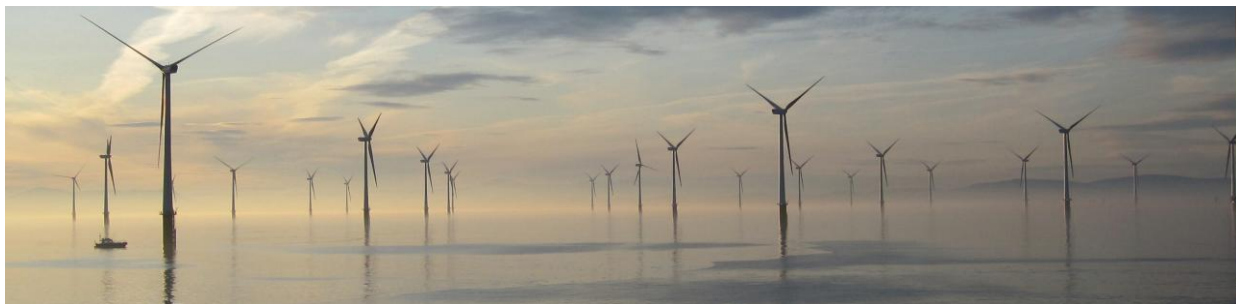




Rampion Offshore Wind Farm



ES Section 6 – Physical Environment **Appendix 6.1 (Part two)**

Fugro Geoconsulting Ltd

Document 6.3.6ii

December 2012

APFP Regulation 5(2)(a)

Revision A

E.ON Climate & Renewables UK Rampion Offshore Wind Limited



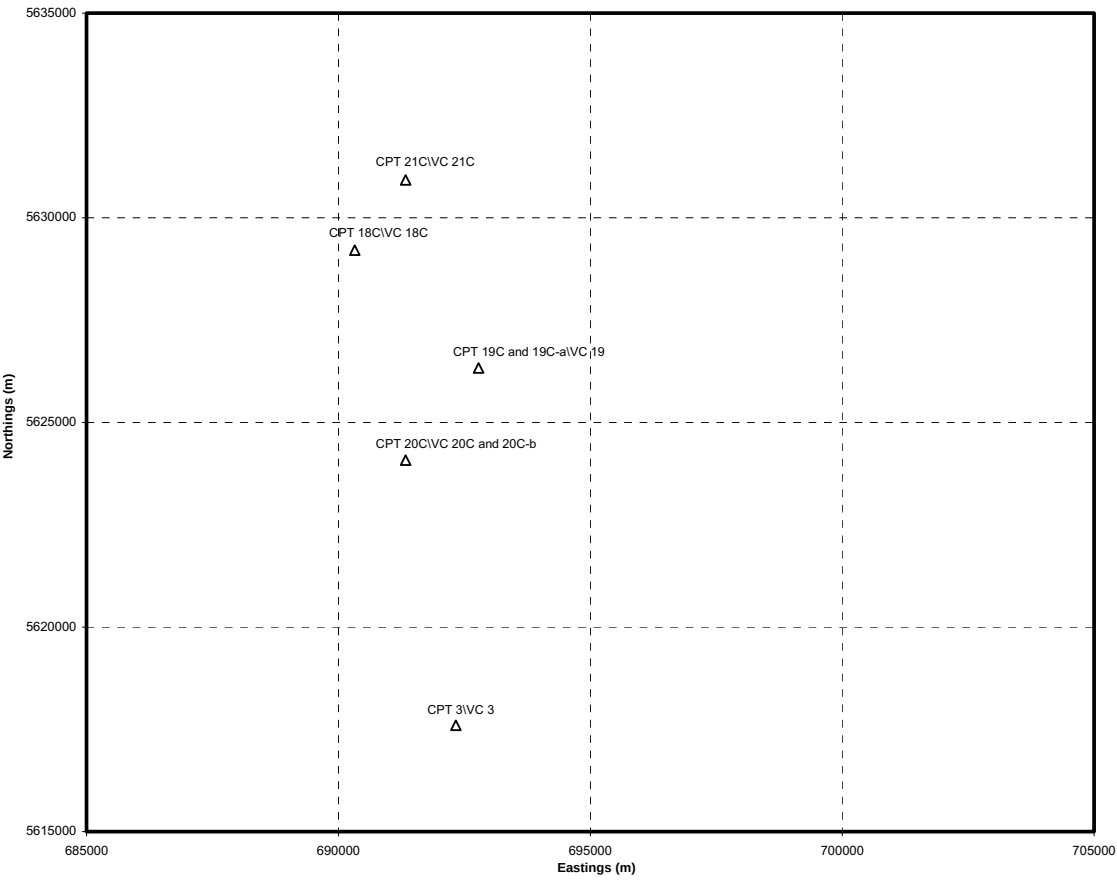
MAIN TEXT

LIST OF PLATES

Description	Plates
General Location Plan	1-1
Location Plan	1-2



GENERAL LOCATION PLAN



**SECTION A
GEOTECHNICAL LOGS**

TABLE OF CONTENTS

- A1. VIBROCORE LOGS**
- A2. INTERPRETED GEOTECHNICAL LOGS FROM CPT**

SECTION A
GEOTECHNICAL LOGS

A1.	VIBROCORE LOGS	1
A1.1	Details	1
A1.2	Practice for Vibrocore Sampling	2
A1.1	Practice for Vibrocore Sampling	3
A2.	INTERPRETED GEOTECHNICAL LOGS FROM CPT	1
A2.1	Details	1
A2.2	Interpretation of Undrained Shear Strength from CPT's	1
A2.3	Interpretation of Relative Density from CPT's	1

A1. VIBROCORE LOGS

A1.1 Details

Geotechnical logs for each vibrocore location are presented in Plates Section A1. The numbering of repetitions is explained in section 2.1 of the Main Text.

These logs have been compiled based upon laboratory test results and in-situ test data. The logs indicate measured and inferred:

- a. Soil layering; including classifications of undrained shear strength in fine-grained cohesive soils.
- b. Measured undrained shear strength values.
- c. Measured moisture content, plasticity and soil density data.
- d. Soil layering presented on each core log is based on observations from the vibrocore sample.

Where repeat vibrocores were performed in attempts to secure deeper penetration, the data from the deepest is used in compiling the geotechnical logs.

All soils have been described in accordance with BS 5930:1999. Please refer to Appendix I for a fuller explanation.

A1.2 Practice for Vibrocore Sampling

Sampling Stage Control

General Procedure:	Refer to document titled "Vibrocore Operations Manual" (Fugro Alluvial Offshore ref. D-F-006) presented in Appendix 1
Depth Reference Level:	Base of seabed frame assumed level with seafloor at start of test
Termination Stage:	Target depth achieved or Operators discretion

Vibrocore Sampling

Sampling System:	Main lifting wire from vessels crane
Type and Make of Vibrocorer:	FAOL 6m HPC
Sampler Insertion Equipment:	Vibro-unit at head of equipment
Sampler:	Thick-walled barrel, 6.4m long, with plastic liner
Core Catcher:	Applicable
Depth Indicator:	Digital Penetrometer
Log	
Ground Description:	BS5930:1999 and Fugro Soil classification procedure 5091DT-RPT-02-R4. T.W. Spink. The CIRIA Chalk description and classification Scheme

References

BSI British Standards Institution (1999), "Code of Practice for Site Investigations", British Standard BS 5930:1999.
Fugro Soil classification procedure 5091DT-RPT-02-R4.

A1.1 Practice for Vibrocore Sampling

SAMPLING STAGE CONTROL

General Procedure:	Refer to document titled "Vibrocore Operations Manual" (Fugro Alluvial Offshore ref. D-F-006) presented in Appendix 1
Depth Reference Level:	Base of seabed frame assumed level with seafloor at start of test
Termination Stage:	Target depth or refusal

VIBROCORE SAMPLING

Sampling System:	Vibrocorer
Type and Make of Vibrocorer:	FAOL 6m HPC
Sampler Insertion Equipment:	Vibro-unit at head of equipment
Sampler:	Thick walled barrel 6.4m long
Core Catcher:	Applicable
Depth Indicator:	Spring on core barrel

SAMPLE HANDLING

Refer to sub-section "Practice for Sample Handling and Laboratory Testing" presented in report section titled "Geotechnical Laboratory Test Results"

GEOTECHNICAL LOG

Purpose:	Cable Route
Data Processing and Management:	GeoDin 6.0
Water Depth Reference:	Echo Sounder
Ground Description:	BS5930:1999 and Fugro Soil classification procedure 5091DT-RPT-02-R4 T.W. Spink. The CIRIA Chalk description and classification Scheme
Graphical Display:	Graphical scales selected to suit general presentation of data
Unit Weight derived from Water Content:	Assuming: PD = 2.67 to 2.70 for Chalk samples fully saturated with pore water of 1 Mg/m ³

REFERENCES

BSI British Standards Institution (1999), "Code of Practice for Site Investigations", British Standard BS 5930:1999.
Computer Program GeODin[®], Recording, Presentation and Analysis of Geo-data



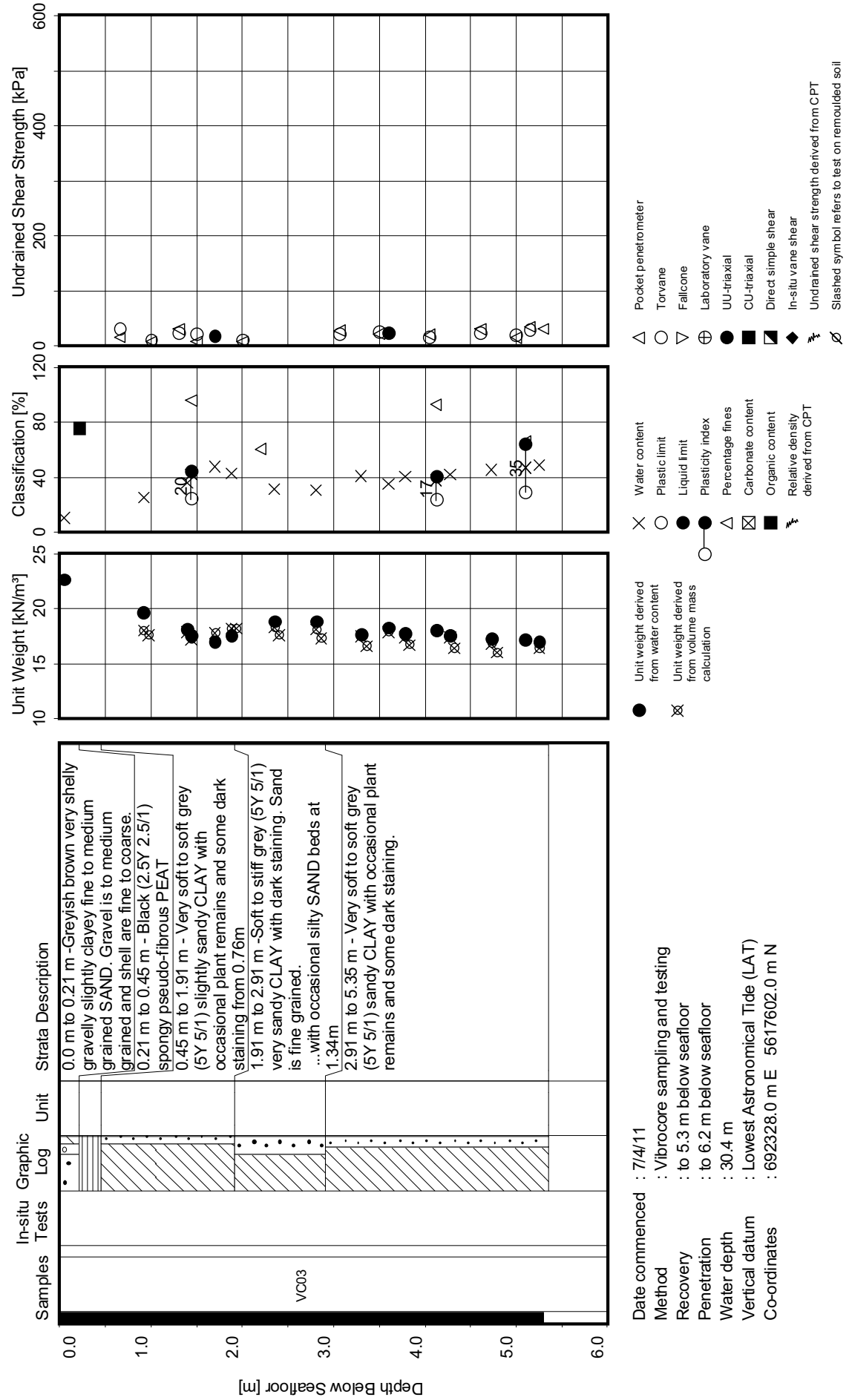
VIBROCORE LOGS

LIST OF PLATES

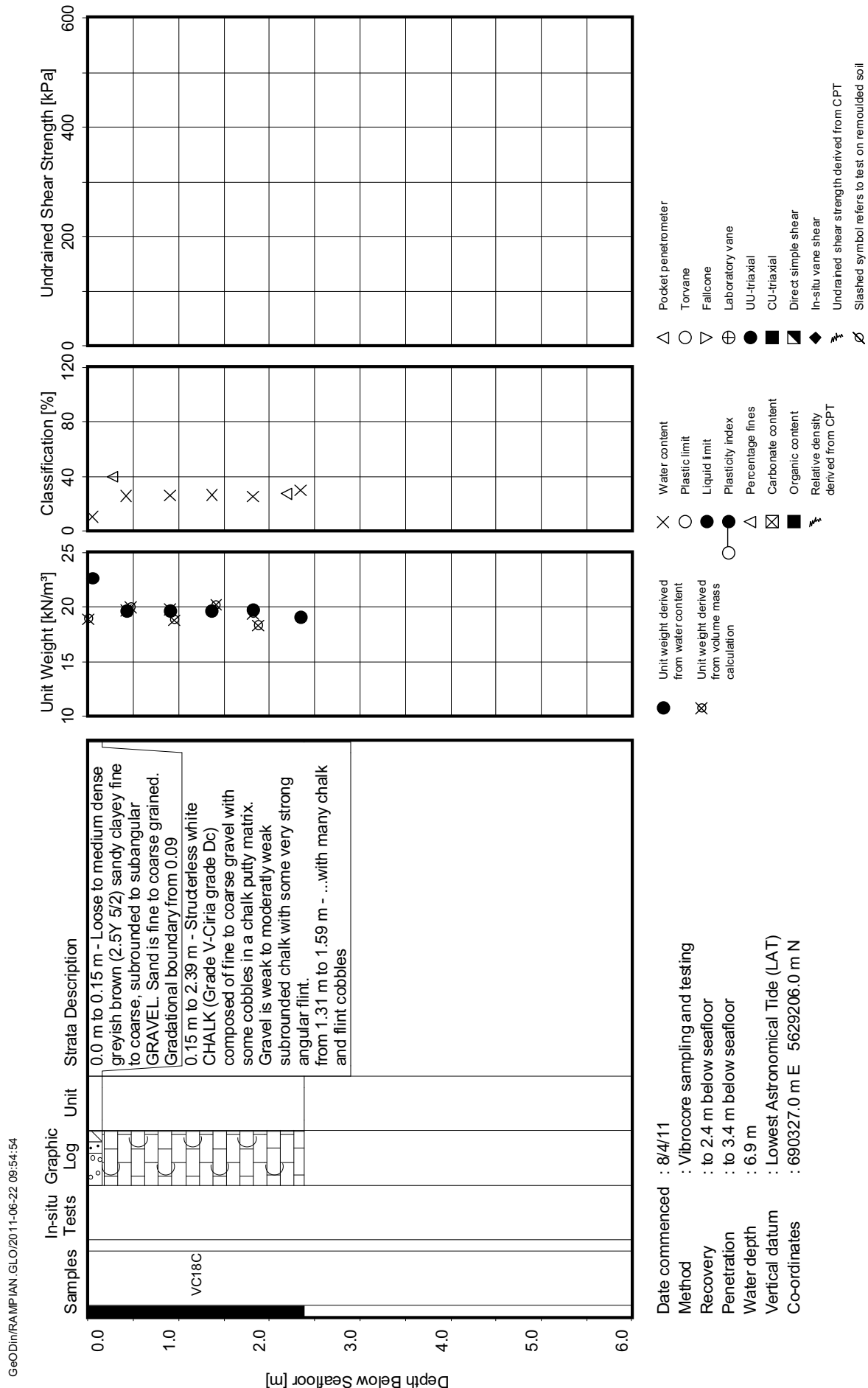
Description	Plates
VIBROCORE LOGS	A1-1 to A1-6



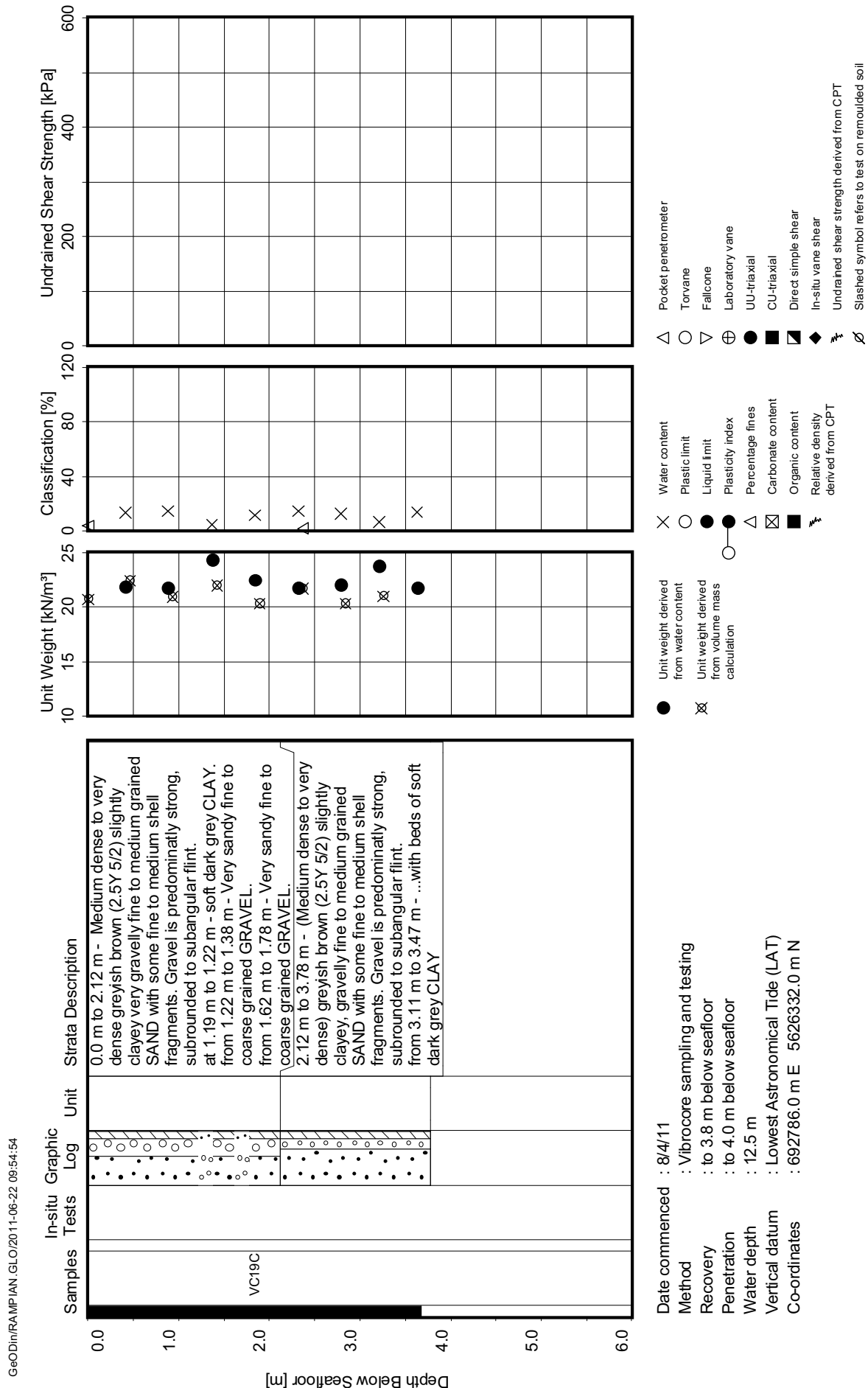
GeODIR/RAMPION.GLO/2011-06-22 09:54:53



GEOTECHNICAL LOG
LOCATION VC 03
Rampion

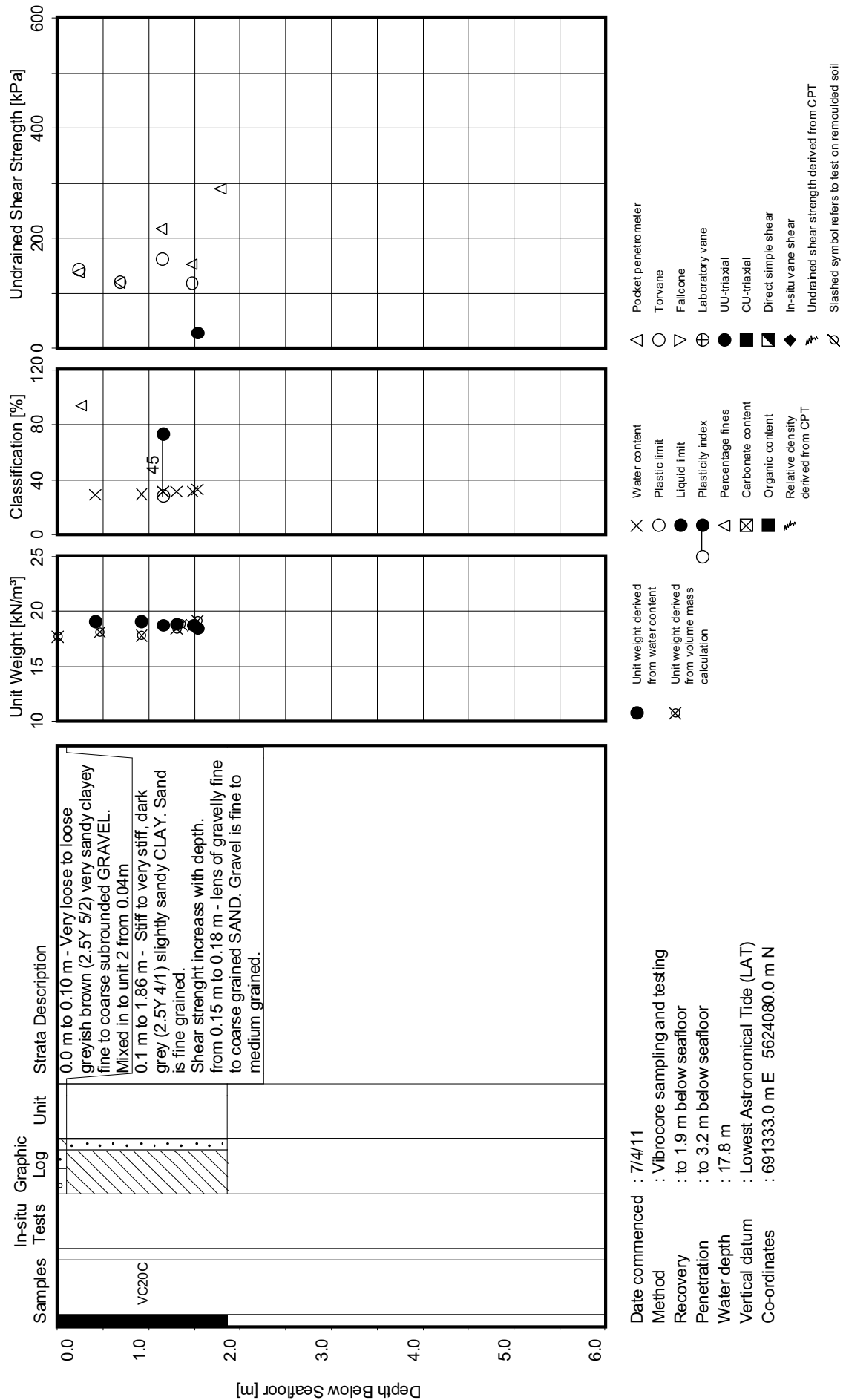


GEOTECHNICAL LOG
LOCATION VC 18C
Rampion



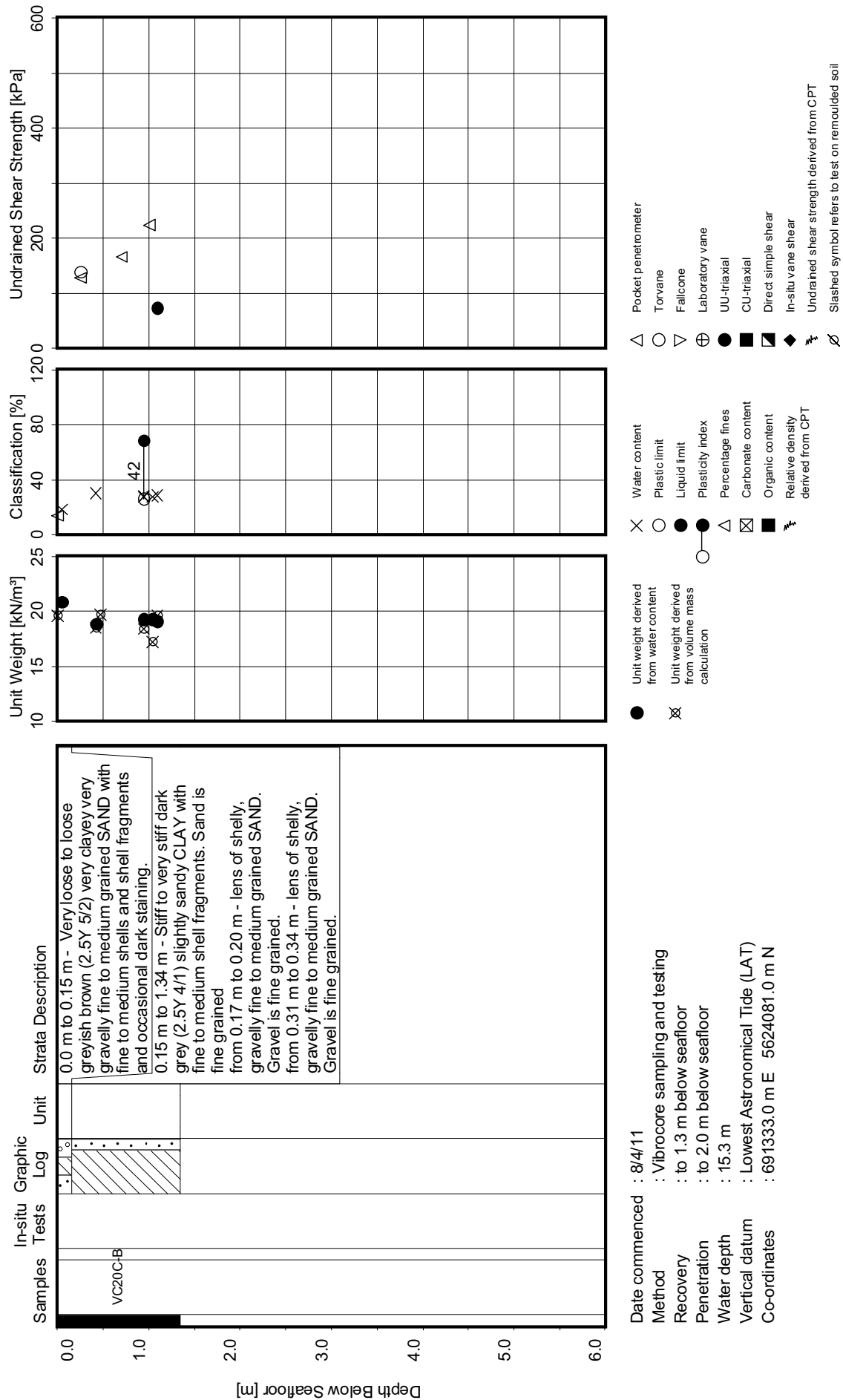
GEOTECHNICAL LOG
LOCATION VC 19C
Rampion

GeODIR/RAMPION.GLO/2011-06-22 09:54:55

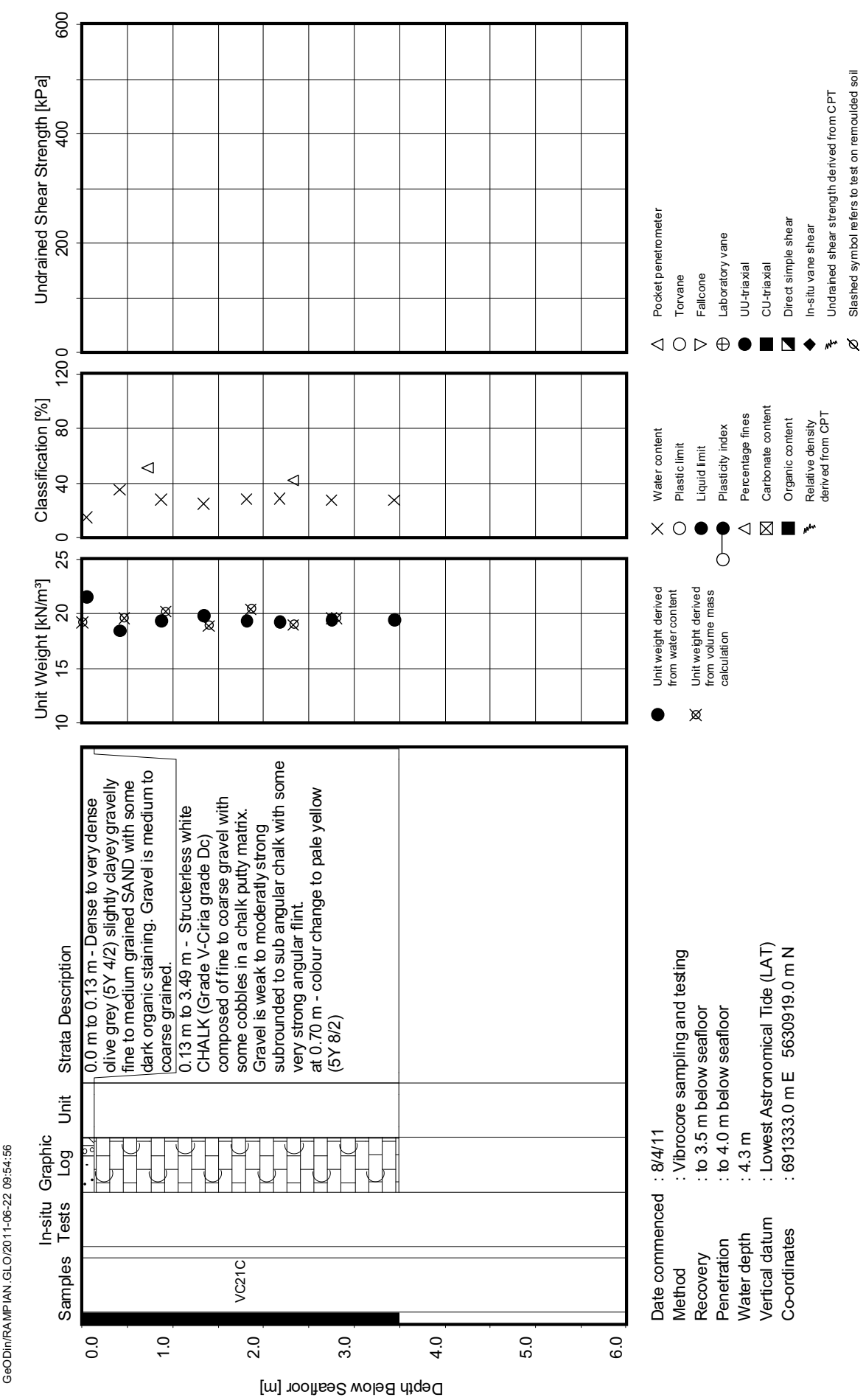


GEOTECHNICAL LOG
LOCATION VC 20C
Rampion

GeODm/RAMPION.GLO/2011-06-22 09:54:55



GEOTECHNICAL LOG
LOCATION VC 20C-B
Rampion



SECTION A2

INTERPRETED GEOTECHNICAL LOGS FROM CPT

A2.	INTERPRETED GEOTECHNICAL LOGS FROM CPT	1
A2.1	Details	1
A2.2	Interpretation of Undrained Shear Strength from CPT's	1
A2.3	Interpretation of Relative Density from CPT's	1

A2. INTERPRETED GEOTECHNICAL LOGS FROM CPT

A2.1 Details

Geotechnical logs for each CPT location are presented in Plates Section A2. The numbering of repetitions is explained in section 2.1 of the Main Text.

These logs have been compiled based upon in-situ test data and laboratory test data. The logs indicate measured and inferred:

- a. Soil layering; including classifications of undrained shear strength in fine-grained cohesive soils.

Soil layering presented on each log is based on observations from the CPT data recovered.

Where repeat CPT's were performed in attempts to secure deeper penetration, the data from the deepest is used in compiling the geotechnical logs.

A2.2 Interpretation of Undrained Shear Strength from CPT's

In fine-grained cohesive (clay) soils, undrained shear strength has been interpreted from CPT data using the relationship:

$$suu = q_{net}/N_{kt}$$

where:

suu = the inferred unconsolidated undrained triaxial shear strength in compression (kPa)

q_{net} = the net cone resistance (kPa)

N_{kt} = an empirical factor relating cone resistance to undrained shear strength

Based on a review of comparable suu and q_{net} data in the Central North Sea, it has been considered appropriate to adopt an N_{kt} range of 15 to 20 to infer the suu profiles that are presented on the logs. This range is typical for Quaternary clays in the North Sea. More details of the methods used to infer q_{net} from CPT data are presented in Section B.

A2.3 Interpretation of Relative Density from CPT's

In cohesionless soil the relative density is estimated using the relationship proposed by Jamiolkowski et al. (1988)

For this report a range of K_o of between 0.5 and 1.0 has been used when estimating the effect of the in-situ horizontal stress, giving an upper and lower bound inferred relative density.

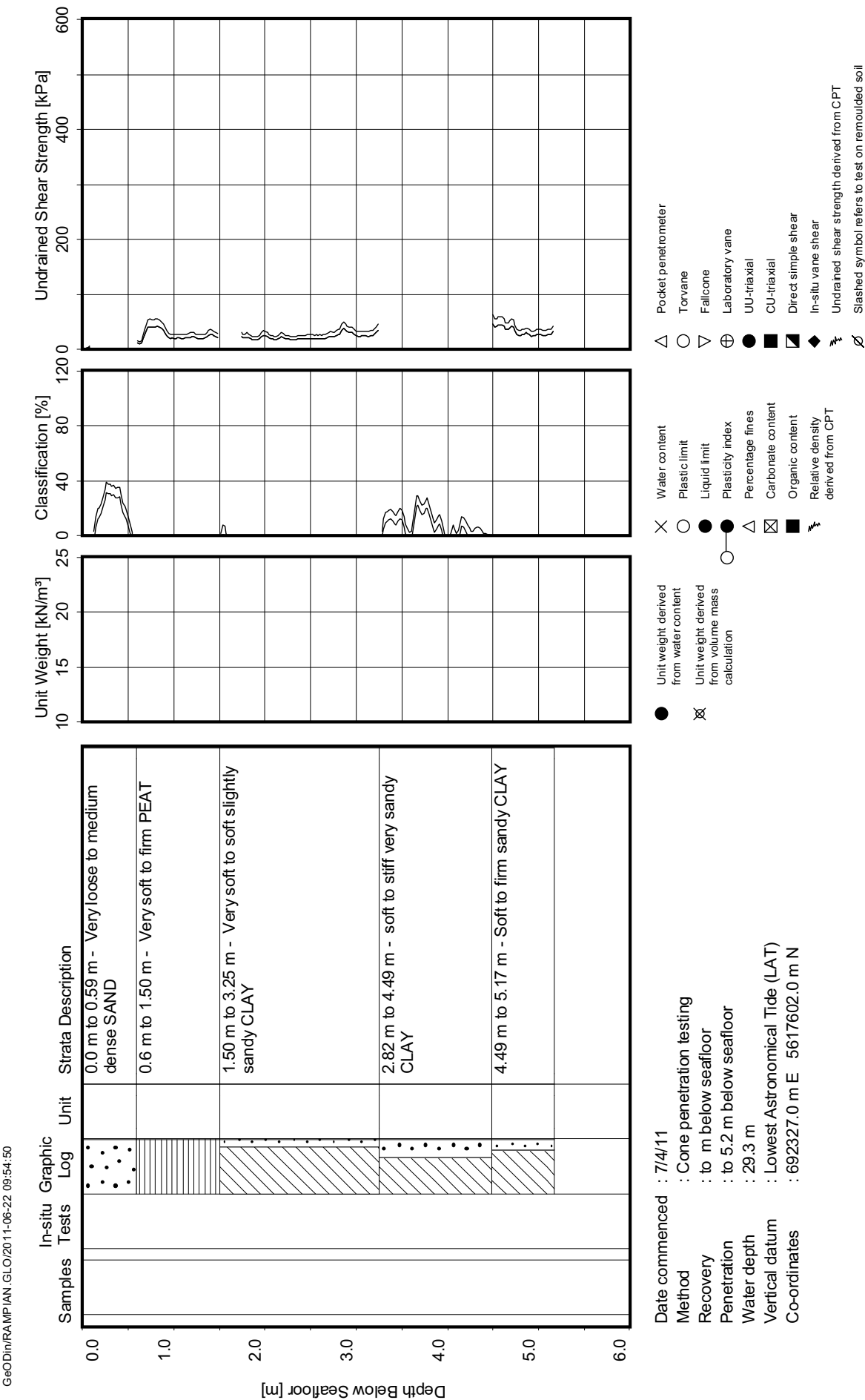
The resulting relative densities have been used to classify the soil for the descriptions accompanying the PCPT results.



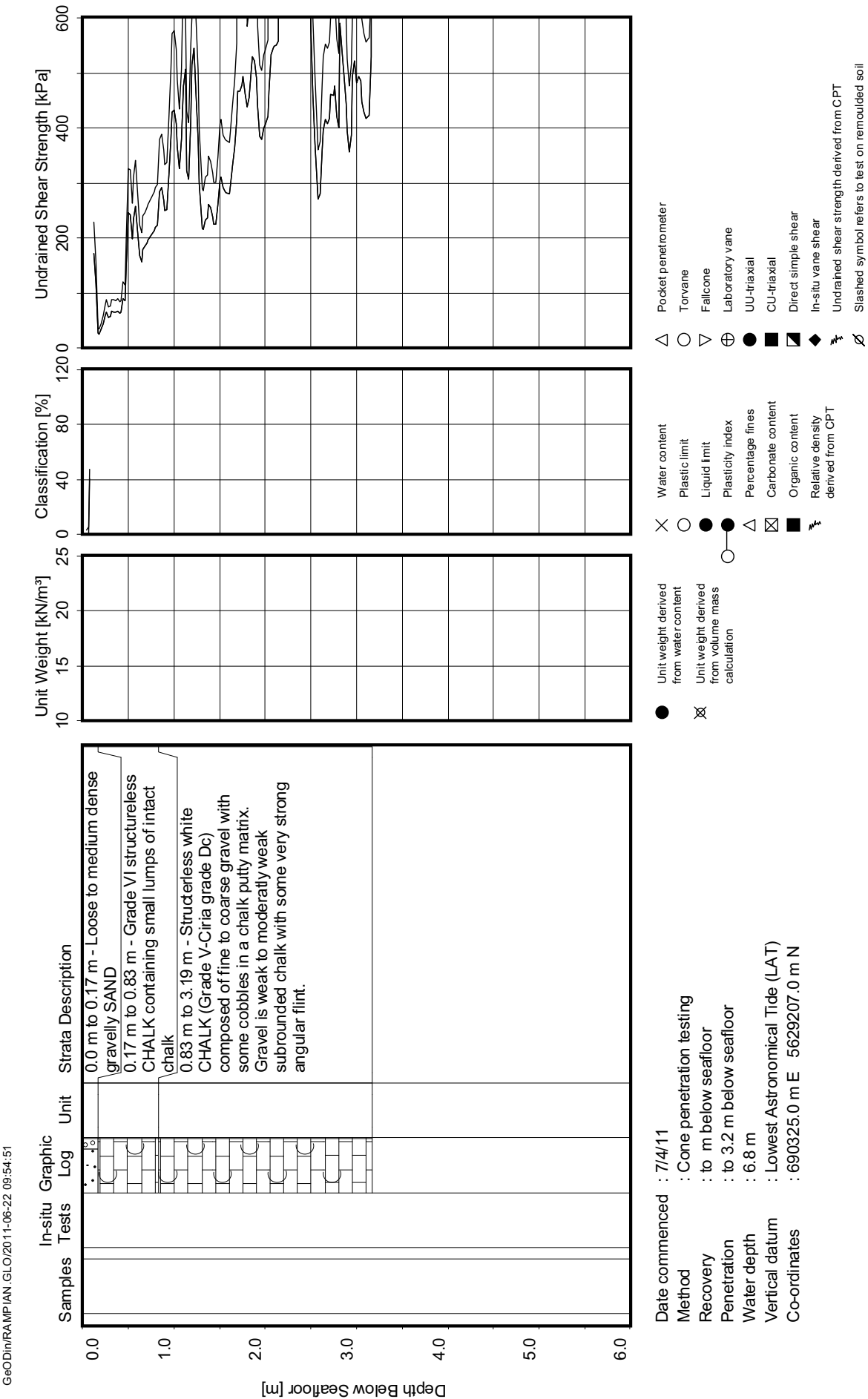
INTERPRETED GEOTECHNICAL LOGS FROM CPT

LIST OF PLATES

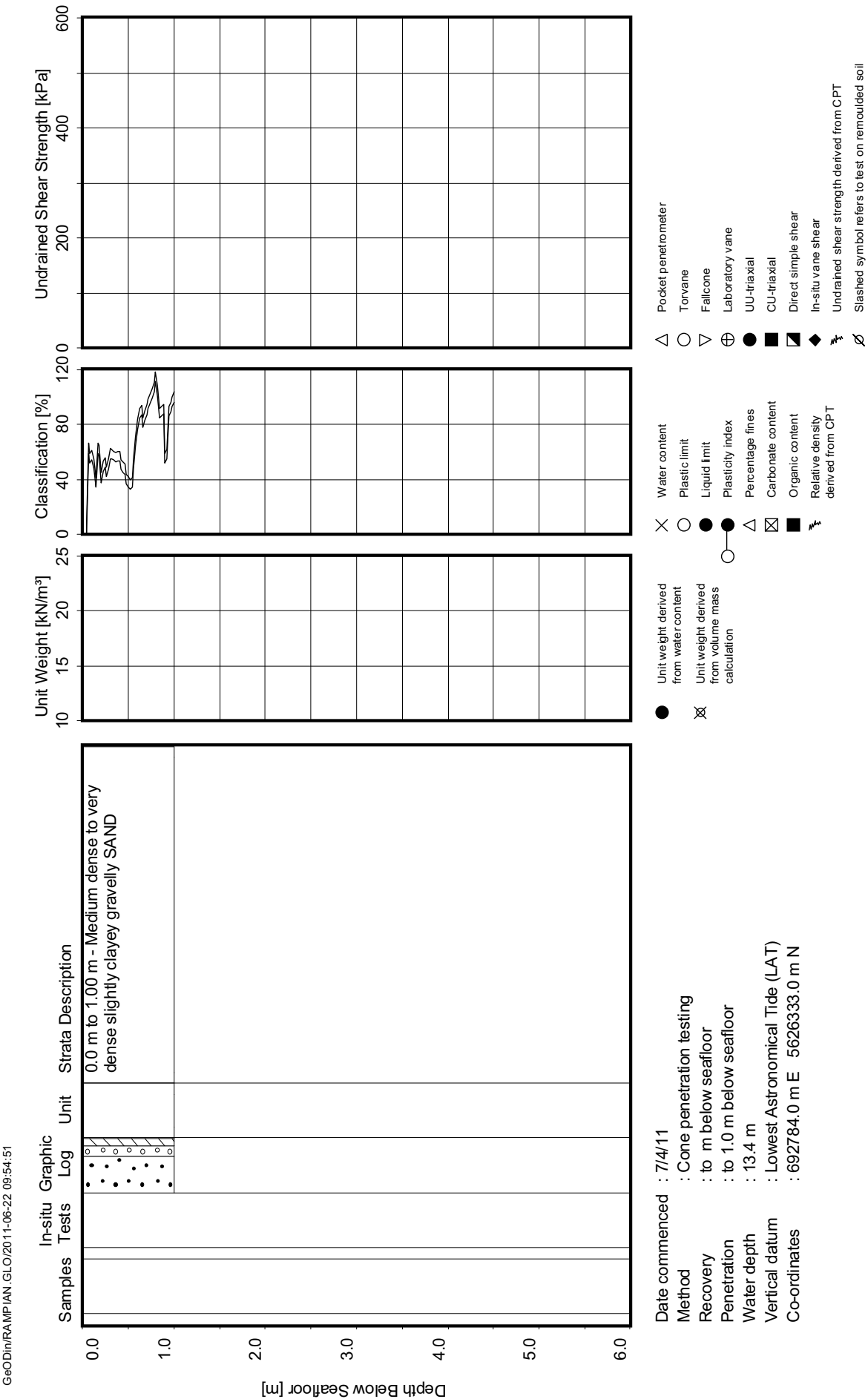
Description	Plates
CPT LOGS	A2-1 to A2-6



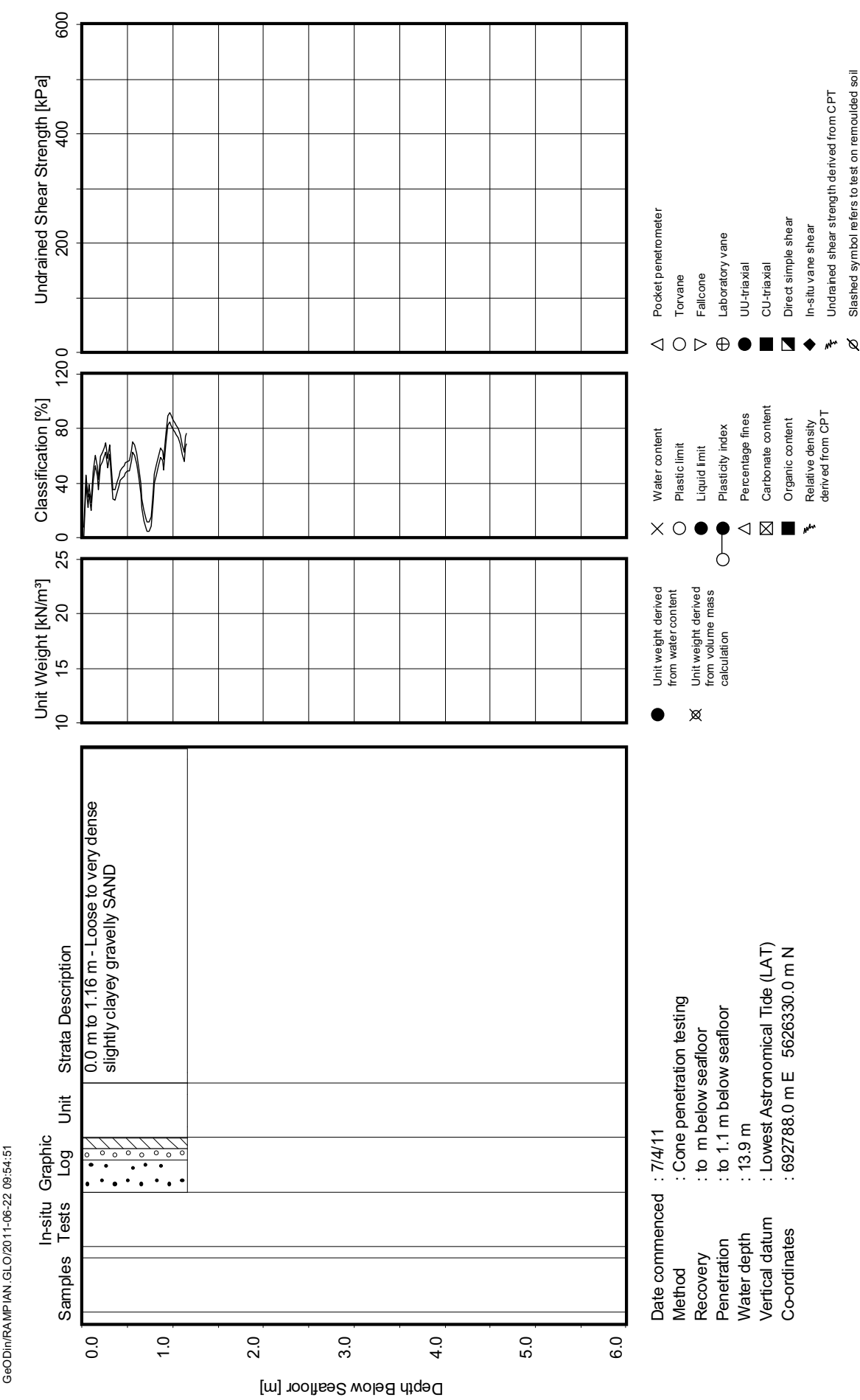
GEOTECHNICAL LOG
LOCATION CPT 03
Rampion



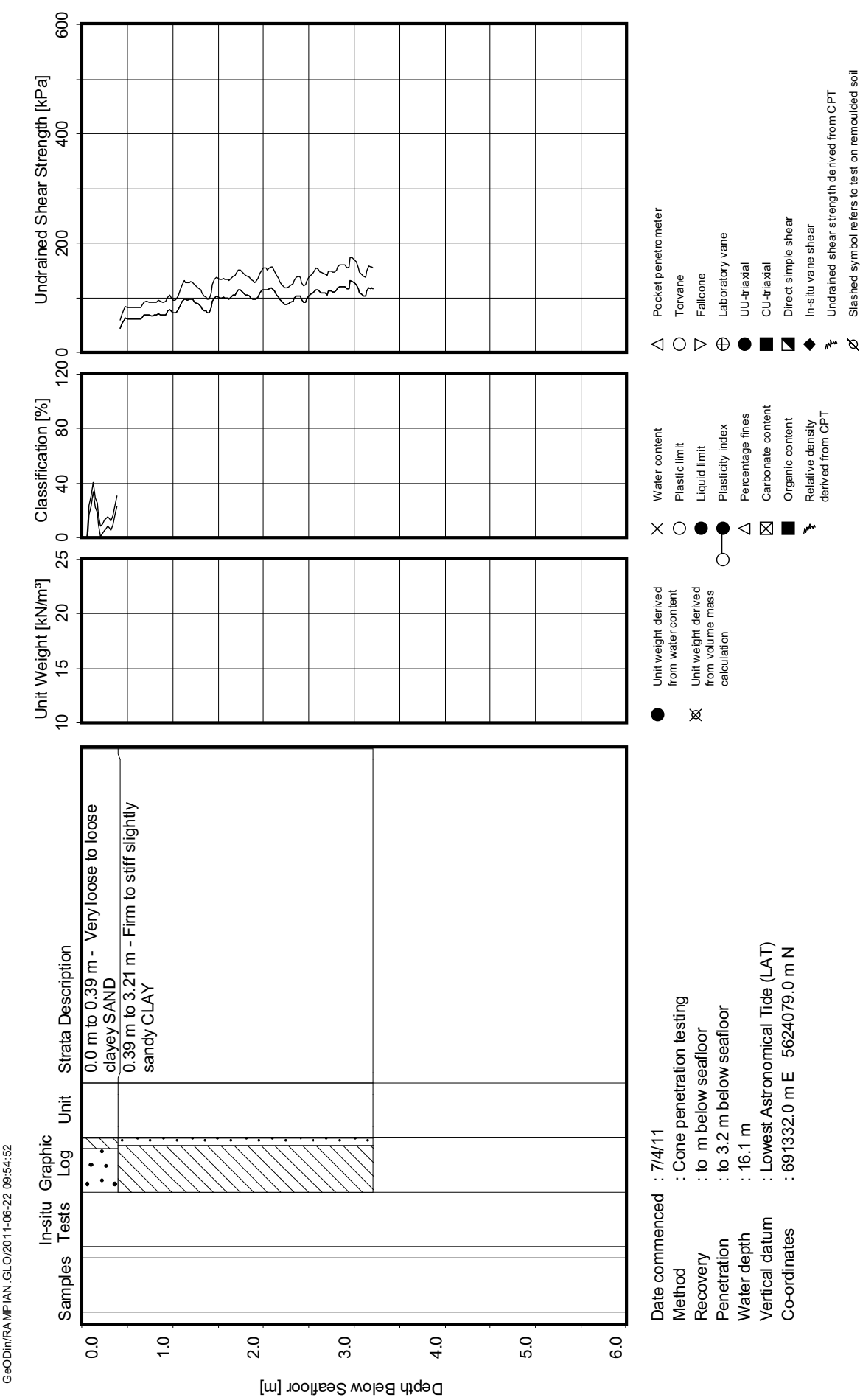
GEOTECHNICAL LOG
LOCATION CPT 18C
Rampion



GEOTECHNICAL LOG
LOCATION CPT 19C
Rampion

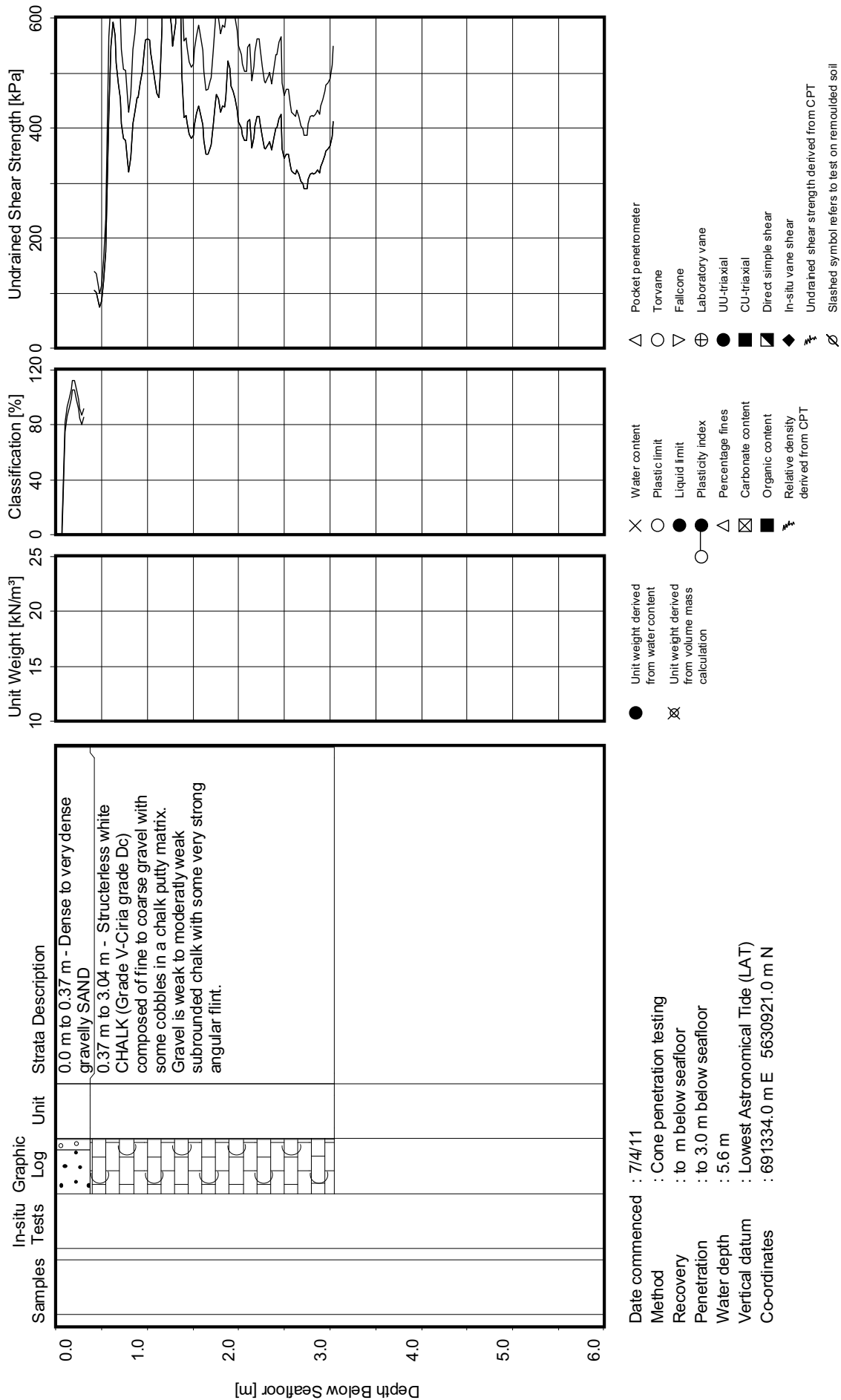


GEOTECHNICAL LOG
LOCATION CPT 19Ca
Rampion



GEOTECHNICAL LOG
LOCATION CPT 20C
Rampion

GeODIR/RAMPION.GLO/2011-06-22 09:54:52



GEOTECHNICAL LOG
LOCATION CPT 21C
Rampion

**SECTION B
IN-SITU TEST DATA**

TABLE OF CONTENTS

B1. CONE PENETRATION TESTS

SECTION B1
CONE PENETRATION TESTS

B1.	CONE PENETRATION TESTS	1
B1.1	Test details	1
B1.2	Results	1
B1.3	Practice for Cone Penetration Testing	2

B1. CONE PENETRATION TESTS

B1.1 Test details

6 Cone Penetration Tests, including retests, were completed at 5 locations along the survey route. Tests that have a small alphabetic suffix after the number are retests on the same location. Tests with a capital alphabetic suffix after the number are new locations.

The ROSON system using piezocones with a projected area of 10cm² and a maximum thrust capacity of 8 tonnes was used during the investigation. Pore pressure measurements were made on the cone shoulder. Corresponding α and β values for the Fugro cones used are 0.75 and 1.0 respectively. A summary of CPT abbreviations and definitions is presented in Appendix I, together with diagrams showing the layout and geometry of the cones that were used during the site investigation.

B1.2 Results

The results of the piezocone penetration tests are presented in the Plates of Section B.

The plots are presented at scales appropriate for the test data ranges. All tests are presented at a vertical scale accommodating up to 6.5 metres penetration.

The PCPT results are presented in graphical format with appended test details, including co-ordinates and water depth at time of testing.

This section presents plots of measured cone data:

Measured cone data:

- a. Cone resistance (q_c).
- b. Cone sleeve friction (f_s).
- c. Pore-water pressure (u_2).
- d. Depth below seabed (corrected for cone inclination).

Calculated cone data:

- a. Total cone resistance (q_t)
- b. Friction ratio (R_f)
- c. Excess pore-water pressure ratio (B_q), the ratio of the measured excess pore-water pressure to the net cone resistance (the total cone resistance minus total overburden pressure relative to mudline), $B_q = (du/q_{net})$

B1.3 Practice for Cone Penetration Testing

TEST CONTROL – PENETRATION

General Procedure:	Refer to document titled “Cone Penetration Testing Operations Manual” (FAOL ref. D-F-005), presented in Appendix 1
Target Accuracy Class:	Class 3
Set-up Stage:	Location as directed by client Cone Penetrometer selected as directed by client and in liason with Fugro Alluvial Offshore Limited
Depth Reference Level:	- Base of seabed frame assumed level with seafloor at start of testing
Additional Measurements:	Not Applicable
Test Stage:	
Test Termination:	Discretion of Operator
Drill-Out:	Not Applicable

CPT APPARATUS

Thrust Machine:	Roson®
Reaction Equipment:	Roson unit with ballast with combined weight of approx. 8 tons
Push Rods:	36mm O.D.
Push Rod Casing:	Not Applicable
Friction Reducer:	Applicable – 0.5m above cone tip
Penetrometer Type:	F5CKEHW2/B Piezocone Penetrometer 50kN load sensor (100kN max load) Non-directional inclinometer 1000 mm ² cone base area 15000 mm ² sleeve area

DATA ACQUISITION AND PROCESSING

Data Recording – Penetration:	Digital, manual and computer software control
Data Recording – Dissipation:	Not Applicable
Depth Correction for Penetrometer	Applicable
Inclination:	

REFERENCES

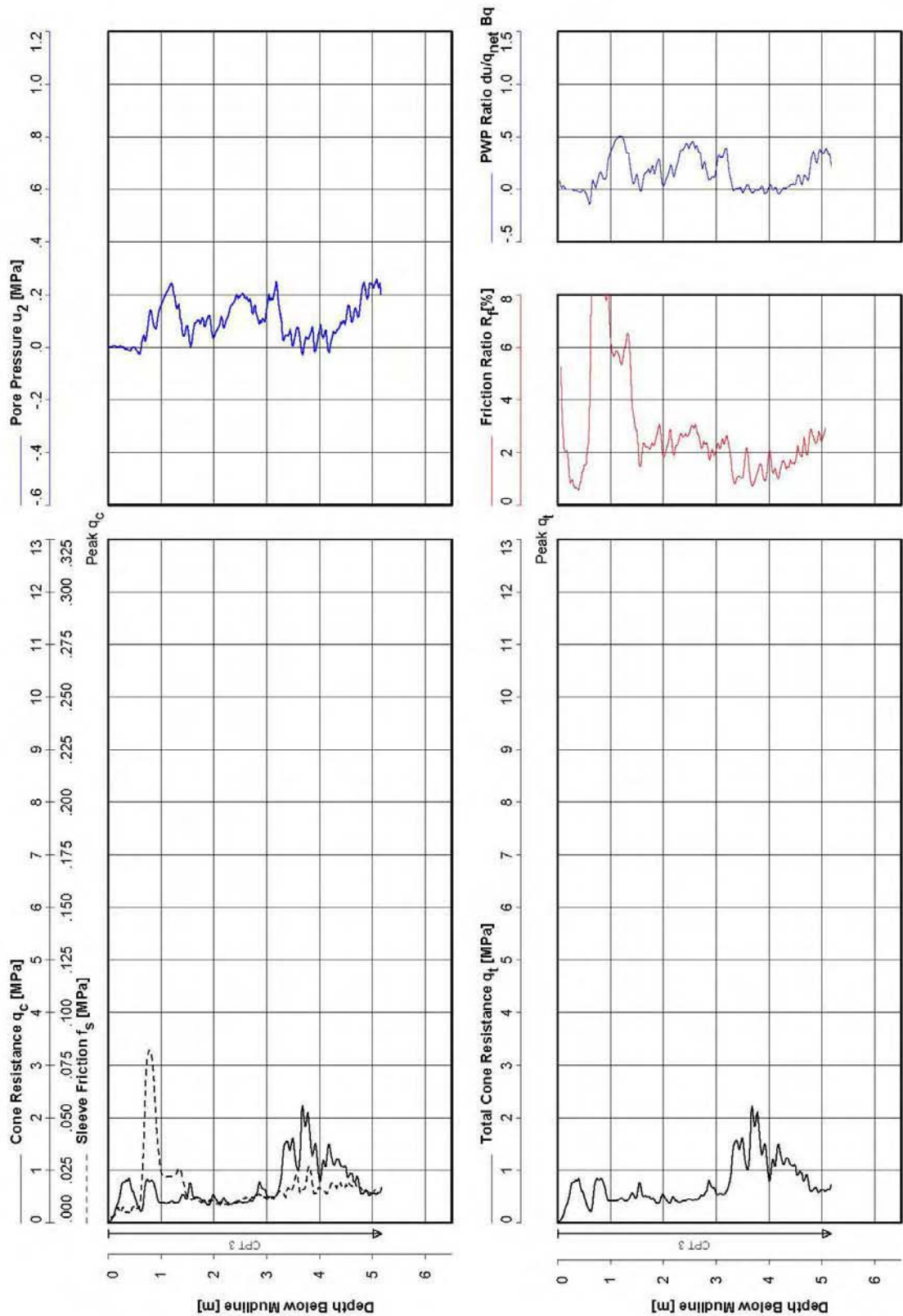
Computer Program UNIPLOT, Processing of CPT data



CONE PENETRATION TESTS (CPT)

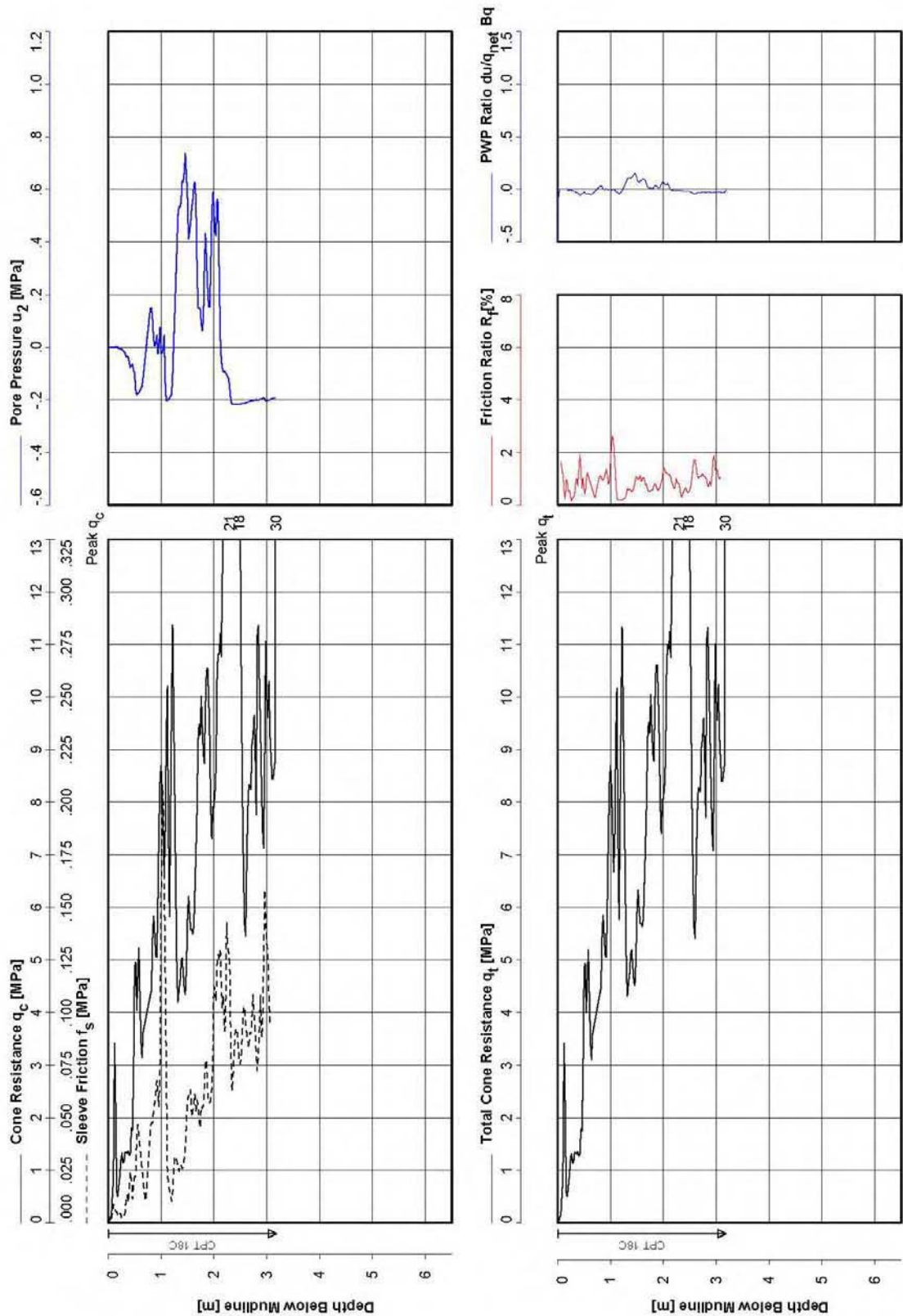
LIST OF PLATES

Description	Plates
CONE PENETRATION TESTS	B-1 to B-6



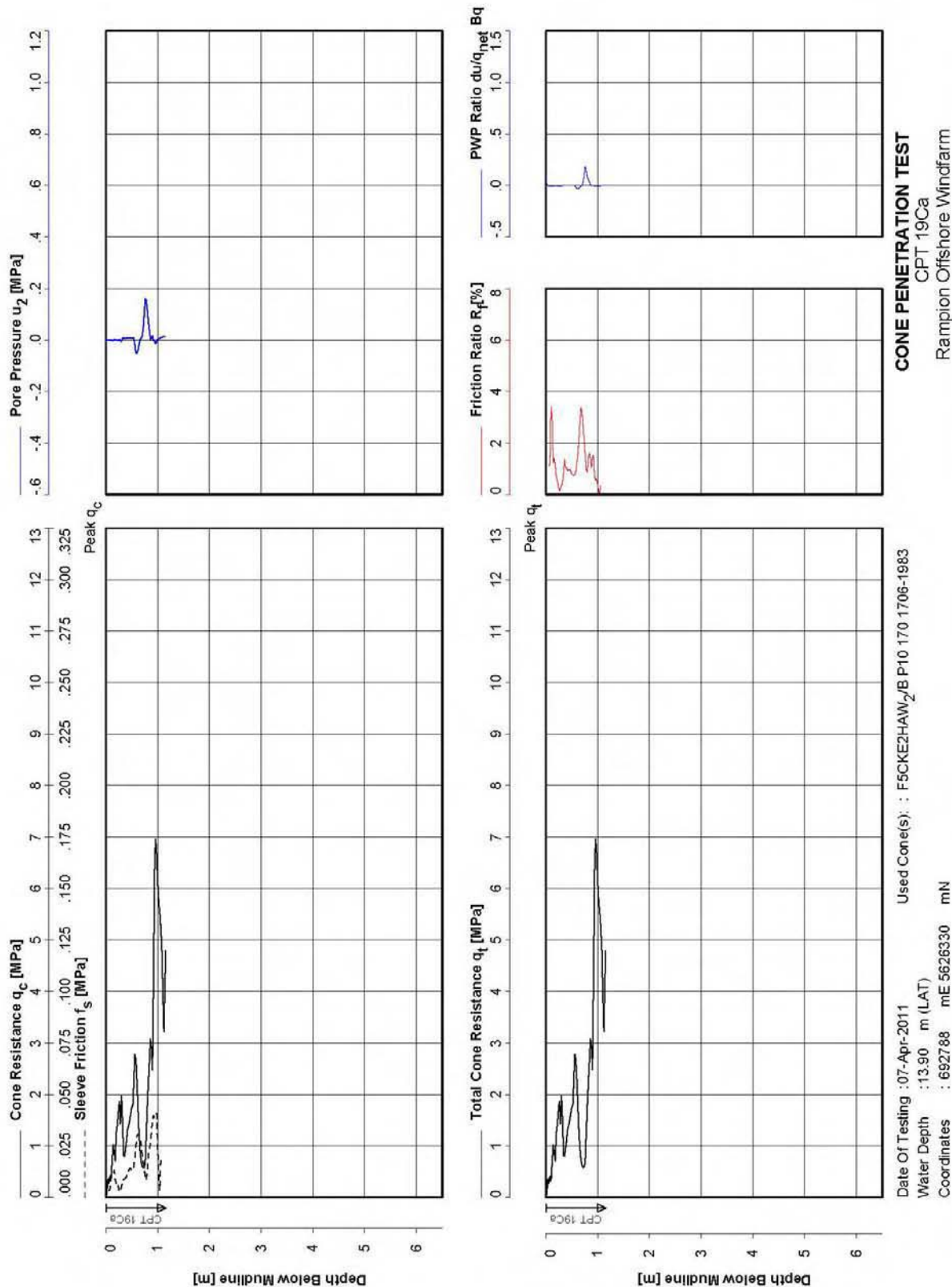
CONE PENETRATION TEST
CPT 3
Rampion Offshore Windfarm

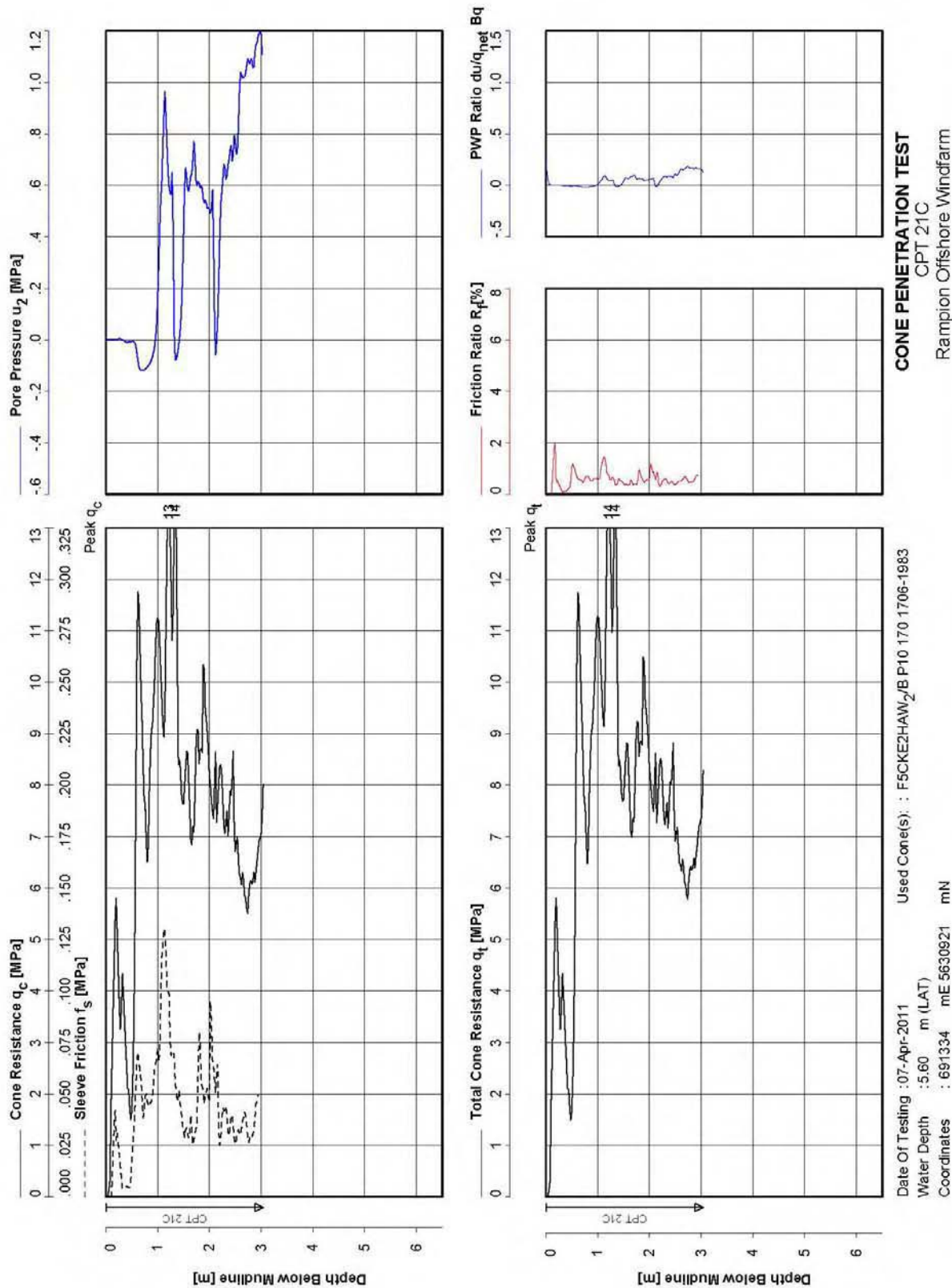
Date Of Testing : 07-Apr-2011
Water Depth : 29.30 m (LAT)
Coordinates : 692327 mE 5617602 mN
Used Cone(s) : F5CKE2HAW2/B P10 1708-1983

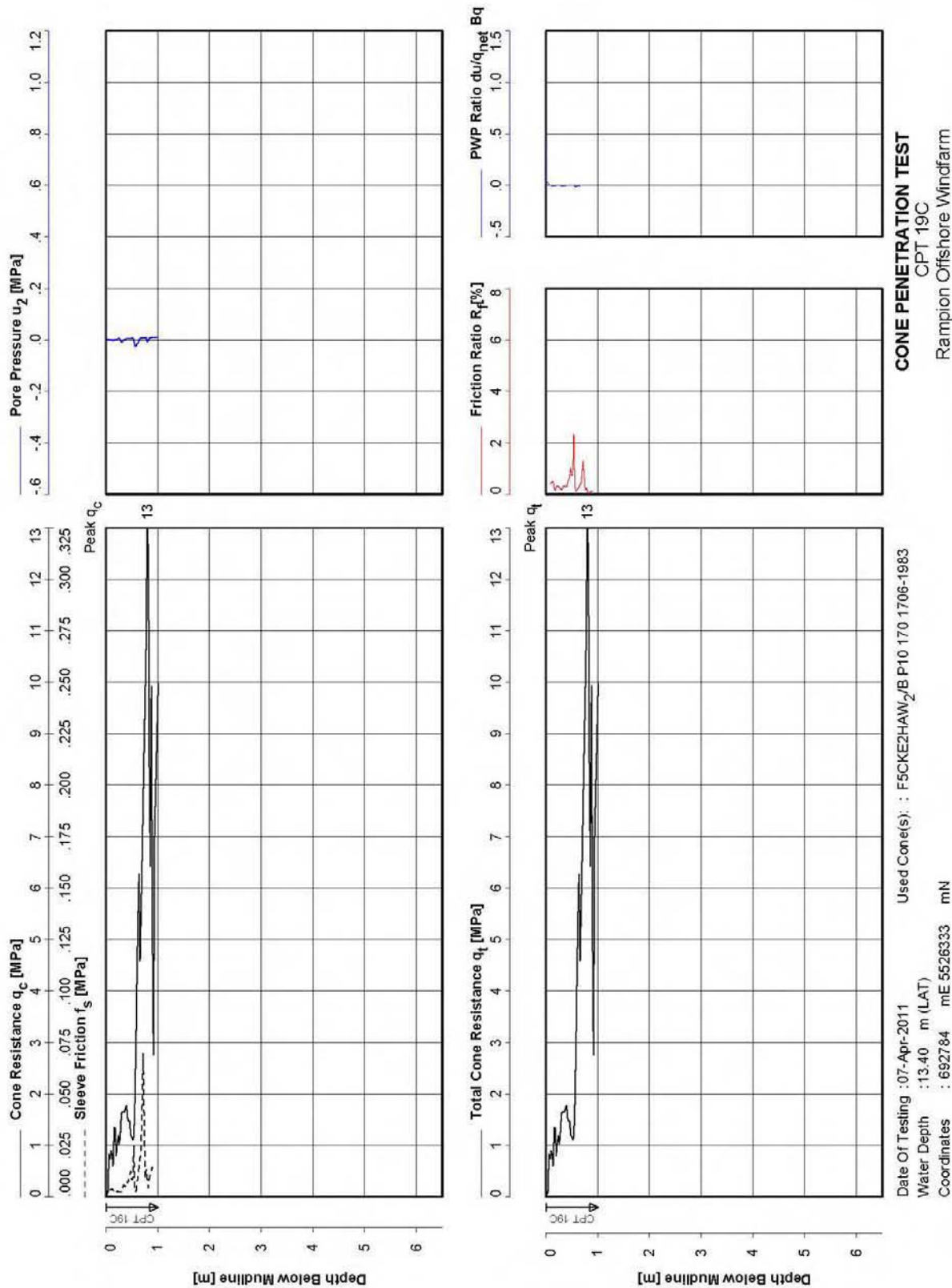


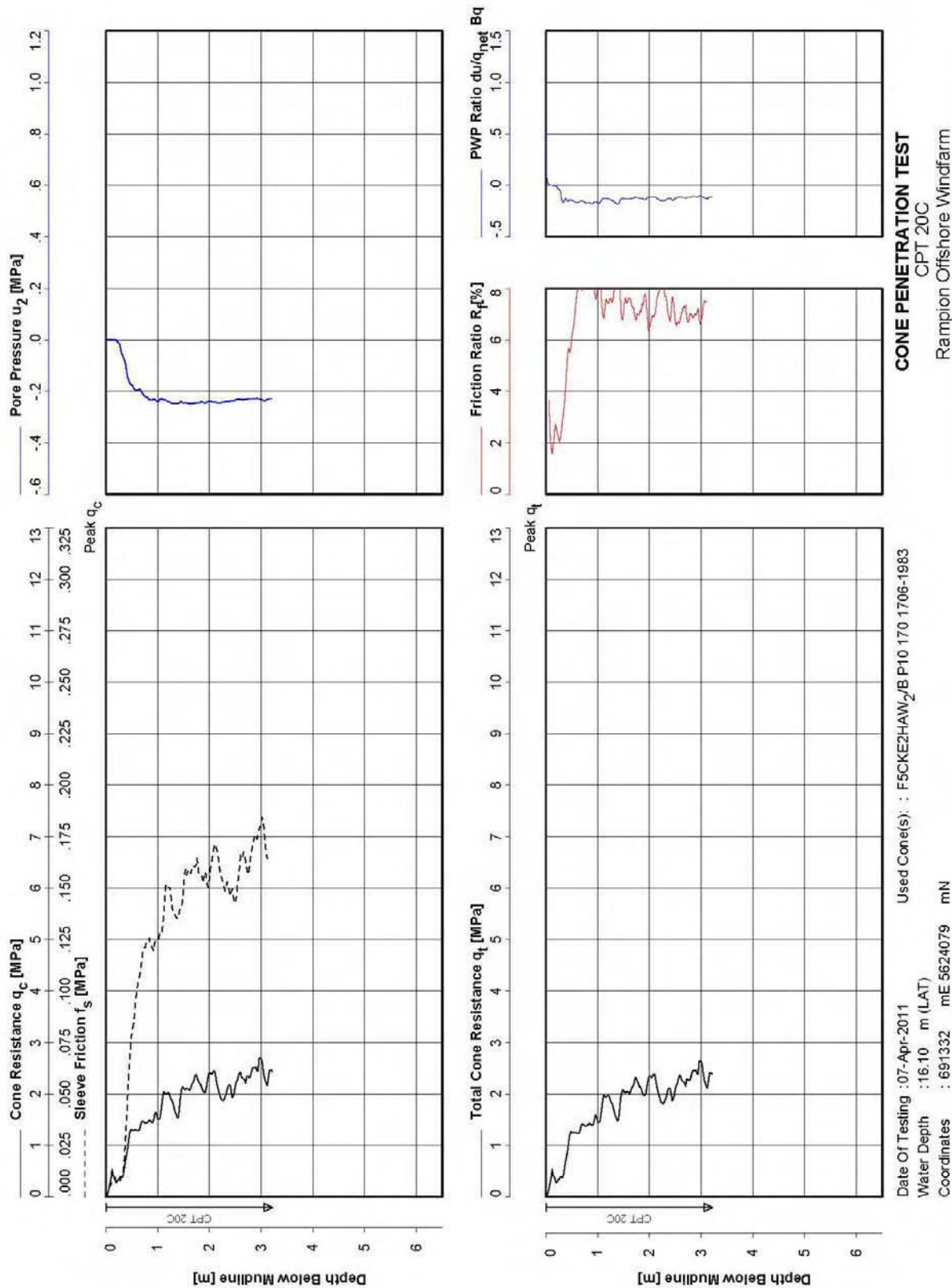
CONE PENETRATION TEST
CPT 18C
Rampion Offshore Windfarm

Date Of Testing : 07-Apr-2011
Water Depth : 6.80 m (LAT)
Coordinates : 690325 mE 5629207 mN
Used Cone(s) : F5CKE2HAW2/B P10 170 1706-1983









**SECTION C
GEOTECHNICAL LABORATORY TEST RESULTS**

TABLE OF CONTENTS

C1.	LABORATORY TESTING OVERVIEW
C2.	INDEX LABORATORY TESTS
C3.	CHEMICAL TESTS
C4.	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (UU) TEST UNCONFINED AND COMPRESSIVE STRENGTH TEST

SECTION C1
LABORATORY TESTING OVERVIEW

C1.	LABORATORY TESTING OVERVIEW	1
C1.1	Schedule of UKAS Accreditation	1
C1.2	Laboratory testing Overview	3
C1.3	Practice for Sample Handling and Laboratory Testing	4

C1. LABORATORY TESTING OVERVIEW

C1.1 Schedule of UKAS Accreditation

The schedule below shows what laboratory tests FAOL have UKAS accreditation for. Table 1 in the Main Text details which tests were performed by FAOL and what tests (if any) have been performed by third party laboratories.

Schedule of Accreditation
issued by
United Kingdom Accreditation Service
21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 4146 Accredited to ISO/IEC 17025:2005	Fugro Alluvial Offshore Limited Issue No: 003 Issue date: 9 September 2010 <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"> Morton Peto Road Gapton Hall Industrial Estate Great Yarmouth Norfolk NR31 0LT </td><td style="width: 50%;"> Contact: Mr A Pearce Tel: +44 (0)1493 650484 Fax: +44 (0)870 402 1399 E-Mail: a.pearce@fugro.com Website: www.alluvial.co.uk </td></tr> </table>	Morton Peto Road Gapton Hall Industrial Estate Great Yarmouth Norfolk NR31 0LT	Contact: Mr A Pearce Tel: +44 (0)1493 650484 Fax: +44 (0)870 402 1399 E-Mail: a.pearce@fugro.com Website: www.alluvial.co.uk
Morton Peto Road Gapton Hall Industrial Estate Great Yarmouth Norfolk NR31 0LT	Contact: Mr A Pearce Tel: +44 (0)1493 650484 Fax: +44 (0)870 402 1399 E-Mail: a.pearce@fugro.com Website: www.alluvial.co.uk		
Testing performed at the above address only			

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
SOILS for civil engineering purposes	Shear strength - small shearbox	BS 1377:Part 7:1990 Documented In-House Method L-T-030a based on BS 1377: Part 7: 1990.
	Shear strength – laboratory vane	BS 1377:Part 7:1990
	Moisture content - oven drying method	BS 1377:Part 2:1990
	Liquid limit - cone penetrometer	BS 1377:Part 2:1990
	Liquid limit - cone penetrometer - one point	BS 1377:Part 2:1990
	Plastic limit	BS 1377:Part 2:1990
	Plasticity index and liquidity index	BS 1377:Part 2:1990
	Density - linear measurement	BS 1377:Part 2:1990
	Particle density – gas jar	BS 1377:Part 2:1990
	Particle density - small pycnometer	BS 1377:Part 2:1990
	Particle size distribution - wet sieving	BS 1377:Part 2:1990
	Particle size distribution - dry sieving	BS 1377:Part 2:1990

 4146 Accredited to ISO/IEC 17025:2005	Schedule of Accreditation issued by United Kingdom Accreditation Service 21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK	
	Fugro Alluvial Offshore Limited Issue No: 003 Issue date: 09 September 2010	
Testing performed at main address only		
Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
SOILS for civil engineering purposes (cont'd)	Particle size distribution - hydrometer method	BS 1377:Part 2:1990
	Resistivity – Wenner probe method	BS 1377:Part 3:1990
	Dry density/moisture content relationship (vibrating hammer)	Documented In-House Method L-T-028a based on BS 1377:Part 4: 1990
	Minimum density of sands	Documented In-House Method L-T-029a based on BS 1377:Part 4: 1990
	Thermal conductivity – transient heat method	Documented In-House Method L-T-042a based on ASTM D5334-08 using FElv Thermcon equipment
	Thermal conductivity – transient heat method	Documented In-House Method L-T-045a based on ASTM D5334-08 using KD2 PRO equipment
END		

C1.2 Laboratory testing Overview

All laboratory tests were performed according to the procedures presented in BS1377 (1990), where appropriate. However, for ease of reference, laboratory method statements for the tests performed during the project are presented in Appendix 1.

In general, the results of the laboratory tests are considered to be of good quality in that they are representative of the soils that were tested. Further discussion of individual test results is presented in the appropriate sections that follow.

