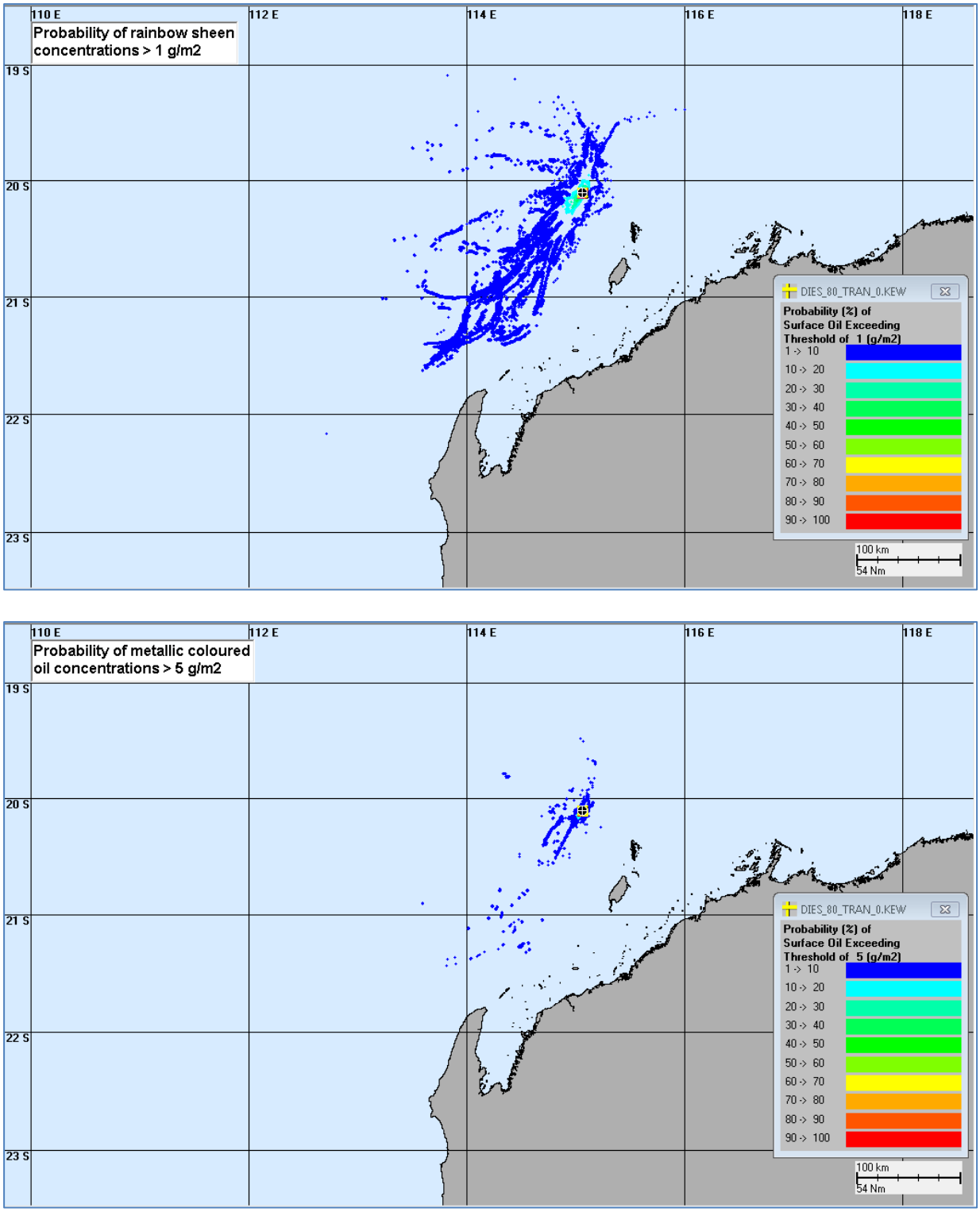

Figure 4: **Predicted probability of sea surface exposure to concentrations above 1.0 g/m^2 (top) and 5.0 g/m^2 (bottom) resulting from an 80,000L diesel spill at the proposed Julimar B manifold location during transitional periods.**

