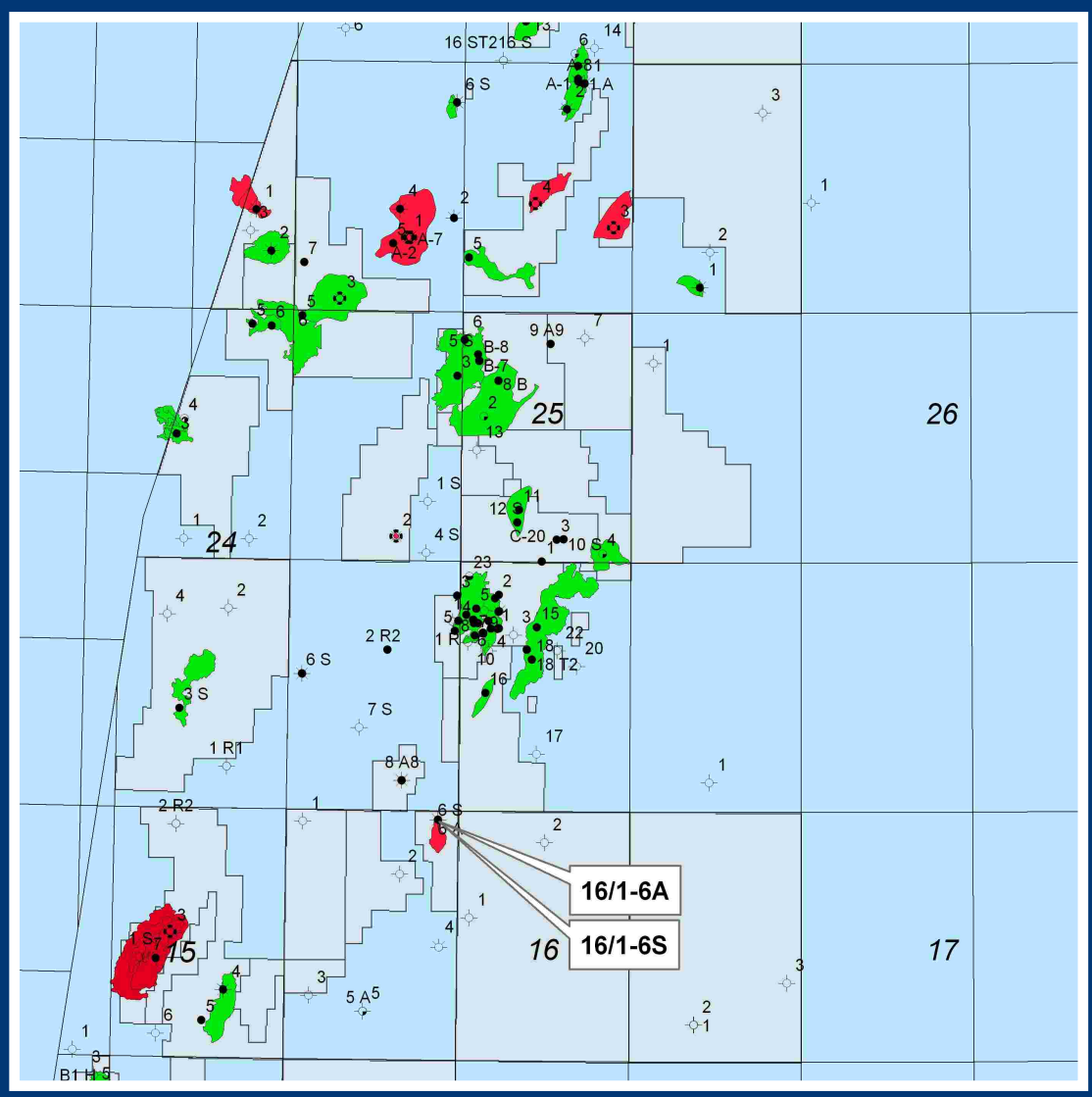
STATOIL

Final Well Report
PL167, Wells 16/1-6S & 16/1-6A



Exploration and Production (UPN)

Norway, December 2003

DNO

Grafisk/a03/0447

65mm perm
Trenger x ?

Final Well Report
PL167, Wells 16/1-6S & 16/1-6A

November 2003

STATOIL

Final Well Report
PL167, Wells 16/1-6S & 16/1-6A

November 2003

STATOIL

STATOIL

Final Well Report
PL 167
Wells 16/1-6S & 16/1-6A

03s94*733

STATOIL

Title:
Final Well Report **PL 167** **Wells 16/1-6S & 16/1-6A**

Document no.:	Contract no./project no.:	Filing no.:
03s94*733		

Classification:	Distribution:
Restricted	**According to distribution list**

Distribution date:	Rev. date:	Rev. no.:	Copy no.:
	2003-12-16	**0**	

Author(s)/Source(s):

Lars Lilledal, TO-SF-RU SAT

Reidar Emil Pedersen, OPR BOR BRT

Elin Svendsen, OPR BOR BRT

Jan Eirik Haugen, OPR BEV TEK

Per Furmyr, OPR BEV GEO

Subjects:

General information

Exemptions and Non-Conformances

Health, Environment, Safety and Quality

Geology and Formation Data Report

Drilling Operations Report

Remarks:	
Valid from:	Updated:
Responsible publisher:	Authority to approve deviations:

Techn. responsible:	Name:	Date/Signature:
Well Project Manager	**Ture Bjørgen**	T. Bjørgen 18/12/03
Responsible:	Name:	Date/Signature: 18.12-03
OPR BEV, Manager Well Eval.	**Jan Skagen**	Jan Skagen
Recommended:	Name:	Date/Signature:
OPR BOR, Manager Expl. Drlg.	**Harald Mortensen** For	18/12-03 Kjell M Hegglebø
Approved:	Name:	Date/Signature:
UPN LET NS, Manager	**Frode Fasteland**	19/12 03 F. Fasteland

DISTRIBUTION LIST	No. of copies
NPD, attn. Magne G. Edvardsen	2
DNO, attn. Arild K. Jørstad	1
UPN LET NS, attn. Frode Fasteland	1
Statoil Document Centre, Stavanger	2
Total	**6**

Table of contents

1 Introduction

Well 16/1-6S was planned as a deviated well in order to enable a geological sidetrack, 16/1-6A, being drilled if certain criteria were met in the first well. These criteria were met, and consequently the sidetrack was drilled. This report comprises both wells.

1.1 Well data record

Well names	:	16/1-6S & 16/1-6A
Type of wells	:	Wildcat
Prospect	:	Verdandi
Country	:	Norway
Area	:	North Sea, Utsira High
License	:	PL 167
Licencees	:	Statoil ASA 80 %
		DNO AS 20 %
Drilling unit	:	Borgland Dolphin
Type	:	Semi submersible drilling rig
Water depth	:	112 m MSL
Air gap	:	31 m
TD 16/1-6S	:	1997 m MD RT / 1909 m TVD RT
TD 16/1-6A	:	2194 m MD RT / 2024 m TVD RT
On license	:	19.05.03
Rig release	:	22.06.03
Formation at TD	:	Shetland Group in both welltracks

Surface:

Geographic co-ordinates	:	58° 59' 27.95" N
		02° 17' 43.07" E
Datum/Spheroid	:	ED-50 / Int. 1924
UTM	:	UTM Zone 31, CM 03° E
		6 539 424.9 N
		459 501.3 E
Seismic location	:	Seismic survey SNST3D, Inline 4379, Crossline 5037

16/1-6S; Top Heimdal at 1861.5 m MD RT

Geographic co-ordinates	:	58° 59' 19.69" N 02° 17' 43.13" E
Datum/Spheroid	:	ED-50 / Int. 1924
UTM	:	UTM Zone 31, CM 03° E 6 539 169.6 N 459 499.5 E
Seismic location	:	Seismic survey SNST3D, Inline 4369, Crossline 5037

16/1-6A; Topp Heimdal at 2006 m MD RT

Geographic co-ordinates	:	58° 59' 40.40" N 02° 17' 42.59" E
Datum/Spheroid	:	ED-50 / Int. 1924
UTM	:	UTM Zone 31, CM 03° E 6 539 810.3 N 459 497.6 E
Seismic location	:	Seismic survey SNST3D, Inline 4394, Crossline 5037

All depths in this report refer to MD RT (Rotary Table) unless otherwise stated.

PL167, Verdandi

Wells 16/1-6S & 16/1-6A

Location map

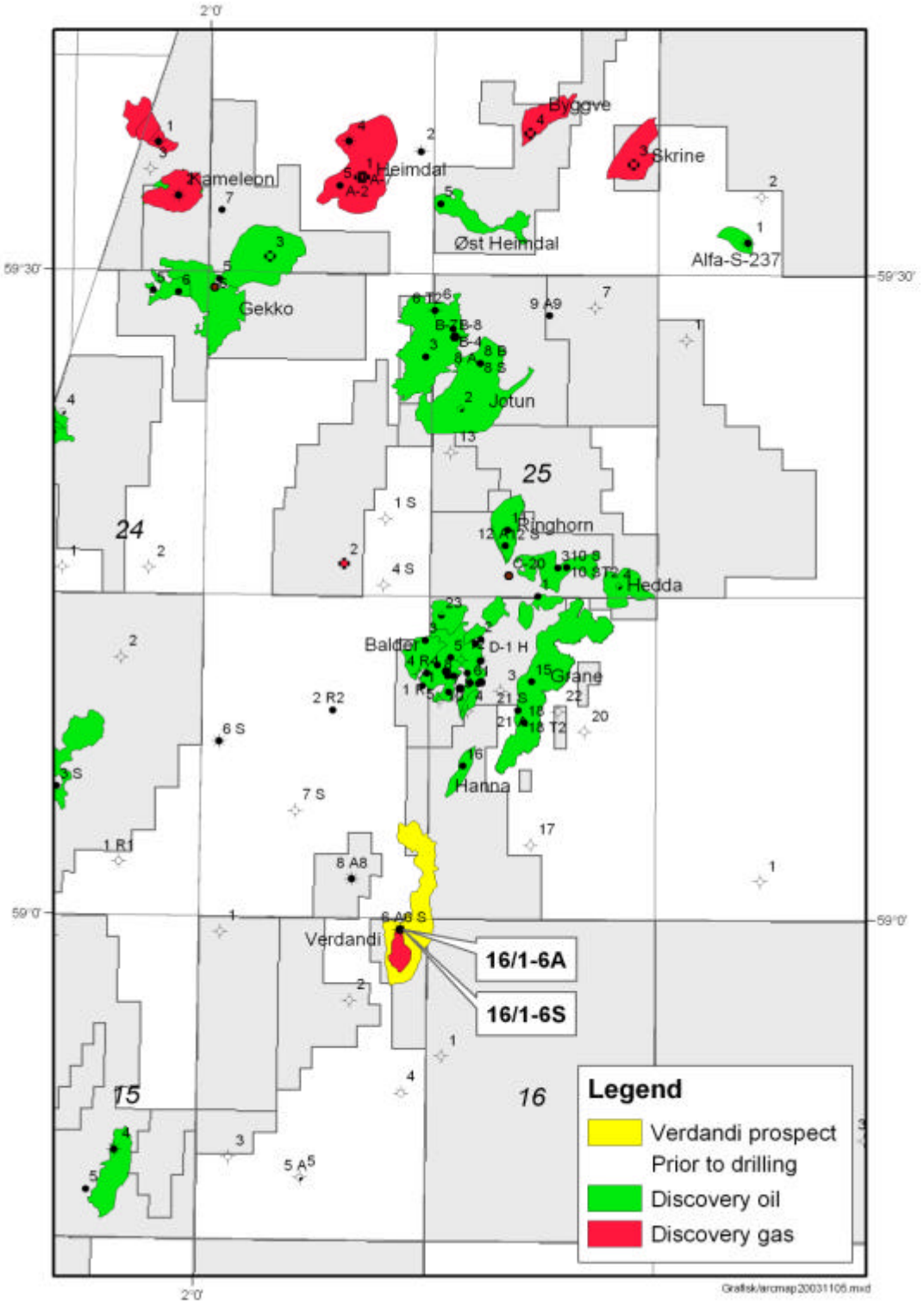


Fig. 1.1

1.2 Well objectives

The objective of well 16/1-6S was to test the hydrocarbon potential of the Verdandi prospect in a favorable position with respect to an observed DHI (Direct Hydrocarbon Indicator), reservoir development and a tentative gas - oil contact.

Well 16/1-6S proved “gas down to” in sandstones belonging to the Heimdal Formation and no water contact was found. The objectives for drilling a sidetrack, 16/1-6A, were thereby fulfilled.

The objective of well 16/1-6A was to penetrate the Heimdal Formation downflank, where a flat event had been mapped, in order to investigate the extent of the gas discovery and possibly penetrate a hydrocarbon - water contact.

1.3 Results of the wells

Well 16/1-6S was spudded in a water depth of 112 m MSL and drilled to a total depth of 1997 m. MWD logs and drillgas indicated shallow gas in a sandstone stringer at 603 m.

Hydrocarbons were proven at two stratigraphic levels: Oil was found in thin sandstones belonging to the Grid Formation with no oil – water contact defined. Furthermore gas was found in the Heimdal Formation with a “gas down to” situation. The Heimdal Formation proved to be slightly deeper and significantly thinner than expected (see Figure 1.2 for extent of the gas discovery).

One conventional core was cut in the Heimdal Formation. Sidewall cores were recovered from the Grid Formation sandstones. MDT hydrocarbon samples were collected from both hydrocarbon zones. Sidewall coring and VSP logging could not be performed below 1762 m since it was not possible to pass this depth due to hole problems. No DST was performed.

Well 16/1-6A was kicked off from 16/1-6S at 1215 m. Both the Grid and the Heimdal sandstones proved to be dry. The Heimdal Formation was found to be considerably deeper and also thinner than expected.

One core was cut in the Grid Formation, but junk in the hole prevented the core from entering the core barrel, hence no recovery. MWD log data were collected from the whole welltrack, while the majority of the wireline logging, including MDT and VSP, had to be abandoned due to tight, partly collapsed hole.

PL167, Verdandi
Gas discovery

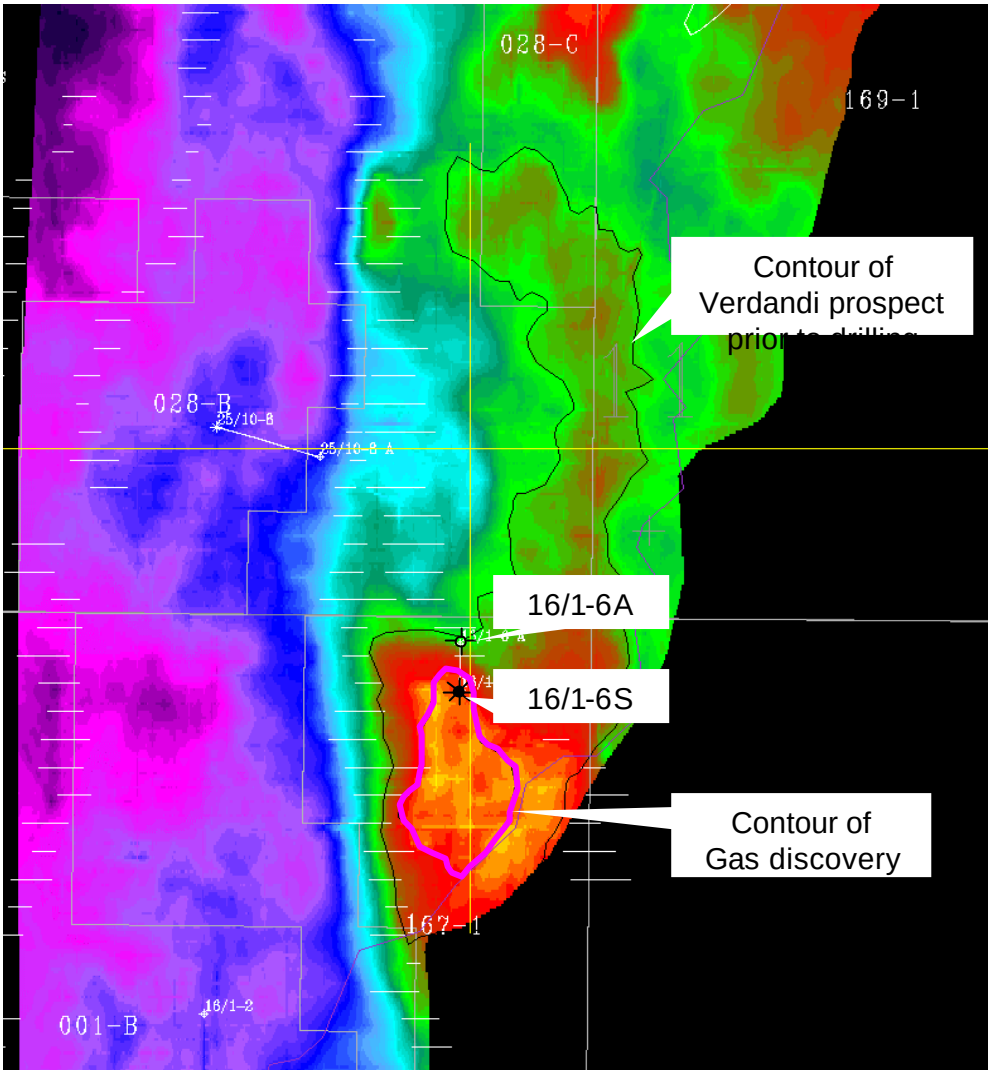


Fig. 1.2

1.4 Drilling summary

1.4.1 Casing

Casing	Shoe depth [mMD / mTVD RT]	LOT / FIT [Equivalent mud weight]
30"	203 / 203	na
18 ¾" WH x 20" csg	545.5 / 545.5	LOT: 1.82 g/cm³
16" x 13 3/8" csg	1196.5 / 1196.5	FIT: 1.60 g/cm³

Table 1.1

1.4.2 Drilling fluids

Section	Section TD [m MD RT]	Maximum mud weight [g/cm³]	Mud type
36"	204 (17 ½" @ 207)	1.03	Sea water / high visc. sweeps
26"	551	1.03	Sea water / high visc. sweeps
17"	1206	1.25	Glydril (water based KCl/glycol/polymer)
8 ½"	1997	1.39	Novatec (pseudo oil based drilling fluid)
8 ½" sidetrack	2194	1.45	Novatec (pseudo oil based drilling fluid)

Table 1.2

1.5 Data acquisition summary

See Figures 1.3 and 1.4.

PL 167

RT - MSL: 31 m

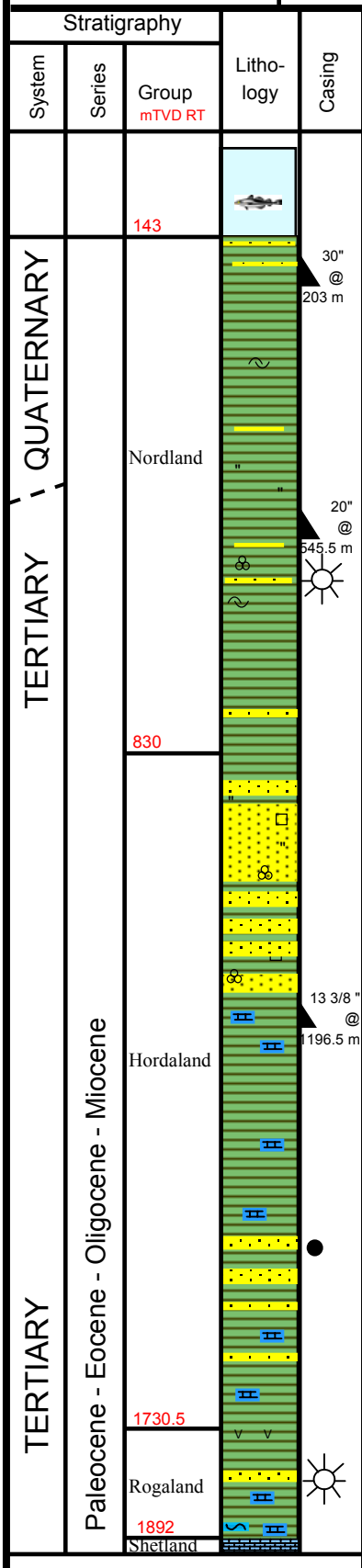
Water Depth: 112 m

Well 16/1-6S
Formation Evaluation

STATOIL

Made by: PF

Date 06.11.2003



Coring

One Core cut:
1804.5-1827.0 m
(1872.0-1899.0 m MD RT).
99.44% Rec.

Sampling

One bulk and one washed and dried sample every 10 m in interval: 560-1800 m, and every 3 m in interval: 1800-1989 m. From 1989 m to TD samples are missing due to down hole losses. Samples also missing in cored Interval.

One 1 ltr. Mud sample approx. every 100 m, from 544 m to TD..

Logging

26" section

MWD (BHI): Gamma-Resistivity-Directional

17 ½" section

MWD (BHI): Gamma-Resistivity-Directional

8 ½" section

MWD (BHI): Gamma-Resistivity-Directional-Annular pressure

WIRELINE (Schlumb.):
PEX-AIT-DSI (1992-1197 m)
MDT-GR (1881-1499 m, pretests & samples)
VSP-GR (1745-240 m)
CST-GR (1748-1495 m, 20 shots attempted, rec. 19, 1 empty)

Fig. 1.3

PL 167

RT - MSL: 31 m

Water Depth: 112 m

Well 16/1-6A
Formation Evaluation

STATOIL

Made by: PF

Date 06.11.2003

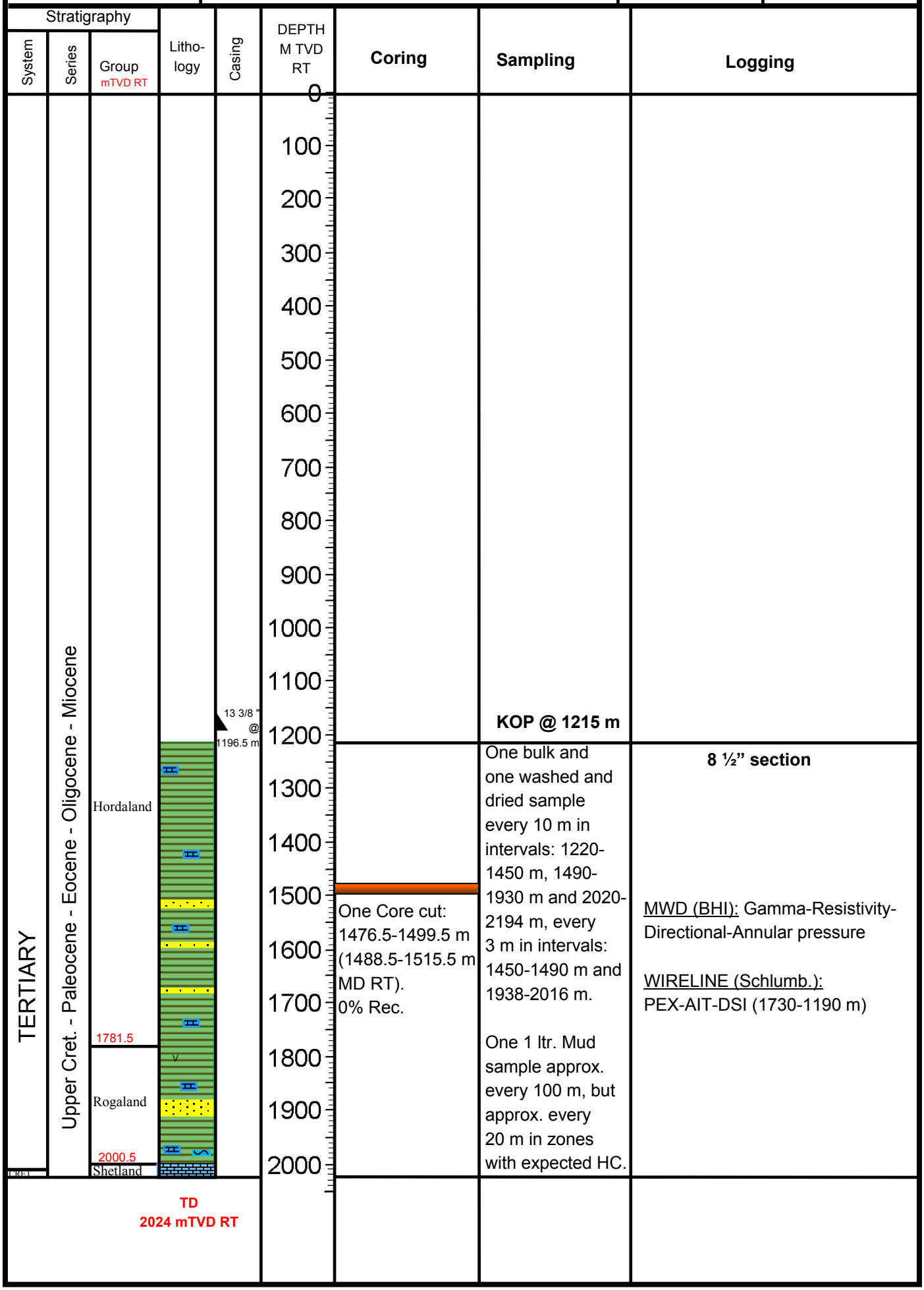


Fig. 1.4

2 Dispensations and non-conformances

Dispensation from	Synergi no.	Date	Title
WR 0547	218454	20.05.2003	Dropping of EMS survey tool after drilling into the reservoir. Well 16/1-6S
Document: "Utslipssøknad ved boring av letebrønn 16/1-6S & 16/1-6A"	220499	26.05.2003	Change of discharge volumes from the originally proposed and approved volumes
WR 0547	222612	10.06.2003	Dropping of EMS survey tool after drilling into the reservoir. Well 16/1-6A.
WR 0436	62570	16.06.2003	Side entry sub below the BOP while running the MDT on TLC

Table 2.1

2.1 Non effectuated dispensations

- A dispensation from "Opplysningsforskriften §7", stating that the application for Consent To Drill and Well Programme should be submitted to the NPD 9 weeks prior to spud, was granted. However, these documents were submitted 07.02.03, which were within the 9 weeks prior to spud (22.05.03).

- Furthermore, no exemptions were made with regards to WR0442 and WR1182, pertaining to the detailed planning process prior to spud.

3 Health, safety, environment and quality (HSE&Q)

3.1 RUH

A total number of 121 RUHs were registered while drilling the Verdandi well. Of these:

- 36 were HSE related
- 82 were quality related
- 3 were HSE/quality related

The reporting distribution was:

- 79 reported by Dolphin
- 11 reported by 3rd part companies
- 31 reported by Statoil

3.2 Comments to RUH

Of the above mentioned RUH reports, there were:

- 0 LTA's
- 0 red incidents
- 3 yellow incidents (1 HSE & 2 Quality)
- 2 spill to sea
- 2 first aid incidents
- 1 falling object and 6 potential falling objects detected

The three yellow incidents were:

- Potential falling object: A roller of 2 kg was only fastened to the BOP ladder with a single bolt. The potential fall height was 15 m
- Economical impact: Counter on RAM cylinder A (starboard) was out of order causing slow tripping time
- Economical impact: The monkey hand, used to rack DP-stands failed to operate, causing time delay.

The two spills to sea were:

- The piston in mud pump # 1 was leaking and 1.8 m³ POBM (pseudo oil based mud) was discharged to sea. However, only 1.3 m³ of this volume was base oil.
- Transferred WBM (water based mud) from pit to storage tank. The tank was overfilled and 1 m^3 water based mud was discharged to sea.

The two first aid incidents (both rated green) were:

- Person was leaning back in an office chair in the accommodation, when the chair broke.

The result was a bruised back.

- A person tripped and fell while walking across the steel beams on the main deck. The result was a bruised right hip

The falling object (rated green) was:

- An "emergency exit" sign on starboard box girder door had fallen off

3.3 Experience summary

Item	Experience	Immediate solution	Solution recommended	D-time [hrs]
Move				
	Three anchor handlers (one in bridle) were used to tow Borgland from Statfjord Nord to Verdandi	The average speed was close to 7 knots i.e. faster than expected	Use three boats to tow	
36" section				
	Ran cement stinger inside 30" conductor while the conductor was hung off in the 105mt skid on the cellar deck. Hence, rigging a "false" rotary was avoided.		Recommended for the future. The method is HSE friendly and saves time	
17" section				
Setting 16" Casing hanger	Problems while setting 16" casing hanger in the adapter ring installed in the 20" casing.	After circulating and moving the hanger up and down, indication of correct hanger depth was seen (tagging the same point without increasing pump-pressure	The reason for the problem is probably cuttings and debris in the landing area. It is recommended to wash the area prior to running this type of hanger	
8 1/2" section				
Slow tripping speed	Due to failure on one of the pulse counters on ram rig cylinders tripping speed was very low	Changed position indicator in ram rig cylinder A. Water was found in the sensor.		
Rack back Autotrak assembly	The AT BHA was racked during the core-run with the intention to save rig time. This proved not efficient	To save rig time on Borgland Dolphin, L/D BHA with the bit left on and dump MWD / LWD data on deck.		0
Heavy losses in Ekofisk Fm (Shetland Group)	During drilling of the 8 1/2" hole, heavy losses occurred after drilled 16 m into the Ekofisk Formation. The static loss was 350 - 800 lpm. No LCM pill was premade in the pits.	Pulled above predicted loss zone to reduce the possibility of getting differential stuck. Observed well and filled well with new 1.39 g/cm³ POBM while mixing LCM pill (G-seal, Nutplug). Pumped 8 m³ LCM pill and lowered mud weight to 1.35 g/cm³. Losses stopped with no static or	Consider to not drill in to Ekofisk Formation for logging rathole. Have a LCM pill ready as a backup for future drilling into the Ekofisk Formation. The losses were most likely caused by natural occurring fissures in the formation, not by high mud weight and ECD inducing	12

Item	Experience	Immediate solution	Solution recommended	D-time [hrs]
		dynamic losses.	formation failure due to low formation strength.	
Logging				
VSP	VSP tool could not pass 1762 m	Attempted several times to pass – No-go	Consider modified casing program when such an excessive logging program is planned	
8 1/2" sidetrack				
Kick off with AutoTrak	The 13 3/8" casing shoe was set at 1197 m. Placed a cement kick-off plug from 1350m to 1150 m. Time from tagging cement and until the well was kicked of was 6.5 hrs			
Coring	Split-ring on 16" casing hanger found in core barrel causing an unsuccessful coring run		Evaluate this casing hanger equipment before next application.	
Logging				
Sticky conditions when attempting to log VSP in DP	The planned VSP log which were to be run inside the P&A cement stinger had to be omitted. A sticky test showed that the hole was unstable and 25 ton overpull was necessary to get loose. The hole then packed off and circulation was lost (total loss of 12 m^3).	Kept the drill pipe in motion at all times, cancelled the VSP run and commenced the P&A cement jobs.		
P&A				
Cutting of 20" and 30 " conductor	Successful cut and latch of MOST tool. The WH was pulled free with 25 ton overpull, indicating that the canvas sheet dressed on the upper 30" joint functioned as planned.		Develop indicators (pins or similar which could be easy to observe on the ROV camera) on the MOST tool which provide clear indications when the MOST tool is properly landed on to the wellhead connector	
Releasing the PGB from the 30" casing stump.	The PGB is released from the 30" casing stump according to the following procedure: 1. Unscrew bolts which holds the two locking ring together 2. Inserting two bolts in the lower locking ring (sticking out horizontally) 3. Attach slings to the two bolts and pull the lower lock ring loose by using two tuggers at the same time		Design a system that allows one to apply pull on the whole locking ring (instead of two separate points) to ease the unlocking process.	

Refer also to chapters 4.11, 5.1.2, 5.3.2, 5.4.2, 5.5.2, 5.6.2 and 5.7.2 for further details regarding experiences and recommendations.

3.4 Time distribution 16/1-6S & 16/1-6A

Total scope of work time	**35,1 days**
Actual total time	**34,1 days**
Total down time	**79 hrs**
Waiting on weather (WOW)	**8,5 hrs**

Ops. Factor: $= \frac{Total\_time - Down\_time - WOW}{Total\_time - WOW} * 100$	**90.0%**

For further details regarding down time, see the lost time log in sections 4.7.8 & 4.8.8 in this report.

Fig. 3.1 D-time distribution, wells 16/1-6S & 16/1-6A

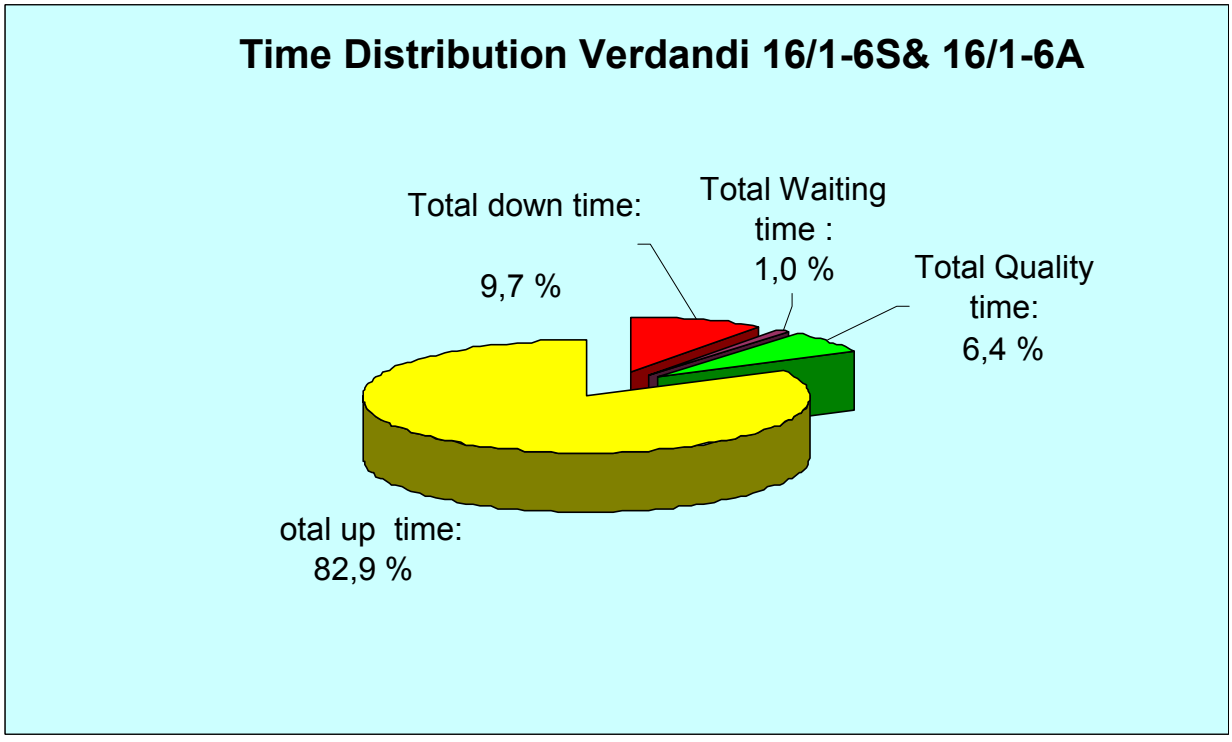


Fig. 3.2 D-time distribution pr Company in hours

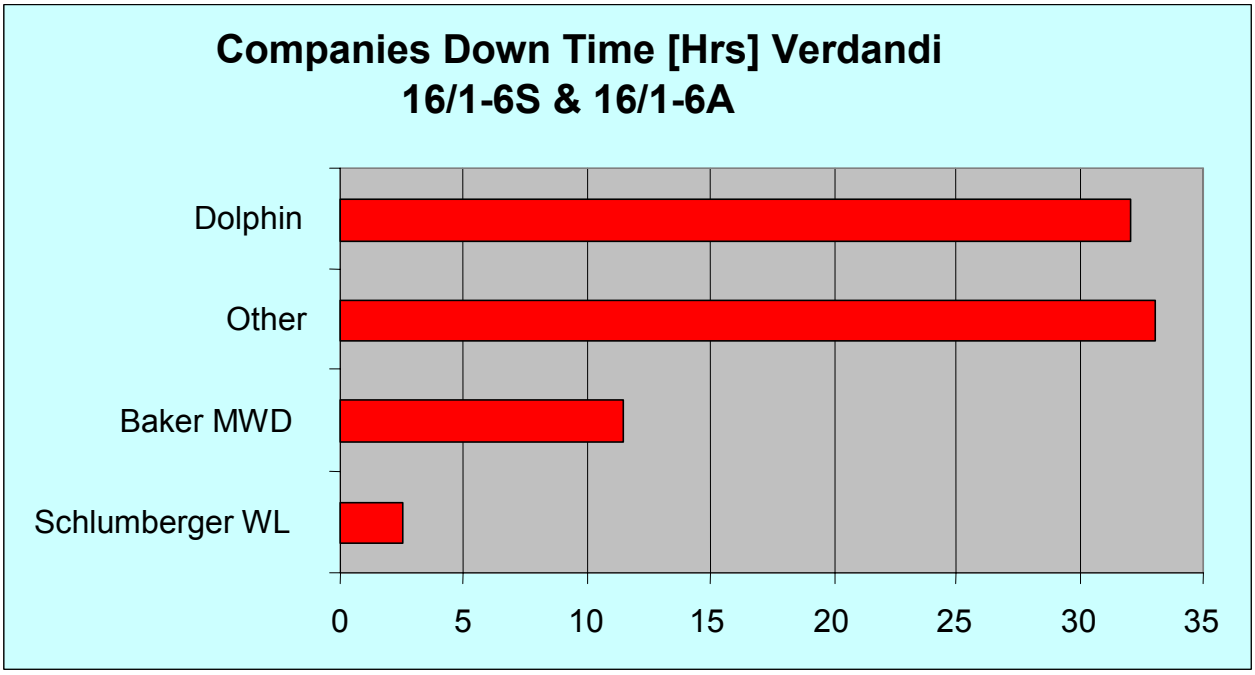
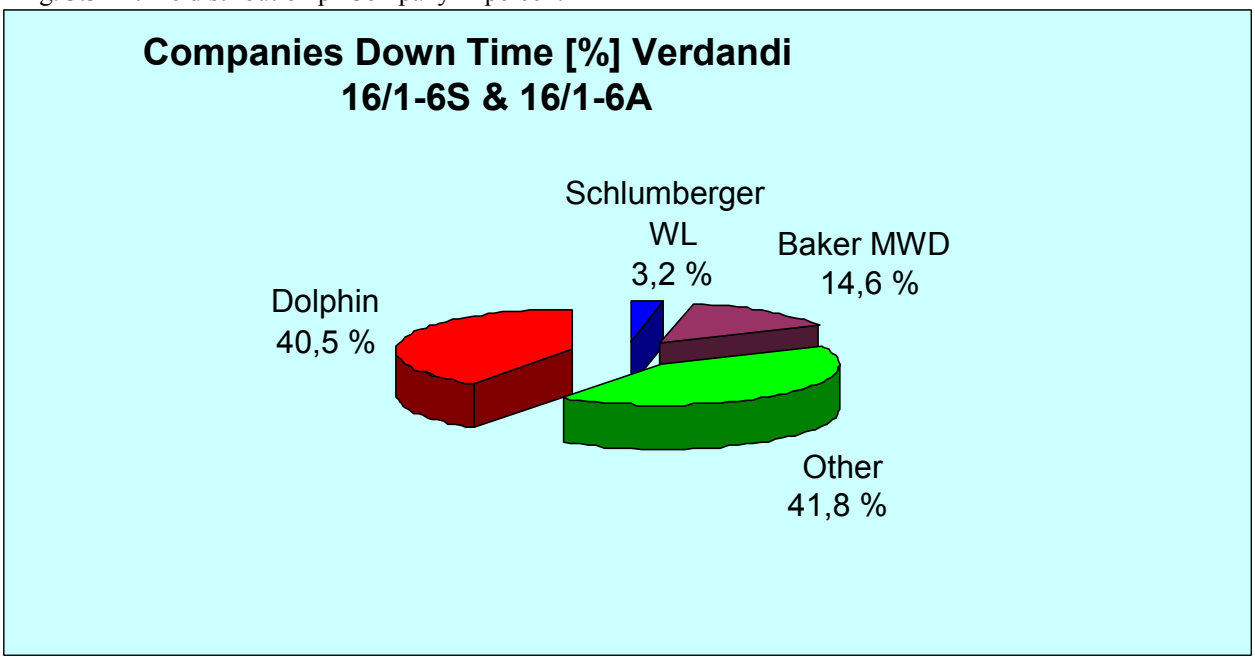


Fig. 3.3 D-time distribution pr Company in percent



4 Geology and formation data report

4.1 Geological setting and results

The Verdandi structure is located on the western part of the Utsira High, which since late Jurassic times has been a structural high between the Viking Graben in the west and the Stord Basin towards the east (Figure 4.1).

Uplift and erosion of the East Shetland Platform in the early Paleocene produced Paleocene sediments infilling the accommodation space created by subsidence of the South Viking Graben. Additional local accommodation space was created by Danian slumping on the flanks of the Utsira High. This slumping episode forms the erosion surface, which is the base for the Paleocene sandstones found in the Verdandi wells.

Wells 16/1-6S and 16/1-6A are situated in the southern part of the Verandi prospect. 16/1-6S penetrated rocks ranging in age from Quaternary to Cretaceous, while 16/1-6A penetrated sediments of Tertiary to Cretaceous age. Both well tracks reached TD in rocks belonging to the Shetland Group (Figures 4.2-3). The wells revealed stratigraphic sequences close to prognosed.

4.2 Shallow gas results

Shallow gas warnings were given for two levels: a Class 1 warning for 616 m and a Class 2 warning for 878 m (prognosed intra Utsira sandstone).

A sandy layer with shallow gas was penetrated at 603 m, hence confirming the gas warning for 616 m. Whether the gas zone has abnormal pore pressure is unknown as it was drilled with weighted mud (1.15 g/cm^3).

No shallow gas was found at any other levels (hence the Class 2 warning at 878 m was not confirmed).

4.3 Stratigraphy

The stratigraphical division is based on the biostratigraphic report, log curves and on correlation with nearby wells. The stratigraphy of the entire wells are shown in Figures 4.2 and 4.3.

PL 167, Verdandi

Structural elements, Utsira High area

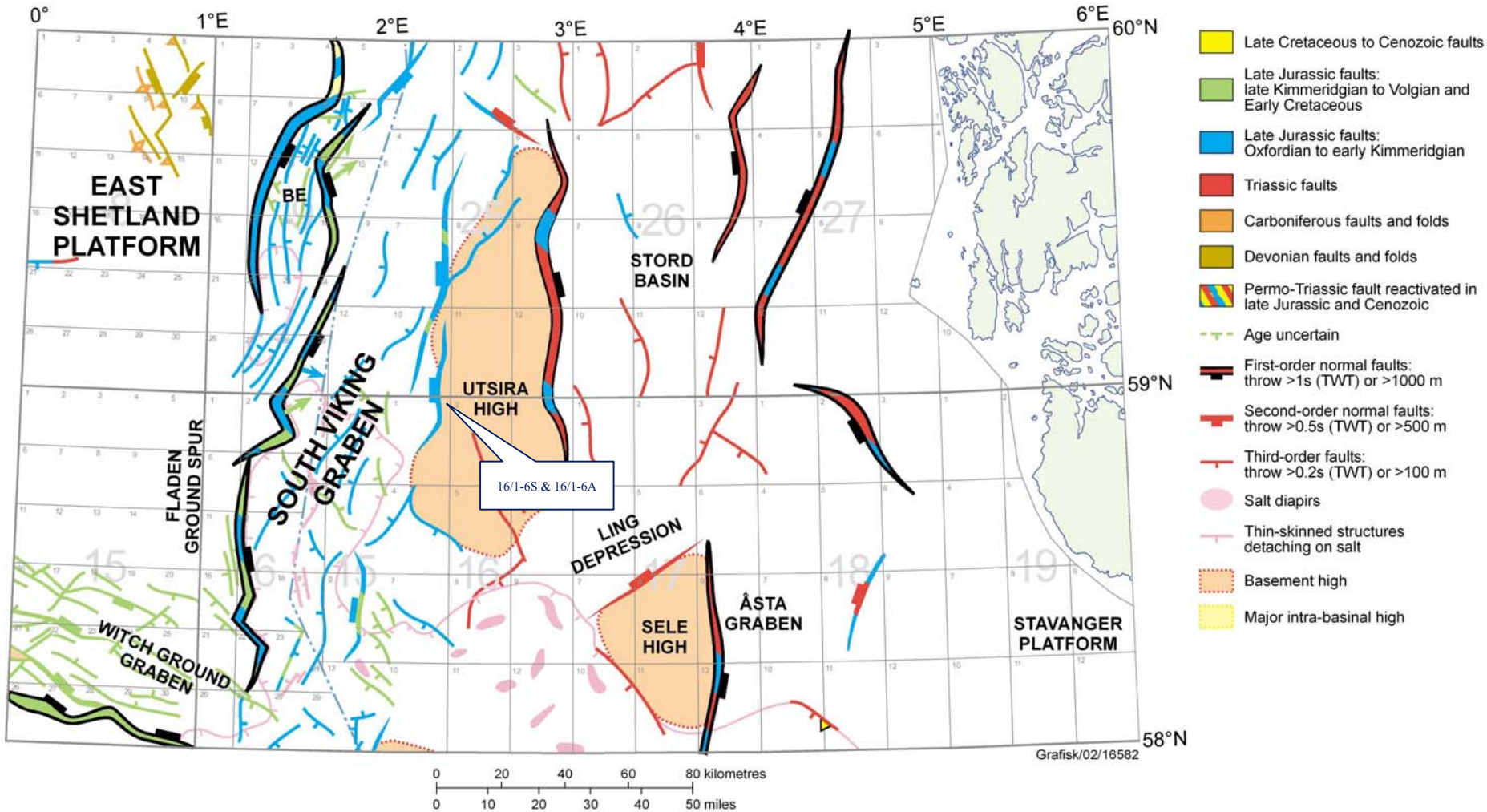


Fig. 4.1

4.3.1 Tables of chronostratigraphy

Stratigraphic succession		m	
	Studied interval 560 – 1986 m	**From**	**To**
Tertiary	Upper Pliocene	560	680
	~~ Hiatus ~~~		
	Upper Miocene	780	830
	~~ Hiatus ~~~		
	Middle Miocene	840	880
	Lower Miocene	880	1060
	Upper Oligocene	1070	1210
	Lower Oligocene	1270	1450
	Upper Eocene	1480	
	Middle Eocene	1502	1669
	Lower Eocene	1700	1809
	~~ Hiatus ~~~		
	Upper Paleocene	1821	1962
	Lower Paleocene	1965	1977
	TD	1997	

Table 4.1 Well 16/1-6S

Stratigraphic succession		m	
	Studied interval 1400 – 2190 m	**From**	**To**
Tertiary	Lower Oligocene	1400	1462
	Upper Eocene	1490	
	Middle Eocene	1515	1750
	Lower Eocene	1760	1900
	~~ Hiatus ~~~		
	Upper Paleocene	1920	2140
	Lower Paleocene	2150	2160
Cretaceous	Upper Maastrichtian	2190	
	TD	2194	

Table 4.2 Well 16/1-6A

4.3.2 Tables of litostratigraphy

Table of lithostratigraphy					
System	**Group / Formation**	**Observed depth**			**TWT**
		m MD RT	**m TVD RT**	**m MSL**	**sec.**
QUATERNARY	NORDLAND GROUP. (Sea Floor)	143	143	112	0,152
TERTIARY	Utsira Formation	775	775	744	0,814
	Base Utsira Formation	782,5	782,5	751,5	0,821
	HORDALAND GROUP	830	830	799	0,867
	Skade Formation	1053,5	1053,5	1022,5	1,076
	Base Skade Formation	1154	1154	1123	1,168
	Grid Formation	1489,5	1482	1451	1,481
	Grid Formation	1597	1575	1544	1,567
	Grid Formation	1672	1637,5	1606,5	1,626
	ROGALAND GROUP	1783	1730,5	1699,5	
	Balder Formation	1783	1730,5	1699,5	
	Sele Formation	1816,5	1758,5	1727,5	
	Lista Formation	1823,5	1764	1733	
	Heimdal Formation	1861,5	1796	1765	
	Base Heimdal Formation	1875,5	1807,5	1776,5	
	Våle Formation	1931,5	1854,5	1823,5	
CRETACEOUS	SHETLAND GROUP	1976,5	1892	1861	
	Ekofisk Formation	1976,5	1892	1861	
	TD	1997	1909	1878	

Table 4.3 Well 16/1-6S

Table of lithostratigraphy					
System	**Group / Formation**	**Observed depth**			**TWT**
		m MD RT	**m TVD RT**	**m MSL**	**sec.**
TERTIARY	Grid Formation	1529,5	1511,5	1480,5	
	Grid Formation	1629	1593,5	1562,5	
	Grid Formation	1742	1680	1649	
	ROGALAND GROUP	1875,5	1781,5	1750,5	
	Balder Formation	1875,5	1781,5	1750,5	
	Sele Formation	1914	1811	1780	
	Lista Formation	1952	1840	1809	
	Heimdal Formation	2006,5	1881,5	1850,5	
	Base Heimdal Formation	2055,5	1918,5	1887,5	
	Våle Formation	2123	1970	1939	
CRETACEOUS	SHETLAND GROUP	2163	2000,5	1969,5	
	Ekofisk Formation	2163	2000,5	1969,5	
	Tor Formation	2181	2014	1983	
	TD	2194	2024	1993	

Table 4.4 Well 16/1-6A

4.4 Litostratigraphic description

4.4.1 Well 16/1-6S

NORDLAND GROUP **143.0 - 830.0 m, (112.0 – 799.0 m TVD MSL)**

System: Quaternary
Series: Upper Miocene - Pleistocene
Depositional environment: Marine, shelf

The Nordland Group in this well comprises the Quaternary and the uppermost part of the Tertiary down to the hiatus between the Upper and Middle Miocene.

