National Oceanography Centre, Southampton

Cruise Report No.30

SERPENT Cruise Reports 2007

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ABSTRACT

The SERPENT Project, Scientific & Environmental ROV Partnership using Existing iNdustrial Technology, is a collaboration between world leading scientific institutions and companies associated with the oil and gas industry. SERPENT is hosted at the National Oceanography Centre, Southampton (NOCS), one of the worlds' largest research and teaching organisations specialising in deep-sea science and oceanography. SERPENT encompasses a scientific network of academic partners across the world (USA, Canada, Brazil, Africa, Australia), linked to a network of major oil and gas operators and contractors. The project centres around the opportunistic use of ROVs (Remotely Operated Vehicles) in operational settings during periods of stand-by time. The project also aims to maximise the scientific benefit of environmental data collected as part of routine offshore operations and environmental surveys. Through access to ROVs and such environmental data scientists at NOCS and from the wider SERPENT partnership aim to improve the scientific understanding of the deep-sea's biodiversity in all its aspects. This document presents the cruise reports for SERPENT missions carried out in 2007 and includes a history of all previous SERPENT missions and a list of samples taken during the project to date.

KEYWORDS SERPENT, ROV, Remotely Operated Vehicle, oil and gas industry, offshore drilling, diversity, *Transocean Rather*, *Transocean Leader*, *West Epsilon*, *Fugro Mercator*, *Mad Dog Spar*, *Discoverer Enterprise*, *Sovereign Explorer*, *Polar Pioneer*, Rosebank, Midnattsol, Ragnarokk, Orca, Nucula

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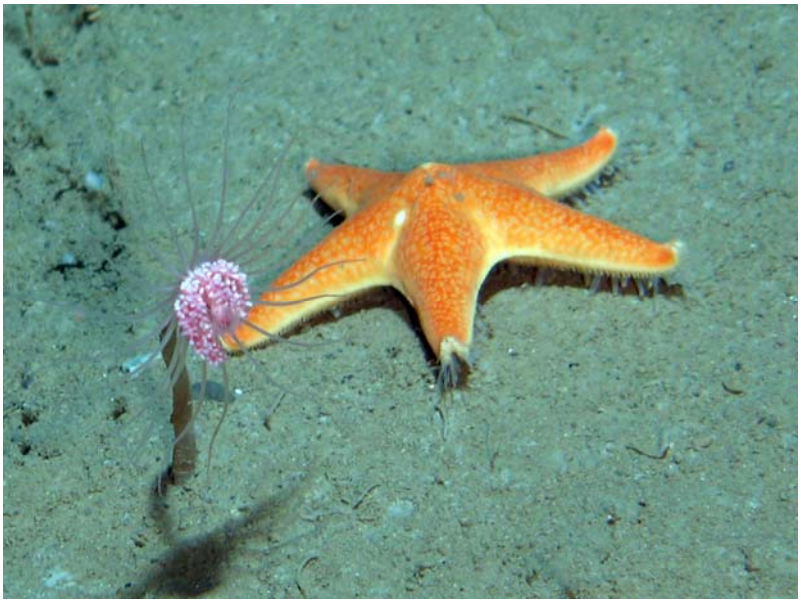
SERPENT
scientific and environmental rov partnership
using existing industrial technology

SERPENT CRUISE REPORTS

2007



ANDREW GATES

DANIEL JONES

MARK BENFIELD

JANNE KAARIAINEN

CONTENTS

COMPLETE SERPENT MISSION LIST

Mission number	Rig / Vessel	Field	Location	Date	SERPENT representative	Cruise Report	Visit type
1	M.V. Regalia	Schiehallion	Faroe-Shetland Channel	20.7 – 2.8.2002	Ian Hudson	No	Science
2	Paul B Loyd Junior	Foinaven	Faroe-Shetland Channel	14 – 28.05.2003	Daniel Jones	Yes	Science
3	M.V. Nordica	Schiehallion	Faroe-Shetland Channel	25 – 28.07.2003	Daniel Jones	Yes	Science
4	Transocean Leader	Schiehallion	Faroe-Shetland Channel	27.09 – 03.10.2003	Ben Wigham	No	Science
5	Jack Bates	Laggan 1	Faroe-Shetland Channel	14 – 23.04.2004	Daniel Jones	Yes	Science
6	Subsea Viking	Schiehallion	Faroe-Shetland Channel	Sep-04	BBC / Ben Wigham	No	BBC filming
7	Boa Deep C	TIOF	Mauritania	16 – 23.09.2004	Daniel Jones	Yes	Science
8	Jack Bates	Calister 1	Otway Basin, Australia	21.10 – 1.11.2004	Adele Pile, Gareth Andrews	Yes	Science
9	Jack Bates	Enfield 1	Australia	21.3 – 1.4.2005	Adele Pile, Gareth Andrews, Katie Robertson	Yes	Science
10	Paul B Loyd Junior	Schiehallion	Faroe-Shetland Channel	23-27.4.2005	Tania Smith	Yes	Science
11	Transocean Leader	Onyx	Norwegian Margin	May-05	Ben Wigham	No	Science
12	Jack Bates	Enfield 2	Australia	24 – 27.5.2005	Katie Robertson	Yes	Science
13	Sedco 703	Pluto	Australia	30.7 – 3.8.2005	Adele Pile	Yes	Science
14	Jack Bates	Enfield 3	Australia	12 – 23.12.2005	Katie Robertson	Yes	Science
15	Paul B Loyd Junior	Schiehallion	Faroe-Shetland Channel	26.2 – 5.3.2006	Lis Maclaren school	Yes	Schools project
16	Jack Bates	Enfield 4	Australia	15-21.3.2006	Katie Robertson	Yes	Science
17	Eirik Raude	Uranus	Barents Sea	17 – 23.3.2006	Janne Kaariainen	Yes	Science
18	West Alpha	Morvin	Norwegian Margin	20 – 27.4.2006	Janne Kaariainen, Nina Rothe	Yes	Science
19	Eirik Raude	Edvarda	Norwegian Margin	17 - 23.5.2006	Janne Kaariainen	Yes	Science
20	Thylacine (fixed platform)	Thylacine	Otway Basin, Australia	22 – 26.5.2006	Adele Pile, Gareth Andrews	Yes	Science
21	Eirik Raude	Edvarda	Norwegian Margin	19 – 20.6.2006	Janne Kaariainen, Lis Maclaren	No	Filming
22	Stena Don	Brugdan 1	Faroe-Shetland Channel	10 – 13.7.2006	Janne Kaariainen	No	Science

Mission number	Rig / Vessel	Field	Location	Date	SERPENT representative	Cruise Report	Visit type
23	Ocean Bounty (Diamond offshore)	Mutineer	Carnarvon Basin, Western Australia	19-27.7.2006	Gareth Andrews	Yes	Science
24	Stena Don	Brugdan 2	Faroe-Shetland Channel	7 – 14.8.2006	Daniel Jones	Yes	Science
25	Polar Pioneer	Tornerose	Barents Sea	31.8 – 4.9.2006	Daniel Jones	Yes	Science
26	Stena Don	Brugdan 3	Faroe-Shetland Channel	30.8 – 4.9.2006	Janne Kaariainen	Yes	Science
27	Stena Don	Brugdan 4	Faroe-Shetland Channel	11-17.10.2006	Daniel Jones	Yes	Science
28	Polar Pioneer	Nucula	Barents Sea	29. 01 – 03.02.2007	Janne Kaariainen	Yes	Science
29	Fugro Mercator	Laggan 2 (survey)	Faroe-Shetland Channel		Daniel Jones	Yes	Science
30	Transocean Rather	Rosebank 1	Faroe-Shetland Channel	04-12.04.2007	Andrew Gates	Yes	Science
31	Transocean Rather	Rosebank 2	Faroe-Shetland Channel	07-13.06.2007	Andrew Gates	Yes	Science
32	Transocean Leader	Midnattsol 1	Norwegian Margin	01-05.07.2007	Andrew Gates	Yes	Science
33	West Epsilon	Ragnarokk 1	Norwegian North Sea	26-30.07.2007	Andrew Gates	Yes	Science
34	Sovereign Explorer	Orca	Venezuela	22.07 - 03.08.2007	Daniel Jones	Yes	Science
35	Transocean Leader	Midnattsol 2	Norwegian Margin	23-29.08.2007	Andrew Gates	Yes	Science
36	West Epsilon	Ragnarokk 2	Norwegian North Sea	30.8-5.9.2007	Daniel Jones	Yes	Science
37	Transocean Rather	Rosebank 3	Faroe-Shetland Channel	26.09 - 1.10.2007	Andrew Gates	Yes	Science
38	Transocean Discoverer Enterprise	MC777	Gulf of Mexico	1-2.11.2007	Mark Benfield	Yes	Science
39	Mad Dog Spar	GC782	Gulf of Mexico	11-13.12.2007	Mark Benfield	Yes	Science

MISSION 28

POLAR PIONEER, NUCULA, BARENTS SEA, NORWAY

JANNE KAARIAINEN

1: GENERAL INFORMATION:

Client:	Hydro
Rig operator:	Transocean
Rig name:	Polar Pioneer
Rig location:	Nucula, Barents Sea
Seabed depth:	293 m
Seabed temperature:	~6.5°C
ROV operator:	Oceaneering
ROV:	Magnum 063 (work class)
ROV team:	Roar Kristensen, Alf Volmert and Egil Andre Jensen.

2: GEAR:

Magnum 063 Work class ROV
ROV push cores x 9: new design (not used)
1 Ekman grab (23x23 cm – not used)
Amphipod traps (not used)
Luminophore tracers and plastic frames (not used)
Zip pump (not used)
Kongsberg OE1366 CCD colour video camera (serial 0437)
Sediment marker buoys x 16 and sediment traps x 8.

3: NARRATIVE:

29/01/07

Arrive in Hammerfest

30/01/07

The helicopter was overbooked – SERPENT and the Oceaneering people were booked on a transfer on the next day.

31/01/07-01/02/07.

Arrival on Polar Pioneer (morning).
Safety inductions and tour of the rig (morning).
Meet the Oceaneering ROV team (morning).
Locate and set-up equipment (afternoon). Formaldehyde missing, enquires made.
Work begins on night shift but an observation was made that the cement casing at the base of the BOP had disappeared (collapsed) resulting in large hole around the riser with the BOP swaying in the currents. The ROV required for investigations and monitoring purposes all night. No SERPENT work carried out.

01/02/07-02/02/07

Video transects (8) conducted from 2100 to 2330. Conducting further transects to investigate the extent of drill spoil distribution. Seabed impact map produced as a result. 0100-0300 ecological highlights, collecting close-up footage of organisms for identification purposes. 0300 – 0530 inspection of the marker buoys around the well head. Still unable to locate formaldehyde, it seems like the formaldehyde may have been removed at the polar base in Hammerfest and never sent to Polar Pioneer.

02/02/07-03/02/07

The cement casing under the BOP was decided to be relayed and consequently the BOP is going to be brought on deck. As a result the ROV team will be busy with little downtime to complete SERPENT operations. It was decided the mission would come to an end and Janne returned to Hammerfest and London on the 3 Feb.

4. SAMPLES:

ROV video transect surveys and push core samples were taken during the pre-drilling visit to Midnattsol. The sample label code structure is described below and the samples listed in the following table.

CODE STRUCTURE:

PP/020207/002#1

Polar Pioneer / Date / ROV SERPENT dive log number # replicate

SAMPLE STATIONS:

Video transects

In total, eight video transects conducted at major headings during the SERPENT visit. The pre-drilling survey was not suitable for analysis due to lack of time and visibility.

In addition to video transects, a few hours of general footage of the organisms encountered in the area were collected for identification and behavioural purposes.

Samples:

Station/Sample code	Location	Sample type	Sample details
PP/010207/001	Main well	Video Transect	120 m transect heading 0° from the BOP
PP/010207/002	Main well	Video Transect	100 m transect heading 90° from the BOP
PP/010207/003	Main well	Video Transect	120 m transect heading 180° from the BOP
PP/010207/004	Main well	Video Transect	135 m transect heading 270° from the BOP
PP/010207/005	Main well	Video Transect	110 m transect heading 45° from the BOP
PP/010207/006	Main well	Video Transect	110 m transect heading 135° from the BOP
PP/010207/007	Main well	Video Transect	104 m transect heading 225° from the BOP
PP/010207/008	Main well	Video Transect	150 m transect heading 315° from the BOP

OBSERVATIONS

SEDIMENT ACCUMULATION:

Pre-drilling marker buoys were placed on the sediment surface, these were inspected post drilling and the sediment depth assessed visually. Results in the following table:

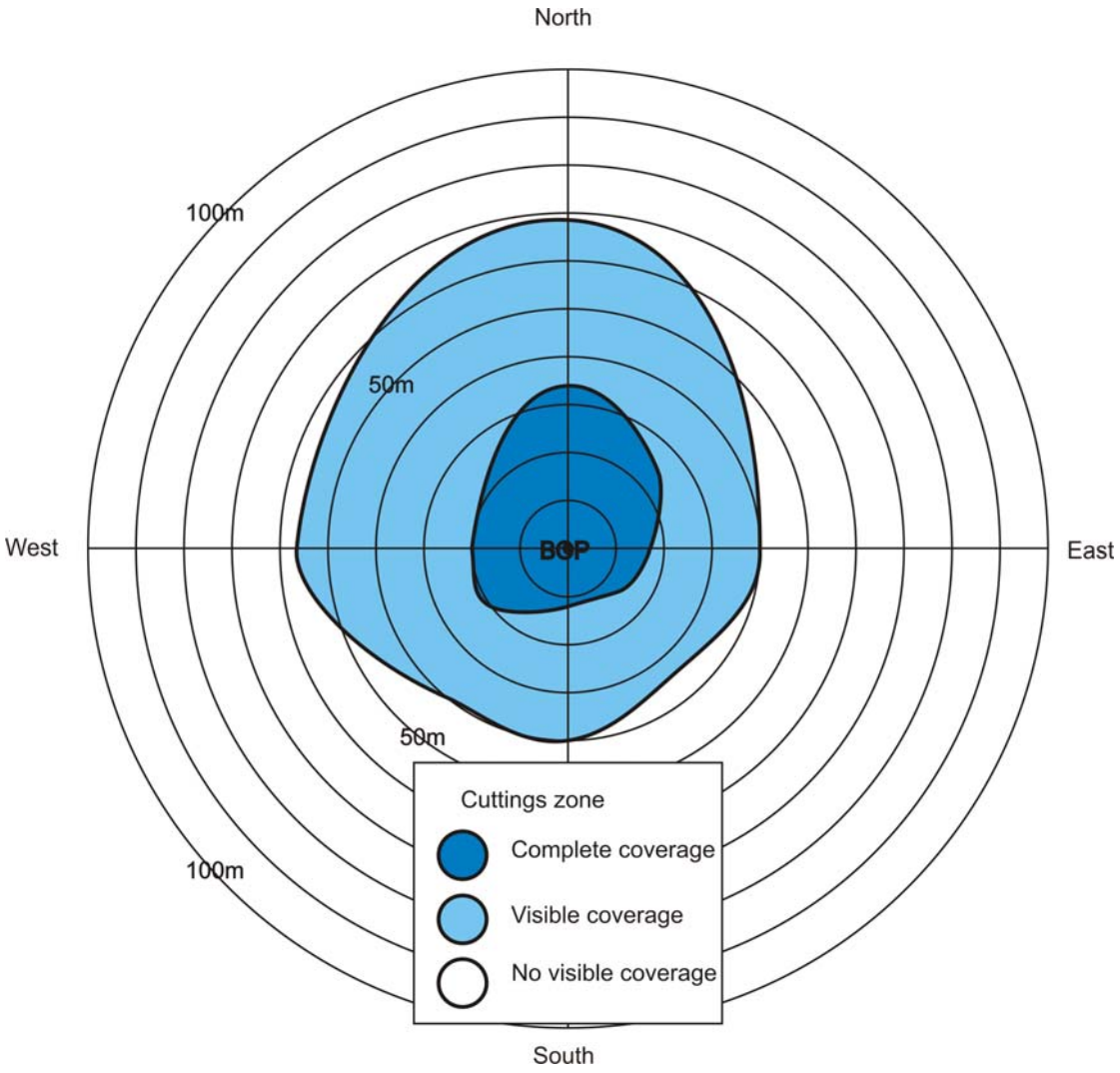
Buoy	Position	Sediment depth, cm
M reflex U ring	4.6 m at 240º	~20-30 cm
M7	15 m at 240º	< 5 cm
M3	7 m at 150º	~5 cm
M24	20 m at 150º	< 5 cm
M32	50 m at 150º	< 5 cm
M26	20 m at 60º	< 5 cm
M2	5 m at 330º	~65cm
M 28	16 m at 330º	< 5 cm

DRILL SPOIL HORIZONTAL DISTRIBUTION OBSERVATIONS

ROV video transects were conducted radiating from the BOP, the position of the ROV was assessed simultaneously using the navigation system on the ROV. This allowed mapping of the distribution of drill spoil around the BOP. Drill spoil coverage was classified visually as:

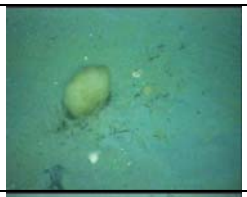
- Complete coverage of seabed
- Visible drill spoil (5 – 95% coverage of seabed)
- No visible drill spoil (<5% coverage of seabed)

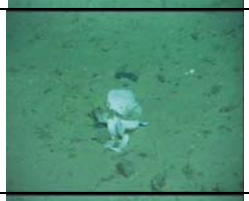
The following figure summarises the distribution of drill spoil observed on the seabed from 8 video transects at various directions:



The post top hole drilling seabed impact map at the Nucula well: (Left) complete coverage, (Middle) Visible coverage, (Right) Drill spoil is no longer visible (<5% coverage).

FAUNAL OBSERVATIONS

	Time	Dive	location	Observation	Photo / video	Sample collected	Sample retained
02/02/2007	16:09	1	Sea floor	Sponge		No	No
02/02/2007	16:09	1	Sea floor	Anemone		No	No
02/02/2007	16:10	1	Sea floor	Bryozoan		No	No
02/02/2007	16:12	1	Sea floor	Fish		No	No
02/02/2007	16:12	1	Sea floor	Sponge and Squat lobster		No	No
02/02/2007	16:14	1	Sea floor	Henricia asteroid		No	No
02/02/2007	16:14	1	Sea floor	Bryozoan/sponge?		No	No

02/02/2007	16:16	1	Sea floor	Decapod shrimp		No	No
02/02/2007	16:17	1	Sea floor	Gastropod with parasitic anemone		No	No
02/02/2007	16:19	1	Sea floor	Henricia asteroid		No	No
02/02/2007	16:23	1	Sea floor	Stalked sponge (*Stylocaudia*)		No	No
02/02/2007	16:25	1	Sea floor	Bryozoan		No	No
02/02/2007	16:26	1	Sea floor	Sponges and bryozoans		No	No
02/02/2007	16:52	1	Sea floor	Bolcera anemone		No	No

5: GEAR REPORT:

MAGNUM 063 ROV

This work class system was effective for operations, there was little problem with the system. It had a tooling tray on the underside with a sliding drawer system but this was not used. Navigations were very accurate.

SEDIMENT MARKER BUOYS:

The sediment accumulation marker buoys consisted of cemented weight connected to a small buoy via a rope. The ropes of the marker buoys were labelled at 10 cm intervals with a high visibility tape. In addition every 50 cm marked was labelled with a different colour. Prior to drilling operations commencing, these marker buoys were laid down around the survey area and the level of accumulated sediment was investigated during the post-drilling survey.
They worked

APPENDIX 1: VIDEO TRANSECT POSITIONAL INFORMATION

Date	Time	Notes	Observation
01/02/2007	20:31:45	Heading 0	Start of line
01/02/2007	20.39.00	Heading 0	75 m
01/02/2007	20:42:05	Heading 0	100 m
01/02/2007	20:43:30	Heading 0	End of line; 120 m
01/02/2007	20:54:20	Heading 90	Start of line
01/02/2007	20:55:50	Heading 90	20 m
01/02/2007	20:57:30	Heading 90	40 m
01/02/2007	20:59:50	Heading 90	60 m
01/02/2007	21:01:43	Heading 90	80 m
01/02/2007	21:02:30	Heading 90	End of line; 100 m
01/02/2007	21:09:30	Heading 180	Start of line
01/02/2007	21:10:56	Heading 180	12 m
01/02/2007	21:12:00	Heading 180	27 m
01/02/2007	21:12:57	Heading 180	40 m
01/02/2007	21:14:09	Heading 180	60 m
01/02/2007	21:15:16	Heading 180	80 m
01/02/2007	21:16:02	Heading 180	100 m
01/02/2007	21:16:43	Heading 180	120 m
01/02/2007	21:26:40	Heading 270	Start of line
01/02/2007	21:28:20	Heading 270	20 m
01/02/2007	21:29:19	Heading 270	40 m
01/02/2007	21:30:30	Heading 270	60 m
01/02/2007	21:31:30	Heading 270	80 m
01/02/2007	21:32:30	Heading 270	100 m
01/02/2007	21:33:30	Heading 270	120 m
01/02/2007	21:34:30	Heading 270	End of line; 135 m
01/02/2007	21:45:30	Heading 45	Start of line
01/02/2007	21:48:00	Heading 45	30 m
01/02/2007	21:49:20	Heading 45	50 m
01/02/2007	21:50:15	Heading 45	70 m
01/02/2007	21:51:30	Heading 45	100 m
01/02/2007	21:52:05	Heading 45	End of line; 110 m
01/02/2007	22:25:50	Heading 135	Start of line
01/02/2007	22:27:20	Heading 135	15 m
01/02/2007	22:27:40	Heading 135	20 m
01/02/2007	22:29:00	Heading 135	40 m
01/02/2007	22:30:30	Heading 135	60 m
01/02/2007	22:32:05	Heading 135	80 m
01/02/2007	22:33:00	Heading 135	100 m

01/02/2007	22:34:11	Heading 135	End of line; 110 m
01/02/2007	22:42:30	Heading 225	Start of line
01/02/2007	22:43:30	Heading 225	15 m
01/02/2007	22:43:55	Heading 225	20 m
01/02/2007	22:45:30	Heading 225	40 m
01/02/2007	22:47:00	Heading 225	60 m
01/02/2007	22:48:30	Heading 225	80 m
01/02/2007	22:49:50	Heading 225	100 m
01/02/2007	22:50:17	Heading 225	End of line; 104 m
01/02/2007	22:59:01	Heading 315	Start of line
01/02/2007	23:00:30	Heading 315	20 m
01/02/2007	23:01:10	Heading 315	30 m
01/02/2007	23:02:05	Heading 315	50 m
01/02/2007	23:03:30	Heading 315	70 m
01/02/2007	23:05:40	Heading 315	90 m
01/02/2007	23:07:20	Heading 315	110 m
01/02/2007	23:08:30	Heading 315	130 m
01/02/2007	23:09:20	Heading 315	End of line; 150 m

VISIT 29

FUGRO MERCATOR, LAGGAN, FAROE-SHETLAND CHANNEL

DANIEL JONES & ALAN HUGHES

1. GENERAL INFORMATION:

Client: Total E & P UK Ltd
Vessel: Fugro Mercator
Survey Location: Sullom Voe to Laggan Exploration area
Laggan Site Position: 60°56.72´N 02°53.48´W
Seabed depth: up to 650 m
Seabed temperature: variable to -1°C
ROV operator: Bluestream
ROV: Seaeye Tiger
Work dates: 28 January to 3 May 2007
Personnel: NOCS: Daniel Jones, Alan Hughes
Fugro: Paul Collins, Ralph Butcher + others
Total E & P UK Ltd: Iain Park
Seastar: Steve Dewie, Magnus Axelsson

2. GEAR:

Seaeye Tiger (no manipulators)
Colour video camera
Kongsberg OE14-208 (no strobe)
Box core samples were also taken

3. SAMPLING LOCATIONS:

ROV background video transects						
transect length	100 meters					
Name	centre point (also megacore location)		ROV start point		ROV end point	
	x	y	x	y	x	y
R1	507902	6758684	507921	6758730	507882	6758637
R2	504744	6755163	504701	6755137	504786	6755188
R3	504328	6759551	504368	6759580	504287	6759521
R4	507679	6755777	507636	6755751	507721	6755802
R5	507743	6755440	507725	6755393	507760	6755486
R6	505347	6759331	505327	6759284	505366	6759377
R7	504837	6759793	504787	6759790	504886	6759795
R8	508500	6758666	508549	6758670	508450	6758661
R9	507596	6758009	507582	6757960	507609	6758057
R10	504430	6753998	504385	6754020	504474	6753975
R11	503387	6756320	503404	6756273	503369	6756366
R12	508320	6759316	508273	6759296	508366	6759335
ROV well video transects						
well	Name	start x	start y	end x	end y	
206/1a-4az	WA1	505887.6	6757372.9	505887.6	6756373	
	WA2	506387.6	6756872.9	505387.6	6756873	
	WA3	506240.6	6757225.9	506240.6	6756520	
	WA4	505534.6	6756519.9	505534.6	6757226	
206/1-3	WC1	503849.5	6758691	503849.5	6757691	
	WC2	504349.5	6758191	503349.5	6758191	
Boxcore locations						
description	Name					
		x	y	no. samples		
Laggan Baseline 1	R1	507902	6758684	1		
Laggan Baseline 2	R2	504744	6755163	1		
Laggan Baseline 3	R3	504328	6759551	1		
Laggan Baseline 4	R4	507679	6755777	1		
Laggan Baseline 5	R5	507743	6755440	1		
Laggan Baseline 6	R6	505347	6759331	1		
Laggan Baseline 7	R7	504837	6759793	1		
Laggan Baseline 8	R8	508500	6758666	1		
Laggan Baseline 9	R9	507596	6758009	1		
Laggan Baseline 10	R10	504430	6753998	1		
Laggan Baseline 11	R11	503387	6756320	1		
Laggan Baseline 12	R12	508320	6759316	1		

2061/a-4AZ	WA1	505887	6756873	3		
206/1 - 3	WC1	503849	6758191	3		
2061/a-4AZ 100m downstream	WA2	505951	6756950	3		
206/1 - 3 100m downstream	WC2	503913	6758268	3		
2061/a-4AZ 500m downstream	WA5	506208	6757256	3		
206/1 - 3 500m downstream	WC5	504170	6758574	3		
2061/a-4AZ 1000m downstream	WA7	506530	6757639	3		
2061/a-4AZ 100m upstream	WA3	505823	6756796	3		
206/1 - 3 100m upstream	WC3	503785	6758114	3		
2061/a-4AZ 500m upstream	WA6	505566	6756490	3		
206/1 - 3 500m upstream	WC6	503528	6757808	3		

In addition to these data obtained at the Laggan site a large amount of data was obtained for the route between Laggan and Sullow Voe in Shetland.

There are still photographs stored on CD and DVDs of all the survey video (as well as a documentation sheet) stored by SERPENT.

VISIT 30

TRANSOCEAN RATHER, ROSEBANK 1, FAROE-SHETLAND CHANNEL

ANDREW GATES

1: GENERAL INFORMATION

Client:	Chevron
Rig operator:	Transocean
Rig name:	Transocean Rather
Rig location:	Rosebank, Faroe-Shetland Channel, Well 205/1-1
Rig position:	60˚ 59' 32.776" North 03˚ 49' 49.242" West
Seabed depth:	1085 m
ROV operator:	Subsea 7
ROV:	Centurion 05 HD (work class)

2: VISIT NARRATIVE

WEDNESDAY 4TH APRIL 2007

Having been due to fly out earlier in the week but having had my flight cancelled I travelled to Aberdeen on the morning of my flight. I arrived at Bristows heliport at 1330. The flight to rig arrived at 1745. I attended the rig induction and took the Transocean “colours” test for the rest of the evening. My personality is apparently “blue over green”.

THURSDAY 5TH APRIL 2007

0630. I attended the morning meeting, after which I was introduced to the ROV team. The ROV was not going to dive for a few days at the rig is still at the old well, the reason for the delay was poor weather and difficulties with anchor handling.
During the day the stills camera was the focus of our work. It was switching on but was not communicating with the computer – the error message “camera failed to intialize” was repeatedly displayed.
Eventually pins 2 + 3 in the 9 pin adapter were swapped and it worked in the ROV control room. When fitted to the ROV it no longer worked. The work was abandoned for the day leaving the camera to be finished tomorrow.
2130. I gave a presentation about SERPENT and why I am on the rig at the “pre-spud” meeting. I spent the rest of the evening being shown pictures and video of marine life that the ROV team and other rig staff had collected. Most of it appeared to be from “You Tube” but the Barge Engineer had some good pictures of pilot whales he had seen from the bridge. I downloaded these to add to the SERPENT website.

FRIDAY 6TH APRIL

0630. Morning meeting. Still the same situation as yesterday, still at the old site and still waiting on weather.
1000. The camera problem had been solved and it was now working on the ROV. The pictures were very good quality.
We discussed the plans for SERPENT work during the visit and discussed ways in which the work could be done. Lee Charters, the ROV supervisor, had been on the *Transocean Leader* when Ben Wigham carried out one of the early SERPENT missions and was looking forward to doing some more work with us.
As yet there is no indication as to when the rig will move to the new well site or how long I can stay on board for. It is possible I may have to leave before I can get any work done.
We tested the ROV and everything was in working order. A new team member, Allan, arrived on days chopper.

SATURDAY 7TH APRIL

0630. Morning meeting. The anchor handling has commenced and they are nearly all up, rig movement will probably commence today.
I spent the morning working on the sediment samples that had kindly been collected by the ROV team at the previous well at the current well. They were still in the core tubes and frozen in the galley so I defrosted them, processed them (top 5 cm) and put them into formalin.
We planned SERPENT operations, including where to set up the experimental station, to do the transects as soon as the transponder was in place to located the BOP site.
1830. I attended the weekly safety meeting which was being chaired by the ROV team. As an honoury member of the ROV team I had read out accident reports and suggest ways in which they could have been avoided or better dealt with.
2100. I gave another SERPENT talk during the pre-spud meeting.

SUNDAY 8TH APRIL

0630. We were told at the morning meeting that there was still one more anchor to be recovered before the rig could be moved. I discussed with the ROV team how best to send SERPENT samples back to Southampton after we had finished work.
1000. The weather is still poor. There is little ballast at the moment (presumably in preparation for the move) so the ROV can't dive and helicopters can't land.
I put the core samplers together and had a look through the video collected at the current well by the ROV team.
1800. We had an emergency drill. Everybody has to go to their room to get their survival bad including survival suit and then go to their Muster Station, mine was the cinema.
1830. We are told that we are now at the new location, hopefully we can start SERPENT work tomorrow.

MONDAY 9TH APRIL 2007

0630. At the morning meeting it was explained that we are in the new location and 2 of the anchors were in place. The rest will go down today so it is unlikely that the ROV can dive today. The weather has been picking up today, there is not a lot that can be done workwise. I have been helping around the ROV control room to get to know more about working offshore.
I filled out a hot work permit to get permission to take some photos around the rig. There had been talk of me leaving but Ken (Company Man suggests I stay until next Monday as there are limited seats on the Chopper and I might be able to get some work done).

TUESDAY 10TH APRIL

The Anchor handling has been delayed because the weather has worsened. The swell has increased and the wind has picked up.
I spent the morning showing Lee the SERPENT equipment. We made some modifications to the Biofilm frame to make it easier to manipulate with the ROV arms.
I started making a poster about SERPENT to display on the *Rather* with the intention of adding current images when we can get some.
Lee found some old footage he had collected previously. We put it onto DVD. Lee is replaced by Doug as ROV supervisor tomorrow. This a shame as he has been keen to get the ROV into the water to do the SERPENT work.

WEDNESDAY 11TH APRIL

The weather has improved. Anchor handling re-commenced over night and there are four more anchors to finish. It is planned to dive Thursday or Friday.

THURSDAY 12TH APRIL

Meet Doug, he is keen and interested in the SERPENT work. We made a few more adjustments to the kit that Doug recommended. The welder made some bioturbation frames for us.
In the evening I had just finished giving another presentation about SERPENT when the emergency alarm sounded. This was not a drill and we were instructed to collect our survival suits and go to our muster stations. We were informed that one of the anchor handling vessels had capsized. We spent several hours in the muster stations. Eventually we were told to organize ourselves into stretcher handling parties of 6 men. There had to be 3 parties available at any time. The first were called up as 3 men had been recovered from the water. None of them were wearing survival suits and had sadly died in the water.
At approximately midnight we were informed that the ship was still attached to the rig by the anchor line and as a precaution all non essential personnel would be evacuated from the rig.
I was on the first helicopter off the rig, which had had all its seats removed to fit more people in.
We arrived in Sumburgh airport at about 0130.
It later emerged that 8 men had died on the as a result of the Bourbon Dolphin sinking including a 14 year old boy and his father.

FRIDAY 13TH APRIL

After spending the night and most of the morning (due to heavy fog) at Sumburgh airport we were transported to Scatsta and took a BP charter flight to Aberdeen. On arrival at Aberdeen we were taken to the Thistle Hotel at the airport where everybody was interviewed by police. We were provided with some food, some spare clothes and a small amount of cash. We were offered a hotel room for the night while awaiting updates on the rig. It was clear that SERPENT operations would not happen for weeks due to the problems and likely investigation so I decided to go home. I took a train to Newcastle and arrived at 1 am.