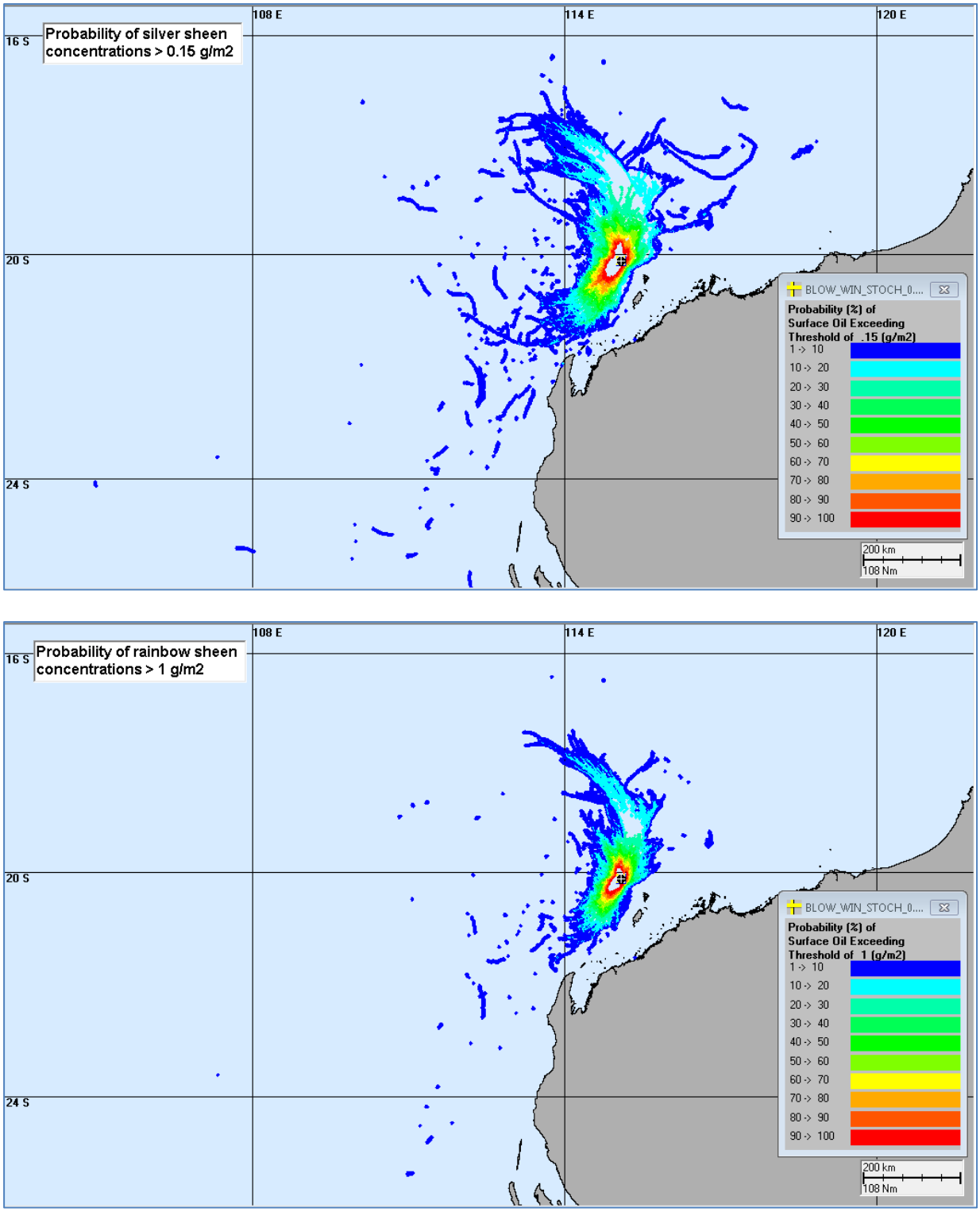

Figure 5: **Predicted probability of contact by surface films exceeding 0.15 g/m^2 (top) and 1.0 g/m^2 (bottom) resulting from a 10 week (294,000 bbl) blowout of condensate at the proposed Julimar B manifold location during winter.**

