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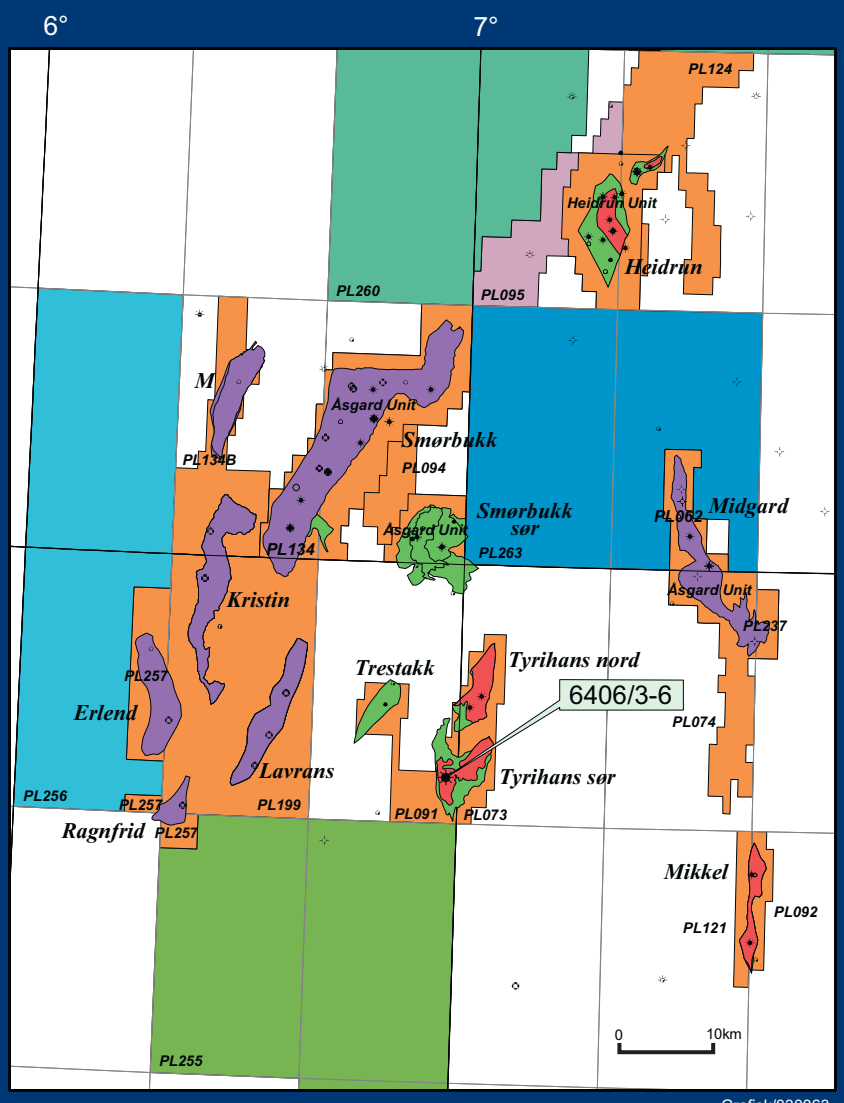
Final Well Report
PL091/PL073, Well 6406/3-6



Grafisk/030063

Exploration and Production (UPN)
Norway, May 2003

ExxonMobil

HYDRO

TOTAL FINA ELF

45mm perm
Trenger x ?

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Final Well Report
PL 091/073
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Title:
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Exemptions and non-conformances

Health, safety, environment and quality

Geology and formation data report

Drilling operations report

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1 Introduction

1.1 Well data record

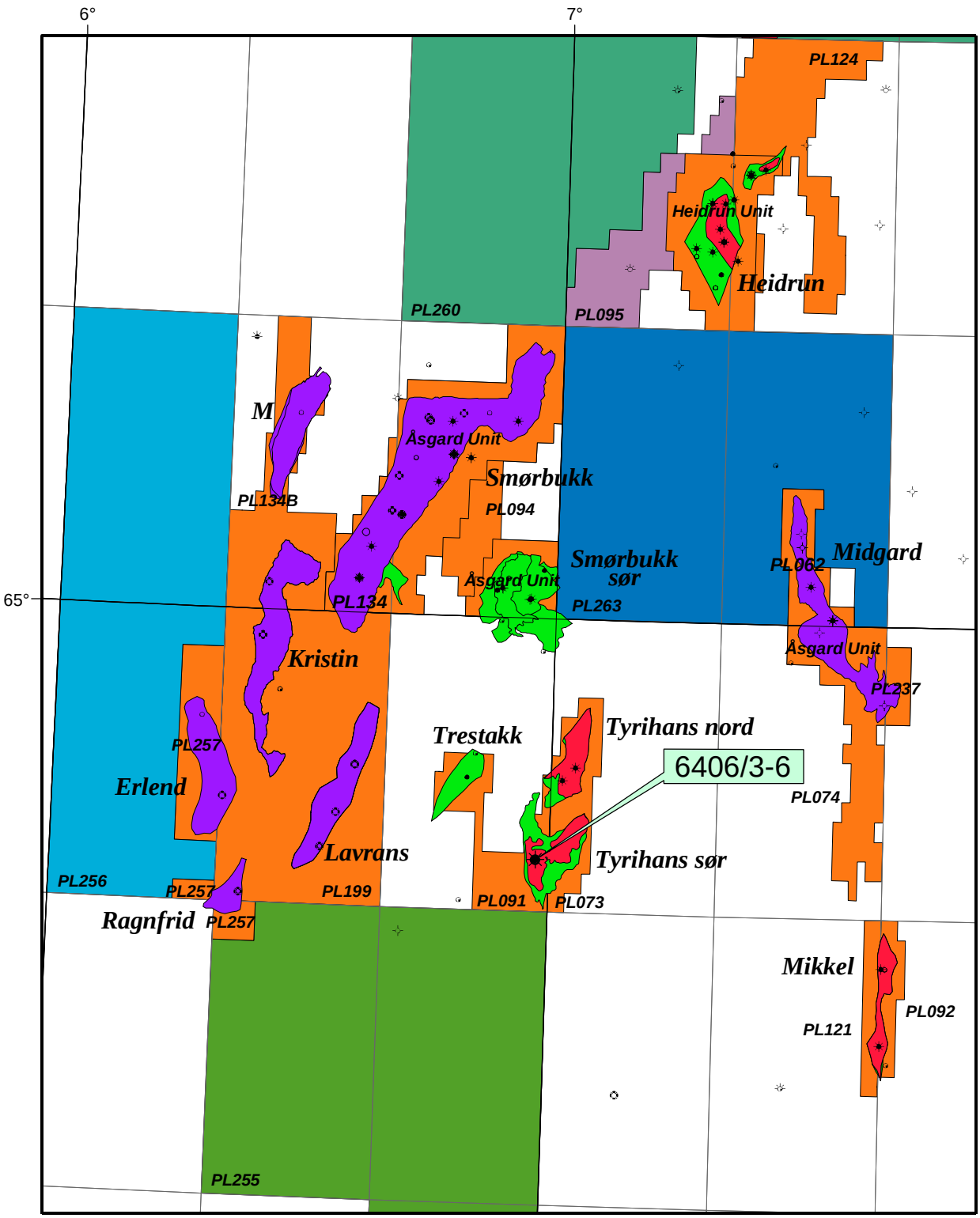
Well name	:	6406/3-6	
Type of well	:	Appraisal	
Field	:	Tyrihans Sør	
Country	:	Norway	
Area	:	Halten Terrace	
License	:	PL 091/PL 073	
Licencees PL 091	:	Statoil	55 %
		ExxonMobil	33 %
		Norsk Hydro	12 %
PL 073	:	Statoil	54.667 %
		TotalFinaElf	33.333 %
		Norsk Hydro	12 %

Drilling unit	:	Stena Don
Type	:	Semi submersible DP drilling rig
Water depth	:	273 m MSL
Air gap	:	24 m
TD	:	4175 m MD RKB/4174 m TVD RKB
On license	:	20.09.02
Rig release	:	15.11.02
Formation at TD	:	Tilje Formation
Geographic co-ordinates	:	64° 47' 43.56" N 06° 57' 55.17" E
Datum/Spheroid	:	ED-50 / Int. 1924
UTM	:	UTM Zone 32, CM 09° E 7 187 389N 403 326E
Seismic location	:	Seismic survey ST9503R99, Inline 484, Crossline 927.

All depths in this report refer to MD RKB (Rotary Kelly Bushing) unless otherwise stated.

Tyrihans

Haltenbank Fields & Discoveries



0 5 10 15 20 Kilometers

arcmap_20011004_ia_index_tyrihans_anfa

Figure 1.2

1.2 Well objectives

The main objectives of well 6406/3-6 were to:

- sample the formation fluids of Tyrihans Sør in order to determine the hydrocarbon phase
- identify any possible erosion of the Garn Formation in the western part of the field in order to reduce uncertainties in the hydrocarbon volumes in place

1.3 Result of the wells

Well 6406/3-6 was spudded in a water depth of 273 m MSL and drilled to a total depth of 4175 m. No shallow gas was observed on MWD logs or by the ROV at the wellhead.

A thick Garn Formation was found with no signs of erosion. Two reservoir zones were proven to be hydrocarbon bearing: the Garn Formation containing oil with a gas cap overlying an aquifer zone, and the Ile Formation containing oil in the upper half of the formation. A gas/condensate-oil contact and an oil-water contact was proven in the Garn Formation at 3672 m TVD RKB and 3707 m TVD RKB respectively, while an oil-water contact was proven in the Ile Formation at 3849 m TVD RKB. This was verified by logs, pressure data and hydrocarbon samples.

No conventional cores were cut in this well, but a number of sidewall cores were collected from the hydrocarbon bearing intervals. MDT oil samples were collected from all hydrocarbon bearing reservoir zones.

No DST was performed.

1.4 Drilling summary

1.4.1 Casing

A 30” conductor was run followed by 13 3/8” casing, 9 5/8” liner and 7” liner.

Casing	Shoe depth [m]	LOT /FIT [Equivalent Mud Weight]
30"	357	
18 ¾” WH x 13 3/8" csg	1773	FIT - 1.83 g/cm^3
9 5/8” liner	2897	FIT - 1.85 g/cm^3
7” liner	3647	XLOT - 1.49 g/cm^3

Table 1.1

1.4.2 Drilling fluids

Section	Section TD [m]	Maximum mud weight [g/cm³]	Mud type
36"	459	1.03	Sea water / high visc. sweeps
17 ½""	1780	1.20	Sea water / high visc. Sweeps / NaCl brine
12 ¼"	2903	1.75	Versavert (oil based mud)
8 ½"	3654,5	1.66	Versavert (oil based mud)
6"	4175	1.22	Glydrill (water based mud)

Table 1.2

1.5 Data acquisition summary

See Figure 1.2.

PL 091/073

RKB – Sea: 24 m

Water depth: 273 m

Well 6406/3-6
Formation Evaluation

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Made by: PF

Date: 23.04.03

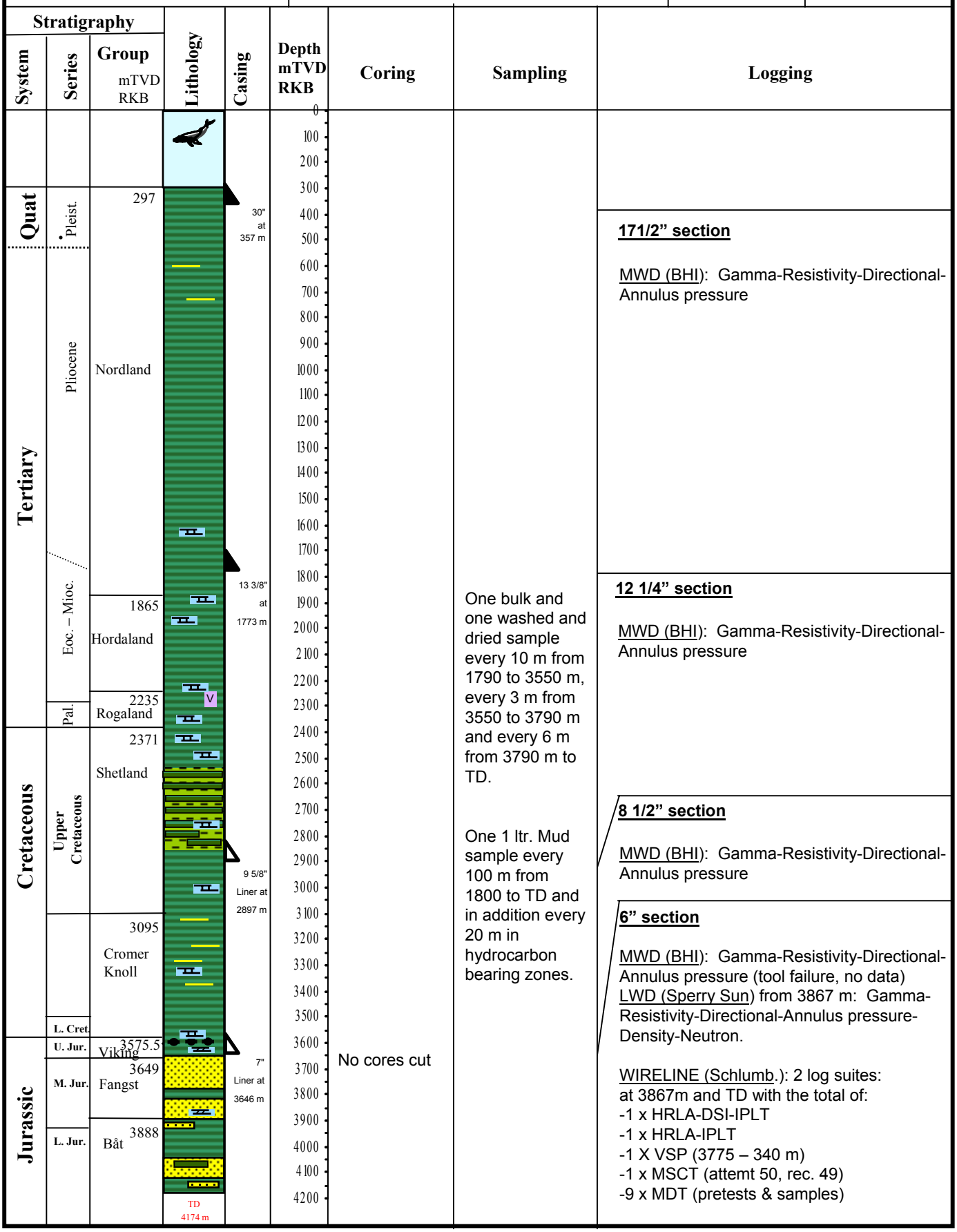


Figure 1.2

2 Exemptions and non-conformances

The following exemptions were approved prior to and during the operations.

Dispensation from	Synergi no.	Date	Title
WR1251 Well control drilling activities	20554	08.07.2002	Unntak om krav til risermargin ved innboring I trykkrampe, brønn 6406/3-6 Tyrihans Sør.
WR0436 Drilling & Completion Operations	200432	08.11.2002	Fravik fra HPHT definisjon og tilhørende prosedyrer (WD691) for videre boring, brønn 6406/3-6 Tyrihans Sør.

Table 2.1

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

3.1 RUH

Category	Number of RUHs	From Stena	From service companies	From Statoil
HSE	21	18	3	
Quality	6	3	3	
HSE/Quality	28	16	11	1
Total	**55**	**37**	**17**	**1**

Table 3.1

3.2 Comments to RUH

Personnel Injuries

- Two personal injuries occured and both resulted in Lost Time Accidents. The accidents took place the same day in connection with casing loading/crane operation. Both injured persons were directly involved in this operation. There were no technical reasons for the accidents or reasons that could be attributed to other involved personnel.

As a result of the accidents Stena has reviewed their procedures concerning casing loading. It has also been decided that Stenas Crane Operators, as well as deck crew, will attend special "crane operators course" at the " Crane Simulator" in Trondheim.

Discharge to the environment

- None

Falling objects

- One falling object – factor 3 (Cover plate for electric junction box)

Other serious incidents (Factor < 4)

- Person went on to aft catwalk without harness (factor 2)
- No 2 Thruster tripped on high vibration (factor 3)
- Mud-motor washed out (factor 3)

3.3 Experience summary

Item	Experience	Immediate solution	Solution recommended	D-time [hrs]
36" section				
Cement unit	Computer problems prior to the 30" cement job. Problems with the mix- flow metres.	Re-booted system		1.5
17 ½" section				
Leak in well head connector	VX ring installed on well head prior to running BOP. After landing BOP a leak in the connector was discovered.	Disconnected BOP and changed VX ring to resilient type.	Run BOP with VX ring installed in the connector. If VX ring is to be installed on the well head, use resilient type.	12.5
12 ¼" section				
Losses on 9 5/8" cmt job	Lost 42 m3 of mud during mixing and displacement of cement .	Losses expected. Continued operation with 2000 lpm in displacement rate.	For future Tyrihans well designs, the loss zone is most likely located in bottom Tare/Top Springar Fm around 2390 m.	2.0
8 1/2" section				
MWD de-coding problems (BHI)	Severe de-coding problems. Real time data only obtainable when drilling with reduced flow rate or reaming. Cause of de-coding problem related to pump noise.	Close co-operation between MWD operator and driller avoided round trip.	An adjustment to the mud pump dampeners has been done, and the problem with pump noise has been resolved.	0.0
6" section				
MWD/LWD failure (Sperry Sun)	The MWD/LWD failed on both runs. Limited and no memory data obtained. Failures related to stick-slip/vibrations.	Continued drilling without MWD/LWD data available.	Higher focus in the planning phase on stick-slip/vibrations analysis with regards to optimizing the BHA for "low vibrations performance" (position of stabilizers, use of motor and bit choice). Stick-slip/vibration is a "killer" for the 4 ¾" sized MWD/LWD tools.	11.5
Wash out in mud motor (BHI)	Sudden pressure drop and ROP decreased to zero.	POOH and laid down mud motor. RIH with a rotary BHA. Changed MWD/LWD as this had already failed.	Ref. solution recommended above.	31.5
Mud properties	Poor mobility observed during MDT logging	Extensive additional MDT logging for locating the very best sands and also use dual packer for sampling.	CaCO3 should not be used in reservoirs above 100 °C unless extensive compatibility testing and return permeability testing has been conducted.	10

Item	Experience	Immediate solution	Solution recommended	D-time [hrs]
Logging				
MDT logging	Not enough sleeves for running two MDT 18 gal chambers in tandem.	Used extra rig time to drain the chambers	Better planning and checking of delivered equipment	2.0
MDT logging	Stuck MDT	Cut and thread cable into drill pipe. Continued LWF.	Perform better risk assessment and optimise mud properties for reducing risk of getting stuck with wire line	98
MDT logging	Hydraulic pressure gauge in the pump out module failed.	POOH and replaced tool.	Better preventive maintenance	11.75
MDT logging	Short circuit in cable head	Troubleshot and build new cable head	Better training of operators	10.5

Table 3.2

3.4 Time distribution

Planned total time (including changes in scope of work)	54.5 days
Actual total time	55.7 days
Total down time	229 hrs
Waiting on weather (WOW)	14,5 hrs

Ops. Factor: $= \frac{Total\_time - Down\_time - WOW}{Total\_time - WOW} * 100$	**82.6%**

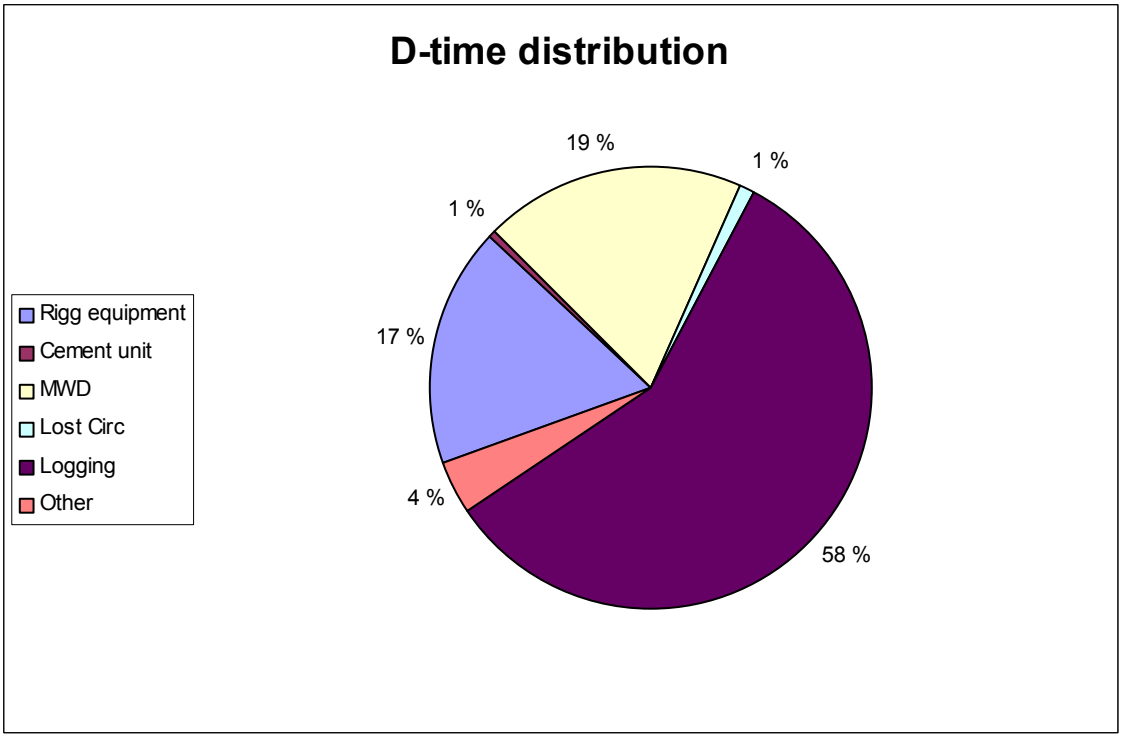


Figure 3.1 D-time distribution

Major contributors to the unproductive time were the stuck MDT log and the other technical problems with wire line logging (failure of MDT hydraulic pressure gauge and short circuit in cable head).

4 Geology and formation data report

4.1 Geological setting and results

The Halten Terrace is situated in the central part of the Mid - Norwegian Shelf, between the Trøndelag Platform to the east and the Vøring – Rås Basin to the west. Three major tectonic events have been important in the area; extension in late Permian / early Triassic, extension in Late Middle Jurassic / Early Cretaceous and extension in Late Cretaceous / Early Tertiary.

The Tyrihans structures (Tyrihans Nord and Tyrihans Sør) were established during Late Middle Jurassic / Early Cretaceous. The structural trend is NNE - SSW (planar faults). No faults are observed in the Late Cretaceous / Early Tertiary succession, hence only normal subsidence took place during this period, interrupted by doming in Eocene – Oligocene further west.

Well 6406/3-6 is situated in the western part of the Tyrihans Sør structure. The well penetrated rocks ranging in age from Quaternary to Jurassic, with TD in the Tilje Formation (Figures 1.1 and 4.1-2.). The well revealed a stratigraphic sequence close to the prognosed.

4.2 Shallow gas results

The well was classified as class 0 - no shallow gas expected, and was drilled with seawater down to 1620 m. No shallow gas was observed (see shallow gas report in Appendices).

4.3 Stratigraphy

The stratigraphical division is based on the biostratigraphic reports, wireline log curves and on correlation with nearby wells. The stratigraphy of the entire well and the reservoir section is shown in Figures 4.1-2. No Tofte Formation has been defined in this well due to the limited amount of sandstone being present within the Ror Formation.

4.3.1 Table of chronostratigraphy

Stratigraphic succession		m	
	Studied interval 1790 – 4175 m	**From**	**To**
Tertiary	Upper Oligocene	1790	1960
	Lower Oligocene	1970	2003
	Upper Eocene	2020	2023
	Middle Eocene	2030	2183
	Lower Eocene	2190	2280
	Upper Paleocene	2290	2353
---------- Base Tertiary unconformity ---------			
Cretaceous	Lower Maastrichtian	2370	2380
	Upper Campanian	2400	2450
	Middle Campanian	2460	2550
	Lower Campanian	2570	2630
	Upper Santonian	2640	2700
	Middle Santonian	2710	2770
	Lower Santonian	2790	2830
	Upper Coniacian	2850	3040
	Middle Coniacian	3060	3090
	Lower Coniacian	3100	3130
	Upper Turonian?	3150	3480
	~~ Hiatus ~~~		
	Middle to Upper Albian	3490	3520
	Lower Albian	3530	3533
	Aptian	3540	3553
	Upper Barremian	3556	3559
	Lower Barremian	3562	3568
---------- Base Cretaceous unconformity ---------			
Jurassic	Upper Volgian	3583	
	Middle Volgian	3586	3589
	~~ Hiatus ~~~		
	Upper Oxfordian	3592	
	Middle – Lower Oxfordian	3595	3598
	Lower Oxfordian	3601	3604
	~~ Hiatus ~~~		
	Lower Callovian	3610	
	Upper Bathonian	3613	3616
	Middle Bathonian	3622	
	Lower Bathonian	3625	3637
	Upper Bajocian	3640	3649
	Upper? – Lower Bajocian	3652	3727
	Lower Bajocian	3729.5	3765.5
	~~ ??Hiatus?? ~~~		
	Upper – Middle Aalenian	3767	3876
	Lower Aalenian	3882	3918
	Upper Toarcian	3921	3951
	Middle Toarcian	3957	3987
	Middle – Lower Toarcian	3993	4005
	Lower Toarcian	4011	4037
	Upper Pliensbachian	4043	4175
	TD	4175	

Table 4.1

4.3.2 Table of lithostratigraphy

Table of lithostratigraphy					
System	**Group / Formation**	**Observed depth**			**TWT**
		m	**m TVD**	**m TVD MSL**	**sec.**
QUATERNARY	NORDLAND GROUP. (Sea Floor)	297.0	297.0	273.0	0.370
TERTIARY	Naust Formation	507.0	507.0	483.0	0.603
	Kai Formation	1421.0	1421.0	1397.0	1.388
	HORDALAND GROUP	1865.0	1865.0	1841.0	1.780
	Brygge Formation	1865.0	1865.0	1841.0	1.780
	ROGALAND GROUP	2235.0	2235.0	2211.0	2.149
	Tare Formation	2235.0	2235.0	2211.0	2.149
	Tang Formation	2304.0	2304.0	2280.0	2.215
CRETACEOUS	SHETLAND GROUP	2371.0	2371.0	2347.0	2.282
	Springar Formation	2371.0	2371.0	2347.0	2.282
	Nise Formation	2490.0	2490.0	2466.0	2.390
	Kvitnos Formation	2806.0	2806.0	2782.0	2.639
	CR. KNOLL GROUP	3095.0	3095.0	3071.0	2.850
	Lysing Formation	3095.0	3095.0	3071.0	2.850
	Lange Formation	3124.0	3123.5	3099.5	2.872
	Lyr Formation	3548.5	3547.5	3523.5	3.161
JURASSIC	VIKING GROUP	3576.5	3575.5	3551.5	3.181
	Spekk Formation	3576.5	3575.5	3551.5	3.181
	Melke Formation	3594.0	3593.0	3569.0	3.193
	FANGST GROUP	3650.0	3649.0	3625.0	3.228
	Garn Formation	3650.0	3649.0	3625.0	3.228
	Not Formation	3767.0	3766.0	3742.0	
	Ile Formation	3805.0	3804.0	3780.0	
	BÅT GROUP	3889.0	3888.0	3864.0	
	Ror Formation	3889.0	3888.0	3864.0	
	Tilje Formation	4041.0	4040.0	4016.0	
	TD	4175.0	4174.0	4150.0	

Table 4.2

4.4 Lithostratigraphic description

NORDLAND GROUP **297.0 - 1865.0 mMD, 297.0 – 1865.0 mTVD (273.0 - 1841.0 mTVD MSL)**

The Nordland Group comprises the Quaternary, and the Naust and the Kai Formations of Tertiary age. Most of the Nordland Group, including the Quaternary, the Naust Formation and the major part of the Kai Formation, was drilled with returns to the seafloor. Descriptions of lithology down to 1780 m is inferred from the MWD memory log and relevant information from offset wells.

Quaternary **297.0 - 507.0 mMD, 297.0 – 507.0 mTVD (273.0 - 483.0 mTVD MSL)**

System: Quaternary
Series: Pleistocene

The sediments consist mainly of thick clay units interbedded with thinner sand layers or stringers. Based on the gamma ray log, the sand layers seem to be silty or argillaceous.

Naust Formation **507.0 - 1421.0 mMD, 507.0 – 1421.0 mTVD (483.0 - 1397.0 mTVD MSL)**

System: Tertiary
Series: Pliocene

The boundary to the overlying Quaternary sediments is picked at a slight increase on the resistivity log curve, consistent with the boundary in previous wells in the area. The MWD logs suggest that the predominant lithology in the Naust Formation is claystone, slightly sandy and silty in parts, but with no distinct sand intervals.

Kai Formation **1421.0 - 1865.0 mMD, 1421.0 – 1865.0 mTVD (1397.0 - 1841.0 mTVD MSL)**

System: Tertiary
Series: Lower Miocene - Lower Pliocene
Depositional environment: Marine, inner, mid to outer shelf

The top of the Kai Formation is picked at a distinct shift in the resistivity readings towards lower values compared to the overlying Naust Formation.

The upper part of the Kai Formation seems to consist mainly of uniform claystone with minor traces of silt/sand.

The lower part of the Kai Formation is described from cuttings and consists of claystone with thin limestone stringers.

The claystone is dark brownish grey to olive brown, firm, blocky, with silty microlamina and is non calcareous. The limestone is light orange, soft to firm, subblocky and slightly argillaceous.

HORDALAND GROUP **1865.0 - 2235.0 mMD, 1865.0 – 2235.0 mTVD (1841.0 – 2211.0 mTVD MSL)**

The Hordaland Group comprises the Brygge Formation.

Brygge Formation **1865.0 - 2235.0 mMD, 1865.0 – 2235.0 mTVD (1841.0 - 2211.0 mTVD MSL)**

System: Tertiary
Series: Upper Oligocene - Lower Eocene
Depositional environment: Marine, mid to outer shelf to upper bathyal

The top of the Brygge Formation is picked at the start of a decreasing resistivity trend.
The Brygge Formation consists of claystone with occasional stringers of limestone and dolomite.

The claystone is olive grey to medium dark grey, green grey, dark greenish grey, becoming dark reddish brown to moderate reddish brown. It is firm, blocky, silty, slightly argillaceous, non calcareous, in part glauconitic and occasionally micropyritic.
The limestone is light to very light grey, soft to firm, subblocky and slightly argillaceous.
The dolomite is yellow brown, firm to medium hard, occasionally hard, blocky and slightly argillaceous. Traces of pyrite nodules are seen in the lower part of the formation.

ROGALAND GROUP **2235.0 - 2371.0 mMD, 2235.0 – 2371.0 mTVD (2211.0 - 2347.0 mTVD MSL)**

The Rogaland Group comprises the Tare and the Tang Formations.

Tare Formation **2235.0 - 2304.0 mMD, 2235.0 – 2304.0 mTVD (2211.0 - 2280.0 mTVD MSL)**

System: Tertiary
Series: Lower Eocene - Upper Paleocene
Depositional environment: Marine, outer shelf

At the top of the Tare Formation, the gamma ray has a shift towards lower values, while the resistivity shifts towards higher values. The Tare Formation consists predominantly of tuffaceous claystone with occasional limestone and dolomite stringers.

The tuffaceous claystone is medium grey to blue grey, light greenish grey, silty, with traces of black microspecks and has a crumbly texture. The claystone is moderate to dark reddish brown, greenish grey and greyish green. It is medium hard to hard, silty, blocky, glauconitic and non to slightly calcareous. In the lower part, the claystone is predominantly greenish grey to dark greenish grey.
The limestone is off white to light grey, predominantly cryptocrystalline with carbonaceous microlamina and pyrite nodules. The dolomite is light brown grey, subcrystalline, with pyrite nodules. Traces of pyrite are observed in the upper part of the formation.

Tang Formation **2304.0 - 2371.0 mMD, 2304.0 – 2371.0 mTVD (2280.0 – 2347.0 mTVD MSL)**

System: Tertiary
Series: Upper Paleocene
Depositional environment: Marine, outer shelf to upper bathyal, shallowing to marine outer shelf

At the top of the Tang Fomation, there is a shift in the resistivity log data towards lower values. The Tang Formation consists of claystone with occasional limestone stringers.

The claystone is medium dark grey to olive grey, greenish grey to dark greenish grey, firm to moderately hard, brittle, subblocky to splintery and non to slightly calcareous.

The limestone is greyish orange, occasionally pale yellowish brown, very hard, blocky and microcrystalline. Traces of pyrite are observed throughout the unit.

SHETLAND GROUP **2371.0 - 3095.0 mMD, 2371.0 – 3095.0 mTVD (2347.0 - 3071.0 mTVD MSL)**

The Shetland Group comprises the Springar, Nise- and Kvitnos Formations.

Springar Formation **2371.0 – 2490.0 mMD, 2371.0 – 2490.0 mTVD (2347.0 - 2466.0 mTVD MSL)**

System: Cretaceous
Series: Upper Cretaceous
Stage: Upper Maastrichtian – Upper Campanian
Depositional environment: Marine, outer shelf to upper bathyal

The top of the Springar Formation is defined by a clear shift of the resistivity readings towards higher values. The gamma ray data show a slight shift towards lower values. The Springar Formation consists of claystone with limestone stringers.

The claystone is predominantly medium dark grey to dark grey, also dark greenish grey, firm to moderately hard, subblocky, slightly silty and non calcareous.

The limestone is light yellow brown to brownish grey, firm, blocky and argillaceous. Traces of pyrite are observed throughout the unit.

Nise Formation **2490.0 – 2806.0 mMD, 2490.0 – 2806.0 mTVD (2466.0 - 2782.0 mTVD MSL)**

System: Cretaceous
Series: Upper Cretaceous
Stage: Upper Campanian – Lower Santonian
Depositional environment: Marine, outer shelf to upper bathyal

The top of the Nise Formation is picked at a slight shift in the gamma ray - and resistivity trends. The gamma ray is reading lower values, and the resistivity is reading higher values. The Nise Formation consists predominantly of siltstone with interbedded claystone and occasional limestone stringers.

The siltstone is medium dark grey to dark grey, firm to moderately hard, subblocky to blocky, glauconitic in parts, non calcareous, grading to claystone and occasionally grading to very fine grained sandstone.

The claystone is medium dark to dark grey, olive grey, firm to moderately hard, blocky, non to moderately calcareous, silty in parts and occasionally grading to siltstone.

The limestone is brownish grey to dark yellow brown, occasionally greyish orange pink, blocky, firm and argillaceous.

Kvitnos Formation **2806.0 – 3095.0 mMD, 2806.0 – 3095.0 mTVD (2782.0 - 3071.0 mTVD MSL)**

System: Cretaceous
Series: Upper Cretaceous
Stage: Lower Santonian
Depositional environment: Marine, outer shelf to upper bathyal

The top of the Kvitnos Formation is picked at a slight trend shift in the gamma ray - and resistivity. The Kvitnos Formation consists of claystone and siltstone with stringers of limestone. In the upper part of the formation, there is a gradual transition from siltstone to silty claystone.

The siltstone is medium dark grey, firm to moderately hard, subblocky to blocky, glauconitic in parts, non to moderate calcareous and grading to claystone.

The claystone is medium dark to olive grey, moderately hard, brittle, non calcareous, and slightly to very silty.

The limestone is brownish grey to dark yellow brown, occasionally greyish orange pink, firm, blocky and argillaceous.

CROMER KNOLL GROUP **3095.0 - 3576.5 mMD, 3095.0 – 3575.5 mTVD (3071.0 - 3551.5 mTVD MSL)**

The Cromer Knoll Group comprises the Lysing, Lange- and Lyr Formations.

Lysing Formation **3095.0 - 3124.0 mMD, 3095.0 – 3123.5 mTVD (3071.0 - 3099.5 mTVD MSL)**

System: Cretaceous
Series: Upper Cretaceous
Stage: Lower Santonian
Depositional environment: Marine, outer shelf to upper bathyal

The top of the Lysing Formation is defined by a clear drop in the gamma ray readings and a sharp decline in the resistivity readings. The Lysing Formation consists of claystone with sandstone and limestone stringers and with traces of glauconite.

The claystone is dark grey, firm to moderately hard, subblocky to blocky, silty and slightly calcareous.

The sandstone is very light grey, glauconitic, friable and consists of very fine quartz grains. The sand grains are subrounded to rounded, well sorted and slightly to moderately calcareous cemented.

The limestone is brownish grey to dark yellowish brown, blocky to microcrystalline, firm and argillaceous.

Lange Formation **3124.0 - 3548.5 mMD, 3123.5 – 3547.5 mTVD (3099.5 - 3523.5 mTVD MSL)**

System: Cretaceous
Series: Upper Cretaceous – Lower Cretaceous
Stage: Upper Turonian – Lower Aptian
Depositional environment: Marine, mid to outer shelf to upper bathyal

The top of the Lange Formation is picked at a drop in the resistivity readings.

The Lange Formation consists of claystone with some sandstone, siltstone and limestone stringers.

The claystone is dark grey to olive black, dark greenish grey, firm to moderately hard, subblocky to blocky, locally subfissile, slightly silty and non to slightly calcareous.

The sandstone consists of very fine to fine quartz grains, which are subangular to subrounded and moderately to well sorted. The sandstone is argillaceous in parts and slightly calcareous cemented.

The siltstone is medium dark grey to olive black, firm, subblocky, calcareous and sandy, occasionally grading to sandstone.

The limestone is pale yellowish brown, occasionally white or pink, microcrystalline and firm to very hard, locally argillaceous and dolomitic.

Lyr Formation **3548.5 - 3576.5 mMD, 3547.5 – 3575.5 mTVD (3523.5 - 3551.5 mTVD MSL)**

System: Cretaceous
Series: Lower Cretaceous
Stage: Upper Barremian – Upper Ryazanian
Depositional environment: Marine, mid shelf

The top of the Lyr Formation is defined by a clear drop on the gamma ray log. The Lyr Formation consists of claystone with a major limestone bed at the base of the formation.

The claystone has interbedded dark grey to greenish grey and greyish brown colours. It is firm to moderately hard, subfissile to blocky, silty in parts and is non to very calcareous.

The limestone is pale brown to brownish grey, pinkish white to yellowish white, moderately hard to hard and microcrystalline.

VIKING GROUP **3576.5 - 3650.0 mMD, 3575.5 – 3649.0 mTVD (3551.5 - 3625.0 mTVD MSL)**

The Viking Group comprises the Spekk- and Melke Formations.

Spekk Formation **3576.5 - 3594.0 mMD, 3575.5 – 3593.0 mTVD (3551.5 - 3569.0 mTVD MSL)**

System: Cretaceous - Jurassic
Series: Lower Cretaceous - Upper Jurassic
Stage: Upper Ryazanian – Middle Oxfordian
Depositional environment: Marine, mid to outer shelf

The top of the Spekk Formation is defined by a distinct and major increase in the gamma ray readings. The Spekk Formation consists of claystone.

The claystone is olive black to dusky yellowish brown, hard, blocky and non calcareous.

Melke Formation **3594.0 - 3650.0 mMD, 3593.0 – 3649.0 mTVD (3569.0 – 3625.0 mTVD MSL)**

System: Jurassic
Series: Upper Jurassic – Middle Jurassic
Stage: Middle Oxfordian - Upper Bajocian
Depositional environment: Marine, inner shelf to marginal marine

The top of the Melke Formation is defined by a distinct decrease in the gamma ray readings. The Melke Formation consists of claystone with some limestone stringers. Traces of pyrite and glauconite occur.

The claystone is predominantly olive black, hard, blocky, micropyritic and non calcareous.

The limestone is pale brown to dark yellowish brown, moderately hard to hard and subblocky to blocky.

FANGST GROUP **3650.0 - 3889.0 mMD, 3649.0 – 3888.0 mTVD (3625.0 - 3864.0 mTVD MSL)**

The Fangst Group comprises the Garn, Not- and Ile Formations.

Garn Formation **3650.0 - 3767.0 mMD, 3649.0 – 3766.0 mTVD (3625.0 - 3742.0 mTVD MSL)**

System: Jurassic
Series: Middle Jurassic
Stage: Upper Bajocian – Lower Bajocian
Depositional environment: Marginal marine to marine, inner shelf

The top of the Garn Formation is defined by a distinct decrease in the gamma ray readings. The upper boundary is also seen on the density. The Garn Formation comprises massive sandstone.

The sandstone consists of clear, translucent to transparent to occasionally milky white quartz grains which appear as loose to friable in the samples. The grain size varies from very fine to coarse with fine to medium being dominant. The grains are angular to subrounded, the angularity partly being caused by breaking of silica cement. Sorting is predominantly moderate. Silica cement dominates, but calcareous cement has been logged in minor amounts. The sandstone is very clean with only minor amounts of pyrite and mica.

Not Formation **3767.0 - 3805.0 mMD, 3766.0 – 3804.0 mTVD (3742.0 - 3780.0 mTVD MSL)**

System: Jurassic
Series: Middle Jurassic
Stage: Upper Aalenian – Middle Aalenian
Depositional environment: Marginal marine to marine, inner shelf

The top of the Not Formation is defined by a sharp increase in the gamma ray - and resistivity readings going from the overlying Garn Formation into the claystone of the Not Formation. This boundary is also well defined on the density log, but difficult to see on the sonic log. The Not Formation is made up of claystone which in parts grade to siltstone.
The claystone is olive grey to olive black, firm to moderately hard, blocky, silty to very silty and in intervals grading to argillaceous siltstone. Locally the claystone/siltstone is sandy, while it is commonly carbonaceous and non calcareous.

Ile Formation **3805.0 - 3889.0 mMD, 3804.0 – 3888.0 mTVD (3780.0 - 3864.0 mTVD MSL)**

System: Jurassic
Series: Middle Jurassic
Stage: Middle Aalenian – Lower Aalenian
Depositional environment: Marginal marine to marine, inner shelf

The top of the Ile Formation is recognized by lower and more erratic gamma ray readings. The upper part of the Ile Formation consists of sandstone interbedded with claystone. Beneath the upper 20 m, sandstone is the dominating lithology.

The sandstone appears as loose with clear to translucent quartz grains which are dominantly very fine to fine. The grains are moderately sorted, angular to subrounded and appear to be silica cemented.

The claystone is logged as similar to the claystone in the Not Formation. The samples are of poor quality.

BÅT GROUP **3889.0 - 4175.0 mMD, 3888.0 – 4174.0 mTVD (3864.0 - 4150.0 mTVD MSL)**

The part of the Båt Group penetrated in this well, comprises the Ror- and Tilje Formations. The well reached TD 134 m into the Tilje Formation.

Ror Formation **3889.0 - 4041.0 mMD, 3888.0 – 4040.0 mTVD (3864.0 - 4016.0 mTVD MSL)**

System: Jurassic
Series: Middle Jurassic – Lower Jurassic
Stage: Lower Aalenian – Lower Toarcian
Depositional environment: Marginal marine to marine, inner shelf

The top of the Ror Formation is picked at the top of an increasing gamma-ray trend.

The Ror Formation consists of medium grey, firm to moderately hard claystone in the upper part with more siltstone and sandstone in the lower part.

The claystone is medium grey, firm to moderately hard and occasionally silty.
The sandstone is fine to silty, moderately sorted and cemented.
The siltstone is grey to brownish grey, grading to silty claystone and very fine sandstone.

Tilje Formation **4041.0 – 4175.0 mMD, 4040.0 – 4174.0 mTVD (4016.0 - 4150.0 mTVD MSL)**

System: Jurassic
Series: Lower Jurassic
Stage: Upper Pliensbachian
Depositional environment: Marginal marine

The top of the Tilje Formation is picked at a distinct drop in both gamma- and resistivity readings.

The Tilje Formation consists of interbedded sandstone and claystone. The sandstone becomes coarser with depth grading from very fine to medium at the top, to fine to coarse at the base. The sandstone is occasionally silica cemented.

The claystone is dark grey and firm.

TD: 4175 m (4174 m TVD, 4150 m TVD MSL).