C1.3 Practice for Sample Handling and Laboratory Testing

INITIAL SAMPLE HANDLING

Open-Tube Sampler: Identification/labelling and transfer of sample tube to site laboratory

SITE GEOTECHNICAL LABORATORY

Test Programme: Geotechnical classification

Programme Adjustment: Assessment of feasibility of a test (by sample inspection) and, if required, selection of alternative test specimen if adequate test completion proves impracticable

Sample in Liner: Top-bottom visual geotechnical description including visual carbonate content assessment

Top-bottom geotechnical classification testing (pocket penetrometer, torvane)

Labelling for preservation in liner

Sample in Bag(s): Visual geotechnical description including visual carbonate content assessment

Labelling for disturbed preservation sections

SAMPLE PROTECTION

Packaging of Sample in Liner: Fixing of plastic end caps

Placement in labelled shipping container for vertical transport of samples

On-Site Sample/Core Storage: On-board storage area

SAMPLE TRANSPORT

Fugro Sample Transport: Shipping containers off-loading from vessel at port of demobilisation

Road-freight and air freight to Fugro Alluvial Soils Laboratory

Client Sample Transport: Not applicable

OFFICE GEOTECHNICAL LABORATORY

Test Programme: Geotechnical classification, strength and stiffness

Chemical Analysis

Programme Adjustment: Assessment of feasibility of a test (by sample inspection) prior to start of specimen preparation

Decision by laboratory: (1) to proceed with test, (2) not to proceed with test, (3) to advise adjustments to test procedure

Selection by laboratory of alternative test specimen if decision is "not to proceed" or when adequate test completion proves impracticable

Sample in Liner: Longitudinal cutting of liner

Visual geotechnical description

Photography of selected sample section(s)

Geotechnical test specimen selection, removal from liner and preparation for testing

Geotechnical testing

Labelling of geotechnical sample sections for undisturbed preservation and/or disturbed preservation

Sample in Plastic Bags If applicable, selection and labelling of left-over sample sections for disturbed preservation

SAMPLE STORAGE AND DISPOSITION

Sample Storage: 3 Months from Final Report

Final Disposition: In accordance with office laboratory procedures



LABORATORY TESTING OVERVIEW

LIST OF PLATES

Description	Plates
SUMMARY OF LABORATORY TEST RESULTS	C1-1 to C1-7

Sample		w	Unit Weight [kN/m ³]			P _s	pH	Carb. Cont.	Org. Cont.	Atterberg Limits			Fines	c _u [kPa]			
No.	Depth		γ ₁	γ ₂	γ _d					w _p	w _L	I _p		PP	TV	UU	LV
	[m]	[%]				[Mg/m ³]		[%]	[%]	[%]	[%]	[%]	[%]				
03	0.05	10	22.6														
	0.21								75								
	0.66													17	30		
	0.92	25	19.6	18.0	14.4												
	0.97			17.6													
	1.00													8	10		
	1.30													31	22		
	1.39	36	18.1	17.9	13.2												
	1.44	42	17.5	17.2						24	44	20	96				
	1.60													8	20		
	1.70	48	16.9	17.8												16	
	1.88	43	17.5	18.2	12.7												
	1.93			18.2													
	2.00													8	10		
	2.20												61				
	2.35	31	18.8	18.3	14.0												
	2.40			17.6													
	2.81	31	18.8	18.1	13.8												
	2.86			17.3													
	3.06													28	21		
	3.30	41	17.6	17.5	12.4												
	3.36			16.6													
	3.50													23	25		
	3.60	35	18.2	17.9												23	
	3.78	40	17.7	17.4	12.4												
	3.83			16.7													
	4.05													20	15		
	4.12	38	18.0							23	40	17	93				
	4.27	42	17.5	17.4	12.2												
	4.32			16.4													

Key:

w : water content

γ₁ : unit weight derived from water content

γ₂ : unit weight derived from volume mass calculation

γ_d : dry unit weight of ground

ρ : density of solid particles

pH : pH

Carb. Cont. : carbonate content

Org. Cont. : organic matter content

w_p : plastic limit

w_L : liquid limit

I_p : plasticity index

Fines : mass percentage of material passing 63 μm or 75 μm sieve

PP : pocket penetrometer

TV : torvane

UU : Unconsolidated Undrained Triaxial

LV : laboratory vane

c_u : undrained shear strength

10r : r refers to test on remoulded soil

LABORATORY CLASSIFICATION TEST RESULTS

LOCATION VC 03

Rampion

GeoDinRAMPION LAB SUM GLO/2011-08-21 17:41:34

Sample		w	Unit Weight [kN/m ³]			p _s	pH	Carb. Cont.	Org. Cont.	Atterberg Limits			Fines	c _u [kPa]			
No.	Depth		γ ₁	γ ₂	γ _d					w _p	w _L	I _p		PP	TV	UU	LV
	[m]	[%]				[Mg/m ³]		[%]	[%]	[%]	[%]	[%]	[%]				
	4.60													30	23		
	4.73	45	17.2	16.8	11.5												
	4.79			16.0													
	5.00													15	18		
	5.10	47	17.1							29	64	35	66				
	5.15													35	28		
	5.25	49	16.9	16.4	11.0												
	5.30													31			
Key: w : water content γ ₁ : unit weight derived from water content γ ₂ : unit weight derived from volume mass calculation γ _d : dry unit weight of ground p : density of solid particles pH : pH Carb. Cont. : carbonate content Org. Cont. : organic matter content w _p : plastic limit w _L : liquid limit I _p : plasticity index Fines : mass percentage of material passing 63 μm or 75 μm sieve PP : pocket penetrometer TV : torvane UU : Unconsolidated Undrained Triaxial LV : laboratory vane c _u : undrained shear strength 10r : r refers to test on remoulded soil																	

LABORATORY CLASSIFICATION TEST RESULTS

LOCATION VC 03
Rampton

GeoDirRAMPION LAB SUM GLO/2011-08-21 17:41:34

Sample		w	Unit Weight [kN/m ³]			P _s	pH	Carb. Cont.	Org. Cont.	Atterberg Limits			Fines	c _u [kPa]			
No.	Depth		γ ₁	γ ₂	γ _d					w _p	w _L	I _p		PP	TV	UU	LV
	[m]	[%]				[Mg/m ³]		[%]	[%]	[%]	[%]	[%]	[%]				
18C	0.00			18.9													
	0.05	10	22.6														
	0.27												40				
	0.42	26	19.6	19.7	15.6												
	0.47			20.0													
	0.90	26	19.6	19.8	15.7												
	0.95			18.8													
	1.36	26	19.6														
	1.41			20.2													
	1.44						8.5										
	1.82	25	19.7	19.4	15.5												
	1.87			18.3													
	2.19												27				
	2.34	30	19.0														
Key: w : water content γ ₁ : unit weight derived from water content γ ₂ : unit weight derived from volume mass calculation γ _d : dry unit weight of ground ρ : density of solid particles pH : pH Carb. Cont. : carbonate content Org. Cont. : organic matter content w _p : plastic limit w _L : liquid limit I _p : plasticity index Fines : mass percentage of material passing 63 μm or 75 μm sieve PP : pocket penetrometer TV : torvane UU : Unconsolidated Undrained Triaxial LV : laboratory vane c _u : undrained shear strength 10r : r refers to test on remoulded soil																	

LABORATORY CLASSIFICATION TEST RESULTS

LOCATION VC 18C
Rampton

GeoDirRAMPION LAB SUM GLO/2011-08-21 17:41:35

Sample		w	Unit Weight [kN/m ³]			P _s	pH	Carb. Cont.	Org. Cont.	Atterberg Limits			Fines	c _u [kPa]			
No.	Depth		γ ₁	γ ₂	γ ₀					w _p	w _L	I _p		PP	TV	UU	LV
	[m]	[%]				[Mg/m ³]		[%]	[%]	[%]	[%]	[%]	[%]				
19C	0.00			20.7									4				
	0.41	14	21.8														
	0.46			22.4													
	0.88	14	21.7														
	0.93			20.9													
	1.37	5	24.3														
	1.42			22.0													
	1.84	11	22.4														
	1.89			20.3													
	2.32	14	21.7														
	2.37			21.7									2				
	2.79	13	22.0														
	2.84			20.3													
	3.21	7	23.7	9.2	8.6												
	3.26			21.0													
	3.63	14	21.7	9.0	7.9												
Key: w : water content γ ₁ : unit weight derived from water content γ ₂ : unit weight derived from volume mass calculation γ ₀ : dry unit weight of ground ρ : density of solid particles pH : pH Carb. Cont. : carbonate content Org. Cont. : organic matter content w _p : plastic limit w _L : liquid limit I _p : plasticity index Fines : mass percentage of material passing 63 μm or 75 μm sieve PP : pocket penetrometer TV : torvane UU : Unconsolidated Undrained Triaxial LV : laboratory vane c _u : undrained shear strength 10r : r refers to test on remoulded soil																	

LABORATORY CLASSIFICATION TEST RESULTS

LOCATION VC 19C
Rampton

GeoDirRAMPJIAN LAB SUM GLO/2011-08-21 17:41:35

Sample		w	Unit Weight [kN/m ³]			P _s	pH	Carb. Cont.	Org. Cont.	Atterberg Limits			Fines	c _u [kPa]			
No.	Depth		γ ₁	γ ₂	γ _d					w _p	w _L	I _p		PP	TV	UU	LV
	[m]	[%]				[Mg/m ³]		[%]	[%]	[%]	[%]	[%]	[%]				
20C	0.00			17.7													
	0.23												94	138	143		
	0.26																
	0.41	29	19.0														
	0.46			18.1													
	0.68													120	120		
	0.92	29	19.0	17.8													
	1.14													217	163		
	1.15	32	18.7				8.4			28	73	45					
	1.30	31	18.8	18.4	14.0												
	1.35			18.8													
	1.47													153	118		
	1.48	32	18.7	18.7	14.2												
	1.53	33	18.4	19.1												27	
	1.78													290			
Key: w : water content γ ₁ : unit weight derived from water content γ ₂ : unit weight derived from volume mass calculation γ _d : dry unit weight of ground ρ : density of solid particles pH : pH Carb. Cont. : carbonate content Org. Cont. : organic matter content w _p : plastic limit w _L : liquid limit I _p : plasticity index Fines : mass percentage of material passing 63 μm or 75 μm sieve PP : pocket penetrometer TV : torvane UU : Unconsolidated Undrained Triaxial LV : laboratory vane c _u : undrained shear strength 10r : r refers to test on remoulded soil																	

LABORATORY CLASSIFICATION TEST RESULTS

LOCATION VC 20C
Rampton

GeoDirRAMPION LAB SUM GLO/2011-08-21 17:41:35

Sample		w	Unit Weight [kN/m ³]			p _s	pH	Carb. Cont.	Org. Cont.	Atterberg Limits			Fines	c _u [kPa]			
No.	Depth		γ ₁	γ ₂	γ _d					w _p	w _L	I _p		PP	TV	UU	LV
	[m]	[%]				[Mg/m ³]		[%]	[%]	[%]	[%]	[%]	[%]				
20C-B	0.00			19.6									14				
	0.05	19	20.8											128	138		
	0.25																
	0.42	31	18.8	18.5	14.2												
	0.47			19.7													
	0.70													166			
	0.94	28	19.2	18.4						26	68	42					
	1.01													224			
	1.04	28	19.2	17.2	13.4												
	1.09	29	19.0	19.6												72	
Key: w : water content γ ₁ : unit weight derived from water content γ ₂ : unit weight derived from volume mass calculation γ _d : dry unit weight of ground p : density of solid particles pH : pH Carb. Cont. : carbonate content Org. Cont. : organic matter content w _p : plastic limit w _L : liquid limit I _p : plasticity index Fines : mass percentage of material passing 63 μm or 75 μm sieve PP : pocket penetrometer TV : torvane UU : Unconsolidated Undrained Triaxial LV : laboratory vane c _u : undrained shear strength 10r : r refers to test on remoulded soil																	

LABORATORY CLASSIFICATION TEST RESULTS

LOCATION VC 20C-B
Rampton

GeoDirRAMPION LAB SUM GLO/2011-08-21 17:41:36

Sample		w	Unit Weight [kN/m ³]			P _s	pH	Carb. Cont.	Org. Cont.	Atterberg Limits			Fines	c _u [kPa]			
No.	Depth		γ ₁	γ ₂	γ ₀					w _p	w _L	I _p		PP	TV	UU	LV
	[m]	[%]				[Mg/m ³]		[%]	[%]	[%]	[%]	[%]	[%]				
21C	0.00			19.2													
	0.05	15	21.5														
	0.41	35	18.4														
	0.46			19.6													
	0.72												51				
	0.87	28	19.3														
	0.92			20.2													
	1.34	25	19.8														
	1.39			18.9													
	1.81	28	19.3														
	1.86			20.4													
	2.18	29	19.2														
	2.33			19.0									42				
	2.75	27	19.4	19.6	15.4												
	2.80			19.6													
	3.44	28	19.4														
Key: w : water content γ ₁ : unit weight derived from water content γ ₂ : unit weight derived from volume mass calculation γ ₀ : dry unit weight of ground ρ : density of solid particles pH : pH Carb. Cont. : carbonate content Org. Cont. : organic matter content w _p : plastic limit w _L : liquid limit I _p : plasticity index Fines : mass percentage of material passing 63 μm or 75 μm sieve PP : pocket penetrometer TV : torvane UU : Unconsolidated Undrained Triaxial LV : laboratory vane c _u : undrained shear strength 10r : r refers to test on remoulded soil																	

LABORATORY CLASSIFICATION TEST RESULTS

LOCATION VC 21C
Rampton

GeoDirRAMPION LAB SUM GLO/2011-08-21 17:41:36



SECTION C2
INDEX LABORATORY TESTS

C2.	INDEX LABORATORY TESTS	1
C2.1	Details	1

C2. INDEX LABORATORY TESTS

C2.1 Details

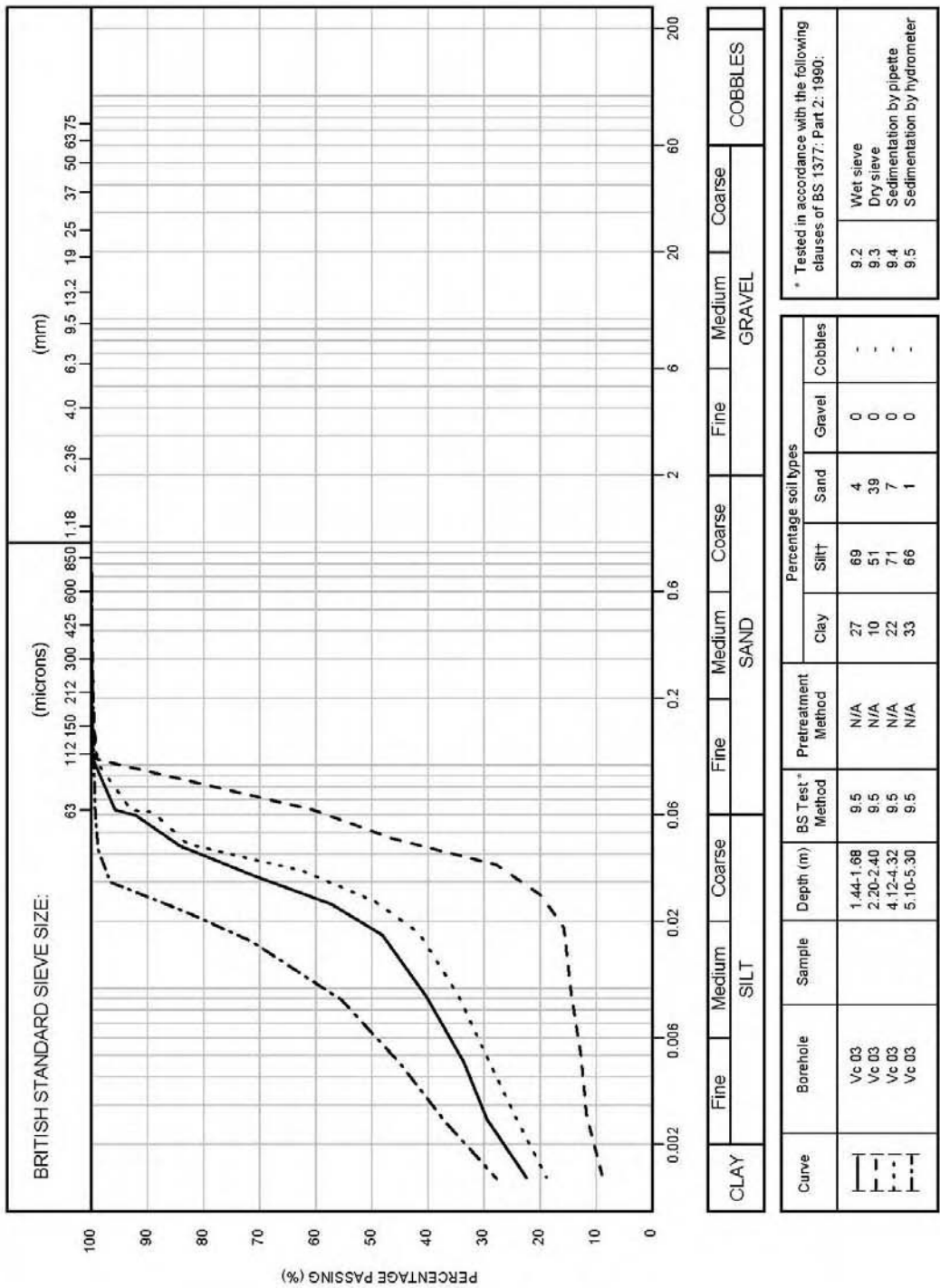
Index laboratory tests that were performed on soils obtained during investigation include natural moisture content, Atterberg Limits, bulk and dry density, particle size distribution, sedimentation, pocket Penetrometer and Torvane. The results of these tests are presented on the geotechnical logs in section A and on the following plates.



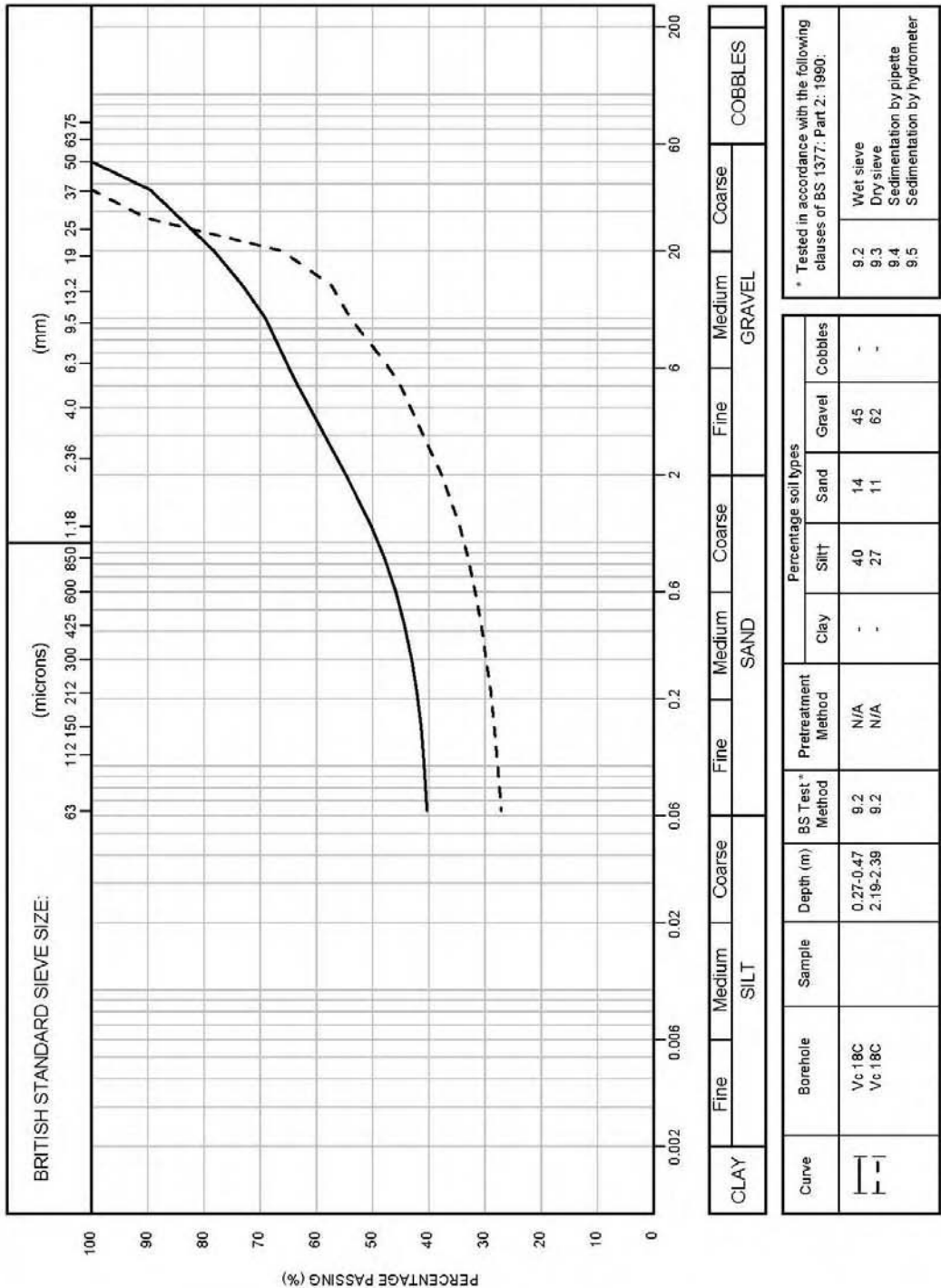
INDEX LABORATORY TESTS

LIST OF PLATES

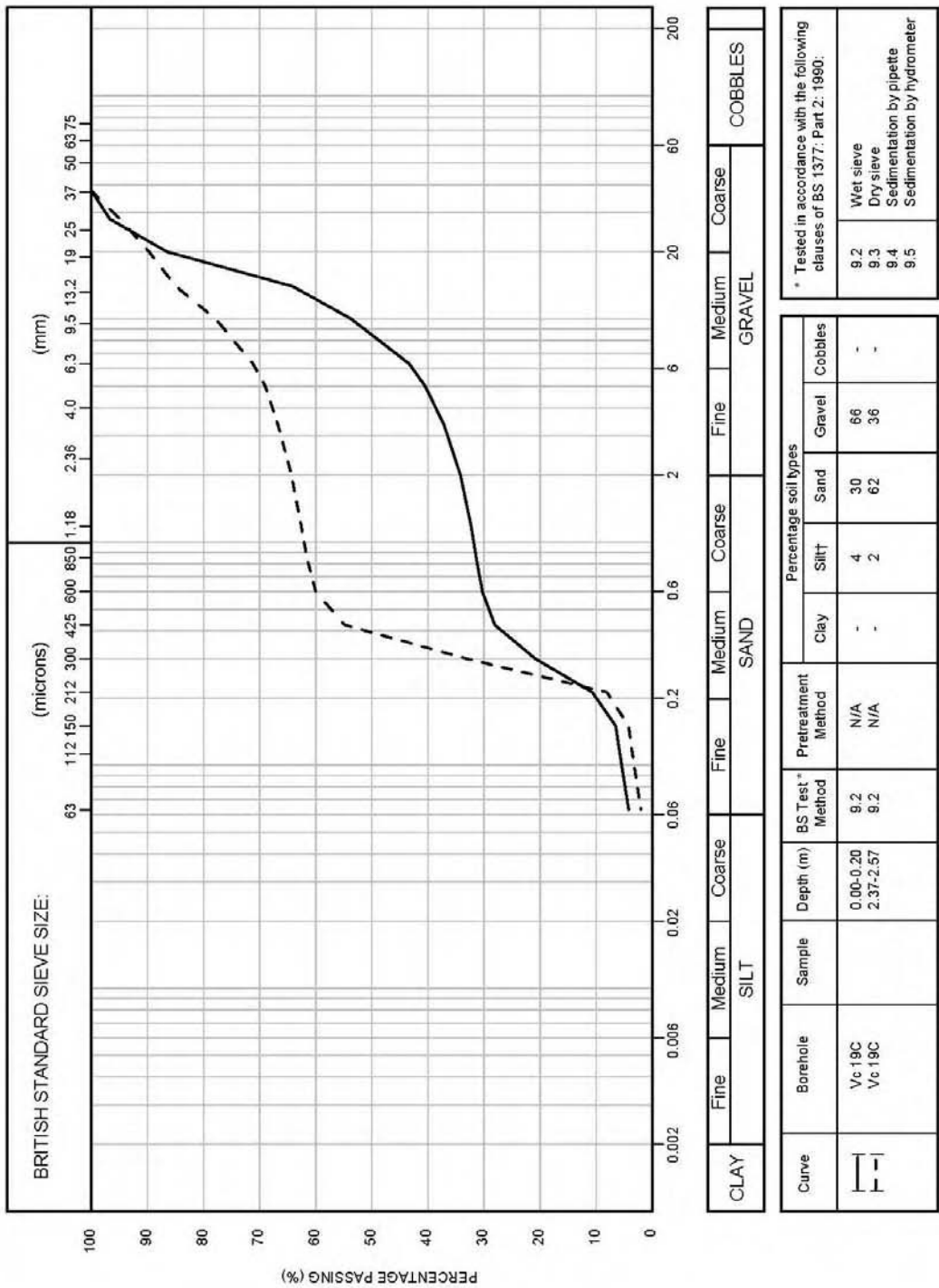
Description	Plates
PARTICLE SIZE DISTRIBUTION	C2-1 to C2-6
ATTERBERG LIMIT PLOTS	C2-7 to C2-8

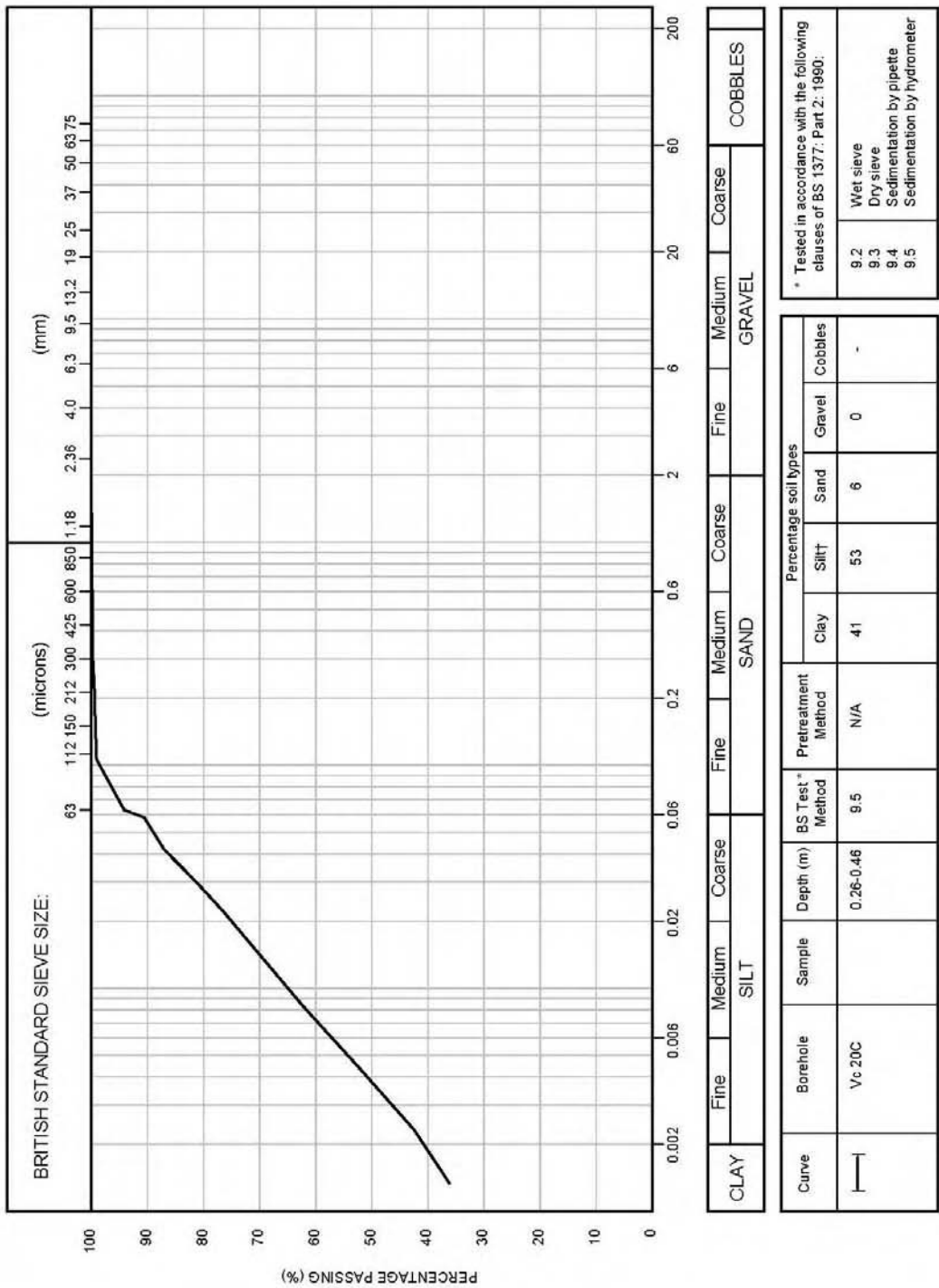


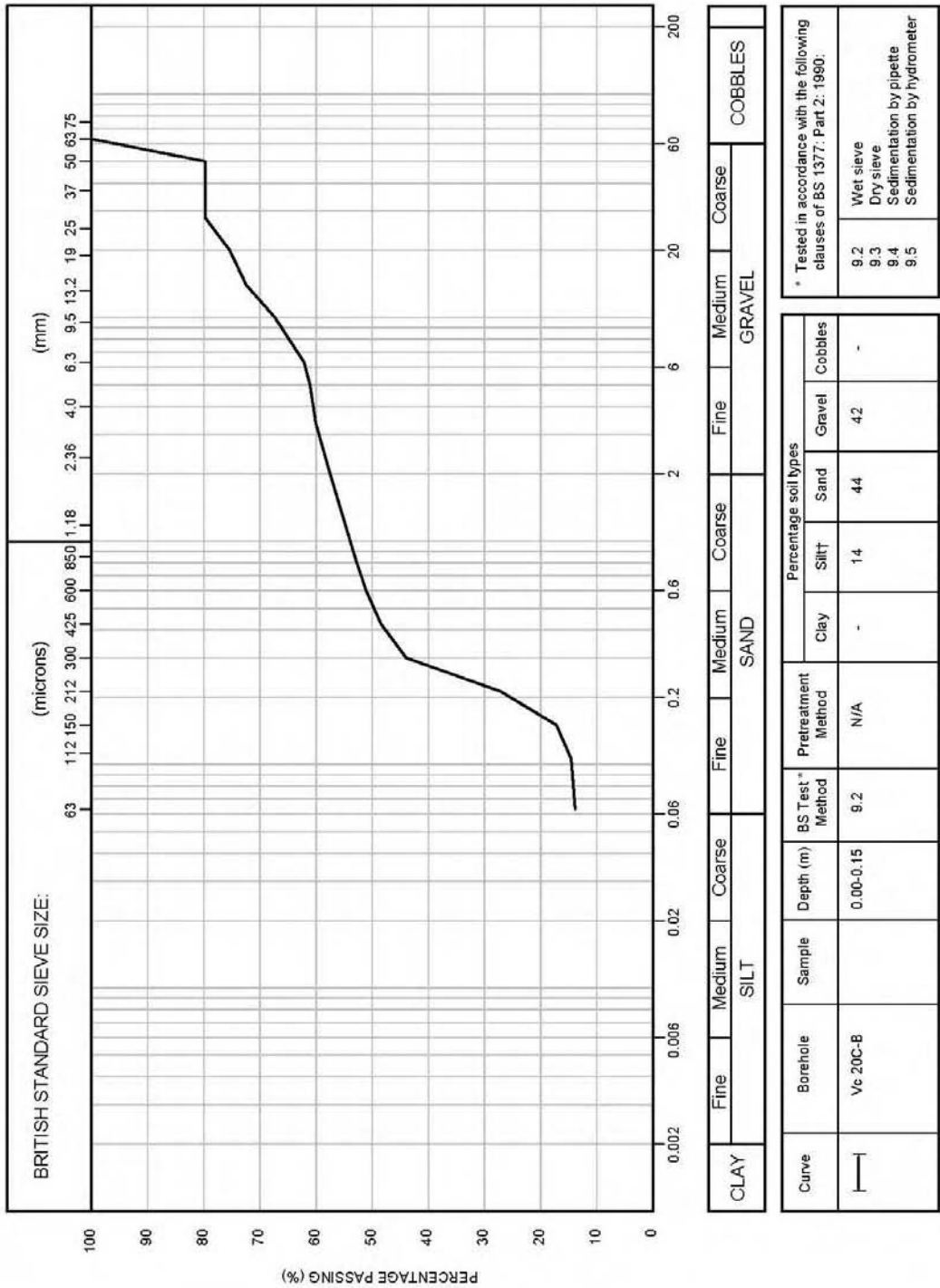
† Note: Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns



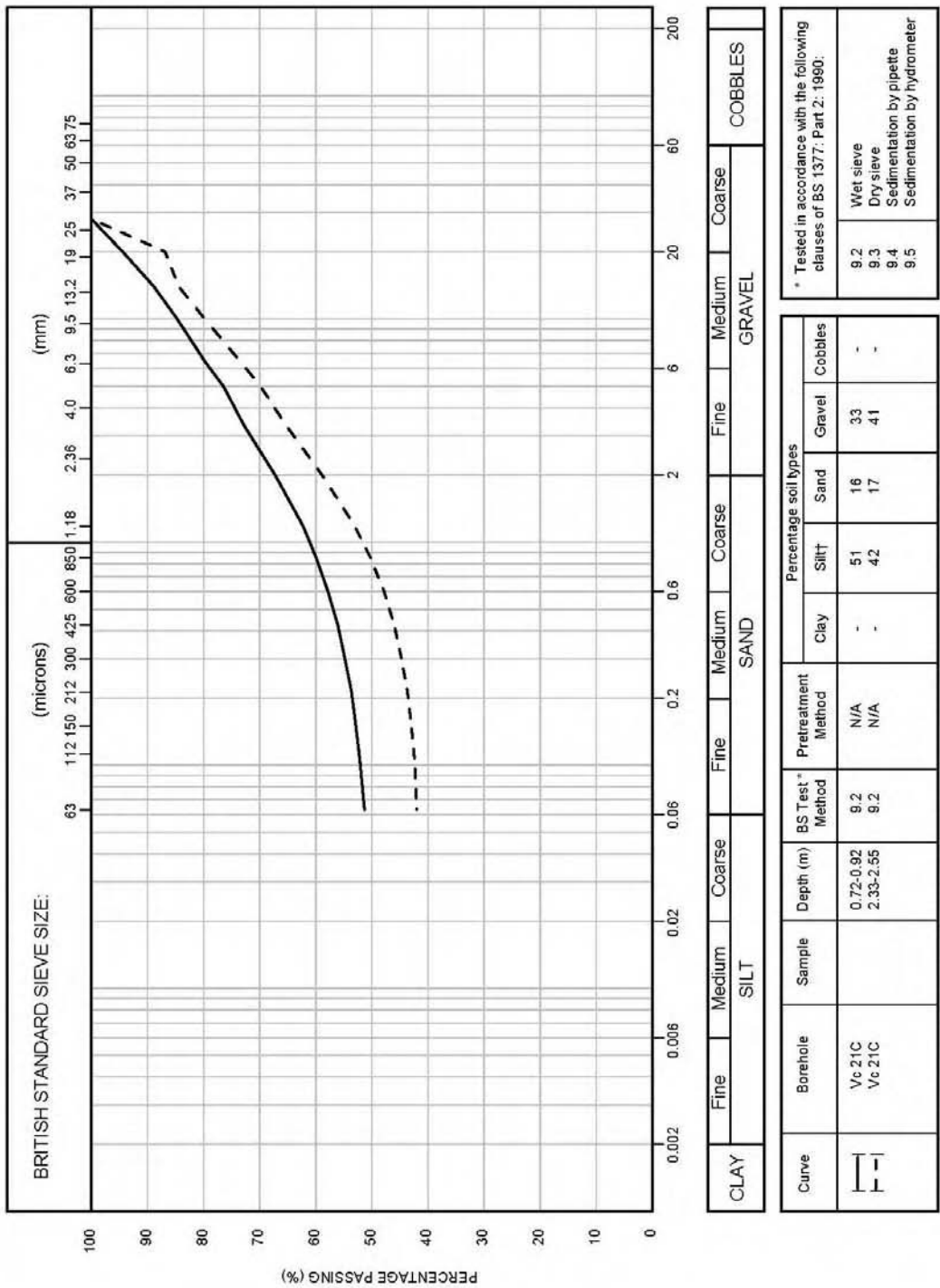
PARTICLE SIZE DISTRIBUTION TEST RESULTS







PARTICLE SIZE DISTRIBUTION TEST RESULTS



PARTICLE SIZE DISTRIBUTION TEST RESULTS

LIQUID AND PLASTIC LIMIT TEST

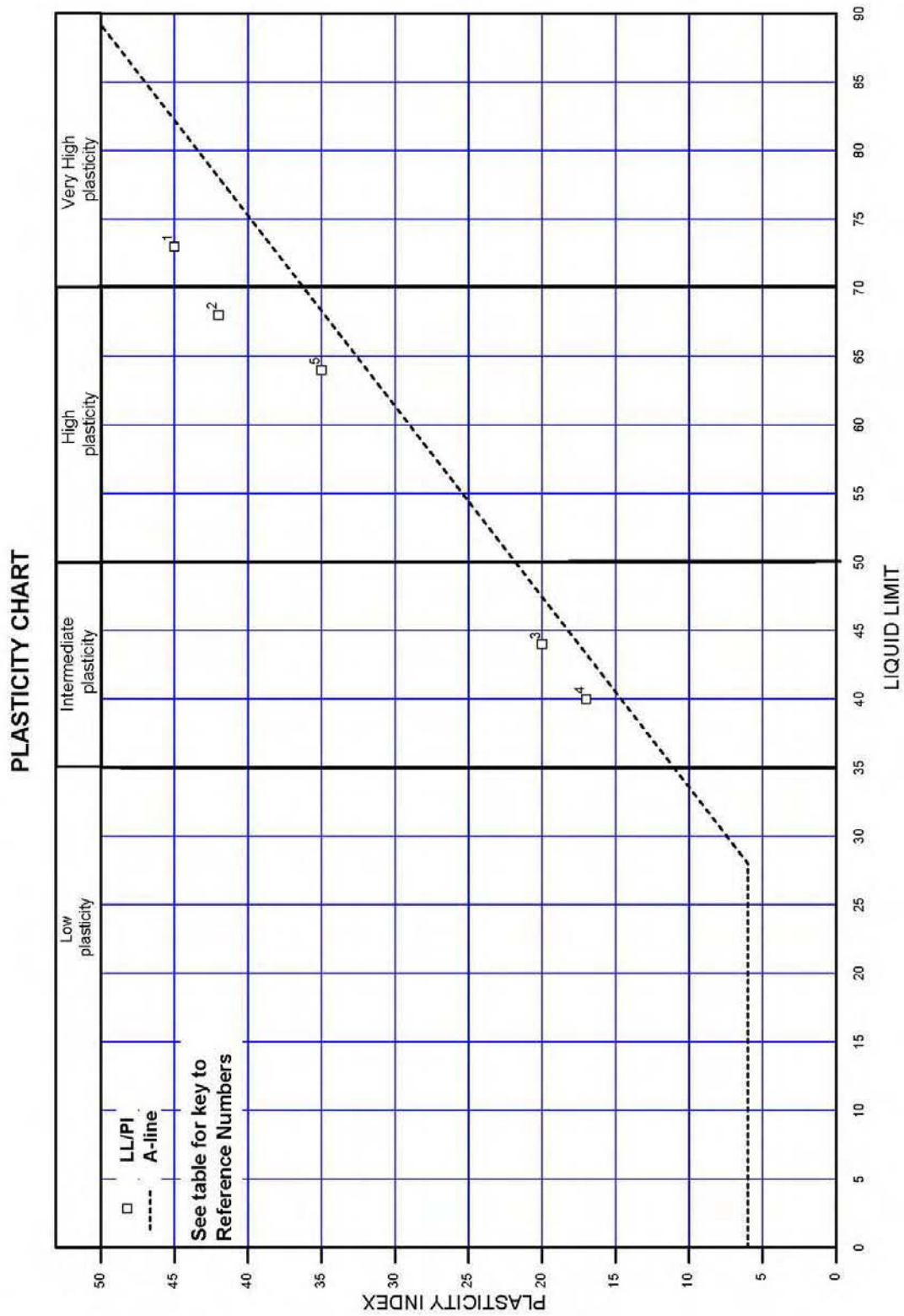
Test specification : BS 1377 - Part 2 (1990) :

Moisture Content (w) - Clause 3. Liquid Limit (WL) - Clause 4. Plastic Limit (WP) - Clause 5.

Plasticity Index (IP) and Liquidity Index (IL) - Clause 5.4

Liquidity Index is determined for soils tested for natural moisture content.

Location Number	Sample Level (m)	Soil Condition	% retained on 425 μ	Natural Moisture Content %	Liquid Limit WL	Plastic Limit WP	Plasticity Index IP	Liquidity Index IL	Chart Ref
VC 20C	1.15-1.35	Natural		32	73	28	45	0.08	1
VC 20C-B	0.94-1.09	Natural		28	68	26	42	0.05	2
VC 03	1.44-1.68	Natural		42	44	24	20	0.91	3
VC 03	4.12-4.32	Natural		38	40	23	17	0.88	4
VC 03	5.10-5.30	Natural		47	64	29	35	0.51	5





SECTION C3
CHEMICAL TESTS

C3.	CHEMICAL TESTS	1
C3.1	Details	1

C3. CHEMICAL TESTS

C3.1 Details

Chemical testing may be required to determine the amount of chemical substances, including sulphate and pH, in samples of soil and ground water, to assist in the design of structures and pipelines to resist chemical attack and corrosion.



CHEMICAL TESTS

LIST OF PLATES

Description	Plates
CHEMICAL TESTS	C3-1 to C3-7



Analytical Services
Torrington Avenue,
Coventry, CV4 9GU

T: +44 (0)24 7642 1213
F: +44 (0)24 7685 6575

www.stsanalytical.com

Ms Mutton
Fugro Alluvial Ltd
Morton Peto Road
Great Yarmouth NR31 0LT
Norfolk

08 June 2011

Test Report: COV/781507/2011

Dear Ms Mutton

Analysis of your sample(s) submitted on 01 June 2011 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using Severn Trent Services and we look forward to receiving your next samples.

Yours Sincerely,

Signed: 

Name: L. Ellis

Title: Inorganics Operations Manager



Severn Trent Services Analytical Services is a trading name of Severn Trent Laboratories Limited.
This communication has been sent to you by Severn Trent Laboratories Ltd. Registered in England and Wales. Registration No.2148934.
Registered Office: Severn Trent Centre, 2 St. John's Street, Coventry, CV1 2LZ

Report Summary



1314
1229
0097
4409



**Ms Hannah Mutton
Fugro Alluvial Ltd
Morton Peto Road
Great Yarmouth
Norfolk
NR31 0LT**

Date of Issue: **08 June 2011**

Report Number: **COV/781507/2011**

Issue **1**

Job Description: Offshore Soil Samples

Job Location: Rampion

Number of Samples
included in this report **3**

Job Received: **01 June 2011**

Number of Test Results
included in this report **7**

Analysis Commenced: **02 June 2011**

Signed: 

Name: **L. Ellis**

Date: **08 June 2011**

Title: **Inorganics Operations Manager**

Severn Trent Services was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested. Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

Severn Trent Services Analytical Services is a trading name of Severn Trent Laboratories Limited. This communication has been sent to you by Severn Trent Laboratories Limited. Registered in England and Wales. Registration No. 2148934. Registered Office: Severn Trent Centre, 2 St. John's Street, Coventry, CV1 2LZ

(c) Severn Trent Services 2011. All rights reserved. We, Severn Trent Laboratories Limited, are the owner of all copyright in this report. You must not copy, reproduce, amend or adapt this report, its contents or any format in which it is delivered without our prior written agreement. If you copy, reproduce, amend, or adapt this report in any way without our agreement you will be liable for any damage or loss to us. In the event of a dispute the copy of the report held by us shall be the reference copy.

Severn Trent Services

Analytical Services, Torrington Avenue, Coventry, CV4 9GU
Tel: +44 (0)24 7642 1213 Fax: +44 (0)24 7685 6575

Page 1 of 6

Certificate of Analysis



1314
1229
0897
4409

SEVERN
TRENT
SERVICES

Report Number: **COV/781507/2011**

Issue **1**

Laboratory Number: **12413909**

Sample **1** of **3**

Sample Source: **Fugro Alluvial Ltd**

Sample Point Description:

Sample Description: **VC3 @ 1.44m - 1.68m**

Sample Matrix: **Not In Project**

Sample Date/Time:

Sample Received: **01 June 2011**

Analysis Complete: **08 June 2011**

Test Description	Result	Units	Accreditation	Method
Sulphate, Total as SO ₄	0.061	%	Y Cov	45
pH	8.5	pH units	Y Cov	39
Sulphate as SO ₄ , Water Soluble	0.27	g/l	Y Cov	46

Analyst Comments for 12413909:

No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.

Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.

I/S=Insufficient sample

Signed: *L. Ellis*

Name: **L. Ellis**

Date: **08 June 2011**

Title: **Inorganics Operations Manager**

Severn Trent Services

Analytical Services, Torrington Avenue, Coventry, CV4 9GU
Tel: +44 (0)24 7642 1213 Fax: +44 (0)24 7685 6575

Page 2 of 6

Certificate of Analysis



1314
1229
0897
4409

SEVERN
TRENT
SERVICES

Report Number: **COV/781507/2011**

Issue **1**

Laboratory Number: **12413910**

Sample **2** of **3**

Sample Source: **Fugro Alluvial Ltd**

Sample Point Description:

Sample Description: **VC20C @ 1.15m - 1.35m**

Sample Matrix: **Not In Project**

Sample Date/Time:

Sample Received: **01 June 2011**

Analysis Complete: **08 June 2011**

Test Description	Result	Units	Accreditation	Method
Sulphate, Total as SO ₄	0.16	%	Y Cov	45
pH	8.4	pH units	Y Cov	39
Sulphate as SO ₄ , Water Soluble	0.12	g/l	Y Cov	46

Analyst Comments for 12413910:

No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.

Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.

I/S=Insufficient sample

Signed: *L. Ellis*

Name: **L. Ellis**

Date: **08 June 2011**

Title: **Inorganics Operations Manager**

Severn Trent Services

Analytical Services, Torrington Avenue, Coventry, CV4 9GU
Tel: +44 (0)24 7642 1213 Fax: +44 (0)24 7685 6575

Page 3 of 6

Certificate of Analysis



1314
1229
0897
4409

SEVERN
TRENT
SERVICES

Report Number: **COV/781507/2011**

Issue **1**

Laboratory Number: **12413911**

Sample **3** of **3**

Sample Source: **Fugro Alluvial Ltd**

Sample Point Description:

Sample Description: **VC3 @ 0.21m - 0.45m**

Sample Matrix: **Not In Project**

Sample Date/Time:

Sample Received: **01 June 2011**

Analysis Complete: **08 June 2011**

Test Description	Result	Units	Accreditation	Method
Loss on ignition, dried solids	75	%	Y Cov	337

Analyst Comments for 12413911: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.

Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.

I/S=Insufficient sample

Signed: *L. Ellis*

Name: **L. Ellis**

Date: **08 June 2011**

Title: **Inorganics Operations Manager**

Severn Trent Services

Analytical Services, Torrington Avenue, Coventry, CV4 9GU
Tel: +44 (0)24 7642 1213 Fax: +44 (0)24 7685 6575

Page 4 of 6



ANALYST COMMENTS FOR REPORT COV/781507/2011

Issue 1

Date of Issue: **08 June 2011**

Sample No	Analysis Comments
12413909	
12413910	
12413911	

Signed: *L. Ellis*

Name: **L. Ellis**

Date: **08 June 2011**

Title: **Inorganics Operations Manager**



DETERMINAND COMMENTS FOR REPORT COV/781507/2011

ISSUE 1

Date of Issue : 08 June 2011

Sample No	Description	Determinand	Comments

Signed:



Name: L. Ellis

Date: 08 June 2011

Title: Inorganics Operations Manager



SECTION C4
UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (UU) TEST

C4.	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (UU) TEST	1
C4.1	Details	1

C4. UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (UU) TEST UNCONFINED AND COMPRESSIVE STRENGTH TEST

C4.1 Details

Unconsolidated undrained triaxial compression tests are carried out on undisturbed samples to determine the undrained shear strength.

Remoulded undrained triaxial compression tests are carried out to determine the remoulded shear strength of samples and are normally carried out in conjunction with undisturbed tests to provide a measure of soil sensitivity.

Samples are tested with a height to diameter ratio of approximately 2:1 in accordance with the procedures of BS1377:1990.

Unconfined compressive strength tests are performed on rock samples to determine rock strength.



UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (UU) TEST
AND COMPRESSIVE STRENGTH TEST

LIST OF PLATES

Description	Plates
UU Triaxial and UCS tests	C4-1 to C4-7



TEST CERTIFICATE

Your Ref: 110515
Our Ref: G006115320

02 Jun 2011

For the attention of: **Ms Hannah Mutton**
Fugro Allmaral Offshore Limited
Morton Peto Road
Capton Hall Industrial Estate
Great Yarmouth
Norfolk
NR31 0LT

Location: **RAMPION**

Description: **6 undisturbed samples**

Date Received: **18 May 2011**

Test Procedures: Determination of the untrained shear strength in triaxial compression without measurement of pore pressure (Uniaxial method)
BS 1377 Part 7: 1990 Method II
* SPM Uniaxial Compressive Strength
The Complete ISRM Suggested Methods For Rock Characterization, Testing And Monitoring: 19-4 2006 Editors: R. Ulusay & J.A. Hudson



Helen Wilson
Senior Laboratory Technician
for FUGRO ENGINEERING SERVICES LIMITED

Figure 1 of 4

* Tests marked with an asterisk fall outside the accreditation status of the laboratory



FUGRO ENGINEERING SERVICES LIMITED

Our Ref: HW//CON113039
Your Ref: 110515

June 1, 2011

For the attention of Hannah Mutton

Fugro Alluvial Offshore Ltd.
Morton Peto Road
Gapton Hall Industrial Estate
Great Yarmouth
NR31 0LT

Armstrong House
Unit 43
Number One Industrial Estate
Medomley Road
Consett
Co. Durham
DH8 6TW
Tel: +44 1207 531 120
Fax: +44 1207 531 809
www.fes.co.uk

Dear Sirs

RAMPION

We are pleased to enclose the results of tests carried out on samples delivered to our laboratory from the above site.

The laboratory test results enclosed with this letter give the properties of individual specimens tested under specified conditions. Individual results or groups of results may not be appropriate for use as design parameters for some geotechnical analyses. The samples may be non-representative, disturbed internally or prepared and tested under conditions suited for a different geotechnical application. Unless the selection of design parameters is discussed in this report, it is recommended that the advice of a Geotechnical Specialist is sought.

With regard to disposal of the remaining samples, it is our normal practise to dispose of the samples after one calendar month from the date of issue of the final report. We will do so without further notice unless we hear from you within one month.

If you wish to store the samples after this period we will do so on your written request. Any storage in excess of one month will be charged at the enclosed schedule of rates.

If you have any queries please do not hesitate to contact us.

Yours faithfully
FUGRO ENGINEERING SERVICES LIMITED



Helen Wilson
On behalf of Laboratory Manager



Graham Batley
Senior Laboratory Technician

Registered in England No. 1861562 VAT No. GB 537 7908 18
A member of the Fugro Group of companies with offices throughout the world.



FESL 10000 01/08

FUGRO ALLUVIAL OFFSHORE LIMITED
RAMPION



GENERAL NOTES ON LABORATORY TEST RESULTS

1. TEST METHODS

The tests reported on the following sheets have been carried out in accordance with the methods given in BS 1377:1990 'Methods of test for soils for civil engineering purposes', and ISRM 'Suggested methods for rock characterization, testing and monitoring', subject to a small number of variances as described below under the respective headings. These notes also serve as keysheets to any notation used in reporting the laboratory tests.

2. KEY TO NOTATION OF SAMPLE TYPE

- D: Disturbed sample.
B: Bulk disturbed sample.
U: General purpose open drive tube sample.
P: Piston sample.
C: Core sample.

3. CLASSIFICATION TESTS

% passing 425µm: this figure is only correctly reported when 'WS' is shown in the 'Method of preparation' column. For 'HP' and 'AR', the reported figure is an estimate only.

- WS: sample prepared by Wet Sieving.
HP: sample prepared by Hand Picking (removal) of gravel sized fragments.
AR: sample tested As Received.
NP: non-plastic.

4. COMPACTION RELATED TESTS

Sample preparation: **Individual** indicates test carried out on individual sub-samples.

Single indicates test carried out on a single sample.

Assumed values of particle density are reported in brackets e.g. (2.67)

5. SAMPLE DESCRIPTIONS

The sample descriptions shown on the test report sheets are the technician's visual descriptions of the test samples, in accordance with Clause 9.1 of Part 1 of BS 1377:1990 and do not necessarily comply with the requirements of BS5930:1999. For a more comprehensive description of the soil samples to BS5930, reference should be made to the exploratory hole records, or an engineering description can be provided on request.

Fugro Alluvial Offshore Limited
RAMPION



SUMMARY OF ROCK STRENGTH TESTS
ISRM 1981 Part 2

Hole	Sample no	Type	Depth (m)	Bulk Density (Mg/m ³)	Water Content (%)	Dry Density (Mg/m ³)	Diameter (mm)	Length (mm)	Stress Rate (Mpa/min)	Load at failure (kN)	Tensile Strength (MPa)	UCS (MPa)	Mode of Failure	Lithology
VC 18C		U	1.62	1.96	24	1.59	84	110	0.04	1.44		0.3		White CHALK, extremely weak
VC 21C		U	2.55	2.01	25	1.61	85	143	0.05	2.73		0.5		White CHALK, extremely weak

Remarks	
---------	--

Contract No: CON113039

Figure No.

Sheet

4 of 4

Fugro Alluvial Offshore Limited
RAMPION



**SUMMARY OF UNDRAINED SHEAR STRENGTH TESTS IN TRIAXIAL COMPRESSION
WITHOUT MEASUREMENT OF POREWATER PRESSURE**

BS : 1377 Part 7 : 1990 : Test 8 and 9

Hole	Sample No	Type	Depth	Specimen Depth	Bulk Density (Mg/m ³)	Moisture Content (%)	Dry Density (Mg/m ³)	Diameter (mm)	Preparation	Cell Pressure (kPa)	Failure Strain (%)	Mode of Failure	Cohesion (kPa)	Average Cohesion (kPa)	Description
VC 3		U	1.68	60	1.81	48	1.22	84.2	U	360	16.2	C	16	16	(Soft) grey CLAY
VC 3		U	3.58	50	1.82	35	1.35	83.9	U	400	12.2	C	23	23	Soft grey SILT
VC 20C		U	1.53	80	1.95	33	1.46	82.8	U	230	5.5	C	27	27	(Firm) brown slightly sandy CLAY
VC 20C-B		U	1.09	70	2.00	29	1.55	82.6	U	230	6.1	C	72	72	Firm brown slightly sandy CLAY

Test Type:	UU - Unconsolidated undrained	Mode of Failure: B - Brittle	P - Plastic	Preparation: REM - Remoulded
	UUM - Unconsolidated undrained multistage	C - Compound		U - Undisturbed
Remarks				

Contract No: CON113039

Figure No.

Sheet 3 of 4

**SECTION D
POSITIONING AND WATER DEPTH DATA**

TABLE OF CONTENTS

D1. SAMPLE LOCATIONS

D2. FUGRO SURVEY LIMITED POSITIONING REPORT

The co-ordinates presented in this report are the actual location co-ordinates provided offshore by Fugro Survey Ltd.

The user of presented geodetic information must consider the accuracy of measurements, particularly where use may differ from original intentions.



SECTION D1
SAMPLE LOCATIONS

D1.	SAMPLE LOCATIONS	1
D1.1	Positioning Information	1

D1. SAMPLE LOCATIONS

D1.1 Positioning Information

A tabulated summary of Vibrocore and PCPT co-ordinates are presented in this section.

Target co-ordinates for all locations were specified by EON prior to the investigation. The co-ordinates presented in this report are the actual location co-ordinates recorded by the FSLTD surveyors. Geodetic parameters used are:

Co-ordinates for all locations are expressed using the UTM projection, WGS84 Datum, WGS84 Spheroid, with a Central Meridian of 3° West.

Water depths were measured at the time of sampling and in-situ testing and have been reduced to LAT.

The user of presented geodetic information must consider the accuracy of measurements, particularly where use may differ from original intentions. For example, the water depth measurements serve to establish sample and test depths below seafloor.



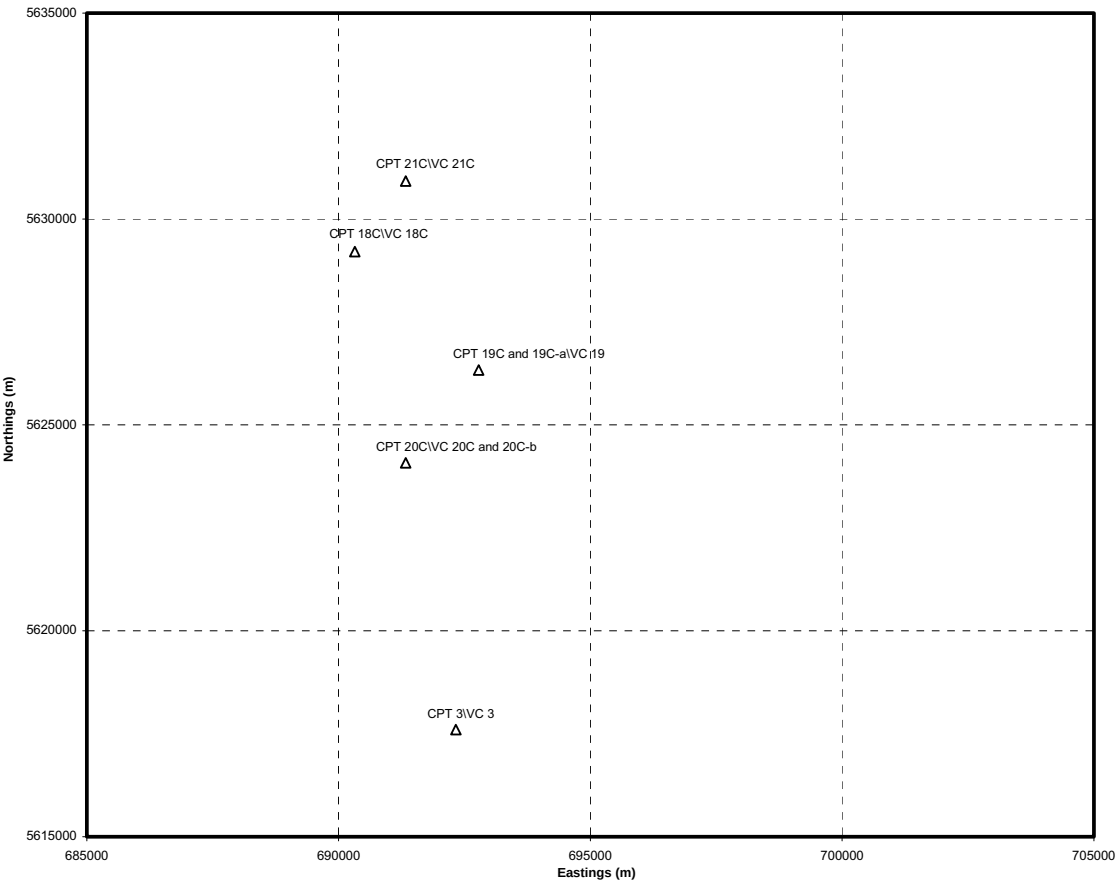
SAMPLE LOCATIONS

LIST OF PLATES

Description	Plates
CPT and HPC Locations	D1-1
Location Plan	D1-2

PCPT SUMMARY							
CPT No.	Date	Time UTC+1	Actual Coordinates UTM		Water Depth (m) (LAT)	Penetration (m)	Stop Criteria
			Eastings (m)	Northings (m)			
CPT_21C	07/04/2011	11:08	691334	5630921	5.60	3.04	D
CPT_18C	07/04/2011	11:48	690325	5629207	6.80	3.19	D
CPT_19C	07/04/2011	12:37	692784	5626333	13.40	1.00	C
CPT_19Ca	07/04/2011	12:43	692788	5626330	13.90	1.16	C
CPT_20C	07/04/2011	13:17	691332	5624079	16.10	3.21	D
CPT_3	07/04/2011	14:14	692327	5617602	29.30	5.17	D
Stop Criteria: D=Depth achieved, E=Excess thrust, C=Cone inclination, L=cone end Load, F=sleeve Friction, T=frame Tilt, O=Other							

VC SUMMARY							
VC No.	Date	Time UTC+1	Actual Coordinates UTM		Water Depth (m) LAT	Penetration (m)	Recovery (m)
			Eastings (m)	Northings (m)			
VC03	07/04/2011	15:53	692328	5617602	30.40	6.20	5.35
VC20C	07/04/2011	16:41	691333	5624080	17.80	3.17	1.86
VC21C	08/04/2011	11:09	691333	5630919	4.30	3.96	3.49
VC18C	08/04/2011	11:35	690327	5629206	6.90	3.39	2.39
VC19C	08/04/2011	12:14	692786	5626332	12.50	4.00	3.78
VC20C-B	08/04/2011	12:52	691333	5624081	15.30	1.95	1.34



**SECTION D2
FUGRO SURVEY LIMITED POSITIONING REPORT**

D2. FUGRO SURVEY LIMITED POSITIONING REPORT

D2.1 Positioning Report

The Fugro Survey Limited Positioning Report is presented in this section.

WILLENDEAVOUR

RAMPION WIND FARM
GEOTECHNICAL & ENVIRONMENTAL
INVESTIGATION

Survey Period: 5 April – 9 April 2011
Report Number: 00589R01.00



Prepared for: Fugro Alluvial Offshore Limited
Morton Peto Road
Gapton Hall Industrial Estate
Great Yarmouth
NR31 0LT



Client Reference 110515

00	Issued as Proof	J. Wicks	A. Hurst	D. Parsons	27 April 2011
Rev	Description	Prepared	Checked	Approved	Date

CONTENTS

	Page
1. INTRODUCTION	1
1.1 Definitions	1
1.2 Abbreviations	1
1.3 Scope of Work	2
2. RESULTS	3
2.1 CPT Positions	3
2.2 Vibrocore Positions	3
2.3 Camera Positions	4
3. SUMMARY OF EVENTS	5
4. SURVEY CONTROL	6
4.1 Geodetic Parameters	6
4.2 Surface Positioning	7
4.3 DGPS Integrity Check	8
4.4 Position Comparison	9
4.5 Gyro Compass Check	10
4.6 Tides	11
5. PERSONNEL AND EQUIPMENT	12
5.1 Personnel	12
5.2 Equipment	12
6. SAFETY	13
6.1 HAZOPS	14
6.2 Safety Meetings	14
6.3 Toolbox Meetings	14
6.4 Safe Job Analysis	14

APPENDICES

Page

A.	SEQUENCE OF SIGNIFICANT EVENTS	16
B.	OFFSETS	19
C.	INTENDED LOCATIONS	20

TABLES

Table 2.1: CPT Positions	3
Table 2.2: Vibrocore Positions	3
Table 2.3: Camera Photo Fixes	4
Table 4.1: Project Geodetic and Projection Parameters	6
Table 4.2: Gyro Compass Check	10

FIGURES

Figure 4.1: Verification of Test Point in Starfix.Geo	6
Figure 4.2: DGPS Integrity Check	8
Figure 4.3: Starfix Final Fix Report	9
Figure 4.4: Visual Verification of Gyro Check Whilst Alongside	11

1. INTRODUCTION

1.1 Definitions

Project Name:	Rampion Wind Farm Geotechnical & Environmental Investigation
Geotechnical Contractor:	Fugro Alluvial Offshore Limited, Great Yarmouth
Survey Sub-contractor:	Fugro Survey, Great Yarmouth
Client:	Fugro Alluvial
Location:	Rampion Wind Farm
Vessel:	Multicat Willendeavour
Coordinates:	All coordinates are expressed in terms of the geodetic system stated in Section 4.1
Time Zone:	Local Time (UTC + 1 hour)

1.2 Abbreviations

FAOL	Fugro Alluvial Offshore Limited (Company)
FSLTD	Fugro Survey Limited (Contractor)
BSEN	British Standard European Norm
C-O	Computed minus Observed
CPT	Cone Penetration Test
CRP	Central Reference Point
DGPS	Differential Global Positioning System
EUSAT	EUropean SATellite
GLONASS	Global Navigation Satellite System
GPS	Global Positioning System
HP	High Precision
PC	Personal Computer
SEIS	Fugro navigation software package
UKOOA	United Kingdom Offshore Operators Association
UTC	Universal Time Coordinated
UTM	Universal Transverse Mercator
WGS84	World Geodetic System 1984
WRB	Wave Rider Buoy
XP	eXtra Precision

1.3 Scope of Work

Fugro Survey Limited (FSLTD) was contracted on behalf of Fugro Alluvial Offshore Limited (FAOL) to provide positioning and reporting services for the Multicat vessel, Willendeavour. FAOL has been contacted by EON requesting site investigations at the proposed Rampion Offshore Wind Farm. The geotechnical and environmental investigation consisted of five camera sweeps, five CPT and five Vibrocore locations.

The vessel is fitted with positioning and navigation systems provided by FSLTD and manned by one FSLTD Surveyor / Engineer, covering all survey operations.

FSLTD were contracted to conduct the following scope of work:-

- Mobilise survey personnel and equipment on board Willendeavour.

- Measure all offsets and verify against available General Arrangement plans.

- Conduct the following system checks and calibrations:

 - DGPS function and system comparison

 - Gyro Compass check alongside

- Provide navigational displays to helmsman.

- Provide positioning support during move to each location, to a position tolerance of $\pm 2\text{m}$

- Record all sample positions

- Compile and submit a survey results and operations report.

2. RESULTS

A total of 10 samples were taken at pre-determined locations. Each mean position was derived from the average of 10 fixes logged over a 10 second period immediately after placing the different geotechnical rigs on the seabed. An echo sounder transmission depth of **2.0m** was added to all raw soundings.

2.1 CPT Positions

Table 2.1: CPT Positions

	Intended Location		Actual Location		To Intended		Raw Water Depth [m]	Tide above LAT [m]	Reduced Water Depth [LAT m]
	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Range [m]	Bearing [°T]			
18C	690 324.8	5 629 206.7	690 325.1	5 629 207.3	0.7	12.1	12.1	5.3	6.8
19C	692 783.7	5 626 332.7	692 783.6	5 626 332.8	0.1	19.1	19.1	5.7	13.4
20C	691 332.6	5 624 079.6	691 332.1	5 624 079.4	0.5	21.8	21.8	5.7	16.1
21C	691 333.7	5 630 919.7	691 334.2	5 630 920.7	1.1	9.0	9.0	3.4	5.6
BH 3	692 327.0	5 617 601.8	692 327.4	5 617 601.7	0.4	34.5	34.5	5.2	29.3
19Ca	692 783.7	5 626 332.7	692 788.5	5 626 330.2	5.4	19.6	19.6	5.7	13.9

2.2 Vibrocore Positions

Table 2.2: Vibrocore Positions

	Intended Location		Actual Location		To Intended		Raw Water Depth [m]	Tide above LAT [m]	Reduced Water Depth [LAT m]
	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Range [m]	Bearing [°T]			
18C	690 324.8	5 629 206.7	690 327.1	5 629 206.4	2.3	280	11.2	4.3	6.9
19C	692 783.7	5 626 332.7	692 785.7	5 626 332.2	2.1	285	17.5	5.0	12.5
20C	691 332.6	5 624 079.6	691 331.7	5 624 077.9	1.9	029	20.3	2.5	17.8
21C	691 333.7	5 630 919.7	691 333.3	5 630 918.9	0.9	027	8.2	3.9	4.3
BH 3	692 327.0	5 617 601.8	692 327.8	5 617 601.1	1.0	312	33.8	3.4	30.4
20Ca	691 332.6	5 624 079.6	691 334.5	5 624 080.4	2.0	250	19.9	1.8	18.1
20Cb	691 332.6	5 624 079.6	691 332.6	5 624 081.0	1.4	181	20.7	5.4	15.3

2.3 Camera Positions

Camera sweeps were carried out at 5 locations, with 5 fixes being recorded at each location.

Table 2.3: Camera Photo Fixes

Camera Sweep	Fix	Easting (m)	Northing (m)
21C	fix1	691 334.0	5 630 918.5
	fix2	691 332.9	5 630 918.0
	fix3	691 333.3	5 630 919.8
	fix4	691 332.7	5 630 920.1
	fix5	691 334.2	5 630 918.5
18C	fix1	690 324.0	5 629 207.0
	fix2	690 324.2	5 629 205.9
	fix3	690 324.8	5 629 205.6
	fix4	690 325.3	5 629 207.5
	fix5	690 324.4	5 629 205.2
19C	fix1	692 781.9	5 626 333.0
	fix2	692 785.4	5 626 333.1
	fix3	692 780.9	5 626 333.7
	fix4	692 784.1	5 626 333.4
	fix5	692 784.8	5 626 334.1
20c	fix1	691 333.1	5 624 078.5
	fix2	691 332.3	5 624 079.7
	fix3	691 333.7	5 624 081.1
	fix4	691 333.1	5 624 078.8
	fix5	691 333.5	5 624 079.8
BH3	fix1	692 326.0	5 617 600.7
	fix2	692 326.8	5 617 600.4
	fix3	692 325.5	5 617 602.8
	fix4	692 326.1	5 617 602.8
	fix5	692 326.8	5 617 601.8

3. SUMMARY OF EVENTS

FSLTD Engineer J. Wicks joined the Willendeavour whilst the vessel was alongside William's Quay, Southampton, on 5 April 2011. After a Toolbox Talk the vessel gyro compass was checked by taped offsets to the known quay heading. The mobilisation was complete at 19:30.

The vessel departed Southampton at 12:40 on 6 April, when a vessel induction was conducted. The vessel arrived at the first camera location at 13:05 and all camera sweep were completed by 1517 hours. The vessel then moved to a nearby Wave Rider Buoy location with the requested intention of recovering it, however the bungee snapped forcing a return to port.

On 7 April, the vessel departed at 1015 for the CPT locations. Work continued from 1108 to 1435 when all CPT's were completed. Operations then switched over to Vibrocoring and three samples were taken between 1537 and 1729 before a problem necessitated an early return to Shoreham.

On 8th April, the vessel departed the lock at 1025, arriving at the intended VC location at 1108. The remaining vibrocores were taken without incident by 1300 hours and the vessel returned to port to offload FAOL equipment. At 1420, the vessel resailed, arriving at the WRB location at 1530. At 1554, the clump weight was recovered and the vessel returned to port by 1730 with demobilisation complete.

All personnel and equipment returned to Great Yarmouth on 9th April

4. SURVEY CONTROL

4.1 Geodetic Parameters

Table 4.1: Project Geodetic and Projection Parameters

GPS Positioning Datum Parameters : WGS84					
Datum		World Geodetic System 1984 (WGS84)			
Semi major axis		6 378 137.000 Metres			
1 / Flattening		298.257 223 563			
Project Projection Parameters : Transverse Mercator					
Grid Projection		Universal Transverse Mercator			
UTM Zone		30 North			
Central Meridian		3° West			
Latitude of Origin		0°			
Longitude of Origin		3° West			
False Easting		500 000			
False Northing		0			
Scale factor on Central Meridian		0.9996			
Datum Shift Parameters :					
Shift dX [m]	0.000	Rotation rX (“)	0.000	Scale Factor (ppm)	0.000
Shift dY [m]	0.000	Rotation rY (“)	0.000		
Shift dZ [m]	0.000	Rotation rZ (“)	0.000		

This is the Right Handed Coordinate Frame Rotation convention used by the Fugro Starfix navigation.

A test point was carried out on position 18C. Verification of the datum shift in use was carried out by carrying out a transformation of this point in Starfix.Geo.



Figure 4.1: Verification of Test Point in Starfix.Geo

4.2 Surface Positioning

Positioning is provided by two Fugro StarPack units which are supplied with DGPS corrections via their internal demodulator and provide Starfix.HP and Starfix.XP solutions.

Primary DGPS Navigation – Starfix HP2

GPS data: Fugro StarPack L1/L2 DGPS receiver with integrated demodulator
Antenna: Alison combined L1/L2 GPS and Differential Corrections antenna
Correction data: Differential Carrier via EUSAT communications satellite
Corrections automatically selected on range and quality
Output: Fugro HP computation telegram to Starfix.SEIS

Secondary DGPS Navigation – Starfix HP1

GPS data: Fugro StarPack L1/L2 DGPS receiver with integrated demodulator
Antenna: Alison combined L1/L2 GPS and Differential Corrections antenna
Correction data: Differential Carrier via EUSAT communications satellite
Corrections based on clock and orbit corrections
Output: Fugro HP computation telegram to Starfix.SEIS

Both Starfix DGPS antennas are located on the Willendeavour's wheelhouse. The primary antenna is located on the mast; secondary antenna is located on the port aft corner of the wheelhouse roof.

The following reference stations were utilised during positioning operations, supplying differential corrections from the Fugro SeaStar DGPS corrections network: Aberdeen, Shannon, Leidschendam and Vienna.

4.3 DGPS Integrity Check

Prior to survey operations, whilst the vessel was alongside Shoreham, a DGPS integrity check was performed. Verification of a point of known coordinates using HP2 (primary GPS) showed that the system is working within specification.

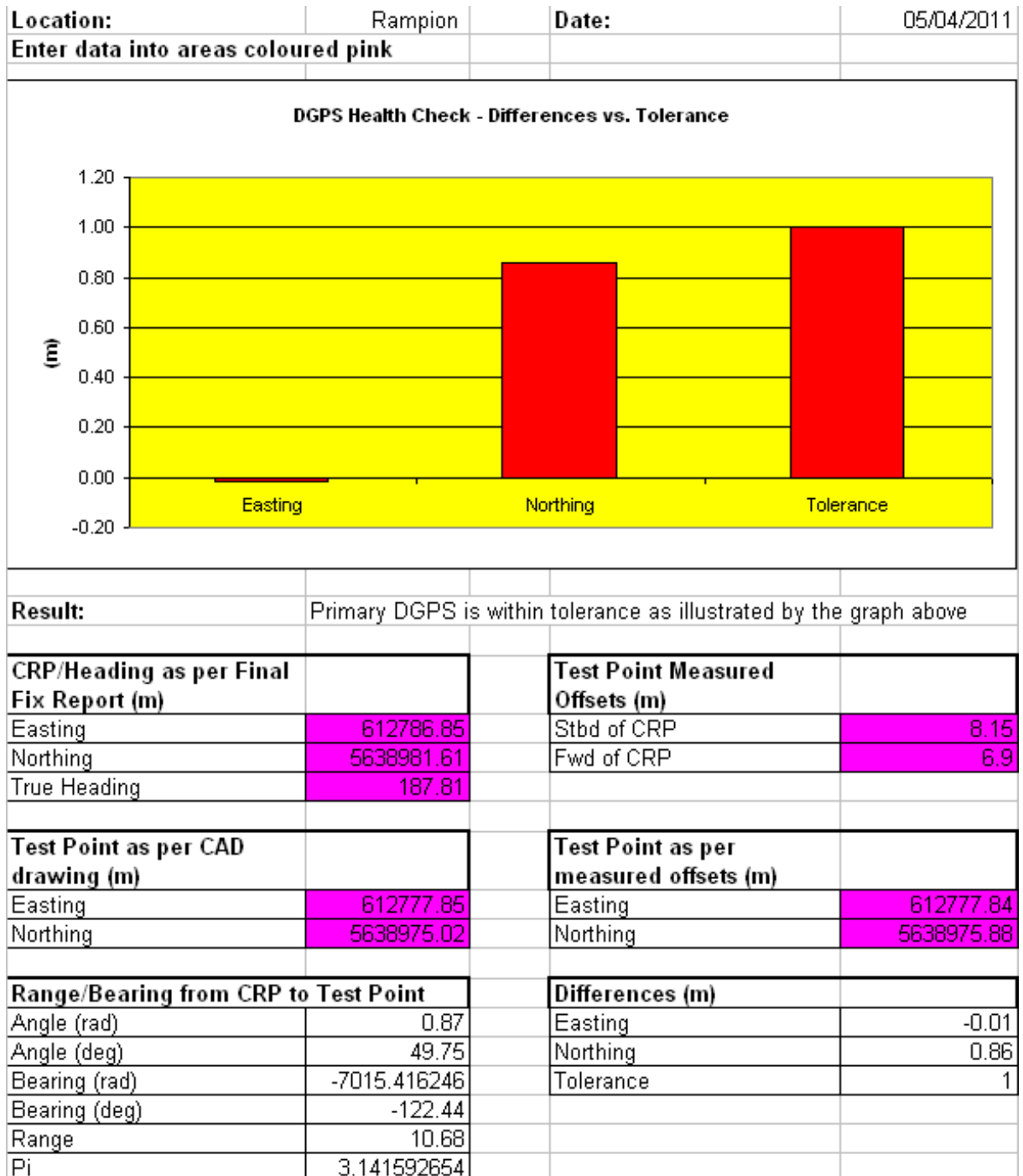


Figure 4.2: DGPS Integrity Check

4.4 Position Comparison

A position comparison was carried out between the two Starfix HP systems onboard prior to work commencing on the Rampion project. Horizontal differences between the HP solution on HP1 and HP2 were minimal. A similar comparison between the HP solution of the primary GPS system HP2 and the Eurodrone was a maximum 1.50m difference.

```
Fugro Job Number      39 00589 Willendeavour
Job Name              Willendeavour Alluvial
Fugro Personnel
Client Name
Client Representative
Sampling Started      05 Apr 2011 19:08:09 (local)
Sampling Ended        05 Apr 2011 19:38:12 (local)
Comment
```

```
Intended Offset / Well Location
Geodetic Datum      WGS84
Latitude            50°53'29.1062"N
Longitude           1°23'47.3243"W
Projection           Transverse Mercator (UTM) Zone: 30
Easting             612777.851 m
Northing            5638975.023 m
Intended Rig Heading 189.00 °T
```

Final DGPS Position Fix Summary for Willendeavour At Southampton

CRP computed from NMEA GHP 64.GGA (Primary)

CRP Offset From CRP

```
Starboard          0.000 m
Forward            0.000 m
Up                 0.000 m
Geodetic Datum      WGS84
Latitude            50°53'29.3131"N
Longitude           1°23'46.8565"W
Projection           Transverse Mercator (UTM) Zone: 30
Easting             612786.852 m
Northing            5638961.610 m
Height              51.367 m (ellipsoidal)
Final Rig Heading    187.81 °T
                   186.57 °G (Convergence 1.24° World Standard)
Gyro C-O            0.20 °
Position is 11.16 m @ 55.05 °T (53.80 °G) FROM intended location
```

Figure 4.3: Starfix Final Fix Report

4.5 Gyro Compass Check

A Gyro Compass check was performed while the vessel was alongside Southampton Docks on 5 April 2011. A C-O of 0.17° was entered on this date.

Dist 11.36
Bearing (G) 183.78

Observed Gyro	189.93 °
Calc. Bearing(G)	188.86 °
Convergence	1.24 °
Jetty position	stbd
Calc. Heading(T)	190.10 °
Gyro C-O	0.17 °

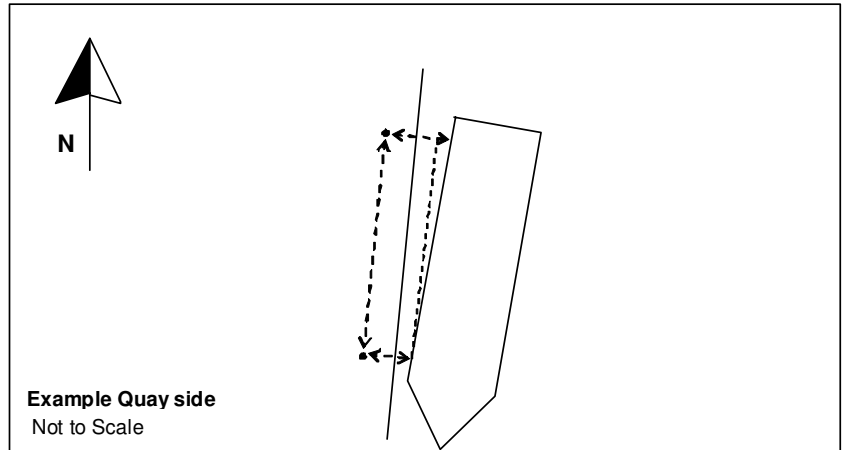


Table 4.2: Gyro Compass Check

Logged Gyro Readings and Measurements						Calculations			
Fix No.	Time	Gyro [°]	Bow [m]	Stern [m]	Dist [m]	Angle Ship to Quay [°]	Calc Ves Grid [°]	Calc Ves True [°]	Gyro C-O [°]
1	16:26:25	190.2	0.48	1.52	11.36	5.23	189.01	190.25	0.05
2	16:27:30	189.7	0.48	1.51	11.36	5.18	188.96	190.20	0.55
3	16:28:00	189.1	0.47	1.47	11.36	5.03	188.81	190.05	0.94
4	16:28:30	189.9	0.47	1.51	11.36	5.23	189.01	190.25	0.39
5	16:29:00	190.5	0.47	1.48	11.36	5.08	188.86	190.10	-0.44
6	16:29:30	189.7	0.47	1.48	11.36	5.08	188.86	190.10	0.39
7	16:30:00	190.0	0.49	1.46	11.36	4.88	188.66	189.90	-0.09
8	16:30:30	190.0	0.46	1.46	11.36	5.03	188.81	190.05	0.07
9	16:31:00	190.4	0.46	1.45	11.36	4.98	188.76	190.00	-0.40
10	16:31:30	189.9	0.45	1.46	11.36	5.08	188.86	190.10	0.21
Mean		189.9	0.47	1.48	11.36	5.08	188.86	190.10	0.17

4.5 Gyro Compass Check (continued)

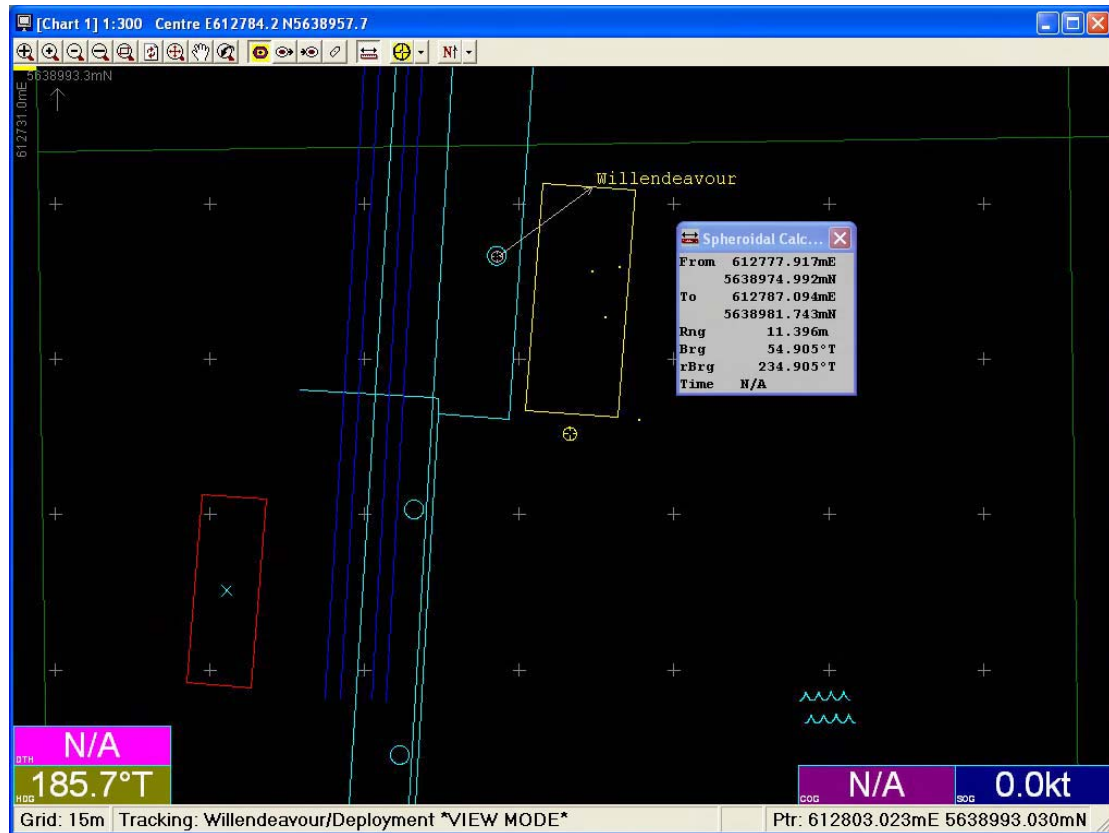


Figure 4.4: Visual Verification of Gyro Check Whilst Alongside

4.6 Tides

Depths were reduced post survey to Lowest Astronomical Tide based on extrapolated tides at location using predicted tides for the Standard Port of Shoreham. Tidal predictions were issued to the vessel in advance.

5. PERSONNEL AND EQUIPMENT

5.1 Personnel

The following FSLTD personnel were aboard the Multicat Willendeavour during Geotechnical investigation.

Name	Discipline	Date On	Date Off
J. Wicks	Party Chief	5 April 2011	9 April 2011

5.2 Equipment

2 x Alison GPS GLONASS Antenna
2 x StarPack DGPS systems
2 x PC systems - Starfix.SEIS Online
1 x Eurodrone GPS Vector sensor Gyro Compass

Survey equipment remained operational throughout the project. No issues were reported.

6. SAFETY

Upon arrival on the vessel, all new personnel underwent an induction briefing carried out by a member of the marine crew, usually the Chief Officer where they addressed the primary safety issues surrounding the vessel. In addition various meetings were held with members from both the marine and survey crew to define the project and general offshore operations. Personnel were made aware of the following issues, systems and site specific policies:

- Information Report Card Reporting Procedure
- Substance Abuse Policies
- Personal Protective Equipment Policy
- Working at Height Policy

All survey and project related operations were carried out in a safe and responsible manner and at no time did they compromise Fugro Health and Safety policies. Following the completion of initial briefings, all new personnel were given a tour of the vessel and shown all the safety features. Regular safety meetings were held at the beginning of every day and when the job scope changed. Minutes of all safety related meetings including Toolbox Talks were kept on board by FAOL throughout the duration of the work.

Personnel were required to actively participate in schemes designed to enhance their own, and everybody else's health and safety, onboard the vessel.

Protective Clothing

All FSLTD personnel carry the following protective clothing:

- 1 x Hard Hat (BSEN 397)
- 1 x Pair of Safety Boots (BSEN 344, 345, 346)
- 1 x Pair of Safety Glasses (BSEN 166)
- 1 x Coveralls (BSEN 470-1,531)
- 1 x Pair Gloves
- 1 x Thermal Jacket

Documentation

All FSLTD personnel are in possession of the following documentation:

- 1 x Current Passport
- 1 x UKOOA / Norwegian Approved Offshore Medical Certificate
- 1 x UKOOA / Norwegian Approved Offshore Survival Certificate
- 1 x Certificate of Employers Liability Insurance

A project specific emergency response document was issued to the vessel at mobilisation.

6.1 HAZOPS

During all operations all safety procedures were adhered to. Special attention was paid to safety requirements when carrying out the following activities:

- Working at height
- High Voltage maintenance and electrical connection
- Deck arrangement and management creating (trip) hazards
- Crane operations

6.2 Safety Meetings

Regular safety meetings were held on board where representatives of all disciplines were required to attend. The minutes of these meetings were posted on the general notice board.

6.3 Toolbox Meetings

Toolbox meetings were a regular feature of the safety culture on board. These meetings were convened at the start of every day and prior to the start of any significant survey task or change in survey operations. All key personnel involved in the operations attended. These meetings attempted to identify and reduce hazards to a minimum and were in addition to any safety meetings held on board the vessel.

6.4 Safe Job Analysis

Where appropriate, a Safe Job Analysis was carried out for all operations not normally undertaken as part of the "normal" survey operations. This Safe Job Analysis involved all personnel involved with the particular task.

It is considered that all survey operations were carried out in a safe and responsible manner and did not compromise the Client or Fugro Survey Health and Safety policies and safe working practices at any time during the mobilisation and calibrations.

APPENDICES

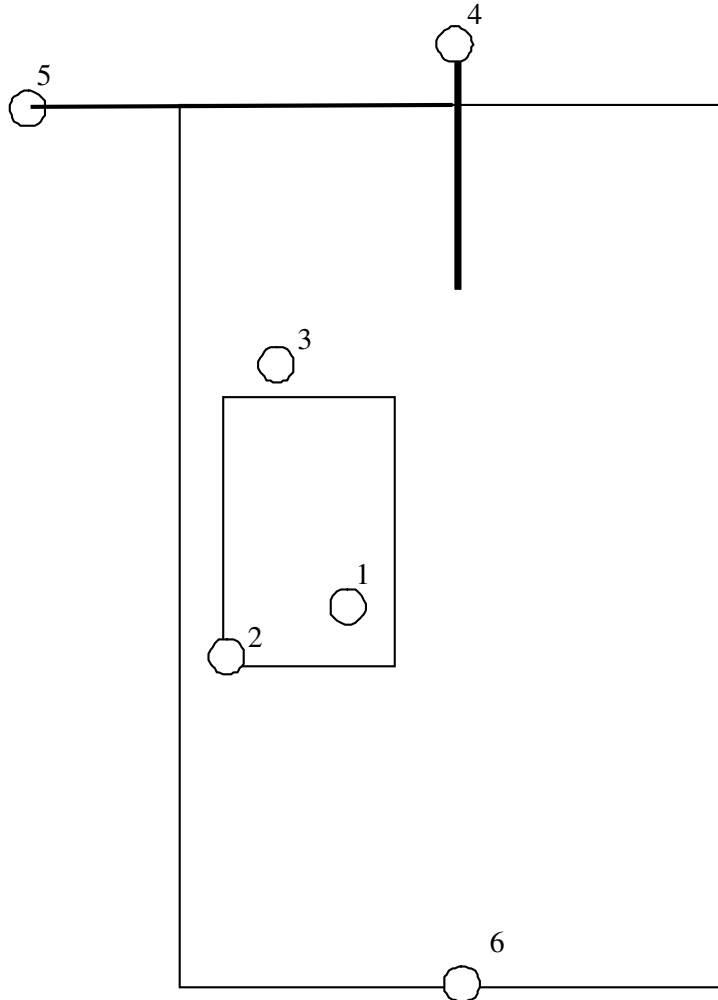
A. SEQUENCE OF SIGNIFICANT EVENTS

Date	Time	Events
05/04/11	07:30	Departed for vessel
	14:00	Arrived Willendeavour
	14:10	Toolbox Talk
	16:20	Logging on
	19:00	Gyro check completed, C-O = 0.17
	19:30	Boat mobilised and calibrations completed
	20:45	Arrive hotel
06/04/11	09:00	Depart hotel
	11:30	Arrive vessel, coordinates checked and put into system also one extra, total now five boreholes
	12:00	Waiting on fish representative, echo sounder depth check carried out; 10cm difference
	12:40	Depart Southampton, induction carried out
	12:55	Toolbox Talk
	13:05	On location for camera drop
	13:20	Log file 201104061220
	13:26	Moving to Location 18C
	13:40	On location for camera drop
	13:40	Log file 201104061240
	13:46	Moving to Location 19C
	14:07	On location for camera drop
	14:09	Log file 201104061309
	14:17	Moving to Location 20C
	14:31	On location for camera drop
	14:31	Log file 201104061331
	14:41	Moving to Location bh3
	15:12	On location for camera drop
	15:17	Log file 201104061417
	15:31	Moving to Wave Rider buoy location, extra job to recover E:688858.8, N:5617657.6
	15:50	On location for WRB pick up
	16:00	Log file 201104061458
	16:05	WRB bungee snapped. E:688683.4, N:5617581.6
	16:10	Returning to port
	17:30	Alongside
	08:30	Depart hotel
	09:30	Arrive vessel waiting for 10:00 lock gates
	10:15	Proceed to 21C for CPT
	10:48	On location 21C, log file 201104071006
	11:00	Deploying CPT

Date	Time	Events
07/04/11	11:08	CPT on bottom, E:691334.19, N:5630920.69
	11:17	Recovering CPT
	11:18	CPT on deck
	11:25	Proceed to 18C for CPT
	11:40	On location 18C, log file 201104071039
	11:42	Deploying CPT
	11:48	CPT on bottom, E:690325.06, N:5629207.33
	11:58	Recovering CPT
	12:05	CPT on deck
	12:08	Proceed to 19C for CPT
	12:31	On location 19C, log file 201104071131
	12:32	Deploying CPT
	12:37	CPT on bottom, E:692783.61, N:5626332.80, retest needed
	12:42	Recovering CPT
	12:43	Retest 19Ca E:692788.28, N:5626330.22
	12:48	Recovering CPT
	12:55	Proceed to 20C for CPT
	13:12	On location 20C, log file 201104071212
	13:13	Deploying CPT
	13:17	CPT on bottom, E:691332.60, N:5624079.60
	13:24	Recovering CPT
	13:29	CPT on deck
	13:32	Proceed to BH3 for CPT
	14:07	On location BH3, log file 201104071307
	14:09	Deploying CPT
	14:14	CPT on bottom, E:692327.41, N:5617601.7
	14:22	Recovering CPT
	14:35	CPT on deck
	14:36	Changing over CPT to Vibrocore
	15:37	Vibrocore set up commencing work
	15:47	On location BH3, log file 201104071447
	15:49	Deploying Vibrocore
	15:52	Vibrocore on bottom, E:692327.80, N:5617601.14
	15:55	Recovering Vibrocore
	15:58	Vibrocore on deck
	16:03	Proceed to 20C for Vibrocore
	16:36	On location 20C, log file 201104071537
	16:40	Deploying Vibrocore
	16:41	Vibrocore on bottom, E:691331.75, N:5624077.90
	16:44	Recovering Vibrocore
	16:48	Vibrocore on deck
	17:00	Retest needed 20Ca
	17:22	Deploying Vibrocore. , log file 201104071622
	17:25	Vibrocore on bottom, E:691334.45, N:5624080.35

Date	Time	Events
07/04/11	17:27	Recovering Vibrocore HPC not working
	17:29	Vibrocore on deck
	17:30	HPC problem heading back to port
	18:30	Vessel alongside
08/04/11	09:10	Arrive vessel
	09:50	Depart for lock gates
	10:25	Proceed to 21C for Vibrocore, toolbox talk completed
	11:08	On location 21C, log file 201104081008
	11:10	Deploying Vibrocore
	11:10	Vibrocore on bottom, E:691333.31, N:5630918.87
	11:12	Recovering Vibrocore
	11:14	Vibrocore on deck
	11:21	Proceed to 18C for Vibrocore
	11:32	On location 18C, log file 201104081032
	11:34	Deploying Vibrocore
	11:35	Vibrocore on bottom, E:690327.06, N:5629206.38
	11:37	Recovering Vibrocore
	11:39	Vibrocore on deck
	11:48	Proceed to 19C for Vibrocore
	12:08	On location 19C, log file 201104081108
	12:09	Deploying Vibrocore
	12:14	Vibrocore on bottom, E:69275.75, N:5626332.21
	12:17	Recovering Vibrocore
	12:19	Vibrocore on deck
	12:25	Proceed to 20C for Vibrocore
	12:49	On location 20C, log file 201104081149
	12:50	Deploying Vibrocore
	12:52	Vibrocore on bottom, E:691331.75, N:5624077.90
	12:55	Recovering Vibrocore
	12:58	Vibrocore on deck
	12:58	Heading back into port to demobilise FAOL equipment, survey needed for diver positioning
	13:40	Alongside Shoreham collecting divers and demobilising / stowing FAOL equipment
	14:20	Departing port for WRB location
	15:31	On location, buoy on surface connected to wire hauling in
	15:54	Clump weight on deck, heading back into port
	17:30	Alongside and demobilised
09/04/11		Personnel demobilised

B. OFFSETS



	Offset (in metres)	X [+Stbd]	Y [+Bow]	Z [+Up]
1	HP 1	-0.82	8.10	7.01
2	HP 2	-3.40	7.49	6.19
3	CSI Vector sensor	-2.49	12.37	7.07
4	Deployment (CPT and VC Phase)	0.00	24.00	0.00
5	Deployment 2	-6.50	22.00	0.00
6	CRP Centre Stern	0.00	0.00	0.00

C. INTENDED LOCATIONS

Vibrocore and CPT	Easting (m)	Northing (m)
18C	690 324.8	5629 206.7
19C	692 783.7	5626 332.7
20C	691 332.6	5624 079.6
21C	691 333.7	5630 919.7
BH 3	692 327.0	5617 601.8

END OF DOCUMENT

**SECTION E
GUIDELINES FOR USE OF REPORT**

E. GUIDELINES FOR USE OF REPORT

E.1 Guidelines

- i. This report and the assessment carried out in connection with the report (together the “Services”) were compiled and carried out by Fugro Alluvial Offshore Limited (“FAOL”) for EON Climate and Renewable UK Developments Limited (“Client”) in accordance with instructions received. The Services were performed by FAOL with the skill and care ordinarily exercised by a reasonable geotechnical specialist at the time the Services were performed. Further, and in particular, the Services were performed by FAOL taking into account the limits of the scope of works required by the Client, the time scale involved and the resources, including financial and manpower resources, agreed between FAOL and the Client.
- ii. Other than that expressly contained in paragraph 1 above, FAOL provides no other representation or warranty whether express or implied, in relation to the Services.
- iii. The Services were performed by FAOL exclusively for the purposes of the Client. FAOL is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, FAOL does not authorise, consent or condone any party other than the Client relying upon the Services. Should this report or any part of this report or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and FAOL disclaims any liability to such party. Any such party would be well advised to seek independent advice from a competent geotechnical specialist and / or lawyer.
- iv. It is FAOL’s understanding that this report is to be used for the purpose described in Section 1.3 of the main text of this report, entitled “Purpose and Scope of Work”. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, and/or should the Client’s proposed development or use of the site change (including in particular any change in any design and/or specification relating to the proposed use or development of the site), this report may no longer be valid or appropriate and any further use of or reliance upon the report in those circumstances by the Client without FAOL’s review and advice shall be at the Client’s sole and own risk. Should FAOL be requested, and FAOL agree, to review the report after the date hereof, FAOL shall be entitled to additional payment at the then existing rates or such other terms as may be agreed between FAOL and the Client.
- v. The passage of time may result in changes (whether man-made or otherwise) in site conditions and changes in regulatory or other legal provisions, technology, methods of analysis, or economic conditions which could render the report inaccurate or unreliable. The information, recommendations and conclusions contained in this report should not be relied upon if any such changes have taken place or after a period of 2 years from the date of this report or such other period as maybe expressly stated in the report, without the written agreement of FAOL. In the absence of such written agreement of FAOL, reliance on the report after any such changes have occurred or after the period of 2 years has expired shall be at the Client’s own and sole risk. Should FAOL agree to review the report after the period of 2 years has expired, FAOL shall be entitled to additional payment at the then existing rates or such other terms as may be agreed between FAOL and the Client.
- vi. The observations, recommendations and conclusions in this report are based solely upon the Services, which were provided pursuant to the contract between the Client and FAOL. FAOL has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the Client and FAOL. FAOL is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services.

- vii. Where the Services have involved FAOL's interpretation and/or other use of any information (including documentation or materials, analysis, recommendations and conclusions) provided by third parties (including independent testing and/or information services or laboratories) or the Client and upon which FAOL was reasonably entitled to rely or involved FAOL's observations of existing physical conditions of any site involved in the Services, then the Services clearly are limited by the accuracy of such information and the observations which were reasonably possible of the said site. Unless otherwise stated, FAOL was not authorised and did not attempt to independently verify the accuracy or completeness of such information, received from the Client or third parties during the performance of the Services. FAOL is not liable for any inaccuracies (including any incompleteness) in the said information, the discovery of which inaccuracies required the doing of any act including the gathering of any information which it was not reasonably possible for FAOL to do including the doing of any independent investigation of the information provided to FAOL save as otherwise provided in the terms of the contract between the Client and FAOL.
- viii. The soil and ground conditions information provided in the Services are based solely on evaluations of soil and ground condition samples and in-situ tests at determined sample test locations and elevations. That information cannot be extrapolated to any area or elevation outside those locations and elevations unless specifically so stated in the report. In the light of the information available to FAOL, the soil and ground conditions information are considered appropriate for use in relation to the geotechnical design and installation aspects of the structures addressed in the report, but they may not be appropriate for the design of other structures.