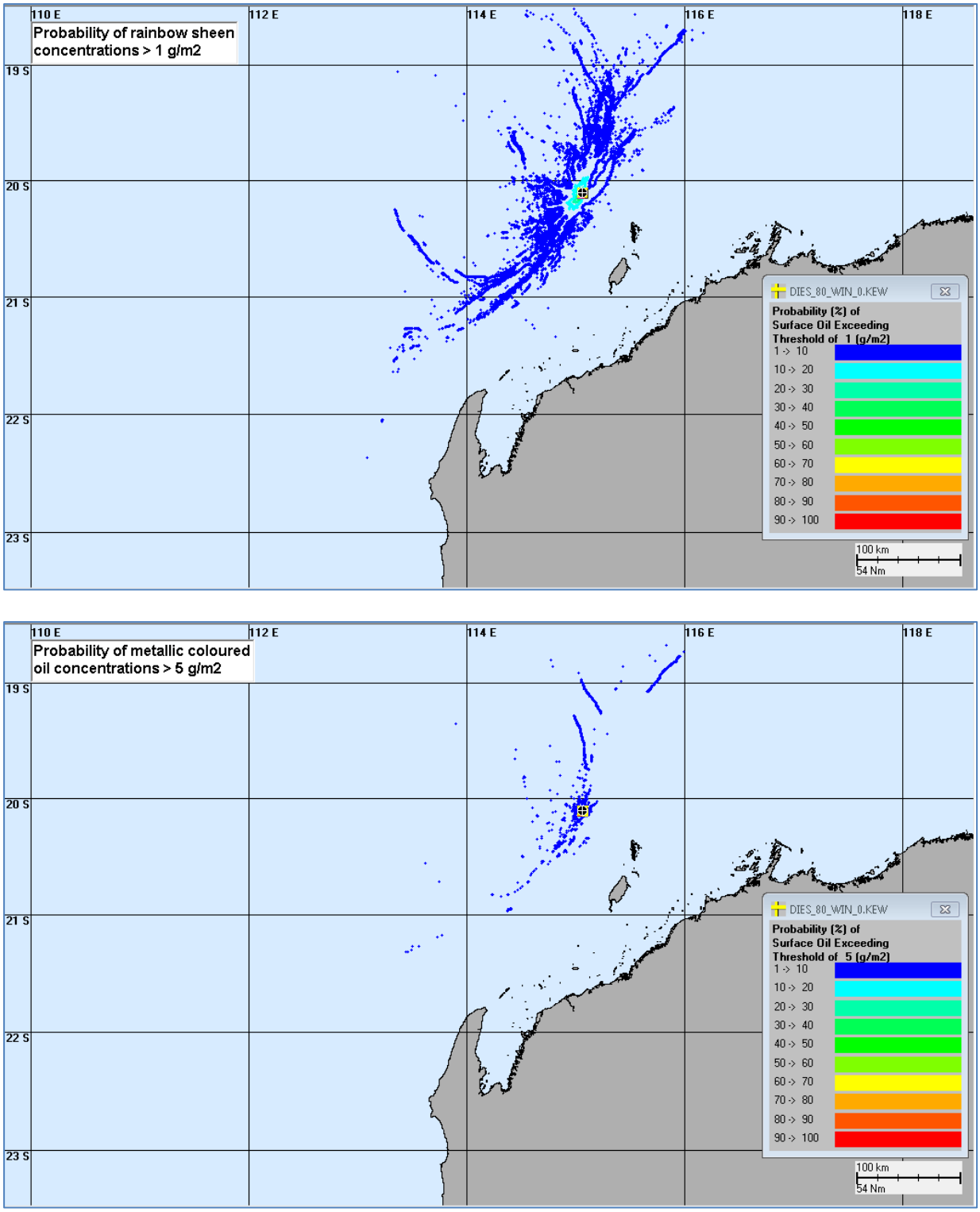

Figure 6: **Predicted probability of sea surface exposure to concentrations above 1.0 g/m^2 (top) and 5.0 g/m^2 (bottom) resulting from an 80,000L diesel spill at the proposed Julimar B manifold location during winter.**

ATTACHMENT 1

Shell MDS (M) Sdn Bhd

Data Sheet

Issued June 2006

Product name	**Shell Saraline 185V**
Product category	**Synthetic Base Drilling Fluid**
Description	Shell Saraline 185V is a premium-quality drilling fluid suitable for use in deep water applications. Because of its clean natural gas origin, it contains virtually no aromatics and contaminants such as sulphur and amines. Shell Saraline 185V is classified as a synthetic base drilling fluid as it is produced from the reaction of a purified feedstock as opposed to highly refined/processed mineral oils, which are produced from the distillation or refining of crude oil (OGP, 2003)[1] Shell Saraline 185V readily biodegrades, is non-toxic in the water column and has low sediment toxicity. It has a low viscosity, a low pour point and relatively high flash point making it ideal for deepwater exploration. It is widely used as a non-aqueous base fluid in an invert emulsion drilling mud in the upstream oil and gas industry. Shell Saraline 185V and/or its variants and related products have been used at various times in Malaysia, Thailand, Vietnam, Myanmar, Indonesia, The Philippines, Bangladesh, India, Australia, New Zealand, China and the Caspian Sea since 1997. Shell Saraline 185V is a mixture of alkanes of carbon chain length of predominantly C10 to C20. [1] International Association of Oil & Gas Producers (OGP). Environmental Aspects of the Use and Disposal on Non-Aqueous Drilling Fluids Associated with Offshore Oil and Gas Operations. Report No. 342, May 2003. Website address: http://www.ogp.org.uk/pubs/324.pdf