PL 091/073

RKB – Sea: 24 m

Water depth: 273 m

Well 6406/3-6
Prognosis vs. observed stratigraphy

STATOIL

Made by: PF

Date: 23.04.03

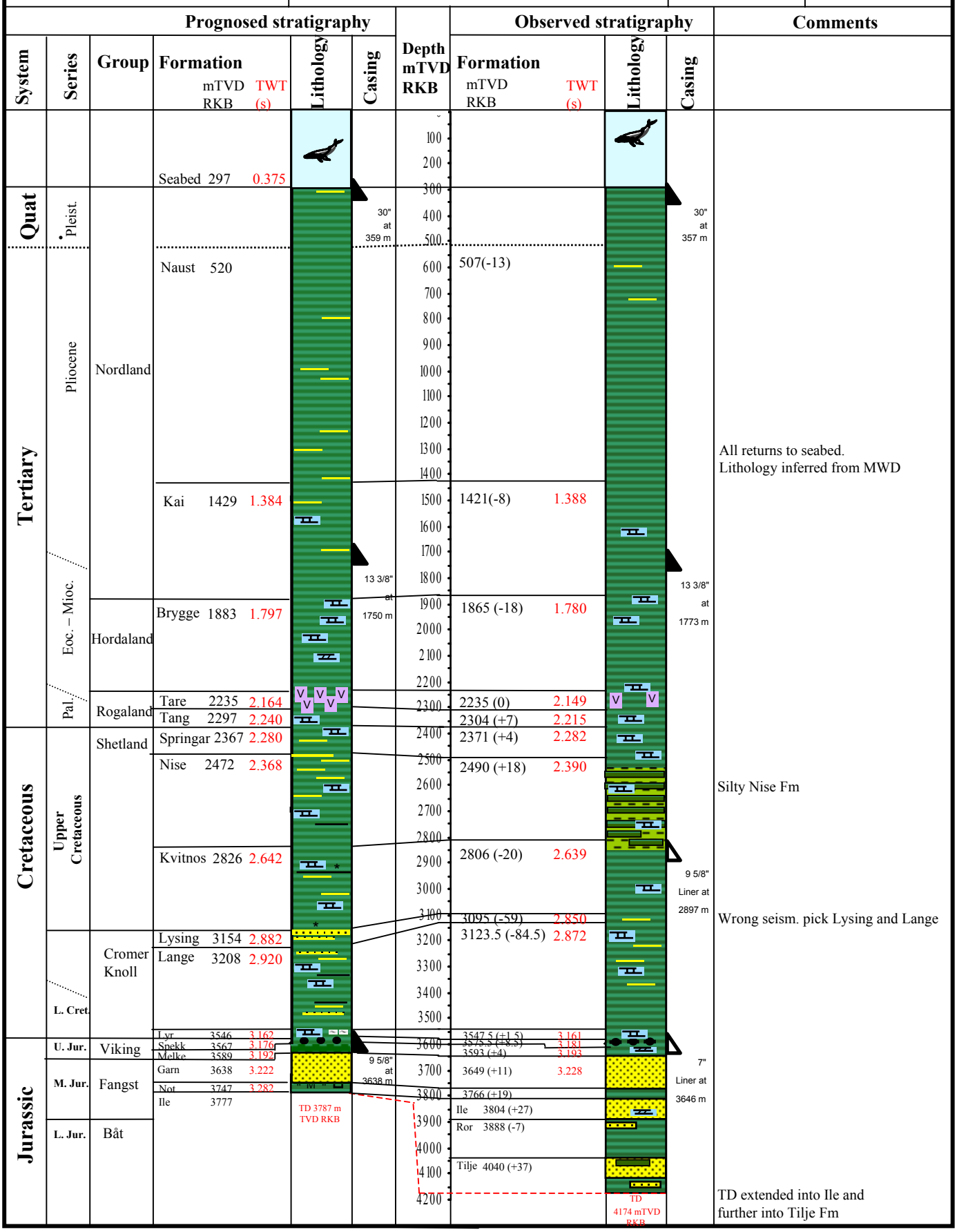


Figure 4.1

PL 091/073

RKB – Sea: 24 m

Water depth: 273 m

Well 6406/3-6
Prognosis vs. observed stratigraphy – reservoir section

STATOIL

Made by: PF

Date: 23.04.03

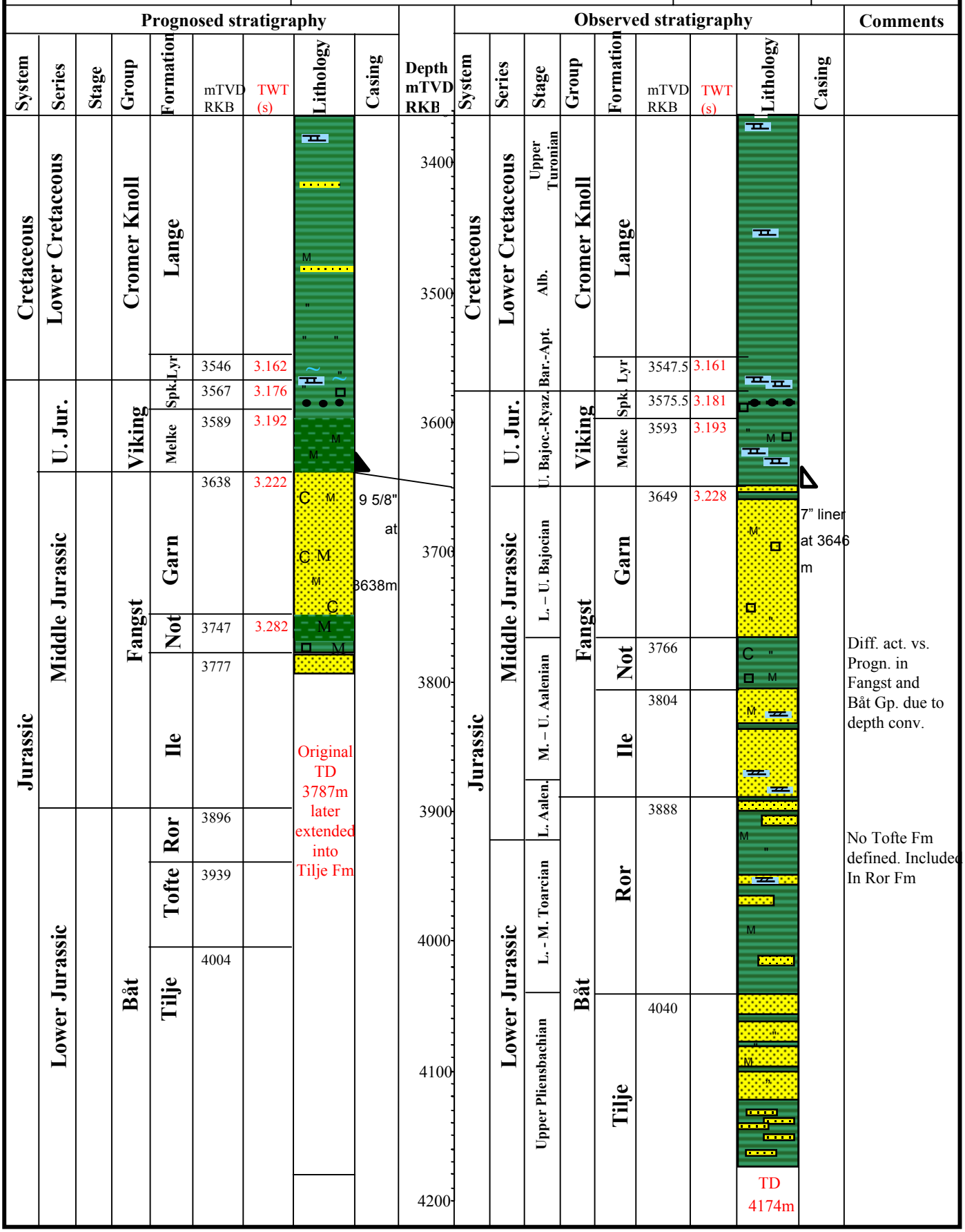


Figure 4.2

4.5 Hydrocarbon indications

There were no sandstone intervals recorded in the 12 ¼" section. The lithology generally consisted of claystone, silty claystone and argillaceous siltstone, with very low permeabilities. There were no shows recorded in the 12 ¼" section. The gas level was generally low throughout the section, with predominantly light components (C1 to C3).

In the 8 ½" section, drilled with oil based mud, only the upper 5 m of the Garn Formation was penetrated. The sandstone in the Garn Formation had bright yellow fluorescence. The natural hydrocarbon fluorescence was easily separated from the background fluorescence caused by the oil based mud. It was, however, not possible to do a proper cut analysis with the oil based mud present.

The main part of the Fangst reservoir was penetrated within the 6" section, drilled with water based mud. The sandstone in the Garn Formation had an even blue white to yellow white fluorescence. Below 3720 m the fluorescence gradually disappeared, with only traces in the basal part of the Garn Formation. Generally very little cut fluorescence was observed, only a very weak cloudy blue white cut fluorescence was logged in places in the upper part of the Garn Formation, indicating a very light HC system. Possible contacts were difficult to interpret from the fluorescence due to the problems with samples coming up late due to low velocity in the riser.

Good gas shows including gas peaks (see Table 4.3) were recorded in the Garn Formation down to approximately 3705 m where the gas level started to drop. This drop was clearly seen on the normalized (% gas/ROP) gas trend (see Figure 4.3). The gas ratio plots showed a change around 3705 m. Comparing the gas data with wireline logs and MDT data, there is a good correlation regarding hydrocarbon contacts. Although the gas ratio plots indicate gas throughout the hydrocarbon zones and oil in the water zone, they could be useful tools in evaluating gas shows during drilling. A generally light hydrocarbon system in the Garn Formation in this case, could explain that the plots indicate gas potential.

The sandstone in the Ile Formation had an even, moderate to bright yellow fluorescence, but no cut fluorescence was found, indicating a light hydrocarbon system.

Good gas shows were recorded in the Ile Formation and using the response from the Garn Formation as a reference, it appeared that a high hydrocarbon saturation was present in the Ile Formation down to 3830 – 3840 m. The gas plots showed similar responses as to what was seen in the oil zone in the Garn Formation, interpreted to indicate a relatively light HC system, light oil or oil condensate.

DEPTH M	GAS %	C_1 ppm	C_2 ppm	C_3 ppm	iC_4 ppm	nC_4 ppm	C_5 ppm	TYPE	BG %
2167	0,9	9725	128	17	3	3	3	FG	0,3
2281	0,5	7465	122	17	4	4		FG	0,35
2399	3,7	42259	1547	610	114	92	31	FG	0,35
2522	1,4	19513	474	164	23	36		POG	0,35
2522,1	1,4	17183	363	142	19	31		POG	0,35
2522,2	1,2	16076	391	107	16	28		POG	0,35
2594	1	10187	219	62	7	14		STG	0,15
3577	0,5	5277	205	89	7	0	7	FG	0,2
3589	0,8	7492	455	198	13	0	13	FG	0,2
3651	4,9	59108	2660	825	75	159	33	FG	0,2
3658	7,5	56666	4338	2001	185	304	78	TG	1
3674	4,3	47698	3664	1478	154	257	69	FG	1
3790	13,1	102326	15284	8386	824	1558	659	TG	0,5
3827	0,6	5222	393	277	185	304	78	FG	0,06

Table 4.3 Gas peaks

4.6 Geophysical results

The observed formation tops in the Tertiary and Cretaceous, apart from the top Lysing and Lange Formations, were generally encountered close to prognosis and well within the prognosed uncertainties (see Figure 4.1 and 4.2). The Lysing and Lange Formations were observed deeper than prognosed, due to wrong seismic picks.

The formation tops within the Viking, Fangst and Båt Groups were also encountered well within the prognosed uncertainties, the differences from prognosis being attributed to depth conversion. The section shown in Figure 4.4, illustrates the well tie to the main formation tops.

4.7 Data acquisition

4.7.1 Cuttings and mud samples

A standard mud logging unit was used for the well (details may be found in the End of Well Report, Halliburton Sperry Sun).

Cuttings were sampled every 10 m from 1790 m to 3550 m, and then every 3 - 6 m down to TD. Mud samples were collected every 100 m from 1800 m to TD, and every 20 m in the hydrocarbon bearing zones (Figure 1.2).

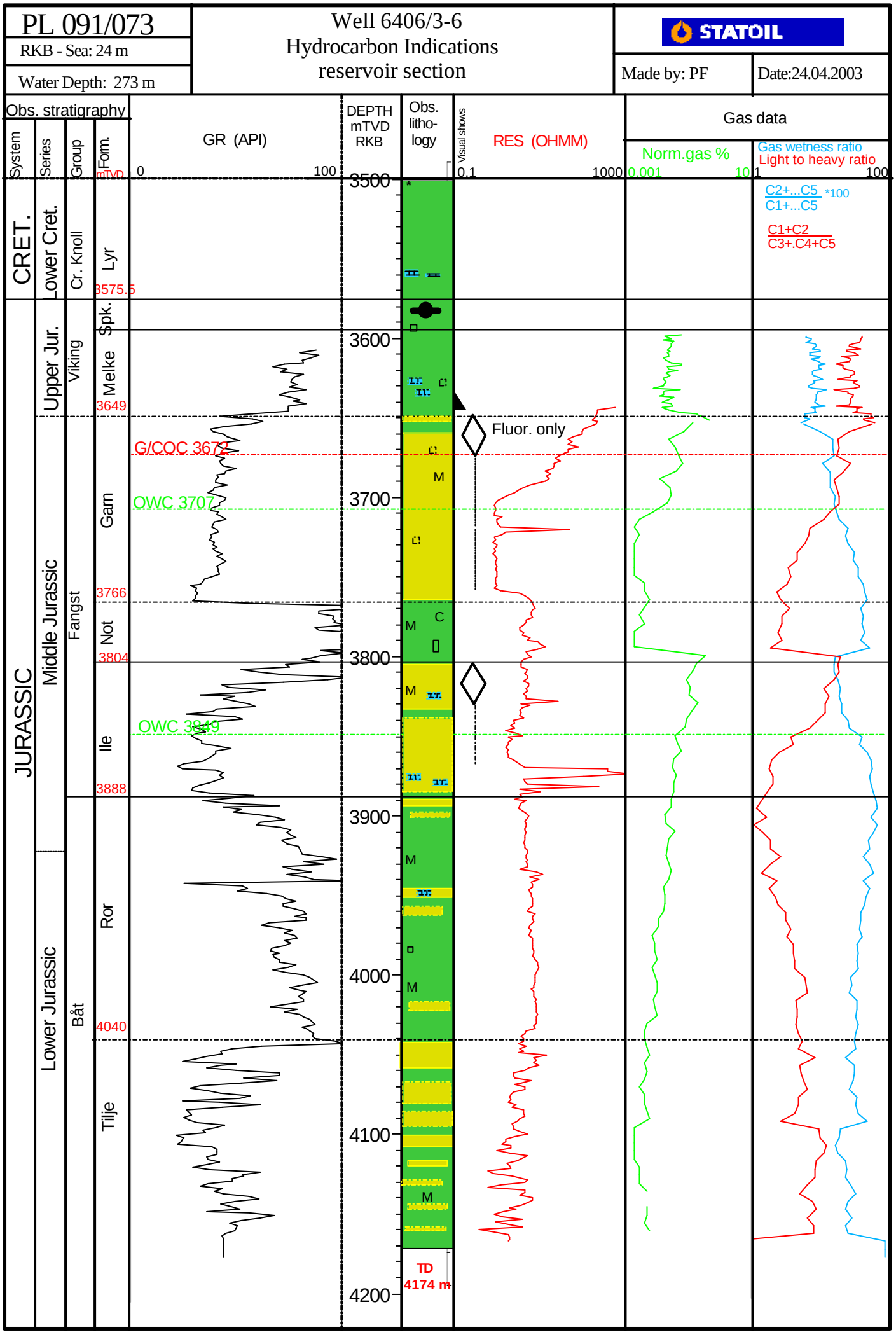

PL 091/073
RKB - Sea: 24 m
Water Depth: 273 m
Well 6406/3-6
Hydrocarbon Indications
reservoir section
STATOIL
Made by: PF
Date:24.04.2003
Obs. stratigraphy
System
Series
Group
Form.
mTVD
GR (API)
0
100
DEPTH
mTVD
RKB
Obs.
litho-
logy
Visual shows
RES (OHMM)
0.1
1000
Gas data
Norm.gas %
0.001
10
Gas wetness ratio
Light to heavy ratio
1
100
C2+...C5 *100
C1+...C5
C1+C2
C3+.C4+C5
CRET.
Lower Cret.
Cr. Knoll
Lyr
3575.5
JURASSIC
Upper Jur.
Viking
Spk.
Melke
3649
Middle Jurassic
Fangst
Garn
3766
Not
3804
Ile
3888
Lower Jurassic
Båt
Ror
4040
Tilje
G/COC 3672
OWC 3707
OWC 3849
Fluor. only
3500
3600
3700
3800
3900
4000
4100
4200
TD
4174 m

Figure 4.3

PL 091/073
Well 6406/3-6
Seismic section

STATOIL

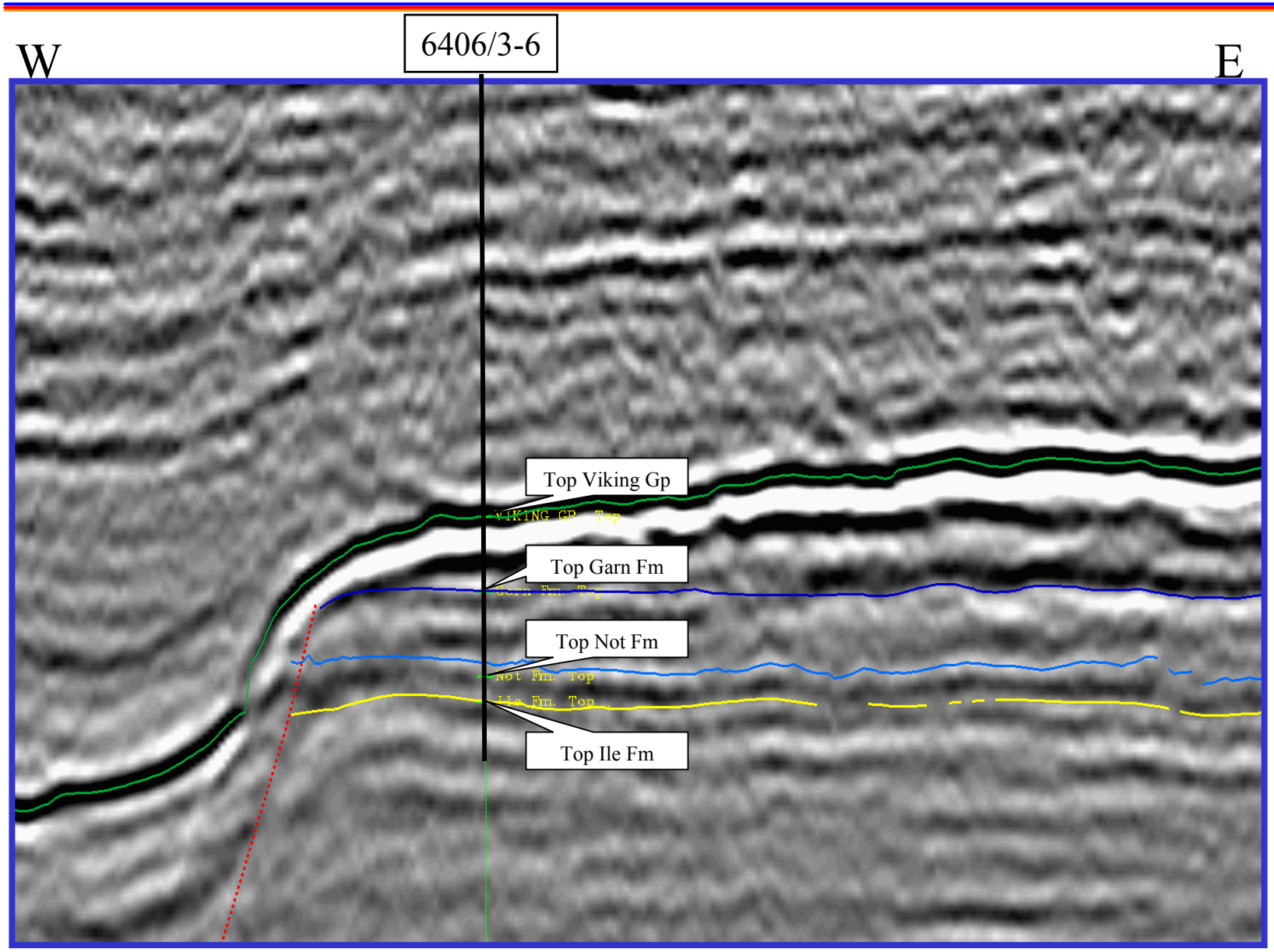


Figure 4.4

4.7.2 Conventional coring

No conventional cores were cut in this well.

4.7.3 MWD/LWD

The MWD logging is summarized in Table 4.4 below. Logging was performed by Baker Hughes Inteq (BHI) down to 3867 m, from where Halliburton Sperry Sun LWD logging was performed (BHI could not supply the required 4 3/4" LWD services).

Run no.	Depth interval m	Collar diam.	Tool type	Comments
1	359 - 1780	8 ¼"	MPR	The Hitech depth system not good for a high definition MWD log.
2	1780 - 2900	8 ¼"	MPR	DCP sub failed at 2810 m, else good data quality.
3	2900 – 3654	6 ¾"	MPR	Decoding problems in the entire section. Memory log OK except that the RES-sensor failed at 3445 m.
4	3654.5 - 3867	4 ¾"	MPR	Failed in casing, no data aquired.
5	3867 – 4090	4 ¾"	EWR-P4/DGR/SLD/CTN	Sperry Sun, failed at 3943 m
6	4090 – 4175	4 ¾"	EWR-P4/DGR/SLD/CTN	Sperry Sun, failed during reaming, no real time data, gamma and neutron memory data, partly recovered in workshop two weeks later

Table 4.4 MWD/LWD summary

4.7.4 Wireline logging

The wireline logging in this well is summarized in Table 4.5 below.

LOGGING PROGRAMME			
#	**TOOL COMBINATION**	**RUN**	**INTERVAL m**
1	HRLA-DSI-IPLT	1A	3864.5 - 3649.5 m (open hole) 3649.5 – 3380.0 m (cased hole)
2	MDT-GR (pressure and oil sampling in Garn)	1A	Pretests 3656.0 - 3752.8 m, sampling at 3700.0 m (deep Garn oil zone)
3	MDT-GR (sampling with dual packer)	1B	Sampling at 3685.6 m (middle Garn oil zone)
4	MDT-GR (oil sampling in Garn)	1C	Pretests 3692.3 – 3707.0 m, sampling at 3699.8 m (deep Garn oil zone), sampling at 3706.8 m (deep Garn oil zone)
5	ASI-GR (VSP)	1A	A zero-offset VSP was performed. 165 levels were shot from 3775 to 340 m with a five level ASI tool.
6	MDT-GR (oil and water sampling in Garn)	1D	Sampling at 3675.1 m (shallow Garn oil zone) Sampling at 3719 m (Garn water zone). Tool stuck at 3675.1 m
7	MDT - GR (pressure and sampling in Ile and Garn)	1E	Pretests 3807.5 – 3833.0 m, sampling at 3823.8 m, sampling at 3662.2 m (Garn gas condensate)
8	MDT – GR (sampling middle Garn oil zone)	1F	Sampling at 3694.2 m
9	MDT – GR (sampling middle Garn oil zone with probe)	1G	Sampling at 3694.2 m (deep Garn oil zone)
10	MDT – GR (sampling Garn gas condensate with dual packer)	1H	Sampling at 3668.3 m (Garn gas condensate)
11	MSCT	1A	49 plugs in interval 3655 m – 3833 m
12	HRLA-IPLT	2A	4175 m – 3760 m
13	MDT – GR	2A	Pretests from 3843.4 m – 4157.2 m. Sampling at 4050.5 m (Tilje) and at 3847.8 m (Ile)

Table 4.5 Wireline logging programme

Drill number	Depth (m)	Comments
1	3707.0	Recovered
2	3703.5	"
3	3700.0	"
4	3695.8	"
5	3690.2	"
6	3689.0	"
7	3685.5	"
8	3680.0	"
9	3675.0	"
10	3672.5	"
11	3671.2	"
12	3668.2	"
13	3665.5	"
14	3664.0	"
15	3833.0	Lost
16	3831.0	Recovered
17	3824.2	"
18	3823.8	"
19	3819.0	"
20	3817.5	"
21	3907.5	"
22	3806.5	"
23	3781.0	"
24	3768.5	"
25	3753.0	"
26	3734.0	"
27	3729.5	"
28	3715.5	"
29	3709.0	"
30	3766.0	"
31	3742.5	"
32	3732.6	"
33	3724.0	"
34	3717.5	"
35	3710.5	"
36	3705.5	"
37	3697.0	"
38	3694.4	"
39	3692.0	"
40	3687.0	"
41	3686.3	"
42	3684.0	"
43	3682.5	"
44	3682.0	"
45	3678.0	"
46	3676.0	"
47	3672.2	"
48	3667.0	"
49	3657.5	"
50	3655.0	"

Table 4.6 MSCT depths

Additional lithological description can be found in Appendix E.

4.7.5 Data quality

The BHI MWD data was generally of good quality, but problems with the Hitech depth system caused gaps in data at some levels. In the 8 ½" section, surface noise and extensive downhole stick-slip caused severe decoding problems leading to almost no real time data and in addition the resistivity sensor failed at 3445 m. Memory data was, however, of good quality. In the 6" section the BHI tool failed while running in, and no MWD data was acquired by BHI in this section.

Both LWD runs performed by Halliburton Sperry Sun within the 6" section, failed. Reamed data and a short interval of real time data was acquired. Memory data could not be extracted offshore, but was partly recovered in the workshop. Parts of the real time log were affected by poor decoding, while memory data was of good quality.

The HRLA/IPLT/HNGS tool string hung up at 3815 m (possible dog leg) on the up log and approx. 10 m of data were lost in this interval. No repeat section was performed due to problems to pass the restriction. Except for this interval, the HRLA/IPLT/HNGS gave good data in both runs. The DSI was run in P&S mode with upper and lower dipole and in Stonely mode in the Garn Formation. The DSI was also run in the casing up to 3380 m where the formation signal was lost.

Excellent recovery and quality was obtained with the MSCT tool. Good data quality was acquired for the VSP service. The quality of the MDT pressure points (run 1A) and the gradients in the gas, oil and water zones in the Garn Formation were very good. The gas condensate analyser (CGA) was used with success to determine fluid type and GOR in the oil and gas zones. Very good mobilities were recorded during run 1A. During MDT run 1C and run 1D, it became apparent that the good mobilities that was measured during run 1A could not be repeated and much time and effort was spent to find the best possible zones for single phase sampling. It is suspected that the reduction in mobility that was observed is related to $CaCO_3$ added to the mud. However, despite the problems with mobility reduction, the quality of the PVT samples in the gas and oil zones in the Garn and Ile formations were good. In the cases where mobility was too low for sampling single phase fluid with the MDT single probe, additional sample depths were taken with the dual packer to minimize the drawdown and increase the possibility for sampling single phase fluid.

Waterbased KCl mud was used when drilling the 6" hole section. The sulphate content was kept as low as 150 ppm to reduce the risk of $BaSo_4$ precipitation in water bearing reservoir zones. Tritium tracer was added to a level of 74 kBq/liter for calculation of mud filtrate contamination in MDT water samples. However, the quality of the water sample was poor (but usable) due to too much mud filtrate contamination. The reason for this was that the MDT pump out module was only functioning in one direction making the cleanup flow inefficient.

4.8 Formation pressure

The pore pressure profile shows a normal pressure gradient (1.03 g/cm^3) down to approximately 1600 m where an increase starts. At approximately 2500 m, in the Springar- and Nise Formations, the formation pressure gradient reaches a maximum of 1.65 g/cm^3 EMW. This was estimated based on a pump off test at this depth with mud weight of 1.63 g/cm^3 EMW. The formation pressure gradient drops off to a minimum of approximately 1.52 g/cm^3 EMW through the Lysing- and Lange Formations and then increases to 1.58 g/cm^3 EMW towards the top of the Garn Formation.

The pressure profile is evaluated using gas data and resistivity logs and is essentially the same as prognosed in the drilling programme. The pressure profile was prognosed from available wireline logs and drilling data (gas readings and drilling parameters) from the previous Tyrihans wells. Figures 4.5 and 4.6 show the composite plots of sonic, gamma, bulk density, resistivity, caliper, ROP, gas readings and D-exponent respectively.

The overburden gradient in the reservoir section is calculated based on data from the density log acquired in this well. Density data from the wells 6506/12-1 (Smørbukk) and the other Tyrihans wells were used from 640 m to the top of the reservoir.

An extended leak off test (XLOT) was performed below the 7" liner shoe. The XLOT gave an initial break down pressure of 717 bar, (2.00 g/cm^3 EMW), a reopening pressure of 542 bar (1.52 g/cm^3 EMW) and a minimum horizonal stress of 1.49 g/cm^3 EMW (532 bar). Reference is made to separate report (Appendix F) on XLOT analysis.

Figure 4.7 shows the pressure profile.

PL 091/073

RKB - Sea: 24 m

Water Depth: 273 m MSL

Composite plot
Well 6406/3

STATOIL

Made by: JKR | Date:28.04.2003

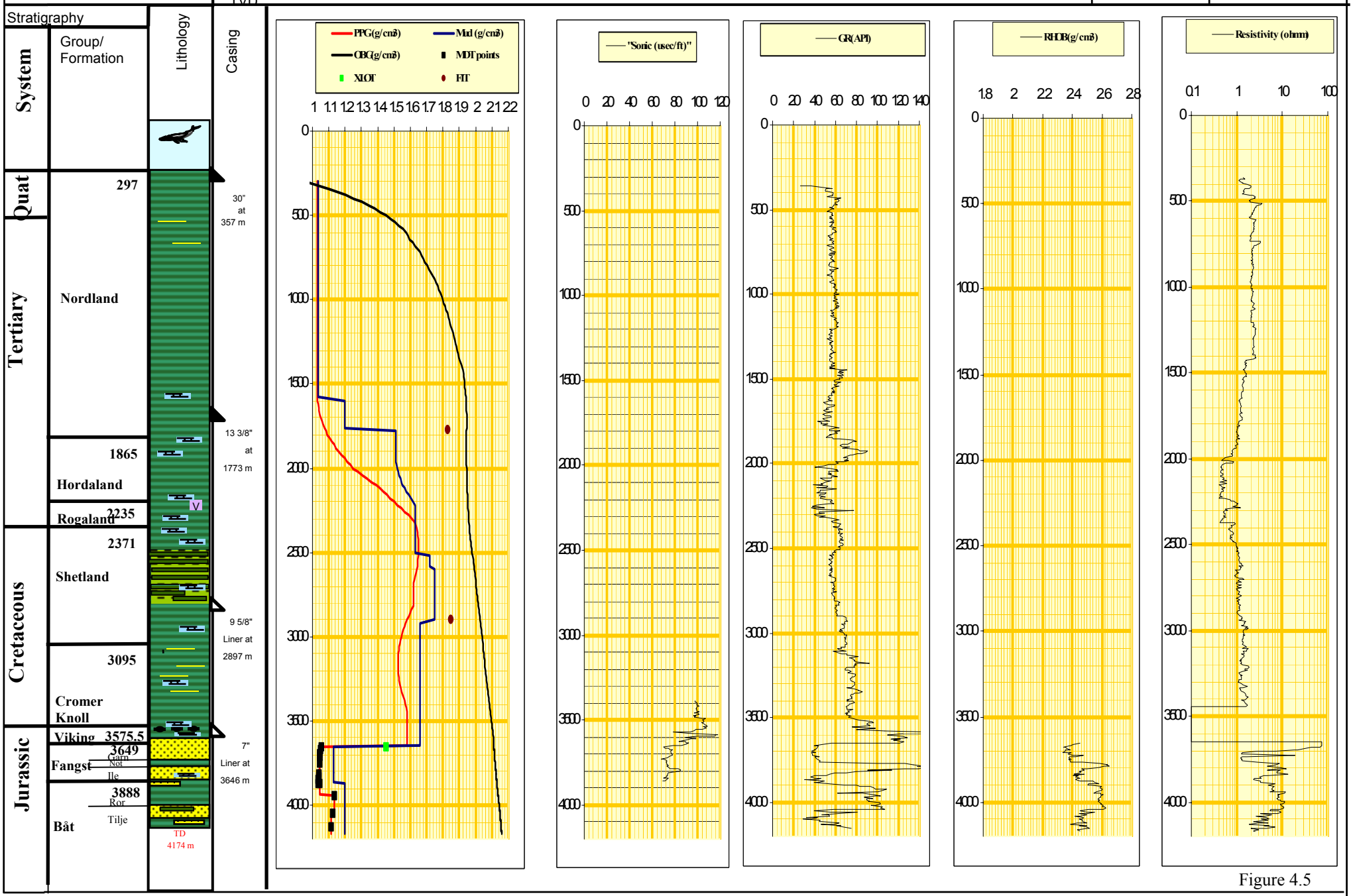


Figure 4.5

PL 091/073

RKB - Sea: 24 m

Water Depth: 273 m MSL

Composite plot
Well 6406/3

STATOIL

Made by: JKR | Date:28.04.2003

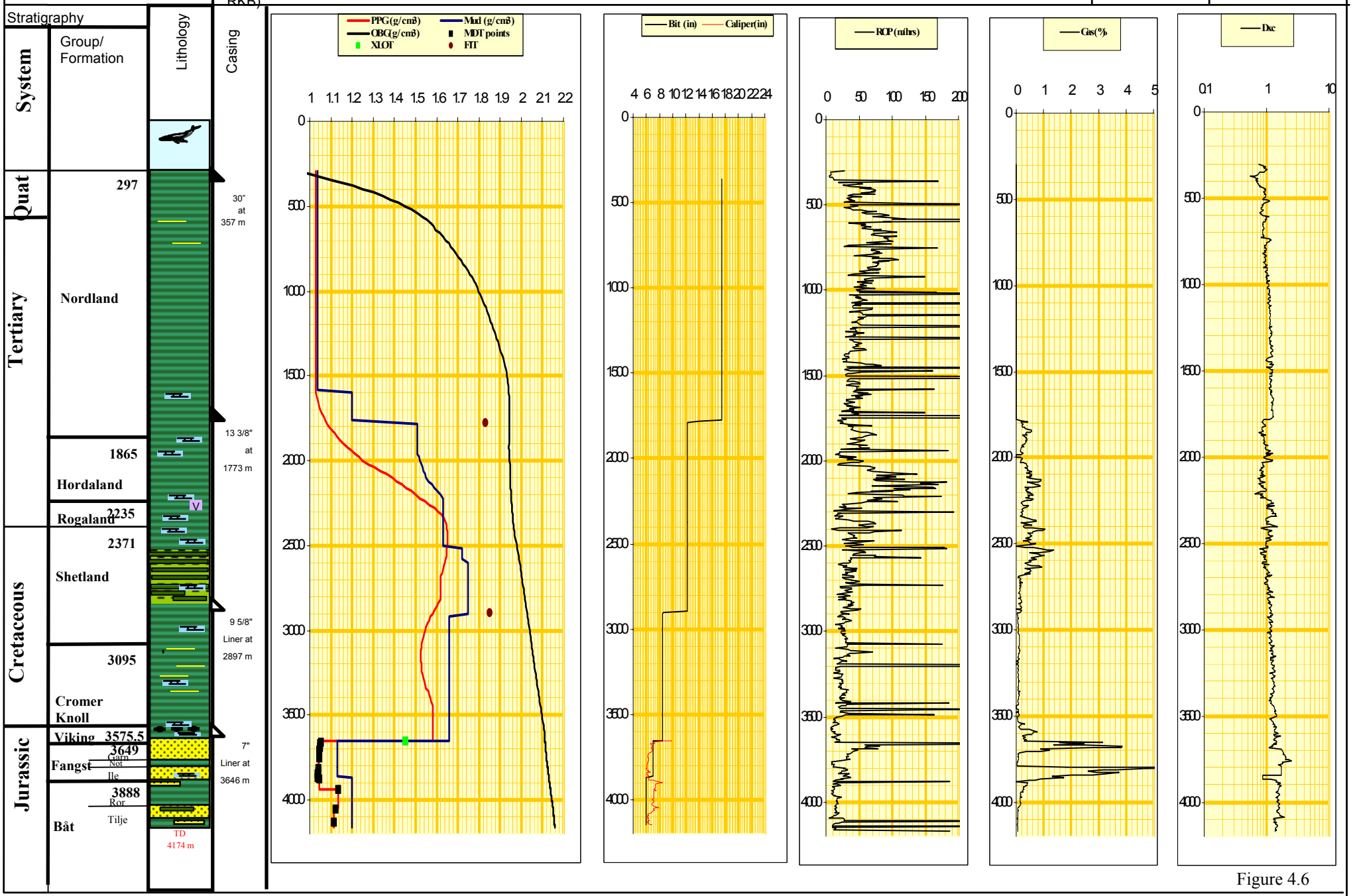


Figure 4.6

PL 091/073

RKB - Sea: 24 m

Water Depth: 273 m MSL

Pressure Plot
Well 6406/3-6

STATOIL

Made by: JKR

Date:28.04.2003

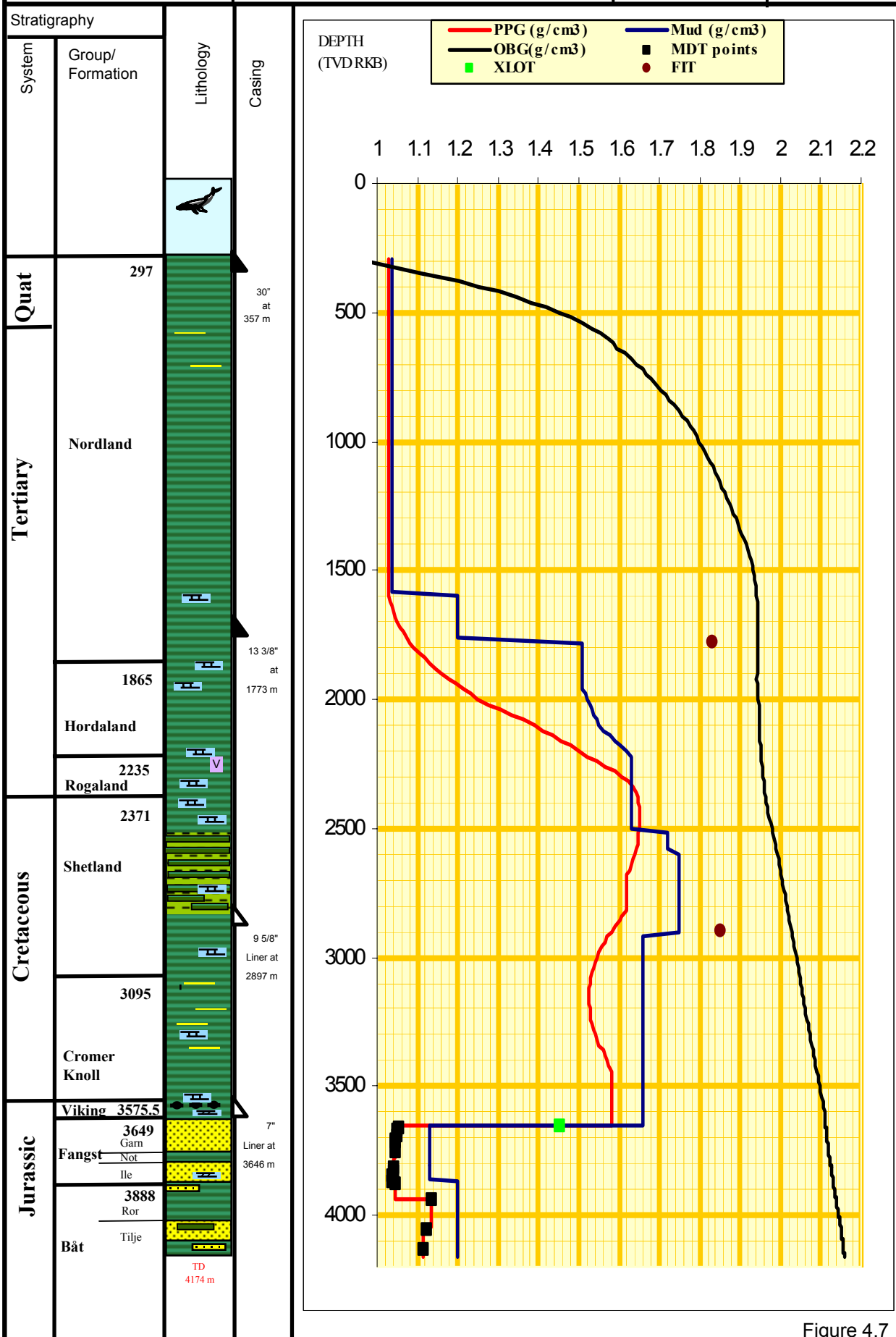


Figure 4.7

4.8.1 Reservoir pressure summary

In the first MDT run (Run 1A) a total of 29 pretests were attempted in the Garn Formation. 27 of these gave good pore pressure readings and 2 pretests were stable initially, but continued to increase possibly due to leak between the pad and the wall. The fluid gradients in the hydrocarbon zone and water zone were easy to identify and are as follows (Table 4.6):

Zone	Density, (g/cm^3)
Gas condensate	0.368
Upper oil	0.569
Average oil	0.588
Lower oil	0.591
Water	1.005

Table 4.6 Density from pressure gradients in the Garn Formation

Fluid contacts based on gradient evaluation in the Garn Formation are dependent on which regression line is used. A curved fit through the oil points gives a thicker oil column. The following ranges of fluid contacts are obtained:

- GOC : 3646 – 3648 TVD MSL
- WOC : 3683 – 3685 TVD MSL

Figure 4.8 below, shows a plot of the gradients listed in table above.

In MDT run 1E a combined tool string was run to collect oil samples in the Garn Formation and to acquire formation pressure data in the Ile Formation. A total of 11 pretests were attempted, of which only 3 pretests were considered to be of good quality, 6 pretests were supercharged and 2 pretests were tight.

During MDT run 2A, formation pressures were acquired in the lower Ile Formation as well as in the Ror- and Tilje Formations. In the Ile Formation, a total of 7 pressure points were taken, of which 4 pressure points had good quality and 3 pressure points were unstable. It was not possible to determine any hydrocarbon gradient based on pressure measurements in the Ile Formation. Due to poor data quality it is not easy to determine a water gradient in the Ile Formation. Based on two pretests at 3853.6 and 3867.7 m respectively, the water density in the Ile Formation is calculated to be 0.99 g/cm_3. Due to the thin sand present, only one valid pressure point was obtained in the Ror Formation.

In the Tilje Formation, a total of 24 pressure points were attempted, of which only 10 pressure points were of good quality, 8 pressure points were tight, 4 pressure points were supercharged and 2 pressure points had lost seal. No fluid gradients could be obtained in the Tilje Formation due to poor data quality. Figure 4.9, shows a pressure plot with all formation pressures collected, including supercharged pressure points.