The upper part of the Nordland Group down to 551 m, was drilled with returns to the seafloor. Descriptions of lithology down to 560 m are inferred from the recorded MWD memory log and relevant information from offset wells. From that depth and throughout the rest of the Nordland Group, descriptions are based on cuttings. The Quaternary - Tertiary boundary is tentatively placed at approximately 450 m.

The sediments consist mainly of thick clay units interbedded with thinner silty sand layers or stringers. Based on the gamma ray log, the sand layers seem to be silty or argillaceous. In the uppermost part of the Nordland Group, a thicker sand/gravel unit with scattered boulders were observed.

The interval from 560 m and down to top of the Hordaland Group consists of claystone with thin beds of sand and silt.
The claystone is medium dark grey to medium grey. It is soft, amorphous to subblocky, calcareous to very calcareous, micaceous and silty. From 700 m, the claystone is becoming very silty and sandy, grading to siltstone.

The sand – and siltstone appears as clear to translucent, very fine to fine, rarely coarse quartz grains, in parts grading to siltstone. Mica, glauconite and foraminifera are present.

Utsira Formation **775.0 – 782.5 m, (744.0 – 751.5 m TVD MSL)**
System: Tertiary
Series: Upper Miocene
Depositional environment: Marine, shelf

A thin Utsira Formation is present in the lower part of the Nordland Group.The boundary between the Utsira Formation and the overlying claystones and siltstones is picked on a decrease on both the gamma ray and the resistivity values.

The Utsira Formation consists of sandstone, which is unconsolidated and comprising medium grey, very fine to fine well sorted quartz. The sandstone is silty, micaceous and slightly glauconitic.

HORDALAND GROUP **830.0 - 1783.0 m, (799.0–1699.5 m TVD MSL)**

System: Tertiary
Series: Lower Eocene – Middle Miocene
Depositional environment: Marine, shelf - bathyal

The top of the Hordaland Group is defined on the basis of biostratigraphic data. The boundary is not easily picked on the log curves, but is seen to coincide with a trend shift in the gamma log to decreasing values combined with a small drop in resistivity values.

The Upper Oligocene and Miocene part of the Hordaland Group is very sandy with sandstone sequences interbedded with claystone. The Miocene comprises a sandstone unit, which has not been designated to a specific formation, while the Upper Oligocene comprises the sandy Skade Formation.

The Miocene sand unit appears to be unconsolidated and consists of clear to translucent, fine to very coarse sand, which is fair to well sorted, subrounded to rounded, appears loose and shows excellent visible porosity. A few layers and stringers of claystone occur.
The claystone is olive grey to brownish grey, soft to firm, amorphous to subblocky, very silty and sandy, grading to siltstone in parts. Furthermore, it is calcareous, glauconitic and micropyritic in parts. Loose grains of glauconite, shell fragments, foraminifera, microfossils and mica are logged throughout.

The Lower Oligocene and Eocene part of the Hordaland Group is dominated by claystone with beds of limestone, but also including three distinct sandstone units, which has been designated to the Grid Formation.

The claystone is olive grey to olive black, medium grey and brownish grey grading to more greenish grey shades in the lower part. It is furthermore firm, blocky, generally non calcareous with occasional calcareous lamina, silty - micromicaceous and glauconitic in parts and have traces of micropyrite.

The limestone is dominantly pale yellowish brown to yellowish grey, firm to hard, micrittic, argillaceous in parts and occasionally dolomitic.

Skade Formation **1053.5 - 1154.0 m, (1022.5 - 1123.0 m TVD MSL)**

System: Tertiary
Series: Upper Oligocene
Depositional environment: Marine, shelf (oxic, hemipelagic cond.)

The top of the Skade Formation is recognized by a sharp drop in gamma - and resistivity readings.

The Skade Formation consists of sandstone with beds of claystone.

The sandstone consists of clear to translucent, very fine to coarse, predominantly medium and occasionally very coarse grained quartz. The quartz grains appear mostly as loose, poor to moderately sorted and subangular to rounded.

The argillaceous beds consist of brownish black to olive black, occasionally brownish grey claystone which is soft to firm, amorphous to subblocky, silty, glauconitic, micaceous and non calcareous to slightly calcareous.

There are traces of glauconite, shell fragments and mica.

Grid Formation **1489.5 - 1550.0 m, (1451.0 - 1506.5 m TVD MSL)**
1597.0 - 1601.5 m, (1544.0 - 1548.0 m TVD MSL)
1672.0 - 1685.0 m, (1606.5 - 1617.5 m TVD MSL)

System: Tertiary
Series: Middle – Upper Eocene
Depositional environment: Marine, bathyal (dysaerobic, hemipelagic cond.)

The Grid Formation comprises three units of sandstone. The uppermost unit is interbedded with claystone and has stringers of limestone, while the other two consist of uniform sandstone. The top of the uppermost unit is recognized by a drop in gamma ray readings and an increase in resistivity readings (due to the presence of hydrocarbons), while the tops of the other two units are picked on sharp drops in gamma – and resistivity readings.

The sandstone is light to medium to light brownish grey with light brown hydrocarbon stain in the upper part of the uppermost unit. The sandstone consists of clear to translucent, very fine to fine, occasionally medium grained quartz, which is furthermore loose, well sorted and subangular to subrounded. It is slightly argillaceous in parts, but generally with good visual porosity.

The claystone is brownish black to dark greenish grey, firm, blocky, generally non calcareous with occasional calcareous lamina and has traces of micropyrite.

The limestone is pale yellowish brown to yellowish grey, firm to hard and in parts dolomitic.

ROGALAND GROUP **1783.0 – 1976.5 m, (1699.5 - 1861.0 m TVD MSL)**

System: **Tertiary**
Series: Lower Paleocene – Lower Eocene
Depositional environment: **Marine, shelf - bathyal**

The top of the Rogaland Group is defined by an increase in the resistivity, sonic velocity, and a corresponding drop in the gamma ray readings ("barrel shape").

The Rogaland Group comprises the Balder, Sele, Lista, Heimdal and Våle Formations.

Balder Formation **1783.0 – 1816.5 m, (1699.5 – 1727.5 m TVD MSL)**

System: **Tertiary**
Series: **Lower Eocene**
Depositional environment: Marine, shelf (dysoxic with hypohaline influences)

The Balder Formation consists of interbedded claystone and tuffaceous claystone with minor stringers of dolomitic limestone.

The claystone is multicoloured; medium dark grey, dark greenish grey, olive grey to olive black, moderate brown, greyish red and medium bluish grey. 30 to 50 percent of the claystone is tuffaceous: medium light grey to medium bluish grey with black specks of glassy material disseminated in the sediment, giving the claystone a grainy texture thus appearing in part very sandy and silty. The claystone is soft to firm, occasionally micropyritic and generally non to occasionally calcareous.

The limestone is pale yellowish brown, firm, micrittic and dolomitic in parts.

Sele Formation **1816.5 – 1823.5 m, (1727.5 – 1733.0 m TVD MSL)**

System: **Tertiary**
Series: **Upper Paleocene**
Depositional environment: **Marine, shelf (dysoxic with hypohaline influences)**

The top of the Sele Formation is defined by a marked increase in the gamma ray readings and a corresponding shift in the resistivity to a lower level.

The Sele Formation is dominated by claystone, which is non to slightly tuffaceous. The claystone is varicoloured with shades of grey as the dominant colour, soft to firm, subblocky and micropyritic in parts.

Lista Formation **1823.5 - 1861.5 m, (1733.0 - 1765.0 m TVD MSL) and 1875.5 – 1931.5 m, (1776.5 – 1823.5 m TVD MSL)**

System: **Tertiary**
Series: Upper Paleocene
Depositional environment: **Marine, bathyal (dysaerobic, hemipelagic cond. with turbiditic influences)**

The boundary between the Sele and the Lista Formations is picked at a sharp drop in the gamma ray readings combined with an increase in the resistivity readings.

On the logs, the arenaceous Heimdal Formation is defined within the Lista Formation by marked lower gamma ray readings and in this case, due to the presence of hydrocarbons, increased resistivity readings.

The Lista Formation is dominated by claystone with only minor siltstone and dolomitic limestone and traces of sand.

The claystone is medium dark grey and olive black to dark greenish grey. In the lower part it is multicoloured with shades of greenish grey, bluish grey, brownish grey and minor medium dark grey. It is firm to moderately hard, blocky, slightly silty to silty, occasionally with traces of sand, slightly micropyritic and micromicaceous and non calcareous with occasional calcareous concretions. Occasionally it has a waxy to soapy texture and occasionally also a crumbly (tuffaceous?) texture.

The siltstone is light brownish grey to brownish grey, firm to moderately hard and micromicaceous.

The limestone is partly dolomitic and is white to pale yellowish brown to yellowish grey and is firm and micrittic.

Heimdal Formation **1861.5 - 1875.5 m, (1765.0 - 1776.5 m TVD MSL)**

System: Tertiary
Series: Upper Paleocene
Depositional environment: **Marine, bathyal (dysaerobic, hemipelagic cond. with turbiditic influences)**

The Heimdal Formation consists of sandstone with beds of claystone.

The sandstone is medium dark grey to brownish grey or olive grey and comprises clear to translucent, very fine to medium, moderately sorted and subangular to subrounded quartz. The sandstone is soft with some argillaceous matrix, slightly micaceous and appears to have a fair to good visible porosity.

The claystone is varicoloured, predominantly bluish green and olive black, also dusky yellowish brown to very dusky red. It is firm, blocky and non calcareous.

There are traces of glauconite and pyrite nodules.

Våle Formation **1931.5 – 1976.5 m, (1823.5 - 1861.0 m TVD MSL)**

System: **Tertiary**
Series: Lower Paleocene - Upper Paleocene
Depositional environment: Marine, bathyal (well oxygenated, hemipelagic cond. with allochtonous influences)

The top of the Våle Formation is defined by biostrtigraphic data, but may be recognized on logs by a slight drop in gamma ray readings together with an increasing trend in the resistivity readings, reflecting an increasing content of calcareous sediments.

The Våle Formation comprises claystone with stringers of limestone and in the lower part also beds of marl.
The claystone is predominantly medium dark grey to greenish grey and occasionally bluish grey, firm, blocky and non to slightly calcareous.

The limestone is white to off white, light brown, firm and micrittic.

The marl is white to off white, light to medium bluish grey and also moderate red. It is firm, blocky, micrittic in parts and with varying amounts of argillaceous content.

SHETLAND GROUP **1976.5 – 1997.0 m (TD), (1861.0 – 1878.0 m TVD MSL)**

System: Tertiary
Series: Lower Paleocene
Depositional environment: Marine, bathyal

The top of the Shetland Group is defined by an abrupt increase in the resistivity and sonic velocity with a corresponding drop in the gamma ray readings.

The Shetland Group is represented only by the Ekofisk Formation as TD was reached within this formation.

Ekofisk Formation **1976.5 – 1977.0 m (TD), (1861.0 – 1878.0 m TVD MSL)**

System: Tertiary
Series: Lower Paleocene
Depositional environment: Marine, bathyal (well oxygenated, hemipelagic cond. with allochtonous influences)

The Ekofisk Formation consists of limestone with beds of marl and claystone.

The limestone is white to off white, firm to moderately hard, blocky and micrittic.

The marl is mainly light grey to medium bluish grey, firm, blocky and with varying argillaceous content.

The claystone is medium dark grey and greenish grey. It is firm, blocky, locally with a waxy lustre, non to slightly calcareous and with traces of pyrite.

4.4.2 Well 16/1-6A

HORDALAND GROUP 1215.0 (KOP) - 1875.5 m, (1205.0 – 1750.5 m TVD MSL)

System: Tertiary
Series: Lower Eocene – Lower Oligocene
Depositional environment: Marine, bathyal

The Hordaland Group is dominated by claystone with some well defined sandstone units: the Grid Formation. Stringers of dolomitic limestone are commom throughout, as well as stringers of fine grained sandstone and siltstone.

The dominating colours of the claystone vary from brownish black to dark grey and greenish grey to olive black. Moderate brown, pale red and pale green to dusky bluish green colours occur. The claystone is silty to very silty and locally grading to siltstone.The claystone is occasionally micromicaceous, micropyritic and glauconitic in intervals. It appears as firm in the upper part and becomes gradually harder, up to moderately hard, with depth. The claystone is generally non calcareous, occasionally slightly calcareous. In the last few meters above the Rogaland Group, traces of tuffaceous claystone are common.

The limestone is partly dolomitic throughout the entire sequence, with colours varying from very light grey to light yellowish grey to moderately yellowish brown. The limestone is soft to hard, occasionally brittle, and slightly argillaceous in parts.

The thin, arenaceous stringers consist of light brown sandstone and siltstone with clear to translucent, loose quartz grains, which vary from very fine to silt.

Traces of pyrite and glauconite are common.

Grid Formation **1529.5 - 1553.0 m, (1480.5 - 1500.5 m TVD MSL)**
1629.0 - 1637.5 m, (1562.5 - 1569.5 m TVD MSL)
1742.0 - 1756.5 m, (1649.0 - 1660.0 m TVD MSL)

System: Tertiary
Series: Middle Eocene
Depositional environment: Marine, bathyal (dysaerobic, hemipelagic cond.)

The Grid Formation in this well track comprises three well defined units of massive sandstone with stringers of limestone or carbonate cemented sandstone. The tops of the sandstone units are picked on sharp drops in gamma – and resistivity readings.

The sandstone consists of clear to translucent, very fine to occasionally fine to medium, well sorted, subangular to subrounded and loose quartz. Traces of glauconite occur.

The limestone is yellowish grey to very light grey to pale yellowish brown, firm and micrittic.

ROGALAND GROUP 1875.5 - 2163.0 m, (1750.5 - 1969.5 m TVD MSL)

System: **Tertiary**
Series: Lower Paleocene – Lower Eocene
Depositional environment: Marine, shelf - bathyal

The top of the Rogaland Group is defined by an increase in the resistivity and a corresponding drop in the gamma ray readings ("barrel shape").

The Rogaland Group comprises the Balder, Sele, Lista, Heimdal and Våle Formations.

Balder Formation 1875.5 - 1914.0 m, (1750.5 - 1780.0 m TVD MSL)

System: Tertiary
Series: Lower Eocene
Depositional environment: Marine, shelf (dysoxic with hypohaline influences)

The Balder Formation consists of interbedded claystone and tuffaceous claystone with minor stringers of dolomitic limestone.

The claystone is varicoloured; greyish black to olive black, dusky yellowish brown to very dusky red, occasionally dark greenish grey. 30 to 50 percent of the claystone is tuffaceous: medium grey to medium bluish grey with black specks of glassy material disseminated in the sediment, giving the claystone a grainy texture, thus appearing in part very sandy and silty. The claystone is soft to firm, occasionally micropyritic and glauconitic and generally non to occasionally slightly calcareous.

The limestone is pale yellowish brown, firm, micrittic and dolomitic in parts.

Sele Formation 1914.0 – 1952.0 m, (1780.0 – 1809.0 m TVD MSL)

System: Tertiary
Series: Upper Paleocene
Depositional environment: Marine, shelf (dysoxic with hypohaline influences)

The top of the Sele Formation is defined by a marked increase in the gamma ray readings and a corresponding shift in the resistivity to a lower level.

The Sele Formation is dominated by claystone, which is non to slightly tuffaceous. The claystone is varicoloured with shades of grey, yellowish brown and dusky red as the dominant colours, soft to firm and blocky.

Lista Formation **1952.0 – 2006.5 m, (1809.0 – 1850.5 m TVD MSL)**
2055.5 – 2123.0 m, (1887.5 – 1939.0 m TVD MSL)

System: Tertiary
Series: Upper Paleocene
Depositional environment: Marine, bathyal (dysaerobic, hemipelagic cond. with turbiditic influences)

The boundary between the Sele and the Lista Formations is picked at a drop in the gamma ray readings combined with a slight increase in the resistivity readings. As the Sele Formation in this well track is thicker than in well 16/1-6S, the top of the Lista Formation is not easily correlated to 16/1-6S.

On the logs, the arenaceous Heimdal Formation is defined within the Lista Formation by marked lower gamma ray - and resistivity readings.

The Lista Formation is dominated by claystone with thin stringers of partly dolomitic limestone.

The claystone is varicoloured with shades of greenish grey, olive black, yellowish brown and dusky red. It is firm, blocky, non calcareous with occasional calcareous concretions and has traces of tuff, pyrite and glauconite. Occasionally it has a waxy to soapy texture .

The limestone is partly dolomitic and is pale to moderately yellowish brown, firm and micrittic.

Heimdal Formation **2006.5 – 2055.5 m, (1850.5 – 1887.5 m TVD MSL)**

System: Tertiary
Series: Upper Paleocene
Depositional environment: Marine, bathyal (dysaerobic, hemipelagic cond. with turbiditic influences)

The Heimdal Formation consists of sandstones with beds of claystone, particularly in the upper part. The top is picked on decreased gamma – and resistivity readings. The age of the major part of the Heimdal Formation in this well track, is older than the Heimdal Formation in well 16/1-6S.

The sandstone consists of clear to translucent quartz, which is very fine to medium with traces of coarse, well sorted and subangular to rounded grains. The sandstone is friable and has locally abundant argillaceous matrix, but generally exhibits a fair visible porosity.

The claystone is varicoloured with an appearance similar to the claystone within the Lista Formation.

Våle Formation **2123.0 - 2163.0 m, (1939.0 - 1969.5 m TVD MSL)**

System: Tertiary
Series: Lower - Upper Paleocene
Depositional environment: Marine, bathyal (well oxygenated, hemipelagic cond. with allochtonous influences)

The top of the Våle Formation is defined by biostratigraphic data, but may be recognized on the logs by the onset of a dropping trend in the gamma ray readings together with an increasing trend in the resistivity readings, reflecting an increased content of calcareous sediments.

The Våle Formation comprises claystone with beds of marl in the lower part.

The claystone is prdominantly pale green to greenish grey and also olive black, firm, blocky and non to slightly calcareous with traces of pyrite and glauconite.

The marl is white to off white and light brown. It is firm to moderately hard, blocky and with varying amounts of argillaceous content.

SHETLAND GROUP **2163.0 - 2194.0 m (TD), (1969.5 - 1993.0 m TVD MSL)**

System: Cretaceous - Tertiary
Series: Upper Cretaceous – Lower Paleocene
Stage: Maastrichtian - Danian
Depositional environment: Marine, bathyal

The top of the Shetland Group is defined by an increase in the resistivity with a corresponding drop in the gamma ray readings.

The Shetland Group is represented only by the Ekofisk and Tor Formations as TD was reached within the latter formation.

Ekofisk Formation **2163.0 – 2181.0 m, (1969.5 – 1983.0 m TVD MSL)**

System: Tertiary
Series: Lower Paleocene
Stage: Danian
Depositional environment: Marine, bathyal (well oxygenated, hemipelagic cond. with allochtonous influences)

The Ekofisk Formation consists of limestone with beds of marl and claystone.

The limestone is white to off white to light brown, firm to moderately hard, blocky and micrittic.

The marl is mainly white to off white and light grey to light brown, firm to moderately hard, blocky and with varying argillaceous content.
The claystone is predominantly greyish black to olive black or pale green to greenish grey. It is firm, blocky and non calcareous.

Tor Formation **2181.0 – 2194.0 m (TD), (1983.0 – 1993.0 m TVD MSL)**

System: Tertiary
Series: Upper Cretaceous
Stage: Maastrichtian
Depositional environment: Marine, bathyal (well oxygenated, hemipelagic cond.)

The top of the Tor Formation is defined by a drop in the gamma ray readings to very low values. However, the definition of the Tor Formation is mainly based on biostratigraphic data.

The lithology of the Tor Formation is dominated by white to off white to light brown, firm to moderately hard, blocky and micrittic limestone.

PL 167

RT - MSL: 31 m

Water Depth: 112 m

Well 16/1-6S
Prognosis vs. observed stratigraphy

STATOIL

Made by: PF

Date 06.11.2003

Prognosed

System	Series	Group	Formation	mTVD RT	Seismic Markers	TWT (ms)	Litho-logy	Casing
			Seabed					
QUATARNARY / TERTIARY	Pliocene - Pleistocene	Nordland		143		151		30" @ 205 m
				616		646		20" @ 550 m
			Utsira	758		785		
				878		895		
	Paleocene - Eocene - Oligocene - Miocene	Hordaland		1004		1012		
			Skade	1064		1069		
				1163		1164		13 3/8" @ 1190 m
			Grid	1521		1522		
TERTIARY		Rogaland	Balder	1744				
			Sele	1760		1753		
			Lista	1769				
			Heimdal	1786		1769		
			Lista (Våle/Ty ?)	1829		1804		
		Shetland	Ekofisk	1895		1855		

TD 1945 mTVD RT or 50 m into Ekofisk Fm.

DEPTH M TVD RT

0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000

Observed

Formation	mTVD RT	Seismic Markers	TWT (ms)	Litho-logy	Casing	Comments
					30" @ 203 m	
	603 (-13)		650		20" @ 545.5 m	
Utsira	775 (17)		814			
Hordaland	830 (-174)		867			Wrong seism. pick. Sand sequence interpreted to be Utsira actually included in Hordaland Gp.
Skade	1053.5 (-10.5)		1076			
	1154 (-9)		1168		13 3/8" @ 1196.5 m	
Grid	1482 (-39)		1481			Top Grid picked at thin sand layers above massive sand
Balder	1730.5 (-13.5)					
Sele	1758.5 (-0.5)					
Lista	1764 (-5)					
Heimdal	1796 (10)					Heimdal thinner than progn.
Lista	1807.5 (-21.5)					
Våle	1854.5					
Ekofisk	1892 (-3)					

TD 1909 mTVD RT

Fig. 4.2

PL 167

RT - MSL: 31 m

Water Depth: 112 m

Well 16/1-6A
Prognosis vs. observed stratigraphy

STATOIL

Made by: PF

Date 06.11.2003

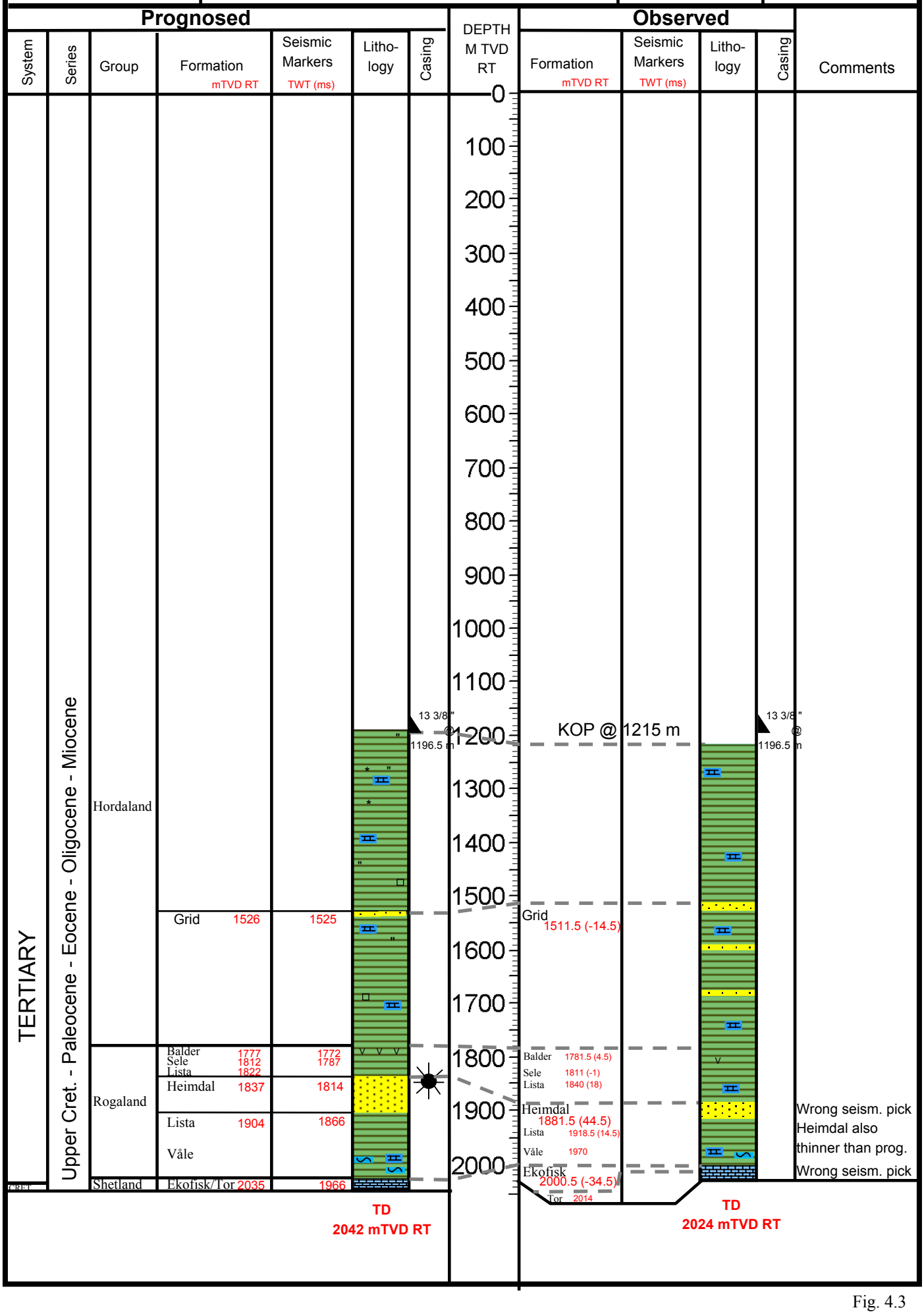


Fig. 4.3

4.5 Hydrocarbon indications

16/1-6S:

Hydrocarbon indications (presumed shallow gas) were seen in a sandy stringer at 603 m. This was based on log responses with a decrease in gamma ray and a slight increase in resistivity readings. In addition, the formation gas from the stringer peaked at 2.46 %, all C1. Traces of sand (without shows) were logged in corresponding cutting samples (see Figure 4.4 for shows summary).

A distinct gas peak of 2.55 %, C1 to nC4, was recorded from 1498 m. Log responses indicated thin, hydrocarbon filled stringers of sand belonging to the Grid Formation, but stratigraphically positioned above the massive Grid sandstone. Cuttings exhibited calcareous sand with traces of hydrocarbon stain and with spotty to even, bright, bluish white, direct fluorescence with instant, white cut fluorescence. MDT hydrocarbon samples confirmed the presence of oil, with a density of 0.857 g/cm³. No shows were seen in the underlying, massive Grid sandstone with logs confirming a water wet sandstone.

Weak visual shows, consisting of dark yellow, direct fluorescence with bluish white cut fluorescence were logged in traces of sandstone at 1790 and 1809 m.

At 1861.5 m the MWD logs suggested a new sand unit, the Heimdal Formation, with an indication of hydrocarbons based on the resistivity readings. The bottom up sample confirmed sandstone with dark yellow, direct fluorescence. The cut fluorescence response was bluish white to white, using Iso-propanol as the indicator solvent. A gas peak of 1.05 %, C1 to nC5, was recorded from 1870 m. The subsequent core revealed traces of dark brown hydrocarbon stain in addition to confirming the shows observed in cuttings. Logs and core data clearly showed that hydrocarbons were present down to the base of the Heimdal sandstone. Below that level and down to TD of well 16/1-6S, no further indications of hydrocarbons were encountered. MDT hydrocarbon samples confirmed the presence of gas, density 0.154 g/cm³, within the Heimdal Formation. Visual shows indicate that there are traces of heavier, residual hydrocarbons within the Heimdal sandstone.

Depth m	Total gas %	Back-ground %	C1 ppm	C2 ppm	C3 ppm	iC4 ppm	nC4 ppm	iC5 ppm	nC5 ppm	Remarks
607	2.46	0.5	21971	0	0	0	0	0	0	Formation Gas
739	1.49	0.7	12692	0	0	0	0	0	0	Formation Gas
1251	0.46	0.25	4237	0	2	0	0	0	0	Formation Gas
1308	0.28	0.15	2507	0	1	0	0	0	0	Formation Gas
1464	0.93	0.50	8482	145	17	10	5	0	0	Formation Gas
1498	2.55	0.50	21750	675	240	17	12	0	0	Formation Gas
1795	0.50	0.20	3945	218	56	55	16	3	1	Formation Gas
1801	0.50	0.20	3884	254	80	54	17	3	1	Formation Gas
1821	0.39	0.20	2964	160	28	49	12	3	1	Formation Gas
1853	0.25	0.20	1694	82	19	49	8	3	1	Formation Gas
1862	0.71	0.20	5519	375	130	59	15	3	1	Formation Gas
1870	1.05	0.20	8446	520	175	61	17	4	2	Formation Gas
1872	0.62		6030	95	17	6	5	0	0	Trip gas
1899	0.82		7617	190	40	6	5	0	0	Trip gas
1990	0.96	0.30	6447	886	462	103	113	9	7	Formation Gas
1975	11.7		10060	5250	1575	130	160	8	6	Trip Gas

Table 4.5 Gas peaks, well 16/1-6S

16/1-6A:

At 1529.5 m the MWD logs indicated a sand unit, the Grid Formation, with subsequent cuttings confirming sandstone. No hydrocarbon shows were observed within the cuttings. However, a small gas peak of 0.45 %, C1 to nC4, was logged at 1533 m. In addition the MWD and wireline logs show relatively high resistivity readings combined with high porosity within the uppermost 2 – 3 m of the Grid sandstone. Unfortunately, no conclusions regarding the presence of hydrocarbons could be drawn from these weak indications.

Very weak visual shows were observed in cuttings at 2016 m and from 2030 to 2070 m, consisting of traces of spotty, weak yellow, direct fluorescence with slow, streaming, bluish white cut fluorescence. These shows were logged from argillaceous matrix within the Heimdal Formation and are considered to be residual only. Logs and formation gas data clearly demonstrate a water wet Heimdal sandstone.

Depth m	Total gas %	Back-ground %	C1 ppm	C2 ppm	C3 ppm	iC4 ppm	nC4 ppm	iC5 ppm	nC5 ppm	Remarks
1488.	0.18		1700	5						Trip Gas
1533	0.45	0.2	4220	49	12	18	11			Formation Gas
1791	0.30	0.17	2688	9	1	18	1			Formation Gas
1889	0.38	0.17	3426	39	6	21	1			Formation Gas
1921	0.32	0.17	2818	36	5	22	1	10		Formation Gas
2027	0.34	0.15	2789	149	24	22	2	7		Formation Gas
2053	0.30	0.15	2470	128	23	21	2	7		Formation Gas
2133	0.22	0.17	1789	44	9	20	1	6		Formation Gas
2194	5.81	0.70	55880	545	56	11	3	2		Circulated bottoms up during TD logging operations

Table 4.6 Gas peaks, well16/1-6A

PL 167

RT - MSL: 31 m

Water Depth: 112 m

Wells 16/1-6S & 16/1-6 A
Hydrocarbon Indications

STATOIL

Made by: PF

Date 05.11.2003

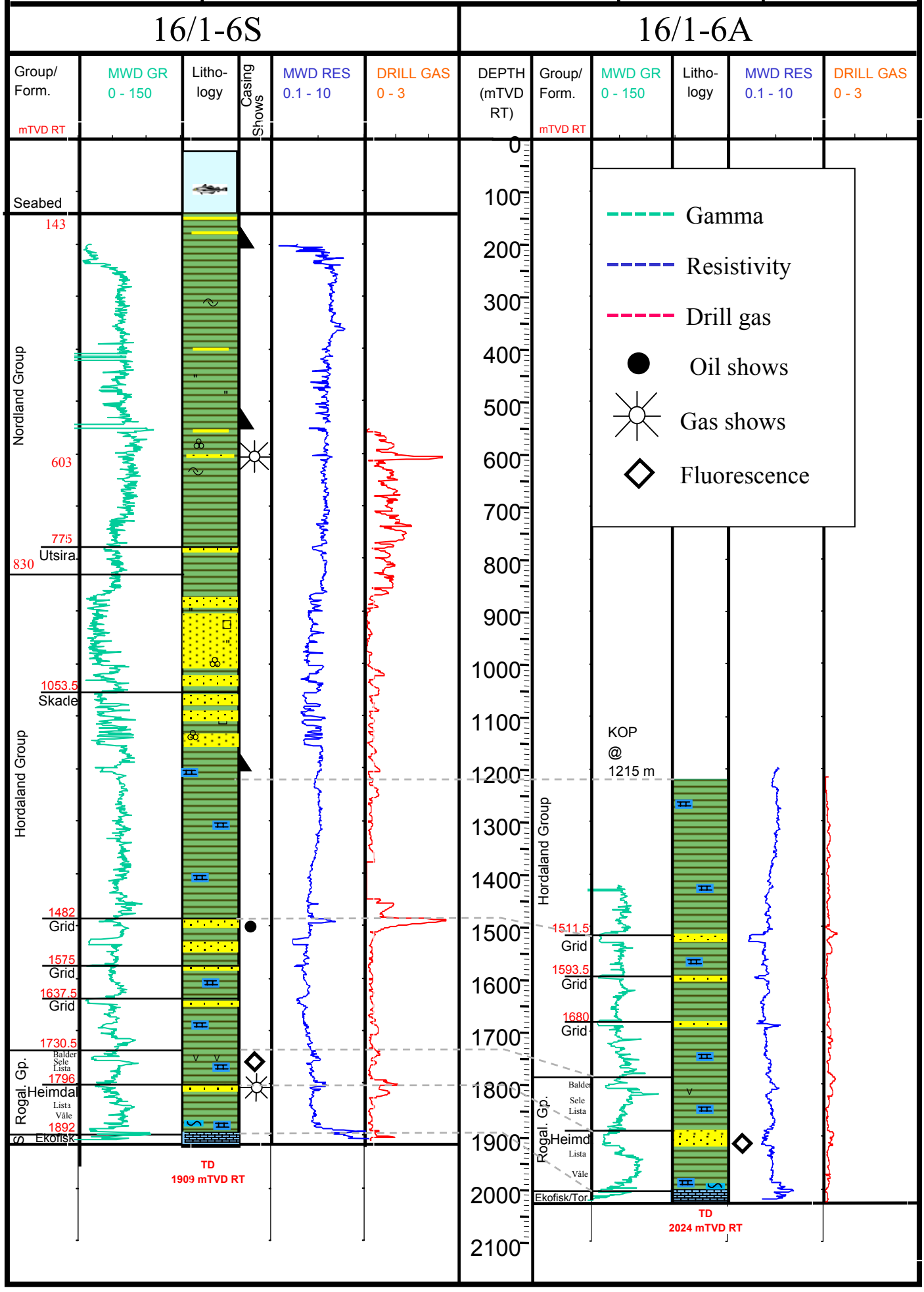


Fig. 4.4

4.6 Geophysical results

16/1-6S:

The observed formation tops, apart from the base Utsira Formation, the top Hordaland Group and also the top Grid Formation, were generally encountered close to prognosis and within the prognosed uncertainties (see Figure 4.2).

The initial prognosis and interpretation of the base Utsira Formation / top Hordaland Group (prognosed at 1004 m TVD RT) proved to be wrong. Biostratigraphical analyses suggest an older age (Middle Miocene) for the thick sand deposits originally interpreted as the Utsira Formation, now including them in the Hordaland Group.

The top of the Grid Formation was prognosed at the top of the first massive Eocene sand unit. However, the actual top Grid Formation has been picked at the top of a sequence of thin sand layers interbedded with claystone, preceding the massive sand.

The top of the Heimdal Formation was found 10 m deeper and the base 21.5 m shallower than prognosed, thereby decreasing the expected reservoir thickness significantly (see seismic summary in Figure 4.5).

16/1-6A:

In this well track, the observed formation tops generally deviate more from the prognosis than in well 16/1-6S (see Figure 4.3). Top Heimdal Formation and top Shetland Group were outside prognosed uncertainties. Furthermore, the Heimdal Formation sandstone was significantly thinner than prognosed.

There are no VSP or check shot data from this well track. This makes it difficult to directly compare seismic picks with observed formation tops. However, it seems likely that errors in seismic picks in an area influenced by faults and/or dipping layers, are the main reasons for deviations between observed and prognosed.

PL167, Verdandi

Wells 16/1-6S & 16/1-6A

Seismic interpretation, post wells

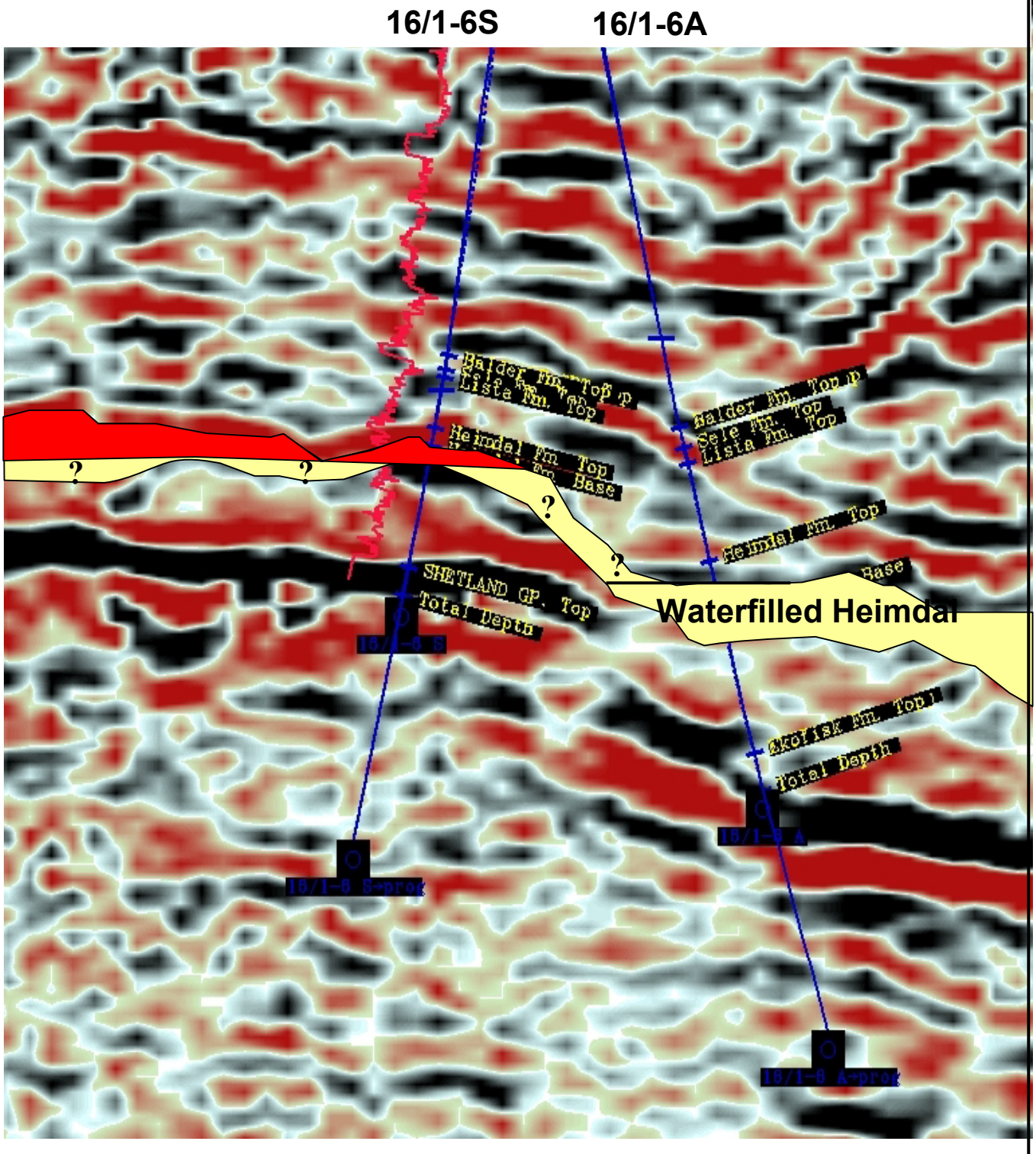


Fig. 4.5

4.7 Data acquisition

4.7.1 Cuttings and mud samples

A standard mud logging unit was used for the wells (details in Geoservices Final Well Report).

16/1-6S:

Cuttings were sampled at every 10 m from 560 m to 1800 m and then at every 3 m from 1800 m to 1989 m. From 1989 m to TD at 1997 m, the samples were lost due to downhole mud losses. In addition, samples are missing in the cored interval, 1872 – 1899 m. Mud samples were collected approximately at every 100 m from 544 m down to TD.

16/1-6A:

Cuttings were sampled at every 10 m in the intervals 1220 – 1450 m, 1490 – 1930 m and 2020 – 2194 m and at every 3 m in intervals 1450 – 1490 m and 1938 – 2016 m. Mud samples were taken approximately at every 100 m, but with shorter intervals (every 20 m) in zones with expected hydrocarbons and whilst coring.

4.7.2 Conventional coring

The coring was performed by Halliburton DBS.

One core was successfully cut in the Heimdal/Lista Formation in well 16/1-6S.

Core no.	Cored interval (m)	Recovered interval (m)	Recovered m	Recovered %	Barrel length	Diff. from logs	Comments
1	1872 – 1899	1872.00 – 1898.85	26.85	99.44	27 m	+ 0.75 m	Cored 27m

Table 4.7 Coring, well 16/1-6S

In well 16/1-6A, one core was attempted cut within the prognosed Grid Formation. However, junk in hole prevented the core form entering the core barrel, hence no recovery (see picture in ch. 5.6.1).

Core no.	Cored interval (m)	Recovered interval (m)	Recovered m	Recovered %	Barrel length	Diff. from logs	Comments
1	1488.5 – 1515.5	-	0	0	27 m		Milled 27m

Table 4.8 Coring, well 16/1-6A

4.7.3 MWD/LWD

The MWD logging was performed by Baker Hughes Inteq.
In well 16/1-6S, MWD logging including gamma ray, resistivity and directional measurements were performed from the 30" casing shoe to TD. In the 8 ½" section, MWD annular pressure measurements were also included.

Run no.	Depth interval m	Collar diam.	Tool type	Comments
1	-	8 ¼"	MPR	Misrun. First tool failed surface test, second tool failed during cement drilling
2	203 - 551	8 ¼"	MPR	Good data
3	551 - 1206	8 ¼"	MPR	Good data
4	1169 - 1872	6 ¾"	Autotrack/MPR	Data loss 1516-1524 m due to surface system problems
5	1872 - 1997	6 ¾"	Autotrack/MPR	Good data

Table 4.9 MWD logging, well 16/1-6S

In well 16/1-6A, the MWD logging included gamma, resistivity, directional and annular pressure measurements.

Run no.	Depth interval m	Collar diam.	Tool type	Comments
1	1149 - 1490	6 ¾"	Autotrack/MPR	Gamma and pressure failed at 1205 m
2	1490 - 2194	6 ¾"	Autotrack/MPR	Real time drop out from 2040 – 2064 m

Table 4.10 MWD logging, well 16/1-6A

4.7.4 4.7.4 Wireline logging

Run no.	TOOL COMBINATION	RUN	INTERVAL m
1	PEX-AIT-DSI	1A	1992-1197
2	MDT-GR (pressure points and sampling)	1A	1881-1499
3	VSP-GR	1A	1745-240
4	CST-GR	1A	1748-1495

Table 4.11 Wireline logging, well 16/1-6S

The CST and VSP logging strings were unable to pass 1762 m due to hole problems.

20 CST shots were attempted, 19 had good recovery, 1 was empty.

Read Wellservices performed a zero-offset VSP in the well. A 4-level tool was used to shoot at 15 m level spacing from 1745 m to 240 m.

Run no.	TOOL COMBINATION	RUN	INTERVAL m
1	PEX-AIT-DSI	1A	1730-1190. Tool could not pass 1750 due to wash-out.
2	MDT-GR (pressure points and sampling)	1A	TLC attempted, but could not pass 1750
3	VSP-GR	1A	Was replanned to run inside drillpipe, but was cancelled due to hole problems.

Table 4.12 Wireline logging, well 16/1-6A

4.7.5 Data quality

Conventional coring:

The coring performance was good in well 16/1-6S, with one successfully cut core of good quality. In 16/1-6A, junk in hole prevented any core recovery.

MWD/LWD:

The BHI MWD data was generally of good quality. However, three incidents of tool failure or data loss occurred:

- Two MWD collar failures at the start of the 26" hole section in well 16/1-6S.
- The MWD gamma ray and pressure board failed from the start of the 16/1-6A well track, causing no gamma or ECD data to be obtained from 1213 m to 1490 m.
- The BHI MWD logging screen was "frozen" for more than an hour while drilling within the Heimdal Formation in well track 16/1-6A. The incident left a real time log gap of approximately 25 m. Memory data were, however, intact.

Wireline logging:

Well 16/1-6S:The objectives of the wireline logging operation were met on the two first runs. On the third and fourth run it was not possible to reach the TD due to washout which may have been caused by a collapsing hole. A shortened program for CST and VSP was therefore the result. The quality of the log data was generally good. The MDT fluid samples in the Heimdal reservoir were of limited value due to high mud filtrate contamination. The fluid samples from the Grid formation were of high quality with low mud filtrate contamination.

Well 16/1-6A: The objectives were not met due to hole problems. The first run with PEX-AIT-DSI could not enter the open hole due to cement inside the casing.
After several attempts and also reaming the hole, the logging string entered open hole.
Was not able to pass 1750 m due to restrictions assumed to be collapsed

hole. The hole was then logged from 1750 m up to the casing shoe. The MDT run was attempted on TLC, but stopped at the same restriction at 1750 m, hence no results. The VSP run was subsequently cancelled. A VSP inside the drillpipe was planned as an alternative, but this attempt was also cancelled due to the hole problems and risk of getting stuck with the drillpipe. The quality of the logs from the shortened run was generally good.

4.8 Formation pressure

The pore pressure calculation for wells 16/1-6S and 16/1-6A is mainly based on information from evaluating MDT pressure data, electric logs and drilling parameters. The pore pressure gradient, mud weight and overburden gradient are presented graphically together with relevant log data in Figures 4.6, 4.7 and 4.8.