3. GEAR:

ROV
Centurion 05 HD work class ROV
100 hp
1500 m
Conan 7 function manipulator arm
Slingsby 5 function manipulator arm

Cameras
Typhoon zoom camera (main colour video camera)
SIT (Silicon Intensifier Target) low light camera
Low light CCD camera
Kongsburg digital stills camera

Tether Management System
Slingsby TMS
Max TMS tether length = 260 m (approx 100 m away from BOP in direction away from TMS)
Main lift umbilical = 1479 m

Control room
Tritech Seaking sonar
Fibre-optic gyro and autoheading
Blackbox recorder (hard disc) and 2 DVD recorders and video grabber
Two 12 way valve ports for hydraulics (for pan and tilt)
Fibre-optic multiplexer and conventional copper multiplexer
Fibre-optic video box

ROV Team
Lee Charters
Doug Hyem
Tony Fortunato
Derek Cruickshanks
Brendon Proud
Darren Wilson
Allan MacCabe
Dan Meher

4. SAMPLES:

CODE STRUCTURE:

TR/260407/001#1

Transocean Rather / Date / ROV dive log number # replicate

SAMPLE STATIONS:

Station/Sample code	Location	Sample type	Sample details
TR/260407/001#1	Video Transect	100 m long	Transect west of Spud-in location
TR/260407/001#2	Video Transect	100 m long	Transect south of Spud-in location
TR/260407/001#3	Video Transect	100 m long	Transect north of Spud-in location
TR/260407/001#4	Video Transect	100 m long	Transect east of Spud-in location
TR/260407/002#1	ROV push core	Top 5 cm preserved in formalin	100 m west of Spud-in location
TR/260407/002#2	ROV push core	Top 5 cm preserved in formalin	100 m south of Spud-in location
TR/260407/002#3	ROV push core	Top 5 cm preserved in formalin	100 m north of Spud-in location
TR/260407/002#4	ROV push core	Top 5 cm preserved in formalin	100 m east of Spud-in location
TR/260407/002#5	ROV push core	Top 5 cm preserved in formalin	At Spud-in location
TR/260407/002#6	ROV push core	Top 5 cm preserved in formalin	At Spud-in location

VISIT 31

TRANSOCEAN RATHER, ROSEBANK 2 – WELL 205 1-1, FAROE-SHETLAND CHANNEL

ANDREW GATES

1. GENERAL INFORMATION:

Client:	Chevron
Dates:	7th – 13th June 2007
SERPENT rep:	Andrew Gates
Rig operator:	Transocean
Rig name:	Transocean Rather
Rig location:	Rosebank, Faroe-Shetland Channel, Well 205/1-1
Rig position:	60˚ 59' 32.776" North 03˚ 49' 49.242" West
Seabed depth:	1085 m
ROV operator:	Subsea 7
ROV:	Centurion 05 HD (work class)
ROV team:	Lee Charters, Derek Cruickshanks, Chris Moore, Harry Frith (visit), Doug Hyem (set up of experiments prior to visit)

2. GEAR:

Magnum 070 Work class ROV
ROV push cores x 6
Ekman corers x 2
SERPENT biofilm frame
SERPENT bioturbation corrals
SERPENT wood colonization sample

3. NARRATIVE:

THURSDAY 7TH JUNE

Arrived on the *Transocean Rather* rig at 1700. After brief induction I met with Subsea7 ROV team and discussed SERPENT work plans for the visit. Lee Charters was on board again and was keen to get some successful dives after the last SERPENT visit to the *Rather*.

FRIDAY 8TH JUNE

The ROV team, on standby, had been called up for operational work in the night. I attended the morning safety briefing before meeting the ROV team at 0730. As the ROV was in the water (Dive 102 – SERPENT Dive 1) the decision was taken to familiarize myself with the area and

use the stills camera to take photographs of organisms. Marker buoy inspections were also carried out at sites 10 m to the north and south of the BOP (1330). It was not possible to locate the Marker buoy to the west of the BOP. Before recovery of the ROV the SERPENT wood settlement experiment was recovered (1620).

SATURDAY 9TH JUNE

Essential maintenance was carried out on the TMS camera; this had failed on the last dive so it was not clear how much tether was out and with strong currents this was needed. I used this maintenance time to download the photos from Dive 102 from the stills camera and prepare sample containers for the biofilm plates. After completion of maintenance the ROV was launched (1545, Dive 103 – SERPENT Dive 2). Following inspection of the riser and BOP bull's eyes the SERPENT biofilm frame was recovered. ROV was back on deck at 1815 and I finished sample processing at 1930.

SUNDAY 10TH JUNE

As part of the "Five To Keep Alive" safety programme on the *Transocean Rather* I took part in a area audit for the port columns and pontoons (1100). On launching the ROV (Dive 104 – SERPENT Dive 3) to sample the bioturbation corrals a line insulation monitor (LIMS) alarm sounded. The dive was immediately abandoned and the ROV was recovered. I used this time to select and save the sections of video footage from the previous dives. There was no further dive today.

MONDAY 11TH JUNE

I attended the morning teleconference to present the findings from the area audit while the ROV team completed repairs from Sunday. Four push corers were attached to the five function manipulator arm for sampling the bioturbation corrals and the ROV was launched at 1130 (Dive 105 – SERPENT Dive 4). The currents taking the ROV away from the BOP at a heading of 260˚ were strong (reading 4.5˚ port forward on the riser bull's eye) and we could not reach the experimental station 100 m from the BOP at 60˚. Instead of recovering the ROV the time was used to take further video footage and still photographs. Four push core samples were taken from the bioturbation corrals (1906) when the currents had decreased in strength. The core samples were processed by dividing each core into ten 1 cm sections, finishing at 2130.

TUESDAY 12TH JUNE

Following the late finish on Monday the shift, start on Tuesday was delayed until 0900. ROV off deck at 1000 with push cores for more bioturbation sampling (Dive 106 – SERPENT Dive 5). Again the currents were strong with the bull's eye reading 5.5˚ port forward on the riser. Again we could not get the ROV to the experimental station so further stills photos and video footage were taken. When the currents had dropped we attempted to take bioturbation push cores but the LIM alarm sounded. The dive was abandoned and the ROV recovered. Fortunately the ROV team managed to repair the fault and the ROV was launched again at 2200 (Dve 107 – SERPENT Dive 6). As this was the last dive it was decided to replace the push cores with an Ekman grab sampler to supplement the previously collected bioturbation push cores. ROV back on deck at 0030.

WEDNESDAY 13TH JUNE

Samples were packed into aluminium box for shipping back to Southampton, remaining video and photos were downloaded and SERPENT equipment was packed away before checking in for helicopter at 1200. ROV team agreed to carry out post drilling video transects when the currents allow and to send them to SERPENT Project office. Off *Transocean Rather* at 1430.

4. SAMPLES:

CODE STRUCTURE:

TR/080607/102#1

Transocean Rather / Date / ROV dive log number # replicate

SAMPLE STATIONS:

Station	Location	Sample type	Sample details
TR/080607/102#1	100m at 60° from BOP	Wood sample	Wood in formaldehyde
TR/090607/103#1-6	100m at 60˚ from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
TR/090607/103#7-12	100m at 60˚ from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
TR/090607/103#13-18	100m at 60˚ from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
TR/090607/103#19-24	100m at 60˚ from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
TR/110607/105#1	100m at 60˚ from BOP	ROV push core	Top 10cm in separate 1cm sections
TR/110607/105#2	100m at 60˚ from BOP	ROV push core	Top 10cm in separate 1cm sections
TR/110607/105#3	100m at 60˚ from BOP	ROV push core	Top 10cm in separate 1cm sections
TR/110607/105#4	100m at 60˚ from BOP	ROV push core	Top 10cm in separate 1cm sections
TR/120607/107#1	100m at 60˚ from BOP	Ekman core	Core in formalin
TR/150607/110#1	Transect north of BOP	Video Transect	100m long
TR/150607/110#2	Transect east of BOP	Video Transect	100m long
TR/150607/110#3	Transect south of BOP	Video Transect	100m long
TR/150607/110#4	Transect west of BOP	Video Transect	100m long

5. GEAR REPORT:

CENTURION HD ROV

Generally the ROV was suitable for all functions.
The TMS camera was not working when I arrived and it had to be fixed so we knew how much tether was out at any time.
There was a problem with alarms going off because of water getting into the electrics – LIM alarm (Line Insulation Monitor).

ROV PUSH CORES

A holder was constructed, consisting of a metal frame into which the push corers were placed and held apart by rubber blocks, that was strapped to the five function manipulator arm. From here the corers could be removed by a combination of pulling them out with the seven function arm and pulling the holder away with the five function arm.

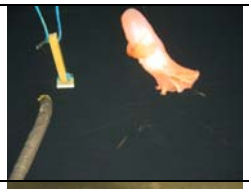
6. OBSERVATIONS

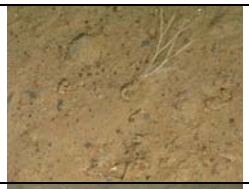
DRILL CUTTING DEPTH OBSERVATIONS

Predrilling marker buoys were placed on the sediment surface, these were inspected post drilling and the sediment depth assessed visually. Results in the following table:

BUOY	POSITION	SEDIMENT DEPTH, MM	DATE OF INSPECTION
1	10M S OF BOP	450	08/06/2007
2	10 M N OF BOP	100	08/06/2007
3	10 M W OF BOP	MISSING	08/06/2007

FAUNAL OBSERVATIONS

Date	Time	Dive	location	Observation	Photo / video	Sample collected	Sample retained
08/06/07	1623	1	On transit back to cage	Ophiurod moving across sea bed	video	No	No
08/06/07	1623	1		Cirrate octopod		No	No
08/06/07	08:01			*Crossaster*		No	No
08/06/07	08:02			Indet cnidarian		No	No
08/06/07	08:02			*Lycodonus* sp.		No	No
08/06/07	08:28			Ray		No	No
08/06/07	08:34			Rockling		No	No
08/06/07	08:38			anemones		No	No
08/06/07	09:13			Indet. Soft coral		No	No

08/06/07	09:26			Indet		No	No
08/06/07	09:44			Sabellid and stauromedusae		No	No
08/06/07	09:51			*Ophiopleura borealis*		No	No
08/06/07	09:53			Indet. Soft coral pink			
08/06/07	10:04			Unknown cnidarian		No	No
08/06/07	10:10			Unknown		No	No
08/06/07	10:19			*Colossendeis proboscidea*		No	No
08/06/07	10:30			*Astropecten*		No	No
08/06/07	10:35			*Tubularia*		No	No

08/06/07	10:38			Unknown soft coral		No	No
08/06/07	10:52			Gastropod		No	No
08/06/07	11:20			Unknown cnidarian		No	No
08/06/07	14:52			indet		No	No
08/06/07	14:31			*Colossendeis* sp.		No	No
08/06/07	14:33			Decapod shrimp		No	No
08/06/07	16:15		Near bioturbation corral	Ctenophore		No	No
11/06/07	1320	3		Unknown sponge		No	No
11/06/07	1330	3	30 m from BOP	*Lycodes* sp.		No	No

11/06/07	15:54			*Cerianthus* sp.		No	No
11/06/07	16:01			Sponge		No	No
11/06/07	16:26			Nymphonid pycnogonid		No	No

MISSON 32

TRANSOCEAN LEADER, MIDNATTSOL 1, NORWAY

ANDREW GATES

1. GENERAL INFORMATION:

Mission objective: Pre-drilling surveys and set-up of equipment

SERPENT representative: Dr. Andrew Gates

Client: Statoil
Rig Operator: Transocean
ROV Operator: Oceaneering International
ROV team: Tore Damdalen – Day Supervisor
Kjell Brede Rustad – Night Supervisor/Day Supervisor
Nils Helgeland – Shift Change Night Supervisor
Andrê Strandberg – Pilot Tech
Erik Garatun – Pilot Tech
Kjetil Svendsen – Pilot Tech
Ragnar Svendsen – Pilot Tech

Position: 064º 00, 59.6 N
005º 16, 44.9 E
Water depth: 928 m
Water temperature: -0.94

2. GEAR:

Centurion Work class ROV
ROV push cores x 5
Ekman corers x 2
SERPENT sediment marker buoys x 12

3. NARRATIVE:

01/07/2007 My arrival on the *Transocean Leader* at approximately 1300 was followed by participation in the Transocean rig safety induction and meeting of the ROV crew. The SERPENT equipment had not arrived on board because of the recent change-over of the *Transocean Leader* and it was currently in transit to the rig and would arrive shortly. Drilling of the pilot well was due to start today giving us little time to carry out pre-drilling works in this area. I had been expecting to arrive on the rig prior to the start of the pilot well.

SERPENT plans were discuss with the ROV crew, who have a number of operational tasks ongoing and intend to locate the transponder which is in position where the pilot well will be drilled. There was some confusion about the location of the pilot well; I was informed that the pilot well is only to be 5 m from the main well, however we carried out video transects around the transponder (4 during the day shift and 3 during night shift). I am later informed that the main well is actually to be drilled 50m from the man well and that the transponder we have been using as a guide for the pilot well is actually for the main well. This does not pose a problem, though as we will have little time to carry out work before the main well which may have been affected by drilling disturbance from the pilot well. Consequently we have a good set of pre-disturbance video transects from the main well.

Visibility was poor at certain times during the ROV video transects so they were frequently aborted and re-started. For this reason I worked for the first half of the night shift to continue the video transects. We had further trouble with visibility so I finished work and the night shift managed to carry out the remaining transects during the course of their shift. The reason for the poor visibility was uncertain but its irregular occurrence suggested that it may have resulted from anchor handling operations which had been ongoing.

02/07/2007 SERPENT operations were not possible today because drilling had begun on the pilot well and the ROV was required to remain in the cage to watch for gas bubbles. Later in the day I had a discussion with the Statoil company man and he informed me that the drilling had been temporarily suspended because of technical problems and that I had a few hours in which the ROV would be free for SERPENT work. Based on our position and limited equipment the decision was taken to take video transects from the pilot well in an attempt to see the effects of the very initial stages of drilling the pilot hole, the location of which was 50m NNW of the main well (see Figure?). Three transects were taken around the area in the time available and some footage was obtained of a large penatulid, which appeared to be a common organism in the area. Further transects were attempted but visibility was poor and drilling operations recommenced.

We had some information on the whereabouts of the SERPENT equipment. We were given container numbers for the kit and located them; unfortunately one of the containers was inaccessible and needed to be moved. This was done but it turned out not to contain the SERPENT boxes. A search through all the containers eventually yielded our equipment which was taken to the ROV shack and the corers were assembled. NOTE in future visits it may be necessary to include more than 5 core holders.

03/07/2007
At 0730 I attended the morning meeting (much more formal than on *Transocean Rather*). Details of the drilling of the pilot well were established and it is going to continue for approximately a further 24 hours. I reported the SERPENT work to date and there was appreciation of the Giant Club Sponge we had observed on the video transects the previous day (the ROV output is visible on-screen in the Statoil offices and we were requested “to go back and look at the trees”). There was also discussion of the use of a basket to lower the

marker buoys to the seabed, however this proves to be a problem as the greatest depth that they can get to is 600 m (approx 300 m short). This is a problem for two reasons, firstly Transocean are not happy to lower baskets in case of tangling with the drill string and secondly because as the line is too short there is greater chance of it tangling because it is not stationary on the seabed.

Discussions to resolve the marker buoy situation were ongoing after the meeting (mostly in Norwegian!) to use the SERPENT marker buoys instead of the rig ones to locate the main well to save time and ensure that more SERPENT work is completed. Further discussions leads to decision that the markers will be lowered in a basket despite the concerns of Transocean.

I spoke to Statoil (Hilde) who were putting pressure on us to the get the chemical core samples completed as they did not the proper environmental survey prior to drilling. After some discussion it is decided to take as many cores as possible but if there is only time for one dive SERPENT will take 3 cores and Statoil 2. These need to be frozen and delivered to Nina Aas on return to Kristiansund. Discuss plans with rig Mechanic to make bioturbation frames for use after the BOP is down. This is agreed and when they are complete they will be delivered to the ROV team.

4th July 2007
At the morning meeting we are informed that there is 130 m remaining to drill and that SERPENT work can commence at approximately midday. Further discussion with Mechanic about bioturbation frames (I should have gone to the maintenance office to submit plans rather than speaking to the mechanic). Again they agree to do the work.
The plan is to bring the ROV on deck when the drilling stops to carry out routine maintenance and fix the corers to the 5-function manipulator arm and then dive to take the cores.

The marker buoys were prepared for deployment (corrected measurements recorded and placed into basket for lowering to 600 m) and push corers were prepared for use. Five corers were placed along the five-function arm strapped to a length of sheet metal. This system failed, partly because the new cores do not fill with water correctly on transit to the seabed so the pressure in the tubes was too great to remove them from the holders. This coring failed and the ROV returned to the cage to await completion of cementing the pilot hole before it could be used again.

5th July 2007
I continued to work on the nightshift as the ROV was able to carry out dives for SERPENT. We rearranged the corers on the five-function arm of the ROV – 2 either side of the manipulator arm and used cable ties to keep the seals open (unfortunately one of the core holders was lost in the previous dive). The coring worked successfully aided by some very skilled use of the five-function manipulator arm by Nils Helgeland. We managed to collect 4 core samples, 2 of which were kept by SERPENT and two were allocated to Statoil for chemical analysis.
The sediment marker buoys have been left to be set out by the ROV team this morning after I leave. They are to be lowered in a basket to the seabed and then placed in the positions shown in the diagram below.

4. SAMPLES:

ROV video transect surveys and push core samples were taken during the pre-drilling visit to Midnattsol. The sample label code structure is described below and the samples listed in the following table.

CODE STRUCTURE:

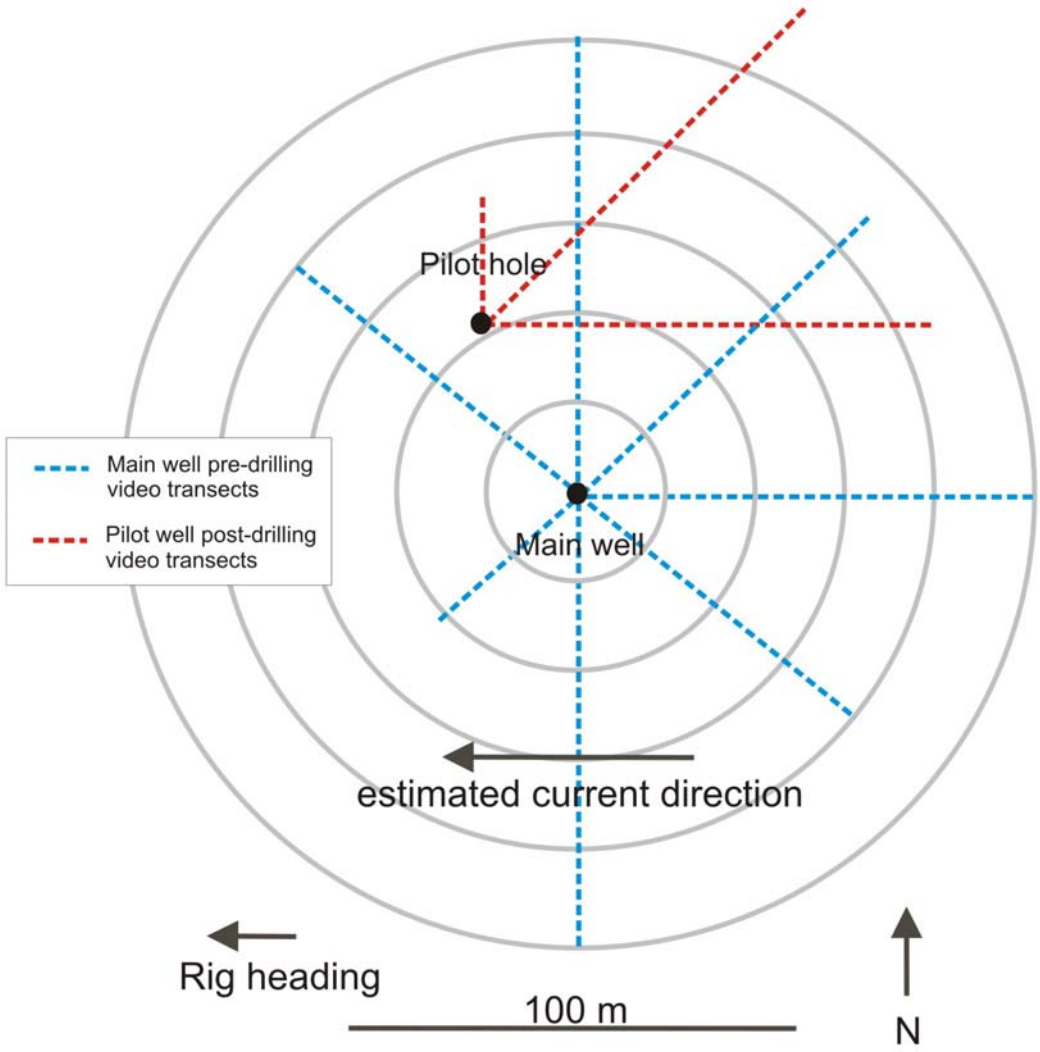
TL/020707/002#1

Transocean Leader / Date / ROV SERPENT dive log number # replicate

SAMPLE STATIONS:

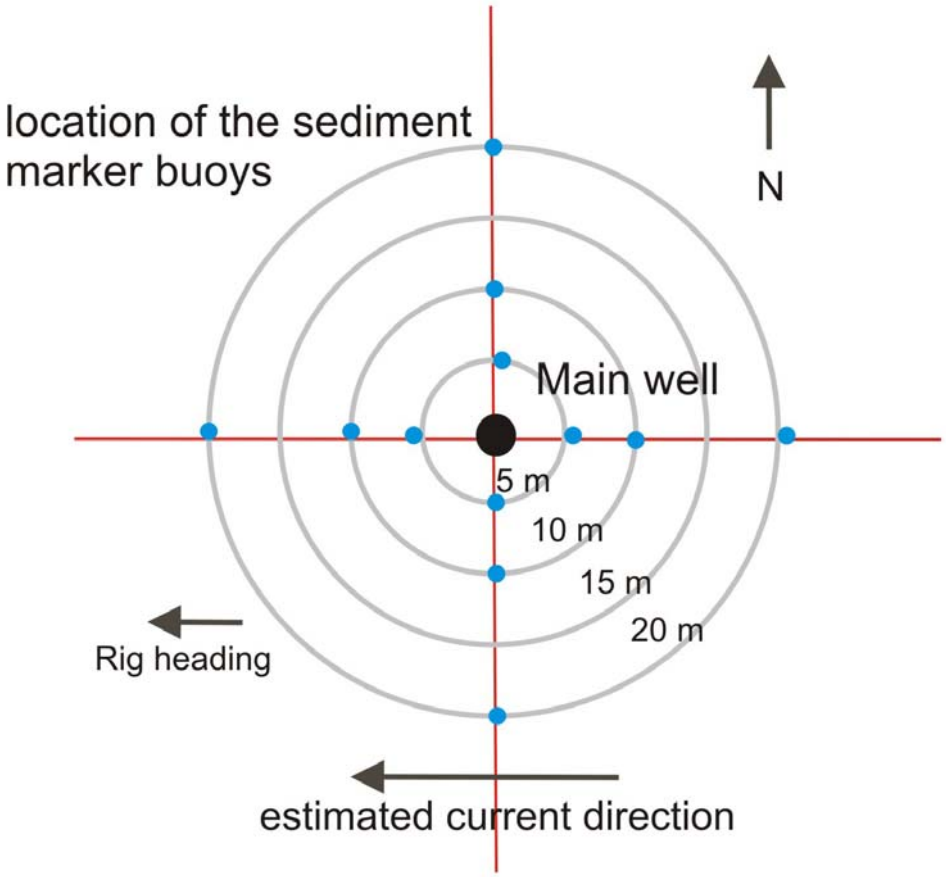
Station/Sample code	Location	Sample type	Sample details
TL/010707/001#1	Main well	ROV video transect	40 m transect at 225º from the main well
TL/010707/001#2	Main well	ROV video transect	90 m transect at 315º from the main well
TL/010707/001#3	Main well	ROV video transect	90 m transect at 045º from the main well
TL/010707/001#4	Main well	ROV video transect	80 m transect at 135º from the main well
TL/010707/001#5	Main well	ROV video transect	100 m transect at 000º from the main well
TL/010707/001#6	Main well	ROV video transect	100 m transect at 180º from the main well
TL/010707/001#7	Main well	ROV video transect	100 m transect at 090º from the main well
TL/010707/001#8	Main well	ROV video transect	Transect at 270 º from the main well – abandoned poor visibility
TL/020707/002#1	Pilot well	ROV video transect	100 m transect heading 050º from the pilot well
TL/020707/002#2	Pilot Well	ROV video transect	100 m transect heading 090º form pilot well
TL/020707/002#3	Pilot Well	ROV video transect	30 m transect at 000º from pilot well
TL/050707/004#1	Well Spud-in location – Main Well	ROV push core	Top 3 cm for Statoil
TL/050707/004#2	Spud-in location – Main Well	ROV push core	Top 3 cm for Statoil
TL/050707/004#3	Spud-in location – Main Well	ROV push core	Top 5 cm meiofauna SERPENT samples
TL/050707/004#4	Spud-in location – Main Well	ROV push core	Top 5 cm meiofauna SERPENT samples

VIDEO TRANSECT MAP



The video transects carried out during the Midnattsol pre-drilling visit. The main well transects (blue) were conducted prior to any drilling activity while the pilot well transects were taken during a pause for maintenance after drilling had started.

SEDIMENT MARKER BUOYS

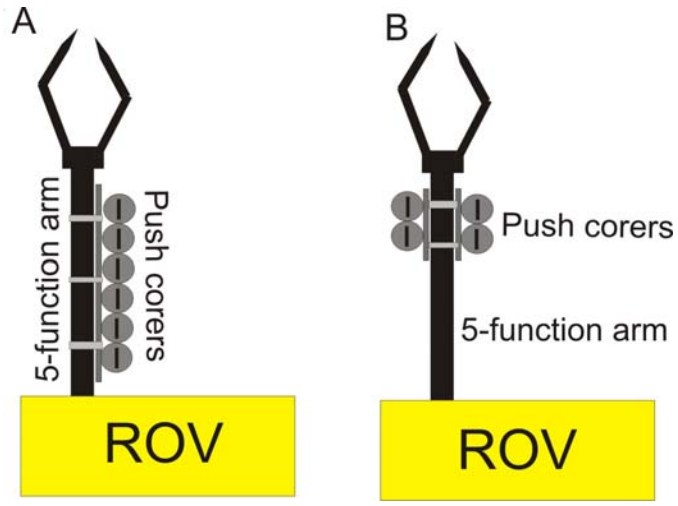


The location of the sediment marker buoys in position around the main well at Midnattsol before drilling commenced. In addition four ROV push core samples were taken at the location of the main well prior to drilling.

5. GEAR REPORT

Push corers:

We had not provided a mechanism for attachment of the corers to the ROV so one had to be constructed. Initially the Corers were attached to a piece of scrap connecting metal strip and attached to the inside of the 5-function arm (see A on figure below). Unfortunately it was impossible to remove the corers closest to the ROV so the design was changed to only hold four corers and to have 2 on either side of the 5-function arm. One of the core holders had previously been broken so it was not possible to get 6 onto the arm so it was decided to use four. In future it is recommended to fit as many cores to the ROV as can possibly be accommodated without hampering manipulation capabilities. This may depend to a large extent on the capabilities of the ROV operators.



This was the first time in which the new design of SERPENT coring devices had been used. Initially this presented a problem as water did not enter the core tubes on descent to the sea bed. As air remained in the tubes at nearly 1000m water depth it was not possible to remove the cores from their holders. This problem was rectified simply by filling the corers with water before each dive. Another method employed was to insert a cable tie between the rubber seal and the top of the coring device, which could easily be removed on arrival at the sea bed.

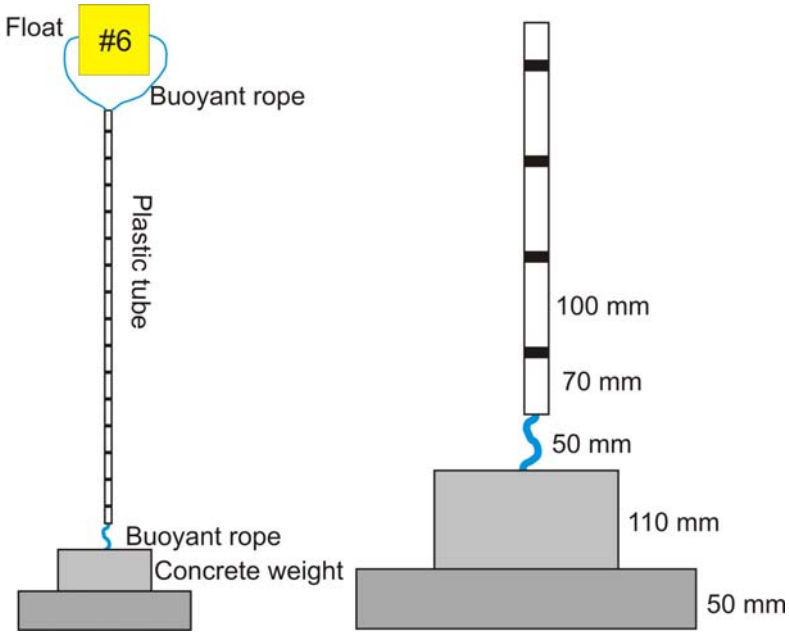
Bioturbation Corral:

A bioturbation corral was requested from the rig welder. He was happy to make one but being a pre-drilling he was very busy and unable to make it during the pre-drill SERPENT visit. Plans were given to him and he agreed to make the frame and hand it over to the ROV team when it was finished.

Sediment Marker Buoys:

Sediment marker buoys had previously been constructed by the Oceaneering International ROV team. They had been shipped to the rig and arrived during the Pre-drill visit. Unfortunately the container they had arrived in was one of the last to arrive on the rig and it was placed with the doors facing another container making it impossible to get in until the crane operator had moved

it. Again the hectic schedule of a pre-drilling visit delayed this procedure. The ROV team had not considered the distance from the bottom of the weight to the start of their tube with the measurements marked on so it was necessary to document the additional measurements on the buoys, see below:



Kongsberg Stills Camera:

There was a Kongsberg OE14-336 digital stills camera available on the Transocean Leader. It was not fitted to the ROV for this visit and due to the short time scale and large work load it was decided to wait until the post-drilling visit to fit the camera. It often takes a long time to get the camera fully set up and working properly. Instead the colour video camera was used and stills were taken from that to record interesting biological observations.

APPENDIX 1: VIDEO TRANSECT POSITIONAL DATA

Date	Time	Distance (m)	Heading	Sample	Notes
01/07/2007	15:31:20	0 – start	220	TL/010707/001#1	40 m transect at 225º from the main well location
	15:32:22	10			Many sabellids
	15:33:42	20			
	15:34:50	30			
	15:37:07	40 – end			Interrupted to check transponder for Statoil
01/07/2007	16:20:36	0 – start	315	TL/010707/001#2	90 m transect at 315º from the main well
	16:21:30	10			
	16:22:30	20			
	16:23:16	30			
	16:24:29	40			
	16:25:19	60			
	16:26:49	80			Possibly too fast, asked to slow down for next tansect
	16:27:39	90 – end			
01/07/2007	17:33:38	0 – start	045	TL/010707/001#3	90 m transect at 045º from the main well
	17:35:16	20			Started at 20m from well location – transect much slower
	17:37:53	40			
	17:41:28	50			
	17:43:06	60			
	17:45:39	70			
	17:48:59	80			
	17:51:21	90 – end			
01/07/2007	18:02:09	0 – start	135	TL/010707/001#4	80 m transect at 135º from the main well
	18:03:55	20			
	18:06:18	40			
	18:09:57	60			
	18:11:51	70			
	18:14:40	80 - end			
01/07/2007	20:50:00	0 - start	000	n/a	000 abandoned due to poor visibility
	21:09:00	0 - start	000	n/a	000 abandoned due to poor visibility
	21:58:00	0 - start	000	n/a	000 abandoned due to poor visibility
	23:04:50	0 – start	000	TL/010707/001#5	100 m transect at 000º from the main well
	23:13:55	100 – end			
02/07/2007	00:01:41	0 start	190	TL/010707/001#6	100 m transect at 180º from the main well
02/07/2007	00:11:30	100 end			
02/07/2007	02:02:31	0 – start	090	TL/010707/001#7	100 m transect at 090º from the main well
02/07/2007	02:08:53	100 – end			
02/07/2007	03:00:28	0-start	270	TL/010707/001#8	Transect at 270 º from the main well – abandoned poor visibility
02/07/2007	16:02:50	0 – start	50	TL/020707/002#1	100 m transect heading 050º from the pilot well
	16:04:22	10			
	16:05:52	20			
	16:08:17	30			
	16:10:44	40			
	16:13:00	50			

	16:15:33	60			
	16:19:49	70 - end			
02/07/2007	16:35:31	0	90	TL/020707/002#2	100 m transect heading 090º form pilot well
	16:36:33	10			
	16:38:18	20			
	16:40:03	30			
	16:44:30	40			
	16:48:59	50			
	16:51:39	60			
	16:54:57	70			
	16:56:59	80			
	16:59:34	80			
	17:01:48	100 – end			
02/07/2007	17:14:09	0 - start		TL/020707/002#3	30 m transect at 000º from pilot well
	17:15:55	20			Pause due to poor vis
	17:17:48	40 – end			Abandon due to poor vis

APPENDIX 2: CORE SAMPLES COLLECTED

Date	Time	Dive	Sample location	Sample code	Sample notes	Sample retained
05/07/07	02:22	4	Proposed BOP location	TL/050707/004#1	Top 3 cm for chemical analysis	Frozen
05/07/07	02:22	4	Proposed BOP location	TL/050707/004#2	Top 3 cm for chemical analysis	Frozen
05/07/07	02:22	4	Proposed BOP location	TL/050707/004#2	Top 5 cm for meiofauna analysis	Formalin
05/07/07	02:22	4	Proposed BOP location	TL/050707/004#2	Top 3 cm for meiofauna analysis	Formalin

APPENDIX 3: FAUNAL OBSERVATIONS

Date	Time	Dive	location	Observation	Photo / video	Sample collected	Sample retained
01/07/2007	23:11:26	1	100 north of main well location	Sculpin (*Cottunculus*) lying on rock at the end of a video transect		No	No
01/07/2007	23:11:50	1	Approx 90 m north of main well	*Gorgonocephalus* sp.		No	No
02/07/2007	16:07:30	3	North west of main well – approx 30 m	*Chondrocladia* (giant club sponge)		No	No
02/07/2007	15:54:07	3	Pilot well	*Umbellula* sp.		No	No
02/07/2007	15:57:39	3	Pilot well	*Umbellula* sp.		No	No
02/07/2007	16:09:30	3	North of main well	Cerianthids and ophiuroid		No	No

MISSON 33

WEST EPSILON, RAGNAROKK 1, NORWAY

ANDREW GATES

1. GENERAL INFORMATION:

Client: Statoil
Dates: 25th – 30th July 2007
Position: 058º 53' 00 N
002º 22' 20 E

Water depth: 114 m
Water temperature: 8.4°C

SERPENT Representative: Dr Andrew Gates

Rig Operator: Seadrill Ltd
Rig: West Epsilon

ROV Operator: Oceaneering

ROV team: Terje Olsen – Day Supervisor
Trond Flæte– Night Supervisor
Lars Grastveit – Pilot Tech (day)
Øyvind Helgeneseth – Pilot Tech (day)
Daniel Hesjedal – Pilot Tech (night)
Kåre Tjøstheim – Pilot Tech (night)

2. GEAR:

Magnum 034 ROV
ROV push cores: plastic topped, jubilee clip design with frame designed and built on West Epsilon
Colour video camera

3. NARRATIVE:

25th July 2007 Following my arrival on the West Epsilon at 1945 I took part in the rig safety induction and was introduced to the OIM and Statoil Company Representative.