PL 091/073, WELL: 6406/3-6 RKB - MSL: 24 m Water Depth: 273 m MSL	Pressure Plot 6406/3-6	STATOIL Made by: JKR Date:28.04.2003

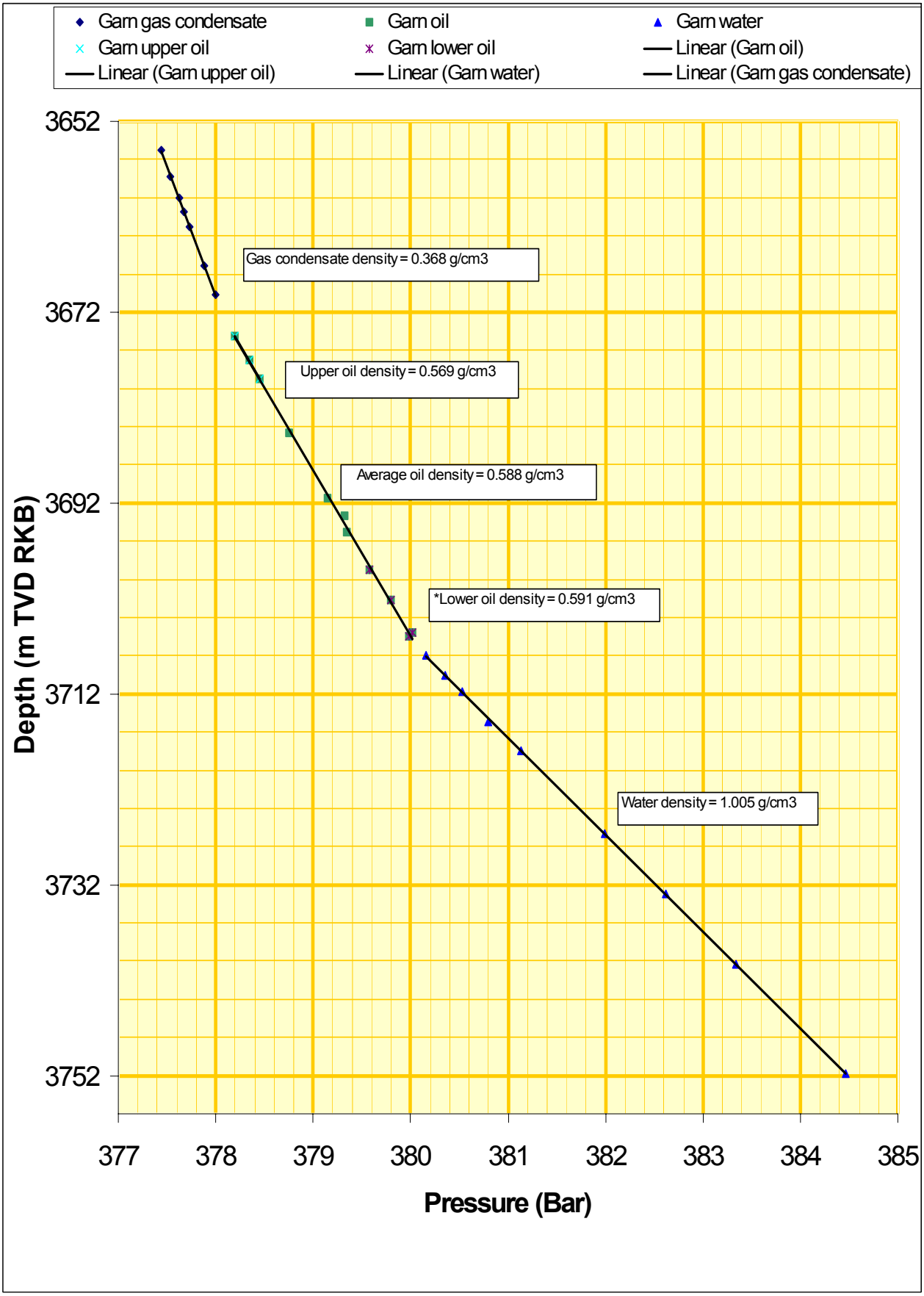


Figure 4.8

PL 091/073, WELL: 6406/3-6 RKB - MSL: 24 m Water Depth: 273 m MSL	Pressure Plot 6406/3-6	STATOIL Made by: JKR Date:28.04.2003

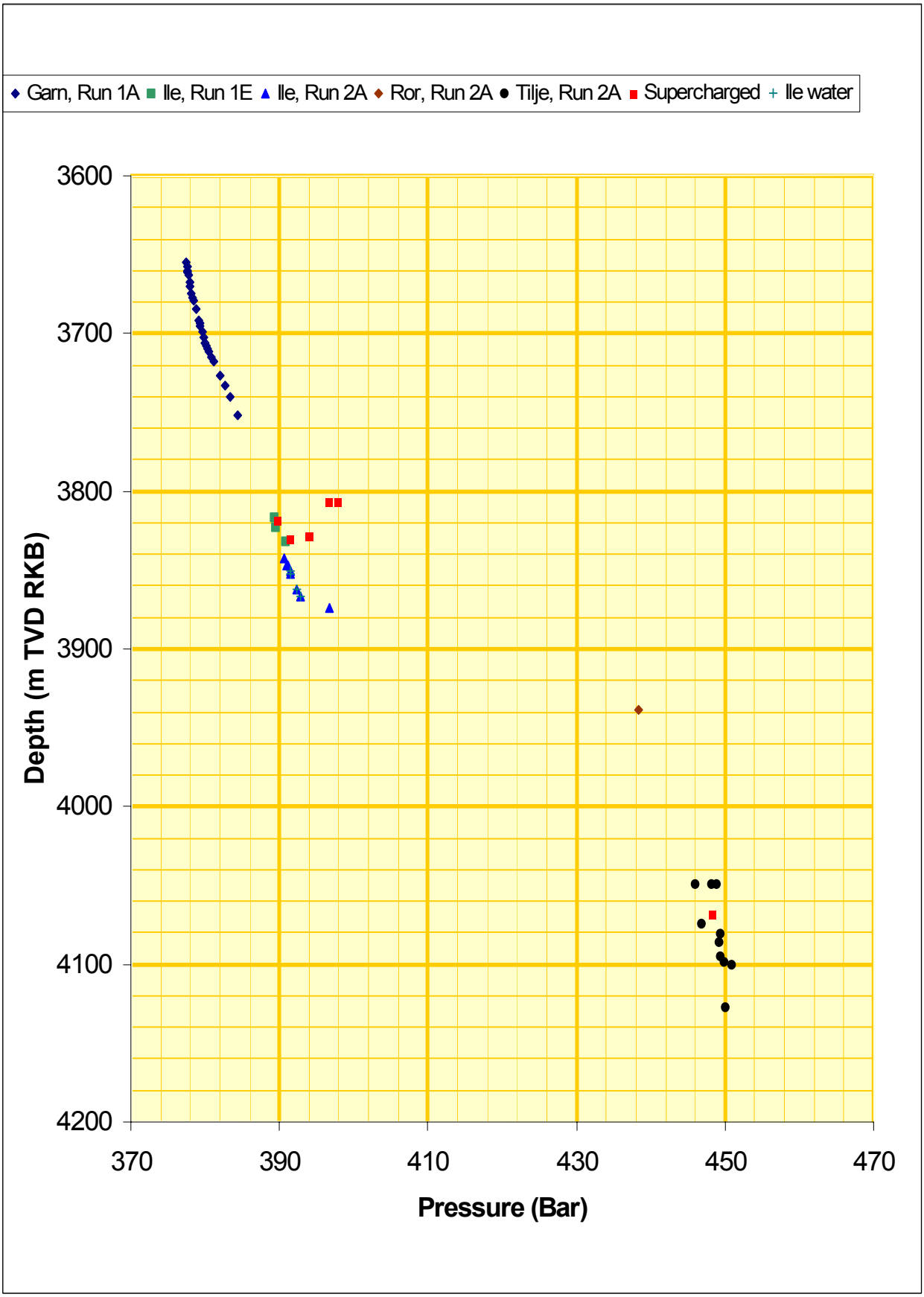


Figure 4.9

More details are shown in the tables 4.7 to 4.15 below:

Test #	Fm. name	Depth (m)	Depth (m TVD MSL)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Formation pressure (bar)	Mobility (mD/CP)	Temp. °C	Comments
1	Garn	3656.0	3631.0	407.60	407.65	377.447	16.0	119.4	Moderate
2	Garn	3658.8	3633.8	407.90	407.96	377.536	116.3	119.7	Good
3	Garn	3661.0	3636.0	408.08	408.19	377.625	122.4	120.1	Good
4	Garn	3662.5	3637.5	408.37	408.26	377.675	379.2	120.6	Good
5	Garn	3664.0	3639.0	408.30	408.53	377.735	667.0	N/A	Good
6	Garn	3668.2	3643.2	408.89	408.89	377.881	279.3	N/A	Good
7	Garn	3671.2	3646.2	409.23	409.26	377.993	154.6	122.8	Good
8	Garn	3675.5	3650.5	409.80	409.80	378.201	654.8	122.6	Good
9	Garn	3678.0	3653.0	410.03	410.02	378.343	390.3	123.0	Good
10	Garn	3680.0	3655.0	410.22	410.15	378.455	34.9	123.5	Good
11	Garn	3685.6	3660.6	410.90	410.79	378.759	199.5	123.8	Good
12	Garn	3688.0	3663.0	411.15	411.18	378.889	52.3	124.3	Good, first stable, then start increasing - leak?
13	Garn	3692.5	3667.5	411.69	411.61	379.152	278.4	124.7	Good
14	Garn	3694.4	3669.4	411.85	411.78	379.327	10.9	125.0	Not Stable
15	Garn	3696.0	3671.0	412.17	412.05	379.349	558.0	125.4	Good
16	Garn	3700.0	3675.0	412.41	412.47	379.582	273.0	125.6	Good
17	Garn	3703.1	3678.1	412.84	412.72	379.802	56.3	125.9	Moderate
18	Garn	3706.6	3681.6	413.29	413.09	380.023	19.7	126.1	Moderate
19	Garn	3707.0	3682.0	413.23	413.22	379.985	637.0	126.4	Good
20	Garn	3709.0	3684.0	413.40	413.44	380.159	144.5	126.8	Good
21	Garn	3711.0	3686.0	413.69	413.11	380.359	99.4	126.8	Good
22	Garn	3712.8	3687.8	413.40	413.80	380.535	394.8	127.0	Good
23	Garn	3715.9	3690.9	414.17	414.20	380.797	419.0	127.1	Good
24	Garn	3719.0	3694.0	414.61	414.61	381.131	757.1	127.4	Good
25	Garn	3723.8	3698.8	415.21	415.21	381.606	114.5	127.7	Good, first stable, then Start increasing – leak?
26	Garn	3727.7	3702.7	415.62	415.56	381.998	20.5	127.9	Moderate
27	Garn	3734.0	3709.0	416.35	416.34	382.615	158.4	128.2	Leak shortly after setting probe. OK pressure prior to leak
28	Garn	3741.3	3716.3	417.10	417.17	383.339	60.5	128.5	Moderate
29	Garn	3752.8	3727.8	418.52	418.30	384.465	55.4	128.8	Moderate
30	Garn	3700.0	3675.0	N/A	N/A	379.580	322.0	N/A	Oil sampling, 1x1 gallon, 4x450 cc, 2x250 cc
31	Garn	3668.2	3643.2	408.80	N/A	377.900	299.5	127.1	Scanning with LFA/CGA.

Table 4.7 MDT-GR Run 1A

Test #	Fm. name	Depth (m)	Depth (m TVD MSL)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Formation pressure (bar)	Mobility (mD/CP)	Temp. (°C)	Comments
1	Garn	3683.6	3658.6	411.10		378.800	0.7		Observation probe, low permeability
2	Garn	3685.6	3660.6	N/A	N/A	379.183	N/A	N/A	Dual packer, good mobility. Oil sampling, pump and leak problems. Filled 2.75 gal (PVT sample) and partly filled 18 gal (approx 15 liter dead oil)

Table 4.8 MDT-GR Run 1B

Test #	Fm. name	Depth (m)	Depth (m TVD MSL)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Formation pressure (bar)	Mobility (mD/CP)	Temp. (°C)	Comments
1	Garn	3699.8	3674.8	412.70	N/A	379.576	297.3	129.8	Sampled 1x2.75 gal and 1x450 cc oil.
2	Garn	3706.8	3681.8	413.50	N/A	380.049	1 141.0	N/A	Sampled 2x250cc, 3x450cc, 1x2.75 gal, 1x18 gal oil

Table 4.9 MDT-GR Run 1C

Test #	Fm. name	Depth (m)	Depth (m TVD MSL)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Formation pressure (bar)	Mobility (mD/CP)	Temp. (°C)	Comments
1	Garn	3675.1	3650.1	410.18	N/A	378.202	208.3	N/A	Oil sampling, 1x1 gal, 2x250cc, 2x 450 cc
2	Garn	3719.0	3694.0	414.51	N/A	381.053	233.0	135.5	Water sample, 1x1 gallon, 2x450 cc
3	Garn	3706.4	3681.4	412.77	N/A	379.947	73.8	135.2	Attempt oil sample, no success, lost communication to tool. Later stuck and tool worked again while LWF

Table 4.10 MDT-GR Run 1D

Test #	Fm. name	Depth (m)	Depth (m TVD MSL)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Formation pressure (bar)	Mobility (mD/CP)	Temp. (°C)	Comments
1	Ile	3807.5	3782.5	429.75	N/A	N/A	N/A	N/A	Tight
2	Ile	3807.7	3782.7	429.76	N/A	397.700	0.4	N/A	Supercharged
3	Ile	3807.9	3782.9	429.75	N/A	396.590	1.2	N/A	Supercharged.
4	Ile	3817.2	3792.2	430.85	N/A	389.330	5.9	N/A	Pressure 'stable', but fluctuating a bit, 0.005 bar
5	Ile	3819.0	3794.0	431.02	N/A	389.627	2.8	N/A	Probably supercharged
6	Ile	3823.8	3798.8	431.55	N/A	389.474	18.2	N/A	Scanning, Sampling hydrocarbons 1 x 1 gal, 2 x 450 cc
7	Ile	3829.0	3804.0	432.20	N/A	393.800	0.4	N/A	Supercharged
8	Ile	3826.8	3801.8	431.88	N/A	-	N/A	N/A	Tight, pretest aborted
9	Ile	3830.5	3805.5	432.30	N/A	391.300	1.6	N/A	Supercharged
10	Ile	3833.0	3808.0	432.58	N/A	390.890	1.2	N/A	Pressure 'stable', but fluctuating a bit
11	Ile	3830.5	3805.5	432..31	N/A	N/A	0.3	N/A	Added 1.3 m. Prestest still supercharged.
12	Garn	3664.0	3640.0	413.74	N/A	377.770	27.8	N/A	Mobility test
13	Garn	3663.8	3638.8	413.68	N/A	N/A	39.7	N/A	Mobility test
14	Garn	3663.6	3638.6	413.60	N/A	377.760	48.0	N/A	
15	Garn	3663.4	3638.4	413.60	N/A	377.779	87.4	N/A	Mobility test
16	Garn	3663.2	3638.2	413.61	N/A	377.744	46.0	N/A	Mobility test
17	Garn	3668.2	3643.2	414.20	N/A	377.928	40.0	N/A	Mobility test
18	Garn	3671.3	3646.3	414.50	N/A	378.056	152.0	N/A	Mobility test
19	Garn	3662.2	3637.2	413.60	N/A	377.710	56.0	N/A	Sampling, 1 x 1 gal and 1 x 450 cc

Table 4.11 MDT-GR Run 1E

Test #	Fm. name	Depth (m)	Depth (m TVD MSL	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Formation pressure (bar)	Mobility (mD/CP)	Temp. (°C)	Comments
1	Garn	3694.2	3693.2	417.078	417.078	379.234	84.2	130.5	Sampling 3 x 6 gal and 3 x 2 ¾ gal

Table 4.12 MDT-GR Run 1F

Test #	Fm. name	Depth (m)	Depth (m TVD MSL)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Formation pressure (bar)	Mobility (mD/CP)	Temp. (°C	Comments
1	Garn	3694.2	3693.2	417.224	417.224	379.283	76.8	130.5	Sampling 2 x 2 ¾ gal
2	Garn	3668.3	3667.3	414.000	414.000	377.890	N/A	N/A	Attempt to sample 2 x 250 cc and 4 x 450 cc with dual packer. Hydraulic pressure gauge in pump failed.

Table 4.13 MDT-GR Run 1G

Test #	Fm. name	Depth (m)	Depth (m TVD MSL)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Formation pressure (bar)	Mobility (mD/CP)	Temp. (°C)	Comments
1	Garn	3668.3	3667.3	414.702	414.702	377.860	NA	134.0	Sampling 1 gal, 2 x 250 cc and 4 x 450 cc.

Table 4.14 MDT-GR Run 1H

Test #	Fm. name	Depth (m)	Depth (m TVD MSL)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Formation pressure (bar)	Mobility (mD/CP)	Temp (°C)	Comments
1	Tilje	4042.8	4041.8	485.70	485.70	N/A	N/A	N/A	Tight, test aborted
2	Tilje	4047.0	4046.0	485.90	485.90	N/A	N/A	N/A	Tight, test aborted
3	Tilje	4050.0	4049.0	486.09	486.09	448.10	0.7	N/A	Low permeability, abort pumping
4	Tilje	4050.5	4049.5	486.20	486.20	445.98	1.8	137.8	Low permeability, sampling 3x450 cc
5	Tilje	4062.0	4061.0	487.78	487.78	N/A	N/A	N/A	Poor seal, test aborted
6	Tilje	4064.5	4063.5	488.20	488.20	N/A	N/A	N/A	Tight, test aborted
7	Tilje	4069.2	4068.2	488.60	488.56	448.10	N/A	N/A	Supercharged
8	Tilje	4071.3	4070.3	488.83	488.84	N/A	N/A	N/A	Tight
9	Tilje	4075.0	4074.0	489.26	489.26	446.88	0.8	N/A	Low permeability
10	Tilje	4078.8	4077.8	489.76	489.76	N/A	N/A	N/A	Tight, test aborted
11	Tilje	4083.0	4082.0	490.25	490.25	N/A	N/A	N/A	Supercharged, aborted
12	Tilje	4086.5	4085.5	490.60	490.60	449.15	0.6	N/A	Low permeability
13	Tilje	4095.5	4094.5	491.79	491.79	449.42	0.6	N/A	Low permeability
14	Tilje	4099.5	4098.5	492.18	492.22	449.88	0.2	N/A	Low permeability
15	Tilje	4101.0	4100.0	492.42	492.42	450.86	0.2	N/A	Supercharged
16	Tilje	4128.4	4127.4	495.71	495.71	450.00	61.9	N/A	Very good permeability
17	Tilje	4081.3	4080.3	490.01	489.96	449.32	0.2	N/A	Low permeability
18	Tilje	4067.8	4066.8	N/A	N/A	N/A	N/A	N/A	Tight, test aborted
19	Tilje	4049.8	4048.8	486.19	486.19	449.83	0.1	N/A	Low permeability
20	Tilje	4047.3	4046.3	N/A	N/A	N/A	N/A	N/A	Tight, test aborted

21	Tilje	4046.5	4045.5	N/A	N/A	N/A	N/A	N/A	Tight test aborted
22	Tilje	4099.5	4098.5	492.18	492.18	449.88	0.2	N/A	Low permeability
23	Tilje	4083.0	4082.0	490.25	490.25	N/A	N/A	N/A	Lost seal
24	Tilje	4082.9	4081.9	N/A	N/A	N/A	N/A	N/A	Supercharged
25	Tofte	3940.0	3939.0	473.44	473.41	438.33	6.4	N/A	Good mobility
26	Ile	3843.4	3842.4	461.72	461.80	390.70	12.1	N/A	Fluctuating formation pressure
27	Ile	3847.8	3846.8	462.25	462.27	391.07	7.5	130.3	Sample point, water sample
28	Ile	3851.4	3850.4	462.74	462.77	391.42	2.0	N/A	Fluctuating formation pressure
29	Ile	3853.6	3852.6	463.05	463.06	391.42	6.8	N/A	Good mobility
30	Ile	3863.4	3862.4	464.30	464.28	392.38	6.8	N/A	Fluctuating formation pressure
31	Ile	3867.7	3866.7	464.79	464.81	392.79	10.1	N/A	Good mobility
32	Ile	3874.9	3873.9	465.60	465.65	396.72	0.2	N/A	Low permeability

Table 4.15 MDT-GR Run 2A

4.9 Reservoir fluid sampling

PVT samples of good quality were collected in the Garn gas-condensate zone, Garn oil zone and the Ile oil zone. Single phase bottles were used both in the gas condensate and the oil zone in the Garn Formation to ensure that the samples would remain in single phase also while pulling sample bottles to surface. Due to poor mobility during run 1C and run 1D, the dual packer was used to take samples with sufficiently small drawdown to ensure that single phase samples could be obtained.

A total of approximately 100 liter of oil was sampled to 20 liter gas bottles for extensive hydrate inhibition studies.

The quality and amount of formation water from the Garn Formation is poor, primarily because these samples were collected during LWF (logging while fishing) after the MDT was released. The MDT pump was only working in one stroke during LWF. Consequently, sampling was initiated earlier than normal practice, to secure that at least some formation water was sampled prior to a potential pump breakdown which could have triggered an additional MDT run. Although, the amount of contamination was calculated to be 12 % based on tritium, the water quality was satisfactory for analysis.

An attempt was also made to sample formation fluid in the Ile water zone and the Tilje Formation. In the Ile Formation, mostly mudfiltrate was sampled, but with some barium ions and very small traces of oil (reported by Altinex). In the Tilje Formation, only mudfiltrate was sampled, in spite of indications from the LFA in the MDT tool that slugs of oil were mobilized. The primary challenge for collecting formation fluids in both the Ile water zone and the Tilje Formation was poor permeability and inadequate tool configuration (no packer run in the string).

4.9.1 Samples

An overview of the samples collected in this well with sampling details are shown in Table 4.16 below:

Sample depth	Run No.	Formation	*Bottle Number	Chamber	Drawdown	Pump Volume	Mobility	Transferred to
(m)				Size	(bar)	(liter)	(mD/CP)	
3700.0	1A	Garn	SPMC-3 #156	250cc	10.5	>162	322	8286-MA, some used offshore
3700.0	1A	Garn	SPMC-2 #154	250cc	10	>162	322	9833-MA
3700.0	1A	Garn	MPSR-6 #929	450 cc	10	>162	322	TS-24611
3700.0	1A	Garn	MPSR-1 #643	450 cc	9	>162	322	TS-36303
3700.0	1A	Garn	MPSR-5 #804	450 cc	9	>162	322	TS-24608, 130 cc used offshore
3700.0	1A	Garn	MPSR-785	450 cc	9	>162	322	TS-24308
3700.0	1A	Garn	# 172	1 gal	17	162	322	TS-47507 (4 liter gas bottle)
3685.6	1B	Garn	# 100	2 .75 gal	1.5	230	Good (dual packer)	TS-5805 TS-36003, 100 cc used offshore TS-52002 3.4 liter sample
3685.6	1B	Garn	# 69	18 gal	1.5	240	Good	18 gal chamber only partly filled. Jerry can, approx 15 l, mostly oil Plastic can, approx 5 liter, mostly mud
3699.8	1C	Garn	# 115	2.75 gal	6.3	60	297	50253, 9.7 liter sample (also from #116)
3699.8	1C	Garn	# 116	2.75 gal	6.6	85	297	TS-52102, 3.5 liter sample TS-23614, 0.5 liter sample TS-22016, 0.5 liter sample
3699.8	1C	Garn	MPSR-6#1041	450 cc	6.9	100	297	TS-12003
3706.8	1C	Garn	SPMC-3 #146	250 cc	0.95	28	1141	8281-MA, 100 cc used offshore
3706.8	1C	Garn	SPMC-2 #125	250 cc	0.93	>28	1141	3905-MA
3706.8	1C	Garn	MPSR-1 #147	450 cc	1.0	>28	1141	TS-9015
3706.8	1C	Garn	MPSR-5# 931	450 cc	0.95	>28	1141	TS-3821
3706.8	1C	Garn	MPSR-4#152	450 cc	1.0	>28	1141	C-18902
3706.8	1C	Garn	# 153	1 gal	0.96	>28	1141	TS-47510 (4 liter gas bottle)
3706.8	1C	Garn	# 62	18 gal	2.3	16	1141	50479, gas bottles, 16.6 liter [1)] 50448, gas bottle, 17.5 liter [1)] 50011, gas bottle, 7.4 liter [1)] Dead sample, approx 0.5 liter
3675.1	1D	Garn	SPMC-3 #137	250	3.0	54	208	2036-EA, 100 cc used offshore. No offshore analysis due to high water cut in sample
3675.1	1D	Garn	SPMC-2 #134	250	2.9	57	208	9248-MA
3675.1	1D	Garn	MPSR-6 #929	450	3.0	61	208	TS-28705, 120 cc used offshore
3675.1	1D	Garn	MPSR-1 #643	450	2.9	65	208	TS-23605
3675.1	1D	Garn	# 194	1 gal	3.5	68	208	Tool was empty
3719.0	1D	Garn	MPSR-6 #928	450	2.3	58	-	Bottle was empty
3719.0	1D	Garn	# 131	1 gal	2.0	135	255	TS-2420, 650 cc (pressurized sample) 1x0.5 l glass bottle, w/5 ml H2SO4 1x1.0 l glass bottle, w/10 ml H2SO4 Rest to plastic bottles Some used for offshore water analysis

3719.0	1D	Garn	MPSR-1#779	450	1.9	130	255	C-19501
3719.0	1D	Garn	MPSR-5#804	450	2.2	180	255	TS-6418 25 cc used for contamination analysis NB! Dead volume (12 cc) in MPSR-804 was filled with distilled water. A sample of this water is given to Altinex.
3823.8	1E	Ile	#153	1 gal	66	40	18	TS-47505, (4 liter gas bottle)
3823.8	1E	Ile	MPSR-152	450	68	46	18	TS-52003
3823.8	1E	Ile	MPSR-931	450	68	49	18	TS-4055
3662.2	1E	Garn	#172	1 gal	26	69	56	TS-52104 (4 liter gas bottle)
3662.2	1E	Garn	MPSR-1041	450	31	78	56	TS-0609
3694.2	1F	Garn	# 69	18 gal	34	22	84	50173, 18 liter sample [1)] 50068 , 19 liter sample [1)] Plastic bottle 48, dead sample 1liter Plastic bottle 49, dead sample 0.5 liter
3694.2	1F	Garn	# 170	2.75 gal	32	30	84	50376, 5.8 liter sample [1)]
3694.2	1F	Garn	# 133	2.75 gal	31	38	84	50376, 4.9 liter sample [1)]
3694.2	1F	Garn	# 116	2.75 gal	31	46	84	50376, 6.5 liter sample [1)]
3694.2	1G	Garn	#100	2.75 gal	3.8	10	77	Jerry Can # 50, 6.0 liter sample [1)]
3694.2	1G	Garn	#115	2.75 gal	3.2	10	77	Jerry Can # 50, 5.6 liter sample [1)]
3668.3	1H	Garn	#131	1 gal	0.5	197	Good	TS-47508 (4 liter gas bottle)
3668.3	1H	Garn	#785	450	0.5	197	Good	20588
3668.3	1H	Garn	#928	450	0.5	197	Good	TS-52101
3668.3	1H	Garn	#784	450	0.5	197	Good	20443
3668.3	1H	Garn	#929	450	0.5	197	Good	TS-24303
3668.3	1H	Garn	#125	250	0.5	197	Good	2511-EA
3668.3	1H	Garn	#146	250	0.5	197	Good	Empty, bottle was not filled
4050.5	2A	Tilje	#929	450	260	8	1.8	Mudfiltrate
4050.5	2A	Tilje	#928	450	260	14	1.8	Mudfiltrate
4050.5	2A	Tilje	#785	450	260	19	1.8	Mudfiltrate
3847.8	2A	Tilje	#1041	450	150	57	7.5	Bottle did not fill
3847.8	2A	Ile	#152	450	150	58	7.5	Bottle filled too early (only mudfiltrate and traces of oil)
3847.8	2A	Ile	#931	450	150	59	7.5	Mostly mudfiltrate, traces of oil and barium ions from formation water.

[1)] Volume in gas bottles is based on weight measurements of bottle and a density of 0.855 g/cm^3

Table 4.16 Samples collected

More detailed analyses of fluid samples can be found in separate reports (Appendix F).

4.10 Formation temperature

The temperature gradient prognosis for this well was based on a DST performed in well 6407/1-4. The true formation temperature was calculated from Horner extrapolation. Based on this temperature measurement, a gradient of 3.94 ^{o}C/100 m was constructed from seabed to the top of the Garn Formation. In addition, a temperature gradient of 2.6 ^{o}C/100 m through the reservoir section has been used, based on experiences from the Smørbukk Field.

As a comparison, maximum recorded temperature from each logging run has been plotted in Figure 4.10. The maximum recorded temperatures are affected by the duration since the last circulation and the circulation time. Taken these factors into account, the corrected log temperatures are shown in Figure 4.10.

Another approach is to normalize all temperature measurements to a datum depth (3700 m TVD RKB) and calculate the extrapolated Horner temperature for each undisturbed logging period (i.e. no wipertrips etc.).

This approach, with similar corrections gives extrapolated Horner temperatures of 133.8, 137.7 and 137.1 ^{o}C for the three respective logging periods (average of 136.2 ^{o}C). This is in good agreement with DST temperature from well 6407/1-4. At this depth (3700 m TVD RKB), the formation temperature based on DST gradient is prognosed to be 138.4^{o}C.

Maximum estimated formation temperature at TD was calculated to be 150.5 ^{o}C. An overview of the recorded and corrected temperatures, etc. are shown in Table 4.17 below:

TOOL COMBINATION	Depth of measurement (m TVD RKB)	Recorded max temperature (^{0}C)	Time since last circulation (hrs)	Corrected log temperature (^{0}C)	Horner temperature (^{o}C)
HRLA-DSI-IPLT	3822	128	20.6	149.9	133.8
MDT-GR (pressure and oil sampling, Garn)	3723	128	38.4	136.4	
MDT-GR (sampling with dual packer)	3674	129	55.5	134.4	
MDT-GR (oil sampling, Garn)	3697	129	88.4	131.7	
*MDT-GR (oil and water sampling, Garn)	3733	136	210.6	136.4	
MDT - GR (pressure and sampling Ile and Garn)	3823	134	24.8	146.9	137.7
MDT – GR (sampling middle oil zone)	3684	133	38.5	141.4	
MDT – GR (sampling middle oil zone with probe and gas condensate with dual packer)	3684	133	53	138.7	
MDT – GR (sampling Garn gas condensate with dual packer)	3656	134	79.5	137.2	
MSCT	3791	139	94	141.4	
**HRLA-IPLT	4146	138	18.3	154.5	137.1
MDT – GR	4118	143	40.3	150.9	

*Wipertrips were performed before these logs.
**Wipertrips were performed before these logs.

Table 4.17 Measured and corrected log temperatures

PL 091/073

RKB - Sea: 24 m

Water Depth: 273 m MSL

Temperature Plot
Well 6406/3-6

STATOIL

Made by: JKR

Date:28.04.2003

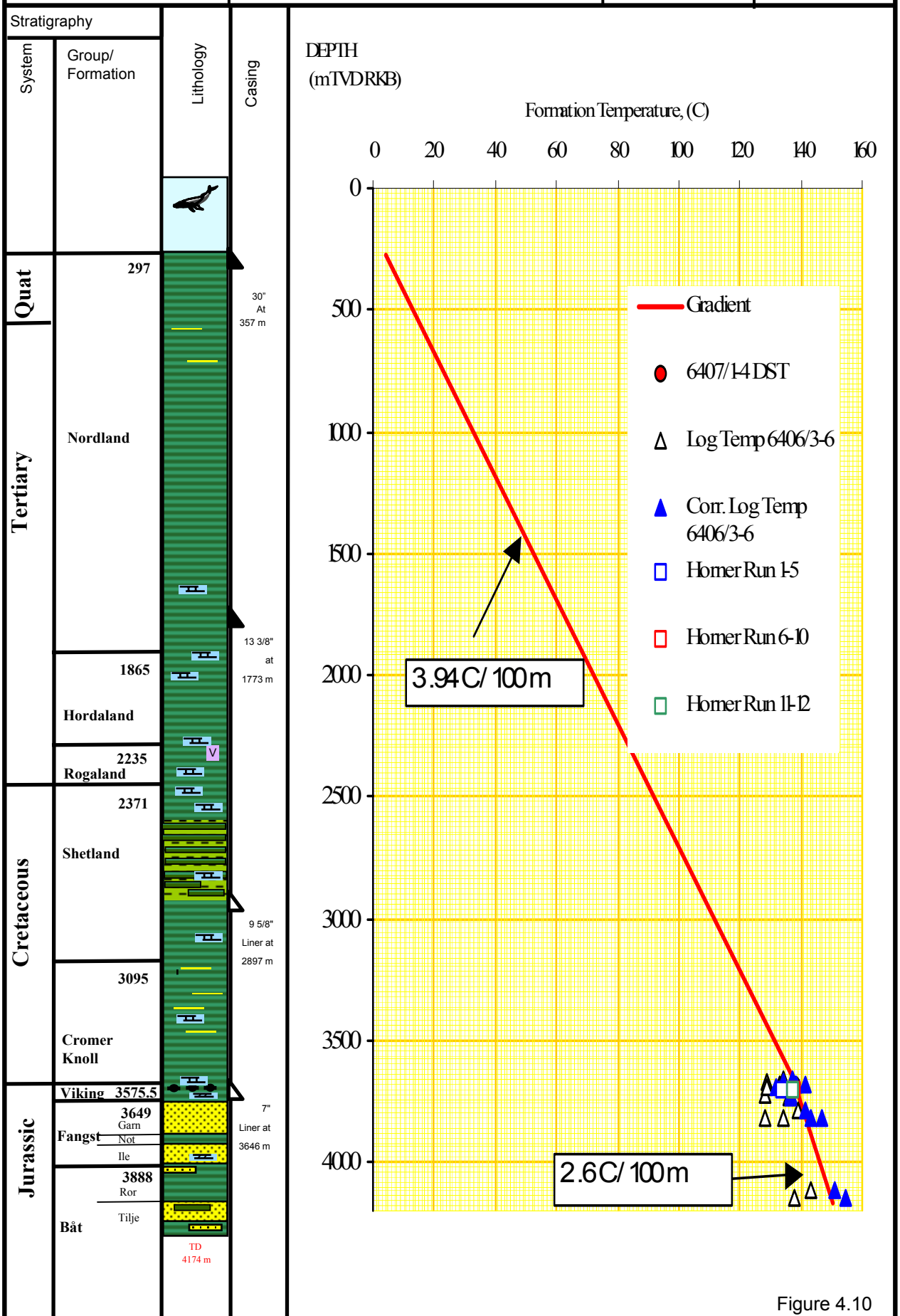


Figure 4.10

4.11 Experiences / recommendations

4.11.1 MWD and LWD logging

In the 8 ½" section, severe decoding problems were caused by pump noise. The problem was solved by adjusting the pump pulsation dampeners (ref. chapters 5.5.1 and 5.5.2 for more details).

In the 6" section, both LWD runs failed. The tool failures were related to high vibration and/or stick – slip. These failures demonstrate a need for higher focus in the planning phase on stick-slip/vibrations analysis with regards to optimizing the BHA for "low vibrations performance". In addition they demonstrate the importance of real time monitoring of vibration and stick – slip.

4.11.2 Wireline logging

- Water Samples:

If high quality formation water samples are required in water based mud, low sulphate mud should be used and all involved personnel should be aware of the importance of not contaminating the mud with seawater.

- Tracer:

Tritium tracer should be added whenever high quality formation water samples are required and the possibility of sampling a mixture of mudfiltrate and formation water exists.

- $CaCO_3$:

$CaCo_3$ should not be added to mud in high temperature reservoirs (above 100 ^oC), if formation damage can be detrimental to thesample quality, duration of test or fluid sampling. If absolute required as weighting material for fluid loss control agent, thorough return permeability tests with adequate mud and core material should be performed up front.

- Dual packer:

Whenever sampling in tight reservoirs is required or high quality single phase fluids are required in medium reservoir quality, the dual packer should be considered.

- CGA:

The condensate gas analyzer (CGA) was used for the first time in Norway and proved to be beneficial in determining fluid contacts and providing GOR estimates, which might be particularly important if an extensive sampling program are planned for in the gas condensate and oil zones respectively.

- Interact:

The Schlumberger real time data transfer system (Interact) was used on this well and proved to be very useful for real time evaluation of the MDT logs (mobility, LFA, CGA behavior) and optimizing decision making process.

5 Drilling operations report

5.1 Rig move and positioning

5.1.1 Summary

The semi submersible, DP drilling rig "Stena Don" sailed from the Norne field to the Tyrihans Sør location. The transit distance, 75 Nm, was done in 20 hrs with an average speed of 3,8 knots. During transit, preparations for spudding were carried out, such as making up cement stand and CART tool. At location, the hole opener was picked up and spud mud was mixed while conducting DP field arrival tests.

5.1.2 Experiences / recommendations

Due to the necessity of crane operations during transit, the rig was moved in drilling draft. The weather conditions were good so no problems were encountered during the transit.

5.2 Drilling top hole section

5.2.1 Summary

After placing out transponders and marker buoys, a 36" hole was drilled from sea bed at 297 m to section TD at 357 m with an average ROP of 6,3 m/hr. The top hole section was drilled using sea water and high viscosity pills as drilling fluid. No boulders were encountered and the formation was easy to drill. The inclination was measured to 2,0° at TD and 0,5° at the top. At TD the hole was displaced to 1,35 g/cm³ mud prior to pulling out. No overpull was experienced during pulling out of hole.

The 30" conductor was run to 357 m and cemented in place with 3,0 meter stick up and an angle of 1,0°.

5.2.2 Experiences / recommendations

- Drilling parameters:
  The top hole was drilled with maximum flow (4600 lpm), high rotational speed (70-100 rpm) and low WOB (1-5 mT). Used Odfjell hole opener for the first time. A cost saving alternative that worked fine.

- Cement excess:
  Used 300% excess lead cement based on open hole volume and 15 m³ tail cement. Returns were detected by ROV.

- Problems with the Mix flow metres on the cement unit:
  Computer problems caused 1,5 hrs D-time prior to the cement job. Halliburton support team onshore was contacted and the problem was finally solved by rebooting the entire UNIPRO system.

5.3 Drilling 17 ½" section

5.3.1 Summary

A 17 ½" section was drilled out of the 30" conductor and down to TD at 1780 m. To ensure a sufficient formation strength at the 13 3/8" casing shoe, the casing point was set 160 m into the pressure build up zone (pressure build up from approximately 1620 m). Seawater and high viscosity pills were therefore used as drilling fluid down to 1620 m and from 1620 m and down to TD, the section was drilled with 1,20 g/cm³ NaCl brine. At TD the hole was circulated clean and displaced to 1,30 g/cm³ Glydrill mud. Some minor tightspots (10-15 mT) were experienced while pulling out of hole.

The 13 3/8" casing was run and set at 1770 m with an average running speed of 7-9 joints per hour. The casing was successfully cemented. Had full returns during cement job and bumped the cement plugs with 97% pump efficiency.

Ran and installed the riser and BOP and pressure tested the well to 330 bar/10 min.

5.3.2 Experiences / recommendations

- Drilling parameters:
  The section was drilled with 3400–4500 lpm / 120-180 rpm / 6-18 mT WOB.
  The packed bottom hole assembly with a 17 ½" Smith MGGH worked well. No stick-slip/vibrations was identified within a wide span of RPM and WOB. The average on bottom ROP was 42 m/hr.

- Drilling with NaCl brine:
  The use of almost 1500 m³ NaCl brine worked fine. High focus on the logistical challenge in advance and close follow up onboard Stena Don made the sucsess.

  Recommendation:
  By using the term "brine" for this drilling fluid, the supply vessels only used their dedicated brine tanks for shipping out the fluid. This led to many deliveries of "brine" in order to fill up the rig with sufficient volume. Emphasize towards the supply base what

the fluid is supposed to be used as. In our case some contamination of water based mud into the "brine" would not have caused any problems and the full tank capacity of the supply vessel could have been used when shipping out the fluid.

- Leak in VX-ring, well head connector:
  The BOP was run with the VX ring installed on the well head. After landing the BOP a connector leak was experienced during the pressure test. The BOP was disconnected and a severe damage to the VX ring was discovered. The VX ring was changed to a resilient type and a good pressure test was obtained.

  Recommendation:
  Run BOP with the VX ring pre-installed in the well head connector. If the VX ring is to be installed on the well head, use a resilient type.

5.4 Drilling 12 ¼" section

5.4.1 Summary

The 12 ¼" section was drilled from the 13 3/8" shoe and down to 2900 m using oil based mud. The well was displaced to oil based mud while drilling out the 13 3/8" shoe. After drilling 3 m new formation, an FIT was performed to 1,83 g/cm³ EMW.

The original plan was to drill the 12 ¼" hole down to 3640 m (2-4 m into the top of the reservoir). A key factor of this design was to seal off the unstable shale in the Melke Formation just above the reservoir. Due to depth uncertainties with respect to the top of the reservoir, the only insurance of not exposing the Melke shale in the next section was to drill until the reservoir was detected on the MWD logs. The max pore pressure in the section was estimated to 1,65 g/cm³ in the potentially sandy/silty Nise Formation at approximately 2492 m. Interpretation of gas readings and pore pressure data from reference wells, indicated that there could be traces of mobile hydrocarbons in the Nise Formation and the pressure span could be within 1,62-1,65 g/cm³.

Regulatory demands (NPD and Statoil) sat an absolute criterion of keeping a full riser margin through out the entire section. This meant that the section had to be drilled with a mud weight of 1,75 g/cm³ when passing 2492 m and down to TD. As the reservoir pressure was estimated to maximum 1,06 g/cm³, drilling into the reservoir with a mud weight of 1,75 g/cm³ was identified as a to high risk. The maximum limit for the mud weight was set at 1,72 g/cm³, i.e. the maximum pore pressure in the section could not exceed 1,63 g/cm³.

A plan for drilling into the Nise Formation with a mud weight close to the pore pressure and thereby verifying the pore pressure, was put forward. A dispensation from the regulations for drilling approximately 300 m without riser margin was applied for and approved within Statoil and by the NPD. In the case of the pore pressure being equal or less than 1,63 g/cm³

the section TD could be set at 3640 m, drilled with a maximum mud weight of 1,72 g/cm³. Otherwise the section TD was set at 2900 m using a mud weight of 1,75 g/cm³.

The actual pore pressure in the Nise Formation was interpreted to 1,65 g/cm³ and consequently the section TD was set at 2900 m.

A 9 5/8" liner was run and set at 2897 m. Average running speed was 12 jts/hr. While circulating prior to the cement job, partly loss of returns was experienced and the following cement job was conducted with partial returns. The plug was bumped with 97% pump efficiency.

5.4.2 Experiences / recommendations

- Drilling out of 13 3/8" shoe:
  Used 11,5 hours for drilling out the 13 3/8" cement plugs, shoe track and shoe. A probable cause for the excess amount of time was the wiper plugs spinning. Almost 9 hours was used for drilling through the plugs. A 10x4x4 cm part of a wiper plug was found jammed in the centre of the bit.

  Recommendation:
  Consider to use shark-bite for the wiper plugs when drilling with a PDC bit is planned.

- Drilling parameters:
  The section was drilled with 3400 lpm / 80-120 rpm / 2-10 mT WOB.
  Overall the packed bottom hole assembly with a Smith S985HPX (6 bladed with 22 mm cutters) worked well. No stick-slip/vibrations was identified. The average on bottom ROP was 28,7 m/hr (expected 25-30 m/hr). When drilling through limestone stringers slow progress (< 1m/hr) and the string stalling out was experienced.

  Recommendation:
  For a similar application a less aggressive bit would help prevent stalling of the string and allow for more WOB when drilling through limestone stringers.

- Losses prior to and during cement job:
  While circulating prior to the cement job, partial loss of returns was experienced. The pump rate was increased in steps to 1650 lpm, were losses was observed. The pump rate was reduced to 1100 lpm, but still partly losses. Pumped a total of 70 m³ mud, lost 11 m³. Dropped the ball and set the 9 5/8" liner hanger. Had no returns while pumping the ball down (lost 10 m³ mud with 500 lpm) and static losses (3 m³ => 30 m³/hr with well on trip tank) while setting the hanger. The static losses decreased rapidly to zero. A 100 m³ of mud was weighted up to 1,75 g/cm³ prior to starting the cement job. During the following pumping of base oil and spacer (1200 lpm), mixing and pumping of cement (900 lpm) and displacement (max 2000 lpm), a total of 42 m³ (1 + 8 + 33 m³) of mud was lost. During displacement the pump rate was increased in steps to 2000 lpm and a steady rate of 50% losses was experienced at all rates.

Top of cement was estimated to approx. 2390 m (calculated based on pump pressure), and indicates that the most likely loss zone was located in the transition zone between the Tang and Springar formations (top of Shetland group). Simulated ECD values (MudCalc) at this depth (2390 m) during circulation (1650 lpm) indicates that the formation integrity (fracture pressure) is around 1,80 – 1,81 g/cm³ EMW.

In all the reference wells (and also in general for the area) losses have been experienced while running 9 5/8" casing or during the 9 5/8" cement job. The loss scenario was therefore expected in this well. The difference between this case and the others is that the 9 5/8" shoe was set much shallower (2900 m), but still the same losses were experienced. I.e. for future Tyrihans well designs; the loss zone has been verified to be above 2900 m and most likely located in bottom Tare or top of the Springar Formation around 2390 m. The loss zone has an estimated fracture pressure of approx. 1,80 g/cm³ EMW.

5.5 Drilling 8 ½" section

5.5.1 Summary

As a consequence of the 9 5/8" liner being set at approximately 2900 m, the 8 ½" section was drilled from the 9 5/8" liner shoe down to 3654 m (6 m into the reservoir), covering the last interval of the originally planned 12 ¼" section.

The mud weight was reduced from 1,75 to 1,66 g/cm³ while drilling the 9 5/8 liner shoe. An FIT to 1,85 g/cm³ EMW was performed. Throughout the entire section severe MWD decoding problems were experienced. Real time data was only obtained while drilling with reduced flow rate or reaming off bottom. Close co-operation between the MWD engineer and the driller gave an acceptable real time log for well correlation. The procedure was to drill one stand and then reamed/logged the same. As the well got closer to the reservoir, the drilled sections prior to reaming/logging were cut down to singles and then finally 5 m intervals. The alternative to this procedure was a roundtrip to change the BHA and bit without any guaranties for better real time log quality. The memory log showed acceptable quality, except for the resistivity that was missing from 3595 m.

A 7" liner was run and set at 3647 m and cemented with full returns. Bumped plugs with 97% pump efficiency.

5.5.2 Experiences / recommendations

- Drilling out of 9 5/8" liner shoe:
  Used 7 hours for drilling out the 9 5/8" cement plugs, shoe track and shoe. A probable cause for the excess amount of time was the wiper plugs spinning.

  Recommendation:
  Consider to use shark-bite for the wiper plugs when drilling with a PDC bit is planned.

- Drilling parameters:
  The section was drilled with 1800 - 2500 lpm / 80-140 rpm / 2-11 mT WOB. A packed bottom hole assembly with an 8 ½" Smith MA89PX was used. The average on bottom ROP was 20,1 m/hr. Severe MWD decoding problems throughout the entire section slowed down the drilling speed.

- MWD de-coding problems and resistivity failure:
  Severe de-coding problems and high stick-slip values were seen throughout the section. It is belived that the de-coding problems seen were closely connected to mud pump noise. This can clearly be seen from the analysis of raw transmission data from this section. The stick-slip condition can, however, have further aggravated the decoding problems.