All values are given in equivalent mud weight, EMW (g/cm^3), unless otherwise specified.

A normal pore pressure gradient of 1.03 g/cm^3 is calculated down to approximately 1350 m TVD RT where an increase starts and continues through the Hordaland Group.
Formation pressure measurements performed in well 16/1-6S indicate normal pressure in all sandstone bearing intervals in the Grid sandstones and in the Heimdal sandstone units. Sonic log trends and Dxc exponent in the well indicate, however, slightly overpressured sediments in shale dominated intervals below the Skade Formation sandstone and below the Grid Formation sandstone (Hordaland Group). A maximum pore pressure gradient of 1.22 g/cm^3 is estimated in the Hordaland Group at 1650 m. Towards the base of the Hordaland Group, a drop in the pore pressure gradient is indicated, giving close to normal hydrostatic pore pressure gradient at the top of the Balder Formation at 1750 m. No indication of abnormal pore pressure is observed in the Rogaland Group.

MDT measurements in well 16/1-6S indicate a pressure gradient close to 1.03 g/cm^3 in the Heimdal sandstone. A fluid gradient of 0.15 g/cm^3 was measured in the Heimdal sandstone, indicating a light gas, which was confirmed by PVT samples.

Washouts at 1700 m could indicate a possible start of collapse in the lower Hordaland shale.

Losses were experienced at 1890 m in Ekofisk Formation. This could be related to possible fractures in an uplifted limestone.

Well 16/1-6A: Washout and possible formation collapse was experienced at 1700 m, which could be explained by unstable shales in the lower part of the Hordaland Group.
No losses were experienced when drilling into the Ekofisk Formation.

4.8.1 Reservoir pressure summary

Pressure measurements show a well-defined gas gradient in the bottom part of the Heimdal Formation. One pressure point in the top zone has a pressure slightly higher than the gradient. This pressure point was repeated, giving an even higher pressure. Calculated pressure gradient in the Heimdal Formation gas zone was 0.15 g/cm³. No gas-oil contact was proven.
No pressure fluid gradient was attempted in the Grid Formation, but the pressure measurements indicate normal pressure in the Grid Formation. See figure 4.9 for reservoir pressure plot.

Test #	Foration name	Depth RT	Depth m TVD RT	Formation pressure	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Mobility (mD/cp)	Temp. (°C)	Comments
1	Grid Fm.	1673,5	1670,5	163,06	218,34	218,22	1583	56,3	Good
2	Heimdal Fm.	1862,9	1797,0	238,94	239,08	239,00			Lost seal
3	Heimdal Fm.	1862,0	1796,3		238,86	238,82			Tight
4		1866,2	1799,8		239,40	239,00			Tight
5		1866,7	1800,3	181,55	239,35	239,28	17,9	69,4	Good
6		1867,0	1800,5	232,17	239,29	239,26			Lost seal
7		1869,0	1802,1		239,55	239,51			Lost seal
8		1870,0	1803,0	181,55	239,66	239,58	18,5	71,2	Good
9		1871,0	1803,8	181,58	239,74	239,69	66,5	71,2	Good
10	Heimdal Fm.	1872,0	1804,6	181,60	239,83	239,80	17,7	71,9	Good
11	Heimdal Fm.	1873,0	1805,5	181,61	239,94	239,88	4,3	72,3	Good
12	Heimdal Fm.	1874,0	1806,3	181,62	240,03	240,00	34,4	72,7	Good
13	Heimdal Fm.	1875,0	1807,1	181,64	240,10	240,08	15,5	73,2	Good
14	Heimdal Fm.	1875,5	1807,6		240,12	240,11			Lost seal
15	Heimdal Fm	1881,3	1812,4		240,95	240,85			Tight
16	Balder Fm	1866,7	1800,3	181,56	239,14	239,17	68,9		Good
17	Heimdal Fm	1871,0	1803,8		239,61				Lost seal
18	Heimdal Fm	1871,0	1803,8	181,53	239,64				Display froze. reboot computer
19	Heimdal Fm	1870,5	180,3,4	181,52	239,60				Sampling point
20	Heimdal Fm	1870,5	1803,4	181,52	239,60	239,95	13,0		After sampling
21	Heimdal Fm	1875,5	1807,6	181,73	240,12	240,40	10,5	77,6	Pumping. Gas indications
22	Heimdal Fm	1881,2	1812,3		240,78				Three attempts, all tight
23	Grid Fm	1499,0	1491,7	148,43	196,45		68,0		Samples, 2x450 cc
24	Grid Fm	1499,0	1497,1	147,86	196,69		32		Samples, 1x450 cc, 1x1 gal
25	Grid Fm	1499,0	1497,1	147,75			4,5	63,6	After sampling

Table 4.13 MDT pretests, well 16/1-6S

4.9 Reservoir fluid sampling

Gas samples were collected in the Heimdal sandstone at 1870.5 m. Due to an oil based mud filtrate the contamination was as high as 59 % which gave limited value for PVT analysis. For the oil sample collected in the Grid sandstone at 1499 m, the contamination was calculated to 16 %.

Sample depth	Run No.	*Bottle Number	Chamber	Drawdown	Formation Pressure	Pump Volume	Mobility	Opening pressure	Transferred to
(m)			(volume)	(bar)	(bar)	(liters)	(mD/cp)	(bar)	
1870,5	1A	MPSR3 #694	450 cm³	5,6	181,52	~38,5	13	269	PT1116
1870,5	1A	MPSR2 #649	450 cm³	4,8	181,52	~64,5	13	265	TS11102
1870,5	1A	MPSR4 #768	450 cm³	5,0	181,52	73,5	13	269	TS10615
1499,0	1A	MPSR6 #783	450 cm³	16,3	148,43	~13,5	68	48	TS11101
1499,0	1A	MPSR1 #173	450 cm³	29,8	148,43	~19,5	68	58	PT1151
1499,0	1A	MPSR5 #779	450 cm³	53,9	147,86	~5,0	32	48	TS10501
1499,0	1A	SC #169	1 gal	67,1	147,75	~11,5	4,5	52	TS47401

Table 4.14 Fluid samples and bottles, well 16/1-6S

Sample depth	MDT Run	Original chamber	Analysis sample from	Density At 15.6 °C	Density Res.cond	GOR	Dew/ Bubble pt	Vicosity	Comments
(m)	#	#	#	g/cm³	g/cm³	Sm^3/m^3	bar@ °C	cP	
1870.5	1A	649	TS-10615	0.7813 (Gas 0.693,air=1)	No data	6428	No data	No data	Gas sample, 59 wt% contamination
1499.0	1A	779	P-1151	0.9386	0.888	21.8	78.6@64	24	Oil sample, 16 wt% contamination

Table 4.15 Hydrocarbon analysis on fluid samples, well 16/1-6S

For details on fluid analysis results, refer to the following report:
CoreLab, 16/1-6S, Reservoir Fluid Study reference: RFLA20030168

4.10 Formation temperature

An average temperature gradient of 4.51 ^{o}C/100 meters is calculated from the seabed down to TD, based on Horner extrapolation method applied to the maximum log temperatures. This gradient gives a temperature of 84 ^{o}C at TD.

See Figure 4.10 for temperature profile.

Tool combination	Depth of measurement (m TVD RT)	Recorded max temperature (^{0}C)	Time since last circulation (hrs)	Evaluated temperature (^{0}C)
PEX-AIT-DSI	1793	73	8,7	
MDT-GR	1822	80	21	84 at 1822 m

Table 4.16 Measured and evaluated temperature, well 16/1-6S

4.11 Experiences and recommendations

- Borehole stability:
  Potential borehole stability problems in the lower Hordaland Group should be investigated, and the need for additional casing should be considered in order to complete the data acquisition programme for future wells in this area.

- Conventional coring:
  Junk in the hole, caused by a lock ring in the 16" casing hanger assembly, prevented any core recovery in well track 16/1-6A. The casing hanger lock ring that was used, will be evaluated prior to any new application.
  Metal junk was also found on top of the 16/1-6S core, but fortunately without influencing the coring performance. The incidents demonstrate the need for good hole cleaning prior to coring.

- MWD logging:
  The incident with the BHI MWD logging screen being "frozen" for more than an hour while drilling in the Heimdal Formation in well track 16/1-6A, illustrates the importance for the MWD operators to be alert, continously quality checking logging data at all times during drilling and also communicating any problems to Statoil.

- Wireline logging:
  When running the CST, redundant bullets were fired when the programme was shortened. This was done unintentionally and could have led to stuck tool.

PL 167
RT - MSL: 31 m
Water Depth: 112 m

Composite plot
Well 16/1-6S

STATOIL

Made by: JEH | Date:12.12.2003

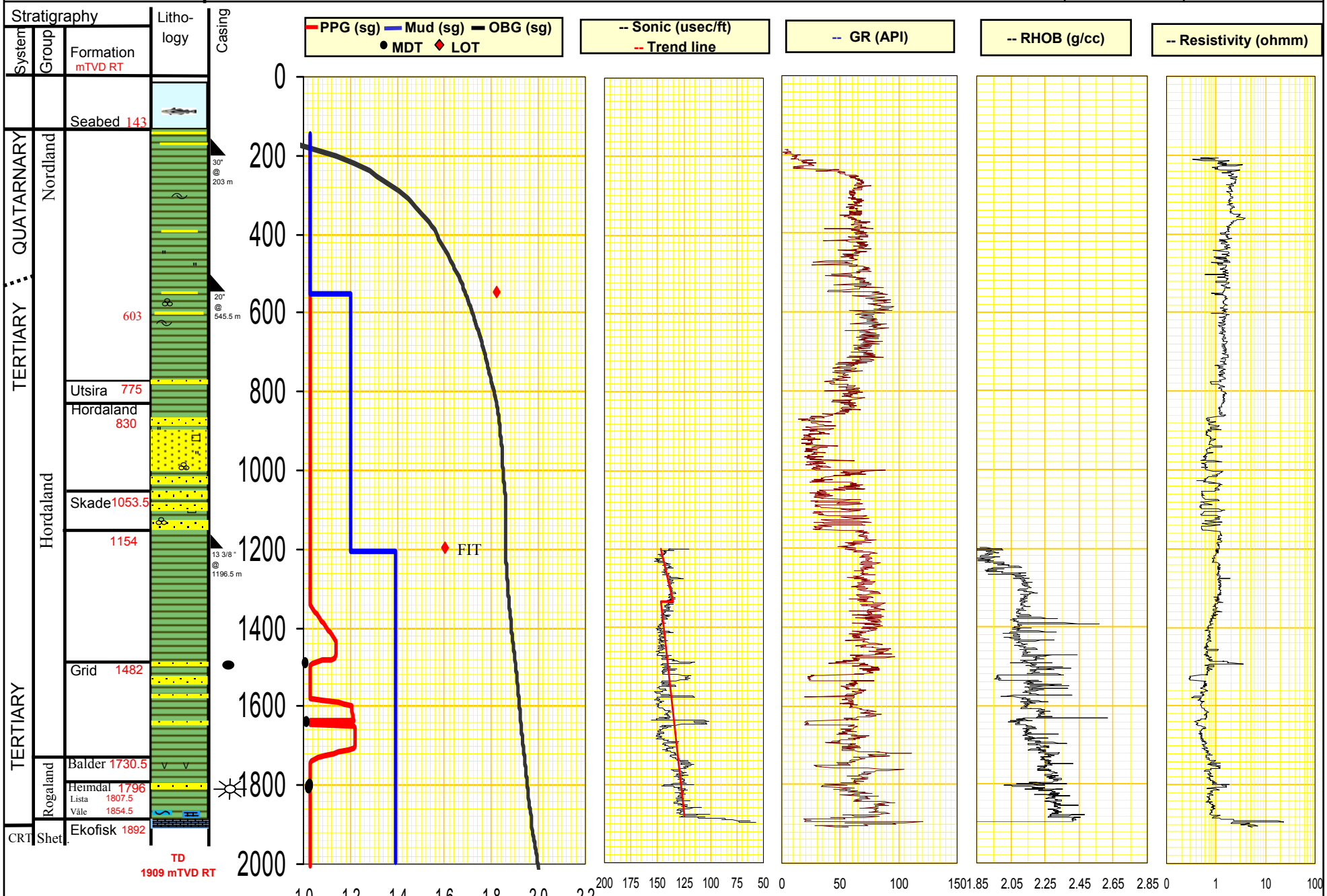


Fig 4.6

PL 167
RT - MSL: 31 m
Water Depth: 112 m

Composite plot drilling parameters Well 16/1-6S

STATOIL

Made by: JEH | Date:12.12.2003

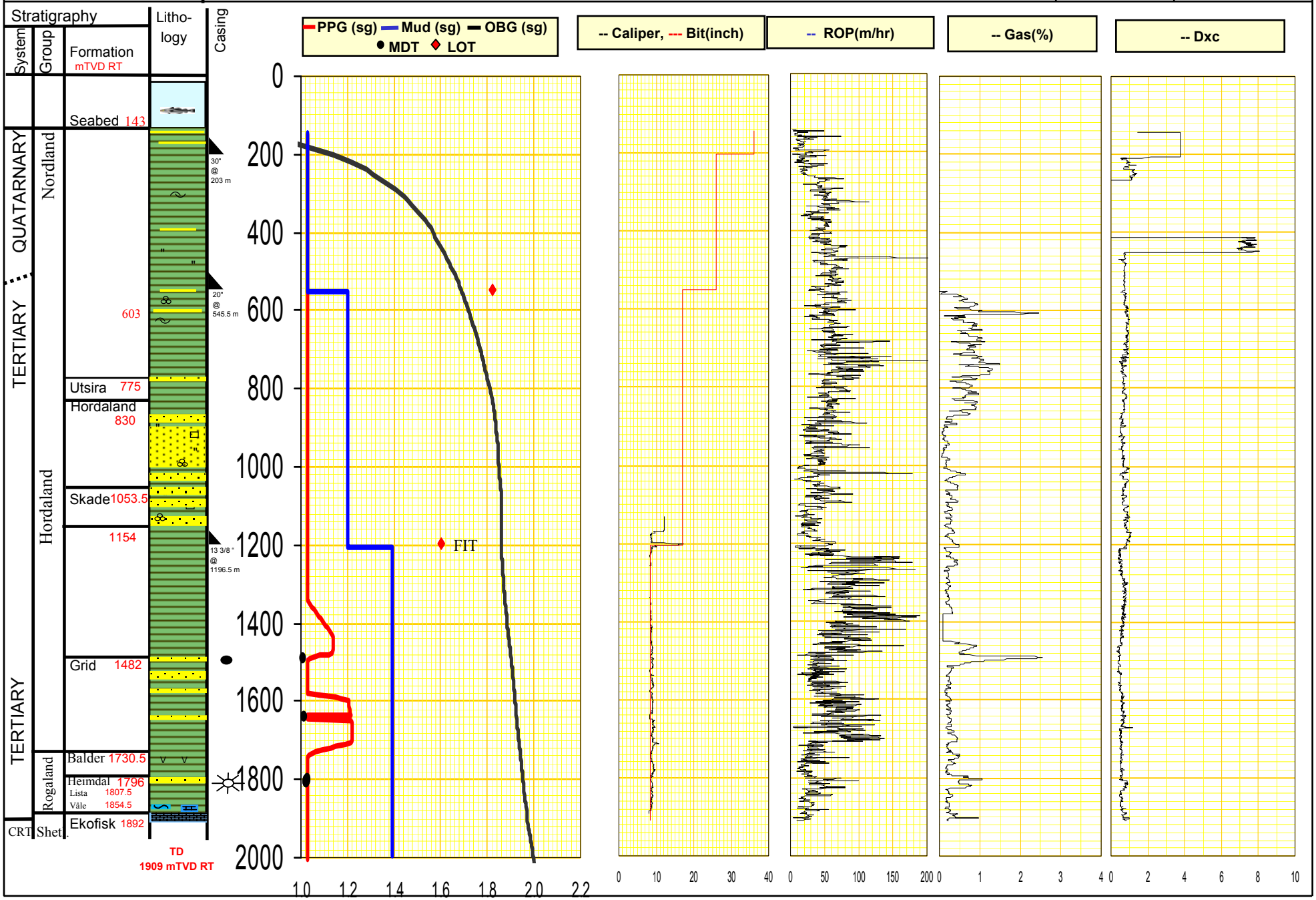


Fig 4.7

PL 167
RT - MSL: 31 m
Water Depth: 112 m

Composite plot
Well 16/1-6A

STATOIL

Made by: JEH | Date:12.12.2003

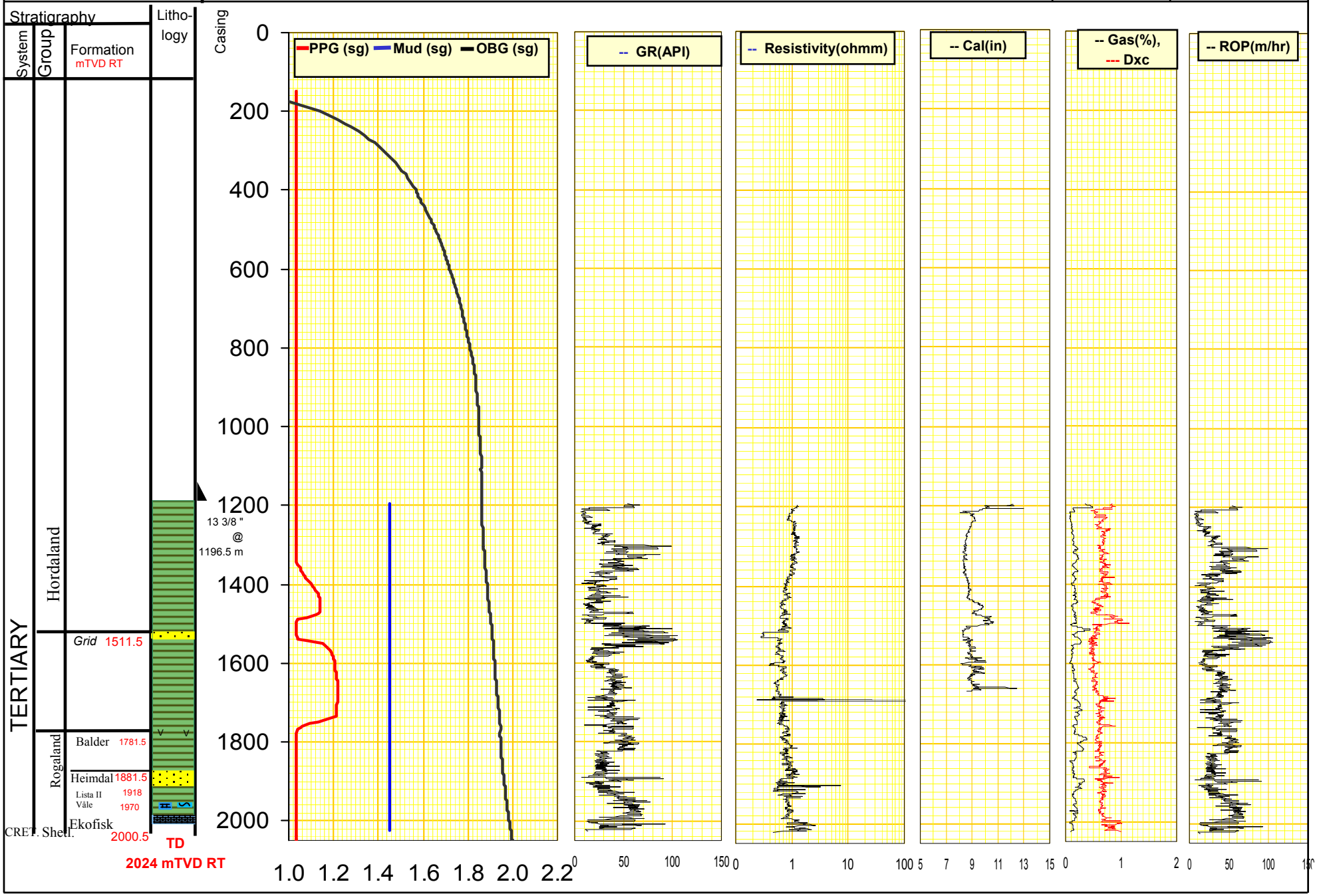


Fig 4.8

Well 16/1-6S
Heimdal Formation pressure

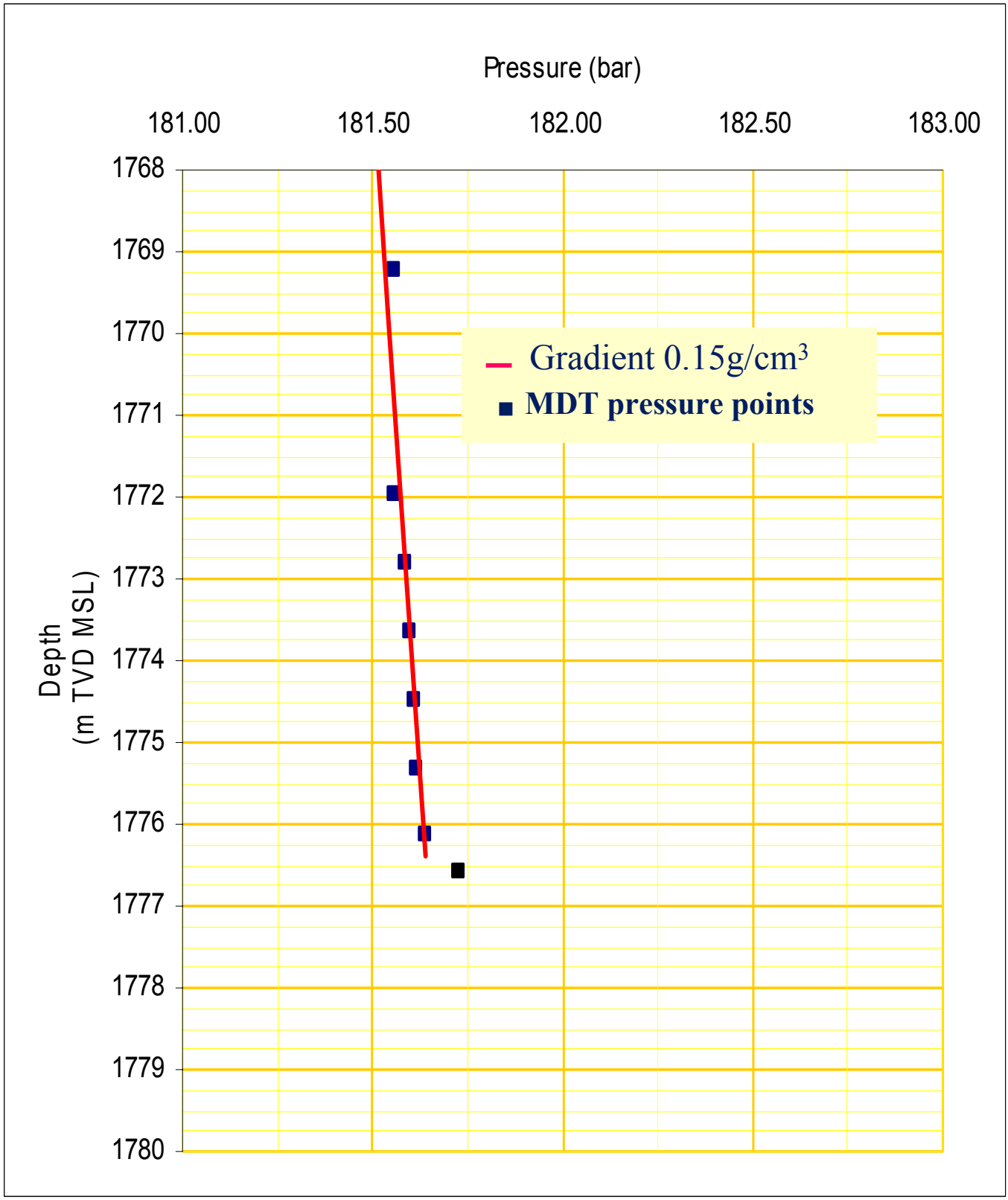


Fig. 4.9

PL 167

RT - MSL: 31 m

Water Depth: 112 m

Temperature Plot
WELL 16/1-6S

STATOIL

Made by: JEH

Date: 27.10.2003

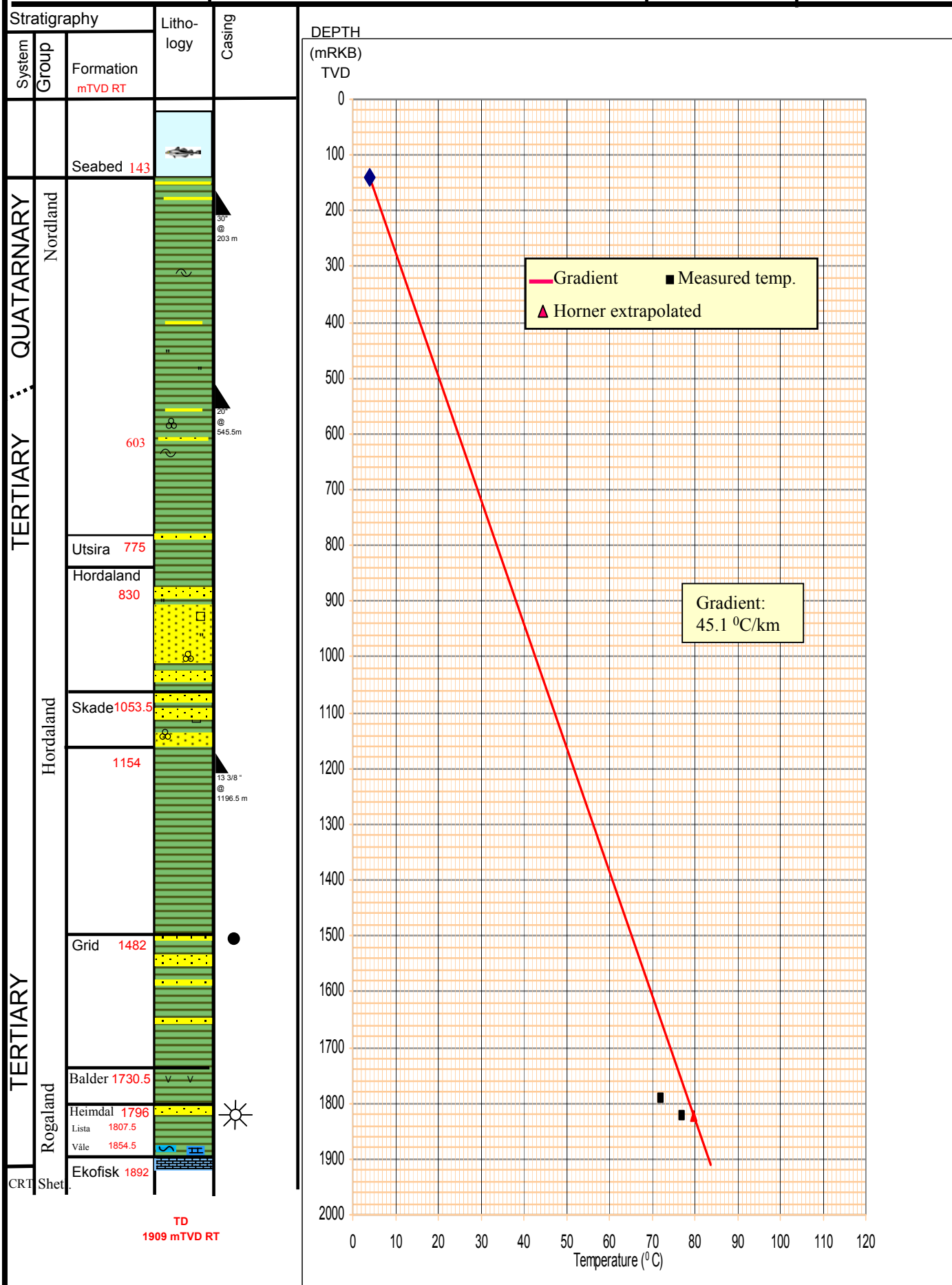


Fig. 4.10

5 Drilling operations report

5.1 Rig move and positioning

5.1.1 Summary

The semi-submersible rig "Borgland Dolphin" was moved from block 33/9 to the Verdandi location 16/1-6S. The transit distance, 145 nm, was covered in 23.5 hrs with an average speed of 7.0 knots. Mærsk Helper, Mærsk Achiever and San Fruttuoso were used as towing vessels, towing on anchor chains #1 and #8 and on the bridle.

During transit, service and maintenance on rig equipment were carried out. To be able to get the cross braces above water, the spudding equipment was loaded onboard after arriving on location. Hence, preparations for spudding was not carried out during transit.

Anchor handling of 8 anchors, ballasting of rig and tension testing of anchors to 180 tons (except anchor 6 which was tensioned to 160 tons) were carried out in 27.5 hrs. This includes attaching jumper buoys to the four chains crossing Statpipe and the Cross Atlantic fiber cable.

5.1.2 Experiences / recommendations

- Towing:
  Using three towing vessels proved beneficial, resulting in a relatively short transit time. It is recommended to use two or three towing boats when moving rigs over large distances.

- ROV
  The three marker buoys were deployed after the rig was pumped down to drilling draft and the anchors were run. It is recommended to deploy the marker buoys as a parallel activity.

5.2 Drilling top hole section

5.2.1 Summary

After deploying transponders and marker buoys, a 36" hole was drilled from sea bed at 143 m to section TD at 207 m (depth of 17 ½" bit). Low weight on bit was used to ensure vertical hole. The top hole section was drilled using sea water and high viscosity pills as drilling fluid. The maximum recorded Anderdrift inclination was 0.75° at TD. The hole was displaced to 1.35 g/cm³ mud prior to pulling out. No overpull was experienced when pulling out of hole.

The 30" conductor was run to 203 m and cemented in place with 2.5 meter stick up of the 30" WH. The bull eyes on the PGB both showed 0.5°. However, the bull eyes indicated 0.5° in exact opposite directions. When running in, the conductor took weight 4 m above planned setting depth and was washed down the last meters. The cement slurry used for the conductor was 1.56 g/cm³ G-cement lead slurry, and 1.95 g/cm³ tail slurry. 150% OH excess was used.

5.2.2 Experiences / recommendations

- Drilling parameters:
  The section was drilled with relatively low weight on bit (2 – 6 ton) to ensure a vertical hole. However, as the formation drilled in the 36" section on this location was relatively soft and no boulders were encountered, higher weight on bit would be feasible and is recommended for future wells in this area.

- Waiting on cement:
  Spent 7.5 hours rig time waiting on the cement to set up before the 30" conductor running tool could be released. The original plan of cementing the conductor using X-Lite cement was abandoned just prior to start of the operations, as Halliburton could not recommend usage of this product onboard Borgland Dolphin. This recommendation was due to challenges getting rid of the excess X-lite cement from the cement tanks if, for instance, the cement line was plugged early in the job and regular G-cement back up had to be run

- Bottom Hole Assembly:
  Used a Odfjell Well Services two stage hole 26"/36" opener with a 17 ½" milled tooth bit, together with an 8" Anderdrift and 8" drill collars. This BHA should provide the necessary stiffness to drill top holes in this area.

5.3 Drilling 26" section

5.3.1 Summary

Drilled out the 30" conductor shoe and cleaned the rat hole in 2 hours. At this point, the BHA had to be pulled as the MWD collar failed.

The 26" section was drilled down to TD at 551 m in one bit run, using a packed assembly with a milled tooth bit (IADC-code 115). Hard drilling and boulders were encountered in the first 40 m of the section, hampering the rate of penetration. The 26" section was drilled with an average on bottom ROP of 39.1 m/hr. Seawater and high viscosity pills were used as drilling fluid in this section. At TD the hole was circulated clean and displaced to 1.35 g/cm³ mud. Some minor tight spots (10-15 mT) were experienced at 536 – 525 m, 264 m and 246 m when pulling out of hole.

The 20" casing was run and set at 545.5 m with an average running speed of approximately 5 joints per hour. The 20" casing had a landing ring for a 16" casing hanger installed at 416 m. The casing was successfully cemented, and a single plug system was utilized. Had full returns during cement job and bumped the cement plug with 97% pump efficiency.

Ran and installed the riser and BOP and pressure tested the well to 180 bar.

5.3.2 Experiences / recommendations

- Drilling parameters:
  Drilled section with bout 50 rpm, 4500 lpm and roughly 5 ton WOB. Parameters were cut back in the upper 40 m of the section when drilling through boulders.

5.4 Drilling 17" section

5.4.1 Summary

The 17" section was drilled from the 20" casing shoe at 545.5 m and vertically down to 1206 m. The section was drilled using a packed rotary assembly, a milled tooth bit (IADC-code 115) and KCl/glycol/polymer water based drilling fluid. The mud weight started out at 1.15 g/cm³ at the beginning of the section and was purposely drifted up to 1.21 g/cm³ while drilling. The 20" casing shoe and rat hole was drilled out and cleaned in 3.5 hours, where the cementing plug and shoetrack itself was drilled in 2.0 hours. Below the 20" casing shoe a leak off test was performed to 1.82 g/cm³ EMW.

When drilling through the two warned levels that could contain shallow gas, a hydrocarbon bearing sand was proven in the upper level at 603 m. The lower level, which was in the prognosed Utsira Formation, was found water bearing and with normal pressure gradient.

Pulling out the BHA after reaching section TD, some minor tight spots were experienced between 621 and 591 m. The 13 3/8" casing was run to 1196.5 m. The 13 3/8" casing was crossed over to a 16" casing hanger, which was landed out in the casing hanger landing adaptor installed in the 20" casing at 416 m. Landing the 16" casing hanger proved difficult, as it was impossible to get proper indication of correct landing. When landing this type of hanger, locking pins in the hanger shall engage into a groove in the landing adaptor. Therefore, it shall be possible to confirm correct landing by applying overpull to the hanger. However, on this occasion it was not possible to get an overpull test. Based on the landing string tally, the 20" casing tally and recorded pump pressures, it was decided to carry on with the operation and cement the casing. Additional information can be found in section *3.3 Experience summary and 4.4.2 Experiences / recommendations*.

A gas tight lead slurry was pumped and top of cement was planned at 516 m, 30 m into the 20" casing. The cement job was carried out with full returns, and the plug was bumped with a pump efficiency of 97.5%.

After cementing, the seal assembly was successfully set and tested to 170 bars.

5.4.2 Experiences / recommendations

- Drilling parameters:
  High torque caused the top drive to stall out towards section TD. This was believed to be caused by poor hole cleaning.

- Landing 16" casing hanger in landing adaptor
  As the casing hanger locking pins did not engage in the groove in the casing hanger landing adaptor, it was not possible to confirm correct landing of the hanger by applying overpull. The hanger was successfully set on depth. Incorrect setting depth would result in the seal assembly not working. A more robust system for hanging off casing hangers in landing adaptors would be preferable

5.5 Drilling 8 ½" section

5.5.1 Summary

The 8 ½" hole section was drilled from the 13 3/8" casing shoe at 1196.5 m and down to final TD at 1997 m in two bit runs and one core run.

The section down to coring point was drilled with a Hughes Christensen HCR607 and an AutoTrak assembly. The 13 3/8" casing shoe and rat hole was drilled out and cleaned in 4 hours. Below the 13 3/8" casing shoe a formation integrity test was performed to 1.60 g/cm^3 EMW. The well was built up to a sailing angle of 33^o at 1571m, and this angle was maintained to TD.

The drilling fluid used was a pseudo oil based mud with a weight of 1.39 g/cm^3. The rate of penetration was 30 – 100 m/hr down to 1750 m, from where the ROP was restricted to be able to evaluate possible coring point. When drilling at approx. 1870 m, sandstringers (Heimdal Formation) were observed on the MWD log, and it was decided to circulate B/U for samples at 1872 m. Shows of HC were proven and it was decided to pull out of hole for coring. An EMS survey tool was dropped prior to pulling out of hole.

One core was cut from 1872 – 1899 m, with a core recovery of 99.4%.

The remaining part of the well was drilled with the same AutoTrak and bit as mentioned above. The cored interval was logged with the MWD prior to drilling ahead. The average penetration rate after coring was 21.8 m/hr. At 1997 m mud losses were observed in the active system, with a static mud loss of 800 l/min. An 8 m³ LCM pill was pumped in the hole, which cured the losses. A total mud volume of 55 m^3 was lost to the formation. After establishing the circulation, the mud weight was reduced to 1.35 g/cm^3.

Four wireline logging runs were carried out, where the two first runs; PEX/AIT/DSI and the MDT sampling, were performed without any operational problems. The VSP and the CST tool strings were not able to pass 1762 m, possibly due to a washout at this depth. There were no tendencies of sticky conditions during the wire line logging.

After logging was completed, the reservoir was plugged with cement from 1973 to 1725 m. Large amounts of cavings was reported in the returns when circulating bottoms up after placing the first cement plug. A kick off plug was placed from
1550 – 1320 m on top of a Perigon cement support tool in the transition zone between open hole and 13 3/8" casing. Again, large amounts of cavings were reported in the returns when circulating the hole clean after placing the cement plug.

5.5.2 Experiences / recommendations

- Drilling out of 13 3/8" casing shoe:
  Drilled out of the 13 3/8" casing shoe with the 8 ½" drilling assembly in 3 hours. There were no problems associated with this, neither with drilling nor with wire line logging.

- Drilling parameters:
  The section was drilled with 2200 - 2600 lpm / 80-160 rpm / 2-10 mT WOB.

5.6 Drilling sidetrack, well 16/1-6A

5.6.1 Summary

The sidetrack was drilled with the same 8 ½" bit and AutoTrak bottom hole assembly as used to drilled the main bore. Drilling fluid was 1.45 g/cm³ Novatec pseudo oil based mud. The mud weight was increased from 1.39 to 1.45 g/cm³ whilst drilling cement inside casing. Approximately 18 m below the 13 3/8" casing shoe, the mud returns showed 50% new formation and the KOP was hence defined at 1215 m. Total time from tagging the cement plug inside the 13 3/8" casing to 50% new formation was seen was 6.5 hrs.

Continued drilling with an azimuth of ±360° and a build rate of 3.5°/30 m according to planned well path. Drilled down to the prognosed Grid Formation at 1490 m, where the AutoTrak was pulled and a 90 ft core barrel run in. Took 6 MT weight at 1150 m while running in with the core barrel. Connected the DDM and washed/rotated (25 RPM) to 1172m. Continued RIH out of the 13 3/8" shoe and to 1205m where again weight was taken. Connected DDM and reamed through obstacle.

Tagged bottom at 1490m and cut core from 1490 – 1515m in two hours. Typical coring parameters were 3-10 ton WOB, 4-6 KNm w/ 70-120 rpm and 50-55 bar standpipe pressure at 1000 l/min circulation rate. Pulled free with 3 MT overpull and pulled out of hole with the core barrel. At surface it was discovered that the core head was filled with steel junk and thus no core recovered. The junk was later found to be the split ring from the 16" casing hanger assembly (see picture on the next page). The 16" casing hanger assembly possibly hung up in the BOP while running in, tearing off the split ring and leaving it in the BOP area until the BOP rams were operated (the day before the coring). At this time, the ring could have fallen down into the well and was caught by the core head when this was run.

Core head w/junk from the 16" casing hanger assembly

The same AutoTrak assembly and bit was re-run and continued drilling as per well path plan to top reservoir. The inclination was built to 40.5° by 1715 m and this angle was kept to TD.

Top Heimdal Formation came in at 2006.5 m / 1881.5 m TVD RT. However, as the reservoir was found to be water bearing no cores were cut here. The well was drilled to TD at 2194 m / 2024 m TVD RT (33 m into the Shetland Group chalk). When pulling out, an EMS survey tool was dropped to verify the MWD tool readings. The tool was dropped with the BHA above the reservoir sands.

Rigged up wireline equipment and ran in hole with PEX/AIT/DSI. The tool string stopped at 1170 m, which was inside the 13 3/8" at the float collar depth. Worked the tool string, but was not able to slide through the restriction. Pulled out the wire line and ran in hole with an 8 ½" BHA and cleaned the shoetrack. Re-ran the logging string, which again stopped, this time at 1150 m. Two wiper trips were run; a 12 ¼" BHA was used to clean out the shoetrack, and thereafter an 8 ½" BHA was run to TD to verify and clean the hole. The WL equipment was again rigged up and the PEX/AIT/DSI tool string was run in to 1750m, where it stopped. Worked the string several times without success. Pulled the wire line logging tool and rigged up for Tubing Conveyed Logging (TLC). Ran in hole with the logging tool on 5" drill pipe to

1750, where the tool string again stopped. It was not possible to work through the restriction with the given compression limitations on the MDT logging tools. The logging operation was discontinued because of poor hole conditions, and decision was made to commence plugging and abandonment. In addition, an inside drill pipe VSP logging tool was planned to be run inside the cement stinger.

5.6.2 Experiences / recommendations

- Drilling out of 13 3/8" casing shoe and kicking off with Autotrak:
  Drilled out of the 13 3/8" casing shoe with the 8 ½" drilling assembly. No problems were related to the drilling phase. However, problems were encountered when trying to run wire line logs through the shoe track

- Kick off:
  Total time from tagging the cement plug inside the 13 3/8" casing to 50% new formation was seen was 6.5 hrs It is recommended for future well to use exactly the same slurry on kick off plugs, and the AutoTrak also showed a very good side tracking performance.

- Drilling fluid:
  The mud showed no signs of sagging or weight fluctuations. The 100 rpm viscosity readings were kept low and steady between 22 – 26, which contributed to keep the ECD at 1.49 – 1.51 g/cm³ EMW, well within the limitations from the FIT taken to 1.60 g/cm³ EMW. Due to a water influx, which origin was never found, into the active mud system, keeping the drilling fluid oil/water ration within the specification of 75:25 proved difficult.

- Drilling parameters:
  Typical drilling parameters were 3-6 ton WOB, 4-6 KNm w/ 140-160 rpm and 180-200 bar stand pipe pressure pumping at 2200 lpm before coring and 1-3 ton WOB, 6-8 KNm w/ 140-160 rpm and 190-210 bar stand pipe pressure pumping at 2300 - 2400 lpm after coring. The ECD was in the range of 1.49 – 1.51 g/cm³ EMW.

5.7 Permanent P&A

5.7.1 Summary

Ran in hole with cement stinger (253 m of 3 ½" DP and 5" DP to surface) to log VSP inside drill pipe and plug back the water filled Heimdal sands. Took 5 ton weight at 1741 m, and had to wash past this restriction. Ran down to TD at 2194 m. While circulating prior to the cement job, large amounts of cavings came over the shakers. Before pumping down the logging tool, a "sticky test" was carried out at 2190. After keeping the pipe stationary for 15 minutes, 25 tons of over pull was necessary to free the pipe. In addition, the hole packed off and 12 m³ mud was lost to the formation. Due to this, the planned VSP logging run was abandoned and a non gas tight cement plug was placed from 2194 to 1914 m.

A second non-gas tight cement plug was then placed on top of the Perigon cement support tool from 1300 to 1100 m, covering the transition between open hole and casing.

Pulled out of hole, laid down DP and pulled 13 3/8" wear bushing while waiting on the cement plug to set up. After 16 hrs, the cement plug was tested to 90 bar (72 bar above the 1.60 g/cm³ EMW FIT at the 13 3/8" casing shoe). A 13 3/8" EZSV plug was the set at 425 m and tested to 90 bar (70 bar above the 1.82 g/cm³ EMW LOT at the 20" casing shoe). The volume above the plug was displ. to seawater and a cmt plug was placed from 425 to 175m.

After pulling the BOP, the premade cutting assembly was made up. Installed the two armed guide frame and RIH and placed the cutters on 148m. Sat down 5 ton weight on safety clamp and picked up to engage MOST tool and cut 20" x 30" casing in 1.5 hrs. Pulled WH free with 25 ton overpull and retrieved the WH assy to surface. Landed and secured PGB on 105 ton skid in moonpool. While simultaneously starting to pull anchors, the PGB was released and the 30 & 20" casing were laid out on deck.

The anchors were pulled without any problems or incidents, and the rig was off contract at 22:00 the 22nd of June 2003.

5.7.2 Experiences / recommendations

- Perigon Cement support tool:
  The perigon cement support tool was pumped out of the string before cement was pumped, to avoid cementing up the cement stinger if the Perigon tool got stuck in the pipe.

- Faulty drill water supply:
  Had problems with drill water delivery, which again caused a delay in mixing of spacer. The cement job was done without any further incidents, but while starting to POOH, an incident with the pipe handling equipment occurred delaying

the trip out of cement with 45 minutes. However, no overpull was seen while continuing pulling. Pulled out to well above calculated top of spacer and circulated two DP volumes. After half of the planned cement slurry volume was mixed and pumped, the drill water pump broke down (the back up pump was also not functioning) and a repair would not be feasible within the cement setup timeframe. At this point there were cement slurry in all lines from the cement unit, standpipe manifold and up through the top drive. Attempted to fill the Halliburton mixing tanks with freshwater via a 2" hose, but this proved too time consuming. Established contact with Halliburton project engineer onshore, and were given go ahead to use seawater. The down side of doing so, was that the slurry was going to set up 1 hr faster than the original proposed slurry. It was decided on the rig that this would be (barely) sufficient time to do the cement job and pull the stinger out of it and this was done accordingly.

- Circulating after setting cement plugs:
  To avoid any spacer in the returns the cement stinger was pulled 100 m above top of cement before circulating. Circulated bottoms up after setting the transition zone plug, as problems with drill water supply delayed operations to such extent that cement could have set up in the stinger or in annulus. No cement residue or spacer was seen over the shakers.

- Pulling 30 x 20" casings:
  On the 30" conductor wellhead a canvas sleeve is installed to reduce the necessary over pull needed when carrying out the permanent P&A operation.

5.8 Figures and tables

5.8.1 Well schematic well 16/1-6S

Well: 16/1-6S
Field: Verdandi
Rig: Borgland Dolphin

FINAL WELL SCHEMATIC

HOLE		CASING				LOT FIT	TOC		CSG.SHOE T.Packer		RKB	Incl.	M.W.	LWD LOGS	SURV CSG/ OH
SIZE	TVD MD	SIZE	TYPE / RAD. MARKERS	CENTRALIZERS	TEST PRESS [BAR]	[g/cm³]	MD	TVD	MD	TVD			[g/cm³]		
Sea Bed	143														
36"	203 203	**30"**	5 jnts. 30", 310 lb/ft, X-52, ST-2. incl 30" WH housing & shoe joint	None	**N/A**		Seabed	Seabed	203	203		0°	1.03 - 1,35 WBM	None	OH: Anderdrift
26"	551 551	**20"**	18 3/4" WH incl. 20", 133 lb/ft, N-80, Antares ER	Type: ST A4 1 centr. / jnt on bottom 3 joints	**180** **(SW)**		516 Seabed	516 Seabed	416 546	416 546	X X	0°	1.03 - 1.35 WBM	LWD GR/RES	OH: DIR
17"	1 206 1 206	**13 3/8"**	16" casing hanger crossed over to 13 3/8" 72 lb/ft, P-110, New Vam	Type: NW-ST A¤ 1 centr. / jnt on bottom 5 joints*	**170** **(1.21 g/cm³)**	**LOT** **1.82**			1 197	1 197		0°	1.15 - 1.20 WBM	LWD GR/RES	OH: DIR
8 1/2"	1 909 1 997					**FIT** **1.60**						32°	1.39 POBM	LWD GR / RES PWD	OH DIR

NOTE: * Centralizers considered to be placed 50 m above & below intervals where zonal isolation is required, i.e. : Shallow gas zones. Centralizers will be evaluated for Utsira sands.