27th July 2007 Drilling was planned to begin on Sunday (29th July) allowing two days for SERPENT work. At the morning meeting I gave a summary of the SERPENT work-plans and was introduced to the Oceaneering day supervisor. The work-plans were discussed and the ROV team decided to construct a frame to hold the six sets of coring equipment in the five function arm rather than strapping the corers to the arm. After this had been completed the first SERPENT dive commenced. Six meiofauna push cores were taken at the proposed drilling location. The sediment was very soft at the surface and then harder underneath making the coring difficult. Frequently it was difficult to obtain a good sample. Two samples were lost as the corers broke. After taking three cores there was a shift change. I continued to work with the night-shift crew until the core sampling was complete.

28th July 2007 At the morning meeting some predicted poor weather conditions were reported which may hamper the unloading of the vessel and thus delay the onset of drilling. It was suggested that I leave the rig on Monday as drilling was due to start and POB was high.
The plan for the day was to carry out video transects and then to take further sediment samples, saving time by combining both operations into a single dive. Unfortunately an alarm sounded in the ROV control room which prevented work from commencing; initially the cause of the problem was unclear. It was eventually diagnosed to be the result of reduced voltage to a fibre-optic converter. The problem was fixed by 1700 and the video transects commenced at 1730; four were completed before the shift change. Again I continued work onto the night shift and took six cores. Four were taken for Statoil chemical analysis while two further meiofauna cores were attempted. Unfortunately one of the corers broke in the process because of difficulty in collecting the samples. The broken corer was used as a make-shift specimen sampler and some echinoid specimens were collected to aid in the identification of those witnessed in the video transects. The samples were brought to the surface and processed; the Statoil samples were frozen in the galley freezer.

29th July 2007 The poor weather that had been predicted had begun and there was a large swell. It was decided to take the remaining core samples as soon as possible so that the ROV could return to the rig for core processing and re-enter the water before the swell reached its maximum size. Six core samples were taken at around the disturbance caused by Leg 3 of the rig, to be used for comparison with the samples taken at the location of the proposed drilling. This procedure was difficult because in certain places the mud was very soft and would not stay well in the corers but six were eventually collected.
Following the collection of the leg impact disturbance samples further video transects were carried out to take the total number collected to eight.
When the video transects were completed the opportunity was taken to taken some “ecological highlights” footage to gain an understanding of the area and to get close up images of the organisms likely to be encountered in the subsequent video transect analysis.

30th July 2007 All samples had been stored and DVDs burned in time to leave the rig when I was informed that the helicopter was no longer coming out to the *West Epsilon*. After some confusion it was confirmed that I did actually have a seat on the helicopter and I left the rig at 1145. The core samples for Statoil were handed over to ‘Box Delivery’ at Sola airport, Stavanger at 1300.

4. SAMPLES:

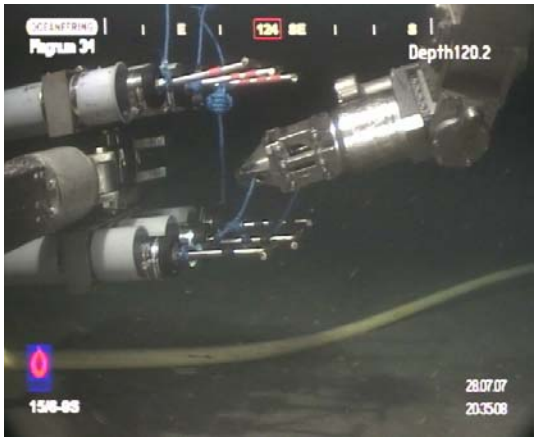
CODE STRUCTURE:

For example: WE/020707/002#1
West Epsilon / Date / SERPENT dive log number # replicate

SAMPLE COLLECTED:

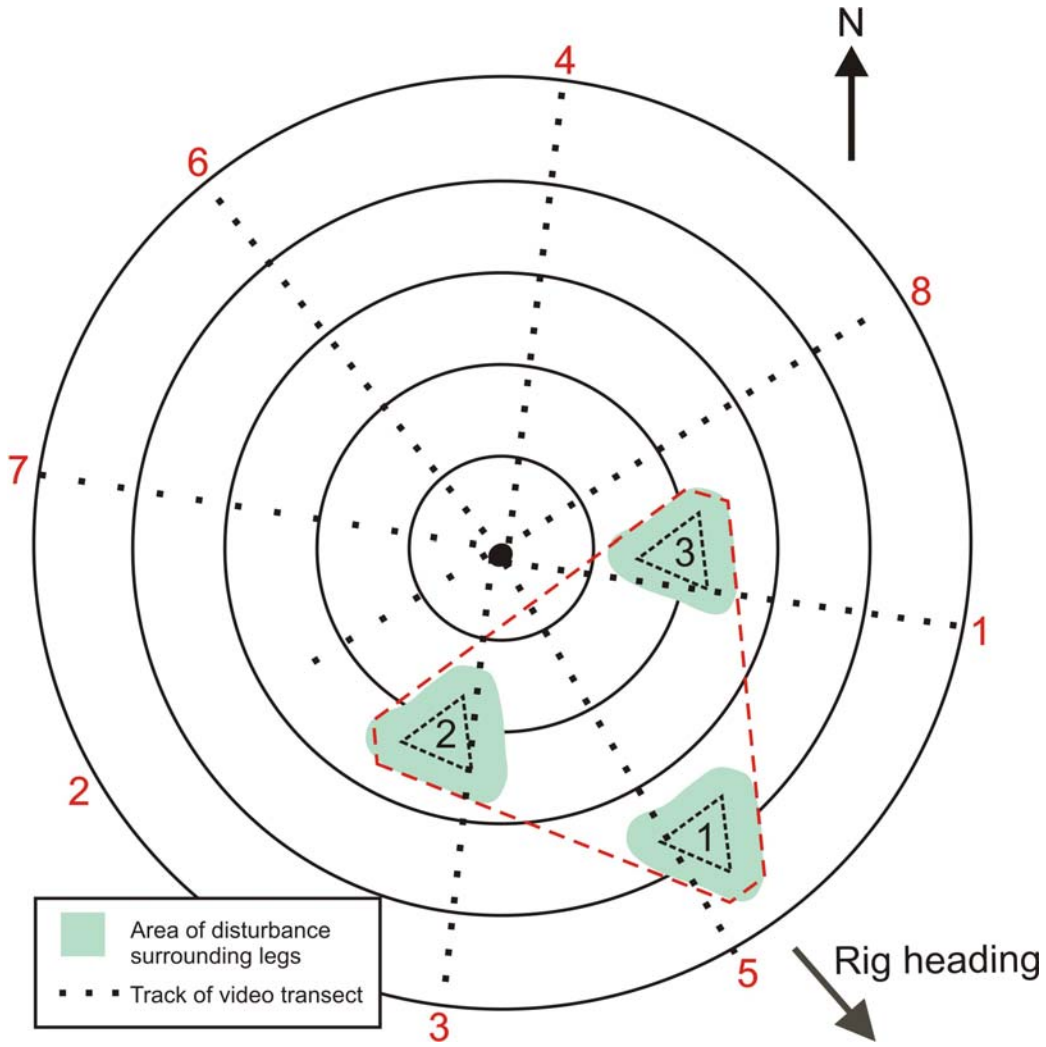
Station/Sample code	Location	Sample type	Sample details
WE/270707/001#1	Proposed spud-in location	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/270707/001#2	Proposed spud-in location	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/270707/001#3	Proposed spud-in location	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/270707/001#4	Proposed spud-in location	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/280707/002#1	Proposed spud-in location	ROV push core	Top 3 cm for Statoil chemical analysis
WE/280707/002#2	25 m at 135° from proposed spud-in location	ROV push core	Top 3 cm for Statoil chemical analysis
WE/280707/002#3	50 m at 135° from proposed spud-in location	ROV push core	Top 3 cm for Statoil chemical analysis
WE/280707/001#4	120 m at 135° from proposed spud-in location	ROV push core	Top 3 cm for Statoil chemical analysis
WE/280707/001#5	Proposed spud-in location	Specimen sample	Echinoid specimen
WE/280707/001#6	Proposed spud-in location	ROV push core	Top 5 cm for SERPENT chemical analysis
WE/280707/002#7	Proposed spud-in location	Video transect	100 m transect heading 100° from proposed drilling location
WE/280707/002#8	Proposed spud-in location	Video transect	100 m transect heading 280° from proposed drilling location
WE/280707/002#9	Proposed spud-in location	Video transect	95 m transect heading 190° from proposed drilling location
WE/280707/002#10	Proposed spud-in location	Video transect	100 m transect heading 010° from proposed drilling location
WE/290707/003#1	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/290707/003#2	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/290707/003#3	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/290707/003#4	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/290707/003#5	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/290707/003#6	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
WE/280707/004#1	Proposed spud-in location	Video transect	100 m transect heading 145° from proposed drilling location
WE/280707/004#2	Proposed spud-in location	Video transect	95 m transect heading 325° from proposed drilling location
WE/280707/004#3	Proposed spud-in location	Video transect	50 m transect heading 235° from proposed drilling location
WE/280707/004#4	Proposed spud-in location	Video transect	90 m transect heading 055° from proposed drilling location

Use of the seven funtion manipulator arm for core sampling at Ragnarokk



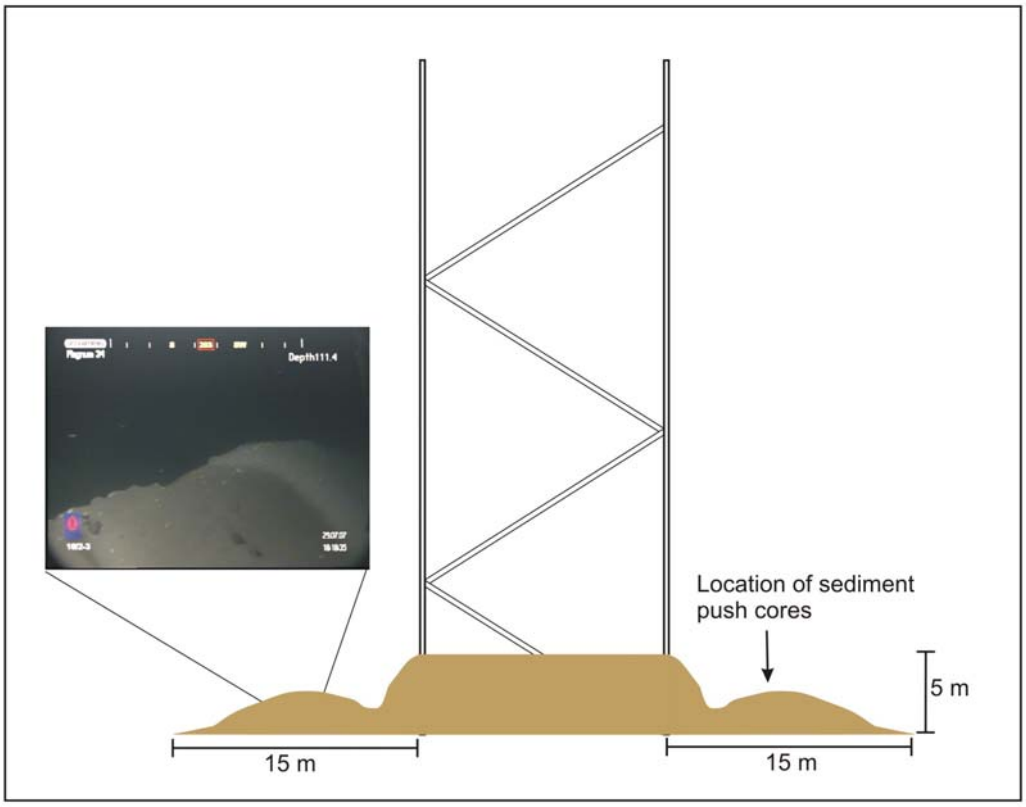
VIDEO TRANSECT MAP

Eight video transects were taken radiating from the propsed location of the BOP; this was located 13m from the aft of the rig. Its position on the seabed was established using the ROV sonar to navigate to a distance of 32 m from each of legs two and three. Transects 1, 3 and 5 passed the areas of disturbance caused by the deployment of the legs of the jack-up rig. From observations made during the visit and from measurements taken from the transects it is estimated that the areas of disturbance extend approximately 15 m from the legs in each direction and the sediment mound was approximately 5 m in height.



The video transects carried out during the Ragnarokk pre-drilling visit. The transects were conducted prior to any drilling activity. The green areas represent estimated disturbance caused by the legs of the jack-up rig.
Previously SERPENT visits have been carried out on semi-submersible drilling rigs so the jack-up rig, *West Epsilon* provided an opportunity to investigate the effects of the impact of the legs supporting the rig. As noted above the disturbance, in the form of a large mound of sediment, was observed extending approximately 15 m from each of the legs. As part of the visit to

Ragnarokk six push cores were taken from the disturbance mound to analyse the meiofaunal content and compare undisturbed samples taken at the BOP location. The figure below represents this disturbance and shows the location of the sediment push cores taken in the area.



Representation of the impact of the deployment of the legs supporting the jack-up rig estimated from observations from the ROV and measurements taken from video transects. The location of the push cores is also shown.

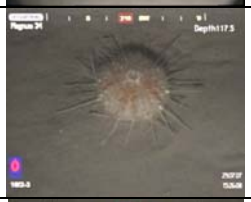
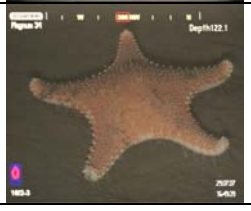
APPENDIX 1: TRANSECT POSITIONAL DATA

Date	Time	Distance (m)	Heading	Sample	Notes
28/7/2007	17:34:23	0 – start	100	WE/280707/002#7	100 m transect heading 100° from proposed drilling location
	17:40:00	50			
	17:46:15	100 – end			
28/7/2007	17:59:43	0 – start	280	WE/280707/002#8	100 m transect heading 280° from proposed drilling location
	18:05:21	100 – end			
28/7/2007	18:15:07	0 – start	190	WE/280707/002#9	95 m transect heading 190° from proposed drilling location
	18:18:30				Passing the disturbance from the legs
	18:19:40	50			
	18:24:20	100 – end			
28/7/2007	18:40:18	0 – start	010	WE/280707/002#10	100 m transect heading 010° from proposed drilling location
	18:47:49	100 – end			
29/07/2007	13:49:25	0 – start	145	WE/280707/004#1	100 m transect heading 145° from proposed drilling location
	13:53:38	50			
	13:56:23				Leg 1
	13:57:15	80			
	13:58:52	100 – end			
29/07/2007	14:14:50	0 – start	325	WE/280707/004#2	95 m transect heading 325° from proposed drilling location
	14:18:40	50			
	14:22:07	100 – end			
29/07/2007	14:50:07	0 – start	235	WE/280707/004#3	50 m transect heading 235° from proposed drilling location
	14:52:36				Passing leg 2
	14:53:39				Beyond leg 2
	14:54:40	50 – end			
29/07/2007	15:13:15	0 – start	055	WE/280707/004#4	90 m transect heading 055° from proposed drilling location
	15:14:22				Passing leg 3
	15:17:22	50			
	15:19:50	100 – end			

APPENDIX 2: CORE SAMPLES

Date	Time	Dive	Sample location	Sample code	Sample notes	Sample retained
27/07/07	1909	1	Spud-in location	WE/270707/001#1	Red 2	Top 5 cm in Formalin
27/07/07	1921	1	Spud-in location	WE/270707/001#2	Red 3	Top 5 cm in Formalin
27/07/07	2055	1	Spud-in location	WE/270707/001#3	Black 1	Top 5 cm in Formalin
27/07/07	2131	1	Spud-in location	WE/270707/001#4	Black 2	Top 5 cm in Formalin
28/07/07	2035	2	Spud-in location	WE/280707/002#1	Black 1	Top 3 cm, Frozen
28/07/07	2045	2	Spud-in location	WE/280707/002#2	Black 2	Top 3 cm, Frozen
28/07/07	2104	2	Spud-in location	WE/280707/002#3	Black 3	Top 3 cm, Frozen
28/07/07	2118	2	Spud-in location	WE/280707/002#4	Red 2	Top 3 cm, Frozen
28/07/07	2202	2	Spud-in location	WE/280707/002#6	Red 3	Top 5 cm in Formalin
29/07/07	0853	3	Leg 3	WE/290707/003#1	Black 1	Top 5 cm in Formalin
29/07/07	0859	3	Leg 3	WE/290707/003#2	Black 2	Top 5 cm in Formalin
29/07/07	0914	3	Leg 3	WE/290707/003#3	Black 3	Top 5 cm in Formalin
29/07/07	0925	3	Leg 3	WE/290707/003#4	Red 1	Top 5 cm in Formalin
29/07/07	0950	3	Leg 3	WE/290707/003#5	Red 2	Top 5 cm in Formalin
29/07/07	1002	3	Leg 3	WE/290707/003#6	Red 3	Top 5 cm in Formalin

APPENDIX 3: FAUNAL OBSERVATIONS

Date	Time	Dive	location	Observation	Photo / video	Sample collected	Sample retained
28/07/07	18:46			Abundant echinoids, typical scene		Yes	Formalin
29/07/07	13:52			Pennatulid		No	No
29/07/07	15:26			Echinoid (*Echinus acutus*)		Yes	Formalin
29/07/07	15:53			Asteroid		No	No
29/07/07	16:05			Pennatulid – *Pennatula phosphorea*		No	No
29/07/07	16:40			Hagfish		No	No
29/07/07	16:49			Asteroid		No	No

29/07/07	17:32			Flatfish and echinoids		No	No
29/07/07	17:45			Gastropod		No	No
29/07/07	17:54			Scallop		No	No
29/07/07				Polychaete (*Ophiodromus flexuosus*)		No	No

MISSON 34

SOVEREIGN EXPLORER, ORCA, VENEZUELA

DANIEL JONES

1. GENERAL INFORMATION:

Client: Statoil
Rig operator: Transocean
Rig name: Sovereign Explorer
Rig location: Orca, Offshore Venezuela
Rig position: 09°44'07.4" N 59°44'60" W
Seabed depth: 543 m
Seabed temperature: 3°C
ROV operator: Subsea 7
ROV: Centurion 38 HD
ROV team:

Supervisor	Rogelio Zumaya
Pilot until 28/7	Benito Guzman
Observer	Jorge Rosas
Pilot after 28/7	Jose Gongora

2. GEAR:

Centurion 38 HD ROV
ROV push cores x 4: plastic topped, jubilee clip design
Bottle type Amphipod trap (4 litre plastic water bottle)
Large crate type crab trap (size of lobster pot)
Colour video camera

3. NARRATIVE:

WEDNESDAY 25th July 2007

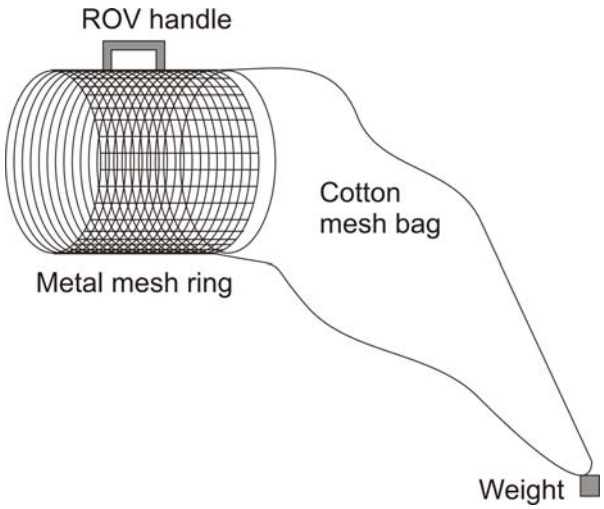
Flew out to rig on helicopter from Maturin at 6:15 am, landed on rig at approx 8:30 am. Had safety briefings etc and met up with ROV team at about 11 am. They were installing AX ring on well head. Once this was completed we were able to complete two ROV video transects. They had completed 8 pre-drilling video transects already (on 14th Jult 2007). Drilling was started on the 16th July 2007, this was a pilot hole around 25 m away from the present hole, it was stopped on 17th July. The main hole was started at 00:20 on the 19th July 2007 and the first section was completed (all the tophole) and the drill string pulled from the hole on 20th July at 17:47. Owing to the soft sediment drilling was done with the drill bit in the casing, water was pumped through the drill bit and the casing pushed into the sediment as it was displaced by the jetting. There was some major subsidence of the casing and guide base once the weight was put on the seabed. After this the guidebase and casing were pulled up from the rig and cemented into place – as yet with no further movement. The BOP has not yet been put in place. The casing and guidebase will need to support the additional weight of the BOP rams. The sediment is very soft. Although the ROV team did not deploy the sediment marker buoys it would appear that most of the tophole cuttings were very fine and not detectable on the sediment surface – much of the accumulated sediment was likely displaced with the sinking guidebase. Tophole sediments are only visible to around 10 m from the guidebase.

THURSDAY 26th July 2007

Went to the rig meeting at 5:45 am. ROV dived at around 6:30 am to make inspection of guidebase and bullseyes. After this SERPENT operations began. We were able to achieve a lot today doing all the 8 post drilling surveys. There only seemed to be minor disturbance visible over a short distance. It was only at 75 degrees where any visible disturbance extended any further. There was occasionally some fragments of mud from the anchors on the seabed but not drilling induced sediment. It is likely that this sediment is not detected visually – as it was drilled with water only (no mud to date) there is no expected toxic effect. Faunal traces are in abundance even close to the well so any deposited sediments could not be very thick. After completing the transects we attempted to sample an isocrinid crinoid using the manipulator alone, we encountered problems owing to the fine sediments. We will make the ROV negatively buoyant for tomorrows sampling so that we don't have to down-thrust to stay on station. We eventually caught the crinoid in the manipulator but lost it during movement.

FRIDAY 27th July 2007

Went to the rig meeting at 5:45 am. All day was spent doing BOP inspections so no opportunity for SERPENT work. I used the time to manufacture an amphipod trap from some scrap metal and a 4 litre water bottle (with the top cut off, turned around and re attached to the bottle – I also used a thin plastic collar on the bottle top to try and further reduce escape). We also got the Welder, Malcolm, to make us a ROV operated scoop from metal. Once he had made the metal I attached a cotton mesh laundry bag (with a large, thick cable tie weaved around the metal mesh) to catch the specimens in.



SATURDAY 28th July 2007

Went to the rig meeting at 5:45 am. Spent much of the day waiting, watching the BOP (Blow out Preventer). At 16:00 we started a science dive (dive 4) we were armed with an amphipod trap (mounted on the TMS) and a scoop. We deployed the amphipod trap near the BOP and then set off to try and catch some samples with the scoop. On the first go we tried to use the scoop to elegantly scoop an anemone but the visibility was quickly stirred up and we had to try and scoop blindly into the sediment – without success as it was later seen. We went back up to the TMS to rearrange the manipulator. TMS stands for Tether Management System – a subsea winch that controls the ROV tether. The TMS is attached to the surface by the strong wire umbilical. The ROV docks to the TMS for deployment and retrieval. On the second go (17:04) we dropped into a cloud of sediment and the scoop got filled up as the ROV touched down on the seafloor; we returned again to the TMS. On the third go we tried positioning the scoop in front of the ROV and flying at things – this approach seemed to work effectively but the bag became full very quickly with clay / mud sediment. We tried to catch a cerianthid – it turns out this was unsuccessful. At 17:37 the scoop broke along the weld at the top so we recovered the vehicle. On inspection of the sediment we found a small collection of invertebrates – highlights were an ophiuroid and some conical cup coral like organisms.

SUNDAY 29th July 2007

Went to the rig meeting at 5:45 am. We deployed the ROV at 07:15 for a science dive (dive 5) – the Bullseyes were checked and we saw the trap near the BOP. It was full of hagfish and a large isopod. There were larger isopods and crabs trying unsuccessfully to get in. The scoop unfortunately got lost on the way down to the seabed. We had put two jubilee clips to attach it to the 7 function manipulator jaws so not quite sure why it was lost. As we had no equipment we picked up the trap and recovered the vehicle. Whilst this was going on I made a larger trap out of a large plastic crate – which was about the size of a European lobster pot and should allow us to catch the larger beasts! I baited the trap with canned tuna (as before) and chicken (as the rig workers based in the Gulf of Mexico had recommended chicken as bait to catch deep-water spidercrabs – which, incidentally, were supposedly nice to eat but turned black – both cooked and uncooked after 2 days…). I retrieved the hagfish and large isopod and put chilled in the ROV control room (unfortunately the formalin is still not here) with the other stuff. Without the scoop we switched to coring and mounted the 4 push cores on the vehicle jubilee clipped into in a large plastic crate which in turn was jubilee clipped to the front of the vehicle. We have also made the vehicle about 10 kg negatively buoyant to try and minimise the seabed stirring. The two traps were deployed mounted on the TMS with thin cable ties (which break when pulled off by the ROV). The cores were filled with water and a tape strip put through the seals – with these mark 3 cores the seal can be too good if they are not filled with water first. The next dive (dive 6) began at 13:30, it takes about 30 minutes to reach the seabed at 545 m deep. Out of TMS at

13:54 and retrieving large trap from TMS frame. At 14:01 the large trap was released about 3 metres north of the BOP. We went back to the TMS to retrieve the smaller trap, picking it up at 14:07. The small trap was deployed about a metre from the larger trap. Went back to the TMS and began searching for some animals to core at 14:15. We found several cerianthids but the sediment stirred up too much. We eventually tried to core a hole in the seabed where we thought a cerianthid may have been. We got a core but the pilot couldn't retrieve it successful, it was dropped and then we picked up only the plastic part of the tube loosing the metal handle. This was left in the sample basket on the front of the ROV. The ROV could not reach the other cores. Retrieving the vehicle at 15:43. There was only a small quantity of clay in the broken core.

MONDAY 30th July 2007

Went to the rig meeting at 5:45 am. ROV off deck for dive 7 at 6:40 at seabed at 07:15. They checked the bullseyes on the BOP and we saw the small trap on the way with a very large isopod (about 400 mm in length) trying to get into the small trap (unfortunately not the larger trap). Core tube in centre fell off as they were checking the BOP. At 8:22 we commenced looking for megafauna to sample. Well… one jubilee clip broke on the centre core (of 3) and that fell onto the seabed when the ROV hit the BOP, the second and third core were broken on extraction. We did find a good cerianthid anemone to try and sample. With no equipment left intact we returned to the TMS and surfaced. Malcolm the welder had made us a new scoop so we attached this to the vehicle and dived again (dive 8) leaving deck around 10:15. Spent a long time watching the bulls eyes to see if they had moved – they did not – but in the mean time one of the pilots tore the bag on the scoop by catching it onto the BOP. We eventually got permission to bring the vehicle to the surface, repair the bag and try again. The next dive (dive 9) commenced around 14:20, we appeared to successfully scoop a cerianthid which retracted into its tube just as we were lifting it out. At 15:43 we appeared to catch another cerianthid. We attempted, unsuccessfully to catch an isocrinid at 15:48 but it was lost. We then managed to get some good video stills of some of the megafauna (isocrinid, hydroid, sabellid, worm-like holothurian?) before trying to catch the crinoid. It was interesting to note that the hydroid had a symbiotic galatheid entwined in its branches. We appeared to catch the crinoid and then came up as the bag on the scoop was full of sediment. We arrived on the surface at around 17:00. I removed the scoop from the 7 function manipulator and took the cotton mesh bag off. I gently washed the sediment in the bag removing the finer fractions and exposing the fauna. It was a successful haul collecting both cerianthid tubes, a large solitary pink coral, some smaller white solitary corals but unfortunately only fragments of the crinoid (and not it's calyx). My specimen jars and formaldehyde arrived today – I had also got some alcohol (70% isopropanol I think) from the doctor and preserved some specimens in both.

TUESDAY 31st July 2007

Went to the rig meeting at 5:45 am. ROV off deck for dive 10 at 6:20. Arrived at the seabed and checked the bullseyes on the BOP (used to ensure that this large subsea structure is level). Went hunting for organisms at 07:30. Found an anemone at 07:57, stopped by it waiting for the sediment to clear (slight forward trim as the vehicle is on the seabed sometimes helps clear the sediment). Attempt capture at 8:27 when sediment had cleared. We appeared to successfully catch the anemone at 08:46. Moving off to try and catch something else. Probably captured anemone and cerianthid at 09:14. Moved off and found a strange fish – with numerous adapted fin rays. Found another anemone but waiting for sediment to clear 09:44. Ran out of tether so started another transect nearer the BOP. We found an anemone and tried to sample it but noticed that the bag was quite empty – as we could not see if it is ripped we are going to recover the vehicle (10:39). We recovered the vehicle and I processed the bag of samples (the bag had not ripped) and found a conical cupcoral which I think must be one of the two sorts of "anemone" we have seen, as well as some other organisms of interest (small white cupcorals, cerianthid tube, some small mollusc shells and small cylindrical organisms. I re-attached a new bag (and the old bag – for double security) to the scoop and we dived again for dive 11

commencing around 13:20. Collected the core sampler dropped on an earlier dive and put it into a basket mounted on the TMS. Did a transect at 70 degrees and found a starfish which appeared to be upside-down on the sediment surface – caught it anyway. Unfortunately the netting had caught on the scoop reducing the net underneath it – useful for reducing escape. We went back to the TMS and then did a transect at 190 degrees, eventually found a holothurian. Current was much higher than normal (normally negligible) observed going to 300 degrees at approximate maximum of 1 metre every 12 seconds (5 metres a minute) but it is difficult to tell how much of that is as a result of the ROV thrusters. Until today we had observed near zero currents. We attempted to catch the holothurian and returned to the BOP to pick up the traps. The large trap was successful catching a giant isopod (approx 250 mm long). Much of the contents of the scoop were lost except a asteroid and a white coral.

4. SAMPLES:

CODE STRUCTURE:

SE/250707/001#1
Sovereign Explorer / Date / station number # replicate

SAMPLE STATIONS:

Station	Location	Sample type	Preservation
SE/140707/001#1	300° heading from well site	Video Transect	.mpg
SE/140707/002#1	120° heading from well site	Video Transect	.mpg
SE/140707/003#1	30° heading from well site	Video Transect	.mpg
SE/140707/004#1	210° heading from well site	Video Transect	.mpg
SE/140707/005#1	330 heading from well site	Video Transect	.mpg
SE/140707/006#1	165° heading from well site	Video Transect	.mpg
SE/140707/007#1	120° heading from well site	Video Transect	.mpg
SE/140707/008#1	255° heading from well site	Video Transect	.mpg
SE/250707/009#1	30° heading from guidebase	Video Transect	.mpg
SE/250707/010#1	165° heading from guidebase	Video Transect	.mpg
SE/260707/011#1	75° heading from guidebase	Video Transect	.mpg
SE/260707/012#1	225° heading from guidebase	Video Transect	.mpg
SE/260707/013#1	330° heading from guidebase	Video Transect	.mpg
SE/260707/014#1	120° heading from guidebase	Video Transect	.mpg
SE/260707/015#1	210° heading from guidebase	Video Transect	.mpg
SE/260707/016#1	300° heading from guidebase	Video Transect	.mpg
SE/280707/017#1	330° 30 m from BOP	Scoop sample	Chilled then formalin
SE/280707/018#1	1 m from BOP	4L bottle trap (tuna bait)	Chilled then 2 hagfish in alcohol and 4 in formalin. Isopod in formalin.
SE/300707/019#1	50° 30 m from BOP	Scoop sample	All catch in alcohol
SE/310707/020#1	40° 30 m from BOP	Scoop sample	All catch in formalin
SE/310707/021#1	50 m from BOP	Scoop samples	Asteroid and coral in formalin
SE/310707/022#1	2 m from BOP	Trap samples	Giant Isopod

5. GEAR REPORT

ROV Centurion 38HD:

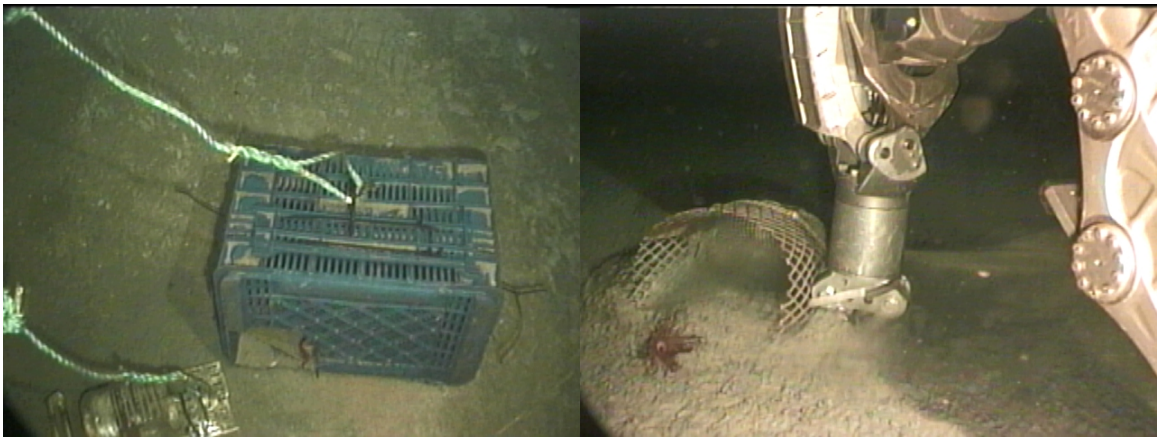
The vehicle was generally good for all operations. It did not have a stills camera, the zip pump was a small, non-venturi type pump and not suitable for specimen collection. There was no navigation available. We did not suffer any breakdowns of the vehicle.

Push Cores:

We did not manage to obtain any push cores. I brought four units to the rig but these were quickly broken or lost through imprecise manipulations. The retrieved parts were sent to USB to start their ROV equipment pool.

Scoop:

The faunal scoop was constructed by the rig welder. It proved reasonably successful but we had several problems with the mesh bag getting caught on the metal teeth, this could be solved in the future by putting a metal band around the cutting edge of the scoop. We weighted the bag down but some manipulator movements still caught the free portion. On one occasion the bag was ripped when caught on the BOP. We lost the first (and better scoop – it had a larger handle – large enough for both fingers of the 7 function) as a result of failed jubilee clips – always use at least 2 jubilee clips in different attachment points.



Traps:

The traps were generally successful despite their makeshift nature. The smaller trap was more effective but I think this was because the bait was better retained and the shape of it made the entry point both easy to access and the area with the highest bait odour.