  Investigation in the work shop revealed that the MPR sub had failed as a direct result of the high stick-slip values. No or limited real time data made it difficult to prevent stick/slip vibration during drilling.

  An adjustment to the mud pump dampners has been done, and the problem with the pump noise has now been resolved.

- Cementing – problems with CMS unit, less SCR-100L (**retarder**) used than planned:
  When mixing and pumping the cement slurry on the 7" liner, the CMS pump #5 did not pump more then 150 liters of SCR-100L. For 8,2 m³ of slurry 450 liters should have been used.

  A full investigation on the CMS unit was initiated. The conclusion from the investigation was that air trapped in the hose between the CMS unit and the cement unit migrated up into the CMS pump flowmeter. The flowmeter reads as if it is a fluid that is being pumped, but actually it is a mixture of fluid and air. As a result, less chemical is being feed through the pump.

  A check valve has now been installed on the outlet of the flowmeter. This prevents any air in the system to migrate into the flowmeter. Also the hoses on the CMS unit has been changed to a transparent type, this enables a visually inspection for air in the system.

5.6 Drilling 6” section

5.6.1 Summary

The 6” section was drilled from the 7” liner shoe to a final TD at 4175 m. An extensive logging/sampling program was performed (a total of 13 logging runs).

Drilled the 7” liner shoe, cleaned out the rat hole and displaced the well to 1,12 g/cm³ water based mud. To optimize for maximum flow rates during the displacement, a simplified BHA (no motor and MWD/LWD) was used for the operation. Thereafter the BHA was POOH and changed.

Ran back in hole with a new BHA (run #1) consisting of a 6” bit (Smith M50 PX), 7” near bit reamer (Security DBS), motor and MWD. Performed an extended LOT (XLOT) to 1,49 g/cm³ EMW. While circulating prior to the XLOT the MWD tool stopped pulsing. A decision was made to continue drilling without MWD real time data. Drilled a 6” x 7” hole from the 7” liner shoe to 3867 m. The mud weight drifted from 1,12 g/cm³ to 1,13 g/cm³ at 3876 m. No over pull was recorded when pulling out of hole with the BHA.

At 3867 m a total of 11 logging runs were performed. On run #6 the tool string got stuck, necessitating a cut and thread operation. The tool string was pulled free with 40 ton over pull but still the communication with the tools was ok. Continued to log while fishing until the communication was lost during water sampling, approximately 20 hrs later. After the tool string was recovered to surface, a wiper trip to TD was performed.Reference is made to *chapter 4.7.4* for further details regarding the logging operation.

Ran back in hole with a 6” BHA (run #2) including motor and Sperry Sun LWD package (GR/RES/DEN/NEU). Reamed and logged the interval from 3790 m – 3867 m. Drilled a 6” hole from 3867 m – 4090 m. At 3943 m the MWD/LWD stopped pulsing, but a decision was made to continue drilling without real time data. At 4090 m a sudden pressure drop was experienced and the ROP decreased to zero. The BHA was pulled out of hole and a washout in the mud motor was discovered. Laid down the mud motor and changed the MWD/LWD package. Ran back in hole with a 6” rotary BHA (run #3). Reamed and logged the interval from 3790 m - 4090 m. At 4007 m the MWD/LWD stopped pulsing. A decision was med to continue drilling without real time data (anticipated data on memory log). Drilled a 6” hole from 4090 m to final TD at 4175 m. No excessive over pull was experienced while pulling out of hole. At surface, no memory data was recovered from the MWD/LWD.

On the last 300 m drilled, the mud weight was increased to 1,20 g/cm³ and the drilling fluid was treated with glycol and chemicals to withstand high temperatures (maximum temperature at TD estimated to 150°C).

Performed 2 logging runs at TD (4175 m), HRLA-IPLT and MDT (pressure points and fluid sampling).

5.6.2 Experiences / recommendations

- Drill out shoe:
  Used 12 hrs for drilling plugs and landing collar and 3 hrs on drilling hard cement, float and shoe. A 6" insert bit with no nozzles was used (Smith XR20). Parameters 0-10 ton WOB / 0-1400 lpm / 0-100 rpm.

  Recommendation:
  If a separate run for drilling out the shoe is planned, a mill tooth bit should be used.

- Mixing of water based mud (WBM) for the reservoir section:
  Due to strict requirements with regards to the planned reservoir fluid sampling programme, a low sulphate content (< 200 mg/ltr) and no glycol drilling fluid was required. This meant that the entire WBM volume for the planned reservoir section had to be new built. A total of 472 m³ of KCl polymer mud was built onboard Stena Don. This operation was more time consuming than anticipated (20 hrs). Severe problems with mixing of CaCO3 from big bags were experienced. The bags were damp and the material was not easily flowing into the hoppers.

  Recommendation:
  For a similar scenario, it is highly recommended to ship out "ready to use" drilling fluid.

- MWD failure (BHI):
  The 4 ¾" NaviMPR tool failed to transmit after circulating for only 25 min. No memory data was recorded past the initial half hour. The transmitting failure was caused by a short circuit in the power section of the tool.

- Drilling with 7" near bit reamer (3647 m – 3867 m):
  To optimize for the logging operations (enlarge the 6" hole to 7" and thereby reduce the risk of getting stuck) a 7" near bit reamer (security DBS NBR600 with PDC cutters) was used on the first drilling run in the 6" section. ROP wise the near bit reamer did not slow the progress down as the ROP was higher than expected (12-14 m/hr compared to 4-6 m/hr on the best reference well). From the wireline caliper log it is evident that the near bit reamer started off well in the Garn Formation. Half way through it started to wear and by the time the Ile Formation was reached at 3805 m, the reamer had no more effect (6" hole). The Garn sandstones were very abrasive with partly high angularity caused by breaking up of silica cement. As a conclusion of the run the NBR600 did not slow down the ROP in a significant degree. The PDC cutter configuration was not able to meet the abrasive formation in this reservoir although they were "…the strongest there is….". Based on the results from the first run the near bit reamer was left out for the remaining 6" drilling runs.

- MWD/LWD failure (Halliburton/Sperry Sun):
  The Halliburton/Sperry Sun MWD/LWD tools failed on both runs. On the first run during drilling and on the second run during reaming. Investigation of the tools in the workshop revealed damages beyond repair to both the tools electronic packages. The assumption is that the damages were related to high stick-slip/vibrations.

  On the first run high stick-slip values were recorded, and measures (changes in drilling parameters) were taken to minimize the stick-slip trend. Still the tool failed after only 76 m drilling. On the second run the tools failed during reaming (re-logging a section). A vibration study afterwards revealed that the used RPM's during reaming was inducing high lateral vibrations in the tool string.

  Recommendation:
  Higher focus in the planning phase on stick-slip/vibrations analysis with regards to optimizing the BHA for "low vibrations performance" (position of stabilizers, use of motor and bit choice). Stick-slip/vibration is a "killer" for the 4 ¾" sized MWD/LWD tools.

5.7 P&A

5.7.1 Summary

Ran in hole with cement stinger (300 m of 2 7/8" DP, 1090 m 3 ½" DP and 5 ½" DP to surface), and placed six cement plugs from 4175 to 2735 m (gas tight from 4175 m – 3547 m). Pressure tested the cement plugs to 185 bar and placed a 13 3/8" EZSV plug at 550 m. The EZSV was pressure tested to 185 bar, and the volume above the plug was displaced to seawater. A surface cement plug was placed from 550 m to 330 m and the BOP and riser was pulled. Ran in hole with a MOST tool and cut the 18 3/4" and 30" wellheads 5 m below seabed. Pulled free with 28 ton over pull.

5.7.2 Experiences / recommendations

- Rubber/canvas sleeve on the 30" conductor housing:

  On the 30" conductor a rubber/canvas sleeve was installed. This seemed to work as intended and to pull free the wellhead housing only 28 ton over pull was necessary.

5.8 Figures and tables

5.8.1 Well schematic

Well: **6406/3-6**

Field: **PL091, Tyrihans sør**

Rig: **Stena Don**

WELL SCHEMATIC

All depths referred to RKB
RKB - MSL Stena Don: 24 m

HOLE		CASING				LOT / FIT	TOC		CSG. SHOE				LWD LOGS	SURV CSG/ OH
SIZE	TVD MD	SIZE	TYPE / RAD. MARKERS	CENTRALIZERS	TEST PRESS [BAR]	[g/cm³]	TVD	MD	TVD	MD				
SB	#REF!						Sea bed	Sea bed			RKB			
36"	359 359	30"	Type: 309.7 lb/ft, X-52, ST-2		N/A	N/A			359	359			N/A	Anderdrift
17 1/2"	1780 1780	13 3/8"	Type: 72 lb/ft, P-110, New Vam	1 x Bow type / 4 first joints	330	FIT 1,83			Top liner: 1716 1773	Top liner: 1716 1773			Resistivity Gamma Ray Pressure	MWD
12 1/4"	2903 2903	9 5/8"	Type: 53,5 lb/ft, P-110, New Vam	1 x Bow type / 4 first joints	190	FIT 1,85	2390 (Calculated)	2390	Top liner: 2835 2897	Top liner: 2835 2897			Resistivity Gamma Ray Pressure	MWD
8 1/2"	3654,5 3654,5	7"	Type: 29 lb/ft, L-80, Vam Top	1 x Bow type / 4 first joints	160	XLOT 1,49	3200	3200	3647	3647			Resistivity Gamma Ray Pressure	MWD
6"	4175 4175	N/A							4175	4175			Resistivity Gamma Ray Pressure Density Neutron	MWD

13.01.2003

5.8.2 P&A wellbore schematic

Rev.3.0
10.01.2003

Well: 6406/3-6
Field: PL091, Tyrihans sør
Rig: Stena Don

WELL SCHEMATIC - PLUGGED WELL

Purpose of plugging: **Permanent P&A**
Date of abandonment: **14.11.2002**

HOLE		CASING AND FORMATION				LOT / FIT	CSG & TOC		PLUG BACK		RKB	PRESSURE / LOAD TESTS	CASING CUT
SIZE	TVD MD	SIZE	CASING TYPE	PERMEABLE HC BEARING ZONES	MUD [SG]	[SG]	TVD	MD	TVD	MD			
SB	297												302
36"	359 359	30"	309.7 lb/ft, X-52, ST-2	None	SW	N/A	359	359	330	330	Surface cement plug (#7)	PRESS.TEST 70 BAR ABOVE LOT AT 7" SHOE [185 BAR]	
17 1/2"	1780 1780	13 3/8"	72 lb/ft, P-110, New Vam	None	SW & 1,20 Brine	FIT 1,83	Top liner: 1716 1773	Top liner: 1716 1773	550	550	EZSV 1,20 WBM		
12 1/4"	2903 2903	9 5/8"	53,5 lb/ft, P-110, New Vam	None	1,51-1,75	FIT 1,85	2390 (Calculated) Top liner: 2835 2897	2390 Top liner: 2835 2897	2735	2735	Three-stage (#4 to#6) cement plug	PRESS.TEST 70 BAR ABOVE LOT AT 7" SHOE [185 BAR]	
8 1/2"	3654,5 3654,5	7"	29 lb/ft, L-80, Vam Ace	None	1,66	XLOT 1,49	3200 3647	3200 3647	3547	3547	3-stage (#1, #2 & #3) Gas tight cmt plugs		
6"	4175 4175	N/A		Top Garn fm. 3649 mMD / 3649 mTVD Top Ile fm. 3805 mMD / 3805 mTVD Top Tilje fm. 4004 mMD / 4004 mTVD	1,12-1,20		4175	4175					

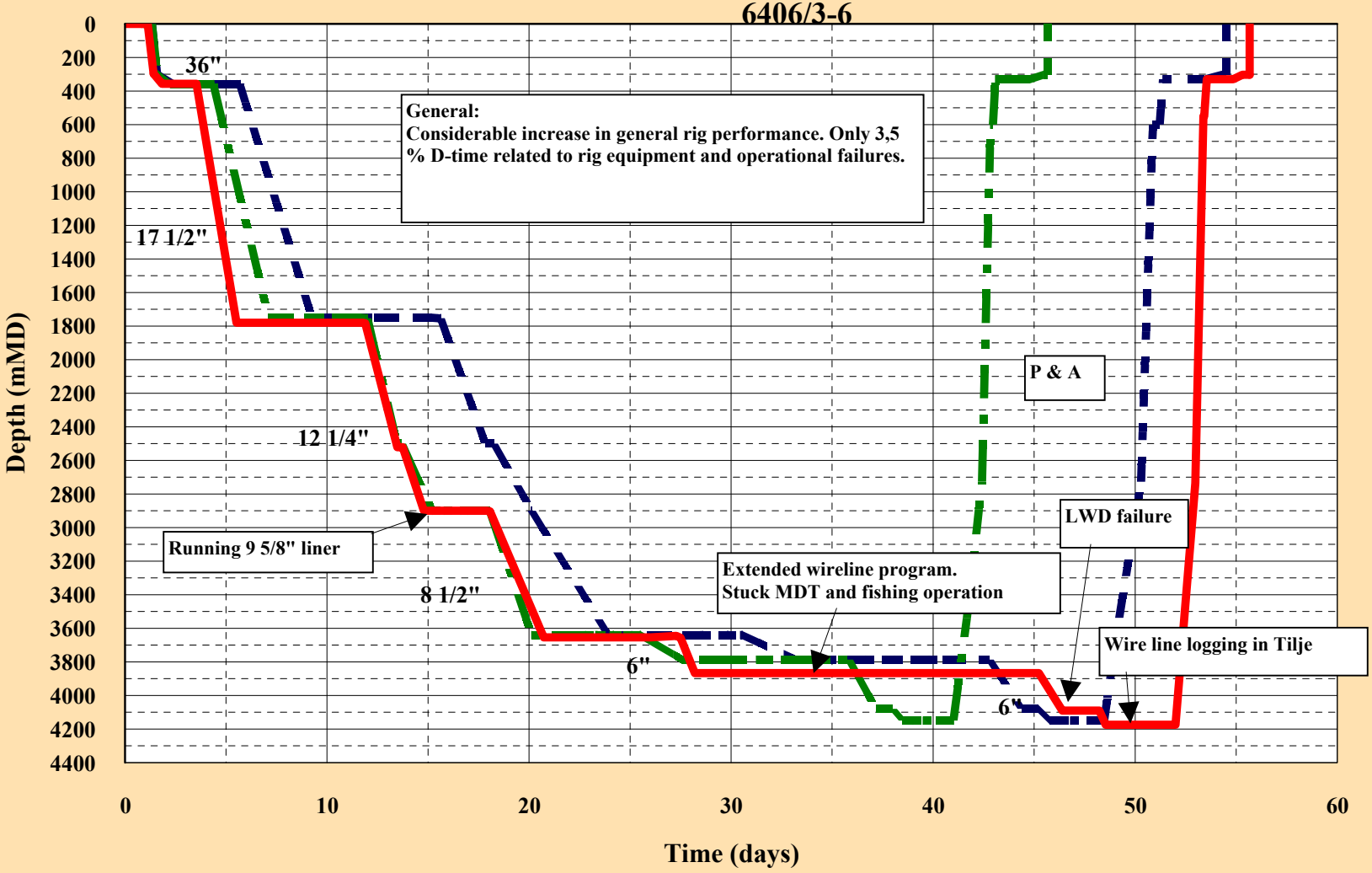
5.8.3 Time/depth curve

STATOIL

Time - Depth Plot

Stena Don

6406/3-6



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

Updated date/time:
Date: 18.11.2002
Time: 15:06

Start date/time:
Date: 20.09.2002
Time: 12:00

Finish date/time:
Date: 15.11.2002
Time: 04:00

Total budget time:
54,5 days

Time used:
55,7 days

Time behind budget:
1,2 days

Comments:

Original Budget : 37 days

Change of scope:
1) Including extra time for 9 5/8" liner due to PP in Nise: + 3,5 days
2) Logging program: + 3,5 days
3) TD into IleFm: + 1,5 days
4) TD into Tilje Fm: + 9 days

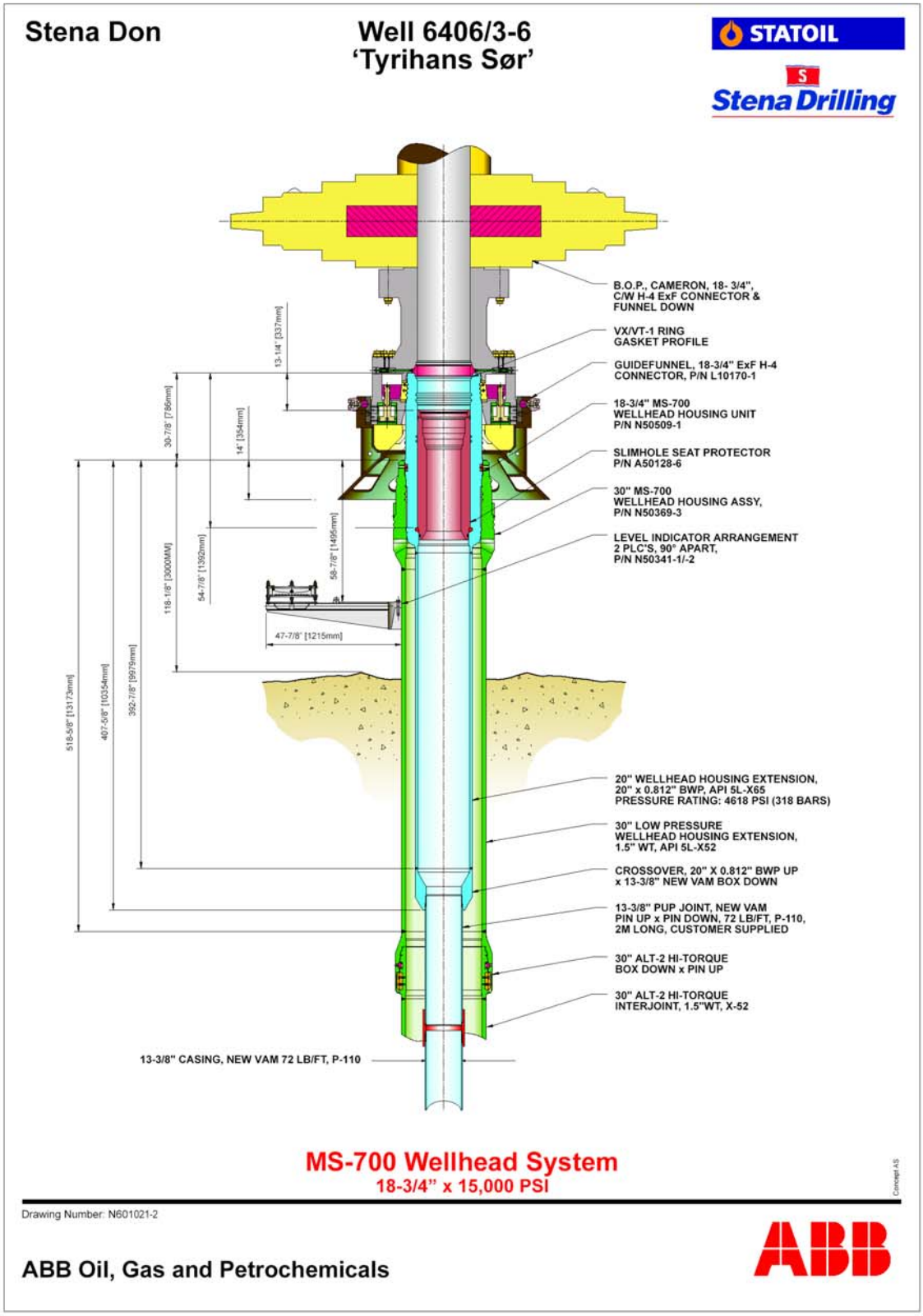
TOTAL BUDGET : 54,5 DAYS

5.8.4 Timeplanner

DAY	START DATE	START TIME	Budg. time (hrs)	Acc. budg. time (days)	Opt. time (hrs)	Acc. opt. time (days)	Budg./ Opt. depth (mMD)	Plan time (hrs)	Actual time (hrs)	Acc. actual time (days)	Actual Depth (mMD)		Activity description	Company	Down time (hrs)	Accum. down time (hrs)	Waiting time (hrs)	Accum. waiting time (hrs)	Comments (reason for down/waiting time)
													Transitt and positioning						**Transitt and positioning**
Fri	20.09.2002	12:00	0,0	0,0	0,0	0,0	0	0,0	0,0	0,0	0	F	Start operation		0,0	0,0	0,0	0,0	
Fri	20.09.2002	12:00	22,0	0,9	22,0	0,9	0	16,0	20,0	0,8	0	F	Rig in transitt from Norne to Tyrihans. Average speed : 3,8 knots			0,0		0,0	
Sat	21.09.2002	08:00	6,0	1,2	6,0	1,2	0	6,0	6,0	1,1	0	F	Ballasting and final rig positioning.	Thales		0,0		0,0	
Section time (days)			1,2		1,2			0,9	1,1				Section time ahead of/behind (-) budg:0,1 days, Tot. time ahead of/behind (-) budg:0,1 days		0,0	hours	0,0	hours	Down time: 0,0% , Total Down time: 0,0% , Waiting time: 0,0% , Total Waiting time: 0,0%
													36" hole section (297 - 359 mMD)						**36" hole section (297 - 359 mMD)**
Sat	21.09.2002	14:00	4,0	1,3	4,0	1,3	0	4,0	1,0	1,1	0	F	MU 30" running tool & cmt stand, rack back same.	ABB		0,0		0,0	
Sat	21.09.2002	15:00	6,0	1,6	6,0	1,6	297	6,0	7,0	1,4	297	F	MU and RIH with 36" BHA.			0,0		0,0	
Sat	21.09.2002	22:00	20,0	2,4	16,0	2,3	359	16,0	10,0	1,8	357	F	Drill 36" hole to TD at 357 mMD.			0,0		0,0	
Sun	22.09.2002	08:00	5,0	2,6	5,0	2,5	359	2,0	1,0	1,9	357	F	Circulate hole clean, wiper trip and displace hole to weighted mud.			0,0		0,0	
Sun	22.09.2002	09:00	8,0	3,0	8,0	2,8	359	3,0	2,5	2,0	357	F	POOH with 36" BHA and LD same.			0,0		0,0	
Sun	22.09.2002	11:30	24,0	4,0	12,0	3,3	359	9,0	12,0	2,5	357	F	RU and run 30" conductor, WH and cement stinger.	ABB/Stena		0,0		0,0	
Sun	22.09.2002	23:30	22,0	4,9	9,0	3,7	359	9,0	9,5	2,9	357	F	Pump and displace cement, WOC.	Halliburton	1,5	1,5	6,5	6,5	Troubleshoot & Repair chemical flow-meter (1,5 hrs). WOC (6,5 hrs)
Mon	23.09.2002	09:00	8,0	5,2	8,0	4,0	359	4,0	6,0	3,1	357,0	F	Retrieve running tool and landing string. LD cmt. stand	Stena	3,0	4,5		6,5	Change IBOP in Topdrive (3 hrs)
Mon	23.09.2002	15:00	8,0	5,5	8,0	4,3	359	6,0	7,0	3,4	357	F	MU and RIH with 17 1/2" BHA.	BHI/Statoil	1,0	5,5	0,5	7,0	MWD: Break connection and clean area (1 hrs). Waiting on Helicopter (0,5 hrs)
Mon	23.09.2002	22:00	4,0	5,7	1,5	4,4	359	1,5	3,0	3,5	357	F	Drill out cement and 30" shoe.			5,5		7,0	
Section time (days)			4,5		3,2			2,5	2,5				Section time ahead of/behind (-) budg:2,1 days, Tot. time ahead of/behind (-) budg:2,2 days		5,5	hours	7,0	hours	Down time: 9,3% , Total Down time: 6,5% , Waiting time: 11,9% , Total Waiting time: 8,2%
													26" hole section not included in budget						**26" hole section not included in budget**
Tue	24.09.2002	01:00	0,0	5,7	0,0	4,4	370	0,0	0,0	3,5	357	F				5,5		7,0	
Tue	24.09.2002	01:00	0,0	5,7	0,0	4,4	370	0,0	0,0	3,5	357	F	No 26" section planned			5,5		7,0	
Tue	24.09.2002	01:00	0,0	5,7	0,0	4,4	370	0,0	0,0	3,5	357	F				5,5		7,0	
Section time (days)			0,0		0,0			0,0	0,0						0,0	hours	0,0	hours	
													17 1/2" hole section (359 - 1780 mMD)						**17 1/2" hole section (359 - 1780 mMD)**
Tue	24.09.2002	01:00	85,0	9,3	65,0	7,1	1750	48,0	47,5	5,5	1780	F	Drill 17 1/2" hole to TD at 1780 mMD (last 150 m with weighted brine).	Stena	2,5	8,0		7,0	Mud pump failure.
Thu	26.09.2002	00:30	8,0	9,6	6,0	7,4	1750	4,0	0,0	5,5	1780	F	Circulate hole clean.			8,0		7,0	
Thu	26.09.2002	00:30	18,0	10,3	14,0	7,9	1750	10,0	11,5	6,0	1780	F	Displace to weighted mud and POOH. Rack back 17 1/2" BHA.	MI		8,0		7,0	
Thu	26.09.2002	12:00	28,0	11,5	22,0	8,9	1750	27,0	30,0	7,3	1780	F	RU and run 20" x13 3/8" casing.	ABB / Stena		8,0		7,0	
Fri	27.09.2002	18:00	8,0	11,8	6,0	9,1	1750	6,0	7,5	7,6	1780	F	Circulate, pump and displace cement.	Halliburton		8,0		7,0	
Sat	28.09.2002	01:30	12,0	12,3	8,0	9,4	1750	8,0	3,5	7,7	1780	F	Release RT, POOH and wash well head area. LD cement head and RT.			8,0		7,0	
Sat	28.09.2002	05:00	46,0	14,3	36,0	10,9	1750	55,0	66,0	10,5	1780	F	Run BOP/ Riser. WOW. Land, neg press. test. Lift off BOP and installed new gasket ring. RD.		13,0	21,0	10,0	17,0	WOW for lifting slip jnt from deck. Leak in WH connector (12,5hrs).
Mon	30.09.2002	23:00	6,0	14,5	5,0	11,1	1750	0,0	0,0	10,5	1780,0	F	LD 17 1/2" BHA.			21,0		17,0	
Mon	30.09.2002	23:00	16,0	15,2	13,0	11,7	1750	10,0	18,5	11,2	1780	F	MU and RIH with 12 1/4" BHA. Function test BOP.	BHI	3,0	24,0		17,0	Changed IBOP
Tue	01.10.2002	17:30	8,0	15,5	6,0	11,9	1753	13,0	13,5	11,8	1780	F	Drill out shoe track and 3 m new while displacing to 1,51 sg OBM.	MI	3,0	27,0		17,0	Laking hose on top drive (0,5 hrs) + Failed pressure test (2,5 hrs)
Wed	02.10.2002	07:00	3,0	15,6	1,5	12,0	1753	1,5	2,5	11,9	1783	F	Circulate, Spot pill &Perform FIT to 1,83 sg.			27,0		17,0	
Section time (days)			9,9		7,6			7,6	8,4				Section time ahead of/behind (-) budg:1,6 days, Tot. time ahead of/behind (-) budg:3,7 days		21,5	hours	10,0	hours	Down time: 10,7% , Total Down time: 9,5% , Waiting time: 5,0% , Total Waiting time: 6,0%
													12 1/4" hole section (1783 - 2900 mMD)						**12 1/4" hole section (1783 - 2900 mMD)**
Wed	02.10.2002	09:30	53,0	17,8	35,0	13,5	2500	30,0	38,0	13,5	2522	F	Drill 12 1/4" hole to 2522 m.			27,0		17,0	
Thu	03.10.2002	23:30	10,0	18,3	6,0	13,7	2500	5,0	6,5	13,8	2522	F	Circ. bttms up. Evaluate PP.(1,65) Increase MW to include riser margin.(1,75)			27,0		17,0	
Fri	04.10.2002	06:00	45,0	20,1	36,0	15,2	2900	50,0	25,0	14,8	2900	F	Cont. drilling 12 1/4" hole to 2900 m.		3,0	30,0		17,0	Leak in goose neck conn (3 hrs)
Sat	05.10.2002	07:00	0,0	20,1	14,0	15,8	2900	18,0	13,5	15,4	2900	F	Circ. hole clean and POOH.			30,0		17,0	
Sat	05.10.2002	20:30	0,0	20,1	20,0	16,6	2900	16,5	18,0	16,1	2900	F	RU and run 9 5/8" liner.	Stena/Weatherford		30,0		17,0	
Sun	06.10.2002	14:30	0,0	20,1	8,0	17,0	2900	15,0	15,0	16,7	2900	F	Circulate, pump and displace cement.	Halliburton	2,0	32,0		17,0	Loss
Mon	07.10.2002	05:30	0,0	20,1	6,0	17,2	2900	6,0	8,0	17,1	2900	F	Release running tool and POOH with landing string.			32,0		17,0	
Mon	07.10.2002	13:30	0,0	20,1	1,0	17,3	2900	0,0	0,0	17,1	2900	F	LD cement head.			32,0		17,0	
Mon	07.10.2002	13:30	0,0	20,1	13,0	17,8	2900	15,0	10,5	17,5	2900	F	MU and RIH with 8 1/2" BHA.	BHI		32,0		17,0	
Tue	08.10.2002	00:00	0,0	20,1	4,0	18,0	2900	10,0	10,0	17,9	2900	F	Drill out shoe track and clean out rathole (reduce MW to 1,66 sg).			32,0		17,0	
Tue	08.10.2002	10:00	0,0	20,1	2,0	18,0	2900	2,0	3,5	18,1	2903	F				32,0		17,0	
Section time (days)			4,5		6,0			7,0	6,2				Section time ahead of/behind (-) budg:-1,7 days, Tot. time ahead of/behind (-) budg:2,1 days		5,0	hours	0,0	hours	Down time: 3,4% , Total Down time: 7,4% , Waiting time: 0,0% , Total Waiting time: 3,9%
													8 1/2" hole section (2900 - 3654 mMD)						**8 1/2" hole section (2900 - 3654 mMD)**
Tue	08.10.2002	13:30	91,0	23,9	50,0	20,1	3640	50,0	64,0	20,7	3654,5	F	Drill 8 1/2" hole to 3654,5 m (5,5 m into Garn form.)		4,0	36,0		17,0	Mudpumps (2+2)
Fri	11.10.2002	05:30	28,0	25,1	24,0	21,1	3640	18,0	10,5	21,2	3654,5	F	Circ. hole clean and POOH.			36,0		17,0	
Fri	11.10.2002	16:00	18,0	25,8	8,0	21,5	3640	0,0	0,0	21,2	3654,5	C	RU Wireline and perform MSCT logging (NOT DONE)			36,0		17,0	
Fri	11.10.2002	16:00	42,0	27,6	24,0	22,5	3640	20,0	24,5	22,2	3654,5	F	RU and run 7" liner.			36,0		17,0	
Sat	12.10.2002	16:30	8,0	27,9	8,0	22,8	3640	5,0	5,5	22,4	3654,5	F	Circulate, set hanger, pump and displace cement.			36,0		17,0	
Sat	12.10.2002	22:00	14,0	28,5	12,0	23,3	3640	7,0	8,5	22,8	3654,5	F	Release running tool, set TSP packer, pressure test and POOH with landing string.			36,0		17,0	
Sun	13.10.2002	06:30	2,0	28,6	1,0	23,3	3640	0,0	0,0	22,8	3654,5	F	LD cement head (Done prior to set TSP).			36,0		17,0	
Sun	13.10.2002	06:30	0,0	28,6	1,0	23,4	3640	12,0	16,0	23,4	3654,5	F	Test BOP		2,0	38,0		17,0	Leaking seal on BOP test tool.
Sun	13.10.2002	22:30	22,0	29,5	15,0	24,0	3640	12,0	14,0	24,0	3654,5	F	MU and RIH with 6" BHA (for drilling out float/shoe).	Schlumberger		38,0		17,0	
Mon	14.10.2002	12:30	8,0	29,8	4,0	24,2	3640	6,0	17,5	24,8	3654,5	F	Drill out shoe track and clean out rathole.			38,0		17,0	
Tue	15.10.2002	06:00	0,0	29,8	0,0	24,2	3640	3,0	9,0	25,1	3654,5	F	Clean pits and lines (after use of OBM)			38,0		17,0	
Tue	15.10.2002	15:00	0,0	29,8	0,0	24,2	3640	17,0	15,0	25,8	3654,5	F	Mix new KCL WBM			38,0		17,0	
Wed	16.10.2002	06:00	15,0	30,5	12,0	24,7	3640	12,0	6,5	26,0	3654,5	F	Displace well to 1,12 sg Water based Mud (WBM)			38,0		17,0	
Wed	16.10.2002	12:30	0,0	30,5	18,0	25,4	3640	20,0	30,5	27,3	3645,5	F	POOH and change BHA. RIH with 6" drilling BHA.			38,0		17,0	
Thu	17.10.2002	19:00	2,0	30,5	2,0	25,5	3640	2,0	5,0	27,5	3656,5	F	Circulate, drill 3 m new formation & Perform XLOT			38,0		17,0	
Section time (days)			10,4		7,5			7,7	9,4				Section time ahead of/behind (-) budg:1,0 days, Tot. time ahead of/behind (-) budg:3,0 days		6,0	hours	0,0	hours	Down time: 2,6% , Total Down time: 5,8% , Waiting time: 0,0% , Total Waiting time: 2,6%
													6" hole section (3654 - 4150 mMD)						**6" hole section (3654 - 4150 mMD)**

Fri	18.10.2002	00:00	64,0	33,2	50,0	27,6	3787	41,0	17,0	28,2	3867	F	Drill 6" hole to TD at 3847 m - 70m into Ile formation.			38,0		17,0	
Fri	18.10.2002	17:00	26,0	34,3	20,0	28,4	3787	15,0	16,0	28,9	3867	F	Circulate well clean and POOH.			38,0		17,0	
Sat	19.10.2002	09:00	12,0	34,8	9,0	28,8	3787	9,0	14,5	29,5	3867	F	RU for wireline and perform Log run #1 (HRLA/DSI/IPLT)			38,0		17,0	
Sat	19.10.2002	23:30	17,0	35,5	14,0	29,4	3787	14,0	22,5	30,4	3867	F	Log run # 2 (MDT - pressure points/scanning/sampling)			38,0		17,0	
Sun	20.10.2002	22:00	16,0	36,2	14,0	30,0	3787	42,0	46,5	32,4	3867	F	Log run # 3 (Dual pkr). Pump failed. Run#4 (MDT - sampling&mini DST)		14,0	52,0		17,0	MDT pump failed (12,0 hrs), CGA tool comm problem (2,0 hrs)
Tue	22.10.2002	20:30	12,0	36,7	10,0	30,4	3787	12,0	12,0	32,9	3867	F	Log run # 5 (VSP)			52,0		17,0	
Wed	23.10.2002	08:30	24,0	37,7	21,0	31,3	3787	21,0	17,5	33,6	3867	F	Log run # 6 (MDT - sampling 3 levels). Tool stuck after sampling at 3675,1 m.		80,0	132,0		17,0	Stuck.
Thu	24.10.2002	02:00	0,0	37,7	0,0	31,3	3787	48,0	125,0	38,8	3867	F	Cut cable. Fish stuck logging tool. Log while fishing (?)		26,0	158,0		17,0	Toolfailure Schlumberger.
Tue	29.10.2002	07:00	10,0	38,1	10,0	31,7	3787	6,0	12,5	39,3	3867	F	BOP test		1,0	159,0		17,0	Rev 2: extra 9 days. Downtime on Stena.
Tue	29.10.2002	19:30	20,0	38,9	20,0	32,5	3787	24,0	31,0	40,6	3867	F	Wiper trip			159,0		17,0	Rev 2: extra 9 days
Thu	31.10.2002	02:30	21,0	39,8	16,0	33,2	3787	16,0	23,0	41,6	3867	F	Log run # 7 (MDT - sampling 1 level)			159,0		17,0	
Fri	01.11.2002	01:30	16,0	40,5	16,0	33,8	3787	16,0	52,5	43,8	3867	F	Additional Ile logging run # 8 and #9 (MDT - sampling 1 level?)		3,0	162,0		17,0	Rev 2: extra 9 days. Sclumberger failure.
Sun	03.11.2002	06:00	18,0	41,2	16,0	34,5	3787	16,0	13,5	44,3	3867	F	Log run # 10 (MSCT - 50 sidewall cores). RD wireline.		19,0	181,0		17,0	Sclumberger tool failure
Sun	03.11.2002	19:30	26,0	42,3	20,0	35,3	3787	0,0	0,0	44,3	3867	C	RIH 7" RTTS on DP. Pressure test well. POOH with RTTS. (NOT DONE)			181,0		17,0	Rev 2: extra 9 days
Sun	03.11.2002	19:30	12,0	42,8	12,0	35,8	3787	12,0	22,0	45,2	3867	F	RIH 6" BHA with motor and LWD.			181,0		17,0	Rev 2: extra 9 days
Mon	04.11.2002	17:30	38,0	44,4	32,0	37,2	4080	30,0	28,0	46,4	4090	F	Drill 6" section to TD 4090 m (6 m/hr).			181,0		17,0	Rev 2: extra 9 days
Tue	05.11.2002	21:30	20,0	45,2	20,0	38,0	4080	43,0	44,0	48,2	4090	F	Circulate hole clean. POOH for MWD change. RIH. Ream hole from 3790 to 4090 m.		31,5	212,5		17,0	Rev 2: extra 9 days. Downtime due to change of motor and LWD. BHI and Sperry Sun.
Thu	07.11.2002	17:30	14,0	45,8	12,0	38,5	4150	12,0	7,5	48,5	4175	F	Drill 6" section to TD 4150 m (5 m/hr).		11,5	224,0		17,0	Rev 2: extra 9 days. Downtime Sperry Sun, reaming of hole due to LWD failure
Fri	08.11.2002	01:00	12,0	46,3	12,0	39,0	4150	12,0	16,0	49,2	4175	F	Circulate well clean and POOH.			224,0		17,0	Rev 2: extra 9 days
Fri	08.11.2002	17:00	12,0	46,8	12,0	39,5	4150	12,0	12,0	49,7	4175	F	WL run # 12 (HRLA - IPLT)			224,0		17,0	
Sat	09.11.2002	05:00	20,0	47,6	16,0	40,2	4150	27,0	30,0	51,0	4175	F	WL run # 13 (GR - MDT)			224,0		17,0	
Sun	10.11.2002	11:00	20,0	48,5	20,0	41,0	4150	0,0	0,0	51,0	4175	C	WL run # 14 (MSCT) (NOT DONE)			224,0		17,0	Rev 2: extra 9 days
Section time (days)			17,9		15,5			17,8	23,5				Section time ahead of/behind (-) budg:-4,2 days, Tot. time ahead of/behind (-) budg:-1,2 days		186,0	hours	0,0	hours	Down time: 33,0% , Total Down time: 18,3% , Waiting time: 0,0% , Total Waiting time: 1,4%
													Permanent P&A						Permanent P&A
Sun	10.11.2002	11:00	18,0	49,2	16,0	41,7	3538	22,0	25,0	52,0	4175	F	RIH with cement stinger and Plug back open hole to +/- 100 m into 7" liner (3547 m)	Halliburton		224,0		17,0	Rev 2: extra 9 days
Mon	11.11.2002	12:00	26,0	50,3	18,0	42,4	2727	22,0	23,5	53,0	2735	F	Place a three stage cement plug from 3547 m to 2735 m and POOH.	Halliburton		224,0		17,0	
Tue	12.11.2002	11:30	14,0	50,9	10,0	42,8	600	10,0	9,5	53,4	550	F	RIH and set 13 3/8" EZSV on drillpipe at 550 m. Pressure test same and bottom cmt. plug.		5,0	229,0		17,0	Rev 2: extra 9 days
Tue	12.11.2002	21:00	8,0	51,2	3,0	43,0	600	3,0	1,0	53,4	550	F	Displace to SW and POOH.	MI		229,0		17,0	
Tue	12.11.2002	22:00	4,0	51,4	3,0	43,1	330	2,0	3,0	53,5	330	F	Set a balanced cement plug to max 50 m below seabed.			229,0		17,0	Rev 2: extra 9 days
Wed	13.11.2002	01:00	0,0	51,4	5,0	43,3	330	5,0	10,5	54,0	330	F	(Pressure tested BOP while WOW). Retrieve wear bushing. L/D 3 1/2" DP.			229,0	4,5	21,5	
Wed	13.11.2002	11:30	50,0	53,5	36,0	44,8	330	24,0	21,0	54,9	330	F	Pull Riser/BOP.			229,0		21,5	
Thu	14.11.2002	08:30	20,0	54,3	16,0	45,5	303	16,0	11,0	55,3	303	F	Cut & retrieve 20" x 30" csg / WH.	Weatherford		229,0		21,5	
Thu	14.11.2002	19:30	5,0	54,5	5,0	45,7	303	5,0	8,5	55,7	303	F	Retrieve transponders & recovered lost Taut wire.			229,0		21,5	
Fri	15.11.2002	04:00	0,0	54,5	0,0	45,7	0	0,0	0,0	55,7	0	F	END OF OPERATIONS			229,0		21,5	
Fri	15.11.2002	04:00	6,0		4,7			4,5	4,7				Section time ahead of/behind (-) budg:1,3 days, Tot. time ahead of/behind (-) budg:-1,2 days		5,0	hours	4,5	hours	Down time: 4,4% , Total Down time: 17,1% , Waiting time: 4,0% , Total Waiting time: 1,6%
End of operation																				

5.8.5 Wellhead system


Stena Don
Well 6406/3-6
'Tyrihans Sør'
STATOIL
Stena Drilling
B.O.P., CAMERON, 18- 3/4", C/W H-4 ExF CONNECTOR & FUNNEL DOWN
VX/VT-1 RING GASKET PROFILE
GUIDEFUNNEL, 18-3/4" ExF H-4 CONNECTOR, P/N L10170-1
18-3/4" MS-700 WELLHEAD HOUSING UNIT P/N N50509-1
SLIMHOLE SEAT PROTECTOR P/N A50128-6
30" MS-700 WELLHEAD HOUSING ASSY, P/N N50369-3
LEVEL INDICATOR ARRANGEMENT 2 PLC'S, 90° APART, P/N N50341-1/-2
20" WELLHEAD HOUSING EXTENSION, 20" x 0.812" BWP, API 5L-X65 PRESSURE RATING: 4618 PSI (318 BARS)
30" LOW PRESSURE WELLHEAD HOUSING EXTENSION, 1.5" WT, API 5L-X52
CROSSOVER, 20" X 0.812" BWP UP x 13-3/8" NEW VAM BOX DOWN
13-3/8" PUP JOINT, NEW VAM PIN UP x PIN DOWN, 72 LB/FT, P-110, 2M LONG, CUSTOMER SUPPLIED
30" ALT-2 HI-TORQUE BOX DOWN x PIN UP
30" ALT-2 HI-TORQUE INTERJOINT, 1.5"WT, X-52
13-3/8" CASING, NEW VAM 72 LB/FT, P-110
13-1/4" [337mm]
30-7/8" [786mm]
14" [354mm]
58-7/8" [1496mm]
54-7/8" [1392mm]
118-1/8" [3000MM]
47-7/8" [1215mm]
518-5/8" [13173mm]
407-5/8" [10354mm]
392-7/8" [9979mm]
MS-700 Wellhead System
18-3/4" x 15,000 PSI
Drawing Number: N601021-2
ABB Oil, Gas and Petrochemicals
ABB

5.8.6 Drilling fluids

Well: 6406/3-6

Field: PL091, Tyrihans sør

Rig: Stena Don

DRILLING FLUIDS PROGRAMME

HOLE SIZE	HOLE TVD MD	CASING SIZE	CASING TVD MD	MUD TYPE	MW [SG]	LGS [KG/m³]	10 sec. [Pa]	10 min. [Pa]	Fann 100 rpm	Fann 3 rpm	O/W ratio	PV [mPa]	API FL [ml]	HTHP FL [ml]	MBT [KG/m³]	pH	Kcl [KG/m³]	Glyc. [%]	ES	Funnel Visc. [%]	Volume built [m³]
36"	359 359	30"	359 359	SW CMC-EHV	1,03 - 1,35											8 - 9				> 200	417
				Comments:	*The section was drilled using sea water with CMC-EHV hi-vis sweeps. The hole was displaced to 1,35 sg CMC mud prior to POOH at TD. 160 m³ of 1,60 sg kill mud (KCl - Glydrill) was prepared prior to spud.*																
17 1/2"	1780 1780	13 3/8"	1773 1773	SW CMC-EHV NaCL brine	1,03 - 1,30											8 - 9				> 200	2317
				Comments:	*The section was drilled using sea water with CMC-EHV hi-vis sweeps down to approx. 1600 m. From +/- 1600 m and down to section TD 1,20 sg NaCl brine was used.* *The hole was displaced to 1,30 sg Glydrill mud prior to POOH at TD.*																
12 1/4"	2903 2903	9 5/8"	2897 2897	Versavert (OBM)	1,54 - 1,75	98 - 196	7 - 10	12 - 20	28 - 38	8 - 10	72/28 - 73/27	40 - 57		2,6 - 3,8					608 - 663	71 - 75	185
				Comments:	*The section was drilled with Versavert OBM drilling fluid.*																
8 1/2"	3654,5 3654,5	7"	3647 3647	Versavert (OBM)	1,66	62 - 30	4 - 7	11	33 - 35	9 - 10	71/29 - 73/27	44 - 52		1,5					740 -750	67 - 68	101
				Comments:	*The section was drilled with Versavert OBM drilling fluid.*																
6"	4175 4175	N/A		Glydrill 99%KCl (WBM)	1,12 - 1,22	128 - 188	2 - 4	3 - 6	12 - 20	3 - 6		9 - 14	3,2 - 3,8		< 70	7,8 - 9,8	85 - 137	0*			527
				Comments:	*The section was drilled using KCl/Polymer waterbased drilling fluid. The fluid was mixed on the rig using 99% KCl and no addition of Glucol.* *Due to extending the well to 4175 m, the drilling fluid was upgraded to withstand a temperature > 150°C. Sulphate content was kept below 150 ml/l. Oil contamination was 2% at the end.*																