5.8.2 Well schematic well 16/1-6A

Well: 16/1-6A
Field: Verdandi
Rig: Borgland Dolphin

FINAL WELL SCHEMATIC

HOLE		CASING				LOT FIT	TOC		CSG.SHOE T.Packer		RKB	Incl.	M.W.	LWD LOGS	SURV CSG/ OH
SIZE	TVD MD	SIZE	TYPE / RAD. MARKERS	CENTRALIZERS	TEST PRESS [BAR]	[g/cm³]	MD	TVD	MD	TVD			[g/cm³]		
Sea Bed	143														
36"	203 203	**30"**	5 jnts. 30", 310 lb/ft, X-52, ST-2. incl 30" WH housing & shoe joint	None	**N/A**		Seabed	Seabed	203	203		0°	1.03 - 1,35 WBM	None	OH: Anderdrift
26"	551 551	**20"**	18 3/4" WH incl. 20", 133 lb/ft, N-80, Antares ER	Type: ST A4 1 centr. / jnt on bottom 3 joints	**180** **(SW)**		516 Seabed	516 Seabed	416 546	416 546	X X	0°	1.03 - 1.35 WBM	LWD GR/RES	OH: DIR
17"	1 206 1 206	**13 3/8"**	16" casing hanger crossed over to 13 3/8" 72 lb/ft, P-110, New Vam	Type: NW-ST A¤ 1 centr. / jnt on bottom 5 joints*	**170** **(1.21 g/cm³)**	**LOT** **1.82**			1 197	1 197		0°	1.15 - 1.20 WBM	LWD GR/RES	OH: DIR
8 1/2"	2 194 2 024					**FIT** **1.60**						41°	1.45 POBM	LWD GR / RES PWD	OH DIR

NOTE: * Centralizers considered to be placed 50 m above & below intervals where zonal isolation is required, i.e. : Shallow gas zones. Centralizers will be evaluated for Utsira sands.

5.8.3 P&A wellbore schematic 16/1-6S

Well: 16/1-6S
Field: Verdandi
Rig: Borgland Dolphin

WELL SCHEMATIC - PLUGGED WELL

Purpose of plugging: **Permanent P&A**
Date of abandonment: **May, 2003**

HOLE		CASING and FORMATION				LOT / FIT	TOC					TESTS	CUT
SIZE	TVD MD	SIZE	CASING TYPE	PERMEABLE HC BEARING ZONES	Mud [g/cm³]	s.g.	TVD	MD	TVD	MD	RT-MSL = 31 m		
									143	143	Seabed		
	202	30"	X-52, 309 lb/ft, ST-2	None	1,03 sg	N/A							148
36"	202						180	180	203	203			
	556	20"x	N-80, 133 lb/ft, Antares		1.03 sg	LOT							
26"	556	13 3/8"		None		1,82 sg			546	546			
							420	420			Cmt Plug #3	70 bar above LOT	
	1206	13 3/8"	P110, 72 lb/ft, New Vam	Nordland group Gas seen at 607 m TVD	1.15sg	FIT 1,60 sg					1.39 SG WBM		
17"	1206						1100	1100				70 bar above LOT	
									1197	1197	Cmt Plug #2		
							1300	1300					
											Perigon		
											1.39 sg		
8 1/2"	1945 2038				1.39 sg	N/A	1725	1786					
				Top Heimdal fm: 1850 mMD / 1786 mTVD					1786	1850	Top Reservoir		
											Cmt Plug #1		
							1945	2038	1945	2038			

5.8.4 P&A wellbore schematic 16/1-6A

Well: 16/1-6A
Field: Verdandi
Rig: Borgland Dolphin

WELL SCHEMATIC - PLUGGED WELL

Purpose of plugging: **P&A Well**
Date of abandonment: **June, 2003**

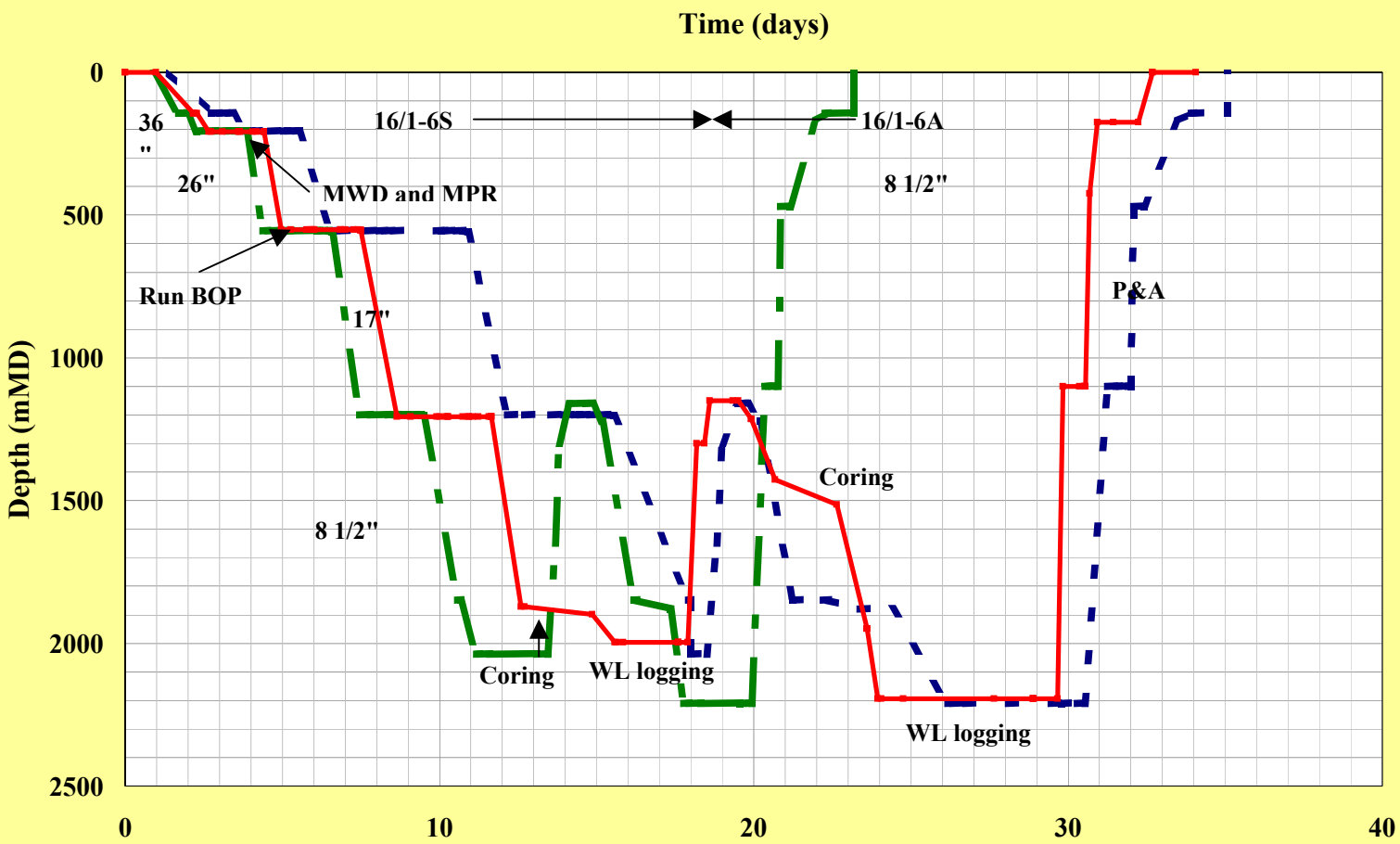
HOLE		CASING and FORMATION				LOT / FIT	TOC					TESTS	CUT
SIZE	TVD MD	SIZE	CASING TYPE	PERMEABLE HC BEARING ZONES	Mud [g/cm³]	s.g.	TVD	MD	TVD	MD	RT-MSL = 31 m		
36"	202 202	**30"**	X-52, 309 lb/ft, ST-2	None	1.03 sg	N/A		**175**	143 203	143 203	Seabed Sea water		148
26"	556 556	**20"x 13 3/8"**	N-80, 133 lb/ft, Antares	None	1.03 sg	LOT 1.82 sg		**425**	416 546	416 546	Cmt Plug #3	70 bar above 20" LOT	
17"	1206 1206	**13 3/8"**	P110, 72 lb/ft, New Vam		1.15sg	FIT 1.60 sg		**1100**	1197	1197	1.45 g/cm³ POBM Cmt Plug #2	72 bar above 13 3/8" FIT	
8 1/2"	2042 2220				1.45 sg	N/A		**1300** **1914** **2194**	1887 2024	2013 2194	Perigon 1.45 g/cm³ POBM Top Heimdal Cmt Plug #1		

5.8.5 Time/depth curve

STATOIL

Time - Depth Plot

Borgland Dolphin



Budget time (days)
Optimum time (days)
Actual time (days)

Updated date/time:
Date: 24.09.2003
Time: 08:57

Start date/time:
Date: 19.05.2003
Time: 20:30

Finish date/time:
Date: 22.06.2003
Time: 22:00

Total budget time:
35.1

Time used:
34.1

Time ahead of budget:
1.0

Comments:

5.8.6 Timeplanner

Sun	Updated: 21.09.2003	16:03
Mon	Start date: 19.05.2003	20:30
Sun	Finished: 22.06.2003	22:00

TIMEPLANNER

STATOIL

16/1-6S, Verdandi

Borgland Dolphin

Time ahead of budget: 1,0

DAY	START DATE	START TIME	Budg. time (hrs)	Acc. budg. time (days)	Opt. time (hrs)	Acc. opt. time (days)	Budg. depth (mMD)	Plan time (hrs)	Actual time (hrs)	Acc. actual time (days)	Actual Depth (mMD)	Stat	Activity description	Company
													Rig move / Anchor handling and 36" section	
Mon	19.05.2003	20:30											Start operation	Dolphin / Marine
Mon	19.05.2003	20:30	34,0	1,4	21,0	0,9		21,0	23,5	1,0	0	F	Move rig from Statfjord E-template to Verdandi (145 nm	
Tue	20.05.2003	20:00	32,0	2,8	20,0	1,7	143,0	24,0	28,5	2,2	143	F	Set anchors and ballast rig to drilling draft. Finalize rig positioning	
Thu	22.05.2003	00:30	0,0	2,8	0,0	1,7	143,0	0,0	0,0	2,2	143	F	Rig modification	
Thu	22.05.2003	00:30	6,0	3,0	0,0	1,7	143,0	0,0	0,0	2,2	143,0	F	Pick up drill pipe/drill collars	
Thu	22.05.2003	00:30	7,0	3,3	5,0	1,9	143,0	5,0	1,5	2,2	143,0	F	MU cement stand and 30" cond housing. R/B same. MU 36" BHA	
Thu	22.05.2003	02:00	3,0	3,4	1,0	2,0	143,0	1,0	1,5	2,3	143,0	F	Continue RIH while PU 5" HWDP. Pos rig and placed ROV buoys on seabed	
Thu	22.05.2003	03:30	10,0	3,8	8,0	2,3	205,0	9,0	9,0	2,7	207,0	F	Drill 36" hole to 205 m. Circulate hole clean.	
Thu	22.05.2003	12:30	5,0	4,0	4,0	2,5	205,0	4,0	1,5	2,7	207,0	F	Displace to 1.35 sg mud. POOH. R/B DC and HWDP. L/D BHA	
Thu	22.05.2003	14:00	14,0	4,6	10,0	2,9	205,0	10,0	9,0	3,1	207,0	F	Rig up and run 30" conductor, PGB and cement stinger	
Thu	22.05.2003	23:00	10,0	5,0	9,0	3,3	205,0	9,0	12,0	3,6	207,0	F	Pump and displace G-cement. WOC and release running tool. Flush & POOH	
Fri	23.05.2003	11:00	3,0	5,2	2,0	3,3	205,0	2,0	1,0	3,6	207,0	F	L/D cement stand and 36" BHA. Make up cement stand for 20" casing	
Fri	23.05.2003	12:00	0,0	5,2	0,0	3,3	205,0	0,0		3,6	207,0	F	Optional: Planned rig maintenance	
Fri	23.05.2003	12:00	6,0	5,4	4,0	3,5	205,0	4,0	10,0	4,1	207,0	F	M/U 26" BHA and RIH.	
Fri	23.05.2003	22:00	3,0	5,5	2,0	3,6	205,0	2,0	3,0	4,2	207,0	F	Drill out shoe track and 30" condutor shoe	
Sat	24.05.2003	01:00		5,5	7,0	3,9	205,0	7,0	5,5	4,4	207,0	F	POOH to change failed MWD. Run back in hole	
Section time (days)				5,5		3,9		4,1	4,4				Section time ahead of/behind (-) budg:1,1 days, Tot. time ahead of/behind (-) budg:1 days	
													26" section	
Sat	24.05.2003	06:30	24,0	6,5	12,0	4,4	556,0	12,0	13,0	5,0	551,0	F	Drill 26"hole section TD	
Sat	24.05.2003	19:30	7,0	6,8	4,0	4,5	556,0	4,0	7,5	5,3	551,0	F	Circulate well clean, displace to 1.35 sg mud. Wash PGB. POOH.	
Sun	25.05.2003	03:00	20,0	7,7	9,0	4,9	556,0	9,0	12,0	5,8	551,0	F	R/U and run 20" casing and 18 3/4" WH housing.	
Sun	25.05.2003	15:00	10,0	8,1	5,0	5,1	556,0	5,0	3,5	5,9	551,0	F	Circulate. Pume and displace cement.	
Sun	25.05.2003	18:30	4,0	8,3	3,0	5,3	556,0	3,0	1,5	6,0	551,0	F	Release RT and wash WH area. POOH.	
Sun	25.05.2003	20:00	7,0	8,5	1,0	5,3	556,0	1,0	1,0	6,0	551,0	F	L/D RT, cement stand and 26" BHA.	
Sun	25.05.2003	21:00	36,0	10,0	20,0	6,1	556,0	20,0	20,0	6,9	551,0	F	Prepare to run BOP. Run BOP/riser. Press. Test BOP, WH conn. and casing to 180 bar	
Mon	26.05.2003	17:00	0,0	10,0	0,0	6,1	556,0	0,0	0,0	6,9	551,0	F	Optional: Planned rig maintenance	
Mon	26.05.2003	17:00	3,0	10,2	1,5	6,2	556,0	1,5	3,5	7,0	551,0	F	M/U cement stand and hang off tool	
Mon	26.05.2003	20:30	9,0	10,5	4,0	6,4	556,0	5,0	6,5	7,3	551,0	F	M/U 17" BHA and RIH	
Tue	27.05.2003	03:00	5,0	10,8	3,0	6,5	556,0	3,0	3,5	7,4	551,0	F	Drill out shoe track and drill 3 m new formation while disp. to 1.15 g/cm³ mud	Dolp./Dowel/FKS
Tue	27.05.2003	06:30	4,0	10,9	2,5	6,6	559,0	2,5	2,0	7,5	554,0	F	Pull in to casing shoe, circulate and perform LOT	Dolphin/FKS
Section time (days)				5,4		2,7		2,8	3,1				Section time ahead of/behind (-) budg:2,3 days, Tot. time ahead of/behind (-) budg:1 days	
													17" section	
Tue	27.05.2003	08:30	30,0	12,2	21,0	7,5	1200,0	21,0	27,5	8,6	1206,0	F	Drill 17" hole to section TD (Goal 30 m/hr effective)	Dolphin
Wed	28.05.2003	12:00	13,0	12,7	8,0	7,8	1200,0	8,0	10,5	9,1	1206,0	F	Circulate hole clean, flowcheck and POOH. Pull WE	Dolphin / Marine
Wed	28.05.2003	22:30	20,0	13,5	14,0	8,4	1200,0	14,0	20,0	9,9	1206,0	F	Rig up and run 13 3/8" casing and 16" casing hanger.	
Thu	29.05.2003	18:30	10,0	14,0	5,0	8,6	1200,0	5,0	2,0	10,0	1206,0	F	Circulate, pump and displace cement	Dolphin
Thu	29.05.2003	20:30	8,0	14,3	2,0	8,7	1200,0	2,0	5,0	10,2	1206,0	F	Release running tool. POOH. L/D running too	Dolphin/MI
Fri	30.05.2003	01:30	4,0	14,5	1,0	8,7	1200,0	1,0	1,5	10,3	1206,0	F	L/D 17" BHA and cement stand.	Dolp./Weath./FKS
Fri	30.05.2003	03:00	0,0	14,5	4,0	8,9	1200,0	4,0	0,0	10,3	1206,0	F	RIH and retrieve bore protector. Wash wellhead. POOH	
Fri	30.05.2003	03:00	0,0	14,5	3,0	9,0	1200,0	7,0	11,5	10,8	1206,0	F	Inspect ram rig and clean rig	
Fri	30.05.2003	14:30	0,0	14,5	0,0	9,0	1200,0	0,0	4,5	10,9	1206,0	F	RIH and run 18 3/4" wear bushing. POOH with WB running tool	
Fri	30.05.2003	19:00	0,0	14,5	0,0	9,0	1200,0	0,0	0,0	10,9	1206,0	F	Optional: Planned rig maintenance	
Fri	30.05.2003	19:00	8,0	14,8	5,0	9,2	1200,0	5,0	3,0	11,1	1206,0	F	M/U 8 1/2" AutoTrak assembly.	
Fri	30.05.2003	22:00	8,0	15,1	2,0	9,3	1200,0	2,0	4,0	11,2	1206,0	F	RIH with 8 1/2" BHA	
Sat	31.05.2003	02:00	6,0	15,4	3,0	9,4	1200,0	8,0	8,5	11,6	1206,0	F	Drill out shoe track while disp. to 1.39 g/cm³ POBM, and drill 3 m new formation	
Sat	31.05.2003	10:30	4,0	15,5	2,0	9,5	1203,0	2,0	1,5	11,6	1206,0	F	Circulate and perform FIT to 1.60 g/cm³ EMW	
Section time (days)				4,6		2,9		3,3	4,1				Section time ahead of/behind (-) budg:0,5 days, Tot. time ahead of/behind (-) budg:1 days	
													8 1/2" section, mainbore	
Sat	31.05.2003	12:00	57,0	17,9	26,0	10,6	1850,0	21,0	23,0	12,6	1872,0	F	Drill 8 1/2" hole with 3D system to top reservoir. (Goal: 25 m/hr effective	Dolphin
Sun	01.06.2003	11:00	2,0	18,0	2,0	10,7	1850,0	2,0	2,5	12,7	1872,0	F	Circulate BU for samples.	Dolphin / Marine
Sun	01.06.2003	13:30	0,0	18,0	0,0	10,7	1850,0	51,5	51,5	14,9	1899,0	F	Optional: POOH with 8 1/2" BHA. RIH and cut core(s). POOH. RIH w/ 8 1/2" BHA	
Tue	03.06.2003	17:00	0,0	18,0	12,5	11,2	2038,0	18,5	17,5	15,6	1997,0	F	Drill 8 1/2" hole to TD (Goal: 15 m/hr effective).	
Wed	04.06.2003	10:30	0,0	18,0	2,0	11,3	2038,0	2,0	1,5	15,6	1997,0	F	Circulate hole clean and POOH to top reservoir	
Wed	04.06.2003	12:00	0,0	18,0	8,0	11,6	2038,0	6,0	5,0	15,9	1997,0	F	Drop EMS survey tool and POOH to surface	Dolp./Dowel/FKS
Wed	04.06.2003	17:00	0,0	18,0	36,0	13,1	2038,0	43,0	42,0	17,6	1997,0	F	Perform wire line logging	Dolphin/FKS
Section time (days)				2,5		3,6		6,0	6,0				Section time ahead of/behind (-) budg:-3,5 days, Tot. time ahead of/behind (-) budg:1 days	
													8 1/2" section, sidetrack	
Fri	06.06.2003	11:00	12,0	18,5	8,0	13,4	2038,0	8,0	7,0	17,9	1997,0	F	P/U 3 1/2" cement stinger and RIH to TD	
Fri	06.06.2003	18:00	8,0	18,8	6,0	13,7	1650,0	6,0	7,0	18,2	1300,0	F	Plug back reservoir section with cmt. plug #1, install perigon CST, pump cmt. Plug #2	
Sat	07.06.2003	01:00	4,0	19,0	3,0	13,8	1300,0	3,0	6,0	18,4	1300,0	F	POOH to 1300 m. Circ. B/U.	
Sat	07.06.2003	07:00	12,0	19,5	8,0	14,1	1160,0	8,0	4,0	18,6	1150,0	F	Set kick-off plug up to 1150 m.	
Sat	07.06.2003	11:00	0,0	19,5	12,0	14,6	1160,0	14,0	17,5	19,3	1150,0	F	POOH and LD 5" DP and test BOP	
Sun	08.06.2003	04:30	7,0	19,8	5,0	14,9	1160,0	5,0	4,0	19,5	1150,0	F	M/U 8 1/2" AutoTrak assembly and RIH.	
Sun	08.06.2003	08:30	10,0	20,2	8,0	15,2	1220,0	10,0	10,0	19,9	1215,0	F	Tag cement. Drill cement down to 1215 mMD. Kick off well at 1215 m	
Sun	08.06.2003	18:30		20,2	0,0	15,2	1220,0			19,9	1215,0		NEW WELL NAME: 16/1-6A	
Sun	08.06.2003	18:30	25,0	21,3	24,0	16,2	1850,0	14,5	18,5	20,7	1427,0	F	Drill 8 1/2" hole with 3D system to top Grid. (Goal: 25 m/hr effective)	
Mon	09.06.2003	13:00	0,0	21,3	0,0	16,2	1850,0	44,0	47,0	22,6	1514,0	F	Optional: POOH with 8 1/2" BHA. RIH and cut core. POOH. RIH w/ 8 1/2" BHA	
Wed	11.06.2003	12:00	36,0	22,8	0,0	16,2	1850,0	12,0	23,0	23,6	1949,0	F	Drill 8 1/2" hole with 3D system to top reservoir. (Goal: 25 m/hr effective	
Thu	12.06.2003	11:00	4,0	22,9	2,0	16,3	1850,0	2,0	0,0	23,6	1949,0	F	Circulate BU for samples.	
Thu	12.06.2003	11:00	32,0	24,3	26,0	17,4	1880,0	24,0	0,0	23,6	1949,0	F	POOH with 8 1/2" BHA. RIH and 2nd core run. POOH with core	
Thu	12.06.2003	11:00	30,0	25,5	0,0	17,4	1880,0	24,0	0,0	23,6	1949,0	F	RIH with 3rd core run. POOH with core. RIH w/ 8 1/2" BHA	
Thu	12.06.2003	11:00	18,0	26,3	10,0	17,8	2210,0	8,0	8,0	23,9	2194,0	F	Drill 8 1/2" hole to TD (Goal: 15 m/hr effective).	
Thu	12.06.2003	19:00	4,0	26,4	4,0	17,9	2210,0	4,0	3,0	24,1	2194,0	F	Circulate hole clean and POOH to top reservoir	
Thu	12.06.2003	22:00	10,0	26,8	9,0	18,3	2210,0	11,0	16,5	24,8	2194,0	F	Drop EMS survey tool and POOH and lay down Baker BHA. L/D CBBI	
Fri	13.06.2003	14:30	73,0	29,9	30,0	19,6	2210,0	69,5	69,5	27,6	2194,0	F	Perform wireline logging (incl. Wipertrips & drill out shoetrack w/12 1/4" bit	
Mon	16.06.2003	12:00	0,0	29,9	0,0	19,6	2210,0	30,0	30,0	28,9	2194,0	F	Perform MDT/GR logging on DP to 2162 m	
Section time (days)				11,9		6,5		12,4	11,3				Section time ahead of/behind (-) budg:0,6 days, Tot. time ahead of/behind (-) budg:1 days	
													Plugging and abandonment	
Tue	17.06.2003	18:00	12,0	30,4	6,0	19,8	2210,0	6,0	18,5	29,7	2194,0	F	P/U 3 1/2" cement stinger and RIH to TD. Plug back Heimdal sand	
Wed	18.06.2003	12:30	6,0	30,6	3,0	19,9	2210,0	3,0	4,0	29,8	1100,0	F	POOH to 1300m. Install CST (cement support tool)	
Wed	18.06.2003	16:30	17,0	31,3	10,0	20,4	1100,0	14,0	13,0	30,4	1100,0	F	Plug back trans. zone OH/csg with cement. POOH. LD 600m 5"DP & 3 1/2" DF	
Thu	19.06.2003	05:30	7,0	31,6	3,0	20,5	1100,0	3,0	3,5	30,5	1100,0	F	RIH with jet assembly and Multi Purpose Tool. Rtrieve Wear Bushing. POOH	
Thu	19.06.2003	09:00	2,0	31,7	2,0	20,6	1100,0	2,0	0,0	30,5	1100,0	F	L/D 6 1/2" DC's and hang off tool	
Thu	19.06.2003	09:00	7,0	32,0	4,0	20,7	1100,0	4,0	0,5	30,5	1100,0	F	RIH with 13 3/8" EZSV on DP to 110 m	
Thu	19.06.2003	09:30	2,0	32,1	1,0	20,8	1100,0	1,0	0,5	30,6	1100,0	F	Pressure test transtition zone cment plug to 70 bar above 13 3/8" FIT	
Thu	19.06.2003	10:00	2,0	32,2	2,0	20,9	470,0	2,0	3,0	30,7	425,0	F	Set 13 3/8" EZSV at 425 m. Test to 70 bar above 13 3/8" FIT.	
Thu	19.06.2003	13:00	8,0	32,5	7,0	21,1	470,0	7,0	6,0	30,9	175,0	F	Displace well to sea water. Place cement plug from 425 to 180 m. POOH	
Thu	19.06.2003	19:00	0,0	32,5	0,0	21,1	470,0	13,0	12,0	31,4	175,0	F	Lay down and backload 5 riser joints	
Fri	20.06.2003	07:00	24,0	33,5	20,0	22,0	170,0	20,0	19,0	32,2	175,0	F	Pull riser and BOP.	
Sat	21.06.2003	02:00	10,0	33,9	7,0	22,3	143,0	7,0	11,0	32,7	0,0	F	RIH with MOST and motor cutting assy. Cut WH. POOH w/PGB & WH	
Sat	21.06.2003	13:00	2,0	34,0	2,0	22,4	143,0	2,0	0,0	32,7	0,0	F	L/D WH and cutting assembly	
Sat	21.06.2003	13:00	26,0	35,1	20,0	23,2	143,0	30,0	33,0	34,1	0,0	F	Pull anchors & deballast rig, meanwhile L/D WH/PGB and cutting assy - 6 hrs	
Sun	22.06.2003	22:00		35,1		23,2				34,1			END OF WELL	
Sun	22.06.2003	22:00		5,2				4,8	5,2				Section time ahead of/behind (-) budg:0 days, Tot. time ahead of/behind (-) budg:1 days	
End of operation														

5.8.7 Lost time log 16/1-6S

Date / Time

(All data according to DBR)

LOST TIME LOG For Verdandi 16/1-6S

Start: 2003-05-19-20:30:00
End 2003-06-8-18:30:00

Updated: 07.09.2003 **Time used:** **19,92** days

Section	Date	Time	Waiting hrs	Downtime hrs	Quality time hrs	Synergi no	Brief Problem description	Company	Dril Quip	Dolphin	BHI DD	BHI MWD	Security DBS	Oceaneering	Geoservice	Slb WL	Weatherford	Halliburton Cem	Res Lab.	Other	Quality time	WOW	WOC	Other Waiting
Anchor	21-mai-03	00.00-01.00	1,0	0,0	0,0	N/A	Wait to offload boat																	1,0
36"	23-mai-03	00:30-08:00	7,5	0,0	0,0	N/A	WOC after 30" conductor job																7,5	
26"	23-mai-03	13.30-18.00	0,0	4,5	0,0	Statoil # 220295	MPR sub failure	BHI MWD				4,5												
26"	23-mai-03	18.00-18.30	0,0	0,5	0,0	Dolphin # 44104357	Load cell failure on DDM	Dolphin		0,5														
26"	23-mai-03	20:30-22:00	0,0	1,5	0,0	Statoil # 220297	MWD failure	BHI MWD				1,5												
26"	24-mai-03	01.00-06.30	0,0	5,5	0,0	Statoil # 220297	MWD failure	BHI MWD				5,5												
26"	25-mai-03	14.00-14.30	0,0	0,5	0,0	Dolphin # 4410468	N2 system built up pressure	Dolphin		0,5														
17"	27-mai-03	21.30-23.00	0,0	0,0	1,5	N/A	Wiper trip														1,5			
17"	29-mai-03	00.30-01.30	0,0	1,0	0,0	Dolphin # 44104413	PS-30 slips failure	Dolphin		1,0														
17"	29-mai-03	04:30-05:00	0,0	0,5	0,0	Dolphin # 44104412	Troubleshot BX elevator	Dolphin		0,5														
17"	29-mai-03	05:30-06:00	0,0	0,5	0,0	Dolphin # 44104412	Troubleshot BX elevator	Dolphin		0,5														
17"	30-mai-03	17:30-18:30	0,0	1,0	0,0	N/A	Unable to set WB	Other												1,0				
8 1/2"	1-jun-03	17:30-22:30	0,0	5,0	0,0	Dolphin # 44104446	Troubleshot pulse counter on ram cylinder A	Dolphin		5,0														
8 1/2"	2-jun-03	08:30-10:30	0,0	2,0	0,0	Dolphin # 44104446	Troubleshot pulse counter on ram cylinder A	Dolphin		2,0														
8 1/2"	3-jun-03	03:30-08:00	0,0	4,5	0,0	Dolphin # 44104446	Changed pulser on ram cylinder A	Dolphin		4,5														
8 1/2"	3-jun-03	23:30-00:00	0,0	0,5	0,0	Statoil # 221919	Loss while drilling the Ekofisk chalk	Other												0,5				
8 1/2"	4-jun-03	00:00-10:30	0,0	10,5	0,0	Statoil # 221919	Loss while drilling the Ekofisk chalk	Other												10,5				
8 1/2"	5-jun-03	02:00-04:30	0,0	2,5	0,0	Statoil # 222235	MDT surface power supply failure	Slb								2,5								
8 1/2"	8-jun-03	00:00-00:30	0,0	0,5	0,0	Dolphin # 44104478	PS-30 slips failure	Dolphin		0,5														
	TOTAL		**8,5**	**41,0**	**1,5**				**0,0**	**15,0**	**0,0**	**11,5**	**0,0**	**0,0**	**0,0**	**2,5**	**0,0**	**0,0**	**0,0**	**12,0**	**1,5**	**0,0**	**7,5**	**1,0**

Total Time:	**478,0**	**100,0**	%
Total down time :	**41,0**	**8,6**	%
Total Waiting time	**8,5**	**1,8**	%
Total Quality time:	1,5	**0,3**	%
Total up time:	427,0	89,3	%

WOW time subtracted from the factors below:

Operational Efficiency Facto	**91,4**	%

Operational Down Time:	**8,6**	%
Operational Quality Time:	**0,3**	%
Operational Up Time:	**89,3**	%
Total:	**98,2**	%

Total WOW time, Operational Efficiency Factor and Operational DownTime to be reported on DBR:

5.8.8 Lost time log 16/1-6A

LOST TIME LOG

Date / Time

(All data according to DBR)

(Only one company on lost time at any stage)

Updated:

Start: 2003-06-8-18:30:00
End 2003-06-22-22:00:00
Start 2
End 2
Start 3
End 3
Start 4
End 4

Time used for the well: (16/1-6A) **14,15** days

																					Q. time	Waiting Time			
Date	**Hrs**	**Waiting hrs**	**Downtime hrs**	**Quality time hrs**	**RUH no**	**Problem description**	**Company**	**BHI DD**	**BHI MWD**	**Dolphin**	**Schlumberger**	**MI Norge**	**Dril Quip**	**Halliburton Cem**	**Oceaneering**	**Geoservices**	**Security DBS**	**Weatherford**	**Res Lab.**	**Nodeco**	**Statoil**	**Other**	**Quality time**	**WOW**	**WOC**	**Other**
9-jun-03	08:30-09:30	0,0	1,0	0,0	Dolphin # 44104490	Overtorqued seaver sub connection	Dolphin			1,0																
9-jun-03	15:30-18:30	0,0	3,0	0,0	Dolphin # 44104489	Problems with PS30 slips	Dolphin			3,0																
9-jun-03	22:00-24:00	0,0	2,0	0,0	Dolphin # 44104491	Troubleshot on lower guiding arm	Dolphin			2,0																
13-jun-03	01:00-09:30	0,0	8,5	0,0	Dolphin # 44104498	Troubleshot on monkey arm	Dolphin			8,5																
13-jun-03	19:00-22:00	0,0	3,0	0,0	Statoil # 223547	Not able to pass 1170m w/ WL log	Other															3,0				
13-jun-03	22:00-24:00	0,0	0,0	2,0	N/A	Wiper trip to 1300m																	2,0			
14-jun-03	00:00-12:00	0,0	0,0	12,0	N/A	Wiper trip to 1300m																	12,0			
14-jun-03	13:00-15:30	0,0	2,5	0,0	Statoil # 223547	Not able to pass 1150m w/ WL log	Other															2,5				
14-jun-03	15:30-24:00	0,0	0,0	8,5	N/A	Drill out 13 3/8" shoetrack with 12 1/4" bit																	8,5			
15-jun-03	00:00-21:00	0,0	0,0	21,0	N/A	Drill out 13 3/8" shoetrack with 12 1/4" bit + wipertrip to TD																	21,0			
15-jun-03	21:00-22:00	0,0	1,0	0,0	Dolphin: 44104510	Lost rig-air	Dolphin			1,0																
15-jun-03	22:00-24:00	0,0	0,0	2,0	N/A	wipertrip to TD																	2,0			
16-jun-03	00:00-05:30	0,0	0,0	5,5	N/A	wipertrip to TD																	5,5			
16-jun-03	06:30-12:00	0,0	5,5	0,0	Statoil # 223547	Not able to pass 1750 with WL log	Other															5,5				
17-jun-03	06:30-16:30	0,0	10,0	0,0	Statoil # 223547	Not able to pass 1747 with MDT on TLC	Other															10,0				
18-jun-03	17:30-18:00	0,0	0,5	0,0	Dolphin44104525	Stop in drill water supply during cementing	dolphin			0,5																
18-jun-03	04:30-05:30	0,0	1,0	0,0	dolphin 44104527	Pipe skate stopped	dolphin			1,0																
		0,0	0,0	0,0																						
TOTAL		**0,0**	**38,0**	**51,0**				**0,0**	**0,0**	**17,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**21,0**	**51,0**	**0,0**	**0,0**	**0,0**
		Waiting hrs	**Downtime hrs**	**Quality time hrs**		**Problem description**	**Company**	**BHI DD**	**BHI MWD**	**Dolphin**	**Schlumberger**	**MI Norge**	**Dril Quip**	**Halliburton Cem**	**Oceaneering**	**Geoservices**	**Security DBS**	**Weatherford**	**Res Lab.**	**Nodeco**	**Statoil**	**Other**	**Quality time**	**WOW**	**WOC**	**Other**

Total Time:	**339,5**	**hrs**	**100,0** %
Total down time :	**38,0**	**hrs**	**11,2** %
Total Waiting time	**0,0**	**hrs**	**0,0** %
Total Quality time:	**51,0**	**hrs**	**15,0** %
Total up time:	**250,5**	**hrs**	**73,8** %

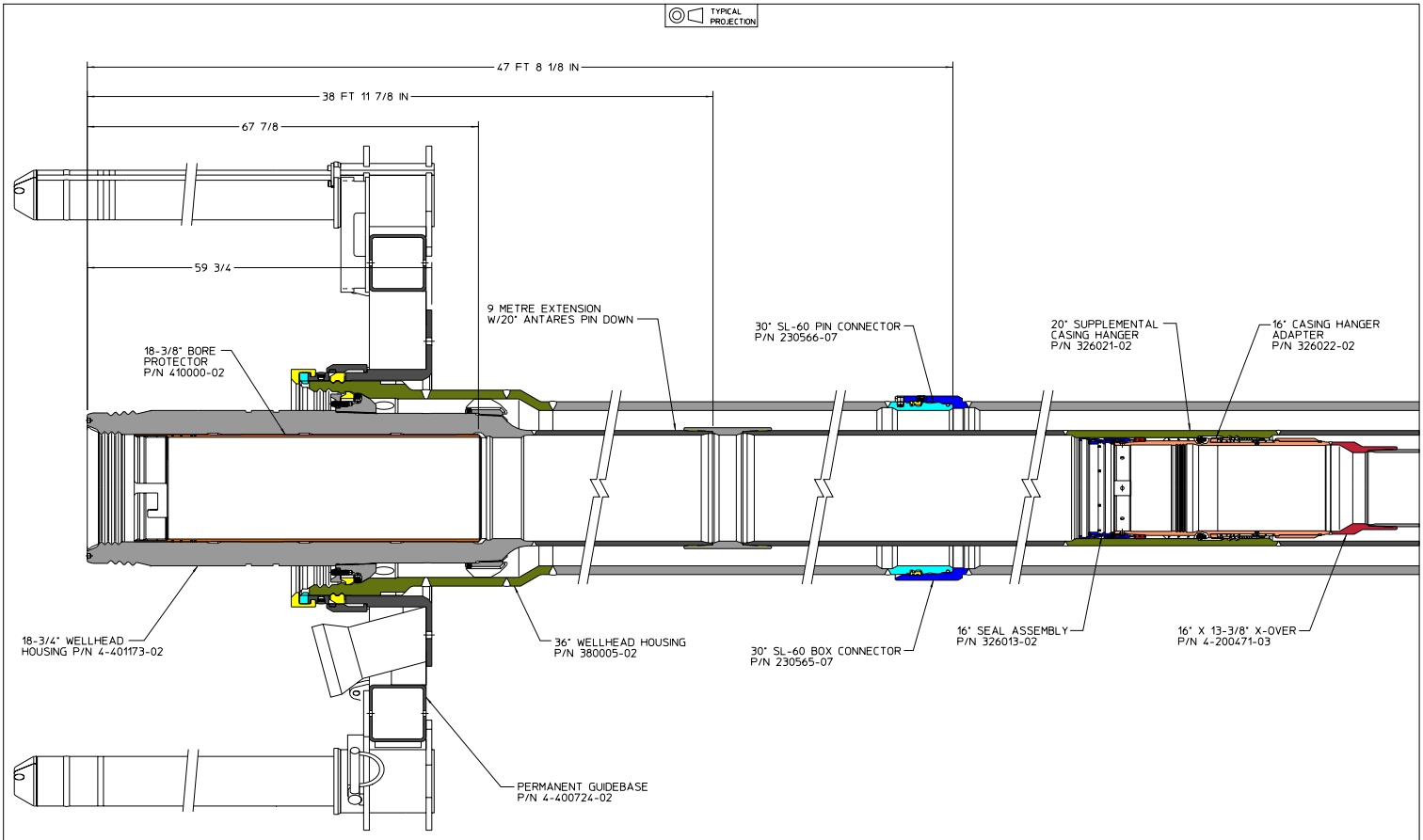
Total WOW time, Operational Efficiency Factor and Operational DownTime to be reported on DBR:

WOW time subtracted from the factors below:

Operational Efficiency Factor:	**88,8**	**%**

Operational Down Time:	**11,2**	**%**
Operational Quality Time:	**15,0**	**%**
Operational Up Time:	**73,8**	**%**
Total:	**100,0**	**%**

5.8.9 Wellhead system



NOTES:

ESTIMATED WEIGHT	
LBS.	KG.

REVISIONS				
REV.	DATE	CHKD.	APP.	REL.

DWN. BY: PB
CHKD. BY:
APP. BY:
REL. BY:
REL. DATE:
REF. LAYOUT:
ALL DIMENSIONS IN INCHES

CAD

SWS. STACK-UP. WELLHEAD. TYPE SS-15. 30" X 20" CASING PROGRAM W/EXTENDED LENGTH WEAR BUSHING INSTALLED F/ STATOIL WELL 16/6-15
SALES DRAWING

DRIL-QUIP (EUROPE) LTD.

DWG SIZE	PART NUMBER	LAST REV
A1	4-SD-30347-02CP	

5.8.10 Drilling fluids

Well: 16/1-6S & 6A
Field: Verdandi
Rig: Borgland Dolpin

DRILLING FLUIDS PROGRAMME

HOLE SIZE	HOLE TVD MD	CASING SIZE	CASING TVD MD	MUD TYPE	MW [g/cm³]	LGS [kg/m³]	10 sec. [Pa]	10 min. [Pa]	API FL [ml]	Fann 3 rpm [lb/sqft]	PV [cP]	FV [sec]	YP [Pa]	KCl [kg/m³]	pH	Ca++ [g/cm³]	MBT [kg/m³]	Glycol [V/V %]		Total Volume Old Volume New Volume Usage [m³]
36"	203 203	**30"**	202 202	SW/ Bentonite sweeps	1.03 - 1.35							>200			8 - 9					396 0 396 305
26"	551 551	**20"**	546 546	SW/ Bentonite sweeps	1.03 - 1.35							>200			8 - 9					543 305 238 543
17"	1 206 1 206	**13 3/8"**	1 197 1 197	Glydril	1.15 - 1.21	9 - 98	5 - 6	7	3.1 - 3.6	8 - 10	13	na	12.5 - 13.5	168 - 173	7.9 - 8.1	1200 - 2600		5		601 0 601 448

HOLE SIZE	HOLE TVD MD	MUD TYPE	MW [g/cm³]	LGS [kg/m³]	10 sec. [Pa]	10 min. [Pa]	API FL [ml]	Fann 3 rpm [lb/sqft]	PV [cP]	YP [Pa]	HTHP FL [ml]	Filter cake [ml]	pH	Activity	ES [Volt]	Ex. Lime [kg/m³]	OWR	Total Volume Old Volume New Volume Usage [m³]
8 1/2"	1 909 1 997	Novatec Pseudo oil based mud	1.35 - 1.39	25 - 103	5 - 6	6 - 7	na	7 - 10	20 - 31	9 - 11	1.8 - 2.1	1	na	0.86 - 0.9	550 - 663	7 - 15.2	66/34 - 78/22	493 263 260 140
8 1/2" sidetrack	2 024 2 194	Novatec Pseudo oil based mud	1.45	46 - 163	4 - 6	6 - 7	na	8 - 11	17 - 24	9 - 12	1.8	<1	na	0.89 - 0.94	542 - 828	7.8 - 11.4	63/37 - 76/24	646 533 113 55

5.8.11 Cementing data well 16/1-6S

Well: 16/1-6S
Field: Verdandi
Rig: Borgland Dolphin

CEMENT PROGRAMME

HOLE		CASING SHOE		TOC	VOLUME/ EXCESS	CEMENT SLURRY DESIGN										SPACER	DISPLACEMENT
SIZE	TVD MD	SIZE	TVD MD	TVD MD		Components	Lead [ltr/100kg]	Tail [ltr/100kg]	Density [g/cm^3]	Yield [ltr/100kg]	Stat. / Circ. Temp [°C]	Thickening time [hrs to 30 Bc]	API Free Water [%]	API Fluid loss [cc/30min]	24 hrs C. S. [psi]		Fluids and Rates
36"	207	**30"**	203	143	Lead: 12 m3 Tail: 18 m3 150%	Norcem "G" + 0,1% EZ-FLO CaCl2 liquid Econolite NF-6 Sea water	- 3.20 0.10 95.07	4.35 - 0.10 39.56	L: 1,56 T: 1,95	L: 129,42 Code STL10 T: 75,06 Code STT10	6-8	L: > 6 T: 3 - 4	n/a	n/a	L: +/- 200 T: +/- 500	Min. 30 m3 Sea water	Sea water 1000 - 2000 lpm
26"	551	**20"**	546	138	Lead: 70,5 m^3 Tail: 16,2 m^3 50% (Lead)	Norcem "G" Cmt. (100 kg) Econolite NF-6 Sea water	3.20 0.10 95.07	- 0.10 43.78	L: 1,56 T: 1,92	L: 129,42 Code STL10 T: 74,93 Code STTNT	22 / 19	L: 6:46 T: 5:00	n/a	n/a	L: 300 T: 1650	Casing volume Sea water	Sea water 3000 lpm
17"	1 206	**13 3/8"**	1 197	995	Lead: 29,7 m3 Tail: 15 m3 20 %	Norcem "G" Cmt. (100 kg) Gascon 469 Halad-613L HR-4L CFR-5LE+ NF-6 Fresh water	5.50 10.00 0.50 2.00 0.10 44.32	- - 0.50 - 0.10 43.32	L: 1,75 T: 1,92	L: 93,51 Code GTF79 T: 75,01 Code MPT14	48 / 37	L: 5:10 T: 2:59	L: 0 T: 1	L: 38 T: n.a.	L: 1000 T: 1800	20 m3 Tuned Spacer	WBM 3000 lpm
8 1/2"	1973	**OH plug**	1973	1725	9,8 m3 20%	Norcem "G" Cmt. (100 kg) Gascon 469 Halad-613L HR-5L CFR-5LE+ NF-6 Fresh water		3.50 10.00 0.40 2.50 0.10 30.17	1.90	77.76 Code GTT90	84 / 68	05:17	0	32	+/- 2900	5 m3 Tuned spacer	OBM
8 1/2"	1550	**OH plug**	1550	1320	9 m3 20%	Norcem "G" Cmt. (100 kg) Gascon 469 Halad-613L HR-5L CFR-5LE+ NF-6 Fresh water		3.50 10.00 0.40 2.50 0.10 30.17	1.90	77.76 Code GTT90	84 / 68	05:17	0	32	+/- 2900	5 m3 Tuned spacer	OBM

5.8.12 Cementing data well 16/1-6A

Well: 16/1-6A
Field: Verdande
Rig: Borgland Dolphin

CEMENT PROGRAMME

HOLE		CASING SHOE		TOC	VOLUME/ EXCESS	CEMENT SLURRY DESIGN										SPACER	DISPLACEMENT
SIZE	TVD MD	SIZE	TVD MD	TVD MD		Components	Lead [ltr/100kg]	Tail [ltr/100kg]	Density [g/cm^3]	Yield [ltr/100kg]	Stat. / Circ. Temp [°C]	Thickening time [hrs to 30 Bc]	API Free Water [%]	API Fluid loss [cc/30min]	24 hrs C. S. [psi]		Fluids and Rates
8 1/2"	2194	**OH plug**	2194	1914	10,5 m3 20%	Norcem "G" Cmt. (100 kg) Halad-613L HR-4L CFR-5LE+ NF-6 Fresh water		1.00 0.30 1.00 0.10 43.33	1.90	76.82 Code MPT05	84 / 68	04:05	0	n.a.	2700	5 m3 Tuned spacer	OBM
8 1/2" **x** **13 3/8"**	1 300 1 300	**transition plug**	1 300 1 300	1 100 1 100	10,9 m3 20% in OH	Norcem "G" Cmt. (100 kg) Halad-613L HR-4L NF-6 Fresh water (seawater on last 5,4 m3)		0.50 0.50 0.10 42.84	1.92	75.02 Code MPT14	55 / 44	03:18	1.3	n/a	2200	8 m3 Tuned spacer	OBM
13 3/8" **x** **20"**	425 425	**Surface Plug**	425 425	175 175	43,5 m3	Norcem "G" Cmt. (100 kg) NF-6 Sea Water		0.10 46.74		77.90 Code STTNT	18 / 15	+/- 4	n/a	n/a	+/- 1200	seawater	Seawater

5.8.13 Bottom hole assemblies well 16/1-6S

BHA report

Wellbore: NO 16/1-6 S

BHA seq: 1 BHA category: BHA description: **36" drilling assy**

BHA no: 1

String component	OD in	ID in	Length m	Acc length m
DRILL COLLAR	8.000		111.61	111.61
X-OVER	9.500		0.91	112.52
ANDERDRIFT	8.125		3.08	115.60
BIT	17.500		0.42	116.02
HOLE OPENER	26.000		1.06	117.08
X-OVER	8.000		0.63	117.71
HOLE OPENER	36.000		2.92	120.63
FLOAT SUB	9.500		0.91	121.54
HW DRILL PIPE	5.000		92.38	213.92

BHA seq: 2 BHA category: BHA description: **26" drilling assy**

BHA no: 2

String component	OD in	ID in	Length m	Acc length m
MPR SUB	8.250		5.03	218.95
X-OVER	9.375		0.32	219.27
STAB. NB W/FLOAT	26.000		2.43	221.70
STAB STRING	9.500		2.29	223.99
STAB STRING	26.000		2.39	226.38
BIT	26.000		0.57	226.95
MWD TOOL,HIGH FLOW	8.250		11.11	238.06
X-OVER	7.750		0.63	238.69
DRILL COLLAR	8.000		111.61	350.30
DRILL COLLAR	9.500		2.64	352.94
HW DRILL PIPE	5.000		83.12	436.06
SAVER SUB	8.125		0.70	436.76