APPENDIX 1
DESCRIPTIONS OF METHODS AND PRACTICES

1.	CONE PENETRATION TEST (CPT) DEFINITIONS	1
2.	LIST OF SYMBOLS AND TERMS	2
3.	SOIL CLASSIFICATION SYSTEM	5
4.	LABORATORY TEST METHOD STATEMENTS	8
4.1	General	8
4.2	Moisture Content	9
4.3	Bulk and Dry Density	10
4.4	Particle Size Distribution (PSD)	11
4.5	Torvane Test	12
4.6	Pocket Penetrometer Test	13
4.7	Atterberg Limits Determination using Cone Penetration Method	14
4.8	Chemical Testing	16
4.9	Unconsolidated Undrained Triaxial Compression Test On Undisturbed And / Or Remoulded Soil	17
4.10	Unconfined Compressive Strength Test	19
5.	DATA SHEETS	20
5.1	HPC Data Sheet	20
5.2	HPC Operations Manual	22
5.3	CPT Data Sheet	30
5.4	CPT Operations Manual D-F-005	33
5.5	Cone Calibration Certificates	41
5.6	Vessel Specification	42

1. CONE PENETRATION TEST (CPT) DEFINITIONS

An explanation of common CPT abbreviations is presented below:

q_c	=	Measured cone resistance.
d	=	Depth below mudline at start of test.
α	=	The ratio of the area of the cone shaft to the area of the cone face.
β	=	The ratio of the excess pore-water pressure acting on the cone shoulder to that acting at the sensor location.
u_o	=	The theoretical hydrostatic water pressure relative to mudline acting at the elevation of the cone face.
du	=	The pore-water pressure in excess of the theoretical hydrostatic pore-water pressure relative to mudline.
p_o	=	The total overburden pressure relative to mudline.
f_s	=	The measured cone sleeve friction.
γ_w	=	The unit weight of sea water.

Total cone resistance (q_t) is the measured cone resistance corrected for the effects of cone shape and pore-pressure distribution around the cone tip. The formula used to calculate q_t is given below:

$$q_t = q_c + \alpha \cdot \gamma_w \cdot d + (1-\alpha) \cdot (u_o + \beta du)$$

Net cone resistance (q_{net}) is defined as total cone resistance (q_t) minus the total overburden pressure relative to mudline (p_o). The formula used to calculate q_{net} is given below:

$$q_{net} = q_c + \alpha \cdot \gamma_w \cdot d + (1-\alpha) \cdot (u_o + \beta du) - p_o$$

Excess pore-water pressure ratio is the ratio of the measured excess pore-water pressure to the net cone resistance. The formula used to calculate B_q is given below:

$$B_q = (du/q_{net})$$

Friction ratio is the ratio of the measured cone sleeve friction to the measured cone resistance and is normally expressed as a percentage. The formula used to calculate R_f is given below:

$$R_f = (f_s/q_c) \times 100\%$$

2. LIST OF SYMBOLS AND TERMS

a	=	attraction (in terms of effective stress)
A_f	=	Skempton's pore-water pressure parameter at failure
B	=	Skempton's pore-pressure parameter
BML	=	below mudline
c'	=	cohesion (in terms of effective stress)
c_v	=	coefficient of consolidation
CAUc	=	anisotropically consolidated undrained triaxial compression test
CAUe	=	anisotropically consolidated undrained triaxial extension test
CPT	=	cone penetration test
CRS	=	constant rate of strain 'oedometer' test
D	=	Janbu's 'D' parameter
D_r	=	relative density
DSS	=	static direct simple shear test
CSS	=	cyclic direct simple shear test
E_d	=	drained elastic modulus
E_u	=	undrained elastic modulus
E_{50}	=	secant elastic modulus (measured at half the deviator stress at failure)
e	=	voids ratio
e_o	=	initial voids ratio
FC	=	fallcone
G	=	shear modulus
I_p	=	plasticity index = $w_L - w_p$
k	=	coefficient of permeability
L & F	=	Ladd et al. (1977)
LI	=	liquidity index
LL	=	liquid limit
LV	=	labvane
M	=	constrained modulus (one-dimensional consolidation)
m	=	Janbu (1985) deformation parameter
m_v	=	coefficient of compressibility
M & K	=	Mayne and Kulhawy (1982)
MC	=	moisture content
n	=	porosity
N	=	number of cycles
N_F	=	number of cycles to failure
N_{kt}	=	cone factor (q_{net}/s_u)
OCR	=	overconsolidation ratio (p_c'/p_o')
OED	=	incremental oedometer test
K_o	=	coefficient of earth pressure at rest
PD	=	particle density
PI	=	plasticity index
PL	=	plastic limit

PP	=	pocket penetrometer
PSD	=	particle size distribution
p'	=	$(\sigma_1' + 2K_o \sigma_3')/3$
p_o'	=	effective overburden pressure in situ
Δp	=	$p_c' - p_o'$
p_c'	=	vertical effective pre-consolidation pressure in situ
p_r'	=	reference stress for Janbu (1985) approach to settlement calculation
q	=	$(\sigma_1' - \sigma_3')$
s'	=	$(\sigma_1' + \sigma_3')/2$
SD	=	standard deviation
S & N	=	Skempton and Northey (1952)
S_r	=	degree of saturation
s_u	=	undrained shear strength
s_{ua}	=	undrained shear strength from CAUc test
s_{ud}	=	undrained shear strength from DSS test
s_{uu}	=	undrained shear strength from UU test
s_{up}	=	undrained shear strength from CAUe test
$s_{u(pp)}$	=	undrained shear strength from pocket penetrometer test
$s_u(R)$	=	remoulded shear strength
TC	=	thermal conductivity
TC(R)	=	remoulded thermal conductivity
TV	=	torvane
t	=	$(\sigma_1 - \sigma_3)/2$
UU	=	unconsolidated undrained triaxial compression test
u	=	pore-water pressure
u_f	=	pore-water pressure at failure
u_N	=	pore-water pressure after N cycles
w	=	water content
w_i	=	initial water content
w_f	=	final water content
w_L	=	liquid limit
w_p	=	plastic limit
$\Delta\sigma_1$	=	change in major principal stress, σ_1
$\Delta\sigma_2$	=	change in minor principal stress, σ_2
$\Delta\sigma_3$	=	change in minor principal stress, σ_3
$\Delta\sigma_d$	=	change in deviator stress ($\Delta\sigma_a - \Delta\sigma_r$)
$\Delta\sigma_r$	=	change in total radial stress
$\Delta\sigma_r'$	=	change in effective radial stress
$\Delta\sigma_m'$	=	change in mean effective stress
$\Delta\sigma_v$	=	change in total vertical stress
$\Delta\sigma_v'$	=	change in effective vertical stress
Δu	=	change in pore-water pressure
Δu_f	=	change in pore-water pressure at failure
ε_{50}	=	vertical strain at half the maximum deviator stress

ε_v	=	vertical strain
ε_{vc}	=	vertical strain after consolidation
ε_{vf}	=	vertical strain at failure
ε_{vol}	=	volumetric strain
$\tan \phi$	=	internal friction
$\tan \rho$	=	mobilised internal friction
β	=	ratio of pore-water pressure generation in cyclic test relative to number of cycles and confining pressure.
β	=	pore-water pressure correction factor (CPTu)
ϕ_u	=	undrained friction angle
ϕ_d	=	drained friction angle
ϕ'	=	effective friction angle
ϕ_{cv}	=	friction angle at constant volume
ϕ_{res}	=	ultimate friction angle at large strain
γ_w	=	unit weight of water
γ_{av}	=	average cyclic shear strain
γ_{cy}	=	cyclic shear strain
γ_f	=	shear strain at failure
γ'	=	effective unit weight of soil
γ_d	=	unit dry weight of soil
γ_{dmin}	=	minimum dry unit weight of soil
γ_{dmax}	=	maximum dry unit weight of soil
γ_N	=	cyclic shear strain after N cycles
γ_s	=	unit weight of solid particles
ρ	=	density of soil
ρ_s	=	density of solid particles
σ_1'	=	effective major principal stress
σ_3'	=	effective minor principal stress
σ_c'	=	effective consolidation pressure (isotropic)
σ_r'	=	radial effective stress
σ_{rc}'	=	radial effective consolidation stress
σ_v'	=	vertical effective stress
σ_{vc}'	=	vertical effective consolidation stress
σ_{oct}'	=	octahedral stress
τ	=	shear stress
τ_{av}	=	average shear stress during cyclic test
τ_{cy}	=	cyclic shear stress
τ_{res}	=	residual horizontal shear stress at large strain

3. SOIL CLASSIFICATION SYSTEM

All soils have been described in accordance with Fugro Soil classification procedure 5091DT-RPT-02-R4.

This document states: 'It has been agreed that the soil classification systems of all Fugro geotechnical groups will conform to either BS 5930 or ASTM D 2487. This document encompasses both procedures, and presents specific additions to each system that will enable the naming conventions to be as similar as possible throughout Fugro. For description and classification of calcareous soils, the system outlined by Clark and Walker (1977) is integrated with both systems.

Soil descriptions for this report are based upon BS5930:1999.

The limits of consistency that have been adopted for the predominantly cohesive soils are based on BS5930 (1999), and are presented in Table 1. Note that an additional range for "Very Hard" soils is included to cover the full range of strength of soils.

Table 1: Ranges of Shear Strength for Soil Description

Consistency	Shear Strength (kPa)
Very soft	0 – 20
Soft	20 – 40
Firm	40 – 75
Stiff	75 – 150
Very Stiff	150 – 300
Hard	300 – 600
Very Hard	Greater than 600

The limits of consistency adopted in sand soils are based on the ranges presented in Table 2 (Lambe and Whitman, 1969).

Table 2: Ranges of Relative Density for Soil Description

Consistency	Relative Density (%)
Very Loose	0 – 15
Loose	15 – 35
Medium Dense	35 – 65
Dense	65 – 85
Very Dense	85 – 100

Descriptive terms are based on British Standard BS 5930: 1999: Code of practice for site investigations.

The basic soil types as defined by particle size analysis are as follows:

GRAVEL	Coarse	20.0mm to 60.0mm
	Medium	6.0mm to 20.0mm
	Fine	2.0mm to 6.0mm
SAND	Coarse	0.6mm to 2.0mm
	Medium	0.2mm to 0.6mm
	Fine	0.06mm to 0.2mm
SILT	Coarse	0.02mm to 0.06mm
	Medium	0.006mm to 0.02mm
	Fine	0.002mm to 0.006mm
CLAY		Less than 0.002mm

For the purpose of soil description in the core logs, the grading may be abbreviated e.g. sandy (fm) GRAVEL (mc) = sandy (fine to medium) GRAVEL (medium to coarse). The descriptive grading term is based on the occurrence of 10% or more of the sand or gravel fraction.

Most soils are of a composite nature, containing variable percentages of the above soil types. They can be broadly divided into coarse and fine soils. A coarse soil generally contains 65% or more of coarse material and is described as SAND or GRAVEL depending on which of the constituents predominates.

SOIL COLOUR

The Munsell Colour Chart is the standard for soil colour description. The Munsell colour is arranged according to three variables, Hue, Value and Chroma. The Hue notation of a colour indicates its relation to red, yellow, green, blue and purple. The Value notation indicates the relative lightness. The Chroma notation indicates the intensity of the colour.

It is not necessary to include the colour code on borehole logs or in report text, but it may be included in detailed sample descriptions.

Table 3: Descriptive Terms and Ranges for Secondary Constituents

Term	Principal soil type	Approximate proportion of secondary constituent	
		Coarse soil	Fine soil
Slightly clayey or silty	SAND and/or GRAVEL		< 5%
Clayey or silty			5% - 20%
Very clayey or silty			> 20% (1)
Slightly sandy or gravelly		< 5%	
Sandy or gravelly		5% - 20%	
Very sandy or gravelly		> 20%	
Slightly sandy and/or gravelly	SILT or CLAY	< 35%	
Sandy and/or gravelly		35% - 65%	
Very sandy and/or gravelly		> 65% (2)	

Notes: (1) or can be described as fine soil depending on engineering behaviour

(2) or can be described as coarse soil depending on engineering behaviour

A fine soil generally contains 35% or more of fine material and is defined as a CLAY or SILT depending on its plasticity. On the plasticity chart a silt plots below the 'A' line and a clay plots above it.

In the absence of plasticity data a fine soil may be assigned a description based on particle size distribution.

4. LABORATORY TEST METHOD STATEMENTS

4.1 General

This section contains details of the general test procedures adopted by Fugro Alluvial Offshore Limited when performing laboratory testing on samples.

If possible, the tests were performed following the methods outlined in British Standard 1377:1990. During testing the soils have been described both from visual examination and, where other results were available, following the recommendations of the British Standard Code of Practice BS 5930 (1999).

4.2 Moisture Content

4.2.1 General

The moisture content is defined as the ratio of the weight of water to the weight of dry soil. Moisture content determinations are performed in accordance with the procedures of BS1377: 1990. A brief outline of the test procedure is presented here.

4.2.2 Test Procedure

The moisture content is determined by weighing a suitable quantity of wet soil. The soil is then dried in an oven, typically for a period of 24 hours, at a temperature of 105°C to 110°C. The resulting dry soil is re-weighed in order to obtain the weight of water lost from the specimen. The moisture content, as defined above, is then determined.

4.2.3 Presentation of Results

Individual results are presented in tabular form.

4.2.4 Accuracy of Measurements

Temperature	+2.5°C
Weight	± 0.1g (site measurements)
	± 0.01g (onshore measurements)

4.2.5 Reference

BS1377:1990 "British Standard Methods of Test for Soils for Civil Engineering Purposes" Part 2, Section 3.

4.3 Bulk and Dry Density

4.3.1 General

Bulk density is defined as the mass of soil per unit volume and is normally expressed in units of Megagrammes per cubic metre (Mg/m^3). Dry density is defined as the mass of dry soil per unit volume. Density determinations are performed in accordance with the procedures of BS1377: 1990. A brief outline of the test procedure is presented here.

4.3.2 Test Procedure

The bulk density of a specimen is determined by weighing a known volume of wet soil. The dry density is determined by oven drying a known volume of soil for a period, typically 24 hours, at a temperature of 105°C to 110°C and then weighing the dry soil.

4.3.3 Presentation of Results

Individual results are presented in tabular form.

4.3.4 Accuracy of Measurements

Dimensions	$\pm 0.1 \text{ mm}$ (site Measurements)
Temperature	$\pm 2.5^\circ\text{C}$
Weight	$\pm 0.1 \text{ g}$ (site Measurements) $\pm 0.01 \text{ g}$ (onshore Measurements)

4.3.5 Density of Intact Core

Based on the above principles, the density of intact core for each 0.5m core section is determined by measurement of the weight and dimensions of the sample after careful trimming to remove any excess core tube, and elimination of voids.

4.3.6 Accuracy of Measurements

Dimensions	$\pm 1 \text{ mm}$
Temperature	$\pm 5^\circ\text{C}$
Weight	$\pm 1 \text{ g}$

4.3.7 REFERENCE

BS1377:1990 "British Standard Methods of Test for Soils for Civil Engineering Purposes" Part 2, Section 7.

4.4 Particle Size Distribution (PSD)

4.4.1 General

The in-situ behaviour of soil is affected by its particle size distribution. Particle size distribution tests are performed in accordance with the procedures of BS1377: 1990. A brief outline of the test procedures is presented below.

4.4.2 Test Procedures

Wet Sieving - The specimen is soaked in water, or, if the sample is cohesive, it may be dispersed with a solution of sodium hexametaphosphate for a period of at least 1 hour before being washed through a 63 micron sieve. The percentage by weight of the various particle sizes in excess of 63 microns is determined by mechanical sieving through sieves of apertures adequately covering the range of particle sizes represented in the soil.

Sedimentation - The distribution of particle sizes smaller than 63 microns is determined using the pipette or hydrometer method on the soil/water suspension washed through the 63-micron sieve during wet sieving. In this method, the specific gravity of the soil/water suspension is determined at various times and related to soil particle size by means of Stokes' Law.

4.4.3 Data Presentation

Particle size distribution, expressed in terms of percentage of soil by weight passing a particular sieve size, is presented for individual tests.

4.4.4 Accuracy of Measurements

Weight	$\pm 0.01\text{g}$.
Density	$\pm 0.0001\text{g/mL}$
Temperature	$\pm 0.2^{\circ}\text{C}$
Time	± 1 second

4.4.5 REFERENCES

BS1377:1990 "British Standard Methods of Test for Soils for Civil Engineering Purposes" Part 2, Section 9.

4.5 Torvane Test

4.5.1 General

The torvane test is used to obtain a quick estimate of the undrained shear strength of the soil. The test and equipment are described by Head (1982). A brief outline of the test procedure is presented here.

4.5.2 Test Procedure

The Torvane is a small hand-operated device consisting of a metal disc with thin radial vanes projecting from one face. The disc is pressed against a flat surface of the soil until the vanes are fully embedded. It is then rotated through a torsion spring until the soil enclosed within the vanes is sheared from the sample. The device is calibrated to indicate the shear strength of the soil from the rotation of the torsion spring. Several vane sizes are available that can be attached to the basic torvane in order to increase the range of the instrument. Generally the results are presented as an average of three readings.

4.5.3 Presentation of Results

Individual test results are tabulated on the "Summary of Laboratory Test Results" sheets and may also be presented graphically.

4.5.4 Accuracy of Measurements

Typically $\pm 10\%$ of presented value

4.5.5 Reference

HEAD, K. (1982), "Manual of Soil Laboratory Testing, Vol. 2: Permeability, Shear Strength and Compressibility Tests", Pentech Press, London and Plymouth.

4.6 Pocket Penetrometer Test

4.6.1 General

The pocket penetrometer test is used to obtain a quick estimate of the undrained shear strength of the soil. The test and equipment are described by Head (1992). A brief outline of the test procedure is presented here.

4.6.2 Test Procedure

A small cylindrical metal rod is slowly pressed into the soil through a spring until it is embedded a predetermined distance. This hand-operated device is calibrated such that the undrained shear strength of the soil can be calculated by reading off a scale that measures the compression of the spring and multiplying by an appropriate factor which depends on the diameter of the cylindrical metal rod. The range of the instrument may be increased by attaching cylindrical rods of various sizes to the basic penetrometer. Generally the results are presented as an average of three readings.

4.6.3 Presentation of Results

Individual test results are tabulated on the "Summary of Laboratory Test Results" sheets and may also be presented graphically.

4.6.4 Accuracy of Results

Typically $\pm 10\%$ of presented value

4.6.5 Reference

HEAD, K. (1982), "Manual of Soil Laboratory Testing, Vol. 2: Permeability, Shear Strength and Compressibility Tests", Pentech Press, London and Plymouth.

4.7 Atterberg Limits Determination using Cone Penetration Method

4.7.1 General

Atterberg Limits tests are performed to determine the liquid and plastic limits, and hence the plasticity index of a cohesive soil. Definitions of liquid and plastic limit are presented below. The plasticity index is defined as the difference between the liquid and plastic limits. The tests are performed in accordance with the procedures of BS1377:1990. A brief outline of the test procedures is presented here. Atterberg limit determinations are performed on the soil fraction passing a 425 μ m sieve.

4.7.2 Test Procedure

4.7.2.1 Liquid Limit

The 'Cone Penetrometer Apparatus' consists of a cone with a smooth polished surface and angle of $30^\circ \pm 1^\circ$. The weight of the cone, together with its associated shaft is $80\text{g} \pm 0.1\text{g}$. A support assembly with an automatic cone release mechanism and cone height adjustment mechanism is used to hold the cone vertically.

Distilled water is added and thoroughly mixed with the soil to be tested to produce a homogeneous paste. The paste is then placed in a cup with a diameter of at least 55mm and a depth of at least 40mm. The surface of the soil is smoothed off level and parallel to the base. The tip of the cone is lowered so that it is just touching the top surface of the soil, and the automatic tripping mechanism is released. The cone is allowed to penetrate into the soil for a period of $5\text{s} \pm 1\text{s}$, then the penetration is recorded and a sample of soil from the cup is removed for water content determination.

4.7.2.2 Four Point

By varying the water content of the soil, at least three times, a series of cone penetrations in the approximate range 15mm to 25mm are produced. The Liquid limit is defined as the moisture content at which the cone penetrates 20mm into the soil.

4.7.2.3 Single Point

By varying the water content of the soil, a test with a penetration as close as possible to 20mm is performed. The test is repeated until 2 consecutive readings within 0.5mm are obtained. The Liquid limit is defined as the moisture content multiplied by correction factor published in the standard.

4.7.2.4 Plastic Limit

The plastic limit is determined by allowing a portion of approximately twenty grammes of the soil used for the liquid limit test to dry partially. When the soil has dried sufficiently to be workable by hand, it is kneaded into a ball until cracks appear on the surface. The soil is then rolled into threads approximately three millimetres in diameter using even pressure. The plastic limit is defined as the moisture content at which the threads of soil three millimetres in diameter crumble.

Data Presentation

Result of Atterberg Limits determinations are presented both in tabular form, and plotted on a BS5930 "Plasticity Chart".

4.7.3 Accuracy of Measurements

Weight $\pm 0.01\text{g}$.

4.7.4 References

BS1377:1990 "British Standard Methods of Test for Soils for Civil Engineering Purposes" Part 2

4.8 Chemical Testing

4.8.1 General

Chemical testing may be required to determine the amount of chemical substances, including organic matter, in samples of soil and ground water, to assist in the design of structures and pipelines to resist chemical attack and corrosion.

4.8.2 Test Procedure

General chemical results including pH value, Total Sulphate, Organic Content, Carbonate Content and Chloride Content are carried out according to the specified procedure in BS.1377, Part 3, 1990. Heavy metal chemical tests are carried out according to the specified procedure in the HMSO Sectional Publication: "Methods for the Examination of Waters and Associated Materials".

4.8.3 Presentation of Results

The results are presented in tabular form.

4.8.4 References

Total Sulphate - BS.1377: Part 3:1990.Clause 5

pH Value - BS.1377: Part 3:1990.Clause 9

4.9 Unconsolidated Undrained Triaxial Compression Test On Undisturbed And / Or Remoulded Soil

4.9.1 General

Unconsolidated undrained triaxial compression tests are carried out on undisturbed samples to determine the undrained shear strength.

Remoulded undrained triaxial compression tests are carried out to determine the remoulded shear strength of samples and are normally carried out in conjunction with undisturbed tests to provide a measure of soil sensitivity.

Samples are tested with a height to diameter ratio of approximately 2:1 in accordance with the procedures of BS1377:1990.

4.9.2 Sample Preparation

Remoulded Sample

The sample is grated at natural moisture content to provide the mass of soil needed to give the required density in a mould of known volume. A base plate is placed in the bottom of the mould and the soil is compacted into the mould in three equal layers using a tamping tool or, if necessary, an electrically operated vibrating hammer

Undisturbed Sample

The sample is extruded from the sample tube and carefully trimmed to a height to diameter ratio of approximately 2:1

Both Remoulded or Undisturbed Samples

The sample is weighed and measured to determine the bulk density and a moisture content determination is carried out on a portion of soil representative of the soil to be tested. The trimmed sample is placed on the base pedestal and a greased top cap is placed on top of the sample. The sample is enclosed within a rubber membrane that is sealed with rubber 'O' rings to prevent the ingress of water into the specimen during testing.

4.9.3 Test Procedure

Shearing Stage

The triaxial cell is assembled and filled with water. The triaxial cell is pressurised to a suitable pressure and the piston is brought into contact with the top cap. The load cell or proving ring and displacement transducer or dial gauge are zeroed. The sample is sheared at a rate of strain equivalent to two per cent per minute with measurements of displacement and load being recorded at intervals equivalent to 0.5 per cent strain. The test is terminated when an axial strain of 20% has been reached.

After Shearing

On completion of the shearing stage the cell pressure is reduced to atmospheric pressure, the water drained and the sample removed from the cell. After sketching the failure shape, the sample is weighed

and placed in a thermostatically controlled oven, typically for a period of 24 hours, at a temperature of 105-110°C. This procedure enables the moisture content, wet density and dry density to be determined.

4.9.4 Data Presentation

The test data is processed using in-house developed software that incorporates an allowance for the effect of the membrane on the behaviour of the specimen. The following results are presented in the report.

- Initial sample dimensions (mm).
- Initial moisture content (%)
- Bulk and dry density (Mg/m³).
- Cell pressure (kPa)
- Undrained shear strength (kPa)
- Graph of axial strain (%) versus deviator stress or shear stress (kPa)

where

$$\begin{aligned}\text{deviator stress} &= (\sigma_a - \sigma_r) \\ \text{shear stress} &= 0.5 \times (\sigma_a - \sigma_r)\end{aligned}$$

where

σ_a = total axial stress
 σ_r = total radial stress

4.9.5 Accuracy of Measurements

The moisture contents and dry densities are determined in accordance with the accuracy's stated in the relevant procedures.

Dimensions	± 0.01 mm
Displacement	± 0.01 mm
Load: 100kN ring	± 4N; 50kN ring ± 2N; 10kN ring ± 1N; Load cell ± 1N
Cell pressure	± 5 kPa

4.10 Unconfined Compressive Strength Test

4.10.1 General

The Unconfined Compressive Strength test is used for strength classification and characterisation of intact rock.

4.10.2 Sample Preparation

The specimen is extracted from intact rock core and trimmed to a height/diameter ratio of between 2.0 and 3.0, the diameter of the specimen being at least ten times greater than the largest grain in the rock. The specimen is placed between two steel platens in a loading apparatus.

4.10.3 Test Procedure

Load is applied to the specimen via the steel platens, at a constant load rate, of between 0.5 and 1.0 MPa/sec, such that failure occurs within 5-10 min the commencement of loading. After the test the natural moisture content and bulk density of the specimen are determined.

4.10.4 Data Presentation

The following results are presented:-

- Initial specimen dimensions (mm)
- Loading rate (kN/min)
- Crushing Strength

$$s = P/A_0 \text{ (MPa)}$$

where

s = the compressive stress in the specimen,

P = the compressive load

A_0 = the initial cross-sectional area of the specimen

- Failure mode diagram

4.10.5 Accuracy of Measurements

Dimensions $\pm 0.01\text{mm}$

Load $\pm 1\text{N}$

5. DATA SHEETS

5.1 HPC Data Sheet

High Performance Corer - HPC™



High Performance Corer - HPC™

Alluvial Mining has developed a High Performance Corer™ to cope with the demand for longer sample recovery in dense granular and stiff cohesive materials.

The HPC™ utilises innovative electric motor technology and sample barrel design. The new motor technology allows an optimisation of excitation frequency and vibration amplitude to suit any particular soil conditions. At it's most powerful settings the HPC™ can apply more than twice the power and five times the vibration amplitude of a standard vibrocorer. All of this translates into much longer sample recovery.

The HPC™ may also be used with a newly developed low area ratio sample barrel which minimises the sampling disturbance in clay soils.

Special Features

- Maximum working water depths of 450 m
- Umbilical spooler for deep water projects
- Easily transported by road, sea or air
- Real time penetration and base tilt registration

Applications

- Pre-dredge surveys
- Environmental investigations
- Mineral/Aggregate prospecting
- Inshore civil engineering site investigations
- Offshore oil and gas pipeline geotechnical investigations

Specification

- 415V, minimum 45 kVA power supply
- 3m to 6m core barrel (8m optional)
- Mild steel barrels 101.6 mm o.d. 93.6 mm i.d.
- PVC liners 88.9 mm o.d. 84.14 mm i.d.

Optional sample sizes available

Dimensions

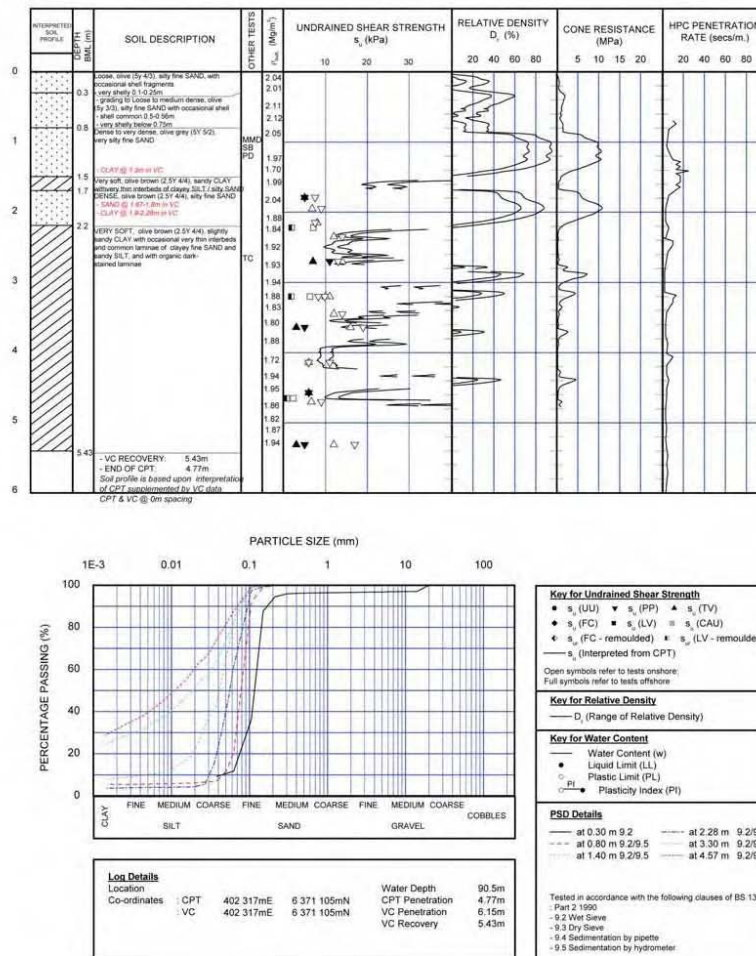
CORE BARREL(m)	HIGHT(m)	BASE(m)	WEIGHT(kg)
6.0	8.1	2.8 x 2.4	3160





The HPCTM penetration and soils data may be used in combination with CPT data to further refine stratigraphic and soils parameter logging along pipelines or in discrete location seabed soil engineering projects.

Example of HPC™ data set:



VIBROCORE / CPT LOG

The specification of the equipment in this data sheet may be subject to modifications without prior notice

Fugro Alluvial Offshore Limited
Morton Peto Road
Gapton Hall Industrial Estate
GreatYarmouth
NR31 0LT UK
Tel : +44 (0) 1493 650 484
Fax : +44 (0) 1493 440 319
www.alluvial.co.uk
info@alluvial.co.uk

February 2008

274

5.2 HPC Operations Manual



FUGRO ALLUVIAL OFFSHORE LTD

Code of Practice: D-F-006

Title: Vibrocore Operations Manual

Responsible Person: Operations Manager

This document is confidential. The copyright therein is vested in Fugro Alluvial Offshore Limited, Morton Peto Road, Gapton Hall Ind. Est., Great Yarmouth, NR31 0LT.
All rights reserved.

Issue 6.1

1 of 8

Uncontrolled if printed

VIBROCORE OPERATIONS MANUAL

1. OBJECTIVES

The purpose of this document is to define the operational procedures associated with the vibrocorer operations of Fugro Alluvial Offshore Ltd (FAOL).

2. SCOPE

This procedure shall be adhered to by all FAOL staff, by any staff seconded from another Division and by any contract staff during Vibrocore Operations.

3. RELATED DOCUMENTS

The following documents are related to this procedure:

M-Q-113-	Company Training Procedure
CTA001a	Tender and Contract Review
M-M-010	Vibrocorer Inspection Manual

4. DEFINITIONS

None

5. PROCEDURE

5.1 MOBILISATION OF EQUIPMENT IN THE YARD

All items of vibrocoring equipment required for the contract shall be transferred to a designated place in the yard prior to transportation to site.

The amount of consumable equipment prepared with the equipment to be despatched will depend upon the scope of work. Generally an extra 50% (in number) of plastic liners shall be carried as a contingency. Should the client request additional consumables then this shall be dealt with in the Contract Review process.

All equipment is listed on the Equipment Routing Form (DF006). This list shall act as proof of equipment sent and be signed off by the Operations Manager. Function checks shall be undertaken in accordance with the Vibrocore System Checklist (DF011) and shall be reported on the checklist.

VIBROCORE OPERATIONS MANUAL

The Operations Manager shall be made aware of any lack of equipment and shall decide on measures to be taken to rectify the problem.

Equipment shall be loaded onto the lorries using the fork lift truck or an outside crane contractor. Care should be taken in loading the equipment and ensuring it is correctly fastened down for transport. All small tools shall be packed in ammo boxes or alternative packing cases. Special care is required for any sensitive equipment such as computers.

5.2 MOBILISATION OF EQUIPMENT ON VESSEL

Personnel shall be available at the vessel, ready to receive the transport and equipment for off loading onto the vessel. At the discretion of the Operations Manager this task may be put in the hands of an agent.

All equipment loaded onto the vessel shall be checked against the Equipment Routing Form (Vibrocorer) (DF006) and signed by the party chief or his deputy. The Operations Manager shall be contacted about any discrepancies found and the deficiencies shall be rectified as soon as possible.

Before transferring the equipment onto the vessel, the captain or ship's bosun shall be consulted to agree the best arrangement. A deck plan or layout may have already been discussed in the Project Quality Plan.

An FAOL employee or his agent shall sign off the haulage delivery note when requested by the haulier and before the haulier's departure.

The equipment shall be mobilised onto the vessel using a hired land crane or by using the ships' own equipment. On completing of the installation of equipment onto the vessel a brief test of all equipment shall be carried out and the findings recorded on the Operation Report DF060.

All equipment shall be properly secured to deck either by sea-fastenings and/or by welding. This is to prevent any movement and loss of equipment in adverse weather conditions. Tools, spare parts, consumables and computer equipment shall be stowed in a secure, dry control room and fastened down.

The vibrocorer may be positioned ready for deployment if agreed by the captain, but should be securely fastened to the deck or bulwarks for a safe sea passage.

VIBROCORE OPERATIONS MANUAL

5.3 OPERATION AND DEPLOYMENT OF VIBROCORE EQUIPMENT

5.3.1 Preparing the Frame and Power Supply

Two pins shall be fitted through the pivoting foot of the Zenkovitch corer leg prior to deployment and may be maintained in this configuration throughout the job. The cylindrical corer is best set up on the quayside before placing on the vessel. The three legs shall be pinned together individually with the aid of a crane to lift it clear of the ground.

The power cable shall be connected once the rig is on the vessel. A cable pull grip (Kellum grip) is provided to release any strain on the plug, and should be fitted to the cable at the plug end and anchored to a suitable position on the coring pot. The power cable at the pot end should be greased (silicone type grease) before connecting to the pot. The plug should not be allowed to be pulled. The cable is connected through a starter box (for easy control) to either the ship's electrical supply or, via a deck lead, to a generator.

5.3.2 Preparing the Barrel

The preparation of the barrel is best carried out with the barrel lying in a horizontal position, either on the deck or supported on a bench. The following steps shall be taken to prepare the barrel before loading into the frame:

- I. Load the plastic liner into the barrel, leaving approx. 300mm showing at the cutting shoe end.
- II. Position an 'O' ring over the liner, or use several wraps of electrical tape and push the liner into the barrel. The 'O' ring may need to be pushed with a small screwdriver or hacksaw blade to beyond the threaded part of the barrel. Trial and error shall be needed for the number of wraps needed if tape is used. Either method is adequate and is necessary to prevent sand or silt from entering the space between the barrel and liner and blocking the sample inside.
- III. Place a core catcher in the end of the liner, "fingers" pointing up the barrel. This shall be positioned just beyond the thread and it may be possible to screw it in with the cutting shoe. The core catcher is used to prevent the sample from dropping out of the liner. In soft clays it may be necessary to use two core catchers to prevent soil loss.
- IV. The cutting shoe can now be fitted and tightened up using a chain wrench.
- V. The excess liner protruding from the flange end is trimmed to a length suitable for a snug fit into the pot flange.

VIBROCORE OPERATIONS MANUAL

- VI. Load the piston into the liner at the flange end and with the aid of a boat hook or similar pole, push the piston down the liner until it lies just short of the core catcher. Problems may occur with new leathers on the piston which may be overcome by soaking the piston in water for a while. Make sure that the rope on the piston is long enough to be able to be tied off on the frame after passing through the jambcleat.

The piston may be loaded in the liner prior to step (i) if no pole is available. The barrel is now ready for loading into the coring rig.

5.3.3 Loading Barrel into Coring Rig

It is generally easier to install the prepared barrel into the coring unit whilst that is held horizontally but this is not always possible since the deployment position may well be at an angle. The following steps detail the loading of barrels into the rig :

- I. Open any gates on the coring rig to allow ease of entry to the base plate. This is necessary for the cylindrical type corer, where a frame gate needs to be opened and the gate at the base plate needs to be in the open position. This is not necessary on the Zenkovitch corer.
- II. Enter the shoe end of the barrel through the base plate.
- III. Route the piston rope through the pot adapter and out of the hole in the side to the jambcleat.
- IV. The barrel and pot flanges can now be aligned and bolted together. There is only need to use three bolts to secure the barrel to the pot (one in every other hole). Make sure the bolt heads are down facing. This is to prevent the nuts from burring on the base plate if full penetration is achieved.
- V. Pass the piston rope through the jambcleat and anchor to a convenient place on top of the frame.
- VI. Place the penetration ring around the barrel and slide to the base plate.
- VII. If the cylindrical corer is being used the gate pin shall need to be fitted. This pin is connected to a length of rope to the pot and inserted through the base frame and gate. This is used to aid the retention of sample in the cutting shoe when retracted from the seabed. The rope length shall be calculated so that the pin is pulled out on barrel retraction.

5.3.4 Deployment of Coring Unit

The method of deployment of vibrocorers depends largely on the vessel space and set-up. The ship may use an 'A' frame, Hiab, land crane or ship's boom and may involve a second or third winch attachment. A typical deployment method is as follows:

VIBROCORE OPERATIONS MANUAL

- I. With the coring rig in a horizontal position and the head on the deck, the lower end or foot is secured by chains to the side of the vessel.
- II. The deployment winches and crane/'A' frame are then operated so that the leg restraints take the weight of the coring rig. With the weight on the chains the winch continues to operate so as to cause the vibrocorer head to raise from the deck until the main lift wire has taken the full weight of the rig.
- III. With the weight relaxed from the retaining chains, they can be removed from the ships side and attached to the legs of the corer or guide lines. In this position the corer can be lowered to the seabed.

5.3.5 Coring Operation

Upon confirmation by all involved parties that the unit is on the seabed and in a vertical position coring operations may commence. The lifting wire shall go slack when the rig is on the bottom.

- I. The starter panel is then activated to start the corer. A nominal period of 10 minutes is allowed for the corer to be vibrating on the bottom, depending on site conditions.
- II. After this time the starter panel is switched off and the main lifting wire activated to start the lift back to the surface.
- III. It is essential, particularly in shallow water, that the main lifting wire is vertical above the pot for a good straight pull on the barrel. This is to prevent any unnecessary bending of barrels.
- IV. The barrel should be extracted slowly out of the ground until clear of the seabed and then raised quickly to the vessel side.

5.3.6 Recovery Procedure

- I. Upon completion of coring the main winch continues to operate until the rig is at the surface.
- II. The leg chains are retrieved from the framework and secured to the two strong points.
- III. The weight is taken up on the chains and the head of the frame made to tilt towards the deck of the vessel.
- IV. The main lifting winch is then lowered and the head of the corer brought to rest gently on the deck.
- V. The barrel is then removed and replaced with an empty prepared barrel.

VIBROCORE OPERATIONS MANUAL

5.3.7 Removing the Liner

Prior to the removal of the barrel from the rig, the measurement of penetration using the spring should be taken. This should be taken from the base up or calculated as such.

Remove the liner as follows:

- I. Place barrel on the deck or mount on table.
- II. Remove cutting shoe with chains (if the shoe holds any sample place it in a bag).
- III. Remove core catcher (if the catcher holds any sample place it in a bag).
- IV. Removing the liner from the barrel can be done using three different methods :
 - a) Price Puller - this removes the liner from the flange end. Attach the puller to the exposed piece of liner. Make sure the barrel is secured to the deck or attach a rope to the barrel, allowing for a pull from the flange; it may be that a hole in the deck is advisable to put the flange in. Tighten the puller to the liner. Use an adequate method of retraction on the Puller e.g. and tackle and remove the liner slowly. Try and keep a straight pull.
 - b) Standard Extractor Tool - this pushes the liner from the flange out of the cutting shoe end. Make sure the barrel is secured to the deck or table, allowing for a push from the flange. Remove the excess liner with a hacksaw to prevent crushing of the liner. Insert the extractor tool and push or hammer the liner. The tool should be used with care to prevent the liner being pushed out too rapidly. If this method does not work, then the Screw Extractor should be used.
 - c) Screw Extractor - this tool is only used if the line is tight and requires the same set up as (b). Attach the screw extractor to the flange and add an adapter to the end. The barrel shall need to be held firm as not to turn. Start turning the handle of the extractor to move the liner from the barrel.
- V. A black cap should be fitted to the bottom end of the core and affixed with electrical tape. The core is cut into approximate 1 metre lengths and capped, black at bottom and yellow at the top. All caps to be sealed with tape. All cores shall be examined and tested by the geologist if required before any sealing of samples.

The client may require that wax be added to each end of the core to hold moisture content. This is done prior to attaching the caps.
- VI. All core lengths are to be labelled both on the yellow cap and down the side of the liner. This shall also apply to the bag samples. The labels shall include :

Contract Number

VIBROCORE OPERATIONS MANUAL

Vibrocore Number
Relevant lengths of core piece or bag sample
Client Name or Contract Name

- VII. All core samples shall be stored upright in an area of least disturbance. Bag samples shall be stored in the same place and kept fully air-tight.
- VIII. A note of all sample details to be kept in the note book :

Vibrocore Number
Water depth (if known)
Co-ordinates (if known)
Geology
Times of test
Penetration
Recovery
Lengths of samples, bags
Any other comments

5.4 DEMOBILISATION OF EQUIPMENT

Upon completion of the vibrocoreing programme the equipment shall, if possible, be broken down on board and packed away ready for arrival in port.

The equipment is off loaded on to transport at the quay side by the ship's crane or land crane and delivered back to the yard.

All equipment shall be checked and accounted for and the Routing Document shall be completed ready for the transport. A copy shall be signed by the engineer or party chief and given to the lorry driver.

Any damage or loss should be recorded in the end of contract report and issued to the Operations Manager at the earliest possible time.

A list of all samples shall be prepared on the Sample Transmission List (DF090) a copy shall be returned with the samples and a copy hand carried.

END OF DOCUMENT



5.3 CPT Data Sheet

Roson Seabed Cone Penetrometer CPT1



Our Roson Seabed Penetrometer system is capable of undertaking a rapid evaluation of in situ soil properties in a large variety of soil types in water depths of up to 500 metres. Test results are used to assess strength parameters, pore water pressure and relative soil density, as well as to provide a detailed stratigraphic profile.

Special Features

Continuous penetration into the seabed at the standard rate of 2.0 cm per second is achieved through a friction-wheel system clamped onto the CPT rods. Variable thrust from 4 - 16 tonnes. The required ballast is obtained from weights incorporated into the CPT frame.

Cones Available

- Piezocones
- Friction cones
- Electrical Conductivity Cones
- Low Capacity cones (for very soft cohesive soils)
- T Bar
- In situ Vane

Optional Features

- Penetration in excess of 15 metres is possible depending on the soil conditions and deployment arrangement.



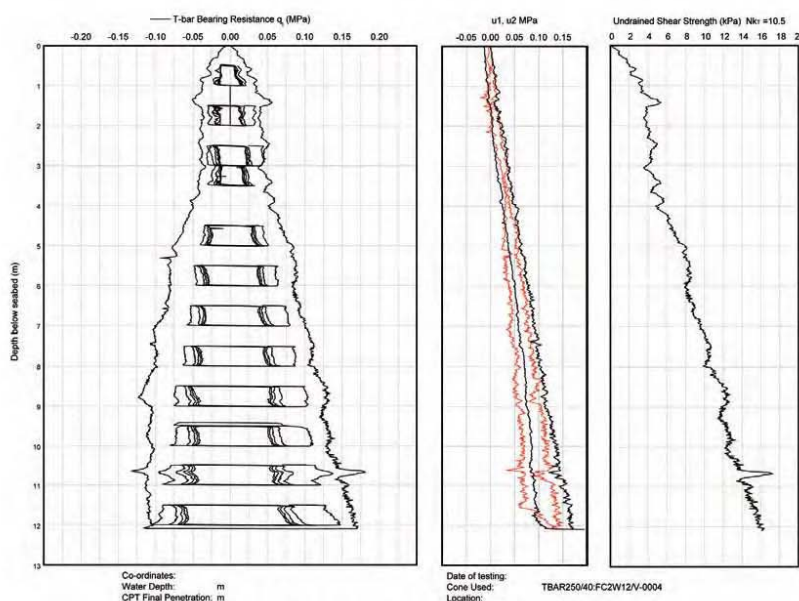


Applications

- Offshore pipeline route and subsea structure geotechnical surveys
- Pre-dredging geotechnical investigations
- Marine inshore geotechnics
- Site investigations for marine reclamation projects
- Marine aggregate surveys

Technical Data/Dimensions

UNIT	BASE(m)	WEIGHT(tonnes)	MAX THRUST(kN)
2 modules	2.2 x 3.2	5 - 10	40 - 80
4 modules	2.2 x 3.2	10 - 20	100 - 160



CYCLIC T-BAR PENETRATION TEST RESULTS -

Example of T-bar and cyclic T-bar data set acquired using the ROSON wheel drive PCPT. The T-Bar test is taken to full depth and return to surface, so giving an undisturbed and remoulded strength, and then multiple cyclic tests are undertaken a discrete depth intervals. Cyclic T-Bar test can be used to refine the understanding of the residual remoulded shear strength and sensitivity of the soils.

The specification of the equipment in this data sheet may be subject to modifications without prior notice

Fugro Alluvial Offshore Limited
Morton Peto Road
Gapton Hall Industrial Estate
GreatYarmouth
NR31 0LT UK
Tel : +44 (0) 1493 650 484
Fax : +44 (0) 1493 440 319
www.alluvial.co.uk
info@alluvial.co.uk

February 2008

272



5.4 CPT Operations Manual D-F-005



FUGRO ALLUVIAL OFFSHORE LTD

Code of Practice: D-F-005

Title: Cone Penetration Testing Operations Manual

Responsible Person: Operations Manager

This document is confidential. The copyright therein is vested in Fugro Alluvial Offshore Limited, Morton Peto Road, Gapton Hall Ind. Est., Great Yarmouth, NR31 0LT.
All rights reserved.

CONE PENETRATION TESTING OPERATIONS MANUAL

1. OBJECTIVES

The purpose of this document is to define the operational procedures associated with the Cone Penetration Testing (CPT) operations of Fugro Alluvial Offshore Ltd (FAOL).

2. SCOPE

This procedure shall be adhered to by all the staff of FAOL, by any staff seconded from another Division and by any contract staff during CPT Operations.

3. RELATED DOCUMENTS

The following documents are related to this procedure:

M-Q-113	Company Training Procedure
C-C-001	Cone Penetration Testing Calibration Procedures

4. DEFINITIONS

4.1 UMBILICAL CABLE

The umbilical cable is the assembly of signal cable, power leads and load bearing strands that connect between the seabed unit and the vessel.

4.2 FLY LEADS

The fly lead is the length of signal cable that connects the cone via the cone rods to a junction box on the seabed unit.

5. PROCEDURE

5.1 CALIBRATION

5.1.1 General

A cone will be due for calibration and inspection when the time since calibration exceeds three months or with immediate effect if there is any suspicion of damage or if the zero load output of any load cell varies by more than 80 mv from the value quoted on the calibration certificate.

CONE PENETRATION TESTING OPERATIONS MANUAL

5.1.2 Calibration Procedure

FAOL operates CPT systems supplied by two manufacturers. These manufacturers are A.P. van den Berg B.V. and Fugro Engineers B.V. both based in the Netherlands. PCPT cones and electronic data handling systems are supplied only by FEBV in the Netherlands. Fugro type cones shall be sent for calibration and inspection to the FEBV facilities in the Netherlands. Calibration procedures shall be performed in accordance with their procedure C-C-001, "Cone Penetration Testing Calibration Procedures".

5.2 MOBILISATION OF EQUIPMENT IN THE YARD

The CPT system shall be assembled together onshore where a complete function test shall be made of the ROSON drive modules, the surface control unit, cone testing/De-airing apparatus and ancillary equipment. The findings of the functional test shall be recorded on the CPT System checklist (DF014).

Where ROSON CPT Units remain in the yard unused for in excess of 30 days, it is a requirement that the motors should be started and run for a period of approximately 1 hour every 30 days to prevent deterioration of the resistivity in the motor windings.

Cones shall be checked for current calibration sheets, for any visual defects or wear-down and checks shall also be made to ensure that cones are compatible with the proposed working water depths.

Umbilical cables shall be connected and tested using the CPT System Checklist (DF010) for all function operations. Visual checks shall be made of their insulation, termination connections and identification and they shall be measured for length. All checks shall be recorded on the Equipment Routing Form (DF009). Checks shall be made against the Project Plan to ensure that the umbilical cables are sufficiently long for the working water depths.

Spare parts and consumables shall be checked both visually and functionally where possible and itemised on the Equipment Routing Form (DF009). The number of spare parts and consumables will depend on the size and type of project. Copies of the Equipment Routing Form (DF009) shall be despatched with the equipment.

All lifting points to equipment shall be tested and certified, including all lifting Strops, Shackles, Swivels, etc. Copies of all test certificates shall be sent with the equipment.

Equipment shall be packed into shipping containers, with all the computer equipment packed into padded transportation boxes.

Equipment shall be loaded onto Lorries using a fork lift truck and/or mobile crane, as required, taking care to make sure all equipment is safely and securely fastened.

CONE PENETRATION TESTING OPERATIONS MANUAL

5.3 MOBILISATION OF EQUIPMENT ON VESSEL

Personnel shall be available at the vessel, ready to receive the transport and equipment for off loading onto the vessel. At the discretion of the Operations Manager this task may be put in the hands of an agent.

All equipment loaded onto the vessel shall be checked against the Equipment Routing Form (DF009) and signed by the party chief or his deputy, in accordance with the Mobilisation/Demobilisation Procedure.

Before transferring the equipment onto the vessel, the captain or ship's bosun shall be consulted to agree the best arrangement. A deck plan or layout may have already been discussed in the Project Quality Plan.

An FAOL employee or his agent shall sign off the haulage delivery note when requested by the haulier and before the haulier's departure.

The equipment shall be mobilised onto the vessel using a hired land crane or by using the ships' own equipment. On completing of the installation of equipment onto the vessel a brief test of all equipment shall be carried out and the findings recorded on the Operation Report DF033.

A full list of all cones mobilised shall be prepared on DF012 and the utilisation of the cones during the project shall be recorded.

All equipment shall be properly secured to deck either by sea-fastenings and/or by welding. This is to prevent any movement and loss of equipment in adverse weather conditions. Tools, spare parts, consumables and computer equipment shall be stowed in a secure, dry control room and fastened down.

Discussions shall be made between Captain, Bosun, Party Chief and FAOL Project Leader to determine the safest position for the CPT unit for a controlled deployment and recovery. The CPT unit shall be positioned as close as possible to the deployment area to prevent any unnecessary and potentially dangerous movements around the deck. It shall then be fastened securely by way of chain or wire cables and tensioners.

5.4 OPERATION AND DEPLOYMENT OF CPT EQUIPMENT

5.4.1 Preparing the CPT Lifting Frame

The CPT unit has various types of lifting frame in a range of heights. A suitable frame shall be chosen dependent upon the depth of penetration required from the test. A rod support

CONE PENETRATION TESTING OPERATIONS MANUAL

tube is mounted onto the frame which shall be approximately the same height as the total length of rods needed for the test. Once the frame has been fitted, the attached guy-wires shall be tensioned for added support.

5.4.2 Connection of Umbilical and Power Supply

The umbilical is connected to the CPT unit after it has been positioned on the deck of the vessel. The umbilical is usually deployed from a hydraulic power spooler, which shall have been already positioned on deck and fastened by welding. Slip-rings are incorporated into the spooler so that the CPT unit can be permanently powered up during deployment and lowering to the seabed. This enables pre-warming of the cone circuit to take place and also enables the Pore Pressure to be observed on lowering through the water. The umbilical is connected to the CPT unit using a compensated termination box via a cable gland. Careful attention must be paid to the correct connection of cables using the wiring diagram and cable identification tags. The deck lead is then connected from the spooler to the surface control termination box. Covers shall be temporarily placed on the boxes for power up and a full function test shall be made. When its clear that the CPT is fully working the termination box covers shall be securely fastened, all cable glands shall be checked for tightness and then transformer oil shall be pumped into the box to prevent any water ingress. A cable pull grip (Kellum grip) is provided on the umbilical to prevent any loading on the cable gland at the termination box on the CPT.

5.4.3 Loading Rods and Flylead

A plug is screwed into the top of the rod which is already mounted in the drive modules. This plug also acts as the top limit switch activator and a protection guide for the Flylead. A new 1 metre section of rod is now screwed into place from below the drive modules, using stilsons to tighten the rod into the upper rod which is being held fast by the friction drive wheels. The drive motors can now be run to drive the rods upwards. More rods are added until the total length of rods above the drive modules equals the greatest depth of push required in the test. An insert is fitted into the flylead connector to protect connecting pins from damage and dirt before being fed through the rods. The flylead can now be passed through the rods from the top and connection is later made to the cone.

5.4.4 Preparation of Electric Cone

A cone is connected to the surface control unit using a test lead and a function test is made of the signal conditioning modules. If the cone is seen to be working correctly it shall be de-aired. The de-airing chamber shall be checked to ensure it contains sufficient glycerol fluid to submerge the pore pressure porous element of the cone. The cone is placed in the de-airing chamber and the vacuum pump switched on. After approximately 1 hour the cone

CONE PENETRATION TESTING OPERATIONS MANUAL

should be fully de-aired. On removal from the chamber a rubber membrane (condom) is carefully rolled onto the cone making sure there is no air trapped behind the tip. This shall keep the cone in a de-aired state while it is fitted to the CPT and preparations are made for deployment.

The cone has to be de-aired to gain rapid and maximum response to changes in pore water pressure as the cone is being pushed through the soil during the test. If during testing a slow or apparently reduced reaction of the Pore Pressure is observed then the cone shall be removed and de-aired. A spare cone shall always be kept inside the chamber in a de-aired state ready for replacement as required.

5.4.5 Attachment of Electric Cone

The flylead is passed through a friction breaker adapter which connects the cone to the rods and also acts as a bottom limit switch activator. A circlip is fitted over the Lemo connector on the flylead followed by an "O" ring in the second groove; this acts as the water tight seal for the cone connection. Power is switched onto the CPT and the cone checked for a stable and adjustable reading. If working correctly then the cone shall be connected to the adapter and then to the rods, the cone being tightening using the supplied 36mm C spanner.

Tightening of the adapter to the rods shall then take place, using stillsons. Care shall be taken whilst fitting the cone not to damage the rubber membrane.

5.4.6 Deployment of CPT

When the Engineer in charge is confident of the vessel's stable position the winch operator shall be instructed to lift the CPT clear of the deck and to position it over the side of the vessel. During the deployment from deck to water the frame shall be stabilised with tugger winches. The CPT shall be lowered down to the seabed at a safe and steady rate in unison with the umbilical spooler, taking care not to lower the CPT quicker than the spooler can pay out the umbilical. When the CPT is on the seabed a length of slack hoisting wire and umbilical shall be let out to allow for any movements of the vessel during the test.

5.4.7 CPT Operation

The inclination of the CPT unit shall be checked to find its standing position and this shall be noted in the log. The cone shall be checked against its calibration certificate sheet and the measured parameters shall be set to zero. Water depth and times are noted into the log and a final check shall be made on deck to make sure that vessel is not moving position and that cables are slack. The test shall now be started with constant checks being made by deck

CONE PENETRATION TESTING OPERATIONS MANUAL

personnel of the vessel's positioning. During retraction of the rods after the test and before the CPT is recovered to surface the test results are checked and data saved.

5.4.8 Recovery Procedure

On completion of the test the Engineer in charge shall instruct the winch operator to lift the CPT unit clear from the seabed, taking care that the rig is not snatched up by movements of the vessel causing sudden loading of the winch. The rig shall be raised to the surface with the spooler taking up the slack. When the rig is brought against the stern of the vessel the tugger lines shall be attached. If the next location is nearby the rig shall remain outboard secured by tugger lines. The CPT rig shall be recovered to deck in the event of longer passages.

5.4.9 Test results

The test results shall be processed immediately by personal computer using FAOL software to produce an interpretation of the tested soil. Backup copies of test data shall be made onto floppy disk for safe keeping.

At any time during CPT operations, or after mobilisation and before demobilisation of the CPT unit the Client may wish to observe a Cone Calibration Check. Using a field test gauge the cone to be used shall be loaded against a calibrated scale gauge and compared against the display at the control unit. The results of this test can be saved and printed out but needs to be observed and signed by the client during the check for verification.

5.5 DEMOBILISATION OF EQUIPMENT

On completion of the CPT programme and weather permitting the equipment can be broken down and packed away ready for arrival into port.

The equipment is off loaded onto transport at the quay side by the ship's crane or land crane and delivered back to the yard. All equipment should be checked and accounted for and the Routing Document made ready for transport, this should be signed by the engineer or party chief and given to the lorry driver. Any damage or loss should be entered on a non-conformance report and issued to the Operations Manager as soon as possible.

END OF DOCUMENT

5.5 Cone Calibration Certificates

CALIBRATION CERTIFICATE



APPLICANT FAOLtd CERTIFICATE NUMBER FC101464 Page 1 of 1
SUBMITTED A Piezo Cone Penetrometer MANUFACTURER Fugro Engineers B.V.
Device type CONE, A10F5CKE2HAW2/B, 100 bar, Micro Impulse SERIAL NUMBER 1708-1993

The device contains an electronic data sheet which contains, amongst others, the characteristics of all the sensors inside the device. The data acquisition system calculates the measured value from these known characteristics. All calibration results are conform the values specified below.

Force calibration

Calibration reference : 548 FRE.001

Procedure : FEBV.CAL.PRO.003 KALIBRATIE KRACHT

Title of channel(s) : Cone and Cone+Frict.

Max. load 100 kN

Range	Calibration range From To	Sensitivity Deviation	Zero load output
1	0 50 kN	< 0.5 %	< 1.00 kN
Calibration uncertainty		0.3 %	0.008 kN

Pressure test :

Deviation from specified Alpha factor at 2.5 MPa < 5 %

Cone quality control values :

Max. deviation from reference	< 1 %
Max. Tip to Sleeve friction Crosstalk	< 1 %

Pressure calibration

Calibration reference : 3257-0001

Procedure : FEBV.CAL.PRO.004 KALIBRATIE DRUK

Title of channel : Pore 2

Max. load 15.0 MPa

Range	Calibration range From To	Sensitivity Deviation	Zero load output
1	0 2.5 MPa	< 1.0 %	< 0.40 MPa
Calibration uncertainty		0.6 %	0.003 MPa

Pore 1 transducer Keller PA-8-100 bar/8467.8

SN : 53295

Calibration of the DUAL axis slope sensors

Calibration reference :

Procedure: FEBV.CAL.PRO.006 KALIBRATIE HELLING

Title of channel : Slope x, Slope y

Range	Calibration range From To	Sensitivity Deviation	Zero load output
1	-10 deg 10 deg	< 3 %	< 0.5 deg
Calibration uncertainty		1 %	0.5 deg

Typical values for this type of device

Cone diameter (mm)	35.68	Pore 2 position	2	Alpha factor	0.75
Cone area (square cm)	10.00	Sleeve length (mm)	132.6	Cone - Sleeve distance (mm)	9
Sleeve diameter (mm)	36.0	Sleeve area (square cm)	150.0	Cone - Pore 2 distance (mm)	9

TRACEABILITY The measurements have been executed using standards for which the traceability to primary and/or (inter)national standards has been demonstrated.

Calibrated by: Tempelaar, Rolf

Approved by: Sinjorgo, Gerry

Calibration date: 14/12/2010

Approval date: 14/12/2010

Calibrate before: 14/12/2011

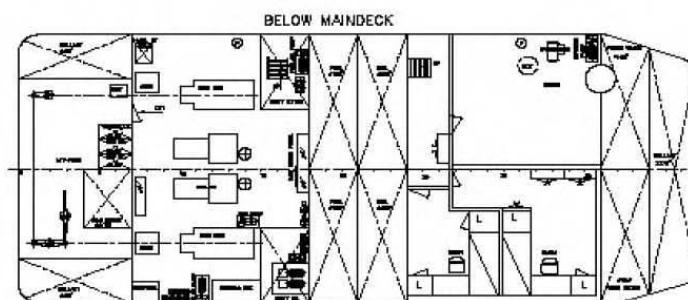
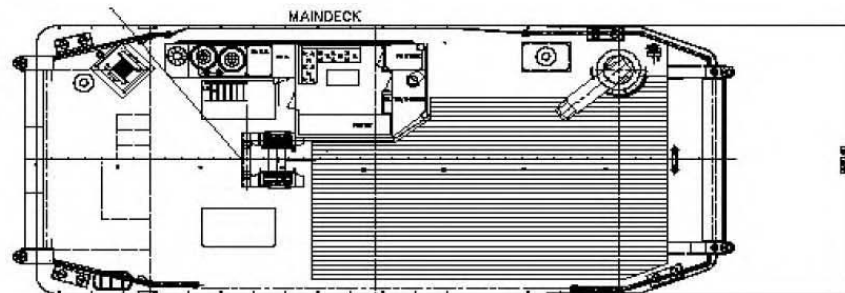
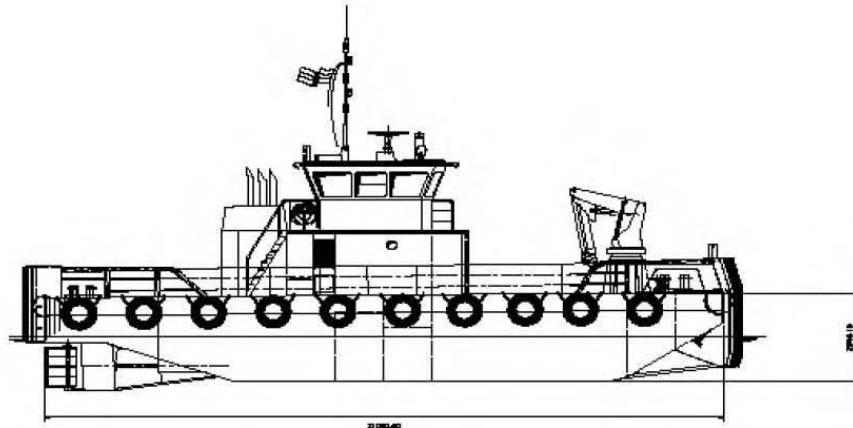


Template : 5CNE2HAW2 100bar.doc 100bar.doc Updated : 4/01/2010 3:08:00 PM

5.6 Vessel Specification

WILLENDEAVOUR 22m Multicat	
Type of Vessel:	Eurocarrier 2209 (multi-cat type vessel)
Name:	Willendeavour
Flag:	British/Southampton
Official Number:	912689
Built/Date:	Holland/2007
Net Tonnage:	91.87
Radio Call Sign:	MMPC
MMSI Number:	235051664
Certification:	Bureau Veritas I 3/3 Special Service/Multi Purpose - Coastal Area MCA Workboat Code Cat 2 (60 miles) 15 persons
Dimensions:	22.0m loa x 9.0m boa x 3m depth
Draft (minimum):	1.8m
Propulsion:	2 x fixed pitch 4-blade propellers in Nozzles
Main Engines:	2 x Caterpillar C18
Total Output Main engines:	1200hp (894Kw)@ 1800 rpm
Marine Transmissions:	Twin Disc MG516 DC 4.52:1
Free Running Speed:	9 knots
Bollard Pull:	15t (approx)
Electrical System:	24v DC and 220v shore supply
Generator	68Kw John Deere 4045TF258 keel cooled 75Kw John Deere 4045TF258 radiator cooled
Hydraulic Crane:	Heila 120-4SL with winch 120t/m [9.3t @ 12.11,] inc remote control
Anchor Handling/towing winch:	Hydrauision 50 tonnes
Tugger winch:	Hydrauision 10 tonnes
Deck Equipment:	Bow roller and stern roller, burning gear, welding set, compressor
Tank Capacity:	Diesel fuel oil : 42,000ltr. With transfer pump Freshwater: 57,000 ltr With transfer pump
Accommodation:	2 x 1 berth cabins, 1 x 2 berth cabin WC/Shower room, day/mes room (air conditioned)
Navigation Means:	Full navigation lighting, radar with daylight monitor, DGPS satellite navigation, Full colour chart plotter, 2 x VHF, Cellular telephone and satellite phone
 WILLIAMS www.williams-shipping.co.uk	
Williams Shipping Marine Ltd. Manor House Avenue Millbrook, Southampton SO15 0LF Tel: 02380 237 330 Fax: 02380 236 151 E-mail: enquiries@williams-marine.co.uk	

WILLEDEAVOUR 22m Multicat



MAIN DIMENSIONS

Length o/a 22.00 mtr
Beam o/a 2.90 mtr
Depth of hold 5.00/3.00 mtr

PROPELLER

50 CATAPILLAR fixed pitch

Type D18

1000-1000 Type M8 B1P

Ratio 4.52 : 1

HYDRAULIC CRANE 10000 kg

HYDRAULIC HANDLING WINCH 500T

GENERAL REMARK 1

mechanisms and materials of stress

handling stress and ballast to be submitted

CLASSIFICATION 1

BUREAU VERITAS DESIGN



WILLIAMS

www.williams-shipping.co.uk

Williams Shipping Marine Ltd.

Manor House Avenue

Millbrook, Southampton

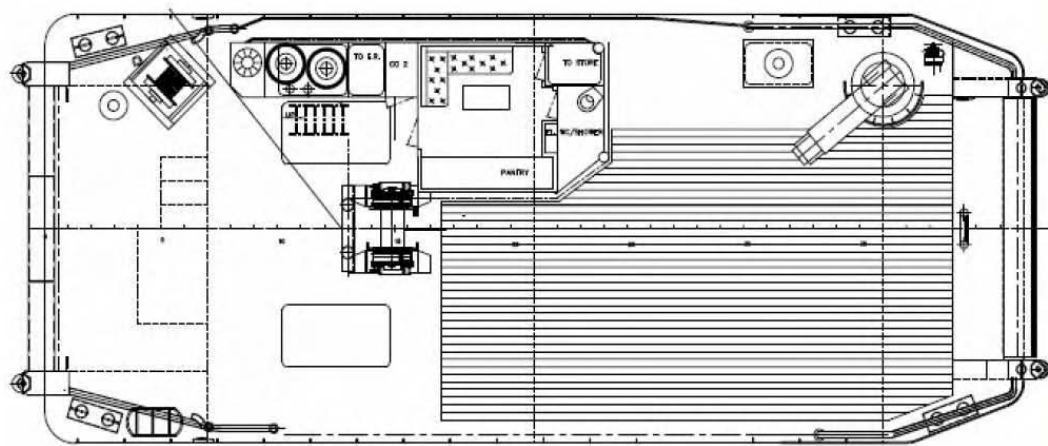
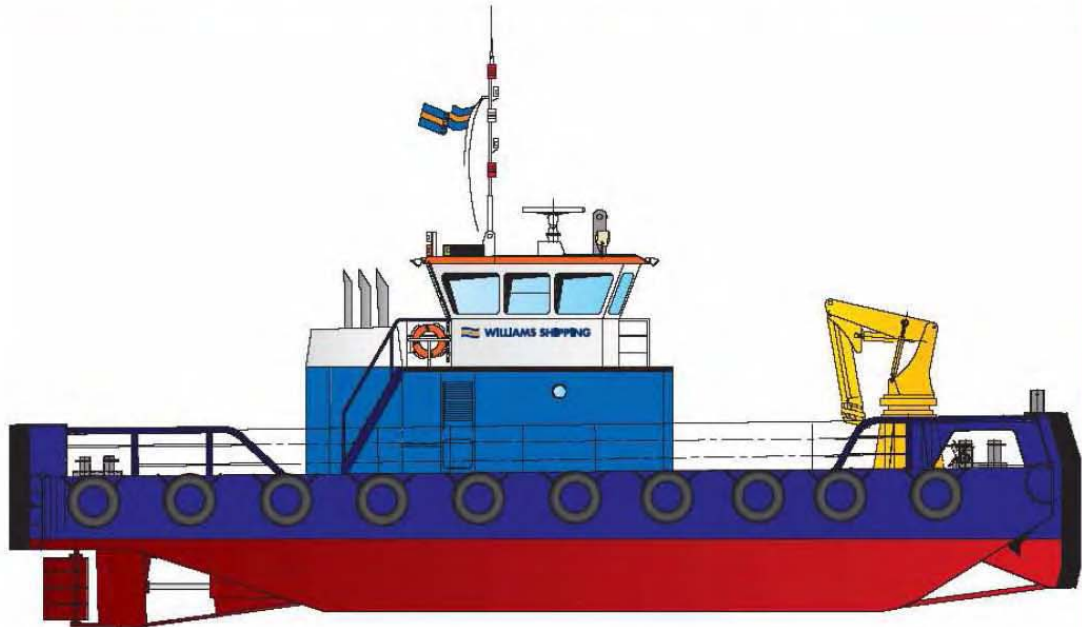
SO15 0LF

Tel: 02380 237 330

Fax: 02380 236 151

E-mail: enquiries@williams-marine.co.uk

WILLENDEAVOUR 22m Multicat



WILLIAMS

www.williams-shipping.co.uk

Williams Shipping Marine Ltd.
Manor House Avenue
Millbrook, Southampton
SO15 0LF
Tel: 02380 237 330
Fax: 02380 236 151
E-mail: enquiries@williams-marine.co.uk

PART C

FIELD OPERATIONS

TABLE OF CONTENTS

C.	SUMMARY
C.1	LOG OF ACTIVITIES
C.2	DRILLING OPERATIONS
C.3	SAMPLING
C.4	CPTU PENETRATION TESTING
C.5	FIELD LABORATORY
C.6	POSITIONING
C.7	REFERENCES
C.8	HSE

C. SUMMARY

Fugro GeoConsulting Limited (FGCLTD) has been requested by E.on Energy and Renewables (E.on) to produce a factual geotechnical report to assist in the design and development of the Rampion field located in Block 3/28 of the UK Sector of the North Sea.

The data obtained from the geotechnical site investigation at the Rampion field is to assist in determining geotechnical parameters for use in the installation of the proposed monopole met mast and wind turbine locations.

The work was performed from the M/V Saltire from 27 March to 06 April 2011 and from the M/V Willendeavour from the 5 April to 9 April 2011, in accordance with instructions received from E.on.

The water depth, relative to mean sea level, ranged between 8.2 m and 44.9 m corrected to Lowest Astronomical Tide (LAT) at the Rampion site.

Table C.1: Summary of Site Work – M/V Fugro Saltire

Location	Final Penetration [m BSF]	Sampling and Testing Details (successful samples/tests only)
BH_02	46.4	19 CPT and 24 Samples
BH_04	47.4	29 CPT and 24 Samples
BH_04a	4.2	6 Samples
BH_06	52.9	17 CPT, 37 Samples and 3 Hammers
BH_07	40.0	17 CPT, 31 Samples and 2 Hammers
BH_13	45.2	27 CPT, 27 Samples and 8 Hammers
BH_14	50.2	23 CPT and 25 Samples
BH_16	46.4	26 CPT, 19 Samples and 5 Hammers
BH_17	45.1	24 CPT and 25 Samples

Notes:

Table excludes number of tests of nil penetration / no recovery

BSF = Below seafloor

CPT = Cone Penetration Testing

Table C.2: Summary of Site Work – M/V Willendeavour

Location	Final Penetration [m BSF]	Sampling and Testing Details (successful samples/tests only)
VC_03	5.6	1 Vibrocore
CPT_03	5.2	1 CPT
VC_18C	2.6	1 Vibrocore
CPT_18C	3.2	1 CPT
VC_19C	4.0	1 Vibrocore
CPT_19C	1.0	1 CPT
CPT_19Ca	1.2	1 CPT
VC_20C	1.9	1 Vibrocore
VC_20Cb	1.4	1 Vibrocore
CPT_20C	3.2	1 CPT
VC_21C	3.7	1 Vibrocore
CPT_21C	3.0	1 CPT

Notes:

Table excludes number of tests of nil penetration / no recovery

BSF = Below seafloor

VC = Vibrocore test

CPT = Cone penetrometer test

Table C.2: Summary of Soil Conditions – Metmast Location BH_13

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
II	0.0	3.7	Pale olive to very dark grey sandy silica GRAVEL with cobbles. Clasts are sub-angular to sub-rounded of flint
IVa	3.7	17.6	Stiff to hard very dark greenish grey slightly sandy CLAY with thin to very thin beds and fine to coarse gravel-sized pockets of very dark greenish grey silty silica sand
IVc	17.6	33.5	Very dense dark grey to dark greenish grey fine silica SAND
IVd	33.5	44.2	Hard to very hard dark olive grey to dark grey slightly sandy CLAY with fine to medium gravel-sized pockets of dark greyish brown slightly silty silica sand
IVe	44.2	45.2*	Dark grey silty fine silica SAND occasionally with medium gravel-sized pockets of black clay with mica crystals

Notes:

BSF = Below seafloor

Table C.3: Summary of Soil Conditions – Metmast Location BH_14

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
I	0.0	2.8	Medium dense to dense dark greyish green very silty silica fine SAND with fine gravel-sized pockets of dark greenish grey clay with medium to coarse sub-angular to sub-rounded silica gravel
IVa	2.8	11.8	Stiff to Hard dark greenish grey slightly sandy CLAY with closely spaced thin laminae of grey and black fine to medium silica sand
IVb	11.8	31.0	Thinly to thickly interlaminated very stiff to hard dark greenish grey slightly sandy CLAY and fine to medium greenish grey silica SAND with traces of fine black silica sand and evidence of bioturbation (burrows)
IVd	31.0	37.5	Stiff to very hard dark greenish grey slightly sandy CLAY
IVe	37.5	50.2*	Very dense dark greenish grey slightly clayey fine silica SAND

Notes:

BSF = Below seafloor

* = End of Borehole

Table C.4: Summary of Soil Conditions – BH_02

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
I	0.0	0.4	Very loose to medium dense SAND
Ila	0.4	5.9	Medium dense to dense very dark greenish grey fine silty silica SAND with closely spaced thick laminae and fine to medium gravel-sized pockets of dark grey sandy clay with fine to medium gravel-sized pockets of greenish grey fine silica sand
Vd	5.9	12.1	Very stiff to hard dark greenish grey slightly sandy CLAY with traces of fine gravel-sized pockets of black staining
Ve	12.1	46.4*	Thinly interlaminated to medium interbedded very dark to dark greenish grey silty fine to medium silica SAND and very dark to dark greenish grey slightly sandy CLAY occasionally with fine to coarse gravel-sized pockets of sandy clay to clayey silica sand

Notes:

BSF = Below seafloor

* = End of Borehole

Table C.5: Summary of Soil Conditions – BH_04/04a

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
I	0.0	0.1	Very loose to loose dark greenish grey fine to coarse silica SAND with fine to medium gravel and fine to coarse gravel-sized shells fragments and shells
IIIb	0.1	3.1	Firm to very stiff dark greenish grey to dark grey slightly sandy CLAY with fine gravel-sized shell fragments and shells
IVc	3.1	22.5	Dense to very dense dark greenish grey to dark grey silty to very silty fine silica SAND
Va	22.5	39.5	Hard to very hard dark grey slightly sandy CLAY with fine to medium gravel-sized pockets of dark greenish grey fine to medium silica sand
Vb	39.5	47.4*	Hard to very hard greenish grey sandy SILT with coarse gravel-sized pockets and laminations of grey fine silica sand

Notes:

BSF = Below seafloor

* = End of Borehole

Table C.6: Summary of Soil Conditions – BH_06

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
I	0.0	0.3	Medium dense to dense SAND
Va	0.3	19.0	Stiff to very stiff dark grey slightly sandy CLAY with fine gravel-sized pockets of grey sand
Vb	19.0	26.1	Dark to very dark grey slightly sandy SILT
Ve	26.1	31.0	Very stiff to hard very dark greenish grey slightly sandy CLAY and medium dense to very dense dark greenish grey slightly silty fine silica SAND with coarse sand-sized to fine gravel-sized shell fragments
Vf	31.0	42.1	Hard to very hard mottled and thinly interlaminated grey and brown CLAY
Vi	42.1	47.1	Very dense dark greyish green fine to medium silica SAND with fine gravel-sized pockets of greenish grey fine to medium silica sand
Vlb	47.1	48.5	Structureless CHALK composed of white silt with closely spaced thin laminations of slightly duller white silt (Grade Dm)
Vlc	48.5	52.9*	Structureless CHALK composed of white creamy silt and medium blocky gravel with traces of fine to medium gravel-sized flint. Chalk clasts are weak, medium density (Grade Dc)

Notes:

BSF = Below seafloor

*= End of Borehole

Table C.7: Summary of Soil Conditions – BH_07

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
I	0.0	0.3	Dense SAND
Vlb	0.3	4.0	Structureless CHALK composed of white silt and fine to coarse blocky gravel with few angular fine to coarse gravel-sized black flint. Chalk clasts are very weak, low density (Grade Dm)
Vlc	4.0	27.0	Structureless CHALK composed of white silt and fine to coarse blocky gravel. Chalk clasts are weak, medium density (Grade Dc)
Vld	27.0	45.8*	Structureless CHALK composed of white silt and fine to coarse angular and blocky gravel. Chalk clasts are weak, low to medium density (Grade Dc)

Notes:

BSF = Below seafloor

*= End of Borehole

Table C.8: Summary of Soil Conditions – BH_16

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
IIa	0.0	6.0	Loose to medium dense very dark greenish grey to greenish grey slightly silty fine to coarse silica SAND with coarse sand-sized to fine gravel-sized shell fragments
IIIc	6.0	19.0	Dense to very dense very dark greenish grey to greenish grey slightly silty fine to coarse silica SAND
IIId	19.0	22.5	White grey and black sub-angular to sub-rounded fine to coarse silica GRAVEL of mixed lithologies
IIIc	22.5	27.5	Very dense olive grey silty fine silica SAND with sub-angular to sub-rounded medium silica gravel
IVb	27.5	39..5	Thin to medium interbedded dark greyish brown sandy CLAY and very dark greenish grey slightly clayey fine silica SAND
IVc	39.5	42.3	Thinly to medium interbedded dark greenish grey calcareous SANDSTONE with few brown and white fossils and very dark grey fine silica SAND
Vc	42.3	46.4*	Medium dense dark greenish grey to olive grey slightly clayey to very clayey fine silica SAND

Notes:

BSF = Below seafloor

* = End of Borehole

Table C.9: Summary of Soil Conditions – BH_17

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
Ve	0.0	21.0	Thin to thickly interlaminated very stiff to hard greenish grey slightly sandy CLAY with thin laminae of light greenish grey silty fine silica sand and dark greenish grey very silty fine silica SAND
Vf	21.0	28.8	Very stiff to hard dark greenish grey slightly sandy CLAY with very closely to closely spaced thin to thick laminae of greenish grey fine silica sand
Vi	28.8	45.1*	Very dense dark greenish grey to greenish grey fine silica SAND

Notes:

BSF = Below seafloor

* = End of Borehole

Table C.10: Summary of Soil Conditions – VC_03 / CPT_03

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
IIb	0.0	0.2	Light brown sandy GRAVEL. Sand is fine to coarse. Gravel is ANG-SBR fine to medium of shell and shell fragments
IIIa	0.2	0.4	Very dark brown spongy PEAT
IIIb	0.4	2.5	Very soft to soft light grey CLAY
IIIb	2.5	3.5	Light grey sandy SILT. Sand is fine
IIIb	3.5	4.0	Soft grey CLAY
IIIb	4.0	5.0	Light grey SILT
IIIb	5.0	5.4*	Very soft light grey CLAY

Notes:

BSF = Below seafloor

* = End of Borehole

ANG = Angular

SBR = Sub-rounded

Table C.11: Summary of Soil Conditions – VC_18C / CPT_18C

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
IIb	0.0	1.0	Light grey/white sandy GRAVEL. Sand is fine to coarse. Gravel is SBA - SBR fine to coarse of mixed lithologies
IIId	1.0	3.2*	White clayey sandy GRAVEL. Sand is fine to coarse. Gravel is SBA fine to coarse of chalk (Structure-less granular chalk - grain supported with intergranular chalk putty/clay)

Notes:

BSF = Below seafloor

* = End of Borehole

SBA = Sub-angular

SBR = Sub-Rounded

Table C.12: Summary of Soil Conditions – VC_19C / CPT_19C / CPT_19Ca

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
IIa	0.0	3.8*	Grey/brown gravelly SAND. Sand is fine to coarse. Gravel is ANG - SBR fine to medium of shell, shell fragments and mixed lithologies From 2.00m ... Becoming light brown/tan

Notes:

BSF = Below seafloor, SBR = Sub-Rounded

* = End of Borehole, SBA = Sub-angular

Table C.13: Summary of Soil Conditions – VC_20C / VC_20Cb / CPT_20C

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
IIb	0.0	0.0/1.0	Brown sandy GRAVEL.. Sand is fine to coarse. Gravel is SBR fine to coarse of mixed lithologies.
IIa	0.0	0.0/1.0	Brown silty gravelly SAND. Sand is fine to coarse. Gravel is ANG - SBR fine to medium of shell, shell fragments and mixed lithologies
IIIb	1.0	3.2*	Soft to very stiff grey CLAY

Notes:

BSF = Below seafloor

* = End of Borehole

ANG = Angular

SBR = Sub-Rounded

Table C.14: Summary of Soil Conditions – VC_21C / CPT_21C

Depth Range of Soil [m BSF]			Soil Description
Soil Unit	Top	Base	
IIb	0.0	1.0	Light grey/white sandy GRAVEL. Sand is fine to coarse. Gravel is SBA - SBR fine to coarse of mixed lithologies
IIId	1.0	3.5*	White clayey sandy GRAVEL. Sand is fine to coarse. Gravel is SBA fine to coarse chalk. (Structure-less granular chalk - grain supported with intergranular chalk putty/clay)

Notes:

BSF = Below seafloor

* = End of Borehole

SBA = Sub-angular

SBR=Sub-Rounded

SECTION C.1
LOG OF ACTIVITIES

C.1	LOG OF ACTIVITIES	1
C.1.1	GENERAL	1
C.1.2	CONTRACTUAL ARRANGEMENTS	1
C.1.3	PROBLEMS	2

C.1 LOG OF ACTIVITIES

C.1.1 GENERAL

The offshore fieldwork was performed from the M/V Fugro Saltire from 27 March to 06 April 2011 and from the M/V Willendeavour from 05 April to 09 April 2011. A time log for the fieldwork programme is presented at the end of this section, together with a performance summary.

The final scope of work is presented in Table C.1-1 below.

Table C.1-1: Summary of Site Work – Rampion Wind Farm Project

Location	Final Penetration [m BSF]	Sampling and Testing Details (successful samples/tests only)
BH_02	46.4	19 CPT and 24 Samples
BH_04	47.4	29 CPT and 24 Samples
BH_04a	4.2	6 Samples
BH_06	52.9	17 CPT, 37 Samples and 3 Hammers
BH_07	40.0	17 CPT, 31 Samples and 2 Hammers
BH_13	45.2	27 CPT, 27 Samples and 8 Hammers
BH_14	50.2	23 CPT and 25 Samples
BH_16	46.4	26 CPT, 19 Samples and 5 Hammers
BH_17	45.1	24 CPT and 25 Samples

Note: Table excludes number of tests of nil penetration / no recovery

BSF = Below seafloor

CPT = Cone Penetration Testing

C.1.2 CONTRACTUAL ARRANGEMENTS

Contractual arrangements were as follows:

E.ON Climate and Renewables (EON) was Fugro's Client for this project. During the fieldwork, EON was represented offshore by Peter Watson and Jeffrey Frasier on the M/V Fugro Saltire.

Fugro GeoConsulting Limited (FGCLTD) acted as the principal contractor and was represented onshore by Scott McHugh.

Work was performed from the M/V Fugro Saltire under the following contractual arrangements:

FGCLTD provided offshore supervision, operated the soil testing laboratory and to provide in-situ testing processing. FGCLTD was represented offshore by Harald Pater.

Fugro Seacore Limited (FSCL) was contracted to provide the drilling equipment and drilling personnel. FSCL were represented offshore by Mike Crimp.

Fugro Global Environmental Services (GEOS) were contracted for provision of the wave rider buoy.

Fugro Engineers B.V. (FEBV) was contracted to provide geotechnical sampling and in-situ testing equipment. FEBV were represented offshore by Robertus Ammerlan.

Fugro Subsea Services Limited (FSSL) was sub-contracted to FSSL to provide vessel management, positioning and sector scan services and environmental video survey services. FSSL was represented offshore by Matt Steele.

Fugro Survey Limited (FSL) was sub-contracted to FSSL to provide the positioning services, and was represented offshore by Marcin Michalek.

E Forland AS was sub-contracted to FSSL to provide the M/V Fugro Saltire and was represented by Captain Bjørn Johannessen.

Work was performed from the M/V Willendeavour under the following contractual arrangements:

Fugro Alluvial Offshore Limited (FAOL) was sub-contracted to FGCLTD to provide nearshore project and site management, to provide equipment and personnel. FAOL were represented by Oscar Zarate.

Fugro Survey Limited (FSL) was sub-contracted to FAOL to provide the positioning services, and was represented offshore by Jonathan Wicks.

Williams Shipping Limited was sub-contracted to FAOL to provide the M/V Willendeavour and was represented by Darren Wright.

C.1.3 PROBLEMS

During BH_04 an error was made in tidal correction readings, and it was discovered that the driller had drilled to 4.5 m BSF and not the required 2.5 m BSF. It was decided to continue with the current borehole and an adjacent borehole was performed to fill the data gap to 4.5 m. Corrections were made to all the recovered data and the error in depth records does not affect the quality or reliability of the data.

An error occurred with the UU triaxial testing machine, which meant it was no longer possible to perform UU testing at BH_02. This does not affect the quality of the data at any other locations, which are believed to adequately represent the soil conditions and show good correlation with the in-situ testing performed.

Whilst attempting to recover the wave rider buoy to the M/V Willendeavour the second section of the rubber bungee became caught on the underneath of the ships anchor. After several attempts to free the bungee it was decided that the safest way to move forward was to un-attach the wave rider buoy and release the rubber with two fender buoys attached and try to manoeuvre the vessel as to free the

snagged line. Whilst attempting to manoeuvre the vessel the strain became too much for the rubber and it parted roughly 10 cm below the top connector (which was attached to the two fender buoys). Crew along with a specialist team of divers onboard returned to site to recover the remaining wave buoy equipment. These buoys were then recovered along with the parted top section. The vessel and FAOL crew proceeded to recover the rest of the equipment to deck using both the ships crane and main lift winch.

There were no other major problems with the geotechnical investigation.



LOG OF ACTIVITIES

LIST OF PLATES – SECTION C.1

Description	Plate
Log of Activity	C.1-1 to C.1-5

DATE	TIME		ACTIVITY	WEATHER (Wind Speed) (Direction) (Heave/m)
	FROM	TO		
25/03/2011	15:00	24:00	Mobilisation alongside in Falmouth, UK. Loading stores loading various equipment Installation of gas detection system repairs on thruster 5	
26/03/2011	0:00	24:00	Mobilisation alongside in Falmouth, UK. Loading provision Loading various equipment Installation of gas detection system Repairs on Thruster 5	
27/03/2011	0:00	12:55	Mobilisation alongside in Falmouth, UK Loading various equipment Calibration and testing of gas detection system H2S training session 4	
	8:00		kick-off meeting	
	10:30		vessel induction for new personnel	
	11:00			
	12:55	24:00	Sailing to location	
	14:30		muster drill	
	16:00		operational meeting	
	19:00		extra kick-off meeting for personnel not able to attend first kick-off meeting	
28/03/2011	0:00	6:40	Sailing to location	
	6:40	6:50	Set-up DP for deployment of Waverider buoy	
	6:50	7:45	Deployment of Waverider buoy	
	7:45	8:20	Moving from Waverider buoy location to location BH_13	
	8:20	9:45	Vessel on location BH_13; Full infield DP-trials and DP-model build up	
	9:45	10:32	ROV-flight: deployment of ROV and placement of reference beacon	
	10:32	11:35	ROV-flight; site survey (camera) & sector scan sonar	
	11:35	12:40	Deck preparations, shift change & ToolBoxTalk	
	12:40	14:50	Lower SBF and building pipes	
	14:50	24:00	Drilling and testing on location BH_13 to 18m bsf	
29/03/2011	0:00	16:10	Drilling, testing and sampling location BH_13 to 45.15m bsf, EOB confirmed by Client	
	12:35	13:35	ROV flight to reposition reference beacon	
	16:10	17:30	Tripping pipe, lift SBF	
	17:30	18:40	Move to location BH_14	
	18:40	18:50	Deployment of ROV, placement of reference beacon on seabed	
	18:50	19:45	ROV flight, site survey with camera and Sector Scan sonar; Recovery of ROV	
	19:45	20:15	Change bit	
	20:15	21:15	Kelly bend; change kelly; new Kelly bend after one pipe run; change Kelly again	
	21:15	22:18	Run pipe and lower SBF	
	22:18	24:00	Drilling, testing and sampling BH_14 to 2.83m bsf	
30/03/2011	0:00	13:15	Drilling, testing and sampling BH_14 to 50.15m bsf EOB confirmed by Client	
	13:15	14:50	Trip pipe, lift SBF	
	13:45	14:25	ROV flight to recover reference beacon off seabed	
	14:50	15:45	Move to location BH_17	
	15:45	16:14	ROV deployed for placing of reference beacon on seabed	
	16:14	16:50	ROV flight, site survey with camera and Sector Scan sonar; Recovery of ROV	
	16:50	17:20	Deck preparations	
	17:20	18:40	Lower SBF, run pipe	
	18:40	24:00	Drilling, testing and sampling BH_17 to 21m	

**Time Log of Investigation - M/V Fugro Saltire
Rampion Wind Farm, 2011 Site Investigation**



Date: 27/09/2008

Drawn by:
AF

Date:

Date:

Checked by:

Approved by:

DATE	TIME		ACTIVITY	WEATHER (Wind Speed) (Direction) (Heave/m)
	FROM	TO		
31/03/2011	0:00	9:30	Drilling, testing and sampling BH_17 to 45.10m bsf, EOB confirmed by Client	
	9:30	10:40	Lifting SBF, trip pipe	
	10:40	11:40	ROV flight to collect reference beacon from seabed	
	11:40	12:10	Move to location BH_16	
	12:10	13:00	Deploy ROV to place reference beacon on seabed	
			ROV flight, site survey with camera, and performing sector scan. Recovery of ROV	
	13:00	14:10	Lower SBF, run pipe	
	14:10	14:30	Preparing deck	
	14:30	15:00	Testing equipment	
	15:00	19:00	Drilling, testing and sampling BH_16	
01/04/2011	19:00	19:15	Heading change 15 degrees port side because of weather	
	19:15	24:00	Drilling, testing and sampling BH_16 to 26.01m bsf	
	0:00	8:10	Drilling, testing and sampling BH_16 to 46.40m bsf, EOB confirmed by Client	
	8:10	9:05	Lift SBF and trip pipe	
	8:20	8:54	ROV flight to recover reference beacon from seabed	
	9:05	10:00	Move to location BH_04	
	10:00	10:30	Deployment of ROV; placement of reference beacon on seabed	
	10:30	11:30	ROV flight, site survey with camera and Sector Scan sonar; Recovery of ROV	
	11:30	12:15	Deck preparation, monitoring weather, DP set-up	
	12:15	12:55	Lower SBF, run pipe	
02/04/2011	12:55	24:00	Drilling, testing and sampling BH_04 to 22.50m bsf	
	0:00	8:30	Drilling, testing and sampling BH_04 to 47.36m bsf, EOB confirmed by Client	
	8:30	9:00	Tripping pipe to mudline	
	9:00	9:30	Lifting SBF 5m above seabed for bump-over	
	9:30	11:30	Testing and sampling BH_04A to 4.19m bsf, EOB confirmed by Client	
	11:30	12:25	Lift SBF and trip pipe	
	11:40	12:10	ROV flight to recover reference beacon from seabed	
	12:25	13:50	Move to location BH_06	
	13:50	14:05	Deployment of ROV; placement of reference beacon on seabed	
	14:05	15:05	ROV flight, site survey with camera and Sector Scan sonar; Recovery of ROV	
03/04/2011	15:05	16:05	Lower SBF, run pipe	
	16:05	24:00	Drilling, testing and sampling BH_06 to 23:15m bsf	
	0:00	13:00	Drilling, testing and sampling BH_06 to 52.92m bsf, EOB confirmed by Client	
	13:00	14:05	Lift SBF, trip pipe	
	13:25	13:50	ROV flight to recover reference beacon from seabed	
	14:05	14:55	Move to location BH_07	
	14:55	15:15	Deployment of ROV; placement of reference beacon on seabed	
	15:15	16:05	ROV flight, site survey with camera and Sector Scan sonar; Recovery of ROV	
	16:05	17:05	Lower SBF, run pipe	
	17:05	23:00	Drilling, testing and sampling BH_07	
	23:00	23:30	Pore pressure not good, checking equipment	
	23:30	24:00	Drilling, testing and sampling BH_07 to 20m bsf	

Time Log of Investigation - M/V Fugro Saltire Rampion Wind Farm, 2011 Site Investigation

Date: 27/09/2008

Drawn by:
AF

Date:

Date:

Checked by:

Approved by:

DATE	TIME		ACTIVITY	WEATHER (Wind Speed) (Direction) (Heave/m)
	FROM	TO		
04/04/2011	0:00	11:20	Drilling, testing and sampling BH_07 to 45.77m bsf, EOB confirmed by Client	
	11:20	12:45	Lift SBF, trip pipe	
	12:00	12:20	ROV flight to recover reference beacon from seabed	
	12:45	13:55	Move to location BH_02	
	13:55	14:15	Deployment of ROV; placement of reference beacon on seabed	
	14:15	15:10	ROV flight, site survey with camera and Sector Scan sonar; Recovery of ROV	
	15:10	16:20	Lower SBF, run pipe	
05/04/2011	16:20	24:00	Drilling, testing and sampling BH_02 to 23.40m bsf	
	0:00	5:30	Drilling, testing and sampling BH_07 to 46.43m bsf, EOB confirmed by Client	
	5:30	7:00	Lift SBF, trip pipe	
	6:05	6:25	ROV flight to recover reference beacon from seabed	
	7:00	7:40	Seafastening	
	7:40	13:05	Sail to port of Southampton	
	11:00		Pilot on board	
06/04/2011	13:05	24:00	Alongside berth 106, Southampton port Demobilisation	
	0:00	12:00	Alongside in port of Southampton Demobilisation Crew change END OF PROJECT	

**Time Log of Investigation - M/V Fugro Saltire
Rampion Wind Farm, 2011 Site Investigation**

Date: 27/09/2008

Drawn by:
AF

Date:

Date:

Checked by:

Approved by:

DATE	TIME		ACTIVITY	WEATHER (Wind Speed) (Direction) (Heave/m)
	FROM	TO		
05/04/2011	7:00	11:30	Drive to hotel	
	11:30	12:20	Drive to Will Endeavour at Southampton	
	12:20	19:30	Mobilisation & wet test environmental equipment. Dry test CPT & VC - all ok	
	19:30	24:00	Standby in Southampton	
06/04/2011	0:00	4:00	Standby in Southampton	
	4:00	11:00	Transit to Shoreham on Sea, Brighton	
	11:00	12:38	Await arrival of fisheries liaison officer	
	12:38	13:05	Leave Shoreham on Sea out to site to begin Site Investigation	
	13:05	13:26	Arrive at location 21C - Drop camera	
	13:26	13:38	Transit to next location 18C	
	13:38	13:45	Arrive at location 18C - Drop camera	
	13:45	14:04	Transit to next location 19C	
	14:04	14:17	Arrive at location 19C - Drop camera	
	14:17	14:29	Transit to next location 20C	
	14:29	14:40	Arrive at location 20C - Drop camera	
	14:40	15:13	Transit to next location BH3	
	15:13	15:30	Arrive at location BH3 - Drop camera	
	15:30	15:56	Transit to pick up weather buoy	
	15:56	16:20	Attempt to recover buoy. Buoy was recovered however during operation to recover the bungee, became snagged upon, ships' anchor and parted from buoy.	
	16:20	18:00	Transit to Shoreham on Sea, Brighton	
	18:00	19:20	Rig up and wet test CPT ready for morning - Test ok.	
	19:20	24:00	Standby in Shoreham on Sea	
07/04/2011	0:00	10:00	Standby in Shoreham on Sea	
	10:00	10:45	Transit to first CPT location - CPT 21C	
	10:45	11:00	Tool Box Talk	
	11:00	11:10	Rig up for deployment	
	11:10	11:20	Deploy and push CPT 21C	
	11:20	11:40	Transit to next CPT location - CPT 18C	
	11:40	12:04	Deploy and push CPT 18C	
	12:04	12:30	Transit to next CPT location - CPT 19C	
	12:30	12:40	Deploy and push CPT 19C - Retest required, refusal at 1.08m	
	12:40	12:44	Bump over 5m to 19C_a	
	12:44	12:50	Push CPT 19C_a	
	12:50	13:08	Transit to next CPT location - CPT 20C	
	13:08	13:24	Deploy and push CPT 20C	
	13:24	14:08	Transit to next CPT location - CPT 3	
	14:08	14:23	Deploy and push CPT3	
	14:23	15:30	Pull CPT back to deck & demob CPT. Rig up for VC's	
	15:30	15:54	Lower VC drill VC-BH3 and recover back to deck	
	15:54	16:30	Transit to next location VC20C	
	16:30	16:50	Lower VC drill VC20C and recover back to deck	
	16:50	17:00	Started panel overload.	
	17:00	19:20	Transit back to Shoreham on Sea	
	19:20	24:00	Standby at shoreham on sea	
08/04/2011	0:00	10:00	Standby in Shoreham on Sea	
	10:00	11:00	Transit to VC location VC21C	
	11:00	11:15	Drill VC21C and recover back to deck	
	11:15	11:30	Move to next location - VC18C	
	11:30	11:47	Drill VC18C and recover back to deck	

Time Log of Investigation - M/V Willendeavour Rampion Wind Farm, 2011 Site Investigation



Date: 27/09/2008

Drawn by:
AF

Date:

Date:

Checked by:

Approved by:

DATE	TIME		ACTIVITY	WEATHER (Wind Speed) (Direction) (Heave/m)
	FROM	TO		
08/04/2011	11:47	12:11	Move to next location - 19C	
	12:11	12:25	Drill VC19C and recover back to deck	
	12:25	12:45	Move to next location - VC20C-B (Retest)	
	12:45	13:00	Drill VC20C and recover back to deck	
	13:00	13:40	Transit to Shoeham on Sea to pick up divers to recover lost weather bouy anchor.	
	13:40	14:20	All divers and equipemet on board	
	14:20	15:30	Transit out to lost anchor location	
	15:30	15:55	Arrive at lost anchor location, bouy visable at surface, ships winch pulls 3" anchor chain to deck. No need for divers.	
	15:55	17:50	Transit back to Shoreham on Sea.	
	17:50	19:30	FAOL Continue with Demob.	
	19:30	24:00	Job complete. Willendeavour to transit to Southampton to continue demob withou FAOL staff	

**Time Log of Investigation - M/V Willendeavour
Rampion Wind Farm, 2011 Site Investigation**

SECTION C.2

DRILLING OPERATIONS

C.2	DRILLING OPERATIONS	1
C.2.1	GENERAL	1
C.2.2	DRILLING OPERATIONS	1
C.2.3	EQUIPMENT	2
C.2.4	PROBLEMS	2

C.2 DRILLING OPERATIONS

C.2.1 GENERAL

A total of 9 boreholes were drilled during the site investigation.