14.01.2003

5.8.7 Cementing data

Well: 6406/3-6
Field: PL091, Tyrihans sør
Rig: Stena Don

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 [SG]	Yield [ltr/100kg]	Stat. / Circ. Temp [°C]	Thickening time [hrs to 70 Bc]	API Free Water [%]	API Fluid loss [cc/30min]	24 hrs C.S. [psi]		Fluids and Rates
36"	359 359	**30"**	359 359	#REF! #REF!	L: 31 m3 T: 23 m3 300% OH	Norcem "G" Econolite NF-6 CaCl2 liquid Sea water	3,20 0,10 - 95,07	- 0,10 4,35 39,56	L: 1.56 T: 1.95	Code STL10: L: 129.42 Code STT10: T: 75.06	6 / 6 (API)	L: > 6 T: 3 - 4	N/A	N/A	L: +/- 200 T: +/- 500	60 m3 Seawater	Sea water 1200 lpm
17 1/2"	1780 1780	**13 3/8"**	1773 1773	#REF! #REF!	L: 182 m3 T: 20 m3 100% OH	Norcem "G"+0,1% EZ-FLO Econolite HR-4L FDP-C-613L NF-6 Seawater Fresh water	3,20 3,50 - 0,10 92.59 -	- 1,10 0,50 0,10 - 42,41	L: 1.56 T: 1.92	Code STL60: L: 130.45 Code MPT05: T: 75.17	63 / 45 (API)	L: 7:46 T: 3:46	L: N/A T: 0,35	N/A	L: 500 T: 1400	131 m3 1,20 SG mud 10 m3 seawater	Sea water 3000 lpm
12 1/4"	2903 2903	**9 5/8"**	2897 2897	2390 2390	26 m3 40% OH	Norcem "G"+0,1% EZ-FLO Microblock CFR-5LE+ SCR-100L Halad 600LE+ NF-6 Fresh water		10,00 1,00 0,80 6,00 0,10 28,49	1,95	Code KOPHP: 77,48	108 / 73 (API)	05:34	0	38	3650	4 m3 baseoil 20 m3 1,86 SG Spacer 4T (Tuned Spacer E+)	OBM (Versavert) 2000 lpm
8 1/2"	3654,5 3654,5	**7"**	3647 3647	3200 3200	8,2 m3 75% OH	Norcem "G"+0,1% EZ-FLO + 35 % SSA-1 BWOC Microblock CFR-5LE+ SCR-100L Halad 600LE+ NF-6 Fresh water		16,00 0,50 6,00 9,00 0,10 33,19	1,90	Code GTTTZ 109,19	138 / 102 (API)	06:35	0	48	2600	2,5 m3 baseoil 10 m3 1,70 SG Spacer 4T (Tuned Spacer E+)	OBM (Versavert) 1000 lpm
PERMANENT P&A																	
P&A 6" Open hole	4175 4175	**7"**	3647 3647	3545 3545	3 stage plug 4,6 m3 + 4,6 m3 + 4,3 m3 20 % OH	Norcem "G"+0,1% EZ-FLO + 35 % SSA-1 BWOC Microblock CFR-3L SCR-500L Halad 413L NF-6 Fresh water		22,00 0,50 4,80 9,00 0,10 30,75	1,90	Code HTG90 111,51	142 / 120 (enertech)	05:18	0	29	3000	4 m3 freshwater in front of each plug	KCL mud 1600 - 2500 lpm
P&A 7" liner	3545 3545			3005 3005	2 stage plug 2 x 5,3 m3	Norcem "G"+0,1% EZ-FLO + 35 % SSA-1 BWOC Microblock SCR-100L NF-6 Fresh water		8,00 4,00 0,10 48,00	1,90	Not in contract 104,49	132 / 100 (API)	05:40	0	N/A	2350	4 m3 freshwater in front of each plug	KCL mud 2500 lpm
P&A 7"x 9 5/8" linerlap	3005 3005			2735 2735	7 m3	Norcem "G"+0,1% EZ-FLO Microblock SCR-100L Halad 600LE+ NF-6 Fresh water		5,00 1,40 3,00 0,10 34,49	1,95	Code KOPMP 75,04	110 / 90 (API)	04:24	0	N/A	3800	6 m3 freshwater	KCL mud 2500 lpm
P&A Surface-plug	550 550			330 330	17 m3	Norcem "G"+0,1% EZ-FLO + 35 % SSA-1 BWOC NF-6 Seawater		0,10 57,84	1,90	Code STTNT 102,31	15 / 13 (API)	> 4	N/A	N/A	+/- 1500	6 m3 freshwater	Seawater 800 lpm

13.01.2003

5.8.8 Bit record

Wellbore: 6406/03-006

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
1	17 1/2"	1	1	MXT1	115	Hughes Christensen	MA569L3	3 x 13	1 x 14	x	x	,540
2	17 1/2"	1	2	MGGH	135	Smith Bits	LW 3543	1 x 15	1 x 16	2 x 20	x	,983
3	12 1/4"	3	3	S985HPX	S121	Smith Bits	JS8517	8 x 20	x	x	x	2,455
4	8 1/2"	4RR	4	MA89HPX	M323	Smith Bits	JS7041	3 x 14	3 x 13	x	x	,840
5	6"	5	5	XR20HTDGPD	517X	Smith Bits	MH0831	3 x 29	x	x	x	1,936
6	7"		6	NBR600		Security DBS	912743702	x	x	x	x	
6	6"	6	6	M50PX	M333	Smith Bits	JS7868	3 x 14	x	x	x	,451
7	6"	7	9	XR20HTDGPD	517X	Smith Bits	MK1139	x	x	x	x	
8	6"	8	10	M33PX	M432	Smith Bits	JR0678	2 x 14	1 x 13	x	x	,431
9	6"	9	11	M33PX	M432	Smith Bits	js6705	3 x 13	x	x	x	,389

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
1	17 1/2"	4750	230	297	343	46	6,3	7,3	0	3	80	100	200	4400
2	17 1/2"	4132	193	359	1780	1421	33,8	42,0	5	21	93	203	3300	12900
3	12 1/4"	3150	325	1780	2900	1120	38,7	28,9	4	12	80	150	2	15
4	8 1/2"	2500	290	2903	3654	751	37,4	20,1	2	11	80	140	2	18
5	6"	1200	208	3654	3654	0	13,2	,0	0	10	0	100	0	5
6	6"	1200	180	3654	3867	213	15,2	14,0	2	8	80	400	4000	14000
6	7"													
7	6"													
8	6"	1185	247	3867	4090	223	20,6	10,8	2	13	365	440	4	10
9	6"	1200	180	4090	4175	85	5,9	14,4	2	7	100	130	4	12

Run No	Bit Size	IADC dull grading								Remarks
		I	O	DC	L	B	G	OC	RP	
1	17 1/2"									26" HO: 2,34 m from Bit, nozzles: 3 x 11. 36" HO: 3,01 m from Bit, nozzles: 3 x 13.
2	17 1/2"	4	3	CT	A	E	I	ER	TD	
3	12 1/4"	4	2	CT	N	X	I	PN	TD	Drilled float/plugs/25 m shoetrack in 11.5 hrs. Found a 10x4x4 cm part from float/plugs jammed in center of bit.
4	8 1/2"	1	1	NO	A	X	I	NO	TD	Rerunable.
5	6"	1	1	NO	A	E	I	NO	BHA	No nozzles. Drill out 7" shoetrack. Total 33 krevs.
6	6"	1	2	WT	A	X	I	NO	TD	Ran with 7" NBreamer.
6	7"									
7	6"	1	1	NO	A	E	I	NO	LOG	Bit for wipertrip. No nozzles installed.
8	6"	3	3	WT	A	X	I	BT	DMF	
9	6"	2	1	CT	N	X	I	WT	TD	

5.8.9 Bottomhole assemblies

Wellbore: 6406/03-006

BHA seq: 1 BHA category: Drilling BHA description: 17 1/2" x 26" x 36" HO assy.

BHA no: 1

String component	OD in	ID in	Length m	Acc length m
BIT, TRI CONE	17,500		0,40	0,40
FLOAT SUB	9,500		1,59	1,99
HOLE OPENER	36,000		3,27	5,26
X-OVER SUB W/FLOAT	9,500		0,91	6,17
ANDERDRIFT	8,000		2,90	9,07
DRILL COLLAR	8,000	2,813	103,02	112,09
X-OVER	8,000	4,000	1,15	113,24
H W DRILL PIPE	5,500	3,250	27,57	140,81
DRILL PIPE	5,500	4,780		140,81

BHA seq: 2 BHA category: Drilling BHA description: 17 1/2"

BHA no: 2

String component	OD in	ID in	Length m	Acc length m
BIT, TRI CONE	17,500		0,40	0,40
NEARBIT STAB	17,500	3,000	2,40	2,80
PONY COLLAR	9,500	3,000	2,86	5,66
STAB STRING	17,500	3,000	2,30	7,96
X-OVER	9,438	3,000	0,62	8,58
MWD MPR	8,250	2,813	4,95	13,53
MWD, DCP	8,250	2,813	11,23	24,76
SAVER SUB	8,313	2,813	1,00	25,76
STAB STRING	17,500	3,000	1,61	27,37
DRILL COLLAR	8,000	2,813	74,92	102,29
JAR	7,750	3,000	9,68	111,97
DRILL COLLAR	8,000	2,813	28,10	140,07
X-OVER	8,000	4,000	1,15	141,22
H W DRILL PIPE	5,500	3,250	82,46	223,68
DP 5 1/2"	5,500	4,780		223,68

BHA seq: 3 BHA category: Drilling BHA description: 12 1/4" section

BHA no: 3

String component	OD in	ID in	Length m	Acc length m
BIT, PDC	12,250		0,27	0,27
MWD, CORE POINT FINDER	12,250	2,750	1,16	1,43
MPR SUB	8,250	2,750	3,68	5,11
MOD STAB	12,250	2,750	1,35	6,46
MWD DCP	8,250	3,000	12,09	18,55
STAB STRING	12,250	3,000	1,66	20,21
FLOAT SUB	8,000	2,875	1,07	21,28
DRILL COLLAR	8,000	2,813	74,92	96,20
JAR	7,750	3,000	9,68	105,88
DRILL COLLAR	8,000	2,813	28,10	133,98
X-OVER	8,000	2,813	0,91	134,89
H W DRILL PIPE	5,000	3,000	84,60	219,49
DP 5"	5,000	3,250	988,18	1207,67
X-OVER	6,875	2,875	0,85	1208,52
DRIFT SUB	6,938	2,250	0,88	1209,40
DP 5 1/2"	5,500	4,780		1209,40

BHA seq: 4 BHA category: Drilling BHA description: 8 1/2" section

BHA no: 4

String component	OD in	ID in	Length m	Acc length m
PDC BIT	8,500		0,29	0,29
MWD, CORE POINT FINDER	8,375	3,500	1,19	1,48
MWD, MPR	6,750	3,500	3,72	5,20
MOD STAB	8,500	2,250	1,09	6,29
MWD, DCP	6,750	2,250	2,20	8,49
MWD	6,625		8,65	17,14
SAVER SUB	6,880	3,250	0,75	17,89
STAB STRING	8,500	3,000	1,69	19,58
FLOAT SUB	6,310	2,250	0,83	20,41
DRILL COLLAR	6,500	2,310	75,20	95,61
JAR	6,500		9,59	105,20
DRILL COLLAR	6,500	2,310	28,22	133,42
HW DRILL PIPE	5,000	3,000	84,60	218,02
DP 5"	5,000	3,250	1802,16	2020,18
X-OVER	6,875	2,875	0,85	2021,03
DRIFT SUB	7,000	3,625	0,88	2021,91
DP 5 1/2"	5,500			2021,91

BHA seq: 5 BHA category: Drilling BHA description: 6" drill out assembly

BHA no: 5

String component	OD in	ID in	Length m	Acc length m
ROCK BIT	6,000		0,19	0,19
NB STAB W/FL	5,875	2,250	1,47	1,66
DRILL COLLAR	4,750	2,250	113,71	115,37
JAR	4,750	2,250	8,91	124,28
DRILL COLLAR	4,750	2,250	18,94	143,22
HW DRILL PIPE	3,500	2,125	136,20	279,42
DP 3 1/2"	3,500	3,602	553,10	832,52
X-OVER	6,875	2,500	1,02	833,54
DP 5 1/2"	5,500	4,780		833,54

BHA seq: 6 BHA category: Drilling BHA description: 6"x7" drilling assembly

BHA no: 6

String component	OD in	ID in	Length m	Acc length m
PDC BIT	6,000		0,22	0,22
NEAR BIT REAMER	7,000	2,250	0,77	0,99
NAVIDRILL M1/XL 0	4,750		8,92	9,91
FLOAT SUB	4,815		0,43	10,34
STAB STRING	5,875		1,41	11,75
PIN X PIN SUB	4,750	2,625	1,21	12,96
MWD, MPR	4,750		5,15	18,11
MWD, COLLAR	4,750		7,03	25,14
STAB STRING	5,875	2,250	1,21	26,35
DRILL COLLAR	4,750	2,250	113,71	140,06
JAR	4,750	2,250	8,91	148,97
DRILL COLLAR	4,750	2,250	18,94	167,91
HW DRILL PIPE	3,500	2,125	136,20	304,11
DP 3 1/2"	3,500	3,602	788,65	1092,76
X-OVER	6,875	2,500	1,02	1093,78
DP 5 1/2"	5,500	4,780		1093,78

BHA seq: 7 BHA category: BHA description: Fishing wireline string

BHA no: 7

String component	OD in	ID in	Length m	Acc length m
OVERSHOT	3,500	2,500	0,60	0,60
X-OVER	4,750		0,50	1,10
DP 3 1/2"	3,500	2,602	1061,34	1062,44
X-OVER	5,000	2,500	1,02	1063,46

	DP 5 1/2"	5,500	4,780	2533,40	3596,86
	X-OVER	6,875	3,375	0,58	3597,44
	CCTS	6,625	2,500	1,18	3598,62
	SIDE ENTRY SUB	6,125	3,750	1,60	3600,22

BHA seq: 8 BHA category: BHA description: TCL assembly

BHA no: 8

String component	OD in	ID in	Length m	Acc length m
MDT	5,000		38,33	38,33
GR	3,375		1,68	40,01
ACTS	3,375		1,22	41,23
TCC-BF	3,375		0,91	42,14
LEH-QT	3,375		0,50	42,64
OVERSHOT	3,500	2,500	0,60	43,24
X-OVER	4,750		0,50	43,74
DP 3 1/2"	3,500	2,602	1061,34	1105,08
X-OVER	5,000	2,500	1,02	1106,10
DP 5 1/2"	5,500	4,780	2533,40	3639,50
X-OVER	6,875	3,375	0,58	3640,08
CCTS	6,625	2,500	1,18	3641,26
SIDE ENTRY SUB	6,125	3,750	1,60	3642,86
DP 5"	5,000	4,280		3642,86

BHA seq: 9 BHA category: Drilling BHA description: 6"x7" drilling assembly

BHA no: 9

String component	OD in	ID in	Length m	Acc length m
ROCK BIT	6,000		0,19	0,19
NEARBIT STAB	5,875	2,250	1,47	1,66
DRILL COLLAR	4,750	2,250	18,96	20,62
STAB STRING	5,875	2,000	1,21	21,83
DRILL COLLAR	4,750	2,250	94,75	116,58
JAR	4,688	2,250	8,91	125,49
DRILL COLLAR	4,750	2,250	18,94	144,43
DP 3 1/2"	3,500	2,125	924,85	1069,28
X-OVER	5,000	2,500	1,02	1070,30
DP 5 1/2"	5,500	4,780		1070,30

BHA seq: 10 BHA category: Drilling BHA description: 6" drilling assembly

BHA no: 10

String component	OD in	ID in	Length m	Acc length m
PDC BIT	6,000		0,22	0,22
NAVIDRILL M1/XL 0	4,750		8,92	9,14
FLOAT SUB	4,815		0,43	9,57
STAB STRING	5,875		1,41	10,98
MWD, PWD	4,750		29,59	40,57
STAB STRING	5,875	2,250	1,21	41,78
DRILL COLLAR	4,750	2,250	142,13	183,91
HW DRILL PIPE	3,500	2,125	18,13	202,04
JAR	4,750	2,250	8,91	210,95
HW DRILL PIPE	3,500	2,125	136,20	347,15
DP 3 1/2"	3,500	3,602	1080,80	1427,95
X-OVER	6,875	2,500	1,02	1428,97
DP 5 1/2"	5,500	4,780		1428,97

BHA seq: 11 BHA category: Drilling BHA description: 6" rotary assembly

BHA no: 11

String component	OD in	ID in	Length m	Acc length m
PDC BIT	6,000		0,22	0,22
NB STAB W/FL	5,750	2,250	1,47	1,69
PONY COLLAR	4,750	2,125	4,54	6,23
STAB STRING	5,875	2,250	1,41	7,64
MWD, PWD	4,750		29,73	37,37
STAB. W/TOTCO	5,875	2,250	1,21	38,58
DRILL COLLAR	4,750	2,250	142,13	180,71
HW DRILL PIPE	3,500	2,125	18,13	198,84
JAR	4,688	2,250	8,91	207,75
HW DRILL PIPE	3,500	2,125	136,20	343,95
DP 3 1/2"	3,500	2,500	1080,80	1424,75
X-OVER	7,000	2,500	1,02	1425,77
DP 5 1/2"	5,500	4,780		1425,77

6 Appendices

Appendix A Operational listing

Operations

Wellbore: 6406/03-006

Time from	Time to	Time used	Depth mMD	Act code	---- Status ---- During opr	End of opr	Description of activities
20.09.2002.12:00	00:00	12,0		MNMU	OK	OK	Rig transferred from well 6608/10-F3H at 1200 hrs. In transit from Norne to Tyrihans. Position at 2400 hrs: N 65 deg. 17' 10". E 007 deg. 29' 54" Distance sailed: 45,5 nm. Distance to go: 32,5 nm. Average speed: 3,7 knots.
21.09.2002.00:00	06:00	6,0		MNMU	OK	OK	Rig in transit from Norne to Tyrihans. Position at 0600 hrs: N 64 deg. 54' 13". E 007 deg. 03' 19" Distance sailed: 71,1 nm. Distance to go: 6,9 nm. Average speed: 3,9 knots. ETA location: 0745 hrs.
21.09.2002.06:00	08:00	2,0		MNMU	OK	OK	Continued rig move to Tyrihans. Meanwhile continued work on IBOP.
21.09.2002.08:00	14:00	6,0		MNPU	OK	OK	DP field arival testing. Meanwhile L/O HOT and double 5" DP. M/U new HOT and CMT stand and racked in derrick. Rearanged DP in derrick.
21.09.2002.14:00	15:00	1,0		CERU	OK	OK	M/U 30" CART and racked in derric.
21.09.2002.15:00	19:00	4,0	277,0	DTPU	OK	OK	P/U 36" HO pre-made BHA and ran in on 5 1/2" DP to 277 m.
21.09.2002.19:00	19:30	0,5	277,0	DUSU	OK	OK	Tested Anderdrift.
21.09.2002.19:30	20:00	0,5	277,0	DTDU	OK	OK	Spaced out to tag sea bed, made up drilling doubles.
21.09.2002.20:00	22:00	2,0	297,0	DTDU	OK	OK	Tagged sea bed at 297 m. Rov confirmed rig position. Deployed Buoys.
21.09.2002.22:00	00:00	2,0	308,0	DDRU	OK	OK	Drilled 17 1/2" hole, open to 36" from 297 m to 308 m. Parameters: Flow 1000-2000 lpm, RPM 30-50, WOB 0-1mt. Swept hole with 10 m3 hivis every 10 to 15 m drilled.
22.09.2002.00:00	06:00	6,0	343,0	DDRU	OK	OK	Drilled 17 1/2" hole, open to 36" from 308 m to 343 m. Parameters: Flow 4500-4750 lpm, RPM 80-100, WOB 0-3 mt. Swept hole with 10 m3 hivis every 10 to 15 m drilled.
22.09.2002.06:00	07:30	1,5	360,0	DDRU	OK	OK	Drilled 36" hole from 343 m to 357 m. (17 1/2" hole to 360 m) Parameters: Flow: 4600 lpm, RPM: 70-100, WOB: 1-5 mt. Swept hole with 10 m3 hivis every 10 - 15 m drilled.
22.09.2002.07:30	08:00	0,5	360,0	DUSU	OK	OK	ROV checked space-out. Inclination reading from Anderdrift at TD: 2,0 deg.
22.09.2002.08:00	08:30	0,5	360,0	DCAU	OK	OK	Sweept hole with 35 m3 hivis pill. Displaced to 1,35 sg mud, pumped 1,5 x hole volume.
22.09.2002.08:30	11:00	2,5		DTCU	OK	OK	POOH to seabed, no overpull. POOH and L/D BHA.
22.09.2002.11:00	11:30	0,5		CERU	OK	OK	Performed pre-job meeting.
22.09.2002.11:30	12:30	1,0		CERU	OK	OK	R/U to run 30" conductor.
22.09.2002.12:30	16:00	3,5		CARU	OK	OK	P/U and ran 30" Conductor. R/D 30" handling equipment. Ran 5" cement stinger.
22.09.2002.16:00	17:00	1,0		CARU	OK	OK	M/U 30" CART, installed 2 bulls-eyes and filled conductor with sea water.
22.09.2002.17:00	18:30	1,5		CARU	OK	OK	Filled Conductor with sea water, ROV closed ball valve on RT. Continued to run conductor on 5 1/2" DP.

22.09.2002.18:30	19:30	1,0	357,0	CARU	OK	OK	Stabbed Conductor into 36" hole while observing with ROV, continued RIH to setting depth. M/U cement std. Circulated at 500 lpm, 5 bar.
22.09.2002.19:30	21:00	1,5	357,0	CARU	OK	OK	ROV confirmed 3 m. stickup, circulated 60 m3 sea water at 4000 lpm, 104 bar. Pressure tested cmt surface lines to 150 bar/5 min.
22.09.2002.21:00	21:30	0,5		CARU	OK	OK	Performed pre-job meeting prior to cmt job.
22.09.2002.21:30	22:00	0,5	357,0	CCCU	OK	E FAIL	Lined up to cmt unit and prepared to performe cement job. Problems with Mix Flow Meters.
22.09.2002.22:00	23:30	1,5	357,0	CSOD	E FAIL	OK	Trouble shot on Chemical Mix Flow Meter. Resolved data problems on cement unit.
22.09.2002.23:30	00:00	0,5	357,0	CSSU	OK	OK	Mixed and pumped 1,56 sg lead slurry at 800-1050 lpm.
23.09.2002.00:00	01:30	1,5	357,0	CSSU	OK	OK	Continued mixing and pumping a total of 31 m3 1,56 sg lead slurry and 23 m3 1,95 sg tail slurry. Displaced cement with 7,58 m3 sea water.
23.09.2002.01:30	06:00	4,5	357,0	CSCW	OK	OK	WOC. Stick-up: 3 m. Bulls eyes: Port side: 1,0 deg, aft: 1,5 deg.
23.09.2002.06:00	08:00	2,0	357,0	CSCW	OK	OK	WOC.
23.09.2002.08:00	09:00	1,0		CTTU	OK	OK	Released 30" CART and racked cemet stand in derrick. Pulled out to 5 m below 30" housing, flushed housing area for 5 min at 4700 lpm.
23.09.2002.09:00	10:00	1,0		CTTU	OK	OK	Racked 30" CART and pulled out 5" cmt stinger.
23.09.2002.10:00	12:00	2,0		CTTU	OK	E FAIL	L/O 30" CART assy and cement head.
23.09.2002.12:00	15:00	3,0		DERD	E FAIL	OK	Change out top drive IBOP.
23.09.2002.15:00	15:30	0,5		DTPU	OK	OK	Performed pre-job meeting prior to pick up BHA.
23.09.2002.15:30	16:00	0,5		DTPU	OK	OK	M/U 17 1/2" BHA and MWD.
23.09.2002.16:00	16:30	0,5		DDOW	OK	OK	Waited on crane due to helicopter arival.
23.09.2002.16:30	17:00	0,5		DTPU	OK	E FAIL	Continued M/U 17 1/2" BHA.
23.09.2002.17:00	18:00	1,0		DEMD	E FAIL	OK	Attempted to calibrate MWD tool, no go. Broke and inspected MWD connection.
23.09.2002.18:00	21:30	3,5	340,0	DTPU	OK	OK	Calibrated MWD tool and ran in with 17 1/2" BHA to 20 m above 30" housing. Confirmed rig position. Ran in and stabbed BHA into housing. Ran in to 340 m
23.09.2002.21:30	22:00	0,5	354,0	DTPU	OK	OK	Washed down from 340 m and tag cement at 354 m.
23.09.2002.22:00	00:00	2,0	357,0	CDDU	OK	OK	Drilled out cement and shoe track at 357 m. Parameters; Flow: 4512 lpm, Pressure 194 bar, 30-50 RPM, 0-5 mt WOB. Swept hole with 5 m3 hivis pill.
24.09.2002.00:00	00:30	0,5	359,0	CDDU	OK	OK	Continued to drill out shoe track and rat hole to 359 m. Pumped 5 m3 hivis sweep.
24.09.2002.00:30	01:00	0,5	359,0	CDDU	OK	OK	Reamed shoe several times, no obstructiones.
24.09.2002.01:00	06:00	5,0	495,0	DDRU	OK	OK	Drilled 17 1/2" hole from 359 m to 495 m. Parameters; Flow 4550 lpm, Pressure 195 bar, 40-90 RPM, 2-11 mt WOB. Pumped 5 m3 hivis sweeps every 15 m drilled.
24.09.2002.06:00	00:00	18,0	1190,0	DDRU	OK	OK	Drilled 17 1/2" hole from 495 m to 1190 m. Parameters: 4500 lpm, 204 bar, 120-180 RPM, 8-14 mt WOB, 4-12 kNm. Pumped 5 m3 hivis every 15 m drilled.
25.09.2002.00:00	06:00	6,0	1371,0	DDRU	OK	OK	Drilled 17 1/2" hole from 1190 m to 1371m. Parameters: 4500 lpm, 210 bar, 180-190 RPM, 10-14 mt WOB, 8-12 kNm. Pumped 5 m3 hivis every 15 m drilled.
25.09.2002.06:00	15:00	9,0	1620,0	DDRU	OK	OK	Drilled 17 1/2" hole from 1371 m to 1620 m. Parameters: 4500 lpm, 218 bar, 170 RPM, 10-18 mt WOB, 6-11 kNm. Pumped 5 m3 hivis pill every 15 m drilled.
25.09.2002.15:00	20:30	5,5	1758,0	DDRU	OK	E FAIL	Drilled 17 1/2" hole from 1620 m to 1758 m with 1,20 sg NaCl-Brine. Parameters: 3400 lpm, 150 bar, 180 RPM, 10-18 mt WOB, 5-11 kNm. Pumped 5 m3 hivis pill every 15 m3 drilling.
25.09.2002.20:30	23:00	2,5	1758,0	DERD	E FAIL	OK	Stopped drilling due to mud pump no. 1 shut down. Reciprocated drill pipe. Pumped 5 m3 hivis pill and chased pill with 1,20 sg NaCl brine at 2000 lpm for 0,5 hrs. Stopped pumping, continued to reciprocate drill pipe untill mud pump no. 1 was repaired.

25.09.2002.23:00	00:00	1,0	1769,0	DDRU	OK	OK	Drilled 17 1/2" hole from 1758 m to 1769 m with 1,20 sg NaCl-Brine. Parameters: 3400 lpm, 150 bar, 180 RPM, 10-18 mt WOB, 5-11 kNm.
26.09.2002.00:00	00:30	0,5	1780,0	DDRU	OK	OK	Drilled 17 1/2" hole from 1769 m to TD at 1780 m with 1,20 sg NaCl-Brine. Parameters: 3400 lpm, 150 bar, 180 RPM, 10-18 mt WOB, 5-11 kNm.
26.09.2002.00:30	01:30	1,0	1780,0	DCAU	OK	OK	Pumped 11 m3 hivis pill and displaced hole to 1,30 sg Glydrill mud. Parameters: 4000 lpm, 200 bar, 150 rpm.
26.09.2002.01:30	06:00	4,5	1780,0	DTCU	OK	OK	POOH. Tight hole from 1691 m to 1562 m, worked tight area with 10-15 mt overpull. Continued to POOH from 1562 m to 1125 m.
26.09.2002.06:00	09:00	3,0	366,0	DTCU	OK	OK	POOH with 17 1/2" BHA from 1125 m to 366 m. Topped up hole with 25 m3 1,30 sg mud and pulled into shoe.
26.09.2002.09:00	12:00	3,0		DTCU	OK	OK	POOH. LD 2 ea BHA modules on deck.
26.09.2002.12:00	14:00	2,0		CERU	OK	OK	MU and drifted cement stand. Racked stand in derrick.
26.09.2002.14:00	16:30	2,5		CERU	OK	OK	R/U to run 13 3/8" casing. Installed BX frame elevator and PS30 slips.
26.09.2002.16:30	17:00	0,5		CERU	OK	OK	Performed pre-job meeting and risk assessment with involved personnel.
26.09.2002.17:00	18:00	1,0		CARU	OK	OK	PU Shoe jnt. Checked shoe and installed centralizer.
26.09.2002.18:00	18:30	0,5		CERU	OK	OK	Performed pre-job meeting and risk assessment with night crew.
26.09.2002.18:30	20:00	1,5		CARU	OK	OK	PU and thread locked shoetrack. Installed centralizers 1 ea on 4 first jnts. Checked shoetrack for backflow and integrety of float.
26.09.2002.20:00	23:30	3,5	268,0	CARU	OK	OK	Ran 13 3/8" casing to sea bed. Filled string every 5 jnts with 1,20 sg mud.
26.09.2002.23:30	00:00	0,5	295,0	CARU	OK	OK	Positioned rig over 30" housing. Stabbed 13 3/8" casing into 30" housing assisted by ROV.
27.09.2002.00:00	06:00	6,0	907,0	CARU	OK	OK	Ran 13 3/8" casing to 907 m. Filled string every 5 jnt with 1,20 sg mud. Running speed: 9 jnts/hrs. Have run a total of 75 jnts, 48 jnts remaining.
27.09.2002.06:00	12:30	6,5	1470,0	CARU	OK	OK	Ran 13 3/8" csg from 907 - 1470 m. Filled string with 1.2 SG mud every 5th jnt. Running speed : 7 jnts / hr.
27.09.2002.12:30	13:00	0,5	1470,0	CARU	OK	OK	Filled pipe and changed to 5 1/2" elevator.
27.09.2002.13:00	14:00	1,0	1470,0	CARU	OK	OK	PU and MU 18 3/4" WH housing with preinstalled plugs and slimhole WB. Removed PS-30 slips and set WH housing in RT.
27.09.2002.14:00	16:30	2,5	1760,0	CARU	OK	OK	RIH with 13 3/8" csg on 5 1/2" DP to tight spot at 1545 m (15 Ton). Washed down from 1545 - 1760 with 500 LPM.
27.09.2002.16:30	18:00	1,5	1760,0	CARU	OK	OK	PU cmt stand and connected hydraulic lines and hose. Washed down last stand with 1000 LPM / 24 Bar. Landed 18 3/4" WH in 30" housing and set down all string weight. Performed over pull test to 25 ton.
27.09.2002.18:00	19:00	1,0	1773,0	CCCU	OK	OK	Circulated 131 m3 of 1.20 SG mud with 2300 LPM / 45-25 Bar. Meanwhile held pre-job meeting with involved personel prior to cmt job.
27.09.2002.19:00	20:00	1,0	1773,0	CSSU	OK	OK	Tested cmt lines to 200 Bar. Pumped 10 m3 sea water spacer from cmt unit. Dropped ball for bottom wiper plug.
27.09.2002.20:00	23:30	3,5	1773,0	CSSU	OK	OK	Mixed and pumped 182,5 m3 1.56 SG lead slurry with 1000 LPM.
27.09.2002.23:30	00:00	0,5	1773,0	CSSU	OK	OK	Mixed and pumped 20 m3 1.92 SG tail slurry with 800-900 LPM.
28.09.2002.00:00	01:00	1,0	1773,0	CSSU	OK	OK	Released dart and displaced same with cmt unit. Sheared plug at 3250 l / 150 Bar. Switched to rig pumps and displaced cmt slurry with 3000 LPM / 46-155 Bar. Reduced rate to 500 LPM / 80 Bar and bumped plug with 155 Bar / 5 min. Checked for back flow. Plug bumped at 4750 stks (equals to appr. 97 % efficiency with calculated volume of 113 m3).
28.09.2002.01:00	02:00	1,0	1773,0	CERU	OK	OK	RD cmt hose and hydraulic lines. Released CART tool with 5 right turns and pulled clear of WH. Racked back cmt stand. ROV inspected gasket area and bulls eyes, no changes.
28.09.2002.02:00	03:30	1,5		CERU	OK	OK	Moved rig 40 m of location and POOH with CART tool. LD CART tool.
28.09.2002.03:30	05:00	1,5		CERU	OK	OK	PU cmt stand from derrick and LD same.
28.09.2002.05:00	06:00	1,0		BBRU	OK	OK	RU on drill floor to run riser and BOP.
28.09.2002.06:00	06:30	0,5		BBRU	OK	OK	Performed pre-job meeting and risk assessment prior to run BOP and riser.

28.09.2002.06:30	07:30	1,0		BBRU	OK	OK	RU riser guide head. RD casing tong.
28.09.2002.07:30	08:30	1,0		BBRU	OK	OK	Changed elevator inserts. LD 350 mt bails and bail links. Installed 750 mt bails and elevator.
28.09.2002.08:30	09:30	1,0		BBRU	OK	OK	Cleared rig floor, rigged up control lines for riser spider and torque wrenches. Installed riser running tool and function tested same.
28.09.2002.09:30	12:00	2,5		BBRU	OK	OK	RU torque wrenches. Evaluated weather condition, carried out risk assessment prior to pick up gimbal and spider with crane.
28.09.2002.12:00	13:30	1,5		BBRU	OK	OK	Installed gimbal and spider.
28.09.2002.13:30	15:00	1,5		BBRU	OK	OK	MU guide funnel to BOP. PU and MU 10' and 20' riser pup jnts.
28.09.2002.15:00	17:00	2,0		BBRU	OK	OK	Installed riser yoke on port crane.
28.09.2002.17:00	20:30	3,5		BBRU	OK	OK	PU and MU 65' riser jnt to double of pup jnts. Skidded BOP under rotary and MU same to riser jnts.
28.09.2002.20:30	21:30	1,0		BBRU	OK	OK	Attached mux clamps on lower riser jnt and lowered BOP through splash zone. Filled up K/C/conduit lines and pressure tested same to 320 Bar / 10 min.
28.09.2002.21:30	00:00	2,5	86,0	BBRU	OK	OK	Ran BOP and riser from 20 m to 86 m. Pressure tested K/C/conduit lines 20/330 Bar for 5/10 min after jnt #6.
29.09.2002.00:00	04:00	4,0	260,0	BBRU	OK	OK	Ran BOP and riser from 86 m to 260 m. Pressure tested K/C/conduit lines 20/330 Bar for 5/10 min after jnt #12.
29.09.2002.04:00	04:30	0,5	260,0	BBRU	OK	OK	RD riser yoke from port crane and RU to handle slip jnt.
29.09.2002.04:30	06:00	1,5	260,0	BBWW	OK	OK	WOW to PU slip jnt from riser deck to cat walk. Wind 30 knts / 2-3 deg roll/pitch.
29.09.2002.06:00	14:30	8,5	260,0	BBWW	OK	OK	WOW to pick up slip jnt from riser deck. Meanwhile performed maintenance on top drive and iron roughneck. Pressure tested stp manifold to 345 Bar.
29.09.2002.14:30	15:00	0,5	260,0	BBRU	OK	OK	Lifted slip jnt from riser deck and LD same on aft catwalk.
29.09.2002.15:00	17:00	2,0		BBRU	OK	OK	MU slip jnt to BOP. Filled K/C/conduit lines, installed mux cable clamps and landed out slip jnt in spider.
29.09.2002.17:00	20:30	3,5		BBRU	OK	OK	MU landing jnt and lowered riser and BOP. Installed goose necks and safety slings for K/C/conduit lines. Pressure tested K/C lines to 30/330 bar for 5/10 min.
29.09.2002.20:30	21:30	1,0		BBRU	OK	OK	Installed mux cables saddles.
29.09.2002.21:30	22:30	1,0		BBRU	OK	OK	Installed riser tension wires.
29.09.2002.22:30	00:00	1,5		BBRU	OK	OK	Moved rig over location and prepared to land BOP.
30.09.2002.00:00	00:30	0,5		BBRU	OK	OK	Landed BOP on WH. Set down 50 mt, closed connector and performed 25 mt over pull test.
30.09.2002.00:30	02:00	1,5		BBRU	OK	OK	Opened slip jnt and stroke out same. LD landing jnt.
30.09.2002.02:00	03:00	1,0		BBRU	OK	E FAIL	PU and installed diverter element. Meanwhile attempted to pressure test casing/WH connector to 330 bar, neg. Observed leakage of 20 bar/10 min.
30.09.2002.03:00	05:00	2,0		DERD	E FAIL	OK	LD diverter element. PU landing jnt and MU same. Collapsed slip jnt and closed same.
30.09.2002.05:00	06:00	1,0		DERD	E FAIL	OK	Unlatched BOP and moved rig off location. ROV inspected VX gasket ring, observed damages on upper part of ring. Removed and returned to surface with same.
30.09.2002.06:00	07:30	1,5		DERD	E FAIL	OK	ROV recovered VX gasket to surface. Inspected connector with sea owl.
30.09.2002.07:30	08:30	1,0		DERD	E FAIL	OK	Installed brush on sea owl. Ran in and cleaned connector face with same.
30.09.2002.08:30	11:30	3,0		DERD	E FAIL	OK	Evaluated damages on VX gasket and observations inside connector. Installed VX gasket w/ Hycar inserts in well head with ROV.
30.09.2002.11:30	12:00	0,5		DERD	E FAIL	OK	Moved rig over WH and landed BOP with 25 mt down weight. Latched connector and confirmed same with 25 mt overpull.
30.09.2002.12:00	13:00	1,0		DERD	E FAIL	OK	Pressure tested connector/casing against blind shear ram to 20/330 bar 5/10 min.
30.09.2002.13:00	13:30	0,5		DERD	E FAIL	OK	Opened slip jnt and stroke out same. LD landing jnt.
30.09.2002.13:30	15:30	2,0		DERD	E FAIL	OK	PU and installed diverter element. LD diverter handling tool.
30.09.2002.15:30	17:00	1,5		BBRU	OK	OK	RD riser handling gear. LD gimbal and spider and installed master bushings.

30.09.2002.17:00	18:30	1,5		BBRU	OK	OK	LD riser handling tool. RD riser gripper head from hydraracker and removed same from rig floor.
30.09.2002.18:30	19:30	1,0		BBRU	OK	E FAIL	RD 750 mt bails.
30.09.2002.19:30	23:00	3,5		DERD	E FAIL	OK	Changed out leaking IBOP. Installed new IBOP.
30.09.2002.23:00	00:00	1,0		BBRU	OK	OK	Installed 350 mt bails, bail links and BX-elevators.
01.10.2002.00:00	00:30	0,5		BBRU	OK	OK	Performed pre-job meeting and risk assessment prior to MU 12 1/4" BHA.
01.10.2002.00:30	02:00	1,5		DTPU	OK	OK	PU and MU 2 ea MWD modules. Broke off premade bit and MU new. Tested MWD and initiated memory on tool.
01.10.2002.02:00	04:30	2,5		DTDU	OK	OK	MU 12 1/4" BHA.
01.10.2002.04:30	06:00	1,5	930,0	DTDU	OK	OK	RIH with 12 1/4" BHA on 5" DP. Installed auto DP slips.
01.10.2002.06:00	07:30	1,5	1209,0	DTDU	OK	OK	RIH from 930 m to 1209 m on 5"DP. Changed over to 5 1/2" inserts on elevator and autoslips. MU drift sub and x-over.
01.10.2002.07:30	08:00	0,5	1209,0	DTDU	OK	E FAIL	Filled DP and tested MWD with 2300 lpm, 60 bar.
01.10.2002.08:00	08:30	0,5	1209,0	DERD	E FAIL	OK	Repaired leaking hose on top drive torque wrench.
01.10.2002.08:30	09:30	1,0	1209,0	BBDU	OK	E FAIL	MU side entry sub and kelly cock to top drive. Attempted to pressure test mud hose, kelly cock and IBOP. neg.
01.10.2002.09:30	12:00	2,5	1209,0	DERD	E FAIL	OK	Trouble shot, unable to obtain good pressure test.
01.10.2002.12:00	14:00	2,0	1209,0	BBOU	OK	OK	MU top drive to DP and opened compensator. Spaced out for function testing of BOP. Meanwhile pressure tested mudhose and IBOP to 330 / 10 min. Function tested diverter with 1000 lpm, 10bar.
01.10.2002.14:00	14:30	0,5	1209,0	DTDU	OK	OK	LD kelly cock and side entry sub.
01.10.2002.14:30	16:00	1,5	1739,0	DTDU	OK	OK	RIH on 5 1/2" DP from 1209 m to 1739 m.
01.10.2002.16:00	17:00	1,0	1743,0	CDDU	OK	OK	Tagged cement at 1739 m. MU top drive and drilled firm cement form 1739 m to 1743 m.
01.10.2002.17:00	17:30	0,5	1743,0	DDOU	OK	OK	Spaced out and performed kick drill.
01.10.2002.17:30	00:00	6,5	1744,0	CDDU	OK	OK	Drilled wiper plugs and float. Used various drilling parameters due to slow progress. Meanwhile held pre-job meeting with all involved personel prior to displacing well to OBM and drilling of 12 1/4" section.
02.10.2002.00:00	03:00	3,0	1766,0	CDDU	OK	OK	Drilled hard cement from 1744 - 1766 m. Parameters: 3300 lpm / 130 bar / 75 rpm / 3-10 kNm / WOB 3-7 mt.
02.10.2002.03:00	05:00	2,0	1766,0	DCAU	OK	OK	Displaced well to 1,51 sg OBM by pumping 8 m3 hivis spacer ahead of OBM. Displaced K/C/boster line to OBM.
02.10.2002.05:00	06:00	1,0	1772,0	CDDU	OK	OK	Cont. drilled hard cement from 1766 - 1772 m. Parameters: 3300 lpm / 130 bar / 75 rpm / 3-10 kNm / WOB 3-7 mt.
02.10.2002.06:00	07:00	1,0	1780,0	CDDU	OK	OK	Drilled shoe track and rat hole from 1772 to 1780 m. Reamed area several times, no obstructions. Parameters: 3300 lpm / 297 bar / 75 rpm / 2-6 mt WOB / 2-5 kNm.
02.10.2002.07:00	07:30	0,5	1783,0	DDRU	OK	OK	Drilled 3 m new formation from 1780 to 1783 m. Parameters: 3300 lpm / 284 bar / 75 rpm / 2-6 mt WOB / 2-5 kNm.
02.10.2002.07:30	08:30	1,0	1783,0	DCAU	OK	OK	Circulated BU, spotted 5 m3 OBM hivis pill on bottom.
02.10.2002.08:30	09:30	1,0	1783,0	EXFU	OK	OK	Pulled into shoe and performed FIT to 1,83 sg.
02.10.2002.09:30	18:00	8,5	1954,0	DDRU	OK	OK	Drilled 12 1/4" hole from 1783 to 1954 m. Parameters: 3300 lpm / 290 bar / 70-150 rpm / 2-14 mt WOB / 2-9 kNm.
02.10.2002.18:00	00:00	6,0	2101,0	DDRU	OK	OK	Drilled 12 1/4" hole from 1954 m to 2101 m. Increased MW in steps from 1,51 sg to 1,55 sg while drilling. Parameters: 3300 lpm / 290 bar / 75-150 rpm / 2-8 mt WOB / 2-9 kNm.
03.10.2002.00:00	04:00	4,0	2230,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2101 m to 2230 m. Increased MW from 1,55 sg to 1,63 sg while drilling. Parameters: 3300 lpm / 310 bar / 150-160 rpm / 2-6 mt WOB / 3-9 kNm.
03.10.2002.04:00	06:00	2,0	2270,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2230 m to 2270 m. Parameters: 3400 lpm / 320 bar / 80-150 rpm / 2-8 mt WOB / 3-15 kNm / ECD 1.64-1.65 SG.
03.10.2002.06:00	08:00	2,0	2288,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2270 - 2288 m. Parametres : 3400 LPM / 320 Bar / 80-150 RPM / 3-14 KNm / 2-8 Ton WOB / ECD 1.64-1.65 SG.