BHA seq: 3 BHA category: BHA description: **17" drilling assy**

BHA no: 3

String component	OD in	ID in	Length m	Acc length m
STAB STRING	17.000		2.39	439.15
STAB. NB W/FLOAT	17.000		2.29	441.44
MWD TOOL,HIGH FLOW	8.250		11.16	452.60

MPR SUB	8.250	5.03	457.63
X-OVER	9.375	0.32	457.95
SAVER SUB	8.125	0.70	458.65
STAB STRING	17.000	1.98	460.63
DRILL COLLAR	8.000	102.31	562.94
DRILL COLLAR	9.500	3.00	565.94
BIT	17.000	0.43	566.37
HW DRILL PIPE	5.000	83.12	649.49
X-OVER	7.750	0.63	650.12
DRILL COLLAR	8.000	18.29	668.41
JAR	7.750	9.67	678.08

BHA seq: 4 BHA category: Drilling BHA description: **8,5" autotrack assy**

BHA no: 4

String component	OD in	ID in	Length m	Acc length m
H W DRILL PIPE	6.500	3.000	83.12	761.20
DRILL COLLAR	6.500	2.813	28.40	789.60
JAR	6.500	2.750	9.31	798.91
DRILL COLLAR	6.500	2.813	85.24	884.15
FLOAT SUB	6.625	2.250	0.95	885.10
ROLLER REAMER	8.500	2.813	2.02	887.12
ORIENTING SUB	6.188	2.813	1.49	888.61
STOP SUB	6.500	2.813	0.51	889.12
NM DRILL COLLAR	6.875	2.750	9.39	898.51
NON MAG. X-OVER	6.500	2.813	0.60	899.11
BCPM	6.500	2.813	3.21	902.32
FLEX SUB W/ STAB	8.375	2.813	1.31	903.63
ON TRAK	8.375	2.813	5.14	908.77
AUTOTRAK	8.375	2.813	3.48	912.25
BIT	8.500		0.33	912.58

BHA seq: 5 BHA category: Drilling BHA description: **8,5" core assy**

BHA no: 5

String component	OD in	ID in	Length m	Acc length m
H W DRILL PIPE	6.500	3.000	83.12	995.70
JAR	6.500	2.750	9.31	1005.01
DRILL COLLAR	6.500	4.810	113.65	1118.66
FLOAT SUB	6.500		0.91	1119.57
CORE BARREL	8.470	4.250	30.09	1149.66
CORE HEAD	8.500		0.36	1150.02

BHA seq: 6 BHA category: Drilling BHA description: **8,5" autotrack assy**

BHA no: 6

String component	OD in	ID in	Length m	Acc length m
NON MAG. X-OVER	6.500	2.813	0.60	1150.62

BCPM	6.500	2.813	3.21	1153.83
FLEX SUB W/ STAB	8.375	2.813	1.31	1155.14
ON TRAK	8.375	2.813	5.14	1160.28
AUTOTRAK	8.375	2.813	3.48	1163.76
STOP SUB	6.500	2.813	0.51	1164.27
BIT	8.500		0.33	1164.60
DRILL COLLAR	6.500	2.813	28.40	1193.00
JAR	6.500	2.750	9.31	1202.31
DRILL COLLAR	6.500	2.813	85.24	1287.55
NM DRILL COLLAR	6.875	2.750	9.39	1296.94
ORIENTING SUB	6.188	2.813	1.49	1298.43
FLOAT SUB	6.625	2.250	0.95	1299.38
H W DRILL PIPE	6.500	3.000	83.12	1382.50
ROLLER REAMER	8.500	2.813	2.02	1384.52

BHA seq: 7 BHA category: Wireline BHA description:

PEX-AIT / DSI logging string

BHA no: 7

String component	OD in	ID in	Length m	Acc length m
ACTS	3.375		1.22	1385.74
DTC-H	3.375		0.91	1386.65
HILTB-DTB	3.375		6.01	1392.66
AH-107	3.375		0.60	1393.26
AH-107	3.375		0.61	1393.87
DSST-B	3.625		15.54	1409.41
LEH-QT	2.313		0.89	1410.30
HAIT-H	3.625		4.88	1415.18

BHA seq: 8 BHA category: Wireline BHA description: **MDT logging string.**

BHA no: 8

String component	OD in	ID in	Length m	Acc length m
LEH-QT	3.312		0.88	1416.06
ACTS	3.375		1.22	1417.28
GAMMA-RAY	3.375		1.67	1418.95
MRPC	5.000		1.52	1420.47
MRHY	5.000		2.57	1423.04
MRPS	5.000		2.44	1425.48
LFA	5.000		1.55	1427.03
MRPO	5.000		3.24	1430.27
CGA	5.000		1.55	1431.82
MRSC	5.000		1.87	1433.69
TCC-BF	3.375		0.92	1434.61
MRSC	5.000		1.86	1436.47
MRMS	5.000		4.02	1440.49
MDAH-AA	5.000		0.27	1440.76

BHA seq: 9 BHA category: Wireline BHA description:

VSP logging string

BHA no: 9

String component	OD in	ID in	Length m	Acc length m
CABLE HEAD	3.120		0.88	1441.64
TAS	3.660		1.53	1443.17
ASR	5.160		0.89	1444.06
CABLE (7-46 HEPTA)			14.11	1458.17
ASR	5.160		0.89	1459.06
CABLE (7-46 HEPTA)			14.11	1473.17
ASR	5.160		0.89	1474.06
CABLE (7-46 HEPTA)			14.11	1488.17
CABLE (7-46 HEPTA)			4.11	1492.28
ASR	5.160		0.89	1493.17
CABLE (7-46 HEPTA)			4.11	1497.28
VSR	3.540		0.80	1498.08

BHA seq: 10 BHA category: Wireline BHA description:

CST logging string

BHA no: 10

String component	OD in	ID in	Length m	Acc length m
PEH-A	4.500		0.54	1498.62
AH-64	4.500		0.41	1499.03
PGGT-D	4.500		1.78	1500.81
CST-Z	4.500		3.48	1504.29
CST-AA	4.500		2.77	1507.06

5.8.14 Bottom hole assemblies well 16/1-6A

BHA report

Wellbore: NO 16/1-6 A

BHA seq: 1 BHA category: Drilling BHA description: *AutoTrak assembly*

BHA no: 1

String component	OD in	ID in	Length m	Acc length m
ORIENTING SUB	6.188	2.813	1.49	1.49
BIT	8.500		0.33	1.82
BCPM	6.500	2.813	3.21	5.03
FLOAT SUB	6.625	2.250	0.95	5.98
STOP SUB	6.500	2.813	0.51	6.49
JAR	6.500	2.750	9.31	15.80
ROLLER REAMER	8.500	2.813	2.02	17.82
DRILL COLLAR	6.500	2.813	85.24	103.06
NON MAG. X-OVER	6.500	2.813	0.60	103.66
NM DRILL COLLAR	6.875	2.750	9.39	113.05
AUTOTRAK	8.375	2.813	3.48	116.53
DRILL COLLAR	6.500	2.813	28.40	144.93
HW DRILL PIPE	6.500	3.000	83.12	228.05
ON TRAK	8.375	2.813	5.14	233.19
FLEX SUB W/ STAB	8.375	2.813	1.31	234.50
DP 5"	5.000	4.276	1.00	235.50

BHA seq: 2 BHA category: Drilling BHA description: *Core assembly*

BHA no: 2

String component	OD in	ID in	Length m	Acc length m
DRILL COLLAR	6.500	2.813	28.40	263.90
HWDP 5"	6.500	3.000	83.12	347.02
DRILL COLLAR	6.500	2.813	85.24	432.26
JAR	6.500	2.750	9.31	441.57
CORE BARREL	8.469		30.09	471.66
CORE HEAD	8.500		0.36	472.02
FLOAT SUB	6.500		0.91	472.93

BHA seq: 3 BHA category: Drilling BHA description: *AutoTrak assembly*

BHA no: 3

String component	OD in	ID in	Length m	Acc length m
STOP SUB	6.500	2.813	0.51	473.44
NON MAG. X-OVER	6.500	2.813	0.60	474.04
BCPM	6.500	2.813	3.21	477.25
FLEX SUB W/ STAB	8.375	2.813	1.31	478.56
AUTOTRAK	8.375	2.813	3.48	482.04
BIT	8.500		0.33	482.37
ROLLER REAMER	8.500	2.813	2.02	484.39
ON TRAK	8.375	2.813	5.14	489.53
HW DRILL PIPE	6.500	3.000	83.12	572.65
DRILL COLLAR	6.500	2.813	28.40	601.05
JAR	6.500	2.750	9.31	610.36
DRILL COLLAR	6.500	2.813	85.24	695.60
NM DRILL COLLAR	6.875	2.750	9.39	704.99
ORIENTING SUB	6.188	2.813	1.49	706.48
DP 5"	5.000	4.276	1.00	707.48
FLOAT SUB	6.625	2.250	0.95	708.43

BHA seq: 4 BHA category: Drilling BHA description:

Wipertrip

BHA no: 4

String component	OD in	ID in	Length m	Acc length m
HW DRILL PIPE	6.500	3.000	83.12	791.55
JAR	6.500	2.750	9.31	800.86
DRILL COL	6.500	2.815	28.40	829.26
STABILIZER	8.375	2.875	1.75	831.01
DRILL COLLAR	6.500	2.812	28.41	859.42
NB STAB W/FL	8.500	2.875	2.10	861.52
BIT	8.500		0.25	861.77

BHA seq: 5 BHA category: Drilling BHA description:

Wipertrip to drill out shoetrack

BHA no: 5

String component	OD in	ID in	Length m	Acc length m
HW DRILL PIPE	6.500	3.000	110.91	972.68
JAR	6.500	2.750	9.31	981.99
DRILL COL	6.500	2.815	28.40	1010.39
X-OVER	8.000	3.000	0.63	1011.02
DRILL COLLAR	8.000	2.812	28.28	1039.30
NB STAB W/FL	12.250	3.000	1.82	1041.12
BIT	12.250		0.30	1041.42

BHA seq: 6 BHA category: Drilling BHA description: *Wipertrip to TD*

BHA no: 6

String component	OD in	ID in	Length m	Acc length m
HW DRILL PIPE	6.500	3.000	83.12	1124.54
JAR	6.500	2.750	9.31	1133.85
DRILL COL	6.500	2.815	28.40	1162.25
STABILIZER	8.375	2.875	1.75	1164.00
DRILL COLLAR	6.500	2.812	28.41	1192.41
NB STAB W/FL	8.500	2.875	2.10	1194.51
BIT	8.500		0.25	1194.76

BHA seq: 7 BHA category: Wireline BHA description: *MDT/GR on TLC*

BHA no: 7

String component	OD in	ID in	Length m	Acc length m
DP 5"	6.625	4.276	146.29	1341.05
X-OVER	5.000	2.750	0.92	1341.97
MDT	6.000		27.00	1368.97
FLOAT SUB	6.500	2.750	0.92	1369.89
DP 5"	6.625	4.276	9.81	1379.70
SIDE ENTRY SUB	6.125	3.875	1.68	1381.38
DP 5"	6.625	4.276	962.95	2344.33
JAR	6.500	2.750	9.31	2353.64

BHA seq: 8 BHA category: BHA description: *Cut 20" x 30" casings*

BHA no: 9

String component	OD in	ID in	Length m	Acc length m
MOTOR	9.500	3.500	8.73	2362.37
STABILIZER	17.500		0.91	2363.28
CUTTER	12.000	2.000	1.83	2365.11
BULL NOSE	8.000	1.500	0.37	2365.48

5.8.15 Bit record well 16/1-6S

Bit record

Wellbore: NO 16/1-6 S

Run No	Bit Size	Bit No	BHA No	Bit Type	IADC code	Bit manufacturer	Serial No	Nozzles (n/32") no x n	no x n	no x n	no x n	Flow Area in2
2	26"	2	2	XT1C	115M	Security DBS		4 x 18	x	x	x	.995
3	17"	3	3	MX1	115	Hughes Christensen	6010225	1 x 20	3 x 18	x	x	1.053
4	8 1/2"	4	4	HCR607	M323	Hughes Christensen	7201627	4 x 11	3 x 12	x	x	.703
5	8 1/2"	5	5	FC274LI	M432	DIAMANT BOART S	10417494	x	x	x	x	1.550
6	8 1/2"	4RR	6	HCR607	M323	Hughes Christensen	7201627	4 x 11	3 x 12	x	x	.703

Wellbore: NO 16/1-6 S

Run No	Bit Size	Pump Rate l/min	Pump Press bar	Depth in mMD	Depth out mMD	Drilled length m	Hours Drilled	ROP	Min WOB ton	Max WOB ton	Min RPM	Max RPM	Torque Min Nm	Torque Max Nm	Con drag Min 1000 daN	Con drag Max 1000 daN
2	26"	4500	200	207	551	344	8.8	39.1	5		50		6			
3	17"	4500	230	533	1206	673	16	42.1	4	10	130	170	6	40		
4	8 1/2"	2400	230	1169	1872	703	17.1	41.1	1	10	50	150	3	10		
5	8 1/2"	1000	66	1872	1899	27	0.8	33.8	6	10	80	100	6	9		
6	8 1/2"	2360	220	1899	1997	98	4.5	21.8	1	10	100	150	6	10		

Wellbore: NO 16/1-6 S

		IADC dull grading								
Run No	Bit Size	I	O	DC	L	B	G	OC	RP	Remarks
2	26"	1	1	NO		E	1	NO	TD	
3	17"	4	2	BT	A	E	I	BT	TD	
4	8 1/2"	0	0	NO	A	X	I	NO	CP	
5	8 1/2"	0	3	BT	T	X	I	NO	TD	
6	8 1/2"	0	0	NO	A	X	I	NO	LOG	IADC Dull grading before rerun: 0-0-NO-A-X-I-NO-CP.

5.8.16 Bit record well 16/1-6A

Bit record

Wellbore: NO 16/1-6 A

								Nozzles (n/32")				
Run No	Bit Size	Bit No	BHA No	Bit Type	IADC code	Bit manufacturer	Serial No	no x n	no x n	no x n	no x n	Flow Area in2
1	8 1/2"	1RR2	1	HCR607	M323	Hughes Christensen	7201627	4 x 11	3 x 12	x	x	.703
2	8 1/2"	2RR	2	FC274LI	M432	DIAMANT BOART S	10417494	x	x	x	x	1.550
3	8 1/2"	1RR3	3	HCR607	M323	Hughes Christensen	7201627	4 x 11	3 x 12	x	x	.703
4	8 1/2"	4	4	ATJG8	347	Hughes Christensen	w 80 dl	3 x 22	x	x	x	1.114
5	12 1/4"	5	5	ATJG8	347	Hughes Christensen	6004550	x	x	x	x	
6	8 1/2"	4RR1	6	ATJG8	347	Hughes Christensen	w 80 dl	3 x 22	x	x	x	1.114

Wellbore: NO 16/1-6 A

Run No	Bit Size	Pump Rate l/min	Pump Press bar	Depth in mMD	Depth out mMD	Drilled length m	Hours Drilled	ROP	Min WOB ton	Max WOB ton	Min RPM	Max RPM	Torque Min Nm	Torque Max Nm	Con drag Min 1000 daN	Con drag Max 1000 daN

1	8 1/2"	2340	200	1149	1490	341	17.3	19.7	1	7	60	165	3	8
2	8 1/2"	1000	54	1488	1515	27	1.9	14.2	3	10	70	120	4	6
3	8 1/2"	2400	210	1514	2194	680	19.8	34.3	1	12	80	160		12000
4	8 1/2"	2700	130	1150	1300	150				3	30	80		17000
5	12 1/4"	3240	140	1150	1197	47			4	8		70		
6	8 1/2"	2400	140	1196	2194	998						150		6000

Wellbore: NO 16/1-6 A

IADC dull grading

Run No	Bit Size	I	O	DC	L	B	G	OC	RP	Remarks
1	8 1/2"	0	0	NO	A	X	I	NO	CP	IADC dull grading before run: 0-0-NO-A-X-I-NO-TD
2	8 1/2"	7	8	JD	A	X	I	BT	TD	IADC dull grading before run: 0-3-BT-T-X-I-NO-TD
3	8 1/2"									IADC dull grading after re-run: 0-0-NO-A-X-I-NO-CP
4	8 1/2"	1	1	BT	2	E	I	NO		Wipertrip to 1300 m to clean out cement inside 13 3/8" casing.
5	12 1/4"	1	1	NO		E	I	NO	BHA	Drill out 13 3/8" shoetrack
6	8 1/2"	1	1	BT	2	E	I	NO		Wipertrip to TD

6 Appendices

App A Operational listing

Extract of daily activities well 16/1-6S

All data are taken from the DBR system (06:00 – 06:00 hrs)

Operations

Start first activity: **01.01.1980 00:00** **Start last activity:** **24.09.2003 23:59**

Well: NO 16/1-6 S

Wellbore: NO 16/1-6 S INITIAL

Time from	Time to	Time used	Depth mMD	Act code	---- Status ---- During opr	End of opr	Description of activities
19.05.2003 20:30	00:00	3.5		MNMU	OK	OK	Under tow. Position at 2400hrs: N 061deg, 3.8min, E 001deg, 59min. Distance sailed 22nm, distance remaining to turning point 122nm. Average speed 6.3 knots, ETA turning point: 1930hrs, 20/05/03.
		3.5					
20.05.2003 00:00	06:00	6.0		MNMU	OK	OK	Under tow. Position at 0600hrs: N 060deg, 20.1min, E 001deg, 56.4min. Distance sailed 66nm, distance remaining to turning point 78nm. Average speed 6.9 knots, ETA turning point: 1900hrs, 20/05/03.
20.05.2003 06:00	18:30	12.5		MNMU	OK	OK	Undertow. Past turning point at 1630hrs. Arrived well location. Disconnected San Fruttoso from tow bridle.
20.05.2003 18:30	00:00	5.5		MNBU	OK	OK	Ballasted rig to drilling draft. Anchor #4: San Fruttoso received chaser at 1927hrs. Anchor #5: Mærsk Achiever received chaser at 2100hrs.
		24.0					
21.05.2003 00:00	01:00	1.0		MNOW	OK	OK	Waited on supply vessel to arrive.
21.05.2003 01:00	03:00	2.0		DDOU	OK	OK	Unloaded supply vessel.
21.05.2003 03:00	06:00	3.0		MARU	OK	OK	Anchor #4: anchor on bottom at 0451hrs, returned chaser to rig at 0517hrs.
21.05.2003 06:00	18:30	12.5		MARU	OK	OK	Anchor #5: anchor on bottom at 0649hrs, chaser returned to rig at 0708hrs. Anchor #3: San Fruttoso received chaser at 0800hrs, anchor on bottom at 1236hrs, chaser returned to rig at 1256hrs. Anchor #6: Normand Atlantic received chaser at 0800hrs, attached jumper buoys to chain 0957 to 1047hrs, anchor on bottom at 1252hrs, PB anchor on bottom at 1332hrs, anchor buoy in the sea at 1341hrs. Anchor #1: jumper buoys attached to chain 0750 to 0910 hrs, anchor on bottom at 1422hrs, Anchor #8: jumper buoys attached to chain 0810 to 0827hrs, anchor on bottom at 1048hrs, anchor buoy in the sea at 1105hrs. Anchor #7: Mærsk Achiever received chaser at 1120hrs, attached jumper buoys to chain 1310 to 1344hrs, anchor on

							bottom at 1518hrs. Anchor #2: Mærsk Helper received chaser at 1504hrs, anchor on bottom at 1805hrs, chaser returned to rig at 1830 hrs.
21.05.2003 18:30	20:30	2.0		MARU	OK	OK	Soaked anchors.
21.05.2003 20:30	23:00	2.5		MARU	OK	OK	Tensioned tested anchors to 160mt (anchor #6) and 180mt (remaining anchors). Observed jumper buoy clearance from seabed for mooring lines #1 (28m clearance with 60mt tension), #6 (21m clearance with 100mt tension), #7 (50m clearance with 76mt tension) and #8 (58m clearance with 91mt tension). Adjusted rig position.
21.05.2003 23:00	00:00	1.0		DDOU	OK	OK	Deployed ROV. Ran basket with marker buoys to seabed. ROV removed buoys from basket and placed on seabed. Retrieved basket.
		24.0					
22.05.2003 00:00	00:30	0.5		CAOU	OK	OK	MU 30" WH housing RT and 5" DP std; SB same.
22.05.2003 00:30	01:30	1.0		DTBU	OK	OK	LD 5" DP pup. PU std 5" HWDP. LD top single. Installed drilling pup. PU std 5" HWDP.
22.05.2003 01:30	02:00	0.5	143.0	DTDU	OK	OK	RIH to seabed. Marked pipe in rotary. ROV placed 3 marker buoys around intended wellbore.
22.05.2003 02:00	04:00	2.0	155.0	DDRU	OK	OK	Washed down 2m, circ at 800 lpm. Drilled 145 to 155m, 0-2mt WOB, 30 rpm, 2 kNm torque, 1500 lpm, 18 bar.
22.05.2003 04:00	06:00	2.0	184.0	DDRU	OK	OK	Drilled 155 to 184m. 0-2mt WOB, 80 rpm, 3-6 kNm torque, 3000 lpm, 65 bar.
22.05.2003 06:00	08:30	2.5	207.0	DDRU	OK	OK	Drilled 184 to 191m, 0-2mt WOB, 80 rpm, 3-6 kNm torque, 3000 lpm, 65 bar. Drilled 191 to 207m (17 1/2" bit depth), 2-6mt WOB, 80 rpm, 3-6 kNm torque, 4500 lpm, 115 bar. Survey at 207m: 3/4 deg.
22.05.2003 08:30	09:30	1.0		CCCU	OK	OK	Circ bottoms up with SW and 30 m3 hi-vis pill. Displaced hole with 1.35sg mud.
22.05.2003 09:30	10:00	0.5		CTTU	OK	OK	POH to 5m below seabed and topped-off hole with 1.35sg mud.
22.05.2003 10:00	11:30	1.5		CTTU	OK	OK	Changed handling equipment. Inspected Ram-rig for loose items. Re-secured 2 bolts on pipehandler.
22.05.2003 11:30	14:00	2.5		CTTU	OK	OK	POH. LD 36" HO and Anderdrift.
22.05.2003 14:00	14:30	0.5		CARU	OK	OK	Held pre-job meeting. RU to run 30" conductor.
22.05.2003 14:30	15:00	0.5		CARU	OK	OK	Moved 105mt skid with PGB into moonpool.
22.05.2003 15:00	20:00	5.0		CARU	OK	OK	RIH with 30" shoe jt, 3x30" intermediate jts, and 30" WH housing jt through PGB. MU RT to 30" WH housing. Lowered 30" WH housing into PGB and locked same. BO RT. POH and RB same. RIH with total 5 jts 5" DP below RT. Filled conductor with SW while running.
22.05.2003 20:00	21:00	1.0		CARU	OK	OK	Lowered RT with 5" landing string into 30" WH housing and MU same. PU and removed 105mt skid from moonpool. Ran PGB to sea level and filled same with SW. RIH with 30" conductor string with 5" landing string to seabed.
22.05.2003 21:00	22:00	1.0		CARU	OK	OK	Stabbed 30" shoe jt into hole. Continued to RIH. Installed cmt std. Lowered 30" conductor; took weight 4m above planned setting depth. Circ 1.35sg mud and washed down last 4m. Shoe depth: 203m (tentative) with 2.25m stick-up.
22.05.2003 22:00	23:00	1.0		CARU	OK	OK	Checked bulls eye on PGB (0 deg) and GP orientation (109 deg). MU cmt hose. Flushed and presure tested rig-up to 150 bar. Pumped 30 m3 SW at 2000 lpm, 8 bar.
22.05.2003 23:00	23:30	0.5		CSOU	OK	OK	Held pre-job meeting.

22.05.2003 23:30	00:00	0.5		CSSU	OK	OK	Mixed and pumped 12,0 m3 1.56sg lead cement slurry followed by 18,0 m3 1.95 sg cement slurry. ROV observed returns during cementing.
		24.0					
23.05.2003 00:00	00:30	0.5		CSSU	OK	OK	Displaced cement with 5 m3 SW. ROV observed returns during displacement. Checked stick-up.
23.05.2003 00:30	06:00	5.5		CSCW	OK	OK	WOC while maintaining constant stickup; ROV observing. Held prejob/safety meeting for 26"hole section at 02:00 - 03:00
23.05.2003 06:00	08:00	2.0		CSCW	OK	OK	WOC. Disconnected cement hose.
23.05.2003 08:00	10:30	2.5		CARU	OK	OK	BO RT from 30" WH housing. RB cement std. POH with 5" V150 DP landing string until btm of stinger 5m below 30" WH. Circ with SW at 4500 lpm while pulling to wash WH and PGB area. POH. BO and LD 30" WH housing RT. POH with 5" V150 DP stinger. Final bull eye readings on PGB after disconn. R/T: Zero deg.
23.05.2003 10:30	11:00	0.5		CERU	OK	OK	BO and LD safety valve, XO's, and pump-in sub from cement std. RB std.
23.05.2003 11:00	12:00	1.0		CERU	OK	OK	MU cement std with Nodeco cement head. RB in riser SB area.
23.05.2003 12:00	13:30	1.5		DTDU	OK	E FAIL	MU 26" BHA. Tested MWD; MPR sub gamma ray data questionable.
23.05.2003 13:30	18:00	4.5		DTMD	E FAIL	E FAIL	Troubleshot MPR. POH. Changed MPR. Function tested MWD/MPR. Meanwhile, troubleshot failure of load cell on DDM. Meanwhile, held pre-job / safety meeting regarding drilling the 26" hole section.
23.05.2003 18:00	18:30	0.5		RMRD	E FAIL	OK	Continued to troubleshoot failure of load cell on DDM.
23.05.2003 18:30	20:30	2.0	199.0	DTDU	OK	E FAIL	Installed guide ropes shackles from BHA to GL's. Changed to 5-1/2" handling equipment. RIH to 139m. Changed to 5" handling equipment. Installed XO. Stabbed bit into WH. Cont to RIH with 5" HWDP. Tagged TOC at 199m while circ at 3000 lpm, 87 bar. MWD signals not received.
23.05.2003 20:30	22:00	1.5	199.0	DEMD	E FAIL	OK	Troubleshot lack of communication from MWD. Cycled pumps at different pump rates. Discussed issues with onshore personnel.
23.05.2003 22:00	00:00	2.0	203.0	CDDU	OK	OK	Drilled cement and shoe at 203m; 3mt WOB, 40 rpm, 3 kNm torque, 4500 lpm, 200 bar..
		24.0					
24.05.2003 00:00	01:00	1.0	207.0	CSOU	OK	OK	Cleaned out rathole to 207m. Pumped 10 m3 hi-vis pill and reamed through shoe several times. Circ pill out of hole; 4500 lpm.
24.05.2003 01:00	02:30	1.5		DEMD	E FAIL	OK	POH.
24.05.2003 02:30	04:30	2.0		DEMD	E FAIL	OK	Checked MWD; apparent failure in elctrical system. Changed out MWD with back-up MWD. Function tested same.
24.05.2003 04:30	05:30	1.0		DEMD	E FAIL	OK	Installed guide ropes with shackles between BHA and GL's.
24.05.2003 05:30	06:00	0.5	84.0	DEMD	E FAIL	OK	MU BHA and RIH.
24.05.2003 06:00	06:30	0.5	195.0	DEMD	E FAIL	OK	RIH.
24.05.2003 06:30	19:30	13.0	551.0	DDRU	OK	OK	Installed drilling std. Drilled 26" hole from 207 to 551m; 5mt WOB, 50 rpm, 6 kNm torque, 4500 lpm, 200 bar. Pumped 10 m3 hi-vis pill each std to clean hole.
24.05.2003 19:30	20:30	1.0	551.0	DCAU	OK	OK	Circ bottoms up. Pumped 20 m3 hi-vis pill, circ pill out of hole.
24.05.2003	21:30	1.0	551.0	DCAU	OK	OK	Displaced hole to 1.35sg mud, 3100 lpm, 100-115 bar.

20:30							Meanwhile, moved casing tongs onto drillfloor.
24.05.2003 21:30	23:00	1.5	140.0	CTTU	OK	OK	POH to WH; tight spots encountered at 536-525m (14mt overpull), 264m (14mt overpull), and 246m (14mt overpull).
24.05.2003 23:00	00:00	1.0	27.0	CTTU	OK	OK	Circ and cleaned WH. POH.
		24.0					
25.05.2003 00:00	02:00	2.0		CTTU	OK	OK	BO&LD 26" stab. RU casing tongs while dump MWD. BO&LD MWD and MPR to deck separately. BO&LD stab, short DC, NB stab and bit assy to deck.
25.05.2003 02:00	03:00	1.0		DDOU	OK	OK	Cleaned and tidied drillfloor. Inspected DDM, yoke, and ram guide after drilling.
25.05.2003 03:00	06:00	3.0	123.0	CARU	OK	OK	Installed 20" casing elevators and slips bowl. Held pre-job meeting. PU shoe jt. PU float jt and Baker-lok to shoe jt. Run 20" casing.
25.05.2003 06:00	10:30	4.5	400.0	CARU	OK	OK	RIH with 20" casing. Filled every jt.
25.05.2003 10:30	12:30	2.0	400.0	CARU	OK	OK	Changed to 5" handling equipment. PU 18-3/4" WH housing jt; MU same to casing.
25.05.2003 12:30	13:30	1.0	525.0	CARU	OK	OK	RIH with 20" casing on 5" V150 DP. Pumped 5m3 after first std, filled each std thereafter.
25.05.2003 13:30	14:00	0.5	525.0	CARU	OK	O FAIL	PU and MU cement stand. Connected cmt hose. Attempted open compensator; insufficient N2 pressure.
25.05.2003 14:00	14:30	0.5	525.0	DEOD	O FAIL	OK	Built up pressure in N2 system. Opened compensator.
25.05.2003 14:30	15:00	0.5	545.0	CARU	OK	OK	Landed and latched 18-3/4" WH housing in 30" WH housing. Verified latch-in with 20mt overpull.
25.05.2003 15:00	15:30	0.5	545.0	CCCU	OK	OK	Pumped 100 m3 SW at 2150 lpm, 20 bar. Meanwhile, pressure tested cement hose / surface rig-up to 20/200 bar for 5/10 min.
25.05.2003 15:30	16:00	0.5	545.0	CSOU	OK	OK	Held pre-job meeting.
25.05.2003 16:00	18:00	2.0	545.0	CSSU	OK	OK	Mixed and pumped 70 m3 1.56sg lead slurry followd with 15 m3 1.92sg tail slurry. Meanwhile, RD 20" casing tongs and handling equipment. Disconnected GL's and pulled same to surface.
25.05.2003 18:00	18:30	0.5	545.0	CSSU	OK	OK	Released dart. Displaced cement with cement unit at 1200 lpm. Wiper plug sheared 1.0 m3. Continued and pumped total 3.2 m3 at 120 bar. Switched to rig pumps and continued displacement at 3000 lpm, 23 bar. Lowered displacement rate to 650 lpm, 18 bar, after 62 m3. Bumped plug at 67.3 m3 displacement, 90 bar. Bled-off pressure; floats held. 97% pump effeciency observed.
25.05.2003 18:30	19:00	0.5	545.0	CARU	OK	OK	Disconnected cement hose. Marked DP at rotary. Released RT. PU above GP's.
25.05.2003 19:00	19:30	0.5	525.0	CARU	OK	OK	BO / RB cement std in riser chute.
25.05.2003 19:30	20:30	1.0		CARU	OK	OK	POH with RT. Service break connections on RT, LD same. Top of 18-3/4" WH / RKB 139.4m, 16" landing sholder: 416.0m, 20" casing shoe: 545.7m.
25.05.2003 20:30	21:00	0.5		CARU	OK	OK	PU cement std. BO cement head; LD same to deck.
25.05.2003 21:00	00:00	3.0		BBRU	OK	OK	RU to run riser. Meanwhile, moved BOP/cradle into moonpool.
		24.0					
26.05.2003 00:00	03:00	3.0		BBRU	OK	OK	PU 50ft riser jtfrom deck and MU to BOP. PU, removed cradle from moonpool. Lowered BOP into underhull guidance system. Attached pod lines and clamps. Installed GL's into BOP frame posts; ran same to 2m above seabed. Tested C&K lines to 30/345 bar for 5/10 min.

26.05.2003 03:00	06:00	3.0	104.0	BBRU	OK	OK	Ran BOP through splash zone. Cont running same. Tested C&K lines to 30/345 bar every 3 jts.
26.05.2003 06:00	07:00	1.0		BBRU	OK	OK	Ran BOP on riser. Tested C&K lines to 30/345 bar every 3 jts.
26.05.2003 07:00	08:30	1.5		BBRU	OK	OK	Held pre-job meeting. RU and moved slip jt from parking position to riser chute. PU and MU slip jt.
26.05.2003 08:30	09:00	0.5		BBRU	OK	OK	PU and MU landing jt.
26.05.2003 09:00	11:00	2.0		BBRU	OK	OK	Lowered slip and engaged slip ring. Lowered same; installed pod hose saddles. PU riser.
26.05.2003 11:00	11:30	0.5		BBRU	OK	OK	Moved rig over wellbore. Meanwhile, pressure tested C&K lines to 30/345 bar.
26.05.2003 11:30	12:00	0.5		BBRU	OK	OK	Established GL's. Landed BOP. Locked connector; pull tested same with 25mt overpull.
26.05.2003 12:00	13:00	1.0		BBDU	OK	OK	Installed RBQ plates. Functioned SR with accoustic system. Pressure tested connector and 20" casing to 180 bar with SW.
26.05.2003 13:00	14:00	1.0		BBRU	OK	OK	Unlocked and stroked out inner barrel. BO and RB landing jt. LO hydraulic riser RT.
26.05.2003 14:00	15:30	1.5		BBRU	OK	OK	RU and PU diverter from deck. MU to inner barrel. Landed and locked diverter in housing. LO RT.
26.05.2003 15:30	17:00	1.5		BBRU	OK	OK	RD riser handling equipment.
26.05.2003 17:00	19:00	2.0		CSOU	OK	OK	MU cement std. Installed control lines and lo-torq valves. SB in riser chute; secured same.
26.05.2003 19:00	20:30	1.5		DDOU	OK	OK	MU hang-off std; RB same.
26.05.2003 20:30	21:00	0.5	8.0	DTBU	OK	OK	Changed handling equipment. PU BHA assy #1.
26.05.2003 21:00	22:00	1.0	8.0	DTBU	OK	OK	PU and loaded MWD.
26.05.2003 22:00	00:00	2.0	158.0	DTBU	OK	OK	MU BHA.
		24.0					
27.05.2003 00:00	01:30	1.5	504.0	DTDU	OK	OK	Changed to 5" handling equipment. RIH with 5" HWDP and 5" DP.
27.05.2003 01:30	02:00	0.5	504.0	DDOU	OK	OK	Installed drlg std. RIH and tagged TOC at 533m.
27.05.2003 02:00	03:00	1.0	504.0	DDOU	OK	OK	Performed choke drill. Functioned BOP on blue pod from driller's console and yellow pod from remote.
27.05.2003 03:00	05:00	2.0	548.0	CDDU	OK	OK	Drilled plug, float collar, cement, and float shoe to 547.5m; 5-8mt WOB, 80 rpm, 3-7 kNm torque, 4500 lpm, 180-190 bar. Drilled to 548m. Began displacing SW with 1.15sg Glydril mud when started drilling.
27.05.2003 05:00	06:00	1.0	548.0	CSOU	OK	OK	Circ to clear shakers, had to decrease pump rate as low as 2000 lpm.
27.05.2003 06:00	06:30	0.5	554.0	CSOU	OK	OK	Clean Out rathole and drill new formation from 551 m MD to 554 m MD
27.05.2003 06:30	07:30	1.0	554.0	DCAU	OK	OK	Circulate and condition mud 4500 lpm / 190 bar at 554 m MD.
27.05.2003 07:30	08:30	1.0	554.0	EXLU	OK	OK	Perform LOT to EQMW 1,82 SG at 20" Csg shoe.
27.05.2003 08:30	19:00	10.5	908.0	DDRU	OK	OK	Drill 17" hole from 554 m MD to 908m MD. 4500 lpm/ 190 bar / 130 - 170 RPM / 4-10 T WOB, Torque 6-15 KNm. Increasing torque with peaks up to 40 KNm.
27.05.2003 19:00	20:00	1.0	908.0	DCAU	OK	OK	Circulate btms up to condition hole at 908 m MD.
27.05.2003	21:00	1.0	923.0	DDRU	OK	OK	Continue drilling 17" hole from 908 - 923 m MD. Torque

20:00							values still high. Peaks up to 30 KNm.
27.05.2003 21:00	21:30	0.5	923.0	DCAU	OK	OK	Circulate btms up at 923 m MD.
27.05.2003 21:30	22:00	0.5	738.0	DCWK	OK	OK	Wipertrip to 738 m MD. No drag seen
27.05.2003 22:00	23:00	1.0	923.0	DCWK	OK	OK	RIH from 738 m MD - 923 m MD. Hole in good conditions.
27.05.2003 23:00	00:00	1.0	950.0	DDRU	OK	OK	Continue drilling 17" hole from 923 m MD to 950 m MD
		24.0					
28.05.2003 00:00	02:00	2.0	1003.0	DDRU	OK	OK	Continue drilling 17" hole from 950 m MD - 1003 m MD. 4500 lpm / 210 Bar / 130 - 170 RPM /4-10 T WOB /Torque 6-15 KNm. Increasing with torque peaks up to 40 KNm.
28.05.2003 02:00	06:00	4.0	1090.0	DDDU	OK	OK	Continue drilling 17" hole from 1003- 1090 m MD. Hold back ROP to 15 m/hr to clean hole from 1003 -1013 m MD. Drillbreak at 1023 m MD. ROP increased from 60 m/ hr to 160 m /hr. Flowchecked well for 10 min at 1023 m MD, well static. Drilling parameters : 4500 lpm / 230 bar / 130- 170 RPM / 4-10 t WOB / Torque 6-15 KNm.
28.05.2003 06:00	12:00	6.0	1206.0	DDRU	OK	OK	Drilled 17" hole from 1090 m MD - 1206 m MD. 450 lpm / 210 Bar / 130 - 170 RPM / 4-10 t. WOB / Torque 6-15 KNm, peaks up to 40 KnM.
28.05.2003 12:00	14:30	2.5	1206.0	DCAU	OK	OK	Circulated hole clean. 4500 lpm / 230 bar / 160 rpm.
28.05.2003 14:30	15:00	0.5	1206.0	DTCU	OK	OK	Flowchecked well for 10 min OK. Pumped slug and racked back drilling stand.
28.05.2003 15:00	16:00	1.0	621.0	DTCU	OK	OK	POOH from 1175 m MD to 621 m MD
28.05.2003 16:00	17:30	1.5	591.0	DTCU	OK	OK	Tight hole from 621 m - 591 m. Rotated / worked through several times until slick. Continued POOH into 20" csg shoe. Performed kick drill and flowcheck well for 10 min inside shoe.
28.05.2003 17:30	20:30	3.0	.0	DTDU	OK	OK	L/D BHA.
28.05.2003 20:30	22:30	2.0	.0	BHRU	OK	OK	M/U Wear bushing RT and RIH with same. Pull wear bushing. POOH with wear bushing/ RT.
28.05.2003 22:30	00:00	1.5	.0	CAOU	OK	OK	Cleaned and tidied drill floor. Prepared for running 13 3/8" Casing.
		24.0					
29.05.2003 00:00	00:30	0.5	.0	CAOU	OK	E FAIL	Cont. rigging up for running casing. Stopped due to problems operating PS 30 slips.
29.05.2003 00:30	01:30	1.0	.0	DERD	E FAIL	OK	Trouble shoot and repaired hydraulic hoses for PS 30 slips.
29.05.2003 01:30	02:00	0.5	.0	CAOU	OK	OK	Held prejob meeting prior to runnning 13 3/8" casing
29.05.2003 02:00	04:30	2.5	122.0	CARU	OK	E FAIL	M/U shoe, Intermediate joint and float. Backer locked same and ran 13 3/8" Csg to 122 m MD. Stopped due to problems with latch function on BX elevator.
29.05.2003 04:30	05:00	0.5	122.0	DERD	E FAIL	OK	Troubleshot problems with BX elevator.
29.05.2003 05:00	05:30	0.5	122.0	CAOU	OK	OK	Drifted casing landing string while troubleshoting problems with BX elevator
29.05.2003 05:30	06:00	0.5	122.0	CAOD	E FAIL	OK	Continueed troubleshoting BX elevator. Found solenoid valve damaged. Changed to manual side door elevator.
29.05.2003 06:00	13:00	7.0	776.0	CARU	OK	OK	Cont. RIH with 13 3/8" casing to 776 m. Held SJA prior to running casing with manual elevators. Filled casing every 5th. joint.
29.05.2003 13:00	13:30	0.5	784.0	CARU	OK	OK	P/U 16" casing hanger from deck and M/U same. P/U 1 stand of HWDP and connected to casing hanger RT.

							Removed inserts and body for 13 3/8" casing from PS 30 slips. Lowered hanger through rotary and installed insert carrier and inserts for 5" DP in PS 30.
29.05.2003 13:30	15:30	2.0	1179.0	CARU	OK	OK	Cont. RIH with 13 3/8" casing on 3 stands of HWDP and 5" DP to 1179 m.
29.05.2003 15:30	16:00	0.5	1179.0	CARU	OK	OK	P/U cement stand from riser chute and installed same.
29.05.2003 16:00	18:00	2.0	1196.7	CCCU	OK	OK	Filled string and broke circulation. Pumped 1.5 times B/U with 2300 lpm/ 50 bar. Meanwhile attempted to land and lock hanger. Unable to lock hanger in place due to land out high. Worked string until solid landing. Sat down all weight excluding landing string, and performed over pull test several times, no go. Decided to continue with cementing operations.
29.05.2003 18:00	18:30	0.5	1196.7	CSSU	OK	OK	Performed pre job meeting prior to cementing. Meanwhile flushed and pressure tested surface lines to 200 bar. Lined up for pumping spacer.
29.05.2003 18:30	19:00	0.5	1196.7	CSSU	OK	OK	Pumped 20 m3 1.35 SG spacer at 2100 lpm/ 55 bar with rig pumps. Dropped ball and lined up to pump cement.
29.05.2003 19:00	20:30	1.5	1196.7	CSSU	OK	OK	Mixed and pumped 29,7 m3 1.75 SG lead slurry followed by 15 m3 1.92 SG tail slurry. Released dart and displaced cement to DF with cement unit. Lined up and displaced cement with rig pumps. Observed top plug sheared with 140 bar after pumping 3100 l. Continued displacing cement with 3000 lpm. Bumped plug after pumping 3828 strokes giving a pump efficiency of 97.5 %. FCP 50 bar. Pressured up to 90 bar and held pressure for 5 min. Bled off pressure to cement unit, no back flow.
29.05.2003 20:30	21:30	1.0	1196.7	CSOU	OK	OK	Released RT by rotating 5 turns to the right, torque 7 KNm. String dropped 25 cm. Sat seal assembly and pressure tested same to 170 bar/ 10 min.
29.05.2003 21:30	22:30	1.0	410.0	CTTU	OK	OK	Broke off cement stand. Disconnected cement hose and racked cement stand in riser chute.
29.05.2003 22:30	00:00	1.5		CTTU	OK	OK	POOH with casing hanger RT.
		24.0					
30.05.2003 00:00	01:30	1.5		CTTU	OK	OK	B/O and L/D casing hanger running tool.
30.05.2003 01:30	03:00	1.5		CERU	OK	OK	P/U cement stand from riser chute. B/O and L/D cement head. Cleared drill floor.
30.05.2003 03:00	06:00	3.0		DEOU	OK	OK	Stopped all operations and cleaned rig.
30.05.2003 06:00	14:30	8.5	.0	DEOU	OK	OK	Cleaned and tidied all areas on rig. Performed Safety inspection in ramrig. Peformed PM's on drillfloor and shakerhouse.
30.05.2003 14:30	15:30	1.0		BHRU	OK	OK	Made up jet sub, wear bushing RT and 18 3/4" wear bushing.
30.05.2003 15:30	16:00	0.5	139.0	BHRU	OK	OK	RIH with wear bushing.
30.05.2003 16:00	16:30	0.5	139.0	BHRU	OK	OK	Washed wellhead with 3000 lpm/ 20 bar.
30.05.2003 16:30	17:00	0.5	139.0	BHRU	OK	OK	Sat wear bushing. Pulled 3 ton OP to release. POOH with wear bushing RT.
30.05.2003 17:00	17:30	0.5		BHRU	OK	O FAIL	Found wear bushing not set. Checked wear bushing. Found piecec of soft rubber on wear bushing.
30.05.2003 17:30	18:00	0.5	139.0	BHRD	O FAIL	OK	RIH with wear bushing. Washed wellhead with 3000 lpm/ 20 bar.
30.05.2003 18:00	18:30	0.5		BHRD	O FAIL	OK	Sat wear bushing. Pulled 11 ton OP to release. POOH with wear bushing RT.
30.05.2003	19:00	0.5		BHRU	OK	OK	L/D wear bushing RT. Racked 1 stand of 5" DP and L/D jet

18:30							sub.
30.05.2003 19:00	20:00	1.0		DTDU	OK	OK	P/U and made up 8 1/2" AutoTrak and Ontrack MWD. Programmed MWD. Meanwhile closed shear ram and tested 20" x 13 3/8" casing to 170 bar/ 10 min. Pumped a total of 875 l. Volume bled back 875 l.
30.05.2003 20:00	22:0 0	2.0	230.0	DTDU	OK	OK	M/U and RIH with 8 1/2" BHA to 230 m.
30.05.2003 22:00	00:00	2.0	1140.0	DTDU	OK	OK	RIH with 8 1/2" BHA to 1140 m. Filled pipe at 540 m.
		24.0					
31.05.2003 00:00	01:00	1.0	1140.0	DTDU	OK	OK	Connected drilling stand and broke circulation. Performed choke drill.
31.05.2003 01:00	01:30	0.5	1140.0	DTDU	OK	OK	Held pre job meeting prior to start drilling.
31.05.2003 01:30	02:00	0.5	1170.0	CDDU	OK	OK	Established circulation and tagged cement/ wiper plugs at 1170 m.
31.05.2003 02:00	04:00	2.0	1170.0	CDDU	OK	OK	Circulated with reduced rate 900 lpm due to cement contaminated mud plugging the shakers. Changed screens and increased flowrate stepwise up to 2100 lpm.
31.05.2003 04:00	06:00	2.0	1190.0	CDDU	OK	OK	Drilled wiper plugs and cement to 1190 m with 2100 lpm/ 126 bar/ 50 - 80 RPM/ 1 - 5 ton/ 3 -6 KNm.
31.05.2003 06:00	10:00	4.0	1206.0	CDDU	OK	OK	Continued drilling cement and shoetrack to 1206 m MD. 2100 lpm / 150 bar / 50 -80 RPM / 1-5 ton / 3-6 KNm. Cleaned shoetrack. Displaced hole to 1,38 SG POBM while drilling shoetrack.
31.05.2003 10:00	10:30	0.5	1209.0	DDOU	OK	OK	Drilled 3 m new formation. Reamed several times and pulled into shoe.
31.05.2003 10:30	11:30	1.0	1197.0	EXFU	OK	OK	Lined up cement unit to pump down drill string and K/ C-lines. Closed BOP. Performed FIT to 1,6 EQMW. Pumped 209 liter and bled back same.
31.05.2003 11:30	12:00	0.5	1209.0	DDDU	OK	OK	Opened BOP and lined up mud pump 1 and prepared for drilling of 8 1/2" section.
31.05.2003 12:00	19:00	7.0	1492.0	DDDU	OK	OK	Drilled 8 1/2" hole from 1209 m MD - 1492 m MD with 2200 - 2400 lpm / 180 - 190 bar / 140 - 150 RPM / 1-5 ton / 6-9 KNm. ECD: 1,40 sg
31.05.2003 19:00	00:00	5.0	1605.0	DDDU	OK	OK	Continue drilling 8 1/2" hole from 1492 m MD - 1605 m MD with 2150 - 2400 lpm/ 180 - 220 bar/ 150 RPM/ 1 - 3 ton/ 5 - 9 KNm/ ROP 30 - 60 m/ hr. ECD: 1,42 sg
		24.0					
01.06.2003 00:00	06:00	6.0	1787.0	DDDU	OK	OK	Continue drilling 8 1/2" hole from 1605 m MD - 1787 m MD with 2400 lpm/ 215 - 230 bar/ 150 RPM/ 1 - 7 ton/ 5 - 9 KNm/ ROP 30 - 100 m/ hr. Controlled ROP to 30 m/ hr from 1750 m. ECD: 1,44 sg
01.06.2003 06:00	11:00	5.0	1872.0	DDDU	OK	OK	Cont. drilling 8 1/2" hole from 1787 m MD - 1872 m MD with 2200 - 2350 lpm / 170 - 210 bar / 150 RPM / 0,5 - 2 ton / 5-9 KNm / ROP 10- 50 m/hr, ECD 1,43 -1,44 EQMW
01.06.2003 11:00	13:00	2.0	1872.0	ECSU	OK	OK	Circulated B/U for samples. Max gas 1,05 % at 1870 m MD lagdepth.
01.06.2003 13:00	14:00	1.0	1872.0	ECSU	OK	OK	Circulated while preparing EMS. Dropped EMS and waited for 10 min.
01.06.2003 14:00	17:30	3.5	1139.0	DTRU	OK	E FAIL	POOH to 1139 m MD. Slow tripping speed due failure on pulse counter on Ram cylinder. Performed kickdrill and flow-checked for 10 min. OK
01.06.2003 17:30	19:00	1.5	1139.0	DERD	E FAIL	OK	Troubleshot pulse counter on Ram cylinder A.
01.06.2003 19:00	21:00	2.0	585.0	DERD	E FAIL	OK	POOH from 1139 m to 585 m. Slow tripping due to failure on pulse counter.
01.06.2003 21:00	22:30	1.5	585.0	DERD	E FAIL	OK	Troubleshot pulse counter on Ram cylinder A.