The final depths of investigation in each borehole are listed below (Table C.2-1), together with the number of successful cone penetration tests (CPTs) and samples recovered.

Table C.2-1: Summary of Site Work – Rampion Wind Farm

Location	Final Penetration [m BSF]	Sampling and Testing Details (successful samples/tests only)
BH_02	46.4	19 CPT and 24 Samples
BH_04	47.4	29 CPT and 24 Samples
BH_04a	4.2	6 Samples
BH_06	52.9	17 CPT, 37 Samples and 3 Hammers
BH_07	40.0	17 CPT, 31 Samples and 2 Hammers
BH_13	45.2	27 CPT, 27 Samples and 8 Hammers
BH_14	50.2	23 CPT and 25 Samples
BH_16	46.4	26 CPT, 19 Samples and 5 Hammers
BH_17	45.1	24 CPT and 25 Samples

Note: Table excludes number of tests of nil penetration / no recovery

BSF = Below seafloor

C.2.2 DRILLING OPERATIONS

Drilling operations onboard the Fugro Saltire were performed using a straight flush rotary system connected to a heave compensator. A 4.5 inch i.d. A.P.I. drillpipe was used with a five-wing open drag bit.

The water depth at the beginning of each borehole was checked by noting the length of drillpipe at touchdown of the bit onto the clamps of the SEACLAM[®]. During drilling each borehole was flushed and stabilised using either seawater or a mixture of seawater and drilling mud (guargum).

The drilling system used during the soil investigation only allowed inspection of the soil at depths at which the samples were taken. In intervening zones, the soil characteristics can be estimated from the in-situ test data, the rate of drilling, the bit load, mud pressure and the general behaviour of the drillstring.

Drilling logs have been produced based on the records kept by Fugro's own drillers and operators. These logs are presented at the end of this section.

C.2.3 EQUIPMENT

Equipment data sheets that were used during the site Investigation are presented at the end of this section.

Coring equipment (P-Q corer, Fugro Marine Core Barrel) was mobilised in the event bedrock was discovered at any of the boreholes. During the investigation it was not necessary to use this equipment due to the unstructured nature of the chalk sampled at site.

C.2.4 PROBLEMS

During BH_04 an error was made in tidal correction readings, and it was discovered that the driller had drilled to 4.5 m BSF and not the required 2.5 m BSF. It was decided to continue with the current borehole and an adjacent borehole was performed to fill the data gap to 4.5 m. Corrections were made to all the recovered data and the error in depth records does not affect the quality or reliability of the data.

DRILLING OPERATIONS

LIST OF PLATES – SECTION C.2

Description	Plate
Drilling Logs – BH_02	C.2-1
Drilling Logs – BH_04	C.2-2
Drilling Logs – BH_04a	C.2-3
Drilling Logs – BH_06	C.2-4
Drilling Logs – BH_07	C.2-5
Drilling Logs – BH_13	C.2-6 to C.2-7
Drilling Logs – BH_14	C.2-8
Drilling Logs – BH_16	C.2-9
Drilling Logs – BH_17	C.2-10
Equipment Data Sheets:	
Geotechnical Drilling Vessel – Fugro Saltire	C.2-11 to C.2-12
R100 Drilling Rig	C.2-13
SeaClam Mk II	C.2-14 to C.2-15
Offshore Drilling and Sampling	C.2-16 to C.2-17
WISON® Mk III	C.2-18 to C.2-19
Wipsampler	C.2-20 to C.2-21
Piezo-Cone Penetrometer	C.2-22 to C.2-23
Fugro Marine Core Barrel	C.2-24 to C.2-25
Multicat – Willendeavour	C.2-26 to C.2-30
High Performance Corer - HPC	C.2-31 to C.2-32
Roson Seabed Cone Penetrometer CPT1	C.2-33 to C.2-34

E.ON CLIMATE AND RENEWABLES
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION



Date:
27/09/2008

Drawn by:
AF

Date:
Date:

Checked by:
Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline (m)	Sample No.	Tube Details	Sample Length (m)	Wison		Remarks
								Test No.	Stroke (m)	
From	(t)	(PSI)								
16:10	-	-	-	0.0	-	-	-	CPT01	2.90	
17:05	1	29	58	3.0	WIP01	3"	0.55	-	-	
17:23	1	29	73	4.0	-	-	-	CPT02	2.94	
18:18	1	29	58	7.0	WIP02	3"	0.69	-	-	
18:44	1.4	29	73	8.0	WIP03	3"	0.81	-	-	
19:06	1.4	58	87	9.0	-	-	-	CPT03	2.84	
19:36	1.4	58	73	12.0	WIP04	3"	0.24	-	-	
19:49	1.4	29	44	12.5	WIP05	3"	0.68	-	-	
20:11	1.4	29	44	13.5	-	-	-	CPT04	2.89	
20:48	1.6	29	87	16.5	WIP06	3"	0.33	-	-	
21:21	1.6	29	44	17.0	WIP07	3"	0.75	-	-	
21:35	1.6	29	44	18.0	-	-	-	CPT05	1.50	
22:00	1.6	29	44	19.5	WIP08	3"	0.13	-	-	
22:16	1.6	29	44	20.0	WIP09	3"	0.36	-	-	
22:30	1.6	29	58	20.5	-	-	-	CPT06	0.55	
22:45	1.8	29	73	21.5	-	-	-	CPT07	0.27	
23:00	1.8	29	87	22.0	-	-	-	CPT08	0.16	
23:15	1.8	29	58	22.5	WIP10	3"	0.12	-	-	
23:37	2	29	58	23.0	WIP11	3"	0.4	-	-	
23:50	2	29	58	23.5	-	-	-	CPT09	1.48	
00:25	2	20	80	25.0	-	-	-	CPT10	0.75	
00:45	2	20	80	26.0	WIP12	3"	0.2	-	-	
01:00	2	10	20	26.5	WIP13	3"	0.1	-	-	
01:07	2	10	50	27.0	-	-	-	CPT11	1.40	
01:22	2	10	50	28.5	-	-	-	CPT12	1.17	
01:37	2	10	80	30.0	WIP14	3"	0.45	-	-	
01:50	2	10	80	30.5	WIP15	3"	0.25	-	-	
02:00	2	10	80	31.0	-	-	-	CPT13	1.39	
02:14	2	10	80	32.5	-	-	-	CPT14	1.34	
02:35	2	10	80	34.0	WIP16	3"	0.35	-	-	
02:50	2	10	80	34.5	WIP17	3"	0.4	-	-	
03:00	2	10	150	35.0	-	-	-	CPT15	0.49	
03:10	2	10	150	36.0	-	-	-	CPT16	0.60	
03:25	2	10	150	37.0	WIP18	3"	0.2	-	-	
03:37	2	10	150	37.5	WIP19	3"	0.38	-	-	
03:47	2	10	120	38.0	-	-	-	CPT17	1.31	
04:00	2	10	20	39.5	-	-	-	CPT18	1.14	
04:20	2	10	20	41.0	WIP20	3"	0.18	-	-	
04:25	2	10	80	41.5	WIP21	3"	0.12	-	-	
04:35	2	10	20	42.0	WIP22	3"	0.35	-	-	
04:42	2	10	20	42.5	WIP23	3"	0.3	-	-	
04:50	2	10	20	43.0	-	-	-	CPT19	2.86	
05:20	2	10	150	46.0	WIP24	3"	0.43	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_02

Date:
27/09/2008Drawn by:
AFDate:
Date:Checked by:
Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline	Sample No.	Tube Details	Sample Length	Wison		Remarks
								Test No.	Stroke	
From	(t)	(PSI)		(m)			(m)		(m)	
13:20				ML	-	-	-	CPT01	2.48	
14:05	1.0	29	87	4.5	WIP01	2"	0.68	-	-	
14:22	1.0	29	-	5.5	-	-	-	CPT02	0.15	
14:35	1.0	29	-	6.0	-	-	-	CPT03	0.15	
14:47	1.0	29	-	6.5	-	-	-	CPT04	0.16	
14:58	1.0	29	-	7.0	WIP02	2"	0.14	-	-	
15:14	1.0	29	-	7.5	WIP03	2"	0.15	-	-	
15:27	1.0	29	-	8.0	-	-	-	CPT05	0.23	
16:00	1.0	29	87	8.5	-	-	-	CPT06	0.49	
16:14	1.0	29	73	9.0	-	-	-	CPT07	1.35	
16:45	1.2	29	87	10.5	WIP04	2"	0.66	-	-	
17:05	1.4	29	58	11.5	-	-	-	CPT08	0.58	
17:25	1.4	29	58	12.5	-	-	-	CPT09	0.56	
18:00	1.4	29	58	13.0	-	-	-	CPT10	0.60	
19:35	1.6	29	44	14.0	WIP05	2"	0.19	-	-	
19:45	1.6	29	44	14.5	WIP06	2"	0.20	-	-	
20:05	1.6	29	44	15.0	-	-	-	CPT11	0.14	
20:15	1.6	29	44	15.5	-	-	-	CPT12	0.14	
20:30	1.6	29	44	16.0	-	-	-	CPT13	0.10	
20:40	1.6	29	44	16.5	WIP07	2"	0.24	-	-	
21:00	1.6	29	44	17.0	WIP08	2"	0.28	-	-	
21:10	1.6	29	44	17.5	-	-	-	CPT14	0.13	
21:30	1.6	29	44	18.0	-	-	-	CPT15	0.15	
21:50	1.6	29	44	18.5	-	-	-	CPT16	0.16	
22:05	1.6	29	44	19.0	WIP09	2"	0.22	-	-	
22:25	1.8	29	44	19.5	WIP10	2"	0.20	-	-	
22:40	1.8	29	44	20.0	-	-	-	CPT17	0.10	
22:55	1.8	29	44	20.5	-	-	-	CPT18	0.11	
23:09	1.8	29	44	21.0	-	-	-	CPT19	0.18	
23:24	1.8	29	44	21.5	WIP11	2"	0.95	-	-	
00:00	1.8			22.5	WIP12	3"	0.52	-	-	
00:30	1.8	10	150	23.5	WIP13	3"	0.25	-	-	
00:50	1.8	10	150	24.0	-	-	-	CPT20	2.94	
01:20	1.8	10	400	27.0	WIP14	3"	0.39	-	-	
01:55	1.8	10	450	27.5	WIP15	3"	0.33	-	-	
02:10	1.8	10	300	28.0	-	-	-	CPT21	0.73	
02:30	1.8	10	250	29.0	-	-	-	CPT22	1.10	
02:55	1.8	10	20	30.5	WIP16	3"	0.16	-	-	
03:15	1.8	10	20	31.0	WIP17	3"	0.20	-	-	
03:30	1.8	10	150	31.5	-	-	-	CPT23	1.42	
03:55	1.8	10	20	33.0	-	-	-	CPT24	0.08	
04:06	1.8	10	200	33.5	-	-	-	CPT25	0.57	
04:35	1.8	10	450	34.5	WIP18	3"	0.30	-	-	
04:45	1.8	10	200	35.0	WIP19	3"	0.45	-	-	
05:00	1.8	10	450	35.5	-	-	-	CPT26	2.92	
05:30	1.8	10	500	38.5	WIP20	3"	0.65	-	-	
06:10	1.8	10	350	39.5	WIP21	3"	0.60	-	-	
06:17	1.8	10	150	40.5	-	-	-	CPT27	1.72	
06:55	1.8	10	50	42.5	-	-	-	CPT28	0.06	
07:10	1.8	10	80	43.0	WIP22	3"	0.30	-	-	
07:35	1.8	10	80	43.5	WIP23	3"	0.35	-	-	
07:45	1.8	10	80	44.0	-	-	-	CPT29	2.77	
08:15	1.8	10	500	47.0	WIP24	3"	0.36	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_04

E.ON CLIMATE AND RENEWABLES
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION



Date:
27/09/2008

Drawn by:
AF

Date:
Date:

Checked by:
Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline (m)	Sample No.	Tube Details	Sample Length (m)	Wison		Remarks
								Test No.	Stroke	
From	(t)	(PSI)							(m)	
09:30				0.0	-	-	-	CPT01		
09:44	1.0	0	10	0.0	WIP01	3"	0.53	-	-	
10:05	1.0	10	50	1.0	WIP02	3"	0.74	-	-	
10:15	1.0	10	50	2.0	WIP03	3"	0.67	-	-	
10:42	1.0	10	50	3.0	WIP04	3"	0.23	-	-	
10:52	1.0	10	50	3.5	WIP05	3"	0.64	-	-	
11:10	1.0	10	50	4.0	WIP06	3"	0.19	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_04A

Date:
27/09/2008Drawn by:
AF

Date:

Date:

Checked by:

Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline (m)	Sample No.	Tube Details	Sample Length (m)	Wison		Remarks
								Test No.	Stroke	
From	(t)	(PSI)							(m)	
16:05				0.0	-	-	-	CPT01	2.95	
16:35	1.0	29	73	3.0	W01	3"	0.50	-	-	
16:53	1.0	29	73	4.0	W02	3"	0.34	-	-	
17:16	1.0	29	58	4.5	W03	3"	0.51	-	-	
17:26	1.0	29	87	5.0	-	-	-	CPT02	2.96	
18:36	1.2	29	145	8.0	W04	3"	0.52	-	-	
19:00	1.2	73	145	9.0	W05	3"	0.35	-	-	
19:16	1.4	73	145	9.5	W06	3"	0.84	-	-	
19:36	1.4	73	145	10.5	-	-	-	CPT03		
20:20	1.6	116	218	13.5	W07	3"	0.41	-	-	
20:40	1.6	116	218	14.0	W08	3"	0.89	-	-	
20:50	1.6	116	218	15.0	-	-	-	CPT04		
21:25	1.6	116	218	18.0	W09	3"	0.56	-	-	
21:43	1.6	116	218	19.0	W10	3"	0.18	-	-	
22:07	1.8	73	174	19.5	W11	3"	0.43	-	-	
22:25	1.8	73	145	20.0	-	-	-	CPT05	2.15	
22:43	1.8	73	116	22.5	W12	3"	0.42	-	-	
23:15	1.8	29	73	23.0	W13	3"	0.15	-	-	
23:35	1.8	29	87	23.5	W14	3"	0.07	-	-	
00:05	-	-	-	23.5	HS14a		0.36	-	-	
00:40	1.8	10	50	24.0	W15	3"	0.00	-	-	
00:55	1.8	10	150	25.0	-	-	-	CPT06	0.84	
01:10	1.8	10	150	26.0	W16	3"	0.20	-	-	
01:18	1.8	10	20	26.5	W17	3"	0.07	-	-	
01:30	1.8	10	120	27.0	W18	3"	0.18	-	-	
01:42	1.8	10	150	27.5	W19	3"	0.16	-	-	
01:52	1.8	10	20	28.0	-	-	-	CPT07	1.19	
02:10	1.8	10	150	29.5	-	-	-	CPT08	0.03	
02:30				29.5	HS20		0.05	-	-	
02:40	1.8	10	200	30.0	W21	3"	0.00	-	-	
02:55				30.0	HS21		0.07	-	-	
03:15	1.8	10	0	30.5	W22	3"	0.00	-	-	
03:27	1.8	10	100	31.0	W23	3"	0.37	-	-	
03:40	1.8	10	100	31.5	W24	3"	0.18	-	-	
03:55	1.8	10	100	32.0	-	-	-	CPT09	2.88	
04:20	1.8	10	100	35.0	W25	3"	0.36	-	-	
04:40	1.8	10	250	35.5	W26	3"	0.32	-	-	
04:56	1.8	10	200	36.0	-	-	-	CPT10	1.47	
05:55	2.5	10	100	37.5	W27	3"	0.40	-	-	
06:20	2.5	10	150	38.5	W28	3"	0.37	-	-	
06:30	2.5	10	150	39.5	-	-	-	CPT11	2.18	
07:00	2.0	10	500	42.0	W29	3"	0.20	-	-	
07:15	1.6	10	50	42.5	W30	3"	0.38	-	-	
07:32	1.6	10	80	43.0	-	-	-	CPT12	0.19	
07:50	1.6	10	20	43.5	-	-	-	CPT13	0.12	
08:07	1.6	10	20	44.0	-	-	-	CPT14	0.27	
08:30	1.6	10	20	44.5	W31	3"	0.20	-	-	
08:45	1.6	10	20	45.0	W32	3"	0.26	-	-	
09:00	1.6	10	20	45.5	-	-	-	CPT15	0.28	
09:20	1.6	10	20	46.0	-	-	-	CPT16	0.28	
09:44	1.6	10	20	46.5	-	-	-	CPT17	0.09	
10:03	1.6	10	20	47.0	W33	3"	0.17	-	-	
10:20	1.6	10	20	47.5	W34	3"	0.05	-	-	
10:50	1.6	10	20	48.0	W35	3"	0.30	-	-	
11:05	1.6	10	20	48.5	W36	3"	0.65	-	-	
11:15	1.6	10	20	49.5	W37	3"	0.25	-	-	
11:35	1.6	10	20	50.0	W38	3"	0.62	-	-	
03:50	1.4	10	50	51.0	W39	3"	0.20	-	-	
09:36	1.4	10	50	52.0	W40	2"	0.92	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_06

Date:
27/09/2008Drawn by:
AFDate:
Date:Checked by:
Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline (m)	Sample No.	Tube Details	Sample Length (m)	Wison		Remarks
								Test No.	Stroke	
From	(t)	(PSI)							(m)	
17:15	-	-	-	0.0	-	-	-	CPT01	2.98	
18:05	1.0	29	44	3.0	WIP01	3"	0.20	-	-	
18:23	1.0	29	44	4.0	WIP02	3"	0.86	-	-	
18:35	1.0	29	44	5.0	-	-	-	CPT02	1.72	
18:50	1.0	29	44	7.0	WIP03	3"	0.90	-	-	
19:05	1.0	29	58	8.0	WIP04	3"	0.92	-	-	
19:15	1.0	29	58	9.0	-	-	-	CPT03	2.35	
19:40	1.0	29	87	11.5	WIP05	3"	0.92	-	-	
19:50	1.0	29	58	12.5	WIP06	3"	0.54	-	-	
20:05	1.0	29	58	13.5	-	-	-	CPT04	0.72	
20:15	1.0	29	58	14.5	-	-	-	CPT05a	0.15	
20:55	-	-	-	140.5	HAM01	60mm	0.20	-	-	
21:30	1.0	29	44	15.0	HAM02	60mm	0.30	-	-	
21:45	1.0	29	58	15.5	WIP07	3"	0.94	-	-	
22:04	1.0	29	58	16.5	-	-	-	CPT06	0.87	
22:23	1.0	29	58	17.5	-	-	-	CPT07	1.68	
22:48	1.0	29	58	19.5	WIP08	3"	0.29	-	-	
23:15	1.0	29	58	20.0	WIP09	3"	0.32	-	-	
23:55	1.0	20	30	20.0	WIP09	3"	0.32	-	-	
00:27	1.0	20	50	20.5	WIP10	3"	0.16	-	-	
00:40	1.0	20	30	21.0	WIP11	3"	0.17	-	-	
00:50	1.0	20	30	21.5	-	-	-	CPT08	0.13	
01:00	1.2	20	50	22.0	-	-	-	CPT09	0.09	
01:30	1.2	20	50	22.5	-	-	-	CPT10	0.16	
01:35	1.2	20	50	23.0	WIP12	3"	0.20	-	-	
01:55	1.2	20	50	23.5	WIP13	3"	0.32	-	-	
02:10	1.2	20	50	24.0	WIP14	3"	0.50	-	-	
02:25	1.2	20	100	24.5	WIP15	3"	0.23	-	-	
02:35	1.2	20	30	25.0	-	-	-	CPT11	0.53	
02:48	1.2	20	80	26.0	-	-	-	CPT12	0.11	
03:05	1.2	20	50	26.5	-	-	-	CPT13	0.24	
03:20	1.2	20	50	27.0	WIP16	3"	0.17	-	-	
03:38	1.2	20	50	27.5	WIP17	3"	0.12	-	-	
03:55	1.2	20	50	28.0	WIP18	3"	0.10	-	-	
04:05	1.2	10	50	28.5	WIP19	3"	0.10	-	-	
04:25	1.2	10	50	29.0	-	-	-	CPT14	0.48	
04:40	1.2	10	50	29.5	-	-	-	CPT15	0.89	
05:10	1.2	10	50	30.5	-	-	-	CPT16	0.89	
05:30	1.2	10	50	31.5	WIP20	3"	0.29	-	-	
06:26	1.2	10	30	32.0	WIP21	3"	0.20	-	-	
06:40	1.2	10	50	32.5	WIP22	3"	0.35	-	-	
06:40	1.2	10	20	32.5	WIP22	3"	0.35	-	-	
06:45	1.2	10	80	33.0	WIP23	3"	0.38	-	-	
06:55	1.2	10	100	33.5	-	-	-	CPT17	0.45	
07:12	1.2	10	80	34.5	-	-	-	CPT18	2.34	
07:40	1.2	10	50	37.0	WIP24	3"	0.15	-	-	
08:00	1.2	10	50	37.5	WIP25	3"	0.46	-	-	
08:12	1.2	10	50	38.5	WIP26	3"	0.45	-	-	
08:27	1.2	10	50	39.0	WIP27	3"	0.43	-	-	
08:25	1.2	10	50	39.5	-	-	-	CPT19	0.59	
09:08	1.2	10	50	40.5	-	-	-	CPT20	0.33	
09:30	1.2	10	50	41.5	WIP28	3"	0.43	-	-	
09:50	1.2	10	50	42.0	WIP29	3"	0.55	-	-	
10:05	1.2	10	30	42.5	WIP30	3"	0.22	-	-	
10:22	1.2	10	50	43.5	-	-	-	CPT21	0.13	
10:40	1.2	10	50	44.0	-	-	-	CPT22	0.13	
10:55	1.2	10	50	44.5	-	-	-	CPT23	0.47	
11:05	1.2	10	50	45.5	WIP31	3"	0.27	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_07

Date:
27/09/2008Drawn by:
AFDate:
Date:Checked by:
Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline (m)	Sample No.	Tube Details	Sample Length (m)	Wison		Remarks
								Test No.	Stroke	
From	(t)	(PSI)							(m)	
15:05				0.0	-	-	-	CPT01	0.55	
15:50	1.0	29	-	0.5	-	-	-	CPT02	0.46	
16:15	1.0	29	-	1.0	-	-	-	CPT03	1.14	
16:45	1.0	29	-	2.5	WIP01	3"	0.00	-	-	
17:10	1.0	29	-	2.5	HAM01a	60mm	0.00	-	-	
17:55	1.0	29	-	-	-	-	-	-	-	Clearing bit
18:10	1.0	29	-	3.0	WIP02	3"	0.00	-	-	
18:15	1.0	29	-	3.0	HAM02a	60mm	0.00	-	-	
18:30	1.0	29	-	-	-	-	-	-	-	Clearing bit
18:41	1.0	29	-	3.0	WIP02b	3"	0.30	-	-	
19:00	1.0	29	58	3.5	WIP03	3"	0.45	-	-	
19:30	1.0	29	87	4.5	-	-	-	CPT04	2.74	
20:40	1.5	73	102	7.5	WIP04	3"	0.80	-	-	
21:20	1.5	73	102	8.5	WIP05	3"	0.86	-	-	
21:32	1.5	73	102	9.5	-	-	-	CPT05	2.93	
21:55	1.5	73	145	12.5	WIP06	3"	0.93	-	-	
22:15	1.5	73	145	13.5	WIP07	3"	0.70	-	-	
22:40	1.5	73	145	14.5	-	-	-	CPT06	2.90	
23:15	1.5	73	145	17.5	WIP08	3"	0.18	-	-	
23:40	2.0	29	44	18.0	WIP09	3"	0.15	-	-	
23:55	1.5	10	50	18.0	HAM09a	60mm	0.50	-	-	
00:22	1.4	10	50	18.5	-	-	-	CPT07	0.10	
00:40	1.4	10	50	19.0	-	-	-	CPT08	0.30	
01:00	1.4	10	80	19.5	-	-	-	CPT09	0.11	
01:15	1.4	10	80	20.0	WIP10	3"	0.14	-	-	
01:30	1.4	10	80	20.0	HAM10a	60mm	0.35	-	-	
01:55	1.4	10	50	20.5	WIP11	3"	0.15	-	-	
02:10	1.4	10	50	20.5	HAM11a	60mm	0.50	-	-	
02:30	1.4	10	20	21.0	-	-	-	CPT10	1.29	
03:00	1.8	10	20	22.5	-	-	-	CPT11	0.12	
03:20	2.0	10	20	23.0	-	-	-	CPT12	0.19	
03:32	2.0	10	20	23.5	WIP12	3"	0.12	-	-	
03:45	2.0	10	20	23.5	HAM12a	60mm	0.50	-	-	
03:56	2.0	10	20	24.0	WIP13	3"	0.15	-	-	
04:10	2.0	10	20	24.5	-	-	-	CPT13	0.16	
04:25	2.0	10	10	25.0	-	-	-	CPT14	0.15	
04:42	2.0	10	20	25.5	-	-	-	CPT15	0.13	
04:53	2.0	10	20	26.0	WIP14	3"	0.20	-	-	
05:08	2.0	10	20	26.5	WIP15	3"	0.15	-	-	
05:30	2.0	10	20	27.0	-	-	-	CPT16	0.30	
05:45	2.0	10	20	27.5	-	-	-	CPT17	0.14	
06:20	2.0	10	20	28.0	-	-	-	CPT18	0.13	
06:45	2.0	10	20	28.5	WIP16	3"	0.15	-	-	
07:02	2.0	10	20	28.5	HAM16a	60mm	0.10	-	-	
08:20	2.0	10	20	29.0	WIP17	3"	-	-	-	
08:35	2.0	10	20	29.5	-	-	-	CPT19	0.00	
08:50	2.0	10	20	30.0	-	-	-	CPT20	0.12	
09:15	2.0	10	20	30.0	HAM18	60mm	0.40	-	-	
09:40	2.0	10	20	30.5	WIP19	3"	0.22	-	-	
09:55	2.0	10	20	31.0	-	-	-	CPT21	0.14	
10:15	2.0	10	20	31.5	-	-	-	CPT22	0.11	
10:22	2.0	10	20	32.0	-	-	-	CPT23	0.12	
11:00	2.0	10	20	32.5	WIP20	3"	0.16	-	-	
11:10	2.0	10	20	33.0	WIP21	3"	0.54	-	-	
11:24	2.0	10	20	33.5	-	-	-	CPT24	1.44	
11:39	2.0	10	150	35.0	WIP22	3"	0.67	-	-	
12:15	2.0	73	174	36.0	-	-	-	CPT25	1.40	
12:44	2.0	73	145	37.5	-	-	-	CPT26	1.41	
13:18	2.0	116	189	39.0	WIP23	3"	0.87	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_13

E.ON CLIMATE AND RENEWABLES
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION



Date:
27/09/2008

Drawn by:
AF

Date:
Date:

Checked by:
Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline (m)	Sample No.	Tube Details	Sample Length (m)	Wison		Remarks
								Test No.	Stroke	
From	(t)	(PSI)							(m)	
13:18	2.0	116	189	39.0	WIP23	3"	0.87	-	-	
13:40	2.2	116	174	40.0	WIP24	3"	0.72	-	-	
14:03	2.2	145	203	41.0	-	-	-	CPT27	2.85	
15:00	2.4	73	145	44.0	WIP25	3"	0.26	-	-	
15:25	2.4	29	87	44.5	WIP26	3"	0.17	-	-	
15:56	2.4	29	87	45.0	WIP27	3"	0.15	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_13

Date:
27/09/2008Drawn by:
AFDate:
Date:Checked by:
Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline (m)	Sample No.	Tube Details	Sample Length (m)	Wison		Remarks
								Test No.	Stroke	
From	(t)	(PSI)							(m)	
22:25	-	-	-	0.0	-	-	-	CPT01	2.04	Top 0.8 m possibly disturbed
23:14	1.0	0	29	2.0	W01	3"	0.35	-	-	
23:31	1.0	0	29	2.5	W02	3"	0.33	-	-	
23:50	1.0	0	29	3.0	-	-	-	CPT02	3.00	
00:30	1.0	10	200	6.0	W03	2"	0.60	-	-	
00:50	1.0	10	150	7.0	W04	3"	0.72	-	-	
01:00	1.0	10	180	8.0	-	-	-	CPT03	3.00	
01:20	1.0	10	150	11.0	W05	3"	0.85	-	-	
01:32	1.0	10	150	12.0	W06	3"	0.84	-	-	
01:47	1.0	10	80	13.0	-	-	-	CPT04	2.66	
02:15	1.3	10	80	16.0	W07	3"	0.85	-	-	
02:31	1.3	10	100	17.0	W08	3"	0.80	-	-	
02:45	1.3	10	100	18.0	-	-	-	CPT05	2.82	
03:15	1.3	10	150	21.0	W09	3"	0.75	-	-	
03:25	1.3	10	100	22.0	W10	3"	0.64	-	-	
03:35	1.3	10	100	23.0	-	-	-	CPT06	1.63	
04:15	1.3	10	100	25.0	W11	3"	0.66	-	-	
04:23	1.3	10	100	26.0	W12	3"	0.68	-	-	
04:32	1.3	10	100	27.0	-	-	-	CPT07	2.97	
04:55	1.3	10	100	30.0	W13	3"	0.43	-	-	
05:06	1.3	10	50	31.0	W14	3"	0.87	-	-	
05:20	1.3	10	30	32.0	-	-	-	CPT08	2.84	
06:20	1.6	10	200	35.0	W15	3"	-	-	-	
06:35	1.6	10	200	36.0	W16	3"	-	-	-	
06:50	1.6	10	200	37.0	-	-	-	CPT09	0.66	
07:05	1.6	10	50	38.0	-	-	-	CPT10	0.09	
07:15	1.6	10	20	38.5	-	-	-	CPT11	0.50	
07:45	1.6	10	20	39.5	W17	3"	0.11	-	-	
08:05	1.6	10	20	40.0	W18	3"	0.11	-	-	
08:20	1.6	10	20	40.5	-	-	-	CPT12	0.16	
08:35	1.6	10	20	41.0	-	-	-	CPT13	0.42	
08:48	1.6	10	100	41.5	-	-	-	CPT14	0.14	
09:00	1.6	10	20	42.0	W19	3"	0.18	-	-	
09:10	1.6	10	20	42.5	W20	3"	0.18	-	-	
09:32	1.6	10	20	43.0	-	-	-	CPT15	0.58	
09:50	1.6	10	20	44.0	-	-	-	CPT16	0.16	
09:57	1.6	10	20	44.5	-	-	-	CPT17	0.11	
10:05	1.6	10	20	45.0	W21	3"	0.16	-	-	
10:20	1.6	10	20	45.5	W22	3"	0.17	-	-	
10:35	1.6	10	20	46.0	-	-	-	CPT18	0.11	
10:49	1.6	10	20	46.5	-	-	-	CPT19	0.13	
11:00	1.6	10	20	47.0	-	-	-	CPT20	0.18	
11:14	1.6	10	20	47.5	W23	3"	0.15	-	-	
11:35	1.6	10	20	48.0	W24	3"	0.15	-	-	
11:55	1.6	10	20	48.5	-	-	-	CPT21	0.15	
12:20	1.6	29	43	49.0	-	-	-	CPT22	0.15	
12:35	1.6	29	43	49.5	-	-	-	CPT23	0.11	
12:48	1.6	29	43	50.0	W25	3"	0.15	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_14

Date:
27/09/2008Drawn by:
AF

Date:

Date:

Checked by:
Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline (m)	Sample No.	Tube Details	Sample Length (m)	Wison		Remarks
								Test No.	Stroke	
From	(t)	(PSI)							(m)	
15:00	1.0	29	-	0.0	-	-	-	CPT01	2.99	
15:25	1.0	29	-	3.0	HAM01a	-	0.10	-	-	
				3.0	WIP01	3"	0.15	-	-	
15:40	1.0	29	-	4.0	-	-	-	CPT02	2.91	
16:00	1.0	29	-	7.0	WIP02	2"	0.70	-	-	
16:20	1.0	29	-	8.0	-	-	-	CPT03	2.76	
16:41	1.0	29	-	11.0	WIP03	2"	0.75	-	-	
17:03	1.0	29	-	12.0	-	-	-	CPT04	2.76	
17:17	1.0	29	-	15.0	WIP04	2"	0.52	-	-	
18:15	1.2	29	-	16.0	-	-	-	CPT05	2.20	
18:32	1.2	29	-	18.5	WIP05	2"	0.44	-	-	
18:52	1.4	29	-	19.0	WIP06	2"	0.40	-	-	
19:16	1.4	29	-	19.5	HAM02	-	0.01	-	-	
19:30	1.4	29	-	20.0	HAM03	-	0.02	-	-	
20:00	1.4	29	-	20.5	-	-	-	CPT06	0.29	
20:28	1.4	29	-	21.0	-	-	-	CPT07	0.12	
20:46	1.4	29	44	21.5	HAM04	-	0.10	-	-	
21:00	1.4	29	44	22.0	-	-	-	CPT08	0.07	
21:20	1.4	29	58	22.5	-	-	-	CPT09	0.34	
21:35	1.4	29	58	23.0	-	-	-	CPT10	0.08	
21:50	1.4	29	44	23.5	HAM05	-	0.15	-	-	
22:08	1.4	29	58	24.0	WIP07	2"	0.15	-	-	
22:32	1.4	29	44	24.5	-	-	-	CPT11	0.09	
22:48	1.6	29	58	25.0	-	-	-	CPT12	0.07	
23:02	1.8	29	73	25.5	-	-	-	CPT13	0.13	
23:15	1.8	29	73	26.0	HAM06	-	0.01	-	-	
23:30	1.8	29	44	26.5	WIP08	2"	0.25	-	-	
00:20	1.8	10	20	27.0	-	-	-	CPT14	0.20	
00:35	1.8	10	200	27.5	-	-	-	CPT15	2.85	
01:05	2.0	10	180	30.5	WIP09	3"	0.35	-	-	
01:20	2.2	10	180	31.0	WIP10	3"	0.45	-	-	
01:35	2.1	10	350	31.5	-	-	-	CPT16	0.18	
01:50	2.2	10	20	32.0	-	-	-	CPT17	0.12	
02:05	1.8	10	200	32.5	-	-	-	CPT18	2.19	
02:35	2.1	10	80	35.0	WIP11	3"	0.07	-	-	
02:45	2.0	10	20	35.5	WIP12	3"	0.13	-	-	
03:00	2.0	10	20	36.0	-	-	-	CPT19	0.15	
03:15	2.0	10	150	36.5	-	-	-	CPT20	1.42	
03:52	2.0	10	150	38.0	WIP13	3"	0.05	-	-	
04:05	2.0	10	190	38.0	WIP13a	3"	0.45	-	-	
04:22	2.0	10	50	38.5	WIP14	3"	0.45	-	-	
04:32	2.0	10	250	39.0	-	-	-	CPT21	0.67	
04:50	2.0	10	200	40.0	-	-	-	CPT22	0.25	
05:00	2.0	10	20	40.5	-	-	-	CPT23	0.17	
05:25	2.0	10	20	41.0	WIP15	3"	0.05	-	-	
05:55	2.5	10	20	41.5	WIP16	3"	0.12	-	-	
06:30	2.0	10	20	42.0	-	-	-	CPT24	0.20	
06:50	2.0	10	20	42.5	-	-	-	CPT25	1.26	
07:20	2.0	10	150	44.0	WIP17	3"	0.50	-	-	
07:30	2.0	10	250	44.5	-	-	-	CPT26	1.40	
07:45	2.0	10	350	46.0	WIP18	3"	0.40	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_16

Date:
27/09/2008Drawn by:
AFDate:
Date:Checked by:
Approved by:

Drilling Time	Bit Load	Mud Pressure		Depth Below Mudline (m)	Sample No.	Tube Details	Sample Length (m)	Wison		Remarks
								Test No.	Stroke	
From	(t)	(PSI)							(m)	
18:45				0.0	-	-	-	CPT01	2.28	
19:40	1	29	73	2.5	WIP01	3"	0.3	-	-	
19:55	1	29	58	3.0	WIP02	3"	0.33	-	-	
20:12	1	29	29	3.5	-	-	-	CPT02	2.90	
20:39	1	29	73	6.5	WIP03	3"	0.55	-	-	
21:00	1	29	73	7.5	WIP04	3"	0.36	-	-	
21:20	1	29	58	8.0	-	-	-	CPT03	2.95	
21:49	1	29	73	11.0	WIP05	3"	0.55	-	-	
22:10	1	29	87	12.0	WIP06	3"	0.58	-	-	
22:25	1	29	87	13.0	-	-	-	CPT04	2.80	
22:56	1	87	189	16.0	WIP07	3"	0.4	-	-	
23:18	1	73	174	17.0	WIP08	3"	0.35	-	-	
23:35	1	87	145	18.0	-	-	-	CPT05	2.92	
00:15	1.3	100	150	21.0	WIP09	3"	0.33	-	-	
00:25	1.3	10	200	22.0	WIP10	3"	0.63	-	-	
00:35	1.3	10	150	23.0	-	-	-	CPT06	2.91	
00:58	1.3	10	150	26.0	WIP11	3"	0.62	-	-	
01:08	1.3	10	150	27.0	WIP12	3"	0.57	-	-	
01:20	1.3	10	180	28.0	-	-	-	CPT07	1.18	
01:35	1.3	10	180	29.5	-	-	-	CPT08	0.16	
01:50	1.8	10	30	30.0	WIP13	3"	0.13	-	-	
02:20	1.8	10	80	30.5	WIP14	3"	0.12	-	-	
02:32	1.8	10	80	31.0	-	-	-	CPT09	0.13	
03:00	1.8	10	80	31.5	-	-	-	CPT10	0.14	
03:15	1.8	10	80	32.0	-	-	-	CPT11	0.14	
03:24	1.8	10	20	32.5	WIP15	3"	0.15	-	-	
03:35	1.8	10	20	33.0	WIP16	3"	0.15	-	-	
03:45	1.8	10	20	33.5	-	-	-	CPT12	0.28	
03:55	1.8	10	20	34.0	-	-	-	CPT13	0.11	
04:10	1.8	10	20	34.5	-	-	-	CPT14	0.15	
04:25	1.8	10	20	35.0	WIP17	3"	0.15	-	-	
04:40	1.8	10	150	35.5	WIP18	3"	0.27	-	-	
04:50	1.8	10	20	36.0	-	-	-	CPT15	1.41	
05:10	1.8	10	20	37.5	-	-	-	CPT16	0.20	
05:20	1.8	10	20	38.0	-	-	-	CPT17	0.08	
05:55	1.8	10	20	38.5	WIP19	3"	0.15	-	-	
06:20	1.8	10	20	39.0	WIP20	3"	0.15	-	-	
06:30	1.8	10	20	39.5	-	-	-	CPT18	0.09	
06:50	1.8	10	20	40.0	-	-	-	CPT19	0.09	
07:05	1.8	10	20	40.5	-	-	-	CPT20	0.20	
07:20	1.8	10	20	41.0	WIP21	3"	0.2	-	-	
07:35	1.8	10	20	41.5	WIP22	3"	0.13	-	-	
07:45	1.8	10	20	42.0	-	-	-	CPT21	0.15	
08:00	1.8	10	20	42.5	-	-	-	CPT22	0.17	
08:20	1.8	10	20	43.0	-	-	-	CPT23	0.11	
08:35	1.8	10	20	43.5	WIP23	3"	0.16	-	-	
08:50	1.8	10	20	44.0	WIP24	3"	0.2	-	-	
09:05	1.8	10	20	44.5	-	-	-	CPT24	0.04	
09:15	1.8	10	20	45.0	WIP25	3"	0.1	-	-	

DRILL LOGS
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION
BH_17

Fugro Saltire

ROV Survey, Construction Support and Intervention Vessel



Delivered in 2008, the *Fugro Saltire* is Fugro's latest, purpose built ROV support vessel, that has been specifically designed to address the latest demands of the deep water Remote Intervention, Construction & Survey markets.

The DNV +1A1 class vessel is equipped with a 150T knuckle-boom crane with active heave compensation, capable of operating to 3000m, plus a separate 10T auxiliary subsea crane.

With two Work Class ROV systems located within the central hanger area, the full extent of the 1,000m² main deck can be made available for the exclusive use of the Client. A working moonpool measuring 7.2 x 7.2m is situated immediately aft of the hanger area.

The full reach of the 46m x 22m timbered main deck is designed for deck loading of 10T/m² and offers our Clients the flexibility to both carry extensive deck cargos and to provide a platform for the deployment of substantial subsea loads using the 150T main crane.

The DP2 vessel features a Simrad SDP21 system interfaced to the Fugro Seastar DGPS, two Simrad HiPAP500 USBL acoustic systems, Seapath 200 and a Fanbeam laser system.

Dual Fugro FCV3000 150HP work-class ROV systems are deployed from the integrated ROV hangar via hydraulically operated doors on either side of the vessel, and purpose-built Launch & Recovery Systems (LARS) designed to minimise the effects of vessel motion. Work Class ROV deployment and recovery is controlled from a central area in the hangar.

This exceptionally well-appointed vessel has been designed to provide optimum working conditions and one of its key features is the co-location of all main internal work-spaces within one large area. The central control room houses control consoles for the two Work Class ROV systems with space for a third ROV console. This area also provides ample space for on-line survey/navigation and observation desks for clients and/or subsea ROT operators. Four offices and off-line processing are located adjacent to the main control room.

With additional dedicated 500KVA power, fuel, water and air supply points around the deck, the facilities are in place to support a wide variety of Client's construction, intervention, maintenance and pipeline support spreads.

The ample under-deck capacity allows future capacity upgrades such as additional tanks for pipeline commissioning fluids and chemicals.

Angola
Argentina
Australia
Azerbaijan
Belgium
Bermuda
Brazil
Brunei
Canada
China
Congo
Denmark
Egypt
France
Gabon
Germany
Ghana
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kuwait
Lebanon
Luxembourg
Malaysia
Mexico
Netherlands
Netherlands Antilles
Norway
Nigeria
Oman
Pakistan
Philippines
Poland
Qatar
Russia
Saudi Arabia
Singapore
South Africa
Spain
Switzerland
Thailand
Trinidad & Tobago
Turkmenistan
United Arab Emirates
United Kingdom
United States
Venezuela
Vietnam

Fugro Saltire

ROV Survey and Construction Support Vessel

NAME	M/V Fugro Saltire	POR	Bergen, Norway
CLASSIFICATION	DNV +1A1, E0, Dynpos AUTR, Comfort V(3) - C(3), Clean, HELDK-SH, Dk(+), SF, ICE C	GRT / NRT	9603 T / 2,881T
OWNER	E. Forland AS	CALL SIGN	LAYM
BUILDER	BMV A/S, Delivery May 2008	IMO	9377016
FLAG	Norway	MMSI	258401000

Dimensions		Helideck		Accommodation	
LOA / LBP	111.00m; LBP 100.20m	Type Sikorsky S61 D-Value : 24 (24m Diameter); Max. landing load : 12,800kg;		Total complement	105 persons
Breadth	24.0 m			Cabins	37 x Single ; 34 x Double
Draft	7.50m (maximum)			Hospital	Medical treatment room & rest room
Tonnage	Gross: 9603, Net: 2881			Offices	Online survey room - 12m x 12m Offline survey room - 7m x 12m 3 x Client office - 15m² Conference room Auditorium/ Cinema – 54 seats Gymnasium / Sauna Lounge areas
Freeboard	2.10m			Recreation	
Machinery		Capacities		WROV Systems	
Main Power Plant	4 x Rolls Royce Bergen Diesel each driving Marelli Generators	Fresh water	472m³	Type & Quantity	2 x FCV3000 150HP ROV systems
Total Power	15,750 kW / 16.800 kVA, 60Hz	Water maker	2 x WF generators, 25T/day each	Deployment Locations	1 x Port side, 1 x Starboard side, via doors in enclosed Hangar Area
Auxiliary	1 x Mitsubishi/Stamford , 685kVA	Ballast water	2,291m³	TMS	9.3 Te SWL, 600m tether capacity
Main Propulsion	Diesel-Electric : 2 x ducted CPP main propellers with variable frequency electric drive, 4200kW each	Marine Diesel oil	2,943m³	System Depth rating	3,000msw
Bow thrusters	2 x Tunnel; Super Silent, Variable Pitch, 2000kW electric AC drive 1 x Retractable Azimuth, variable pitch	Lube oil	185,7m³	LARS	2 x <i>Hydramarine</i> , SS6 rated (DF=3) Telescoping A-frame, 15T SWL
Stern thrusters	1400kW electric AC drive 2 x Tunnel Pitch controlled 1400kW electric AC drive	Chemical Tanks	Space available for tank capacity up to 250m³	Lift Umbilical winch	2 x Active Heave Comp, 2.0 m/s High Speed (0-100m/min) : 15T LP 4000m capacity, 3500m fitted
Speed	Service 16 knots	Control and Navigation		Vehicle Dimensions	3m x 1.7m x 1.7m
Endurance	60 days	DP system	<i>Simrad</i> SDP21	Vehicle HPU Power	150HP
Deck & Machinery		DP references	Dual DGPS; 2 x HiPAP500 <i>Fanbeam</i> <i>Seapath</i> 200	Vehicle Payload	400kg
Deck area	1030m² Free timbered area 960m	Gyrocompass	3x <i>SGB Meridian</i> Gyrocompass	Tooling Skid Capacity	Max 3,000kg
Deck loading	10T/m²	VRU	2 x Kongsberg MRU	Manipulators	2 x <i>Schilling Titan</i> 4 master-slave 2 x <i>Schilling Rigmaster</i>
Deck crane	Hydramarine AHC 150Te @ 10m; 75Te @ 20m ; 25Te@35m Main Lift Wire: 3000m x Ø70mm, Whip Line (Aux Winch) : 10Te @ 36m ; Hook Travel : 450m	Radars	1 x 10cm ARPA radar 1 x 3cm ARPA radar	Cameras	8 x Video channels per system
Auxiliary crane	Hydramarine 10Te @ 15m ; Hook Travel : 1000m	Echosounder	1 x <i>Kongsberg Simrad</i> EA 600 1 x <i>Furuno</i> FE 700 2 x <i>Furuno GP150</i> <i>Fugro Seastar</i> DGPS receiver 1 x <i>Furuno</i> DS80	Sonar	<i>Kongsberg</i> 675kHz Digital head
Capstans	4 x Mooring capstans on aft deck	GPS		Heading/Attitude	<i>Ixsea OCTANS</i> 3
Moonpool	7.2m x 7.2m located on aft deck	DGPS		Depth	DigiQuartz 8CB4000-I
		Speed log		OBSROV Systems	
		Communications		Type & Quantity	1 x Seaeye Lynx (optional)
		Satellite	Dual KU-Band / C-Band systems 128Mbit/s, Max Capacity 1Mbit/s <i>Furuno</i> FS 2570 <i>Furuno</i> FM 8800S / FM 2721	TMS	Seaeeye Type # garage style 200m Tether capacity
		MF/HF		System Depth rating	1500msw
		VHF			
		Safety			
		Lifeboats	2 x Eide Marine Tech A/S		
		Liferafts	6 X 40per		
		MOB boat	1 x Stromme FRC 750, Waterjet 212HP		

Fugro-Rovtech Ltd

Fugro House, Denmore Road, Bridge Of Don, Aberdeen, AB23 8JW

Tel: +44 (0) 1224 257600

Fax: +44 (0) 1224 853912

www.fugro.com



NO OTHER COMPANY CAN PROVIDE THE SAME COMPREHENSIVE RANGE OF GEOTECHNICAL, SURVEY AND GEOSCIENCE SERVICES

R100 Marine Drill Specification

Derrick / Hoist System:

Type: Twin hydraulic cylinders 8.7 m stroke driving via wire rope system with 2:1 velocity ratio
 Travel: 17.2 m
 Load capacity: 100 tonnes on hoist wires

Hoist System Power Unit:

Type: Electro-hydraulic, 4 x axial piston pump units each limited to 75 kW / 50Hz; 90 kW / 60 Hz

Installed power: 373 kW @ 50 Hz
 435 kW @ 60 Hz

Max. output flow: 4 x 455 litres / min. @ 50 Hz
 4 x 380 litres / min. @ 60 Hz

Max. output pressure: 320 bar

Heave compensator:

Type: Air / oil passive compensator driving through hoist cylinders
 Travel: 5.0 m
 Load capacity: 80 tonnes

Slingshot Valve:

Type: Olmsted flow shut-off type, fully automatic with manual compensator lock facility

Drill System Power Units:

Type: Diesel hydraulic
 Installed power: 149 kW
 Output: 6 x 70 litres / min. @ 210 bar

Sampling System:

Heave compensated free-fall sample winch; heave compensated piggy-back coring drill; full support equipment for third party geotechnical equipment.

Pipe Handling System:

Varco break-out unit with deployment system
 Slips bowl & power slips
 Pipe racking with pipe handling crane & kick-out system

Seabed Template:

Dimensions: 3.5 m x 3.5 m x 2.0 m
 Weight: 20 tonnes

Mud System:

Type: GD-FXDX + 2 x CAT 6020
 Pump capacity: 450 litres / min. @ 70 bar
 Tank capacities: 2 x 5.0 cu.m
 Mud mix: Re-circulating colloidal mixer



R100 Marine Drill mobilised on board "Kingfisher" for the Gibraltar Strait Crossing project



Seaclam MK II

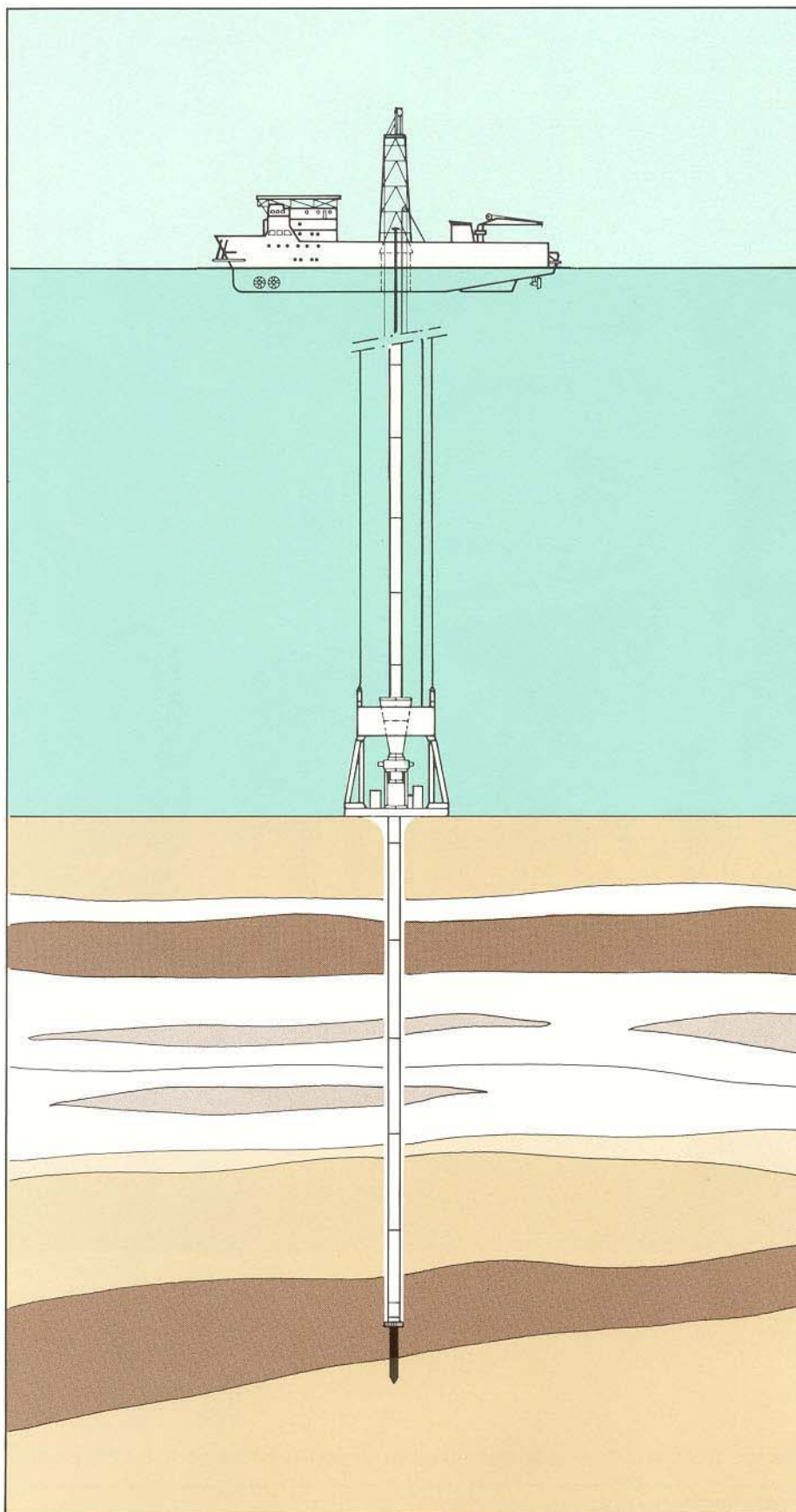


Offshore geotechnical borings are generally drilled without the use of a riser and consequently the unsupported drillstring provides only limited reaction for downhole operations such as push sampling and cone testing. To obtain better horizontal and vertical control over the drillstring, the SEACLAM was developed by Fugro and has been in use since 1981.

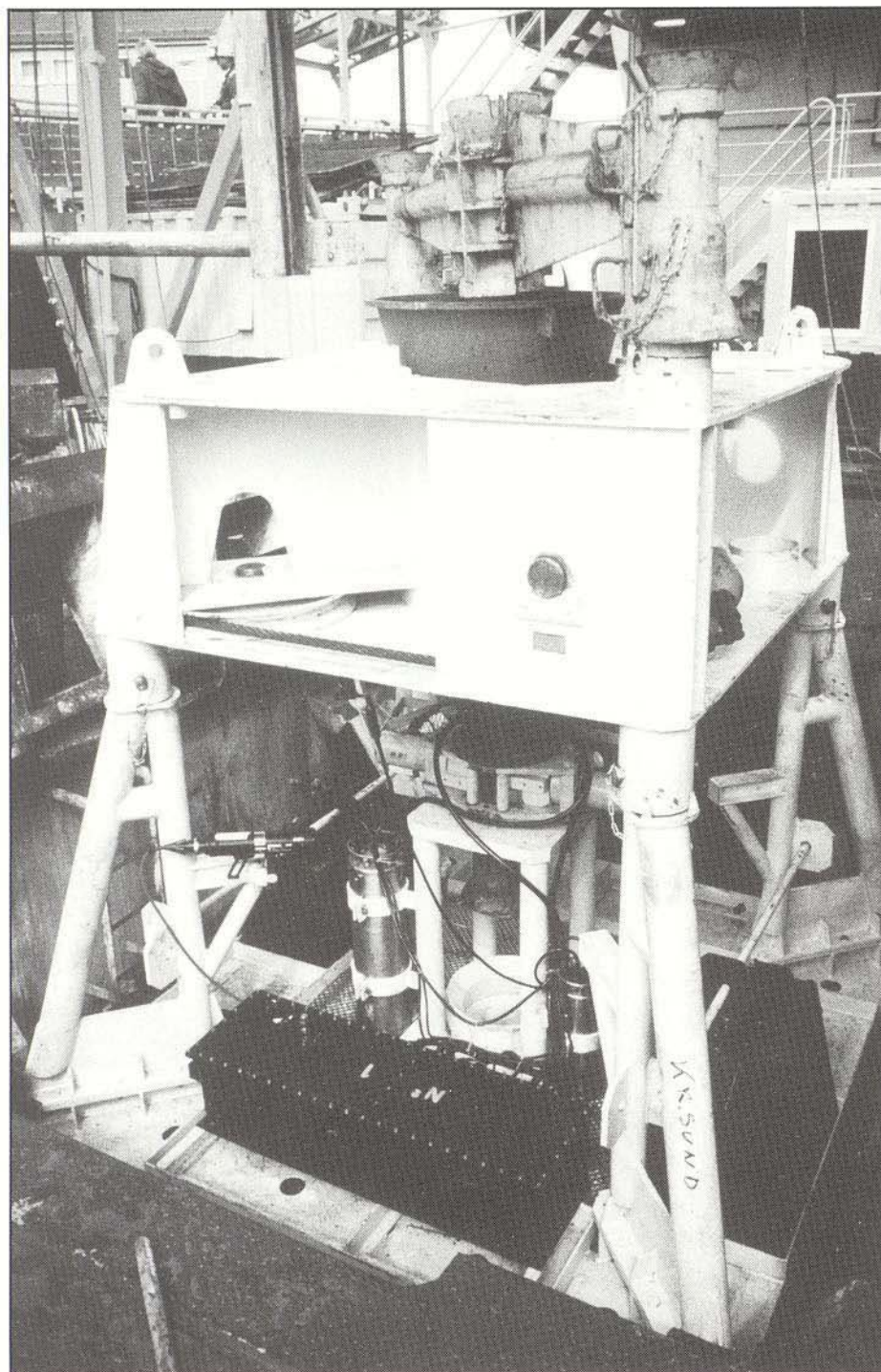
The SEACLAM consists of a frame which rests on the seabed during drilling operations and serves as a re-entry base. It clamps the drillstring by a hydraulically operated pipeclamp, to stabilise the string vertically and to increase the reaction during downhole testing and sampling (both operations can be performed from mudline to the final borehole depth).

With the increasing water depths in which geotechnical investigations are required and the need to equip the SEACLAM with various sensors including underwater TV equipment, Fugro has developed its Mk II version of the SEACLAM system.

The SEACLAM Mk II is equipped with a subsea powerpack system to operate the hydraulic pipeclamp. Moreover, it features two way tilt meters and a water pressure sensor. Also sensors for water temperature and water current measurement can be accommodated in the system. Spare capacity is available to connect optional equipment such as sophisticated water level recording systems. An optional underwater TV system with light to observe seabed operations is also available. One single umbilical to transmit all signals including the TV signal and the required electrical power is used in order to minimise entangling problems with the drillstring. Communication with the SEACLAM is taken care of by a mini-computer system located in the control cabin. This allows the measured data such as the water pressure, water temperature or current to be stored on floppy disk. Whilst in operation all sensors on the frame can be monitored continuously. Intelligent systems on the frame, monitor the communication continuously and in the event that communication is lost for any reason, the pipeclamp, if in closed position, is automatically opened. This allows the frame to be hoisted back to the moonpool for checking without the necessity to pull back the drillstring.



Offshore drilling and testing system using the SEACLAM at seabed



The SEACLAM Mk II frame fits the moon-pool of all the specialised 'North Sea' type drilling vessels. The clamp can grip any diameter drillpipe between 115 mm (4.5") and 250 mm (10") and can withstand an upward or downward force of 200 kN. With the weight of the drillstring, it provides ample reaction for downhole operations. It also cancels out load variations in heave compensators that might otherwise hamper in situ testing. The SEACLAM Mk II frame can easily be converted into a complete SEACALF of WHEELDRIVE SEACALF on-board the vessel. It can then perform cone penetration tests from mudline.

TECHNICAL DATA

Maximum working water depth

- : 650 m

Maximum reaction

- : 200 kN

Approximate rig dimensions

- frame : □ 3 m
- height : 3.4 m
- weight : 60 kN
- ballast : 0-200 kN

The specification of the equipment in this data sheet may be subject to modifications without prior notice.

Fugro Engineers B.V.

10, Veurse Achterweg, P.O. Box 250, 2260 AG Leidschendam, The Netherlands.

Phone: 31-70-3111444 – Telefax: 31-70-3203640 – Telex: 31010 fugro nl.

Fugro Engineers B.V. is a member of the Fugro Group, with offices throughout the world.

Offshore drilling and sampling

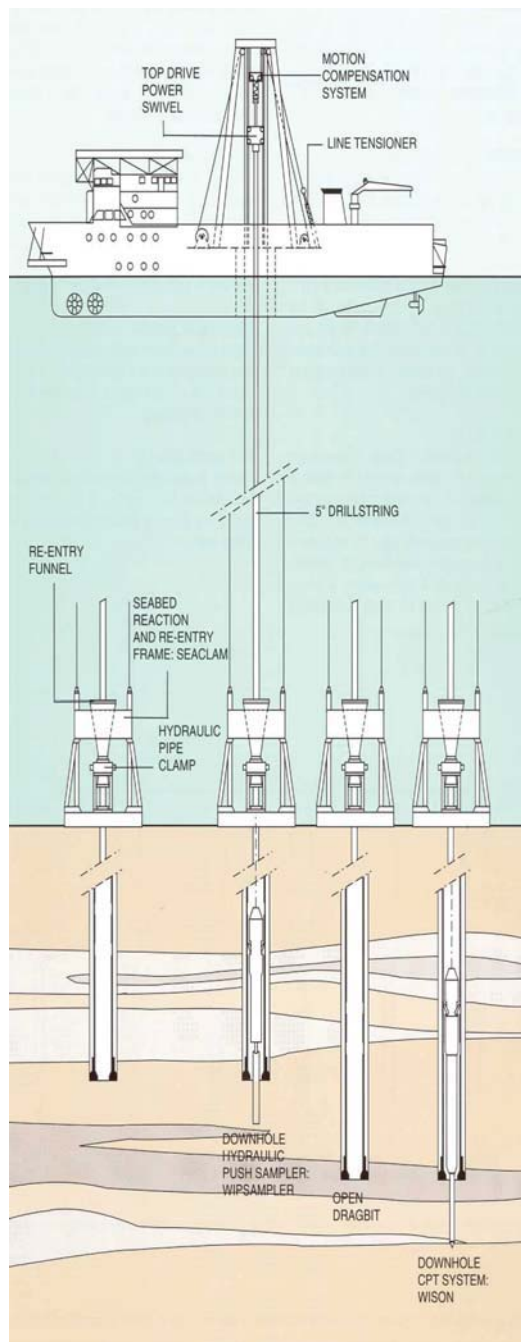


Figure 1: Schematic diagram of the operational procedures for drilling, push sampling and in-situ testing using a cone penetrometer

The geotechnical investigation of offshore sites is generally performed by drilling boreholes for sampling and in-situ testing, see Figure 1. The drilling method is based on open hole rotary drilling without mud returning to the vessel. The borehole is advanced by rotating a 5 inch drill string with an open dragbit.

Since the start of site investigations in the North Sea, Fugro has been using downhole tools for sampling and in-situ testing in boreholes. Extensive use of these tools began in the early seventies and since then has been continuously expanded to keep pace with the design requirements for larger and more complex structures. Equipment is now available for high quality push and piston sampling, cone penetration tests (CPTU), vane shear tests, hydraulic fracture tests (HFT), pressuremeter and numerous other tests, some of which are described in more detail below. All of these testing tools can at present be deployed to a depth of 650 metres below the sea surface and are designed to operate to 1500 metres.

Operational Methods

Fugro performs sampling and testing from the bottom of a vertically-stabilised drill string. This provides optimum protection against buckling of tools and drill string. It also makes it possible to accurately control and monitor the penetration of the sampling tube or sensor into the soil below the bottom of the borehole. Most of the equipment utilises a hydraulic jacking system that is operated downhole via an electrohydraulic umbilical cable, which allows the measured data to be displayed at the surface as the test proceeds. Downhole instrumentation is available to check tool position, proper latch-in, total applied thrust and penetration of sensor or sampling tube into the soil. Digital data transmission is used with this equipment.

The reaction force required to enable sampling tubes or test probes to be pushed into the soil is provided by the weight of the drill string and the SEACLAM. Fugro has developed the SEACLAM to provide up to 90 kN of additional reaction and to eliminate vertical movement. The SEACLAM is a seabed guide base incorporating a hydraulic pipeclamp for gripping the drill string.



WIPSAMPLER

(1)

Fugro-s downhole push sampler is capable of obtaining 50, 61 or 72 mm diameter samples up to 900 mm in length. A range of sample tubes is available for different soil conditions.

PISTON SAMPLER (2)

This sampler is similar to the WIPSAMPLER but incorporates a fixed piston to improve sample quality and recovery in soft soils.

AMBIENT PRESSURE SAMPLER (3)

This sampler is an adaptation of the WIPSAMPLER that allows a 65 cm³ sample to be recovered and maintained at ambient pressure. A conventional sample is also taken.

WISON (4+5)

Fugro-s downhole Cone Penetration Test system, which is used to push a wide variety of cone penetrometers into the soil, is called the WISON. Other types of sensors may also be employed with this system. The Mark III version has a stroke of 3 metres and a thrust capacity of 90 kN for cone penetration testing.

IN-SITU VANE (6)

The Fugro vane shear tool measures shear strength in-situ. The IN-SITU VANE allows 1.5 metres of penetration below the drill bit. A variety of vane blade sizes are available for use.

Permeameter (7)

This tool allows the measurement of permeability in-situ in clay soils with permeability of 10⁻⁹ to 10⁻¹² m/s. Variable head tests can be performed over the test section of 1 m. The PERMEAMETER is combined with a piezo-cone.

Dilatometer Jack (8)

Fugro's downhole jack enables downhole deployment of a dilatometer. It also makes use of the Fugro's downhole data monitoring system.

BAT Probe Jack (9)

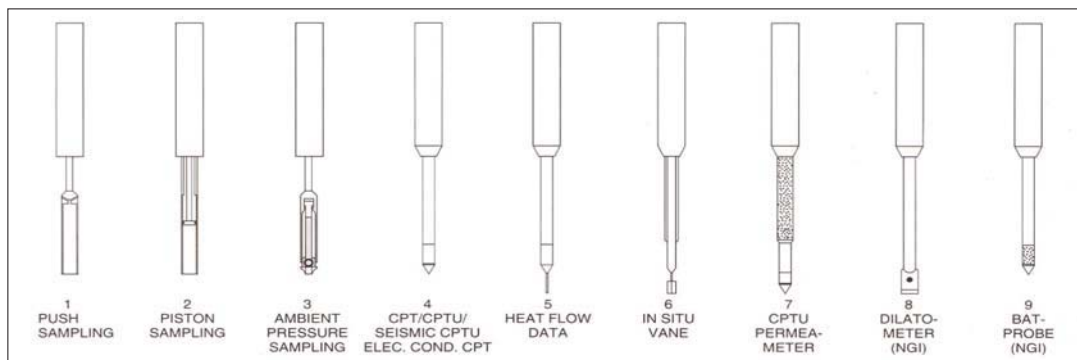
Fugro-s downhole jack enables deployment of the BAT probe. It also makes use of the Fugro's downhole data monitoring system.

Pressuremeter Jack

Fugro-s downhole jack may be used to push a pressuremeter into the soil. The Fugro downhole data monitoring system is used when pressuremeter tests are performed.

Hydraulic Fracture Test

This test, which is used to determine the hydraulic fracture pressure of a formation, can be performed in-situ using the Fugro DRILL STRING ANCHOR with a downhole or surface monitoring system, or with the DOWNHOLE HFT system. This system is based on the WISON and uses a piezo-cone to create a test cavity of 0.5 or 1.0 m length which is sealed at



©Fugro April 2005. This document includes technical information. Reasonable effort has been made to verify its correctness at the time of compilation but details may change with the passage of time and without prior notice. Fugro does not accept any liability for loss or damage of any kind arising from use of the information.

Fugro NV

10 Veurse Achterweg
PO Box 41
2260 AA Leidschendam
The Netherlands

www.fugro.com

For more info: brochure@fugro.com

WISON[®] Mk III



WISON[®] Mk III in operation

The WISON[®] Mk III Cone Penetration Test (CPT) System enables in-situ soil properties to be measured from the base of a borehole either offshore or on land. Tests can be performed at any depth down to 650 m below drill floor level if the depth limitations of the drilling system permit. The tests can be performed consecutively or intermittently throughout the borehole providing a continuous or semi-continuous profile of measured parameters.

EQUIPMENT

The WISON[®] consists of a wireline downhole jacking unit with a 3 metre stroke and a thrust capacity of 90 kN.

TESTING PROCEDURES

The WISON[®] is normally used in conjunction with a straight flush rotary drilling system and open bit. After the borehole has been advanced to the required test level it is cleaned by mud flushing and if there is a centre plug in the bit it is retrieved. The WISON[®] is lowered by its electro-hydraulic umbilical to the bit, where it seats and latches under its own weight.

The test sequence is then activated from a surface control cabin and the cone penetrometer is hydraulically pushed into the soil at a constant rate of 20 mm/s. Throughout the test the measurements of cone resistance, sleeve friction and pore pressure, if measured, are displayed graphically in the control cabin. These data are simultaneously recorded by computer on disk. This facilitates detailed data processing, interpretation and presentation both offshore and onshore.

Upon reaching the maximum achievable stroke of 3 m, or the limiting thrust capacity of 90 kN, the test is terminated and the system depressurised. The drill string is lifted to retract the test rod and the WISON[®] unit is retrieved; the complete operation having taken 10 to 15 minutes.

REACTION FORCE

During the test sufficient reaction force is required to balance the penetration thrust. If this is not available from the drill string alone the system may be used in conjunction with the Fugro SEACLAM seabed reaction frame.

TEST INTERPRETATION

With the aid of empirical correlations the cone measurements can be used to estimate soil type, relative density and angle of internal friction of granular soils and undrained shear strength of cohesive soils as well as other factors such as stress history.

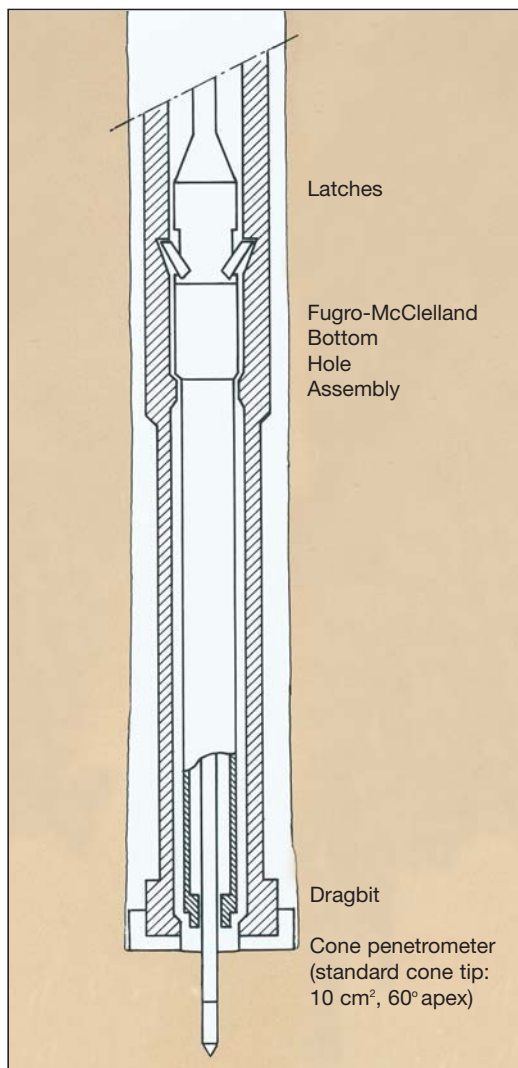
EXPERIENCE

Since its debut in 1973 some 37,000 tests have been performed throughout the world with the WISON[®] system.



CONE PENETROMETER SELECTION

To cope with the wide variety of soil and soft rock types that can be encountered, a range of cones of varying size, capacity and function have been developed. A list of the different cone types currently available is given below.



WISON® Mk III

EQUIPMENT SPECIFICATION:

Design depth below drill floor : 1500 m
 Max. depth below drill floor : 650 m
 (based on maximum umbilical length currently available)
 Maximum thrust : 90 kN
 Penetrometer sensors :
 • sleeve cone
 • temperature
 • piezo-cone
 • shear wave and compression wave velocity
 • ball penetrometer
 • electrical conductivity
 • heat flow
 Natural gamma
 Cone base area: 500 and 1000 mm²



WISON® before lowering it down the drillstring

WISON® is a registered trademark of Fugro NV. © Fugro April 2005. This document includes technical information. Reasonable effort has been made to verify its correctness at the time of compilation but details may change with the passage of time and without prior notice. Fugro does not accept any liability for loss or damage of any kind arising from use of the information.

Fugro NV

10 Veurse Achterweg
 PO Box 41
 2260 AA Leidschendam
 The Netherlands

www.fugro.com

For more info: brochure@fugro.com

Wipsampler

The wireline push sampling equipment - WIPSAMPLER - has been developed by Fugro to obtain high quality push samples either offshore or on land. The advantage of this system is that it enables samples to be obtained from the bottom of a boring at any level down to depths of 650 m below drillfloor. Over the last 10 years alone some 17,500 samples have been obtained using the equipment.

EQUIPMENT

The WIPSAMPLER consists of a down-hole jacking unit to which 1 m long thin walled sample tubes of either 51 mm or 76 mm diameter are attached. Thus longer samples of a higher quality are obtained than by means of conventional techniques. The technique has been used successfully to obtain samples in a variety of soils ranging from soft to very hard clay to medium dense/dense sands and soft rocks.

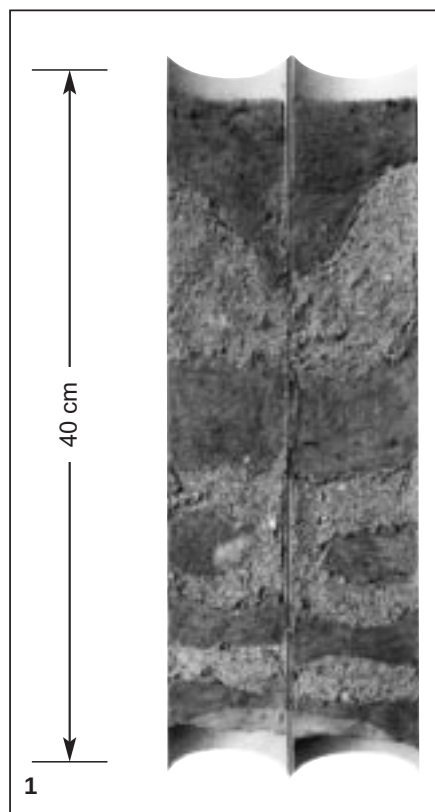
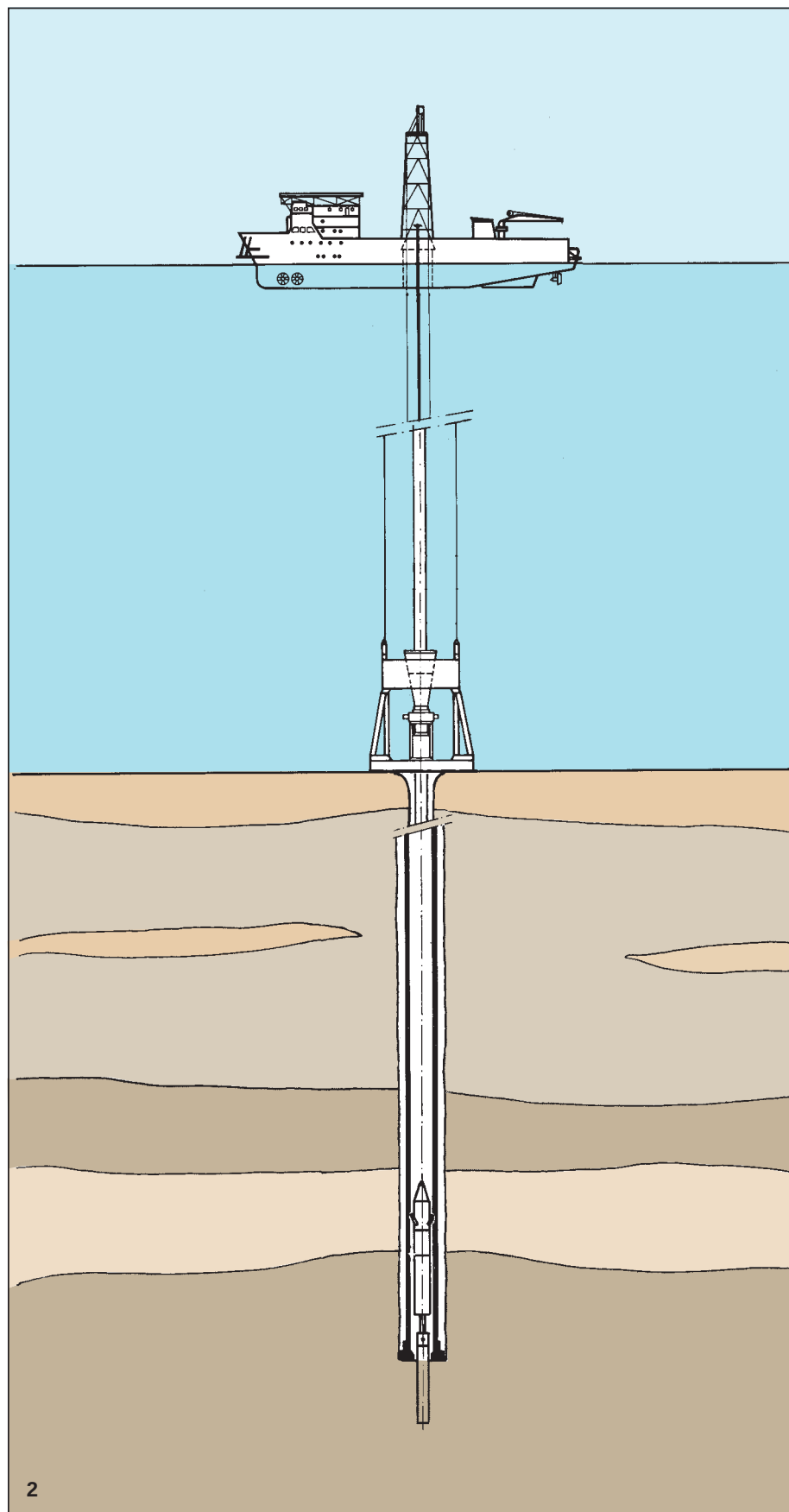


Fig. 1 - Undisturbed sample of interbedded sand and clay obtained with the WIPSAMPLER

Fig. 2 WIPSAMPLER with SEACLAM



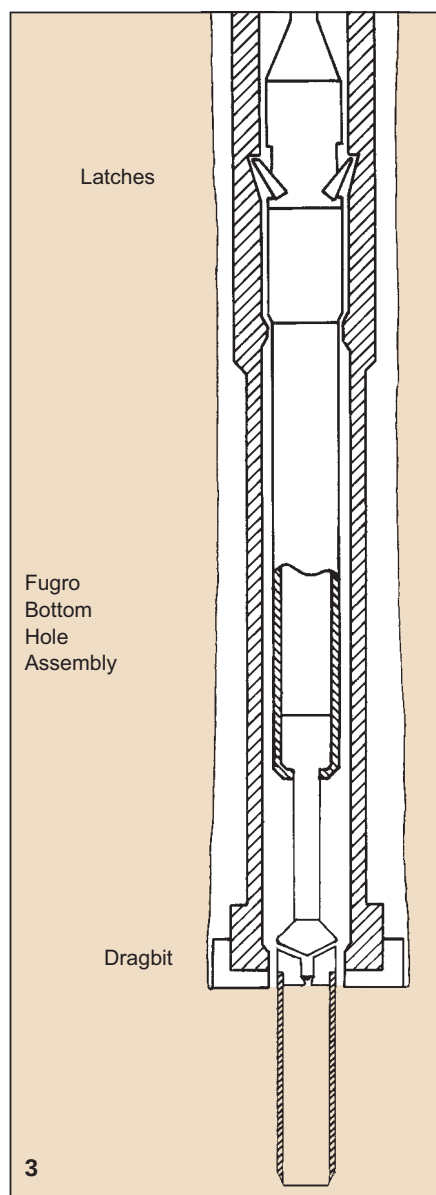
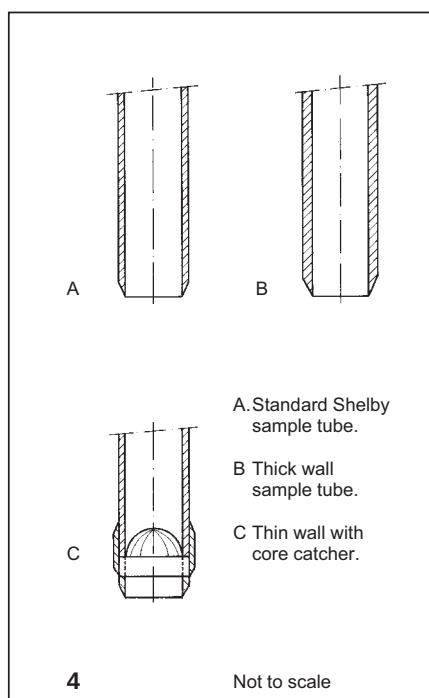


Fig. 3 - WIPSAMPLER

Fig. 4 - Range of sample tubes.



SAMPLING PROCEDURES

The WIPSAMPLER unit is lowered down the inside of the drillstring attached to an umbilical cable. Upon reaching the drill-bit it latches automatically into a seating sub assembly. The internal hydraulic piston then forces the sample tube into the soil at a constant rate of penetration. Tube penetration and the thrust applied are recorded on the surface control data acquisition unit. The system has a thrust capacity of 80 kN and utilises the drill-string as a reaction force, if necessary the available reaction from the drillstring can be increased using other items of equipment such as the SEACLAM seabed reaction frame and/or Drillstring Anchor packer system. See relevant data sheets.

The samples are thus obtained from a vertically stabilised drillstring. After each test the WIPSAMPLER is withdrawn and drilling operations are resumed. Typically, one test takes about 10-15 minutes. Upon retrieval of the equipment the sample tube is removed and the sample extruded from the examination and testing or sealed for later testing onshore.

SELECTION OF TUBES

In addition to the requirement of the WIPSAMPLER to obtain good quality push samples, considerable attention has been directed to the design of a range of sample tubes. These have been developed in order to further improve sample quality and to cope with the variety of soils typically encountered in offshore soil investigations. It is Fugro practice to use specially prepared Shelby tubes in association with tube quality control between successive samples for taking undisturbed samples in "normal" soils. However, for situations where standard Shelby tubes are unsuitable i.e. where sample handling requires a liner or in the presence of cemented bands, special sample tubes are required.

For use in overconsolidated clays and dense sands special tubes incorporating cutting shoes with/without a core catcher are used. Special thick walled tubes have been designed for use in hard clays, soft or well cemented sands.

SPECIAL FEATURES

A special WIPSAMPLER is available that can be used in combination with our Christensen Marine Wireline core barrel. The Mk II version of this barrel as used by Fugro has been adapted to allow deployment of our range of proprietary downhole tools. With this special WIPSAMPLER samples up to 2.5 inch (60 mm) can be taken.

EQUIPMENT SPECIFICATIONS

Design depth below drillfloor :	1500 m
Max. depth below drillfloor :	650 m
(based on maximum umbilical length currently available)	
Maximum thrust :	80 kN
Sample diameter :	46-72 mm
Sample length :	900 mm

SAMPLE TUBE SPECIFICATIONS

Tube length:	1000 mm
76 mm O.D., 2.0 mm W.T.	
76 mm O.D., 4.5 mm W.T.	
76 mm O.D., 2.0 mm W.T. with core catcher	
50 mm O.D., 2.0 mm W.T.	

The specification of the equipment in this data sheet may be subject to modifications without prior notice.

Fugro Engineers B.V.

10, Veurse Achterweg, P.O. Box 250, 2260 AG Leidschendam, The Netherlands.

Phone: 31-70-3111444 – Telefax: 31-70-3203640 – Telex: 31010 fugro nl.

Fugro Engineers B.V. is a member of the Fugro Group, with offices throughout the world.

PIEZO-CONE PENETROMETER

INTRODUCTION

The piezo-cone penetrometer is an electrical measuring instrument for Piezo-Cone Penetration Tests (CPTUs). The measurands are cone resistance (q_c), sleeve friction (f_s), pore pressure (u). Figure 1 presents the layout of a 1,000 mm² (10 cm²) piezo-cone penetrometer with the filter positioned in the face of the cone. Piezo-cone penetration tests involve the in-situ measurement of the resistance of ground to continuous penetration at a steady penetration of push rods having a cone at the base. The measurements permit high quality interpretation of the ground conditions. A piezo-cone penetrometer also allows pore pressure dissipation testing.

INSTRUMENT DETAILS

The common Fugro piezo-cone penetrometers have 1,000 mm² and 1,500 mm² cone base areas and a single filter position. The filter position is either in the face of the cone (face filter) or in the cylindrical extension above the base of the cone. Penetrometers with 100 mm² and 500 mm² cone base areas and penetrometers with double and triple filter positions are also available. The cone and the friction sleeve consist of high-quality steel that is resistant to corrosion and abrasion. The filter consists of either porous HDPE or ceramic material. The sensors for the cone and frictions sleeve consist of load-cell type measuring transducers arranged in series. This arrangement permits a stiff penetrometer design.

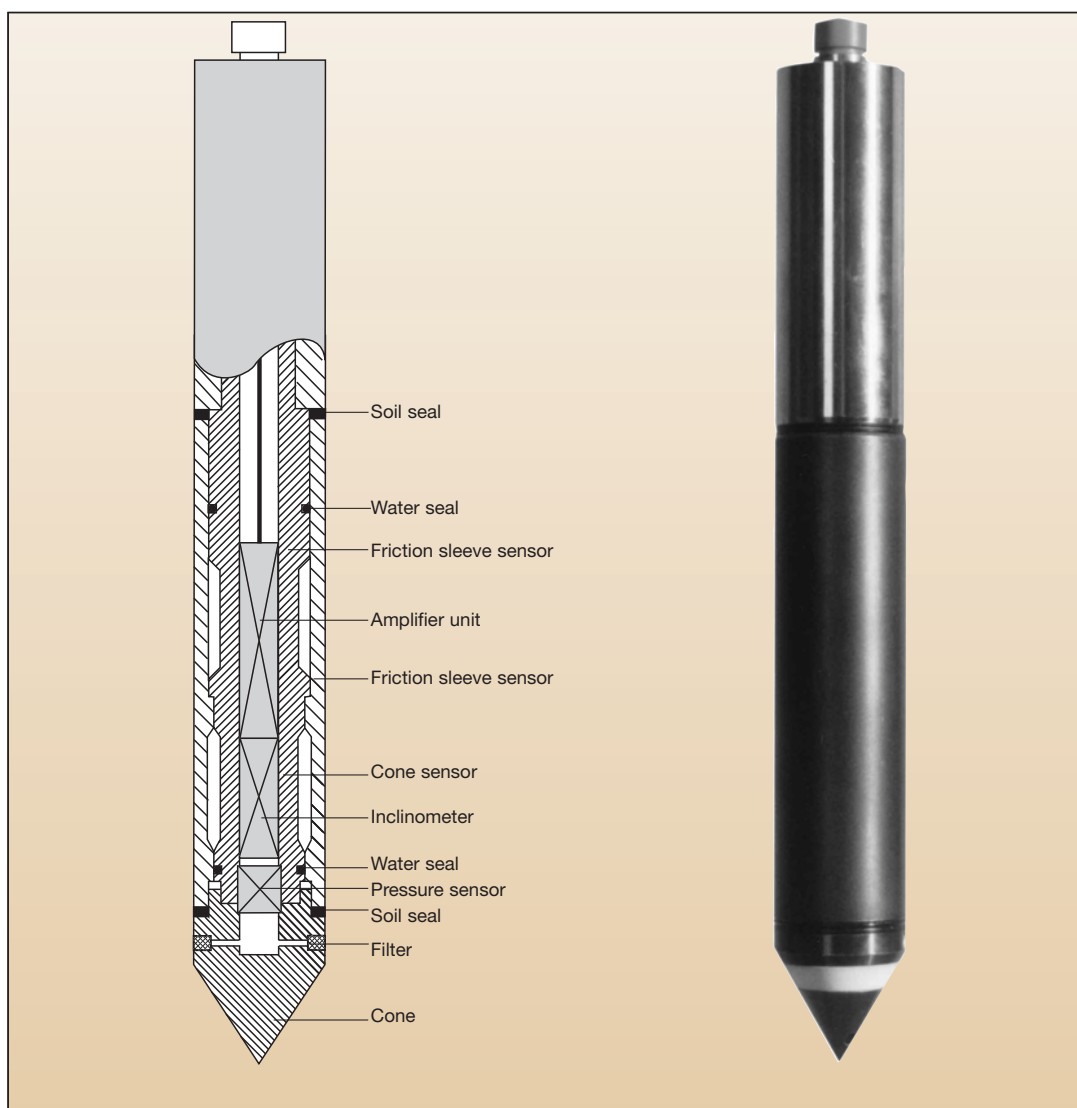


Fig. 1. Fugro Piezo-cone Penetrometer



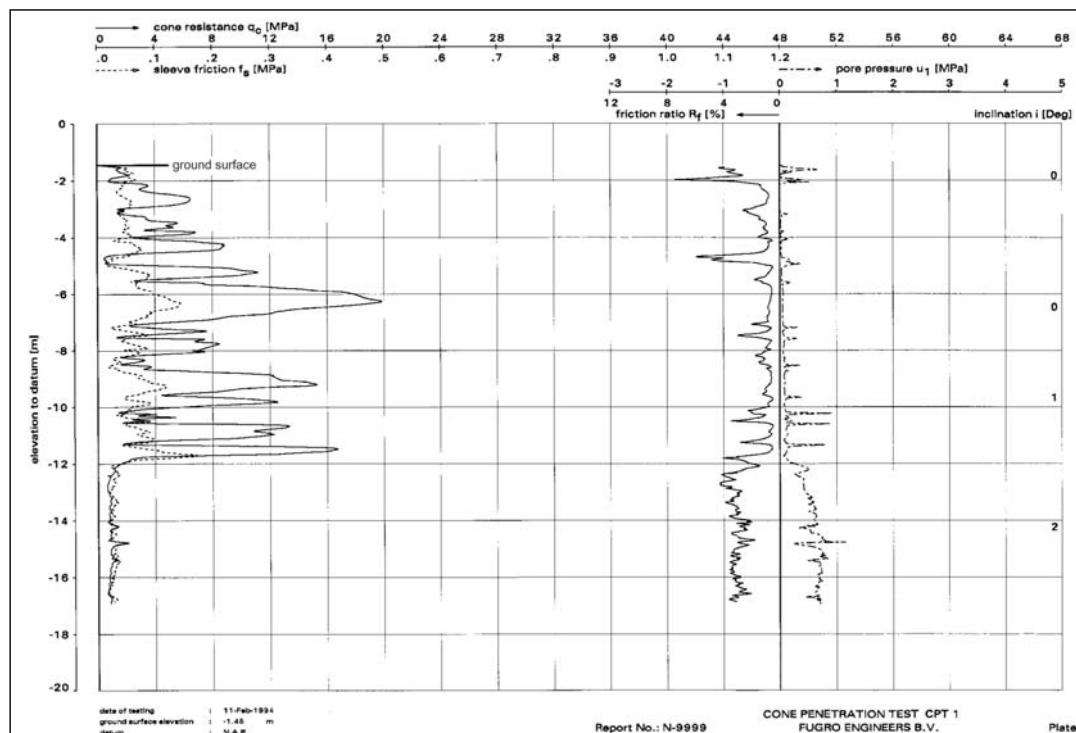


Fig. 2. Results obtained using the piezo-cone penetrometer at an onshore site

Penetrometer stiffness promotes the resistance to bending and relative movements of the various components, and hence the in-situ accuracy. The pore pressure sensor is of the piezo-resistive type, requiring a very small volume change for the specified measuring range. The configuration of the filter, the internal connections and the pressure sensor facilitates practical and efficient saturation. An internal amplifier unit enhances the analogue signal-to-noise ratios of the sensors. This promotes high-quality data transmission.