APPENDIX 1 – Specimens Collected

Station	Seabed	Organism	Preserved in RNAlater	Preserved in Formalin	Preserved in Alcohol	Notes
SE/280707/017#1	Fine silt	1 x Ophiuroid, 3 x conical corals?, polychaetes/sipunculids/holothurians – small, mollusc shells		Entire catch		330° 30 m from BOP collected in Scoop
SE/280707/018#1	Cuttings and cement near BOP	6 x hagfish and a large isopod.		4 hagfish and Isopod	2 hagfish	From about 1 m from BOP collected in trap
SE/300707/019#1	Fine silt	1 large cupcoral (white base, pink on top), 2 small conical white corals, 2 cerianthid tubes (purple), fragments of crinoid but no calyx, polychaetes/sipunculids/holothurians			Entire catch	50° 30 m from BOP collected in Scoop
SE/310707/020#1	Fine silt	1 large cupcoral (looks like anemone on video (white base pink on top), 2 small conical white cupcorals, 1 cerianthid tube (looks damaged?), smaller organisms or parts of organism including some mollusc shells (no live molluscs)		Entire catch		40° 30 m from BOP collected in scoop
SE/310707/021#1	Fine silt	1 Asteroid (Similar to Plinthaster) and 1 small white coral				50 m from BOP caught in scoop
SE/310707/022#1	Cuttings and cement near BOP	1 giant Isopod	Sample of gill and blood	Rest of Isopod		2 m from BOP caught in large trap

APPENDIX 2 – Core Samples

No cores successfully obtained

Date	Time	Dive	Sample location	Sample code	Core markings	Sample notes	Sample retained

APPENDIX 3 – Observations

Faunal Observations

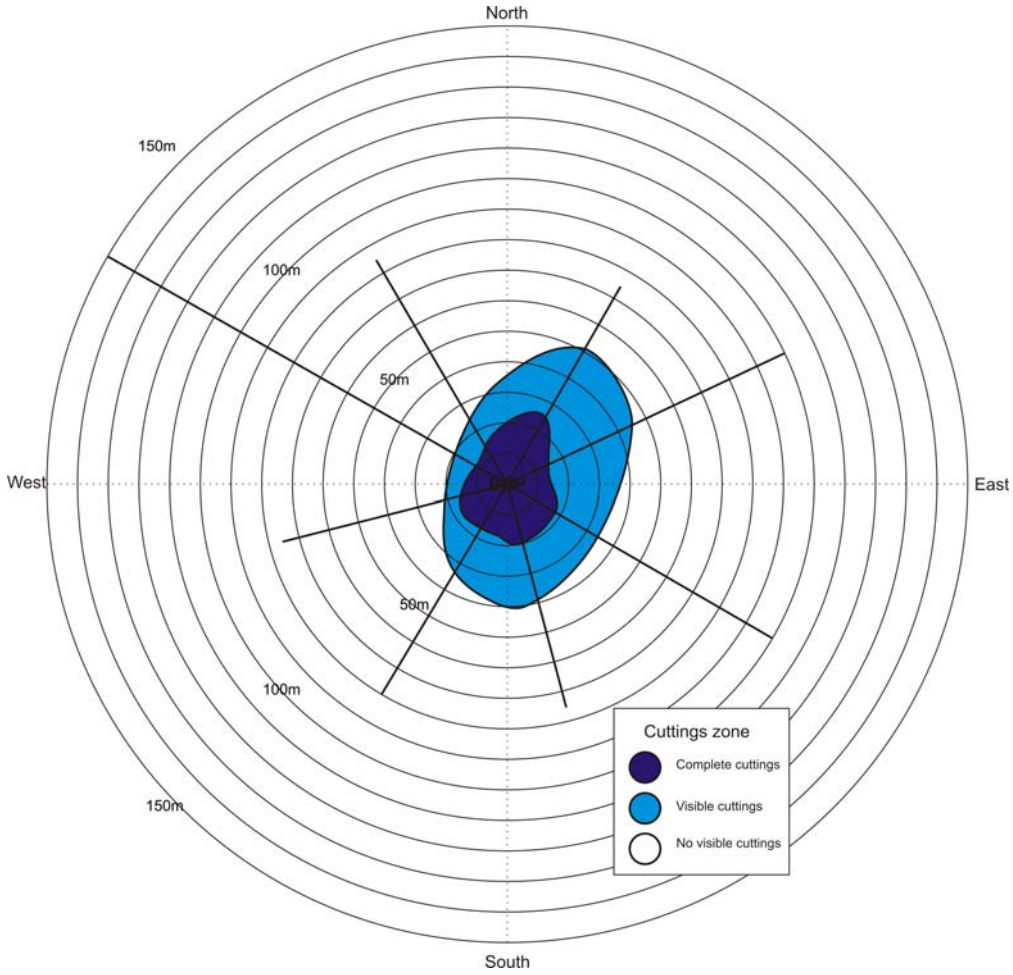
Date	Time	Dive	location	Observation	Photo / video	Sample collected	Sample retained
26/07/2007	10:37:49	3	Close to guidebase	Large pink jelly		No	No
30/07/2007	07:31:00	7	Close to BOP	Giant isopod trying to get into trap	Video	No	No
30/07/2007	12:49:00	7	Close to BOP	Isopod and crab by trap	Video	No	No
30/07/2007	15:46	9	50° 30 m from BOP	Sabellid polychaete		No	No
30/07/2007	15:51	9	50° 30 m from BOP	Holothurian?		No	No
30/07/2007	15:50	9	50° 30 m from BOP	Hydroid? With symbiotic galatheid		No	No

30/07/2007	15:53	9	50° 30 m from BOP	Stalked crinoid		Yes	Only fragments, no calyx retained
31/07/2007	08:26	10	40° 30 m from BOP	Anemone		Yes	Possibly not sure if it is this one or the one
31/07/2007	09:10	10	40° 35 m from BOP	Different anemone		Yes	Possibly
31/07/2007	09:12	10	40° 35 m from BOP	Cerianthid anemone		Yes	Yes (possibly damaged)
31/07/2007	09:06	10	40° 35 m from BOP	Crab		No	No
31/07/2007	09:26	10	40° 40 m from BOP	Strange fish		No	No

31/07/2007	15:33	11	270° 40 m from BOP	Sea star		yes	
31/07/2007	16:18	11	190° 40 m from BOP	Holothurian		yes	

Drill cuttings observations

Observations were made of drill cuttings around the rig. It was operationally difficult to distinguish between areas but I think the results are consistent. Full cuttings areas had a smooth surface of newly deposited (very fine – muds and clays) cuttings with larger lumps of clay from subsurface, there were occasional cracks in the sediment surface as a result of small scale sediment slumping – often associated with ROV disturbance. In the partially disturbed areas the sediment surface appeared smooth and had minimal bioturbation – where fauna was visible it was contained in a halo of sediment which it had cleared around its body (particularly the orange cupcorals). The seabed beyond was generally rougher in appearance (presumably from surface foraminiferans / hydroids) and a subtly darker colour, it had frequent, often major bioturbation. In this area I suspect cuttings were present but in relatively low quantities. See map below.



Drill cuttings observations around the well at Orca

APPENDIX 4 – Video Transects

VIDEO TRANSECTS

Date	Time	Dive	Sample	Notes	Observation
14/07/2007	09:50	1	SE/140707/001#1	300° heading from well site	Pre-drilling
14/07/2007	10:30	1	SE/140707/002#1	120° heading from well site	Pre-drilling
14/07/2007	11:20	1	SE/140707/003#1	30° heading from well site	Pre-drilling
14/07/2007	12:00	1	SE/140707/004#1	210° heading from well site	Pre-drilling
14/07/2007	12:30	1	SE/140707/005#1	330 heading from well site	Pre-drilling
14/07/2007	13:05	1	SE/140707/006#1	165° heading from well site	Pre-drilling
14/07/2007	13:40	1	SE/140707/007#1	120° heading from well site	Pre-drilling
14/07/2007	14:10	1	SE/140707/008#1	255° heading from well site	Pre-drilling
25/07/2007	13:21:15	2	SE/250707/009#1	30° heading from guidebase 75 m long transect	Start post-drilling transect
25/07/2007	13:27:20	2	SE/250707/009#1		Finish transect
25/07/2007	13:38:04	2	SE/250707/010#1	165° heading from guidebase, 75 m long transect	Start post-drilling transect
25/07/2007	13:40:11	2	SE/250707/010#1		Re-start transect once sediment cleared
25/07/2007	13:45:09	2	SE/250707/010#1		Finish transect
26/07/2007	10:11:32	3	SE/260707/011#1	75° heading from guidebase, 100 m long transect	Start post-drilling transect
26/07/2007	10:22:46	3	SE/260707/011#1		Finish transect
26/07/2007	10:41:11	3	SE/260707/012#1	225° heading from guidebase, 75 m long transect	Start post-drilling transect
26/07/2007	10:44:41	3	SE/260707/012#1		Large crab
26/07/2007	10:46:30	3	SE/260707/012#1		Orange anglerfish
26/07/2007	10:48:14	3	SE/260707/012#1		Finish transect
26/07/2007	12:13:16	3	SE/260707/013#1	330° heading from guidebase, 85 m long transect	Start post-drilling transect

26/07/2007	12:22:28	3	SE/260707/013#1		Finish transect
26/07/2007	12:33:34	3	SE/260707/014#1	120° heading from guidebase, 100 m long transect	Start post-drilling transect
26/07/2007	12:41:39	3	SE/260707/014#1		Finish transect
26/07/2007	13:48:53	3	SE/260707/015#1	210° heading from guidebase, 80 m long transect	Start post-drilling transect
26/07/2007	13:57:43	3	SE/260707/015#1		Finish transect
26/07/2007	14:42:08	3	SE/260707/016#1	300° heading from guidebase, 80 m long transect	Start post-drilling transect
26/07/2007	14:59:09	3	SE/260707/016#1		Finish transect

MISSON 35

TRANSOCEAN LEADER, MIDNATTSOL 2, NORWAY

ANDREW GATES

1. GENERAL INFORMATION:

Client: Statoil

Rig: *Transocean Leader*
Rig Operator: Transocean

Position: 064º 00, 59.6 N
005º 16, 44.9 E

Water depth: 928 m
Water temperature: -0.94

SERPENT Representative: Dr Andrew Gates

ROV Operator: Oceaneering
ROV team:

	Day	Night
Supervisor	Andre Aadlandsvik	Trond Nilsen
Technician	Nils Danielsen	Ron Sande
Pilot	Morten Sejersen	Jørn Kalvøy

2. GEAR:

Magnum 018 Work class ROV
ROV push cores x 5
Ekman corers x 2
SERPENT sediment marker buoys x 12
Kongsberg 5MP digital stills camera
Amphipod trap x 1
Bioturbation corrals x 4

3. VISIT NARRATIVE:

Friday 17th August to Sunday 19th August
Travel to Heathrow on 3 consecutive days but twice the visit was delayed and the advice was to wait in the UK. I arrived in Kristiansund on Sunday evening.

Monday 20th August – Wednesday 22nd August
Visit delayed until Thursday. Travel to Trondheim to visit Nina Aas at the Statoil labs.

Thursday 23rd August
Travel to the *Transocean Leader*. Arrival approximately 1030. No day shift ROV crew. Wait until night shift to discuss work. Statoil want me to work on the day shift.

Firday 24th August
Day shift ROV crew arrive. Begin work soon after arrival. Attempt 5 core samples at 10 m N BOP. This was difficult due to concrete layer on the surface of the mud. Managed to get 1 core at 10 m. Moved on to the 25 m site and got 2 more cores. FUGRO's current meter staff arrived on board the rig. They have to recover the current meter using the ROV.

Saturday 25th August
Waiting on weather. Fugro current meter work is not completed yet because of the weather. The swell dropped by mid afternoon and as the ROV was already in the water it was decided to take the 8 post-drilling video transects. Transects were actually taken coming towards the BOP from 100 m so that sonar could be used to more accurately determine distance and enable compensation to be made for currents.
I came out again on the night shift to take readings of the sediment marker buoys. The ROV crew were left to recover the current meter and then recover the marker buoys.

Sunday 26th August:
I had discussed the possibility of taking samples of any epifauna from the current meter (Fugro rep. Martin Goff) but unfortunately there was very little on there despite it being on the sea bed since the 4th July 2007. We discussed the future possibility of opportunistically attaching SERPENT settlement plates and biofilm frames to current metres in the future.
The day shift crew agreed to fit the stills camera to the ROV. This took longer than expected because the previous crew, who claimed it was functioning, had only tested it in the control room connected to the computer. The camera was working by lunchtime and the ROV was in the water after lunch with 4 push cores for the Statoil chemical analysis cores. The concrete around the BOP hampered the collection of sediment samples but these were eventually obtained successfully.
Time was allowed to take ecological highlights photographs and then the 4 push cores were taken. In the process of the work a specimen of *Umbellula* was observed, apparently damaged by the drill spoil. This was collected and samples taken for RNA analysis.

Monday 27th August
The bioturbation frames were sampled and some photographs were taken in the morning before 7-function manipulator broke. Whilst the arm was repaired I spent the afternoon processing the bioturbation samples and constructing an amphipod trap.

Tuesday 28th August
Amphipod trap was deployed during the night shift and Ekman was taken to seabed. Collected some further ecological highlights data before sampling a specimen of *Chondrocladia gigantea* (5 RNA later samples taken before preservation in formalin). An ekman was then taken before recovery to the rig. A problem occurred with the push release on the Ekman and it was bent in

the process of release. This was rectified when back on deck and on testing the grab functioned correctly.
The ROV then dived again to take a further Ekman sample and to recover the amphipod trap. On the way to the depth temperature readings were take ever 200 m starting at 100m to profile the water column; this involved stopping for 20 m at each measurement depth as there is a long lag in the temperature gauge.
The amphipod trap was a success, many specimens including some large specimens.

Wednesday 29th August
At the morning meeting I gave a presentation about the work we had carried out during the visit which was well received amongst the rig staff. I left the *Transocean Leader* at 1000. Statoil sediment chemical analysis samples were delivered, as previously arranged, to the cargo department at Kristiansund airport before leaving for London via Oslo.

4. SAMPLES:

ROV video transect surveys, push core samples, visual inspections, Ekman core samples, specimen samples and tissue samples from specimens were taken during the post-drilling visit to Midnattsol. The sample label code structure is described below and the samples listed in the following table.

CODE STRUCTURE:

TL/280807/002#1
Transocean Leader / Date / SERPENT dive log number # replicate

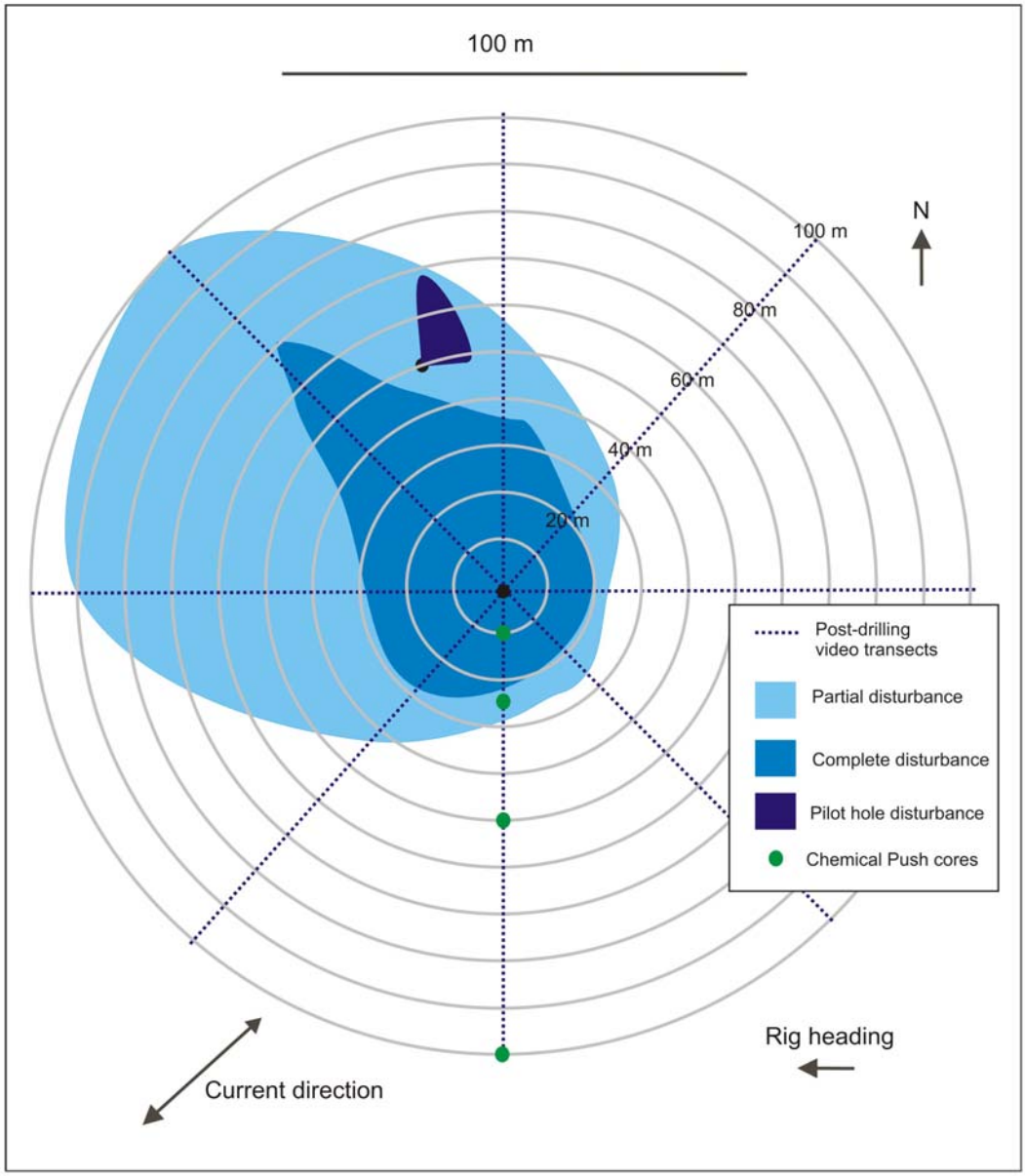
SAMPLE STATIONS:

Station/Sample ID	Location	Sample type	Sample details
TL/240807/005#1	25 m N BOP	Meiofauna push core	Top 5 cm in Formalin
TL/240807/005#2	25 m N BOP	Meiofauna push core	Top 5 cm in Formalin
TL/240807/005#3	10 m N BOP	Meiofauna push core	Top 5 cm in Formalin
TL/250807/006#1	100 m 360° BOP	Video Transect	DVD
TL/250807/006#2	100 m 45° BOP	Video Transect	DVD
TL/250807/006#3	100 m 90° BOP	Video Transect	DVD
TL/250807/006#4	100 m 135° BOP	Video Transect	DVD
TL/250807/006#5	100 m 180° BOP	Video Transect	DVD
TL/250807/006#6	100 m 315° BOP	Video Transect	DVD
TL/250807/006#7	100 m 270° BOP	Video Transect	DVD
TL/250807/006#8	100 m 225° BOP	Video Transect	DVD
TL/250807/006#9	12 locations surrounding BOP	Marker buoy readings	DVD
TL/260807/007#1	100 m S BOP	Chemical push core	Top 3 cm frozen
TL/260807/007#2	50 m S BOP	Chemical push core	Top 3 cm frozen
TL/260807/007#3	25 m S BOP	Chemical push core	Top 3 cm frozen
TL/260807/007#4	10 m S BOP	Chemical push core	Top 3 cm frozen
TL/260807/007#5	100 NW BOP	Umbelulla specimen	Cut up and preserved in formalin
TL/260807/007#6	Umbelulla arm	Tissue sample	In RNA Later
TL/260807/007#7	Umbelulla arm	Tissue sample	In RNA Later
TL/260807/007#8	Umbelulla arm	Tissue sample	In RNA Later
TL/260807/007#9	Umbelulla arm	Tissue sample	In RNA Later
TL/260807/007#10	100 m S BOP	Microscopy sediment sample	Glass vial
TL/260807/007#11	50 m S BOP	Microscopy sediment sample	Glass vial
TL/260807/007#12	25 m S BOP	Microscopy sediment sample	Glass vial
TL/260807/007#13	10 m S BOP	Microscopy sediment sample	Glass vial
TL/270807/008#1-10	29 m N BOP	Sediment push core	10 x 1cm sections
TL/270807/008#11-20	29 m N BOP	Sediment push core	10 x 1cm sections
TL/270807/008#21-30	29 m N BOP	Sediment push core	10 x 1cm sections
TL/270807/008#31-40	29 m N BOP	Sediment push core	10 x 1cm sections
TL/280807/009#1	29 m N BOP	Ekman grab	Sieved and preserved in formalin
TL/280807/009#2	50 m NW BOP	Chondrocladia specimen	In formalin
TL/280807/009#3	Sponge body cells	Tissue sample	In RNA Later
TL/280807/009#4	Sponge body cells	Tissue sample	In RNA Later
TL/280807/009#5	Sponge body cells	Tissue sample	In RNA Later
TL/280807/009#6	Sponge body cells	Tissue sample	In RNA Later
TL/280807/009#7	Sponge body cells	Tissue sample	In RNA Later
TL/280807/010#1	29 m N BOP	Ekman grab	Sieved and preserved in

			formalin
TL/280807/010#2	20m S BOP	Amphipod trap	Specimens preserved in formalin
TL/280807/010#3	Whole organism	Tissue sample	In RNA Later
TL/280807/010#4	Whole organism	Tissue sample	In RNA Later
TL/280807/010#5	Whole organism	Tissue sample	In RNA Later
TL/280807/010#6	Whole organism	Tissue sample	In RNA Later
TL/280807/010#7	Whole organism	Tissue sample	In RNA Later
TL/280807/010#8	Whole organism	Tissue sample	In RNA Later

HORIZONTAL DRILL SPOIL

The horizontal extent of drill was assessed using observations made during routine ROV operations and through detailed study of the video transects. The distribution of the drill spoil does not appear to be directly related to the predominant current direction, but this is likely to be the result of previous disturbance associated with the pilot well and the downward slope in the direction of North West.

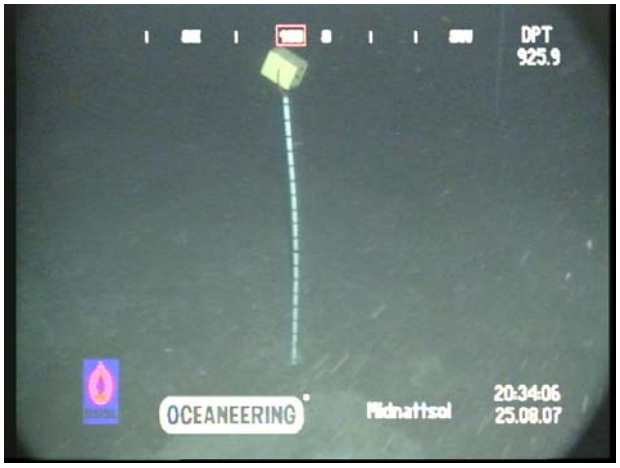


Initial analysis of the current data collected by Fugro suggested that the predominant current varied between the SW and the NE, with the strongest currents towards the SW. After further

analysis these data will be available for use by SERPENT and will provide useful additional material for follow-up reports.

VERTICAL DRILL SPOIL

The vertical accumulation of drill spoil was assessed by visual inspection of the sediment marker buoys deployed during the pre-drill visit. As expected, vertical accumulation was greatest close to the BOP and reached a maximum of 81 cm of accumulated sediment. As distance from the BOP increased the accumulated sediment decreased and at 20 m there was between 5 and 20 cm of drill spoil accumulation.



It should be noted that the end of well data are those that should be cited because the earlier readings are not correctly calibrated to the actual size of the marker buoys. They are presented to highlight the limited change in sediment accumulation after drilling the 17 1/4" section.

Marker Buoy	Distance from BOP	Heading	Vertical drill spoil accumulation (cm)			
			17 1/4" sec drilling	12" sec drilling	8 1/2" sec drilling	End of well
8	5	E	20	20	20	31
11	5	NW	0	5	0	Estimated 50 – 100
12	5	S	0	0	0	Estimated 50 – 100
2	10	W	65	65	65	81
4	10	N	30	35	30	41
6	10	S	0	0	0	23
9	10	E	0	0	0	26
1	15	W	55	55	55	61
3	20	W	0	0	0	20
5	20	N	10	10	10	20
7	20	S	0	0	0	< 5
10	20	E	0	0	0	15

5. GEAR REPORT

Magnum 018 ROV:
The ROV was suitable for all tasks. The video was good and hard disc storage system made recovery of visual data relatively quick and easy although some of the pre-drilling video transects were not saved properly.
Initially the light from the main bulbs was being obscured by part of the structure of the vehicle meaning there was a dark shadow across most images, this was rectified by moving the bulbs.

Kongsberg Digital stills camera:
The camera generally worked well. There was no flash provided but this was not a problem as the lights on the vehicle were powerful enough to provide enough light for everything apart from fast moving fish.

Bioturbation Corrals:
There were made by the rig welder but as they were not finished during the pre-drilling visit there had been many delays in finishing them. This meant that the bioturbation experiments were only set up 2 weeks prior to the post drilling visit. It is recommended that if bioturbation experiments are planned, that corrals are sent to the rig in advance.

APPENDIX 1: VIDEO TRANSECT POSITIONAL DATA

Date	Time	Distance (m)	Heading	Sample	Notes
25/08/2007	15:18:48	100 - start	000	TL/250807/006#1	100 m 360° BOP
	15:19:58	80			Transects heading in towards BOP
	15:23:17	60			
	15:27:55	40			
	15:30:20	30			
	15:32:20	20			
	15:34:04	10			
	15:35:59	0 – end			
25/08/2007	15:46:58	100 – start	045	TL/250807/006#2	100 m 45° BOP
	15:48:21	80			
	15:49:34	70			Some sideways movement of ROV
	15:51:45	60			
	15:53:55	40			
	15:55:11	20			Complete disturbance evident
	15:56:05	0- end			
25/08/2007	16:14:14	100 – start	090	TL/250807/006#3	100 m 90° BOP
	16:15:45	70			
	16:17:21	50			
	16:18:16	40			
	16:18:48	30			
	16:19:31	20			
	16:19:59	10			
	16:20:33	0 – end			
25/08/2007	16:44:47	100		TL/250807/006#4	100 m 135° BOP
	16:48:27	80			
	16:49:50	70			
	16:51:36	60			
	16:53:48	40			
	16:56:00	20			
	16:57:13	10			
	16:58:00	0 – end			
25/08/2007	17:07:02	100 – start	180	TL/250807/006#5	100 m 180° BOP
	17:09:07	80			
	17:09:47	70			
	17:10:44	60			
	17:11:40	50			
	17:13:12	40			
	17:14:23	30			Poor visibility. Tether dragging.
	17:30:34	25			Pause to sort tether and for visibility to clear.

	17:31:50	10			
	17:32:10	0 – end			
25/08/2007	17:52:00	100 – start	315	TL/250807/006#6	100 m 315° BOP
	17:53:16	80			
	17:55:20	60			
	17:56:53	50			
	17:59:16	40			Evidence for a slope at the site
	18:00:25	35			
	18:01:47	20			
	18:03:17	10			
	18:03:40	0 – end			
25/08/2007	18:14:31	100 – start	270	TL/250807/006#7	100 m 270° BOP
	18:16:17	80			
	18:18:11	60			
	18:18:35	50			
	18:19:22	40			
	18:20:23	20			
	18:21:10	0 - end			
25/08/2007	18:45:34	100- start	225	TL/250807/006#8	100 m 225° BOP
	18:47:23	80			
	18:48:23	60			
	18:49:05	50			
	18:49:35	40			
	18:50:38	20			
	18:51:08	10			
	18:51:30	0 – end			Fish observed at end

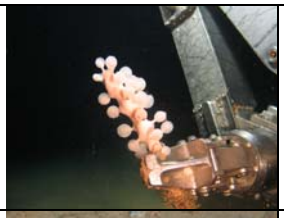
APPENDIX 2: CORE SAMPLES

Date	Dive	Sample location	Sample code	Core markings	Sample notes	Sample retained
24/08/2007	5	25 m N BOP	TL/240807/005#1	Core 1	Meiofauna push core Difficulty in taking samples (4 attempts) due to thin concrete layer	Top 5 cm in Formalin
24/08/2007	5	25 m N BOP	TL/240807/005#2	Core 2	Meiofauna push core	Top 5 cm in Formalin
24/08/2007	5	10 m N BOP	TL/240807/005#3	Core 3	Meiofauna push core	Top 5 cm in Formalin
26/08/2007	7	100 m S BOP	TL/260807/007#1	Green – right	Chemical push core	Top 3 cm frozen
26/08/2007	7	50 m S BOP	TL/260807/007#2	Blue – right	Chemical push core	Top 3 cm frozen
26/08/2007	7	25 m S BOP	TL/260807/007#3	Blue – left	Chemical push core	Top 3 cm frozen
26/08/2007	7	10 m S BOP	TL/260807/007#4	Green – left	Chemical push core Difficulty in taking sample – ROV lifting up, thin layer of concrete	Top 3 cm frozen
27/08/2007	8	29 m N BOP	TL/270808/008#1-10	Green – right	Cores from bioturbation corral 1	10 x 1cm sections - Frozen
27/08/2007	8	29 m N BOP	TL/270808/008#11-20	Blue – right	Cores from bioturbation corral 1	10 x 1cm sections - Frozen
27/08/2007	8	29 m N BOP	TL/270808/008#21-30	Blue – left	Cores from bioturbation corral 2	10 x 1cm sections - Frozen
27/08/2007	8	29 m N BOP	TL/270808/008#31-40	Green - left	Cores from bioturbation corral 2	10 x 1cm sections - Frozen
28/08/07	9	29 m N BOP	TL/280807/009/#1	n/a	Ekman core from close to Bioturbation corrals	Sieved to 0.5mm and in Formalin
28/08/07	10	29 m N BOP	TL/280807/010/#1	n/a	Ekman core from close to Bioturbation corrals	Sieved to 0.5mm and in Formalin

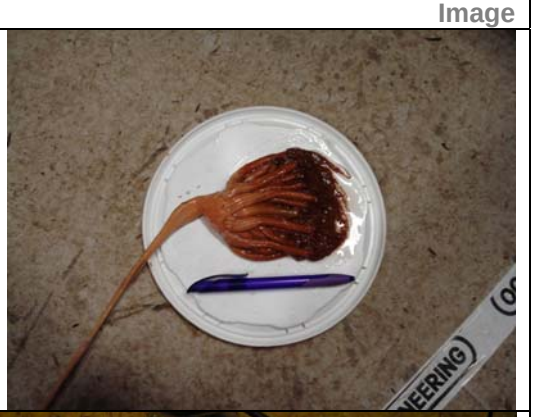
APPENDIX 3: FAUNAL OBSERVATIONS

Date	Time	Dive	location	Observation	Photo / video	Sample collected	Sample retained
25/08/07	18:51	6	BOP	Scorpion fish	video	No	No
26/08/07	14:15	7	NW of BOP	Basket star - *Gorgonocephalus*		No	No
26/08/07	15:18	7		*Chondrocladia*		No	No
26/08/07	16:20	7		Cirrate octopod		No	No
26/08/07	16:23	7		Ray		No	No
26/08/07	17:38	8	Pilot well	*Umbelulla*		Yes	Formalin
27/08/07	11:09	8	Experimental station	Nudibranch?		No	No
27/08/07	11:18	9	BOP	Unknown fish		No	No

27/08/07	11:30	9		Lycodonus?		No	No
28/08/07	08:24	10		Anemone		No	No
28/08/07	09:01			Cerianthid		No	No
28/08/07	08:47			Sabellid		No	No
28/08/07	09:27			*Astropecten*		No	No
28/08/07	09:27			Rockling		No	No
28/08/07	09:29			Tubularia with commensual amphipods		No	No
28/08/07	09:43			Hydroid and Asteroid		No	No

28/08/07	09:55			*Chondrocladia*		Yes	Formalin
28/08/07	10:34			Amphipod		No	No
28/08/07	10:11			*Collosendeis*		No	No
28/08/07	10:45		10 m from BOP	*Lycodes*		No	No
28/08/07	10:25		BOP	*Cottunculus*		No	No

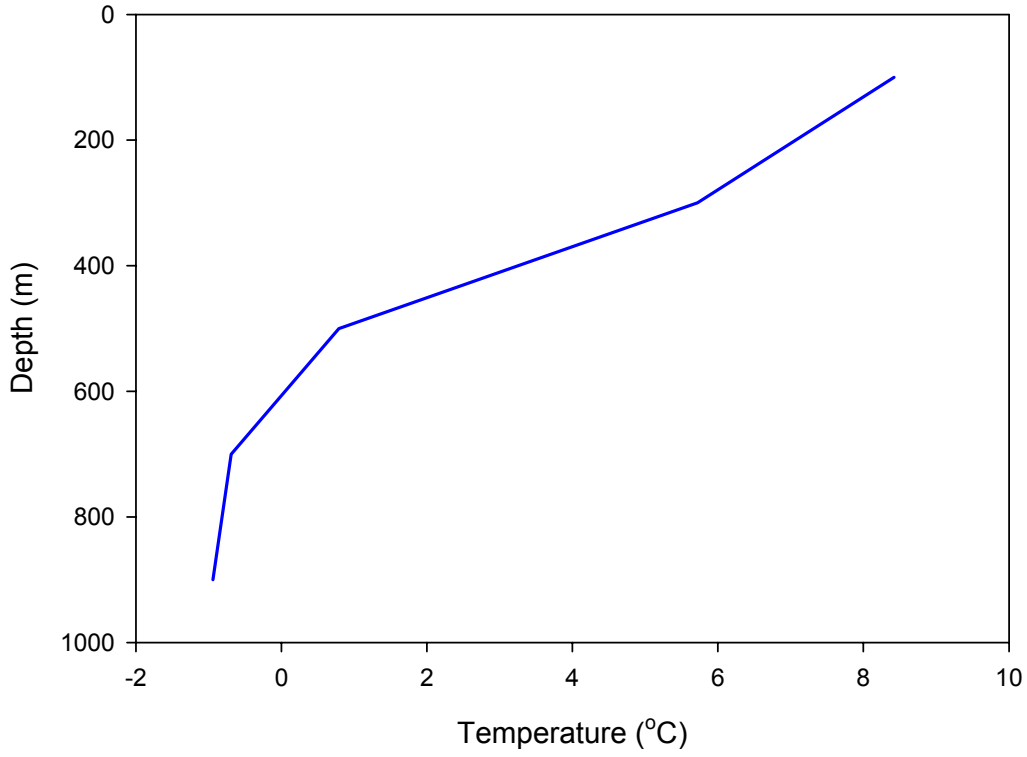
APPENDIX 4: SPECIMEN CAPTURE

Sample ID	Organism	Image
TL/260807/007#5	*Umbellula* sp.	
TL/280807/009#2	*Chondrocladia gigantea*	
TL/280807/010#2	Amphipods (at least 300 specimens in trap)	

APPENDIX 5: TEMPERATURE PROFILE

The drilling engineers were having some trouble with the BOP fluid apparently freezing. They needed to know at which point in the water column the temperature was above zero. At their request Oceaneering made a temperature profile using the thermometer on board the ROV. The result is shown below.

There was a very slow response time for the instrument and the ROV had to be left at each depth for 20 minutes to get a stable reading. From a maximum of 8.42 °C at the surface the temperature dropped to -0.94 at the sea bed.