01.06.2003 22:30	23:30	1.0	234.0	DTRU	OK	OK	Cont. POOH from 585 m to 234 m.
01.06.2003 23:30	00:00	0.5	205.0	DTRU	OK	OK	Cont. POOH with BHA. Racked back HWDP.
		24.0					
02.06.2003 00:00	01:30	1.5	28.0	DTRU	OK	OK	Cont. POOH BHA and racked back same.
02.06.2003 01:30	03:00	1.5		DTRU	OK	OK	Turned off batterries on MWD. Broke off bit and racked AutoTrak/ MWD in setback. Cleaned and tidied drillfloor.
02.06.2003 03:00	06:00	3.0		EECU	OK	OK	Held prejob meeting prior to picking up core assembly. P/U and M/U core barrel to bit. P/U and M/U intermediate section and top section. P/U and M/U fibre glass innerbarrel.
02.06.2003 06:00	08:30	2.5	237.0	EECU	OK	OK	Cont. M/U BHA and RIH to 237 m MD.
02.06.2003 08:30	10:30	2.0	700.0	DERD	E FAIL	OK	Cont. RIH from 237 m MD - 700 m MD. Slow tripping speed due to failure on puls counter on Ram cylinder.
02.06.2003 10:30	16:30	6.0	1872.0	ETCU	OK	OK	Cont. RIH 700 m MD - 1844 m MD. Start washing down to 1872 m MD. Circulate B/U with 1200 lpm / 50 bar / 15 RPM / 3 KNm. Max gas 0.6%.
02.06.2003 16:30	17:30	1.0	1899.0	ERCU	OK	OK	Dropped steelball. Reduced rate to 600 lpm until ball seated. Pump-pressure increased from 7 to 30 bar. Started coring at 16:40. Cut core from 1872 m MD - 1899 m MD with 1000 lpm / 5-10 ton / 80- 100 rpm / 66-68 bar / 6-9 KNm / ROP 32 m/hr.
02.06.2003 17:30	22:00	4.5	237.0	ETCU	OK	OK	POOH with 1 stand and pumped slug. POOH to 400 m MD with pulling speed 1.5 min/ std. Cont POOH to 237 m with 3 min/ std. Flow checked well inside 13 3/8" csg shoe and before pulling BHA through BOP.
02.06.2003 22:00	23:30	1.5	31.0	ETCU	OK	OK	POOH with BHA. Racked back HWDP and DC's. L/D jar. Pulling speed from 100 m, 5 min/ std.
02.06.2003 23:30	00:00	0.5	31.0	ETCU	OK	OK	Held SJA meeting with involved personell prior to L/D and handling core.
		24.0					
03.06.2003 00:00	03:30	3.5	31.0	EECU	OK	OK	B/O float sub and removed ball. B/O core bit. B/O and L/D innerbarrel in 3 pieces. Cleaned and tidied drill floor. Left outer barrel secured in rotary.
03.06.2003 03:30	06:00	2.5	31.0	DERD	E FAIL	OK	Changed out pulse counter on Ram cylinder A.
03.06.2003 06:00	08:00	2.0	.0	DERD	E FAIL	OK	Replaced pulse counter on Ram Cylinder A.
03.06.2003 08:00	09:00	1.0	.0	EECU	OK	OK	Racked back outer core barrels and P/U AutoTrack BHA from setback. M/U BIT to AutoTrack.
03.06.2003 09:00	09:30	0.5	.0	DDOU	OK	OK	Downloaded MWD / LWD memory data.
03.06.2003 09:30	11:30	2.0	235.0	DTDU	OK	OK	M/U BHA and RIH to 235 m MD.
03.06.2003 11:30	15:00	3.5	1869.0	DTDU	OK	OK	RIH with AutoTrack to 1869 m MD : Broke circulation at 1000 m MD.
03.06.2003 15:00	17:00	2.0	1899.0	DCAU	OK	OK	Reamed and logged cored interval from 1869 m MD - 1899 m MD with MWD / LWD.
03.06.2003 17:00	23:30	6.5	1997.0	DDDU	OK	C LOSS	Drilled 8,5" hole from 1899 m MD to 1997 m with 2200 - 2350 lpm/ 200 - 220 bar/ 100 - 150 RPM/ 0,5 - 10 ton/ 6 - 10 KNm/ ROP 10 - 50 m/ hr/ ECD 1.41 - 1.43 EQMW. At 23:15 hrs observed loss in active. Picked off bottom and flowchecked.
03.06.2003 23:30	00:00	0.5	1990.0	DCLD	C LOSS	OK	Observed well on trip tank. Static loss 800 l/ min at 23:30 hrs.
		24.0					
04.06.2003	01:00	1.0	1960.0	DCLD	C	OK	Lined well back on active system due to heavy losses. Kept

00:00					LOSS		well full by circulating down kill line. Racked back drilling stand. Loss rate at 00:00 hrs: 650 l/min, 00:30 hrs: 430 l/ min, 00:45 hrs: 350 l/ min. Rotated pipe with 15 RPM. Meanwhile mixed and prepared LCM pill.
04.06.2003 01:00	02:00	1.0	1980.0	DCLD	C LOSS	OK	Pumped 8 m3 LCM pill containing G-seal (57 kg/m3), Nutplug F (47 kg/m3) and Nutplug M (47 kg/m3) with 800 lpm/ 15 bar. Displaced pill with mud at 630 lpm/ 15 bar. Loss rate during pumping/ displacing of LCM pill 380 l/min. No losses during last 5 min of displacement. Total loss during pumping/ displacement of LCM pill: 15 m3. Rotated pipe with 15 RPM during displacement of pill.
04.06.2003 02:00	03:00	1.0	1743.0	DCLD	C LOSS	OK	Observed well on trip tank, well stable. Total losses from 23:15 hrs 55 m3. POOH to 1743 m. No losses during trip out.
04.06.2003 03:00	05:00	2.0	1743.0	DCLD	C LOSS	OK	Established circulation and increased pumprate in steps up to 1500 lpm/ 94 bar, no losses.
04.06.2003 05:00	06:00	1.0	1743.0	DCLD	C LOSS	OK	Circulated at reduced MW to 1.35 SG with 1500 lpm/ 95 bar.
04.06.2003 06:00	10:30	4.5	1980.0	DCLD	C LOSS	OK	Cont. reducing mudweight to 1,35 SG. 1700 lpm -95 bar. 1,35 SG POBM in returns at 07:15 hrs. Increased flowrate in steps to 2000 lpm - 130 bars. Washed and reamed from 1752 m MD - 1980 m MD.
04.06.2003 10:30	12:00	1.5	1980.0	DCAU	OK	OK	Circulate Bottoms up with 2000 lpm / 140 bar / 30 RPM / 5 KNm
04.06.2003 12:00	17:00	5.0	113.0	DTLU	OK	OK	Dowlinked autotrack for tripping mode. Flowchecked well. Pumped slug and POOH from 1980 m MD - 113 m MD. L/D BHA. Cleared drillfloor and prepared to rig up for wireline.
04.06.2003 17:00	19:00	2.0	.0	ELWU	OK	OK	Performed Pre-job meeting and rigged up for wireline. P/U and M/U PEX-AIT/DSI toolstring. Installed radioactive sources
04.06.2003 19:00	23:00	4.0		ELWU	OK	OK	RIH with PEX-AIT/DSI to 1993 m. Logged repeat section and main log. POOH.
04.06.2003 23:00	00:00	1.0		ELWU	OK	OK	Removed radioactive sources. Rigged down PEX-AIT/DSI toolstring.
		24.0					
05.06.2003 00:00	00:30	0.5		ELWU	OK	OK	Cont. rigging down PEX-AIT/DSI toolstring.
05.06.2003 00:30	02:00	1.5		ELWU	OK	E FAIL	P/U and M/U MDT toolstring and tested same. Problem with powersupply to toolstring.
05.06.2003 02:00	04:30	2.5		ELOD	E FAIL	OK	Troubleshot problem with powersupply. Changed out module on surface equipment.
05.06.2003 04:30	06:00	1.5	1350.0	ELWU	OK	OK	RIH with MDT to 1350 m.
05.06.2003 06:00	19:00	13.0		ELWU	OK	OK	Cont. RIH with MDT / GR. Took 11 pressure points and 7 fluid samples. POOH with MDT / GR W/L logging string.
05.06.2003 19:00	20:00	1.0		ELWU	OK	OK	Rigged down MDT toolstring.
05.06.2003 20:00	21:00	1.0		ELWU	OK	OK	P/U and M/U VSP logging string.
05.06.2003 21:00	00:00	3.0		ELWU	OK	OK	R/U and ran airgun in water using starboard crane. RIH with VSP string. Not able to pass 1762 m MD. Logged/ Shot VSP.
		24.0					
06.06.2003 00:00	01:30	1.5		ELWU	OK	OK	Cont. logging VSP. POOH with VSP toolstring.
06.06.2003 01:30	02:00	0.5		ELWU	OK	OK	Rigged down VSP toolstring.
06.06.2003 02:00	04:00	2.0		ELWU	OK	OK	Held prejob meeting prior to handling explosives. Prepared rig for radio silence and M/U CST toolstring.

06.06.2003 04:00	06:00	2.0		ELWU	OK	OK	RIH with CST toolstring. Unable to pass restriction at 1762 m MD. Made several attempts to pass restriction.
06.06.2003 06:00	09:00	3.0	250.0	ELWU	OK	OK	Unable to pass 1762 m MD. Cut sidewall cores with CST. POOH to 250 m.
06.06.2003 09:00	11:00	2.0		ELWU	OK	OK	Enforced radio silence. POOH from 250 m. L/D CST toolstring and rigged down WL equipment. 25 of 30 shots fired.
06.06.2003 11:00	18:00	7.0	1973.0	PTTU	OK	OK	RIH with 3,5 x 5" DP to 1973 m MD. P/U 27 joints of 3 1/2" DP while running in hole.
06.06.2003 18:00	20:00	2.0	1973.0	PCCU	OK	OK	Circulated B/U and conditioned mud with 2000 lpm/ 115 bar. Max gas at B/U 11,7 %. Circulated until gas below 1 %. Meanwhile held pre job meeting prior to cement job. Pumped 5 m3 1.70 SG spacer with rig pumps.
06.06.2003 20:00	21:00	1.0	1973.0	PSSU	OK	OK	Mixed and pumped 9,8 m3 1.90 SG cement slurry followed by 1590 l spacer with cement unit. Displaced to DF with 250 l DW. Lined over to rig pumps and displaced cement with 13.4 m3 mud at 2000 lpm/ 115 bar.
06.06.2003 21:00	21:30	0.5	1725.0	PTTU	OK	OK	POOH from 1973 to 1725 m.
06.06.2003 21:30	23:00	1.5	1725.0	PCCU	OK	OK	Dropped sponge ball and circulated B/U with 2000 lpm/ 113 bar/ 150 RPM while reciprocating string.
06.06.2003 23:00	23:30	0.5	1555.0	PTTU	OK	OK	POOH to 1555 m.
06.06.2003 23:30	00:00	0.5	1555.0	PCCU	OK	OK	Installed perigon cement support tool and pumped down same to set at 1555 m. Meanwhile performed prejob meeting prior to cement job.
		24.0					
07.06.2003 00:00	01:00	1.0	1550.0	PSSU	OK	OK	Pumped 5 m3 1.70 SG spacer with rig pumps at 1500 lpm/ 64 bar. Mixed and pumped 9,04 m3 1.90 SG cement slurry followed by 1307 l spacer with cement unit. Displaced to DF with 250 l DW. Lined over to rig pumps and displaced cement with 9.8 m3 mud at 2000 lpm/ 100 bar.
07.06.2003 01:00	02:00	1.0	1304.0	PTTU	OK	OK	POOH to 1304 m.
07.06.2003 02:00	06:00	4.0	1304.0	PCCU	OK	OK	Dropped sponge ball and circulated B/U with 2000 lpm/ 104 bar/ 150 RPM while reciprocating string. Large amount of cuttings/ cavings over the shakers. Increased flowrate to 2600 lpm/ 158 bar and continued circulating hole clean.
07.06.2003 06:00	08:00	2.0	1304.0	PSSU	OK	OK	Cont. Circulating hole clean. Pumped 8 m3 1,7 SG spacer with rig pumps at 1950 / lpm / 100 bar. Mixed and pumped 10 m3 2,0 SG cement slurry followed by 446 l spacer with cement unit. Displaced to DF with 250 l DW. Lined over to rig pumps and displaced cement with 8,8 m3 mud at 2000 lpm / 104 bar
07.06.2003 08:00	08:30	0.5	1150.0	PTTU	OK	OK	POOH to 1150 m MD.
07.06.2003 08:30	11:00	2.5	1150.0	PCCU	OK	OK	Dropped sponge ball and circulated B/U with 2000 lpm / 102 bar / 140 rpm. Large amount of cuttings, spacer and cement on B/U. Reduced flow rate to 500 lpm to reduce loss on shakers. Increased rate in steps up 2000 lpm and circulated until hole clean.
07.06.2003 11:00	16:30	5.5	252.0	DTPU	OK	OK	POOH to 252 m MD with 5" drillpipe and L/D same. Took timeout when removing tripping device with chute gates opened. L/D a total of 90 joints.
07.06.2003 16:30	18:30	2.0	.0	PTTU	OK	OK	Changed to 3,5" elevators and slips. POOH with 3,5" DP and rack back same.
07.06.2003 18:30	19:00	0.5	.0	BBOU	OK	OK	Cleared drill floor and changed to 5" handling equipment. Function tested acoustic.
07.06.2003 19:00	20:30	1.5	140.0	BBOU	OK	OK	Made up BOP test tool and RIH with same.
07.06.2003	00:00	3.5	140.0	BBDU	OK	E	Pressure tested BOP to 35/ 180 bar for 5/ 10 min on blue

20:30						FAIL	pod. Functiontested on yellow pod. Unable to open PS-30 slips when start pulling out of hole.
		24.0					
08.06.2003 00:00	00:30	0.5	140.0	DERD	E FAIL	OK	Troubleshot and repaired interlock override switch for PS-30 slips.
08.06.2003 00:30	02:00	1.5	.0	BBOU	OK	OK	POOH and L/D BOP test tool.
08.06.2003 02:00	04:30	2.5	.0	BBOU	OK	OK	Rigged up and tested auto and manual IBOP on DDM to 35/ 180 bar for 5/ 10 min. Tested mud hose against valve 7 on stand pipe manifold to 35/ 180 bar for 5/ 10 min.
08.06.2003 04:30	06:00	1.5		DTDU	OK	OK	P/U and M/U AutoTrak and MWD. Programmed MWD and turned on batteries. Cont. RIH with 8 1/2" BHA. P/U jar from deck.
08.06.2003 06:00	08:30	2.5	235.0	DTDU	OK	OK	Cont M/U and RIH with BHA to 235 m MD.
08.06.2003 08:30	11:30	3.0	965.0	DTDU	OK	OK	Installed 5" inserts in slips and RIH with AutoTrak assy. on 5" DP to 965 m MD. Performed kick drill.
08.06.2003 11:30	12:00	0.5	1149.0	CDDU	OK	OK	P/U drilling stand and wash down to 1149 m MD. Meanwhile held mini meeting to discuss stuckpipe and lost circulation.
08.06.2003 12:00	18:30	6.5	1215.0	CDDU	OK	OK	Tagged cement at 1149 m MD and sat down 10 tons. Drilled cement/ formation from 1149 m MD to 1215 m MD with 2000 lpm / 134-138 bar / 0-5 ton / 60 - 74 RPM / 4-9 KNm. Increased mud weight to 1,45 SG while drilling cement. Drilled cement and 30 % formation at 1209 m MD. Took check surveys. 50 % formation in samples from 1215 m MD. Continued operations on well 16/1-006S.
		18.5					
Sum wellbore		478.0					

Extract of daily activities well 16/1-6A

All data are taken from the DBR system (06:00 – 06:00 hrs)

Operations

Start first activity: **01.01.1980 00:00** **Start last activity:** **24.09.2003 23:59**

Well: NO 16/1-6 S

Wellbore: NO 16/1-6 A SIDETRACK

Time from	Time to	Time used	Depth mMD	Act code	---- Status ---- During opr	End of opr	Description of activities
09.06.2003 06:00	08:30	2.5	1417.0	DDDU	OK	O FAIL	Drilled 8 1/2" hole from 1404 m MD - 1417 m MD with 2200 lpm/ 175 bar/ 3 - 4 ton/ 150 - 160 RPM/ 4 - 5 KNm. Controlled ROP to 30 m/hr for good quality real time MWD log. Unable to take connection due to overtorqued connection.
09.06.2003 08:30	09:30	1.0	1417.0	RCOD	O FAIL	OK	Unable to break overtorqued saver sub connection. Held toolbox meeting and SJA and broke connection with rig tongs.
09.06.2003 09:30	13:00	3.5	1490.0	DDDU	OK	OK	Cont. drilling 8 1/2" hole from 1417 m - 1490 m MD with 2150 - 2340 lpm/ 173 - 200 bar/ 0 - 4 ton/ 150 - 165 RPM/ 4 - 6 KNm. Controlled ROP for MWD log. Boosted riser with 800 lpm.
09.06.2003 13:00	15:00	2.0	1490.0	DCAU	OK	OK	Circulated B/U for samples with 2330 lpm/ 199 bar.
09.06.2003 15:00	15:30	0.5	1490.0	DTRU	OK	O FAIL	Circulated and downlinked AutoTrak to tripping mode. Boosted one riser volume. Pumped slug. Not able to break connection between drilling pup and saver sub due to overtorqued connection.
09.06.2003 15:30	18:30	3.0	1490.0	RCOD	O FAIL	OK	Rigged up rig tongs and attempted to break out drilling stand. Unable to break due to pipe slipping in PS-30 slips. Removed PS-30 slips and installed rotary outer ring, master bushings and manual slips. Engaged gear lock on DDM and broke out drilling stand using rig tongs.
09.06.2003 18:30	22:00	3.5	123.0	DTRU	OK	E FAIL	POOH with 8 1/2" BHA from 1490 m - 123 m. Stopped due to problems with lower guiding arm. Not able to rack first DC stand. Pressure tested standpipe manifold to 35/ 345 bar for 5/ 10 min while POOH.
09.06.2003 22:00	00:00	2.0	123.0	DERD	E FAIL	OK	Troubleshot and adjusted hydraulic closing pressure on lower guiding arm.
		18.0					
10.06.2003 00:00	02:00	2.0		DTDU	OK	OK	Racked back 4 std DC. Broke off bit. B/O and L/D jar, BCPM, MWD and AutoTrak.
10.06.2003 02:00	06:00	4.0	325.0	EECU	OK	OK	Held prejob meeting prior to pick up core barrel. P/U corebarrel from setback. M/U core head and P/U and M/U 3 joints of innerbarrel. Cont. RIH with core assembly to 325 m.
10.06.2003 06:00	08:00	2.0	1143.0	ETCU	OK	OK	RIH with core assembly to 1143 m.
10.06.2003 08:00	10:30	2.5	1464.0	ETCU	OK	OK	Engaged DDM and washed down with 100 lpm. Took 6 ton weight at 1150 m. Rotated 25 RPM and reamed down to

							1172 m, no torque. Cont. RIH. Took wight at 1205 m. Engaged DDM and reamed down with 30 RPM to 1218 m. Cont. RIH to 1464 m.
10.06.2003 10:30	11:00	0.5	1490.0	ETCU	OK	OK	Engaged DDM and washed down from 1464 m with 1200 lpm/ 32 bar. Took 3 ton weight at 1475 m. Reamed down with 25 RPM from 1475 m
10.06.2003 11:00	12:00	1.0	1490.0	ETCU	OK	OK	Tagged bottom at 1490 m. Took SCR's and spaced out for coring. Picked up drilling stand, dropped ball and broke circulation with 600 lpm. Held pre-core meeting. Observed pressure increase from 10 - 21 bar when ball seated.
10.06.2003 12:00	14:00	2.0	1515.5	ERCU	OK	OK	Cut core from 1488,5 m - 1515,5 m with 1000 lpm/ 54 bar/ 3 - 10 ton/ 70 - 120 RPM/ 4 - 6 KNm.
10.06.2003 14:00	15:30	1.5	1430.0	ETCU	OK	OK	Pulled free with 3 ton OP. Flow checked well. POOH wet to 1430 m.
10.06.2003 15:30	22:00	6.5		ETCU	OK	OK	POOH with core assembly 1.5 min/ std to 400m, 3 min/ std from 400 - 100 m and 5 min/ std from 100 m. Meanwhile held prejob meeting and SJA prior to L/D cores.
10.06.2003 22:00	23:00	1.0		EECU	OK	OK	L/D float sub and pulled core barrel above rotary. Found core head plugged with junk. Removed junk from core head.
10.06.2003 23:00	00:00	1.0		EECU	OK	OK	B/O core head and installed protector. Secured core barrel in rotary.
		24.0					
11.06.2003 00:00	01:00	1.0		EECU	OK	OK	B/O and L/D inner barrels. Racked core barrel in setback. Cleared drill floor.
11.06.2003 01:00	02:00	1.0		DEOU	OK	OK	Held prejob meeting. Installed PS-30 slips.
11.06.2003 02:00	04:30	2.5		DTDU	OK	OK	P/U and M/U AutoTrak, MWD, BCPM and orienting sub. Reprogrammed and initialised MWD. M/U bit.
11.06.2003 04:30	06:00	1.5	327.0	DTDU	OK	OK	Cont. M/U and RIH with 8 1/2" BHA to 327 m.
11.06.2003 06:00	08:30	2.5	1450.0	DTDU	OK	OK	Cont. RIH from 327 to 1450 m.
11.06.2003 08:30	12:00	3.5	1514.0	DDOU	OK	OK	P/U drilling stand, filled string and established circulation. Reamed and logged with MWD from 1450 to 1514 m. (2400 lpm/ 190 bar/ 65 rpm/ 3-5 kNm).
11.06.2003 12:00	00:00	12.0	1783.0	DDDU	OK	OK	Drilled and oriented 8 1/2" hole from 1514 to 1783 m with 2000-2300 lpm/ 150-200 bar/ 80-150 rpm/ 1-3 t WOB/ 6-8 kNm/ 1,48 -1,50 ECD.
		24.0					
12.06.2003 00:00	06:00	6.0	1929.0	DDDU	OK	OK	Drilled and oriented 8 1/2" hole from 1783 to 1929 m with 2300-2400 lpm/190-210 bar/ 160 rpm/ 1-3 t WOB/ 6-8 kNm/ 1,49 -1,51 ECD.
12.06.2003 06:00	19:00	13.0	2194.0	DDDU	OK	OK	Drilled 8 1/2" hole from 1929 to 2194 m with 2400 lpm/ 220 bar/ 100 rpm/ 1-10 t WOB/ 8-13 kNm/ 1,51- 1,52 ECD.
12.06.2003 19:00	20:30	1.5	2194.0	DCAU	OK	OK	Circ. hole clean with 2450 lpm and conditioned mud, confirmed TD at 2194 m.
12.06.2003 20:30	21:00	0.5	2194.0	DTLU	OK	OK	B/O drilling pup with rig tongs and changed saver sub. Flow checked 10 min.
12.06.2003 21:00	22:00	1.0	2015.0	DTLU	OK	OK	POOH to top Heimdal Fm. - no overpull. Dropped EMS tool and pumped slug.
12.06.2003 22:00	00:00	2.0	1260.0	DTLU	OK	OK	POOH to 13 3/8" shoe at 1197 m - no overpull.
		24.0					
13.06.2003 00:00	01:00	1.0	788.0	DTLU	OK	E FAIL	Flow checked 10 min and cont. POOH to 788 m. VPH started to move uncontrolled.
13.06.2003 01:00	06:00	5.0	788.0	DERD	E FAIL	OK	Troubleshot problems with VPH.
13.06.2003	09:30	3.5	788.0	DERD	E	OK	Cont. troubleshooting problems with VPH. Found fault on

06:00					FAIL		pulse counter, replaced same.
13.06.2003 09:30	11:00	1.5	151.0	DTLU	OK	OK	POOH from 788 to 151 m.
13.06.2003 11:00	13:30	2.5		DTLU	OK	OK	L/D jar and R/B DC's. L/D orienting sub and Autotrack assy with bit.
13.06.2003 13:30	14:30	1.0		DDOU	OK	OK	B/O and L/D core barrel stand.
13.06.2003 14:30	17:30	3.0		ELOU	OK	OK	Cleared drill floor and R/U WL equipment. Held prejob meeting and loaded nuclear source, tested tool string.
13.06.2003 17:30	19:00	1.5	1170.0	ELWU	OK	O FAIL	RIH with run #1: PEX RES/DSI. Toolstring stood up at 1170 m, attempted to work string past restriction - no success.
13.06.2003 19:00	19:30	0.5		ELOD	O FAIL	O FAIL	POOH with logging string. Unloaded nuclear source and R/D toolstring. Removed lower part of toolstring with resistivity module (AIT-H). Installed knuckle joint and rubber nose. M/U toolstring and loaded nuclear source.
13.06.2003 19:30	20:30	1.0	1170.0	ELOD	O FAIL	O FAIL	RIH with run #1: PEX DSI. Toolstring stood up at 1170 m, attempted to work string past restriction - no success.
13.06.2003 20:30	22:00	1.5		ELOD	O FAIL	OK	POOH with toolstring and unloaded nuclear source. R/D toolstring and WL equipment, cleared drill floor.
13.06.2003 22:00	00:00	2.0	153.0	ELWK	OK	OK	M/U 8 1/2" BHA for wiper trip and RIH to 153 m.
		24.0					
14.06.2003 00:00	02:00	2.0	1150.0	ELWK	OK	OK	Cont. RIH with 8 1/2" cleanout assy to 1150 m.
14.06.2003 02:00	05:00	3.0	1200.0	ELWK	OK	OK	Reamed and washed down inside 13 3/8" casing from 1150 to 1197 m with 2700 lpm/ 130 bar/ 30-80 rpm until possible to slide through the restrictions. (Took weight at 1150, 1166, 1173 and 1196 m)
14.06.2003 05:00	06:00	1.0	1300.0	ELWK	OK	OK	RIH to 1300 m and circ. BU with 2700 lpm/ 30 rpm while boosting riser with 1000 lpm.
14.06.2003 06:00	07:00	1.0	1349.0	ELWK	OK	OK	Cont. circ hole clean at 1300 m with 2700 lpm/135 bar/ 30 rpm, boosted riser with 1000 lpm. RIH with 8 1/2" bit to 1349 m - OK.
14.06.2003 07:00	10:30	3.5	153.0	ELWK	OK	OK	Pumped slug and POOH with 8 1/2" clean out assy to 153 m. Recorded 10 ton OP in intervall between 1233 - 1262 m, wiped intervall.
14.06.2003 10:30	12:00	1.5		ELWK	OK	OK	L/D jar and R/B DC stands.
14.06.2003 12:00	13:00	1.0		ELOU	OK	O FAIL	R/U WL equipment and toolstring.
14.06.2003 13:00	15:30	2.5		ELOD	O FAIL	OK	RIH with logging for run #1 PEX RES/DSI to 1150 m. Not able to run through restriction at 1150 m with toolstring. POOH and R/D WL equipment.
14.06.2003 15:30	17:30	2.0		ELWK	OK	OK	M/U 12 1/4" clean out assy.
14.06.2003 17:30	19:30	2.0		ELWK	OK	OK	RIH to 1142 m, filled pipe.
14.06.2003 19:30	20:00	0.5	1150.0	ELWK	OK	OK	Drilled cement at 1150 m with 3250 lpm/ 150 bar/ 60 rpm/ 3-6 ton WOB/ 3-10 kNm. Boosted riser with 1250 lpm.
14.06.2003 20:00	20:30	0.5	1150.0	ELWK	OK	OK	Stopped drilling due to large amounts of rubber and plastic debris plugging off gumbo trap, cleaned out same.
14.06.2003 20:30	00:00	3.5	1196.0	ELWK	OK	OK	Drilled cement from 1150 to 1196 m with 3250 lpm/ 150 bar/ 60 rpm/ 3-6 ton WOB/ 3-10 kNm. Boosted riser with 1250 lpm.
		24.0					
15.06.2003 00:00	01:00	1.0	1196.0	ELWK	OK	OK	Circ. hole clean with 3250 lpm while boosting riser with 1250 lpm.
15.06.2003	03:00	2.0	178.0	ELWK	OK	OK	Flow checked, pumped slug and POOH to 178 m.

01:00							
15.06.2003 03:00	04:30	1.5		ELWK	OK	OK	R/B BHA, L/D jar, 12 1/4" bit and NB stabilizer.
15.06.2003 04:30	05:30	1.0		ELWK	OK	OK	Changed inserts in PS-30 slips. Changed to BX elevator and installed inserts in elevator.
15.06.2003 05:30	06:00	0.5		ELWK	OK	OK	P/U and RIH with 8 1/2" BHA to 60 m.
15.06.2003 06:00	08:30	2.5	1196.0	ELWK	OK	OK	Cont. RIH with 8 1/2" BHA from 60 to 1196 m.
15.06.2003 08:30	09:30	1.0	1196.0	ELWK	OK	OK	Filled DP and B/circ. Verified bottom of 12 1/4" hole at 1196 m, not able to pass. Reamed through shoe several times with 2200 lpm/ 30 - 90 rpm until able to pass down without rotation.
15.06.2003 09:30	11:00	1.5	1700.0	ELWK	OK	OK	Cont. RIH to 1700 m.
15.06.2003 11:00	17:30	6.5	2191.0	ELWK	OK	OK	Took weight at 1700 m. Connected DDM and washed/reamed down from 1700 to 2191 m with 2200 lpm/30-90 rpm.
15.06.2003 17:30	20:30	3.0	2191.0	ELWK	OK	OK	Circulated hole clean with 2400 lpm/ 140 bar/ 150 rpm/ 5-6 kNm while boosting riser with 1600 lpm. Observed large amounts of cavings over shakers.
15.06.2003 20:30	21:00	0.5	2127.0	ELWK	OK	E FAIL	Flow checked for 10 min and pumped slug. POOH from 2191 to 2127 m - no overpull. Had to stop operations at 21:07 hrs due to low rig-air pressure.
15.06.2003 21:00	22:00	1.0	2127.0	DERD	E FAIL	OK	Troubleshot problems with overheating and tripping of rig-air compressor. Meanwhile opened compensator and rotated string with 10-15 rpm.
15.06.2003 22:00	23:30	1.5	2119.0	ELWK	OK	OK	Started to POOH at 21:54 hrs. Hole packed off at 2119 m, max OP 25 ton, worked pipe. Connected DDM, worked stand up/down with 300 - 700 lpm and 55 rpm. Partial losses, regained returns and increased pumprate to 700 lpm with stable returns. Total loss downhole 8,2 m3.
15.06.2003 23:30	00:00	0.5	1876.0	ELWK	OK	OK	POOH from 2119 to 1876 m, 5 ton OP on first stand - no OP on next stands.
		24.0					
16.06.2003 00:00	01:00	1.0	1750.0	ELWK	OK	OK	Pumped slug and POOH from 1876 to 1790 m - no OP. Recorded 10 ton OP at 1790 m. Connected DDM and worked string to 1750 with 500 lpm/ 10 rpm, recorded 4 - 8 ton OP in intervall. Had full returns.
16.06.2003 01:00	02:30	1.5	1197.0	ELWK	OK	OK	POOH into 13 3/8" shoe - no OP. Flow checked.
16.06.2003 02:30	04:30	2.0	153.0	ELWK	OK	OK	POOH to 153 m.
16.06.2003 04:30	05:30	1.0	.0	ELWK	OK	OK	POOH and racked back BHA.
16.06.2003 05:30	06:00	0.5	.0	ELOU	OK	OK	R/U wireline equipment.
16.06.2003 06:00	06:30	0.5		ELOU	OK	O FAIL	Cont. R/U WL equipment. P/U and M/U toolsting.
16.06.2003 06:30	10:30	4.0		ELOD	O FAIL	O FAIL	RIH with logging run #1 (PEX RES/DSI) to 1750 m, not able to pass at 1750 m. POOH while logging from 1740 to 1197 m. Cont. POOH.
16.06.2003 10:30	12:00	1.5		ELOD	O FAIL	OK	Unloaded nuclear source and R/D toolstring.
16.06.2003 12:00	14:30	2.5		ELDU	OK	OK	R/U loggingstring for TLC run #1A (MDT/GR).
16.06.2003 14:30	15:00	0.5		ELDU	OK	OK	Removed PS-30 slips, installed master bushing with split bowl.
16.06.2003	19:30	4.5	1146.0	ELDU	OK	OK	RIH with loggingstring for run # 1A on 5" DP, installed jar at

15:00							174 m and cont. RIH on 5" DP to 1146 m. (B/circ. and pumped 1000 lpm/10 min at 470, 750 and 1000 m)
16.06.2003 19:30	20:00	0.5	1146.0	ELDU	OK	OK	Held prejob meeting and SJA prior to R/U up WL sheaves and snatch blocks in derrick. Meanwhile circ. with 600 lpm.
16.06.2003 20:00	22:30	2.5	1146.0	ELDU	OK	OK	R/U up WL sheaves and snatch blocks in derrick. Meanwhile circ. with 600 lpm.
16.06.2003 22:30	00:00	1.5	1146.0	ELDU	OK	OK	Pulled WL through sheaves and terminated cable head.
		24.0					
17.06.2003 00:00	01:00	1.0	1158.0	ELDU	OK	OK	P/U side entry sub, ran locomotive 50 m down DP. M/U side entry sub, one single 5" DP and float sub.
17.06.2003 01:00	03:00	2.0	1158.0	ELDU	OK	OK	Ran down with locomotive and latched onto toolstring, tested connection. Pulltested clamp on side entry sub.
17.06.2003 03:00	05:30	2.5	1741.0	ELDU	OK	OK	RIH from 1158 to 1741 m with MDT/GR toolstring, filled DP and B/Circ. every 5th stand.
17.06.2003 05:30	06:00	0.5		ELDU	OK	OK	Took 3 ton weight at 1741 m. Worked string down from 1741 to 1746 m with max. 6 ton down weight.
17.06.2003 06:00	06:30	0.5	1747.0	ELDU	OK	O FAIL	Cont. working MDT/GR logging string down from 1746 to 1747 m with max. 6 ton down, not able to pass 1747 m.
17.06.2003 06:30	09:00	2.5	1160.0	ELOD	O FAIL	O FAIL	POOH with logging string to 1160 m.
17.06.2003 09:00	10:00	1.0	1146.0	ELOD	O FAIL	O FAIL	B/O and L/D float sub and 5" DP single.
17.06.2003 10:00	11:30	1.5	1146.0	ELOD	O FAIL	O FAIL	Unlatched and POOH with wet connectors and locomotive. B/O and L/D side entry sub. Pulled cable head through sheaves in derrick.
17.06.2003 11:30	15:00	3.5		ELOD	O FAIL	O FAIL	POOH with MDT/GR logging string, L/D jar.
17.06.2003 15:00	16:30	1.5		ELOD	O FAIL	OK	R/D x-over and WL logging string. Cleared drill floor.
17.06.2003 16:30	18:00	1.5		DDOU	OK	OK	P/U from set-back and L/D 6 stands x 6 1/2" DC's, 8 1/2" stabilizer, float sub and 8 1/2" bit.
17.06.2003 18:00	19:00	1.0		ELOU	OK	OK	Drifted 3 1/2" DP in set-back to 2 7/16" prior to VSP logging with ESR tool. Changed to 3 1/2" handling equipment on drill floor.
17.06.2003 19:00	00:00	5.0	2000.0	PTTU	OK	OK	RIH with 9 stands 3 1/2" DP to 252,7 m. Cont. RIH with 5" DP to 1720 m, B/circ with 2500 lpm/170 bar/50 rpm. RIH to 1741 m, took 5 ton weight, washed down stand with 3000 lpm/150 rpm. Cont RIH to 2000 m.
		24.0					
18.06.2003 00:00	01:00	1.0	2194.0	PTTU	OK	OK	Cont. RIH to 2194 m, wased down last stand.
18.06.2003 01:00	04:00	3.0	2194.0	PCCU	OK	OK	Circ. hole clean with 3300 lpm/ 300 bar/ 175 rpm. Large amount of cavings over shakers, had max 5 % gas at first BU. Meanwhile held pre-job meeting prior to R/U side entry sub, wireline and pump down ESR tool.
18.06.2003 04:00	05:00	1.0	2194.0	PCCU	OK	OK	Performed "sticky" test at 2190 m, got 25 ton OP after keeping DP stationary for 15 min. Hole packed off, worked pipe up/down with 200 lpm/ 50 bar/ 120 rpm. Regained partial return and increased pumprate stepwise to 2000 lpm with full returns. Total downhole loss 12 m3.
18.06.2003 06:00	11:30	5.5	2193.0	PCCU	OK	OK	Cont. increasing circ. rate stepwise to 3300 lpm after regaining full returns, resiprocated stand and rotated with 140 rpm. Meanwhile mixed spacer for cement job and held prejob meeting.
18.06.2003 11:30	12:30	1.0	2193.0	PSSU	OK	OK	Pumped 5 m3 1,70 sg spacer. Isolated stand pipe down to mud pump and put 30 bar behind valve. Mixed and pumped 10,5 m3 1,90 sg cement slurry. Pumped 1973 litre 1,70 sg spacer behind slurry and displaced same to drill floor with 250 litre drill water. Displaced cement slurry with 14,3 m3

							POBM at 2000 lpm/ 86 bar.
18.06.2003 12:30	15:00	2.5	1650.0	PTTU	OK	OK	POOH from 2193 to 1650 m.
18.06.2003 15:00	15:30	0.5	1650.0	PCCU	OK	OK	Dropped sponge ball and circ 2 x DP volume with 2050 lpm/100 bar/150 rpm.
18.06.2003 15:30	16:30	1.0	1305.0	PTTU	OK	OK	POOH to 1305 m.
18.06.2003 16:30	17:00	0.5	1305.0	PCCU	OK	OK	Installed Perigon cement support tool and displaced same to 1305 m with 10,5 m3 POBM. Meanwhile performed prejob meeting for next cement job.
18.06.2003 17:00	17:30	0.5	1300.0	PSSU	OK	E FAIL	Pumped 8 m3 1,70 sg spacer. Mixed and pumped 5,5 m3 1,92 sg cement slurry. Had to stop mixing cement slurry due to stop in drill water supply on rig.
18.06.2003 17:30	18:00	0.5	1300.0	DERD	E FAIL	OK	Troubleshot stop in drill water supply and discussed further options.
18.06.2003 18:00	18:30	0.5	1300.0	PSSU	OK	OK	Cont. mixing 5,4 m3 1,92 sg cement slurry with sea water instead of drill water. Pumped 850 litre 1,70 sg spacer and displaced cement with 7,9 m3 POBM at 2000 lpm.
18.06.2003 18:30	19:30	1.0	900.0	PTTU	OK	OK	POOH to 900 m and dropped sponge ball.
18.06.2003 19:30	21:00	1.5	900.0	PCCU	OK	OK	Circ. BU with 2500 lpm/150 rpm while reciprocating string. Spotted 14 m3 1,39 sg POBM LCM pill from 900 to 722 m.
18.06.2003 21:00	00:00	3.0	409.0	PTTU	OK	OK	POOH from 900 to 409 m while L/D 47 joints 5" DP on deck.
		23.0					
19.06.2003 00:00	02:00	2.0	278.0	PTTU	OK	OK	POOH from 409 to 253 m while L/D 16 joints 5" DP on deck.
19.06.2003 02:00	04:30	2.5	18.0	PTTU	OK	E FAIL	POOH from 253 to 18 m while L/D 27 joints 3 1/2" DP on deck. Not able to operate skate.
19.06.2003 04:30	05:30	1.0	18.0	DERD	E FAIL	OK	Troubleshot skate, found proxy not working.
19.06.2003 05:30	06:00	0.5		PTPU	OK	OK	L/D two remaining 3 1/2" joints on drillfloor. Changed to 5" handling equipment. M/U DrillQuip multi purpose tool.
19.06.2003 06:00	07:30	1.5	139.0	PTTU	OK	OK	RIH with DrillQuip multi purpose tool, landet out in WH. Pulled WB free with 30 ton OP.
19.06.2003 07:30	09:00	1.5	.0	PTTU	OK	OK	POOH with WB and released from Multi purpose tool, L/D same. Meanwhile prepared to run EZSV.
19.06.2003 09:00	09:30	0.5	.0	PSMU	OK	OK	M/U 13 3/8" EZSV and adapter to HWDP.
19.06.2003 09:30	10:00	0.5	110.0	PSSU	OK	OK	RIH with EZSV to 110 m, closed BSR and pressure tested cement plug #2 to 90 bar/10 min.
19.06.2003 10:00	11:30	1.5	425.0	PSMU	OK	OK	Cont. RIH to 425 m, filled ea 3. stand.
19.06.2003 11:30	13:00	1.5	425.0	PSMU	OK	OK	Set EZSV at 425 m acc. to Halliburton procedures. Pressure tested plug to 90 bar/10 min. Verified setting depth by tagging EZSV.
19.06.2003 13:00	15:00	2.0	425.0	PCCU	OK	OK	Displaced well from 425 m, c/k-lines and booster line to sea water.
19.06.2003 15:00	17:00	2.0	425.0	PSSU	OK	OK	Held prejob meeting, mixed and pumped 43,5 m3 1,90 sg slurry. Displaced same with 1,3 m3 sea water. (cement plug from 425 to 175 m).
19.06.2003 17:00	18:00	1.0	160.0	PTTU	OK	OK	POOH to 160 m, dropped sponge ball and circ. BU.
19.06.2003 18:00	19:30	1.5	.0	PTTU	OK	OK	POOH and B/O EZSV RT , cleared drillfloor.
19.06.2003 19:30	22:00	2.5	.0	PAOU	OK	OK	R/U handling equipment for marine riser and prepared to pull marine riser/BOP.
19.06.2003	00:00	2.0	.0	PAOU	OK	OK	Decided to L/O marine riser joints from set back and