MEASUREMENTS

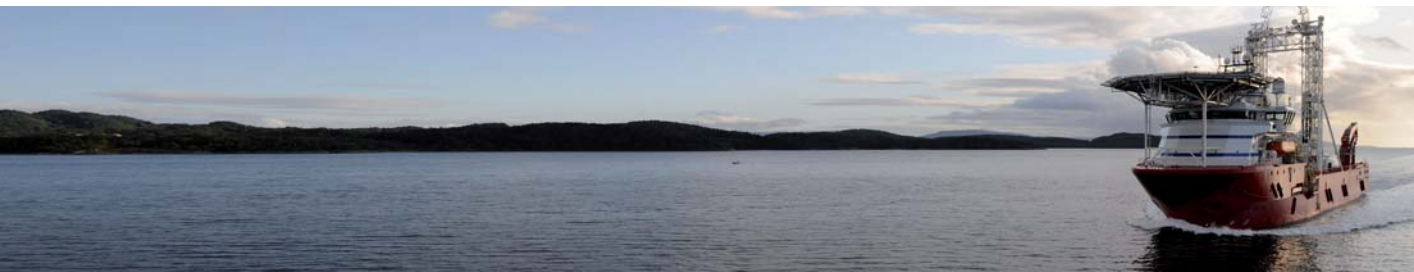
A computer-based data acquisition system provides the link between the electrical output signals of the piezo-cone sensors and the digitally recorded data. Figure 2 presents typical results. The digital data allow rapid processing of the measurements and the derivation of CPTU parameters such as q_t , q_{net} and B_q .

©Fugro March 2005. This document includes technical information. Reasonable effort has been made to verify its correctness at the time of compilation but details may change with the passage of time and without prior notice. Fugro does not accept any liability for loss or damage of any kind arising from use of the information.

Fugro NV
 10 Veurse Achterweg
 PO Box 41
 2260 AA Leidschendam
 The Netherlands
www.fugro.com
 For more info: brochure@fugro.com



Fugro Marine Core Barrel



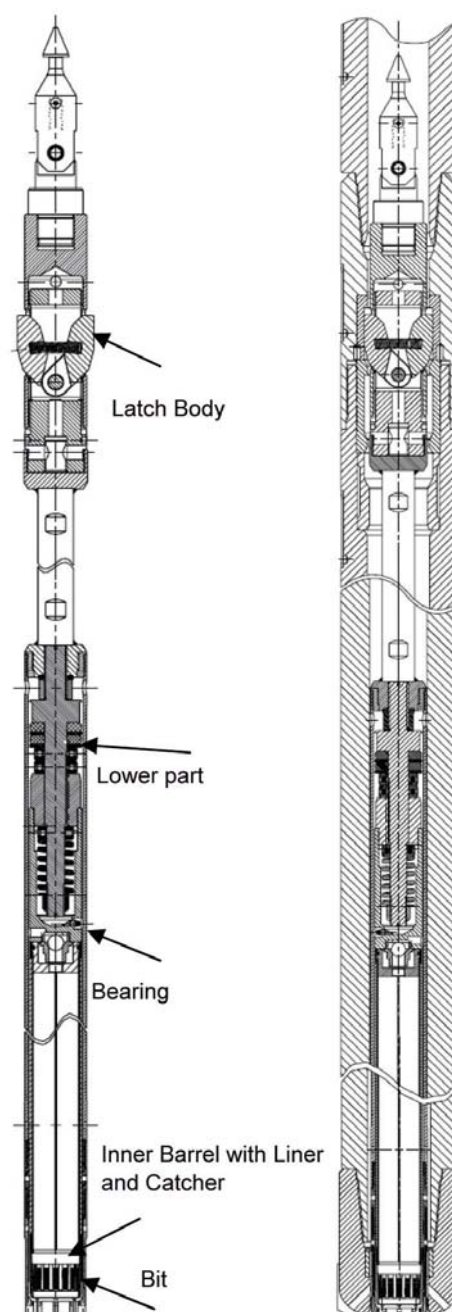
The downhole system to take samples in hard rock formations

The Fugro Marine Core Barrel (FMCB) is a downhole system developed to take samples in hard rock formations. The FMCB is inserted into the drill pipe. The outer barrel rotates together with the drill pipe during the drilling operation, while the inner barrel is stationary with the sediment. The tip of the inner bit is flush with the main bit. A core with a maximum length of 1,5 meters is taken. After the test the FMCB is recovered using an overshot. The FMCB was developed as a replacement for the Christensen core barrel. The FMCB can be used in the WISON MkIII BHA and in the XP BHA which eliminates the need for tripping the pipe to run a separate coring BHA. The Boart Longyear's HQ3 Barrel is used as a base for the FMCB.

The FMCB was developed as a replacement for the Christensen core barrel. The FMCB can be used in the WISON MkIII BHA and in the XP BHA which eliminates the need for tripping the pipe to run a separate coring BHA. The Boart Longyear's HQ3 Barrel is used as a base for the FMCB.

Specifications

Water Depth	: 0-3000 m
System	: Wireline tool
Lifting cable	: 16mm steel cable
Logging cable	: 12mm steel cable
Flush	: Min 150l/min mud flow
Winch Speed	: 60m/min
Weight	: < 60kg
Dimensions	: 3,5m - mkII version, 4,2m XP - FC version
Sort of formation	: Formations from cohesive clay to hard formations like granite.
Penetration rate	: Depending on bottom conditions target is 2 m/hour, Stop criterion is 1m/hour
Sampling system	: Based on Boart, Longyear HQ3 system (triple tube core barrel of which 1 liner)
Sample length	: 1.5 m
Bit	: 3 type PDL, drag bit diameter impregnated
Sample diameter	: 59 mm.



Fugro Marine Core Barrel

Equipment Specifications

Sampling System	- Sampling by wireline core drilling - Outer tube of core barrel rotates together with drill pipe during drilling operation, with tip of coring bit being flush with drilling bit - FMCB recovery by wireline overshoot after completion of core run
Core Barrel	- HQ triple tube 62.5 mm sample diameter 1.5 m maximum core length
Target Ground Type(s)	Stiff to hard clays, cemented soils and rock
Drilling & Coring	- Borehole diameter of about 230 mm - Range of drilling and coring bits - Minimum 150 l/min flow of drilling fluid - Penetration rate of about 2 m/hour, depending on ground conditions
Stop Criterion	Penetration rate of <20 mm/min
Maximum Water Depth	3000 m
Tool Handling	16 mm steel cable - Tool length of 3.5 m (WISON MKIII version) or 4.2 m (XP version) - Tool mass of about 65 kg (no core) and about 75 kg (with 1.5 m core sample)

This document includes technical information. Reasonable effort has been made to verify its correctness at the time of compilation but details may change with the passage of time and without prior notice. Fugro does not accept any liability for loss or damage of any kind arising from use of the information.

Fugro Engineers

Veurse Achterweg 10
 2264 SG, Leidschendam
 The Netherlands
 Telephone : +31 (0) 70 311 1422
 Email : offshoregeotechnical@fugro.com



GENERAL

Type of Vessel:	Multicat type vessel (Eurocarrier 2209)
Builder:	Neptune Marine BV
Build Date, Place:	2007, The Netherlands
Classification	Bureau Veritas I 3/3 Special Service/Multi Purpose - Coastal Area
Certification:	MCA Workboat Code Cat 2 (60 miles) 12 passengers

DIMENSIONS

Length O.A.	22m
Beam O.A.	9m
Depth at Sides	3m
Draft Aft	1.8m

PERFORMANCE

Free Running Speed:	9 knots (approx)
Bollard Pull:	15.0 t (approx)
Deck Carrying Capacity	80t

PROPULSION SYSTEM

Main Engines:	2 x Caterpillar C18
Total Power	1200hp (894Kw)@ 1800 rpm
Marine Transmissions:	2 x Twin Disc MG516 DC 4.52:1
Propulsion:	2 x 1350mm dia 4-blade fixed pitch propellers in Nozzles

AUXILIARY EQUIPMENT

Generator Sets	John Deere 4045TF258 (keel cooled) - 68Kw
	John Deere 4045TF258 (radiator cooled) - 75Kw
Fuel Transfer Pumps	40m3 per hr
Water Transfer Pumps	40m3 per hr
Electrical System:	24v DC and 220v shore supply

DECK EQUIPMENT

Hydraulic Crane:	Heila 120-4SL - 120t/m (with 10t winch and r/c)
Capacity	[9.3t @ 12.11,] inc remote control
Anchor Handling/towing winch:	Hydrauvision 50 tonnes
Tugger winch:	Hydrauvision 10 tonnes
Bow Roller / Stern Roller	820mm dia
Towing Hook	Mampaey
Air Compressor	14 cuft/min
Welding set	TBA
Burning Gear	Oxy Acetylene
Other	Wooden deck protection, 2 push knees

TANK CAPACITIES

Fuel Oil	42.00m3
Fresh Water	57.00m3
Lube Oil	TBA

ACCOMODATION

Wheelhouse with air conditioning seating for crew, large air conditioned galley / day room with sanitary space.
Below deck 2 x 1 person cabins, 1 x 2 person cabin. Large workshop/store, washing machine and dryer.

NAVIGATION AND COMMUNICATION EQUIPMENT

Searchlight	Sunbeam Searchlight 250W
	Kotter type Magnetic Compass / Furuno SC-50 Satellite Compass
Compass	
Radar	Furuno 1505 M111
GPS	Furuno GP-150D
Echo Sounder	Furuno FCV-585
VHF Radio	2 x Sailor RT 5022DSC
Handheld VHF	2 x Tron TR20
Navtex	Dual Channel NX700A
Chart Plotter	PC with Euronav electronic charts
AIS	Comar Class B AIS CSB200
Satellite phone	Sailor Iridium SC4000
Phone:	Motorolla GSM phone
Auto Pilot	Radio Holland Seapilot 25
SART	Tron Sart 9ghz
EPIRB	Tron 40s 406mhz

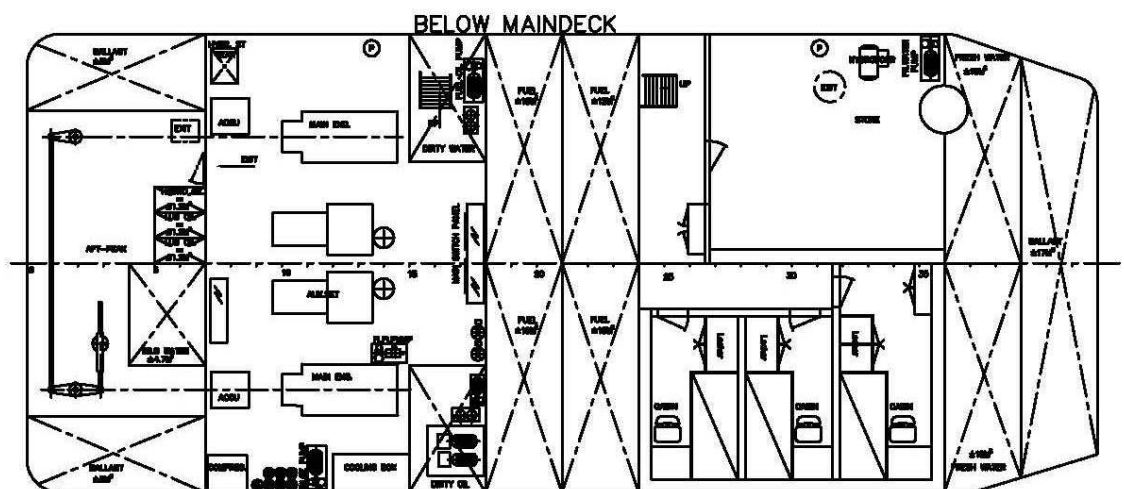
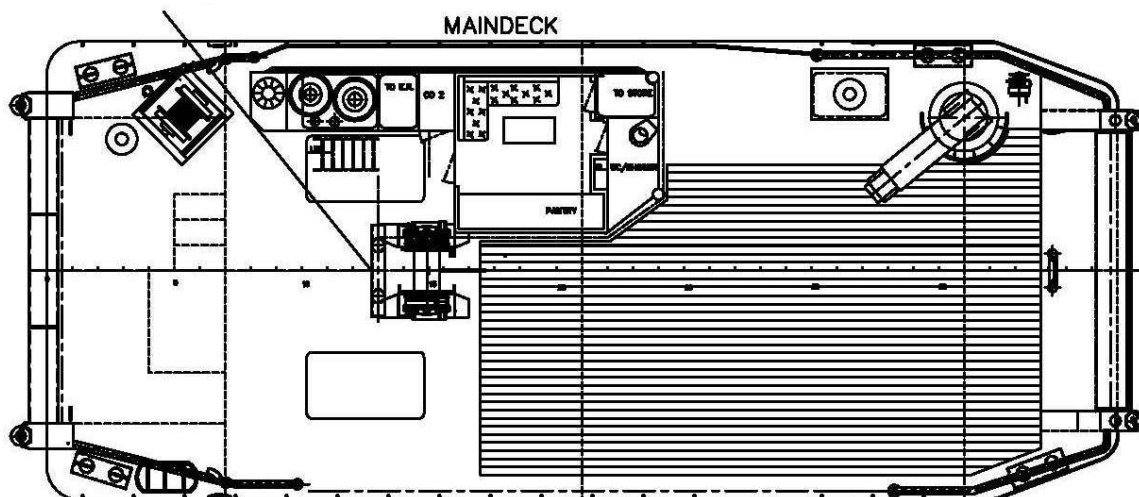
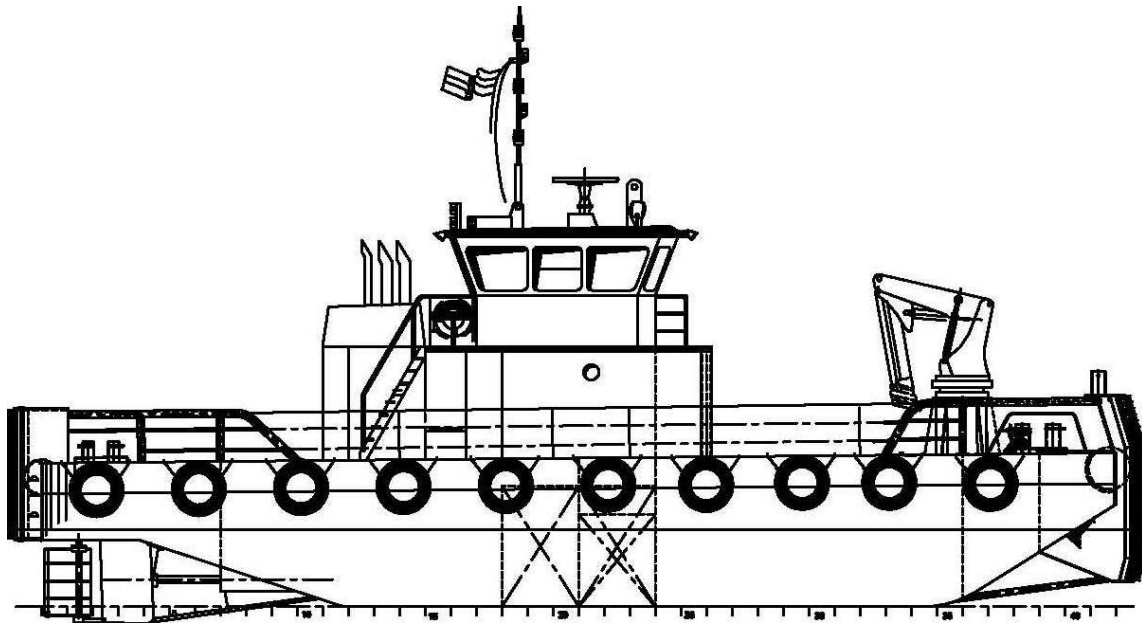
This specification is for guidance only. Whilst every care is taken in the preparation of this specification, please check details before making any decisions reliant upon them.



WILLIAMS

Williams Shipping Marine Ltd.
Dock Gate 4, Southampton SO14 3GF UK
www.williams-shipping.co.uk
enquiries@williams-shipping.co.uk
Telephone +44 (0)23 8023 7330

Williams Marine & Port Services Ltd
Port of Pembroke, Pembroke SA72 6TD UK
www.wmps.co.uk
info@wmps.co.uk
Telephone +44 (0)1646 684169



This drawing is for layout guidance only. Dimensions are approximate. Whilst every care is taken in the preparation of this drawing, please check all dimensions and equipment details before making any decisions reliant upon them.

**WILLIAMS**

Williams Shipping Marine Ltd.
Dock Gate 4, Southampton SO14 3GF UK
www.williams-shipping.co.uk
enquiries@williams-shipping.co.uk
Telephone +44 (0)23 8023 7330

Williams Marine & Port Services Ltd
Port of Pembroke, Pembroke SA72 6TD UK
www.wmps.co.uk
info@wmps.co.uk
Telephone +44 (0)1646 684169

WILLENDEAVOUR 22m Multicat

Type of Vessel:	Eurocarrier 2209 (multi-cat type vessel)
Name:	Willendeavour
Flag:	British/Southampton
Official Number:	912689
Built/Date:	Holland/2007
Net Tonnage:	91.87
Radio Call Sign:	MMPC
MMSI Number:	235051664
Certification:	Bureau Veritas I 3/3 Special Service/Multi Purpose - Coastal Area MCA Workboat Code Cat 2 (60 miles) 15 persons
Dimensions:	22.0m loa x 9.0m boa x 3m depth
Draft (minimum):	1.8m
Propulsion:	2 x fixed pitch 4-blade propellers in Nozzles
Main Engines:	2 x Caterpillar C18
Total Output Main engines:	1200hp (894Kw)@ 1800 rpm
Marine Transmissions:	Twin Disc MG516 DC 4.52:1
Free Running Speed:	9 knots
Bollard Pull:	15t (approx)
Electrical System:	24v DC and 220v shore supply
Generator	68Kw John Deere 4045TF258 keel cooled 75Kw John Deere 4045TF258 radiator cooled
Hydraulic Crane:	Heila 120-4SL with winch 120t/m [9.3t @ 12.11,] inc remote control
Anchor Handling/towing winch:	Hydrauision 50 tonnes
Tugger winch:	Hydrauision 10 tonnes
Deck Equipment:	Bow roller and stern roller, burning gear, welding set, compressor
Tank Capacity:	Diesel fuel oil : 42,000ltr. With transfer pump Freshwater: 57,000 ltr With transfer pump
Accommodation:	2 x 1 berth cabins, 1 x 2 berth cabin WC/Shower room, day/mes room (air conditioned)
Navigation Means	Full navigation lighting, radar with daylight monitor, DGPS satellite navigation, Full colour chart plotter, 2 x VHF, Cellular telephone and satellite phone



WILLIAMS

www.williams-shipping.co.uk

Williams Shipping Marine Ltd.

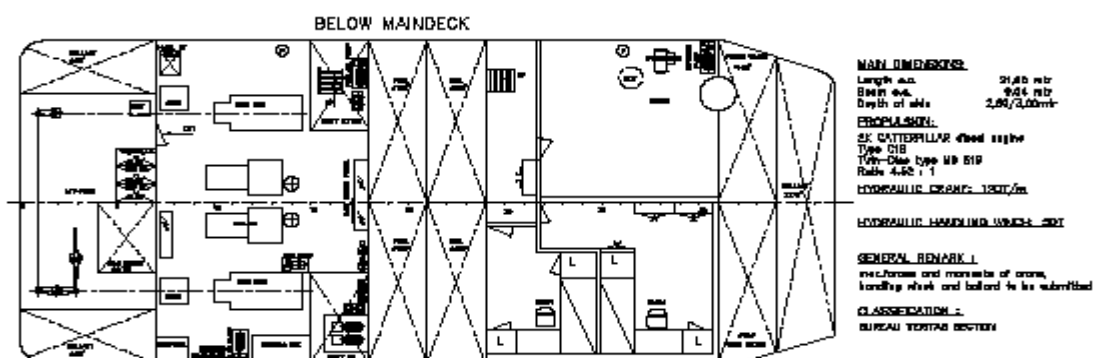
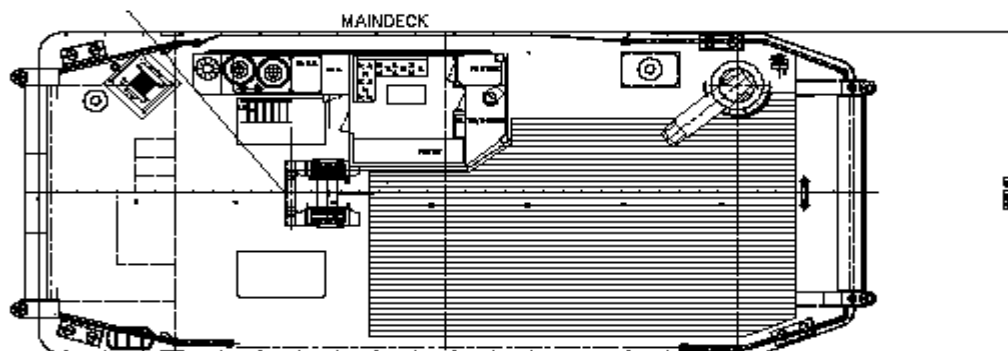
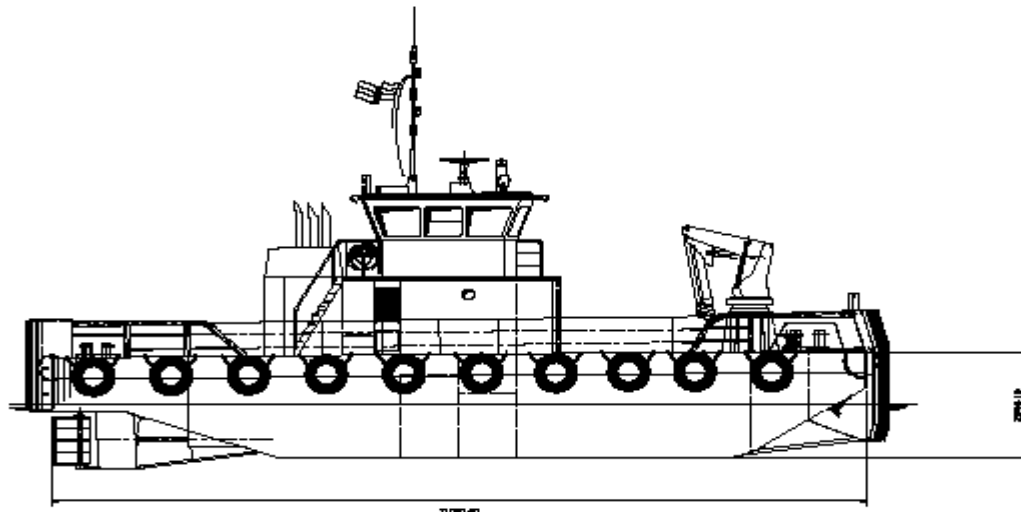
Manor House Avenue
Millbrook, Southampton
SO15 0LF

Tel: 02380 237 330

Fax: 02380 236 151

E-mail: enquiries@williams-marine.co.uk

WILLENDÉAVOUR 22m Multicat



WILLIAMS

www.williams-shipping.co.uk

Williams Shipping Marine Ltd.

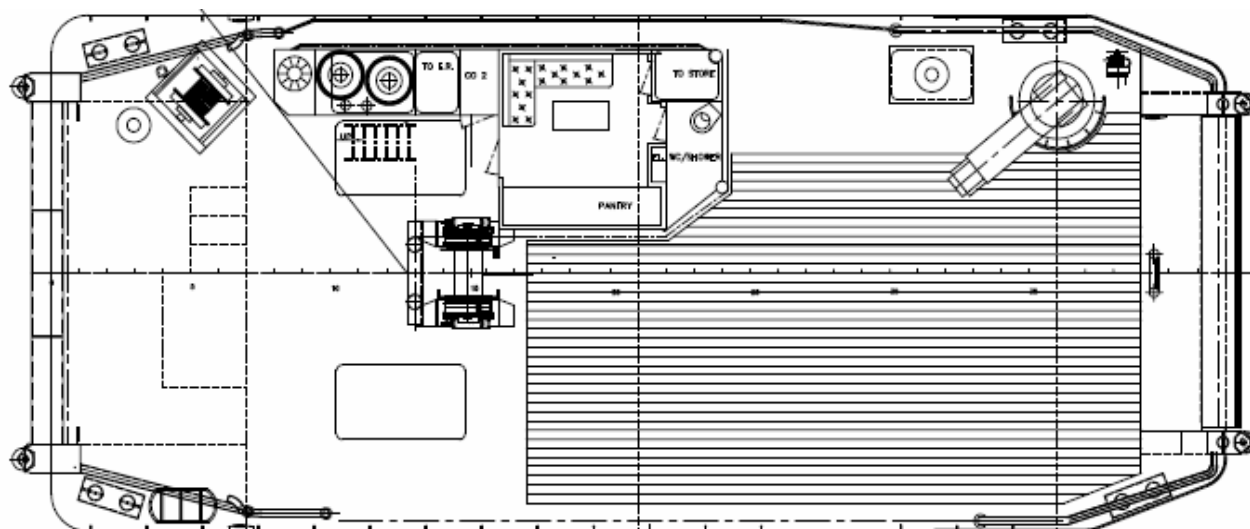
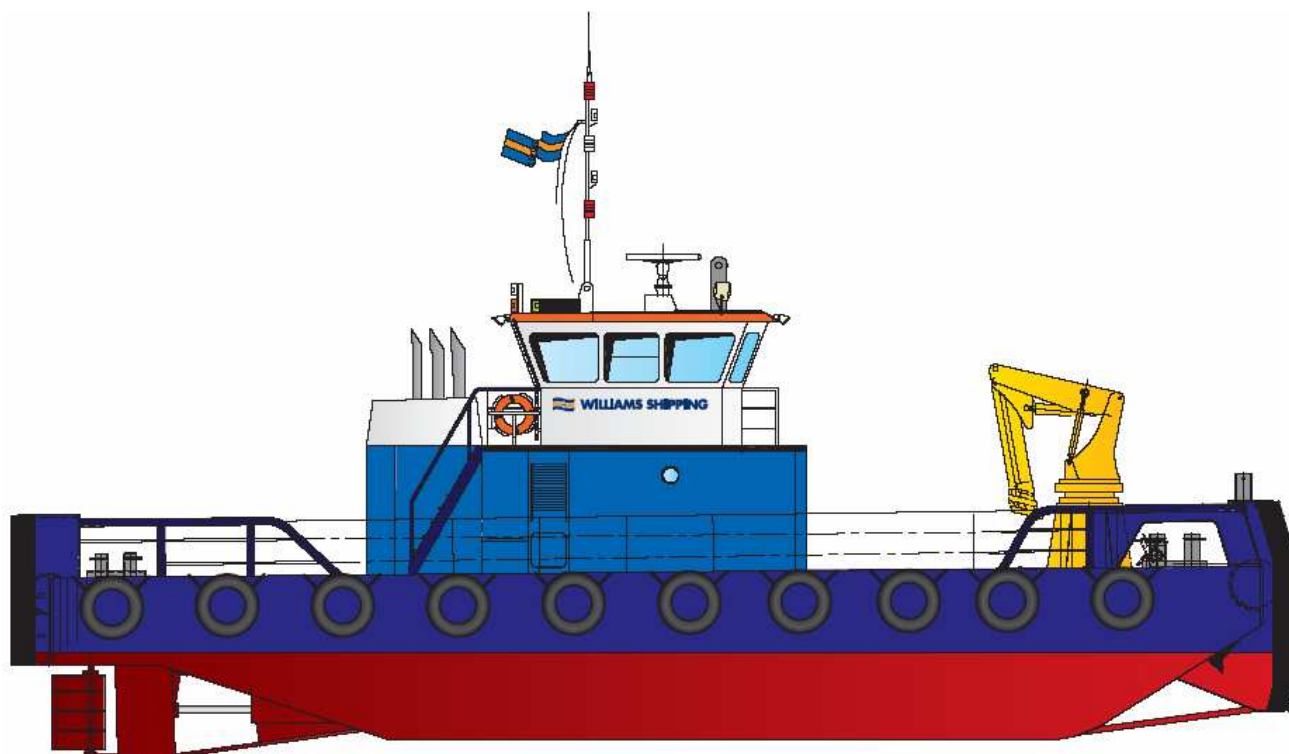
Manor House Avenue
Millbrook, Southampton
SO15 0LF

Tel: 02380 237 330

Fax: 02380 236 151

E-mail: enquiries@williams-marine.co.uk

WILLENDÉAVOUR 22m Multicat



WILLIAMS

www.williams-shipping.co.uk

Williams Shipping Marine Ltd.

Manor House Avenue
Millbrook, Southampton
SO15 0LF

Tel: 02380 237 330

Fax: 02380 236 151

E-mail: enquiries@williams-marine.co.uk

High Performance Corer - HPC™



High Performance Corer - HPC™

Alluvial Mining has developed a High Performance Corer™ to cope with the demand for longer sample recovery in dense granular and stiff cohesive materials.

The HPC™ utilises innovative electric motor technology and sample barrel design. The new motor technology allows an optimisation of excitation frequency and vibration amplitude to suit any particular soil conditions. At it's most powerful settings the HPC™ can apply more than twice the power and five times the vibration amplitude of a standard vibrocorer. All of this translates into much longer sample recovery.

The HPC™ may also be used with a newly developed low area ratio sample barrel which minimises the sampling disturbance in clay soils.

Special Features

- Maximum working water depths of 450 m
- Umbilical spooler for deep water projects
- Easily transported by road, sea or air
- Real time penetration and base tilt registration

Applications

- Pre-dredge surveys
- Environmental investigations
- Mineral/Aggregate prospecting
- Inshore civil engineering site investigations
- Offshore oil and gas pipeline geotechnical investigations

Specification

- 415V, minimum 45 kVA power supply
- 3m to 6m core barrel (8m optional)
- Mild steel barrels 101.6 mm o.d. 93.6 mm i.d.
- PVC liners 88.9 mm o.d. 84.14 mm i.d.

Optional sample sizes available

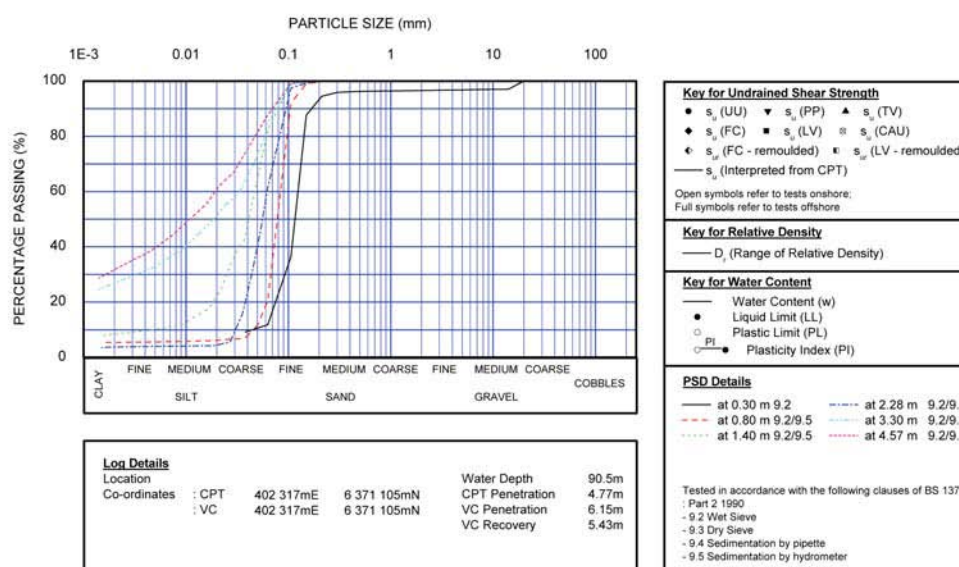
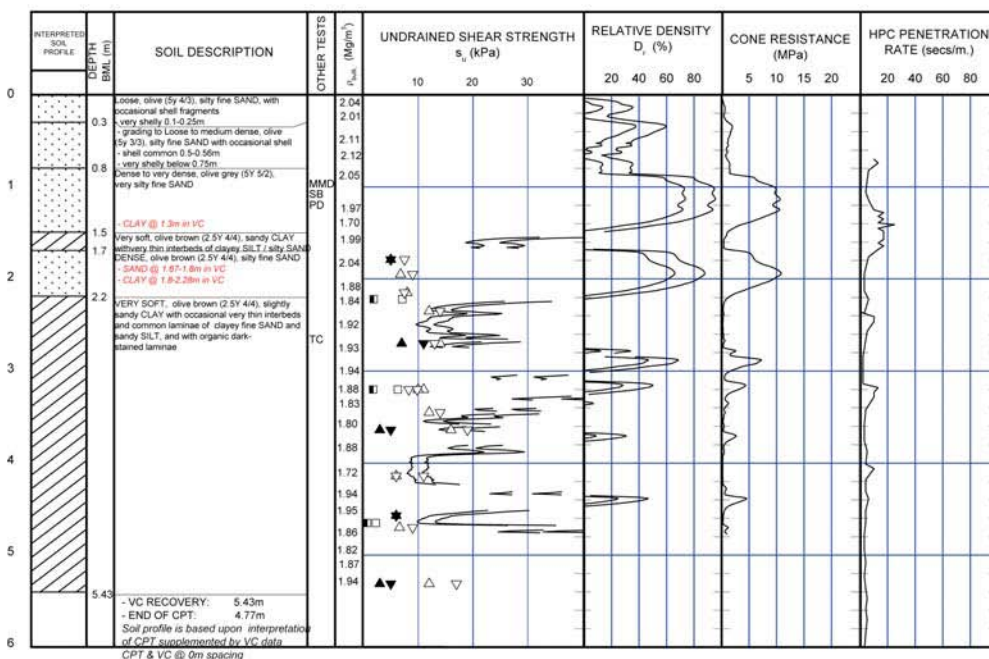
Dimensions

CORE BARREL(m)	HIGHT(m)	BASE(m)	WEIGHT(kg)
6.0	8.1	2.8 x 2.4	3160



The HPCTM penetration and soils data may be used in combination with CPT data to further refine stratigraphic and soils parameter logging along pipelines or in discrete location seabed soil engineering projects.

Example of HPC™ data set:



VIBROCORE / CPT LOG

The specification of the equipment in this data sheet may be subject to modifications without prior notice

Fugro Alluvial Offshore Limited
Morton Peto Road
Gapton Hall Industrial Estate
GreatYarmouth
NR31 OLT UK
Tel : +44 (0) 1493 650 484
Fax : +44 (0) 1493 440 319
www.alluvial.co.uk
info@alluvial.co.uk

Roson Seabed Cone Penetrometer CPT1



Our Roson Seabed Penetrometer system is capable of undertaking a rapid evaluation of in situ soil properties in a large variety of soil types in water depths of up to 500 metres. Test results are used to assess strength parameters, pore water pressure and relative soil density, as well as to provide a detailed stratigraphic profile.

Special Features

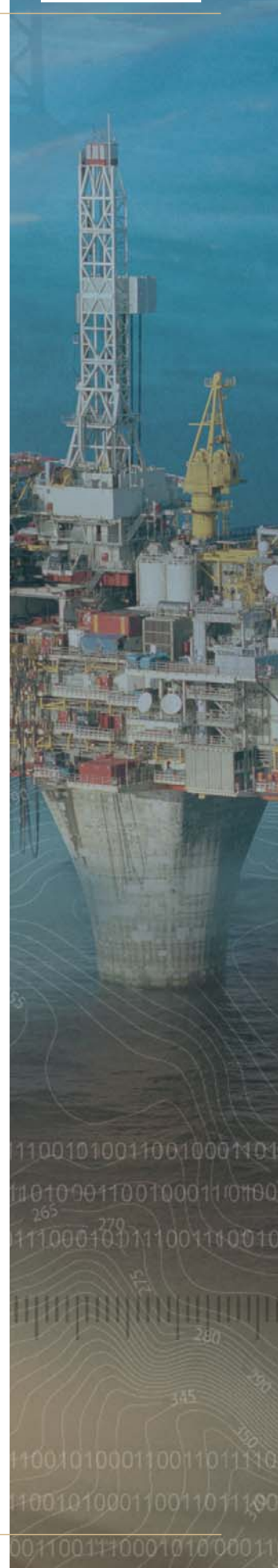
Continuous penetration into the seabed at the standard rate of 2.0 cm per second is achieved through a friction-wheel system clamped onto the CPT rods. Variable thrust from 4 - 16 tonnes. The required ballast is obtained from weights incorporated into the CPT frame.

Cones Available

- Piezocones
- Friction cones
- Electrical Conductivity Cones
- Low Capacity cones (for very soft cohesive soils)
- T Bar
- In situ Vane

Optional Features

- Penetration in excess of 15 metres is possible depending on the soil conditions and deployment arrangement.

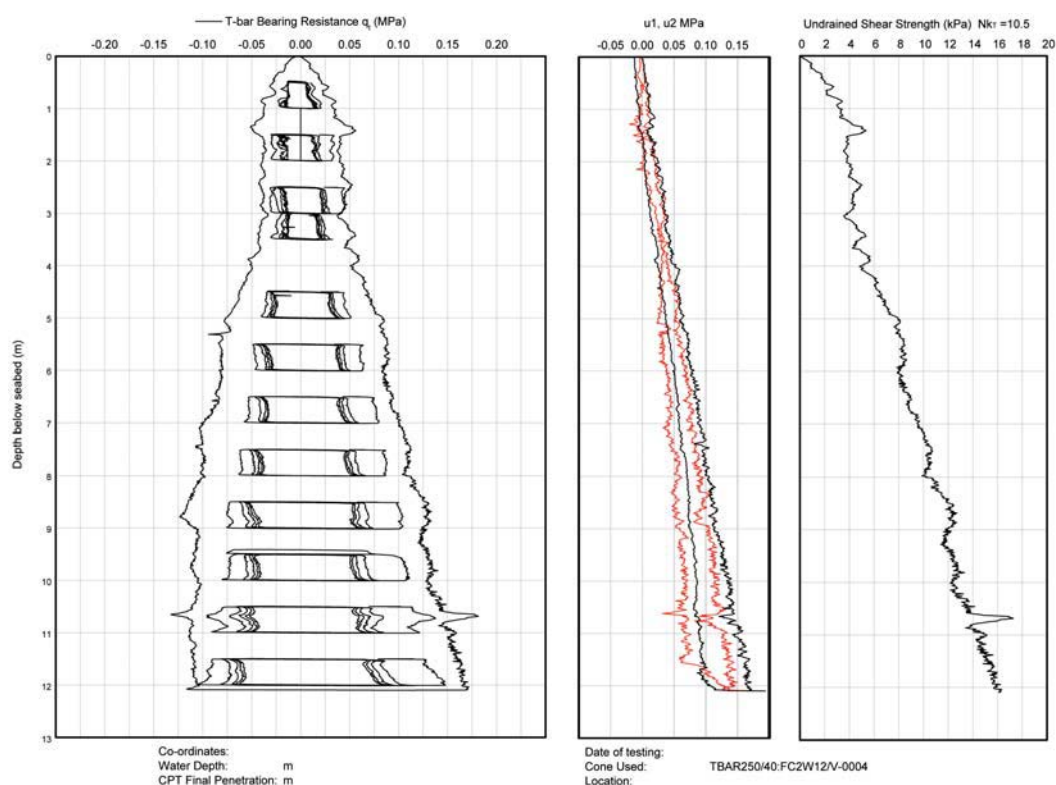


Applications

- Offshore pipeline route and subsea structure geotechnical surveys
- Pre-dredging geotechnical investigations
- Marine inshore geotechnics
- Site investigations for marine reclamation projects
- Marine aggregate surveys

Technical Data/Dimensions

UNIT	BASE(m)	WEIGHT(tonnes)	MAX THRUST(kN)
2 modules	2.2 x 3.2	5 - 10	40 - 80
4 modules	2.2 x 3.2	10 - 20	100 - 160



CYCLIC T-BAR PENETRATION TEST RESULTS -

Example of T-bar and cyclic T-bar data set acquired using the ROSON wheel drive PCPT. The T-Bar test is taken to full depth and return to surface, so giving an undisturbed and remoulded strength, and then multiple cyclic tests are undertaken at discrete depth intervals. Cyclic T-Bar test can be used to refine the understanding of the residual remoulded shear strength and sensitivity of the soils.

The specification of the equipment in this data sheet may be subject to modifications without prior notice

Fugro Alluvial Offshore Limited
Morton Peto Road
Gapton Hall Industrial Estate
GreatYarmouth
NR31 0LT UK
Tel : +44 (0) 1493 650 484
Fax : +44 (0) 1493 440 319
www.alluvial.co.uk
info@alluvial.co.uk

SECTION C.3

SAMPLING

C.3	SAMPLING	1
C.3.1	SAMPLING AND IN-SITU TESTING	1
C.3.2	PROBLEMS	2

C.3 SAMPLING

C.3.1 SAMPLING AND IN-SITU TESTING

C.3.1.1 Sampling

A total of 218 push samples and 18 hammer samples were recovered during the site investigation. Basic details of the borehole-sampling techniques are given below and further details of the WIPSAMPLER® may be found on the equipment data sheets that are presented at the end of Section C2. A summary of all the sampling methods performed at each borehole is presented in Tables C.3-1 and C.3-2 below.

- (i) **Push Samples** – Where hard clay or sand soils were expected, sampling was performed using Fugro's wireline WIPSAMPLER® in combination with seamless sample tubes of 72 mm internal diameter, 2 mm wall thickness and 1 m length. In harder soils, tubes with an increased wall thickness of 4 mm were used to try and prevent buckling during sampling. When using this system the sample tube was pushed into the soil at a constant rate of 20 mm per second using the reaction obtained by clamping the drillpipe at seafloor with Fugro's SEACLAM® system.

In very dense sands, a 52 mm internal diameter was used. This was to increase sample recovery due to poor penetration with the 72 mm tube. A core catcher was used to prevent loss of sample as the sample was lifted back to deck.

- (ii) **Hammer Samples** - This technique was used in order to maximise the quantity of sample retrieved and to attain the in-situ strength of the soil. For this sample, Shelby split-spoon sample tubes were used.
- (iii) **Vibrocore Samples** – Sampling operations during the fieldwork from the M/V Willendeavour were performed using FAOLs High Performance Corer (HPC™) deployed from the deck of the vessel.

Table C.3-1: Summary of Site Work – Rampion Wind Farm Project

Location	Final Penetration [m BSF]	Sampling and Testing Details (successful samples/tests only)
BH_02	46.4	19 CPT and 24 Samples
BH_04	47.4	29 CPT and 24 Samples
BH_04a	4.2	6 Samples
BH_06	52.9	17 CPT, 37 Samples and 3 Hammers
BH_07	40.0	17 CPT, 31 Samples and 2 Hammers
BH_13	45.2	27 CPT, 27 Samples and 8 Hammers
BH_14	50.2	23 CPT and 25 Samples
BH_16	46.4	26 CPT, 19 Samples and 5 Hammers
BH_17	45.1	24 CPT and 25 Samples

Notes:

Table excludes number of tests of nil penetration / no recovery

BSF = Below seafloor

CPT = Cone penetrometer test

Table C.3-2: Summary of Site Work – M/V Willendeavour

Location	Final Penetration [m BSF]	Sampling and Testing Details (successful samples/tests only)
VC_03	5.6	1 Vibrocore
CPT_03	5.2	1 CPT
VC_18C	2.6	1 Vibrocore
CPT_18C	3.2	1 CPT
VC_19C	4.0	1 Vibrocore
CPT_19C	1.0	1 CPT
CPT_19Ca	1.2	1 CPT
VC_20C	1.9	1 Vibrocore
VC_20Cb	1.4	1 Vibrocore
CPT_20C	3.2	1 CPT
VC_21C	3.7	1 Vibrocore
CPT_21C	3.0	1 CPT

Notes:

Table excludes number of tests of nil penetration / no recovery

BSF = Below seafloor

VC = Vibrocore test

CPT = Cone penetrometer test

Further details of the WIPSAMPLER[®], SEACLAM[®] reaction system and HPC[™] can be found in the equipment data sheets that are presented in Section C.2. A record of sample depths and recovered lengths is presented on the drilling logs also at the end of Section C.2.

C.3.1.2 In-situ Testing

A total of 188 downhole WISON[®] PCPTs were performed during the investigation, using Fugro's SEACLAM[®] system for reaction and six seabed CPTs were performed using the Roson Cone Penetrometer. In general, the results are considered to be of good quality and representative of the soils that were tested. Further details of the cone penetration tests, including test results, are presented in Section B.10 and Section C.4.

C.3.2 PROBLEMS

There were no major problems with the sampling and in-situ testing equipment.

SECTION C.4

CPT PENETRATION TESTING

C.4	CPT PENETRATION TESTING	1
C.4.1	GENERAL	1
C.4.2	CONE CALIBRATION AND CONE ZEROS	1
C.4.3	PROBLEMS	3

C.4 CPT TESTING

C.4.1 GENERAL

Cone Penetration Tests (CPTs) from the M/V Fugro Saltire were performed downhole using Fugro's WISON® Mk III system.

Cones with a projected area of 10 cm² and a 5 tonne capacity were used for the testing, with pore pressure measurements being made at the cone shoulder. Corresponding α and β values for the cones used are 0.75 and 1.0, respectively. A diagram showing the layout and geometry of Fugro cones and details of the piezocone penetrometer are given in Section C.2. In harder layers a cone with a reduced area of 5 cm² and a 8 tonne capacity were used for testing. Corresponding α and β values for the cones used are 0.5 and 1.0, respectively. No pore pressure measurements can be recorded with the F8 cone.

Reaction for the tests was provided by Fugro's SEACLAM® seabed reaction frame, which provided a submerged reaction weight of the order of 10 tonnes.

Each cone used on this project was calibrated before mobilisation in the Fugro Engineers B.V. onshore laboratory in Leidschendam, The Netherlands. Following the fieldwork, all cones that were not irreparably damaged were returned to the Leidschendam laboratory for post-fieldwork calibration. Pre-fieldwork cone calibration certificates for a number of cones used are presented on Plates C.4-1 to C.4-4.

CPTs performed from the M/V Willendeavour were performed using the Roson Seabed Cone Penetrometer. Further details of the Roson unit are presented in Section C.2 of this report.

Signals from the cones were transmitted in digital form and stored for subsequent computer processing and included:

- (i) Penetration;
- (ii) Cone resistance, q_c ;
- (iii) Sleeve friction, f_s ;
- (iv) Pore water pressure, u .

Tests were terminated at the discretion of the senior operator performing the test. When taking the decision to stop a test, the senior operator took into account the total thrust being applied to the cone, the tip resistance, and the soil conditions through which the cone had already passed.

C.4.2 CONE CALIBRATION AND CONE ZEROS

Each cone used on this project was calibrated before mobilisation in the Fugro Engineers B.V. onshore laboratory in Leidschendam, The Netherlands. Following the fieldwork, all cones that were not irreparably damaged were returned to the Leidschendam laboratory for post-fieldwork calibration.

Pre-fieldwork cone calibration certificates for a number of the cones used are presented on Plates C.4-1 to C.4-4.

Prior to the investigation, all cones used during the site investigation were calibrated in the office of Fugro Engineers B.V. in Leidschendam, The Netherlands. Pre-fieldwork cone calibration certificates are presented at the end of this section. A summary of cone processing data is also presented, including a summary of calculated maximum thrusts recorded during each test on Plates C.4-9 to C.4-16. It may be seen that the cone zeros are generally stable and show expected trends as the testing depth increases at each location. A list of the cones used in the investigation is presented in **Error! Reference source not found..**

Table C.4-1: Cones Used During the Site Investigation

Location	CPT Number	Depth Range [m BSF]	Cones Used
BH_02	1 to 8	0.0 to 22.2	F5CKEW2/V-1955
	9	23.5 to 25.0	F8CKE/V-1551
	10	25.0 to 25.8	F5CKEW2/V-1955
	11 to 15	27.0 to 35.5	F8CKE/V-1551
	16	36.0 to 36.6	F5CKEW2/V-1955
	17 to 18	38.0 to 40.6	F8CKE/V-1551
	19	43.0 to 45.9	F5CKEW2/V-1955
BH_04	1 to 4	0.0 to 6.7	F5CKEW2/V-1356
	5 to 14	8.0 to 17.6	F8CKE/V-1738
	15 to 19	18.0 to 21.2	F8CKE/V-1551
	20 to 29	26.9 to 46.8	F5CKEW2/V-1356
BH_06	1 to 17	0.0 to 46.6	F5CKEW2/V-1356
BH_07	1 to 6	0.0 to 17.3	F5CKEW2/V-1356
	7	17.5 to 19.2	F5CKEW2/V-1877
	8 to 23	21.5 to 45.0	F5CKEW2/V-1955
BH_13	1 to 9	0.0 to 19.6	F5CKEW2/V-1314
	10 to 26	21.0 to 38.9	F8CKE/V-1680
	27	41.0 to 43.9	F5CKEW2/V-1314
BH_14	1 to 10	0.0 to 38.1	F5CKEW2/V-1314
	11 to 23	38.5 to 49.6	F8CKE/V-1680
BH_16	1 to 19	0.0 to 36.2	F5CKEW2/V-1314
	20 to 23	36.5 to 40.7	F8CKE/V-1698
	24 to 26	42.0 to 45.9	F8CKE/V-1680
BH_17	1 to 8	0.0 to 29.7	F5CKEW2/V-1314
	9 to 20	31.0 to 40.7	F8CKE/V-1680
	21 to 24	42.5 to 44.5	F5CKEW2/V-1314
CPT_03	1	0.0 to 5.2	F5CKE2HAW2/B P10 170
CPT_18C	1	0.0 to 3.2	F5CKE2HAW2/B P10 170
CPT_19C	1	0.0 to 1.0	F5CKE2HAW2/B P10 170
CPT_19Ca	1	0.0 to 1.2	F5CKE2HAW2/B P10 170
CPT_20C	1	0.0 to 3.2	F5CKE2HAW2/B P10 170
CPT_21C	1	0.0 to 3.0	F5CKE2HAW2/B P10 170

C.4.3 PROBLEMS

No significant problems were experienced with the in-situ testing equipment.

CPTU PENETRATION TESTING

LIST OF PLATES – SECTION C.4

Description	Plate
Pre-Fieldwork Cone Calibration Sheets	C.4-1 to C.4-4
Max Thrust Sheet – BH_02	C.4-5
Max Thrust Sheet – BH_04	C.4-6
Max Thrust Sheet – BH_06	C.4-7
Max Thrust Sheet – BH_07	C.4-8
Max Thrust Sheet – BH_13	C.4-9
Max Thrust Sheet – BH_14	C.4-10
Max Thrust Sheet – BH_16	C.4-11
Max Thrust Sheet – BH_17	C.4-12



CONE PENETROMETER CALIBRATION CERTIFICATE

Applicant	Fugro Engineers B.V.	Certificate no.	30085
Submitted	Conepenetrometer	Manufacturer	Fugro Engineers B.V.
Device type	CONE, A10F5CKEW2/V, 100 bar, WISON®	Serial number	1706-1955

Cone diameter (mm)	35.70	α factor	0.75
Cone Area (cm ²)	10.00	Sleeve length (mm)	132.60
Sleeve diameter (mm)	36.00	Sleeve area (cm ²)	150.00

Calibration reference: 548FRE.001 Procedure: FEBV.CAL.PRO.003 KALIBRATIE KRACHT

Cone loadcell	Load limit: 100.0 kN	Sleeve loadcell	Load limit: 100.0 kN
Base area (cm ²)	10.00	Zero (mV)	-4.3
Range 1 (kN)	50.0	Cal factor	802.7
Range 2 (kN)		Cal factor	
Range 3 (kN)		Cal factor	

Output Cone loadcell	29.7	mV	Output Sleeve loadcell	30.1	mV	Actual α factor	0.740
----------------------	------	----	------------------------	------	----	------------------------	-------

Calibration reference: 3257-0001 Procedure: FEBV.CAL.PRO.004 KALIBRATIE DRUK

Porepressure transducer 1	Load limit: 15.00 MPa	Brand: Keller	Type: PA-8-100 bar/8467.8 s/n: 53145
	Zero (mV)	-71.0	
Range 1 (MPa)	2.5	Cal factor	435.1

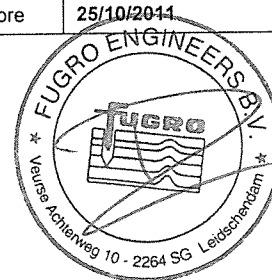
Calibration reference: Hoekomat Procedure: FEBV.CAL.PRO.006 KALIBRATIE Helling

Angle	0	5	10	15	Zero (mV)	0.0
Output in mV	0	0	0	0	Cal factor	0

TRACEABILITY: THE MEASUREMENTS HAVE BEEN EXECUTED USING STANDARDS FOR WHICH THE TRACEABILITY TO PRIMARY AND/ OR (INTER)NATIONAL STANDARDS HAS BEEN DEMONSTRATED.

Calibrated by	Tempelaar, Rolf	Approved by	Sinjorgo, Gerry
Calibration date	25/10/2010	Approval date	25/10/2010
		Calibrate before	25/10/2011

Signature department manager:



CONE PENETROMETER CALIBRATION CERTIFICATE



Applicant	Fugro Engineers B.V.	Certificate no.	30645
Submitted	Conepenetrometer	Manufacturer	Fugro Engineers B.V.
Device type	CONE, A10F5CKEW2/V, 100 bar, WISON®, Mod anti-ruls	Serial number	1706-1356

Cone diameter (mm)	35.70	α factor	0.75
Cone Area (cm ²)	10.00	Sleeve length (mm)	132.60
Sleeve diameter (mm)	36.00	Sleeve area (cm ²)	150.00

Calibration reference: 548FRE.001 Procedure: FEBV.CAL.PRO.003 KALIBRATIE KRACHT							
Cone loadcell		Load limit: 100.0 kN		Sleeve loadcell		Load limit: 100.0 kN	
Base area (cm ²)	10.00	Zero (mV)	-26.7	Base area (cm ²)	150.00	Zero (mV)	23.4
Range 1 (kN)	50.0	Cal factor	787.8	Range 1 (kN)	50.0	Cal factor	787.1
Range 2 (kN)		Cal factor		Range 2 (kN)		Cal factor	
Range 3 (kN)		Cal factor		Range 3 (kN)		Cal factor	

Output Cone loadcell	29.0	mV	Output Sleeve loadcell	29.2	mV	Actual α factor	0.740
----------------------	------	----	------------------------	------	----	------------------------	-------

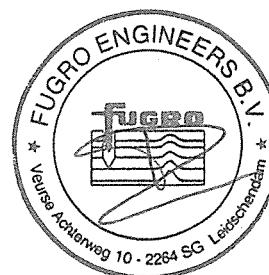
Calibration reference: 3257-0001 Procedure: FEBV.CAL.PRO.004 KALIBRATIE DRUK					
Porepressure transducer 1		Load limit: 15.00 MPa		Brand: Keller	Type: PA-8-100 bar / 8467.8 s/n: 64810
		Zero (mV)	-64.1		
Range 1 (MPa)	2.5	Cal factor	429.7		

Calibration reference: Hoekomat Procedure: FEBV.CAL.PRO.006 KALIBRATIE Helling							
Angle	0	5	10	15		Zero (mV)	
Output in mV						Cal factor	0

TRACEABILITY: THE MEASUREMENTS HAVE BEEN EXECUTED USING STANDARDS FOR WHICH THE TRACEABILITY TO PRIMARY AND/ OR (INTER)NATIONAL STANDARDS HAS BEEN DEMONSTRATED.

Calibrated by	Bouter, Jerry	Approved by	Sinjorgo, Gerry				
Calibration date	22/12/2010	Approval date	22/12/2010	Calibrate before	22/12/2011		

Signature department manager:



CONE PENETROMETER CALIBRATION CERTIFICATE



Applicant	Fugro Engineers B.V.	Certificate no.	29044
Submitted	Conepenetrometer	Manufacturer	Fugro Engineers B.V.
Device type	CONE, A05F8CKE/V, WISON®	Serial number	1721-1680

Cone diameter (mm)	25.00	α factor	0.50
Cone Area (cm ²)	5.00	Sleeve length (mm)	97.20
Sleeve diameter (mm)	25.50	Sleeve area (cm ²)	75.00

Calibration reference: 548FRE.001 Procedure: FEBV.CAL.PRO.003 KALIBRATIE KRACHT							
Cone loadcell		Load limit: 80.0 kN		Sleeve loadcell		Load limit: 80.0 kN	
Base area (cm ²)	5.00	Zero (mV)	15.3	Base area (cm ²)	75.00	Zero (mV)	12.6
Range 1 (kN)	80.0	Cal factor	1965.0	Range 1 (kN)	80.0	Cal factor	1926.5
Range 2 (kN)		Cal factor		Range 2 (kN)		Cal factor	
Range 3 (kN)		Cal factor		Range 3 (kN)		Cal factor	

Output Cone loadcell	15.3	mV	Output Sleeve loadcell	23.2	mV	Actual α factor	0.500
----------------------	------	----	------------------------	------	----	------------------------	-------

Calibration reference: 3257-0001 Procedure: FEBV.CAL.PRO.004 KALIBRATIE DRUK					
Porepressure transducer 1		Load limit: MPa		Brand:	Type: s/n:
		Zero (mV)			
Range 1 (MPa)	2.5	Cal factor			

Calibration reference: Hoekomat Procedure: FEBV.CAL.PRO.006 KALIBRATIE Helling							
Angle	0	5	10	15		Zero (mV)	
Output in mV						Cal factor	0

TRACEABILITY: THE MEASUREMENTS HAVE BEEN EXECUTED USING STANDARDS FOR WHICH THE TRACEABILITY TO PRIMARY AND/ OR (INTER)NATIONAL STANDARDS HAS BEEN DEMONSTRATED.

Calibrated by	Tempelaar, Rolf	Approved by	Sinjorgo, Gerry				
Calibration date	15/06/2010	Approval date	15/11/2010	Calibrate before	15/06/2011		

Signature department manager:



CONE PENETROMETER CALIBRATION CERTIFICATE



Applicant	Fugro Engineers B.V.	Certificate no.	30860
Submitted	Conepenetrometer	Manufacturer	Fugro Engineers B.V.
Device type	CONE, A05F8CKE/V, WISON®	Serial number	1721-1738

Cone diameter (mm)	25.00	α factor	0.50
Cone Area (cm ²)	5.00	Sleeve length (mm)	97.20
Sleeve diameter (mm)	25.50	Sleeve area (cm ²)	75.00

Calibration reference: 548FRE.001 Procedure: FEBV.CAL.PRO.003 KALIBRATIE KRACHT					
Cone loadcell		Load limit: 80.0 kN		Sleeve loadcell	
Base area (cm ²)		Zero (mV)	-3.2	Base area (cm ²)	
Range 1 (kN)		Cal factor	1948.3	Range 1 (kN)	
Range 2 (kN)		Cal factor		Range 2 (kN)	
Range 3 (kN)		Cal factor		Range 3 (kN)	

Output Cone loadcell	15.0	mV	Output Sleeve loadcell	21.9	mV	Actual α factor	0.490
----------------------	------	----	------------------------	------	----	------------------------	-------

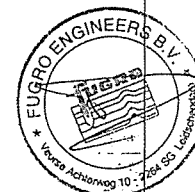
Calibration reference: 3257-0001 Procedure: FEBV.CAL.PRO.004 KALIBRATIE DRUK					
Porepressure transducer 1		Load limit: MPa		Type: s/n:	
		Zero (mV)			
Range 1 (MPa)		Cal factor			

Calibration reference: Hoekomat Procedure: FEBV.CAL.PRO.006 KALIBRATIE Helling					
Angle	0	5	10	15	Zero (mV)
Output in mV					Cal factor

TRACEABILITY: THE MEASUREMENTS HAVE BEEN EXECUTED USING STANDARDS FOR WHICH THE TRACEABILITY TO PRIMARY AND/ OR (INTER)NATIONAL STANDARDS HAS BEEN DEMONSTRATED.

Calibrated by	Tempelaar, Rolf	Approved by	Sinjorgo, Gorry		
Calibration date	11/01/2011	Approval date	11/01/2011	Calibrate before	11/01/2012

Signature department manager:



Test No.	ZEROS BEFORE TEST			OFFSETS BEFORE TEST			OFFSETS AFTER TEST			Calculated Alpha Value (-)	Max Thrust (kN)	Cone Serial No.	Remarks
	qc (MPa)	qc + fs (MPa)	U (MPa)	qc (mV)	qc + fs (mV)	U (mV)	qc (mV)	qc + fs (mV)	U (mV)				
CPT01.000	0.152	0.109	0.351	7.324	16.479	-68.130	6.790	16.098	-67.978	0.433	11.5	F5CKEW2/V-1955	
CPT02.000	0.280	0.246	0.388	7.095	16.327	-68.359	7.477	16.174	-66.147	0.722	18.7	F5CKEW2/V-1955	
CPT03.000	0.375	0.341	0.536	7.706	16.708	-68.283	6.561	16.251	-68.054	0.700	29.1	F5CKEW2/V-1955	
CPT04.000	0.333	0.251	0.508	7.172	17.014	-68.130	6.332	15.945	-67.444	0.656	46.2	F5CKEW2/V-1955	
CPT05.000	0.409	0.388	0.635	7.553	17.319	-68.207	8.926	18.616	-67.902	0.644	46.2	F5CKEW2/V-1955	
CPT06.000	0.447	0.407	0.662	7.095	17.242	-68.054	6.714	16.861	-67.444	0.675	50.4	F5CKEW2/V-1955	
CPT07.000	0.442	0.407	0.664	7.019	17.166	-67.902	6.409	16.403	-68.050	0.666	50.2	F5CKEW2/V-1955	
CPT08.000	0.447	0.440	0.659	7.340	16.861	-67.978	7.248	17.090	-58.670	0.678	50.2	F5CKEW2/V-1955	
CPT09.000	0.303	0.523	-	25.101	19.836	-	24.872	19.302	-	0.514*	22.9	F8CKEV-1551	
CPT10.000	0.418	0.345	0.600	7.095	17.853	-67.825	7.553	17.471	-68.054	0.697	43.6	F5CKEW2/V-1955	
CPT11.000	0.303	0.498	-	25.024	19.455	-	25.253	19.445	-	0.485*	29.9	F8CKEV-1551	
CPT12.000	0.353	0.562	-	25.024	19.836	-	24.567	20.218	-	0.552*	34.0	F8CKEV-1551	
CPT13.000	0.328	0.532	-	25.101	20.065	-	25.523	19.913	-	0.494*	42.3	F8CKEV-1551	
CPT14.000	0.359	0.536	-	24.261	19.989	-	24.719	17.471	-	0.528*	37.2	F8CKEV-1551	
CPT15.000	0.334	0.555	-	24.796	18.082	-	25.253	19.531	-	0.474*	21.6	F8CKEV-1551	
CPT16.000	0.489	0.312	0.664	7.248	18.234	-67.978	7.172	17.166	-67.749	0.736	50.0	F5CKEW2/V-1955	
CPT17.000	0.396	0.600	-	24.643	19.455	-	24.796	19.226	-	0.547*	41.5	F8CKEV-1551	
CPT18.000	0.371	0.542	-	24.490	19.531	-	24.719	19.226	-	0.502*	35.8	F8CKEV-1551	
CPT19.000	0.585	0.445	0.811	7.477	18.463	-67.978	7.019	16.937	-68.207	0.721	39.8	F5CKEW2/V-1955	

NOTES: * Value has been calculated using Uniplot

CONE PENETRATION TEST

BH_02

RAMPION OFFSHORE WIND FARM SITE INVESTIGATION

E.ON CLIMATE AND RENEWABLES
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION



Test No.	ZEROS BEFORE TEST			OFFSETS BEFORE TEST			OFFSETS AFTER TEST			Calculated Alpha Value (-)	Max Thrust (kN)	Cone Serial No.	Remarks
	qc (MPa)	qc + fs (MPa)	U (MPa)	qc (mV)	qc + fs (mV)	U (mV)	qc (mV)	qc + fs (mV)	U (mV)				
CPT01.000	0.194	0.252	0.291	-25.635	25.177	-62.561	-25.711	24.872	-62.714	0.667	12.0	F5CKEW2/V-1356	No offsets after test
CPT02.000	0.218	0.194	0.315	-25.635	25.101	-62.790	-25.684	24.948	-62.561	0.692	50.5	F5CKEW2/V-1356	
CPT03.000	0.237	0.218	0.340	-25.787	25.101	-62.790	-25.864	25.024	-62.714	0.697	50.2	F5CKEW2/V-1356	
CPT04.000	0.208	0.218	0.312	-25.558	28.687	-62.866	-25.864	24.872	-62.714	0.667	50.4	F5CKEW2/V-1356	
CPT05.000	0.175	0.241	-	-0.839	1.450	-	-1.221	0.076	-	0.53*	49.8	F8CKEN-1738	
CPT06.000	0.175	0.254	-	-1.526	-0.810	-	-1.755	-0.763	-	0.522*	49.8	F8CKEN-1738	
CPT07.000	0.175	0.274	-	-1.602	0.000	-	-1.678	-0.381	-	0.515*	49.7	F8CKEN-1738	
CPT08.000	0.200	0.319	-	-2.365	-0.916	-	-2.441	-1.080	-	0.548*	49.6	F8CKEN-1738	
CPT09.000	0.175	0.267	-	-2.289	-1.144	-	-2.365	-1.526	-	0.467*	48.1	F8CKEN-1738	
CPT10.000	0.188	0.280	-	-2.594	-1.831	-	-2.823	-1.907	-	0.495*	49.9	F8CKEN-1738	
CPT11.000	0.200	0.274	-	-2.820	-2.060	-	-	-	-	0.5*	50.1	F8CKEN-1738	
CPT12.000	0.194	0.274	-	-2.747	0.870	-	-2.747	0.687	-	0.479*	50.1	F8CKEN-1738	
CPT13.000	0.207	0.306	-	-2.899	-0.763	-	-2.518	-0.229	-	0.505*	50.2	F8CKEN-1738	
CPT14.000	0.244	0.378	-	-2.975	-0.610	-	-	-	-	0.574*	50.4	F8CKEN-1738	high friction offset - change cone
CPT15.000	0.235	0.402	-	25.787	20.820	-	25.330	20.828	-	0.547*	50.0	F8CKEN-1551	
CPT16.000	0.217	0.332	-	25.253	20.447	-	26.474	20.523	-	0.499*	23.1	F8CKEN-1551	
CPT17.000	0.235	0.370	-	25.635	19.226	-	25.787	20.447	-	0.522*	50.4	F8CKEN-1551	
CPT18.000	0.260	0.402	-	25.330	19.684	-	25.711	20.599	-	0.571*	50.3	F8CKEN-1551	
CPT19.000	0.241	0.402	-	25.711	20.294	-	25.787	20.447	-	0.524*	50.4	F8CKEN-1551	
CPT20.000	0.356	0.325	0.530	-24.719	25.330	-62.790	-25.177	24.567	-62.790	0.672	36.1	F5CKEW2/V-1356	
CPT21.000	0.445	0.460	0.612	-	-	-	-25.482	25.330	-62.866	0.727	50.3	F5CKEW2/V-1356	
CPT22.000	0.353	0.393	0.559	-24.261	25.482	-63.019	-25.558	24.796	-62.790	0.631	49.0	F5CKEW2/V-1356	
CPT23.000	0.402	0.465	0.650	-24.414	24.948	-62.866	-24.490	24.719	-62.790	0.618	47.7	F5CKEW2/V-1356	
CPT24.000	0.460	0.475	0.716	-23.041	25.558	-63.095	-22.736	25.330	-62.714	0.642	40.9	F5CKEW2/V-1356	
CPT25.000	0.460	0.504	0.707	-	-	-	-24.261	24.643	-62.561	0.651	50.3	F5CKEW2/V-1356	
CPT26.000	0.450	0.456	0.653	-23.880	24.872	-62.943	-24.872	24.719	-62.637	0.689	37.1	F5CKEW2/V-1356	high cone offset - ok on next test
CPT27.000	0.378	0.397	0.562	-24.033	24.261	-42.038	-24.567	24.490	-62.256	0.673	49.1	F5CKEW2/V-1356	
CPT28.000	0.499	0.538	0.759	-23.270	24.643	-62.943	-24.033	26.398	-62.866	0.657	50.4	F5CKEW2/V-1356	
CPT29.000	0.160	0.228	0.235	-	-	-	-23.956	22.237	-62.790	0.681	50.2	F5CKEW2/V-1356	

NOTES: * Value has been calculated using Uniplot

CONE PENETRATION TEST
BH_04
 RAMPION OFFSHORE WIND FARM SITE INVESTIGATION

Test No.	ZEROS BEFORE TEST			OFFSETS BEFORE TEST			OFFSETS AFTER TEST			Calculated Alpha Value (-)	Max Thrust (kN)	Cone Serial No.	Remarks
	qc (MPa)	qc + fs (MPa)	U (MPa)	qc (mV)	qc + fs (mV)	U (mV)	qc (mV)	qc + fs (mV)	U (mV)				
CPT01.000	0.116	0.010	0.272	-23.804	26.932	-62.485	-24.261	27.084	-63.019	0.426	40.2	F5CKEW2N-1356	high pore offset - ok on next test
CPT02.000	0.257	0.257	0.356	-24.109	27.084	-62.790	-24.109	26.855	-62.714	0.722	21.4	F5CKEW2N-1356	
CPT03.000	0.291	0.276	0.453	-23.270	27.542	-62.637	-24.796	26.398	-62.637	0.642	23.2	F5CKEW2N-1356	
CPT04.000	0.320	0.281	0.475	-23.651	27.695	-62.714	-24.980	26.550	-62.332	0.674	33.5	F5CKEW2N-1356	
CPT05.000	0.315	0.286	0.434	-23.575	27.466	-62.637	-23.041	27.618	-50.049	0.726	28.2	F5CKEW2N-1356	
CPT06.000	0.397	0.397	0.584	-22.354	27.770	-62.714	-	-	-	0.680	26.8	F5CKEW2N-1356	
CPT07.000	0.392	0.407	0.614	-22.659	27.695	-62.790	-24.033	27.237	-62.790	0.638	42.0	F5CKEW2N-1356	
CPT08.000	0.431	0.426	0.632	-22.659	28.305	-62.943	-22.812	28.610	-62.740	0.682	41.2	F5CKEW2N-1356	
CPT09.000	0.387	0.402	0.603	-22.812	28.381	-62.714	-23.651	28.000	-62.485	0.642	43.6	F5CKEW2N-1356	
CPT10.000	0.470	0.485	0.705	-23.117	28.076	-62.866	-23.956	28.152	-62.408	0.667	49.0	F5CKEW2N-1356	
CPT11.000	0.475	0.499	0.720	-23.117	28.229	-62.637	-23.041	28.000	-64.485	0.660	49.7	F5CKEW2N-1356	
CPT12.000	0.470	0.475	0.711	-23.041	28.534	-62.714	-22.736	28.992	-62.561	0.661	48.3	F5CKEW2N-1356	
CPT13.000	0.537	0.514	0.754	-23.346	28.534	-62.866	-23.422	28.000	-62.537	0.712	50.3	F5CKEW2N-1356	
CPT14.000	0.499	0.465	0.705	-23.422	28.229	-62.866	-23.422	28.534	-62.637	0.708	50.4	F5CKEW2N-1356	
CPT15.000	0.537	0.557	0.772	-23.117	27.924	-62.790	-23.727	28.305	-62.561	0.696	50.5	F5CKEW2N-1356	
CPT16.000	0.533	0.514	0.765	-23.499	28.534	-62.866	-23.346	28.610	-62.637	0.697	37.0	F5CKEW2N-1356	
CPT17.000	0.576	0.557	0.824	-23.422	28.687	-62.943	-23.193	28.381	-62.637	0.699	49.9	F5CKEW2N-1356	

NOTES: * Value has been calculated using Uniplot

CONE PENETRATION TEST
BH_06
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION

Test No.	ZEROS BEFORE TEST			OFFSETS BEFORE TEST			OFFSETS AFTER TEST			Calculated Alpha Value (-)	Max Thrust (kN)	Cone Serial No.	Remarks
	qc (MPa)	qc + fs (MPa)	U (MPa)	qc (mV)	qc + fs (mV)	U (mV)	qc (mV)	qc + fs (mV)	U (mV)				
CPT01.000	0.169	0.145	0.300	-23.575	28.229	-62.637	-23.804	28.458	-62.866	0.563	4.4	F5CKEW2V-1356	No offsets at start
CPT02.000	0.242	0.204	0.357	-23.575	28.305	-62.561	-24.185	27.771	-62.561	0.678	27.5	F5CKEW2V-1356	
CPT03.000	0.261	0.179	0.399	-23.041	28.381	-62.408	-23.651	28.000	-62.485	0.654	20.3	F5CKEW2V-1356	
CPT04.000	0.291	0.228	0.447	-22.812	28.610	-62.637	-23.193	28.229	-62.408	0.651	49.8	F5CKEW2V-1536	
CPT05.000	0.349	0.378	0.484	-	-	-	-23.880	26.790	-62.790	0.721#	0.0	F5CKEW2V-1536	
CPT06.000	0.339	0.310	0.505	-23.270	27.466	-62.790	-24.109	26.321	-62.637	0.671	0.0	F5CKEW2V-1536	
CPT07.000	0.355	0.289	0.519	37.003	22.736	-46.463	36.621	21.667	-48.539	0.684	0.0	F5CKEW2V-1877	
CPT08.000	0.394	0.378	0.570	6.332	7.858	-68.054	6.104	9.003	-68.280	0.691	46.4	F5CKEW2V-1955	
CPT09.000	0.399	0.378	0.574	5.722	8.926	-67.902	5.875	11.520	-68.130	0.695	46.1	F5CKEW2V-1955	
CPT10.000	0.371	0.378	0.555	5.646	11.520	-67.978	5.493	11.597	-67.978	0.668	35.3	F5CKEW2V-1955	
CPT11.000	0.409	0.407	0.599	5.798	11.826	-67.978	5.493	11.520	-65.231	0.683	49.0	F5CKEW2V-1955	
CPT12.000	0.380	0.397	0.597	6.332	11.673	-67.978	6.409	12.970	-68.207	0.637	43.3	F5CKEW2V-1955	
CPT13.000	0.413	0.407	0.601	5.951	12.741	-67.978	5.417	12.589	-68.359	0.687	49.0	F5CKEW2V-1955	
CPT14.000	0.385	0.341	0.605	5.875	12.665	-62.283	5.035	12.283	-62.978	0.636	49.5	F5CKEW2V-1955	
CPT15.000	0.485	0.435	0.605	6.790	13.504	-67.902	5.112	8.850	-68.359	0.802	48.9	F5CKEW2V-1955	
CPT16.000	0.347	0.317	0.600	7.401	13.428	-68.054	6.104	15.259	-68.359	0.578	49.2	F5CKEW2V-1955	
CPT17.000	0.375	0.085	0.649	6.866	17.471	-67.978	6.714	15.640	-68.207	0.578	49.9	F5CKEW2V-1955	
CPT18.000	0.466	0.606	0.664	7.248	14.877	-67.978	6.485	15.564	-68.436	0.702	47.4	F5CKEW2V-1955	
CPT19.000	0.475	0.568	0.728	6.409	14.496	-67.978	6.256	15.335	-67.902	0.652	48.4	F5CKEW2V-1955	
CPT20.000	0.632	0.596	0.807	7.172	16.861	-68.130	6.866	16.403	-68.359	0.783	34.6	F5CKEW2V-1955	
CPT21.000	0.513	0.445	0.792	8.240	7.172	-68.054	8.240	7.172	-68.283	0.648	46.9	F5CKEW2V-1955	
CPT22.000	0.542	0.445	0.793	6.485	16.632	-68.054	6.790	16.403	-68.280	0.683	39.0	F5CKEW2V-1955	

NOTES: *Value has been calculated using Uniplot

Value has been calculated using on deck offsets after tests

CONE PENETRATION TEST

BH_07

RAMPION OFFSHORE WIND FARM SITE INVESTIGATION

E.ON CLIMATE AND RENEWABLES
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION



Test No.	ZEROS BEFORE TEST			OFFSETS BEFORE TEST			OFFSETS AFTER TEST			Calculated Alpha Value (-)	Max Thrust (kN)	Cone Serial No.	Remarks
	qc (MPa)	qc + fs (MPa)	U (MPa)	qc (mV)	qc + fs (mV)	U (mV)	qc (mV)	qc + fs (mV)	U (mV)				
CPT01.000	0.091	-0.376	0.216	21.591	28.305	-32.043	20.981	27.161	-32.043	0.421	16.1	F5CKEW2/V-1314	Test Invalid
CPT02.000	0.168	-0.293	0.226	21.515	30.518	-32.196	20.981	26.703	-32.043	0.743	19.5	F5CKEW2/V-1314	
CPT03.000	0.159	-0.212	0.231	21.133	25.101	-32.043	20.828	26.627	-32.043	0.688	24.1	F5CKEW2/V-1314	
CPT04.000	0.168	-0.058	0.237	20.981	27.237	-32.196	20.530	23.956	-32.120	0.709	15.6	F5CKEW2/V-1314	
CPT05.000	0.284	-0.159	0.404	20.981	27.618	-32.272	21.439	27.313	-31.586	0.703	16.8	F5CKEW2/V-1314	
CPT06.000	0.313	-0.217	0.447	21.133	29.144	-32.196	20.981	22.354	-31.862	0.700	24.6	F5CKEW2/V-1314	
CPT07.000	0.303	0.082	0.447	21.591	27.084	-32.043	21.591	24.338	-31.821	0.678	42.3	F5CKEW2/V-1314	
CPT08.000	0.308	0.166	0.411	21.210	30.060	-32.196	21.439	24.872	-31.662	0.749	46.2	F5CKEW2/V-1314	
CPT09.000	0.332	0.039	0.452	21.439	29.678	-32.272	21.515	26.398	-31.815	0.735	43.6	F5CKEW2/V-1314	
CPT10.000	0.186	-0.165	-	14.877	12.589	-	14.572	11.597	-	0.435*	49.2	F8CKEV-1680	
CPT11.000	0.205	-0.114	-	14.572	11.444	-	14.420	11.673	-	0.463*	42.2	F8CKEV-1680	
CPT12.000	0.205	-0.057	-	14.572	11.673	-	14.038	11.368	-	0.458*	50.1	F8CKEV-1680	
CPT13.000	0.211	-0.203	-	14.420	11.826	-	14.343	11.902	-	0.456*	48.8	F8CKEV-1680	
CPT14.000	0.273	0.139	-	14.420	11.902	-	14.267	12.054	-	0.583*	48.9	F8CKEV-1680	
CPT15.000	0.217	0.051	-	14.420	11.978	-	14.343	12.110	-	0.459*	48.1	F8CKEV-1680	
CPT16.000	0.236	-0.025	-	14.801	12.360	-	14.877	10.147	-	0.484*	50.7	F8CKEV-1680	
CPT17.000	0.248	0.361	-	14.877	11.673	-	15.564	11.826	-	0.503*	47.8	F8CKEV-1680	
CPT18.000	0.273	0.241	-	14.801	12.360	-	15.640	12.360	-	0.548*	49.4	F8CKEV-1680	
CPT19.000													
CPT20.000	0.242	0.228	-	14.877	11.902	-	15.869	13.123	-	0.467*	32.0	F8CKEV-1680	
CPT21.000	0.270	0.425	-	16.020	11.826	-	15.564	12.512	-	0.511*	50.2	F8CKEV-1680	
CPT22.000	0.286	0.437	-	16.174	13.428	-	15.488	13.046	-	0.537*	50.5	F8CKEV-1680	
CPT23.000	0.267	0.412	-	15.869	13.275	-	15.564	12.741	-	0.496*	50.4	F8CKEV-1680	
CPT24.000	0.273	0.196	-	14.954	12.360	-	15.869	11.749	-	0.494*	33.8	F8CKEV-1680	
CPT25.000	0.273	0.247	-	15.335	11.978	-	15.564	12.589	-	0.472*	30.2	F8CKEV-1680	
CPT26.000	0.323	3.336	-	15.411	13.657	-	15.793	13.351	-	0.545*	15.6	F8CKEV-1680	
CPT27.000	0.597	0.433	0.798	21.744	28.915	-32.349	21.591	27.771	-31.967	0.748	35.4	F5CKEW2/V-1314	

NOTES: * Value has been calculated using Uniplot

CONE PENETRATION TEST
BH_13
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION

Test No.	ZEROS BEFORE TEST			OFFSETS BEFORE TEST			OFFSETS AFTER TEST			Calculated Alpha Value (-)	Max Thrust (kN)	Cone Serial No.	Remarks
	qc (MPa)	qc + fs (MPa)	U (MPa)	qc (mV)	qc + fs (mV)	U (mV)	qc (mV)	qc + fs (mV)	U (mV)				
CPT01.000	0.164	-0.077	0.227	21.896	29.449	-32.349	20.905	27.695	-31.891	0.722	20.3	F5CKEW2V-1314	
CPT02.000	0.168	-0.014	0.240	21.591	30.518	-32.272	21.439	28.076	-31.815	0.700	14.9	F5CKEW2V-1314	
CPT03.000	0.231	0.250	0.329	21.667	27.084	-32.196	21.591	28.000	-32.281	0.702	21.1	F5CKEW2V-1314	
CPT04.000	0.265	0.043	0.392	21.896	30.365	-32.349	21.439	28.152	-31.815	0.676	24.0	F5CKEW2V-1314	
CPT05.000	0.342	0.241	0.477	21.896	29.221	-32.196	21.973	28.305	-31.662	0.717	25.5	F5CKEW2V-1314	
CPT06.000	0.342	0.169	0.485	22.049	29.831	-32.196	21.896	26.932	-31.738	0.705	35.7	F5CKEW2V-1314	
CPT07.000	0.096	0.029	0.133	22.202	28.534	-32.043	21.744	26.474	-31.967	0.722	31.4	F5CKEW2V-1314	
CPT08.000	0.447	0.361	0.618	22.049	29.831	-32.272	21.973	28.390	-32.120	0.723	25.5	F5CKEW2V-1314	
CPT09.000	0.327	0.250	0.536	22.202	30.289	-32.425	22.278	29.297	-32.349	0.610	40.4	F5CKEW2V-1314	
CPT10.000	0.380	0.356	0.593	22.736	30.212	-32.010	22.659	29.755	-32.272	0.641	50.5	F5CKEW2V-1314	
CPT11.000	0.304	0.431	-	15.259	13.504	-	15.793	13.580	-	0.517*	51.1	F8CKEV-1680	
CPT12.000	0.298	0.418	-	14.725	12.970	-	14.877	13.046	-	0.49*	51.8	F8CKEV-1680	
CPT13.000	0.329	0.431	-	14.648	13.046	-	14.725	13.123	-	0.537*	51.7	F8CKEV-1680	
CPT14.000	0.335	0.507	-	14.496	12.817	-	15.488	14.648	-	0.542*	54.2	F8CKEV-1680	
CPT15.000	0.335	0.507	-	15.106	13.657	-	15.106	13.504	-	0.529*	51.8	F8CKEV-1680	
CPT16.000	0.304	0.343	-	14.572	13.199	-	14.572	13.580	-	0.473*	51.7	F8CKEV-1680	
CPT17.000	0.360	0.488	-	14.725	13.657	-	15.335	14.420	-	0.556*	51.4	F8CKEV-1680	
CPT18.000	0.348	0.475	-	15.106	14.114	-	15.488	15.030	-	0.525*	52.7	F8CKEV-1680	
CPT19.000	0.342	0.475	-	15.030	14.801	-	15.182	16.479	-	0.512*	51.2	F8CKEV-1680	
CPT20.000	0.367	0.494	-	14.877	16.479	-	15.106	19.310	-	0.546*	51.5	F8CKEV-1680	
CPT21.000	0.360	0.526	-	15.411	19.760	-	14.725	18.463	-	0.523*	52.9	F8CKEV-1680	
CPT22.000	0.348	0.456	-	14.496	18.062	-	14.648	18.845	-	0.502*	52.1	F8CKEV-1680	
CPT23.000	0.373	0.456	-	14.343	18.539	-	14.877	19.030	-	0.535*	53.4	F8CKEV-1680	

NOTES:
* Value has been calculated using Uniplot

CONE PENETRATION TEST

BH_14

RAMPION OFFSHORE WIND FARM SITE INVESTIGATION

Test No.	ZEROS BEFORE TEST			OFFSETS BEFORE TEST			OFFSETS AFTER TEST			Calculated Alpha Value (-)	Max Thrust (kN)	Cone Serial No.	Remarks
	qc (MPa)	qc + fs (MPa)	U (MPa)	qc (mV)	qc + fs (mV)	U (mV)	qc (mV)	qc + fs (mV)	U (mV)				
CPT01.000	0.284	0.299	0.470	22.812	29.370	-32.501	22.659	29.449	-32.425	0.604	6.2	F5CKEW2/V-1314	Communication Problems No offsets after test
CPT02.000	0.370	0.381	0.556	22.583	29.297	-32.578	22.507	29.068	-32.272	0.665	10.8	F5CKEW2/V-1314	
CPT03.000	0.428	0.448	0.641	22.507	29.144	-32.578	22.125	28.610	-32.190	0.668	24.1	F5CKEW2/V-1314	
CPT04.000	0.423	0.438	0.628	22.430	28.992	-32.578	21.774	28.305	-32.196	0.674	28.2	F5CKEW2/V-1314	
CPT05.000	0.428	0.453	0.649	22.507	28.992	-32.578	21.896	28.458	-32.272	0.659	39.4	F5CKEW2/V-1314	
CPT06.000	0.447	0.458	0.669	22.736	29.449	-32.349	22.507	29.373	-32.272	0.668	50.9	F5CKEW2/V-1314	
CPT07.000	0.481	0.467	0.708	22.507	29.221	-32.425	22.049	29.373	-32.349	0.679	50.9	F5CKEW2/V-1314	
CPT08.000	0.486	0.477	0.722	22.507	29.221	-32.501	22.202	29.330	-32.349	0.673	51.1	F5CKEW2/V-1314	
CPT09.000	0.534	0.530	0.759	22.280	29.144	-32.578	22.354	29.526	-32.501	0.704	50.3	F5CKEW2/V-1314	
CPT10.000	0.606	0.612	0.763	22.278	29.297	-32.501	22.020	29.490	-32.501	0.794	50.1	F5CKEW2/V-1314	
CPT11.000	0.553	0.554	0.769	22.278	28.992	-32.501	22.354	29.373	-32.272	0.719	50.8	F5CKEW2/V-1314	
CPT12.000	0.553	0.520	0.773	22.354	29.678	-32.501	22.430	29.602	-32.272	0.715	50.2	FF5CKEV-1314	
CPT13.000	0.548	0.506	0.773	22.354	29.678	-32.349	22.278	29.449	-32.349	0.709	4.9	FF5CKEV-1314	
CPT14.000	0.544	0.544	0.783	22.583	29.221	-32.501	22.507	29.144	-32.272	0.695	47.9	FF5CKEV-1314	
CPT15.000	0.520	0.515	0.730	22.430	29.068	-32.425	22.125	28.229	-31.967	0.712	37.8	FF5CKEV-1314	
CPT16.000	0.491	0.511	0.724	22.888	29.068	-32.349	22.812	29.373	-32.196	0.678	50.2	FF5CKEV-1314	
CPT17.000	0.539	0.525	0.789	23.117	29.678	-32.272	22.346	21.439	-31.891	0.683	47.3	FF5CKEV-1314	
CPT18.000	0.563	0.568	0.813	22.534	20.905	-32.425	21.515	21.057	-30.594	0.692	50.6	FF5CKEV-1314	
CPT19.000	0.582	0.602	0.861	22.125	21.860	-32.349	21.820	21.973	-31.967	0.676	50.7	FF5CKEV-1314	
CPT20.000	0.434	0.655	-	13.657	79.041	-	13.809	79.041	-	0.549*	20.6	FF8CKEV-1698	
CPT21.000	0.403	0.578	-	13.580	79.193	-	13.809	78.659	-	0.494*	50.2	FF8CKEV-1698	
CPT22.000	0.452	0.661	-	13.046	78.049	-	13.428	78.049	-	0.548*	50.9	FF8CKEV-1698	
CPT23.000	0.489	0.693	-	13.123	77.591	-	-	-	-	0.589*	28.4	FF8CKEV-1698	Communication Problems No offsets after test
CPT24.000	0.427	0.629	-	15.793	81.811	-	15.640	79.269	-	0.505*	45.6	FF8CKEV-1698	
CPT25.000	0.440	0.655	-	15.564	79.119	-	15.869	79.422	-	0.518*	27.0	FF8CKEV-1698	
CPT26.000	0.447	0.680	-	15.564	79.422	-	15.793	79.803	-	0.514*	17.2	FF8CKEV-1698	

NOTES: * Value has been calculated using Uniplot

CONE PENETRATION TEST
BH_16
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION

Test No.	ZEROS BEFORE TEST			OFFSETS BEFORE TEST			OFFSETS AFTER TEST			Calculated Alpha Value (-)	Max Thrust (kN)	Cone Serial No.	Remarks
	qc (MPa)	qc + fs (MPa)	U (MPa)	qc (mV)	qc + fs (mV)	U (mV)	qc (mV)	qc + fs (mV)	U (mV)				
CPT01.000	0.216	0.144	0.309	22.430	30.289	-32.272	21.362	28.839	-32.425	0.699	28.2	FF5CKEN-1314	
CPT02.000	0.284	0.265	0.397	22.202	30.136	-32.501	21.439	28.687	-32.272	0.715	32.8	FF5CKEN-1314	
CPT03.000	0.303	0.275	0.417	21.896	35.095	-32.578	20.981	28.305	-32.196	0.727	37.1	FF5CKEN-1314	
CPT04.000	0.399	-1.652	0.561	21.896	34.790	-36.654	21.286	28.687	-32.043	0.711	46.9	FF5CKEN-1314	
CPT05.000	0.322	-0.751	0.470	22.049	34.332	-32.654	21.591	28.763	-31.586	0.685	30.8	FF5CKEN-1314	
CPT06.000	0.409	-0.978	0.607	22.049	34.332	-32.654	21.591	28.763	-31.586	0.674	24.8	FF5CKEN-1314	
CPT07.000	0.443	-1.223	0.676	22.736	36.621	-32.349	22.278	29.678	-32.196	0.655	42.3	FF5CKEN-1314	
CPT08.000	0.510	-1.262	0.686	23.041	40.665	-32.578	22.583	29.907	-32.272	0.743	46.9	FF5CKEN-1314	
CPT09.000	0.261	0.374	-	15.488	18.997	-	15.259	18.692	-	0.45*	51.5	FF8CKEN-1680	
CPT10.000	0.280	0.368	-	15.259	18.692	-	15.182	19.226	-	0.479*	50.8	FF8CKEN-1680	
CPT11.000	0.261	0.355	-	15.259	19.445	-	15.030	19.073	-	0.442*	53.4	FF8CKEN-1680	
CPT12.000	0.261	0.355	-	14.877	18.692	-	15.182	17.014	-	0.431*	53.4	FF8CKEN-1680	
CPT13.000	0.329	0.475	-	14.725	16.479	-	15.030	17.929	-	0.539*	52.6	FF8CKEN-1680	
CPT14.000	0.323	0.475	-	14.877	17.700	-	14.801	17.471	-	0.525*	1.5	FF8CKEN-1680	
CPT15.000	0.342	0.513	-	15.106	17.700	-	14.725	17.583	-	0.543*	42.3	FF8CKEN-1680	
CPT16.000	0.329	0.488	-	15.182	17.776	-	15.106	18.768	-	0.51*	46.2	FF8CKEN-1680	
CPT17.000	0.329	0.513	-	15.182	18.463	-	15.488	19.150	-	0.506*	51.0	FF8CKEN-1680	High Friction Offset -ok on next test
CPT18.000	0.335	0.513	-	15.564	19.073	-	-	-	-	0.504*	53.2	FF8CKEN-1680	
CPT19.000	0.354	0.513	-	15.335	46.158	-	15.560	47.073	-	0.528*	53.1	FF8CKEN-1860	
CPT20.000	0.342	0.501	-	15.335	64.844	-	-	-	-	0.507*	53.6	FF8CKEN-1860	
CPT21.000	0.341	0.528	-	14.114	23.575	-	-	-	-	0.494*	53.2	FF8CKEN-1860	High Friction Offset
CPT22.000	0.520	-1.146	0.726	22.430	38.300	-32.578	22.430	29.449	-32.349	0.716	53.8	FF5CKEN-1314	High Friction Offset
CPT23.000	0.534	-1.536	0.744	22.202	38.986	-32.730	22.202	29.373	-32.501	0.718	50.8	FF5CKEN-1314	
CPT24.000	0.515	-1.402	0.708	22.202	36.545	-32.730	22.125	29.221	-32.125	0.727	44.1	FF5CKEN-1314	

NOTES: * Value has been calculated using Uniplot

CONE PENETRATION TEST
BH_17
RAMPION OFFSHORE WIND FARM SITE INVESTIGATION

SECTION C.5

FIELD LABORATORY

C.5	FIELD LABORATORY	1
C.5.1	GENERAL	1
C.5.2	SAMPLE HANDLING	1
C.5.3	LABORATORY TESTING	1

C.5 FIELD LABORATORY

C.5.1 GENERAL

This section discusses the sample handling and laboratory testing performed offshore during the Rampion Site Investigation.

The total numbers of each laboratory test are presented in Table C.5-1.