03.10.2002.08:00	10:00	2,0	2288,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2288 - 2302 m with 1 mud pump / 2300 LPM. Meanwhile changed out swab on mud pump #1.
03.10.2002.10:00	23:30	13,5	2522,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2302 - 2522 m. Parametres : 3400 LPM / 320-325 Bar / 80-150 RPM / 3-14 KNm / 2-8 Ton WOB.
03.10.2002.23:30	00:00	0,5	2522,0	ECSU	OK	OK	Circulated BU while reciprocating string with 3400 LPM / 325 Bar / 80 RPM / ECD 1.64-1.65 SG.
04.10.2002.00:00	02:30	2,5	2522,0	ECSU	OK	OK	Cont. circulating BU. Performed 10-10-10 pump-off test and circulated BU again. Max. gas fra pump-off test 1.4 % / back ground gas level after BU 0.3 %.
04.10.2002.02:30	03:00	0,5	2522,0	ECSU	OK	OK	Evaluated results from pump-off tests and discussed with town.
04.10.2002.03:00	04:00	1,0	2522,0	DCAU	OK	OK	Circulated with 3400 LPM and performed pump-off test while reducing weight of kill mud from 1.75 SG to 1.72 SG.
04.10.2002.04:00	05:30	1,5	2522,0	DCAU	OK	OK	Circulated with 3000-3400 LPM while increasing weight of active mud system from 1.63 SG to 1.72 SG.
04.10.2002.05:30	06:00	0,5	2530,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2522- 2530 m.
04.10.2002.06:00	09:00	3,0	2594,0	DDRU	OK	E FAIL	Drilled 12 1/4" hole from 2530 - 2594 m. Parametres : 3400 LPM / 355 Bar / 80-120 RPM / 4-13 KNm / 2-8 Ton WOB / 1.73-1.74 SG ECD.
04.10.2002.09:00	11:00	2,0	2440,0	DERD	E FAIL	OK	Leak in goose neck connection on top drive. RU mud bucket and POOH to 2440 m above Nise Fm. MU circ. swedge and cmt hose to string.
04.10.2002.11:00	13:00	2,0	2440,0	DDRU	OK	OK	Increased weight of active mud system from 1.72 SG - 1.75 SG to include riser margin based on further evaluation of results from pump-off tests. Circulated with 1400 LPm / 100 Bar through cmt hose while rotating RT.
04.10.2002.13:00	14:00	1,0	2594,0	DERD	E FAIL	OK	RD cmt hose and circ. swedge. RIH to 2594 m.
04.10.2002.14:00	15:30	1,5	2594,0	DDRU	OK	OK	Circulated and increased MW to 1.75 SG with 3150 LPM / 330 Bar / 40 RPM.
04.10.2002.15:30	22:00	6,5	2715,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2594 - 2715 m. Parametres : 3300 LPM / 350 Bar / 80-120 RPM / 5-16 KNm / 4-8 Ton WOB / 1.76-1.77 SG ECD.
04.10.2002.22:00	00:00	2,0	2755,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2715 - 2755 m with 2300 LPM. Mud pump #2 down due to washed out swab. Prepared mud pump #3 for use.
05.10.2002.00:00	06:00	6,0	2872,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2755 - 2872 m. Parametres : 3150 LPM / 325 Bar / 80-150 RPM / 6-16 KNm / 4-10 Ton WOB / 1.76-1.77 SG ECD. Performed pit drill.
05.10.2002.06:00	07:00	1,0	2900,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2872 - 2900 m.
05.10.2002.07:00	09:30	2,5	2900,0	DCAU	OK	OK	Circulated hole clean with 3200 LPM / 355 Bar / 120 RPM. Took Nodeco readings.
05.10.2002.09:30	13:00	3,5	1770,0	DTCU	OK	OK	POOH 5 1/2" DP into 13 3/8" csg shoe. Pulled first 5 std wet.
05.10.2002.13:00	14:30	1,5	1200,0	DTCU	OK	OK	Took Nodeco readings and wiped/reamed liner packer setting depth area at 1710 - 1730 m. POOH with 5 1/2" DP to 1200 m. Boosted riser with 2000 LPM while POOH.
05.10.2002.14:30	17:30	3,0	220,0	DCAU	OK	OK	Changed to 5" inserts in elevator and slips. LD X/O and drift sub. POOH with 5" DP to 220 m.
05.10.2002.17:30	20:30	3,0		DTDU	OK	OK	POOH with 12 1/4" BHA. LD 2 ea. MWD modules.
05.10.2002.20:30	21:00	0,5		CARU	OK	OK	Cleared drill floor. RU PS-30 slips and changed to 9 5/8" inserts in Varco BX elevator.
05.10.2002.21:00	21:30	0,5		CARU	OK	OK	Held tool-box talk prior to PU and run 9 5/8" liner.
05.10.2002.21:30	23:00	1,5	40,0	CARU	OK	OK	PU and MU shoetrack. Checked same for flow through, backerlocked and installed 1 ea. centr. on first 4 jnts.
05.10.2002.23:00	00:00	1,0	112,0	CARU	OK	OK	RIH with 9 5/8" liner jnts to 112 m. Filled string every 5th jnt.
06.10.2002.00:00	06:00	6,0	970,0	CARU	OK	OK	RIH with 9 5/8" liner jnts from 112 - 970 m. Filled string every 5th jnt. Running speed : 12 jnts / hr. Ran a total of 83 jnts, 17 jnts remaining.
06.10.2002.06:00	08:30	2,5	1170,0	CARU	OK	OK	RIH with 9 5/8" liner to 1170 m.

06.10.2002.08:30	11:00	2,5	1180,0	CARU	OK	OK	Changed to 5 1/2" inserts in BX elevator. PU liner hanger, installed plug and MU same. Filled PBR with fresh water. Broke circulation with 800 LPM / 10 Bar. Removed PS-30 slips and installed auto-slips.
06.10.2002.11:00	14:30	3,5	1773,0	CARU	OK	OK	RIH with 9 5/8" liner on 5 std 5 1/2" HWDP and 5 1/2" DP.
06.10.2002.14:30	15:00	0,5	1773,0	CARU	OK	OK	Broke circ. at 13 3/8" csg shoe with 800 LPM / 22 Bar.
06.10.2002.15:00	20:30	5,5	2870,0	CARU	OK	OK	RIH with 9 5/8" liner from 1773 - 2870 m with reduced running speed of 5 min/std. Filled pipe every 5th.
06.10.2002.20:30	21:30	1,0	2899,0	CARU	OK	OK	MU topdrive and increased pumprate in steps to 1650 LPM / 70 Bar.Circulated down last stand to hard fill at 2899 m.
06.10.2002.21:30	22:00	0,5	2899,0	CARU	OK	OK	Racked back 1 std. PU 5 1/2" DP pup jnt and cmt head from cat walk. MU same to string and installed hydraulic hoses.
06.10.2002.22:00	22:30	0,5	2897,0	CCCU	OK	OK	Broke circulation and increased pump rate in steps to 1650 LPM. Held tool box talk prior to cmt job. Observed losses to formation and reduced flowrate to 1100 LPM, still parly losses. Pumped a total of 70 m3, lost 11 m3.
06.10.2002.22:30	23:30	1,0	2897,0	CAOU	OK	C LOSS	Dropped ball and pumped down same with 500 LPM / 14 Bar. No returns. Lost 10 m3. Sheared ball seat with 166 Bar and set hanger according to Nodeco procedure. Meanwhile static losses of appr. 30 m3/hr with well on trip tank. Lost 3 m3.
06.10.2002.23:30	00:00	0,5	2897,0	CSOD	C LOSS	OK	Observed well on trip tank. No further static losses. Meanwhile prepared to weigh up reserve mud volumes to 1.75 SG.
07.10.2002.00:00	01:30	1,5	2897,0	CSOD	C LOSS	OK	Weighted up 100 m3 OBM from 1.51/ 1.66 SG - 1.75 SG prior to start cementing. Well stable on trip tank.
07.10.2002.01:30	02:30	1,0	2897,0	CAOU	OK	OK	Pumped 4 m3 Base oil and 20 m3 1.86 SG spacer with rig pumps. Increased pump rate in steps to 1200 LPM / 70 Bar. Lost 1 m3. Pressure tested cmt line to 200 Bar / 5 min.
07.10.2002.02:30	04:00	1,5	2897,0	CSOU	OK	OK	Mixed and pumped 26 m3 1.95 SG cmt slurry from the cmt unit. Increased pump rate in steps to 900 LPM / 50 Bar. Lost 8 m3. Released dart and displaced cmt to rig floor with 200 l.
07.10.2002.04:00	05:00	1,0		CSOU	OK	OK	Displaced cmt with rig pumps. Increased pump rate in steps to 2000 LPM. Steady losses of 50 % at all rates. Bumped plug after 2618 stks (calculated volume + 1/2 shoetrack) and held 120 Bar / 5 min. Lost a total of 33 m3 while displacing.
07.10.2002.05:00	05:30	0,5		CATU	OK	OK	Pressure tested 9 5/8" liner to 190 Bar / 5 min using rig pumps. Bled off and checked for back flow.
07.10.2002.05:30	06:00	0,5		CSOU	OK	OK	Disconnected hoses and LD 5 1/2" pup jnt and Nodeco cmt head.
07.10.2002.06:00	07:00	1,0		CAOU	OK	OK	Set 9 5/8" liner packer according to Nodeco procedure. Released RT and PU 2 std.
07.10.2002.07:00	07:30	0,5		CATU	OK	OK	Pressure tested liner packer/csg to 190 Bar/10 min using rig pumps.
07.10.2002.07:30	08:00	0,5	1690,0	BBDU	OK	OK	Function tested BOP.
07.10.2002.08:00	13:30	5,5		CTTU	OK	OK	POOH with 5 1/2" DP landing string. LD RT.
07.10.2002.13:30	15:00	1,5		DTDU	OK	OK	Cleared drillfloor. LD 8" jar from std i derrick.
07.10.2002.15:00	16:30	1,5		DTDU	OK	OK	PU 2 ea. MWD modules from deck and MU same to bit. Plugged into MWD tool and verfied tool functional.
07.10.2002.16:30	17:30	1,0	220,0	DTDU	OK	OK	RIH with 8 1/2" BHA.
07.10.2002.17:30	22:00	4,5	2000,0	DTDU	OK	OK	Installed DP auto slips and RIH with 5" DP. Tested MWD and filled pipe at 1000 m.
07.10.2002.22:00	00:00	2,0	2846,0	DTDU	OK	OK	MU X/O and drift sub. Changed to 5 1/2" inserts in elevator/slips and cont. RIH with 5 1/2" DP.
08.10.2002.00:00	00:30	0,5	2846,0	DTDU	OK	OK	Filled pipe and performed kick drill with night crew.
08.10.2002.00:30	01:00	0,5	2868,0	CDDU	OK	OK	Washed down with 700 LPM and tagged plug at 2868 m.
08.10.2002.01:00	06:00	5,0	2868,0	CDDU	OK	OK	Drilled wiperplug with different parametres, slow progress. Typical parametres : 700-1500 LPM / 30-60 RPM / 2-10 Ton WOB. Meanwhile reduced weight of active OBM volume from 1.75 SG to 1.66 SG.

08.10.2002.06:00	08:00	2,0	2869,0	CDDU	OK	OK	Drilled wiperplug / Landing shoulder with different parametres, slow progress. Reduced mudweight from 1.75 - 1.66 SG.
08.10.2002.08:00	11:00	3,0	2899,0	CDDU	OK	OK	Drilled firm cement in shoetrack. Parametres : 2500 LPM / 215 Bar / 60 RPM / 2-11 KNm / 2-8 Ton WOB.
08.10.2002.11:00	12:00	1,0	2903,0	EXFU	OK	OK	Reamed shoetrack and rathole. Drilled 3 m new formation, circ. hole clean and spotted 5 m3 Hi-vis OBM pill at bottom.
08.10.2002.12:00	13:30	1,5	2903,0	EXFU	OK	OK	Pulled bit inside csg shoe and performed FIT equal to 1.85 SG. Took SCR's and choke line friction readings.
08.10.2002.13:30	00:00	10,5	3088,0	DDRU	OK	OK	Drilled 8 1/2" hole from 2903 - 3088 m. Parametres : 2000-2500 LPM / 215-300 Bar / 80-150 RPM / 3-12 KNm / 3-8 Ton WOB.
09.10.2002.00:00	06:00	6,0	3188,0	DDRU	OK	OK	Drilled 8 1/2" hole from 3088 - 3188 m. Parametres : 2000-2500 LPM / 230-315 Bar / 80-140 RPM / 4-14 KNm / 4-10 Ton WOB.
09.10.2002.06:00	18:30	12,5	3385,0	DDRU	OK	E FAIL	Drilled 8 1/2" hole from 3188 - 3385 m. Parametres : 2250 LPM / 275 Bar / 100-140 RPM / 3-14 KNm / 3-8 Ton WOB. Simultaneously LD damaged 3 1/2" DP from derrick to pipedeck using Hydraracker and fwd mouse hole.
09.10.2002.18:30	20:30	2,0	3385,0	DERD	E FAIL	OK	Washed out liner swab on mud pump #2. Changed and replaced same. Meanwhile circulated with 1000 LPM from cmt unit and reciprocated string.
09.10.2002.20:30	22:00	1,5	3408,0	DDRU	OK	E FAIL	Drilled 8 1/2" hole from 3385 - 3408 m. Drilled with different parametres to try to obtain good MWD decoding on bottom. Achieved good MWD decoding while circulating with 1700-1800 LPM both off/on bottom.
09.10.2002.22:00	00:00	2,0	3408,0	DERD	E FAIL	OK	Washed out liner wear plate on mud pump #2. Repaired electrical failure on MP #1 and continued with same. Meanwhile circulated with 1000 LPM from cmt unit and reciprocated string.
10.10.2002.00:00	01:00	1,0	3421,0	DDRU	OK	OK	Drilled 8 1/2" hole from 3408 - 3421 m. Acceptable decoding with reduced flowrate of 1800 LPM.
10.10.2002.01:00	06:00	5,0	3490,0	DDRU	OK	OK	Drilled 8 1/2" hole from 3421 - 3490 m. Poor decoding while drilling, OK off bottom. Parametres : 2300 LPM / 285 Bar / 80-140 RPM / 3-18 KNm / 5-10 Ton WOB / ECD 1.73-1.74 SG.
10.10.2002.06:00	17:00	11,0	3575,0	DDRU	OK	OK	Drilled 8 1/2" hole from 3490-3595 m with 1800 LPM/190 bar/80-140 RPM/2-16 kNm/2-10 tons WOB/MWD ECD 1.72 sg. Poor decoding while drilling. Decoding OK off bottom.
10.10.2002.17:00	19:30	2,5	3595,0	DDRU	OK	OK	Drilled 8 1/2" hole from 3575-3595 m with 2300 LPM/280 bar/80-140 RPM/2-16 kNm/2-10 tons WOB/MWD ECD 1.72 sg. unable to decode while drilling. Decoding OK off bottom.
10.10.2002.19:30	21:00	1,5	3595,0	DDOU	OK	OK	Reamed and logged from 3583-3595 m. Changed to combinatorial mode.
10.10.2002.21:00	22:30	1,5	3612,0	DDRU	OK	OK	Drilled 8 1/2" hole from 3595-3612 m with 2300 LPM/280 bar/120 RPM/2-14 kNm/2-9 tons WOB. Unable to decode while drilling. Decoding OK off bottom. Flow checked drilling break at 3602 m.
10.10.2002.22:30	23:00	0,5	3612,0	DDOU	OK	OK	Reamed and logged from 3595-3612 m.
10.10.2002.23:00	00:00	1,0	3620,0	DDRU	OK	OK	Drilled 8 1/2" hole from 3612-3620 m with 2300 LPM/280 bar/120 RPM/2-11 kNm/2-4 tons WOB. Unable to decode while drilling.
11.10.2002.00:00	05:30	5,5	3654,5	DDRU	OK	OK	Drilled 8 1/2" hole from 3620-3654,5 m in 5 m intervals with 2300 LPM/280 bar/120 RPM/4-16 kNm/2-8 tons WOB. Unable to decode while drilling. Decoding OK off bottom. Reamed intervals for logging. Held pit drill.
11.10.2002.05:30	06:00	0,5	3654,5	DCAU	OK	OK	Took survey. Circulated BU with 2500 LPM/327 bar.
11.10.2002.06:00	07:30	1,5	3654,5	DCAU	OK	OK	Circulated hole clean with 2500 LPM/325 bar. Max gas 4,9 %. Performed torque test.
11.10.2002.07:30	10:00	2,5	2897,0	DTCU	OK	OK	Flow checked well. Dropped drift. POOH wet to 3509 m. Pumped slug. POOH to shoe at 2897 m. Hole in good condition.
11.10.2002.10:00	16:00	6,0		DTCU	OK	OK	Flow checked and took torque readings in shoe. POOH. Reamed liner hanger setting area from 2830-2850 m. Broke off bit and LD MWD.
11.10.2002.16:00	16:30	0,5		CERU	OK	OK	Cleaned rig floor and LD excess equipment.
11.10.2002.16:30	17:00	0,5		CERU	OK	OK	RU liner running equipment. Held pre job safety meeting.

11.10.2002.17:00	18:00	1,0	25,0	CARU	OK	OK	MU and Bakerlocked shoe track. Checked floats.
11.10.2002.18:00	00:00	6,0	515,0	CARU	OK	OK	MU 7" liner to 515 m.
12.10.2002.00:00	02:30	2,5	803,0	CARU	OK	OK	MU 7" liner from 515-803 m.
12.10.2002.02:30	03:30	1,0	811,0	CARU	OK	OK	PU liner hanger. Installed plugs. MU hanger. Liner weight 29 tons.
12.10.2002.03:30	04:00	0,5	811,0	CARU	OK	OK	Removed PS-30 slips. Changed to 5 1/2" handling equipment.
12.10.2002.04:00	05:00	1,0	811,0	CARU	OK	OK	MU top drive. Broke circulation in steps to 1000 LPM/7 bar. No losses. Meanwhile filled PBR with drill water.
12.10.2002.05:00	06:00	1,0	1100,0	CARU	OK	OK	RIH 7" liner on 5 1/2" DP from 811-1100 m.
12.10.2002.06:00	11:00	5,0	2897,0	CARU	OK	OK	RIH 7" liner on 5 1/2" DP from 1100-2897 m. Max running speed 2 mins/std in 9 5/8" liner. No losses.
12.10.2002.11:00	12:00	1,0	2897,0	CARU	OK	OK	Broke circulation. Increased flow rate in 100 LPM steps to 1000 LPM/56 bar. No losses.
12.10.2002.12:00	16:00	4,0	3654,5	CARU	OK	OK	RIH 7" liner on 5 1/2" DP from 2897-3654,5 m. Broke circulation and washed down last stand. No fill. Max running speed 3 mins/std. No losses.
12.10.2002.16:00	16:30	0,5	3647,0	CARU	OK	OK	Spaced out string. PU and MU cementing head. Installed hydraulic hoses.
12.10.2002.16:30	17:30	1,0	3647,0	CCCU	OK	OK	Broke circulation. Increased flow rate in 100 LPM steps to 1000 LPM/77 bar. Circulated 150% open hole annulus volume. No losses.
12.10.2002.17:30	18:30	1,0	3647,0	CAOU	OK	OK	Dropped ball and pumped down with 450 LPM/31 bar. Set hanger with 150 bar. Set down 10 tons on hanger. Released running tool. Sheared ball seat with 208 bar.
12.10.2002.18:30	19:30	1,0	3647,0	CSSU	OK	OK	Held pre job safety meeting. Meanwhile circulated with 1000 LPM/80 bar. No losses. Pumped 2.5 m3 base oil and 10 m3 1.70 sg spacer 4AT with rig pumps. Pressure tested lines to 200 bar.
12.10.2002.19:30	20:30	1,0	3647,0	CSSU	OK	OK	Released dart#1. Halliburton mixed and pumped 8,2 m3 1.90 sg silica cement slurry.
12.10.2002.20:30	22:00	1,5	3647,0	CSSU	OK	OK	Released dart#2. Displaced cement to rig floor with 160 ltr mix water. Displaced cement with 47.1 m3 OBM using rig pumps at 1000 LPM. No losses. Rotated liner with 15 RPM/4 kNm after base oil reaching shoe. Bumped plug after 1981 strokes (97,4 % pump efficiency). Pressure tested liner 160 bar/10 mins. Checked for back flow.
12.10.2002.22:00	22:30	0,5	2835,0	CSSU	OK	OK	LD cementing head.
12.10.2002.22:30	23:00	0,5	2835,0	CSOU	OK	OK	Set TSP liner packer with 40 tons.
12.10.2002.23:00	00:00	1,0	2780,0	CATU	OK	OK	Racked back 2 stands. String pulled dry. Filled string. Closed UPR. Pressure tested casing, liners and liner laps to 160 bar/10 mins.
13.10.2002.00:00	06:00	6,0		CTTU	OK	OK	POOH liner running tool. String pulled dry to 2400 m. Pumped slug. Held kick drill.
13.10.2002.06:00	06:30	0,5		CERU	OK	OK	Cleaned rig floor.
13.10.2002.06:30	08:30	2,0	297,0	BBDU	OK	OK	MU bull nose, jet sub and BOP test tool. RIH. Jetted BOP and landed test tool in wellhead.
13.10.2002.08:30	12:30	4,0	297,0	BBDU	OK	E FAIL	Pressure tested upper annular preventer, kill line, inner and outer kill line valves and inner chokeline valves to 30/200 bar 5/10 mins. Observed returns through drill pipe on test#4.
13.10.2002.12:30	14:30	2,0	297,0	CAOD	E FAIL	OK	POOH. Found damaged seal on test tool. Changed out seal. RIH and landed in wellhead.
13.10.2002.14:30	17:30	3,0	297,0	BBDU	OK	OK	Pressure tested choke line, outer chokeline valves, lower annular preventer, UPR, MPR and LPR and fail safe valves to 30/200 bar 5/10 mins.
13.10.2002.17:30	18:00	0,5	297,0	BBDU	OK	OK	RU test hose to top drive. Meanwhile completing welding of pad eye in derrick for TLC logging.
13.10.2002.18:00	20:30	2,5	297,0	BBDU	OK	OK	Pressure tested Kelly cock, IBOP and mud hose to 20/345 bar 5/10 mins.
13.10.2002.20:30	21:00	0,5	297,0	BBDU	OK	OK	RD test hose from top drive.
13.10.2002.21:00	22:30	1,5		BBDU	OK	OK	POOH. LD test tool, jet sub and bull nose.
13.10.2002.22:30	23:00	0,5		DTDU	OK	OK	Cleaned rig floor. Prepare to PU 6" BHA.
13.10.2002.23:00	00:00	1,0	30,0	DTDU	OK	OK	MU 6" bit, 5 7/8" NBstab and 1 stand 4 3/4" DC.
14.10.2002.00:00	00:30	0,5	85,0	DTDU	OK	OK	RIH 6" BHA with 2 stands 4 3/4" DC from derrick.
14.10.2002.00:30	02:30	2,0	277,0	DTPU	OK	OK	RIH 6" BHA while picking up 5 DC, jar and 15 HWDP from deck. Meanwhile pressure tested standpipe and choke manifolds to 30/345 bar 5/10 mins.

14.10.2002.02:30	04:00	1,5	832,0	DTDU	OK	OK	RIH 6" BHA on 3 1/2" DP from 277-832 m.
14.10.2002.04:00	06:00	2,0	1265,0	DTDU	OK	OK	Changed to 5 1/2" handling equipment. RIH 6" BHA on 5 1/2" DP from 832-1265 m. Filled pipe every 30 stands.
14.10.2002.06:00	12:00	6,0	3623,0	DTDU	OK	OK	RIH 6" drill out BHA on 5 1/2" DP from 1265-3608 m. Washed down and tagged top plug at 3623 m.
14.10.2002.12:00	12:30	0,5	3613,0	DTDU	OK	OK	Held kick drill. Performed choke practice.
14.10.2002.12:30	00:00	11,5	3624,8	CDDU	OK	OK	Drilled plugs and landing collar from 3623-3624,8 m with 0-10 tons/ 0-1400 LPM/ 0-280 bar/ 0-100 rpm/ 3-5 kNm.
15.10.2002.00:00	00:30	0,5	3625,0	CDDU	OK	OK	Drilled landing collar (total time for plugs and landing collar 12.0 hrs) with 6-10 tons/ 1200 LPM/ 208 bar/ 40-100 rpm/ 4-6kNm.
15.10.2002.00:30	03:30	3,0	3647,0	CDDU	OK	OK	Drilled hard cement, floatcollar and shoe 3625-3647 m with 4-6 tons/ 1200 LPM/ 208 bar/ 65 rpm/ 4-5 kNm. Cleaned out rat hole to 3654.5 m.
15.10.2002.03:30	06:00	2,5	3639,0	DCAU	OK	OK	Pulled inside casing. Circulated BU with 1300 LPM/ 220 bar. Max. gas 0,3 %. Meanwhile cleaning of pits for WBM.
15.10.2002.06:00	15:00	9,0	3639,0	DDOU	OK	OK	Cleaned pits and surface lines. Meanwhile circulated with 1300 LPM/ 200 bar. Investigated pump pressure fluctuations. Pump pressure stabilized when rotating 30 rpm.
15.10.2002.15:00	00:00	9,0	3639,0	DDOU	OK	OK	Mix 1.12 sg WBM for displacing well. Meanwhile circulated with 1300 LPM/180 bar. Displaced booster line to 1.12 sg WBM.
16.10.2002.00:00	06:00	6,0	3639,0	DDOU	OK	OK	Mix 1.12 sg WBM for displacing well. Meanwhile circulated with 1200 LPM/140 bar.
16.10.2002.06:00	10:30	4,5	3639,0	DDOU	OK	OK	Mixed 1.12 sg WBM for displacing well. Meanwhile circulated with 1200 LPM/ 136 bar.
16.10.2002.10:30	17:30	7,0	3654,5	DCAU	OK	OK	Held pre job safety meeting. Displaced well to 1.12 sg WBM with 1100-1500 LPM/ 200-85 bar. Took SCR. Adjusted riser tensioners.
16.10.2002.17:30	00:00	6,5	1570,0	DTDU	OK	OK	Flow checked well. POOH wet to 2600 m while preparing slug. Pumped slug. POOH to 1570 m.
17.10.2002.00:00	01:30	1,5	833,0	DTDU	OK	OK	POOH from 1570-833 m. Flow checked at 1278 m.
17.10.2002.01:30	02:00	0,5	833,0	DTDU	OK	OK	Changed from 5 1/2" to 3 1/2" handling equipment.
17.10.2002.02:00	03:30	1,5	143,0	DTDU	OK	OK	POOH 3 1/2" DP and HWDP from 833-143 m.
17.10.2002.03:30	04:30	1,0		DTDU	OK	OK	Changed to 4 3/4" handling equipment. POOH BHA. LD bit and NB stab.
17.10.2002.04:30	06:00	1,5		DTDU	OK	OK	MU 6" bit, 7" NBreamer, motor and MWD.
17.10.2002.06:00	07:30	1,5	25,0	DTDU	OK	OK	MU and programmed MWD.
17.10.2002.07:30	09:00	1,5	167,0	DTDU	OK	OK	MU 6"x7" BHA.
17.10.2002.09:00	11:00	2,0	1093,0	DTDU	OK	OK	Changed to 3 1/2" handling equipment. RIH BHA on 3 1/2" HWDP and DP from 167-1093 m.
17.10.2002.11:00	18:00	7,0	3647,0	DTDU	OK	OK	Changed to 5 1/2" handling equipment. RIH from 1093-3647 m. Broke circulation and circulated with 400 LPM/25 bar.to cool MWD at 3180 m. Meanwhile circulated on riser using booster line with 1200 LPM.
17.10.2002.18:00	18:30	0,5	3647,0	DCAU	OK	OK	Filled string and broke circulation. Took SCRs.
17.10.2002.18:30	19:00	0,5	3656,5	DDTU	OK	OK	Washed down to bottom. Drilled 7" hole from 3654,5-3656,5 m with 0-3 tons/ 1200 LPM/ 155-175 bar/ 20 surf RPM/ 3-6 kNm.
17.10.2002.19:00	22:00	3,0	3649,0	ECFU	OK	OK	Circulated BU with 1200-1300 LPM/ 150-160 bar. Boosted riser when BU above BOP. Max gas 1,5 %. MWD stopped pulsing while circulating. Attempted to restart MWD by cycling pumps and varying flowrates. Spotted 4 m3 hivis pill on bottom. Pumped and bled back.
17.10.2002.22:00	00:00	2,0	3649,0	EXLU	OK	OK	Flushed and pressure tested lines. Closed UPR. Performed XLOT by pressuring up to 315 bar (2.00 sg EMW). After 4 mins pressure suddenly dropped and stabilized at 108 bar in 15 mins. Bled off pressure. Volume pumped/returned 2310/180 ltr. Lost 2130 ltr. Repeated cycle. Pressure leaking off at 120 bar (1.45 sg EMW at 3647 m TVD). Mud injecting into formation with 200 LPM/ 159 bar.
18.10.2002.00:00	06:00	6,0	3758,0	DDTU	OK	OK	Drilled 7" hole from 3656,5-3758 m with 2-7 tons/ 1230 LPM/ 165-205 bar/ 120/450 surface/bit RPM/ 5-14 kNm. Max gas 7.5 %. MWD not pulsing.
18.10.2002.06:00	17:00	11,0	3867,0	DDTU	OK	OK	Drilled 7" hole from 3758-3867 m with 4-8 tons/ 1200 LPM/ 165-180 bar/ 80/400 surface/bit RPM/ 4-7 kNm. Max gas 0.6 %. MWD not pulsing.
18.10.2002.17:00	20:00	3,0	3867,0	DCAU	OK	OK	Dropped carbide. Circulated hole clean with 1800 LPM/ 285 bar. No gas from carbide observed. Flow checked.

18.10.2002.20:00	21:30	1,5	3647,0	DTLU	OK	OK	POOH 3867-3647 m. Pumped slug after 5 stands. Hole in good condition. No overpull when pulling NBreamer into shoe.
18.10.2002.21:30	00:00	2,5	2700,0	DTLU	OK	OK	Flow checked. POOH 5 1/2" DP from 3647-2700 m. Slug not effective.
19.10.2002.00:00	04:00	4,0	1093,0	DTLU	OK	OK	POOH 5 1/2" DP from 2700-1093 m. Slug not effective. Pumped new slug on 1236 m.
19.10.2002.04:00	04:30	0,5	1093,0	DTLU	OK	OK	Changed to 3 1/2" handling equipment.
19.10.2002.04:30	06:00	1,5	623,0	DTLU	OK	OK	POOH 3 1/2" DP from 1093-623 m. Held kick drill.
19.10.2002.06:00	07:30	1,5	167,0	DTLU	OK	OK	POOH 3 1/2" DP and HWDP from 623-167 m. Flow checked prior to pulling BHA through BOP.
19.10.2002.07:30	09:00	1,5		DTLU	OK	OK	Changed handling equipment. POOH BHA. LD MWD, motor and bit.
19.10.2002.09:00	10:00	1,0		ELWU	OK	OK	toolbox talk. RU for wireline logging.
19.10.2002.10:00	23:30	13,5		ELWU	OK	OK	MU toolstring for run#1 (HRLA-DSI-IPLT-ACTS-ECRD). Installed radioactive sources. Tool in 12.40 hrs. RIH according procedure for new cable. Logged 3867-3647 m. Logged inside casing to 3380 m. POOH. Tool out 21.34 hrs. Removed radioactive sources. RD toolstring. Calliper showing 6" hole.
19.10.2002.23:30	00:00	0,5		ELRU	OK	OK	PU toolstring for run#2 (MDT-GR-ACTS-ECRD).
20.10.2002.00:00	06:00	6,0	3662,5	ELRU	OK	OK	MU toolstring for run#2 (MDT-GR-ACTS-ECRD). Changed cable head. Tool in 02.30 hrs. RIH. Took 4 pressure points.
20.10.2002.06:00	11:00	5,0	3700,0	ELRU	OK	OK	Logged run#2 (MDT-GR-ACTS-ECRD). Recorded 25 pressure points (total 29, 26 good, 3 not stable). No overpulls observed.
20.10.2002.11:00	22:00	11,0		ELRU	OK	OK	Sampled at 3700 m. Total 6 hrs. No overpull after sampling. Performed scanning at 3668.7 m. POOH. Tool out at 20.30 hrs. RD run#2.
20.10.2002.22:00	00:00	2,0	100,0	ELRU	OK	OK	MU toolstring for run#3 (MDT dual packer-GR-ACTS-ECRD). Tool in 23.30 hrs. RIH to 100 m.
21.10.2002.00:00	06:00	6,0	3685,6	ELRU	OK	OK	RIH run#3. Set dual packer at 3685,6 m. Pumped to clean up for sampling.
21.10.2002.06:00	08:00	2,0	3685,6	ELRU	OK	E FAIL	Sampled with MDT dual packer at 3685,6 m. Observed problems with pump in MDT tool.
21.10.2002.08:00	10:00	2,0	3685,6	EEDD	E FAIL	O FAIL	Troubleshot MDT pump problems. Retracted dual packer.
21.10.2002.10:00	15:00	5,0		EEDD	E FAIL	OK	POOH run#3. No overpull after sampling. Pulled 9340 lbs (1500 lbs overpull) to pass 7" liner shoe.Observed 750 lbs overpulls inside 7" liner. Tool at surface 14:45 hrs. OD of upper/lower packer elements 6.2"/6.35". Max OD prior to run 5.1".
21.10.2002.15:00	19:00	4,0		ELRU	OK	OK	Removed sample chambers. RD dual packer.
21.10.2002.19:00	20:00	1,0		EEDD	E FAIL	E FAIL	RU run#4 (MDT-GR-ACTS-ECRD). Communication problems in toolstring.
21.10.2002.20:00	22:00	2,0		EEDD	E FAIL	OK	Troubleshot communication problem. Found CGA tool faulty. Removed CGA.
21.10.2002.22:00	00:00	2,0	300,0	EEDD	E FAIL	OK	MU run#4 (MDT-GR-ACTS-ECRD). Tool in at 23.00 hrs. RIH.
22.10.2002.00:00	02:00	2,0	3692,0	EEDD	E FAIL	OK	RIH run#4 (MDT-GR-ACTS-ECRD).
22.10.2002.02:00	06:00	4,0	3699,8	ELRU	OK	OK	Took 9 pre tests to find point for sampling. Pumped to clean up for sample at 3692,3 m. To much draw down. Set probe at 3699,8 m. Pumped to clean up for sample.
22.10.2002.06:00	20:30	14,5		ELRU	OK	OK	Wireline run#4 (MDT-GR-ACTS-ECRD). Sampled at 3699,8 m. Total 6 hrs. Sampled and performed mini DST at 3706,8 m. Total 4.5 hrs. No overpulls observed. POOH. Tool o ut at 18.40 hrs. RD toolstring.
22.10.2002.20:30	00:00	3,5	3600,0	ELWU	OK	OK	MU toolstring for run#5 (VSP-GR-ECRD). Tool in at 21.40 hrs. RIH.
23.10.2002.00:00	06:00	6,0	560,0	ELWU	OK	OK	RIH run#5 (VSP-GR-ECRD). Logged from 3775-560 m.
23.10.2002.06:00	08:30	2,5		ELWU	OK	OK	Logged run#5 (VSP-GR-ECRD) 560-340 m. POOH. Tool out at 07.20 hrs. RD toolstring.
23.10.2002.08:30	00:00	15,5	3675,1	ELRU	OK	OK	MU toolstring for run#6 (MDT-GR-ACTS-ECRD). Tool in at 12.00 hrs. RIH. Total 27 attempts to find sample point with sufficient mobility. Sampled at 3675,1 m.
24.10.2002.00:00	02:00	2,0	3675,1	ELRU	OK	STUCK	Sampled at 3675,1 m. Total 5 hrs. Tool stuck after sampling. Probe at 3675.1 m. Top tool at 3665 m.
24.10.2002.02:00	05:00	3,0		ELSD	STUCK	OK	Worked tool. Pulled to max 12 klbs (8 klbs on tension head) for 1 hour. Worked tool. Pulled to max 12 klbs (8 klbs on tension head) for 1 hour.
24.10.2002.05:00	06:00	1,0		ELSD	STUCK	OK	RU and prepared to strip over logging cable. Installed T-bar.

24.10.2002.06:00	08:00	2,0		ELSD	STUCK	OK	Performed pre-job meeting. Cut logging cable and installed Bowen fishing quick connector. RD compensator line and sheaves.
24.10.2002.08:00	11:00	3,0		ELSD	STUCK	OK	RU long bails and sheaves in derrick.
24.10.2002.11:00	12:30	1,5		ELSD	STUCK	OK	Performed pre-job meeting. PU 3 1/2" DP std, threaded wire through std and MU overshot assembly. Performed Open Safety Dialogue with involved personnel on drill floor. Ran in with 3 1/2" DP std.
24.10.2002.12:30	14:00	1,5		ELSD	STUCK	OK	Wireline was rubbing against top-drive. Re-arranged sheave in derrick.
24.10.2002.14:00	15:30	1,5	146,0	FISD	STUCK	E FAIL	RIH with 3 1/2" DP over wireline to 146 m.
24.10.2002.15:30	00:00	8,5	146,0	DERD	E FAIL	OK	Investigated fault on hydraracker gripper head. Changed out dies and increased operation pressure from 80 to 180 Bar. Performed function test on hydraracker.
25.10.2002.00:00	00:30	0,5	290,0	FISD	STUCK	OK	Broke down 1 std 3 1/2" DP in mouse hole and picked up 1 jnt for space out going through BOP.
25.10.2002.00:30	06:00	5,5	555,0	FISD	STUCK	OK	Continued to RIH with 3 1/2" DP over wireline from 290 m to 555 m.
25.10.2002.06:00	09:00	3,0	914,0	FISD	STUCK	OK	Performed pre-job meeting. Continued to RIH with 3 1/2" DP over logging cable from 555 to 914 m.
25.10.2002.09:00	10:00	1,0	914,0	FISD	STUCK	OK	Cut and slipped 90 m logging cable.
25.10.2002.10:00	11:00	1,0	1061,0	FISD	STUCK	OK	Continued to RIH with 3 1/2" DP over logging cable from 914 to 1061m.
25.10.2002.11:00	11:30	0,5	1061,0	FISD	STUCK	OK	Changed to 5 1/2" handling equipment.
25.10.2002.11:30	00:00	12,5	2380,0	FISD	STUCK	OK	RIH with 5 1/2" DP over logging cable from 1061 to 2380 m.
26.10.2002.00:00	05:30	5,5	3010,0	FISD	STUCK	OK	Continued to RIH with 5 1/2" DP over logging cable from 2380 to 3010 m.
26.10.2002.05:30	06:00	0,5	3010,0	FISD	STUCK	OK	Cut and slipped 90 m logging cable. Meanwhile function tested BOP.
26.10.2002.06:00	06:30	0,5	3010,0	FISD	STUCK	OK	Continued to cut and slip logging cable. Meanwhile function tested BOP on blue pod from drillers and toolpushers panel. Performed pre-job meeting.
26.10.2002.06:30	11:00	4,5	3596,0	FISD	STUCK	OK	RIH with 5 1/2" DP over logging cable from 3010 to 3596 m.
26.10.2002.11:00	11:30	0,5	3596,0	FISD	STUCK	OK	Performed pre-job meeting. Installed circulation sub.
26.10.2002.11:30	13:00	1,5	3596,0	FISD	STUCK	OK	Changed to 5" DP handling equipment. Changed topdrive saver sub to 4 1/2" IF and made up to 5" DP.
26.10.2002.13:00	15:30	2,5	3596,0	FISD	STUCK	OK	Connected top drive to DP and broke circulation. Circulated at 2360 lpm, 182 bar, untill gas was 200 m below BOP. Closed UPR and circulated up kill and choke line at 1136 lpm, 61 bar. Maximum gas level recorded: 6,5%. Continued to circulate and boost riser until gas leveled out at 0,2%.
26.10.2002.15:30	17:00	1,5	3596,0	FISD	STUCK	OK	Performed pre-job meeting. Broke out circulation sub. Installed T-bar and made up cutter/side entry sub.
26.10.2002.17:00	19:30	2,5	3596,0	FISD	STUCK	OK	Cut logging cable and threded through subs. Spliced cable ends. Tested communication to logging tool.
26.10.2002.19:30	20:30	1,0	3596,0	FISD	STUCK	OK	Rearranged wireline sheave position for TLC.
26.10.2002.20:30	23:00	2,5	3596,0	FISD	STUCK	OK	Installed and MU string to cutter/side entry sub.
26.10.2002.23:00	00:00	1,0	3658,0	FISD	STUCK	OK	RIH with 5" DP from 3596 to 3658 m.
27.10.2002.00:00	00:30	0,5	3665,0	FISD	STUCK	OK	Made up string to top drive and washed down from 3658 m with 700 lpm, 31 bar, to top of fish at 3665 m.
27.10.2002.00:30	02:00	1,5	3665,0	FISD	STUCK	OK	Engaged fish. Attempted to release fish by applying 10 MT up/down weight. No go.
27.10.2002.02:00	03:00	1,0	3665,0	FISD	STUCK	OK	Continued to work fish by applying up/down weight 10 MT. Changed clock from summer to winter time, meanwhile continued to work fish.
27.10.2002.03:00	06:00	3,0	3665,0	FISD	STUCK	OK	Continued to work fish by applying up weight in steps 10 MT, 15 MT, 20 MT, 30 MT. Maximum 12,5 MT down weight. Not able to free fish.
27.10.2002.06:00	07:30	1,5	3665,0	FISD	STUCK	OK	Slacked off to neutral weight, meanwhile evaluated forward plan. Performed pre-job meeting and risk assessment.
27.10.2002.07:30	08:30	1,0	3660,0	FISD	STUCK	OK	Pulled fish free with 40 MT overpull. Pulled out 5m and checked logging tool, ok. Performed pre-job meeting.
27.10.2002.08:30	11:00	2,5	3806,0	ELRU	OK	OK	RIH on 5" DP from 3660 to 3806 m, took 10 MT weight at 3765 m. Not able to pass 3806 m.
27.10.2002.11:00	12:00	1,0	3719,0	ELRU	OK	OK	POOH to sampling depth at 3719 m.