22:00							backload same due to unfavourable weather forcast for anchor handling. R/U to move riser joints from set-back to deck. Performed SJA/prejob meeting prior to lifting riser joint from deck to boat..
		24.0					
20.06.2003 00:00	06:00	6.0	.0	PAOU	OK	OK	L/D 3 x 75 ft. riser joints to "Normand Atlantic".
20.06.2003 06:00	07:00	1.0	.0	PAOU	OK	OK	L/D 1 x 75 ft. riser joint from riser setback to deck and loaded directly to boat.
20.06.2003 07:00	07:30	0.5	.0	PAOU	OK	OK	Held prejob/SJA meeting with day shift.
20.06.2003 07:30	09:00	1.5	.0	PAOU	OK	OK	L/D 1 x 75 ft. riser joint from riser setback to deck and loaded directly to boat.
20.06.2003 09:00	10:00	1.0	.0	BBRU	OK	OK	Boat could not handle more riser joints due to too rough weather. R/B one riser joint into set back. R/U to pull and L/D diverter. Removed master bushing and installed riser spider.
20.06.2003 10:00	11:00	1.0	.0	BBOU	OK	OK	Handling wire for diverter snapped off, held time-out and discussed incident with crew.
20.06.2003 11:00	13:00	2.0	.0	BBRU	OK	OK	Installed handling slings for diverter and diverter RT. Pulled diverter and L/D on deck.
20.06.2003 13:00	15:30	2.5	125.0	BBRU	OK	OK	Installed 50 ft. riser landing joint, collapsed slipjoint innerbarrel. Disconnected BOP, pulled same to 125 m. Hung off load ring in diverter housing.
20.06.2003 15:30	19:00	3.5	94.0	BBRU	OK	OK	Moved rig 25 m to stb. R/B landing joint. Pulled and R/B slipjoint. Pulled 10 ft. and 15 ft. riser pup joints and L/D on deck.
20.06.2003 19:00	20:30	1.5	.0	BBRU	OK	OK	Pulled BOP/riser. Pulled BOP through splash zone and secured in underhull guidance.
20.06.2003 20:30	23:00	2.5	.0	BBRU	OK	OK	Removed POD line clamps and wires. Pulled all guidelines to surface. Removed transponder. Lifted BOP into craddle, disconnected 50 ft. riser slick joint and L/D on deck.
20.06.2003 23:00	00:00	1.0	.0	BBRU	OK	OK	Moved BOP to parked position and R/D BOP handling equipment.
		24.0					
21.06.2003 00:00	02:00	2.0	.0	BBRU	OK	OK	B/O eye sub and installed torque wrench in DDM. Tied back and secured umbilicals on cellar deck.
21.06.2003 02:00	04:00	2.0	.0	PAHU	OK	OK	P/U premade cutting assy with 8" bullnose, 12" x 47" OD hydraulic cutters, 17 1/2" stabilizer, 9 1/2" Drilex motor and MOST, function tested same. Prepared two-armed guide frame in moonpool. Removed master bushing and ran cutting assy through rotary, installed master bushing. Meanwhile ran down and connected two guidelines.
21.06.2003 04:00	05:00	1.0	.0	PAHU< /TD>	OK	OK	Moved rig over WH and tensioned up guide lines.
21.06.2003 05:00	06:00	1.0	49.0	PAHU	OK	OK	Installed two-armed guide frame. Ran down cutting assy on 8" DC to 49 m and followed with two-armed guide frame. Observed with ROV.
21.06.2003 06:00	07:30	1.5	148.0	PAHU	OK	OK	Cont. running down cutting assy from 49 to 148 m, followed down with two-armed guide frame and ROV to avoid tangling of wires. ROV assisted while entering WH. Set down 5 ton on safety clamps.
21.06.2003 07:30	09:30	2.0	148.0	PAHU	OK	OK	Pulled two-armed guide frame to surface. Ran down and connected two remaining guide lines and tensioned up to 2 ton.
21.06.2003 09:30	10:00	0.5	148.0	PAHU	OK	OK	P/U and engaged MOST tool as per Weatherford procedures.
21.06.2003 10:00	12:00	2.0	148.0	PAHU	OK	OK	Cut 20" x 30 " casing at 148 m (5 m below seabed) by pumping with 2800 - 3200 lpm, observed pressure increase. Meanwhile pulled ROV to surface to repair multi function

							arm.
21.06.2003 12:00	13:00	1.0	.0	PAHU	OK	OK	Set down and engaged MOST tool to WH as per Weatherford procedures. Pulled WH free with 25 ton OP and cont. pulling WH/cutting assy to surface. Kept tension on guidelines while pulling.
21.06.2003 13:00	19:00	6.0	.0	MARU	OK	OK	Anchor #8: Mærsk Helper - started to grapple at 12:45, buoy on water at 14:50. Anchor #7: Mærsk Helper - started to grapple at 15:00, piggy anchor on deck 18:30. Anchor #6: Normand Atlantic - started to grapple at 17:30, piggy anchor on deck at 18:45. Meanwhile landed and secured PGB on 105 ton skid in moonpool, released PGB from 30" stump. Pulled cutting assy and 20" x 30" stump through rotary, held prejob meeting and L/D same on deck. R/D handling wires and installed BX elevator. Performed final seabed inspection with ROV.
21.06.2003 19:00	00:00	5.0	.0	MARU	OK	OK	Anchor #2: Normand Mariner - received chaser at 18:55, anchor on deck at 22:25. Anchor #3: Normand Drott - received chaser at 19:28, anchor on deck at 22:50. Anchor #6: Normand Atlantic - anchor on deck at 19:26, buoys on deck: #1at 20:45, #2 at 21:00; #3 at 21:12, #4 at 21:21, #5 at 21:35, #6 at 21:45. Pennant to rig 23:20. Anchor #7: Mærsk Helper - anchor on deck 22:25. Meanwhile L/D 6 x 8" DC's. R/U and L/D 1 x 75 ft. riser joints from set back to boat.
		24.0					
22.06.2003 00:00	06:00	6.0	.0	MARU	OK	OK	Anchor #2: Normand Mariner - chaser pennant back to rig 00:46. Anchor #7: Mærsk Helper - buoys on deck: #1 at 00:35, #2 at 01:44, #3 at 01:44. Pennant to rig 03:48. Started to de-ballast rig at 04:00. Meanwhile L/D 3 x 75 ft. riser joints from set back to boat, finished at 04:30. R/D riser handling equipment.
22.06.2003 06:00	22:00	16.0	.0	MARU	OK	OK	Anchor #1: Normand Mariner - started to grapple at 10:10, anchor on deck 11:30, buoys on deck: #1 at 13:25, #2 at 13:35, #3 at 14:00. Fluke angle set to 50 degrees (was set at 32 degrees) Anchor #3: Normand Drott - anchor on bolster 07:45. Anchor #5: Normand Drott - pennant from rig at 14:36, anchor on deck at 16:50, pennant to rig at 18:30. Anchor #4: Normand Atlantic - pennant from rig 14:55, anchor on deck at 18:03, pennant to rig at 21:05. Anchor #8: Mærsk Helper - buoy on deck 10:30, anchor on deck 11:20, buoys on deck: #1 at 18:00, #2 at 18:20, #3 at 18:42. Normand Mariner ready in stb towing brest at 16:00 Normand Drott ready in bridle at 20:30 Mærsk Helper ready in bb towing brest at 22:45 Normand Atlaintic to shore for supply for next location Meanwhile L/D HOT and 9 joints HWDP from 06:00 to 09:30. Changed swivle for DDM pipehandler from 09:30 to 22:00. Performed general rig maintenance. Started towing to Statfjord Nord well 33/9 F-4AH at 22:00. ***end of well***
		22.0					
Sum wellbore		327.0					

App B Directional data, survey listing

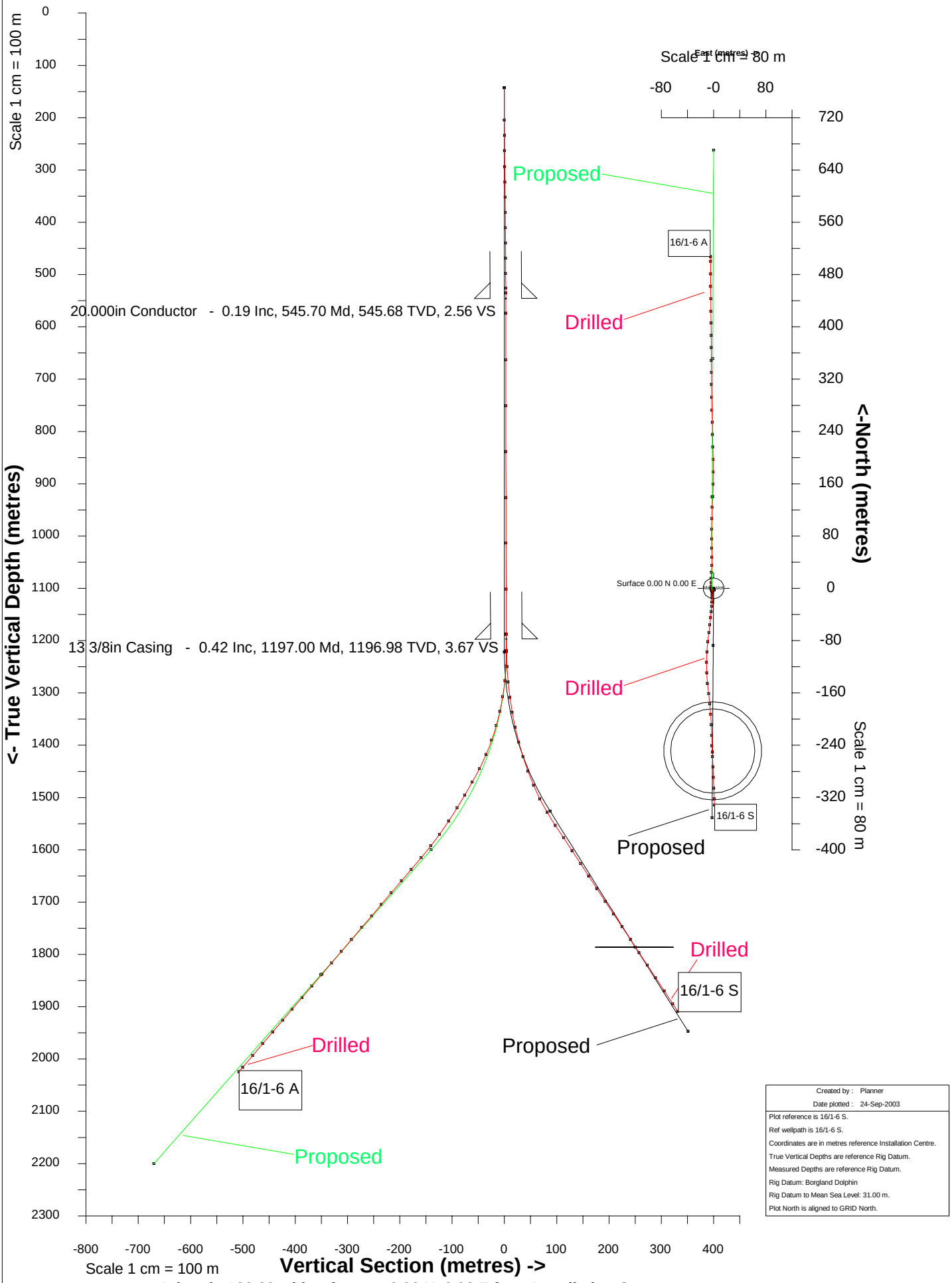
Well plot, wells 16/1-6S & 6A

Statoil

Location:	Norway	Slot:	Main slot
Field:	EXPLORATION ZONE 31	Well:	16/1-6S
Installation:	16/1 Exploration	Wellbore:	16/1-6 S Plan

STATOIL

BAKER HUGHES INTEQ



Created by : Planner
Date plotted : 24-Sep-2003

Plot reference is 16/1-6 S.
Ref wellpath is 16/1-6 S.
Coordinates are in metres reference Installation Centre.
True Vertical Depths are reference Rig Datum.
Measured Depths are reference Rig Datum.
Rig Datum: Borgland Dolphin
Rig Datum to Mean Sea Level: 31.00 m.
Plot North is aligned to GRID North.

Well survey listing well 16/1-6S

STATOIL

Statoil,Slot#1
16/1 Exploration ,16/1
EXPLORATION ZONE 31,Norway

Wellbore: 16/1-6 S
Wellpath: 16/1-6 S Definitive
(TD@1997)
Date Printed: 4-Nov-2003

BAKER HUGHES INTEQ

Wellbore

Name	Created	Last Revised
16/1-6 S	29-May-2003	23-Oct-2003

Well

Name	Government ID	Last Revised
16/1-6S		5-Jun-2003

Slot

Name	Grid Northing	Grid Easting	Latitude	Longitude	North	East
Slot#1	6539424.9000	459501.3000	N58 59 27.9503	E2 17 43.0757	0.00N	0.00E

Installation

Name	Easting	Northing	Coord System Name	North Alignment
16/1 Exploration	459501.300	6539424.900	ED50-UTM-31N on EUROPEAN DATUM 1950 datum	Grid

Field

Name	Easting	Northing	Coord System Name	North Alignment
EXPLORATION ZONE 31	0.0000	0.0000	ED50-UTM-31N on EUROPEAN DATUM 1950 datum	Grid

Created By

Comments

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (Borgland Dolphin 31.0m above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 180.00 degrees
Bottom hole distance is 331.53 Metres on azimuth 179.78 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,Slot#1
16/1 Exploration ,16/1
EXPLORATION ZONE 31,Norway

Wellbore: 16/1-6 S
Wellpath: 16/1-6 S Definitive
(TD@1997)
Date Printed: 4-Nov-2003

BAKER HUGHES INTEQ

Wellpath Report

MD[m]	Inc[deg]	Azi[deg]	TVD[m]	North[m]	East[m]	Dogleg [deg/30m]	Vertical Section[m]
143.00	0.00	0.00	143.00	0.00N	0.00E	0.00	0.00
204.40	0.09	335.46	204.40	0.04N	0.02W	0.04	-0.04
233.70	0.50	164.79	233.70	0.06S	0.00E	0.60	0.06
263.10	0.78	168.41	263.10	0.38S	0.08E	0.29	0.38
293.80	0.83	150.17	293.80	0.78S	0.23E	0.25	0.78
323.00	0.84	159.49	322.99	1.16S	0.41E	0.14	1.16
352.20	0.71	148.40	352.19	1.51S	0.58E	0.20	1.51
381.30	0.48	139.69	381.29	1.76S	0.75E	0.25	1.76
410.60	0.47	155.05	410.59	1.96S	0.88E	0.13	1.96
439.90	0.35	142.80	439.89	2.14S	0.99E	0.15	2.14
468.80	0.26	159.59	468.79	2.28S	1.06E	0.13	2.28
497.90	0.24	202.85	497.88	2.39S	1.06E	0.19	2.39
525.80	0.22	215.64	525.78	2.49S	1.01E	0.06	2.49
535.40	0.23	174.63	535.38	2.52S	1.00E	0.49	2.53
573.80	0.32	260.37	573.78	2.62S	0.90E	0.30	2.62
663.20	0.31	271.52	663.18	2.65S	0.41E	0.02	2.66
751.00	0.34	260.67	750.98	2.69S	0.08W	0.02	2.69
838.90	0.27	238.60	838.88	2.84S	0.51W	0.05	2.84
926.40	0.39	240.76	926.38	3.09S	0.95W	0.04	3.09
1013.40	0.37	266.79	1013.38	3.25S	1.49W	0.06	3.25
1101.50	0.25	207.40	1101.48	3.44S	1.86W	0.11	3.44
1187.80	0.15	255.25	1187.78	3.64S	2.06W	0.06	3.64
1220.90	1.36	182.28	1220.87	4.04S	2.11W	1.20	4.04
1250.10	3.08	178.30	1250.05	5.17S	2.11W	1.77	5.17
1279.30	5.12	180.51	1279.17	7.26S	2.09W	2.10	7.26
1308.60	7.73	182.83	1308.29	10.53S	2.20W	2.69	10.53
1337.80	10.03	181.66	1337.14	15.04S	2.37W	2.37	15.04
1366.90	12.61	182.73	1365.67	20.75S	2.60W	2.67	20.74
1396.00	14.65	183.73	1393.94	27.59S	2.99W	2.12	27.59
1425.20	17.35	185.76	1422.01	35.61S	3.67W	2.83	35.61
1454.10	20.41	185.66	1449.35	44.91S	4.59W	3.18	44.91
1483.50	23.39	186.76	1476.63	55.81S	5.79W	3.07	55.81
1512.00	26.68	187.60	1502.45	67.78S	7.30W	3.48	67.78
1541.30	30.51	185.57	1528.17	81.70S	8.89W	4.05	81.70
1571.10	33.42	183.96	1553.45	97.42S	10.19W	3.05	97.42
1599.50	33.45	180.67	1577.15	113.05S	10.83W	1.91	113.05
1629.00	33.43	177.30	1601.77	129.30S	10.54W	1.89	129.30
1658.70	33.46	174.10	1626.55	145.62S	9.31W	1.78	145.62
1687.00	33.34	172.99	1650.18	161.10S	7.56W	0.66	161.10
1715.50	33.32	174.30	1673.99	176.66S	5.83W	0.76	176.66
1745.10	33.43	176.13	1698.71	192.89S	4.47W	1.03	192.89
1774.00	33.43	177.71	1722.83	208.78S	3.61W	0.90	208.78
1803.40	33.40	178.39	1747.37	224.96S	3.06W	0.38	224.96
1832.50	33.41	177.42	1771.67	240.97S	2.48W	0.55	240.97
1862.60	33.38	177.38	1796.80	257.52S	1.73W	0.04	257.52
1891.50	33.60	177.35	1820.90	273.45S	0.99W	0.23	273.45
1920.00	33.37	177.58	1844.67	289.16S	0.30W	0.28	289.16
1950.40	33.47	177.71	1870.04	305.89S	0.39E	0.12	305.89
1979.90	33.36	178.17	1894.67	322.13S	0.97E	0.28	322.13
1997.00	33.36	178.17	1908.95	331.52S	1.28E	0.00	331.53

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (Borgland Dolphin 31.0m above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 180.00 degrees
Bottom hole distance is 331.53 Metres on azimuth 179.78 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,Slot#1
16/1 Exploration ,16/1
EXPLORATION ZONE 31,Norway

Wellbore: 16/1-6 S
Wellpath: 16/1-6 S Definitive
(TD@1997)
Date Printed: 4-Nov-2003

BAKER HUGHES INTEQ

Hole Sections

Diameter [in]	Start MD[m]	Start TVD[m]	Start North[m]	Start East[m]	End MD[m]	End TVD[m]	End North[m]	Start East[m]	Wellbore
36.000	143.00	143.00	0.00N	0.00E	204.00	204.00	0.04N	0.02W	16/1-6 S
26.000	204.00	204.00	0.04N	0.02W	551.00	550.99	2.58S	0.99E	16/1-6 S
17 1/2	551.00	550.99	2.58S	0.99E	1206.00	1205.97	3.76S	2.10W	16/1-6 S
8 1/2	1206.00	1205.97	3.76S	2.10W	1997.00	1908.95	331.52S	1.28E	16/1-6 S

Casings

Name	Top MD[m]	Top TVD[m]	Top North[m]	Top East[m]	Shoe MD[m]	Shoe TVD[m]	Shoe North[m]	Shoe East[m]	Wellbore
30.000in Conductor	143.00	143.00	0.00N	0.00E	203.00	203.00	0.04N	0.02W	16/1-6 S
20.000in Casing	143.00	143.00	0.00N	0.00E	545.70	545.68	2.56S	1.00E	16/1-6 S
13 3/8in Casing	143.00	143.00	0.00N	0.00E	1196.70	1196.68	3.67S	2.08W	16/1-6 S

Survey Tool Program

Reference	Survey Name	MD[m]	TVD[m]	Survey Tool	Error Model
673624	16/1-6 S BHI.MWD 26" (0-535.40)	535.40	535.38	Magnetic (MWD, EMS)	MWD, standard, mag-corr
673554	16/1-6 S BHI.MWD 17 1/2" (535.40-1187.80)	1187.80	1187.78	Magnetic (MWD, EMS)	MWD, standard, mag-corr
673581	16/1-6 S BHI.MWD 8 1/2" (1187.80-1979.90)	1979.90	1894.67	Magnetic (MWD, EMS)	MWD, standard, mag-corr
673917	16/1-6 S Extrapolation (TD@1997m)	1997.00	1908.95	Magnetic (MWD, EMS)	MWD, standard, mag-corr

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (Borgland Dolphin 31.0m above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 180.00 degrees
Bottom hole distance is 331.53 Metres on azimuth 179.78 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

Well survey listing well 16/1-6A

STATOIL

Statoil,Slot#1
16/1 Exploration ,16/1
EXPLORATION ZONE 31,Norway

Wellbore: 16/1-6 A
Wellpath: 16/1-6 A Definitive
(TD@2194)
Date Printed: 4-Nov-2003

BAKER HUGHES INTEQ

Wellbore

Name	Created	Last Revised
16/1-6 A	10-Jun-2003	23-Oct-2003

Well

Name	Government ID	Last Revised
16/1-6A		5-Jun-2003

Slot

Name	Grid Northing	Grid Easting	Latitude	Longitude	North	East
Slot#1	6539424.9000	459501.3000	N58 59 27.9503	E2 17 43.0757	0.00N	0.00E

Installation

Name	Easting	Northing	Coord System Name	North Alignment
16/1 Exploration	459501.300	6539424.900	ED50-UTM-31N on EUROPEAN DATUM 1950 datum	Grid

Field

Name	Easting	Northing	Coord System Name	North Alignment
EXPLORATION ZONE 31	0.0000	0.0000	ED50-UTM-31N on EUROPEAN DATUM 1950 datum	Grid

Created By

Comments

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (Borgland Dolphin 31.0m above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 0.00 degrees
Bottom hole distance is 507.45 Metres on azimuth 359.48 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,Slot#1
16/1 Exploration ,16/1
EXPLORATION ZONE 31,Norway

Wellbore: 16/1-6 A
Wellpath: 16/1-6 A Definitive
(TD@2194)
Date Printed: 4-Nov-2003

BAKER HUGHES INTEQ

Wellpath Report

MD[m]	Inc[deg]	Azi[deg]	TVD[m]	North[m]	East[m]	Dogleg [deg/30m]	Vertical Section[m]
143.00	0.00	0.00	143.00	0.00N	0.00E	0.00	0.00
204.40	0.09	335.46	204.40	0.04N	0.02W	0.04	0.04
233.70	0.50	164.79	233.70	0.06S	0.00E	0.60	-0.06
263.10	0.78	168.41	263.10	0.38S	0.08E	0.29	-0.38
293.80	0.83	150.17	293.80	0.78S	0.23E	0.25	-0.78
323.00	0.84	159.49	322.99	1.16S	0.41E	0.14	-1.16
352.20	0.71	148.40	352.19	1.51S	0.58E	0.20	-1.51
381.30	0.48	139.69	381.29	1.76S	0.75E	0.25	-1.76
410.60	0.47	155.05	410.59	1.96S	0.88E	0.13	-1.96
439.90	0.35	142.80	439.89	2.14S	0.99E	0.15	-2.14
468.80	0.26	159.59	468.79	2.28S	1.06E	0.13	-2.28
497.90	0.24	202.85	497.88	2.39S	1.06E	0.19	-2.39
525.80	0.22	215.64	525.78	2.49S	1.01E	0.06	-2.49
535.40	0.23	174.63	535.38	2.52S	1.00E	0.49	-2.53
573.80	0.32	260.37	573.78	2.62S	0.90E	0.30	-2.62
663.20	0.31	271.52	663.18	2.65S	0.41E	0.02	-2.66
751.00	0.34	260.67	750.98	2.69S	0.08W	0.02	-2.69
838.90	0.27	238.60	838.88	2.84S	0.51W	0.05	-2.84
926.40	0.39	240.76	926.38	3.09S	0.95W	0.04	-3.09
1013.40	0.37	266.79	1013.38	3.25S	1.49W	0.06	-3.25
1101.50	0.25	207.40	1101.48	3.44S	1.86W	0.11	-3.44
1187.80	0.15	255.25	1187.78	3.64S	2.06W	0.06	-3.64
1219.00	1.98	255.30	1218.97	3.78S	2.62W	1.76	-3.78
1248.70	2.93	343.35	1248.65	3.19S	3.33W	3.51	-3.19
1276.90	6.19	353.19	1276.76	0.99S	3.72W	3.55	-0.99
1307.60	9.62	359.40	1307.16	3.22N	3.94W	3.45	3.22
1336.30	12.46	1.71	1335.33	8.72N	3.87W	3.00	8.72
1364.30	15.62	2.54	1362.49	15.50N	3.62W	3.39	15.50
1393.70	19.69	3.66	1390.50	24.41N	3.13W	4.17	24.41
1423.10	23.20	1.63	1417.86	35.14N	2.64W	3.66	35.14
1452.80	26.54	358.88	1444.80	47.63N	2.61W	3.57	47.63
1481.80	30.19	359.09	1470.32	61.40N	2.85W	3.78	61.40
1510.50	29.86	359.30	1495.16	75.76N	3.05W	0.36	75.76
1539.20	31.75	0.64	1519.81	90.45N	3.06W	2.10	90.45
1569.20	33.75	1.52	1545.04	106.68N	2.75W	2.06	106.68
1599.90	35.63	2.43	1570.29	124.14N	2.14W	1.91	124.14
1627.40	37.73	2.50	1592.34	140.55N	1.43W	2.29	140.55
1657.00	40.45	1.13	1615.31	159.20N	0.85W	2.89	159.20
1686.10	40.47	0.23	1637.45	178.09N	0.63W	0.60	178.08
1715.20	40.43	358.81	1659.60	196.96N	0.78W	0.95	196.96
1744.80	40.50	358.37	1682.12	216.17N	1.26W	0.30	216.17
1774.30	40.45	358.89	1704.56	235.31N	1.71W	0.35	235.31
1802.90	40.45	358.94	1726.32	253.86N	2.06W	0.03	253.86
1832.00	40.44	358.69	1748.47	272.74N	2.46W	0.17	272.74
1862.20	40.44	358.92	1771.45	292.32N	2.86W	0.15	292.32
1892.20	40.45	359.47	1794.28	311.78N	3.14W	0.36	311.78
1920.90	40.37	359.60	1816.14	330.38N	3.29W	0.12	330.38
1949.20	40.46	359.64	1837.68	348.73N	3.41W	0.10	348.73
1979.10	40.38	359.51	1860.45	368.12N	3.55W	0.12	368.12
2008.00	40.48	359.69	1882.44	386.86N	3.69W	0.16	386.86
2037.50	40.34	359.30	1904.91	405.98N	3.85W	0.29	405.98
2064.90	40.38	359.25	1925.79	423.72N	4.08W	0.06	423.72
2094.70	40.41	359.24	1948.48	443.04N	4.33W	0.03	443.03
2123.90	40.40	359.43	1970.72	461.96N	4.55W	0.13	461.96
2153.50	40.44	359.96	1993.25	481.15N	4.65W	0.35	481.15
2182.90	40.47	0.31	2015.62	500.23N	4.61W	0.23	500.23
2194.00	40.47	0.31	2024.07	507.43N	4.57W	0.00	507.43

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (Borgland Dolphin 31.0m above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 0.00 degrees
Bottom hole distance is 507.45 Metres on azimuth 359.48 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,Slot#1
16/1 Exploration ,16/1
EXPLORATION ZONE 31,Norway

Wellbore: 16/1-6 A
Wellpath: 16/1-6 A Definitive
(TD@2194)
Date Printed: 4-Nov-2003

BAKER HUGHES INTEQ

Hole Sections

Diameter [in]	Start MD[m]	Start TVD[m]	Start North[m]	Start East[m]	End MD[m]	End TVD[m]	End North[m]	Start East[m]	Wellbore
36.000	143.00	143.00	0.00N	0.00E	204.00	204.00	0.04N	0.02W	16/1-6 S
26.000	204.00	204.00	0.04N	0.02W	551.00	550.99	2.58S	0.99E	16/1-6 S
17 1/2	551.00	550.99	2.58S	0.99E	1206.00	1205.97	3.69S	2.27W	16/1-6 S
8 1/2	1187.80	1187.78	3.64S	2.06W	2194.00	2024.07	507.43N	4.57W	16/1-6 A

Casings

Name	Top MD[m]	Top TVD[m]	Top North[m]	Top East[m]	Shoe MD[m]	Shoe TVD[m]	Shoe North[m]	Shoe East[m]	Wellbore
30.000in Conductor	143.00	143.00	0.00N	0.00E	203.00	203.00	0.04N	0.02W	16/1-6 S
20.000in Casing	143.00	143.00	0.00N	0.00E	545.70	545.68	2.56S	1.00E	16/1-6 S
13 3/8in Casing	143.00	143.00	0.00N	0.00E	1196.70	1196.68	3.67S	2.08W	16/1-6 S

Survey Tool Program

Reference	Survey Name	MD[m]	TVD[m]	Survey Tool	Error Model
675004	16/6-1 A BHI.MWD 8 1/2" (1219-2182.90)	2182.90	2015.62	Magnetic (MWD, EMS)	MWD, standard, mag-corr
674966	16/6-1 A Extrapolation (TD@2194)	2194.00	2024.07	Magnetic (MWD, EMS)	MWD, standard, mag-corr
673624	16/1-6 S BHI.MWD 26" (0-535.40)	535.40	535.38	Magnetic (MWD, EMS)	MWD, standard, mag-corr
673554	16/1-6 S BHI.MWD 17 1/2" (535.40-1187.80)	1187.80	1187.78	Magnetic (MWD, EMS)	MWD, standard, mag-corr

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (Borgland Dolphin 31.0m above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 0.00 degrees
Bottom hole distance is 507.45 Metres on azimuth 359.48 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

App C List of contractors

SERVICE	COMPANY
Casing/Casing hanger	Dril-Quip
Cementing	Halliburton
Coring	Halliburton DBS
Directional Drilling	Baker Hughes INTEQ
Diving	Oceaneering AS
Drilling Contractor	Dolphin
Electric Logging	Schlumberger Offshore Service NV
Helicopter	Norsk helikopter
Helicopter Booking	Lufttransport (Statoil)
Mud	M-I Norge AS
Mud Logging	Geoservices
MWD	Baker Hughes INTEQ
Rig Positioning	Racal Survey Norge AS
Site Survey	Fugro-Geoteam AS
Wellhead System	Dril-Quip
Lab services	Reslab
Biostratigraphy	Ichron

App D Wellsite sample description

Well 16/1-6S

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 1 of 14
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6S		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: T.F. Kristensen, J. Basset			
Hole size: 17	"	Cut solvent: Iso-Propanol		Date: 27 May 2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
560		Cmt	Baryte cont.
	Tr	Sd: clr – transl qtz, crs, ang – sbang, lse	
570		Cmt	a.a.
	Tr	Clst: m dk gry dk gry, sft, calc	
	Tr	Sd: a.a.	
580	100	Clst: tr agg chlor, mic, v calc, else a.a.	
	Tr	Sd: a.a.	a.a.
590	100	Clst: a.a.	
	Tr	Sd: a.a.	
600	100	Clst: m dk gry – dk gry, olv gry – dk grn gry, sft, sbblky, occ blky, mic, glau, v calc, slty	Tr Baryte
610	100	Clst: m gry – m dk gry, sft, sbblky, occ blky, mic, slty, sdy i.p.	a.a.
620	100	Clst: a.a.	
630	100	Clst: slty, else a.a.	
640	100	Clst: a.a.	
	Tr	Sd: clr – transl, occ yelsh qtz, m – v crs, ang – sbang, pr srt, rk frgs, lse	
	Tr	Pyr	
650	100	Clst: m dk gry, sft, sbblky, mic, glau, calc – v calc, sl slty, i.p.	
	R tr	Sd: crs – v crs, sbang	
	R tr	Foram	
660	Lost		
670	Lost		
680	100	Clst: a.a.	
	R tr	Sd: a.a.	
	R tr	Foram	
690	100	Clst: m dk gry – m gry, sft, sbblky – blky, mic, slty, calc	
	Tr	Foram, Sd	
700	100	Clst: sli slty, occ glau	
710	100	Clst: a.a.	
720	100	Clst: a.a.	
730	100	Clst: grd Sltst, else a.a.	
	R tr	Foram, Sd	

WELLSITE SAMPLE DESCRIPTION					Page 2 of 14
Country: Norway			Area: North Sea		Field: Verdandi
Well no: 16/1-6S			Company: Statoil ASA, DNO AS		
RKB: 31	meters		Geologist: T.F. Kristensen, J. Basset		
Hole size: 17	"		Cut solvent: Iso-Propanol		Date: 27 May 2003

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
740	100	Clst: m dk gry, sft, sbblky, mic, glau, calc – v calc, grd Sltst, sdy, vf	
	R tr	Sd: clr – transl qtz, crs – v crs, ang – sbang, lse	No shows
	R tr	Foram	
750	100	Sltst: m dk gry, sft, sbblky, mic, glau, sdy – v sfy, vf – f, grd to Sst.	a.a.
	R tr	Foram	
760	100	Sst: m dk gry – m gry, sft, sbblky, vf – f, mic, tr glau, cly, grd to Sltst	a.a.
	R tr	Foram	
770	100	Sst: a.a.	a.a.
780	80	Sst: a.a.	a.a.
	20	Sltst: m gry, sft, sbblky, sl mic, calc	
	Tr	Glau	
790	a.a.		a.a.
800	60	Sst: a.a.	a.a.
	40	Clst: m dk gry – dk gry, sft – frm, sbblky, glau, v slty, calc	
	Gd tr	Ls: pa or – gry or, blky, mod hd	
	Gd tr	Glau	
810	100	Sltst: m dk gry, sft, sbblky, v calc, tr mic, glau, v sdy, vf – f	a.a.
	Tr	Ls, Glau	
820	Lost		
830	100	Sltst: m gry – olv gry, sft, sbblky, v calc, cly, sl mic, v sdy, vf - f, glau	a.a.
	Tr	Ls, Glau	
840	100	Sltst: sdy, vf, else a.a.	a.a.
850	100	Sltst: olv gry – brnsh gry, m dk gry, sl sdy, vf, else a.a.	a.a.
860	100	Sltst: olv gry – brn gry, m dk gry, sft, amor – sbblky, sdy, mic, glauc, foss, calc	a.a.
870	100	Sst: clr – trnsl qtz, f – v crs, pred m, mod srt, sbang – rndd, app as lse grns, v glauc, mic, ex vis por	a.a.
	Tr	Sltst: a.a.	
	Tr	Shl frags, Glauc, Mic	
880	100	Sst: clr – trnsl qtz, f – m, occ vcrs – v crs grns, wl srt, sbang – rndd, app as lse grns, v glauc, foss, slily mic, ex vis por	a.a.
	Tr	Glauc, Shl frags, Mic	
890	60	Sst: mod – wl srt, else a.a.	a.a.
	40	Clst: olv gry – brn gry, sft, amor – sbblky, v slty grdg Sltst i.p., occ sdy, glauc, micropyr i.p., calc	
	Tr	Glauc, Shl frags, Mic	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 3 of 14
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6S		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: T.F. Kristensen, J. Basset			
Hole size: 17	"	Cut solvent: Iso-Propanol		Date: 27 May 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
900	80	Sst: clr – trnsl qtz, f – m, occ vcrs – v crs grns, mod – wl srt, sbang – rndd, app as lse grns, v glauc, foss, slily mic, ex vis por	No shows
	20	Clst: olv gry – brn gry, sft, amor – sbblky, v slty grdg Sltst i.p., occ sdy, glauc, micropyr i.p., calc	
	Tr	Glauc, Shl frags, Microfoss, Mic	
910	100	Sst: clr – trnsl qtz, v f – m, mod srt, sbang – rndd, app as lse grns, slily mic	a.a.
920	100	Sst: a.a.	a.a.
930	100	Sst: clt – trnsl qtz, f, wl srtd, sbang – rndd, app as lse grns	a.a.
940	100	Sst: f – m, else a.a.	a.a.
	Tr	Mic, Glauc	
950	100	Sst: f – crs, mod srtd, else a.a.	a.a.
	Sli tr	Mic, Glauc	
960	90	Sst: clr – trnsl qtz, f – v crs, occ gran, pr srtd, sbang – rndd, app lse, ex vis por	a.a.
	10	Clst: olv gry – brn gry, sft, amor – sbblky, slty, occ sdy, glauc, occ micropyr, mod calc	
	Tr	Shl frags, Forams, Glauc	
970	100	Sst: clr – trnsl qtz, occ mlky trnsl qtz, pred m, occ f, occ crs, mod srtd, sbang – rndd, app lse, ex vis por	a.a.
	Sli tr	Glauc	
980	100	Sst: f – v crs, pr srtd, else a.a.	a.a.
	Tr	Glauc	
990	100	Sst: a.a.	a.a.
	Gd tr	Clst: olv gry – brn gry, sft, amor – sbblky, slty, occ sdy, v glauc, occ micropyr, mod calc	
	Tr	Glauc, Shl frags, Microfoss	
1000	90	Sst: a.a.	a.a.
	10	Clst: a.a.	
	Tr	Glauc, Shl frags, , Mica	
1010	50	Sst: a.a.	a.a.
	50	Clst: brn blk, sft – frm, amor – sbblky, slty, sdy i.p., glauc, micromic, non calc	
	Tr	Glauc	
	Sli tr	Shl frags	
1020	100	Clst: brn blk a.a.	a.a.
	Tr	Sst: a.a.	
	Tr	Glauc, Shl frags	
1030	50	Clst: a.a.	a.a.
	50	Sst: clr – trnsl qtz, f – m, wl srt, sbang – rndd, app lse, ex vis por	
	Tr	Glauc, Shk frags, Mic	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 4 of 14
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6S		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: T.F. Kristensen, J. Basset			
Hole size: 17	"	Cut solvent: Iso-Propanol		Date: 28 May 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1040	90	Clst: brn blk – olv blk, occ brn gry, sft – frm, amor – sbblky, slty, sdy i.p., glauc, micromic, non calc	No shows
	10	Sst: clr – trnsl qtz, v f – m, occ crs, pr srt, sbang – sbrndd, lse, ex vis por	
	Tr	Glauc, Shl frags	
1050	90	Clst: a.a.	a.a.
	10	Sst: a.a.	
	Tr	Glauc, Mic	
1060	60	Sst: clr – trnsl qtz, v f – crs, pr srt, sbang – rndd, app lse, ex vis por	a.a.
	40	Clst: a.a.	
	Tr	Glauc, Shl frags	
1070	100	Sst: mod srt, else a.a.	a.a.
	Tr	Clst: a.a.	
1080	100	Sst: a.a.	a.a.
	Tr	Mic, Glauc, Shl frgs, Clst	
1090	70	Sst: clr – transl qtz, f – v crs, pred m, pr – mod srt, sbang – rndd, glauc, mic, non calc	a.a.
	30	Clst: a.a.	
1100	60	Clst: brnsh blk – olv blk, grysh brn, sft – frm, sbblky, slty, glauc, mic, sli calc	
	40	Sst: a.a.	
1110	65	Clst: a.a.	
	35	Sst: a.a.	a.a.
1120	90	Clst: dsky yel brn, brnsh blk – olv blk, sft, sbblky, slty i.p., tr glauc, micromic, sli calc	
	10	Sst: a.a.	a.a.
1130	60	Clst: a.a.	
	40	Sst: a.a.	a.a.
1140	90	Clst: v slty, else a.a.	
	10	Sst: a.a.	a.a.
1150	50	Clst: a.a.	
	50	Sst: a.a.	a.a.
1160	90	Clst: dsky yel brn – brnsh, sft, sbblky, sli calc – calc, slty, sl glauc, micromic, micropyr	
	10	Sst: a.a.	a.a.
1170	100	Clst: a.a., also m gry, glauc – v glauc, sft, micropyr, calc	
1180	100	Clst: a.a.	
1190	100	Clst: pred m gry – m dk gry, sft – frm, sbblky, slty, sli sdy, vf, glauc, calc, micromic	
	Tr	Ls: offwh, blky, micr, frm	
	Tr	Glauc	

WELLSITE SAMPLE DESCRIPTION					Page 5 of 14
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6S		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: T.F. Kristensen, J. Basset			
Hole size: 17	"	Cut solvent: Iso-Propanol		Date: 28 May 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1200	100	Clst: pred m gry – m dk gry, m brn gry, sft – frm, sbblky, v slty, sli sdy - sdy, vf, glauc, calc, micromic	
	Tr	Glauc	
1203 (spot)	100	Clst: a.a.	
1206 (spot)	100	Clst: a.a.	B.u.
	Tr	Glauc	

End of 17" hole section

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 6 of 14
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6S		Company: Statoil ASA, DNO AS			
RKB: 31 meters		Geologist: O.Beyer, T.F. Kristensen			
Hole size: 8 1/2 "		Cut solvent: Iso-Propanol		Date: 31 May 2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1210	100	Clst: olv blk – olv gry, occ m dk gry, frm, blky, slty, micromic, occ slily glauc, non calc – slily calc	No shows
	Sli tr	Glauc	
1220	100	Clst: a.a.	a.a.
	Sli tr	Glauc	
1230	100	Clst: olv gry – brn gry, olv blk, tr gn gry, else a.a.	a.a.
1240	100	Clst: olv gry – olv blk, brn gry, tr gn gry, frm, blky, slty, micromic, glauc i.p., non calc – slily calc	a.a.
1250	100	Clst: a.a.	a.a.
	Sli tr	Ls: pa yel brn – lt olv gry, frm – mod hd, micr, arg	
1260	100	Clst: a.a.	a.a.
	Sli tr	Ls: a.a.	
1270	100	Clst: olv blk, olv gry – brn gry, else a.a.	a.a.
	Sli tr	Glauc, Pyr	
1280	100	Clst: a.a.	a.a.
	Sli tr	Ls: yel gry – pa yel brn, frm, micr, dol, arg	
1290	100	Clst: pred olv blk, else a.a.	a.a.
1300	100	Clst: a.a.	a.a.
1310	80	Clst: a.a.	a.a.
	20	Ls: pa yel brn – yel gry, frm – mod hd, micr, dol, arg	
1320	80	Clst: a.a.	a.a.
	20	Ls: a.a.	
1330	100	Clst: brn gry – olv gry – olv blk, frm, blky, slty, micromic, slily glauc i.p., non calc – occ slily calc	a.a.
	Gd tr	Ls: a.a.	
1340	100	Clst: a.a.	a.a.
	Tr	Ls: a.a.	
1350	100	Clst: a.a.	a.a.
	Tr	Ls: a.a.	
1360	90	Clst: a.a.	a.a.
	10	Ls: pred pa yel brn, else a.a.	
1370	90	Clst: a.a.	a.a.
	10	Ls: pa yel brn, frm – v hd, micr – microxln, dol, arg	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 7 of 14
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6S		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: O.Beyer, T.F. Kristensen			
Hole size: 8 1/2	"	Cut solvent: Iso-Propanol		Date: 31 May 2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1380	90	Clst: brn gry – olv gry – olv blk, frm, blky, slty, micromic, slily glauc i.p., non calc – occ slily calc	No shows
	10	Ls: pa yel brn, frm – v hd, micr – microxln, dol, arg	
1390	100	Clst: olv blk – brn blk, olv gry – brn gry, else a.a.	a.a.
	Tr	Ls: dol a.a.	
1400	100	Clst: pred brn blk, else a.a.	a.a.
	Tr	Ls: pa yel brn – yel gry, dom mikr, i/p dol	
1410	100	Clst: pred brn blk, a.a.	a.a.
	Tr	Ls: pa yel brn – yel gry, a.a.	
1420	100	Clst: pred brn blk, a.a.	a.a.
	Tr	Ls: pa yel brn – yel gry, a.a.	
1430	95	Clst: pred brn blk, bec loc slily – mod calc, frm, blky, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1440	95	Clst: pred brn blk, loc slily – mod calc, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1450	100	Clst: pred brn blk, loc slily – mod calc, a.a.	a.a.
	Gdtr	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1460	100	Clst: pred brn blk, loc slily – mod calc, a.a.	a.a.
	Gdtr	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1470	100	Clst: pred brn blk, loc slily – mod calc, a.a.	a.a.
	Gdtr	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1480	100	Clst: pred brn blk, loc slily – mod calc, a.a.	a.a.
	Gdtr	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1490	95	Clst: pred brn blk, loc slily – mod calc, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1500	70	Clst: pred brn blk, slily – mod calc lam, a.a.	Tr Hc Stn,
	20	Sd: dom clr-transl Qtz, tr Glauc, vf-f, wll srtd, lse-fri (calc mtx/cmt)	Bri blu wh dir Flu
	10	Ls: pa yel brn – yel gry, a.a.	Inst wh Cut
	Tr	Glauc, Dol	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 8 of 14
Country: Norway	Area: North Sea		Field: Verdandi	
Well no: 16/1-6S	Company: Statoil ASA, DNO AS			
RKB: 31 meters	Geologist: O.Beyer, T.F. Kristensen			
Hole size: 8 1/2 "	Cut solvent: Iso-Propanol		Date: 31 May 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1510	90	Clst: pred brn blk, blky, frm, slily – mod calc lam, tr micropyr	Sltr Hc Stn,
	5	Sd: dom clr-transl Qtz, tr Glauc, vf-f, wll srtd, lse-fri (calc mtx/cmt)	Bri blu wh dir Flu
	5	Ls: pa yel brn – yel gry, blky, frm, dom sdy mikr	Inst wh Cut
	Tr	Glauc, Dol	
1520	95	Clst: pred brn blk, pred a.a.	Sltr Hc Stn,
	5	Sd: dom clr-transl Qtz, tr Glauc, vf-f, a.a.	Bri blu wh dir Flu
	Gd tr	Ls: pa yel brn – yel gry, dom sdy mikr, a.a.	Inst wh Cut
	Tr	Glauc, Dol	
1530	95	Clst: pred brn blk, pred a.a.	No Shows
	5	Sd: dom clr-transl Qtz, tr Glauc, vf-f, a.a.	
	Gd tr	Ls: pa yel brn – yel gry, dom sdy mikr, a.a.	
	Tr	Glauc, Dol, Pyr	
1540	80	Sd: dom clr-transl Qtz, tr Flsp, tr Glauc, dom vf-f, wll srtd, sbang-sbrndd, lse	No Shows
	20	Clst: pred brn blk, pred a.a.	
	Gd tr	Ls: pa yel brn – yel gry, dom sdy mikr, a.a.	
	Gd tr	Kao: wh, frm, amor	
	Tr	Glauc, Dol, Pyr	
1550	60	Sd: dom clr-transl Qtz, a.a.	No Shows
	40	Clst: pred brn blk, pred a.a.	
	Gd tr	Ls: pa yel brn – yel gry, dom sdy mikr, a.a.	
	Tr	Glau, Dol, Pyr, Kao	
1560	95	Clst: pred brn blk – olv blk, blky, frm, slily – mod calc lam, tr micropyr	No Shows
	5	Sd: dom clr-transl Qtz, tr Glauc, vf-f, wll srtd, lse-fri	
	Gd tr	Ls: pa yel brn – yel gry, blky, frm, dom mikr	
	Tr	Glau, Dol, Pyr	
1570	100	Clst: pred brn blk – olv blk, bec also dsky blu gn, else a.a.	No Shows
	Tr	Sd, Ls/Dol, Glauc, Pyr	
1580	100	Clst: also gdtr dsky yel brn – mod brn, else a.a.	No Shows
	Tr	Sd, Ls/Dol, Glauc, Pyr	
1590	100	Clst: also min dsky yel brn – mod brn, else a.a.	No Shows
	Tr	Sd, Ls/Dol, Glauc, Pyr	
1600	100	Clst: gen a.a.	No Shows
	Tr	Sd, Ls/Dol, Glauc, Pyr	
1610	100	Clst: bec also sft, amor, slily stky lam	No Shows
	Tr	Sd, Ls/Dol, Glauc, Pyr	
1620	100	Clst: bec gen less stky lam	No Shows
	Tr	Sd, Ls/Dol, Glauc, Pyr	
1630	100	Clst: bec again sft, amor, slily stky lam	No Shows
	Tr	Sd, Ls/Dol, Glauc, Pyr	

WELLSITE SAMPLE DESCRIPTION			Page 9 of 14
Country: Norway	Area: North Sea	Field: Verdandi	
Well no: 16/1-6S	Company: Statoil ASA, DNO AS		
RKB: 31 meters	Geologist: O.Beyer, T.F. Kristensen		
Hole size: 8 1/2 "	Cut solvent: Iso-Propanol	Date: 1 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1640	100	Clst: pred brn blk – olv blk, blky, frm, locally sft, slily – mod calc lam, slily stky, tr micropyr	No Shows
	Gd tr	Ls: pa yel brn – yel gry, blky, frm, dom mikr	
	Tr	Dol, Pyr	
1650	100	Clst: bec loc incr sft,stky, else pred a.a.	No Shows
	Tr	Ls/ Dol, Pyr	
1660	100	Clst: pred sft & stky, a.a.	No Shows
	Tr	Ls/ Dol, Pyr	
1670	40	Sd: clr Qtz, vf-m, mod wll srtd, sbrndd – sbang, tr rndd, gen lse-fri	No Shows
	60	Clst: pred sft & stky, a.a.	
	Tr	Ls/ Dol, Pyr	
1680	50	Sd: clr Qtz, vf-m, a.a.	No Shows
	50	Clst: pred sft & stky, a.a.	
	Tr	Ls/ Dol, Pyr	
1690	20	Sd: clr Qtz, vf-m, a.a.	No Shows
	80	Clst: pred sft & stky, a.a.	
	Tr	Ls/ Dol, Pyr	
1700	100	Clst: pred grnsh blk – olv blk, blky, frm, locally sft, slily – mod calc lam, slily stky, (pa grn lam)	No Shows
	Gd tr	Ls: pa yel brn – yel gry, blky, frm, dom mikr	
	Tr	Dol, Pyr	
1710	100	Clst: pred sft & stky, a.a.	No Shows
	Tr	Ls/ Dol, Pyr	
1720	100	Clst: pred sft & stky, a.a.	No Shows
	Tr	Ls/ Dol, Pyr, Sd	
1730	100	Clst: pred sft & stky, a.a.	No Shows
	Tr	Ls/ Dol, Pyr, Sd	
1740	100	Clst: pred sft & stky, a.a.	No Shows
	Tr	Ls/ Dol, Pyr, Sd	
1750	100	Clst: pred sft & stky, a.a.	No Shows
	Tr	Ls/ Dol, Pyr, Sd	
1760	100	Clst: pred sft & stky, bec also mod brn, frm, non calc	No Shows
	Tr	Ls/ Dol, Pyr, Sd	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 10 of 14
Country: Norway			Area: North Sea		Field: Verdandi
Well no: 16/1-6S			Company: Statoil ASA, DNO AS		
RKB: 31	Meters		Geologist: O.Beyer, T.F. Kristensen		
Hole size: 8 1/2	"		Cut solvent: Iso-Propanol		Date: 1 June 2003