Table C.5-1: Summary of Offshore Laboratory Testing performed from the M/V Fugro Saltire and the M/V Willendeavour

Test Type	No. of Tests
Natural Moisture Content Determination	222
Bulk and Dry Density Determination	216
Pocket Penetrometer Test	118
Torvane Test	32
Unconsolidated Undrained Triaxial Test	30

Details of the laboratory test methods that have been used offshore are presented in Section B.11 of this report.

C.5.2 SAMPLE HANDLING

Immediately after recovery, the samples were extruded from their sample tubes and a visual classification was made. After performing suitable laboratory tests any remaining suitable lengths were cut, tightly wrapped in plastic film and then aluminium foil and placed in a cardboard cylinder. The void between the sample and cylinder was then filled with paraffin wax. Disturbed samples were sealed in plastic bags.

Immediately after recovery, the core liners were split into 1 m sections, and a description of the exposed ends was made. In cohesive soils pocket penetrometers and torvane tests were performed where possible. The sections of core were capped and sealed for transit back to the laboratory.

C.5.3 LABORATORY TESTING

Where deemed appropriate, the following laboratory tests were performed:

- (i) Visual description;
- (ii) Moisture content determination;
- (iii) Bulk and dry density determination;
- (iv) Pocket penetrometer tests;
- (v) Torvane test;
- (vi) Unconsolidated undrained triaxial tests.

The results of all tests are plotted on the borehole logs in Section B.1, and where appropriate the results are summarised on "Summary of Laboratory Test Results" sheets in Section B.2.

The results are generally considered to be of good quality and are representative of the soils that were tested.



SECTION C.6

POSITIONING

C.6	POSITIONING	1
C.6.1	GENERAL	1
C.6.2	PROBLEMS	1

C.6 POSITIONING

C.6.1 GENERAL

A summary of borehole location coordinates and water depth measurements are presented at the end of this section.

Target coordinates for the borehole location was specified by EON, and the actual coordinates were approved prior to borehole and CPT testing operations. The coordinates presented in this report are the calculated location coordinates. Coordinates for all boreholes are expressed using the UTM Zone 30° projection, WGS84 Geodetic Datum with a Central Meridian of 3° East.

Water depths, supplied by FSLTD, have been reduced to Lowest Astronomical Tide (LAT). It should be noted that all water depth measurements made during this investigation are considered sufficiently accurate for geotechnical use, but should not be used in isolation for design purposes.

C.6.2 PROBLEMS

There were no major problems associated with the positioning.



POSITIONING

LIST OF PLATES – SECTION C.6

Description	Plate
FSLTD Survey Data	C.6-1

LOCATION AND DEPTH REPORT



Project No. 11507
Date 04 Apr 2011
Vessel Fugro Saltire
Area Rampion - English Channel
Location BH_2
Survey type Sampling/CPT
Chart Datum LAT

Geodetic Datum WGS84
Projection UTM Zone 30N
Origin Longitude 3°W
Origin Latitude 0°
Hemisphere North
False Easting 500000 m
False Northing 0 m

Location Report BH_2 Location Report.xls

	Easting	Northing
Average position	691041.38	5613643.21 m
Standard deviation	0.09	0.13 m
Intended position	691041.19	5613643.41 m
Difference	0.19	-0.20 m
Range	0.28	m
Bearing	137.35	deg

Depth Report BH_2 Depth Report.xls

	Depth LAT
Probe	32.9 m
Beacon	33.0 m
Drill String	32.7 m
Transducer Depth	0.1 m
Velocity of sound in water	1484.6 m/s
CTD Probe Z offset	3.3 m

For Fugro Survey Ltd

For Fugro Engineers BV

For Client Representative

M. Michalak

H. Pater

P. Watson



LOCATION REPORT

Rampion - English Channel

Location: **BH_2**

Type : Sampling/CPT

Average Position

Standard deviation

Easting (m)

Northing (m)

691041.38

5613643.21

0.09

0.13

Intended position

691041.19

5613643.41

Difference

0.19

-0.20

Distance

0.28 m

Bearing

137.35 deg

Project no:

11507

Date:

4 Apr 2011

Vessel:

Fugro Saltire

Notes:

Datum

WGS84

Projection

UTM Zone 30N

Origin Longitude

3°W

Origin Latitude

0°

Hemisphere

North

False Easting

500000 m

False Northing

0 m

For Fugro Survey Ltd

M.Michalak

For Client

H.Pater

BST	Logged Drill-string Positions		
Time	Fix no.	Easting (m)	Northing (m)
16:07:25	1	691041.53	5613642.93
16:07:28	2	691041.37	5613643.20
16:07:30	3	691041.58	5613643.03
16:07:34	4	691041.47	5613643.31
16:07:36	5	691041.47	5613643.44
16:07:38	6	691041.32	5613643.34
16:07:41	7	691041.45	5613643.31
16:07:43	8	691041.42	5613643.47
16:07:45	9	691041.17	5613643.36
16:07:47	10	691041.27	5613643.39
16:07:49	11	691041.25	5613643.21
16:07:52	12	691041.32	5613643.30
16:07:55	13	691041.31	5613643.19
16:07:57	14	691041.30	5613643.16
16:08:00	15	691041.30	5613643.21
16:08:02	16	691041.43	5613643.22
16:08:04	17	691041.56	5613643.32
16:08:06	18	691041.30	5613643.17
16:08:09	19	691041.43	5613643.31
16:08:11	20	691041.22	5613643.02
16:08:13	21	691041.28	5613643.11
16:08:15	22	691041.32	5613643.30
16:08:16	23	691041.34	5613643.22
16:08:20	24	691041.30	5613643.25
16:08:22	25	691041.33	5613643.15
16:08:22	26	691041.27	5613643.22
16:08:24	27	691041.43	5613643.36
16:08:26	28	691041.32	5613643.32
16:08:28	29	691041.23	5613643.31
16:08:31	30	691041.23	5613643.20
16:08:33	31	691041.25	5613643.28
16:08:37	34	691041.37	5613643.41
16:08:39	35	691041.40	5613643.44
16:08:41	36	691041.23	5613643.23
16:08:45	37	691041.37	5613643.38
16:08:48	38	691041.39	5613643.44
16:08:50	39	691041.29	5613643.31



LOCATION REPORT

16:08:52	40	691041.29	5613643.32
16:08:55	41	691041.34	5613643.36
16:08:57	42	691041.35	5613643.43
16:08:58	43	691041.32	5613643.14
16:08:59	44	691041.42	5613643.23
16:09:01	45	691041.34	5613643.15
16:09:03	46	691041.48	5613643.27
16:09:05	47	691041.25	5613643.25
16:09:08	48	691041.46	5613643.01
16:09:10	49	691041.40	5613642.95
16:09:12	50	691041.40	5613643.07
16:09:13	51	691041.50	5613643.11
16:09:18	52	691041.31	5613643.26
16:09:19	53	691041.48	5613643.08
16:09:20	54	691041.39	5613643.03
16:09:22	55	691041.53	5613643.10
16:09:24	56	691041.59	5613643.19
16:09:27	57	691041.19	5613643.28
16:09:29	58	691041.26	5613643.24
16:09:29	59	691041.62	5613643.30
16:09:31	60	691041.44	5613643.10
16:09:33	61	691041.42	5613643.12
16:09:35	62	691041.67	5613643.21
16:09:42	65	691041.51	5613643.15
16:09:44	66	691041.41	5613642.94
16:09:46	67	691041.49	5613643.13
16:09:50	68	691041.38	5613643.23
16:09:53	69	691041.35	5613643.42
16:09:55	70	691041.33	5613643.32
16:09:55	71	691041.38	5613643.16
16:09:57	72	691041.39	5613643.21
16:09:59	73	691041.33	5613643.08
16:10:01	74	691041.48	5613643.15
16:10:04	75	691041.30	5613643.24
16:10:07	76	691041.40	5613643.24
16:10:09	77	691041.26	5613643.02
16:10:11	78	691041.46	5613643.11
16:10:13	79	691041.60	5613643.18
16:10:16	80	691041.24	5613643.18
16:10:18	81	691041.20	5613643.07
16:10:18	82	691041.34	5613643.02
16:10:20	83	691041.49	5613643.09
16:10:22	84	691041.46	5613643.10
16:10:24	85	691041.59	5613643.20
16:10:27	86	691041.31	5613643.27
16:10:29	87	691041.32	5613643.22
16:10:29	88	691041.41	5613643.06
16:10:31	89	691041.39	5613643.01
16:10:33	90	691041.42	5613643.07
16:10:35	91	691041.37	5613643.04
16:10:40	92	691041.35	5613643.26
16:10:41	93	691041.58	5613643.10
16:10:42	94	691041.45	5613642.92
16:10:44	95	691041.72	5613643.12
16:10:46	96	691041.54	5613642.97
16:10:49	97	691041.41	5613643.23
16:10:52	98	691041.54	5613643.13
16:10:54	99	691041.54	5613643.13
16:10:55	100	691041.54	5613643.12
16:10:57	101	691041.48	5613643.06
16:11:01	102	691041.34	5613643.27
16:11:03	103	691041.38	5613643.02
16:11:04	104	691041.44	5613643.08



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_2

Project no: 11507
Date: 05/04/2011
Instrument: CTD ser no 26326

Latitude :	50.63	N
Start Barometer :	1023	mbar

Gravity =	9.811	m/s ²
Average Density=	1.027	kg/dm ³

Notes:

Depth = $P/d/g \times 10000$ m
Gravity = $9.780318 \times (1 + 0.0052788 \times (\sin(\text{lat})^2 + 0.0000236 \times \sin(\text{lat})^4)) + 0.5 \times 0.000002184 \times P$ m/s²

For Fugro Survey Ltd

For Client

M.Michalak

H.Pater

Probe Readings			
Date	Time	Pressure	Barometer
dd/mm/yyyy	hh:mm:ss	dbar	mbar
04/04/2011	16:07:10	32.259	1023
04/04/2011	16:12:10	32.186	1023
04/04/2011	16:17:10	32.075	1023
04/04/2011	16:22:10	31.981	1023
04/04/2011	16:27:10	31.883	1023
04/04/2011	16:32:10	31.773	1023
04/04/2011	16:37:10	31.693	1023
04/04/2011	16:42:10	31.599	1023
04/04/2011	16:47:10	31.516	1023
04/04/2011	16:52:10	31.420	1023
04/04/2011	16:57:10	31.350	1023
04/04/2011	17:02:10	31.271	1023
04/04/2011	17:07:10	31.179	1023
04/04/2011	17:12:10	31.111	1023
04/04/2011	17:17:10	31.034	1023
04/04/2011	17:22:10	30.964	1023
04/04/2011	17:27:10	30.887	1023
04/04/2011	17:32:10	30.834	1023
04/04/2011	17:37:10	30.789	1023
04/04/2011	17:42:10	30.740	1023
04/04/2011	17:47:10	30.686	1023
04/04/2011	17:52:10	30.641	1023
04/04/2011	17:57:10	30.607	1023
04/04/2011	18:02:10	30.578	1023
04/04/2011	18:07:10	30.562	1023
04/04/2011	18:12:10	30.541	1023
04/04/2011	18:17:10	30.522	1023
04/04/2011	18:22:10	30.510	1023
04/04/2011	18:27:10	30.482	1023
04/04/2011	18:32:10	30.484	1023
04/04/2011	18:37:10	30.487	1023
04/04/2011	18:42:10	30.479	1023
04/04/2011	18:47:10	30.473	1023
04/04/2011	18:52:10	30.490	1023
04/04/2011	18:57:10	30.503	1023
04/04/2011	19:02:10	30.526	1023
04/04/2011	19:07:10	30.551	1023
04/04/2011	19:12:10	30.582	1023
04/04/2011	19:17:10	30.598	1023
04/04/2011	19:22:10	30.635	1023
04/04/2011	19:27:10	30.678	1023
04/04/2011	19:32:10	30.727	1023
04/04/2011	19:37:10	30.782	1023
04/04/2011	19:42:10	30.838	1023

Computed
Depth
m
32.00
31.93
31.82
31.73
31.63
31.52
31.44
31.35
31.27
31.17
31.10
31.02
30.93
30.86
30.79
30.72
30.64
30.59
30.54
30.50
30.44
30.40
30.36
30.34
30.32
30.30
30.28
30.27
30.24
30.24
30.24
30.24
30.23
30.25
30.26
30.28
30.31
30.34
30.36
30.39
30.43
30.48
30.54
30.59



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_2

Project no: 11507
Date: 05/04/2011
Instrument: CTD ser no 26326

04/04/2011	19:47:10	30.895	1023
04/04/2011	19:52:10	30.954	1023
04/04/2011	19:57:10	31.022	1023
04/04/2011	20:02:10	31.084	1023
04/04/2011	20:07:10	31.140	1023
04/04/2011	20:12:10	31.199	1023
04/04/2011	20:17:10	31.267	1023
04/04/2011	20:22:10	31.342	1023
04/04/2011	20:27:10	31.389	1023
04/04/2011	20:32:10	31.461	1023
04/04/2011	20:37:10	31.538	1023
04/04/2011	20:42:10	31.607	1023
04/04/2011	20:47:10	31.669	1023
04/04/2011	20:52:10	31.751	1023
04/04/2011	20:57:10	31.822	1023
04/04/2011	21:02:10	31.897	1023
04/04/2011	21:07:10	31.972	1023
04/04/2011	21:12:10	32.068	1023
04/04/2011	21:17:10	32.155	1023
04/04/2011	21:22:10	32.227	1023
04/04/2011	21:27:10	32.323	1023
04/04/2011	21:32:10	32.423	1023
04/04/2011	21:37:10	32.513	1023
04/04/2011	21:42:10	32.638	1023
04/04/2011	21:47:10	32.746	1023
04/04/2011	21:52:10	32.856	1023
04/04/2011	21:57:10	32.957	1023
04/04/2011	22:02:10	33.059	1023
04/04/2011	22:07:10	33.174	1023
04/04/2011	22:12:10	33.286	1023
04/04/2011	22:17:10	33.409	1023
04/04/2011	22:22:10	33.513	1023
04/04/2011	22:27:10	33.616	1023
04/04/2011	22:32:10	33.734	1023
04/04/2011	22:37:10	33.846	1023
04/04/2011	22:42:10	33.945	1023
04/04/2011	22:47:10	34.054	1023
04/04/2011	22:52:10	34.167	1023
04/04/2011	22:57:10	34.272	1023
04/04/2011	23:02:10	34.373	1023
04/04/2011	23:07:10	34.483	1023
04/04/2011	23:12:10	34.588	1023
04/04/2011	23:17:10	34.670	1023
04/04/2011	23:22:10	34.785	1023
04/04/2011	23:27:10	34.869	1023
04/04/2011	23:32:10	34.950	1023
04/04/2011	23:37:10	35.049	1023
04/04/2011	23:42:10	35.114	1023
04/04/2011	23:47:10	35.176	1023
04/04/2011	23:52:10	35.239	1023
04/04/2011	23:57:10	35.297	1023
05/04/2011	00:02:10	35.358	1022
05/04/2011	00:07:10	35.391	1022
05/04/2011	00:12:10	35.437	1022
05/04/2011	00:17:10	35.477	1022
05/04/2011	00:22:10	35.498	1022
05/04/2011	00:27:10	35.528	1022
05/04/2011	00:32:10	35.545	1022
05/04/2011	00:37:10	35.536	1022
05/04/2011	00:42:10	35.555	1022
05/04/2011	00:47:10	35.542	1022
05/04/2011	00:52:10	35.539	1022
05/04/2011	00:57:10	35.543	1022

30.65
30.71
30.78
30.84
30.89
30.95
31.02
31.09
31.14
31.21
31.29
31.36
31.42
31.50
31.57
31.64
31.72
31.81
31.90
31.97
32.07
32.17
32.25
32.38
32.49
32.60
32.70
32.80
32.91
33.02
33.14
33.25
33.35
33.47
33.58
33.68
33.78
33.90
34.00
34.10
34.21
34.31
34.39
34.51
34.59
34.67
34.77
34.84
34.90
34.96
35.02
35.09
35.12
35.17
35.21
35.23
35.26
35.27
35.26
35.28
35.27
35.27
35.27



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_2

Project no: 11507
Date: 05/04/2011
Instrument: CTD ser no 26326

05/04/2011	01:02:10	35.536	1022
05/04/2011	01:07:10	35.519	1022
05/04/2011	01:12:10	35.519	1022
05/04/2011	01:17:10	35.474	1022
05/04/2011	01:22:10	35.457	1022
05/04/2011	01:27:10	35.430	1022
05/04/2011	01:32:10	35.399	1022
05/04/2011	01:37:10	35.342	1022
05/04/2011	01:42:10	35.302	1022
05/04/2011	01:47:10	35.254	1022
05/04/2011	01:52:10	35.225	1022
05/04/2011	01:57:10	35.160	1022
05/04/2011	02:02:10	35.096	1022
05/04/2011	02:07:10	35.044	1022
05/04/2011	02:12:10	34.983	1022
05/04/2011	02:17:10	34.917	1022
05/04/2011	02:22:10	34.811	1022
05/04/2011	02:27:10	34.747	1022
05/04/2011	02:32:10	34.681	1022
05/04/2011	02:37:10	34.578	1022
05/04/2011	02:42:10	34.498	1022
05/04/2011	02:47:10	34.427	1022
05/04/2011	02:52:10	34.343	1022
05/04/2011	02:57:10	34.245	1022
05/04/2011	03:02:10	34.139	1022
05/04/2011	03:07:10	34.044	1022
05/04/2011	03:12:10	33.949	1022
05/04/2011	03:17:10	33.847	1022
05/04/2011	03:22:10	33.735	1022
05/04/2011	03:27:10	33.628	1022
05/04/2011	03:32:10	33.531	1022
05/04/2011	03:37:10	33.419	1022
05/04/2011	03:42:10	33.321	1022
05/04/2011	03:47:10	33.197	1022
05/04/2011	03:52:10	33.079	1022
05/04/2011	03:57:10	32.975	1022
05/04/2011	04:02:10	32.869	1022
05/04/2011	04:07:10	32.755	1022
05/04/2011	04:12:10	32.651	1022
05/04/2011	04:17:10	32.559	1022
05/04/2011	04:22:10	32.438	1022
05/04/2011	04:27:10	32.328	1022
05/04/2011	04:32:10	32.220	1022
05/04/2011	04:37:10	32.116	1022
05/04/2011	04:42:10	32.021	1022
05/04/2011	04:47:10	31.912	1022
05/04/2011	04:52:10	31.823	1022
05/04/2011	04:57:10	31.709	1022
05/04/2011	05:02:10	31.645	1022
05/04/2011	05:07:10	31.539	1022
05/04/2011	05:12:10	31.454	1022
05/04/2011	05:17:10	31.368	1022
05/04/2011	05:22:10	31.296	1022
05/04/2011	05:27:10	31.218	1022
05/04/2011	05:32:10	31.129	1022
05/04/2011	05:37:10	31.063	1022
05/04/2011	05:42:10	30.991	1022
05/04/2011	05:47:10	30.937	1022
05/04/2011	05:52:10	30.855	1022
05/04/2011	05:57:10	30.827	1022

35.26
35.25
35.25
35.20
35.19
35.16
35.13
35.07
35.03
34.98
34.96
34.89
34.83
34.78
34.72
34.65
34.54
34.48
34.42
34.31
34.23
34.16
34.08
33.98
33.88
33.78
33.69
33.59
33.48
33.37
33.27
33.16
33.07
32.94
32.83
32.72
32.62
32.50
32.40
32.31
32.19
32.08
31.97
31.87
31.78
31.67
31.58
31.47
31.40
31.30
31.21
31.13
31.06
30.98
30.89
30.83
30.75
30.70
30.62
30.59



DEPTH REPORT

Rampion - English Channel

Location: BH_2
Type: Sampling/CPT

Project No.: 11507
Vessel: Fugro Saltire
Chart Datum (C.D.): LAT

Depth Measurements reduced to LAT		
Probe:	32.9	m
Beacon:	33.0	m

Notes:

Data Source: B56
Beacon Z Offset: 1.62 m
Transducer Depth: 0.06 m
Velocity of sound in water: 1484.55 m/s
CTD Probe Z offset: 3.32 m
Standard / Secondary Port: Shoreham
Phase: N/A
Range: N/A

For Fugro Survey Ltd

Client Representative

M.Michalak

H.Pater

Note: other pages should be initialised

Date	Time	Tide	Probe Depth		Time	Fix #	Tide	Beacon Depth	
			Not Red.	Reduced				Not Red.	Reduced
04/04/2011	16:07:10	2.33	32.00	32.99	16:12:59	1	2.23	33.46	32.91
04/04/2011	16:12:10	2.23	31.93	33.02	16:13:04	2	2.21	33.56	33.03
04/04/2011	16:17:10	2.14	31.82	33.00	16:13:10	3	2.21	33.49	32.96
04/04/2011	16:22:10	2.04	31.73	33.00	16:13:15	4	2.21	33.60	33.07
04/04/2011	16:27:10	1.95	31.63	33.00	16:13:20	5	2.21	33.46	32.93
04/04/2011	16:32:10	1.86	31.52	32.98	16:13:25	6	2.21	33.54	33.01
04/04/2011	16:37:10	1.78	31.44	32.98	16:13:30	7	2.21	33.48	32.95
04/04/2011	16:42:10	1.70	31.35	32.97	16:13:35	8	2.21	33.57	33.04
04/04/2011	16:47:10	1.62	31.27	32.97	16:13:40	9	2.21	33.42	32.89
04/04/2011	16:52:10	1.54	31.17	32.95	16:13:45	10	2.21	33.55	33.02
04/04/2011	16:57:10	1.47	31.10	32.95	16:13:50	11	2.21	33.48	32.95
04/04/2011	17:02:10	1.40	31.02	32.95	16:13:55	12	2.21	33.57	33.04
04/04/2011	17:07:10	1.33	30.93	32.92	16:14:00	13	2.19	33.53	33.02
04/04/2011	17:12:10	1.27	30.86	32.92	16:14:05	14	2.19	33.50	32.99
04/04/2011	17:17:10	1.21	30.79	32.90	16:14:10	15	2.19	33.53	33.02
04/04/2011	17:22:10	1.15	30.72	32.89	16:14:15	16	2.19	33.44	32.93
04/04/2011	17:27:10	1.10	30.64	32.86	16:14:20	17	2.19	33.54	33.03
04/04/2011	17:32:10	1.05	30.59	32.85	16:14:25	18	2.19	33.51	33.00
04/04/2011	17:37:10	1.01	30.54	32.85	16:14:30	19	2.19	33.45	32.94
04/04/2011	17:42:10	0.97	30.50	32.84	16:14:35	20	2.19	33.48	32.97
04/04/2011	17:47:10	0.94	30.44	32.83	16:14:40	21	2.19	33.53	33.02
04/04/2011	17:52:10	0.90	30.40	32.81	16:14:45	22	2.19	33.53	33.02
04/04/2011	17:57:10	0.88	30.36	32.81	16:14:50	23	2.19	33.59	33.08
04/04/2011	18:02:10	0.85	30.34	32.80	16:14:55	24	2.19	33.63	33.12
04/04/2011	18:07:10	0.84	30.32	32.80	16:15:00	25	2.18	33.59	33.09
04/04/2011	18:12:10	0.82	30.30	32.80	16:15:05	26	2.18	33.60	33.10
04/04/2011	18:17:10	0.81	30.28	32.79	16:15:10	27	2.18	33.49	32.99
04/04/2011	18:22:10	0.80	30.27	32.78	16:15:15	28	2.18	33.47	32.97
04/04/2011	18:27:10	0.80	30.24	32.76	16:15:20	29	2.18	33.45	32.95
04/04/2011	18:32:10	0.80	30.24	32.76	16:15:25	30	2.18	33.41	32.91
04/04/2011	18:37:10	0.81	30.24	32.76	16:15:31	31	2.18	33.51	33.01
04/04/2011	18:42:10	0.82	30.24	32.74	16:15:36	32	2.18	33.42	32.92
04/04/2011	18:47:10	0.83	30.23	32.72	16:15:41	33	2.18	33.41	32.91
04/04/2011	18:52:10	0.85	30.25	32.72	16:15:46	34	2.18	33.53	33.03
04/04/2011	18:57:10	0.87	30.26	32.71	16:15:51	35	2.18	33.49	32.99



DEPTH REPORT

Rampion - English Channel

04/04/2011	19:02:10	0.89	30.28	32.71	16:15:56	36	2.18	33.59	33.09
04/04/2011	19:07:10	0.92	30.31	32.71	16:16:01	37	2.16	33.53	33.05
04/04/2011	19:12:10	0.95	30.34	32.71	16:16:06	38	2.16	33.41	32.93
04/04/2011	19:17:10	0.99	30.36	32.69	16:16:11	39	2.16	33.52	33.04
04/04/2011	19:22:10	1.03	30.39	32.69	16:16:16	40	2.16	33.52	33.04
04/04/2011	19:27:10	1.07	30.43	32.69	16:16:21	41	2.16	33.54	33.06
04/04/2011	19:32:10	1.12	30.48	32.69	16:16:26	42	2.16	33.50	33.02
04/04/2011	19:37:10	1.17	30.54	32.69	16:16:31	43	2.16	33.44	32.96
04/04/2011	19:42:10	1.22	30.59	32.70	16:16:36	44	2.16	33.34	32.86
04/04/2011	19:47:10	1.27	30.65	32.69	16:16:41	45	2.16	33.50	33.02
04/04/2011	19:52:10	1.33	30.71	32.69	16:16:46	46	2.16	33.27	32.79
04/04/2011	19:57:10	1.40	30.78	32.70	16:16:51	47	2.16	33.31	32.83
04/04/2011	20:02:10	1.46	30.84	32.69	16:16:56	48	2.16	33.51	33.03
04/04/2011	20:07:10	1.53	30.89	32.68	16:17:01	49	2.14	33.34	32.88
04/04/2011	20:12:10	1.61	30.95	32.66	16:17:06	50	2.14	33.34	32.88
04/04/2011	20:17:10	1.68	31.02	32.66	16:17:11	51	2.14	33.43	32.97
04/04/2011	20:22:10	1.76	31.09	32.65	16:17:16	52	2.14	33.32	32.86
04/04/2011	20:27:10	1.84	31.14	32.62	16:17:21	53	2.14	33.39	32.93
04/04/2011	20:32:10	1.93	31.21	32.60	16:17:26	54	2.14	33.41	32.95
04/04/2011	20:37:10	2.01	31.29	32.59	16:17:31	55	2.14	33.38	32.92
04/04/2011	20:42:10	2.10	31.36	32.57	16:17:36	56	2.14	33.51	33.05
04/04/2011	20:47:10	2.20	31.42	32.54	16:17:41	57	2.14	33.49	33.03
04/04/2011	20:52:10	2.29	31.50	32.53	16:17:46	58	2.14	33.26	32.80
04/04/2011	20:57:10	2.39	31.57	32.50	16:17:51	59	2.14	33.38	32.92
04/04/2011	21:02:10	2.49	31.64	32.47	16:17:56	60	2.14	33.22	32.76
04/04/2011	21:07:10	2.59	31.72	32.45	16:18:01	61	2.12	33.33	32.89
04/04/2011	21:12:10	2.69	31.81	32.44	16:18:06	62	2.12	33.46	33.02
04/04/2011	21:17:10	2.80	31.90	32.42	16:18:12	63	2.12	33.34	32.90
04/04/2011	21:22:10	2.91	31.97	32.38	16:18:17	64	2.12	33.36	32.92
04/04/2011	21:27:10	3.01	32.07	32.37	16:18:22	65	2.12	33.45	33.01
04/04/2011	21:32:10	3.12	32.17	32.36	16:18:27	66	2.12	33.53	33.09
04/04/2011	21:37:10	3.24	32.25	32.34	16:18:32	67	2.12	33.45	33.01
04/04/2011	21:42:10	3.35	32.38	32.35	16:18:37	68	2.12	33.46	33.02
04/04/2011	21:47:10	3.46	32.49	32.35	16:18:42	69	2.12	33.41	32.97
04/04/2011	21:52:10	3.57	32.60	32.34	16:18:47	70	2.12	33.4	32.96
04/04/2011	21:57:10	3.68	32.70	32.33	16:18:52	71	2.12	33.52	33.08
04/04/2011	22:02:10	3.80	32.80	32.32	16:18:57	72	2.12	33.46	33.02
04/04/2011	22:07:10	3.91	32.91	32.32	16:19:02	73	2.10	33.44	33.02
04/04/2011	22:12:10	4.02	33.02	32.32	16:19:07	74	2.10	33.38	32.96
04/04/2011	22:17:10	4.13	33.14	32.33	16:19:12	75	2.10	33.43	33.01
04/04/2011	22:22:10	4.24	33.25	32.32	16:19:17	76	2.10	33.46	33.04
04/04/2011	22:27:10	4.35	33.35	32.32	16:19:22	77	2.10	33.39	32.97
04/04/2011	22:32:10	4.46	33.47	32.33	16:19:27	78	2.10	33.44	33.02
04/04/2011	22:37:10	4.56	33.58	32.34	16:19:32	79	2.10	33.35	32.93
04/04/2011	22:42:10	4.67	33.68	32.33	16:19:37	80	2.10	33.44	33.02
04/04/2011	22:47:10	4.77	33.78	32.34	16:19:42	81	2.10	33.45	33.03
04/04/2011	22:52:10	4.86	33.90	32.35	16:19:47	82	2.10	33.26	32.84
04/04/2011	22:57:10	4.96	34.00	32.36	16:19:52	83	2.10	33.36	32.94
04/04/2011	23:02:10	5.05	34.10	32.37	16:19:57	84	2.10	33.31	32.89
04/04/2011	23:07:10	5.14	34.21	32.39	16:20:02	85	2.08	33.34	32.94
04/04/2011	23:12:10	5.22	34.31	32.41	16:20:07	86	2.08	33.45	33.05
04/04/2011	23:17:10	5.30	34.39	32.41	16:20:12	87	2.08	33.31	32.91
04/04/2011	23:22:10	5.38	34.51	32.45	16:20:17	88	2.08	33.28	32.88
04/04/2011	23:27:10	5.45	34.59	32.46	16:20:22	89	2.08	33.41	33.01
04/04/2011	23:32:10	5.52	34.67	32.47	16:20:27	90	2.08	33.41	33.01
04/04/2011	23:37:10	5.59	34.77	32.51	16:20:32	91	2.08	33.41	33.01
04/04/2011	23:42:10	5.64	34.84	32.51	16:20:37	92	2.08	33.25	32.85
04/04/2011	23:47:10	5.70	34.90	32.52	16:20:42	93	2.08	33.46	33.06
04/04/2011	23:52:10	5.75	34.96	32.53	16:20:47	94	2.08	33.34	32.94
04/04/2011	23:57:10	5.80	35.02	32.53	16:20:53	95	2.08	33.34	32.94
05/04/2011	00:02:10	5.83	35.09	32.58	16:20:58	96	2.08	33.33	32.93
05/04/2011	00:07:10	5.86	35.12	32.58	16:21:03	97	2.06	33.41	33.03
05/04/2011	00:12:10	5.89	35.17	32.59	16:21:08	98	2.06	33.39	33.01
05/04/2011	00:17:10	5.92	35.21	32.61	16:21:13	99	2.06	33.32	32.94
05/04/2011	00:22:10	5.93	35.23	32.61	16:21:18	100	2.06	33.5	33.12
05/04/2011	00:27:10	5.95	35.26	32.63	16:21:23	101	2.06	33.44	33.06
05/04/2011	00:32:10	5.95	35.27	32.64					
05/04/2011	00:37:10	5.95	35.26	32.63					

DEPTH REPORT

Rampion - English Channel

05/04/2011	00:42:10	5.95	35.28	32.65
05/04/2011	00:47:10	5.94	35.27	32.65
05/04/2011	00:52:10	5.93	35.27	32.66
05/04/2011	00:57:10	5.91	35.27	32.68
05/04/2011	01:02:10	5.88	35.26	32.70
05/04/2011	01:07:10	5.85	35.25	32.71
05/04/2011	01:12:10	5.82	35.25	32.75
05/04/2011	01:17:10	5.78	35.20	32.74
05/04/2011	01:22:10	5.74	35.19	32.77
05/04/2011	01:27:10	5.69	35.16	32.79
05/04/2011	01:32:10	5.64	35.13	32.81
05/04/2011	01:37:10	5.58	35.07	32.81
05/04/2011	01:42:10	5.52	35.03	32.83
05/04/2011	01:47:10	5.45	34.98	32.85
05/04/2011	01:52:10	5.38	34.96	32.89
05/04/2011	01:57:10	5.31	34.89	32.90
05/04/2011	02:02:10	5.23	34.83	32.91
05/04/2011	02:07:10	5.15	34.78	32.94
05/04/2011	02:12:10	5.07	34.72	32.96
05/04/2011	02:17:10	4.98	34.65	32.98
05/04/2011	02:22:10	4.90	34.54	32.97
05/04/2011	02:27:10	4.80	34.48	33.00
05/04/2011	02:32:10	4.71	34.42	33.03
05/04/2011	02:37:10	4.61	34.31	33.02
05/04/2011	02:42:10	4.52	34.23	33.04
05/04/2011	02:47:10	4.41	34.16	33.07
05/04/2011	02:52:10	4.31	34.08	33.09
05/04/2011	02:57:10	4.21	33.98	33.10
05/04/2011	03:02:10	4.10	33.88	33.10
05/04/2011	03:07:10	3.99	33.78	33.11
05/04/2011	03:12:10	3.89	33.69	33.12
05/04/2011	03:17:10	3.78	33.59	33.13
05/04/2011	03:22:10	3.67	33.48	33.13
05/04/2011	03:27:10	3.56	33.37	33.13
05/04/2011	03:32:10	3.45	33.27	33.15
05/04/2011	03:37:10	3.34	33.16	33.15
05/04/2011	03:42:10	3.23	33.07	33.16
05/04/2011	03:47:10	3.12	32.94	33.15
05/04/2011	03:52:10	3.01	32.83	33.14
05/04/2011	03:57:10	2.90	32.72	33.15
05/04/2011	04:02:10	2.79	32.62	33.15
05/04/2011	04:07:10	2.68	32.50	33.14
05/04/2011	04:12:10	2.58	32.40	33.15
05/04/2011	04:17:10	2.47	32.31	33.16
05/04/2011	04:22:10	2.37	32.19	33.14
05/04/2011	04:27:10	2.27	32.08	33.13



LOCATION AND DEPTH REPORT



Project No. 11507
Date 01 Apr 2011
Vessel Fugro Saltire
Area Rampion - English Channel
Location BH_4
Survey type Sampling/CPT
Chart Datum LAT

Geodetic Datum WGS84
Projection UTM Zone 30N
Origin Longitude 3°W
Origin Latitude 0°
Hemisphere North
False Easting 500000 m
False Northing 0 m

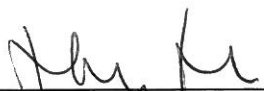
Location Report BH_4 Location Report.xls

	Easting	Northing
Average position	695137.05	5618677.53 m
Standard deviation	0.21	0.16 m
Intended position	695137.10	5618677.60 m
Difference	-0.05	-0.07 m
Range	0.08 m	
Bearing	215.62 deg	

Depth Report BH_4 Depth Report.xls

	Depth LAT
Probe	24.6 m
Beacon	25.1 m
Drill String	24.8 m
Transducer Depth	0.1 m
Velocity of sound in water	1484.3 m/s
CTD Probe Z offset	3.3 m

For Fugro Survey Ltd


M. Michalak

For Fugro Engineers BV


H. Pater

For Client Representative


P. Watson



LOCATION REPORT

Rampion - English Channel

Location: BH_4

Type : Sampling/CPT

Average Position

Standard deviation

Easting (m)

Northing (m)

695137.05

5618677.53

0.21

0.16

Intended position

695137.10

5618677.60

Difference

-0.05

-0.07

Distance

0.08 m

Bearing

215.62 deg

Project no:

11507

Date:

1 Apr 2011

Vessel:

Fugro Saltire

Notes:

Datum

WGS84

Projection

UTM Zone 30N

Origin Longitude

3°W

Origin Latitude

0°

Hemisphere

North

False Easting

500000 m

False Northing

0 m

For Fugro Survey Ltd

For Client

M. Michalak

H. Pater

BST		Logged Drill-string Positions	
Time	Fix no.	Easting (m)	Northing (m)
12:54:47	1	695136.86	5618677.76
12:54:53	2	695136.95	5618677.64
12:54:54	3	695137.24	5618677.20
12:54:56	4	695137.12	5618677.42
12:55:03	5	695136.79	5618677.68
12:55:05	6	695137.33	5618677.34
12:55:09	7	695136.94	5618677.82
12:55:13	8	695136.63	5618677.58
12:55:14	9	695137.06	5618677.64
12:55:16	10	695137.17	5618677.65
12:55:18	11	695137.18	5618677.59
12:55:20	12	695137.01	5618677.45
12:55:25	13	695137.25	5618677.39
12:55:27	14	695137.18	5618677.17
12:55:29	15	695136.96	5618677.78
12:55:31	16	695136.96	5618677.69
12:55:36	17	695137.38	5618677.52
12:55:38	18	695137.36	5618677.33
12:55:40	19	695137.23	5618677.49
12:55:42	20	695137.16	5618677.65
12:55:47	21	695137.31	5618677.62
12:55:49	22	695137.34	5618677.63
12:55:51	23	695137.22	5618677.41
12:55:53	24	695137.04	5618677.62
12:55:58	25	695137.43	5618677.55
12:56:02	26	695137.30	5618677.39
12:56:04	27	695137.11	5618677.55
12:56:09	28	695137.44	5618677.46
12:56:11	29	695137.16	5618677.44
12:56:13	30	695137.24	5618677.34
12:56:20	31	695137.10	5618677.38
12:56:22	32	695137.04	5618677.54
12:56:24	33	695136.99	5618677.61
12:56:26	34	695136.87	5618677.61
12:56:31	35	695137.09	5618677.42
12:56:33	36	695137.31	5618677.45
12:56:35	37	695137.12	5618677.79

Revision: Jan 2010

Page 1 of 2

© Fugro Survey Ltd

BH_4 Location Report.xls



DEPTH REPORT

Rampion - English Channel

Location: BH_4
Type: Sampling/CPT

Project No.: 11507
Vessel: Fugro Saltire
Chart Datum (C.D.): LAT

Depth Measurements reduced to LAT

Probe: 24.6 m
Beacon: 25.1 m

Notes:

Data Source: B56
Beacon Z Offset: 1.62 m
Transducer Depth: 0.06 m
Velocity of sound in water: 1484.30 m/s
CTD Probe Z offset: 3.32 m
Standard / Secondary Port: Shoreham
Phase: N/A
Range: N/A

For Fugro Survey Ltd

Client Representative

M.Michalak

H.Pater

Note: other pages should be initialled

Date	Time	Tide	Probe Depth		Time	Fix #	Tide	Beacon Depth	
			Not Red.	Reduced				Not Red.	Reduced
01/04/2011	12:56:10	4.07	25.75	25.01	12:55:44	1	4.09	27.37	24.97
01/04/2011	13:01:10	3.99	25.66	24.99	12:55:49	2	4.09	27.55	25.15
01/04/2011	13:06:10	3.91	25.58	24.99	12:55:54	3	4.09	27.58	25.18
01/04/2011	13:11:10	3.83	25.51	25.00	12:55:59	4	4.09	27.52	25.12
01/04/2011	13:16:10	3.75	25.42	24.99	12:56:04	5	4.07	27.40	25.01
01/04/2011	13:21:10	3.66	25.33	24.99	12:56:09	6	4.07	27.58	25.19
01/04/2011	13:26:10	3.58	25.23	24.97	12:56:14	7	4.07	27.71	25.32
01/04/2011	13:31:10	3.50	25.17	24.99	12:56:19	8	4.07	27.61	25.22
01/04/2011	13:36:10	3.41	25.11	25.01	12:56:24	9	4.07	27.46	25.07
01/04/2011	13:41:10	3.33	24.94	24.93	12:56:29	10	4.07	27.65	25.26
01/04/2011	13:46:10	3.24	24.88	24.96	12:56:34	11	4.07	27.15	24.76
01/04/2011	13:51:10	3.16	24.76	24.93	12:56:39	12	4.07	27.55	25.16
01/04/2011	13:56:10	3.07	24.71	24.96	12:56:44	13	4.07	27.34	24.95
01/04/2011	14:01:10	2.99	24.62	24.95	12:56:49	14	4.07	27.41	25.02
01/04/2011	14:06:10	2.90	24.53	24.95	12:56:54	15	4.07	27.65	25.26
01/04/2011	14:11:10	2.82	24.42	24.92	12:56:59	16	4.07	27.46	25.07
01/04/2011	14:16:10	2.74	24.37	24.95	12:57:04	17	4.05	27.49	25.12
01/04/2011	14:21:10	2.66	24.27	24.93	12:57:09	18	4.05	27.43	25.06
01/04/2011	14:26:10	2.58	24.12	24.87	12:57:14	19	4.05	27.45	25.08
01/04/2011	14:31:10	2.50	24.04	24.87	12:57:19	20	4.05	27.48	25.11
01/04/2011	14:36:10	2.42	23.97	24.87	12:57:24	21	4.05	27.48	25.11
01/04/2011	14:41:10	2.34	23.87	24.85	12:57:29	22	4.05	27.28	24.91
01/04/2011	14:46:10	2.27	23.73	24.78	12:57:34	23	4.05	27.24	24.87
01/04/2011	14:51:10	2.20	23.70	24.82	12:57:39	24	4.05	27.48	25.11
01/04/2011	14:56:10	2.13	23.59	24.79	12:57:44	25	4.05	27.57	25.20
01/04/2011	15:01:10	2.06	23.54	24.81	12:57:49	26	4.05	27.45	25.08
01/04/2011	15:06:10	1.99	23.43	24.76	12:57:54	27	4.05	27.39	25.02
01/04/2011	15:11:10	1.92	23.33	24.73	12:57:59	28	4.05	27.49	25.12
01/04/2011	15:16:10	1.86	23.27	24.72	12:58:04	29	4.04	27.42	25.06
01/04/2011	15:21:10	1.80	23.21	24.73	12:58:10	30	4.04	27.46	25.10
01/04/2011	15:26:10	1.75	23.10	24.67	12:58:15	31	4.04	27.41	25.05
01/04/2011	15:31:10	1.69	23.06	24.68	12:58:20	32	4.04	27.38	25.02
01/04/2011	15:36:10	1.64	22.98	24.66	12:58:25	33	4.04	27.34	24.98
01/04/2011	15:41:10	1.59	22.93	24.66	12:58:30	34	4.04	27.48	25.12
01/04/2011	15:46:10	1.55	22.85	24.62	12:58:35	35	4.04	27.53	25.17

DEPTH REPORT



Rampion - English Channel

01/04/2011	15:51:10	1.51	22.79	24.61	12:58:40	36	4.04	27.41	25.05
01/04/2011	15:56:10	1.47	22.73	24.58	12:58:45	37	4.04	27.21	24.85
01/04/2011	16:01:10	1.43	22.69	24.58	12:58:50	38	4.04	27.58	25.22
01/04/2011	16:06:10	1.40	22.61	24.53	12:58:55	39	4.04	27.13	24.77
01/04/2011	16:11:10	1.37	22.59	24.54	12:59:00	40	4.02	27.38	25.04
01/04/2011	16:16:10	1.34	22.54	24.51	12:59:05	41	4.02	27.48	25.14
01/04/2011	16:21:10	1.32	22.51	24.51	12:59:10	42	4.02	27.46	25.12
01/04/2011	16:26:10	1.30	22.45	24.47	12:59:15	43	4.02	27.31	24.97
01/04/2011	16:31:10	1.28	22.46	24.49	12:59:20	44	4.02	27.24	24.90
01/04/2011	16:36:10	1.27	22.42	24.46	12:59:25	45	4.02	27.45	25.11
01/04/2011	16:41:10	1.26	22.37	24.43	12:59:30	46	4.02	27.32	24.98
01/04/2011	16:46:10	1.26	22.37	24.43	12:59:35	47	4.02	27.63	25.29
01/04/2011	16:51:10	1.25	22.34	24.40	12:59:40	48	4.02	27.40	25.06
01/04/2011	16:56:10	1.25	22.30	24.37	12:59:45	49	4.02	27.38	25.04
01/04/2011	17:01:10	1.25	22.31	24.37	12:59:50	50	4.02	27.40	25.06
01/04/2011	17:06:10	1.26	22.31	24.37	12:59:55	51	4.02	27.42	25.08
01/04/2011	17:11:10	1.27	22.29	24.34	13:00:00	52	4.01	27.27	24.94
01/04/2011	17:16:10	1.29	22.29	24.33	13:00:05	53	4.01	27.35	25.02
01/04/2011	17:21:10	1.30	22.32	24.34	13:00:10	54	4.01	27.47	25.14
01/04/2011	17:26:10	1.32	22.33	24.32	13:00:15	55	4.01	27.47	25.14
01/04/2011	17:31:10	1.34	22.35	24.33	13:00:20	56	4.01	27.26	24.93
01/04/2011	17:36:10	1.37	22.35	24.31	13:00:25	57	4.01	27.48	25.15
01/04/2011	17:41:10	1.40	22.41	24.34	13:00:30	58	4.01	27.34	25.01
01/04/2011	17:46:10	1.43	22.42	24.30	13:00:35	59	4.01	27.48	25.15
01/04/2011	17:51:10	1.46	22.45	24.31	13:00:40	60	4.01	27.30	24.97
01/04/2011	17:56:10	1.50	22.49	24.31	13:00:46	61	4.01	27.56	25.23
01/04/2011	18:01:10	1.54	22.56	24.33	13:00:51	62	4.01	27.28	24.95
01/04/2011	18:06:10	1.59	22.60	24.33	13:00:56	63	4.01	27.51	25.18
01/04/2011	18:11:10	1.64	22.62	24.31	13:01:01	64	3.99	27.41	25.10
01/04/2011	18:16:10	1.69	22.71	24.34	13:01:06	65	3.99	27.20	24.89
01/04/2011	18:21:10	1.74	22.73	24.32	13:01:11	66	3.99	27.4	25.09
01/04/2011	18:26:10	1.79	22.79	24.31	13:01:16	67	3.99	27.28	24.97
01/04/2011	18:31:10	1.85	22.86	24.33	13:01:21	68	3.99	27.41	25.10
01/04/2011	18:36:10	1.91	22.90	24.31	13:01:26	69	3.99	27.32	25.01
01/04/2011	18:41:10	1.97	22.96	24.30	13:01:31	70	3.99	27.38	25.07
01/04/2011	18:46:10	2.04	23.05	24.33	13:01:36	71	3.99	27.57	25.26
01/04/2011	18:51:10	2.11	23.08	24.29	13:01:41	72	3.99	27.25	24.94
01/04/2011	18:56:10	2.18	23.15	24.29	13:01:46	73	3.99	27.55	25.24
01/04/2011	19:01:10	2.25	23.20	24.28	13:01:51	74	3.99	27.23	24.92
01/04/2011	19:06:10	2.32	23.26	24.26	13:01:56	75	3.99	27.4	25.09
01/04/2011	19:11:10	2.40	23.32	24.24	13:02:01	76	3.97	27.34	25.05
01/04/2011	19:16:10	2.48	23.40	24.24	13:02:06	77	3.97	27.36	25.07
01/04/2011	19:21:10	2.56	23.49	24.25	13:02:11	78	3.97	27.18	24.89
01/04/2011	19:26:10	2.64	23.54	24.22	13:02:16	79	3.97	27.26	24.97
01/04/2011	19:31:10	2.72	23.62	24.21	13:02:21	80	3.97	27.48	25.19
01/04/2011	19:36:10	2.81	23.69	24.20	13:02:26	81	3.97	27.47	25.18
01/04/2011	19:41:10	2.89	23.77	24.19	13:02:31	82	3.97	27.22	24.93
01/04/2011	19:46:10	2.98	23.86	24.20	13:02:36	83	3.97	27.42	25.13
01/04/2011	19:51:10	3.07	23.92	24.17	13:02:41	84	3.97	27.21	24.92
01/04/2011	19:56:10	3.16	24.01	24.17	13:02:46	85	3.97	27.63	25.34
01/04/2011	20:01:10	3.25	24.12	24.19	13:02:51	86	3.97	27.34	25.05
01/04/2011	20:06:10	3.34	24.22	24.20	13:02:56	87	3.97	27.27	24.98
01/04/2011	20:11:10	3.43	24.30	24.18	13:03:01	88	3.96	27.36	25.08
01/04/2011	20:16:10	3.52	24.38	24.18	13:03:06	89	3.96	27.33	25.05
01/04/2011	20:21:10	3.62	24.50	24.20	13:03:11	90	3.96	27.14	24.86
01/04/2011	20:26:10	3.71	24.58	24.19	13:03:16	91	3.96	27.6	25.32
01/04/2011	20:31:10	3.80	24.68	24.20	13:03:22	92	3.96	27.51	25.23
01/04/2011	20:36:10	3.89	24.79	24.22	13:03:27	93	3.96	27.24	24.96
01/04/2011	20:41:10	3.98	24.89	24.23	13:03:32	94	3.96	27.36	25.08
01/04/2011	20:46:10	4.07	25.00	24.25	13:03:37	95	3.96	27.37	25.09
01/04/2011	20:51:10	4.16	25.08	24.24	13:03:42	96	3.96	27.29	25.01
01/04/2011	20:56:10	4.24	25.20	24.28	13:03:47	97	3.96	27.4	25.12
01/04/2011	21:01:10	4.33	25.30	24.29	13:03:52	98	3.96	27.51	25.23
01/04/2011	21:06:10	4.41	25.40	24.31	13:03:57	99	3.96	27.39	25.11
01/04/2011	21:11:10	4.49	25.49	24.32	13:04:02	100	3.94	27.39	25.13
01/04/2011	21:16:10	4.57	25.59	24.34	13:04:07	101	3.94	27.31	25.05
01/04/2011	21:21:10	4.65	25.70	24.37					
01/04/2011	21:26:10	4.72	25.82	24.41					

DEPTH REPORT

Rampion - English Channel

01/04/2011	21:31:10	4.80	25.91	24.43
01/04/2011	21:36:10	4.87	26.00	24.45
01/04/2011	21:41:10	4.93	26.06	24.44
01/04/2011	21:46:10	5.00	26.18	24.50
01/04/2011	21:51:10	5.06	26.24	24.51
01/04/2011	21:56:10	5.11	26.34	24.55
01/04/2011	22:01:10	5.17	26.45	24.61
01/04/2011	22:06:10	5.22	26.50	24.61
01/04/2011	22:11:10	5.26	26.59	24.65
01/04/2011	22:16:10	5.30	26.65	24.66
01/04/2011	22:21:10	5.34	26.67	24.64
01/04/2011	22:26:10	5.37	26.74	24.69
01/04/2011	22:31:10	5.41	26.82	24.74
01/04/2011	22:36:10	5.43	26.81	24.70
01/04/2011	22:41:10	5.45	26.87	24.74
01/04/2011	22:46:10	5.47	26.92	24.77
01/04/2011	22:51:10	5.48	26.92	24.76
01/04/2011	22:56:10	5.49	26.95	24.78
01/04/2011	23:01:10	5.49	26.98	24.81
01/04/2011	23:06:10	5.49	26.96	24.79
01/04/2011	23:11:10	5.49	26.94	24.77
01/04/2011	23:16:10	5.48	26.99	24.83
01/04/2011	23:21:10	5.47	26.97	24.82
01/04/2011	23:26:10	5.45	26.93	24.80
01/04/2011	23:31:10	5.43	26.99	24.88
01/04/2011	23:36:10	5.40	26.96	24.88
01/04/2011	23:41:10	5.37	26.98	24.92
01/04/2011	23:46:10	5.34	26.96	24.94
01/04/2011	23:51:10	5.31	26.94	24.96
01/04/2011	23:56:10	5.27	26.87	24.92
02/04/2011	00:01:10	5.22	26.87	24.97
02/04/2011	00:06:10	5.17	26.81	24.96
02/04/2011	00:11:10	5.12	26.79	24.99
02/04/2011	00:16:10	5.06	26.73	24.99
02/04/2011	00:21:10	5.01	26.72	25.04
02/04/2011	00:26:10	4.95	26.64	25.01
02/04/2011	00:31:10	4.88	26.64	25.07
02/04/2011	00:36:10	4.82	26.51	25.02
02/04/2011	00:41:10	4.75	26.47	25.04
02/04/2011	00:46:10	4.67	26.36	25.00
02/04/2011	00:51:10	4.60	26.31	25.03
02/04/2011	00:56:10	4.52	26.31	25.10
02/04/2011	01:01:10	4.44	26.21	25.09
02/04/2011	01:06:10	4.36	26.12	25.08
02/04/2011	01:11:10	4.28	26.04	25.08
02/04/2011	01:16:10	4.20	25.95	25.07





PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_4

Project no: 11507
Date: 02/04/2011
Instrument: CTD ser no 26326

Latitude :	50.68	N
Start Barometer :	1019	mbar

Gravity =	9.811	m/s ²
Average Density=	1.027	kg/dm ³

Notes:

Depth = $P/d/g \times 10000$ m

Gravity = $9.780318 \times (1 + 0.0052788 \times (\sin(\text{lat})^2 + 0.0000236 \times \sin(\text{lat})^4)) + 0.5 \times 0.000002184 \times P$ m/s²

For Fugro Survey Ltd

For Client

M.Michalak

H.Pater

Probe Readings			
Date	Time	Pressure	Barometer
dd/mm/yyyy	hh:mm:ss	dbar	mbar
01/04/2011	12:56:10	25.960	1019
01/04/2011	13:01:10	25.862	1019
01/04/2011	13:06:10	25.787	1019
01/04/2011	13:11:10	25.717	1019
01/04/2011	13:16:10	25.620	1019
01/04/2011	13:21:10	25.535	1019
01/04/2011	13:26:10	25.433	1019
01/04/2011	13:31:10	25.371	1019
01/04/2011	13:36:10	25.306	1019
01/04/2011	13:41:10	25.140	1019
01/04/2011	13:46:10	25.077	1019
01/04/2011	13:51:10	24.962	1019
01/04/2011	13:56:10	24.906	1019
01/04/2011	14:01:10	24.814	1019
01/04/2011	14:06:10	24.729	1019
01/04/2011	14:11:10	24.617	1019
01/04/2011	14:16:10	24.564	1019
01/04/2011	14:21:10	24.460	1019
01/04/2011	14:26:10	24.314	1019
01/04/2011	14:31:10	24.233	1019
01/04/2011	14:36:10	24.159	1019
01/04/2011	14:41:10	24.058	1019
01/04/2011	14:46:10	23.916	1019
01/04/2011	14:51:10	23.887	1019
01/04/2011	14:56:10	23.780	1019
01/04/2011	15:01:10	23.729	1019
01/04/2011	15:06:10	23.617	1019
01/04/2011	15:11:10	23.519	1019
01/04/2011	15:16:10	23.452	1019
01/04/2011	15:21:10	23.399	1019
01/04/2011	15:26:10	23.283	1019
01/04/2011	15:31:10	23.242	1019
01/04/2011	15:36:10	23.163	1019
01/04/2011	15:41:10	23.113	1019
01/04/2011	15:46:10	23.029	1019
01/04/2011	15:51:10	22.974	1019
01/04/2011	15:56:10	22.911	1019
01/04/2011	16:01:10	22.860	1018
01/04/2011	16:06:10	22.781	1018
01/04/2011	16:11:10	22.760	1018
01/04/2011	16:16:10	22.705	1018
01/04/2011	16:21:10	22.675	1018
01/04/2011	16:26:10	22.618	1018
01/04/2011	16:31:10	22.627	1018

Computed
Depth
m
25.75
25.66
25.58
25.51
25.42
25.33
25.23
25.17
25.11
24.94
24.88
24.76
24.71
24.62
24.53
24.42
24.37
24.27
24.12
24.04
23.97
23.87
23.73
23.70
23.59
23.54
23.43
23.33
23.27
23.21
23.10
23.06
22.98
22.93
22.85
22.79
22.73
22.69
22.61
22.59
22.54
22.51
22.45
22.46



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_4

Project no: 11507
Date: 02/04/2011
Instrument: CTD ser no 26326

01/04/2011	16:36:10	22.585	1018
01/04/2011	16:41:10	22.536	1018
01/04/2011	16:46:10	22.536	1018
01/04/2011	16:51:10	22.504	1018
01/04/2011	16:56:10	22.470	1018
01/04/2011	17:01:10	22.464	1017
01/04/2011	17:06:10	22.470	1017
01/04/2011	17:11:10	22.447	1017
01/04/2011	17:16:10	22.449	1017
01/04/2011	17:21:10	22.478	1017
01/04/2011	17:26:10	22.484	1017
01/04/2011	17:31:10	22.511	1017
01/04/2011	17:36:10	22.513	1017
01/04/2011	17:41:10	22.573	1017
01/04/2011	17:46:10	22.574	1017
01/04/2011	17:51:10	22.612	1017
01/04/2011	17:56:10	22.651	1017
01/04/2011	18:01:10	22.708	1016
01/04/2011	18:06:10	22.750	1016
01/04/2011	18:11:10	22.771	1016
01/04/2011	18:16:10	22.860	1016
01/04/2011	18:21:10	22.886	1016
01/04/2011	18:26:10	22.939	1016
01/04/2011	18:31:10	23.008	1016
01/04/2011	18:36:10	23.057	1016
01/04/2011	18:41:10	23.110	1016
01/04/2011	18:46:10	23.199	1016
01/04/2011	18:51:10	23.231	1016
01/04/2011	18:56:10	23.303	1016
01/04/2011	19:01:10	23.358	1016
01/04/2011	19:06:10	23.416	1016
01/04/2011	19:11:10	23.478	1016
01/04/2011	19:16:10	23.559	1016
01/04/2011	19:21:10	23.643	1016
01/04/2011	19:26:10	23.701	1016
01/04/2011	19:31:10	23.775	1016
01/04/2011	19:36:10	23.849	1016
01/04/2011	19:41:10	23.929	1016
01/04/2011	19:46:10	24.019	1016
01/04/2011	19:51:10	24.081	1016
01/04/2011	19:56:10	24.172	1016
01/04/2011	20:01:10	24.284	1016
01/04/2011	20:06:10	24.380	1016
01/04/2011	20:11:10	24.461	1016
01/04/2011	20:16:10	24.545	1016
01/04/2011	20:21:10	24.665	1016
01/04/2011	20:26:10	24.748	1016
01/04/2011	20:31:10	24.842	1016
01/04/2011	20:36:10	24.960	1016
01/04/2011	20:41:10	25.056	1016
01/04/2011	20:46:10	25.169	1016
01/04/2011	20:51:10	25.247	1016
01/04/2011	20:56:10	25.372	1016
01/04/2011	21:01:10	25.465	1015
01/04/2011	21:06:10	25.563	1015
01/04/2011	21:11:10	25.656	1015
01/04/2011	21:16:10	25.758	1015
01/04/2011	21:21:10	25.861	1015
01/04/2011	21:26:10	25.981	1015
01/04/2011	21:31:10	26.076	1015
01/04/2011	21:36:10	26.165	1015
01/04/2011	21:41:10	26.226	1015
01/04/2011	21:46:10	26.344	1015

22.42
22.37
22.37
22.34
22.30
22.31
22.31
22.29
22.29
22.32
22.33
22.35
22.35
22.41
22.42
22.45
22.49
22.56
22.60
22.62
22.71
22.73
22.79
22.86
22.90
22.96
23.05
23.08
23.15
23.20
23.26
23.32
23.40
23.49
23.54
23.62
23.69
23.77
23.86
23.92
24.01
24.12
24.22
24.30
24.38
24.50
24.58
24.68
24.79
24.89
25.00
25.08
25.20
25.30
25.40
25.49
25.59
25.70
25.82
25.91
26.00
26.06
26.18



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_4

Project no: 11507
Date: 02/04/2011
Instrument: CTD ser no 26326

01/04/2011	21:51:10	26.414	1015
01/04/2011	21:56:10	26.510	1015
01/04/2011	22:01:10	26.624	1015
01/04/2011	22:06:10	26.673	1015
01/04/2011	22:11:10	26.761	1015
01/04/2011	22:16:10	26.819	1015
01/04/2011	22:21:10	26.839	1015
01/04/2011	22:26:10	26.914	1015
01/04/2011	22:31:10	26.997	1015
01/04/2011	22:36:10	26.987	1015
01/04/2011	22:41:10	27.049	1015
01/04/2011	22:46:10	27.091	1015
01/04/2011	22:51:10	27.097	1015
01/04/2011	22:56:10	27.122	1015
01/04/2011	23:01:10	27.160	1015
01/04/2011	23:06:10	27.135	1015
01/04/2011	23:11:10	27.110	1015
01/04/2011	23:16:10	27.166	1015
01/04/2011	23:21:10	27.144	1015
01/04/2011	23:26:10	27.106	1015
01/04/2011	23:31:10	27.163	1015
01/04/2011	23:36:10	27.133	1015
01/04/2011	23:41:10	27.154	1015
01/04/2011	23:46:10	27.131	1015
01/04/2011	23:51:10	27.117	1015
01/04/2011	23:56:10	27.042	1015
02/04/2011	00:01:10	27.050	1016
02/04/2011	00:06:10	26.989	1016
02/04/2011	00:11:10	26.977	1016
02/04/2011	00:16:10	26.912	1016
02/04/2011	00:21:10	26.905	1016
02/04/2011	00:26:10	26.818	1016
02/04/2011	00:31:10	26.819	1016
02/04/2011	00:36:10	26.695	1016
02/04/2011	00:41:10	26.648	1016
02/04/2011	00:46:10	26.538	1016
02/04/2011	00:51:10	26.491	1016
02/04/2011	00:56:10	26.486	1016
02/04/2011	01:01:10	26.391	1016
02/04/2011	01:06:10	26.290	1015
02/04/2011	01:11:10	26.207	1015
02/04/2011	01:16:10	26.115	1015
02/04/2011	01:21:10	26.016	1015
02/04/2011	01:26:10	25.941	1015
02/04/2011	01:31:10	25.837	1015
02/04/2011	01:36:10	25.770	1015
02/04/2011	01:41:10	25.710	1015
02/04/2011	01:46:10	25.592	1015
02/04/2011	01:51:10	25.511	1015
02/04/2011	01:56:10	25.406	1015
02/04/2011	02:01:10	25.350	1015
02/04/2011	02:06:10	25.204	1014
02/04/2011	02:11:10	25.129	1014
02/04/2011	02:16:10	24.978	1014
02/04/2011	02:21:10	24.892	1014
02/04/2011	02:26:10	24.814	1014
02/04/2011	02:31:10	24.695	1014
02/04/2011	02:36:10	24.589	1014
02/04/2011	02:41:10	24.487	1014
02/04/2011	02:46:10	24.381	1014
02/04/2011	02:51:10	24.264	1014
02/04/2011	02:56:10	24.204	1014
02/04/2011	03:01:10	24.126	1014

26.24
26.34
26.45
26.50
26.59
26.65
26.67
26.74
26.82
26.81
26.87
26.92
26.92
26.95
26.98
26.96
26.94
26.99
26.97
26.93
26.99
26.96
26.98
26.96
26.94
26.87
26.87
26.81
26.79
26.73
26.72
26.64
26.64
26.51
26.47
26.36
26.31
26.31
26.21
26.12
26.04
25.95
25.85
25.78
25.67
25.61
25.55
25.43
25.35
25.24
25.19
25.05
24.98
24.83
24.74
24.67
24.55
24.44
24.34
24.24
24.12
24.06
23.98



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_4

Project no: 11507
Date: 02/04/2011
Instrument: CTD ser no 26326

02/04/2011	03:06:10	24.029	1014
02/04/2011	03:11:10	23.924	1014
02/04/2011	03:16:10	23.819	1014
02/04/2011	03:21:10	23.728	1014
02/04/2011	03:26:10	23.620	1014
02/04/2011	03:31:10	23.572	1014
02/04/2011	03:36:10	23.468	1014
02/04/2011	03:41:10	23.400	1013
02/04/2011	03:46:10	23.285	1013
02/04/2011	03:51:10	23.209	1013
02/04/2011	03:56:10	23.131	1013
02/04/2011	04:01:10	23.092	1013
02/04/2011	04:06:10	23.021	1013
02/04/2011	04:11:10	22.927	1013
02/04/2011	04:16:10	22.884	1012
02/04/2011	04:21:10	22.826	1012
02/04/2011	04:26:10	22.766	1012
02/04/2011	04:31:10	22.742	1012
02/04/2011	04:36:10	22.686	1012
02/04/2011	04:41:10	22.632	1012
02/04/2011	04:46:10	22.613	1012
02/04/2011	04:51:10	22.549	1011
02/04/2011	04:56:10	22.532	1011
02/04/2011	05:01:10	22.494	1011
02/04/2011	05:06:10	22.505	1011
02/04/2011	05:11:10	22.487	1011
02/04/2011	05:16:10	22.491	1011
02/04/2011	05:21:10	22.486	1011
02/04/2011	05:26:10	22.463	1010
02/04/2011	05:31:10	22.502	1010
02/04/2011	05:36:10	22.482	1010
02/04/2011	05:41:10	22.489	1010
02/04/2011	05:46:10	22.517	1010
02/04/2011	05:51:10	22.535	1010
02/04/2011	05:56:10	22.553	1010
02/04/2011	06:01:10	22.582	1009
02/04/2011	06:06:10	22.619	1009
02/04/2011	06:11:10	22.663	1009
02/04/2011	06:16:10	22.688	1009
02/04/2011	06:21:10	22.727	1009
02/04/2011	06:26:10	22.781	1009
02/04/2011	06:31:10	22.831	1009
02/04/2011	06:36:10	22.879	1009
02/04/2011	06:41:10	22.934	1009
02/04/2011	06:46:10	22.982	1009
02/04/2011	06:51:10	23.063	1009
02/04/2011	06:56:10	23.112	1009
02/04/2011	07:01:10	23.165	1009
02/04/2011	07:06:10	23.229	1008
02/04/2011	07:11:10	23.288	1008
02/04/2011	07:16:10	23.351	1008
02/04/2011	07:21:10	23.414	1008
02/04/2011	07:26:10	23.460	1008
02/04/2011	07:31:10	23.539	1008
02/04/2011	07:36:10	23.582	1008
02/04/2011	07:41:10	23.655	1008
02/04/2011	07:46:10	23.748	1008
02/04/2011	07:51:10	23.821	1008
02/04/2011	07:56:10	23.918	1008
02/04/2011	08:01:10	24.007	1007
02/04/2011	08:06:10	24.103	1007
02/04/2011	08:11:10	24.187	1007
02/04/2011	08:16:10	24.294	1007

23.89
23.78
23.68
23.59
23.48
23.44
23.33
23.27
23.16
23.08
23.01
22.97
22.90
22.81
22.77
22.71
22.66
22.63
22.58
22.52
22.50
22.45
22.43
22.40
22.41
22.39
22.39
22.39
22.37
22.41
22.39
22.40
22.43
22.45
22.46
22.50
22.54
22.58
22.61
22.65
22.70
22.75
22.80
22.85
22.90
22.98
23.03
23.08
23.15
23.21
23.28
23.34
23.38
23.46
23.50
23.58
23.67
23.74
23.84
23.94
24.03
24.11
24.22

LOCATION AND DEPTH REPORT



Project No. 11507
Date 02 Apr 2011
Vessel Fugro Saltire
Area Rampion - English Channel
Location BH_4a
Survey type Sampling/CPT
Chart Datum LAT

Geodetic Datum WGS84
Projection UTM Zone 30N
Origin Longitude 3°W
Origin Latitude 0°
Hemisphere North
False Easting 500000 m
False Northing 0 m

Location Report BH_4a Location Report.xls

	Easting	Northing
Average position	695142.21	5618678.17 m
Standard deviation	0.13	0.18 m
Intended position	695137.10	5618677.60 m
Difference	5.11	0.57 m
Range	5.14 m	
Bearing	083.63 deg	

Depth Report BH_4a Depth Report.xls

	Depth LAT
Probe	24.8 m
Beacon	24.3 m
Drill String	24.0 m
Transducer Depth	0.1 m
Velocity of sound in water	1484.3 m/s
CTD Probe Z offset	3.3 m

For Fugro Survey Ltd

For Fugro Engineers BV

For Client Representative

M. Michalak
H. Pater
P. Watson



LOCATION REPORT

Rampion - English Channel

Location: **BH_4a**
 Type : Sampling/CPT
 Average Position
 Standard deviation

Easting (m)	Northing (m)
695142.21	5618678.17
0.13	0.18

Project no: 11507
 Date: 2 Apr 2011
 Vessel: Fugro Saltire

Intended position
 Difference
 Distance
 Bearing

Easting (m)	Northing (m)
695137.10	5618677.60
5.11	0.57
5.14 m	
83.63 deg	

Notes:
 Datum WGS84
 Projection UTM Zone 30N
 Origin Longitude 3°W
 Origin Latitude 0°
 Hemisphere North
 False Easting 500000 m
 False Northing 0 m

For Fugro Survey Ltd

M.Michalak

For Client

H.Pater

BST		Logged Drill-string Positions	
Time	Fix no.	Easting (m)	Northing (m)
09:34:56	1	695142.39	5618678.18
09:34:57	2	695142.47	5618678.13
09:34:59	3	695142.45	5618678.01
09:35:00	4	695142.35	5618678.15
09:35:02	5	695142.41	5618678.02
09:35:03	6	695142.46	5618678.07
09:35:05	7	695142.36	5618678.03
09:35:06	8	695142.37	5618678.17
09:35:08	9	695142.07	5618678.15
09:35:09	10	695141.85	5618678.36
09:35:10	11	695142.05	5618678.22
09:35:12	12	695142.23	5618678.12
09:35:13	13	695142.20	5618678.10
09:35:15	14	695142.22	5618678.21
09:35:16	15	695142.04	5618678.42
09:35:19	17	695142.21	5618678.52
09:35:20	18	695142.19	5618678.24
09:35:22	19	695142.30	5618677.99
09:35:23	20	695142.27	5618678.27
09:35:25	21	695142.37	5618678.23
09:35:26	22	695142.05	5618678.52
09:35:28	23	695142.05	5618678.52
09:35:29	24	695142.26	5618678.28
09:35:30	25	695142.35	5618678.17
09:35:32	26	695142.39	5618677.98
09:35:33	27	695142.37	5618678.03
09:35:35	28	695142.31	5618678.27
09:35:36	29	695142.27	5618678.40
09:35:38	30	695142.19	5618678.11
09:35:39	31	695142.21	5618677.95
09:35:40	32	695142.28	5618678.21
09:35:42	33	695142.39	5618678.21
09:35:43	34	695142.38	5618678.28
09:35:45	35	695142.33	5618678.28
09:35:46	36	695142.19	5618678.35
09:35:48	37	695142.30	5618677.87
09:35:49	38	695142.23	5618678.03

LOCATION REPORT

09:35:51	39	695142.16	5618677.94
09:35:52	40	695142.32	5618678.18
09:35:54	41	695142.17	5618678.21
09:35:57	43	695142.20	5618677.92
09:35:58	44	695142.24	5618677.92
09:35:59	45	695142.28	5618678.52
09:36:01	46	695142.21	5618678.41
09:36:04	47	695142.20	5618678.42
09:36:05	48	695142.17	5618678.28
09:36:07	49	695142.06	5618677.93
09:36:08	50	695142.13	5618677.91
09:36:09	51	695142.27	5618678.01
09:36:11	52	695142.11	5618677.92
09:36:12	53	695142.21	5618678.09
09:36:14	54	695142.13	5618678.13
09:36:15	55	695142.18	5618678.31
09:36:18	57	695142.04	5618677.82
09:36:23	60	695142.15	5618678.38
09:36:24	61	695142.41	5618678.40
09:36:25	62	695142.01	5618678.22
09:36:27	63	695141.92	5618678.11
09:36:28	64	695142.09	5618678.08
09:36:30	65	695142.00	5618678.07
09:36:31	66	695142.13	5618677.94
09:36:33	67	695142.22	5618678.08
09:36:34	68	695142.06	5618678.27
09:36:36	69	695142.07	5618678.23
09:36:39	71	695141.90	5618678.40
09:36:40	72	695142.13	5618678.01
09:36:41	73	695142.11	5618678.07
09:36:43	74	695142.18	5618678.03
09:36:44	75	695142.09	5618678.25
09:36:46	76	695142.09	5618678.44
09:36:47	77	695141.88	5618678.27
09:36:49	78	695142.09	5618677.99
09:36:50	79	695142.16	5618678.20
09:36:53	81	695142.16	5618678.14
09:36:54	82	695142.05	5618678.25
09:36:56	83	695142.12	5618678.40
09:36:57	84	695142.18	5618678.11
09:36:59	85	695142.19	5618678.00
09:37:00	86	695142.32	5618677.86
09:37:02	87	695142.31	5618678.15
09:37:03	88	695142.31	5618678.06
09:37:08	89	695142.31	5618678.29
09:37:09	90	695142.23	5618678.18
09:37:10	91	695142.28	5618678.24
09:37:12	92	695142.43	5618678.40
09:37:13	93	695142.36	5618678.28
09:37:15	94	695142.38	5618678.09
09:37:16	95	695142.52	5618678.10
09:37:19	96	695142.12	5618678.60
09:37:20	97	695142.16	5618678.39
09:37:22	98	695142.05	5618678.33
09:37:23	99	695142.16	5618678.08
09:37:25	100	695142.19	5618678.31
09:37:26	101	695142.14	5618678.26
09:37:32	105	695142.12	5618678.35
09:37:33	106	695142.02	5618677.94
09:37:35	107	695142.07	5618678.18
09:37:36	108	695141.94	5618678.38
09:37:39	110	695141.81	5618678.27
09:37:41	111	695142.02	5618678.44





DEPTH REPORT

Rampion - English Channel

Location: BH_4a
Type: Sampling/CPT

Project No.: 11507
Vessel: Fugro Saltire
Chart Datum (C.D.): LAT

Depth Measurements reduced to LAT

Probe:	24.8	m
Beacon:	24.3	m

Notes:

Data Source: B56
Beacon Z Offset: 1.62 m
Transducer Depth: 0.06 m
Velocity of sound in water: 1484.30 m/s
CTD Probe Z offset: 3.32 m
Standard / Secondary Port: Shoreham
Phase: N/A
Range: N/A

For Fugro Survey Ltd

Client Representative

M.Michalak

Note: other pages should be initialised

H.Pater

Date	Time	Tide	Probe Depth		Time	Fix #	Tide	Beacon Depth	
			Not Red.	Reduced				Not Red.	Reduced
02/04/2011	09:36:10	4.61	25.80	24.51	09:31:07	1	4.53	27.24	24.39
02/04/2011	09:41:10	4.69	25.89	24.52	09:31:12	2	4.53	27.05	24.20
02/04/2011	09:46:10	4.77	26.03	24.58	09:31:17	3	4.53	27.29	24.44
02/04/2011	09:51:10	4.84	26.10	24.58	09:31:22	4	4.53	27.13	24.28
02/04/2011	09:56:10	4.91	26.21	24.62	09:31:27	5	4.53	27.21	24.36
02/04/2011	10:01:10	4.98	26.31	24.65	09:31:32	6	4.53	27.01	24.16
02/04/2011	10:06:10	5.04	26.38	24.66	09:31:37	7	4.53	27.26	24.41
02/04/2011	10:11:10	5.10	26.49	24.71	09:31:42	8	4.53	27.15	24.30
02/04/2011	10:16:10	5.16	26.54	24.71	09:31:47	9	4.53	27.29	24.44
02/04/2011	10:21:10	5.21	26.64	24.75	09:31:52	10	4.53	27.06	24.21
02/04/2011	10:26:10	5.26	26.73	24.79	09:31:57	11	4.53	27.24	24.39
02/04/2011	10:31:10	5.30	26.77	24.78	09:32:02	12	4.55	27.09	24.22
02/04/2011	10:36:10	5.34	26.83	24.80	09:32:07	13	4.55	27.26	24.39
02/04/2011	10:41:10	5.38	26.85	24.79	09:32:12	14	4.55	27.04	24.17
02/04/2011	10:46:10	5.41	26.93	24.84	09:32:17	15	4.55	27.18	24.31
02/04/2011	10:51:10	5.44	26.93	24.81	09:32:22	16	4.55	26.99	24.12
02/04/2011	10:56:10	5.46	27.01	24.87	09:32:27	17	4.55	27.37	24.50
02/04/2011	11:01:10	5.48	26.99	24.83	09:32:32	18	4.55	27.45	24.58
02/04/2011	11:06:10	5.49	27.01	24.84	09:32:37	19	4.55	27.12	24.25
02/04/2011	11:11:10	5.50	27.07	24.89	09:32:42	20	4.55	27.36	24.49
02/04/2011	11:16:10	5.51	27.09	24.90	09:32:48	21	4.55	27.27	24.40
02/04/2011	11:21:10	5.51	27.05	24.86	09:32:53	22	4.55	27.07	24.20
02/04/2011	11:26:10	5.50	27.06	24.88	09:32:58	23	4.55	27.28	24.41
02/04/2011	11:31:10	5.49	27.07	24.90	09:33:03	24	4.56	27.07	24.19
					09:33:08	25	4.56	27.30	24.42
					09:33:13	26	4.56	27.52	24.64
					09:33:18	27	4.56	27.17	24.29
					09:33:23	28	4.56	27.41	24.53
					09:33:28	29	4.56	27.18	24.30
					09:33:33	30	4.56	27.45	24.57
					09:33:38	31	4.56	27.26	24.38
					09:33:43	32	4.56	27.34	24.46
					09:33:48	33	4.56	27.25	24.37
					09:33:53	34	4.56	27.25	24.37
					09:33:58	35	4.56	27.15	24.27

DEPTH REPORT



Rampion - English Channel

09:34:03	36	4.58	27.08	24.18
09:34:08	37	4.58	27.12	24.22
09:34:13	38	4.58	27.09	24.19
09:34:18	39	4.58	27.17	24.27
09:34:23	40	4.58	27.01	24.11
09:34:28	41	4.58	27.26	24.36
09:34:33	42	4.58	27.39	24.49
09:34:38	43	4.58	27.25	24.35
09:34:43	44	4.58	27.29	24.39
09:34:48	45	4.58	27.30	24.40
09:34:53	46	4.58	27.34	24.44
09:34:58	47	4.58	27.36	24.46
09:35:03	48	4.59	27.30	24.39
09:35:08	49	4.59	27.33	24.42
09:35:13	50	4.59	27.24	24.33
09:35:18	51	4.59	27.13	24.22
09:35:24	52	4.59	27.32	24.41
09:35:29	53	4.59	27.15	24.24
09:35:34	54	4.59	27.16	24.25
09:35:39	55	4.59	27.28	24.37
09:35:44	56	4.59	27.36	24.45
09:35:49	57	4.59	27.19	24.28
09:35:54	58	4.59	27.28	24.37
09:35:59	59	4.59	27.18	24.27
09:36:04	60	4.61	27.15	24.22
09:36:09	61	4.61	27.21	24.28
09:36:14	62	4.61	27.13	24.20
09:36:19	63	4.61	27.09	24.16
09:36:24	64	4.61	27.07	24.14
09:36:29	65	4.61	27.03	24.10
09:36:34	66	4.61	27.12	24.19
09:36:39	67	4.61	27.23	24.30
09:36:44	68	4.61	27.16	24.23
09:36:49	69	4.61	27.19	24.26
09:36:54	70	4.61	27.03	24.10
09:36:59	71	4.61	27.28	24.35
09:37:04	72	4.63	27.06	24.11
09:37:09	73	4.63	27.17	24.22
09:37:14	74	4.63	27.3	24.35
09:37:19	75	4.63	27.21	24.26
09:37:24	76	4.63	27.41	24.46
09:37:29	77	4.63	27.5	24.55
09:37:34	78	4.63	27.5	24.55
09:37:39	79	4.63	27.53	24.58
09:37:44	80	4.63	27.55	24.60
09:37:49	81	4.63	27.38	24.43
09:37:54	82	4.63	27.47	24.52
09:37:59	83	4.63	27.51	24.56
09:38:05	84	4.64	27.33	24.37
09:38:10	85	4.64	27.31	24.35
09:38:15	86	4.64	27.46	24.50
09:38:20	87	4.64	27.34	24.38
09:38:25	88	4.64	27.51	24.55
09:38:30	89	4.64	27.49	24.53
09:38:35	90	4.64	27.05	24.09
09:38:40	91	4.64	27.16	24.20
09:38:45	92	4.64	27.52	24.56
09:38:50	93	4.64	27.33	24.37
09:38:55	94	4.64	27.38	24.42
09:39:00	95	4.66	27.29	24.31
09:39:05	96	4.66	27.13	24.15
09:39:10	97	4.66	27.17	24.19
09:39:15	98	4.66	27.31	24.33
09:39:20	99	4.66	27.34	24.36
09:39:25	100	4.66	27.24	24.26
09:39:30	101	4.66	27.3	24.32

[Handwritten signature]

[Handwritten signature]



DEPTH REPORT

Rampion - English Channel

LOCATION AND DEPTH REPORT



Project No. 11507
Date 02 Apr 2011
Vessel Fugro Saltire
Area Rampion - English Channel
Location BH_6
Survey type Sampling/CPT
Chart Datum LAT

Geodetic Datum WGS84
Projection UTM Zone 30N
Origin Longitude 3°W
Origin Latitude 0°
Hemisphere North
False Easting 500000 m
False Northing 0 m

Location Report BH_6 Location Report.xls

	Easting	Northing
Average position	703417.46	5618398.21 m
Standard deviation	0.13	0.16 m
Intended position	703417.30	5618398.00 m
Difference	0.16	0.21 m
Range	0.26 m	
Bearing	037.07 deg	

Depth Report BH_6 Depth Report.xls

	Depth LAT
Probe	25.4 m
Beacon	25.1 m
Drill String	25.3 m
Transducer Depth	0.1 m
Velocity of sound in water	1484.6 m/s
CTD Probe Z offset	3.3 m

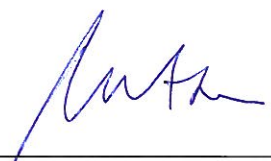
For Fugro Survey Ltd


P. Moharana

For Fugro Engineers BV


H. Pater

For Client Representative


P. Watson



LOCATION REPORT

Rampion - English Channel

Location: **BH_6**

Type : Sampling/CPT

Average Position

Standard deviation

Easting (m)

Northing (m)

703417.46

5618398.21

0.13

0.16

Intended position

703417.30

5618398.00

Difference

0.16

0.21

Distance

0.26 m

Bearing

37.07 deg

Project no:

11507

Date:

2 Apr 2011

Vessel:

Fugro Saltire

Notes:

Datum

WGS84

Projection

UTM Zone 30N

Origin Longitude

3°W

Origin Latitude

0°

Hemisphere

North

False Easting

500000 m

False Northing

0 m

For Fugro Survey Ltd

M.Michalak

For Client

H.Pater

BST Time	Fix no.	Logged Drill-string Positions	
		Easting (m)	Northing (m)
15:43:39	1	703417.46	5618398.43
15:43:40	2	703417.34	5618398.24
15:43:42	3	703417.44	5618398.48
15:43:44	4	703417.46	5618398.09
15:43:48	5	703417.57	5618398.27
15:43:50	6	703417.43	5618398.23
15:43:51	7	703417.36	5618398.07
15:43:53	8	703417.53	5618398.37
15:43:55	9	703417.53	5618398.32
15:43:59	10	703417.36	5618398.08
15:44:01	11	703417.57	5618397.91
15:44:02	12	703417.36	5618397.97
15:44:04	13	703417.25	5618398.30
15:44:06	14	703417.48	5618398.26
15:44:10	15	703417.74	5618398.12
15:44:12	16	703417.57	5618398.37
15:44:13	17	703417.62	5618398.35
15:44:15	18	703417.52	5618398.21
15:44:17	19	703417.45	5618398.24
15:44:21	20	703417.63	5618398.15
15:44:23	21	703417.54	5618398.49
15:44:24	22	703417.34	5618398.45
15:44:26	23	703417.56	5618397.99
15:44:28	24	703417.41	5618398.42
15:44:32	25	703417.37	5618398.25
15:44:33	26	703417.55	5618398.06
15:44:35	27	703417.62	5618398.03
15:44:37	28	703417.44	5618397.98
15:44:39	29	703417.71	5618397.98
15:44:43	30	703417.48	5618398.08
15:44:44	31	703417.49	5618398.20
15:44:46	32	703417.62	5618398.12
15:44:48	33	703417.51	5618398.17
15:44:50	34	703417.66	5618398.14
15:44:54	35	703417.09	5618398.14
15:44:55	36	703417.48	5618398.05
15:44:57	37	703417.43	5618397.85

LOCATION REPORT

15:44:59	38	703417.51	5618398.43
15:45:01	39	703417.36	5618398.15
15:45:05	40	703417.26	5618398.12
15:45:06	41	703417.35	5618398.13
15:45:08	42	703417.25	5618397.97
15:45:10	43	703417.46	5618398.28
15:45:12	44	703417.45	5618398.24
15:45:16	45	703417.27	5618398.16
15:45:17	46	703417.46	5618398.54
15:45:19	47	703417.28	5618398.30
15:45:21	48	703417.35	5618398.13
15:45:23	49	703417.42	5618397.98
15:45:27	50	703417.29	5618398.26
15:45:28	51	703417.16	5618398.25
15:45:30	52	703417.19	5618398.04
15:45:32	53	703417.43	5618398.19
15:45:34	54	703417.48	5618398.02
15:45:38	55	703417.31	5618398.08
15:45:39	56	703417.36	5618398.32
15:45:41	57	703417.33	5618398.19
15:45:43	58	703417.54	5618398.20
15:45:45	59	703417.43	5618398.12
15:45:49	60	703417.66	5618398.34
15:45:50	61	703417.46	5618397.92
15:45:52	62	703417.52	5618398.09
15:45:54	63	703417.73	5618398.34
15:45:56	64	703417.63	5618398.28
15:46:00	65	703417.55	5618398.48
15:46:01	66	703417.58	5618398.17
15:46:03	67	703417.52	5618398.15
15:46:05	68	703417.42	5618398.14
15:46:07	69	703417.43	5618398.16
15:46:11	70	703417.33	5618398.27
15:46:12	71	703417.50	5618398.24
15:46:14	72	703417.72	5618398.59
15:46:16	73	703417.42	5618398.22
15:46:18	74	703417.55	5618398.41
15:46:22	75	703417.61	5618398.10
15:46:23	76	703417.74	5618398.59
15:46:25	77	703417.43	5618398.60
15:46:27	78	703417.12	5618398.10
15:46:29	79	703417.29	5618398.01
15:46:33	80	703417.60	5618398.17
15:46:34	81	703417.23	5618398.34
15:46:36	82	703417.39	5618398.28
15:46:38	83	703417.52	5618398.32
15:46:40	84	703417.26	5618397.96
15:46:44	85	703417.64	5618398.24
15:46:45	86	703417.52	5618398.36
15:46:47	87	703417.40	5618398.11
15:46:49	88	703417.37	5618398.14
15:46:51	89	703417.41	5618398.33
15:46:56	90	703417.72	5618398.19
15:46:57	91	703417.58	5618398.15
15:46:59	92	703417.60	5618398.29
15:47:00	93	703417.62	5618398.23
15:47:04	94	703417.67	5618398.03
15:47:06	95	703417.80	5618398.46
15:47:07	96	703417.58	5618398.38
15:47:09	97	703417.78	5618398.39
15:47:12	98	703416.96	5618398.21
15:47:13	99	703417.81	5618398.38
15:47:15	100	703417.56	5618398.16





DEPTH REPORT

Rampion - English Channel

Location: BH_6
Type: Sampling/CPT

Project No.: 11507
Vessel: Fugro Saltire
Chart Datum (C.D.): LAT

Depth Measurements reduced to LAT

Probe:	25.4	m
Beacon:	25.1	m

Notes:

Data Source: B56
Beacon Z Offset: 1.62 m
Transducer Depth: 0.06 m
Velocity of sound in water: 1484.55 m/s
CTD Probe Z offset: 3.32 m
Standard / Secondary Port: Shoreham
Phase: N/A
Range: N/A

For Fugro Survey Ltd

Client Representative


P. Moharana

H. Pater



Note: other pages should be initialised

Date	Time	Tide	Probe Depth		Time	Fix #	Tide	Beacon Depth	
			Not Red.	Reduced				Not Red.	Reduced
02/04/2011	19:09:10	1.88	23.68	25.12	16:40:34	1	1.26	24.55	24.98
02/04/2011	19:14:10	1.96	23.73	25.09	16:40:39	2	1.26	24.74	25.17
02/04/2011	19:54:10	2.65	24.29	24.96	16:40:44	3	1.26	24.66	25.09
02/04/2011	19:59:10	2.74	24.35	24.93	16:40:49	4	1.26	24.61	25.04
02/04/2011	20:04:10	2.84	24.44	24.92	16:40:54	5	1.26	24.56	24.99
02/04/2011	20:09:10	2.94	24.55	24.93	16:40:59	6	1.26	24.67	25.10
02/04/2011	20:14:10	3.04	24.62	24.90	16:41:04	7	1.25	24.62	25.05
02/04/2011	20:19:10	3.15	24.72	24.89	16:41:09	8	1.25	24.59	25.02
02/04/2011	20:49:10	3.79	25.37	24.91	16:41:14	9	1.25	24.42	24.85
02/04/2011	20:54:10	3.89	25.49	24.91	16:41:19	10	1.25	24.48	24.91
02/04/2011	20:59:10	4.00	25.59	24.90	16:41:24	11	1.25	24.57	25.00
02/04/2011	21:04:10	4.11	25.70	24.91	16:41:29	12	1.25	24.69	25.12
02/04/2011	21:24:10	4.53	26.12	24.91	16:41:34	13	1.25	24.74	25.17
02/04/2011	21:29:10	4.63	26.24	24.93	16:41:39	14	1.25	24.51	24.94
02/04/2011	21:34:10	4.73	26.36	24.95	16:41:44	15	1.25	24.61	25.04
02/04/2011	21:39:10	4.83	26.48	24.97	16:41:49	16	1.25	24.49	24.92
02/04/2011	21:44:10	4.93	26.59	24.98	16:41:54	17	1.25	24.58	25.01
02/04/2011	21:49:10	5.02	26.72	25.01	16:41:59	18	1.25	24.67	25.10
02/04/2011	21:54:10	5.11	26.83	25.04	16:42:04	19	1.24	24.41	24.85
02/04/2011	21:59:10	5.20	26.97	25.09	16:42:09	20	1.24	24.79	25.23
02/04/2011	22:04:10	5.28	27.06	25.10	16:42:15	21	1.24	24.80	25.24
02/04/2011	22:09:10	5.36	27.17	25.12	16:42:20	22	1.24	24.48	24.92
02/04/2011	22:14:10	5.44	27.30	25.18	16:42:25	23	1.24	24.86	25.30
02/04/2011	22:19:10	5.52	27.39	25.20	16:42:30	24	1.24	24.59	25.03
02/04/2011	22:24:10	5.58	27.50	25.24	16:42:35	25	1.24	24.72	25.16
02/04/2011	22:29:10	5.65	27.61	25.28	16:42:40	26	1.24	24.92	25.36
02/04/2011	22:34:10	5.71	27.67	25.28	16:42:45	27	1.24	24.91	25.35
02/04/2011	22:39:10	5.77	27.74	25.29	16:42:50	28	1.24	24.90	25.34
02/04/2011	22:44:10	5.82	27.80	25.31	16:42:55	29	1.24	24.93	25.37
02/04/2011	22:49:10	5.87	27.88	25.33	16:43:00	30	1.24	24.67	25.11
02/04/2011	22:54:10	5.91	27.95	25.36	16:43:05	31	1.24	24.68	25.12
02/04/2011	22:59:10	5.95	27.98	25.36	16:43:10	32	1.24	24.50	24.94
02/04/2011	23:04:10	5.98	28.05	25.39	16:43:15	33	1.24	24.66	25.10
02/04/2011	23:09:10	6.01	28.11	25.42	16:43:20	34	1.24	24.62	25.06
02/04/2011	23:14:10	6.03	28.12	25.41	16:43:25	35	1.24	24.75	25.19