MISSON 36

WEST EPSILON, RAGNAROKK 2, NORWAY

DANIEL JONES

1. GENERAL INFORMATION:

Client: Statoil
Rig operator: Seadrill
Rig name: West Epsilon
Rig location: Ragnarokk, North Sea
Rig position: 058°53'00 N 002° 22' 20 E
Seabed depth: 114 m
Seabed temperature: 8.4°C
ROV operator: Oceaneering
ROV: Magnum 034
ROV team:

Supervisor	Terje Olsen
Pilot	Bjørn Gundersen
Pilot trainee	Jon Martin Holmøy

2. GEAR:

Magnum 034 ROV
ROV push cores: plastic topped, jubilee clip design with frame designed and built on West Epsilon
Colour video camera

3. NARRATIVE:

Friday 31st August 2007

Flew out to rig on helicopter from Stavanger. Arrived on the rig around 12:00. Had safety induction and rig induction until around 14:00. Informed I was on night shift. Shift started 19:00, I assembled the ROV cores and attached them to the frame that had been build onboard for SERPENT use. We attached these cores onto the 5 function manipulator arm. We attempted to dive at 22:15 but the colour camera was broken. We aborted the dive and brought the ROV to the surface for repairs.

Saturday 1st September 2007

Camera was repaired by 01:45. Commenced dive 1 at 01:55 and on seabed at 02:05. We found the conductor marking the position of the well. There was no BOP on the seabed (it is on the surface) and the conductor connects the well to the BOP. Jack-up rigs, production platforms and tension leg platforms have this arrangement. We found the conductor (unfortunately not as good a sonar target as the BOP) and commenced transect one at 2:42 going 100° from the conductor. We had to abandon this as the currents were going with us and it was almost impossible to keep slow or get a clear picture. At 03:02 we were in position to start a transect going the other direction (280°), we started the transect at 03:11. This was successful. We commenced another transect heading 10° at 03:56 which was going well until the colour video camera broke, loosing focus we had to abandon the transect. At 04:21 we attempted to take some core samples close to the drilling activity (10 metres was the nearest we could get owing to sandbags around the conductor for stability). We took 6 cores at this location. Once all cores had been completed using just the SIT camera we noticed that the colour camera had started working again. We repeated the transect at 10° successfully completing it at 05:22. There were large numbers of coal fish observed possibly attracted by the disturbance in obtaining cores or perhaps the ROV lights. We brought the ROV to the surface and I processed the cores – unfortunately only 2 contained sediment. The best core was frozen for chemical analysis by Statoil with a small subsample taken for electron microscopy. The other core with sediment was not very full and some of the material washed out of the bottom of the core – it was retained for meiofaunal analysis but will be rejected if other samples are available. Finished work at 08:00.

19:00 started shift. Went to the meeting at 19:15 and then out to the ROV to fill the cores with water prior to ROV deployment. ROV deployed on dive 2 and we carried out a video transect – the current was still in the same direction as yesterday so we went at 190° from the conductor. This was successful. We got a very good sonar picture of the site from the end of the transect which was saved on video. Unfortunately on our return the sonar was broken so we had no means of navigating. We obtained 5 cores near leg 3 as this was the only structure we could find. We recovered the vehicle.

Sunday 2nd September 2007

As it was no longer possible to accurately position core or transect samples we moved onto experimental work. We made 3 experimental buckets by weighting plastic buckets, drilling hole in the base, adding a lid with a hole large enough for the core and putting a monkey's fist on the handle. We spent the remainder of the shift on dive 3 setting up the experiment to investigate the impacts of smothering by mud on the hugely abundant urchins on the seabed. This was very successful owing to good manipulation skills by Terje.

19:00 Started shift. Went to meeting at 19:15 and then out to the ROV to fill cores with water prior to ROV deployment. In addition we made up a light buoy to place near the conductor so we could find it without the sonar. Dive 4 commenced at 22:00 and was on seabed at 22:35. Found conductor and deployed light buoy at 23:01 and commenced inspection of conductor. Carried out 3 core samples 10 m at 135° from conductor.

Monday 3nd September 2007

The weather was worsening so the ROV team did not want to bring the ROV out of the water. We spent some time searching for the bucket experiments, difficult without the sonar. In the process we observed a monkfish (02:52). We found the buckets and observed the urchins inside with the camera mounted on the 7-function manipulator. We added some mud to one experiment. We collected 5 urchins with a core sampler and brought them up to 10 metres depth for a minute then back down to the seabed to assess the role of decompression on heat shock protein production. We then collected an additional 15 urchins and brought them up to the surface for experimentation. Samples of both urchins were preserved as soon as possible on the surface.

19:00 started shift. Went to meeting at 19:15 and then out to the ROV to fill cores with water prior to ROV deployment. Weather quite bad with 6 m swell and strong winds so we couldn't deploy the ROV until 04:00. I spent the time setting up and carrying out an urchin laboratory experiment. I used a temperature controlled laboratory onboard to heat some urchins up to 21 degrees and then sampled them repeatedly, preserving the tissue for subsequent analysis of heat shock proteins.

Tuesday 4th September 2007

The weather dropped during the night allowing ROV operations to commence at 04:00. The ROV was launched for dive 5. We first carried out some conductor inspections and then collected the buckets containing the urchins. The urchins were dissected, processed and preserved for the duration of the shift.

19:00 started shift. Went to the meeting at 19:15 a supply vessel was due to arrive alongside the rig this evening until 03:00 and there was some concern about the ROV being in the water. Fortunately diving was allowed to commence as long as the ROV was not retrieved until 03:00. We just got the ROV in the water before the supply boat was in position. Dive 6 commenced at 20:35 and was on the seabed by 20:45. We used the time to carry out video transects. Fortunately the boat left much earlier than scheduled and we were able to complete the video transects under it.

Wednesday 5th September 2007

Once we had completed all the video transects we took some core samples of the seabed. It was difficult to take these samples as there was a layer of shell fragments around 100 mm below the sediment surface (and sometimes, elsewhere, on the surface). There was soft sediment above this and sand below. It was difficult to push the cores past the shell layer but essential to retain the sample. Dive 6 finished at 03:00 and was on deck by 03:10. I then processed the cores and at the same time the ROV team launched the ROV for dive 7 at 03:55. We successfully collected five cores at 50 m from the well and one core at 25 m. We brought the ROV to the surface at 6:00. I processed the cores, packed the equipment into 3 aluminium boxes and boarded the helicopter at 09:00 back to Stavanger.

4. SAMPLES:

CODE STRUCTURE:

WE/310807/001#1
West Epsilon / Date / station number # replicate

SAMPLE STATIONS:

Station	Location	Sample type	Preservation
WE/310807/005#1	ROV transect going 280° from conductor	ROV video transect	DVD
WE/010907/006#1	10 m from conductor at 135°	Push core	Frozen
WE/010907/006#2	10 m from conductor at 135°	Push core	Formalin
WE/010907/007#1	ROV transect going 10° from conductor	ROV video transect	DVD
WE/010907/008#1	ROV transect going 190° from conductor	ROV video transect	DVD
WE/010907/009#1	5 m from leg 3	Push core	Formalin
WE/010907/009#2	5 m from leg 3	Push core	Formalin
WE/010907/009#3	5 m from leg 3	Push core	Formalin
WE/010907/009#4	5 m from leg 3	Push core	Formalin
WE/010907/009#5	5 m from leg 3	Push core	Frozen
WE/020907/010#1	5 m from leg 3	Urchin experiment - control	RNA later
WE/020907/010#2	5 m from leg 3	Urchin experiment – control	RNA later
WE/020907/010#3	5 m from leg 3	Urchin experiment – control	RNA later
WE/020907/011#1	5 m from leg 3	Urchin experiment - mud	RNA later
WE/020907/011#2	5 m from leg 3	Urchin experiment – mud	RNA later
WE/020907/011#3	5 m from leg 3	Urchin experiment – mud	RNA later
WE/020907/012#1	5 m from leg 3	Urchin experiment – mud x 2	RNA later
WE/020907/012#2	5 m from leg 3	Urchin experiment – mud x 2	RNA later
WE/020907/012#3	5 m from leg 3	Urchin experiment – mud x 2	RNA later
WE/030907/006#3	10 m from conductor at 135°	Push core	Formalin
WE/030907/006#4	10 m from conductor at 135°	Push core	Formalin
WE/030907/006#5	10 m from conductor at 135°	Push core	Formalin
WE/030907/013#1	5 m from leg 3	Double decompressed urchin # 1	RNA later
WE/030907/013#2	5 m from leg 3	Double decompressed urchin # 2	RNA later
WE/030907/014#1	5 m from leg 3	Unmanipulated urchin # 1	RNA later
WE/030907/014#2	5 m from leg 3	Unmanipulated urchin # 2	RNA later
WE/030907/015#1	5 m from leg 3	Urchin 21° for 1 hour	RNA later
WE/030907/016#1	5 m from leg 3	Urchin 21° for 2 hours	RNA later
WE/040907/017#1	5 m from leg 3	Urchin 21° for 3 hours	RNA later
WE/040907/018#1	5 m from leg 3	Urchin 21° for 4 hours	RNA later
WE/040907/019#1	5 m from leg 3	Urchin 21° for 6 hours	RNA later

WE/040907/020#1	5 m from leg 3	Urchin 21° for 8 hours	RNA later
WE/040907/021#1	5 m from leg 3	Urchin 21° for 10 hours	RNA later
WE/040907/022#1	5 m from leg 3	Urchin taxonomic samples	Formalin
WE/040907/023#1	ROV transect going 325° from conductor	ROV video transect	DVD
WE/040907/024#1	ROV transect going 235° from conductor	ROV video transect	DVD
WE/040907/025#1	ROV transect going 145° from conductor	ROV video transect	DVD
WE/040907/026#1	ROV transect going 100° from conductor	ROV video transect	DVD
WE/040907/027#1	ROV transect going 55° from conductor	ROV video transect	DVD
WE/050907/028#1	100 m from conductor at 135°	Push core	Frozen
WE/050907/028#2	100 m from conductor at 135°	Push core	Formalin
WE/050907/028#3	100 m from conductor at 135°	Push core	Formalin
WE/050907/028#4	100 m from conductor at 135°	Push core	Formalin
WE/050907/028#5	100 m from conductor at 135°	Push core	Formalin
WE/050907/028#6	100 m from conductor at 135°	Push core	Formalin
WE/050907/029#1	50 m from conductor at 135°	Push core	Frozen
WE/050907/029#2	50 m from conductor at 135°	Push core	Formalin
WE/050907/029#3	50 m from conductor at 135°	Push core	Formalin
WE/050907/029#4	50 m from conductor at 135°	Push core	Formalin
WE/050907/029#5	50 m from conductor at 135°	Push core	Formalin
WE/050907/030#1	25 m from conductor at 135°	Push core	Frozen

5. GEAR REPORT

ROV Magnum 034

The vehicle was generally good for all operations. It did not have a stills camera, or zip pump. There was no navigation available. We did not suffer any breakdowns of the vehicle itself although the sonar head was broken on 1st September until a replacement was brought in on the 4th September. The lack of sonar, and hence positioning, limited the sample collection opportunities available on the visit.

Push Cores:

Push cores were mounted to a specially designed rack that was mounted in the 5 function manipulator arm. This design seemed very effective and is one we should adopt for further operations with Oceaneering (I don't think it would work with SS7 5 function arms).

Experimental buckets:

We manufactured experimental treatment chambers with plastic buckets. Holes were drilled in the base of the bucket and the base weighted using a large stainless steel washer. A floating rope with a monkey's fist knot was attached to the bucket handle. A lid was placed on the bucket with a hole cut in it 20 mm larger than the core tube. This system proved effective and easy to introduce organisms and sediment.

APPENDIX 1 – Specimens Collected

Sample	Location	Organism	Preserved in RNAlater	Preserved in Formalin
WE/030907/013#1	5 m from leg 3	Double decompressed urchin # 1	Lantern, gut & gonad	
WE/030907/013#2	5 m from leg 3	Double decompressed urchin # 2	Lantern, gut & gonad	
WE/030907/014#1	5 m from leg 3	Unmanipulated urchin # 1	Lantern, gut & gonad	
WE/030907/014#2	5 m from leg 3	Unmanipulated urchin # 2	Lantern, gut & gonad	
WE/030907/015#1	5 m from leg 3	Urchin 25° for 1 hour	Lantern, gut & gonad	
WE/030907/016#1	5 m from leg 3	Urchin 25° for 2 hours	Lantern, gut & gonad	
WE/040907/017#1	5 m from leg 3	Urchin 25° for 3 hours	Lantern, gut & gonad	
WE/040907/018#1	5 m from leg 3	Urchin 25° for 4 hours	Lantern, gut & gonad	
WE/040907/019#1	5 m from leg 3	Urchin 25° for 6 hours	Lantern, gut & gonad	
WE/040907/020#1	5 m from leg 3	Urchin 25° for 8 hours	Lantern, gut & gonad	
WE/040907/021#1	5 m from leg 3	Urchin 25° for 10 hours	Lantern, gut & gonad	
WE/020907/010#1	5 m from leg 3	Urchin experiment – control urchin # 1	Lantern, gut & gonad	
WE/020907/010#2	5 m from leg 3	Urchin experiment – control urchin # 2	Lantern, gut & gonad	
WE/020907/010#3	5 m from leg 3	Urchin experiment – control urchin # 3	Lantern, gut & gonad	
WE/020907/011#1	5 m from leg 3	Urchin experiment - mud urchin #1	Lantern, gut & gonad	
WE/020907/011#2	5 m from leg 3	Urchin experiment – mud urchin # 2	Lantern, gut & gonad	
WE/020907/011#3	5 m from leg 3	Urchin experiment – mud urchin # 3	Lantern, gut & gonad	
WE/020907/012#1	5 m from leg 3	Urchin experiment – mud x 2 urchin # 1	Lantern, gut & gonad	
WE/020907/012#2	5 m from leg 3	Urchin experiment – mud x 2 urchin # 2	Lantern, gut & gonad	
WE/020907/012#3	5 m from leg 3	Urchin experiment – mud x 2 urchin # 3	Lantern, gut & gonad	
WE/040907/022#1	5 m from leg 3	Urchin taxonomic samples		Whole urchins

APPENDIX 2 – Core Samples

Date	Time	Dive	Sample location	Sample code	Core markings	Sample notes	Sample retained
01/09/2007	05:05	1	10 m from conductor at 135°	WE/010907/006#1		Push core	Frozen
01/09/2007	05:10	1	10 m from conductor at 135°	WE/010907/006#2		Push core	Formalin
01/09/2007	22:46	2	5 m from leg 3	WE/010907/009#1		Push core	Formalin
01/09/2007	23:13	2	5 m from leg 3	WE/010907/009#2		Push core	Formalin
01/09/2007	23:17	2	5 m from leg 3	WE/010907/009#3		Push core	Formalin
01/09/2007	23:31	2	5 m from leg 3	WE/010907/009#4		Push core	Formalin
01/09/2007	23:23	2	5 m from leg 3	WE/010907/009#5		Push core	Frozen
03/09/2007	00:08	4	10 m from conductor at 135°	WE/030907/006#3		Push core	Formalin
03/09/2007	00:12	4	10 m from conductor at 135°	WE/030907/006#4		Push core	Formalin
03/09/2007	00:18	4	10 m from conductor at 135°	WE/030907/006#5		Push core	Formalin
05/09/2007	02:27	6	100 m from conductor at 135°	WE/050907/028#1		Push core	Frozen
05/09/2007	02:32	6	100 m from conductor at 135°	WE/050907/028#2		Push core	Formalin
05/09/2007	02:38	6	100 m from conductor at 135°	WE/050907/028#3		Push core	Formalin
05/09/2007	02:42	6	100 m from conductor at 135°	WE/050907/028#4		Push core	Formalin
05/09/2007	02:44	6	100 m from conductor	WE/050907/028#5		Push core	Formalin

			at 135°				
05/09/2007	02:53	6	100 m from conductor at 135°	WE/050907/028#6		Push core	Formalin
05/09/2007	04:48	7	50 m from conductor at 135°	WE/050907/029#1	50 m from conductor at 135°	Push core	Frozen
05/09/2007	04:55	7	50 m from conductor at 135°	WE/050907/029#2	50 m from conductor at 135°	Push core	Formalin
05/09/2007	04:59	7	50 m from conductor at 135°	WE/050907/029#3	50 m from conductor at 135°	Push core	Formalin
05/09/2007	05:03	7	50 m from conductor at 135°	WE/050907/029#4	50 m from conductor at 135°	Push core	Formalin
05/09/2007	05:11	7	50 m from conductor at 135°	WE/050907/029#5	50 m from conductor at 135°	Push core	Formalin
05/09/2007	05:20	7	25 m from conductor at 135°	WE/050907/030#1	25 m from conductor at 135°	Push core	Frozen

APPENDIX 3 – Observations

Faunal Observations

Date	Time	Dive	location	Observation	Photo / video	Sample collected	Sample retained
01/09/07	05:25	1	Near to conductor	Large numbers of coal fish (straight lateral line) and frequent flatfish	On transect WE/010907/007#1	No	No

Drill cuttings observations

Observations were made of drill cuttings around the rig. However it was operationally very difficult to distinguish cuttings from background sediment.

Experimental observations

The three experimental buckets were deployed during dive 3 (04:00 2/09/07) about 5 m from leg 3. They were retrieved during dive 6 (04:26 4/09/07) with 48 hours of experimental treatment.

Date	Time	Dive	Bucket	Observation
02/09/07	04:16	3	Mud x 2	Deployed bucket onto seabed
02/09/07	04:18	3	Mud x 2	Scooped 6 urchins from seabed in core added to bucket
02/09/07	04:23	3	Mud x 2	All urchins in bucket
02/09/07	04:31	3	Mud x 2	Put 1 core full of mud into bucket
02/09/07	04:39	3	Mud	Deployed bucket onto seabed
02/09/07	04:40		Mud	Scooped 5 urchins from seabed and put into bucket
02/09/07	04:45	3	Mud	Put 1 core full of mud into bucket
02/09/07	04:57	3	Control	Deployed bucket onto seabed
02/09/07	04:58	3	Control	Scooped 6 urchins from seabed and put into bucket. Care taken to minimise amount of mud in bucket
02/09/07	05:16	3	Control	Inspected urchins and all on base of bucket the right way up
02/09/07	05:16	3	Mud x 2	Can still see urchins in bucket
02/09/07	05:16	3	Mud	Can't see any urchins but still suspended sediment
02/09/07	05:21	3	Mud x 2	Added a core full of mud into bucket
02/09/07	05:30	3	Mud	Inspected and can see 1 urchin
02/09/07	05:30	3	Mud x 2	Inspected and can see 3 urchins
02/09/07	06:13	3	Mud x 2	Added a core full of mud

				into bucket
02/09/07	06:17	3	Mud x 2	Added a core full of mud into bucket
02/09/07	06:26	3	Mud	Inspected and all urchins visible
03/09/07	03:08	4	Control	Inspected and all urchins visible on base of bucket
03/09/07	03:09	4	Mud x 2	Inspected and 1 urchin visible on mud on base of bucket. No urchins observed on bucket walls.
03/09/07	03:10	4	Mud	Inspected and 3 urchins visible on mud on base of bucket. No urchins observed on bucket walls.
03/09/07	03:15	4	Mud x 2	Added 2 cores full of mud to bucket
03/09/07	03:25	4	Mud x 2	Inspected bucket and no urchins visible

In addition to the experiments we covered urchins on the seabed and observed their sediment clearing times. At 05:35 (02/09/2007) we covered up two urchins with sediment on top of them. One urchin half covered by sediment moved sideways out of the sediment in 1 min 14 secs. Another urchin that was completely covered by sediment moved sideways out of the sediment in 2 mins 42 secs. They still had some sediment on top of them which they did not appear to clear quickly.

At 05:41 (02/09/2007) we dug a hole (twice as deep as the urchin) with the manipulator and put two urchins inside. We then covered the hole until the surface was flush with the sediment surface. An urchin nearby quickly moved out of the sedimented area. The two completely buried urchins did not escape from the sediment in 30 mins. They may have been damaged by the ROV manipulator in burying.

APPENDIX 4 – Video Transects

VIDEO TRANSECTS

Date	Time	Dive	Sample	Notes	Observation
31/09/07	03:04	1	WE/310807/005#1	ROV transect going 280° from conductor	Transect start
31/09/07	03:11:41	1	WE/310807/005#1	60 m from conductor (50 m from nearest corner of leg 2)	Transect stop
01/09/07	05:19	1	WE/010907/007#1	ROV transect going 10° from conductor	Transect start
01/09/07	05:22:36	1	WE/010907/007#1	50 m from conductor (28 m from nearest corner of leg)	Transect stop
01/09/07	21:06:48	2	WE/010907/008#1	ROV transect going 190° from conductor	Transect start
01/09/07	21:08:56	2	WE/010907/008#1	Going past nearest corner of nearest leg to start	
01/09/07	21:22:39	2	WE/010907/008#1	120 m from conductor (75 m from closest corner of closest leg; 91 m from closest corner of 2nd closest leg)	Transect stop
04/09/07	21:03:55	6	WE/040907/023#1	ROV transect going 325° from conductor	Transect start
04/09/07	21:10:54	6	WE/040907/023#1	85 m from conductor	Transect stop
04/09/07	21:25:15	6	WE/040907/024#1	ROV transect going 235° from conductor	Transect start
04/09/07	21:26:50	6	WE/040907/024#1	Just passing nearest corner of leg	
04/09/07	21:31:50	6	WE/040907/024#1	90 m from conductor	Transect stop
04/09/07	22:48:29	6	WE/040907/025#1	ROV transect going 145° from conductor	Transect start
04/09/07	22:51:40	6	WE/040907/025#1	Reached leg 1	
04/09/07	22:57:19	6	WE/040907/025#1	End of transect 130 m from conductor (56 m to nearest corner of leg 1)	Transect stop
04/09/07	23:32:16	6	WE/040907/026#1	ROV transect going 100° from conductor	Transect start
04/09/07	23:33:34	6	WE/040907/026#1	At leg 3	
04/09/07	23:34:49	6	WE/040907/026#1	Resume transect after leg 3	
04/09/07	23:40:40	6	WE/040907/026#1	135 m from conductor	Transect stop
04/09/07	23:55:48	6	WE/040907/027#1	ROV transect going 55° from conductor	Transect start
04/09/07	00:02:20	6	WE/040907/027#1	Stop transect 130 m from conductor	Transect stop

MISSON 37

TRANSOCEAN RATHER, ROSEBANK VISIT 3, WELL 213/27 – A2, FAROE-SHETLAND CHANNEL

ANDREW GATES

1. GENERAL INFORMATION:

Client:	Chevron
Rig operator:	Transocean
Rig name:	*Transocean Rather*
Rig location:	Rosebank, Faroe-Shetland Channel, Well 213/27 – A2
Rig position:	61˚ 05' 29.485" North 03˚ 41' 13.507" West
Seabed depth:	1125 m
Seabed temperature	-1°C
Rig Heading:	268˚
ROV operator:	Subsea 7
ROV:	Centurion 05 HD (work class)

ROV team:

Day shift	Night Shift (as of 29th September)
Adrian Coward	Graham Ferris
Chris Moore	Ian Lawler
Abdul Abeed	Raymond Beauclerk

Pre-Drill: Lee Charters, Derek Cruickshanks and Harry Frith

2. GEAR:

Centurian 070 Work class ROV
Kongsberg digital stills camera
SERPENT Mk I ROV push corers x 4
SERPENT Mk II ROV push corers x 6
SERPENT baited scavenger traps x 2

3. VISIT NARRATIVE:

Wednesday 26th September
On arrival on the *Transocean Rather,* at approximately 1430, there was a brief induction followed by a meeting with the Subsea 7 ROV team during which SERPENT work plans for the visit were discussed. Lee Charters of Subsea7 was not on board for the visit but Chris Moore who had experience of SERPENT opoerations was present. There was no night shift on board so it was decided to carry out SERPENT work on day shift, beginning on the following morning.

Thursday 27th September
The digital stills camera was tested and other pre-dive checks were carried out. Following the planned operational work nine post-drilling video transects were carried out radiating from the BOP at the following headings: 45°, 90°, 230°, 135°, 180°, 225°, 270°, 315° and 360°. When completed ecological highlights images and video footage were collected. ROV supervisor Aidy considered this a good training exercise for the pilot techs and allowed plenty of time for these observations.

Friday 28th September
The core sampling equipment was fitted to the ROV and a comprehensive core sampling programme was begun. Four push cores were taken at 12 m from the BOP. The pilot techs struggled with the core sampling and suggested the use of monkey's fists to facilitate removal of core samplers from their holders. Some ecological highlights data were collected prior to the coring. After the morning dive the ROV was brought back on deck Two baited scavenger traps were constructed during maintenance on the seven-function manipulator arm, ready for deployment on the subsequent dive.

Saturday 29th September
The coring programme was completed. Meiofauna push core samples taken at 25 and 50 m from the BOP during the day shift and on the night shift samples were taken at 100 metres. A night sift crew had arrived and they took the final samples. This crew were experts in use of the manipulator arms from the experiences working with the "Christmas Trees" in the North Sea. Unfortunately, on deployment of the ROV the two scavenger traps baited with haddock from the galley were lost from the manipulator arm suggesting the previous day's maintenance on the hydraulics had been ineffective.

Sunday 30th September
Attempts were made to locate the scavenger traps based on the known current velocity and the estimated distance they had fallen but this proved unsuccessful. Ecological highlights data were also collected during the morning using both video and stills cameras. The ROV was back on deck at 1400 and stills camera removed, SERPENT images downloaded, equipment packed and prepared for backload. Video footage was selected and stored to DVD.

Monday 1st October
Following a successful and valuable SERPENT mission departure from the *Transocean Rather* to Aberdeen and onward journey to Southampton was on the1030 helicopter.

4. SAMPLES:

CODE STRUCTURE:

e.g. TR/080607/102#1 Transocean Rather / Date / Dive number # replicate

POST DRILLING CORE SAMPLING:

Station	Location	Sample type	Sample details
TR/280907/011#1	12 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/280907/011#2	12 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/280907/011#3	12 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/280907/011#4	12 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/012#1	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/012#2	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/012#3	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/012#4	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin – CORE FAILED
TR/290907/013#1	50 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/013#2	50 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/013#3	50 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/013#4	50 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/014#1	100 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/015#1	100 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/015#2	100 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/015#3	100 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
TR/290907/015#4	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin – REPLACEMENT

POST DRILLING VIDEO TRANSECTS

Station	Location	Sample type	Sample details
TR/270907/016#1	99 m 45° from BOP	Video transect	DVD
TR/270907/017#1	115 m 90° from BOP	Video transect	DVD
TR/270907/018#1	90 m 80° from BOP	Video transect	DVD
TR/270907/019#1	140 m 135° from BOP	Video transect	DVD
TR/270907/020#1	120 m 180° from BOP	Video transect	DVD
TR/270907/021#1	115 m 225° from BOP	Video transect	DVD
TR/270907/022#1	115 m 270° from BOP	Video transect	DVD
TR/270907/023#1	120 m 315° from BOP	Video transect	DVD
TR/270907/024#1	108 m 0° from BOP	Video transect	DVD

PRE DRILLING SAMPLES:

Pre-drilling SERPENT work was carried out by the Subsea 7 ROV team on the arrival of the *Transocean Rather* at well 213/27-A2. These samples included pre-drilling push cores and video transects. These will be used for comparison with similar samples collected after the drilling disturbance during the SERPENT visit to the site at the end of the well.

Station	Location	Sample type	Sample details
TR/250707/025#1	Proposed spud in location	ROV meiofauna push core	Initially frozen, then top 5 cm then preserved in formalin
TR/250707/025#1	Proposed spud in location	ROV meiofauna push core	Initially frozen, then top 5 cm then preserved in formalin
TR/250707/025#1	Proposed spud in location	ROV meiofauna push core	Initially frozen, then top 5 cm then preserved in formalin
TR/250707/025#1	Proposed spud in location	ROV meiofauna push core	Initially frozen, then top 5 cm then preserved in formalin
TR/250707/025#1	Proposed spud in location	ROV meiofauna push core	Initially frozen, then top 5 cm then preserved in formalin
TR/240707/026#1	100 m 0° from BOP	Video transect	DVD
TR/240707/027#1	100 m 180° from BOP	Video transect	DVD
TR/250707/028#1	100 m 90° from BOP	Video transect	DVD
TR/250707/029#1	100 m 270° from BOP	Video transect	DVD
TR/250707/030#1	100 m 45° from BOP	Video transect	DVD
TR/250707/031#1	100 m 135° from BOP	Video transect	DVD
TR/250707/032#1	100 m 225° from BOP	Video transect	DVD
TR/250707/033#1	100 m 315° from BOP	Video transect	DVD

5. GEAR REPORT

Centurion ROV:

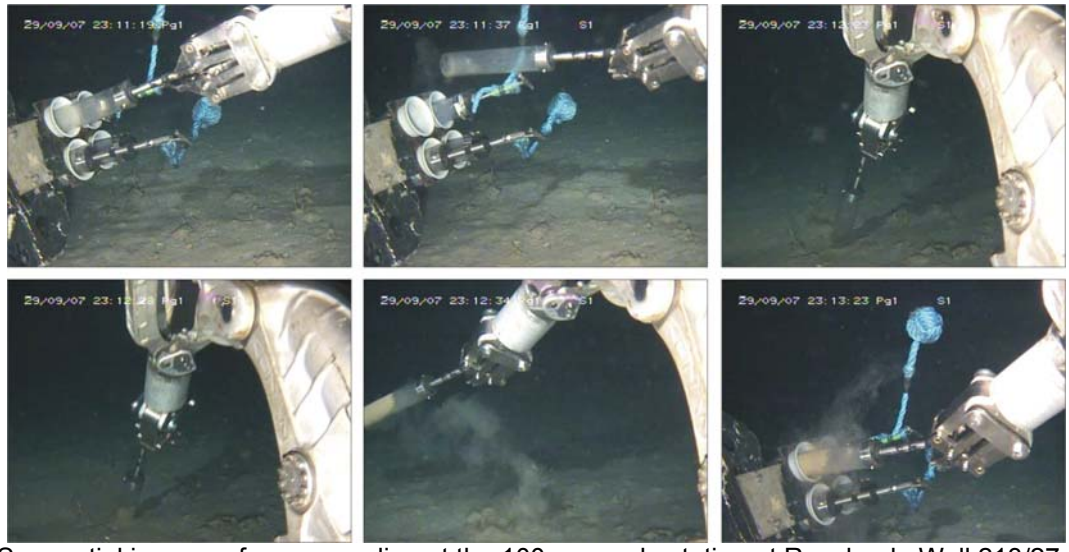
The ROV was the same as had been used previously when working on the *Transocean Rather.* There were some problems with the hydraulics on the 7 function manipulator arm which despite some attention still persisted and resulted in the loss of the amphipod traps during deployment of the ROV.

Kongsberg digital stills camera.

The camera worked well but unfortunately the flash was not functioning so it was difficult to take pictures of mobile subjects. The problem with the flash was intermittent. On some occasions when tested in the control room it would work but because of time constraints and the possibility of getting good images using just the lights on the ROV it was decided not to invest time in repairing the flash.

Push Core samplers:

The push core samplers were generally successful although inaccuarate manipulation by inexperienced pilot techs caused the breakage of a number of units. It was suggested that monkey's fist knots should be tied to each of the handles, however, on arrival of the more experienced crew towards the end of the visit, it was suggested that the monkey's fists actually got in the way. In future, it is best to discuss with the ROV pilots their preferences when coring and have the possibility available to use both methods.



Sequential images of core sampling at the 100m sample station at Rosebank, Well 213/27-A2

DRILL CUTTING HORIZONTAL OBSERVATIONS:

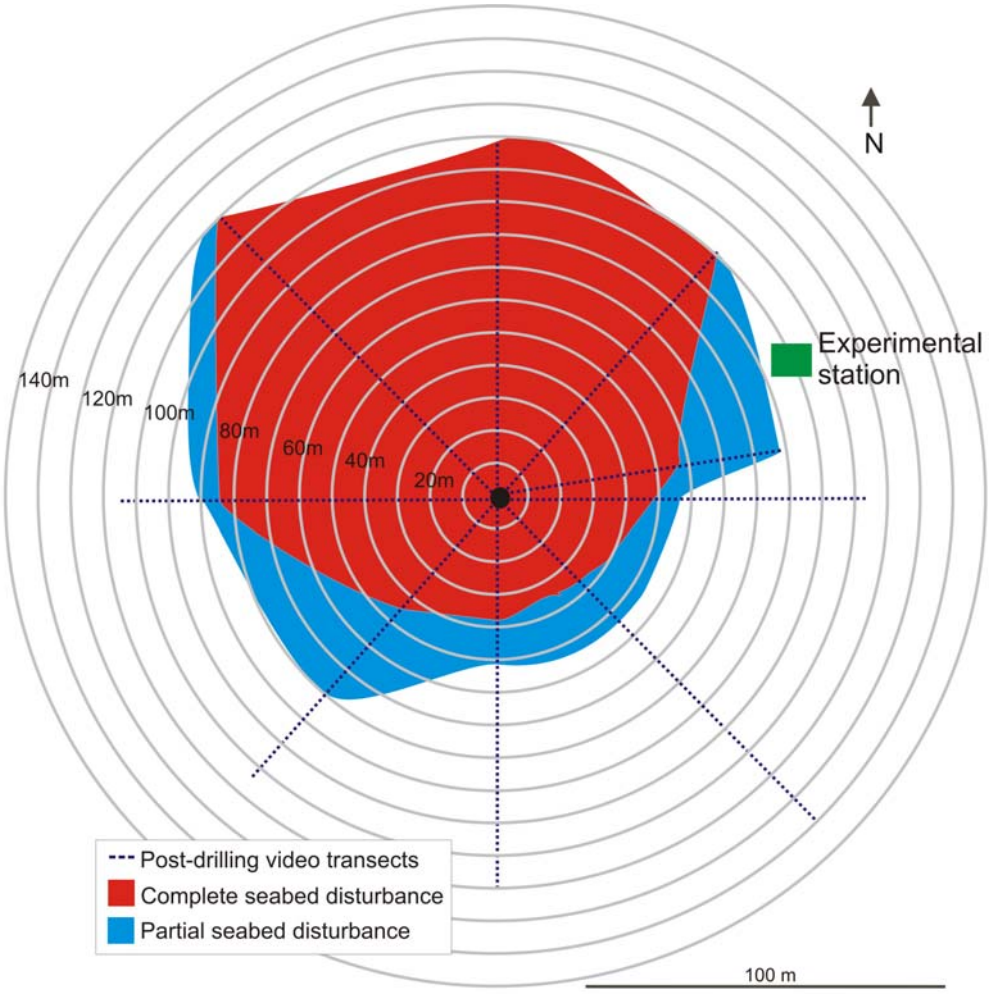
Nine ROV video transects were conducted radiating from the BOP, the position of the ROV was assessed simultaneously using the ROV sonar system to measure distance between the ROV and the BOP. Transects were up to a maximum of 140 m depending on the available tether. The minimum transect length was 90 m.