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1770	100	Clst: m gry – m dk gry, rd bm, gry rd, olv gry, bl gry, sft – frm, sbblky – blky, slily slty, slily glauc, non calc – slily calc	No shows
1780	100	Clst: varic, m gry – m dk gry, rd brn, gry rd, olv gry – brn gry, bl gry, dk gn gry, sft – frm, sbblky – blky, slily slty, slily glauc, non – slily calc	a.a.
	Gd tr	Sst: clr – trnsl qtz, f – m, mod srt, sbang – sbrndd, app as lse grns	
	Tr	Ls: pa yel brn, frm, micr, arg dol	
1790	100	Clst: varic, pred m dk gry – olv blk, else a.a.	Sst: dk yel fluor, cloudy - sl stream bl wh – wh cut fluor
	Tr	Sst: m dk gry, clr – trnsl qtz, v f – f, sbrndd, sft, arg, pr – mod vis por	
1800	100	Clst: a.a.	a.a.
	Gd tr	Sst: tr wk calc cmt, pyr i.p., else a.a.	
	Tr	Ls: lt gry – pa yel brn, frm, micr, arg, dol	
1803	100	Clst: m dk gry, olv blk, m gry – olv gry, frm, blky, tuff i.p., occ slily glauc, non calc	a.a.
	Tr	Tuff: m gry – m bl gry, sft – frm, grny text, spkld blk & wh, non – occ mod calc	
	Tr	Sst: a.a.	
	Tr	Ls: a.a.	
1806	100	Clst: varic, m gry – m dk gry, olv gry – olv blk, brn gry, frm, sbblky – blky, tuff i.p., occ micropyr, tr glauc, non calc – slily calc	No shows
	Gd tr	Tuff: m gry – m bl gry, m lt gry, sft – frm, grny text, spkld, slily glauc i.p., non calc – occ mod calc	
	Tr	Ls: pa yel brn, frm – mod hd, micr, arg, dol	
	Tr	Pyr	
1809	80	Clst: varic, com micropyr, else a.a.	Sst: dk yel fluor, cloudy - stream bl wh cut fluor
	20	Tuff: a.a.	
	Gd tr	Sst: m dk gry, clr – trnsl qtz, v f – f, sbrndd, sft, arg, mod vis por	
	Tr	Ls: a.a.	
	Tr	Pyr	
1812	90	Clst: m lt gry – m dk gry, olv gry – olv blk, sft – frm, sbblky – blky, tuff - occ v tuff, micropyr i.p., tr glauc, non calc – slily calc	a.a.
	10	Tuff: a.a.	
	Tr	Sst: a.a.	
	Tr	Ls: a.a.	
	Tr	Pyr	
1815	80	Clst: a.a.	a.a.
	20	Tuff: a.a.	
	Tr	Sst, Ls, Pyr	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 11 of 14
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6S		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: O.Beyer, T.F. Kristensen			
Hole size: 8 1/2	"	Cut solvent: Iso-Propanol		Date: 2 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1818	100	Clst: varic, m gry – m dk gry, olv gry – olv blk, sft – frm, subblky – blky, tuff i.p., micropyr i.p., non – slily calc	No shows
	Gd tr	Tuff: m gry – m bl gry, m lt gry, sft – frm, grny text, spkld, slily glauc i.p., non calc – occ mod calc	
	Tr	Ls: pa yel brn – yel gry, frm, micr, arg, dol	
	Tr	Pyr	
1821	100	Clst: olv blk – olv gry, m gry – m dk gry, sft – frm, sbblky – blky, occ tuff, slily micromic, non calc	a.a.
	Tr	Tuff: a.a.	
	Tr	Pyr	
1824	100	Clst: m gry – m dk gry, olv gry – olv blk, occ dk gn gry, sft – frm, sbblky – blky, slily micromic, non calc	a.a.
	Sli tr	Tuff: a.a.	
1827	100	Clst: a.a.	a.a.
	Sli tr	Tuff: a.a.	
1830	100	Clst: m gry – m dk gry – olv gry, sft – frm, sbblky – blky, waxy text, slily micromic, non – occ slily calc	a.a.
	Sli tr	Tuff, Pyr	
1833	100	Clst: a.a.	a.a.
1836	100	Clst: m gry – m dk gry – olv gry, gn gry – dk gn gry, olv blk, m lt gry, sft – frm, sbblky – blky, waxy text, occ slily micromic, non calc	a.a.
	Sli tr	Pyr	
1839	100	Clst: a.a.	a.a.
1842	100	Clst: a.a.	a.a.
1845	100	Clst: a.a.	a.a.
1848	100	Clst: m gry – m dk gry, gn gry – m lt gry, olv gry – occ olv blk, else a.a.	a.a.
	Sli tr	Ls: pa yel brn – yel gry, sft – frm, micr, arg, dol	
1851	100	Clst: m gry – olv gry, gn gry – dk gn gry, rd brn – gry rd, sft – frm, sbblky – blky, waxy text, non – occ slily calc	a.a.
1854	100	Clst: occ pyr, else a.a.	a.a.
1857	100	Clst: a.a.	a.a.
1860	70	Clst: a.a.	Soft Sst: dk yel fluor, slow stream bl wh – wh cut fluor
	30	Sst: m lt gry – brn gry, clr – trnsl qtz, f, occ m, mod – wl srtd, sbang - sbrndd, pred as lse grns, occ sft, arg, app pr – gd vis por	
1863	50	Clst: a.a.	a.a.
	50	Sst: a.a.	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 12 of 14
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6S		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: O.Beyer, T.F. Kristensen			
Hole size: 8 1/2	"	Cut solvent: Iso-Propanol		Date: 3 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1866	50	Clst: m gry – olv gry, gn gry – dk gn gry, rd brn – gry rd, sft – frm, sbblky – blky, waxy text, non – occ slily calc	Soft Sst: dk yel fluor, slow stram bl wh - wh cut fluor
	50	Sst: brn gry – m lt gry, clr – trnsl qtz, f , occ m, mod – wl srtd, sbang – sbrndd, pred as lse grns, occ sft, arg, app pr – gd vis por	
1869	70	Sst: a.a.	a.a.
	30	Clst: a.a.	
1872	a.a.	Bttms up at corepoint, depth adjusted from 1870.5 to 1872m after bttms up. Only spot sample taken at this depth	
1872 -1899		Please refer to core description of Core #1	
1899	95	Clst: m –dk brnsh gry, dk yel brn, blky, frm, wxy, non calc	No Shows
	5	Sst: clr-transl Qtz (cavings from above section?)	
1902	80	Clst: a.a.	a.a.
	15	Tuffac Clst: bl gry – grysh blk, frm, sbblky-blky	
	5	Tuff: m gry, abun gn spkld (Glauc), frm, sbbky, slily crmbly txt	
1905	80	Clst: a.a.	a.a.
	15	Tuffac Clst: a.a.	
	5	Tuff: a.a.	
1908	75	Clst: a.a.	a.a.
	25	Tuffac Clst/Tuff: a.a.	
	Gd tr	Ls: off wh-wh, lt brn, frm, cryptoxln, mikr	
1911	80	Clst: a.a.	a.a.
	15	Tuffac Clst/Tuff: a.a.	
	5	Ls: a.a.	
1914	75	Clst: a.a.	a.a.
	15	Tuffac Clst/Tuff: a.a.	
	10	Ls: a.a.	
1917	75	Clst: a.a.	a.a.
	15	Tuffac Clst/Tuff: a.a.	
	10	Ls: a.a.	
Not recovered			
1923	85	Clst: bec incr m dk gry - gn gry, a.a.	a.a.
	10	Tuffac Clst/Tuff: a.a.	
	5	Ls: a.a.	
1926	85	Clst: a.a.	a.a.
	10	Tuffac Clst/Tuff: a.a.	
	5	Ls: a.a.	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 13 of 14
Country: Norway	Area: North Sea		Field: Verdandi	
Well no: 16/1-6S	Company: Statoil ASA, DNO AS			
RKB: 31 meters	Geologist: O.Beyer, T.F. Kristensen			
Hole size: 8 1/2 "	Cut solvent: Iso-Propanol		Date: 4 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1926	85	Clst: m dk gry - gn gry, m –dk brnsh gry, dk yel brn, blky, frm, loc wxy, non calc	No Shows
	10	Tuffac Clst/Tuff: bl gry – grysh blk, frm, sbblky-blky, loc gn spkld (Glauc), frm, sbbky, loc slily crmbly txt	
	5	Ls: off wh-wh, lt brn, frm, cryptoxln, mikr	
1929	90	Clst: a.a.	a.a.
	5	Tuffac Clst/Tuff: a.a.	
	5	Ls: a.a.	
1932	90	Clst: a.a.	a.a.
	10	Ls: a.a.	
1935	80	Clst: i/p slily tuffac, a.a.	a.a.
	20	Ls: dom wh-off wh, blky, frm, cryptoxln, dom mikr	
1938	75	Clst: less tuffac, else gen a.a.	a.a.
	25	Ls: dom mikr, a.a.	
1941	80	Clst: gen a.a.	a.a.
	20	Ls: dom mikr, a.a.	
1944	90	Clst: gen a.a.	a.a.
	10	Ls: dom mikr, a.a.	
1947	95	Clst: bec pred grnsh gry - gnsh blk, else gen a.a.	a.a.
	5	Ls: dom mikr, a.a.	
1950	95	Clst: gen a.a.	a.a.
	5	Ls: dom mikr, a.a.	
1953	100	Clst: gen a.a.	a.a.
	Gd tr	Ls: dom mikr, a.a.	
1956	95	Clst: gen a.a.	a.a.
	5	Ls: dom mikr, a.a.	
1959	50	Ls/Mrl: dom wh-off wh,lt-m bl gry, blky, frm, cryptoxln, also var arg, dom mikr	a.a.
	50	Clst: pred grnsh gry - gnsh blk, a.a.	
1962	95	Clst: pred m dk gry – m bl gry, frm, blky, non – slily calc	a.a.
	5	Ls/Mrl: pred a.a.	
1965	95	Clst: pred a.a.	a.a.
	5	Ls/Mrl: pred a.a	
1968	80	Clst: pred a.a.	a.a.
	20	Ls/Mrl: pred a.a	
1971	50	Clst: pred a.a.	a.a.
	50	Ls/Mrl: pred a.a	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 14 of 14
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6S		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: O.Beyer, T.F. Kristensen			
Hole size: 8 1/2	"	Cut solvent: Iso-Propanol		Date: 4 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1974	50	Ls/Mrl: dom wh-off wh,lt-m bl gry, also bec mod rd, blky, frm, cryptoxln, also var arg, dom mikr	No Shows
	50	Clst: m dk gry - gn gry, blky, frm, loc wxy lust, non – slily calc	
	Tr	Pyr nods, Calc	
1977	60	Ls/Mrl: pred a.a	a.a.
	40	Clst: pred a.a.	
1980	70	Ls/Mrl: pred a.a	a.a.
	30	Clst: pred a.a.	
1983	80	Ls/Mrl: pred a.a	a.a.
	20	Clst: pred a.a.	
	Tr	Qtz: m lse grns, Calc	
1986	80	Ls/Mrl: pred a.a	a.a.
	20	Clst: pred a.a.	
	Tr	Qtz: m lse grns, Calc	
1989	80	Ls/Mrl: pred a.a	a.a.
	20	Clst: pred a.a.	
	Tr	Qtz: m lse grns, Calc	

TD of well 1997mMD RT

Well 16/1-6A

STATOIL

WELLSITE SAMPLE DESCRIPTION

Country: Norway	Area: North Sea	Field: Verdandi
Well no: 16/1-6A	Company: Statoil ASA, DNO AS	
RKB: 31 meters	Geologist: O. Beyer/ I. Winsvold	
Hole size: 8 1/2 "	Cut solvent: Iso-Propanol	Date: 08 June 2003

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1220	100	Clst: olv gry – olv blk, frm, blky, slty, micromic, v calc	cmt contam
1230	100	Clst: a.a.	a.a.
1240	100	Clst: a.a.	a.a.
1250	100	Clst: a.a.	a.a
1260	100	Clst: a.a.	No shows
	Tr	Ls: v lt gry, sft, sbblky	
1270	100	Clst: olv gry, olv blk, frm, blky, stky, i.p. slty, micromic, mod calc	a.a.
1280	100	Clst: a.a.	a.a.
1290	100	Clst: a.a., i.p. micromic	a.a.
1300	100	Clst: a.a., i.p. micromic, v calc	a.a.
1310	100	Clst: olv gry olv blk, frm-mod hd, blky, i.p. micromic, v calc	a.a.
	Tr	Ls: lt brnsh gry, frm, blky, arg, micr	
1320	80	Clst: a.a.	a.a.
	20	Ls: a.a.	
1330	90	Clst: a.a.	a.a.
	10	Ls: a.a.	
1340	90	Clst: a.a.	a.a.
	10	Ls: a.a.	
1350	90	Clst: a.a.	a.a.
	10	Ls: a.a.	
1360	90	Clst: a.a., slily calc	a.a.
	10	Ls: a.a.	
1370	95	Clst: a.a., non calc	a.a.
	5	Ls: a.a.	
1380	100	Clst: a.a.	a.a.
	Tr	Ls: a.a.	
1390	100	Clst: a.a.	a.a.
	Tr	Ls: a.a.	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 2 of 9
Country: Norway	Area: North Sea	Field: Verdandi	
Well no: 16/1-6A	Company: Statoil ASA, DNO AS		
RKB: 31 meters	Geologist: O. Beyer/ I. Winsvold		
Hole size: 8 1/2 "	Cut solvent: Iso-Propanol	Date: 9 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1400	95	Clst: med dk gry – olv gry – olv blk, frm, blky, loc slily slty, micromic non calc – occ slily calc	No shows
	5	Ls: pa yel brn, frm – hd, crypto – microxln, micr, loc dol, arg/slty	
1410	95	Clst: pred olv blk, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, a.a.	
1420	100	Clst: pred brn - olv blk, a.a.	a.a.
	Tr	Ls: pa yel brn – yel gry, a.a.	
1430	95	Clst: pred olv blk – gryish olv gn, bec loc slily – mod calc, frm, blky, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, dom mikr, a.a.	
	Tr	Glauc, Dol	
1440	95	Clst: pred olv blk, loc slily – mod calc, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1453	90	Clst: pred olv blk, loc slily – mod calc, a.a.	a.a.
	10	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1456	90	Clst: pred olv blk, loc slily – mod calc, a.a.	a.a.
	10	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1459	95	Clst: pred olv blk, loc slily – mod calc, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1462	95	Clst: pred olv blk – grysh olv gn, loc slily calc, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1465	Not recovered		
1468	95	Clst: pred olv blk – gryish olv gn, loc slily calc, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1471	95	Clst: pred olv blk – gryish olv gn, loc slily calc, a.a.	a.a.
	5	Ls: pa yel brn – yel gry, a.a.	
	Tr	Glauc, Dol	
1474	90	Clst: pred olv blk – grysh olv gn, loc slily – mod calc, a.a.	a.a.
	10	Ls: pa yel brn, ptchy yel gry, loc slty-sdy, crmbly, bec loc mod hd	
	Tr	Glauc, Dol	
1477	90	Clst: pred a.a..	a.a.
	10	Ls: pred a.a.	

WELLSITE SAMPLE DESCRIPTION					Page 3 of 9
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6A		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: O. Beyer/ I. Winsvold			
Hole size: 8 1/2	"	Cut solvent: Iso-Propanol		Date: 11 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1480	90	Clst: olv blk – gryish olv gn, min gn gry, frm, blky, loc slily slty and sbblky non calc – occ slily calc	No shows
	10	Ls: pa yel brn, frm – hd, crypto – microxln, micr, loc dol, arg, slty - sdy	
	Tr	Pyr nods, Glauc	
1483	85	Clst: pred a.a.	a.a.
	15	Ls: pred a.a.	
	Tr	Pyr nods, Glauc	
1486	90	Clst: pred a.a..	a.a.
	10	Ls: pred a.a.	
	Tr	Pyr nods, Glauc	
1489	85	Clst: pred a.a..	a.a.
	15	Ls: pred a.a.	
	Tr	Pyr nods, Glauc	
1490	85	Clst: pred a.a..	a.a.
Btms up	15	Ls: pred a.a.	
	Tr	Pyr nods, Glauc	

Core # 1488.5 – 1515.5mMD
(MD shifted 1.5m up in the core run relatively to the previous drilling depth due to wrong tally)

1500	100	Clst: pred brn blk, gryish bl gn – dsky bl gn, blky, frm, slily – mod calc lam tr micropyr	No Shows
	Tr	Glauc, Ls/Dol	
1510	95	Clst: pred a.a.	No Shows
	5	Slt/Sltst: v arg, pa yel brn, blky, frm, non calc	
	Gd tr	Ls: pa yel brn – yel gry, dom sdy mikr, a.a.	
	Tr	Glauc, Dol	
1520	95	Clst: pred a.a.	No Shows
	5	Slt/Sltst: a.a.	
	Gd tr	Ls/Dol: a.a.	
	Tr	Glauc, Dol, Pyr	
1530	100	Clst: pred gryish blu gn, a.a.	
	Gd tr	Ls/Dol: dom sdy mikr/dolomikr, a.a.	
	Tr	Glauc, Pyr	
1540	100	Clst: pred a.a., gd tr mod brn, frm, blky	No Shows
	Gd tr	Ls/Dol	
	Tr	Glauc, Pyr	
1550	80	Clst: a.a.	No Shows
	20	Sd: dom clr-transl Qtz, dom vf, tr f-med, v wll srtd, v lse	
	Sltr	Ls/Dol	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 4 of 9
Country: Norway	Area: North Sea		Field: Verdandi	
Well no: 16/1-6A	Company: Statoil ASA, DNO AS			
RKB: 31 meters	Geologist: O. Beyer/ I. Winsvold			
Hole size: 8 1/2 "	Cut solvent: Iso-Propanol		Date: 11 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1560	95	Clst: pred gryish bl gn – dsky bl gn, blky, frm-sft, loc slily stky, non calc	No Shows
	5	Sd: dom clr-transl Qtz, dom vf, tr f-med, v wll srtd, v lse	
	Tr	Ls/Dol: pa yel brn, frm – hd, crypto – microxln, micr, loc dol, i.p. arg/slty/sdy	
	Tr	Qtz sd, Glauc	
1570	100	Clst: pred a.a.	No Shows
	Tr	Sd, Ls/Dol, Glauc	
1580	90	Clst: a.a.	No Shows
	10	Ls: pa yel brn, frm – hd, crypto – microxln, micr, loc dol, i.p. arg/slty/sdy	
	Tr	Sd, Ls/Dol, Glauc	
1590	95	Clst: bec gen less stky lam	No Shows
	5	Ls/Dol: a.a.	
	Sli tr	Sd, Glauc, Pyr	
1600	90	Clst: olv blk – dsky bl grn, blky, frm – mod hd, loc slily slty, non calc	a.a.
	5	Sd: dom clr-transl Qtz, dom vf, tr f-med, v wll srtd, v lse	
	5	Ls: pa yel brn – mod yel brn, blky, frm – hd, cryptoxln – microxln, loc dol, i.p. arg	
1610	90	Clst: a.a	a.a.
	5	Ls: a.a.	
1620	100	Clst: a.a.	a.a.
	Tr	Ls: a.a.	
	Tr	Sd: a.a.	
1630	50	Clst: a.a.	a.a.
	50	Sd: dom clr-transl Qtz, dom vf, tr f-med, v wll srtd, v lse	
1640	70	Clst: a.a.	a.a.
	30	Sd: a.a., also med gry, grad slst	
	Tr	Ls: a.a.	
1650	95	Clst: dom olv blk, dsky bl grn, loc med gry, frm – mod hd, loc slty, non calc	a.a.
	5	Sd: a.a.	
	Tr	Ls: a.a.	
	Tr	Glauc	
1660	95	Clst: a.a.	a.a.
	5	Ls: a.a.	
	Tr	Sd, Glauc	
1670	100	Clst: brn blk, grn blk – dsky bl grn, dksy yel brn, blky, frm – mod hd, non calc	a.a.
	Tr	Sst: dom clr-transl Qtz, dom vf, tr f-med, v wll srtd, v lse, loc med gry – lt olv gry, sft, grad sltst	
	Tr	LS/Dol, Glauc	
1680	a.a.		a.a.

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 5 of 9
Country: Norway	Area: North Sea		Field: Verdandi	
Well no: 16/1-6A	Company: Statoil ASA, DNO AS			
RKB: 31 meters	Geologist: O. Beyer/ I. Winsvold			
Hole size: 8 1/2 "	Cut solvent: Iso-Propanol		Date: 12 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1690	95	Clst: brn blk, grn blk – dsky bl grn, dksy yel brn, blky, frm – mod hd, non calc	No shows.
	5	Sst: dom clr-transl Qtz, dom vf, tr f-med, v wll srtd, v lse	
	Tr	Ls/Dol: pa yel brn – mod yel brn, blky, frm – hd, cryptoxln – microxln, loc dol, i.p. arg	
1700	100	Clst: pred dk grn gry – dsky bl grn, blky, frm – mod hd, non calc, i.p. slty	a.a.
	Tr	Ls/Dol: a.a.	
1710	100	Clst: pred dk grn gry – dsky bl grn, occ med gry, blky, frm – mod hd, non calc, i.p. slty	a.a.
	Tr	Glauc	
1720	100	Clst: a.a.	a.a.
	Tr	Glauc	
1730	100	Clst: a.a., pred dk grn gry, slty	a.a.
	Tr	Ls/Dol: a.a.	
	Tr	Glauc	
1740	Lost		
1750	50	Clst: pred dk grn gry, blky, frm – mod hd, non calc, slty	a.a.
	40	Sst: pa yel brn, clr – trnsl qtz grns, dom vf, tr f-med, v rnd, v wll srtd, sft, pred v lse	
	10	Ls: yel gry – v lt gry, blky, frm, arg. microxln, arg	
1760	80	Clst: pred dk grn gry, occ dsky bl grn, occ med gry, blky, frm – mod hd, non calc, slty	a.a.
	15	Ls: pa yel brn – mod yel brn, blky, frm – hd, cryptoxln – microxln, loc dol, i.p. arg	
	5	Sst: a.a.	
1770	90	Clst: pred dk grn gry – dsky bl grn, blky, frm – mod hd, non calc, i.p. slty	a.a.
	10	Ls: a.a.	
	Tr	Sst: a.a.	
1780	95	Clst: pred olv gry – olv blk, occ dk grn gry - dsky bl grn, blky, frm, non calc	a.a.
	5	Ls: a.a.	
	Tr	Pyr	
1790	100	Clst: a.a.	a.a.
	Tr	Ls: a.a.	
	Tr	Pyr	
1800	95	Clst: a.a.	a.a.
	5	Ls: a.a.	
1810	100	Clst: a.a.	a.a.
	Tr	Ls: a.a.	
	Tr	Glauc	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 6 of 9
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6A		Company: Statoil ASA, DNO AS			
RKB: 31 meters		Geologist: O. Beyer/ I. Winsvold			
Hole size: 8 1/2 "		Cut solvent: Iso-Propanol		Date: 12 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1820	95	Clst: dk grn gry, olv blk, olv gry, blky, frm, non calc	No shows
	5	Ls: yel gry – v lt gry, blky, frm, arg. microxln, arg	
	Tr	Glauc, Pyr	
1830	100	Clst: dk grn gry, olv blk, olv gry, dsky yel brn, blky, frm, non calc	a.a.
	Tr	Ls: a.a.	
	Tr	Glauc, Pyr	
1840	100	Clst: pred dsky yel brn, gry grn, loc olv gry, blky, frm – mod hd, non calc	a.a.
	Tr	Ls: a.a.	
	Tr	Glauc	
1850	100	Clst: pred dsky yel brn – v dsky red, occ gry grn, frm – mod hd, non calc	a.a.
	Tr	Glauc	
1860	100	Clst: a.a.	a.a.
	Tr	Glauc	
1870	100	Clst: a.a.	a.a.
	Tr	Glauc	
1880	100	Clst: pred gry blk – olv blk, occ dsky yel brn – v dsky rd, blky, mod hd – frm, non calc tuff i.p.	a.a.
1890	100	Clst: varic, pred gry blk – olv blk, occ dsky yel brn – v dsky rd, occ med gry – dk med gry blky, mod hd – frm, non calc, tuff i.p.	a.a.
1900	90	Clst: varic, a.a.	a.a.
	10	Tuff/Tuffac Clst: med gry – med bl gry, med lt gry, sft – frm, blk spkld, slily glauc i.p., non calc – occ slily calc	
	Gd tr	Ls: pa yel brn, frm – mod hd, micr, arg, dol	
	Tr	Pyr, Glauc	
1910	80	Clst: varic, a.a.	a.a.
	20	Tuff/Tuffac Clst: gen cln Tuff	
	Tr	Ls, Pyr, Glauc	
1920	85	Clst: varic, a.a.	a.a.
	15	Tuff/Tuffac Clst: pred less cln	
	Tr	Ls, Pyr, Glauc	
1930	90	Clst: varic, a.a.	a.a.
	10	Tuff/Tuffac Clst: pred v arg, grdg Clst	
	Tr	Ls, Pyr, Glauc	
1938	95	Clst: varic, a.a.	a.a.
	5	Tuff/Tuffac Clst: pred v arg, grdg Clst	
	Tr	Ls, Glauc	
1941	100	Clst: dsky yel brn, olv blk, a.a.	
	Tr	Tuff, Ls/Dol, Glauc	a.a.

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 7 of 9
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6A		Company: Statoil ASA, DNO AS			
RKB: 31	meters	Geologist: O. Beyer/ S. Ødegård			
Hole size: 8 1/2	"	Cut solvent: Iso-Propanol		Date: 12 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1944	100	Clst: varic, bl gn, olv blk, occ dsky yel brn – v dsky rd, min med gry – gn gry blky, frm, non calc, loc tr tuffac lam	No Shows
	Gd tr	Ls/Dol: pa yel brn - med brn, frm – mod hd, micr, arg, dol	
	Tr	Pyr, Glauc	
1947	100	Clst: varic, a.a.	a.a.
	Tr	Tuff, Ls, Glauc, Pyr	
1950	95	Clst: varic, a.a.	a.a.
	5	Tuffac Clst: bl gry – med gry, frm, blky, pred v arg, grdg Clst	
	Tr	Ls/Dol, Glauc, Pyr	
1953	100	Clst: varic, pred bl gn, olv blk, a.a.	a.a.
	Tr	Tuff, Ls/Dol, Glauc, Pyr	
1956	100	Clst: varic, pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1959	100	Clst: varic, pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1962	100	Clst: varic, incr bl blk, else pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1965	100	Clst: varic, pred pa gn gry, loc sft-frm, sbblky, slily stky, wxy, non calc	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1968	100	Clst: varic, pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1971	100	Clst: varic, incr mod brn, else pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1974	100	Clst: varic, pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1980	100	Clst: varic, pred pa gn - med gn gry, i.p. wxy, sft, a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1983	100	Clst: varic, incr mod brn - rd brn, else pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1986	Not recovered		
1989	100	Clst: varic, pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
1992	100	Clst: varic, pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 8 of 9
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6A		Company: Statoil ASA, DNO AS			
RKB: 31 meters		Geologist: O. Beyer/ S. Ødegård			
Hole size: 8 1/2 "		Cut solvent: Iso-Propanol		Date: 12 June 2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1995	100	Clst: varic, bl gn, olv blk, occ dsky yel brn – v dsky rd, min med gry – gn gry blky, frm, non calc, loc tr tuffac lam	No Shows
	Gdtr	Ls/Dol: pa yel brn - med brn, frm – mod hd, micr, arg, dol	
	Tr	Pyr, Glauc	
1998	100	Clst: varic, pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
2001	95	Clst: varic, pred a.a.	a.a.
	5	Sst: clr-transl Qtz, vf-f, wl srtd, sbang-sbrndd, fri, arg mtx/cmt, fr vis por	
	Tr	Ls/Dol, Glauc, Pyr	
2004	95	Clst: varic, pred a.a.	a.a.
	5	Sst: pred a.a.	
	5	Ls/Dol: a.a.	
	Tr	Glauc, Pyr	
2007	95	Clst: varic, pred a.a.	a.a.
	5	Sst: pred a.a.	
	5	Ls/Dol: a.a.	
	Tr	Glauc, Pyr	
2010	100	Clst: varic, pred a.a.	a.a.
	Tr	Ls/Dol, Glauc, Pyr	
2013	Not recovered		
2016	70	Clst: varic, pred a.a.	Tr spty wk yel dir Fluor
	30	Sst: clr-transl Qtz, vf-f, wl srtd, sbang-sbrndd, fri, arg (Kao) mtx/cmt, fr vis por	Slw strmg bl wh Cut
	Tr	Ls/Dol, Glauc, Pyr	(from arg mtx)
2030	80	Sst: pred a.a., loc abn Kao mtx	spty v wk resid HC shows
	20	Clst: varic, pred a.a.	
	Tr	Ls/Dol, Glauc, Pyr	
2040	90	Sst: pred a.a., loc abn Kao mtx	resid HC shows, a.a
	10	Clst: varic, pred a.a.	
	Tr	Ls/Dol, Glauc, Pyr	
2050	95	Sst: pred a.a., loc abn Kao mtx	resid HC shows, a.a
	5	Clst: varic, pred a.a.	
	Tr	Ls/Dol, Glauc, Pyr	
2060	80	Clst: varic, a.a	
	20	Sst: vf-med lse Qtz, sbrnd, Tr rnd, gd vis por	resid HC shows, a.a
	Tr	Ls/Dol, Glauc, Pyr Nods, Kao	
2070	80	Clst: varic, also Tr tuffac	
	20	Sst: also Tr Crs rnd Qtz	resid HC shows, a.a
	Tr	Ls/Dol, Glauc, Pyr Nods, Chl	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 9 of 9
Country: Norway		Area: North Sea		Field: Verdandi	
Well no: 16/1-6A		Company: Statoil ASA, DNO AS			
RKB: 31 meters		Geologist: O. Beyer/ S. Ødegård			
Hole size: 8 1/2 "		Cut solvent: Iso-Propanol		Date: 12 June 2003	

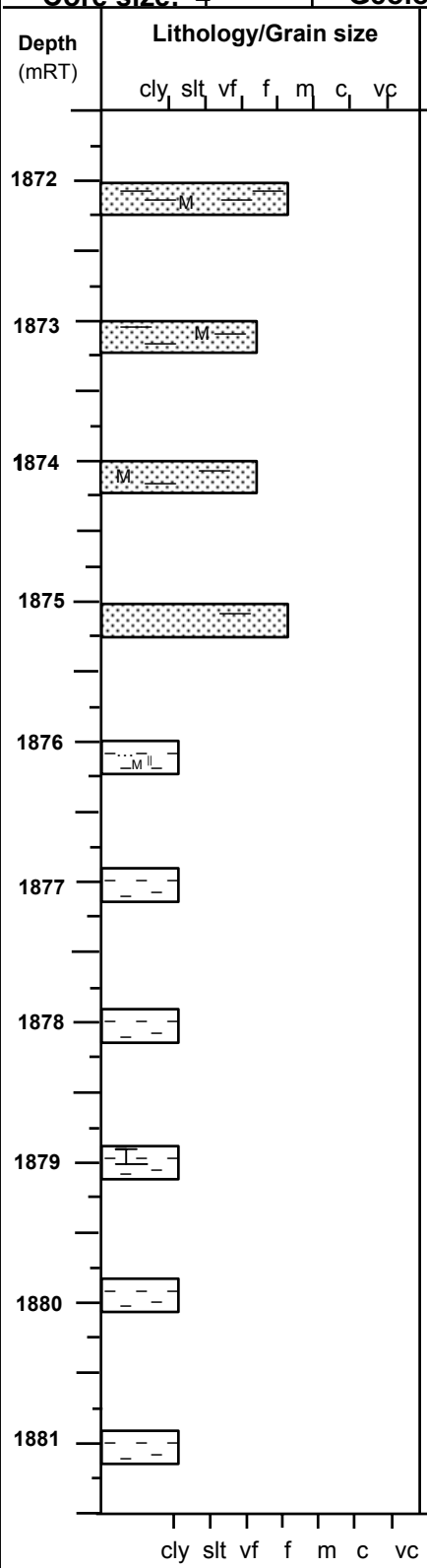
Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2080	90	Clst: varic, pred a.a	No Shows
	5	Sst: a.a	
	5	Tuff, Ls/Dol, Pyr Nods, Glauc, Chl	
2090	90	Clst: varic, pred a.a	a.a
	5	Sst: a.a	
	5	Tuff, Ls/Dol: a.a	
2100	95	Clst: a.a	a.a
	5	Sst: a.a	
	Tr	Slst, Ls/dol, Pyr Nods, Glauc	
2110	100	Clst: a.a	a.a
	Tr	Ls/Dol	
2120	Not recovered		
2130	100	Clst: pred a.a	a.a
	Tr	Ls/Dol	
2140	100	Clst: a.a	a.a
	Tr	Dol	
2150	40	Ls/Dol: off wh-lt brn, arg, frm	a.a
	60	Clst: a.a	
2160	60	Ls/Mrl: wh-off wh-lt brn, less arg, frm-mod hd	a.a
	40	Clst: a.a	
2170	60	Ls/Mrl: a.a	a.a
	40	Clst: a.a	
2180	70	Ls/Mrl: + dk access Min i.p., a.a	a.a
	30	Clst: a.a	
	Tr	Dol: mod yelsh brn, v hd, sbblky, calc	
	Tr	Sst: vf-med lse Qtz, sbrnd, dk yelsh brn arg mtx, sli calc	
2190	70	Ls/Mrl: a.a	a.a
	30	Clst: a.a	
	Tr	Dol: mod yelsh brn, v hd, sbblky, calc	
	Tr	Sst: vf-med lse Qtz, sbrnd, dk yelsh brn arg mtx, sli calc	
2194	80	Ls/Mrl: a.a	a.a
	20	Clst: a.a	
	Tr	Dol: mod yelsh brn, v hd, sbblky, calc	
	Tr	Sst: vf-med lse Qtz, sbrnd, dk yelsh brn arg mtx, sli calc	

TD of well at 2194 m MD RT

App E Core description

CONVENTIONAL CORE DESCRIPTION

Country: Norway	**Area:** North Sea	**Field:** Verdandi
Well no: 16/1-6 S	**Formation:** Heimdal Fm.	
Core no: 1	**Interval:** 1872 - 1899 m MD	**Cored:** 27.0 m **Rec:** 26.85 m 99.4 %
Core size: 4"	**Geologists:** O.Beyer/TFK/K.Helvig	**Date:** 03.06.03



Depth (mRT)	Lithological Description (Rock name, mod. lith., colour, grain size, sorting, roundness, matrix, cementation, hardness, sed. struct., accessories, fossils, porosity, contamination)	Remarks (Shows, etc.)
1872	**SST :** med dk gry – brn gry, clr – trnsl – op qtz, v f – med, occ crs, pr srt, sbang – sbrnn, sft, arg – v arg, mic, pred pr vis por	Tr dk brn stain, ptch – even dk tel fluor, slow stream bl wh – wh cut fluor
1873	**SST :** med dk gry – brn gry, clr – trnsl – op qtz, v f – f, occ med grns, mod srt, arg – occ v arg, mic, pr – mod vis por	Tr dk brn stain, ptchy – even dk yel – yel fluor, cloudy – slow stream bl wh cut fluor
1874	**SST :** med dk gry – brn gry, clr – trnsl qtz, v f – f, mod – wl srt, sft, arg, slily mic, mod – gd vis por	Tr dk brn stain, even – ptcy yel – bright yel fluor, cloudy – slow stream bl wh cut fluor
1875	**SST :** med dh gry – olv gry, f – med, mod srt, sbang – sbrndd, sft, slily arg, gd vis por	Tr dk brn stain, even yel – bright yel fluor, cloudy – slow stream bl wh cut fluor
1876	**CLST :** med dk gry, mod hd – hd, blky, slty, sdy, micromic, non – slily calc	No shows
1877	**CLST :** dk gn gry – dk bl gry, mod hd, blky – sbfiss, non calc	No shows
1878	**CLST :** dk gn gry, else a.a.	No shows
1879	**CLST w/ LS frac fill :** **CLST:** med dk gry, mod hd, blky, slty, slily sdy, slily mic, slily calc **LS:** pa yel brn – lt olv gry, mod hd, xln	No shows
1880	**CLST :** med lt gry – gn gry, mod hd, blky – sbfiss, non calc	No shows
1881	**CLST :** a.a.	No shows

CONVENTIONAL CORE DESCRIPTION

Country: Norway | **Area:** North Sea | **Field:** Verdandi

Well no: 16/1-6 S | **Formation:** Heimdal Fm.

Core no: 1 | **Interval:** 1872 - 1899 m MD | **Cored:** 27.0 m **Rec:** 26.85 m 99.4 %

Core size: 4" | **Geologists:** O.Beyer/TFK/K.Helvig | **Date:** 03.06.03

Depth (mRT)	Lithology/Grain size (cly slt vf f m c vc)	Shows: STAIN	FLUOR	CUT	Porosity: POOR	FAIR	GOOD	Lithological Description (Rock name, mod. lith., colour, grain size, sorting, roundness, matrix, cementation, hardness, sed. struct., accessories, fossils, porosity, contamination)	Remarks (Shows, etc.)
1882								**CLST :** inertlam med lt gry – gn gry and dk gn gry, patches dk gry, mod hd, blky – sbfiss, non calc	No shows
1883								**CLST :** med dk gry, mod hd, blky, slty – v slty, sdy, slily mic, tr micropyr, mod calc	No shows
1884								**CLST :** a.a.	No shows
1885								**CLST :** gn gry – dk gn gry, hd, blky, non calc	No shows
1886								**CLST::** dk gn gry, else a.a.	No shows
1887								**CLST:** |med dk gry – med bl gry, hd, blky, non calc	No shows
1888								**CLST :** brn blk, hd, blky – sbfiss, slily slty, slily micromic, non calc	No shows
1888.75								**CLST :** dk gn gry – dk bl gry, hd, blky – sbfiss, non calc	No shows
1890								**CLST :** mott, med dk gry, gry rd, hd, blky – sbfiss, tr blk carb frags (plt remains), non calc	No shows
1891								**CLST :** brn gry – brn blk, hd, blky – sbfiss, tr blk carb frags (plt remains), slily mic, non calc	No shows

cly slt vf f m c vc

CONVENTIONAL CORE DESCRIPTION

Country: Norway	**Area:** North Sea	**Field:** Verdandi
Well no: 16/1-6 S	**Formation:** Heimdal Fm.	
Core no: 1	**Interval:** 1872 - 1899 m MD	**Cored:** 27.0 m **Rec:** 26.85 m 99.4 %
Core size: 4"	**Geologists:** O.Beyer/TFK/K.Helvig	**Date:** 03.06.03

Depth (mRT)	Lithology/Grain size (cly slt vf f m c vc)	Shows: STAIN	FLUOR	CUT	POOR	FAIR	GOOD	Lithological Description (Rock name, mod. lith., colour, grain size, sorting, roundness, matrix, cementation, hardness, sed. struct., accessories, fossils, porosity, contamination)	Remarks (Shows, etc.)
1892								**CLST :** brn gry – brn blk, hd, blky – sbfiss, tr blk carb frags (plt remains), slily mic, non calc	No shows
1893								**CLST :** a.a.	No shows
1894								**CLST :** a.a.	No shows
1895								**CLST :** brn blk, else a.a.	No shows
1896								**CLST :** a.a.	No shows
1897								**CLST :** med dk gry – brn blk, dk gn gry, else a.a.	No shows
1898								**CLST :** dk gn gry – gn blk, else a.a.	No shows
1898.85								**CLST :** gn gry – dk gn gry, hd, blky, v micropyr, non calc	No shows

Base of core: 1898.85 m

cly slt vf f m c vc

App F Sidewall core description

STATOIL

SIDEWALL CORE DESCRIPTION

Country: Norway	Area: North Sea		Field: Verdandi
Well no: 16/1-6S	Company: Statoil ASA, DNO AS		
Hole size: 8 1/2 "	Geologist: O. Beyer, I. Winsvold		RKB: 31 meters
Run no.: 1A	Reference log: Run 1A: PEX-AIT-DSI	Cut fluid: Iso-propanol	Date: 6.06.2003

Shot no.	Depth (m RKB)	Rec. (mm)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
30	1495	31	CLST: dk grnsh gry, frm, blky, none calc, unif	No Shows
29	1499	27	SST: lt brn HC stn and slily arg mtx, dom clr-transl Qtz, tr Glau, vf-f, wll srt, sbang-sbrnd, lse, non calc mtx/cmt, infer gd vis por CLST: ptch of Clst, gen a.a.	Gd HC odour, lt-m brn HC stn, ptchy mod bri yel dir Flu fst strmg blu wh Cut
28	1502	26	CLST: dk grnsh gry, frm, blky, non calc, unif	No shows
27	1530	?	CLST: dk grnsh gry, frm, blky, non calc, unif	No shows
26	1537	20	SST: dom clr-transl Qtz, vf-f, wll srt, sbang-sbrndd, cln, no mtx/cmt, lse, infer gd vis por	Wk HC odour No Flu & Cut
25	1542	24	SST: lt brn gry arg mtx/HC stn, dom clr-transl Qtz, vf-f, tr med, mod wll srt, sbang-sbrndd, no calc mtx/cmt, lse, infer fr-gd vis por	Wk HC odour No Flu & Cut
24	1546	21	SST: lt brn gry arg mtx/HC stn, dom clr-transl Qtz, vf-f, tr med, mod wll srt, sbang-sbrndd, no calc mtx/cmt, lse, infer fr-gd vis por	Wk HC odour No Flu & Cut
23	1551.8	38	CLST: grysh olv gn – dk gn gry, blky, frm, non calc, unif	No shows
22	1555	26	CLST: grysh olv gn – dk gn gry, blky, frm, non calc, unif	No shows
21	1596	33	CLST: dk grnsh gry-gryish olv gn, frm, blky, non calc, unif	No Shows
20	1600	20	SST: clr-transl Qtz, vf-med Qtz, lse, cln, infer gd vis por	No Shows
19	1602	30	CLST: dk grnsh gry-gryish olv gn, frm, blky, non calc, unif	No Shows
18	1603	30	CLST: dk grnsh gry-gryish olv gn, frm, blky, non calc, unif	No Shows
17	1664	37	CLST: grnsh blk –dsky gn, frm, blky, non calc, unif	No Shows
16	1669	36	CLST: gryish olv gn – dsky yel gn, frm, blky, non calc, unif	No Shows
15	1675	22	SST: lt-med gry mtx, clr-transl Qtz, vf-f, wll srt, sbang, tr sbrnd, slily arg mtx/cmt, gen lse, no calc cmt, gd vis infer por	Wk HC odour No Fluor & Cut
14	1679	22	SST: lt-med gry mtx, clr-transl Qtz, vf-med, mod-wll srt, sbang, tr sbrnd-rnd (med), mod arg mtx/cmt, gen lse, no calc cmt, fr- gd vis infer por	No shows
13	1683	21	SST: lt-med gry mtx, clr-transl Qtz, vf-med, mod-wll srt, sbang, tr sbrnd-rnd (med), mod arg mtx/cmt, gen lse-fri, no calc cmt, fr- gd vis infer por	No shows
12	1686	Empty		

STATOIL

SIDEWALL CORE DESCRIPTION

Country: Norway	Area: North Sea		Field: Verdandi
Well no: 16/1-6S	Company: Statoil ASA, DNO AS		
Hole size: 8 1/2 "	Geologist: O. Beyer, I. Winsvold		RKB: 31 meters
Run no.: 1A	Reference log: Run 1A: PEX-AIT-DSI	Cut fluid: Iso-propanol	Date: 6.06.2003

Shot no.	Depth (m RKB)	Rec. (mm)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
11	1688	56	CLST: gryish olv gn – gryish olv, frm, blky, non calc, wxy lstr, unif	No shows
10	1748	32	CLST: olv gry, frm, blky, non calc, wxy lstr, unif	No shows
9	-	-	Not attempted	
8	-	-	Not attempted	
7	-	-	Not attempted	
6	1675.5	?	SST: lt-med gry mtx, clr-transl Qtz, vf-f, wll srt, sbang, tr sbrnd, slily arg mtx/cmt, gen lse, no calc cmt, gd vis infer por	Wk HC odour No Fluor & Cut
5	1679.5	?	SST: lt-med gry mtx, clr-transl Qtz, vf-med, mod-wll srt, sbang, tr sbrnd-rnd (med), mod arg mtx/cmt, gen lse, no calc cmt, fr- gd vis infer por	No shows
4	-	-	Not attempted	
3	1686.5	?	CLST: gryish olv gn – gryish olv, frm, blky, non calc, wxy lstr, unif	No shows
2	1688.5	?	CLST: gryish olv gn – gryish olv, frm, blky, non calc, wxy lstr, unif	No shows
1	-	-	Not attempted	

App G Other reports

NPD standard form for reporting shallow gas (in Norwegian)

1. *Avstand fra boredekk til havnivå:* 31 m

2. *Vanndyp:* 112 m MSL

3a. *Settedyp for 30" lederør:* 203 m

3b. *Evt. formasjonstyrketest (g/cc):* -

4a. *Settedyp for foringsrør hvorpå BOP settes:* 545.5 m

4b. *Formasjonstyrketest (g/cc):* 1.82 g/cc

6. *Dybdeintervall (mRKB og mTVD) og alder for sandlag grunnere enn 1000 m under havbunnen. Oppgi hvilke lag som evt. inneholder gass.*
   Kvartær 200-238 m: ingen gass
   Pliocene 555 m: ingen gass
   Pliocene 603 m: inneholder grunn gass
   Miocene-Pliocene 775-785 m: ingen gass
   Miocene 866-1003 m: ingen gass

7. *Hvordan ble grunn gass påvist:* Grunn gass ble påvist ved MWD logg respons, og sand med formasjonsgass i retur boreslam..

8. *Sammensetning og opprinnelse til gassen:* Kun C1, sannsynligvis biogen opprinnelse.

9. *Beskriv alle målinger i gassførende lag:* MWD gamma og resistivitets målinger samt måling av total gass og gass kromatografi i retur boreslam.

10. *Angi dyp (mRKB og TVG) til inkonformiteter i borehullsposisjonen.*
    Topp Hordaland Gp: 830 m, 0.867 sek
    Topp Sele Fm : 1816.5 m, ?

11. *Angi utbredelsen av sandlagene (kommunikasjon, kontinuitet, trunkering, etc.):*
    Utbredelse av kvartære sandlag er usikker, men sandlag med grunn gass på 603 m er også påvist i brønn 16/1-4 (ved 625 m).
    Miocene sandlag inkludert Utsira Fm har regional utbredelse.

12. *Angi utbredelsen av evt. gass- skygging ("gas blanking"):* Ingen

13. *Angi evt seismiske indikasjoner på at gassen stammer fra dypere nivå:* Ingen
Beskrivelse dersom gassen stammer fra dypere nivå:

14. *Hvordan samsvarer tolkingen av borestedsundersøkelsen med borehullsdata mht. :*

- *grunn gass:*
Stemmer bra. Grunn gass klasse I varsel ved 616 m oppfylt ved grunn gass på 603 m. Imidlertid ble det ikke påvist grunn gass klasse II som var varslet ved 878 m.

- *sand lag:*
Stemmer bra.

- *inkonformiteter:*
Stemmer bra.

- *Korrelasjon til nærliggende brønner:*
God korrelasjon til nærliggende brønner. Spesielt god korrelasjon til brønn 16/1-4 mhp. sandlag med grunn gass.

Listing of other reports

COMPANY	REPORTS
Baker Hughes Inteq	End of Well Report, MWD and Directional Drilling
Geoservices	Final Well Report, Well: 16/1-6S and 16/1-6A
Ichron	A Biostratigraphical Evaluation of wells 16/1-6S and 16/1-6A, Viking Graben, NOCS
Halliburton Security DBS	Kjerneborings-rapport, brønn 16/1-6S og 16/1-6A
ResLab	Conventional Core Analysis, Well 16/1-6S
Halliburton	Cementing
MI	Summary drilling fluids

7 Enclosures

7.1 Composite log, Well 16/1-6S

7.2 Composite log, Well 16/1-6A

7.3 Formation evaluation log, Well 16/1-6S

7.4 Formation evaluation log, Well 16/1-6A

7.5 Pressure evaluation log, Well 16/1-6S

7.6 Pressure evaluation log, Well 16/1-6A