DEPTH REPORT

Rampion - English Channel

02/04/2011	23:19:10	6.05	28.15	25.42	16:43:30	36	1.24	24.84	25.28
02/04/2011	23:24:10	6.06	28.16	25.42	16:43:35	37	1.24	24.69	25.13
02/04/2011	23:29:10	6.07	28.21	25.46	16:43:40	38	1.24	25.00	25.44
02/04/2011	23:34:10	6.07	28.23	25.48	16:43:45	39	1.24	24.89	25.33
02/04/2011	23:39:10	6.07	28.24	25.50	16:43:50	40	1.24	24.43	24.87
02/04/2011	23:44:10	6.06	28.26	25.52	16:43:55	41	1.24	24.85	25.29
02/04/2011	23:49:10	6.05	28.25	25.52	16:44:00	42	1.23	24.57	25.02
02/04/2011	23:54:10	6.03	28.23	25.52	16:44:05	43	1.23	24.75	25.20
02/04/2011	23:59:10	6.02	28.25	25.55	16:44:10	44	1.23	24.69	25.14
03/04/2011	00:04:10	5.98	28.22	25.56	16:44:15	45	1.23	24.90	25.35
03/04/2011	00:09:10	5.95	28.22	25.59	16:44:20	46	1.23	24.55	25.00
03/04/2011	00:14:10	5.91	28.17	25.59	16:44:25	47	1.23	24.67	25.12
03/04/2011	00:19:10	5.87	28.16	25.62	16:44:30	48	1.23	24.63	25.08
03/04/2011	00:24:10	5.82	28.14	25.64	16:44:35	49	1.23	24.72	25.17
03/04/2011	00:29:10	5.77	28.10	25.65	16:44:40	50	1.23	24.71	25.16
03/04/2011	00:34:10	5.71	28.08	25.69	16:44:45	51	1.23	24.42	24.87
03/04/2011	00:39:10	5.66	28.01	25.67	16:44:50	52	1.23	24.84	25.29
03/04/2011	00:44:10	5.59	27.99	25.72	16:44:56	53	1.23	24.45	24.90
03/04/2011	00:49:10	5.53	27.94	25.73	16:45:01	54	1.22	24.70	25.16
03/04/2011	00:54:10	5.46	27.86	25.73	16:45:06	55	1.22	24.86	25.32
03/04/2011	00:59:10	5.38	27.82	25.75	16:45:11	56	1.22	24.57	25.03
03/04/2011	01:04:10	5.31	27.80	25.81	16:45:16	57	1.22	24.71	25.17
03/04/2011	01:34:10	4.79	27.32	25.85	16:45:21	58	1.22	24.78	25.24
03/04/2011	01:39:10	4.69	27.23	25.86	16:45:26	59	1.22	24.80	25.26
03/04/2011	01:44:10	4.59	27.14	25.86	16:45:31	60	1.22	24.99	25.45
03/04/2011	01:49:10	4.50	27.03	25.86	16:45:36	61	1.22	24.73	25.19
03/04/2011	01:54:10	4.39	26.95	25.87	16:45:41	62	1.22	24.75	25.21
03/04/2011	01:59:10	4.29	26.84	25.87	16:45:46	63	1.22	24.91	25.37
03/04/2011	02:24:10	3.76	26.35	25.90	16:45:51	64	1.22	24.64	25.10
03/04/2011	02:29:10	3.66	26.20	25.87	16:45:56	65	1.22	24.77	25.23
03/04/2011	02:34:10	3.55	26.13	25.90	16:46:01	66	1.22	24.74	25.20
03/04/2011	02:39:10	3.44	26.02	25.90	16:46:06	67	1.22	24.89	25.35
03/04/2011	02:44:10	3.34	25.92	25.90	16:46:11	68	1.22	25.08	25.54
03/04/2011	02:49:10	3.23	25.80	25.89	16:46:16	69	1.22	24.53	24.99
03/04/2011	03:09:10	2.81	25.38	25.90	16:46:21	70	1.22	24.49	24.95
03/04/2011	03:14:10	2.71	25.28	25.89	16:46:26	71	1.22	24.49	24.95
03/04/2011	03:19:10	2.61	25.16	25.88	16:46:31	72	1.22	24.5	24.96
03/04/2011	03:24:10	2.51	25.07	25.87	16:46:36	73	1.22	24.46	24.92
03/04/2011	03:29:10	2.41	24.97	25.87	16:46:41	74	1.22	24.51	24.97
03/04/2011	03:34:10	2.32	24.88	25.88	16:46:46	75	1.22	24.52	24.98
03/04/2011	03:39:10	2.23	24.77	25.87	16:46:51	76	1.22	24.42	24.88
03/04/2011	04:19:10	1.59	24.04	25.77	16:46:56	77	1.22	24.63	25.09
03/04/2011	04:24:10	1.53	23.97	25.76	16:47:01	78	1.21	24.81	25.28
03/04/2011	04:29:10	1.47	23.89	25.74	16:47:06	79	1.21	24.51	24.98
03/04/2011	04:34:10	1.41	23.80	25.71	16:47:11	80	1.21	24.51	24.98
03/04/2011	06:49:10	1.34	23.34	25.32	16:47:16	81	1.21	24.6	25.07
03/04/2011	06:54:10	1.39	23.39	25.32	16:47:21	82	1.21	24.6	25.07
03/04/2011	06:59:10	1.44	23.44	25.32	16:47:26	83	1.21	24.58	25.05
03/04/2011	07:04:10	1.50	23.50	25.32	16:47:31	84	1.21	24.73	25.20
03/04/2011	07:09:10	1.56	23.55	25.31	16:47:37	85	1.21	24.79	25.26
03/04/2011	07:14:10	1.63	23.62	25.31	16:47:42	86	1.21	24.54	25.01
03/04/2011	07:19:10	1.69	23.69	25.31	16:47:47	87	1.21	24.63	25.10
03/04/2011	07:24:10	1.76	23.76	25.32	16:47:52	88	1.21	24.55	25.02
03/04/2011	07:29:10	1.84	23.82	25.30	16:47:57	89	1.21	24.55	25.02
03/04/2011	07:34:10	1.91	23.88	25.29	16:48:02	90	1.21	24.67	25.14
03/04/2011	07:39:10	1.99	23.95	25.28	16:48:07	91	1.21	24.85	25.32
03/04/2011	07:44:10	2.07	24.01	25.26	16:48:12	92	1.21	24.65	25.12
03/04/2011	07:49:10	2.16	24.08	25.24	16:48:17	93	1.21	24.47	24.94
03/04/2011	07:54:10	2.25	24.15	25.23	16:48:22	94	1.21	24.52	24.99
03/04/2011	07:59:10	2.34	24.22	25.21	16:48:27	95	1.21	24.39	24.86
03/04/2011	08:04:10	2.43	24.27	25.16	16:48:32	96	1.21	24.43	24.90
03/04/2011	08:09:10	2.52	24.34	25.14	16:48:37	97	1.21	24.31	24.78
03/04/2011	08:14:10	2.62	24.42	25.12	16:48:42	98	1.21	24.58	25.05
03/04/2011	08:19:10	2.72	24.52	25.12	16:48:47	99	1.21	24.75	25.22
03/04/2011	08:24:10	2.82	24.59	25.09	16:48:52	100	1.21	24.61	25.08
03/04/2011	08:29:10	2.93	24.67	25.07	16:48:57	101	1.21	24.73	25.20
03/04/2011	08:34:10	3.03	24.76	25.05					
03/04/2011	08:39:10	3.14	24.85	25.03					

DEPTH REPORT

Rampion - English Channel

03/04/2011	08:44:10	3.25	24.95	25.03
03/04/2011	08:49:10	3.35	25.06	25.03
03/04/2011	08:54:10	3.46	25.16	25.02
03/04/2011	08:59:10	3.57	25.26	25.01
03/04/2011	09:04:10	3.68	25.36	25.00
03/04/2011	09:09:10	3.79	25.46	24.99
03/04/2011	09:14:10	3.91	25.58	25.00
03/04/2011	09:19:10	4.02	25.70	25.00
03/04/2011	09:24:10	4.13	25.82	25.01
03/04/2011	09:29:10	4.24	25.92	25.00
03/04/2011	09:34:10	4.34	26.03	25.00
03/04/2011	09:39:10	4.45	26.14	25.01
03/04/2011	09:44:10	4.56	26.25	25.02
03/04/2011	09:49:10	4.66	26.36	25.02
03/04/2011	09:54:10	4.76	26.48	25.04
03/04/2011	09:59:10	4.86	26.60	25.06
03/04/2011	10:04:10	4.96	26.71	25.08
03/04/2011	10:09:10	5.05	26.83	25.10
03/04/2011	10:14:10	5.14	26.93	25.10
03/04/2011	10:19:10	5.23	27.02	25.11
03/04/2011	10:24:10	5.31	27.12	25.13
03/04/2011	10:29:10	5.40	27.22	25.15
03/04/2011	10:34:10	5.47	27.32	25.17
03/04/2011	10:39:10	5.55	27.42	25.19
03/04/2011	10:44:10	5.61	27.52	25.22
03/04/2011	10:49:10	5.68	27.61	25.26
03/04/2011	10:54:10	5.74	27.71	25.30
03/04/2011	10:59:10	5.79	27.81	25.34
03/04/2011	11:04:10	5.84	27.91	25.39
03/04/2011	11:09:10	5.89	28.01	25.44
03/04/2011	11:14:10	5.93	28.11	25.50
03/04/2011	11:19:10	5.96	28.20	25.56
03/04/2011	11:24:10	5.99	28.30	25.63
03/04/2011	11:29:10	6.02	28.40	25.70
03/04/2011	11:34:10	6.03	28.50	25.78
03/04/2011	11:39:10	6.05	28.60	25.87
03/04/2011	11:44:10	6.06	28.69	25.96
03/04/2011	11:49:10	6.06	28.79	26.05
03/04/2011	11:54:10	6.06	28.89	26.15
03/04/2011	11:59:10	6.05	28.99	26.26
03/04/2011	12:04:10	6.04	29.09	26.37
03/04/2011	12:09:10	6.02	29.19	26.48
03/04/2011	12:14:10	6.00	29.28	26.61
03/04/2011	12:19:10	5.97	29.38	26.73
03/04/2011	12:24:10	5.94	29.48	26.86
03/04/2011	12:29:10	5.90	29.58	27.00





PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_6

Project no: 11507
Date: 03/04/2011
Instrument: CTD ser no 26326

Latitude :	50.66	N
Start Barometer :	1009	mbar

Gravity =	9.811	m/s ²
Average Density=	1.027	kg/dm ³

Notes:

Depth = $P/d/g * 10000$ m

Gravity = $9.780318 * (1 + 0.0052788 * (\sin(\text{lat})^2 + 0.0000236 * \sin(\text{lat})^4)) + 0.5 * 0.000002184 * P$ m/s²

For Fugro Survey Ltd


P. Moharana

For Client


H. Pater

Probe Readings			
Date	Time	Pressure	Barometer
dd/mm/yyyy	hh:mm:ss	dbar	mbar
02/04/2011	19:09:10	23.904	1012
02/04/2011	19:14:10	23.947	1012
02/04/2011	19:54:10	24.514	1012
02/04/2011	19:59:10	24.578	1012
02/04/2011	20:04:10	24.666	1012
02/04/2011	20:09:10	24.772	1012
02/04/2011	20:14:10	24.851	1012
02/04/2011	20:19:10	24.947	1012
02/04/2011	20:49:10	25.606	1012
02/04/2011	20:54:10	25.721	1012
02/04/2011	20:59:10	25.821	1012
02/04/2011	21:04:10	25.933	1012
02/04/2011	21:24:10	26.355	1012
02/04/2011	21:29:10	26.485	1012
02/04/2011	21:34:10	26.603	1012
02/04/2011	21:39:10	26.721	1012
02/04/2011	21:44:10	26.831	1012
02/04/2011	21:49:10	26.959	1012
02/04/2011	21:54:10	27.077	1012
02/04/2011	21:59:10	27.215	1012
02/04/2011	22:04:10	27.308	1012
02/04/2011	22:09:10	27.416	1012
02/04/2011	22:14:10	27.546	1012
02/04/2011	22:19:10	27.643	1012
02/04/2011	22:24:10	27.751	1012
02/04/2011	22:29:10	27.864	1012
02/04/2011	22:34:10	27.921	1012
02/04/2011	22:39:10	27.995	1012
02/04/2011	22:44:10	28.057	1012
02/04/2011	22:49:10	28.133	1012
02/04/2011	22:54:10	28.199	1012
02/04/2011	22:59:10	28.238	1012
02/04/2011	23:04:10	28.306	1012
02/04/2011	23:09:10	28.363	1012
02/04/2011	23:14:10	28.373	1012
02/04/2011	23:19:10	28.407	1012
02/04/2011	23:24:10	28.415	1012
02/04/2011	23:29:10	28.468	1012
02/04/2011	23:34:10	28.484	1012
02/04/2011	23:39:10	28.501	1012
02/04/2011	23:44:10	28.512	1012
02/04/2011	23:49:10	28.507	1012
02/04/2011	23:54:10	28.490	1012
02/04/2011	23:59:10	28.507	1012

Computed
Depth
m
23.68
23.73
24.29
24.35
24.44
24.55
24.62
24.72
25.37
25.49
25.59
25.70
26.12
26.24
26.36
26.48
26.59
26.72
26.83
26.97
27.06
27.17
27.30
27.39
27.50
27.61
27.67
27.74
27.80
27.88
27.95
27.98
28.05
28.11
28.12
28.15
28.16
28.21
28.23
28.24
28.26
28.25
28.23
28.25

PRESSURE TO DEPTH CONVERSION



Vessel: Fugro Saltire
Location: BH_6

Project no: 11507
Date: 03/04/2011
Instrument: CTD ser no 26326

03/04/2011	00:04:10	28.475	1012
03/04/2011	00:09:10	28.471	1012
03/04/2011	00:14:10	28.430	1012
03/04/2011	00:19:10	28.419	1012
03/04/2011	00:24:10	28.391	1012
03/04/2011	00:29:10	28.356	1012
03/04/2011	00:34:10	28.339	1012
03/04/2011	00:39:10	28.263	1012
03/04/2011	00:44:10	28.247	1012
03/04/2011	00:49:10	28.194	1012
03/04/2011	00:54:10	28.118	1012
03/04/2011	00:59:10	28.068	1012
03/04/2011	01:04:10	28.051	1012
03/04/2011	01:34:10	27.564	1012
03/04/2011	01:39:10	27.475	1012
03/04/2011	01:44:10	27.383	1012
03/04/2011	01:49:10	27.280	1012
03/04/2011	01:54:10	27.191	1012
03/04/2011	01:59:10	27.088	1012
03/04/2011	02:24:10	26.586	1012
03/04/2011	02:29:10	26.444	1012
03/04/2011	02:34:10	26.369	1012
03/04/2011	02:39:10	26.263	1012
03/04/2011	02:44:10	26.154	1012
03/04/2011	02:49:10	26.038	1012
03/04/2011	03:09:10	25.618	1012
03/04/2011	03:14:10	25.512	1012
03/04/2011	03:19:10	25.396	1012
03/04/2011	03:24:10	25.296	1012
03/04/2011	03:29:10	25.195	1012
03/04/2011	03:34:10	25.105	1012
03/04/2011	03:39:10	25.000	1012
03/04/2011	04:19:10	24.260	1012
03/04/2011	04:24:10	24.188	1012
03/04/2011	04:29:10	24.111	1012
03/04/2011	04:34:10	24.024	1012
03/04/2011	06:49:10	23.557	1012
03/04/2011	06:54:10	23.603	1012
03/04/2011	06:59:10	23.657	1012
03/04/2011	07:04:10	23.722	1012
03/04/2011	07:09:10	23.771	1012
03/04/2011	07:14:10	23.838	1012
03/04/2011	07:19:10	23.906	1012
03/04/2011	07:24:10	23.979	1012
03/04/2011	07:29:10	24.039	1012
03/04/2011	07:34:10	24.099	1012
03/04/2011	07:39:10	24.171	1012
03/04/2011	07:44:10	24.237	1012
03/04/2011	07:49:10	24.303	1012
03/04/2011	07:54:10	24.375	1012
03/04/2011	07:59:10	24.448	1012
03/04/2011	08:04:10	24.518	1014
03/04/2011	08:09:10	24.586	1014
03/04/2011	08:14:10	24.670	1014
03/04/2011	08:19:10	24.766	1014
03/04/2011	08:24:10	24.836	1014
03/04/2011	08:29:10	24.919	1014
03/04/2011	08:34:10	25.005	1014
03/04/2011	08:39:10	25.099	1014
03/04/2011	08:44:10	25.204	1014
03/04/2011	08:49:10	25.309	1014
03/04/2011	08:54:10	25.415	1014
03/04/2011	08:59:10	25.511	1014

28.22
28.22
28.17
28.16
28.14
28.10
28.08
28.01
27.99
27.94
27.86
27.82
27.80
27.32
27.23
27.14
27.03
26.95
26.84
26.35
26.20
26.13
26.02
25.92
25.80
25.38
25.28
25.16
25.07
24.97
24.88
24.77
24.04
23.97
23.89
23.80
23.34
23.39
23.44
23.50
23.55
23.62
23.69
23.76
23.82
23.88
23.95
24.01
24.08
24.15
24.22
24.27
24.34
24.42
24.52
24.59
24.67
24.76
24.85
24.95
25.06
25.16
25.26



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_6

Project no: 11507
Date: 03/04/2011
Instrument: CTD ser no 26326

03/04/2011	09:04:10	25.613	1014
03/04/2011	09:09:10	25.717	1014
03/04/2011	09:14:10	25.839	1014
03/04/2011	09:19:10	25.953	1014
03/04/2011	09:24:10	26.074	1014
03/04/2011	09:29:10	26.175	1014
03/04/2011	09:34:10	26.285	1014
03/04/2011	09:39:10	26.401	1014
03/04/2011	09:44:10	26.514	1014
03/04/2011	09:49:10	26.619	1014
03/04/2011	09:54:10	26.739	1014
03/04/2011	09:59:10	26.865	1014
03/04/2011	10:04:10	26.976	1014
03/04/2011	10:09:10	27.093	1014
03/04/2011	10:14:10	27.192	1014
03/04/2011	10:19:10	27.291	1014
03/04/2011	10:24:10	27.390	1014
03/04/2011	10:29:10	27.489	1014
03/04/2011	10:34:10	27.588	1014
03/04/2011	10:39:10	27.687	1014
03/04/2011	10:44:10	27.786	1014
03/04/2011	10:49:10	27.885	1014
03/04/2011	10:54:10	27.984	1014
03/04/2011	10:59:10	28.083	1014
03/04/2011	11:04:10	28.182	1014
03/04/2011	11:09:10	28.281	1014
03/04/2011	11:14:10	28.380	1014
03/04/2011	11:19:10	28.479	1014
03/04/2011	11:24:10	28.578	1014
03/04/2011	11:29:10	28.677	1014
03/04/2011	11:34:10	28.776	1014
03/04/2011	11:39:10	28.875	1014
03/04/2011	11:44:10	28.974	1014
03/04/2011	11:49:10	29.073	1014
03/04/2011	11:54:10	29.172	1014
03/04/2011	11:59:10	29.271	1014
03/04/2011	12:04:10	29.370	1014
03/04/2011	12:09:10	29.469	1014
03/04/2011	12:14:10	29.568	1014
03/04/2011	12:19:10	29.667	1014
03/04/2011	12:24:10	29.766	1014
03/04/2011	12:29:10	29.865	1014
03/04/2011	12:34:10	29.964	1014
03/04/2011	12:39:10	30.063	1014
03/04/2011	12:44:10	30.162	1014
03/04/2011	12:49:10	30.261	1014
03/04/2011	12:54:10	30.360	1014
03/04/2011	12:59:10	30.459	1014
03/04/2011	13:04:10	30.558	1014
03/04/2011	13:09:10	30.657	1014
03/04/2011	13:14:10	30.756	1014
03/04/2011	13:19:10	30.855	1014
03/04/2011	13:24:10	30.954	1014
03/04/2011	13:29:10	31.053	1014

25.36
25.46
25.58
25.70
25.82
25.92
26.03
26.14
26.25
26.36
26.48
26.60
26.71
26.83
26.93
27.02
27.12
27.22
27.32
27.42
27.52
27.61
27.71
27.81
27.91
28.01
28.11
28.20
28.30
28.40
28.50
28.60
28.69
28.79
28.89
28.99
29.09
29.19
29.28
29.38
29.48
29.58
29.68
29.77
29.87
29.97
30.07
30.17
30.27
30.36
30.46
30.56
30.66
30.76

LOCATION AND DEPTH REPORT



Project No. 11507
Date 03 Apr 2011
Vessel Fugro Saltire
Area Rampion - English Channel
Location BH_7
Survey type Sampling/CPT
Chart Datum LAT

Geodetic Datum WGS84
Projection UTM Zone 30N
Origin Longitude 3°W
Origin Latitude 0°
Hemisphere North
False Easting 500000 m
False Northing 0 m

Location Report BH_7 Location Report.xls

	Easting	Northing
Average position	707817.16	5617107.59 m
Standard deviation	0.17	0.15 m
Intended position	707816.89	5617107.50 m
Difference	0.27	0.10 m
Range	0.29 m	
Bearing	070.52 deg	

Depth Report BH_7 Depth Report.xls

	Depth LAT
Probe	28.2 m
Beacon	28.6 m
Drill String	28.4 m
Transducer Depth	0.1 m
Velocity of sound in water	1484.6 m/s
CTD Probe Z offset	3.3 m

For Fugro Survey Ltd

For Fugro Engineers BV

For Client Representative


 M. Michalak


 H. Pater


 P. Watson



LOCATION REPORT

Rampion - English Channel

Location: **BH_7**
 Type : Sampling/CPT
 Average Position
 Standard deviation

	Easting (m)	Northing (m)
	707817.16	5617107.59
	0.17	0.15

Project no: 11507
 Date: 3 Apr 2011
 Vessel: Fugro Saltire

Intended position

	707816.89	5617107.50
--	-----------	------------

Difference

	0.27	0.10
--	------	------

Distance 0.29 m
 Bearing 70.52 deg

Notes:
 Datum WGS84
 Projection UTM Zone 30N
 Origin Longitude 3°W
 Origin Latitude 0°
 Hemisphere North
 False Easting 500000 m
 False Northing 0 m

For Fugro Survey Ltd

M.Michalak

For Client

H.Pater

BST	Logged Drill-string Positions		
Time	Fix no.	Easting (m)	Northing (m)
16:58:44	1	707817.03	5617107.68
16:58:46	2	707817.17	5617107.57
16:58:48	3	707817.06	5617107.46
16:58:53	4	707817.16	5617107.49
16:58:54	5	707817.12	5617107.51
16:58:55	6	707817.52	5617107.56
16:58:57	7	707817.33	5617107.57
16:58:59	8	707817.07	5617107.56
16:59:04	9	707817.18	5617107.59
16:59:05	10	707816.92	5617107.60
16:59:06	11	707817.08	5617107.82
16:59:08	12	707817.00	5617107.49
16:59:10	13	707817.07	5617107.65
16:59:15	14	707817.15	5617107.66
16:59:16	15	707817.14	5617107.45
16:59:17	16	707817.38	5617107.51
16:59:21	18	707817.03	5617107.35
16:59:26	19	707816.83	5617107.68
16:59:30	22	707817.23	5617107.30
16:59:32	23	707817.34	5617107.43
16:59:37	24	707817.07	5617107.37
16:59:37	25	707817.17	5617107.82
16:59:39	26	707817.19	5617107.94
16:59:41	27	707817.16	5617107.71
16:59:43	28	707817.20	5617107.72
16:59:48	29	707816.83	5617107.63
16:59:50	31	707817.41	5617107.35
16:59:52	32	707817.20	5617107.44
16:59:54	33	707817.15	5617107.55
16:59:59	34	707816.97	5617107.48
16:59:59	35	707817.40	5617107.28
17:00:01	36	707817.38	5617107.34
17:00:03	37	707817.38	5617107.85
17:00:05	38	707817.10	5617107.70
17:00:10	39	707817.12	5617107.67
17:00:10	40	707817.08	5617107.47
17:00:12	41	707817.08	5617107.71



LOCATION REPORT

17:00:14	42	707817.11	5617107.59
17:00:16	43	707816.87	5617107.57
17:00:21	44	707816.90	5617107.63
17:00:21	45	707817.49	5617107.72
17:00:23	46	707817.33	5617107.62
17:00:25	47	707817.26	5617107.66
17:00:27	48	707817.39	5617107.55
17:00:32	49	707817.08	5617107.70
17:00:32	50	707817.36	5617107.61
17:00:34	51	707817.46	5617107.49
17:00:36	52	707817.16	5617107.54
17:00:38	53	707817.45	5617107.74
17:00:43	54	707817.10	5617107.70
17:00:43	55	707817.27	5617107.67
17:00:45	56	707817.27	5617107.68
17:00:47	57	707817.08	5617107.47
17:00:49	58	707816.97	5617107.51
17:00:54	59	707817.04	5617107.57
17:00:54	60	707817.40	5617107.72
17:00:56	61	707817.26	5617107.74
17:00:58	62	707816.95	5617107.53
17:01:00	63	707816.87	5617107.45
17:01:05	64	707816.97	5617107.63
17:01:05	65	707817.15	5617107.69
17:01:07	66	707817.33	5617107.71
17:01:09	67	707817.43	5617107.42
17:01:16	69	707816.98	5617107.26
17:01:16	70	707817.06	5617107.54
17:01:18	71	707817.25	5617107.77
17:01:20	72	707817.40	5617107.77
17:01:22	73	707817.21	5617107.39
17:01:27	74	707817.07	5617107.43
17:01:27	75	707816.98	5617107.60
17:01:29	76	707817.04	5617107.75
17:01:31	77	707817.24	5617107.85
17:01:33	78	707817.14	5617107.48
17:01:38	79	707817.11	5617107.55
17:01:38	80	707817.04	5617107.52
17:01:40	81	707817.22	5617107.55
17:01:42	82	707817.25	5617107.58
17:01:44	83	707817.11	5617107.50
17:01:49	84	707817.17	5617107.52
17:01:49	85	707817.21	5617107.72
17:01:51	86	707817.27	5617107.75
17:01:53	87	707817.05	5617107.73
17:01:55	88	707817.17	5617107.66
17:02:00	89	707817.27	5617107.51
17:02:00	90	707817.02	5617107.75
17:02:02	91	707817.13	5617107.78
17:02:04	92	707817.18	5617107.74
17:02:06	93	707817.22	5617107.57
17:02:11	94	707817.10	5617107.65
17:02:11	95	707817.26	5617107.59
17:02:13	96	707817.15	5617107.56
17:02:15	97	707817.42	5617107.75
17:02:17	98	707817.23	5617107.44
17:02:22	99	707816.92	5617107.65
17:02:22	100	707817.41	5617107.89
17:02:24	101	707817.19	5617107.74
17:02:26	102	707817.22	5617107.88
17:02:28	103	707817.13	5617107.46
17:02:33	104	707816.90	5617107.71
17:02:33	105	707817.43	5617107.63



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_7

Project no: 11507
Date: 04/04/2011
Instrument: CTD ser no 26326

Latitude :	50.63	N
Start Barometer :	1014	mbar

Gravity =	9.811	m/s ²
Average Density=	1.027	kg/dm ³

Notes:

Depth = $P/d/g * 10000$ m
Gravity = $9.780318 * (1 + 0.0052788 * (\sin(\text{lat}))^2 + 0.0000236 * \sin(\text{lat})^4) + 0.5 * 0.000002184 * P$ m/s²

For Fugro Survey Ltd

For Client

M. Michalak

H. Pater

Probe Readings			
Date	Time	Pressure	Barometer
dd/mm/yyyy	hh:mm:ss	dbar	mbar
03/04/2011	16:56:10	26.488	1014
03/04/2011	17:01:10	26.433	1014
03/04/2011	17:06:10	26.362	1014
03/04/2011	17:11:10	26.305	1014
03/04/2011	17:16:10	26.265	1014
03/04/2011	17:21:10	26.214	1014
03/04/2011	17:26:10	26.172	1014
03/04/2011	17:31:10	26.126	1014
03/04/2011	17:36:10	26.097	1014
03/04/2011	17:41:10	26.062	1014
03/04/2011	17:46:10	26.032	1014
03/04/2011	17:51:10	26.004	1014
03/04/2011	17:56:10	25.993	1014
03/04/2011	18:01:10	25.980	1015
03/04/2011	18:06:10	25.971	1015
03/04/2011	18:11:10	25.958	1015
03/04/2011	18:16:10	25.952	1015
03/04/2011	18:21:10	25.960	1015
03/04/2011	18:26:10	25.959	1015
03/04/2011	18:31:10	25.973	1015
03/04/2011	18:36:10	25.996	1015
03/04/2011	18:41:10	26.011	1015
03/04/2011	18:46:10	26.033	1015
03/04/2011	18:51:10	26.069	1015
03/04/2011	18:56:10	26.114	1015
03/04/2011	19:01:10	26.146	1015
03/04/2011	19:06:10	26.196	1015
03/04/2011	19:11:10	26.240	1015
03/04/2011	19:16:10	26.301	1015
03/04/2011	19:21:10	26.359	1015
03/04/2011	19:26:10	26.416	1015
03/04/2011	19:31:10	26.473	1015
03/04/2011	19:36:10	26.545	1015
03/04/2011	19:41:10	26.613	1015
03/04/2011	19:46:10	26.689	1015
03/04/2011	19:51:10	26.760	1015
03/04/2011	19:56:10	26.839	1015
03/04/2011	20:01:10	26.915	1015
03/04/2011	20:06:10	26.981	1015
03/04/2011	20:11:10	27.067	1015
03/04/2011	20:16:10	27.144	1015
03/04/2011	20:21:10	27.227	1015
03/04/2011	20:26:10	27.309	1015
03/04/2011	20:31:10	27.394	1015

Computed
Depth
m
26.28
26.22
26.15
26.10
26.06
26.01
25.96
25.92
25.89
25.86
25.83
25.80
25.79
25.76
25.75
25.74
25.74
25.74
25.76
25.78
25.79
25.82
25.85
25.90
25.93
25.98
26.02
26.08
26.14
26.20
26.25
26.32
26.39
26.47
26.54
26.62
26.69
26.76
26.84
26.92
27.00
27.08
27.17



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_7

Project no: 11507
Date: 04/04/2011
Instrument: CTD ser no 26326

03/04/2011	20:36:10	27.469	1015
03/04/2011	20:41:10	27.559	1015
03/04/2011	20:46:10	27.662	1015
03/04/2011	20:51:10	27.754	1015
03/04/2011	20:56:10	27.849	1015
03/04/2011	21:01:10	27.952	1016
03/04/2011	21:06:10	28.057	1016
03/04/2011	21:11:10	28.172	1016
03/04/2011	21:16:10	28.279	1016
03/04/2011	21:21:10	28.390	1016
03/04/2011	21:26:10	28.510	1016
03/04/2011	21:31:10	28.637	1016
03/04/2011	21:36:10	28.747	1016
03/04/2011	21:41:10	28.868	1016
03/04/2011	21:46:10	28.989	1016
03/04/2011	21:51:10	29.109	1016
03/04/2011	21:56:10	29.237	1016
03/04/2011	22:01:10	29.356	1016
03/04/2011	22:06:10	29.487	1016
03/04/2011	22:11:10	29.604	1016
03/04/2011	22:16:10	29.726	1016
03/04/2011	22:21:10	29.869	1016
03/04/2011	22:26:10	29.969	1016
03/04/2011	22:31:10	30.103	1016
03/04/2011	22:36:10	30.212	1016
03/04/2011	22:41:10	30.334	1016
03/04/2011	22:46:10	30.453	1016
03/04/2011	22:51:10	30.560	1016
03/04/2011	22:56:10	30.653	1016
03/04/2011	23:01:10	30.763	1016
03/04/2011	23:06:10	30.840	1016
03/04/2011	23:11:10	30.931	1016
03/04/2011	23:16:10	31.014	1016
03/04/2011	23:21:10	31.079	1016
03/04/2011	23:26:10	31.133	1016
03/04/2011	23:31:10	31.189	1016
03/04/2011	23:36:10	31.238	1016
03/04/2011	23:41:10	31.277	1016
03/04/2011	23:46:10	31.314	1016
03/04/2011	23:51:10	31.338	1016
03/04/2011	23:56:10	31.363	1016
04/04/2011	00:01:10	31.356	1016
04/04/2011	00:06:10	31.382	1016
04/04/2011	00:11:10	31.390	1016
04/04/2011	00:16:10	31.417	1016
04/04/2011	00:21:10	31.400	1016
04/04/2011	00:26:10	31.407	1016
04/04/2011	00:31:10	31.371	1016
04/04/2011	00:36:10	31.368	1016
04/04/2011	00:41:10	31.360	1016
04/04/2011	00:46:10	31.326	1016
04/04/2011	00:51:10	31.310	1016
04/04/2011	00:56:10	31.275	1016
04/04/2011	01:01:10	31.229	1016
04/04/2011	01:06:10	31.220	1016
04/04/2011	01:11:10	31.164	1016
04/04/2011	01:16:10	31.119	1016
04/04/2011	01:21:10	31.060	1016
04/04/2011	01:26:10	31.001	1016
04/04/2011	01:31:10	30.919	1016
04/04/2011	01:36:10	30.877	1016
04/04/2011	01:41:10	30.817	1016
04/04/2011	01:46:10	30.722	1016

27.24
27.33
27.43
27.52
27.62
27.71
27.81
27.93
28.03
28.14
28.26
28.39
28.50
28.62
28.74
28.86
28.99
29.10
29.23
29.35
29.47
29.61
29.71
29.84
29.95
30.07
30.19
30.30
30.39
30.50
30.58
30.67
30.75
30.81
30.87
30.92
30.97
31.01
31.05
31.07
31.09
31.09
31.11
31.12
31.15
31.13
31.14
31.10
31.10
31.09
31.06
31.04
31.01
30.96
30.95
30.90
30.85
30.79
30.74
30.65
30.61
30.55
30.46



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_7

Project no: 11507
Date: 04/04/2011
Instrument: CTD ser no 26326

04/04/2011	01:51:10	30.634	1016
04/04/2011	01:56:10	30.532	1016
04/04/2011	02:01:10	30.493	1016
04/04/2011	02:06:10	30.387	1016
04/04/2011	02:11:10	30.295	1017
04/04/2011	02:16:10	30.191	1017
04/04/2011	02:21:10	30.091	1017
04/04/2011	02:26:10	29.989	1017
04/04/2011	02:31:10	29.899	1017
04/04/2011	02:36:10	29.792	1017
04/04/2011	02:41:10	29.699	1017
04/04/2011	02:46:10	29.604	1017
04/04/2011	02:51:10	29.506	1017
04/04/2011	02:56:10	29.368	1017
04/04/2011	03:01:10	29.264	1017
04/04/2011	03:06:10	29.150	1017
04/04/2011	03:11:10	29.051	1017
04/04/2011	03:16:10	28.930	1017
04/04/2011	03:21:10	28.823	1017
04/04/2011	03:26:10	28.685	1017
04/04/2011	03:31:10	28.601	1017
04/04/2011	03:36:10	28.485	1017
04/04/2011	03:41:10	28.378	1017
04/04/2011	03:46:10	28.261	1017
04/04/2011	03:51:10	28.157	1017
04/04/2011	03:56:10	28.051	1017
04/04/2011	04:01:10	27.936	1017
04/04/2011	04:06:10	27.854	1017
04/04/2011	04:11:10	27.746	1017
04/04/2011	04:16:10	27.656	1018
04/04/2011	04:21:10	27.549	1018
04/04/2011	04:26:10	27.461	1018
04/04/2011	04:31:10	27.368	1018
04/04/2011	04:36:10	27.271	1018
04/04/2011	04:41:10	27.179	1018
04/04/2011	04:46:10	27.093	1018
04/04/2011	04:51:10	27.005	1018
04/04/2011	04:56:10	26.924	1018
04/04/2011	05:01:10	26.836	1018
04/04/2011	05:06:10	26.744	1018
04/04/2011	05:11:10	26.684	1018
04/04/2011	05:16:10	26.614	1018
04/04/2011	05:21:10	26.552	1018
04/04/2011	05:26:10	26.489	1018
04/04/2011	05:31:10	26.444	1018
04/04/2011	05:36:10	26.380	1018
04/04/2011	05:41:10	26.332	1018
04/04/2011	05:46:10	26.286	1018
04/04/2011	05:51:10	26.244	1018
04/04/2011	05:56:10	26.206	1018
04/04/2011	06:01:10	26.180	1019
04/04/2011	06:06:10	26.150	1019
04/04/2011	06:11:10	26.132	1019
04/04/2011	06:16:10	26.111	1019

30.37
30.27
30.23
30.13
30.02
29.92
29.82
29.72
29.63
29.53
29.43
29.34
29.24
29.11
29.00
28.89
28.79
28.67
28.56
28.43
28.34
28.23
28.12
28.01
27.90
27.80
27.68
27.60
27.50
27.40
27.29
27.20
27.11
27.01
26.92
26.84
26.75
26.67
26.58
26.49
26.43
26.36
26.30
26.24
26.19
26.13
26.08
26.04
26.00
25.96
25.92
25.89
25.87
25.85



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_7

Project no: 11507
Date: 04/04/2011
Instrument: CTD ser no 26326

04/04/2011	06:21:10	26.096	1019
04/04/2011	06:26:10	26.085	1019
04/04/2011	06:31:10	26.086	1019
04/04/2011	06:36:10	26.071	1019
04/04/2011	06:41:10	26.084	1019
04/04/2011	06:46:10	26.079	1019
04/04/2011	06:51:10	26.105	1019
04/04/2011	06:56:10	26.118	1020
04/04/2011	07:01:10	26.149	1020
04/04/2011	07:06:10	26.184	1020
04/04/2011	07:11:10	26.220	1020
04/04/2011	07:16:10	26.264	1020
04/04/2011	07:21:10	26.302	1020
04/04/2011	07:26:10	26.353	1020
04/04/2011	07:31:10	26.410	1020
04/04/2011	07:36:10	26.474	1020
04/04/2011	07:41:10	26.529	1020
04/04/2011	07:46:10	26.609	1020
04/04/2011	07:51:10	26.669	1020
04/04/2011	07:56:10	26.739	1020
04/04/2011	08:01:10	26.810	1021
04/04/2011	08:06:10	26.890	1021
04/04/2011	08:11:10	26.966	1021
04/04/2011	08:16:10	27.034	1021
04/04/2011	08:21:10	27.102	1021
04/04/2011	08:26:10	27.177	1021
04/04/2011	08:31:10	27.261	1021
04/04/2011	08:36:10	27.342	1021
04/04/2011	08:41:10	27.414	1021
04/04/2011	08:46:10	27.503	1021
04/04/2011	08:51:10	27.587	1021
04/04/2011	08:56:10	27.668	1021
04/04/2011	09:01:10	27.758	1021
04/04/2011	09:06:10	27.861	1021
04/04/2011	09:11:10	27.955	1021
04/04/2011	09:16:10	28.056	1021
04/04/2011	09:21:10	28.180	1021
04/04/2011	09:26:10	28.270	1021
04/04/2011	09:31:10	28.390	1021
04/04/2011	09:36:10	28.502	1021
04/04/2011	09:41:10	28.630	1021
04/04/2011	09:46:10	28.738	1021
04/04/2011	09:51:10	28.855	1021
04/04/2011	09:56:10	28.987	1021
04/04/2011	10:01:10	29.124	1021
04/04/2011	10:06:10	29.230	1021
04/04/2011	10:11:10	29.355	1021
04/04/2011	10:16:10	29.468	1021
04/04/2011	10:21:10	29.610	1021
04/04/2011	10:26:10	29.721	1021
04/04/2011	10:31:10	29.850	1021

25.84
25.83
25.83
25.81
25.83
25.82
25.85
25.85
25.88
25.92
25.95
26.00
26.03
26.08
26.14
26.20
26.26
26.34
26.40
26.47
26.53
26.61
26.68
26.75
26.82
26.89
26.98
27.06
27.13
27.22
27.30
27.38
27.47
27.57
27.66
27.76
27.89
27.98
28.10
28.21
28.33
28.44
28.56
28.69
28.82
28.93
29.05
29.16
29.31
29.42
29.54



DEPTH REPORT

Rampion - English Channel

Location: BH_7
Type: Sampling/CPT

Project No.: 11507
Vessel: Fugro Saltire
Chart Datum (C.D.): LAT

Depth Measurements reduced to LAT		
Probe:	28.2	m
Beacon:	28.6	m

Notes:

Data Source: B56
Beacon Z Offset: 1.62 m
Transducer Depth: 0.06 m
Velocity of sound in water: 1484.55 m/s
CTD Probe Z offset: 3.32 m
Standard / Secondary Port: Shoreham
Phase: N/A
Range: N/A

For Fugro Survey Ltd

Client Representative

M.Michalak

H.Pater

Note: other pages should be initialised

Date	Time	Tide	Probe Depth		Time	Fix #	Tide	Beacon Depth	
			Not Red.	Reduced				Not Red.	Reduced
03/04/2011	16:56:10	1.26	26.28	28.34	16:56:39	1	1.26	28.20	28.62
03/04/2011	17:01:10	1.21	26.22	28.34	16:56:44	2	1.26	28.19	28.61
03/04/2011	17:06:10	1.16	26.15	28.31	16:56:49	3	1.26	28.18	28.60
03/04/2011	17:11:10	1.12	26.10	28.30	16:56:54	4	1.26	28.20	28.62
03/04/2011	17:16:10	1.09	26.06	28.29	16:56:59	5	1.26	28.17	28.59
03/04/2011	17:21:10	1.05	26.01	28.27	16:57:04	6	1.25	28.27	28.70
03/04/2011	17:26:10	1.03	25.96	28.26	16:57:09	7	1.25	28.15	28.58
03/04/2011	17:31:10	1.00	25.92	28.24	16:57:14	8	1.25	28.16	28.59
03/04/2011	17:36:10	0.98	25.89	28.23	16:57:19	9	1.25	27.96	28.39
03/04/2011	17:41:10	0.97	25.86	28.21	16:57:24	10	1.25	28.19	28.62
03/04/2011	17:46:10	0.96	25.83	28.19	16:57:29	11	1.25	28.15	28.58
03/04/2011	17:51:10	0.95	25.80	28.17	16:57:34	12	1.25	28.15	28.58
03/04/2011	17:56:10	0.95	25.79	28.16	16:57:39	13	1.25	28.26	28.69
03/04/2011	18:01:10	0.95	25.76	28.13	16:57:44	14	1.25	28.32	28.75
03/04/2011	18:06:10	0.96	25.75	28.12	16:57:49	15	1.25	28.24	28.67
03/04/2011	18:11:10	0.97	25.74	28.09	16:57:54	16	1.25	28.24	28.67
03/04/2011	18:16:10	0.98	25.74	28.07	16:57:59	17	1.25	28.40	28.83
03/04/2011	18:21:10	1.00	25.74	28.06	16:58:04	18	1.23	28.26	28.71
03/04/2011	18:26:10	1.02	25.74	28.04	16:58:09	19	1.23	28.26	28.71
03/04/2011	18:31:10	1.05	25.76	28.03	16:58:14	20	1.23	28.13	28.58
03/04/2011	18:36:10	1.08	25.78	28.02	16:58:19	21	1.23	28.26	28.71
03/04/2011	18:41:10	1.11	25.79	28.00	16:58:24	22	1.23	28.24	28.69
03/04/2011	18:46:10	1.15	25.82	27.98	16:58:29	23	1.23	28.21	28.66
03/04/2011	18:51:10	1.20	25.85	27.98	16:58:34	24	1.23	28.28	28.73
03/04/2011	18:56:10	1.24	25.90	27.97	16:58:39	25	1.23	28.28	28.73
03/04/2011	19:01:10	1.29	25.93	27.96	16:58:44	26	1.23	28.20	28.65
03/04/2011	19:06:10	1.35	25.98	27.95	16:58:49	27	1.23	28.21	28.66
03/04/2011	19:11:10	1.40	26.02	27.94	16:58:54	28	1.23	28.15	28.60
03/04/2011	19:16:10	1.46	26.08	27.94	16:58:59	29	1.23	28.23	28.68
03/04/2011	19:21:10	1.53	26.14	27.93	16:59:05	30	1.22	28.29	28.75
03/04/2011	19:26:10	1.59	26.20	27.92	16:59:10	31	1.22	28.22	28.68
03/04/2011	19:31:10	1.66	26.25	27.91	16:59:15	32	1.22	28.23	28.69
03/04/2011	19:36:10	1.74	26.32	27.90	16:59:20	33	1.22	28.21	28.67
03/04/2011	19:41:10	1.82	26.39	27.90	16:59:25	34	1.22	28.16	28.62
03/04/2011	19:46:10	1.90	26.47	27.89	16:59:30	35	1.22	28.16	28.62



DEPTH REPORT

Rampion - English Channel

03/04/2011	19:51:10	1.98	26.54	27.88	16:59:35	36	1.22	28.09	28.55
03/04/2011	19:56:10	2.07	26.62	27.87	16:59:40	37	1.22	28.17	28.63
03/04/2011	20:01:10	2.16	26.69	27.85	16:59:45	38	1.22	28.16	28.62
03/04/2011	20:06:10	2.25	26.76	27.83	16:59:50	39	1.22	28.27	28.73
03/04/2011	20:11:10	2.35	26.84	27.82	16:59:55	40	1.22	28.18	28.64
03/04/2011	20:16:10	2.45	26.92	27.79	17:00:00	41	1.21	28.14	28.61
03/04/2011	20:21:10	2.55	27.00	27.78	17:00:05	42	1.21	28.19	28.66
03/04/2011	20:26:10	2.65	27.08	27.75	17:00:10	43	1.21	28.27	28.74
03/04/2011	20:31:10	2.75	27.17	27.73	17:00:15	44	1.21	28.01	28.48
03/04/2011	20:36:10	2.86	27.24	27.70	17:00:20	45	1.21	28.14	28.61
03/04/2011	20:41:10	2.97	27.33	27.68	17:00:25	46	1.21	28.03	28.50
03/04/2011	20:46:10	3.08	27.43	27.67	17:00:30	47	1.21	28.18	28.65
03/04/2011	20:51:10	3.20	27.52	27.65	17:00:35	48	1.21	28.21	28.68
03/04/2011	20:56:10	3.31	27.62	27.63	17:00:40	49	1.21	28.12	28.59
03/04/2011	21:01:10	3.43	27.71	27.60	17:00:45	50	1.21	28.23	28.70
03/04/2011	21:06:10	3.54	27.81	27.59	17:00:50	51	1.21	28.27	28.74
03/04/2011	21:11:10	3.66	27.93	27.59	17:00:55	52	1.21	28.05	28.52
03/04/2011	21:16:10	3.78	28.03	27.57	17:01:00	53	1.21	28.10	28.57
03/04/2011	21:21:10	3.90	28.14	27.57	17:01:05	54	1.21	28.22	28.69
03/04/2011	21:26:10	4.02	28.26	27.57	17:01:10	55	1.21	28.22	28.69
03/04/2011	21:31:10	4.14	28.39	27.57	17:01:15	56	1.21	28.20	28.67
03/04/2011	21:36:10	4.25	28.50	27.57	17:01:20	57	1.21	28.14	28.61
03/04/2011	21:41:10	4.37	28.62	27.57	17:01:25	58	1.21	28.24	28.71
03/04/2011	21:46:10	4.49	28.74	27.57	17:01:30	59	1.21	28.09	28.56
03/04/2011	21:51:10	4.60	28.86	27.57	17:01:36	60	1.21	28.10	28.57
03/04/2011	21:56:10	4.72	28.99	27.59	17:01:41	61	1.21	28.21	28.68
03/04/2011	22:01:10	4.83	29.10	27.59	17:01:46	62	1.21	28.17	28.64
03/04/2011	22:06:10	4.94	29.23	27.61	17:01:51	63	1.21	28.21	28.68
03/04/2011	22:11:10	5.05	29.35	27.62	17:01:56	64	1.21	28.25	28.72
03/04/2011	22:16:10	5.15	29.47	27.64	17:02:01	65	1.20	28.15	28.63
03/04/2011	22:21:10	5.26	29.61	27.68	17:02:06	66	1.20	28.12	28.60
03/04/2011	22:26:10	5.35	29.71	27.68	17:02:11	67	1.20	28.14	28.62
03/04/2011	22:31:10	5.45	29.84	27.71	17:02:16	68	1.20	28.1	28.58
03/04/2011	22:36:10	5.54	29.95	27.73	17:02:21	69	1.20	28.13	28.61
03/04/2011	22:41:10	5.63	30.07	27.76	17:02:26	70	1.20	28.23	28.71
03/04/2011	22:46:10	5.72	30.19	27.80	17:02:31	71	1.20	28.21	28.69
03/04/2011	22:51:10	5.80	30.30	27.82	17:02:36	72	1.20	28.1	28.58
03/04/2011	22:56:10	5.87	30.39	27.84	17:02:41	73	1.20	28.15	28.63
03/04/2011	23:01:10	5.94	30.50	27.87	17:02:46	74	1.20	28.2	28.68
03/04/2011	23:06:10	6.01	30.58	27.89	17:02:51	75	1.20	28.12	28.60
03/04/2011	23:11:10	6.07	30.67	27.91	17:02:56	76	1.20	28.22	28.70
03/04/2011	23:16:10	6.13	30.75	27.94	17:03:01	77	1.19	28.25	28.74
03/04/2011	23:21:10	6.18	30.81	27.95	17:03:06	78	1.19	28.1	28.59
03/04/2011	23:26:10	6.22	30.87	27.96	17:03:11	79	1.19	28.26	28.75
03/04/2011	23:31:10	6.27	30.92	27.98	17:03:16	80	1.19	28.11	28.60
03/04/2011	23:36:10	6.30	30.97	27.99	17:03:21	81	1.19	28.19	28.68
03/04/2011	23:41:10	6.33	31.01	28.00	17:03:26	82	1.19	28.15	28.64
03/04/2011	23:46:10	6.35	31.05	28.01	17:03:31	83	1.19	28.19	28.68
03/04/2011	23:51:10	6.37	31.07	28.02	17:03:36	84	1.19	28.13	28.62
03/04/2011	23:56:10	6.40	31.09	28.02	17:03:41	85	1.19	28.16	28.65
04/04/2011	00:01:10	6.39	31.09	28.02	17:03:46	86	1.19	28.13	28.62
04/04/2011	00:06:10	6.39	31.11	28.04	17:03:51	87	1.19	28.23	28.72
04/04/2011	00:11:10	6.39	31.12	28.05	17:03:56	88	1.19	28.14	28.63
04/04/2011	00:16:10	6.38	31.15	28.09	17:04:01	89	1.18	28.21	28.71
04/04/2011	00:21:10	6.36	31.13	28.09	17:04:06	90	1.18	28.12	28.62
04/04/2011	00:26:10	6.34	31.14	28.12	17:04:11	91	1.18	28.14	28.64
04/04/2011	00:31:10	6.31	31.10	28.11	17:04:17	92	1.18	28.08	28.58
04/04/2011	00:36:10	6.28	31.10	28.14	17:04:22	93	1.18	28.09	28.59
04/04/2011	00:41:10	6.25	31.09	28.17	17:04:27	94	1.18	28.21	28.71
04/04/2011	00:46:10	6.20	31.06	28.18	17:04:32	95	1.18	28.11	28.61
04/04/2011	00:51:10	6.16	31.04	28.21	17:04:37	96	1.18	28.2	28.70
04/04/2011	00:56:10	6.10	31.01	28.22	17:04:42	97	1.18	28.25	28.75
04/04/2011	01:01:10	6.05	30.96	28.23	17:04:47	98	1.18	28.25	28.75
04/04/2011	01:06:10	5.99	30.95	28.29	17:04:52	99	1.18	28.14	28.64
04/04/2011	01:11:10	5.92	30.90	28.29	17:04:57	100	1.18	28.1	28.60
04/04/2011	01:16:10	5.85	30.85	28.32	17:05:02	101	1.17	28.21	28.72
04/04/2011	01:21:10	5.78	30.79	28.33					
04/04/2011	01:26:10	5.70	30.74	28.35					

DEPTH REPORT

Rampion - English Channel

04/04/2011	01:31:10	5.62	30.65	28.35
04/04/2011	01:36:10	5.54	30.61	28.40
04/04/2011	01:41:10	5.45	30.55	28.42
04/04/2011	01:46:10	5.36	30.46	28.42
04/04/2011	01:51:10	5.26	30.37	28.43
04/04/2011	01:56:10	5.16	30.27	28.43
04/04/2011	02:01:10	5.07	30.23	28.49
04/04/2011	02:06:10	4.96	30.13	28.48
04/04/2011	02:11:10	4.86	30.02	28.49
04/04/2011	02:16:10	4.75	29.92	28.49
04/04/2011	02:21:10	4.64	29.82	28.50
04/04/2011	02:26:10	4.53	29.72	28.51
04/04/2011	02:31:10	4.42	29.63	28.53
04/04/2011	02:36:10	4.31	29.53	28.54
04/04/2011	02:41:10	4.19	29.43	28.56
04/04/2011	02:46:10	4.07	29.34	28.58
04/04/2011	02:51:10	3.96	29.24	28.60
04/04/2011	02:56:10	3.84	29.11	28.58
04/04/2011	03:01:10	3.72	29.00	28.60
04/04/2011	03:06:10	3.61	28.89	28.60
04/04/2011	03:11:10	3.49	28.79	28.62
04/04/2011	03:16:10	3.37	28.67	28.62
04/04/2011	03:21:10	3.26	28.56	28.63
04/04/2011	03:26:10	3.14	28.43	28.61
04/04/2011	03:31:10	3.03	28.34	28.64
04/04/2011	03:36:10	2.91	28.23	28.63
04/04/2011	03:41:10	2.80	28.12	28.64
04/04/2011	03:46:10	2.69	28.01	28.63
04/04/2011	03:51:10	2.58	27.90	28.64
04/04/2011	03:56:10	2.48	27.80	28.64
04/04/2011	04:01:10	2.37	27.68	28.63
04/04/2011	04:06:10	2.27	27.60	28.65
04/04/2011	04:11:10	2.17	27.50	28.64
04/04/2011	04:16:10	2.08	27.40	28.64
04/04/2011	04:21:10	1.98	27.29	28.63
04/04/2011	04:26:10	1.89	27.20	28.63
04/04/2011	04:31:10	1.80	27.11	28.63
04/04/2011	04:36:10	1.72	27.01	28.61
04/04/2011	04:41:10	1.64	26.92	28.60
04/04/2011	04:46:10	1.56	26.84	28.60
04/04/2011	04:51:10	1.49	26.75	28.58
04/04/2011	04:56:10	1.42	26.67	28.57
04/04/2011	05:01:10	1.35	26.58	28.55
04/04/2011	05:06:10	1.29	26.49	28.52
04/04/2011	05:11:10	1.24	26.43	28.52
04/04/2011	05:16:10	1.18	26.36	28.50



LOCATION AND DEPTH REPORT



Project No. 11507
Date 28 Mar 2011
Vessel Fugro Saltire
Area Rampion - English Channel
Location BH_13m
Survey type Sampling/CPT
Chart Datum LAT

Geodetic Datum WGS84
Projection UTM Zone 30N
Origin Longitude 3°W
Origin Latitude 0°
Hemisphere North
False Easting 500000 m
False Northing 0 m

Location Report BH_13m Location Report.xls

	Easting	Northing
Average position	687654.38	5618494.45 m
Standard deviation	0.13	0.13 m
Intended position	687654.50	5618494.40 m
Difference	-0.12	0.05 m
Range	0.13 m	
Bearing	292.79 deg	

Depth Report BH_13m Depth Report.xls

	Depth LAT
Probe	19.4 m
Beacon	18.9 m
Drill String	18.5 m
Transducer Depth	0.3 m
Velocity of sound in water	1484.3 m/s
CTD Probe Z offset	3.3 m

For Fugro Survey Ltd


M. Michalak

For Fugro Engineers BV


H. Peter
H. PATER

For Client Representative


P. Watson



DEPTH REPORT

Rampion - English Channel

Location: BH_13m
Type: Sampling/CPT

Project No.: 11507
Vessel: Fugro Saltire
Chart Datum (C.D.): LAT

Depth Measurements reduced to LAT

Probe: 19.4 m
Beacon: 18.9 m

Notes:

Data Source: B56
Beacon Z Offset: 1.62 m
Transducer Depth: 0.26 m
Velocity of sound in water: 1484.30 m/s
CTD Probe Z offset: 3.32 m
Standard / Secondary Port: Portsmouth
Phase: N/A
Range: N/A

For Fugro Survey Ltd

Client Representative

M. Michalak

P. Watson

Note: other pages should be initialised

Date	Time	Tide	Probe Depth		Time	Fix #	Tide	Beacon Depth	
			Not Red.	Reduced				Not Red.	Reduced
28/03/2011	15:06:10	3.08	18.86	19.10	14:53:19	1	2.98	20.12	19.02
28/03/2011	15:11:10	3.11	18.92	19.13	14:53:24	2	2.98	20.03	18.93
28/03/2011	15:16:10	3.14	18.99	19.16	14:53:29	3	2.98	20.06	18.96
28/03/2011	15:21:10	3.18	19.00	19.14	14:53:34	4	2.98	19.87	18.77
28/03/2011	15:26:10	3.21	19.02	19.12	14:53:39	5	2.98	20.15	19.05
28/03/2011	15:31:10	3.25	19.08	19.16	14:53:44	6	2.98	19.92	18.82
28/03/2011	15:36:10	3.28	19.13	19.16	14:53:49	7	2.98	20.02	18.92
28/03/2011	15:41:10	3.32	19.19	19.19	14:53:54	8	2.98	20.05	18.95
28/03/2011	15:46:10	3.36	19.21	19.18	14:54:00	9	2.98	19.99	18.89
28/03/2011	15:51:10	3.40	19.26	19.18	14:54:05	10	2.98	20.01	18.91
28/03/2011	15:56:10	3.44	19.30	19.18	14:54:10	11	2.98	19.99	18.89
28/03/2011	16:01:10	3.48	19.30	19.15	14:54:15	12	2.98	19.97	18.87
28/03/2011	16:06:10	3.52	19.38	19.19	14:54:20	13	2.98	19.95	18.85
28/03/2011	16:11:10	3.56	19.43	19.20	14:54:25	14	2.98	20.03	18.93
28/03/2011	16:16:10	3.60	19.49	19.22	14:54:30	15	2.98	19.88	18.78
28/03/2011	16:21:10	3.64	19.51	19.19	14:54:35	16	2.98	19.88	18.78
28/03/2011	16:26:10	3.68	19.57	19.21	14:54:40	17	2.98	19.86	18.76
28/03/2011	16:31:10	3.72	19.64	19.24	14:54:45	18	2.98	20.02	18.92
28/03/2011	16:36:10	3.77	19.68	19.23	14:54:50	19	2.98	19.94	18.84
28/03/2011	16:41:10	3.81	19.72	19.23	14:54:55	20	2.98	20.09	18.99
28/03/2011	16:46:10	3.85	19.80	19.27	14:55:00	21	2.98	20.05	18.95
28/03/2011	16:51:10	3.90	19.87	19.29	14:55:05	22	3.01	19.97	18.84
28/03/2011	16:56:10	3.94	19.91	19.29	14:55:10	23	3.01	20.04	18.91
28/03/2011	17:01:10	3.98	19.97	19.31	14:55:15	24	3.01	20.04	18.91
28/03/2011	17:06:10	4.03	20.01	19.30	14:55:20	25	3.01	20.02	18.89
28/03/2011	17:11:10	4.07	20.07	19.32	14:55:25	26	3.01	20.11	18.98
28/03/2011	17:16:10	4.11	20.14	19.34	14:55:30	27	3.01	19.99	18.86
28/03/2011	17:21:10	4.16	20.19	19.35	14:55:35	28	3.01	20.05	18.92
28/03/2011	17:26:10	4.20	20.23	19.35	14:55:40	29	3.01	19.92	18.79
28/03/2011	17:31:10	4.24	20.28	19.36	14:55:45	30	3.01	20.19	19.06
28/03/2011	17:36:10	4.28	20.33	19.37	14:55:50	31	3.01	20.01	18.88
28/03/2011	17:41:10	4.32	20.39	19.38	14:55:55	32	3.01	19.97	18.84
28/03/2011	17:46:10	4.36	20.44	19.40	14:56:00	33	3.01	20.03	18.90
28/03/2011	17:51:10	4.40	20.51	19.43	14:56:05	34	3.01	20.10	18.97
28/03/2011	17:56:10	4.44	20.54	19.41	14:56:10	35	3.01	19.94	18.81
28/03/2011	18:01:10	4.48	20.62	19.46	14:56:15	36	3.01	20.04	18.91

DEPTH REPORT



Rampion - English Channel

28/03/2011	18:06:10	4.52	20.63	19.43	14:56:20	37	3.01	20.09	18.96
28/03/2011	18:11:10	4.55	20.69	19.46	14:56:25	38	3.01	19.96	18.83
28/03/2011	18:16:10	4.59	20.71	19.44	14:56:30	39	3.01	20.07	18.94
28/03/2011	18:21:10	4.62	20.76	19.46	14:56:35	40	3.01	20.02	18.89
28/03/2011	18:26:10	4.65	20.80	19.47	14:56:41	41	3.01	19.98	18.85
28/03/2011	18:31:10	4.68	20.87	19.50	14:56:46	42	3.01	20.06	18.93
28/03/2011	18:36:10	4.71	20.92	19.53	14:56:51	43	3.01	19.92	18.79
28/03/2011	18:41:10	4.74	20.92	19.50	14:56:56	44	3.01	19.92	18.79
28/03/2011	18:46:10	4.76	20.97	19.53	14:57:01	45	3.01	20.00	18.87
28/03/2011	18:51:10	4.79	21.00	19.53	14:57:06	46	3.01	20.09	18.96
28/03/2011	18:56:10	4.81	21.03	19.54	14:57:11	47	3.01	19.85	18.72
28/03/2011	19:01:10	4.83	21.07	19.56	14:57:16	48	3.01	20.15	19.02
28/03/2011	19:06:10	4.85	21.10	19.57	14:57:21	49	3.01	20.30	19.17
28/03/2011	19:11:10	4.87	21.08	19.53	14:57:26	50	3.01	19.69	18.56
28/03/2011	19:16:10	4.88	21.12	19.56	14:57:31	51	3.01	20.07	18.94
28/03/2011	19:21:10	4.90	21.14	19.57	14:57:36	52	3.01	19.98	18.85
28/03/2011	19:26:10	4.91	21.15	19.56	14:57:41	53	3.01	19.93	18.80
28/03/2011	19:31:10	4.92	21.14	19.54	14:57:46	54	3.01	20.03	18.90
28/03/2011	19:36:10	4.93	21.17	19.57	14:57:51	55	3.01	19.89	18.76
28/03/2011	19:41:10	4.93	21.17	19.56	14:57:56	56	3.01	19.87	18.74
28/03/2011	19:46:10	4.94	21.18	19.56	14:58:01	57	3.01	20.04	18.91
28/03/2011	19:51:10	4.94	21.18	19.55	14:58:06	58	3.01	19.64	18.51
28/03/2011	19:56:10	4.94	21.22	19.60	14:58:11	59	3.01	19.95	18.82
28/03/2011	20:01:10	4.94	21.17	19.55	14:58:16	60	3.01	20.00	18.87
28/03/2011	20:06:10	4.94	21.19	19.57	14:58:21	61	3.01	19.91	18.78
28/03/2011	20:11:10	4.94	21.22	19.61	14:58:26	62	3.01	19.99	18.86
28/03/2011	20:16:10	4.93	21.17	19.56	14:58:31	63	3.01	19.99	18.86
28/03/2011	20:21:10	4.92	21.14	19.54	14:58:36	64	3.01	19.91	18.78
28/03/2011	20:26:10	4.91	21.20	19.61	14:58:41	65	3.01	20.06	18.93
28/03/2011	20:31:10	4.90	21.16	19.58	14:58:46	66	3.01	19.9	18.77
28/03/2011	20:36:10	4.89	21.12	19.56	14:58:51	67	3.01	20	18.87
28/03/2011	20:41:10	4.87	21.11	19.56	14:58:56	68	3.01	20.02	18.89
28/03/2011	20:46:10	4.85	21.10	19.57	14:59:01	69	3.01	19.91	18.78
28/03/2011	20:51:10	4.83	21.04	19.53	14:59:06	70	3.01	20.01	18.88
28/03/2011	20:56:10	4.81	21.09	19.60	14:59:11	71	3.01	19.9	18.77
28/03/2011	21:01:10	4.79	21.04	19.57	14:59:16	72	3.01	20.02	18.89
28/03/2011	21:06:10	4.76	20.98	19.54	14:59:22	73	3.01	19.98	18.85
28/03/2011	21:11:10	4.74	20.98	19.56	14:59:27	74	3.01	19.92	18.79
28/03/2011	21:16:10	4.71	20.95	19.56	14:59:32	75	3.01	20.05	18.92
28/03/2011	21:21:10	4.68	20.89	19.53	14:59:37	76	3.01	19.95	18.82
28/03/2011	21:26:10	4.65	20.82	19.50	14:59:42	77	3.01	19.96	18.83
28/03/2011	21:31:10	4.61	20.83	19.54	14:59:47	78	3.01	20.11	18.98
28/03/2011	21:36:10	4.58	20.75	19.49	14:59:52	79	3.01	20.03	18.90
28/03/2011	21:41:10	4.54	20.71	19.49	14:59:57	80	3.01	20.07	18.94
28/03/2011	21:46:10	4.50	20.66	19.48	15:00:02	81	3.04	20.11	18.95
28/03/2011	21:51:10	4.46	20.68	19.54	15:00:07	82	3.04	19.96	18.80
28/03/2011	21:56:10	4.42	20.61	19.51	15:00:12	83	3.04	20.09	18.93
28/03/2011	22:01:10	4.38	20.52	19.46	15:00:17	84	3.04	20.06	18.90
28/03/2011	22:06:10	4.33	20.46	19.45	15:00:22	85	3.04	20.08	18.92
28/03/2011	22:11:10	4.29	20.45	19.48	15:00:27	86	3.04	19.85	18.69
28/03/2011	22:16:10	4.24	20.40	19.48	15:00:32	87	3.04	20.04	18.88
28/03/2011	22:21:10	4.19	20.35	19.48	15:00:37	88	3.04	19.7	18.54
28/03/2011	22:26:10	4.14	20.32	19.50	15:00:42	89	3.04	20.03	18.87
28/03/2011	22:31:10	4.09	20.20	19.43	15:00:47	90	3.04	19.92	18.76
28/03/2011	22:36:10	4.04	20.19	19.47	15:00:52	91	3.04	19.6	18.44
28/03/2011	22:41:10	3.99	20.13	19.47	15:00:57	92	3.04	20.05	18.89
28/03/2011	22:46:10	3.94	20.08	19.46	15:01:02	93	3.04	19.91	18.75
28/03/2011	22:51:10	3.88	20.01	19.45	15:01:07	94	3.04	19.86	18.70
28/03/2011	22:56:10	3.83	20.00	19.49	15:01:12	95	3.04	19.92	18.76
28/03/2011	23:01:10	3.78	19.94	19.48	15:01:17	96	3.04	19.91	18.75
28/03/2011	23:06:10	3.72	19.85	19.44	15:01:22	97	3.04	20.05	18.89
28/03/2011	23:11:10	3.67	19.82	19.47	15:01:27	98	3.04	19.7	18.54
28/03/2011	23:16:10	3.62	19.77	19.47	15:01:32	99	3.04	20	18.84
28/03/2011	23:21:10	3.57	19.70	19.46	15:01:37	100	3.04	20.04	18.88
28/03/2011	23:26:10	3.51	19.67	19.48					
28/03/2011	23:31:10	3.46	19.62	19.48					
28/03/2011	23:36:10	3.41	19.55	19.46					
28/03/2011	23:41:10	3.36	19.50	19.46					

OK

DEPTH REPORT



Rampion - English Channel

28/03/2011	23:46:10	3.32	19.47	19.47
28/03/2011	23:51:10	3.27	19.41	19.46
28/03/2011	23:56:10	3.22	19.34	19.44
29/03/2011	00:01:10	3.18	19.26	19.40
29/03/2011	00:06:10	3.14	19.26	19.44
29/03/2011	00:11:10	3.10	19.21	19.44
29/03/2011	00:16:10	3.06	19.17	19.43
29/03/2011	00:21:10	3.02	19.10	19.40
29/03/2011	00:26:10	2.99	19.07	19.40
29/03/2011	00:31:10	2.95	19.04	19.41
29/03/2011	00:36:10	2.92	18.98	19.37
29/03/2011	00:41:10	2.89	18.96	19.39
29/03/2011	00:46:10	2.87	18.94	19.40
29/03/2011	00:51:10	2.84	18.86	19.33
29/03/2011	00:56:10	2.82	18.87	19.36
29/03/2011	01:01:10	2.80	18.84	19.35
29/03/2011	01:06:10	2.79	18.81	19.34
29/03/2011	01:11:10	2.77	18.77	19.32
29/03/2011	01:16:10	2.76	18.77	19.33
29/03/2011	01:21:10	2.75	18.73	19.30
29/03/2011	01:26:10	2.75	18.72	19.29
29/03/2011	01:31:10	2.74	18.67	19.25
29/03/2011	01:36:10	2.74	18.66	19.24
29/03/2011	01:41:10	2.74	18.65	19.23
29/03/2011	01:46:10	2.74	18.65	19.23
29/03/2011	01:51:10	2.74	18.63	19.21
29/03/2011	01:56:10	2.75	18.63	19.20
29/03/2011	02:01:10	2.76	18.60	19.17
29/03/2011	02:06:10	2.76	18.64	19.20
29/03/2011	02:11:10	2.77	18.60	19.15
29/03/2011	02:16:10	2.79	18.61	19.15
29/03/2011	02:21:10	2.80	18.61	19.13
29/03/2011	02:26:10	2.81	18.56	19.07
29/03/2011	02:31:10	2.83	18.61	19.10
29/03/2011	02:36:10	2.85	18.66	19.13
29/03/2011	02:41:10	2.87	18.65	19.10
29/03/2011	02:46:10	2.89	18.66	19.10
29/03/2011	02:51:10	2.91	18.64	19.06
29/03/2011	02:56:10	2.93	18.69	19.08
29/03/2011	03:01:10	2.95	18.69	19.06
29/03/2011	03:06:10	2.97	18.75	19.10
29/03/2011	03:11:10	3.00	18.75	19.08
29/03/2011	03:16:10	3.02	18.72	19.02
29/03/2011	03:21:10	3.05	18.77	19.04
29/03/2011	03:26:10	3.07	18.81	19.06
29/03/2011	03:31:10	3.10	18.88	19.10

per



LOCATION REPORT

Rampion - English Channel

Location: BH_13m

Type : Sampling/CPT

Average Position

Standard deviation

Easting (m)

Northing (m)

687654.38

5618494.45

0.13

0.13

Intended position

687654.50

5618494.40

Difference

-0.12

0.05

Distance

0.13 m

Bearing

292.79 deg

Project no:

11507

Date:

28 Mar 2011

Vessel:

Fugro Saltire

Notes:

Datum

WGS84

Projection

UTM Zone 30N

Origin Longitude

3°W

Origin Latitude

0°

Hemisphere

North

False Easting

500000 m

False Northing

0 m

For Fugro Survey Ltd

M. Michalak

For Client

H. Peter

H. PATER

BST	Logged Drill-string Positions		
Time	Fix no.	Easting (m)	Northing (m)
14:53:09	1	687654.30	5618494.57
14:53:11	2	687654.35	5618494.42
14:53:12	3	687654.24	5618494.29
14:53:14	4	687654.49	5618494.52
14:53:16	5	687654.24	5618494.49
14:53:18	6	687654.37	5618494.63
14:53:20	7	687654.39	5618494.63
14:53:22	8	687654.23	5618494.53
14:53:24	9	687654.21	5618494.46
14:53:26	10	687654.37	5618494.59
14:53:28	11	687654.55	5618494.52
14:53:29	12	687654.48	5618494.34
14:53:31	13	687654.44	5618494.40
14:53:33	14	687654.47	5618494.57
14:53:35	15	687654.54	5618494.65
14:53:37	16	687654.56	5618494.60
14:53:38	17	687654.31	5618494.40
14:53:40	18	687654.54	5618494.44
14:53:42	19	687654.63	5618494.48
14:53:44	20	687654.14	5618494.31
14:53:46	21	687654.27	5618494.49
14:53:48	22	687654.33	5618494.44
14:53:50	23	687654.30	5618494.33
14:53:52	24	687654.55	5618494.36
14:53:53	25	687654.59	5618494.46
14:53:55	26	687654.41	5618494.57
14:53:57	27	687654.30	5618494.56
14:53:59	28	687654.31	5618494.53
14:54:01	29	687654.37	5618494.46
14:54:03	30	687654.60	5618494.48
14:54:05	31	687654.27	5618494.30
14:54:07	32	687654.55	5618494.58
14:54:08	33	687654.48	5618494.65
14:54:10	34	687654.38	5618494.51
14:54:12	35	687654.20	5618494.36
14:54:14	36	687654.35	5618494.40
14:54:16	37	687654.34	5618494.46

Revision: Jan 2010

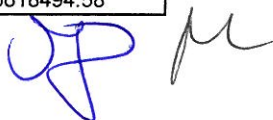
Page 1 of 2

© Fugro Survey Ltd

BH_13m Location Report.xls

LOCATION REPORT

14:54:17	38	687654.31	5618494.49
14:54:19	39	687654.44	5618494.56
14:54:21	40	687654.39	5618494.52
14:54:23	41	687654.64	5618494.57
14:54:25	42	687654.32	5618494.25
14:54:27	43	687654.26	5618494.14
14:54:29	44	687654.40	5618494.14
14:54:31	45	687654.17	5618494.17
14:54:32	46	687654.06	5618494.27
14:54:34	47	687654.29	5618494.43
14:54:44	52	687654.53	5618494.35
14:54:46	53	687654.34	5618494.37
14:54:47	54	687654.35	5618494.38
14:54:49	55	687654.69	5618494.65
14:54:51	56	687654.70	5618494.47
14:54:53	57	687654.37	5618494.26
14:54:55	58	687654.46	5618494.42
14:54:56	59	687654.46	5618494.50
14:54:58	60	687654.31	5618494.40
14:55:00	61	687654.30	5618494.37
14:55:02	62	687654.61	5618494.48
14:55:04	63	687654.31	5618494.18
14:55:06	64	687654.38	5618494.33
14:55:08	65	687654.46	5618494.49
14:55:10	66	687654.60	5618494.62
14:55:11	67	687654.69	5618494.67
14:55:13	68	687654.18	5618494.35
14:55:15	69	687654.58	5618494.49
14:55:17	70	687654.35	5618494.16
14:55:19	71	687654.52	5618494.36
14:55:21	72	687654.45	5618494.29
14:55:23	73	687654.58	5618494.42
14:55:24	74	687654.54	5618494.48
14:55:26	75	687654.28	5618494.37
14:55:28	76	687654.52	5618494.47
14:55:30	77	687654.47	5618494.33
14:55:32	78	687654.45	5618494.46
14:55:34	79	687654.49	5618494.48
14:55:36	80	687654.44	5618494.44
14:55:37	81	687654.16	5618494.17
14:55:39	82	687654.45	5618494.20
14:55:41	83	687654.47	5618494.23
14:55:43	84	687654.46	5618494.39
14:55:45	85	687654.56	5618494.65
14:55:47	86	687654.55	5618494.78
14:55:49	87	687654.38	5618494.63
14:55:51	88	687654.59	5618494.65
14:55:52	89	687654.27	5618494.33
14:55:54	90	687654.38	5618494.47
14:55:56	91	687654.53	5618494.70
14:55:58	92	687654.27	5618494.51
14:56:00	93	687654.41	5618494.55
14:56:02	94	687654.18	5618494.45
14:56:03	95	687654.40	5618494.68
14:56:05	96	687654.35	5618494.67
14:56:07	97	687654.53	5618494.74
14:56:09	98	687654.30	5618494.63
14:56:11	99	687654.36	5618494.65
14:56:13	100	687654.49	5618494.75
14:56:15	101	687654.42	5618494.77
14:56:17	102	687654.22	5618494.60
14:56:18	103	687654.36	5618494.62
14:56:20	104	687654.28	5618494.58



PRESSURE TO DEPTH CONVERSION



Vessel: Fugro Saltire
Location: BH_13m

Project no: 11507
Date: 30/03/2011
Instrument: CTD ser no 26326

Latitude :	50.68	N
Start Barometer :	1016	mbar

Gravity =	9.811	m/s ²
Average Density=	1.027	kg/dm ³

Notes:

Depth = $P/d/g \times 10000$ m
Gravity = $9.780318(1 + 0.0052788 \times (\sin(\text{lat}))^2 + 0.0000236 \times \sin(\text{lat})^4) + 0.5 \times 0.000002184 \times P$ m/s²

For Fugro Survey Ltd


P. Moharana

For Client


H. Peter
H. PATER

Probe Readings			
Date	Time	Pressure	Barometer
dd/mm/yyyy	hh:mm:ss	dbar	mbar
28/03/2011	15:06:10	19.001	1015
28/03/2011	15:11:10	19.057	1015
28/03/2011	15:16:10	19.128	1015
28/03/2011	15:21:10	19.138	1015
28/03/2011	15:26:10	19.158	1015
28/03/2011	15:31:10	19.227	1015
28/03/2011	15:36:10	19.269	1015
28/03/2011	15:41:10	19.330	1015
28/03/2011	15:46:10	19.358	1015
28/03/2011	15:51:10	19.404	1015
28/03/2011	15:56:10	19.441	1015
28/03/2011	16:01:10	19.446	1015
28/03/2011	16:06:10	19.528	1015
28/03/2011	16:11:10	19.579	1015
28/03/2011	16:16:10	19.639	1015
28/03/2011	16:21:10	19.659	1015
28/03/2011	16:26:10	19.713	1015
28/03/2011	16:31:10	19.789	1015
28/03/2011	16:36:10	19.824	1015
28/03/2011	16:41:10	19.871	1015
28/03/2011	16:46:10	19.950	1015
28/03/2011	16:51:10	20.016	1015
28/03/2011	16:56:10	20.062	1015
28/03/2011	17:01:10	20.124	1015
28/03/2011	17:06:10	20.156	1015
28/03/2011	17:11:10	20.218	1015
28/03/2011	17:16:10	20.288	1015
28/03/2011	17:21:10	20.336	1015
28/03/2011	17:26:10	20.380	1015
28/03/2011	17:31:10	20.435	1015
28/03/2011	17:36:10	20.486	1015
28/03/2011	17:41:10	20.538	1015
28/03/2011	17:46:10	20.597	1015
28/03/2011	17:51:10	20.667	1015
28/03/2011	17:56:10	20.689	1015
28/03/2011	18:01:10	20.775	1015
28/03/2011	18:06:10	20.785	1015
28/03/2011	18:11:10	20.847	1015
28/03/2011	18:16:10	20.862	1015
28/03/2011	18:21:10	20.915	1015
28/03/2011	18:26:10	20.959	1015
28/03/2011	18:31:10	21.022	1015
28/03/2011	18:36:10	21.073	1015
28/03/2011	18:41:10	21.074	1015

Computed
Depth
m
18.86
18.92
18.99
19.00
19.02
19.08
19.13
19.19
19.21
19.26
19.30
19.30
19.38
19.43
19.49
19.51
19.57
19.64
19.68
19.72
19.80
19.87
19.91
19.97
20.01
20.07
20.14
20.19
20.23
20.28
20.33
20.39
20.44
20.51
20.54
20.62
20.63
20.69
20.71
20.76
20.80
20.87
20.92
20.92

PRESSURE TO DEPTH CONVERSION



Vessel: Fugro Saltire
Location: BH_13m

Project no: 11507
Date: 30/03/2011
Instrument: CTD ser no 26326

28/03/2011	18:46:10	21.128	1015
28/03/2011	18:51:10	21.159	1015
28/03/2011	18:56:10	21.189	1015
28/03/2011	19:01:10	21.228	1015
28/03/2011	19:06:10	21.259	1015
28/03/2011	19:11:10	21.240	1015
28/03/2011	19:16:10	21.279	1015
28/03/2011	19:21:10	21.301	1015
28/03/2011	19:26:10	21.304	1015
28/03/2011	19:31:10	21.297	1015
28/03/2011	19:36:10	21.333	1015
28/03/2011	19:41:10	21.332	1015
28/03/2011	19:46:10	21.340	1015
28/03/2011	19:51:10	21.335	1015
28/03/2011	19:56:10	21.380	1015
28/03/2011	20:01:10	21.331	1015
28/03/2011	20:06:10	21.347	1015
28/03/2011	20:11:10	21.383	1015
28/03/2011	20:16:10	21.325	1015
28/03/2011	20:21:10	21.296	1015
28/03/2011	20:26:10	21.364	1015
28/03/2011	20:31:10	21.317	1015
28/03/2011	20:36:10	21.281	1015
28/03/2011	20:41:10	21.268	1015
28/03/2011	20:46:10	21.260	1015
28/03/2011	20:51:10	21.199	1015
28/03/2011	20:56:10	21.250	1015
28/03/2011	21:01:10	21.195	1015
28/03/2011	21:06:10	21.140	1015
28/03/2011	21:11:10	21.135	1015
28/03/2011	21:16:10	21.104	1015
28/03/2011	21:21:10	21.045	1015
28/03/2011	21:26:10	20.979	1015
28/03/2011	21:31:10	20.987	1015
28/03/2011	21:36:10	20.904	1015
28/03/2011	21:41:10	20.867	1015
28/03/2011	21:46:10	20.813	1015
28/03/2011	21:51:10	20.833	1015
28/03/2011	21:56:10	20.769	1015
28/03/2011	22:01:10	20.674	1015
28/03/2011	22:06:10	20.615	1015
28/03/2011	22:11:10	20.602	1015
28/03/2011	22:16:10	20.554	1015
28/03/2011	22:21:10	20.504	1015
28/03/2011	22:26:10	20.472	1015
28/03/2011	22:31:10	20.349	1015
28/03/2011	22:36:10	20.341	1015
28/03/2011	22:41:10	20.285	1015
28/03/2011	22:46:10	20.229	1015
28/03/2011	22:51:10	20.163	1015
28/03/2011	22:56:10	20.149	1015
28/03/2011	23:01:10	20.087	1015
28/03/2011	23:06:10	19.998	1015
28/03/2011	23:11:10	19.972	1015
28/03/2011	23:16:10	19.914	1015
28/03/2011	23:21:10	19.851	1015
28/03/2011	23:26:10	19.820	1015
28/03/2011	23:31:10	19.765	1015
28/03/2011	23:36:10	19.696	1015
28/03/2011	23:41:10	19.646	1015
28/03/2011	23:46:10	19.613	1015
28/03/2011	23:51:10	19.554	1015
28/03/2011	23:56:10	19.487	1015

20.97
21.00
21.03
21.07
21.10
21.08
21.12
21.14
21.15
21.14
21.17
21.17
21.18
21.18
21.22
21.17
21.19
21.22
21.17
21.14
21.20
21.16
21.12
21.11
21.10
21.04
21.09
21.04
20.98
20.98
20.95
20.89
20.82
20.83
20.75
20.71
20.66
20.68
20.61
20.52
20.46
20.45
20.40
20.35
20.32
20.20
20.19
20.13
20.08
20.01
20.00
19.94
19.85
19.82
19.77
19.70
19.67
19.62
19.55
19.50
19.47
19.41
19.34

PRESSURE TO DEPTH CONVERSION



Vessel: Fugro Saltire
Location: BH_13m

Project no: 11507
Date: 30/03/2011
Instrument: CTD ser no 26326

29/03/2011	00:01:10	19.402	1015
29/03/2011	00:06:10	19.399	1015
29/03/2011	00:11:10	19.355	1015
29/03/2011	00:16:10	19.315	1015
29/03/2011	00:21:10	19.242	1015
29/03/2011	00:26:10	19.207	1015
29/03/2011	00:31:10	19.186	1015
29/03/2011	00:36:10	19.117	1015
29/03/2011	00:41:10	19.104	1015
29/03/2011	00:46:10	19.086	1015
29/03/2011	00:51:10	19.000	1015
29/03/2011	00:56:10	19.008	1015
29/03/2011	01:01:10	18.978	1015
29/03/2011	01:06:10	18.953	1015
29/03/2011	01:11:10	18.910	1015
29/03/2011	01:16:10	18.910	1015
29/03/2011	01:21:10	18.869	1015
29/03/2011	01:26:10	18.861	1015
29/03/2011	01:31:10	18.811	1015
29/03/2011	01:36:10	18.802	1015
29/03/2011	01:41:10	18.790	1015
29/03/2011	01:46:10	18.786	1015
29/03/2011	01:51:10	18.770	1015
29/03/2011	01:56:10	18.770	1015
29/03/2011	02:01:10	18.743	1015
29/03/2011	02:06:10	18.783	1015
29/03/2011	02:11:10	18.743	1015
29/03/2011	02:16:10	18.751	1015
29/03/2011	02:21:10	18.745	1015
29/03/2011	02:26:10	18.702	1015
29/03/2011	02:31:10	18.744	1015
29/03/2011	02:36:10	18.800	1015
29/03/2011	02:41:10	18.789	1015
29/03/2011	02:46:10	18.800	1015
29/03/2011	02:51:10	18.779	1015
29/03/2011	02:56:10	18.830	1015
29/03/2011	03:01:10	18.826	1015
29/03/2011	03:06:10	18.888	1015
29/03/2011	03:11:10	18.892	1015
29/03/2011	03:16:10	18.856	1015
29/03/2011	03:21:10	18.906	1015
29/03/2011	03:26:10	18.949	1015
29/03/2011	03:31:10	19.021	1015

19.26
19.26
19.21
19.17
19.10
19.07
19.04
18.98
18.96
18.94
18.86
18.87
18.84
18.81
18.77
18.77
18.73
18.72
18.67
18.66
18.65
18.65
18.63
18.63
18.60
18.64
18.60
18.61
18.61
18.56
18.61
18.66
18.65
18.66
18.64
18.69
18.69
18.75
18.75
18.72
18.77
18.81
18.88

LOCATION AND DEPTH REPORT



Project No. 11507
Date 29 Mar 2011
Vessel Fugro Saltire
Area Rampion - English Channel
Location BH_14m
Survey type Sampling/CPT
Chart Datum LAT

Geodetic Datum WGS84
Projection UTM Zone 30N
Origin Longitude 3°W
Origin Latitude 0°
Hemisphere North
False Easting 500000 m
False Northing 0 m

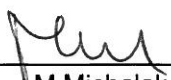
Location Report BH_14m Location Report.xls

	Easting	Northing
Average position	686487.35	5617486.02 m
Standard deviation	0.12	0.16 m
Intended position	686486.90	5617485.70 m
Difference	0.45	0.32 m
Range	0.55 m	
Bearing	054.68	deg

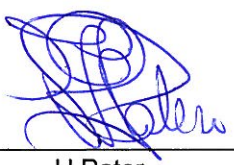
Depth Report BH_14m Depth Report.xls

	Depth LAT
Probe	19.9 m
Beacon	20.7 m
Drill String	20.3 m
Transducer Depth	0.3 m
Velocity of sound in water	1484.3 m/s
CTD Probe Z offset	3.3 m

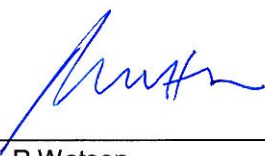
For Fugro Survey Ltd


M. Michalak

For Fugro Engineers BV


H. Pater

For Client Representative


P. Watson



DEPTH REPORT

Rampion - English Channel

Location: BH_14m
Type: Sampling/CPT

Project No.: 11507
Vessel: Fugro Saltire
Chart Datum (C.D.): LAT

Depth Measurements reduced to LAT

Probe: 19.9 m
Beacon: 20.7 m

Notes:

Data Source: B56
Beacon Z Offset: 1.62 m
Transducer Depth: 0.26 m
Velocity of sound in water: 1484.30 m/s
CTD Probe Z offset: 3.32 m
Standard / Secondary Port: Portsmouth
Phase: N/A
Range: N/A

For Fugro Survey Ltd

Client Representative

M.Michalak

H.Pater

Note: other pages should be initialised

Date	Time	Tide	Probe Depth		Time	Fix #	Tide	Beacon Depth	
			Not Red.	Reduced				Not Red.	Reduced
29/03/2011	22:18:10	4.88	21.68	20.12	22:18:02	1	4.88	23.55	20.55
29/03/2011	22:23:10	4.85	21.70	20.17	22:18:07	2	4.88	23.70	20.70
29/03/2011	22:28:10	4.82	21.66	20.16	22:18:12	3	4.88	23.78	20.78
29/03/2011	22:33:10	4.78	21.63	20.17	22:18:17	4	4.88	23.70	20.70
29/03/2011	22:38:10	4.75	21.56	20.13	22:18:22	5	4.88	23.65	20.65
29/03/2011	22:43:10	4.71	21.54	20.15	22:18:27	6	4.88	23.70	20.70
29/03/2011	22:48:10	4.67	21.46	20.11	22:18:32	7	4.88	23.76	20.76
29/03/2011	22:53:10	4.62	21.41	20.11	22:18:37	8	4.88	23.80	20.80
29/03/2011	22:58:10	4.58	21.38	20.12	22:18:42	9	4.88	23.60	20.60
29/03/2011	23:03:10	4.53	21.31	20.10	22:18:52	11	4.88	23.57	20.57
29/03/2011	23:08:10	4.48	21.25	20.09	22:18:57	12	4.88	23.73	20.73
29/03/2011	23:13:10	4.43	21.17	20.06	22:19:02	13	4.88	23.69	20.69
29/03/2011	23:18:10	4.38	21.18	20.13	22:19:07	14	4.88	23.78	20.78
29/03/2011	23:23:10	4.32	21.04	20.04	22:19:12	15	4.88	23.77	20.77
29/03/2011	23:28:10	4.26	21.00	20.05	22:19:17	16	4.88	23.78	20.78
29/03/2011	23:33:10	4.21	20.95	20.06	22:19:22	17	4.88	23.57	20.57
29/03/2011	23:38:10	4.15	20.95	20.12	22:19:27	18	4.88	23.76	20.76
29/03/2011	23:43:10	4.09	20.83	20.06	22:19:32	19	4.88	23.67	20.67
29/03/2011	23:48:10	4.03	20.75	20.04	22:19:37	20	4.88	23.69	20.69
29/03/2011	23:53:10	3.97	20.70	20.06	22:19:42	21	4.88	23.67	20.67
29/03/2011	23:58:10	3.91	20.66	20.08	22:19:47	22	4.88	23.80	20.80
30/03/2011	00:03:10	3.84	20.55	20.03	22:19:52	23	4.88	23.75	20.75
30/03/2011	00:08:10	3.78	20.50	20.04	22:19:58	24	4.88	23.71	20.71
30/03/2011	00:13:10	3.71	20.42	20.02	22:20:03	25	4.87	23.66	20.67
30/03/2011	00:18:10	3.65	20.37	20.05	22:20:08	26	4.87	23.59	20.60
30/03/2011	00:23:10	3.59	20.28	20.02	22:20:13	27	4.87	23.65	20.66
30/03/2011	00:28:10	3.52	20.22	20.01	22:20:18	28	4.87	23.75	20.76
30/03/2011	00:33:10	3.46	20.19	20.05	22:20:23	29	4.87	23.64	20.65
30/03/2011	00:38:10	3.40	20.13	20.05	22:20:28	30	4.87	23.64	20.65
30/03/2011	00:43:10	3.34	20.05	20.03	22:20:33	31	4.87	23.78	20.79
30/03/2011	00:48:10	3.28	19.93	19.97	22:20:38	32	4.87	23.55	20.56
30/03/2011	00:53:10	3.22	19.91	20.01	22:20:43	33	4.87	23.72	20.73
30/03/2011	00:58:10	3.17	19.84	19.99	22:20:48	34	4.87	23.62	20.63
30/03/2011	01:03:10	3.11	19.77	19.98	22:20:53	35	4.87	23.78	20.79
30/03/2011	01:08:10	3.06	19.68	19.94	22:20:58	36	4.87	23.60	20.61