27.10.2002.12:00	15:30	3,5	3719,0	ELRU	OK	OK	Performed mobility test before water sampling.
27.10.2002.15:30	23:00	7,5	3719,0	ELRU	OK	E FAIL	Performed water sampling at 3719 m.
27.10.2002.23:00	23:30	0,5	3719,0	ELOD	E FAIL	OK	Trouble shot communication problems with logging tool. Changed telemetry card.
27.10.2002.23:30	00:00	0,5	3706,0	ELRU	OK	OK	Moved tool to oil sampling depth. No problems to free tool.
28.10.2002.00:00	02:00	2,0	3706,0	ELRU	OK	OK	Performed mobility test before oil sampling.
28.10.2002.02:00	05:00	3,0	3706,0	ELRU	OK	E FAIL	Performed oil sampling at 3706 m.
28.10.2002.05:00	06:00	1,0	3706,0	ELOD	E FAIL	OK	Lost communication with logging tool. Trouble shot problem with power supply.
28.10.2002.06:00	06:30	0,5	3706,0	ELOD	E FAIL	OK	Trouble shot communication with logging tool.
28.10.2002.06:30	07:30	1,0	3701,0	ELOD	E FAIL	OK	Performed pre-job meeting. Pulled out string untill wireline torpedo reached surface.
28.10.2002.07:30	09:00	1,5	3701,0	LEOD	E FAIL	OK	Performed electrical checks on cable.
28.10.2002.09:00	10:00	1,0	3643,0	ELOD	E FAIL	OK	Pulled out string to side entry sub reached surface.
28.10.2002.10:00	10:30	0,5	3643,0	LEOD	E FAIL	OK	Fired electrical week point.
28.10.2002.10:30	12:30	2,0	3643,0	ELOD	E FAIL	OK	POOH with logging cable.
28.10.2002.12:30	14:00	1,5	3643,0	ELOD	E FAIL	OK	LD cutter and side entry sub. RD logging cable and top sheave.
28.10.2002.14:00	15:00	1,0	3643,0	ELOD	E FAIL	OK	Cleared rig floor of excess equipment.
28.10.2002.15:00	00:00	9,0	1682,0	ELOD	E FAIL	OK	Pumped slug and POOH with 5 1/2" DP and fish from 3643 m to 1682 m.
29.10.2002.00:00	01:30	1,5	1106,0	ELOD	E FAIL	OK	Continued to POOH with 5 1/2" DP from 1682 m to 1106 m.
29.10.2002.01:30	04:00	2,5	43,0	ELOD	E FAIL	OK	Changed to 3 1/2" surface handling equipment. POOH with 3 1/2" DP and fish from 1106 m to 43 m.
29.10.2002.04:00	04:30	0,5	43,0	ELOD	E FAIL	OK	Secured fishing assembly in rotary. Removed overshot and grapple from logging tool string.
29.10.2002.04:30	06:00	1,5	43,0	ELOD	E FAIL	OK	Checked communication on logging tool assembly. LD logging tool.
29.10.2002.06:00	07:00	1,0		ELOD	E FAIL	OK	Laid down MDT logging tool.
29.10.2002.07:00	08:00	1,0		BBDU	OK	OK	Made up jet sub and BOP test tool.
29.10.2002.08:00	09:30	1,5	290,0	BBDU	OK	OK	RIH. Washed BOP and WH area. Ran in and landed test tool.
29.10.2002.09:30	12:30	3,0	290,0	BBDU	OK	OK	Pressure tested Annualrs, Pipe-RAMs and fail safe valves to 20/345 bar for 5/10 min on blue pod A from Drillers panel. Function tested on yellow pod from toolpushers panel.
29.10.2002.12:30	13:00	0,5		BBDU	OK	O FAIL	POOH with BOP test tool and jet sub.
29.10.2002.13:00	14:00	1,0		BBOD	O FAIL	OK	Lost pipe wiper in bell nipple, retrieved same.
29.10.2002.14:00	14:30	0,5		BBDU	OK	OK	Continued to POOH with BOP test tool and jet sub.
29.10.2002.14:30	19:00	4,5		BBDU	OK	OK	RU test hose to top drive. Pressure tested kelly cock, IBOP, and mud hose to 20/345 bar for 5/10 min.
29.10.2002.19:00	19:30	0,5		BBDU	OK	OK	RD test equipment.
29.10.2002.19:30	20:30	1,0		DCWK	OK	OK	Changed bails and saver sub on top drive to 5 1/2".
29.10.2002.20:30	23:00	2,5	144,0	DCWK	OK	OK	Performed pre-job meeting. MU 6" BHA and RIH to 144 m.
29.10.2002.23:00	00:00	1,0	628,0	DCWK	OK	OK	RIH with 3 1/2" DP to 628 m.
30.10.2002.00:00	01:00	1,0	1070,0	DCWK	OK	OK	Continued to RIH with 3 1/2" DP from 628 to 1070 m.
30.10.2002.01:00	01:30	0,5	1070,0	DCWK	OK	OK	Changed to 5 1/2" DP handling equipment.
30.10.2002.01:30	06:00	4,5	3307,0	DCWK	OK	OK	RIH with 5 1/2" DP from 1070 to 3307 m.
30.10.2002.06:00	08:00	2,0	3730,0	DCWK	OK	OK	RIH with 5 1/2" DP from 3342 m to 3730 m.
30.10.2002.08:00	09:00	1,0	3758,0	DCWK	OK	OK	Broke circulation at 3730 m, washed and reamed from 3730 to 3758 m. Worked each stand 3 times. Parameters: 150 RPM, 5 kNm, 2800 lpm, 308 bar.
30.10.2002.09:00	09:30	0,5	3758,0	DCWK	OK	OK	Closed UA preventer. Circulated over choke line to poor boy degasser until bottoms up passed. Maximum 0,8 % gass.
30.10.2002.09:30	11:30	2,0	3867,0	DCWK	OK	OK	Washed and reamed from 3758 to 3867 m. No resistance observed. Parameters: 150 RPM, 4-5 kNm, 2500 lpm, 250 bar.
30.10.2002.11:30	14:30	3,0	3867,0	DCWK	OK	OK	Circulated well until gas content levelled out at 0,2%. Maximum gas content recorded: 7,7%.

30.10.2002.14:30	15:30	1,0	3767,0	DCWK	OK	OK	Made wipertrip from TD to 3767 m without rotation and circulation. No resistance observed.
30.10.2002.15:30	16:30	1,0	3647,0	DCWK	OK	OK	Flow checked well. POOH wet from 3767 to 7" liner shoe at 3647 m.
30.10.2002.16:30	23:00	6,5	2260,0	DCWK	OK	OK	Pumped slug and POOH with 5 1/2" DP from 3647m to 2260 m. Performed Pit drill at 2058 m.
30.10.2002.23:00	00:00	1,0	716,0	DCWK	OK	OK	Changed to 3 1/2" handling equipment and continued to POOH with 3 1/2" DP from 2260 to 716m.
31.10.2002.00:00	02:00	2,0	,0	DCWK	OK	OK	Continued to POOH. Brok out Bit and racked BHA in derric.
31.10.2002.02:00	02:30	0,5	,0	DCWK	OK	OK	Cleared rig floor. Performed pre-job meeting.
31.10.2002.02:30	06:00	3,5	3645,0	ELWU	OK	OK	RU for wireline logging. MU logging string for run #7 and RIH to 3645 m.
31.10.2002.06:00	22:00	16,0	3833,0	ELWU	OK	OK	RIH with logging run no 7: MDT/GR/ACTS from 3645 m. Took 11 pre-tests in Ile formation from 3807,5 m to 3833 m and sample at 3823,8 m. Pulled out to 3662,2 m and took gas sample in Garn formation.
31.10.2002.22:00	00:00	2,0		ELWU	OK	OK	POOH with logging run no 7: MDT/GR/ACTS.
01.11.2002.00:00	01:30	1,5		ELWU	OK	OK	Continued POOH with logging run no 7: MDT/GR/ACTS. LD wireline tool string.
01.11.2002.01:30	03:00	1,5		ELWU	OK	OK	MU tool string for logging run no 8: MDT/GR/ACTS. Calibrated and tested tools.
01.11.2002.03:00	06:00	3,0	3694,2	ELWU	OK	OK	RIH with wireline logging run no 8: MDT/GR/ACTS. Correlated and cleaned up prior to take oil sample at 3694,2 m in Garn formation.
01.11.2002.06:00	11:00	5,0	3694,2	ELWU	OK	OK	Took oil sample at 3694,2 m in Garn formation. Pulled tool string free with 0,75 mt overpull.
01.11.2002.11:00	14:30	3,5		ELWU	OK	OK	POOH with logging run no 8: MDT/GR/ACTS. LD logging string.
01.11.2002.14:30	19:30	5,0		ELWU	OK	OK	MU wireline tool string, run no 9: MDT/GR with dual packer. Tested tools and RIH to 3694 m.
01.11.2002.19:30	00:00	4,5	3694,2	ELWU	OK	OK	Correlated and took oil sample at 3694,2 m. Inflated dual packer to take sample in interval from 3668,6 m to 3667,8 m. Started clean up prior to sampling.
02.11.2002.00:00	03:00	3,0	3668,6	ELWU	OK	E FAIL	Continued clean up prior to sampling. Pump stopped working after pumping 160 litres.
02.11.2002.03:00	05:30	2,5		ELOD	E FAIL	OK	POOH with wireline logging run no 9: MDT/GR with dual packer.
02.11.2002.05:30	06:00	0,5		ELOD	E FAIL	OK	LD wireline tool string.
02.11.2002.06:00	06:30	0,5		ELOD	E FAIL	OK	LD wireline tool string, run no 9: MDT/GR with dual packer.
02.11.2002.06:30	22:00	15,5	3745,0	ELOD	E FAIL	OK	RU and RIH with wireline run no 10: MDT/GR with dual packer to 400 m. Trouble shot telemetry problems. POOH. Changed ACTS, GR, TCC and MRPC. Started RIH, problem not solved. POOH and started trouble shooting. Found short cirquit in cable head. Built new cable head, tested tools and rih to 3745 m.
02.11.2002.22:00	00:00	2,0	3668,6	ELWU	OK	OK	Correlated and set packers, exposed interval from 3668,6 m to 3667,8 m. Pumped to clean up prior to sampling.
03.11.2002.00:00	03:00	3,0	3668,6	ELWU	OK	E FAIL	Continued clean up and performed HC sampling from interval 3668,6 m to 3667,8 m. Not able to perform mini DST due to failure of dual packer. Retracted probe and pulled free without overpull.
03.11.2002.03:00	05:00	2,0		ELOD	E FAIL	OK	POOH with logging run no 10: MDT/GR with dual packer.
03.11.2002.05:00	06:00	1,0		ELOD	E FAIL	OK	LD wireline tool string.
03.11.2002.06:00	08:30	2,5		ELCU	OK	OK	MU wireline logging string, run no 11: MSCT/GR.
03.11.2002.08:30	10:30	2,0	3707,0	ELCU	OK	OK	RIH with logging run no 11: MSCT/GR to 3707 m.
03.11.2002.10:30	16:00	5,5	3833,0	ELCU	OK	OK	Cut a total of 50 sidewall cores between 3833 m and 3655 m.
03.11.2002.16:00	18:00	2,0		ELCU	OK	OK	POOH with logging run no 11: MSCT/GR from 3655 m.
03.11.2002.18:00	19:30	1,5		ELCU	OK	OK	LD MSCT/GR tool string and RD Schlumberger wireline. Retrieved 49 cores.
03.11.2002.19:30	00:00	4,5	40,0	DTDU	OK	OK	Held pre-job meeting. PU Navidrill assembly. Broke off bit and reamer. MU new 6" bit and removed float sub and inspected float. Re-installed and tested float to 69 bar for 10 min. Tested Navidrill. PU MWD tool assembly.
04.11.2002.00:00	04:00	4,0	210,0	DTDU	OK	OK	MU MWD assembly and loaded data. Installed radioactive sources and continued RIH with 6" BHA to 210 m.
04.11.2002.04:00	06:00	2,0	1424,0	DTDU	OK	OK	Continued RIH with 6" BHA on 3 1/2" DP from 210 m to 1424 m.

04.11.2002.06:00	13:00	7,0	3790,0	DTDU	OK	OK	RIH with 6" bit and BHA from 1424 m to 3790 m. Filled string every 20 stands. Broke circulation and performed SCR in 7" csg shoe at 3647 m.
04.11.2002.13:00	17:30	4,5	3867,0	DTDU	OK	OK	Reamed and logged with MWD from 3790 m to TD at 3867 m. Running speed 20-25 m/hr, 1200 lpm, 180 bar, 80 RPM, 4-5 KNm torque.
04.11.2002.17:30	00:00	6,5	3917,0	DDTU	OK	OK	Drilled 6" hole from 3867 m to 3917 m. Parameters: 1185 lpm, 190-250 bar, 90-120 rpm, 5-10 mt wob, 5-10 KNm torque. Increased mud weight from 1,15 sg to 1,17 sg while drilling.
05.11.2002.00:00	06:00	6,0	3962,0	DDTU	OK	OK	Drilled 6" hole from 3917 m to 3962 m. Parameters: 1185 lpm, 212-260 bar, 120 rpm, 2-8 mt wob, 4-8 KNm torque. MWD tool stopped pulsing 0300 hrs at 3943 m. Increased mud weight from 1,17 sg to 1,20 sg while drilling.
05.11.2002.06:00	21:30	15,5	4090,0	DDTU	OK	E FAIL	Drilled 6" hole from 3962 m to 4090 m. Parameters: 1185 lpm, 210-260 bar, 40-120/365-440 string/bit RPM, 5-10 mt WOB, 3-10 KNm torque. At 4090 m ROP decreased to zero. Pulled off bottom - 30 mt overpull.
05.11.2002.21:30	00:00	2,5	3444,0	DTTD	E FAIL	OK	Flow checked for 10 min. POOH from 4090 m to 3933 m. Slugged pipe and continued POOH to 3444 m. No excessive overpull in open hole. Performed kick drill at 3467 m.
06.11.2002.00:00	06:00	6,0	2055,0	DTDD	E FAIL	OK	Continued POOH from 3444 m to 2055 m.
06.11.2002.06:00	07:30	1,5	1428,0	DTTD	E FAIL	OK	POOH with 5 1/2" DP from 2055 m to 1428 m.
06.11.2002.07:30	11:00	3,5	40,0	DTTD	E FAIL	OK	Changed to 3 1/2" DP handling equipment and continued POOH with 3 1/2" dp and BHA from 1428 m to 40 m.
06.11.2002.11:00	12:00	1,0	40,0	DTTD	E FAIL	OK	Removed radioactive sources from MWD tool. Downloaded MWD tool. No data retrieved from tool.
06.11.2002.12:00	14:00	2,0		DTTD	E FAIL	OK	LD MWD tool and Navidrill and 6" bit. Found washout on body of Navidrill.
06.11.2002.14:00	15:30	1,5		DTTD	E FAIL	OK	Prepared new MWD tool. Meanwhile installed float in bit sub and pressure tested same to 70 bar for 10 min.
06.11.2002.15:30	20:30	5,0	344,0	DTTD	E FAIL	OK	MU 6" bit and BHA. Loaded MWD tool and installed radioactive sources. Continued RIH with BHA from derrick to 344 m.
06.11.2002.20:30	00:00	3,5	1537,0	DTTD	E FAIL	OK	Installed auto slips and continued RIH with 3 1/2" DP from 344 m to 1425 m. Tested MWD tool and continued RIH with 5 1/2" DP from 1425 m to 1537 m. Performed kick drill with crew at 432 m.
07.11.2002.00:00	04:30	4,5	3790,0	DTTD	E FAIL	E FAIL	Continued RIH with 5 1/2" DP from 1537 m to 3790 m.
07.11.2002.04:30	06:00	1,5	3814,0	ELOD	E FAIL	OK	Reamed and logged with MWD tool from 3790 m to 3814 m. Parameters: 30 m/hr, 1200 lpm, 180 bar, 85 RPM, 4-5 KNm torque.
07.11.2002.06:00	13:30	7,5	4007,0	ELOD	E FAIL	OK	Reamed and logged with MWD from 3814 - 4007 m. Parametres : 30 m/hr / 1200 LPM / 195 Bar / 85 RPM / 3-4 KNm.
07.11.2002.13:30	17:30	4,0	4090,0	ELOD	E FAIL	OK	MWD tool stopped pulsing real time data to surface. Attempted to restart tool, neg. Continued reaming down to 4090 m in case of MWD tool storing data in memory.
07.11.2002.17:30	00:00	6,5	4162,0	DDRU	OK	OK	Drilled 6" hole from 4090 - 4162 m. Flow checked drilling break at 4115 m. Parametres : 1180 LPM / 180 Bar / 120 RPM / 4-12 KNm / 4-7 Ton WOB.
08.11.2002.00:00	01:00	1,0	4175,0	DDRU	OK	OK	Drilled 6" hole from 4162 - 4175 m. Parametres : 1180 LPM / 185 Bar / 100-130 RPM / 2-10 KNm / 4-7 Ton WOB.
08.11.2002.01:00	03:30	2,5	4175,0	DCAU	OK	OK	Circulated BU / hole clean with 1350 LPM / 230 Bar while reciprocating string with 120 RPM. Meanwhile boosted riser with 2000 LPM.
08.11.2002.03:30	05:00	1,5	4030,0	DTLU	OK	OK	Flow checked for 10 min. Pulled 5 std and pumped slug. Installed DP auto slips. Hole slick.
08.11.2002.05:00	06:00	1,0	3720,0	DTLU	OK	OK	POOH with 6" BHA on 5 1/2" DP to 3720 m.
08.11.2002.06:00	07:30	1,5	2866,0	DTLU	OK	OK	POOH with 6" BHA on 5 1/2" DP to 2866 m.
08.11.2002.07:30	08:30	1,0	2866,0	BBDU	OK	OK	Spaced out, closed MPR and function tested BOP. Tested from both pods.
08.11.2002.08:30	11:30	3,0	1480,0	DTLU	OK	OK	POOH with 6" BHA on 5 1/2" DP to 1480 m. Performed trip drill.
08.11.2002.11:30	12:00	0,5	1480,0	DTLU	OK	OK	Redressed DP auto slips and BX elevator for 3 1/2" DP.
08.11.2002.12:00	13:30	1,5	340,0	DTLU	OK	OK	POOH with 3 1/2" DP to 340 m.

08.11.2002.13:30	15:00	1,5		DTDU	OK	OK	POOH with 6" BHA.
08.11.2002.15:00	16:30	1,5		DTDU	OK	OK	Recovered RA sources and dumped MWD memory data. LD MWD tool. Only GR data present in memory.
08.11.2002.16:30	17:00	0,5		DTDU	OK	OK	Broke off bit and LD NB stab, pony collar and string stab. Cleared drill floor for excessive equipment.
08.11.2002.17:00	17:30	0,5		ELWU	OK	OK	RU for wireline logging.
08.11.2002.17:30	00:00	6,5		ELWU	OK	OK	MU toolstring for WL run #12 : HRLA-IPLT. Installed RA sources and RIH according to procedure for new cable. Logged from TD to 3730 m.
09.11.2002.00:00	04:00	4,0		ELWU	OK	OK	Repeat logged and POOH. LD RA sources and toolstring. Hole slick, no overpull.
09.11.2002.04:00	06:00	2,0		ELWU	OK	OK	MU toolstring for WL run #13 : GR-MDT. Tested tool and RIH to 510 m.
09.11.2002.06:00	09:00	3,0		ELWU	OK	OK	RIH with WL run # 13 (GR-MDT). Checked gauges and logged down from 3580 m.
09.11.2002.09:00	22:00	13,0		ELWU	OK	OK	Took 10 good pressure points in Tilje formation from 4042 - 4167 m. Filled 3 x 450 cc bottles at 4050,5 m.
09.11.2002.22:00	23:00	1,0		ELWU	OK	OK	Took 1 good pressure point in Tofte formation at 3940,8 m.
09.11.2002.23:00	00:00	1,0		ELWU	OK	OK	Moved tool to Ile formation and started to take pressure points.
10.11.2002.00:00	05:00	5,0		ELWU	OK	OK	Took a total of 7 good pressure points in Ile formation from 3843 - 3874 m. Filled 3 x 450 cc bottles at 3847,8 m. Had 1500 ft/lbs overpull on tool to come free after last sampling, otherwise hole in excellent condition.
10.11.2002.05:00	06:00	1,0		ELWU	OK	OK	POOH with WL run # 13 (GR-MDT).
10.11.2002.06:00	07:00	1,0		ELWU	OK	OK	POOH with WL run #13 (GR-MWD).
10.11.2002.07:00	09:00	2,0		ELWU	OK	OK	Recovered fluid samples from MDT tool and LD tool string.
10.11.2002.09:00	10:00	1,0		ELWU	OK	OK	RD wireline equipment and cleared drill floor. Meanwhile performed PVT samples on formation samples.
10.11.2002.10:00	11:00	1,0		PTTU	OK	OK	MU cmt stand with Kelly Cock, side entry sub and low torque valve. Racked back same in derrick.
10.11.2002.11:00	15:00	4,0	300,0	PTPU	OK	OK	RU 2 7/8" handling equipment. PU from pipe deck, MU and RIH with 300 m of 2 7/8" tubing. Change to 3 1/2" handling equipment.
10.11.2002.15:00	18:00	3,0	1390,0	PTTU	OK	OK	RIH with 3 1/2" DP to 1390 m.
10.11.2002.18:00	00:00	6,0	4175,0	PTTU	OK	OK	Installed DP auto slips and changed to 5 1/2" inserts in BX elevator. RIH with 5 1/2" DP to 4150 m. MU cmt stand, washed down and tagged bottom at 4175 m.
11.11.2002.00:00	01:30	1,5	4175,0	PCCU	OK	OK	Increased flowrate in steps to 2400 LPM / 250 Bar and circulated BU through topdrive. Max gas at BU 0.3 %. Meanwhile held pre job meeting with all involved personel prior to cementing operations. Pressure tested cmt hose to 200 Bar/ 5 Bar.
11.11.2002.01:30	03:00	1,5	4175,0	PSSU	OK	OK	OH cmt plug #1 : Pumped 4 m3 FW s pacer, 4.6 m3 1.90 SG gas-tight slurry and 1.2 m3 FW from cmt unit. Displaced cmt plug with 1.22 SG mud using rig pumps with 1600 LPM / 140 Bar.
11.11.2002.03:00	05:30	2,5	3963,0	PSSU	OK	OK	POOH to 3963 m with reduced speed, pulling dry. Dropped sponge ball and circulated BU with 2500 LPM / 260 Bar. No cement in returns.
11.11.2002.05:30	06:00	0,5	3963,0	PSSU	OK	OK	OH cmt plug #2 : Pumped 4 m3 FW spacer from cmt unit. Started to mix and pump 4.6 m3 1.90 SG gas-tight cmt slurry.
11.11.2002.06:00	07:00	1,0	3963,0	PSSU	OK	OK	Cont OH cement plug no.2 (3963 m to 3755 m): Displaced with 1.0 m3 FW using cement unit and 30.3 m3 using rig pumps (1600 lpm / 110 bar).
11.11.2002.07:00	08:00	1,0	3753,0	PTTU	OK	OK	POOH from 3963 m to 3753 m. Dropped DP sponge ball and MU cement stand.
11.11.2002.08:00	09:30	1,5	3753,0	PCCU	OK	OK	Circ BU (2500 lpm / 250 bar). Pressure tested cement hose (200 bar / 10 min). Monitored return and checked for cement, observed increase in Ph at BU.
11.11.2002.09:30	10:30	1,0	3755,0	PSSU	OK	OK	7" liner shoe cement plug no.3 (3755 m to 3545 m): Pumped 4.0 m3 FW spacer, 4.3 m3 1.90 gas-tight slurry and displaced with 1.0 m3 FW using cement unit. Cont displacing with 28.0 m3 mud using rig pumps (2500 lpm / 250 bar).

11.11.2002.10:30	11:30	1,0	3543,0	PTTU	OK	OK	POOH from 3753 m to 3543 m. Dropped DP sponge ball and MU cement stand.
11.11.2002.11:30	13:00	1,5	3543,0	PCCU	OK	OK	Circ BU (2500 lpm / 250 bar). Pressure tested cement hose (200 bar / 10 min). Monitored return and checked for cement, observed increase in Ph at BU.
11.11.2002.13:00	14:00	1,0	3545,0	PSSU	OK	OK	7" liner cement plug no.4 (3545 m to 3275 m): Pumped 4.0 m3 FW spacer, 5.3 m3 1.90 non-gas-tight slurry and displaced with 1.0 m3 FW using cement unit. Cont displacing with 24.9 m3 mud using rig pumps (2500 lpm / 250 bar).
11.11.2002.14:00	15:00	1,0	3273,0	PTTU	OK	OK	POOH from 3545 m to 3273 m.
11.11.2002.15:00	16:30	1,5	3273,0	PCCU	OK	OK	Dropped DP sponge ball and MU cement stand. Circ BU (2580 lpm / 250 bar). Monitored return and checked for cement, observed increase in Ph at BU.
11.11.2002.16:30	18:00	1,5	3275,0	PSSU	OK	OK	7" liner cement plug no.5 (3275 m to 3005 m): Pumped 4.0 m3 FW spacer, 5.3 m3 1.90 non-gas-tight slurry and displaced with 1.0 m3 FW using cement unit. Cont displacing with 21.9 m3 mud using rig pumps (2500 lpm / 250 bar).
11.11.2002.18:00	19:00	1,0	3003,0	PTTU	OK	OK	POOH from 3275 m to 3003 m.
11.11.2002.19:00	20:30	1,5	3003,0	PCCU	OK	OK	Dropped DP sponge ball and MU cement stand. Circ BU (2680 lpm / 250 bar). Monitored return and checked for cement, observed increase in Ph at BU.
11.11.2002.20:30	21:30	1,0	3005,0	PSSU	OK	OK	7" liner lap cement plug no.6 (3005 m to 2735 m): Pumped 6.0 m3 FW spacer, 7.0 m3 1.95 non-gas-tight slurry and displaced with 1.0 m3 FW using cement unit. Cont displacing with 18,8 m3 mud using rig pumps (2500 lpm / 244 bar).
11.11.2002.21:30	22:30	1,0	2733,0	PTTU	OK	OK	POOH from 3005 m to 2733 m.
11.11.2002.22:30	00:00	1,5	2733,0	PCCU	OK	OK	Dropped DP sponge ball and MU cement stand. Circ BU (2700 lpm / 250 bar). Monitored return and checked for cement, observed increase in Ph at BU.
12.11.2002.00:00	01:00	1,0	2733,0	PTTU	OK	OK	Functionned BOP and flow checked. Slugged pipe.
12.11.2002.01:00	06:00	5,0	750,0	PTTU	OK	OK	POOH from 2733 m to 750 m.
12.11.2002.06:00	11:30	5,5		PTTU	OK	OK	Cont POOH. LD 2 7/8" DP.
12.11.2002.11:30	14:00	2,5	545,0	PSMU	OK	OK	MU and RIH 13 3/8" EZSV to 545 m.
12.11.2002.14:00	17:30	3,5	545,0	PAOD	O FAIL	O FAIL	Pressure tested cement plugs to 152 bar. Leak observed. POOH to above BOP.
12.11.2002.17:30	18:00	0,5	280,0	PSSU	OK	OK	Closed Shear Ram and pressure tested cement plugs to 152 bar/10 min, ok.
12.11.2002.18:00	19:30	1,5	550,0	PAOD	O FAIL	OK	RIH to 550 m.
12.11.2002.19:30	21:00	1,5	550,0	PSMU	OK	OK	Set Halliburton 13 3/8" EZSV at 550 m. Sheared with 22 t, checked by setting down 2 t, ok. Pressure tested plug to 152 bar/10 min.
12.11.2002.21:00	22:00	1,0	550,0	PCCU	OK	OK	Displaced well to seawater, including choke-, kill- and boosterline.
12.11.2002.22:00	23:00	1,0	550,0	PSSU	OK	OK	MU cement stand and pressure tested same to 200 bar/10 min. Cemented top plug no. 7 (550 m to 330 m): Pumped 6 m3 spacer, 17 m3 slurry 1.90 sg and displaced with 3.7 m3 seawater.
12.11.2002.23:00	00:00	1,0	325,0	PTTU	OK	OK	POOH to 325 m. Circulated 15 min.
13.11.2002.00:00	01:00	1,0		PTTU	OK	OK	POOH and LD Packer stinger.
13.11.2002.01:00	03:30	2,5		BHRU	OK	OK	MU Wear bushing retrieval / BOP test tool on stand with Jet sub. Landed same in wellhead.
13.11.2002.03:30	06:00	2,5		CAWW	OK	OK	Pressure tested BOP while WOW.
13.11.2002.06:00	08:00	2,0		CAWW	OK	OK	Cont. to pressure test BOP while WOW. 20/350 bar.
13.11.2002.08:00	10:00	2,0		BHRU	OK	OK	Pulled Wear bushing free with 25 t overpull. POOH and LD Wear bushing and BOP test tool.
13.11.2002.10:00	11:30	1,5		DTPU	OK	OK	LD 6" BHA from derrick.
13.11.2002.11:30	15:30	4,0		BBRU	OK	OK	RU to pull BOP.
13.11.2002.15:30	17:00	1,5		BBRU	OK	OK	Nippled down and l/out Diverter.
13.11.2002.17:00	18:30	1,5		BBRU	OK	OK	MU Landing joint and lock Slip joint.

13.11.2002.18:30	19:30	1,0	BBRU	OK	OK	Unlatched BOP. Pulled clear of Wellhead and moved 40 m off location.
13.11.2002.19:30	22:30	3,0	BBRU	OK	OK	Held TBT. Removed Tensionners, Goosenecks and Mux saddles. Pulled and l/out Landing joint.
13.11.2002.22:30	23:30	1,0	BBRU	OK	OK	Pulled and l/out Slip joint.
13.11.2002.23:30	00:00	0,5	BBRU	OK	OK	Started pulling BOP and Riser.
14.11.2002.00:00	03:30	3,5	BBRU	OK	OK	Pulled BOP and Riser.
14.11.2002.03:30	05:30	2,0	BBRU	OK	OK	Disconnected Riser and n/down BOP. Installed BOP test cap. Moved BOP to port side of Moonpool. L/out riser joints.
14.11.2002.05:30	06:00	0,5	BBRU	OK	OK	Started r/down Riser handling tools.
14.11.2002.06:00	08:30	2,5	BBRU	OK	OK	R/down Riser handling tools.
14.11.2002.08:30	14:00	5,5	PACU	OK	OK	MU Casing cutting assy and RIH to above Wellhead.
14.11.2002.14:00	17:00	3,0	PACU	OK	OK	Stabbed into wellhead with ROV guidance. Cut Casing 5 m below seabed with 3000 lpm / 145 bar. Pressure increased to 175 bar after 1 hr 10 min. Pulled Casing free with 28 t overpull and POOH with Wellhead.
14.11.2002.17:00	18:00	1,0	PAHU	OK	OK	Removed 2 Bull's eyes from Wellhead in Moonpool.
14.11.2002.18:00	19:30	1,5	PAHU	OK	OK	LD Wellhead and Casing on deck.
14.11.2002.19:30	23:30	4,0	PAOU	OK	OK	Performed seabed survey and removed debries. Recovered lost Tautwire from seabed using ROV and guidewire.
14.11.2002.23:30	00:00	0,5	PAOU	OK	OK	Run ROV basket to seabed.
15.11.2002.00:00	04:00	4,0	PAOU	OK	OK	Recovered 2 Transponders by the ROV, 1 not found (not responding).

Appendix B Directional data, survey listing

STATOIL

Statoil,6406/3-6
6406/3 Exploration,6406/3
EXPLORATION ZONE 32,Norway

Wellbore: 6406/3-6
Wellpath: 6406/3-6 Definitive (Preliminary)
Date Printed: 27-Nov-2002

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Wellbore

Name	Created	Last Revised
6406/3-6	10-Oct-2002	27-Nov-2002

Well

Name	Government ID	Last Revised
6406/3-6		29-Oct-2001

Slot

Name	Grid Northing	Grid Easting	Latitude	Longitude	North	East
6406/3-6	7187389.0000	403326.0000	N64 47 43.5633	E6 57 55.1395	22576.28S	2781.47E

Installation

Name	Easting	Northing	Coord System Name	North Alignment
6406/3 Exploration	400545,309	7209958,985	ED50-UTM-32N on EUROPEAN DATUM 1950 datum	Grid

Field

Name	Easting	Northing	Coord System Name	North Alignment
EXPLORATION ZONE 32	381477,000	7229793,000	ED50-UTM-32N 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 (Stena Don 24.0m above Mean Sea Level)
Vertical Section is from 22576,28S 2781,47E on azimuth 92,75 degrees
Bottom hole distance is 39,20 Metres on azimuth 92,75 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,6406/3-6
6406/3 Exploration,6406/3
EXPLORATION ZONE 32,Norway

Wellbore: 6406/3-6
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Wellpath (Grid) Report

MD[m]	Inc[deg]	Dir[deg]	TVD[m]	North[m]	East[m]	Dogleg [deg/30m]	Vertical Section[m]	Easting	Northing
297,00	0,00	0,00	297,00	22576,28S	2781,47E	0,00	0,00	403326,00	7187389,00
382,60	1,50	14,92	382,59	22575,20S	2781,75E	0,53	0,24	403326,29	7187390,08
442,60	1,21	13,94	442,57	22573,83S	2782,11E	0,15	0,52	403326,64	7187391,46
527,00	0,59	14,53	526,96	22572,54S	2782,43E	0,22	0,79	403326,97	7187392,74
614,20	0,50	11,94	614,16	22571,73S	2782,62E	0,03	0,94	403327,16	7187393,55
701,30	0,24	309,22	701,26	22571,25S	2782,56E	0,15	0,85	403327,10	7187394,03
789,90	0,19	221,90	789,86	22571,24S	2782,32E	0,10	0,61	403326,85	7187394,04
877,10	0,09	22,84	877,06	22571,28S	2782,25E	0,10	0,54	403326,78	7187394,00
965,10	0,16	26,31	965,06	22571,11S	2782,33E	0,02	0,62	403326,86	7187394,17
1048,80	0,15	343,04	1048,76	22570,90S	2782,35E	0,04	0,63	403326,88	7187394,38
1138,50	0,12	158,39	1138,46	22570,88S	2782,35E	0,09	0,62	403326,89	7187394,41
1229,20	0,17	128,64	1229,16	22571,05S	2782,49E	0,03	0,77	403327,03	7187394,23
1316,30	0,19	328,71	1316,26	22571,00S	2782,52E	0,12	0,80	403327,05	7187394,28
1399,40	0,14	342,47	1399,36	22570,79S	2782,42E	0,02	0,68	403326,95	7187394,49
1486,90	0,19	270,65	1486,86	22570,69S	2782,24E	0,07	0,50	403326,77	7187394,59
1574,60	0,12	228,94	1574,56	22570,74S	2782,02E	0,04	0,29	403326,56	7187394,54
1661,70	0,09	251,44	1661,65	22570,83S	2781,89E	0,02	0,16	403326,42	7187394,45
1748,80	0,37	232,91	1748,75	22571,02S	2781,60E	0,10	-0,12	403326,13	7187394,26
1762,40	0,39	203,85	1762,35	22571,09S	2781,55E	0,42	-0,17	403326,08	7187394,19
1837,00	0,50	212,64	1836,95	22571,59S	2781,27E	0,05	-0,42	403325,80	7187393,69
1923,60	0,35	214,34	1923,55	22572,13S	2780,92E	0,05	-0,75	403325,45	7187393,15
2012,50	0,31	263,80	2012,45	22572,38S	2780,52E	0,09	-1,13	403325,06	7187392,90
2099,80	0,30	248,60	2099,75	22572,49S	2780,08E	0,03	-1,57	403324,61	7187392,79
2185,00	0,27	214,40	2184,95	22572,74S	2779,75E	0,06	-1,88	403324,29	7187392,55
2270,40	0,25	258,47	2270,34	22572,94S	2779,46E	0,07	-2,17	403323,99	7187392,34
2363,90	0,25	176,71	2363,84	22573,18S	2779,27E	0,10	-2,34	403323,80	7187392,10
2451,00	0,50	122,73	2450,94	22573,58S	2779,60E	0,14	-1,99	403324,14	7187391,70
2539,90	0,77	97,79	2539,84	22573,87S	2780,52E	0,13	-1,06	403325,05	7187391,41
2626,30	1,09	83,68	2626,22	22573,86S	2781,91E	0,14	0,33	403326,44	7187391,42
2714,60	1,42	84,01	2714,50	22573,65S	2783,83E	0,11	2,24	403328,37	7187391,63
2800,30	1,48	95,17	2800,18	22573,64S	2785,99E	0,10	4,39	403330,52	7187391,64
2888,40	1,71	103,70	2888,24	22574,05S	2788,40E	0,11	6,82	403332,93	7187391,23
2970,00	2,26	103,79	2969,79	22574,73S	2791,15E	0,20	9,60	403335,68	7187390,56
3117,20	3,41	103,53	3116,81	22576,44S	2798,22E	0,23	16,75	403342,75	7187388,84
3203,80	3,68	101,64	3203,24	22577,61S	2803,45E	0,10	22,02	403347,98	7187387,68
3294,00	3,63	98,54	3293,26	22578,61S	2809,11E	0,07	27,72	403353,63	7187386,67
3380,00	2,59	101,05	3379,13	22579,39S	2813,71E	0,37	32,35	403358,23	7187385,89
3467,20	1,63	97,86	3466,27	22579,94S	2816,87E	0,33	35,54	403361,39	7187385,35
3554,30	1,24	73,88	3553,35	22579,85S	2819,00E	0,24	37,66	403363,53	7187385,44
3642,00	0,83	78,79	3641,03	22579,46S	2820,54E	0,14	39,18	403365,06	7187385,83
3782,90	0,57	25,74	3781,92	22578,63S	2821,84E	0,14	40,44	403366,36	7187386,66
3809,80	0,26	343,23	3808,82	22578,45S	2821,88E	0,47	40,47	403366,41	7187386,83
3839,40	0,14	309,19	3838,42	22578,36S	2821,84E	0,17	40,42	403366,36	7187386,92
3868,80	0,31	303,06	3867,82	22578,30S	2821,74E	0,17	40,33	403366,26	7187386,99
3897,40	0,35	293,71	3896,42	22578,22S	2821,60E	0,07	40,18	403366,12	7187387,06
3926,50	0,53	263,04	3925,52	22578,20S	2821,38E	0,30	39,96	403365,90	7187387,08
3955,00	0,92	279,54	3954,02	22578,18S	2821,02E	0,46	39,60	403365,55	7187387,11
3976,90	1,19	266,14	3975,92	22578,16S	2820,62E	0,50	39,20	403365,15	7187387,12

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (Stena Don 24.0m above Mean Sea Level)
Vertical Section is from 22576,28S 2781,47E on azimuth 92,75 degrees
Bottom hole distance is 39,20 Metres on azimuth 92,75 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

Appendix C Contractors list

Service	Company
Liner hanger	Weatherford Norge AS
Cementing	Halliburton Cementing Services
Directional drilling	Baker Hughes Inteq
Helicopters	Norsk Helikopter AS
	Helikopter Service AS
Diving	Oceaneering AS
Drilling contractor/casing	Stena Drilling AS
Electric logging	Schlumberger Offshore Service NV
Helicopter booking	Lufttransport (Statoil)
Mud	MI Drilling Fluids
Mud logging	Halliburton-Sperry Sun
MWD	Baker Hughes Inteq
LWD	Halliburton-Sperry Sun
P&A	Weatherford
Rig positioning	Thales
Site survey	
Wellhead system	ABB Offshore System AS
Casing	Stena Don AS Ltd.(Weatherford)
	Corpro
Lab services and tritium handling offshore	Reslab
Lab services	
Fluid transfer / PVT analysis offshore	Altinex

Appendix D Wellsite sample description

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 1 of 22
Country: Norway	Area: Halten Terrace	Field: Tyrihans Sør	
Well no: 6406/3-6	Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters	Geologist: O.Beyer, T.K.Hals, Jon Basset		
Hole size: 12 1/4 "	Cut solvent:	Date: 02 Oct 2002	

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.
1790	100	Clst: dk brnsh gry- olv brn, frm, blky, slty microlam, non calc	No shows
	Tr	Ls: lt orng, sft - frm, sbblky, slily arg	
1800	100	Clst: pred a.a.	a.a.
1810	100	Clst: pred a.a.	a.a.
1820	Not recovered		
1830	100	Clst: pred a.a.	a.a.
1840	100	Clst: pred olv brn, frm, blky, unif v f sdy-slty incl, non calc	a.a.
1850	100	Clst: pred a.a.	a.a.
1860	100	Clst: pred a.a.	a.a.
1870	100	Clst: bec pred olv brn – med dk gry, else a.a.	a.a.
1880	100	Clst: bec also pa grnsh gry, frm, blky, unif, v f sdy-slty incl, non calc	a.a.
1890	100	Clst: pred a.a.	a.a.
1900	100	Clst: olv brn, grnsh gry, blky, frm-mod hd, slily britt, slty, non cal.	a.a.
	Tr	Ls: lt gry-v lt gry, sft-frm else a.a	
1910	100	Clst: a.a	a.a.
	Tr	Ls: a.a	
1920	100	Clst: a.a Occ med gry, occ micropyr	a.a.
	Tr	Ls: a.a	
1930	95	Clst: a.a	a.a.
	5	Dol: Yel brn, frm-mod hd, occ hd, blky, slily arg	
	Tr	Ls: a.a	
1940	60	Clst: a.a	a.a.
	40	Dol: a.a hd-v hd, slily arg lam	
1950	Not recovered		
1960	100	Clst: Ol gry – md dk gry, else a.a	a.a.
	gd tr	dolm Ls: Yel brn-gr or, frm, blky, slily arg	
1970	90	Clst: a.a Occ slily grnsh gry	a.a.
	10	Dol Ls: a.a	
1980	60	Clst: a.a	a.a.
	40	Dol: Yel brn, frm-mod hd, occ hd, blky, slily arg	
	Tr	Ls: a.a	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 2 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: O.Beyer, T.K.Hals, Jon Basset		
Hole size: 12 1/4 "		Cut solvent:		Date: 02 Oct 2002

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.
1990	90	Clst: Ol gry, grn gry, med dk gry, med hd-hd, slty, blky, slily arg	a.a.
	10	Dol: Gry or -Yel brn, frm, occ med hd, blky, v arg, occ grad ls	
2000	70	Clst: a. a	a.a.
	30	Dol: a. a	
2010	90	Clst: mstly med dk gry – dk gry. Else a.a.	a.a.
	10	Dol: a. a	
2020	90	Clst: dk gry – brnsh bl, occ pl gr, else a.a	a.a.
	10	Dol: a.a	
2030	85	Clst: med gry – dk gry, occ grnsh gry, else a.a.	a.a.
	15	Dol: a.a	
2040	Not recorded		
2050	90	Clst: a.a.	a.a.
	10	Dol: a.a	
2060	90	Clst:	a.a.
	10	Dol: a.a	
2070-2100	Not Recorded		
2110	80	Clst: a.a	a.a
	20	Dol: a.a	
2120	100	Clst: olv gry - med gry, occ lt gry	a.a
	Tr:	Dol: a.a	
2130	100	Clst: med gry-dk gry, grnsh gry	a.a
	Gd tr	Dol: a.a	
2140	100	Clst: a.a	a.a
	Gd tr	Dol: occ v hd. Else a.a.	
	Tr	Ls: a.a	
2150	Lost		
2160	100	Clst: occ lt gry else a.a	a.a
	Tr	Dol: yel brn, else a.a	
2170	Lost		
2180	100	Clst: grnsh gry, dk grnsh gry, occ pyr, else a.a	a.a
	Tr	Dol: a.a	
2190	100	Clst: dk gry, dk grnsh gry else a.a	a.a
	Tr	Dol. Occ v arg	

WELLSITE SAMPLE DESCRIPTION				Page 3 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company:	Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf	
RKB: 24 meters		Geologist:	O.Beyer, T.K.Hals, Jon Basset	
Hole size: 12 1/4 "		Cut solvent:		Date: 02 Oct 2002

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.
2200	100	Clst: Olv gry, grn gry, med dk gry, med hd-hd, slty, blky, slily arg	a.a
	Tr	Ls: off wh – lt yel, pred cryptoxln (mrly) w/ carb microlam, pyr nods incl	
		Dol: lt brn gry, sbxln, pyr nods	
2210	90	Clst: mod rdsh brn, dk rdsh brn, grnsh gry, grysh grn, slily calc, glauc, else a.a	a.a
	10	Ls: a.a	
	Tr	Dol a.a	
	Tr	Pyr nods	
2220	Not recovered		
2230	95	Clst: varicol, pred a.a.	a.a.
	5	Ls/Dol: a.a.	
	Tr	Pyr nods	
2240	70	Clst: varicol, pred a.a.	a.a.
	25	Tuff/Tuffac Clst: med gry – blu gry, lt grnsh gry, slty, tr blk microspks, crmbly txt	
	5	Ls/Dol: a.a.	
	Tr	Pyr nods	
2250	60	Clst: varicol, pred a.a.	a.a.
	35	Tuff/Tuffac Clst: incr med gry (Tuff), v crmbly txt	
	5	Ls/Dol: a.a.	
	Tr	Pyr nods	
2260	60	Clst: varicol, pred a.a.	a.a.
	40	Tuff/Tuffac Clst: incr med gry (Tuff), v crmbly txt	
	Gd tr	Ls/Dol: a.a.	
	Tr	Pyr nods	
2270	Missing		
2280	95	Clst: pred dk gnsh gry – med dk gry, loc mod slty, non – sl calc	
	5	Tuffac Clst/Tuff: bec less cln Tuff, else a.a.	
2290	95	Clst: a.a.	
	5	Tf/tf Clst: a.a.	
	Tr	Ls: grysh or, v hd, blky, microxln	
2300	80	Clst: pred gnsh gry – dk gnsh gry, frm – mod hd, blky – sbblky, non calc	
	10	Sltst: olv gry – med dk gry, frm, sbblky, v arg, carb	
	10	Ls: occ pa yelsh brn, else a.a.	
2310	90	Clst: pred a.a., also occ med brn, frm, crumbly – sbblky, loc v slty, non calc	
	10	Ls: a.a.	
2320	90	Clst: as 2320	
	10	Ls: a.a.	
2330	a.a.		