Typical Chemical Properties

Property	Unit	Value	Test Method
C10 & Lower	%m/m	1.8	GC x GC
C11-C14	%m/m	28.5	GC x GC
C15-C18	%m/m	40.8	GC x GC
C19-C20	%m/m	21.1	GC x GC
C21 & Higher	%m/m	7.8	GC x GC
Total Paraffin	%m/m	99.2	GC x GC

Typical Physical Properties

Property	Unit	Value	Test Method
Physical state		Liquid at ambient temperature.	
Saybolt Colour		30+	ASTM D156
Odour		Odourless	
Boiling Range			ASTM D86
IBP	°C	206	
90% recovered	°C	308	
FBP	°C	318	
Vapour pressure @40°C	kPa	<0.1	Calculated
Density @ 15°C	kg/m^3	778	ASTM D1298
Kinematic viscosity @ 40°C	mm^2/s	2.66	ASTM D445
Vapour density (air=1)		> 5	
Sulphur	ppm	< 3	ASTM D3120
Aromatic	%m	< 0.1	SMS 2728
Pour point	°C	-27	ASTM D97
Cloud point	°C	-14	ASTM D2500
Flash point	°C	89	ASTM D93
Aniline Point	°C	95	ASTM D611
Auto-ignition point	°C	216	ASTM E659
Fire point	°C	114	ASTM D92
Solubility in water		Insoluble	
Copper corrosion 3 hrs at 100°F		1B	ASTM D130

Typical Environmental Properties

Property	Test protocol	Value	Toxicity classification
Biodegradation			
Aerobic	OECD 306 28-d	62%	Biodegrades
Water Column Toxicity			
Mysidopsis bahia[1]	96-hr LC_{50} SPP	>1000000	Non-toxic
T. mossambica[2]	96-hr LC_{50}	145000	Non-toxic
Mugil persia[2]	96-hr LC_{50}	98000	Almost non-toxic
Mugil cephalus[2]	96-hr LC_{50}	86500	Almost non-toxic
Penaeus indicus[2]	96-hr LC_{50}	67000	Almost non-toxic
Pagrus auratus[2]	96-hr LC_{50}	>100000	Non-toxic
Nitzschia closterium[3]	72-hr EC_{50}	>83300	Almost Non-toxic
Pagrus auratus[4]	72-hr EC_{50}	>100000	Non-toxic
Sediment toxicity			
Corophium volutator	10-d LC_{50}	>20000 mg/kg (wet)	Non-toxic
		>50000 mg/kg (dry)	Non-toxic
Boleopthalmus boddarti	10-d LC_{50}	235000 mg/kg	Non-toxic

	Property / **Test protocol** / **Value** / **Toxicity classification** *Scylla serrata* / 10-d LC_{50} / 128000 mg/kg / Non-toxic Partition coefficient OECD 117 / Log P_{ow} / 3.6 / Low tendency to bioaccumulate *1 PARCOM 1995* *[2] OECD 203* *[3] OECD 201, PARCOM ISO 10253 (using Nitzschia closterium)* *[4] US EPA 2003* *PARCOM guideline: sediment test results must be read together with biodegradability and bio-accumulation results*
Storage and Handling	Saraline 185V may be stored in mild steel or stainless steel tanks. Seals and gaskets may be made from compressed asbestos fibre, PTFE, Viton A and Viton B. Natural rubbers, PVC, polystyrene and copper alloys are unsuitable materials for use with Saraline 185V. The recommended storage and handling temperature is between 15 and 45°C.
Hazard Identification	Saraline 185V has a relatively low order of toxicity by the routes of exposure (oral, dermal, inhalation) encountered in normal handling. Like many hydrocarbon liquids, Saraline 185V will dry and de-fat the skin on prolonged contact and on repeated contact could result in skin irritation and dermatitis. Also, like other hydrocarbons, this product can be dangerous when aspirated or ingested. Before handling the product, refer to the Material Safety Data Sheet.
Emergency helpline	+60 (86) 292 222 Refer to the telephone numbers in the Material Safety Data Sheet for emergency and technical support.
Shell Warranties	The information contained in this publication is to the best of our knowledge, true and accurate, but any recommendations or suggestions that may be made are without guarantee, since the conditions of use are beyond our control. Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing patents covering any material or its use. SHELL MDS (M) Sdn Bhd makes no representation and extends no warranty or condition, express or implied, and assumes no liability (whether in contract, tort or otherwise) with respect to the completeness, utility or accuracy of any product; merchantability or fitness for a particular purpose; descriptions of the product are for the sole purpose of product identification and do not imply or express any warranty.