DEPTH REPORT



Rampion - English Channel

30/03/2011	01:13:10	3.01	19.65	19.96	22:21:03	37	4.87	23.60	20.61
30/03/2011	01:18:10	2.96	19.57	19.93	22:21:08	38	4.87	23.85	20.86
30/03/2011	01:23:10	2.91	19.54	19.95	22:21:13	39	4.87	23.59	20.60
30/03/2011	01:28:10	2.87	19.48	19.93	22:21:18	40	4.87	23.69	20.70
30/03/2011	01:33:10	2.83	19.43	19.92	22:21:23	41	4.87	23.89	20.90
30/03/2011	01:38:10	2.79	19.35	19.88	22:21:28	42	4.87	23.81	20.82
30/03/2011	01:43:10	2.76	19.32	19.89	22:21:33	43	4.87	23.78	20.79
30/03/2011	01:48:10	2.72	19.30	19.90	22:21:38	44	4.87	23.90	20.91
30/03/2011	01:53:10	2.69	19.23	19.86	22:21:43	45	4.87	23.72	20.73
30/03/2011	01:58:10	2.67	19.22	19.87	22:21:48	46	4.87	23.84	20.85
30/03/2011	02:03:10	2.64	19.18	19.85	22:21:53	47	4.87	23.83	20.84
30/03/2011	02:08:10	2.62	19.15	19.84	22:21:58	48	4.87	23.88	20.89
30/03/2011	02:13:10	2.61	19.09	19.80	22:22:03	49	4.86	23.73	20.75
30/03/2011	02:18:10	2.59	19.05	19.78	22:22:08	50	4.86	23.92	20.94
30/03/2011	02:23:10	2.58	19.02	19.76	22:22:13	51	4.86	23.75	20.77
30/03/2011	02:28:10	2.57	19.01	19.76	22:22:18	52	4.86	23.90	20.92
30/03/2011	02:33:10	2.56	18.95	19.71	22:22:23	53	4.86	23.90	20.92
30/03/2011	02:38:10	2.56	18.92	19.68	22:22:28	54	4.86	23.67	20.69
30/03/2011	02:43:10	2.56	18.90	19.66	22:22:33	55	4.86	23.70	20.72
30/03/2011	02:48:10	2.56	18.89	19.65	22:22:39	56	4.86	23.84	20.86
30/03/2011	02:53:10	2.56	18.86	19.61	22:22:44	57	4.86	23.75	20.77
30/03/2011	02:58:10	2.57	18.85	19.60	22:22:49	58	4.86	23.76	20.78
30/03/2011	03:03:10	2.58	18.85	19.59	22:22:54	59	4.86	23.67	20.69
30/03/2011	03:08:10	2.59	18.83	19.56	22:22:59	60	4.86	23.59	20.61
30/03/2011	03:13:10	2.60	18.81	19.52	22:23:04	61	4.85	23.62	20.65
30/03/2011	03:18:10	2.61	18.82	19.52	22:23:09	62	4.85	23.69	20.72
30/03/2011	03:23:10	2.63	18.80	19.49	22:23:14	63	4.85	23.88	20.91
30/03/2011	03:28:10	2.65	18.83	19.51	22:23:19	64	4.85	23.67	20.70
30/03/2011	03:33:10	2.67	18.84	19.49	22:23:24	65	4.85	23.68	20.71
30/03/2011	03:38:10	2.69	18.83	19.46	22:23:29	66	4.85	23.75	20.78
30/03/2011	03:43:10	2.71	18.84	19.45	22:23:34	67	4.85	23.91	20.94
30/03/2011	03:48:10	2.73	18.84	19.43	22:23:39	68	4.85	23.74	20.77
30/03/2011	03:53:10	2.75	18.88	19.45	22:23:49	70	4.85	23.77	20.80
30/03/2011	03:58:10	2.78	18.88	19.43	22:23:54	71	4.85	23.7	20.73
30/03/2011	04:03:10	2.80	18.92	19.43	22:23:59	72	4.85	23.91	20.94
30/03/2011	04:08:10	2.83	18.93	19.42	22:24:09	74	4.85	23.74	20.77
30/03/2011	04:13:10	2.86	18.96	19.42	22:24:14	75	4.85	23.71	20.74
30/03/2011	04:18:10	2.88	18.97	19.41	22:24:19	76	4.85	23.94	20.97
30/03/2011	04:23:10	2.91	19.02	19.43	22:24:24	77	4.85	23.66	20.69
30/03/2011	04:28:10	2.94	19.06	19.44	22:24:29	78	4.85	23.74	20.77
30/03/2011	04:33:10	2.97	19.09	19.43	22:24:34	79	4.85	23.81	20.84
30/03/2011	04:38:10	3.00	19.13	19.44	22:24:39	80	4.85	23.8	20.83
30/03/2011	04:43:10	3.03	19.15	19.43	22:24:44	81	4.85	23.73	20.76
30/03/2011	04:48:10	3.07	19.18	19.43	22:24:49	82	4.85	23.81	20.84
30/03/2011	04:53:10	3.10	19.24	19.47	22:24:54	83	4.85	23.7	20.73
30/03/2011	04:58:10	3.13	19.27	19.46	22:24:59	84	4.85	23.68	20.71
30/03/2011	05:03:10	3.17	19.31	19.46	22:25:04	85	4.84	23.67	20.71
30/03/2011	05:08:10	3.20	19.39	19.51	22:25:09	86	4.84	23.8	20.84
30/03/2011	05:13:10	3.24	19.41	19.49	22:25:14	87	4.84	23.78	20.82
30/03/2011	05:18:10	3.27	19.47	19.51	22:25:20	88	4.84	23.63	20.67
30/03/2011	05:23:10	3.31	19.52	19.53	22:25:25	89	4.84	23.65	20.69
30/03/2011	05:28:10	3.35	19.58	19.55	22:25:30	90	4.84	23.71	20.75
30/03/2011	05:33:10	3.39	19.60	19.53	22:25:35	91	4.84	23.79	20.83
30/03/2011	05:38:10	3.43	19.65	19.54	22:25:40	92	4.84	23.87	20.91
30/03/2011	05:43:10	3.47	19.72	19.57	22:25:45	93	4.84	23.62	20.66
30/03/2011	05:48:10	3.51	19.79	19.60	22:25:50	94	4.84	23.75	20.79
30/03/2011	05:53:10	3.55	19.83	19.60	22:25:55	95	4.84	23.56	20.60
30/03/2011	05:58:10	3.59	19.88	19.61	22:26:00	96	4.83	23.78	20.83
30/03/2011	06:03:10	3.64	19.97	19.66	22:26:05	97	4.83	23.9	20.95
30/03/2011	06:08:10	3.68	20.02	19.66	22:26:10	98	4.83	23.64	20.69
30/03/2011	06:13:10	3.72	20.10	19.69	22:26:15	99	4.83	23.57	20.62
30/03/2011	06:18:10	3.77	20.14	19.69					
30/03/2011	06:23:10	3.82	20.22	19.72					
30/03/2011	06:28:10	3.86	20.28	19.73					
30/03/2011	06:33:10	3.91	20.34	19.75					
30/03/2011	06:38:10	3.96	20.41	19.77					
30/03/2011	06:43:10	4.01	20.47	19.78					
30/03/2011	06:48:10	4.05	20.54	19.80					

ph *28*

DEPTH REPORT

Rampion - English Channel

30/03/2011	06:53:10	4.10	20.62	19.84
30/03/2011	06:58:10	4.15	20.68	19.85
30/03/2011	07:03:10	4.20	20.75	19.87
30/03/2011	07:08:10	4.25	20.81	19.88
30/03/2011	07:13:10	4.29	20.87	19.90
30/03/2011	07:18:10	4.34	20.96	19.94
30/03/2011	07:23:10	4.39	21.04	19.97
30/03/2011	07:28:10	4.43	21.09	19.98
30/03/2011	07:33:10	4.48	21.16	20.00
30/03/2011	07:38:10	4.52	21.23	20.03
30/03/2011	07:43:10	4.56	21.28	20.04
30/03/2011	07:48:10	4.60	21.34	20.06
30/03/2011	07:53:10	4.64	21.40	20.08
30/03/2011	07:58:10	4.68	21.46	20.10
30/03/2011	08:03:10	4.72	21.49	20.10
30/03/2011	08:08:10	4.75	21.57	20.14
30/03/2011	08:13:10	4.78	21.61	20.15
30/03/2011	08:18:10	4.81	21.65	20.16
30/03/2011	08:23:10	4.84	21.71	20.19
30/03/2011	08:28:10	4.87	21.75	20.20
30/03/2011	08:33:10	4.89	21.79	20.21
30/03/2011	08:38:10	4.92	21.84	20.24
30/03/2011	08:43:10	4.94	21.84	20.23
30/03/2011	08:48:10	4.96	21.89	20.25
30/03/2011	08:53:10	4.97	21.89	20.24
30/03/2011	08:58:10	4.99	21.95	20.29
30/03/2011	09:03:10	5.00	21.96	20.28
30/03/2011	09:08:10	5.01	21.97	20.28
30/03/2011	09:13:10	5.02	22.00	20.30
30/03/2011	09:18:10	5.02	22.01	20.30
30/03/2011	09:23:10	5.03	21.99	20.28
30/03/2011	09:28:10	5.03	22.00	20.29
30/03/2011	09:33:10	5.03	21.98	20.27
30/03/2011	09:38:10	5.03	21.99	20.29
30/03/2011	09:43:10	5.02	22.00	20.30
30/03/2011	09:48:10	5.01	22.00	20.31
30/03/2011	09:53:10	5.00	22.01	20.32
30/03/2011	09:58:10	4.99	21.99	20.32
30/03/2011	10:03:10	4.98	21.94	20.28
30/03/2011	10:08:10	4.96	21.94	20.30
30/03/2011	10:13:10	4.94	21.91	20.28
30/03/2011	10:18:10	4.92	21.88	20.28
30/03/2011	10:23:10	4.90	21.88	20.30
30/03/2011	10:28:10	4.87	21.81	20.26
30/03/2011	10:33:10	4.85	21.79	20.26
30/03/2011	10:38:10	4.82	21.75	20.25
30/03/2011	10:43:10	4.78	21.73	20.27
30/03/2011	10:48:10	4.75	21.66	20.23
30/03/2011	10:53:10	4.71	21.63	20.24
30/03/2011	10:58:10	4.68	21.60	20.24
30/03/2011	11:03:10	4.63	21.54	20.22
30/03/2011	11:08:10	4.59	21.51	20.24
30/03/2011	11:13:10	4.55	21.45	20.23
30/03/2011	11:18:10	4.50	21.40	20.22
30/03/2011	11:23:10	4.45	21.32	20.19
30/03/2011	11:28:10	4.40	21.26	20.19
30/03/2011	11:33:10	4.34	21.21	20.19
30/03/2011	11:38:10	4.29	21.13	20.16
30/03/2011	11:43:10	4.23	21.11	20.21
30/03/2011	11:48:10	4.17	21.05	20.20
30/03/2011	11:53:10	4.10	20.96	20.18
30/03/2011	11:58:10	4.04	20.90	20.18
30/03/2011	12:03:10	3.98	20.86	20.20





LOCATION REPORT

Rampion - English Channel

Location: BH_14m

Type : Sampling/CPT

Average Position

Standard deviation

Easting (m)

Northing (m)

686487.35

5617486.02

0.12

0.16

Intended position

686486.90

5617485.70

Difference

0.45

0.32

Distance

0.55 m

Bearing

54.68 deg

Project no:

11507

Date:

29 Mar 2011

Vessel:

Fugro Saltire

Notes:

Datum

WGS84

Projection

UTM Zone 30N

Origin Longitude

3°W

Origin Latitude

0°

Hemisphere

North

False Easting

500000 m

False Northing

0 m

For Fugro Survey Ltd

QC Mohan

P.Moharana

For Client

H.Pater

[Signature]

BST		Logged Drill-string Positions	
Time	Fix no.	Easting (m)	Northing (m)
22:17:57	1	686487.33	5617485.93
22:17:59	2	686487.41	5617485.79
22:18:00	3	686487.48	5617485.79
22:18:04	4	686487.22	5617486.24
22:18:05	5	686487.31	5617486.41
22:18:07	6	686487.25	5617486.18
22:18:09	7	686487.41	5617486.16
22:18:26	15	686487.48	5617485.98
22:18:31	16	686487.46	5617486.11
22:18:32	17	686487.50	5617486.06
22:18:35	19	686487.40	5617486.10
22:18:39	20	686487.44	5617486.28
22:18:40	21	686487.27	5617485.90
22:18:42	22	686487.45	5617485.93
22:18:43	23	686487.76	5617485.89
22:18:48	24	686487.30	5617485.98
22:18:49	25	686487.31	5617485.98
22:18:50	26	686487.38	5617486.06
22:18:52	27	686487.26	5617485.98
22:18:56	28	686487.35	5617486.03
22:18:57	29	686487.42	5617486.01
22:18:59	30	686487.51	5617485.74
22:19:00	31	686487.61	5617485.86
22:19:04	32	686487.25	5617486.02
22:19:06	33	686487.46	5617486.29
22:19:13	36	686487.52	5617485.89
22:19:14	37	686487.34	5617485.87
22:19:15	38	686487.27	5617485.78
22:19:17	39	686487.48	5617486.15
22:19:21	40	686487.25	5617485.90
22:19:22	41	686487.26	5617485.87
22:19:24	42	686487.18	5617485.67
22:19:25	43	686487.36	5617486.17
22:19:29	44	686487.43	5617486.05
22:19:30	45	686487.43	5617486.16
22:19:32	46	686487.33	5617486.23
22:19:34	47	686487.18	5617486.10

Revision: Jan 2010

Page 1 of 2

© Fugro Survey Ltd

BH_14m Location Report.xls

LOCATION REPORT

22:19:37	48	686487.19	5617485.98
22:19:39	49	686487.38	5617486.13
22:19:40	50	686487.29	5617485.76
22:19:42	51	686487.38	5617486.12
22:19:46	52	686487.26	5617486.21
22:19:47	53	686487.25	5617486.12
22:19:48	54	686487.08	5617485.98
22:19:50	55	686487.22	5617485.96
22:19:54	56	686487.28	5617486.06
22:19:56	57	686487.18	5617485.87
22:19:57	58	686487.33	5617486.15
22:19:58	59	686487.32	5617486.11
22:20:03	60	686487.28	5617485.92
22:20:04	61	686487.41	5617486.10
22:20:06	62	686487.34	5617486.02
22:20:07	63	686487.23	5617485.86
22:20:07	64	686487.58	5617486.05
22:20:12	66	686487.46	5617486.16
22:20:14	67	686487.34	5617485.92
22:20:15	68	686487.35	5617485.89
22:20:20	69	686487.33	5617485.77
22:20:21	70	686487.58	5617486.19
22:20:23	71	686487.40	5617485.90
22:20:24	72	686487.49	5617486.11
22:20:28	73	686487.37	5617485.82
22:20:30	74	686487.31	5617486.03
22:20:31	75	686487.28	5617486.14
22:20:32	76	686487.38	5617486.17
22:20:36	77	686487.35	5617486.04
22:20:38	78	686487.40	5617485.97
22:20:39	79	686487.41	5617485.95
22:20:41	80	686487.28	5617485.74
22:20:45	81	686487.36	5617486.17
22:20:46	82	686487.43	5617486.29
22:20:47	83	686487.25	5617485.97
22:20:49	84	686487.26	5617485.92
22:20:53	85	686487.15	5617485.66
22:20:54	86	686487.21	5617485.75
22:20:56	87	686487.39	5617486.09
22:20:57	88	686487.29	5617485.82
22:21:01	89	686487.26	5617486.00
22:21:03	90	686487.38	5617486.02
22:21:04	91	686487.29	5617485.84
22:21:05	92	686487.41	5617485.99
22:21:10	93	686487.50	5617486.25
22:21:11	94	686487.39	5617485.95
22:21:12	95	686487.32	5617485.88
22:21:14	96	686487.37	5617486.06
22:21:18	97	686487.48	5617485.98
22:21:18	98	686487.46	5617485.85
22:21:19	99	686487.54	5617485.92
22:21:21	100	686487.38	5617485.78
22:21:22	101	686487.40	5617486.01
22:21:24	102	686487.39	5617485.83
22:21:26	103	686487.39	5617485.83
22:21:27	104	686487.54	5617485.91
22:21:29	105	686487.58	5617485.78
22:21:30	106	686487.59	5617485.95
22:21:34	107	686487.29	5617485.83
22:21:36	108	686487.44	5617485.98
22:21:42	111	686487.40	5617486.19
22:21:45	113	686487.42	5617485.82
22:21:46	114	686487.36	5617486.06





PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_14m

Project no: 11507
Date: 30/03/2011
Instrument: CTD ser no 26326

Latitude :	50.68	N
Start Barometer :	1010	mbar

Gravity =	9.811	m/s ²
Average Density=	1.027	kg/dm ³

Notes:

Depth = $P/d/g * 10000$ m
Gravity = $9.780318 * (1 + 0.0052788 * (\sin(\text{lat}))^2 + 0.0000236 * \sin(\text{lat})^4) + 0.5 * 0.000002184 * P$ m/s²

For Fugro Survey Ltd

QC Mr P

P.Moharana

For Client

H.Pater

Probe Readings			
Date	Time	Pressure	Barometer
dd/mm/yyyy	hh:mm:ss	dbar	mbar
29/03/2011	22:18:10	21.857	1010
29/03/2011	22:23:10	21.874	1010
29/03/2011	22:28:10	21.831	1010
29/03/2011	22:33:10	21.806	1010
29/03/2011	22:38:10	21.731	1010
29/03/2011	22:43:10	21.709	1010
29/03/2011	22:48:10	21.629	1010
29/03/2011	22:53:10	21.582	1010
29/03/2011	22:58:10	21.546	1010
29/03/2011	23:03:10	21.476	1010
29/03/2011	23:08:10	21.418	1010
29/03/2011	23:13:10	21.338	1010
29/03/2011	23:18:10	21.350	1010
29/03/2011	23:23:10	21.205	1010
29/03/2011	23:28:10	21.165	1010
29/03/2011	23:33:10	21.114	1010
29/03/2011	23:38:10	21.118	1010
29/03/2011	23:43:10	20.992	1010
29/03/2011	23:48:10	20.911	1010
29/03/2011	23:53:10	20.868	1010
29/03/2011	23:58:10	20.828	1010
30/03/2011	00:03:10	20.724	1011
30/03/2011	00:08:10	20.674	1011
30/03/2011	00:13:10	20.589	1011
30/03/2011	00:18:10	20.547	1011
30/03/2011	00:23:10	20.455	1011
30/03/2011	00:28:10	20.387	1011
30/03/2011	00:33:10	20.358	1011
30/03/2011	00:38:10	20.302	1011
30/03/2011	00:43:10	20.222	1011
30/03/2011	00:48:10	20.101	1011
30/03/2011	00:53:10	20.081	1011
30/03/2011	00:58:10	20.009	1011
30/03/2011	01:03:10	19.942	1011
30/03/2011	01:08:10	19.850	1011
30/03/2011	01:13:10	19.817	1011
30/03/2011	01:18:10	19.733	1011
30/03/2011	01:23:10	19.710	1011
30/03/2011	01:28:10	19.646	1011
30/03/2011	01:33:10	19.591	1011
30/03/2011	01:38:10	19.512	1011
30/03/2011	01:43:10	19.489	1011
30/03/2011	01:48:10	19.465	1011
30/03/2011	01:53:10	19.395	1011

Computed
Depth
m
21.68
21.70
21.66
21.63
21.56
21.54
21.46
21.41
21.38
21.31
21.25
21.17
21.18
21.04
21.00
20.95
20.95
20.83
20.75
20.70
20.66
20.55
20.50
20.42
20.37
20.28
20.22
20.19
20.13
20.05
19.93
19.91
19.84
19.77
19.68
19.65
19.57
19.54
19.48
19.43
19.35
19.32
19.30
19.23



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_14m

Project no: 11507
Date: 30/03/2011
Instrument: CTD ser no 26326

30/03/2011	01:58:10	19.382	1011
30/03/2011	02:03:10	19.338	1011
30/03/2011	02:08:10	19.311	1011
30/03/2011	02:13:10	19.249	1011
30/03/2011	02:18:10	19.208	1011
30/03/2011	02:23:10	19.184	1011
30/03/2011	02:28:10	19.168	1011
30/03/2011	02:33:10	19.114	1011
30/03/2011	02:38:10	19.085	1011
30/03/2011	02:43:10	19.063	1011
30/03/2011	02:48:10	19.052	1011
30/03/2011	02:53:10	19.016	1011
30/03/2011	02:58:10	19.011	1011
30/03/2011	03:03:10	19.006	1011
30/03/2011	03:08:10	18.989	1011
30/03/2011	03:13:10	18.966	1011
30/03/2011	03:18:10	18.979	1011
30/03/2011	03:23:10	18.961	1011
30/03/2011	03:28:10	18.995	1011
30/03/2011	03:33:10	19.001	1011
30/03/2011	03:38:10	18.990	1011
30/03/2011	03:43:10	18.997	1011
30/03/2011	03:48:10	19.004	1011
30/03/2011	03:53:10	19.043	1011
30/03/2011	03:58:10	19.045	1011
30/03/2011	04:03:10	19.077	1011
30/03/2011	04:08:10	19.089	1011
30/03/2011	04:13:10	19.121	1011
30/03/2011	04:18:10	19.132	1011
30/03/2011	04:23:10	19.181	1011
30/03/2011	04:28:10	19.221	1011
30/03/2011	04:33:10	19.248	1011
30/03/2011	04:38:10	19.289	1011
30/03/2011	04:43:10	19.311	1011
30/03/2011	04:48:10	19.338	1011
30/03/2011	04:53:10	19.408	1011
30/03/2011	04:58:10	19.431	1011
30/03/2011	05:03:10	19.474	1011
30/03/2011	05:08:10	19.555	1011
30/03/2011	05:13:10	19.571	1011
30/03/2011	05:18:10	19.632	1011
30/03/2011	05:23:10	19.685	1011
30/03/2011	05:28:10	19.746	1011
30/03/2011	05:33:10	19.762	1011
30/03/2011	05:38:10	19.812	1011
30/03/2011	05:43:10	19.887	1011
30/03/2011	05:48:10	19.953	1011
30/03/2011	05:53:10	20.001	1011
30/03/2011	05:58:10	20.051	1011
30/03/2011	06:03:10	20.144	1011
30/03/2011	06:08:10	20.185	1011
30/03/2011	06:13:10	20.266	1011
30/03/2011	06:18:10	20.310	1011
30/03/2011	06:23:10	20.391	1011
30/03/2011	06:28:10	20.449	1011
30/03/2011	06:33:10	20.515	1011
30/03/2011	06:38:10	20.584	1011
30/03/2011	06:43:10	20.642	1011
30/03/2011	06:48:10	20.712	1011
30/03/2011	06:53:10	20.799	1011
30/03/2011	06:58:10	20.857	1011
30/03/2011	07:03:10	20.927	1011
30/03/2011	07:08:10	20.986	1011

19.22
19.18
19.15
19.09
19.05
19.02
19.01
18.95
18.92
18.90
18.89
18.86
18.85
18.85
18.83
18.81
18.82
18.80
18.83
18.84
18.83
18.84
18.84
18.88
18.88
18.92
18.93
18.96
18.97
19.02
19.06
19.09
19.13
19.15
19.18
19.24
19.27
19.31
19.39
19.41
19.47
19.52
19.58
19.60
19.65
19.72
19.79
19.83
19.88
19.97
20.02
20.10
20.14
20.22
20.28
20.34
20.41
20.47
20.54
20.62
20.68
20.75
20.81



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_14m

Project no: 11507
Date: 30/03/2011
Instrument: CTD ser no 26326

30/03/2011	07:13:10	21.047	1011
30/03/2011	07:18:10	21.133	1011
30/03/2011	07:23:10	21.214	1011
30/03/2011	07:28:10	21.273	1011
30/03/2011	07:33:10	21.335	1011
30/03/2011	07:38:10	21.407	1011
30/03/2011	07:43:10	21.463	1011
30/03/2011	07:48:10	21.522	1011
30/03/2011	07:53:10	21.579	1011
30/03/2011	07:58:10	21.642	1011
30/03/2011	08:03:10	21.683	1012
30/03/2011	08:08:10	21.758	1012
30/03/2011	08:13:10	21.803	1012
30/03/2011	08:18:10	21.843	1012
30/03/2011	08:23:10	21.904	1012
30/03/2011	08:28:10	21.939	1012
30/03/2011	08:33:10	21.981	1012
30/03/2011	08:38:10	22.030	1012
30/03/2011	08:43:10	22.039	1012
30/03/2011	08:48:10	22.084	1012
30/03/2011	08:53:10	22.084	1012
30/03/2011	08:58:10	22.150	1012
30/03/2011	09:03:10	22.154	1012
30/03/2011	09:08:10	22.170	1012
30/03/2011	09:13:10	22.195	1012
30/03/2011	09:18:10	22.204	1012
30/03/2011	09:23:10	22.188	1012
30/03/2011	09:28:10	22.194	1012
30/03/2011	09:33:10	22.178	1012
30/03/2011	09:38:10	22.187	1012
30/03/2011	09:43:10	22.194	1012
30/03/2011	09:48:10	22.194	1012
30/03/2011	09:53:10	22.202	1012
30/03/2011	09:58:10	22.187	1012
30/03/2011	10:03:10	22.134	1012
30/03/2011	10:08:10	22.135	1012
30/03/2011	10:13:10	22.101	1012
30/03/2011	10:18:10	22.072	1012
30/03/2011	10:23:10	22.071	1012
30/03/2011	10:28:10	22.006	1012
30/03/2011	10:33:10	21.982	1012
30/03/2011	10:38:10	21.944	1012
30/03/2011	10:43:10	21.924	1012
30/03/2011	10:48:10	21.851	1012
30/03/2011	10:53:10	21.822	1012
30/03/2011	10:58:10	21.788	1012
30/03/2011	11:03:10	21.727	1012
30/03/2011	11:08:10	21.700	1012
30/03/2011	11:13:10	21.642	1012
30/03/2011	11:18:10	21.588	1012
30/03/2011	11:23:10	21.508	1012
30/03/2011	11:28:10	21.454	1012
30/03/2011	11:33:10	21.398	1012
30/03/2011	11:38:10	21.317	1012
30/03/2011	11:43:10	21.301	1012
30/03/2011	11:48:10	21.233	1012
30/03/2011	11:53:10	21.147	1012
30/03/2011	11:58:10	21.083	1012
30/03/2011	12:03:10	21.045	1012

20.87
20.96
21.04
21.09
21.16
21.23
21.28
21.34
21.40
21.46
21.49
21.57
21.61
21.65
21.71
21.75
21.79
21.84
21.84
21.89
21.89
21.95
21.96
21.97
22.00
22.01
21.99
22.00
21.98
21.99
22.00
22.00
22.01
21.99
21.94
21.94
21.91
21.88
21.88
21.81
21.79
21.75
21.73
21.66
21.63
21.60
21.54
21.51
21.45
21.40
21.32
21.26
21.21
21.13
21.11
21.05
20.96
20.90
20.86



LOCATION AND DEPTH REPORT

Project No. 11507
Date 31 Mar 2011
Vessel Fugro Saltire
Area Rampion - English Channel
Location BH_16
Survey type Sampling/CPT
Chart Datum LAT

Geodetic Datum WGS84
Projection UTM Zone 30N
Origin Longitude 3°W
Origin Latitude 0°
Hemisphere North
False Easting 500000 m
False Northing 0 m

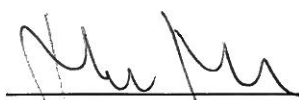
Location Report BH_16 Location Report.xls

	Easting	Northing
Average position	696851.14	5613444.21 m
Standard deviation	0.11	0.08 m
Intended position	696851.00	5613444.90 m
Difference	0.14	-0.69 m
Range	0.70 m	
Bearing	168.52	deg

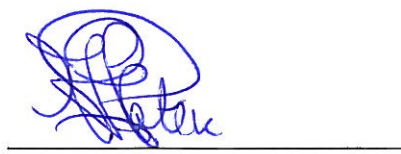
Depth Report BH_16 Depth Report.xls

	Depth LAT
Probe	44.5 m
Beacon	45.4 m
Drill String	44.9 m
Transducer Depth	0.3 m
Velocity of sound in water	1484.3 m/s
CTD Probe Z offset	3.3 m

For Fugro Survey Ltd


M. Michalak

For Fugro Engineers BV


H. Pater

For Client Representative


P. Watson



LOCATION REPORT

Rampion - English Channel

Location: **BH_16**

Type : Sampling/CPT

Average Position

Standard deviation

Easting (m)

Northing (m)

696851.14

5613444.21

0.11

0.08

Intended position

696851.00

5613444.90

Difference

0.14

-0.69

Distance

0.70 m

Bearing

168.52 deg

Project no:

11507

Date:

31 Mar 2011

Vessel:

Fugro Saltire

Notes:

Datum

WGS84

Projection

UTM Zone 30N

Origin Longitude

3°W

Origin Latitude

0°

Hemisphere

North

False Easting

500000 m

False Northing

0 m

For Fugro Survey Ltd

M.Michalak

For Client

H.Pater

BST Time	Fix no.	Logged Drill-string Positions	
		Easting (m)	Northing (m)
13:07:37	1	696851.05	5613444.27
13:07:39	2	696850.97	5613444.34
13:07:41	3	696851.10	5613444.37
13:07:43	4	696850.96	5613444.09
13:07:44	5	696850.93	5613444.16
13:07:46	6	696851.06	5613444.35
13:07:48	7	696850.91	5613444.21
13:07:50	8	696851.14	5613444.38
13:07:52	9	696851.24	5613444.25
13:07:54	10	696851.14	5613444.21
13:07:55	11	696851.19	5613444.33
13:07:57	12	696851.27	5613444.30
13:07:59	13	696851.29	5613444.28
13:08:01	14	696851.28	5613444.30
13:08:03	15	696851.20	5613444.32
13:08:05	16	696851.17	5613444.22
13:08:07	17	696851.22	5613444.19
13:08:08	18	696851.20	5613444.18
13:08:10	19	696851.28	5613444.29
13:08:12	20	696851.30	5613444.33
13:08:14	21	696851.22	5613444.32
13:08:16	22	696851.21	5613444.32
13:08:18	23	696851.27	5613444.26
13:08:20	24	696851.09	5613444.11
13:08:22	25	696851.33	5613444.33
13:08:23	26	696851.29	5613444.26
13:08:25	27	696851.25	5613444.09
13:08:27	28	696851.22	5613444.18
13:08:29	29	696851.09	5613444.08
13:08:31	30	696851.36	5613444.29
13:08:33	31	696851.28	5613444.24
13:08:35	32	696851.23	5613444.23
13:08:36	33	696851.23	5613444.20
13:08:38	34	696851.37	5613444.34
13:08:40	35	696851.27	5613444.33
13:08:42	36	696851.29	5613444.34
13:08:44	37	696851.30	5613444.30

LOCATION REPORT

13:08:46	38	696851.29	5613444.25
13:08:47	39	696851.27	5613444.28
13:08:49	40	696851.24	5613444.26
13:08:51	41	696851.27	5613444.30
13:08:53	42	696851.28	5613444.32
13:08:55	43	696851.28	5613444.34
13:08:57	44	696851.34	5613444.29
13:08:59	45	696851.26	5613444.19
13:09:01	46	696851.31	5613444.26
13:09:02	47	696851.22	5613444.22
13:09:04	48	696851.25	5613444.24
13:09:06	49	696851.31	5613444.17
13:09:08	50	696851.14	5613444.17
13:09:10	51	696851.14	5613444.43
13:09:14	52	696851.09	5613444.10
13:09:18	53	696851.28	5613444.33
13:09:22	54	696850.99	5613444.12
13:09:24	55	696851.14	5613444.07
13:09:26	56	696851.20	5613444.38
13:09:28	57	696851.15	5613444.30
13:09:30	58	696851.09	5613444.14
13:09:32	59	696851.26	5613444.32
13:09:34	60	696851.24	5613444.25
13:09:36	61	696851.17	5613444.22
13:09:37	62	696851.12	5613444.15
13:09:39	63	696851.16	5613444.13
13:09:43	64	696851.06	5613444.16
13:09:45	65	696851.17	5613444.04
13:09:47	66	696851.04	5613444.11
13:09:49	67	696850.95	5613444.07
13:09:51	68	696851.18	5613444.22
13:09:53	69	696851.15	5613444.33
13:09:54	70	696850.95	5613444.10
13:09:56	71	696851.11	5613444.34
13:09:58	72	696850.95	5613444.20
13:10:00	73	696850.91	5613444.16
13:10:02	74	696850.95	5613444.29
13:10:04	75	696850.96	5613444.17
13:10:06	76	696850.98	5613444.10
13:10:08	77	696850.97	5613444.11
13:10:09	78	696850.94	5613444.09
13:10:11	79	696851.12	5613444.17
13:10:13	80	696851.14	5613444.21
13:10:15	81	696851.13	5613444.09
13:10:17	82	696851.10	5613444.09
13:10:19	83	696851.10	5613444.06
13:10:21	84	696851.11	5613444.13
13:10:22	85	696851.11	5613444.18
13:10:24	86	696851.12	5613444.21
13:10:26	87	696851.10	5613444.07
13:10:28	88	696851.13	5613444.12
13:10:30	89	696850.99	5613444.15
13:10:32	90	696851.09	5613444.15
13:10:34	91	696851.07	5613444.13
13:10:35	92	696850.97	5613444.07
13:10:37	93	696850.92	5613444.16
13:10:41	94	696851.01	5613444.17
13:10:43	95	696850.99	5613444.16
13:10:47	96	696850.98	5613444.16
13:10:49	97	696850.93	5613444.08
13:10:53	98	696850.86	5613444.07
13:10:55	99	696851.08	5613444.12
13:10:58	100	696851.04	5613443.99





DEPTH REPORT

Rampion - English Channel

Location: BH_16
Type: Sampling/CPT

Project No.: 11507
Vessel: Fugro Saltire
Chart Datum (C.D.): LAT

Depth Measurements reduced to LAT

Probe:	44.5	m
Beacon:	45.4	m

Notes:

Data Source: B56
Beacon Z Offset: 1.62 m
Transducer Depth: 0.26 m
Velocity of sound in water: 1484.30 m/s
CTD Probe Z offset: 3.32 m
Standard / Secondary Port: Shoreham
Phase: N/A
Range: N/A

For Fugro Survey Ltd

Client Representative

M.Michalak

H.Pater

Note: other pages should be initialised

Date	Time	Tide	Probe Depth		Time	Fix #	Tide	Beacon Depth	
			Not Red.	Reduced				Not Red.	Reduced
31/03/2011	14:08:10	2.43	43.79	44.68	14:08:06	1	2.43	45.94	45.39
31/03/2011	14:13:10	2.37	43.73	44.68	14:08:11	2	2.43	45.94	45.39
31/03/2011	14:18:10	2.31	43.63	44.64	14:08:16	3	2.43	45.87	45.32
31/03/2011	14:23:10	2.25	43.57	44.64	14:08:21	4	2.43	45.83	45.28
31/03/2011	14:28:10	2.19	43.50	44.63	14:08:26	5	2.43	45.72	45.17
31/03/2011	14:33:10	2.13	43.43	44.61	14:08:31	6	2.43	45.86	45.31
31/03/2011	14:38:10	2.08	43.37	44.61	14:08:36	7	2.43	45.99	45.44
31/03/2011	14:43:10	2.03	43.28	44.57	14:08:41	8	2.43	45.94	45.39
31/03/2011	14:48:10	1.98	43.21	44.55	14:08:46	9	2.43	45.92	45.37
31/03/2011	14:53:10	1.93	43.16	44.54	14:08:51	10	2.43	45.83	45.28
31/03/2011	14:58:10	1.89	43.09	44.53	14:08:57	11	2.43	45.89	45.34
31/03/2011	15:03:10	1.85	43.03	44.50	14:09:02	12	2.42	46.01	45.47
31/03/2011	15:08:10	1.81	42.98	44.49	14:09:07	13	2.42	45.92	45.38
31/03/2011	15:13:10	1.77	42.93	44.48	14:09:12	14	2.42	45.86	45.32
31/03/2011	15:18:10	1.74	42.89	44.47	14:09:17	15	2.42	46.01	45.47
31/03/2011	15:23:10	1.71	42.83	44.45	14:09:22	16	2.42	45.83	45.29
31/03/2011	15:28:10	1.68	42.79	44.43	14:09:27	17	2.42	45.83	45.29
31/03/2011	15:33:10	1.65	42.75	44.41	14:09:32	18	2.42	45.93	45.39
31/03/2011	15:38:10	1.63	42.71	44.40	14:09:37	19	2.42	45.90	45.36
31/03/2011	15:43:10	1.61	42.67	44.38	14:09:42	20	2.42	45.85	45.31
31/03/2011	15:48:10	1.59	42.66	44.38	14:09:47	21	2.42	45.74	45.20
31/03/2011	15:53:10	1.58	42.61	44.36	14:09:52	22	2.42	46.01	45.47
31/03/2011	15:58:10	1.57	42.58	44.34	14:09:57	23	2.42	46.06	45.52
31/03/2011	16:03:10	1.56	42.54	44.30	14:10:02	24	2.40	45.86	45.34
31/03/2011	16:08:10	1.55	42.52	44.29	14:10:07	25	2.40	45.97	45.45
31/03/2011	16:13:10	1.55	42.50	44.27	14:10:12	26	2.40	45.99	45.47
31/03/2011	16:18:10	1.55	42.51	44.28	14:10:17	27	2.40	45.93	45.41
31/03/2011	16:23:10	1.55	42.49	44.26	14:10:22	28	2.40	46.04	45.52
31/03/2011	16:28:10	1.56	42.48	44.24	14:10:27	29	2.40	45.83	45.31
31/03/2011	16:33:10	1.57	42.48	44.24	14:10:32	30	2.40	46.02	45.50
31/03/2011	16:38:10	1.58	42.48	44.22	14:10:37	31	2.40	46.06	45.54
31/03/2011	16:43:10	1.59	42.49	44.22	14:10:42	32	2.40	45.88	45.36
31/03/2011	16:48:10	1.61	42.49	44.20	14:10:47	33	2.40	45.98	45.46
31/03/2011	16:53:10	1.63	42.52	44.20	14:10:52	34	2.40	45.87	45.35
31/03/2011	16:58:10	1.65	42.51	44.18	14:10:57	35	2.40	45.69	45.17

DEPTH REPORT



Rampion - English Channel

31/03/2011	17:03:10	1.68	42.56	44.20	14:11:02	36	2.39	45.94	45.43
31/03/2011	17:08:10	1.71	42.57	44.18	14:11:07	37	2.39	45.90	45.39
31/03/2011	17:13:10	1.74	42.61	44.19	14:11:12	38	2.39	45.98	45.47
31/03/2011	17:18:10	1.77	42.63	44.18	14:11:17	39	2.39	45.92	45.41
31/03/2011	17:23:10	1.81	42.67	44.18	14:11:22	40	2.39	45.94	45.43
31/03/2011	17:28:10	1.85	42.72	44.19	14:11:27	41	2.39	46.01	45.50
31/03/2011	17:33:10	1.89	42.76	44.18	14:11:33	42	2.39	45.76	45.25
31/03/2011	17:38:10	1.94	42.82	44.20	14:11:38	43	2.39	45.87	45.36
31/03/2011	17:43:10	1.98	42.87	44.20	14:11:43	44	2.39	45.95	45.44
31/03/2011	17:48:10	2.03	42.91	44.20	14:11:48	45	2.39	45.78	45.27
31/03/2011	17:53:10	2.08	42.96	44.19	14:11:53	46	2.39	45.71	45.20
31/03/2011	17:58:10	2.14	43.01	44.20	14:11:58	47	2.39	46.02	45.51
31/03/2011	18:03:10	2.19	43.07	44.19	14:12:03	48	2.38	45.76	45.26
31/03/2011	18:08:10	2.25	43.12	44.19	14:12:08	49	2.38	45.94	45.44
31/03/2011	18:13:10	2.31	43.17	44.18	14:12:13	50	2.38	46.00	45.50
31/03/2011	18:18:10	2.37	43.23	44.17	14:12:18	51	2.38	45.78	45.28
31/03/2011	18:23:10	2.44	43.30	44.18	14:12:23	52	2.38	45.89	45.39
31/03/2011	18:28:10	2.50	43.36	44.17	14:12:28	53	2.38	45.91	45.41
31/03/2011	18:33:10	2.57	43.42	44.17	14:12:33	54	2.38	45.82	45.32
31/03/2011	18:38:10	2.64	43.48	44.16	14:12:38	55	2.38	45.83	45.33
31/03/2011	18:43:10	2.71	43.57	44.18	14:12:43	56	2.38	45.62	45.12
31/03/2011	18:48:10	2.78	43.63	44.17	14:12:48	57	2.38	45.73	45.23
31/03/2011	18:53:10	2.86	43.70	44.16	14:12:53	58	2.38	45.93	45.43
31/03/2011	18:58:10	2.93	43.78	44.17	14:12:58	59	2.38	45.84	45.34
31/03/2011	19:03:10	3.01	43.86	44.17	14:13:03	60	2.37	45.73	45.24
31/03/2011	19:08:10	3.09	43.93	44.16	14:13:08	61	2.37	45.92	45.43
31/03/2011	19:13:10	3.16	44.00	44.16	14:13:13	62	2.37	45.78	45.29
31/03/2011	19:18:10	3.24	44.11	44.19	14:13:18	63	2.37	45.83	45.34
31/03/2011	19:23:10	3.32	44.18	44.18	14:13:23	64	2.37	45.99	45.50
31/03/2011	19:28:10	3.40	44.26	44.18	14:13:28	65	2.37	45.78	45.29
31/03/2011	19:33:10	3.48	44.36	44.20	14:13:33	66	2.37	45.83	45.34
31/03/2011	19:38:10	3.56	44.44	44.20	14:13:38	67	2.37	45.84	45.35
31/03/2011	19:43:10	3.64	44.53	44.21	14:13:43	68	2.37	45.82	45.33
31/03/2011	19:48:10	3.72	44.61	44.21	14:13:48	69	2.37	46.03	45.54
31/03/2011	19:53:10	3.80	44.72	44.24	14:13:53	70	2.37	46.03	45.54
31/03/2011	19:58:10	3.88	44.81	44.25	14:13:58	71	2.37	46.09	45.60
31/03/2011	20:03:10	3.96	44.89	44.26	14:14:04	72	2.35	45.96	45.49
31/03/2011	20:08:10	4.04	44.98	44.27	14:14:09	73	2.35	45.93	45.46
31/03/2011	20:13:10	4.11	45.08	44.29	14:14:14	74	2.35	45.87	45.40
31/03/2011	20:18:10	4.19	45.16	44.29	14:14:19	75	2.35	45.94	45.47
31/03/2011	20:23:10	4.26	45.27	44.33	14:14:24	76	2.35	46.06	45.59
31/03/2011	20:28:10	4.33	45.37	44.35	14:14:29	77	2.35	45.9	45.43
31/03/2011	20:33:10	4.41	45.46	44.38	14:14:34	78	2.35	45.92	45.45
31/03/2011	20:38:10	4.48	45.57	44.41	14:14:39	79	2.35	45.97	45.50
31/03/2011	20:43:10	4.54	45.65	44.43	14:14:44	80	2.35	45.8	45.33
31/03/2011	20:48:10	4.61	45.77	44.48	14:14:49	81	2.35	45.85	45.38
31/03/2011	20:53:10	4.67	45.84	44.49	14:14:54	82	2.35	45.84	45.37
31/03/2011	20:58:10	4.73	45.93	44.52	14:14:59	83	2.35	45.74	45.27
31/03/2011	21:03:10	4.79	46.02	44.55	14:15:04	84	2.34	45.99	45.53
31/03/2011	21:08:10	4.85	46.10	44.57	14:15:09	85	2.34	45.62	45.16
31/03/2011	21:13:10	4.90	46.19	44.62	14:15:14	86	2.34	45.74	45.28
31/03/2011	21:18:10	4.95	46.26	44.64	14:15:19	87	2.34	45.76	45.30
31/03/2011	21:23:10	4.99	46.33	44.66	14:15:24	88	2.34	45.9	45.44
31/03/2011	21:28:10	5.04	46.41	44.69	14:15:29	89	2.34	45.71	45.25
31/03/2011	21:33:10	5.08	46.47	44.71	14:15:34	90	2.34	45.72	45.26
31/03/2011	21:38:10	5.12	46.53	44.74	14:15:39	91	2.34	45.91	45.45
31/03/2011	21:43:10	5.15	46.57	44.74	14:15:44	92	2.34	45.94	45.48
31/03/2011	21:48:10	5.18	46.64	44.78	14:15:49	93	2.34	45.79	45.33
31/03/2011	21:53:10	5.21	46.67	44.78	14:15:54	94	2.34	45.78	45.32
31/03/2011	21:58:10	5.23	46.70	44.79	14:15:59	95	2.34	45.74	45.28
31/03/2011	22:03:10	5.25	46.74	44.81	14:16:04	96	2.33	45.81	45.36
31/03/2011	22:08:10	5.26	46.77	44.83	14:16:09	97	2.33	45.67	45.22
31/03/2011	22:13:10	5.28	46.79	44.83	14:16:14	98	2.33	45.75	45.30
31/03/2011	22:18:10	5.29	46.81	44.84	14:16:19	99	2.33	45.83	45.38
31/03/2011	22:23:10	5.29	46.82	44.85	14:16:25	100	2.33	45.84	45.39
31/03/2011	22:28:10	5.29	46.83	44.86	14:16:30	101	2.33	45.92	45.47
31/03/2011	22:33:10	5.29	46.83	44.87	14:16:35	102	2.33	45.82	45.37
31/03/2011	22:38:10	5.28	46.83	44.87	14:16:40	103	2.33	45.82	45.37

DEPTH REPORT

Rampion - English Channel

31/03/2011	22:43:10	5.27	46.83	44.88	14:16:45	104	2.33	45.64	45.19
31/03/2011	22:48:10	5.26	46.83	44.89	14:16:50	105	2.33	45.85	45.40
31/03/2011	22:53:10	5.24	46.83	44.91	14:16:55	106	2.33	45.83	45.38
31/03/2011	22:58:10	5.22	46.81	44.91	14:17:00	107	2.32	45.83	45.39
31/03/2011	23:03:10	5.19	46.80	44.92	14:17:05	108	2.32	45.81	45.37
31/03/2011	23:08:10	5.17	46.78	44.94	14:17:10	109	2.32	45.74	45.30
31/03/2011	23:13:10	5.14	46.76	44.95	14:17:15	110	2.32	45.71	45.27
31/03/2011	23:18:10	5.10	46.73	44.95					
31/03/2011	23:23:10	5.06	46.70	44.96					
31/03/2011	23:28:10	5.02	46.69	44.99					
31/03/2011	23:33:10	4.98	46.65	44.99					
31/03/2011	23:38:10	4.93	46.60	44.99					
31/03/2011	23:43:10	4.88	46.55	44.99					
31/03/2011	23:48:10	4.83	46.51	45.00					
31/03/2011	23:53:10	4.78	46.45	44.99					
31/03/2011	23:58:10	4.72	46.43	45.02					
01/04/2011	00:03:10	4.66	46.36	45.02					
01/04/2011	00:08:10	4.59	46.29	45.02					
01/04/2011	00:13:10	4.53	46.22	45.02					
01/04/2011	00:18:10	4.46	46.15	45.01					
01/04/2011	00:23:10	4.39	46.10	45.02					
01/04/2011	00:28:10	4.32	46.02	45.02					
01/04/2011	00:33:10	4.25	45.94	45.01					
01/04/2011	00:38:10	4.18	45.87	45.02					
01/04/2011	00:43:10	4.10	45.80	45.02					
01/04/2011	00:48:10	4.03	45.72	45.01					
01/04/2011	00:53:10	3.95	45.63	45.00					
01/04/2011	00:58:10	3.87	45.55	45.00					
01/04/2011	01:03:10	3.79	45.49	45.02					
01/04/2011	01:08:10	3.71	45.41	45.02					
01/04/2011	01:13:10	3.63	45.32	45.01					
01/04/2011	01:18:10	3.55	45.24	45.01					
01/04/2011	01:23:10	3.47	45.13	44.98					
01/04/2011	01:28:10	3.39	45.03	44.97					
01/04/2011	01:33:10	3.30	44.97	44.98					
01/04/2011	01:38:10	3.22	44.87	44.96					
01/04/2011	01:43:10	3.14	44.78	44.96					
01/04/2011	01:48:10	3.06	44.70	44.96					
01/04/2011	01:53:10	2.98	44.59	44.93					
01/04/2011	01:58:10	2.90	44.52	44.93					
01/04/2011	02:03:10	2.83	44.42	44.91					
01/04/2011	02:08:10	2.75	44.32	44.89					
01/04/2011	02:13:10	2.67	44.26	44.90					
01/04/2011	02:18:10	2.60	44.17	44.89					
01/04/2011	02:23:10	2.52	44.06	44.86					
01/04/2011	02:28:10	2.45	43.99	44.86					





PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_16

Project no: 11507
Date: 01/04/2011
Instrument: CTD ser no 26326

Latitude :	50.63	N
Start Barometer :	1014	mbar

Gravity =	9.811	m/s ²
Average Density=	1.027	kg/dm ³

Notes:

Depth = $P/d/g \times 10000$ m
Gravity = $9.780318 \times (1 + 0.0052788 \times (\sin(\text{lat})^2 + 0.0000236 \times \sin(\text{lat})^4)) + 0.5 \times 0.000002184 \times P$ m/s²

For Fugro Survey Ltd

M.Michalak

For Client

H.Pater

Probe Readings			
Date	Time	Pressure	Barometer
dd/mm/yyyy	hh:mm:ss	dbar	mbar
31/03/2011	14:08:10	44.135	1014
31/03/2011	14:13:10	44.077	1014
31/03/2011	14:18:10	43.973	1014
31/03/2011	14:23:10	43.914	1014
31/03/2011	14:28:10	43.845	1014
31/03/2011	14:33:10	43.774	1014
31/03/2011	14:38:10	43.712	1014
31/03/2011	14:43:10	43.621	1014
31/03/2011	14:48:10	43.559	1014
31/03/2011	14:53:10	43.502	1014
31/03/2011	14:58:10	43.438	1014
31/03/2011	15:03:10	43.372	1014
31/03/2011	15:08:10	43.322	1014
31/03/2011	15:13:10	43.271	1014
31/03/2011	15:18:10	43.227	1014
31/03/2011	15:23:10	43.173	1014
31/03/2011	15:28:10	43.128	1014
31/03/2011	15:33:10	43.086	1014
31/03/2011	15:38:10	43.049	1014
31/03/2011	15:43:10	43.006	1014
31/03/2011	15:48:10	42.995	1014
31/03/2011	15:53:10	42.953	1014
31/03/2011	15:58:10	42.924	1014
31/03/2011	16:03:10	42.887	1015
31/03/2011	16:08:10	42.870	1015
31/03/2011	16:13:10	42.852	1015
31/03/2011	16:18:10	42.862	1015
31/03/2011	16:23:10	42.843	1015
31/03/2011	16:28:10	42.824	1015
31/03/2011	16:33:10	42.832	1015
31/03/2011	16:38:10	42.826	1015
31/03/2011	16:43:10	42.841	1015
31/03/2011	16:48:10	42.836	1015
31/03/2011	16:53:10	42.865	1015
31/03/2011	16:58:10	42.863	1015
31/03/2011	17:03:10	42.909	1015
31/03/2011	17:08:10	42.915	1015
31/03/2011	17:13:10	42.957	1015
31/03/2011	17:18:10	42.984	1015
31/03/2011	17:23:10	43.020	1015
31/03/2011	17:28:10	43.070	1015
31/03/2011	17:33:10	43.108	1015
31/03/2011	17:38:10	43.168	1015
31/03/2011	17:43:10	43.217	1015

Computed
Depth
m
43.79
43.73
43.63
43.57
43.50
43.43
43.37
43.28
43.21
43.16
43.09
43.03
42.98
42.93
42.89
42.83
42.79
42.75
42.71
42.67
42.66
42.61
42.58
42.54
42.52
42.50
42.51
42.49
42.48
42.48
42.48
42.49
42.49
42.52
42.51
42.56
42.57
42.61
42.63
42.67
42.72
42.76
42.82
42.87



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_16

Project no: 11507
Date: 01/04/2011
Instrument: CTD ser no 26326

31/03/2011	17:48:10	43.265	1015
31/03/2011	17:53:10	43.310	1015
31/03/2011	17:58:10	43.366	1015
31/03/2011	18:03:10	43.420	1015
31/03/2011	18:08:10	43.476	1015
31/03/2011	18:13:10	43.539	1016
31/03/2011	18:18:10	43.591	1016
31/03/2011	18:23:10	43.664	1016
31/03/2011	18:28:10	43.723	1016
31/03/2011	18:33:10	43.787	1016
31/03/2011	18:38:10	43.848	1016
31/03/2011	18:43:10	43.938	1016
31/03/2011	18:48:10	43.998	1016
31/03/2011	18:53:10	44.066	1016
31/03/2011	18:58:10	44.149	1016
31/03/2011	19:03:10	44.232	1016
31/03/2011	19:08:10	44.297	1016
31/03/2011	19:13:10	44.369	1016
31/03/2011	19:18:10	44.485	1016
31/03/2011	19:23:10	44.554	1016
31/03/2011	19:28:10	44.630	1016
31/03/2011	19:33:10	44.731	1016
31/03/2011	19:38:10	44.812	1016
31/03/2011	19:43:10	44.909	1016
31/03/2011	19:48:10	44.983	1016
31/03/2011	19:53:10	45.094	1016
31/03/2011	19:58:10	45.184	1016
31/03/2011	20:03:10	45.282	1017
31/03/2011	20:08:10	45.372	1017
31/03/2011	20:13:10	45.473	1017
31/03/2011	20:18:10	45.551	1017
31/03/2011	20:23:10	45.658	1017
31/03/2011	20:28:10	45.761	1017
31/03/2011	20:33:10	45.854	1017
31/03/2011	20:38:10	45.959	1017
31/03/2011	20:43:10	46.047	1017
31/03/2011	20:48:10	46.161	1017
31/03/2011	20:53:10	46.232	1017
31/03/2011	20:58:10	46.329	1017
31/03/2011	21:03:10	46.419	1017
31/03/2011	21:08:10	46.496	1017
31/03/2011	21:13:10	46.593	1017
31/03/2011	21:18:10	46.662	1017
31/03/2011	21:23:10	46.731	1017
31/03/2011	21:28:10	46.805	1017
31/03/2011	21:33:10	46.870	1017
31/03/2011	21:38:10	46.932	1017
31/03/2011	21:43:10	46.975	1017
31/03/2011	21:48:10	47.040	1017
31/03/2011	21:53:10	47.071	1017
31/03/2011	21:58:10	47.098	1017
31/03/2011	22:03:10	47.140	1017
31/03/2011	22:08:10	47.177	1017
31/03/2011	22:13:10	47.191	1017
31/03/2011	22:18:10	47.213	1017
31/03/2011	22:23:10	47.219	1017
31/03/2011	22:28:10	47.232	1017
31/03/2011	22:33:10	47.238	1017
31/03/2011	22:38:10	47.237	1017
31/03/2011	22:43:10	47.235	1017
31/03/2011	22:48:10	47.234	1017
31/03/2011	22:53:10	47.230	1017
31/03/2011	22:58:10	47.214	1017

42.91
42.96
43.01
43.07
43.12
43.17
43.23
43.30
43.36
43.42
43.48
43.57
43.63
43.70
43.78
43.86
43.93
44.00
44.11
44.18
44.26
44.36
44.44
44.53
44.61
44.72
44.81
44.89
44.98
45.08
45.16
45.27
45.37
45.46
45.57
45.65
45.77
45.84
45.93
46.02
46.10
46.19
46.26
46.33
46.41
46.47
46.53
46.57
46.64
46.67
46.70
46.74
46.77
46.79
46.81
46.82
46.83
46.83
46.83
46.83
46.83
46.83
46.81



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_16

Project no: 11507
Date: 01/04/2011
Instrument: CTD ser no 26326

31/03/2011	23:03:10	47.198	1017
31/03/2011	23:08:10	47.185	1017
31/03/2011	23:13:10	47.164	1017
31/03/2011	23:18:10	47.137	1017
31/03/2011	23:23:10	47.106	1017
31/03/2011	23:28:10	47.094	1017
31/03/2011	23:33:10	47.053	1017
31/03/2011	23:38:10	47.004	1017
31/03/2011	23:43:10	46.952	1017
31/03/2011	23:48:10	46.914	1017
31/03/2011	23:53:10	46.846	1017
31/03/2011	23:58:10	46.826	1017
01/04/2011	00:03:10	46.768	1018
01/04/2011	00:08:10	46.701	1018
01/04/2011	00:13:10	46.633	1018
01/04/2011	00:18:10	46.555	1018
01/04/2011	00:23:10	46.503	1018
01/04/2011	00:28:10	46.428	1018
01/04/2011	00:33:10	46.350	1018
01/04/2011	00:38:10	46.279	1018
01/04/2011	00:43:10	46.203	1018
01/04/2011	00:48:10	46.121	1018
01/04/2011	00:53:10	46.034	1018
01/04/2011	00:58:10	45.953	1018
01/04/2011	01:03:10	45.890	1018
01/04/2011	01:08:10	45.815	1018
01/04/2011	01:13:10	45.720	1018
01/04/2011	01:18:10	45.642	1018
01/04/2011	01:23:10	45.529	1018
01/04/2011	01:28:10	45.432	1018
01/04/2011	01:33:10	45.367	1018
01/04/2011	01:38:10	45.263	1018
01/04/2011	01:43:10	45.176	1018
01/04/2011	01:48:10	45.095	1018
01/04/2011	01:53:10	44.988	1018
01/04/2011	01:58:10	44.911	1018
01/04/2011	02:03:10	44.809	1018
01/04/2011	02:08:10	44.712	1018
01/04/2011	02:13:10	44.649	1018
01/04/2011	02:18:10	44.563	1018
01/04/2011	02:23:10	44.452	1018
01/04/2011	02:28:10	44.381	1018
01/04/2011	02:33:10	44.288	1018
01/04/2011	02:38:10	44.194	1018
01/04/2011	02:43:10	44.100	1018
01/04/2011	02:48:10	44.037	1018
01/04/2011	02:53:10	43.940	1018
01/04/2011	02:58:10	43.874	1018
01/04/2011	03:03:10	43.810	1019
01/04/2011	03:08:10	43.735	1019
01/04/2011	03:13:10	43.658	1019
01/04/2011	03:18:10	43.587	1019
01/04/2011	03:23:10	43.542	1019
01/04/2011	03:28:10	43.462	1019
01/04/2011	03:33:10	43.389	1019
01/04/2011	03:38:10	43.373	1019
01/04/2011	03:43:10	43.307	1019
01/04/2011	03:48:10	43.257	1019
01/04/2011	03:53:10	43.205	1019
01/04/2011	03:58:10	43.162	1019
01/04/2011	04:03:10	43.139	1019
01/04/2011	04:08:10	43.092	1019
01/04/2011	04:13:10	43.063	1019

46.80
46.78
46.76
46.73
46.70
46.69
46.65
46.60
46.55
46.51
46.45
46.43
46.36
46.29
46.22
46.15
46.10
46.02
45.94
45.87
45.80
45.72
45.63
45.55
45.49
45.41
45.32
45.24
45.13
45.03
44.97
44.87
44.78
44.70
44.59
44.52
44.42
44.32
44.26
44.17
44.06
43.99
43.90
43.80
43.71
43.65
43.55
43.49
43.41
43.34
43.26
43.19
43.15
43.07
43.00
42.98
42.92
42.87
42.81
42.77
42.75
42.70
42.67



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_16

Project no: 11507
Date: 01/04/2011
Instrument: CTD ser no 26326

01/04/2011	04:18:10	43.040	1019
01/04/2011	04:23:10	43.017	1019
01/04/2011	04:28:10	42.972	1019
01/04/2011	04:33:10	42.976	1019
01/04/2011	04:38:10	42.964	1019
01/04/2011	04:43:10	42.948	1019
01/04/2011	04:48:10	42.948	1019
01/04/2011	04:53:10	42.941	1019
01/04/2011	04:58:10	42.946	1019
01/04/2011	05:03:10	42.964	1019
01/04/2011	05:08:10	42.958	1019
01/04/2011	05:13:10	42.963	1019
01/04/2011	05:18:10	43.021	1019
01/04/2011	05:23:10	43.040	1019
01/04/2011	05:28:10	43.038	1019
01/04/2011	05:33:10	43.099	1019
01/04/2011	05:38:10	43.107	1019
01/04/2011	05:43:10	43.167	1019
01/04/2011	05:48:10	43.218	1019
01/04/2011	05:53:10	43.261	1019
01/04/2011	05:58:10	43.309	1019
01/04/2011	06:03:10	43.362	1020
01/04/2011	06:08:10	43.403	1020
01/04/2011	06:13:10	43.466	1020
01/04/2011	06:18:10	43.520	1020
01/04/2011	06:23:10	43.578	1020
01/04/2011	06:28:10	43.638	1020
01/04/2011	06:33:10	43.697	1020
01/04/2011	06:38:10	43.765	1020
01/04/2011	06:43:10	43.835	1020
01/04/2011	06:48:10	43.891	1020
01/04/2011	06:53:10	43.970	1020
01/04/2011	06:58:10	44.021	1020
01/04/2011	07:03:10	44.102	1020
01/04/2011	07:08:10	44.157	1020
01/04/2011	07:13:10	44.247	1020
01/04/2011	07:18:10	44.325	1020
01/04/2011	07:23:10	44.396	1020
01/04/2011	07:28:10	44.468	1020
01/04/2011	07:33:10	44.565	1020
01/04/2011	07:38:10	44.643	1020
01/04/2011	07:43:10	44.743	1020
01/04/2011	07:48:10	44.828	1020
01/04/2011	07:53:10	44.906	1020
01/04/2011	07:58:10	45.011	1020
01/04/2011	08:03:10	45.085	1020
01/04/2011	08:08:10	45.184	1020
01/04/2011	08:13:10	45.289	1020
01/04/2011	08:18:10	45.391	1020
01/04/2011	08:23:10	45.477	1020

42.65
42.63
42.58
42.59
42.57
42.56
42.56
42.55
42.56
42.57
42.57
42.57
42.63
42.65
42.65
42.71
42.72
42.78
42.83
42.87
42.92
42.96
43.00
43.06
43.12
43.17
43.23
43.29
43.36
43.43
43.48
43.56
43.61
43.69
43.75
43.84
43.92
43.99
44.06
44.15
44.23
44.33
44.41
44.49
44.60
44.67
44.77
44.87
44.97
45.06

LOCATION AND DEPTH REPORT



Project No. 11507
Date 30 Mar 2011
Vessel Fugro Saltire
Area Rampion - English Channel
Location BH_17
Survey type Sampling/CPT
Chart Datum LAT

Geodetic Datum WGS84
Projection UTM Zone 30N
Origin Longitude 3°W
Origin Latitude 0°
Hemisphere North
False Easting 500000 m
False Northing 0 m

Location Report BH_17 Location Report.xls

	Easting	Northing
Average position	690152.69	5615571.13 m
Standard deviation	0.23	0.19 m
Intended position	690152.30	5615571.40 m
Difference	0.39	-0.27 m
Range	0.47 m	
Bearing	124.32	deg

Depth Report BH_17 Depth Report.xls

	Depth LAT
Probe	27.0 m
Beacon	27.4 m
Drill String	27.0 m
Transducer Depth	0.3 m
Velocity of sound in water	1484.3 m/s
CTD Probe Z offset	3.3 m

For Fugro Survey Ltd


 M. Michalak

For Fugro Engineers BV


 H. Pater

For Client Representative


 P. Watson



DEPTH REPORT

Rampion - English Channel

Location: BH_17
Type: Sampling/CPT

Project No.: 11507
Vessel: Fugro Saltire
Chart Datum (C.D.): LAT

Depth Measurements reduced to LAT		
Probe:	27.0	m
Beacon:	27.4	m

Notes:

Data Source: B56
Beacon Z Offset: 1.62 m
Transducer Depth: 0.26 m
Velocity of sound in water: 1484.30 m/s
CTD Probe Z offset: 3.32 m
Standard / Secondary Port: Portsmouth
Phase: N/A
Range: N/A

For Fugro Survey Ltd

Client Representative

M.Michalak

H.Pater

Note: other pages should be initialised

Date	Time	Tide	Probe Depth		Time	Fix #	Tide	Beacon Depth	
			Not Red.	Reduced				Not Red.	Reduced
30/03/2011	18:38:10	3.88	27.26	26.70	18:44:25	1	3.95	29.18	27.11
30/03/2011	18:48:10	3.99	27.42	26.74	18:44:30	2	3.95	29.14	27.07
30/03/2011	18:53:10	4.05	27.49	26.76	18:44:35	3	3.95	29.37	27.30
30/03/2011	18:58:10	4.11	27.56	26.77	18:44:41	4	3.95	29.14	27.07
30/03/2011	19:03:10	4.17	27.65	26.80	18:44:46	5	3.95	29.39	27.32
30/03/2011	19:08:10	4.23	27.72	26.81	18:44:51	6	3.95	29.58	27.51
30/03/2011	19:13:10	4.29	27.80	26.83	18:44:56	7	3.95	29.60	27.53
30/03/2011	19:18:10	4.35	27.89	26.86	18:45:01	8	3.96	29.34	27.26
30/03/2011	19:23:10	4.41	27.96	26.86	18:45:06	9	3.96	29.53	27.45
30/03/2011	19:28:10	4.47	28.02	26.86	18:45:11	10	3.96	29.52	27.44
30/03/2011	19:33:10	4.54	28.10	26.89	18:45:16	11	3.96	29.60	27.52
30/03/2011	19:38:10	4.60	28.18	26.90	18:45:21	12	3.96	29.61	27.53
30/03/2011	19:43:10	4.65	28.25	26.92	18:45:26	13	3.96	29.42	27.34
30/03/2011	19:48:10	4.71	28.34	26.95	18:45:31	14	3.96	29.49	27.41
30/03/2011	19:53:10	4.77	28.40	26.95	18:45:36	15	3.96	29.56	27.48
30/03/2011	19:58:10	4.82	28.49	26.99	18:45:41	16	3.96	29.55	27.47
30/03/2011	20:03:10	4.88	28.56	27.00	18:45:46	17	3.96	29.55	27.47
30/03/2011	20:08:10	4.93	28.64	27.03	18:45:51	18	3.96	29.55	27.47
30/03/2011	20:13:10	4.98	28.72	27.06	18:45:56	19	3.96	29.42	27.34
30/03/2011	20:18:10	5.03	28.78	27.07	18:46:01	20	3.97	29.51	27.42
30/03/2011	20:23:10	5.08	28.85	27.09	18:46:06	21	3.97	29.48	27.39
30/03/2011	20:28:10	5.13	28.90	27.10	18:46:11	22	3.97	29.72	27.63
30/03/2011	20:33:10	5.17	28.97	27.12	18:46:16	23	3.97	29.35	27.26
30/03/2011	20:38:10	5.21	29.03	27.13	18:46:21	24	3.97	29.46	27.37
30/03/2011	20:43:10	5.25	29.08	27.15	18:46:26	25	3.97	29.38	27.29
30/03/2011	20:48:10	5.29	29.13	27.16	18:46:31	26	3.97	29.58	27.49
30/03/2011	20:53:10	5.32	29.19	27.18	18:46:36	27	3.97	29.22	27.13
30/03/2011	20:58:10	5.36	29.23	27.19	18:46:41	28	3.97	29.43	27.34
30/03/2011	21:03:10	5.39	29.27	27.20	18:46:46	29	3.97	29.43	27.34
30/03/2011	21:08:10	5.41	29.32	27.23	18:46:51	30	3.97	29.54	27.45
30/03/2011	21:13:10	5.44	29.35	27.23	18:46:56	31	3.97	29.35	27.26
30/03/2011	21:18:10	5.46	29.37	27.23	18:47:01	32	3.98	29.47	27.37
30/03/2011	21:23:10	5.48	29.42	27.26	18:47:06	33	3.98	29.68	27.58
30/03/2011	21:28:10	5.50	29.42	27.24	18:47:11	34	3.98	29.66	27.56
30/03/2011	21:33:10	5.51	29.45	27.26	18:47:16	35	3.98	29.63	27.53



DEPTH REPORT

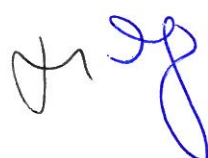
Rampion - English Channel

30/03/2011	21:38:10	5.52	29.47	27.27	18:47:22	36	3.98	29.65	27.55
30/03/2011	21:43:10	5.53	29.49	27.28	18:47:27	37	3.98	29.67	27.57
30/03/2011	21:48:10	5.54	29.50	27.28	18:47:32	38	3.98	29.61	27.51
30/03/2011	21:53:10	5.54	29.51	27.28	18:47:37	39	3.98	29.53	27.43
30/03/2011	21:58:10	5.55	29.51	27.28	18:47:42	40	3.98	29.51	27.41
30/03/2011	22:03:10	5.55	29.50	27.27	18:47:47	41	3.98	29.51	27.41
30/03/2011	22:08:10	5.54	29.50	27.28	18:47:52	42	3.98	29.49	27.39
30/03/2011	22:13:10	5.54	29.51	27.29	18:47:57	43	3.98	29.62	27.52
30/03/2011	22:18:10	5.53	29.49	27.28	18:48:02	44	3.99	29.45	27.34
30/03/2011	22:23:10	5.52	29.48	27.29	18:48:07	45	3.99	29.40	27.29
30/03/2011	22:28:10	5.50	29.45	27.26	18:48:12	46	3.99	29.50	27.39
30/03/2011	22:33:10	5.49	29.44	27.27	18:48:17	47	3.99	29.56	27.45
30/03/2011	22:38:10	5.47	29.42	27.28	18:48:22	48	3.99	29.65	27.54
30/03/2011	22:43:10	5.45	29.38	27.25	18:48:27	49	3.99	29.51	27.40
30/03/2011	22:48:10	5.42	29.35	27.25	18:48:32	50	3.99	29.64	27.53
30/03/2011	22:53:10	5.40	29.31	27.23	18:48:37	51	3.99	29.57	27.46
30/03/2011	22:58:10	5.37	29.28	27.23	18:48:42	52	3.99	29.37	27.26
30/03/2011	23:03:10	5.34	29.22	27.21	18:48:47	53	3.99	29.35	27.24
30/03/2011	23:08:10	5.30	29.18	27.20	18:48:52	54	3.99	29.26	27.15
30/03/2011	23:13:10	5.26	29.12	27.18	18:48:57	55	3.99	29.31	27.20
30/03/2011	23:18:10	5.22	29.09	27.19	18:49:02	56	4.01	29.35	27.22
30/03/2011	23:23:10	5.18	29.03	27.17	18:49:07	57	4.01	29.40	27.27
30/03/2011	23:28:10	5.14	28.97	27.16	18:49:12	58	4.01	29.39	27.26
30/03/2011	23:33:10	5.09	28.91	27.14	18:49:17	59	4.01	29.47	27.34
30/03/2011	23:38:10	5.04	28.86	27.14	18:49:22	60	4.01	29.46	27.33
30/03/2011	23:43:10	4.98	28.78	27.12	18:49:27	61	4.01	29.54	27.41
30/03/2011	23:48:10	4.93	28.74	27.14	18:49:32	62	4.01	29.46	27.33
30/03/2011	23:53:10	4.87	28.70	27.15	18:49:37	63	4.01	29.62	27.49
30/03/2011	23:58:10	4.81	28.60	27.11	18:49:42	64	4.01	29.40	27.27
31/03/2011	00:03:10	4.74	28.54	27.12	18:49:47	65	4.01	29.70	27.57
31/03/2011	00:08:10	4.67	28.47	27.12	18:49:52	66	4.01	29.47	27.34
31/03/2011	00:13:10	4.60	28.39	27.10	18:49:57	67	4.01	29.52	27.39
31/03/2011	00:18:10	4.53	28.36	27.14	18:50:02	68	4.02	29.68	27.54
31/03/2011	00:23:10	4.46	28.27	27.13	18:50:08	69	4.02	29.43	27.29
31/03/2011	00:28:10	4.38	28.21	27.14	18:50:13	70	4.02	29.42	27.28
31/03/2011	00:33:10	4.31	28.12	27.13	18:50:18	71	4.02	29.6	27.46
31/03/2011	00:38:10	4.23	28.04	27.13	18:50:23	72	4.02	29.29	27.15
31/03/2011	00:43:10	4.15	27.95	27.12	18:50:28	73	4.02	29.46	27.32
31/03/2011	00:48:10	4.07	27.89	27.14	18:50:33	74	4.02	29.39	27.25
31/03/2011	00:53:10	3.98	27.80	27.14	18:50:38	75	4.02	29.42	27.28
31/03/2011	00:58:10	3.90	27.73	27.15	18:50:43	76	4.02	29.48	27.34
31/03/2011	01:03:10	3.82	27.65	27.15	18:50:48	77	4.02	29.67	27.53
31/03/2011	01:08:10	3.73	27.58	27.17	18:50:53	78	4.02	29.76	27.62
31/03/2011	01:13:10	3.65	27.49	27.16	18:50:58	79	4.02	29.62	27.48
31/03/2011	01:18:10	3.57	27.41	27.16	18:51:03	80	4.03	29.83	27.68
31/03/2011	01:23:10	3.49	27.35	27.18	18:51:08	81	4.03	29.47	27.32
31/03/2011	01:28:10	3.40	27.27	27.19	18:51:13	82	4.03	29.61	27.46
31/03/2011	01:33:10	3.33	27.19	27.18	18:51:18	83	4.03	29.51	27.36
31/03/2011	01:38:10	3.25	27.11	27.18	18:51:23	84	4.03	29.48	27.33
31/03/2011	01:43:10	3.17	27.03	27.17	18:51:28	85	4.03	29.49	27.34
31/03/2011	01:48:10	3.10	26.96	27.19	18:51:33	86	4.03	29.55	27.40
31/03/2011	01:53:10	3.03	26.89	27.18	18:51:38	87	4.03	29.59	27.44
31/03/2011	01:58:10	2.96	26.81	27.18	18:51:43	88	4.03	29.72	27.57
31/03/2011	02:03:10	2.89	26.75	27.18	18:51:48	89	4.03	29.68	27.53
31/03/2011	02:08:10	2.83	26.69	27.18	18:51:53	90	4.03	29.66	27.51
31/03/2011	02:13:10	2.77	26.61	27.16	18:51:58	91	4.03	29.67	27.52
31/03/2011	02:18:10	2.71	26.56	27.17	18:52:03	92	4.04	29.77	27.61
31/03/2011	02:23:10	2.66	26.50	27.16	18:52:08	93	4.04	29.67	27.51
31/03/2011	02:28:10	2.62	26.41	27.12	18:52:13	94	4.04	29.54	27.38
31/03/2011	02:33:10	2.57	26.35	27.10	18:52:18	95	4.04	29.66	27.50
31/03/2011	02:38:10	2.53	26.29	27.08	18:52:23	96	4.04	29.75	27.59
31/03/2011	02:43:10	2.50	26.23	27.05	18:52:28	97	4.04	29.73	27.57
31/03/2011	02:48:10	2.46	26.19	27.05	18:52:33	98	4.04	29.63	27.47
31/03/2011	02:53:10	2.44	26.13	27.01	18:52:38	99	4.04	29.59	27.43
31/03/2011	02:58:10	2.42	26.08	26.98	18:52:43	100	4.04	29.76	27.60
31/03/2011	03:03:10	2.40	26.06	26.98	18:52:48	101	4.04	29.93	27.77
31/03/2011	03:08:10	2.38	26.03	26.97					
31/03/2011	03:13:10	2.37	25.98	26.93					

DEPTH REPORT

Rampion - English Channel

31/03/2011	03:18:10	2.36	25.95	26.91
31/03/2011	03:23:10	2.36	25.90	26.86
31/03/2011	03:28:10	2.36	25.89	26.85
31/03/2011	03:33:10	2.37	25.86	26.81
31/03/2011	03:38:10	2.37	25.85	26.79
31/03/2011	03:43:10	2.38	25.82	26.76
31/03/2011	03:48:10	2.40	25.81	26.73
31/03/2011	03:53:10	2.41	25.80	26.71
31/03/2011	03:58:10	2.43	25.79	26.68
31/03/2011	04:03:10	2.45	25.80	26.67
31/03/2011	04:08:10	2.47	25.79	26.64
31/03/2011	04:13:10	2.50	25.81	26.63
31/03/2011	04:18:10	2.52	25.81	26.61
31/03/2011	04:23:10	2.55	25.81	26.58
31/03/2011	04:28:10	2.58	25.83	26.57
31/03/2011	04:33:10	2.61	25.85	26.56
31/03/2011	04:38:10	2.64	25.87	26.55
31/03/2011	04:43:10	2.67	25.89	26.54
31/03/2011	04:48:10	2.71	25.91	26.52
31/03/2011	04:53:10	2.74	25.95	26.53
31/03/2011	04:58:10	2.77	25.97	26.52
31/03/2011	05:03:10	2.81	26.01	26.52
31/03/2011	05:08:10	2.84	26.03	26.51
31/03/2011	05:13:10	2.88	26.08	26.53
31/03/2011	05:18:10	2.91	26.12	26.53
31/03/2011	05:23:10	2.95	26.17	26.55
31/03/2011	05:28:10	2.99	26.21	26.54
31/03/2011	05:33:10	3.02	26.26	26.56
31/03/2011	05:38:10	3.06	26.30	26.56
31/03/2011	05:43:10	3.10	26.37	26.59
31/03/2011	05:48:10	3.14	26.41	26.59
31/03/2011	05:53:10	3.18	26.46	26.60
31/03/2011	05:58:10	3.22	26.52	26.62
31/03/2011	06:03:10	3.26	26.57	26.62
31/03/2011	06:08:10	3.30	26.64	26.66
31/03/2011	06:13:10	3.35	26.69	26.66
31/03/2011	06:18:10	3.39	26.75	26.68
31/03/2011	06:23:10	3.44	26.82	26.70
31/03/2011	06:28:10	3.49	26.87	26.70
31/03/2011	06:33:10	3.54	26.92	26.71
31/03/2011	06:38:10	3.59	26.99	26.72
31/03/2011	06:43:10	3.64	27.07	26.75
31/03/2011	06:48:10	3.69	27.14	26.77
31/03/2011	06:53:10	3.75	27.22	26.79
31/03/2011	06:58:10	3.80	27.29	26.81
31/03/2011	07:03:10	3.86	27.38	26.84





LOCATION REPORT

Rampion - English Channel

Location: **BH_17**

Type : Sampling/CPT

Average Position

Standard deviation

Easting (m)

Northing (m)

690152.69

5615571.13

0.23

0.19

Intended position

690152.30

5615571.40

Difference

0.39

-0.27

Distance

0.47 m

Bearing

124.32 deg

Project no:

11507

Date:

30 Mar 2011

Vessel:

Fugro Saltire

Notes:

Datum

WGS84

Projection

UTM Zone 30N

Origin Longitude

3°W

Origin Latitude

0°

Hemisphere

North

False Easting

500000 m

False Northing

0 m

For Fugro Survey Ltd

P. Moharana

P.Moharana

For Client

H. Pater

H.Pater

BST Time	Fix no.	Logged Drill-string Positions	
		Easting (m)	Northing (m)
19:44:14	1	690152.59	5615571.47
19:44:19	2	690152.51	5615571.29
19:44:21	3	690152.77	5615571.38
19:44:22	4	690152.54	5615571.33
19:44:24	5	690152.45	5615571.33
19:44:26	6	690152.58	5615571.40
19:44:31	7	690152.60	5615571.47
19:44:33	8	690152.39	5615571.27
19:44:35	9	690152.60	5615571.49
19:44:36	10	690152.50	5615571.37
19:44:40	11	690152.56	5615571.35
19:44:42	12	690152.49	5615571.13
19:44:45	13	690152.44	5615571.12
19:44:46	14	690152.63	5615571.04
19:44:48	15	690152.71	5615570.84
19:44:50	16	690152.82	5615571.01
19:44:51	17	690152.85	5615570.89
19:44:54	18	690152.43	5615571.11
19:44:56	19	690152.79	5615570.92
19:44:58	20	690152.77	5615570.97
19:45:00	21	690152.77	5615570.93
19:45:01	22	690153.01	5615571.18
19:45:06	23	690152.33	5615571.02
19:45:06	24	690152.63	5615570.79
19:45:08	25	690152.81	5615570.82
19:45:10	26	690153.03	5615571.06
19:45:12	27	690153.01	5615570.88
19:45:13	28	690153.18	5615571.13
19:45:19	29	690152.64	5615570.81
19:45:20	30	690152.99	5615571.02
19:45:22	31	690152.98	5615571.04
19:45:24	32	690153.28	5615571.16
19:45:25	33	690153.06	5615571.09
19:45:30	34	690152.63	5615570.85
19:45:31	35	690153.05	5615570.88
19:45:33	36	690152.96	5615570.96
19:45:34	37	690152.68	5615571.23

Revision: Jan 2010

Page 1 of 2

© Fugro Survey Ltd

BH_17 Location Report.xls

LOCATION REPORT

19:45:36	38	690152.54	5615571.25
19:45:40	39	690152.76	5615571.04
19:45:41	40	690152.67	5615571.10
19:45:43	41	690152.43	5615571.22
19:45:45	42	690152.47	5615571.19
19:45:47	43	690152.45	5615571.10
19:45:51	44	690152.75	5615571.15
19:45:53	45	690152.44	5615571.22
19:45:54	46	690152.40	5615571.17
19:45:56	47	690152.51	5615571.25
19:46:00	48	690152.61	5615571.39
19:46:05	49	690152.77	5615571.41
19:46:07	50	690152.48	5615571.10
19:46:08	51	690152.56	5615571.18
19:46:12	52	690152.68	5615571.00
19:46:16	53	690152.54	5615571.22
19:46:17	54	690152.69	5615571.17
19:46:19	55	690152.67	5615571.19
19:46:21	56	690152.65	5615570.90
19:46:23	57	690152.65	5615570.96
19:46:25	58	690152.59	5615571.31
19:46:27	59	690152.50	5615571.25
19:46:28	60	690152.51	5615571.07
19:46:30	61	690152.69	5615571.34
19:46:32	62	690152.49	5615571.09
19:46:36	63	690152.44	5615571.15
19:46:38	64	690152.44	5615571.34
19:46:40	65	690152.28	5615570.94
19:46:41	66	690152.36	5615571.13
19:46:43	67	690152.47	5615571.17
19:46:45	68	690152.49	5615571.29
19:46:47	69	690152.46	5615570.96
19:46:51	70	690152.48	5615571.35
19:46:53	71	690152.82	5615571.07
19:46:54	72	690152.65	5615570.88
19:46:56	73	690152.83	5615570.87
19:46:58	74	690152.73	5615570.78
19:47:02	75	690152.52	5615570.92
19:47:03	76	690153.04	5615570.81
19:47:05	77	690152.90	5615570.82
19:47:07	78	690152.96	5615570.89
19:47:10	79	690153.00	5615570.69
19:47:14	80	690152.66	5615571.11
19:47:15	81	690153.19	5615570.98
19:47:17	82	690153.09	5615570.78
19:47:19	83	690153.05	5615570.83
19:47:20	84	690153.14	5615570.87
19:47:24	85	690152.69	5615570.98
19:47:25	86	690153.20	5615571.10
19:47:27	87	690153.00	5615570.79
19:47:29	88	690152.98	5615571.02
19:47:30	89	690153.07	5615570.78
19:47:34	90	690152.82	5615571.08
19:47:35	91	690152.91	5615570.92
19:47:37	92	690153.06	5615570.87
19:47:39	93	690153.00	5615570.80
19:47:41	94	690152.95	5615570.62
19:47:43	95	690152.99	5615570.86
19:47:48	96	690152.73	5615570.92
19:47:49	97	690152.71	5615571.11
19:47:51	98	690152.78	5615570.93
19:47:53	99	690152.69	5615571.08
19:47:55	100	690152.57	5615571.10





PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_17

Project no: 11507
Date: 31/03/2011
Instrument: CTD ser no 26326

Latitude :	50.63	N
Start Barometer :	1011	mbar

Gravity =	9.811	m/s ²
Average Density=	1.027	kg/dm ³

Notes:

Depth = $P/d/g \times 10000$ m
Gravity = $9.780318 \times (1 + 0.0052788 \times (\sin(\text{lat}))^2 + 0.0000236 \times \sin(\text{lat})^4) + 0.5 \times 0.000002184 \times P$ m/s²

For Fugro Survey Ltd

Qc Mohan K

P.Moharana

For Client

H.Pater

Probe Readings			
Date	Time	Pressure	Barometer
dd/mm/yyyy	hh:mm:ss	dbar	mbar
30/03/2011	18:38:10	27.473	1011
30/03/2011	18:43:10	22.597	1011
30/03/2011	18:48:10	27.634	1011
30/03/2011	18:53:10	27.708	1011
30/03/2011	18:58:10	27.784	1011
30/03/2011	19:03:10	27.869	1011
30/03/2011	19:08:10	27.941	1011
30/03/2011	19:13:10	28.026	1011
30/03/2011	19:18:10	28.111	1011
30/03/2011	19:23:10	28.178	1011
30/03/2011	19:28:10	28.240	1011
30/03/2011	19:33:10	28.326	1011
30/03/2011	19:38:10	28.402	1011
30/03/2011	19:43:10	28.476	1011
30/03/2011	19:48:10	28.564	1011
30/03/2011	19:53:10	28.629	1011
30/03/2011	19:58:10	28.722	1011
30/03/2011	20:03:10	28.786	1011
30/03/2011	20:08:10	28.870	1011
30/03/2011	20:13:10	28.948	1011
30/03/2011	20:18:10	29.014	1011
30/03/2011	20:23:10	29.083	1011
30/03/2011	20:28:10	29.133	1011
30/03/2011	20:33:10	29.197	1011
30/03/2011	20:38:10	29.259	1011
30/03/2011	20:43:10	29.312	1011
30/03/2011	20:48:10	29.363	1011
30/03/2011	20:53:10	29.419	1011
30/03/2011	20:58:10	29.464	1011
30/03/2011	21:03:10	29.500	1011
30/03/2011	21:08:10	29.557	1011
30/03/2011	21:13:10	29.588	1011
30/03/2011	21:18:10	29.606	1011
30/03/2011	21:23:10	29.651	1011
30/03/2011	21:28:10	29.657	1011
30/03/2011	21:33:10	29.686	1011
30/03/2011	21:38:10	29.706	1011
30/03/2011	21:43:10	29.728	1011
30/03/2011	21:48:10	29.740	1011
30/03/2011	21:53:10	29.741	1011
30/03/2011	21:58:10	29.744	1011
30/03/2011	22:03:10	29.733	1011
30/03/2011	22:08:10	29.736	1011
30/03/2011	22:13:10	29.746	1011

Computed
Depth
m
27.26
22.42
27.42
27.49
27.56
27.65
27.72
27.80
27.89
27.96
28.02
28.10
28.18
28.25
28.34
28.40
28.49
28.56
28.64
28.72
28.78
28.85
28.90
28.97
29.03
29.08
29.13
29.19
29.23
29.27
29.32
29.35
29.37
29.42
29.42
29.45
29.47
29.49
29.50
29.51
29.51
29.50
29.50
29.51



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_17

Project no: 11507
Date: 31/03/2011
Instrument: CTD ser no 26326

30/03/2011	22:18:10	29.722	1011
30/03/2011	22:23:10	29.719	1011
30/03/2011	22:28:10	29.682	1011
30/03/2011	22:33:10	29.671	1011
30/03/2011	22:38:10	29.658	1011
30/03/2011	22:43:10	29.614	1011
30/03/2011	22:48:10	29.587	1011
30/03/2011	22:53:10	29.541	1011
30/03/2011	22:58:10	29.513	1011
30/03/2011	23:03:10	29.467	1012
30/03/2011	23:08:10	29.421	1012
30/03/2011	23:13:10	29.366	1012
30/03/2011	23:18:10	29.331	1012
30/03/2011	23:23:10	29.271	1012
30/03/2011	23:28:10	29.214	1012
30/03/2011	23:33:10	29.149	1012
30/03/2011	23:38:10	29.097	1012
30/03/2011	23:43:10	29.023	1012
30/03/2011	23:48:10	28.983	1012
30/03/2011	23:53:10	28.942	1012
30/03/2011	23:58:10	28.841	1012
31/03/2011	00:03:10	28.787	1013
31/03/2011	00:08:10	28.716	1013
31/03/2011	00:13:10	28.633	1013
31/03/2011	00:18:10	28.601	1013
31/03/2011	00:23:10	28.518	1013
31/03/2011	00:28:10	28.453	1013
31/03/2011	00:33:10	28.361	1013
31/03/2011	00:38:10	28.282	1013
31/03/2011	00:43:10	28.191	1013
31/03/2011	00:48:10	28.128	1013
31/03/2011	00:53:10	28.044	1013
31/03/2011	00:58:10	27.973	1013
31/03/2011	01:03:10	27.891	1013
31/03/2011	01:08:10	27.821	1013
31/03/2011	01:13:10	27.726	1013
31/03/2011	01:18:10	27.649	1013
31/03/2011	01:23:10	27.588	1013
31/03/2011	01:28:10	27.507	1013
31/03/2011	01:33:10	27.425	1013
31/03/2011	01:38:10	27.346	1013
31/03/2011	01:43:10	27.261	1013
31/03/2011	01:48:10	27.199	1013
31/03/2011	01:53:10	27.121	1013
31/03/2011	01:58:10	27.047	1013
31/03/2011	02:03:10	26.971	1012
31/03/2011	02:08:10	26.916	1012
31/03/2011	02:13:10	26.831	1012
31/03/2011	02:18:10	26.786	1012
31/03/2011	02:23:10	26.723	1012
31/03/2011	02:28:10	26.631	1012
31/03/2011	02:33:10	26.570	1012
31/03/2011	02:38:10	26.510	1012
31/03/2011	02:43:10	26.450	1012
31/03/2011	02:48:10	26.413	1012
31/03/2011	02:53:10	26.349	1012
31/03/2011	02:58:10	26.297	1012
31/03/2011	03:03:10	26.265	1011
31/03/2011	03:08:10	26.235	1011
31/03/2011	03:13:10	26.185	1011
31/03/2011	03:18:10	26.161	1011
31/03/2011	03:23:10	26.104	1011
31/03/2011	03:28:10	26.094	1011

29.49
29.48
29.45
29.44
29.42
29.38
29.35
29.31
29.28
29.22
29.18
29.12
29.09
29.03
28.97
28.91
28.86
28.78
28.74
28.70
28.60
28.54
28.47
28.39
28.36
28.27
28.21
28.12
28.04
27.95
27.89
27.80
27.73
27.65
27.58
27.49
27.41
27.35
27.27
27.19
27.11
27.03
26.96
26.89
26.81
26.75
26.69
26.61
26.56
26.50
26.41
26.35
26.29
26.23
26.19
26.13
26.08
26.06
26.03
25.98
25.95
25.90
25.89



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_17

Project no: 11507
Date: 31/03/2011
Instrument: CTD ser no 26326

31/03/2011	03:33:10	26.065	1011
31/03/2011	03:38:10	26.052	1011
31/03/2011	03:43:10	26.029	1011
31/03/2011	03:48:10	26.014	1011
31/03/2011	03:53:10	26.008	1011
31/03/2011	03:58:10	25.999	1011
31/03/2011	04:03:10	26.004	1011
31/03/2011	04:08:10	25.987	1010
31/03/2011	04:13:10	26.007	1010
31/03/2011	04:18:10	26.005	1010
31/03/2011	04:23:10	26.010	1010
31/03/2011	04:28:10	26.022	1010
31/03/2011	04:33:10	26.046	1010
31/03/2011	04:38:10	26.064	1010
31/03/2011	04:43:10	26.089	1010
31/03/2011	04:48:10	26.105	1010
31/03/2011	04:53:10	26.143	1010
31/03/2011	04:58:10	26.166	1010
31/03/2011	05:03:10	26.204	1010
31/03/2011	05:08:10	26.229	1010
31/03/2011	05:13:10	26.280	1010
31/03/2011	05:18:10	26.321	1010
31/03/2011	05:23:10	26.372	1010
31/03/2011	05:28:10	26.407	1010
31/03/2011	05:33:10	26.458	1010
31/03/2011	05:38:10	26.503	1010
31/03/2011	05:43:10	26.566	1010
31/03/2011	05:48:10	26.608	1010
31/03/2011	05:53:10	26.662	1010
31/03/2011	05:58:10	26.722	1010
31/03/2011	06:03:10	26.768	1010
31/03/2011	06:08:10	26.843	1010
31/03/2011	06:13:10	26.890	1010
31/03/2011	06:18:10	26.953	1010
31/03/2011	06:23:10	27.021	1010
31/03/2011	06:28:10	27.074	1010
31/03/2011	06:33:10	27.129	1010
31/03/2011	06:38:10	27.197	1010
31/03/2011	06:43:10	27.278	1010
31/03/2011	06:48:10	27.351	1010
31/03/2011	06:53:10	27.424	1010
31/03/2011	06:58:10	27.497	1010
31/03/2011	07:03:10	27.590	1010
31/03/2011	07:08:10	27.657	1010
31/03/2011	07:13:10	27.753	1010
31/03/2011	07:18:10	27.820	1010
31/03/2011	07:23:10	27.915	1010
31/03/2011	07:28:10	27.999	1010
31/03/2011	07:33:10	28.062	1010
31/03/2011	07:38:10	28.156	1010
31/03/2011	07:43:10	28.231	1010
31/03/2011	07:48:10	28.325	1010
31/03/2011	07:53:10	28.403	1010
31/03/2011	07:58:10	28.496	1010
31/03/2011	08:03:10	28.561	1010
31/03/2011	08:08:10	28.656	1010
31/03/2011	08:13:10	28.740	1010
31/03/2011	08:18:10	28.827	1010
31/03/2011	08:23:10	28.911	1010
31/03/2011	08:28:10	28.993	1010
31/03/2011	08:33:10	29.058	1010
31/03/2011	08:38:10	29.143	1010
31/03/2011	08:43:10	29.211	1010

25.86
25.85
25.82
25.81
25.80
25.79
25.80
25.79
25.81
25.81
25.81
25.83
25.85
25.87
25.89
25.91
25.95
25.97
26.01
26.03
26.08
26.12
26.17
26.21
26.26
26.30
26.37
26.41
26.46
26.52
26.57
26.64
26.69
26.75
26.82
26.87
26.92
26.99
27.07
27.14
27.22
27.29
27.38
27.45
27.54
27.61
27.70
27.79
27.85
27.94
28.02
28.11
28.19
28.28
28.35
28.44
28.52
28.61
28.69
28.77
28.84
28.92
28.99



PRESSURE TO DEPTH CONVERSION

Vessel: Fugro Saltire
Location: BH_17

Project no: 11507
Date: 31/03/2011
Instrument: CTD ser no 26326

31/03/2011	08:48:10	29.283	1010
31/03/2011	08:53:10	29.357	1010
31/03/2011	08:58:10	29.436	1010
31/03/2011	09:03:10	29.485	1010
31/03/2011	09:08:10	29.548	1010
31/03/2011	09:13:10	29.606	1010
31/03/2011	09:18:10	29.650	1010
31/03/2011	09:23:10	29.704	1010
31/03/2011	09:28:10	29.747	1010
31/03/2011	09:33:10	29.777	1010

29.06
29.13
29.21
29.26
29.32
29.38
29.43
29.48
29.52
29.55

VC SUMMARY							
VC No.	Date	Actual Coordinates			Water	Penetration	Recovery
		Time			Depth (m)	(m)	(m)
		UTC+1	Eastings (m)	Northings (m)			
VC03	07/04/2011	15:53	692327	5617602	33.80	6.20	5.54
VC20C	07/04/2011	16:41	691333	5624080	20.30	3.17	1.90
VC21C	08/04/2011	11:09	691333	5630919	8.20	3.96	3.73
VC18C	08/04/2011	11:35	690327	5629206	11.20	3.39	2.55
VC19C	08/04/2011	12:14	692786	5626332	17.50	4.00	3.99
VC20C-B	08/04/2011	12:52	691333	5624081	20.70	1.95	1.43

PCPT SUMMARY							
CPT No.	Date	Actual Coordinates			Water	Depth	Stop
		Time	UTM		Depth (m)	Criteria	
		UTC+1	Eastings (m)	Northings (m)	(Actual)	(m)	
CPT_21C	07/04/2011	11:08	691334	5630921	9.00	3.02	D
CPT_18C	07/04/2011	11:48	690325	5629207	12.10	3.17	D
CPT_19C	07/04/2011	12:37	692784	5526333	19.10	1.00	C
CPT_19Ca	07/04/2011	12:43	692788	5626330	19.60	1.15	C
CPT_20C	07/04/2011	13:17	691332	5624079	21.80	3.21	D
CPT_3	07/04/2011	14:14	692327	5617602	34.50	5.17	D
Stop Criteria: D=Depth achieved, E=Excess thrust, C=Cone inclination, L=cone end Load, F=sleeve Friction, T=frame Tilt, O=Other							

SECTION C.7

REFERENCES

C.7 REFERENCES

1

C.7 REFERENCES

BS 5930, 1999. *Code of Practice for Site Investigations*. London: British Standards Institution.

JAMIOLKOWSKI, M., LO PRESTI, D.C.F. and MANASSERO, M. (2003). Evaluation of relative density and shear strength of sands from CPT and DMT. GERMAINE, J.T., SHEAHAN, T.C. and WHITMAN, R.V. (Eds.), *Soil behavior and soft ground construction: proceedings of the symposium, October 5-6, 2001, Cambridge, Massachusetts, Geotechnical Special Publication, No. 119, American Society of Civil Engineers*, Reston, pp. 201-238.

LAMBE, T.W. and WHITMAN, R.V., 1969. *Soil Mechanics*. New York: John Wiley and Sons Inc.



SECTION C.8

HEALTH, SAFETY AND ENVIRONMENT

C.8	HEALTH, SAFETY AND ENVIRONMENT	1
C.8.1	GENERAL	1

C.8 HEALTH, SAFETY AND ENVIRONMENT

C.8.1 GENERAL

The health, safety and environment (HSE) consideration during the Rampion Wind Farm site investigation was generally strong. A total of 54 people (2 clients, 4 FGCLTD, 7 FEBV, 9 FSC, 2 FSL, 7 FSSL and 23 crew) contributed to the safe performance of 285 hours of site work on the M/V Fugro Saltire and a total of 7 people (3 FAOL, 1 FSL and 3 crew) contributed to the safe performance of 89 hours of site work on the M/V Willendeavour. The following tables show some HSE related statistics obtained during the field work.

Table C.8-1: HSE Performance aboard the M/V Fugro Saltire

Item	Number
Accident/Incident Reports	0
HOC Cards	5
Muster/Safety Drills	2
Tool Box/SJA/HSE Meetings	40

Table C.8-2: HSE Performance aboard the M/V Willendeavour

Item	Number
Accident/Incident Reports	1
HOC Cards	0
Muster/Safety Drills	0
Tool Box/SJA/HSE Meetings	4

C.8.1.1 HOC Cards

Five HOC cards were recorded during the campaign performed by the M/V Fugro Saltire.

C.8.1.2 Incident Reports

Whilst attempting to recover the wave rider buoy to the M/V Willendeavour the second section of the rubber bungee became caught on the underneath of the ships anchor. After several attempts to free the bungee it was decided that the safest way to move forward was to un-attach the wave rider buoy and release the rubber with two fender buoys attached and try to manoeuvre the vessel as to free the snagged line. Whilst attempting to manoeuvre the vessel the strain became too much for the rubber and it parted roughly 10cm below the top connector (which was attached to the two fender buoys). Crew along with a specialist team of divers onboard returned to site to recover the remaining wave buoy equipment. These buoys were then recovered along with the parted top section. The vessel and FAOL crew proceeded to recover the rest of the equipment to deck using both the ships crane and main lift winch.