This allowed mapping of the distribution of drill cuttings around the BOP, classifying drill cuttings visually as:

- Complete coverage of seabed with drill cuttings
- Visible drill cuttings (5 – 95% coverage of seabed with drill cuttings)
- No visible cuttings (<5% coverage of seabed with drill cuttings)

Seabed disturbance (from left): complete coverage with drill cuttings, visible drill cuttings, no visible cuttings.

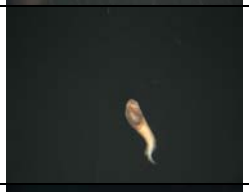
The analysis of the video transects suggested that the drill cuttings extended beyond the maximum length of the transects to the north of the BOP but to the south and east physical disturbance from the deposition of drill spoil reached less than 50 m (below).



Visual assessment of the horizontal extent of drill spoil around the well at Rosebank well 213/27 – A2.

FAUNAL OBSERVATIONS

Date	Time	Dive	location	Observation	Photo / video	Sample collected	Sample retained
12/06/2007	15:32			Stalked sponge		No	No
15/06/2007	10:07			Octopus and sponge		No	No
25/07/2007	16:44			Cerianthid		No	No
25/07/2007	16:44			Gastropod		No	No
25/07/07	16:29			Holes in sediment		No	No
25/07/07	16:38			Soft coral, asteroid and rockling		No	No
25/07/07	16:42			Amphipod		No	No
25/07/07	16:04			Hydroid and pycnogonid		No	No

31/08/2007	09:54			Cirrate octopus		No	No
31/08/2007	08:52			squid		No	No
04/09/2007	09:56			Fish – liparidae		No	No
07/09/2007	09:20			*Tubularia*		No	No
27/09/2007	14:57			asteroid - *Crossaster*		No	No
27/09/2007	14:59			Anemone and pycnogonid		No	No
27/09/2007	15:52			Ray		No	No
29/09/2007	09:17			soft coral		No	No
29/09/2007	09:18			indet.		No	No

29/09/2007	09:24			Anemone and rockling		No	No
29/09/2007	09:37			indet.		No	No
29/09/2007	09:48			Soft coral		No	No
30/09/2007	10:01			Ophiuroid		No	No

APPENDIX 1: POST DRILLING VIDEO TRANSECT DATA

	Time	Distance (m)	Heading	Sample	Notes
27/09/2007	09:46:22	99	45°	TR/270907/016#1	99 m 45° from BOP
	09:47:56	38			
	09:48:43	29			
	09:49:26	16			
	09:50:17	6			
	09:50:27	End			
27/09/2007	09:55:41	115	90°	TR/270907/017#1	115 m 90° from BOP
	09:56:47	101			
	09:57:30	92			
	09:58:09	82			
	09:58:49	71			
	09:59:25	59			
	10:00:21	42			
	10:00:59	35			
	10:01:51	24			
	10:02:30	17			
	10:04:00	End			
27/09/2007	10:20:50	90	80°	TR/270907/018#1	90 m 80° from BOP
	10:22:09	85			
	10:23:22	73			
	10:25:00	55			
	10:26:30	31			
	10:26:57	22			
	10:27:46	10			
	10:28:00	End			
27/09/2007	10:35:28	140	135°	TR/270907/019#1	140 m 135° from BOP
	10:35:57	135			Cloudy/poor vis
	10:36:37	122			
	10:38:37	116			
	10:40:31	98			Cloudy/poor vis
	10:41:19	90			
	10:41:58	83			
	10:43:17	65			
	10:44:30	56			
	10:45:40	50			
	10:47:20	25			
	10:48:05	10			
	10:48:42	End			
27/09/2007	11:01:46	120	180°	TR/270907/020#1	120 m 180° from BOP
	11:02:59	107			
	11:03:40	90			
	11:04:16	81			
	11:05:17	65			
	11:06:25	45			
	11:06:45	35			
	11:07:04	25			
	11:07:20	17			
	11:07:44	9			
	11:08:23	7			

	11:08:54	4			
	11:09:00	End			
27/09/2007	12:43:00	115	225°	TR/270907/021#1	115 m 225° from BOP
	12:43:55	96			
	12:44:15	91			
	12:45:19	70			
	12:46:25	56			
	12:46:55	50			
	12:47:30	44			
	12:48:00	36			Lateral movement of ROV
	12:48:23	19			
	12:49:16	End			
27/09/2007	13:02:50	100	270°	TR/270907/022#1	115 m 270° from BOP
	13:03:37	100			
	13:04:42	87			
	13:05:48	72			
	13:07:20	45			
	13:08:41	33			
	13:09:28	29			
	13:10:27	17			
	13:11:03	8			
	13:11:20	End			
27/09/2007	13:17:52	120	315°	TR/270907/023#1	120 m 315° from BOP
	13:19:00	98			
	13:19:33	91			
	13:20:28	73			
	13:21:06	67			
	13:21:57	56			
	13:22:34	50			
	13:23:20	41			
	13:24:09	33			
	13:24:45	25			
	13:25:09	20			
	13:25:45	12			
	13:26:09	End			
27/09/2007	13:33:50	108	000°	TR/270907/024#1	108 m 0° from BOP
	13:34:27	100			
	13:35:01	92			
	13:35:52	80			
	13:36:11	71			
	13:36:52	60			
	13:37:57	51			
	13:38:58	40			
	13:39:38	31			
	13:39:58	20			
	13:41:01	End			

MISSION 38

DISCOVERER ENTERPRISE, GULF OF MEXICO

MARK BENFIELD

1. GENERAL INFORMATION:

Client: BP
Dates: Nov 1 – 2, 2007
Rig Operator: Transocean
Vessel: Transocean Discoverer Enterprise
ROV operator: Oceaneering
Location: MC777
Latitude: 28° 13' 29.09"N
Longitude: 88° 30' 6.287"W
Water Depth: 5630 feet (1716m)

2. SUMMARY:

This was the first visit to the Discoverer Enterprise since 2006. The purpose of the trip was to brief key personnel aboard the vessel with the Gulf SERPENT Project and to familiarize the Oceaneering ROV group with the SERPENT survey protocols. Enterprise provided data to Gulf SERPENT during our 2006 pilot study and we would like them to begin collecting data routinely during our 2007 operational phase.
There are two ROVs aboard the Enterprise. The vessel is currently conducting drilling operations with some short-term completions anticipated later this year. The ROV group is headed by Ed Galloway (Superintendent).
During the trip I had an opportunity to brief one of the Wellsite Leaders (John Sutler), the vessel OIM (Jason Broussard) and the ROV Superintendent (Ed Galloway) on the objectives of the Gulf SERPENT Project and our plans for implementing an operational data collection program beginning in 2007. The ROV group also generously allowed an unplanned dive to demonstrate the data collection protocols. This dive was conducted on Nov 2 following a riser and BOP inspection.
I received excellent cooperation from all parties on the Enterprise. Based on this meeting I am confident that the ROV Group aboard Enterprise will begin collecting regular SERPENT data following riser inspections and on an ad hoc, time-available basis.

3. SURVEY FINDINGS:

■ The ROV Group provided some recent marine life footage that had been observed during routine work: the scyphomedusan *Periphyllopsis braueri*; a swimming sea cucumber *Enypniastes* sp.; a juvenile sperm whale *Physeter macrocephalus*.
■ During our 11/2/07 survey we observed a ctenophore *Bathocyroe* sp.; a deep-sea shrimp *Plesiopenaeus* sp. ; two different species of squids; and a physonect siphonophore unidentified species.


Periphyllopsis braueri


Bathocyroe sp.


Enypniastes sp.


Unidentified squid

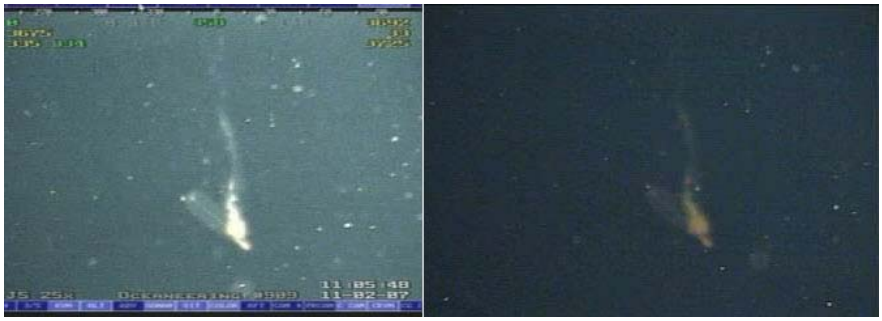

Unidentified siphonophore

4. EDUCATIONAL OUTREACH:

Education is a core component of all SERPENT research. This trip provided an interesting opportunity for K-12 education. Students from all the Grade 3 classes at Hunter College Elementary School in New York City participated in a SERPENT demonstration of the effects of pressure in the deep sea. Each student decorated a styrofoam cup. Thanks to the efforts of the ROV Group aboard Enterprise, the cups were transported in a safely-secured manner to the seafloor where they were subjected to a pressure of ~172 atmospheres. This crushed the cups to a fraction of their original size. The cups were then sent back to the students along with a short video explaining the activity and information about the SERPENT Project.

5. LESSONS LEARNED:

■ *Better Communication*: The ROV group were aware that I was coming out but Ed Galloway only found out at the last minute. He and I went out on the same flight and he only found out that I was coming out when he spoke to Blaine Boudreaux who was leaving the Enterprise that morning. Ed was not aware that I was hoping to have an ROV dive while I was on board. Apparently my e-mail with that information arrived in a corrupted form and couldn't be read. When we discussed it, he went out of his way to make sure that we did dive. Clearly I need to maintain more regular contact with the ROV group, particularly the Superintendent and Supervisors. Trips should be arranged with more lead time so that all can be aware of the timings and expectations for the trip.
■ *Image Quality*: The analogue cameras on the ROV can be adjusted to improve the quality of images by switching off the video overlay after an animal has been sighted. We did this on the test dive, however in reviewing the images back at LSU, it is clear that when the overlay is switched off, the lighting intensity has to be increased. Examples of how the light intensity diminishes when the overlay is switched off are illustrated below. The images on the left have the overlay on, while the images on the right were taken immediately after turning the overlay off. When the lights are increased to compensate for the reduced sensitivity of the camera with the overlay off, the image quality can be very good.



MISSION 39

MAD DOG, GULF OF MEXICO, USA

MARK BENFIELD

1. GENERAL INFORMATION:

Client: BP

Dates: Dec 11 – 13, 2007

SERPENT rep. Mark Benfield

ROV operator: Sonsub

Vessel: Mad Dog Spar

Location: GC782

Latitude: 27° 11’ 18.124”N

Longitude: 90° 16’ 7.363”W

Water Depth: 4440 feet (1353m)

2. SUMMARY:

This was the first visit to Mad Dog and it marks the first operations with Sonsub (Saipen America). The purpose of the trip was to brief key personnel aboard the vessel with the Gulf SERPENT Project and to work with the Sonsub ROV group to adapt our SERPENT survey protocols to make the most effective use of their ROV. Mad Dog is both a production and drilling facility, which makes it an attractive site for SERPENT. This is because the likelihood of the spar remaining at that site for an extended period is high. Moreover, they are in a very southerly location which provides access to waters that we know very little about. Consequently, I am very interested in having them participate in our operational data collection phase.

There is a single heavy work-class ROV aboard Mad Dog – an Innovator. There is also a small inspection vehicle (Seabotix LBV) that is used in shallow water to observe alignment of the air cans within the spar. Mad Dog is currently conducting drilling operations with some short-term spud-in operations anticipated during the end of December 2007 and early January 2008.

During the trip I had an opportunity to brief the OIM (Greg Sonnier) and representatives from

drilling, production, and HSSE on our project. The Wellsite Leaders are (George Walker, Dan Stone, Danny Thomas, Gary Price, and John Sistruck). The ROV group is headed by Heath Sampey (Superintendent) who was present when I visited. His counterpart is Rodney Plante (Superintendent). During my visit I also met with, and received assistance from Glynn Rabalais (ROV Pilot/Electronics Technician) and Charlie Burk (ROV Pilot/Mechanical Technician). Their counterparts on the other shift are Mark Dederich (ROV Pilot/Mechanical Technician) and Aaron Movre (ROV Pilot/Electronics Technican). Mark Pelser (LBV Supervisor) was present to operate the LBV ROV. The ROV group generously allowed two dives to practice and evaluate our data collection protocols. The first dive was conducted on Wednesday December 12 following a riser inspection and a second dive was made on the morning of Thursday December 13, specifically for SERPENT.

There are some differences between the Innovator ROV used at Mad Dog and the Oceaneering vehicles that we've worked with thus far. These differences will have some bearing on how our surveys are conducted. Unlike the Magnum/Millenium ROVs, the Innovator is not deployed from a cage. Instead it is deployed from a large frame called a cursor, that holds the tether management system (TMS) and the ROV. The cursor is lowered to a depth of 500 ft. At that point the TMS and ROV detach from the cursor (although they remain connected to the umbilical) and are lowered to whatever working depth is required. The TMS behaves in exactly the same manner as the cage: the tether is paid out, or hauled back with a level-wind system on a winch. The maximum amount of tether normally paid out is 200 ft.

There are two forward-facing cameras on the Innovator – a black and white video camera and a color one mounted on a pan-tilt head with power zoom and focus. Both record NTSC video and unlike the Oceaneering systems, data from the color camera are recorded at their full NTSC (640 x 480). This will provide images with four times the resolution of the video we're currently receiving from Oceaneering ROVs.

The Innovator has a different lighting configuration that produces a clearer picture of the water because smaller particles tend not to be illuminated. This also means that we cannot see targets as far away from this ROV as we can with a Magnum/Millenium. There is also a sector scanning sonar on the Innovator. It is mounted at the top of the frame facing forward and operates at 675 kHz. This turned out to be a potentially useful tool that allows us to observe targets at distances of about 50 feet in front of the vehicle and may compensate for the reduced visual range that the ROV's lights can illuminate. In addition to the sector scanning sonar, the ROV has a forward-looking ADCP (RDI 1200 kHz) with a range of about 30' and a temperature sensor.

Based on our preliminary ROV work, the existing SERPENT protocols can be used with slight modification to take advantage of the sector scan sonar and 1200 kHz ADCP. The sector scan will let us look beyond the range of the lights for targets while the ADCP will enable us to log the temperature of the water during the dive.

3. SURVEY FINDINGS:

The purpose of our dives was to determine the best way to utilize the ROV for SERPENT surveys and to familiarize the ROV group with the types of animals that we are interested in documenting.

During our two dives we observed several different organisms that were representative of the types of animals that the project is designed to study. These included: larvaceans, a jellyfish, siphonophores, chaetognaths, and a cephalopod (octopus). Representative images of these organisms are included below.

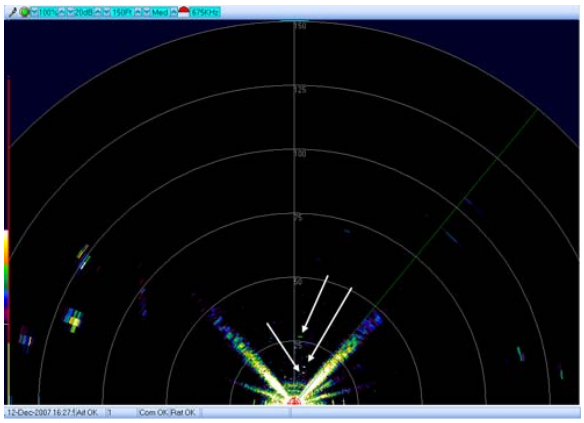
A small hydromedusan jellyfish that was briefly observed while the ROV was returning to the TMS.

A physonect siphonophore. Siphonophores are colonial animals that each have specialized tasks: feeding, propulsion, prey capture, buoyancy. We weren't able to get close enough to this one to identify it but we did use the sonar to find it.

A bolitaenid octopod. These small octopuses are planktonic. There are two species however, there was insufficient detail in the images to determine which species this one was. This is the first time one has been observed by the SERPENT project.

4. LESSONS LEARNED:

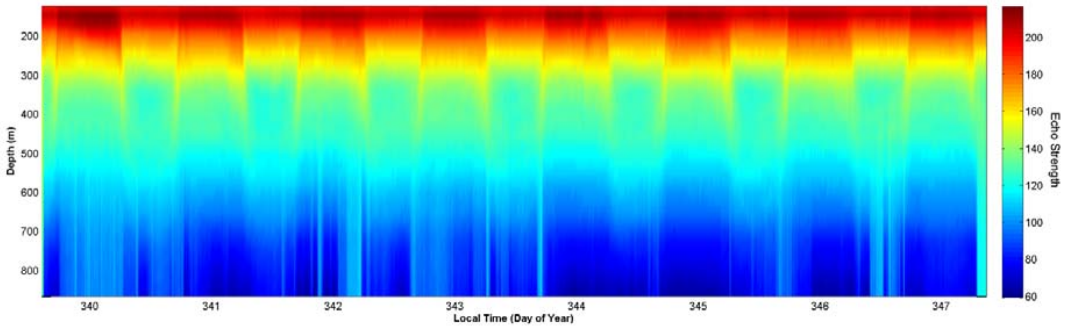
The sector scan sonar permits possible animal targets to be detected and located at ranges beyond those illuminated by the Innovator ROV lights. The maximum range for the sonar should be set to 50 feet. The gain should be set to 100%. The sweep range of the sonar head should be adjusted so that it is within about ±30° of forward. By doing so the refresh time between scans is reduced. Target will show up a consistent (between consecutive scans) green, yellow, or orange points.



The quality of video obtained depends on regular pilot training. Obtaining high quality video footage of marine life requires pilot patience and practice. One of the benefits of SERPENT research to ROV pilots is that it provides valuable pilot training. I will plan periodic trips to Mad Dog to work with the ROV pilots in-order to provide feedback on the quality of video obtained during surveys.

Flame retardant clothing must be provided to any SERPENT personnel visiting a production facility. In the past, we have used 100% cotton clothing plus PPE. As Mad Dog requires flame retardant clothing, SERPENT will acquire high-visibility, flame-retardant coveralls.

The ADCP on Mad Dog provides a valuable record of the pattern of plankton migration beneath the facility. Although the upward-looking system isn't currently operational, the two systems will enable us to determine where in the water column marine life is most concentrated. This information may also be very useful to BP in assessing where cooling water intakes should be located to minimize entrainment of marine life.



An example of the downward-looking ADCP record from Mad Dog beginning on Dec 5, 2007. Red indicates strong echoes while blue echoes are weaker. The intensification of echoes near the surface each night is due to the plankton migrating up from the depths to the surface waters. When combined with the upward-looking data, we should be able to estimate where plankton are most concentrated over a 24 h period.

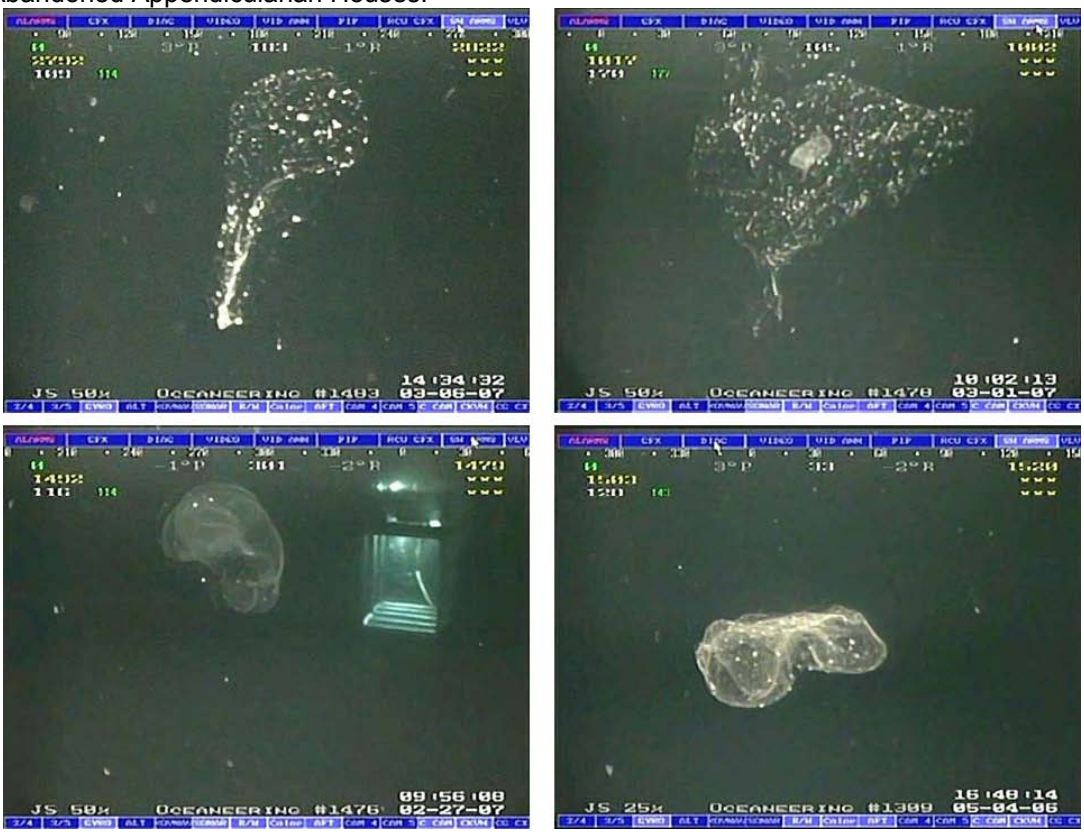
5. OBSERVATIONS:

Appendicularians: The image on the bottom right is of an animal outside of its house. The house is designed to filter small particles out of the water, which are then eaten by the animal inside. Once clogged, the house is abandoned, and slowly sinks to down. These sinking houses are important mechanisms for transferring carbon from the surface to the deep sea. Appendicularians are VERY FRAGILE.






Abandoned Appendicularian Houses:

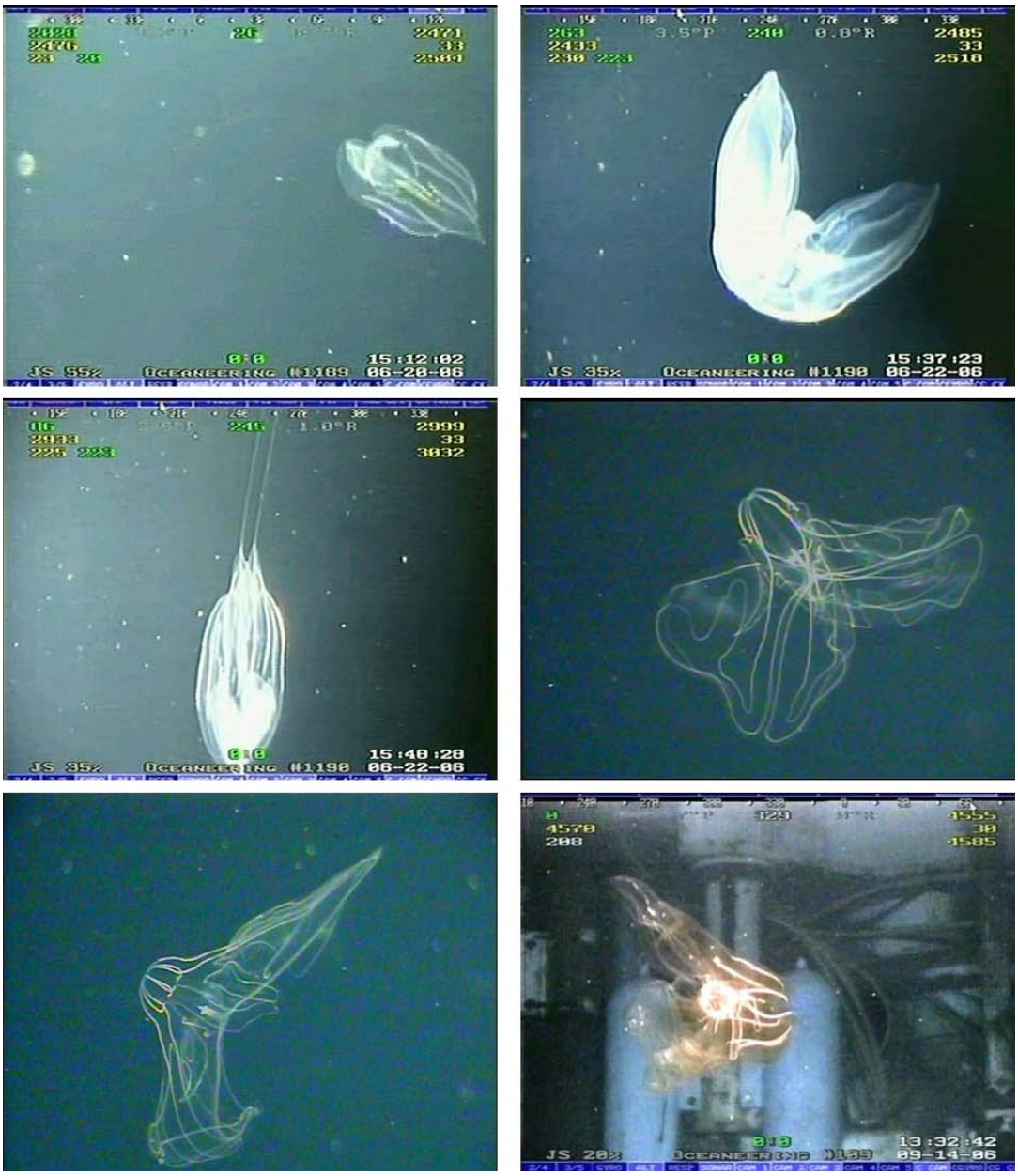


Cephalopods: Squids are the most common members of this group, however there are some planktonic octopuses

Chaetognaths: (arrow-worms):

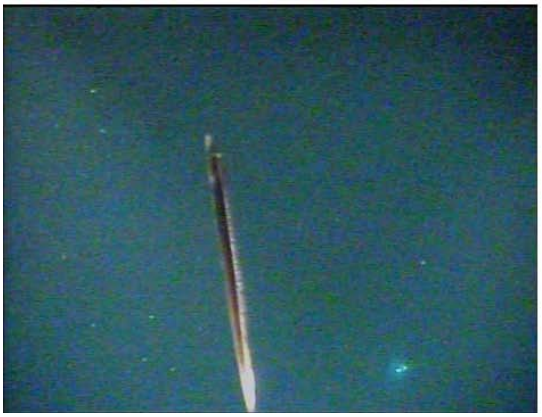
Colozoans: These colonial organisms are snake-like with a series of bright spots along the body in a line or alternating. They could be confused with siphonophores or salp chains at a distance but are not nearly as mobile as either of the other groups.

Ctenophores: These jellyfish-like animals are also called comb-jellies.

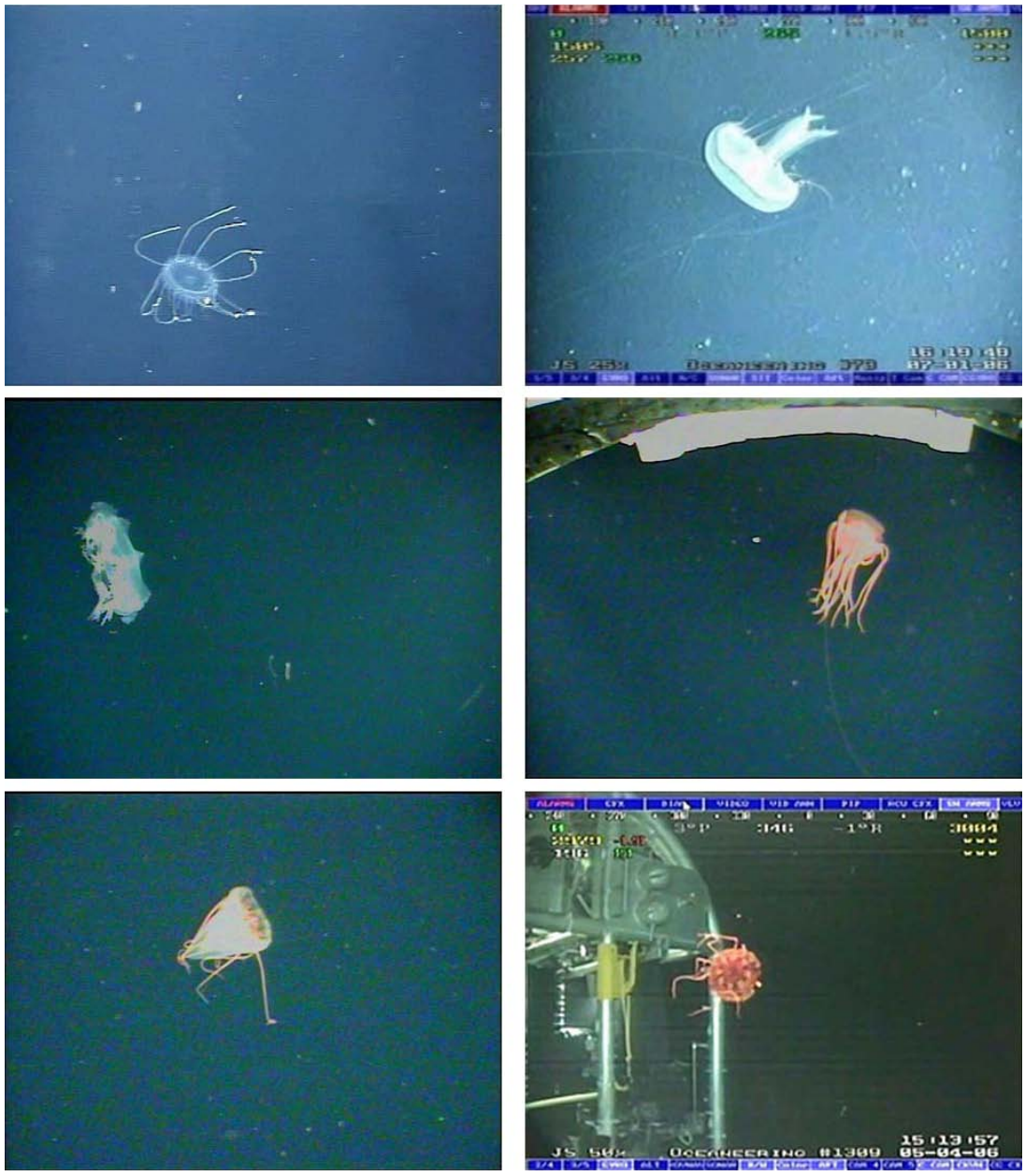


Decapods: There are many different varieties of shrimps and krill in the water column. Most are quite sensitive to light and dart away when they get close to the ROV.

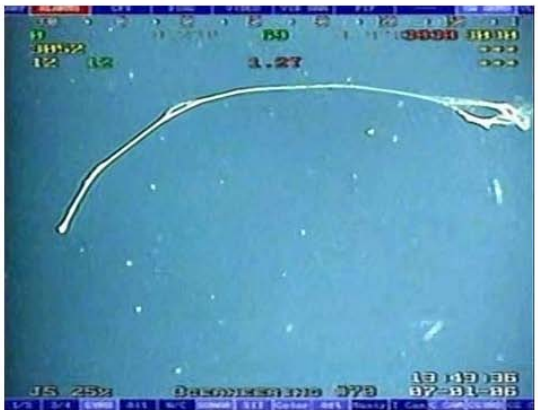
Fish: Midwater fish are fairly common but as most are very sensitive to light, we don't tend to see many with the ROV. Some species such as the Viperfish are quite tolerant of the ROV and can be filmed easily.



Jellyfishes: Among the most common organisms that we see during surveys. There are a wide range of shapes and sizes. Typically they have a round or oval 'bell' and tentacles radiating outwards from the bottom part of the bell.



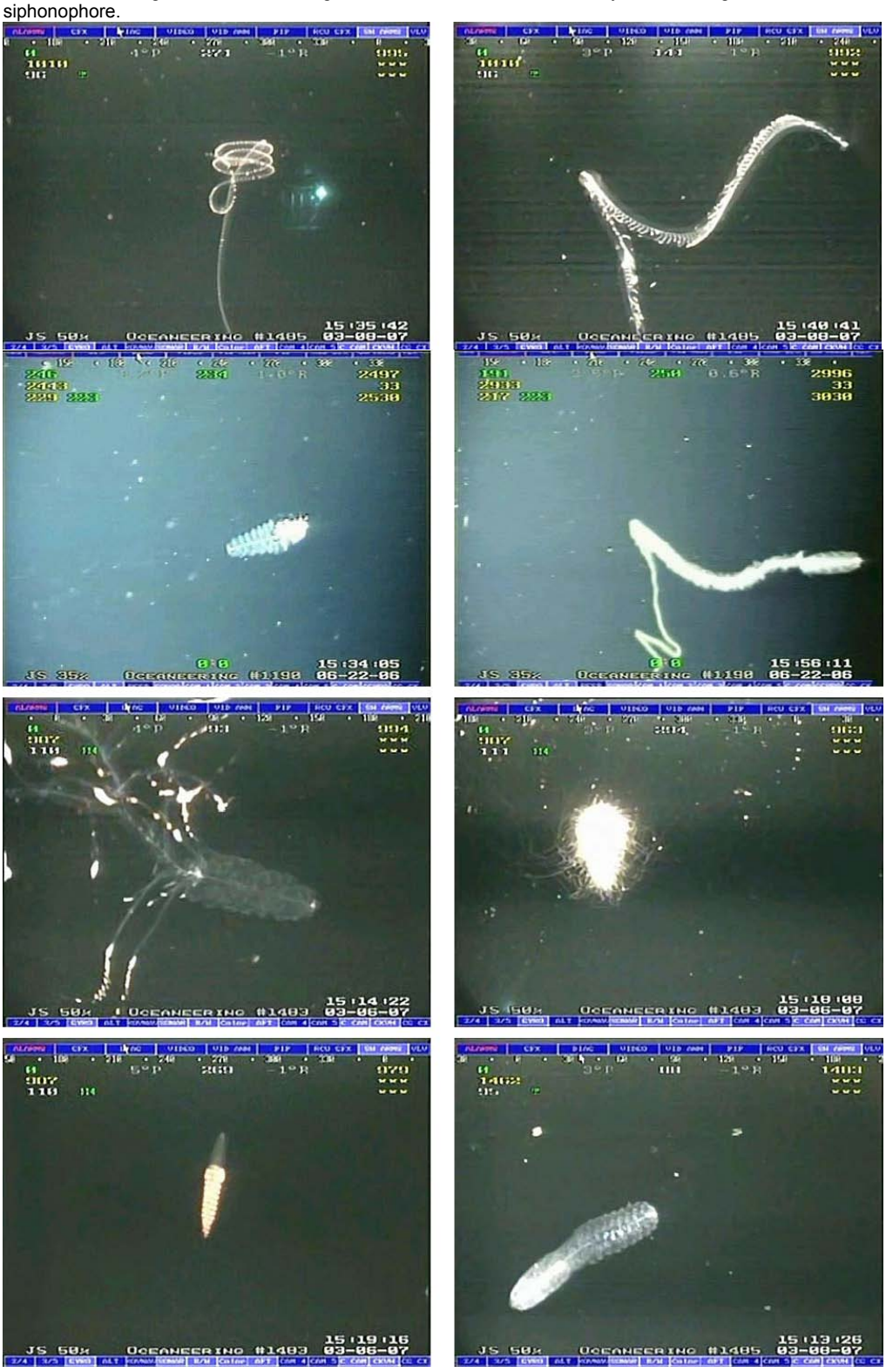
Marine Snow: This is a catch-all term for non-living debris. Much of it originates from animals such as appendicularians and is made of jelly-like mucous. The size and shape are variable but the common types are comet-like strands, rings, and ovals. It is very fragile and disintegrates with slight disturbance.



Pyrosomes: These are relatives of appendicularians and salps. Pyrosomes are distinctive, hollow, colonial organisms. Often they have a small shrimp that lives on their exterior.

Salps: Salps are related to pyrosomes and appendicularians. They are hollow, semi-transparent organisms that occur in two forms: solitaries and aggregates. Solitary salps are barrel-shaped with a line running through the barrel and a bright spot near one end of the body. Aggregates are a series of solitary salps connected to form a chain. These chains can be easily broken up by
turbulence.

Siphonophores: relatives of the jellyfish, these are actually a complex colonial organism. Different parts of the colony perform specialized functions such as propulsion, prey-capture, digestion. Siphonophores are predators that fish for their food using a web of tentacles equipped with toxic stinging cells. They come in many shapes and sizes. Some can be 10 feet long or more. The Portuguese Man-O-War that is commonly seen floating on the surface is a siphonophore.



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Автор Вероника Каминская Broadcast 2007
BBC 1 programme “The Nature of Britain” with Alan Titchmarsh. SERPENT work featured on Programme 5 “Coastal Britain”. Broadcast 7 November 2007.

BBC1 Scotland Landward feature on the SERPENT project 07 February 2007 and an Interview with Dr Brian Bett. Broadcast 11 February.

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BBC Natural History Unit Planet Earth documentary series. Footage obtained by SERPENT project used in Episode 11 – Ocean Deep.
Series first broadcast in the UK, 5 March 2006.

TV2 Norwegian TV station. Segment in programme about the work of SERPENT. "Unike bilder av havet". Eriksen, A. Broadcast 20 June 2006.

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BBC Little Geek!! Earth Report. A new documentary as part of the successful Earth Report series was screened by BBC World around the globe. Going out to over 400 million homes, the documentary describes the SERPENT Project from its beginnings in the UK to its new international collaborations and includes comments from acclaimed movie director James Cameron. Broadcast 18 July 2005 and again on 27 September 2005. Limited copies available.

BBC South Today "Secrets of the Deep" Ian Hudson was interviewed by Sally Taylor about the SERPENT project. Broadcast 20 October 2005.

ITV news Giant Squid raises media interest in the deep ocean. Following on from the pictures released of the giant squid by Japanese researchers Tsunemi Kubodera and Kyoichi Mori at the end of September 2005, ITV news.ran a report on the findings. Our SERPENT Project Coordinator, Ian Hudson, appeared on the news item.
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Grampian TV feature the latest work of the SERPENT project on their "North Tonight" program. Broadcast 16 January 2004.

BBC Scotland SERPENT forum delivers science to oil and gas giants and the Blue Planet team. 02 March 2004.

BBC news SERPENT team is interviewed for documentary on unusual marine life by BBC news correspondent John McIntyre. Broadcast 16 February 2004.

BBC Dr Ian Hudson embarks on a 2 week filming mission to the West of Shetland for the BBC Blue Planet series (see 2006). July 2004.

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BBC Radio 4 Material World Programme. Brian Bett interviewed. To hear this broadcast, go to http://www.bbc.co.uk/radio4/science/thematerialworld_20061116.shtml and select “LISTEN AGAIN” under “PROGRAMME INFO”. Broadcast 16 Nov 2006.

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Aftenposten (The leading newspaper in Norway). Fisk og sjøstjerne bryr seg ikke. Mathismoen, O. 30 January 2007.

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CAPP (Canadian Association of Petroleum Producers). 2007 CAPP Stewardship Report. Scroll down to CHEVRON CANADA SERPENT DEEP WATER SURVEY report, Run Silent, Run Deep. 2007.

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Citizens' Environmental Coalition. Transocean receives Synergy Corporate Awareness Award. Mention of Transocean as founding partner of the SERPENT project. 2 November 2007
Lloyd's List. The leading Maritime and Transpost News Portal. A close encounter with the sea's hidden treasures. Campbell, H. 19 October 2007.

Ron's ROV Links. Scientists probe underwater life in Orphan Basin. Source: The Oil and Gas Magazine. 19 September 2006.

Oceaneering. Oceaneering Partners with SERPENT. 30 August 2007

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Chevron. Chevron Helps Explore for Deepwater Marine Life, 18 September 2008
The Biology Refugia. A group blog hosted at the National University of Singapore highlighting ecology, evolution and biodiversity and other aspects of biology. SERPENT project. Brandon. 18 July 2006.

2005

FRS. Fisheries Research Services. SERPENT project and Nexen enter a three year project. 2005.

NERC/Nexen. Research Study award abstract. The Development of Artificial Reef Structures: Links to Oil and Gas Operations. 2005.

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KONGSBERG. KONGSBERG sponsors Serpent project image competition
24 October 2005

Physorg.com a Science, Technology, Physics and Space News website, runs an article about SERPENT. 27 September 2005.

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Subsea 7. SERPENT forms new alliance. Article about the new collaboration with Louisiana State University. 23 August 2005.

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KONGSBERG. KONGSBERG becomes part of the SERPENT Project. 6 October 2004

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Transocean launch new environmental web pages to announce their global support of SERPENT. 23 February 2004.

2003

www.rovworld.com. Original article from the Houston Chronicle. Oil rigs help biologists unlock mystery of ocean life.
4 January 2003

COMPLETE SERPENT SAMPLE LIST

Mission name	Mission number	Station	Location	Sample type	Sample details
Calister 1	8	C1/231004/001#1	112^0, 100m from BOP	ROV Video Survey	VHS video
Calister 1	8	C1/231004/002#1	029^0, 100m from BOP	ROV Video Survey	VHS video
Calister 1	8	C1/231004/003#1	310^0, 100m from BOP	ROV Video Survey	VHS video
Calister 1	8	C1/231004/004#1	040^0, 100m from BOP	ROV Video Survey	VHS video
Calister 1	8	C1/231004/005#1	120^0, 100m from BOP	ROV Video Survey	VHS video
Calister 1	8	C1/231004/006#1	331^0, 100m from BOP	ROV Video Survey	VHS video
Calister 1	8	C1/261004/001#1	215^0, 57m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/261004/002#1	035^0, 58m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/261004/003#1	215^0, 25m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/261004/004#1	035^0, 12m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/261004/005#1	215^0, 9m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/271004/001#1	125^0, 56m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/271004/002#1	125^0, 45m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/271004/003#1	215^0, 57m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/271004/004#1	215^0, 25m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/271004/005#1	35^0, 64m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/271004/001#1	35^0, 12m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/281004/001#1	215^0, 57m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/281004/002#1	215^0, 25m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/281004/003#1	215^0, 15m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/281004/004#1	125^0, 56m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/281004/005#1	125^0, 45m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/281004/006#1	35^0, 18m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/281004/007#1	35^0, 61m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/291004/001#1	35^0, 61m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/291004/002#1	125^0, 45m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/291004/003#1	125^0, 56m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/291004/004#1	215^0, 57m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/291004/005#1	215^0, 15m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/301004/001#1	35^0, 61m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/301004/002#1	35^0, 16m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/301004/003#1	125^0, 45m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/301004/004#1	125^0, 56m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/301004/005#1	215^0, 15m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/301004/006#1	215^0, 57m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/311004/001#1	35^0, 16m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/311004/002#1	35^0, 61m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/311004/003#1	125^0, 45m from BOP	5 mins video footage of baited trap	VHS video

Calister 1	8	C1/311004/004#1	125^0, 56m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/311004/005#1	215^0, 15m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/311004/006#1	215^0, 57m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/011104/001#1	35^0, 16m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/011104/002#1	35^0, 61m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/011104/003#1	125^0, 56m from BOP	5 mins video footage of baited trap	VHS video
Calister 1	8	C1/011104/004#1	215^0, 57m from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/210305/001#1	Heading 260^0 from BOP	ROV Video Survey	VHS video
Enfield 1	9	E1/210305/002#1	Heading 130^0 from BOP	ROV Video Survey	VHS video
Enfield 1	9	E1/210305/003#1	Heading 324^0 from BOP	ROV Video Survey	VHS video
Enfield 1	9	E1/210305/004#1	Heading 360^0 from BOP	ROV Video Survey	VHS video
Enfield 1	9	E1/210305/005#1	Heading 25^0 from BOP	ROV Video Survey	VHS video
Enfield 1	9	E1/230305/006#1	Heading 104^0 from BOP	ROV Video Survey	VHS video
Enfield 1	9	E1/230305/001#1	30m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/230305/002#1	75m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/230305/003#1	75m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/230305/004#1	75m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/240305/001#1	75m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/240305/002#1	75m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/240305/003#1	30m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/240305/004#1	75m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/250305/001#1	75m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/250305/002#1	75m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/250305/003#1	30m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/250305/004#1	75m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/260305/001#1	30m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/260305/002#1	75m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/260305/003#1	75m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/260305/004#1	75m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/260305/005#1	30m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/260305/006#1	30m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/270305/001#1	30m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/270305/002#1	30m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/300305/001#1	30m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/300305/002#1	75m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/300305/003#1	30m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/300305/004#1	30m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/300305/005#1	75m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/300305/006#1	75m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/010405/001#1	30m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/010405/002#1	75m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video

Enfield 1	9	E1/010405/003#1	30m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/010405/004#1	75m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/010405/005#1	30m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/010405/006#1	75m, Heading 80^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/020405/001#1	30m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/020405/002#1	75m, Heading 220^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/020405/003#1	30m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 1	9	E1/020405/004#1	75m, Heading 151^0 from BOP	5 mins video footage of baited trap	VHS video
Enfield 2	12	E2/221004/001#1	Heading 180^0 from BOP	ROV Video Survey	VHS video
Enfield 2	12	E2/221004/002#1	Heading 90^0 from BOP	ROV Video Survey	VHS video
Enfield 2	12	E2/221004/003#1	Heading 0^0 from BOP	ROV Video Survey	VHS video
Enfield 2	12	E2/221004/004#1	Heading 270^0 from BOP	ROV Video Survey	VHS video
Pluto	13	P2/310707/001#1	Heading 45^0 from BOP	ROV Video Survey	VHS video
Pluto	13	P2/010807/002#1	Heading 180^0 from BOP	ROV Video Survey	VHS video
Pluto	13	P2/010807/003#1	Heading 270^0 from BOP	ROV Video Survey	VHS video
Pluto	13	P2/010807/004#1	Heading 225^0 from BOP	ROV Video Survey	VHS video
Pluto	13	P2/310707/001#1	3m, heading 170^0 from BOP at Pluto2 (trap 1)	5 mins video footage of baited trap	VHS video
Pluto	13	P2/310707/002#1	50m, heading 170^0 from BOP at Pluto2 (trap 5)	5 mins video footage of baited trap	VHS video
Pluto	13	P2/310707/003#1	60m, heading 85^0 from BOP at Pluto2 (trap 3)	5 mins video footage of baited trap	VHS video
Pluto	13	P2/010807/004#1	3m, heading 170^0 from BOP at Pluto2 (trap 1)	5 mins video footage of baited trap	VHS video
Pluto	13	P2/010807/005#1	60m, heading 85^0 from BOP at Pluto2 (trap 6)	5 mins video footage of baited trap	VHS video
Pluto	13	P2/020807/006#1	50m, heading 170^0 from BOP at Pluto2 (trap 5)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/171205/001#1	10m, heading 50^0 from BOP at ENC03 (trap 4)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/171205/002#1	105m, heading 240^0 from BOP at ENC03 (trap 3)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/171205/003#1	100m, Heading 10^0 from BOP at ENC03 (trap 1)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/171205/004#1	120m, Heading 125^0 from BOP at ENC03 (trap 2)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/181205/001#1	110m, Heading 260^0 from BOP at ENC03 (trap 2)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/181205/002#1	100m, Heading 45^0 from BOP at ENC03 (trap 1)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/181205/003#1	100m, heading 180^0 from BOP at ENC03 (trap 3)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/191205/001#1	102m, Heading 240^0 from BOP at ENC03 (trap 2)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/191205/002#1	101m, Heading 0^0 from BOP at ENC03 (trap 1)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/191205/003#1	102m, heading 120^0 from BOP at ENC03 (trap 3)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/191205/004#1	10m, heading 220^0 from BOP at ENC03 (trap 4)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/211205/001#1	102m, Heading 260^0 from BOP at ENC03 (trap 2)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/211205/002#1	101m, heading 180^0 from BOP at ENC03 (trap 4)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/211205/003#1	102m, heading 40^0 from BOP at ENC03 (trap 3)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/211205/004#1	10m, Heading 215^0 from BOP at ENC03 (trap 1)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/221205/001#1	102m, heading 240^0 from BOP at ENC03 (trap 3)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/221205/002#1	96m, Heading 0^0 from BOP at ENC03 (trap 1)	5 mins video footage of baited trap	VHS video
Enfield 3	14	E3/221205/003#1	102m, Heading 120^0 from BOP at ENC03 (trap 2)	Sucked through ROV thruster	
Enfield 3	14	E3/221205/004#1	8.5m, heading 220^0 from BOP at ENC03 (trap 4)	5 mins video footage of baited trap	VHS video

Enfield 3	14	E3/211205/001#1	Heading 320^0 from BOP	ROV Video Survey	VHS video
Enfield 3	14	E3/211205/002#1	Heading 5^0 from BOP	ROV Video Survey	VHS video
Enfield 3	14	E3/211205/003#1	Heading 50^0 from BOP	ROV Video Survey	VHS video
Enfield 3	14	E3/211205/004#1	Heading 95^0 from BOP	ROV Video Survey	VHS video
Enfield 3	14	E3/211205/005#1	Heading 140^0 from BOP	ROV Video Survey	VHS video
Enfield 3	14	E3/211205/006#1	Heading 185^0 from BOP	ROV Video Survey	VHS video
Enfield 3	14	E3/211205/007#1	Heading 230^0 from BOP	ROV Video Survey	VHS video
Enfield 3	14	E3/211205/008#1	Heading 275^0 from BOP	ROV Video Survey	VHS video
Enfield 4	16	E4/150306/001#1	Heading 0^0 from BOP	ROV Video Survey	VHS video
Enfield 4	16	E4/150306/002#1	Heading 45^0 from BOP	ROV Video Survey	VHS video
Enfield 4	16	E4/150306/003#1	Heading 90^0 from BOP	ROV Video Survey	VHS video
Enfield 4	16	E4/150306/004#1	Heading 315^0 from BOP	ROV Video Survey	VHS video
Enfield 4	16	E4/150306/005#1	Heading 135^0 from BOP	ROV Video Survey	VHS video
Enfield 4	16	E4/150306/006#1	Heading 270^0 from BOP	ROV Video Survey	VHS video
Enfield 4	16	E4/150306/007#1	Heading 180^0 from BOP	ROV Video Survey	VHS video
Enfield 4	16	E4/150306/008#1	Heading 225^0 from BOP	ROV Video Survey	VHS video
Enfield 4	16	E4/150306/001#1	70m, heading 150^0 from BOP at END01 (trap 3)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/150306/002#1	105m, heading 240^0 from BOP at END01 (trap 4)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/150306/003#1	60m, Heading 50^0 from BOP at END01 (trap 2)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/150306/004#1	8m, Heading 258^0 from BOP at END01 (trap 1)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/180306/001#1	79m, heading 305^0 from BOP at END01 (trap 3)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/180306/002#1	8m, heading 200^0 from BOP at END01 (trap 1)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/180306/003#1	82m, Heading 109^0 from BOP at END01 (trap 4)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/180306/004#1	54m, Heading 20^0 from BOP at END01 (trap 2)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/190306/001#1	8m, heading 135^0 from BOP at END01 (trap 4)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/190306/002#1	75m, heading 340^0 from BOP at END01 (trap 3)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/190306/003#1	88m, Heading 155^0 from BOP at END01 (trap 2)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/190306/004#1	75m, Heading 75^0 from BOP at END01 (trap 1)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/200306/001#1	3m, heading 135^0 from BOP at END01 (trap 1)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/200306/002#1	80m, heading 338^0 from BOP at END01 (trap 3)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/200306/003#1	77m, Heading 190^0 from BOP at END01 (trap 2)	5 mins video footage of baited trap	VHS video
Enfield 4	16	E4/150306/001#1	Within drill spoil ~8m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/150306/032#1	Within drill spoil ~8m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/150306/033#1	Within drill spoil ~8m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/150306/	Within drill spoil ~8m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/180306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/180306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/180306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/180306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/180306/	Within drill spoil ~8m from BOP	Amphipods	FROZEN
Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	Amphipods	FROZEN
Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	8 x Shrimp	FROZEN
Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	Amphipods	FROZEN

Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/180306/	Outside drill spoil ~100m from BOP	Amphipods	FROZEN
Enfield 4	16	E4/190306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/190306/	Within drill spoil ~8m from BOP	Amphipods	FROZEN
Enfield 4	16	E4/190306/	Outside drill spoil ~100m from BOP	Amphipods	FROZEN
Enfield 4	16	E4/190306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/190306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/190306/	Outside drill spoil ~100m from BOP	Amphipods	FROZEN
Enfield 4	16	E4/190306/	Outside drill spoil ~100m from BOP	Amphipods	FROZEN
Enfield 4	16	E4/190306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/190306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Hagfish	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Hagfish	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Hagfish	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	mixed	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Within drill spoil ~8m from BOP	Amphipods	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from	*B. pelor* isopod	FROZEN

			BOP		
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN

Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	*B. pelor* isopod	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Shrimp	FROZEN
Enfield 4	16	E4/200306/	Outside drill spoil ~100m from BOP	Amphipods	FROZEN
Enfield 4	16	E4/200306/	Inside drill spoil ~8m from BOP	Sea cucumber	FROZEN
Uranus	17	ER/120106/1#1	100m at 0 deg	Push core	PSA
Uranus	17	ER/120106/2#1	10m at 0 deg	Push core	PSA
Uranus	17	ER/120106/3#1	50m at 0 deg	Push core	PSA
Uranus	17	ER/180306/1#2	10m at 0 deg	Push core	PSA
Uranus	17	ER/180306/2#1	90m at 0 deg	Push core	PSA
Uranus	17	ER/180306/3#1	10m at 90 deg	Push core	PSA
Uranus	17	ER/190306/4#1	75m at 90 deg	Push core	PSA
Uranus	17	ER/190306/5#2	10m at 180 deg	Push core	PSA
Uranus	17	ER/190306/6#1	80m at 180 deg	Push core	PSA
Uranus	17	ER/190306/7#1	10m at 270 deg	Push core	PSA
Uranus	17	ER/190306/8#1	90m at 270 deg	Push core	PSA
Uranus	17	ER/190306/10#1	10m at 90 deg	Push core	formalin
Uranus	17	ER/190306/10#2	10m at 90 deg	Push core	formalin
Uranus	17	ER/190306/11#1	70m at 90 deg	Push core	formalin
Uranus	17	ER/190306/11#2	70m at 90 deg	Push core	formalin
Uranus	17	ER/110106/	Video transect	Pre-drill survey; heading 0, 80m	DVD
Uranus	17	ER/110106/	Video transect	Pre-drill survey; heading 90, 80m	DVD
Uranus	17	ER/110106/	Video transect	Pre-drill survey; heading 180, 80m	DVD
Uranus	17	ER/110106/	Video transect	Pre-drill survey; heading 270, 80m	DVD
Uranus	17	ER/110106/	Video transect	Pre-drill survey; heading 45, 80m	DVD
Uranus	17	ER/110106/	Video transect	Pre-drill survey; heading 135, 80m	DVD
Uranus	17	ER/110106/	Video transect	Pre-drill survey; heading 225, 80m	DVD
Uranus	17	ER/110106/	Video transect	Pre-drill survey; heading 315, 80m	DVD
Uranus	17	ER/180306	Video transect	Post drilling survey; heading 0, 75m	DVD
Uranus	17	ER/180306	Video transect	Post drilling survey; heading 90, 70m	DVD
Uranus	17	ER/180306	Video transect	Post drilling survey; heading 180, 90m	DVD
Uranus	17	ER/180306	Video transect	Post drilling survey; heading 270, 90m	DVD
Uranus	17	ER/180306	Video transect	Post drilling survey; heading 45, 70m	DVD
Uranus	17	ER/180306	Video transect	Post drilling survey; heading 135, 90m	DVD

Uranus	17	ER/180306	Video transect	Post drilling survey; heading 225, 80m	DVD
Uranus	17	ER/180306	Video transect	Post drilling survey; heading 315, 80m	DVD
Morvin	18	WA/230306/1#1	0m at 0 deg	Push core	PSA
Morvin	18	WA/230306/2#1	50m at 0 deg	Push core	PSA
Morvin	18	WA/230306/3#1	100m at 0 deg	Push core	PSA
Morvin	18	WA/21042006/1#1	10m north	Push Core	PSA
Morvin	18	WA/21042006/2#1	110m north	Push Core	PSA
Morvin	18	WA/21042006/3#1	8m west	Push Core	PSA
Morvin	18	WA/21042006/4#3	100m west	Push Core	PSA
Morvin	18	WA/21042006/5#3	8m east	Push Core	PSA
Morvin	18	WA/21042006/6#1	90m east	Push Core	PSA
Morvin	18	WA/21042006/7#1	8m south	Push Core	PSA
Morvin	18	WA/21042006/8#1	10m east	Ekman	formalin
Morvin	18	WA/230306/9#1	100m east	Ekman	formalin
Morvin	18	WA/230306/10#1	10m east	Ekman	formalin
Morvin	18	WA/240406/11#1	100m east	Ekman	formalin
Morvin	18	WA/230306/	Video transect	Pre-drill survey; heading 0, 100m	DVD
Morvin	18	WA/230306/	Video transect	Pre-drill survey; heading 270, 100m	DVD
Morvin	18	WA/230306/	Video transect	Pre-drill survey; heading 90, 100m	DVD
Morvin	18	WA/230306/	Video transect	Pre-drill survey; heading 180, 100m	DVD
Morvin	18	WA/230306/	Video transect	Pre-drill survey; heading 135, 100m	DVD
Morvin	18	WA/230306/	Video transect	Pre-drill survey; heading 225, 100m	DVD
Morvin	18	WA/230306/	Video transect	Pre-drill survey; heading 315, 100m	DVD
Morvin	18	WA/230306/	Video transect	Pre-drill survey; heading 45, 100m	DVD
Morvin	18	WA/200406/	Video transect	West $270^{o,\ 100m}$	DVD
Morvin	18	WA/200406/	Video transect	South $180^{o,\ 100m}$	DVD
Morvin	18	WA/210406/	Video transect	North $0^{o,\ 75m}$	DVD
Morvin	18	WA/210406/	Video transect	East $90^{o,\ 100m}$	DVD
Morvin	18	WA/210406/	Video transect	$45^{o,\ 120m}$	DVD
Morvin	18	WA/210406/	Video transect	$135^{o,\ 113m}$	DVD
Morvin	18	WA/210406/	Video transect	$225^{o,\ 85m}$	DVD
Morvin	18	WA/210406/	Video transect	$315^{o,\ 125m}$	DVD
Morvin	18	WA/090706/	Video transect	Pre-drill survey; heading 180, 80m	DVD
Morvin	18	WA/090706/	Video transect	Pre-drill survey; heading 270, 100m	DVD
Morvin	18	WA/090706/	Video transect	Pre-drill survey; heading 0, 140m	DVD
Morvin	18	WA/090706/	Video transect	Pre-drill survey; heading 90, 110m	DVD
Morvin	18	WA/090706/	Video transect	Pre-drill survey; heading 315, 130m	DVD
Morvin	18	WA/090706/	Video transect	Pre-drill survey; heading 225, 80m	DVD
Morvin	18	WA/090706/	Video transect	Pre-drill survey; heading 135, 100m	DVD
Morvin	18	WA/090706/	Video transect	Pre-drill survey; heading 45, 100m	DVD
Edvarda	19	ER/050406	Pre-drill survey; heading 0, 75m	Video transect	DVD
Edvarda	19	ER/050406	Pre-drill survey; heading 90, 75m	Video transect	DVD
Edvarda	19	ER/050406	Pre-drill survey; heading 180, 75m	Video transect	DVD
Edvarda	19	ER/050406	Pre-drill survey; heading 270, 75m	Video transect	DVD

Edvarda	19	ER/050406	Pre-drill survey; heading 45, 75m	Video transect	DVD
Edvarda	19	ER/050406	Pre-drill survey; heading 135, 75m	Video transect	DVD
Edvarda	19	ER/050406	Pre-drill survey; heading 225, 75m	Video transect	DVD
Edvarda	19	ER/050406	Pre-drill survey; heading 315, 75m	Video transect	DVD
Edvarda	19	ER/090406	Post drilling survey; heading 90, 75m	Video transect	DVD
Edvarda	19	ER/100406	Post drilling survey; heading 0, 75m	Video transect	DVD
Edvarda	19	ER/090406	Post drilling survey; heading 270, 75m	Video transect	DVD
Edvarda	19	ER/090406	Post drilling survey; heading 180, 75m	Video transect	DVD
Edvarda	19	ER/090406	Post drilling survey; heading 45, 75m	Video transect	DVD
Edvarda	19	ER/090406	Post drilling survey; heading 135, 75m	Video transect	DVD
Edvarda	19	ER/090406	Post drilling survey; heading 225, 75m	Video transect	DVD
Edvarda	19	ER/100406	Post drilling survey; heading 315, 75m	Video transect	DVD
Edvarda	19	ER/100406	Pre-drill survey; heading 0, 65m	Video transect	DVD
Edvarda	19	ER/100406	Pre-drill survey; heading 180, 80m	Video transect	DVD
Edvarda	19	ER/100406	Pre-drill survey; heading 135, 60m	Video transect	DVD
Edvarda	19	ER/100406	Pre-drill survey; heading 270, 70m	Video transect	DVD
Edvarda	19	ER/100406	Pre-drill survey; heading 315, 65m	Video transect	DVD
Edvarda	19	ER/100406	Pre-drill survey; heading 90, 65m	Video transect	DVD
Edvarda	19	ER/100406	Pre-drill survey; heading 225, 70m	Video transect	DVD
Edvarda	19	ER/100406	Pre-drill survey; heading 45, 60m	Video transect	DVD
Edvarda	19	ER/190506	Post drilling survey; heading 0, 60m	Video transect	DVD
Edvarda	19	ER/190506	Post drilling survey; heading 180, 60m	Video transect	DVD
Edvarda	19	ER/190506	Post drilling survey; heading 90, 70m	Video transect	DVD
Edvarda	19	ER/190506	Post drilling survey; heading 270, 45m	Video transect	DVD
Edvarda	19	ER/190506	Post drilling survey; heading 45, 60m	Video transect	DVD
Edvarda	19	ER/190506	Post drilling survey; heading 135, 55m	Video transect	DVD
Edvarda	19	ER/190506	Post drilling survey; heading 315, 60m	Video transect	DVD
Edvarda	19	ER/190506	Post drilling survey; heading 225, 60m	Video transect	DVD
Edvarda	19	ER/200506/1#2	10m at 90 deg	push core	PSA
Edvarda	19	ER/200506/2#1	75m at 90 deg	push core	PSA
Edvarda	19	ER/200506/3#1	80m at 270 deg	push core	PSA
Edvarda	19	ER/200506/5#2	50m at 0 deg	push core	PSA
Edvarda	19	ER/210506/6#1	10m at 0 deg	push core	PSA
Edvarda	19	ER/210506/7#1	80m at 180deg	push core	PSA
Edvarda	19	ER/210506/8#1	30 at 180 deg	push core	PSA
Edvarda	19	ER/210506/9#1	10 at 90 deg	push core	formalin
Edvarda	19	ER/210506/11#1	30 at 90 deg	push core	formalin
Edvarda	19	ER/210506/13#5	30 at 90 deg	push core	formalin
Edvarda	19	ER/210506/14#2	80 at 90 deg	push core	formalin
Edvarda	19	ER/210506/15#1	30 at 90 deg	push core	formalin
Edvarda	19	ER/210506/16#1	30 at 90 deg	push core	formalin
Edvarda	19	ER/210506/17#1	30 at 90 deg	push core	formalin
Edvarda	19	ER/210506/18#1	80 at 90 deg	push core	formalin
Edvarda	19	ER/210506/19#1	80 at 90 deg	push core	formalin

Edvarda	19	ER/210506/20#1	80 at 90 deg	push core	formalin
Thylacine	20	T1/230506/001#1	50m, going 315° from BOP	ROV Video Survey #1	DVD Video
Thylacine	20	T1/230506/002#1	50m, going 45° from BOP	ROV Video Survey #2	DVD Video
Thylacine	20	T1/230506/003#1	50m, going 90° from BOP	ROV Video Survey #3	DVD Video
Thylacine	20	T1/230506//004#1	50m, going 135° from BOP	ROV Video Survey #4	DVD Video
Thylacine	20	T1/230506/005#1	50m, going 0° from BOP	ROV Video Survey #5	DVD Video
Thylacine	20	T1/240506/001#1	Heading of 216°, 12m from BOP	5 mins video footage of baited trap #2	DVD Video
Thylacine	20	T1/240506/002#1	Heading of 216°, 22m from BOP	5 mins video footage of baited trap #3	DVD Video
Thylacine	20	T1/240506/003#1	Heading of 20°, 12m from BOP	5 mins video footage of baited trap #4	DVD Video
Thylacine	20	T1/240506/004#1	Heading of 20°, 22m from BOP	5 mins video footage of baited trap #1	DVD Video
Thylacine	20	T1/240506/001#1	Heading of 20°, 22m from BOP	Feeding Choice Array	DVD Video
Thylacine	20	T1/240506/006#1	50m, going 270° from BOP	ROV Video Survey #6	DVD Video
Thylacine	20	T1/240506/001#1	Heading of 216°, 12m from BOP	5 mins video footage of baited trap #2	DVD Video
Thylacine	20	T1/240506/002#1	Heading of 340°, 35m from BOP	Feeding Choice Array	DVD Video
Thylacine	20	T1/250506/007#1	50m, going 270° from BOP	ROV Video Survey #7	DVD Video
Mutineer	23	OB/200706/001#1	140°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/200706/002#1	170°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/200706/003#1	130°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/210706/004#1	200°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/210706/005#1	215°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/210706/006#1	40m, going 210° from BOP	ROV Video Survey	DVD Video
Mutineer	23	OB/210706/007#1	40m, going 180° from BOP	ROV Video Survey	DVD Video
Mutineer	23	OB/210706/008#1	40m, going 160° from BOP	ROV Video Survey	DVD Video
Mutineer	23	OB/210706/009#1	40m, going 140° from BOP	ROV Video Survey	DVD Video
Mutineer	23	OB/220706/010#1	210°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/220706/011#1	220°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/230706/012#1	230°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/230706/013#1	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/230706/013#2	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/230706/013#3	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/230706/013#4	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/240706/014#1	180°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/240706/015#1	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/240706/015#2	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/240706/015#3	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/240706/015#4	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/250706/016#1	190°, 40m from BOP	Feeding Choice Array	DVD Video
Mutineer	23	OB/250706/017#1	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/250706/017#2	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/250706/017#3	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/250706/017#4	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/260706/018#1	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/260706/018#2	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/260706/018#3	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded
Mutineer	23	OB/260706/018#4	210°, 40m from BOP	Feeding Cage Experiment	Amount eaten recorded

Brugdan 2	24	SD/070806/001	10m at 60° from BOP	ROV push core	2 – 1 x Top 3cm in plastic bag, 1 x Top 3cm in foil
Brugdan 2	24	SD/070806/002	10m at 240° from BOP	ROV push core	2 – 1 x Top 3cm in plastic bag, 1 x Top 3cm in foil
Brugdan 2	24	SD/080806/003	10m at 150° from BOP	ROV push core	2 – 1 x Top 3cm in plastic bag, 1 x Top 3cm in foil
Brugdan 2	24	SD/080806/004	10m at 330° from BOP	ROV push core	2 – 1 x Top 3cm in plastic bag, 1 x Top 3cm in foil
Brugdan 2	24	SD/080806/005	100m at 150° from BOP	ROV push core	2 – 1 x Top 3cm in plastic bag, 1 x Top 3cm in foil
Brugdan 2	24	SD/080806/006	100m at 330° from BOP	ROV push core	2 – 1 x Top 3cm in plastic bag, 1 x Top 3cm in foil
Brugdan 2	24	SD/090806/007	100m at 240° from BOP	ROV push core	2 – 1 x Top 3cm in plastic bag, 1 x Top 3cm in foil
Brugdan 2	24	SD/090806/008	100m at 60° from BOP	ROV push core	3 – 2 x Top 3cm in plastic bag, 1 x Top 3cm in foil, 1 x Top 3cm in bottle with formalin
Brugdan 2	24	SD/100806/009	Undisturbed area south of BOP >50m away	ROV photos and suction samples	8 preserved in RNAlater, frozen and formalin, further 3 in formalin only
Brugdan 2	24	SD/100806/010	Video transect going 330° to BOP	Video transect	1
Brugdan 2	24	SD/100806/011	Video transect going 150° to BOP	Video transect	1
Brugdan 2	24	SD/100806/012	Undisturbed area 60° from BOP >50m away	ROV photos and suction samples	2 preserved in RNAlater and formalin, further additional catch in formalin
Brugdan 2	24	SD/110806/013	Disturbed area (<30m from BOP)	ROV photos and suction samples	4 preserved in RNAlater and formalin, additional catch in formalin
Brugdan 2	24	SD/110806/014	100m from BOP	Eckman grab	Unsuccessful
Brugdan 2	24	SD/130806/015	Going 0° from BOP	Video transect	1 (seaowl ROV)
Brugdan 2	24	SD/130806/016	Going 180° from BOP	Video transect	1 (seaowl ROV)
Brugdan 2	24	SD/130806/017	Going 270° from BOP	Video transect	1 (seaowl ROV)
Brugdan 2	24	SD/130806/018	Going 90° from BOP	Video transect	1 (seaowl ROV)
Brugdan 2	24	SD/130806/019	Going 60° from BOP	Video transect	1 (seaowl ROV)
Brugdan 2	24	SD/130806/020	Going 150° from BOP	Video transect	1 (seaowl ROV)
Brugdan 2	24	SD/130806/021	Going 240° from BOP	Video transect	1 (seaowl ROV)
Brugdan 2	24	SD/130806/022	Going 330° from BOP	Video transect	1 (seaowl ROV)
Tornerose	25	PP/100806/001#1	10m north of BOP	ROV push core	Frozen
Tornerose	25	PP/100806/002#1	10m east of BOP	ROV push core	Frozen
Tornerose	25	PP/100806/003#1	10m south of BOP	ROV push core	Frozen
Tornerose	25	PP/100806/004#1	10m west of BOP	ROV push core	Frozen
Tornerose	25	PP/100806/005#1	100m south of BOP	ROV push core	Frozen
Tornerose	25	PP/100806/006#1	100m west of BOP	ROV push core	Frozen
Tornerose	25	PP/100806/007#1	100m north of BOP	ROV push core	Frozen
Tornerose	25	PP/100806/008#1	100m east of BOP	ROV push core	Frozen
Tornerose	25	PP/100806/009#1	Predrilling survey, 100m going 90° from well centre	ROV video survey	DVD video
Tornerose	25	PP/100806/010#1	Predrilling survey, 100m going 180° from well centre	ROV video survey	DVD video
Tornerose	25	PP/100806/011#1	Predrilling survey, 100m going 270° from well centre	ROV video survey	DVD video
Tornerose	25	PP/100806/012#1	Predrilling survey, 100m going 360° from well centre	ROV video survey	DVD video
Tornerose	25	PP/310806/013#1	Post drilling survey, 100m going 0° from BOP	ROV video survey	DVD video
Tornerose	25	PP/310806/014#1	Post drilling survey, 100m going 45° from BOP	ROV video survey	DVD video

Tornerose	25	PP/310806/015#1	Post drilling survey, 100m going 90° from BOP	ROV video survey	DVD video
Tornerose	25	PP/310806/016#1	Post drilling survey, 100m going 135° from BOP	ROV video survey	DVD video
Tornerose	25	PP/310806/017#1	Post drilling survey, 100m going 180° from BOP	ROV video survey	DVD video
Tornerose	25	PP/310806/018#1	Post drilling survey, 100m going 225° from BOP	ROV video survey	DVD video
Tornerose	25	PP/310806/019#1	Post drilling survey, 100m going 315° from BOP	ROV video survey	DVD video
Tornerose	25	PP/310806/020#1	Post drilling survey, 100m going 270° from BOP	ROV video survey	DVD video
Tornerose	25	PP/310806/020#2	Post drilling survey, 100m going 270° from BOP	ROV video survey	DVD video
Tornerose	25	PP/310806/020#3	Post drilling survey, 100m going 270° from BOP	ROV video survey	DVD video
Tornerose	25	PP/010906/021#1	10m west of BOP	ROV push core	Frozen
Tornerose	25	PP/010906/022#1	10m south of BOP	ROV push core	Frozen
Tornerose	25	PP/010906/023#1	10m north of BOP	ROV push core	Frozen
Tornerose	25	PP/010906/024#1	10m east of BOP	ROV push core	Frozen
Tornerose	25	PP/010906/025#1	100m east of BOP	ROV push core	Frozen
Tornerose	25	PP/010906/026#1	100m north of BOP	ROV push core	Frozen
Tornerose	25	PP/010906/027#1	100m west of BOP	ROV push core	Frozen
Tornerose	25	PP/010906/028#1	Distant from BOP (~100m)	ROV suction sample	Buffered formalin
Tornerose	25	PP/020906/029#1	10m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/029#2	10m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/029#3	10m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/029#4	10m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/030#1	100m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/030#2	100m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/030#3	100m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/030#4	100m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/031#1	50m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/031#2	50m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/031#3	50m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/031#4	50m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/020906/032#1	60m north of BOP	Amphipod trap	Buffered formalin
Tornerose	25	PP/020906/033#1	60m north of BOP	ROV suction sample	Buffered formalin
Tornerose	25	PP/030906/034#1	25m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/030906/034#2	25m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/030906/034#3	25m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/030906/034#4	25m north of BOP	ROV push core	Buffered formalin
Tornerose	25	PP/030906/035#1	North of BOP	ROV suction sample	frozen
Brugdan 3	26	SD/310806/2#1	240 deg, 100m	ROV push core	Plastic x 2
Brugdan 3	26	SD/310806/3#2	240 deg, 30m	ROV push core	Plastic x 2
Brugdan 3	26	SD/310806/4#1	60 deg, 10m	ROV push core	Plastic x 2
Brugdan 3	26	SD/310806/4#2	60 deg, 10m	ROV push core	Foil x 1
Brugdan 3	26	SD/010906/5#1	60 deg, 100m	ROV push core	Plastic x 2
Brugdan 3	26	SD/010906/5#2	60 deg, 100m	ROV push core	Foil x 1
Brugdan 3	26	SD/010906/6#1	150 deg, 10m	ROV push core	Plastic x 2
Brugdan 3	26	SD/010906/6#2	150 deg, 10m	ROV push core	Foil x 1
Brugdan 3	26	SD/010906/7#2	150 deg, 100m	ROV push core	Plastic x 1
Brugdan 3	26	SD/010906/8#2	330 deg, 10m	ROV push core	Plastic x 2
Brugdan 3	26	SD/010906/9#1	330 deg, 100m	ROV push core	Plastic x 2
Brugdan 3	26	SD/010906/9#2	330 deg, 100m	ROV push core	Foil x 1
Brugdan 3	26	SD/010906/10#1	240 deg, 30m	ROV push core	HC in foil

Brugdan 3	26	SD/010906/11#1	240 deg, 100m	ROV push core	Foil x 1
Brugdan 3	26	SD/020906/12#1	60 deg, 130m	ROV push core	5cm in 2 x plastic bottle formalin
Brugdan 3	26	SD/020906/12#2	60 deg, 130m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/12#4	60 deg, 130m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/12#5	60 deg, 130m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/12#6	60 deg, 130m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/13#2	240 deg, 30m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/13#3	240 deg, 30m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/13#4	240 deg, 30m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/13#5	240 deg, 30m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/14#1	240 deg, 60m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/14#2	240 deg, 60m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/14#3	240 deg, 60m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/14#4	240 deg, 60m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/15#1	240 deg, 60m	ROV push core	1 plastic bag (PSA & OM)
Brugdan 3	26	SD/020906/15#2	240 deg, 60m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/020906/16#1	240 deg, 30m	ROV push core	1 plastic bag (PSA & OM)
Brugdan 3	26	SD/020906/16#2	240 deg, 30m	ROV push core	5 cm in formalin in plastic bottle
Brugdan 3	26	SD/030906/	180 deg, 150m	Video transect	DVD
Brugdan 3	26	SD/030906/	0 deg, 180m	Video transect	DVD
Brugdan 3	26	SD/030906/	270 deg, 150m	Video transect	DVD
Brugdan 3	26	SD/030906/	60 deg, 150m	Video transect	DVD
Brugdan 3	26	SD/030906/	330 deg, 200m	Video transect	DVD
Brugdan 3	26	SD/030906/	150 deg, 180m	Video transect	DVD
Brugdan 3	26	SD/030906/	240 deg, 140m	Video transect	DVD
Brugdan 4	27	SD/121006/001#1	10m at 60° from BOP	ROV push core	Top 3cm in plastic bag
Brugdan 4	27	SD/121006/001#2	10m at 60° from BOP	ROV push core	Top 3cm in foil
Brugdan 4	27	SD/121006/002#1	100m at 60° from BOP	ROV push core	Top 3cm in plastic bag
Brugdan 4	27	SD/121006/002#2	100m at 60° from BOP	ROV push core	Top 3cm in foil
Brugdan 4	27	SD/141006/003#1	Transect north from BOP	Video Transect	160m long
Brugdan 4	27	SD/141006/004#1	Transect south from BOP	Video Transect	200m long
Brugdan 4	27	SD/141006/005#1	Transect west from BOP	Video Transect	150m long
Brugdan 4	27	SD/141006/006#1	Transect east of BOP	Video Transect	200m long
Brugdan 4	27	SD/151006/007#1	10m at 240° from BOP	ROV push core	Top 3cm in plastic bag
Brugdan 4	27	SD/151006/007#2	10m at 240° from BOP	ROV push core	Top 3cm in foil
Brugdan 4	27	SD/151006/008#1	10m at 150° from BOP	ROV push core	Top 3cm in plastic bag
Brugdan 4	27	SD/151006/008#2	10m at 150° from BOP	ROV push core	Top 3cm in foil
Brugdan 4	27	SD/151006/009#1	4m north of BOP	Amphipod trap	Hagfish and amphipods in formalin
Brugdan 4	27	SD/151006/010#1	100m at 240° from BOP	ROV push core	Top 3cm in plastic bag
Brugdan 4	27	SD/151006/010#2	100m at 240° from BOP	ROV push core	Top 3cm in foil
Brugdan 4	27	SD/151006/011#1	100m at 150° from BOP	ROV push core	Top 3cm in plastic bag
Brugdan 4	27	SD/151006/011#2	100m at 150° from BOP	ROV push core	Top 3cm in foil
Brugdan 4	27	SD/161006/012#1	Around 100m north of BOP	ROV suction sample	Mixed catch in formalin, sponge and anemone in RNA later

Nucula	29	PP/010207/001	Main well	Video Transect	120 m transect heading 0° from the BOP
Nucula	29	PP/010207/002	Main well	Video Transect	100 m transect heading 90° from the BOP
Nucula	29	PP/010207/003	Main well	Video Transect	120 m transect heading 180° from the BOP
Nucula	29	PP/010207/004	Main well	Video Transect	135 m transect heading 270° from the BOP
Nucula	29	PP/010207/005	Main well	Video Transect	110 m transect heading 45° from the BOP
Nucula	29	PP/010207/006	Main well	Video Transect	110 m transect heading 135° from the BOP
Nucula	29	PP/010207/007	Main well	Video Transect	104 m transect heading 225° from the BOP
Nucula	29	PP/010207/008	Main well	Video Transect	150 m transect heading 315° from the BOP
Rosebank 1	30	TR/260407/001#1	Transect west of Spud-in location	Video Transect	100 m long
Rosebank 1	30	TR/260407/001#2	Transect south of Spud-in location	Video Transect	100 m long
Rosebank 1	30	TR/260407/001#3	Transect north of Spud-in location	Video Transect	100 m long
Rosebank 1	30	TR/260407/001#4	Transect east of Spud-in location	Video Transect	100 m long
Rosebank 1	30	TR/260407/002#1	100 m west of Spud-in location	ROV push core	Top 5 cm preserved in formalin
Rosebank 1	30	TR/260407/002#2	100 m south of Spud-in location	ROV push core	Top 5 cm preserved in formalin
Rosebank 1	30	TR/260407/002#3	100 m north of Spud-in location	ROV push core	Top 5 cm preserved in formalin
Rosebank 1	30	TR/260407/002#4	100 m east of Spud-in location	ROV push core	Top 5 cm preserved in formalin
Rosebank 1	30	TR/260407/002#5	At Spud-in location	ROV push core	Top 5 cm preserved in formalin
Rosebank 1	30	TR/260407/002#6	At Spud-in location	ROV push core	Top 5 cm preserved in formalin
Rosebank 2	31	TR/080607/102#1	100m at 60° from BOP	Wood sample	Wood in formalin
Rosebank 2	31	TR/090607/103#1	100m at 60˚ from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#2	100m at 60° from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#3	100m at 60˚ from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#4	100m at 60° from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#5	100m at 60˚ from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#6	100m at 60° from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#7	100m at 60° from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#8	100m at 60˚ from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#9	100m at 60° from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#10	100m at 60˚ from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#11	100m at 60° from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#12	100m at 60˚ from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#13	100m at 60° from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#14	100m at 60° from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#15	100m at 60˚ from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#16	100m at 60° from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#17	100m at 60˚ from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#18	100m at 60° from BOP	Stainless steel biofilm plates	Plates in separate Petri dishes

Rosebank 2	31	TR/090607/103#19	100m at 60˚ from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#20	100m at 60° from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#21	100m at 60° from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#22	100m at 60˚ from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#23	100m at 60° from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/090607/103#24	100m at 60˚ from BOP	Mild steel biofilm plates	Plates in separate Petri dishes
Rosebank 2	31	TR/110607/105#1	100m at 60˚ from BOP	ROV Bioturbation push core	Top 10cm in separate 1cm sections
Rosebank 2	31	TR/110607/105#2	100m at 60˚ from BOP	ROV Bioturbation push core	Top 10cm in separate 1cm sections
Rosebank 2	31	TR/110607/105#3	100m at 60˚ from BOP	ROV Bioturbation push core	Top 10cm in separate 1cm sections
Rosebank 2	31	TR/110607/105#4	100m at 60˚ from BOP	ROV Bioturbation push core	Top 10cm in separate 1cm sections
Rosebank 2	31	TR/120607/107#1	100m at 60˚ from BOP	Ekman core	Core in formalin
Rosebank 2	31	TR/150607/110#1	Transect north of BOP	Video Transect	100m long
Rosebank 2	31	TR/150607/110#2	Transect east of BOP	Video Transect	100m long
Rosebank 2	31	TR/150607/110#3	Transect south of BOP	Video Transect	100m long
Rosebank 2	31	TR/150607/110#4	Transect west of BOP	Video Transect	100m long
Midnattsol 1	32	TL/010707/001#1	40m transect 225° from proposed BOP location	Video Transect	DVD
Midnattsol 1	32	TL/010707/001#2	90m transect 315° from proposed BOP location	Video Transect	DVD
Midnattsol 1	32	TL/010707/001#3	90m transect 045° from proposed BOP location	Video Transect	DVD
Midnattsol 1	32	TL/010707/001#4	80m transect 135° from proposed BOP location	Video Transect	DVD
Midnattsol 1	32	TL/010707/001#5	100m transect 000° from proposed BOP location	Video Transect	DVD
Midnattsol 1	32	TL/010707/001#6	100m transect 180° from proposed BOP location	Video Transect	DVD
Midnattsol 1	32	TL/010707/001#7	100m transect 090° from proposed BOP location	Video Transect	DVD
Midnattsol 1	32	TL/010707/001#8	270° from proposed BOP location - Abandoned	Video Transect	DVD
Midnattsol 1	32	TL/020707/002#1	100 m transect heading 050º from the pilot well	Video Transect	DVD
Midnattsol 1	32	TL/020707/002#2	100 m transect heading 090º form pilot well	Video Transect	DVD
Midnattsol 1	32	TL/020707/002#3	30 m transect at 000º from pilot well	Video Transect	DVD
Midnattsol 1	32	TL/050707/004#1	Spud-in location – Main Well	ROV push core	Top 3 cm for Statoil
Midnattsol 1	32	TL/050707/004#2	Spud-in location – Main Well	ROV push core	Top 3 cm for Statoil
Midnattsol 1	32	TL/050707/004#3	Spud-in location – Main Well	ROV push core	Top 5 cm meiofauna SERPENT samples
Midnattsol 1	32	TL/050707/004#4	Spud-in location – Main Well	ROV push core	Top 5 cm meiofauna SERPENT samples
Ragnarokk 1	33	WE/270707/001#1	Proposed spud-in location	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/270707/001#2	Proposed spud-in location	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/270707/001#3	Proposed spud-in location	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/270707/001#4	Proposed spud-in location	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/280707/002#1	Proposed spud-in location	ROV push core	Top 3 cm for Statoil chemical analysis
Ragnarokk 1	33	WE/280707/002#2	25 m at 135° from proposed spud-in location	ROV push core	Top 3 cm for Statoil chemical analysis
Ragnarokk 1	33	WE/280707/002#3	50 m at 135° from proposed spud-in location	ROV push core	Top 3 cm for Statoil chemical analysis
Ragnarokk 1	33	WE/280707/001#4	120 m at 135° from proposed spud-in location	ROV push core	Top 3 cm for Statoil chemical analysis
Ragnarokk 1	33	WE/280707/001#5	Proposed spud-in location	Specimen sample	Echinoid specimens
Ragnarokk	33	WE/280707/001#6	Proposed spud-in location	ROV push core	Top 5 cm for

1					SERPENT analysis
Ragnarokk 1	33	WE/280707/002#7	100 m transect 100° from proposed drilling location	Video transect	DVD
Ragnarokk 1	33	WE/280707/002#8	100 m transect 280° from proposed drilling location	Video transect	DVD
Ragnarokk 1	33	WE/280707/002#9	95 m transect 190° from proposed drilling location	Video transect	DVD
Ragnarokk 1	33	WE/280707/002#10	100 m transect 010° from proposed drilling location	Video transect	DVD
Ragnarokk 1	33	WE/290707/003#1	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/290707/003#2	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/290707/003#3	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/290707/003#4	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/290707/003#5	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/290707/003#6	Sediment mound surrounding Leg 3	ROV push core	Top 5 cm for SERPENT meiofauna analysis
Ragnarokk 1	33	WE/280707/004#1	100 m transect 145° from proposed drilling location	Video transect	DVD
Ragnarokk 1	33	WE/280707/004#2	95 m transect 325° from proposed drilling location	Video transect	DVD
Ragnarokk 1	33	WE/280707/004#3	50 m transect 235° from proposed drilling location	Video transect	DVD
Ragnarokk 1	33	WE/280707/004#4	90 m transect 055° from proposed drilling location	Video transect	DVD
Orca	34	SE/140707/001#1	300° heading from well site	Video Transect	.mpg
Ocra	34	SE/140707/002#1	120° heading from well site	Video Transect	.mpg
Orca	34	SE/140707/003#1	30° heading from well site	Video Transect	.mpg
Ocra	34	SE/140707/004#1	210° heading from well site	Video Transect	.mpg
Orca	34	SE/140707/005#1	330 heading from well site	Video Transect	.mpg
Ocra	34	SE/140707/006#1	165° heading from well site	Video Transect	.mpg
Orca	34	SE/140707/007#1	120° heading from well site	Video Transect	.mpg
Ocra	34	SE/140707/008#1	255° heading from well site	Video Transect	.mpg
Orca	34	SE/250707/009#1	30° heading from guidebase	Video Transect	.mpg
Ocra	34	SE/250707/010#1	165° heading from guidebase	Video Transect	.mpg
Orca	34	SE/260707/011#1	75° heading from guidebase	Video Transect	.mpg
Ocra	34	SE/260707/012#1	225° heading from guidebase	Video Transect	.mpg
Orca	34	SE/260707/013#1	330° heading from guidebase	Video Transect	.mpg
Ocra	34	SE/260707/014#1	120° heading from guidebase	Video Transect	.mpg
Orca	34	SE/260707/015#1	210° heading from guidebase	Video Transect	.mpg
Ocra	34	SE/260707/016#1	300° heading from guidebase	Video Transect	.mpg
Orca	34	SE/280707/017#1	330° 30 m from BOP	Scoop sample	Chilled then formalin
Ocra	34	SE/280707/018#1	1 m from BOP	4L bottle trap (tuna bait)	Chilled then 2 hagfish in alcohol and 4 in formalin. Isopod in formalin.
Orca	34	SE/300707/019#1	50° 30 m from BOP	Scoop sample	All catch in alcohol
Ocra	34	SE/310707/020#1	40° 30 m from BOP	Scoop sample	All catch in formalin
Orca	34	SE/310707/021#1	50 m from BOP	Scoop samples	Asteroid and coral in formalin
Ocra	34	SE/310707/022#1	2 m from BOP	Trap samples	Giant Isopod
Midnattsol 2	35	TL/240807/005#1	25 m N BOP	Meiofauna push core	Top 5 cm in Formalin
Midnattsol 2	35	TL/240807/005#2	25 m N BOP	Meiofauna push core	Top 5 cm in Formalin
Midnattsol 2	35	TL/240807/005#3	10 m N BOP	Meiofauna push core	Top 5 cm in Formalin
Midnattsol 2	35	TL/250807/006#1	100 m 360° BOP	Video Transect	DVD

Midnattsol 2	35	TL/250807/006#2	100 m 45° BOP	Video Transect	DVD
Midnattsol 2	35	TL/250807/006#3	100 m 90° BOP	Video Transect	DVD
Midnattsol 2	35	TL/250807/006#4	100 m 135° BOP	Video Transect	DVD
Midnattsol 2	35	TL/250807/006#5	100 m 180° BOP	Video Transect	DVD
Midnattsol 2	35	TL/250807/006#6	100 m 315° BOP	Video Transect	DVD
Midnattsol 2	35	TL/250807/006#7	100 m 270° BOP	Video Transect	DVD
Midnattsol 2	35	TL/250807/006#8	100 m 225° BOP	Video Transect	DVD
Midnattsol 2	35	TL/250807/006#9	12 locations surrounding BOP	Marker buoy readings	DVD
Midnattsol 2	35	TL/260807/007#1	100 m S BOP	Chemical push core	Top 3 cm frozen
Midnattsol 2	35	TL/260807/007#2	50 m S BOP	Chemical push core	Top 3 cm frozen
Midnattsol 2	35	TL/260807/007#3	25 m S BOP	Chemical push core	Top 3 cm frozen
Midnattsol 2	35	TL/260807/007#4	10 m S BOP	Chemical push core	Top 3 cm frozen
Midnattsol 2	35	TL/260807/007#5	100 NW BOP	Umbelulla specimen	Cut up and preserved in formalin
Midnattsol 2	35	TL/260807/007#6	Umbelulla arm	Tissue sample	In RNA Later
Midnattsol 2	35	TL/260807/007#7	Umbelulla arm	Tissue sample	In RNA Later
Midnattsol 2	35	TL/260807/007#8	Umbelulla arm	Tissue sample	In RNA Later
Midnattsol 2	35	TL/260807/007#9	Umbelulla arm	Tissue sample	In RNA Later
Midnattsol 2	35	TL/260807/007#10	100 m S BOP	Microscopy sediment sample	Glass vial
Midnattsol 2	35	TL/260807/007#11	50 m S BOP	Microscopy sediment sample	Glass vial
Midnattsol 2	35	TL/260807/007#12	25 m S BOP	Microscopy sediment sample	Glass vial
Midnattsol 2	35	TL/260807/007#13	10 m S BOP	Microscopy sediment sample	Glass vial
Midnattsol 2	35	TL/270807/008#1	29 m N BOP Bioturbation corral 1	Sediment push core section	1st 1cm section
Midnattsol 2	35	TL/270807/008#2	29 m N BOP Bioturbation corral 1	Sediment push core section	2nd 1cm section
Midnattsol 2	35	TL/270807/008#3	29 m N BOP Bioturbation corral 1	Sediment push core section	3rd 1cm section
Midnattsol 2	35	TL/270807/008#4	29 m N BOP Bioturbation corral 1	Sediment push core section	4th 1cm section
Midnattsol 2	35	TL/270807/008#5	29 m N BOP Bioturbation corral 1	Sediment push core section	5th 1cm section
Midnattsol 2	35	TL/270807/008#6	29 m N BOP Bioturbation corral 1	Sediment push core section	6th 1cm section
Midnattsol 2	35	TL/270807/008#7	29 m N BOP Bioturbation corral 1	Sediment push core section	7th 1cm section
Midnattsol 2	35	TL/270807/008#8	29 m N BOP Bioturbation corral 1	Sediment push core section	8th 1cm section
Midnattsol 2	35	TL/270807/008#9	29 m N BOP Bioturbation corral 1	Sediment push core section	9th 1cm section
Midnattsol 2	35	TL/270807/008#10	29 m N BOP Bioturbation corral 1	Sediment push core section	10th 1cm section
Midnattsol 2	35	TL/270807/008#11	29 m N BOP Bioturbation corral 1	Sediment push core section	1st 1cm section
Midnattsol 2	35	TL/270807/008#12	29 m N BOP Bioturbation corral 1	Sediment push core section	2nd 1cm section
Midnattsol 2	35	TL/270807/008#13	29 m N BOP Bioturbation corral 1	Sediment push core section	3rd 1cm section
Midnattsol 2	35	TL/270807/008#14	29 m N BOP Bioturbation corral 1	Sediment push core section	4th 1cm section
Midnattsol 2	35	TL/270807/008#15	29 m N BOP Bioturbation corral 1	Sediment push core section	5th 1cm section
Midnattsol 2	35	TL/270807/008#16	29 m N BOP Bioturbation corral 1	Sediment push core section	6th 1cm section
Midnattsol 2	35	TL/270807/008#17	29 m N BOP Bioturbation corral 1	Sediment push core section	7th 1cm section
Midnattsol 2	35	TL/270807/008#18	29 m N BOP Bioturbation corral 1	Sediment push core section	8th 1cm section
Midnattsol 2	35	TL/270807/008#19	29 m N BOP Bioturbation corral 1	Sediment push core section	9th 1cm section
Midnattsol 2	35	TL/270807/008#20	29 m N BOP Bioturbation corral 2	Sediment push core section	10th 1cm section
Midnattsol 2	35	TL/270807/008#21	29 m N BOP Bioturbation corral 2	Sediment push core section	1st 1cm section
Midnattsol 2	35	TL/270807/008#22	29 m N BOP Bioturbation corral 2	Sediment push core section	2nd 1cm section

Midnattsol 2	35	TL/270807/008#23	29 m N BOP Bioturbation corral 2	Sediment push core section	3rd 1cm section
Midnattsol 2	35	TL/270807/008#24	29 m N BOP Bioturbation corral 2	Sediment push core section	4th 1cm section
Midnattsol 2	35	TL/270807/008#25	29 m N BOP Bioturbation corral 2	Sediment push core section	5th 1cm section
Midnattsol 2	35	TL/270807/008#26	29 m N BOP Bioturbation corral 2	Sediment push core section	6th 1cm section
Midnattsol 2	35	TL/270807/008#27	29 m N BOP Bioturbation corral 2	Sediment push core section	7th 1cm section
Midnattsol 2	35	TL/270807/008#28	29 m N BOP Bioturbation corral 2	Sediment push core section	8th 1cm section
Midnattsol 2	35	TL/270807/008#29	29 m N BOP Bioturbation corral 2	Sediment push core section	9th 1cm section
Midnattsol 2	35	TL/270807/008#30	29 m N BOP Bioturbation corral 2	Sediment push core section	10th 1cm section
Midnattsol 2	35	TL/270807/008#31	29 m N BOP Bioturbation corral 2	Sediment push core section	1st 1cm section
Midnattsol 2	35	TL/270807/008#32	29 m N BOP Bioturbation corral 2	Sediment push core section	2nd 1cm section
Midnattsol 2	35	TL/270807/008#33	29 m N BOP Bioturbation corral 2	Sediment push core section	3rd 1cm section
Midnattsol 2	35	TL/270807/008#34	29 m N BOP Bioturbation corral 2	Sediment push core section	4th 1cm section
Midnattsol 2	35	TL/270807/008#35	29 m N BOP Bioturbation corral 2	Sediment push core section	5th 1cm section
Midnattsol 2	35	TL/270807/008#36	29 m N BOP Bioturbation corral 2	Sediment push core section	6th 1cm section
Midnattsol 2	35	TL/270807/008#37	29 m N BOP Bioturbation corral 2	Sediment push core section	7th 1cm section
Midnattsol 2	35	TL/270807/008#38	29 m N BOP Bioturbation corral 2	Sediment push core section	8th 1cm section
Midnattsol 2	35	TL/270807/008#39	29 m N BOP Bioturbation corral 2	Sediment push core section	9th 1cm section
Midnattsol 2	35	TL/270807/008#40	29 m N BOP Bioturbation corral 2	Sediment push core section	10th 1cm section
Midnattsol 2	35	TL/280807/009#1	29 m N BOP	Ekman grab	Sieved and preserved in formalin
Midnattsol 2	35	TL/280807/009#2	50 m NW BOP	Chondrocladia specimen	In formalin
Midnattsol 2	35	TL/280807/009#3	Sponge body cells	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/009#4	Sponge body cells	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/009#5	Sponge body cells	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/009#6	Sponge body cells	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/009#7	Sponge body cells	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/010#1	29 m N BOP	Ekman grab	Sieved and preserved in formalin
Midnattsol 2	35	TL/280807/010#2	20m S BOP	Amphipod trap	Specimens preserved in formalin
Midnattsol 2	35	TL/280807/010#3	Amphipod Whole organism	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/010#4	Amphipod Whole organism	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/010#5	Amphipod Whole organism	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/010#6	Amphipod Whole organism	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/010#7	Amphipod Whole organism	Tissue sample	In RNA Later
Midnattsol 2	35	TL/280807/010#8	Amphipod Whole organism	Tissue sample	In RNA Later
Ragnarokk 2	36	WE/310807/005#1	ROV transect going 280° from conductor	ROV video transect	DVD
Ragnarokk 2	36	WE/010907/006#1	10 m from conductor at 135°	Push core	Frozen
Ragnarokk 2	36	WE/010907/006#2	10 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/010907/007#1	ROV transect going 10° from conductor	ROV video transect	DVD
Ragnarokk 2	36	WE/010907/008#1	ROV transect going 190° from conductor	ROV video transect	DVD
Ragnarokk 2	36	WE/010907/009#1	5 m from leg 3	Push core	Formalin
Ragnarokk 2	36	WE/010907/009#2	5 m from leg 3	Push core	Formalin
Ragnarokk 2	36	WE/010907/009#3	5 m from leg 3	Push core	Formalin
Ragnarokk 2	36	WE/010907/009#4	5 m from leg 3	Push core	Formalin

Ragnarokk 2	36	WE/010907/009#5	5 m from leg 3	Push core	Frozen
Ragnarokk 2	36	WE/020907/010#1	5 m from leg 3	Urchin experiment - control	RNA later
Ragnarokk 2	36	WE/020907/010#2	5 m from leg 3	Urchin experiment – control	RNA later
Ragnarokk 2	36	WE/020907/010#3	5 m from leg 3	Urchin experiment – control	RNA later
Ragnarokk 2	36	WE/020907/011#1	5 m from leg 3	Urchin experiment - mud	RNA later
Ragnarokk 2	36	WE/020907/011#2	5 m from leg 3	Urchin experiment – mud	RNA later
Ragnarokk 2	36	WE/020907/011#3	5 m from leg 3	Urchin experiment – mud	RNA later
Ragnarokk 2	36	WE/020907/012#1	5 m from leg 3	Urchin experiment – mud x 2	RNA later
Ragnarokk 2	36	WE/020907/012#2	5 m from leg 3	Urchin experiment – mud x 2	RNA later
Ragnarokk 2	36	WE/020907/012#3	5 m from leg 3	Urchin experiment – mud x 2	RNA later
Ragnarokk 2	36	WE/030907/006#3	10 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/030907/006#4	10 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/030907/006#5	10 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/030907/013#1	5 m from leg 3	Double decompressed urchin # 1	RNA later
Ragnarokk 2	36	WE/030907/013#2	5 m from leg 3	Double decompressed urchin # 2	RNA later
Ragnarokk 2	36	WE/030907/014#1	5 m from leg 3	Unmanipulated urchin # 1	RNA later
Ragnarokk 2	36	WE/030907/014#2	5 m from leg 3	Unmanipulated urchin # 2	RNA later
Ragnarokk 2	36	WE/030907/015#1	5 m from leg 3	Urchin 21° for 1 hour	RNA later
Ragnarokk 2	36	WE/030907/016#1	5 m from leg 3	Urchin 21° for 2 hours	RNA later
Ragnarokk 2	36	WE/040907/017#1	5 m from leg 3	Urchin 21° for 3 hours	RNA later
Ragnarokk 2	36	WE/040907/018#1	5 m from leg 3	Urchin 21° for 4 hours	RNA later
Ragnarokk 2	36	WE/040907/019#1	5 m from leg 3	Urchin 21° for 6 hours	RNA later
Ragnarokk 2	36	WE/040907/020#1	5 m from leg 3	Urchin 21° for 8 hours	RNA later
Ragnarokk 2	36	WE/040907/021#1	5 m from leg 3	Urchin 21° for 10 hours	RNA later
Ragnarokk 2	36	WE/040907/022#1	5 m from leg 3	Urchin taxonomic samples	Formalin
Ragnarokk 2	36	WE/040907/023#1	ROV transect going 325° from conductor	ROV video transect	DVD
Ragnarokk 2	36	WE/040907/024#1	ROV transect going 235° from conductor	ROV video transect	DVD
Ragnarokk 2	36	WE/040907/025#1	ROV transect going 145° from conductor	ROV video transect	DVD
Ragnarokk 2	36	WE/040907/026#1	ROV transect going 100° from conductor	ROV video transect	DVD
Ragnarokk 2	36	WE/040907/027#1	ROV transect going 55° from conductor	ROV video transect	DVD
Ragnarokk 2	36	WE/050907/028#1	100 m from conductor at 135°	Push core	Frozen
Ragnarokk 2	36	WE/050907/028#2	100 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/028#3	100 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/028#4	100 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/028#5	100 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/028#6	100 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/029#1	50 m from conductor at 135°	Push core	Frozen
Ragnarokk 2	36	WE/050907/029#2	50 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/029#3	50 m from conductor at 135°	Push core	Formalin

Ragnarokk 2	36	WE/050907/029#4	50 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/029#5	50 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/030#1	25 m from conductor at 135°	Push core	Frozen
Ragnarokk 2	36	WE/050907/029#4	50 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/029#5	50 m from conductor at 135°	Push core	Formalin
Ragnarokk 2	36	WE/050907/030#1	25 m from conductor at 135°	Push core	Frozen
Rosebank 3	37	TR/280907/011#1	12 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/280907/011#2	12 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/280907/011#3	12 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/280907/011#4	12 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/012#1	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/012#2	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/012#3	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/012#4	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin – CORE FAILED
Rosebank 3	37	TR/290907/013#1	50 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/013#2	50 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/013#3	50 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/013#4	50 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/014#1	100 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/015#1	100 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/015#2	100 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/015#3	100 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin
Rosebank 3	37	TR/290907/015#4	25 m 225° from BOP	ROV meiofauna push core	Top 5 cm preserved in formalin – REPLACEMENT
Rosebank 3	37	TR/270907/016#1	99 m 45° from BOP	Video transect	DVD
Rosebank 3	37	TR/270907/017#1	115 m 270° from BOP	Video transect	DVD
Rosebank 3	37	TR/270907/018#1	90 m 80° from BOP	Video transect	DVD
Rosebank 3	37	TR/270907/019#1	140 m 135° from BOP	Video transect	DVD
Rosebank 3	37	TR/270907/020#1	120 m 180° from BOP	Video transect	DVD
Rosebank 3	37	TR/270907/021#1	115 m 225° from BOP	Video transect	DVD
Rosebank 3	37	TR/270907/022#1	115 m 270° from BOP	Video transect	DVD
Rosebank 3	37	TR/270907/023#1	120 m 315° from BOP	Video transect	DVD
Rosebank 3	37	TR/270907/024#1	108 m 0° from BOP	Video transect	DVD