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 4 of 22
Country: Norway			Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6			Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24	meters		Geologist: O.Bøe, T.A.Johnsen, Jon Basset		
Hole size: 12 1/4	"		Cut solvent:		Date: 03 Oct 2002

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.
2340	90	Clst: med dk gry – olv gry, gnsh gry – dk gnsh gry, frm – mod hd, brit, sbblky – splin, non – slily calc	
	10	Ls: a.a.	
2350	90	Clst: a.a.	
	10	Ls: a.a.	
	Tr	Pyr nod	
2360	100	Clst: a.a.	
2370	100	Clst: a.a.	
	Tr	Tf/tf Clst: a.a.	
2380	100	Clst: freq mod brn, else a.a.	
2390	90	Clst: a.a.	
	10	Ls: yelsh gry – lt gry, mod hd, brit blky	
2400	90	Clst: pred med gry – dk gry, else a.a.	
	10	Ls: a.a.	
	Gd tr	Pyr nod	
2410	Lost		
2420	100	Clst: Pred med dk gry – dk gry, also dk gnsh gry, frm – mod hd, sbblky, slily slty, non calc	
	Sl Tr	Ls: a.a	
	Tr	Pyr	
2430	80	Clst: a.a	
	20	Ls: lt yel brn – brnsh gry, frm, blky, arg	
	Tr	Pyr	
2440	100	Clst: a.a	
	Gd Tr	Ls: a.a	
	Gd Tr	Pyr	
2450	100	Clst: occ dk gnsh gry, else a.a	
	Sl Tr	Ls: a.a	
	Sl Tr	Pyr	
2460	100	Clst: pred med dk gry – dk gry, occ dk gnsh gry, frm – mod hd, sbblky – blky, slty, non calc	
	Tr	Ls: a.a	
	Tr	Pyr	
2470	100	Clst: a.a	
	Tr	Ls: a.a	
	Tr	Pyr	
2480	80	Clst: a.a	
	20	Ls: a.a	
	Sl Tr	Pyr	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 5 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: O.Bøe, T.A.Johnsen, Jon Basset		
Hole size: 12 1/4 "		Cut solvent:		Date: 3-4 Oct 2002

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.
2490	100 Tr Tr	Clst: pred med dk gry – dk gry, occ dk gnsh gry, frm – mod hd, sbblky – blky, slty, non calc Ls: lt yel – brnsh gry, frm, blky, arg Pyr	
2500	100 Tr Tr	Clst: med dk gry – dk gry, tr dk gnsh gry, sbblky, frm – mod hd, tr glauc, non calc, grad sltst Ls: a.a Pyr	
2510	100 Tr Sl Tr	Clst: a.a Ls: med dk gry, occ v lt gry, frm, blky, arg Pyr	
2520	Sltst: Sl Tr	pred med dk gry, sbblky, frm – mod hd, tr glauc, non calc - calc, grad Clst Ls: brnsh gry – dk yel brn, blky, frm, arg	
2522.5 Btms. up	60 40	Slst: a.a Ls: a.a	
2530	90 10	Sltst: a.a. Ls: a.a.	
2540	100 Gd tr	Sltst: loc dk gnsh gry, else a.a. Ls: a.a.	
2550	100 Tr	Sltst: as 2530 Ls: a.a.	
2560	100 Tr Tr	Sltst: as 2530 Ls: a.a. Clst: mod brn, sbblky, hd, brit	
2570	100	Sltst: a.a.	
2580	80 20	Sltst: a.a. Ls: a.a.	
2590	a.a.		
2600	100 Tr	Sltst: a.a. Ls: a.a.	
2610	80 20	Slst: sdy i.p else a.a Ls: a.a	
2620	90 10	Sltst: loc dkgnsh gry else a.a Ls: a.a	
2630	100 Tr	Sltst: med dk gry – dk gry, frm – mod hd, sbblky – blky, glauc i.p., slily calc – non calc, grad Clst i.p Ls: a.a	
2640	a.a.		

WELLSITE SAMPLE DESCRIPTION					Page 6 of 22
Country: Norway			Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6			Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24	meters		Geologist: O.Bøe, T.A.Johnsen		
Hole size: 12 1/4	"		Cut solvent:		Date: 4 Oct 2002

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.
2650	100	Sltst: med dk gry – dk gry, frm – mod hd, sbblky – blky, glauc i.p., non calc, grad Clst, grad v f sst i.p.	
	Tr	Ls: brnsh gry – dk yel brn, blky, frm, arg	
2660	100	Sltst: a.a	
	Tr	Ls: a.a	
2670	90	Clst: med dk gry – dk gry, frm – mod hd, blky, plty, non calc, grad sltst	
	10	Ls: a.a.	
2680	Lost	working with gasequipment	
2690	Lost	working with gasequipment	
2700	100	Clst: calc else a.a	
	Gd Tr	Ls: a.a	
2710	100	Sltst: slily calc – calc, plty else a.a	
	Gd Tr	Ls: a.a	
2720	Lost		
2730	100	Sltst: a.a	
	Tr	Ls: a.a	
2740	100	Sltst: a.a	
	Gd Tr	Ls: a.a	
2750	100	Sltst: non calc – calc, else a.a	
	Tr	Ls: a.a	
2760	60	Slst: a.a	
	30	Clst med dk gry – dk gry, frm – mod hd, blky, non calc - calc, slty i.p.	
	10	Ls: a.a	
2770	a.a.		
2780	80	Slst: a.a	
	20	Ls: brnsh gry – dk yel brn, occ grysh or pk, blky, frm, arg	
2790	a.a.		
2800	100	Sltst: a.a	
	Tr	Ls: a.a	
2810	a.a.		

WELLSITE SAMPLE DESCRIPTION					Page 7 of 22
Country: Norway			Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6			Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24	meters		Geologist: O.Bøe, T.A.Johnsen		
Hole size: 12 1/4	"		Cut solvent:		Date: 5 Oct 2002

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.
2820	100	Sltst: med dk gry, frm – mod hd, sbblky – blky, glauc i.p., non calc - calc, grad Clst	
	Tr	Ls: brnsh gry – dk yel brn, occ grysh or pk, blky, frm, arg	
2830	a.a.		
2840	a.a.		
2850	70	Sltst: a.a.	
	30	Clst: med dk gry – olv gry, mod hd, brit, non calc, slily – v slty	
	Tr	Ls: a.a.	
2860	a.a.		
2870	70	Sltst: a.a.	
	30	Clst: a.a.	
	Tr:	Ls: a.a.	
2880	a.a.		
2890	80	Clst: a.a.	
	20	Sltst: a.a.	
2900	40	Clst: a.a.	
Btms. up	40	Sltst: a.a.	
	20	Ls: a.a.	

END 12 ¼" SECTION

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 8 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: O.Bøe, T.A.Johnsen		
Hole size: 8 1/2 "		Cut solvent:		Date: 8 Oct 2002

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.
2910	80	Sltst: med dk gry, frm – mod hd, sbblky – blky, glauc i.p., non calc – calc, grad Clst	Cement contaminated sample.
	20	Clst: med dk gry – olv gry, mod hd, brit, non calc, slily – v slty, loc grad Clst	
	Tr	Ls: brnsh gry – dk yel brn, occ grysh or pk, blky, frm, arg	
2920	60	Clst: a.a.	No shows
	40	Sltst: a.a.	
	Tr	Ls: a.a.	
2930	70	Clst: a.a.	a.a
	20	Ls: a.a.	
	10	Sltst: a.a.	
2940	60	Clst: a.a.	a.a
	40	Sltst: a.a.	
	Tr	Ls: a.a.	
2950	80	Clst: a.a.	a.a
	20	Sltst: a.a.	
	Tr	Ls: a.a.	
2960	100	Clst: med dk gry – dk gry, olv gry, blky – plty, mod hd, brit, non clac – slily calc, slty	a.a
	Tr	Ls: occ microxln, else a.a	
2970	100	Clst. a.a	a.a
	Tr	Ls: a.a	
2980	100	Clst. a.a	a.a
	Sl Tr	Ls: a.a	
2990	100	Clst. a.a	
	Sl Tr	Ls: a.a	
3000	100	Clst: slily calc calc, else a.a	a.a
	Sl Tr	Ls: a.a	
3010	100	Clst: slily calc, grad slst, else a.a	a.a
	Sl Tr	Ls: a.a	
3020	100	Clst: pred dk gry – olv blk, else a.a	a.a
	Sl Tr	Ls: a.a	
3030	100	Clst: slily calc – non calc, slty, else a.a	a.a
	Tr	Ls: a.a	
3040	100	Clst: pred dk gry, frm – mod hd, sbblky – blky, slily calc, slty	a.a
	Sl tr	Ls: a.a	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 9 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør	
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf			
RKB: 24 meters		Geologist: O.Bøe, T.A.Johnsen			
Hole size: 8 1/2 "		Cut solvent:		Date: 9 Oct 2002	

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.
3050	100	Clst: pred dk gry, frm – mod hd, sbblky – blky, slily calc, slty	No shows
	Sl tr	Ls: brnsh gry – dk yel brn, occ grysh or pk, blky, frm, arg, occ microxln	
3060	100	Clst: pred dk gry, mod hd, blky – plty, non calc – slily calc, grad sltst i.p.	a.a
3070	95	Clst: a.a	a.a
	5	Ls: a.a	
3080	90	Clst: a.a	a.a
	10	Ls: a.a	
	Tr	Sst: v lt gry, v f, calc cmt, glauc i.p.	
3090	90	Clst: a.a	a.a
	10	Ls: a.a	
	Tr	Sst: a.a	
3100	90	Clst: pred dk gry, frm – mod hd, sbblky – blky, slily calc, slty	a.a
	10	Ls: glauc i.p., else a.a	
	Gd tr	Sst: a.a	
	Tr	glauc	
3110	100	Clst: pred med dk gry, from – mod hd, blky, v calc, slily slty i.p., glauc i.p.	a.a
	Tr	Ls: a.a	
	Sl tr	Pyr	
3120	90	Clst: pred dk gry, frm – mod hd, sbblky – blky, slily calc, slty	a.a
	10	Sst: v lt gry, v f, sbrndd - rndd, wl srt, fri, slily calc - calc cmt, glauc i.p.	
	Gd tr	Ls: glauc i.p., else a.a	
3130	90	Clst: a.a	a.a
	10	Sst: a.a	
	Tr	Ls: a.a	
3140	100	Clst: a.a.	a.a
	Tr	Ls: occ mod brn, loc sdy, else a.a.	
3150	a.a.		a.a.
3160	90	Clst: dk gry – olv blk, else a.a.	a.a
	10	Ls: a.a.	
	Gd tr	Sst: a.a.	
3170	a.a.		a.a.
3040	100	Clst: pred dk gry, frm – mod hd, sbblky – blky, slily calc, slty	a.a
3180	a.a.		a.a.
3190	80	Clst: a.a.	a.a
	20	Ls: a.a.	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 10 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: O.Bøe, T.A.Johnsen		
Hole size: 8 1/2 "		Cut solvent:		Date: 9 Oct 2002

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.
3200	70	Clst: dk gry - olv blk, frm – mod hd, sbblky – blky, slily calc, slty	No shows
	20	Sltst: med dk gry – olv blk, frm, sbblky, non calc, v sdy, arg i.p.	
	10	Ls: a.a.	
3210	60	Clst: a.a.	a.a
	20	Ls: a.a.	
	20	Sltst: a.a.	
	Tr	Sst: a.a.	
3220	80	Clst: a.a.	a.a
	10	Ls: a.a.	
	10	Sltst: a.a.	
	Tr	Sst: lse qtz gr, v f – f, wl srt, sbrndd, calc cmt	
3230	90	Clst: slily – mod calc, else a.a.	a.a
	10	Sltst: a.a.	
	Tr	Ls: a.a.	
	Tr	Sst: a.a.	
3240	80	Clst: dk gry, frm, slty, grad sltst, slily – mod calc, micropyr, sbblky	a.a
	10	Sltst: dk gry, frm, sbblky, sdy, occ grad Sst, calc	
	10	Sst: pred lse qtz gr, v f – f, wl srt, clr gr, sbang – sbrndd, calc cmt, arg i.p.	
3250	90	Clst: a.a.	a.a
	10	Ls: pl yelsh gry, occ wh, frm – v hd, blky, microxln	
	rTr	Sst: a.a.	
3260	100	Clst: a.a.	a.a
	Tr	Sltst: a.a.	
	Tr	Ls: a.a.	
	Tr	Sst: a.a.	
3270	80	Clst: a.a.	a.a
	10	Ls: a.a.	
	10	Sst: lse qtz gr, v f – f, mod srt, clr gr, sbang – sbrndd	
3280	a.a.		
3290	a.a.		
3300	90	Clst: a.a.	a.a
	10	Ls: a.a.	
	Tr	Sst: a.a.	
3310	60	Clst: pred non calc, else a.a	a.a
	20	Ls: a.a	
	20	Sst: a.a	
3320	85	Clst: dk gry – olv blk, frm, sbblky – blky, non calc	a.a
	10	Ls: dk yel brn, pl yel brn – grysh or pk, frm, microxln, occ dolomitic, occ arg	
	5	Sst: a.a	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 11 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: O.Bøe, T.A.Johnsen		
Hole size: 8 1/2 "		Cut solvent:		Date: 9 Oct 2002

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.
3330	85	Clst: dk gry – olv blk, frm, sbblky – blky, non calc	No shows
	10	Ls: pred dk yel brn, frm, arg, occ pl yel brn – grysh or pk, frm, microxln	
	5	Sst: pred lse qtz gr, v f – f, wl srt, clr gr, sbang – sbrndd, calc cmt i.p	
3340	80	Clst: tr dk gnsh gry, slty i.p., else a.a	a.a
	20	Sst: a.a	
	Gd tr	Ls: a.a	
3350	90	Clst: a.a	a.a
	5	Sst: a.a	
	5	Ls: a.a	
3360	90	Clst: slty i.p., slily calc – non calc, else a.a	a.a
	10	Sst: a.a	
	Sl tr	Ls: pred dk yel brn, else a.a	
3370	100	Clst: pred dk gry, frm – mod hd, sbblky – blky, slily calc – non calc, slily slty	a.a
	Gd tr	Sst: a.a	
	Sl tr	Ls: a.a	
3380	95	Clst: a.a	No dir fluor,
	5	Sst: a.a	v sl wk blue
	Tr	Ls: a.a	wh cut
3390	70	Clst: a.a	a.a
	30	Sst: arg i.p., else a.a	
	Tr	Ls: a.a	
3400	90	Clst: a.a	a.a
	10	Sst: a.a	
	Tr	Ls: a.a	
3410	70	Clst: dk gry – dk gnsh gry, frm – mod hd, sbfis, blky, calc	a.a
	20	Ls: dk yel brn, also dk yelsh brown, frm , blky, arg	
	10	Sst: a.a	
3420	100	Clst: pred frm, slily calc – calc	a.a
	Gd tr	Ls: a.a	
	Tr	Sst: a.a	
3430	95	Clst: frm – mod hd, slily calc – non calc, slily slty i.p	a.a
	5	Ls: a.a	
	Tr	Sst: a.a	
3440	95	Clst: a.a	a.a
	5	Ls: a.a	
	Tr	Sst: a.a	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 12 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: T.A.Johnsen, J.M. Østby		
Hole size: 8 1/2 "		Cut solvent:		Date: 9. – 10. Oct 2002

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.
3450	70	Clst: dk gry , dk gnsh gry, frm – mod hd, sbfis, blky, slily calc - non calc, slily slty i.p.	No dir flu, v wk bl wh cut
	20	Ls: dk yel brn, also dk yelsh brown, frm , blky, arg	
	10	Sst: pred lse qtz gr, v f – f, wl srt, clr gr, sbang – sbrndd, glauc, calc cmt i.p.	
3460	80	Clst: a.a.	No shows
	15	Ls: a.a.	
	5	Sst: a.a.	
3470	95	Clst: a.a.	a.a.
	5	Ls: a.a.	
	Gd tr	Sst: a.a.	
3480	a.a.		a.a.
3490	90	Clst: dk gry , dk gnsh gry, a.a.	a.a.
	10	Ls: a.a.	
	Gd tr	Sst: a.a.	
	Tr	Clst: grysh brn, frm, blky, v calc	
3500	95	Clst: dk gry , dk gnsh gry, a.a.	a.a.
	5	Ls: a.a.	
	Tr	Sst: a.a.	
	Sli tr	Clst: grysh brn, a.a.	
3510	80	Clst: dk gry , dk gnsh gry, a.a.	a.a.
	20	Clst: grysh brn, frm – mod hd, blky, calc	
	Sli tr	Sst: a.a.	
3520	50	Clst: dk gry , dk gnsh gry, a.a.	a.a.
	50	Clst: grysh brn, non calc, else a.a.	
3530	70	Clst: grysh brn, a.a.	a.a.
	30	Clst: dk gry , dk gnsh gry, a.a.	
3540	60	Clst: dk gry , dk gnsh gry, a.a.	a.a.
	40	Clst: grysh brn, a.a.	
	Tr	Clst: dk gnsh gry, frm – mod hd, non calc	
3550	80	Clst: dk gry , dk gnsh gry, a.a.	a.a.
	10	Clst: grysh brn, a.a.	
	10	Ls: brnsh gry, mod hd, blky	
	Tr	Pyr	
3553	70	Clst: dk gry , dk gnsh gry, a.a.	a.a.
	20	Clst: grysh brn, non – v calc, else a.a.	
	10	Ls: brnsh gry, mod hd, blky	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 13 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: J.M. Østby		
Hole size: 8 1/2 "		Cut solvent:		Date: 10 Oct 2002

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.
3556	70	Clst: dk brnsh gry, frm – mod hd, non - v calc	No shows
	30	Clst: dk gry , dk gnsh gry, mod hd, sbfis, blky, slily calc - non calc	
	Tr	Ls: brnsh gry, mod hd, blky	
3559	60	Clst: dk brnsh gry, a.a.	a.a.
	30	Clst: dk gry – olv gry , dk gnsh gry, else a.a.	
	Tr	Pyr	
3562	80	Clst: dk brnsh gry, a.a.	a.a.
	20	Clst: dk gry – olv gry , dk gnsh gry, else a.a.	
	Tr	Ls: a.a.	
3565	90	Clst: dk brnsh gry, a.a.	a.a.
	10	Clst: dk gry – olv gry , dk gnsh gry, else a.a.	
3568	70	Clst: dk brnsh gry, a.a.	a.a.
	20	Clst: dk gry – olv gry , dk gnsh gry, a.a.	
	10	Ls: pnksh – yel wh, pa brn, mod hd – hd, microxln	
3571	80	Ls: a.a.	a.a.
	10	Clst: dk brnsh gry, a.a.	
	10	Clst: dk gry – olv gry , dk gnsh gry, a.a.	
3574	100	Ls: a.a.	a.a.
	Tr	Clst: a.a.	
3577	50	Ls: a.a.	a.a.
	50	Clst: olv blk, hd, blky, non calc	
3580	80	Clst: olv blk – dsky yel brn, else a.a.	a.a.
	20	Ls: a.a.	
	Tr	Clst: dk brnsh gry, a.a.	
3583	90	Clst: olv blk – dsky yel brn, a.a.	a.a.
	10	Ls: a.a.	
3586	100	Clst: a.a.	a.a.
	Tr	Ls: a.a.	
3589	100	Clst: a.a.	a.a.
3592	100	Clst: a.a.	a.a.
	Tr	Pyr	
3595	a.a.		a.a.
3598	95	Clst: a.a.	a.a.
	5	Ls: pa brn, hd, blky	
	Tr	Pyr	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 14 of 22
Country: Norway	Area: Halten Terrace		Field: Tyrihans Sør	
Well no: 6406/3-6	Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf			
RKB: 24 meters	Geologist: J.M. Østby			
Hole size: 8 1/2 "	Cut solvent:		Date: 11 Oct 2002	

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.
3601	100 Clst:	olv blk – dsky yel brn, hd, blky, non calc	No shows
	Tr Ls:	pa brn, hd, blky	
	Tr Pyr		
3604	a.a.		a.a.
3607	Lost		
3610	100 Clst:	pred. olv blk, a.a.	a.a.
	Tr Pyr		
3613	100 Clst:	a.a.	a.a.
3616	a.a.		a.a.
3619	90 Clst:	a.a.	a.a.
	10 Ls:	dk yel brn, mod hd, sbblky	
	Tr Pyr		
3622	85 Clst:	micropyr, else a.a.	a.a.
	15 Ls:	a.a.	
	Tr Pyr		
3625	95 Clst:	a.a.	a.a.
	5 Ls:	a.a.	
	Gd tr	Pyr, Tr Glauc	
3628	a.a.		
3631	a.a.		
3634	100 Clst:	a.a.	a.a.
	Tr Ls:	a.a.	
	Tr Pyr		
3637	100 Clst:	a.a.	a.a.
	Tr Pyr		
3640	a.a.		
3643	a.a.		
3646	a.a.		
3649	60 Sst:	clr, trnsl qtz, f, occ crs, fri – occ lse, wl cmt, calc cmt, ang – sbang, loc sbrndd, mod srtd	bri yel fluor, cut fluor affected by OBM
	40 Clst:	a.a.	
	tr Pyr		
3652	a.a.		

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 15 of 22
Country: Norway			Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6			Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24	meters		Geologist: J.M. Østby		
Hole size: 8 1/2	"		Cut solvent:		Date: 11 Oct 2002

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.
3654.5	80	Sst: clr, trnsl – trnsp, mlky wh qtz, f - med, occ crs, fri – occ lse, wl cmt, calc cmt, ang – sbang, loc sbrndd, mod srtd	bri yel fluor, cut fluor affected by OBM
	40	Clst: olv blk – dsky yel brn, hd, blky, non calc, micropyr	
	tr	Pyr	

END 8 ½" SECTION

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 16 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: O. Hunnes, T.F. Kristensen		
Hole size: 6 "		Cut solvent:		Date: 18 Oct 2002

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.
3661	95	Sst: clr, trnsl – trnsp, mlky wh qtz, f - med, occ crs, dom fri, occ sl calc cmt, ang – sbang, loc sbrndd, mod – wll srtd	even dull yel fluor, v wk bl wh cut fluor
	40	Clst: olv blk – dsky yel brn, hd, blky, non calc, micropyr	
3664	100	Sst: a.a	a.a.
	Tr	Clst: a.a.	
3667	100	Sst: a.a.	a.a.
	Tr	Clst: a.a.	
3670	100	Sst: a.a.	a.a.
	Tr	Clst: a.a.	
3673	Lost		
3676	100	Sst: predom med – crs, sbrnd, else a.a.	even, mod yel bri fluor,
	Tr	Clst: a.a.	no – v wk cut fluor
3679	100	Sst: predom a.a.	a.a.
	Tr	Clst: a.a.	
3682	a.a.		a.a.
3685	a.a.		a.a.
3688	a.a.		a.a.
3691	Lost		
3694	Lost		
3697	100	Sst: a.a.	a.a.
3700	a.a.		
3703	a.a.		
3706	a.a.		
3709	a.a.		
3712	Lost		
3715	100	Sst: a.a.	Shows as above
	Tr	Clst: a.a.	
3718	100	Sst: clr – trnsl qtz, f – med, mod srt, ang – sbrndd, app as lse grns, tr sil cmt, app gd vis por	even bl wh – yel wh fluor, none – v wk cloudy bl wh cut fluor

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 17 of 22
Country: Norway	Area: Halten Terrace		Field: Tyrihans Sør	
Well no: 6406/3-6	Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf			
RKB: 24 meters	Geologist: O. Hunnes, T.F. Kristensen			
Hole size: 6 "	Cut solvent:		Date: 18 Oct 2002	

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.
3721	100 Sst:	clr – trnsl qtz, f – med, occ crs grns, mod srt, ang – sbrndd, app as lse grns, tr sil cmt, ang i.p. due to breaking up sil cmt, app gd vis por	Even – spotty bl wh – yel wh fluor, 90%, none – v wk cloudy bl wh cut fluor Pr samples, wl grinded by PDC bit on motor BHA
	Sl tr Mic		
3724	100 Sst:	a.a.	Shows a.a.
3727	100 Sst:	clr – trnsl qtz, f – med, occ crs grns, mod srt, sbang – sbrndd, app as lse grns, tr sil cmt, ang i.p. due to breaking sil cmt, app gd vis por	Shows a.a.
	Tr Kaol:	lt gry, sft – frm, chky text	
	Sl tr Mic		
3730	100 Sst:	a.a.	spotty – even yel wh – dull yel wh fluor, 70%, no cut
3733	100 Sst:	a.a.	60% shows a.a.
3736	100 Sst:	a.a.	40% shows a.a.
3739	100 Sst:	a.a.	30% shows a.a.
3742	100 Sst:	a.a.	a.a.
3745	100 Sst:	a.a.	a.a.
3748	100 Sst:	clr – trnsl qtz, pred f, wl srt, sbang – sbrndd, app as lse grns, gd vis por	10% spotty dull bl wh – yel wh fluor, no cut fluor
3751	100 Sst:	clr – trnsl qtz, f – med, mod srt, ang – sbrndd, pred as lse grns, tr sil cmt, ang i.p. due to breaking sil cmt, app gd vis por	a.a.
3754	100 Sst:	f – med, occ crs grns, tr calc cmt, else a.a.	10% shows a.a. occ bl wh fluor, cvg?
	Tr Kaol:	lt gry, sft – frm, com dk gry lam, chky text	
3757	100 Sst:	clr – trnsl qtz, f – med, occ crs, mod srt, ang – sbrndd, pred as lse grns, tr sil cmt, ang i.p. due to breaking sil cmt, app gd vis por	Shows a.a.
	Tr Mic		
	Tr Kaol:	a.a.	
3760	100 Sst:	f – med, wl srt, else a.a.	10% dull yel fluor, no cut Pr samples, wl grinded by PDC bit on motor BHA
	Sl tr Mic		
	Sl tr Kaol:	a.a.	
	Sl tr Clst:	olv blk – brn blk, frm – mod hd, amor – blky, slty/sdy i.p., micropyr, non calc	
3763	100 Sst:	f – med, occ crs grns, mod srt, else a.a.	a.a.
	Sl tr Clst:	a.a. Clst grinded up by bit, under represented in sample!!!!!!!	
3766	100 Sst:	v – f – med, else a.a.	a.a.

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 18 of 22
Country: Norway	Area: Halten Terrace		Field: Tyrihans Sør	
Well no: 6406/3-6	Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf			
RKB: 24 meters	Geologist: O. Hunnes, T.F. Kristensen			
Hole size: 6 "	Cut solvent:		Date: 18 Oct 2002	

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.
3766	100	Sst: clr – trnsl qtz, v f – med, mod srt, ang – sbrndd, pred as lse grns, tr sil cmt, ang i.p. due to breaking up sil cmt, app gd vis por	10% spotty dull yel fluor, tr bl yel fluor, no cut fluor, Pr samples, Clst grinded up by PDC bit run on motor
	Gd tr	Clst: olv blk – dk gry, frm – mod hd, amor – blky, slty/sdy i.p., micropyr, non calc	
3769	95	Sst: v f – med, occ crs grns, pr srt else a.a.	a.a.
	5	Clst: a.a.	
3772	95	Sst: a.a.	5% shows a.a., else a.a.
	5	Clst: occ dk brn gry, else a.a.	
3775	95	Sst: a.a.	a.a.
	5	Clst: a.a.	
3778	Lost		
3781	100	Sst: f – v crs, pr srtd, else a.a.	Tr shows a.a., Pr samples, v little coming over shakers, sample contam W/ metal shavings & pipe scal
	Tr	Clst: a.a.	
	Tr	Pyr	
3784	a.a.		a.a.
3787	a.a.		a.a.
3790	a.a.		a.a.
		Very little cuttings over shaker, switched to 6m sampling intervals	
3796	a.a.		a.a.
3802	60	Clst: olv gry – olv blk, med dk gry, frm – mod hd, blky, slty – v slty grdg Sltst i.p., sdy i.p., com carb, non calc	Tr dull yel fluor, no cut
	40	Sst: clr – trnsl qtz, v f – med, mod srtd, sbang – sbrndd, app as lse grns, app gd vis por	
3808	50	Clst: a.a.	Sst: spotty – even dull yel - occ yel wh fluor, no cut
	50	Sst: clr – trnsl qtz, v f – v crs, pr srtd, ang – sbrndd, pred lse grns, occ v hd sil cmtd, pred app gd vis por	
3814	70	Clst: v slty grdg Sltst a.a.	Sst: v dull yel fluor, no cut fluor
	30	Sst: a.a.	
3820	60	Sst: a.a.	Mod bri yel fluor, no cut
	40	Clst: a.a.	
3826	70	Sst: a.a.	a.a.
	30	Clst: a.a.	

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 19 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: O. Hunnes, T.F. Kristensen		
Hole size: 6 "		Cut solvent:		Date: 18 Oct 2002

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.
3832	30	Clst: olv gry – olv blk, med dk gry, frm – mod hd, blky, slty – v slty grdg Sltst i.p., sdy i.p., com carb, non calc	Mod bri yel fluor, no cut
	70	Sst: clr – trnsl qtz, v f – med, mod srtd, sbang – sbrndd, app as lse grns, app gd vis por	
	Gd tr	Kaolin (??)	
3838	80	Clst: a.a.	Dull yel fluor, no cut
	20	Sst: a.a.	
3844	80	Clst: a.a.	a.a.
	20	Sst: a.a.	
	Gd tr	Kaolin (??)	
3850	90	Clst: a.a.	a.a.
	10	Sst: a.a.	
	Gd tr	Kaolin (??)	
3856	90	Sst: clr – transl qtz, vf – f, mod – wll srtd, sbang – ang, app as lse grns, app gd vis por	Mod yel even to ptchy fluor, no cut fluor
	10	Clst: a.a.	
3862	100	Sst: pred vf-f, wll srtd, else a.a.	Dull yel fluor, no cut
	Gd tr	Clst: a.a.	
3867	95	Sst: a.a.	a.a.
	5	Clst: a.a.	
3870	100	Sst: clr –transl qtz,vf-med,occ crs,wl srt,sbang,sbrnd	
	Tr	Clst: olv gry-olv blk,med dk gry,frm mod hd,mod slty-v slty	
3873	100	Sst: a.a	
	Tr	Clst: a.a.	
3876	90	Sst: a.a.	
	10	Clst a.a.	
3882	90	Sst: a.a.	
	10	Clst: a.a.	
3888	80	Sst: a.a	
	20	Clst: a.a.	
3891	100	Sst: a.a.	
	Tr	Clst: a.a.	
3897	100	Sst: a.a.	
	Tr	Clst: a.a.	
3903	90	Sst: a.a.	
	10	Clst med gry,also olv gry-olv blk, occ slty-v slty, els a.a.	

WELLSITE SAMPLE DESCRIPTION				Page 20 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: L. Rasmussen, H. Høland		
Hole size: 6 "		Cut solvent:		Date: 04 Nov. 2002

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.
3909	70	Sst: clr –transl Qtz, v f - med, occ crs, wl srt, sbang – sbrnd	No shows
	30	Clst med gry, also olv gry - olv blk, frm - mod hd, occ slty - v slty,	
3915	60	Sst: a.a.	a.a.
	40	Clst: a.a.	
3921	30	Sst: a.a.	a.a.
	70	Clst: a.a.	
3927	40	Sst: clr –transl Qtz, f - med, occ v f - crs, mod srt, sbang – sbrnd, silic cmt, sli calc, mod hd – hd, micromic, occ microglauc	a.a.
	30	Clst med gry, also olv gry - olv blk, frm - mod hd, occ slty - v slty,	
	Tr	Pyr	
3933	a.a.		a.a.
3939	60	Sst: a.a.	a.a.
	40	Clst: a.a.	
3945	a.a.		a.a.
3951	50	Sst: a.a.	a.a.
	50	Clst: a.a.	
3957	40	Sst: a.a.	a.a.
	60	Clst: a.a.	
3963	20	Sst: a.a.	a.a.
	80	Clst: med dk gry – gry blk, also brn gry, else a.a.	
3969	a.a.		a.a.
3975	a.a.		a.a.
3981	40	Sst: a.a.	a.a.
	60	Clst: a.a.	
3987	60	Sst: a.a.	a.a.
	40	Clst: a.a.	
	Tr	Pyr	
3993	a.a.		a.a.
3999	40	Sst: a.a.	a.a.
	60	Clst: a.a.	
	Tr	Pyr	
4004	a.a.		a.a.

STATOIL

WELLSITE SAMPLE DESCRIPTION				Page 21 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf		
RKB: 24 meters		Geologist: L. Rasmussen, H. Høland		
Hole size: 6 "		Cut solvent:		Date: 05 Nov. 2002

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.
4011	40	Sst: clr –transl Qtz, f - med, occ v f - crs, mod srt, sbang – sbrnd, silic cmt, sli calc, mod hd – hd, micromic, occ microglauc	No shows
	30	Clst: med dk gry – gry blk, also brn gry, frm - mod hd, occ slty - v slty,	
	Tr	Pyr	
4017	Lost		
4023	20	Sst: a.a.	a.a.
	80	Clst: a.a.	
	Tr	Pyr	
4029	40	Sst: a.a.	a.a.
	60	Clst: a.a.	
	Tr	Pyr	
4035	50	Sst: a.a.	a.a.
	50	Clst: a.a.	
	Tr	Pyr	
4041	20	Sst: a.a.	a.a.
	80	Clst: a.a.	
	Tr	Pyr	
4047	40	Sst: a.a.	a.a.
	60	Clst: a.a.	
	Tr	Pyr	
4053	80	Sst: f – med, wl srt, also mlky wh silica flakes, else a.a.	a.a.
	20	Clst: a.a.	
4059	70	Sst: a.a.	a.a.
	30	Clst: a.a.	
4065	90	Sst: a.a.	a.a.
	10	Clst: a.a.	
4071	a.a.		a.a.
4077	a.a.		a.a.
4083	90	Sst. a.a.	a.a.
	10	Clst: a.a.	a.a.
4089	90	Sst: a.a.	a.a.
	10	Clst: a.a.	a.a.
4095	85	Sst: lse clr-trans qtz, f, wl srtd, sbrnd, mod calc cmt, mlky wh silica flakes	a.a.
	10	Sltst: med dk gry – dk gry, fm, micromic	
	5	Clst: dk gry – blk, hd	
	Tr	mica, pyr	

STATOIL

WELLSITE SAMPLE DESCRIPTION					Page 22 of 22
Country: Norway		Area: Halten Terrace		Field: Tyrihans Sør	
Well no: 6406/3-6		Company: Statoil ASA, ExonMobil AS, Norsk Hydro Production AS, TotalFinaElf			
RKB: 24 meters		Geologist: H. Høland, A. Fawke			
Hole size: 6 "		Cut solvent: Propanol		Date: 07 Nov. 2002	

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.
4101	95	Sst: lse clr-trans qtz, f, wl srtd, sbrnd, mod calc cmt, mlky wh silica flakes	No shows
	5	Clst: med dk gry – dk gry, sft – fm, slty i.p.	
	Tr	mica	
4107	90	Sst: a.a.	a.a.
	10	Clst: a.a.	
	Tr	mica	
4113	90	Sst: sl – mod calc, else a.a.	a.a.
	10	Clst: a.a.	
	Tr	mica, pyr	
4119	90	Sst: lse clr – transl qtz, f – med, mod – wl srtd, sbang – sbrnd, sl calc	a.a.
	10	Clst: a.a.	
4125	95	Sst: a.a.	a.a.
	5	Clst: hd i.p. else, a.a.	
	Tr	mica	
4131	95	Sst: a.a.	a.a.
	5	Clst: a.a.	
4137	95	Sst: lse clr –transl qtz, f – med, occ crs, pr – mod srt, ang – sbrnd, sl calc i.p.	a.a.
	5	Clst: a.a.	
	Tr	mica, pyr	
4143	90	Sst: a.a.	Slow, blooming,
	10	Clst: a.a.	mod, bl-wh cut
	Tr	mica	fluoresence
4149	90	Sst: predom med, mod srt, sbrnd – rnd, else a.a.	No shows
	10	Clst: a.a.	
	Tr	pyr	
4155	90	Sst: lse clr –transl qtz, f – crs, pr – mod srt, sbrnd - sbang, sl calc i.p.	a.a.
	10	Clst: a.a.	
	Tr	pyr	
4161	90	Sst: lse, clr – transl qtz, f – crs, pr – mod srt, sbang – sbrnd, sl calc i.p.	a.a.
	10	Clst: m gry – dk gry, frm, slty i.p.	
	Tr	pyr	
4167	95	Sst: predom med, wl srt, rnd-sbrnd, else a.a.	a.a.
	5	Clst: a.a.	
	Tr	Pyr	
4173	95	Sst: lse, clr – transl qtz, vf –med, predom f, wl srt, sbrnd – rnd, sl calc i.p.	a.a.
	5	Clst: a.a.	

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Appendix E Sidewall core descriptions

STATOIL

MSCT SIDEWALL CORE DESCRIPTION

Country: Norway	Area: Tyrihans Sør	Field:
Well no: 6406/3-6	Company: Statoil, Norsk Hydro	
Hole size: 6 "	Geologist: Lars Rasmussen, Håvard Høland	R.T.: 18 meters
Run no.: 1A	Reference log: HRLA-DSI-IPLT-ACTS-ECRD	Date: 04.11.2002

Shot no.	Depth (m RT)	Rec. (mm)	Lithological Description	Remarks
			Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Shows, cavings, mud additives, etc.
1	*3707.0*		*SST:* *VLt-gry.M/Crs-gr.Sbang/Sbrndd.M-cmt.W-srt.Scat-C,Pyr.Scs-Cl,Mic*	
2	*3703.5*		*SST:* *a.a.Mod/W-cmt.Mod-srt.Decr-Pyr.Incr-Cl*	
3	*3700.0*		*SST:* *a.a.Decr-Cons(cmt).*	
4	*3695.8*		*SST:* *a.a.Cl,MIc-Lam.Incr-Pyr.*	
5	*3690.2*		*SST:* *a.a.w/o-Lam.Decr-Pyr*	
6	*3689.0*		*SST:* *VLt-gry.F/M-gr.Sbang.M/W-cmt.M-srt.Sec-Ø.Lam.Scat-C,Cl,Mic,Pyr.*	
7	*3685.5*		*SST:* *a.a.MLt-gry.w/o-Lam.Decr-Pyr.Incr-C,Cl,Mic.*	
8	*3680.0*		*SST:* *a.a.VLt-gry.F/Crs-gr.Decr-Cl,Mic.*	
9	*3675.0*		*SST:* *a.a.Lt-gry.F-gr.Lam.Incr-Cl,Mic.*	
10	3672.5	38	SST: clr, transl – transp, also mlky wh Qtz, f – med, occ crs, mod srt, sbang, mod hd – hd, wl silic cmt , sli calc, micromica, occ micropyr, occ microglauc	even bl wh fluor sl strm – blmng bl to bl wh cut fluor
11	*3671.2*		*SST:* *VLt-gry.F-gr.Ang/Sbang.W-cmt.M-srt.Lam.Styl.Ltl-C,Cl,Mic.Scat-Pyr.*	
12	*3668.2*		*SST:* *a.a.M/W-cmt.w/o-Lam.Sec-Ø.Decr-Cl,Mic,Pyr.*	
13	3665.5	40	SST: clr, transl – transp, also mlky wh Qtz, f – med, occ crs, mod srt, sbang, mod hd – hd, wl silic cmt , sli calc, sli micromica, occ micropyr,	even bl wh fluor sl strm – blmng bl to bl wh cut fluor
14	*3664.0*		*SST:* *Lt-gry.F/M/Crs-gr.Ang/Sbrndd.W-cmt.M-srt.Lam.Ltl-Cl,Mic.Scat-C,Pyr*	
15	3833.0		Empty	
16	*3831.0*		*SST:* *a.a.VF-gr.VW-cmt.Incr-Cl,Mic.Styl.Scs-Lim*	

* *Descriptions written in italic are Reslab descriptions, done in the laboratory, while the other descriptions are Statoil Wellsite Geologist's descriptions, done offshore*

STATOIL

MSCT SIDEWALL CORE DESCRIPTION

Country: Norway	Area: Tyrihans Sør	Field:
Well no: 6406/3-6	Company: Statoil, Norsk Hydro	
Hole size: 6 "	Geologist: Lars Rasmussen, Håvard Høland	R.T.: 18 meters
Run no.: 1A	Reference log: HRLA-DSI-IPLT-ACTS-ECRD	Date: 04.11.2002

Shot no.	Depth (m RT)	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.
17	3824.2	40	SST: clr, transl – transp, also mlky wh Qtz, v f – f, occ crs, mod – wl srt, mod hd – hd, sbang, wl silic cmt , sli calc, sli micromica,	even bl wh – yel wh fluor sl strm – blmng bl to bl wh cut fluor
18	*3823.8*		*SST: Lt-gry.VF/F-gr.Sbang/Sbrndd.W-cmt.W-srt.Ltl-C,Cl,Mic,Lim.Scs-Pyr*	
19	*3819.0*		*SST: a.a.*	
20	*3817.5*		*SST: Lt-gry/brnsh.F-gr.Sbrndd.W-cmt.W-srt.Ltl-C,Cl,Mic.Scat-Lim.Tr-Hem*	
21	*3907.5*		*SST/SLTST: Lt-gry.VF(gr)-sd.W-consol.VW-cmt.Lam.w/Cl.Ltl-C,Mic.Tr-Pyr.*	
22	3806.5	34	Interlaminated SST/CLST SST: a.a. CLST: dk gry – gry blk, micac, microcarb, non calc	uneven bl wh fluor, sl strmg – blmg bl wh cut fluor in sst
23	3781.0	44	Finely interlaminated SST/CLST SST: a.a. CLST: micropyr, else a.a.	No shows
24	3768.5	45	Finely interlaminated SST/CLST SST: a.a. CLST: micropyr, else a.a.	a.a.
25	*3753.0*		*SST: VLt-gry.VF/F/M-gr.Sbang/Sbrndd.W-cmt.M-srt.Ltl-C,Cl,Mic.Scat-Pyr.*	
26	*3734.0*		*SST: a.a.Decr-Consol(cmt),Cl,Mic,Pyr*	
27	3729.5	38	SST: clr, transl – transp, also mlky wh Qtz, f – med, occ crs, mod srt, sbang, mod hd – hd, wl silic cmt , sli calc, sli micromica, occ micropyr,	even bl wh fluor sl strm – blmg bl to bl wh cut fluor
28	*3715.5*		*SST: VLt-gry.F/VCrs-gr.Sbang/Sbrndd.M-cmt.M-srt.Ltl-C,Cl,Mic.Scat-Pyr.*	
29	*3709.0*		*SST: a.a.Decr-Cl.*	
30	*3766.0*		*SST: a.a.F/M-gr.Incr-Consol(cmt),Cl.*	
31	*3742.5*		*SST: a.a.VF/F/M-gr.*	

STATOIL

MSCT SIDEWALL CORE DESCRIPTION			Page 3 of 3
Country: Norway	Area: Tyrihans Sør		Field:
Well no: 6406/3-6	Company: Statoil, Norsk Hydro		
Hole size: 6 "	Geologist: Lars Rasmussen, Håvard Høland		R.T.: 18 meters
Run no.: 1A	Reference log: HRLA-DSI-IPLT-ACTS-ECRD		Date: 04.11.2002

Shot no.	Depth (m RT)	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.
32	*3732.6*		*SST:*	*a.a.*	
33	*3724.0*		*SST:*	*Lt-gry.F/Crs-gr.Sbrndd.W-cmt.M-srt.Oil-stn.Lam.Ltl-C,Cl,Mic.Scat-Pyr.*	
34	*3717.5*		*SST:*	*a.a.w/o-Lam,oil(stn).Decr-Mic,Pyr*	
35	*3710.5*		*SST:*	*a.a.Incr-Pyr*	
36	*3705.5*		*SST:*	*a.a.VLt-gry.F/M-gr.Decr-Pyr.Incr-Cl.*	
37	*3697.0*		*SST:*	*a.a.F/Crs-gr.Decr-Consol*	
38	*3694.4*		*SST:*	*a.a.MLt-gry.M/VCrs-gr.M/P-srt.Decr-Cl.*	
39	*3692.0*		*SST:*	*a.a.VLt-gry.F/M-gr.M-srt.Incr-Consol(cmt),Cl*	
40	*3687.0*		*SST:*	*a.a.MLt-gry.Incr-C.*	
41	*3686.3*		*SST:*	*Lt-gry.F/M-gr.Sbang/Sbrndd.M-cmt.M-srt.w/C.Ltl-Cl,Mic.Scat-Pyr.*	
42	*3684.0*		*SST:*	*a.a.Lt-gry.Decr-C.*	
43	*3682.5*		*SST:*	*a.a.Dk-Gry(Oil-stn).Abd-C.*	
44	*3682.0*		*SST:*	*a.a.MLt-gry.Decr-C.*	
45	*3678.0*		*SST:*	*a.a.VLt-gry.F/Crs-gr.w/o-C.*	
46	*3676.0*		*SST:*	*a.a.F-gr.*	
47	*3672.2*		*SST:*	*a.a.F/M-gr.Gran.*	
48	*3667.0*		*SST:*	*a.a.F/VCrs-gr.Incr-Gran.Pbl.*	
49	*3657.5*		*SST:*	*a.a.w/o-Gran,Pbl.Calc-cmt.*	
50	3655.0	39	SST:	clr, transl – transp, also mlky wh Qtz, f – med, occ crs, mod srt, sbang, mod hd – hd, wl silic cmt , sli calc, sli micromica,	even bl wh fluor sl strm – blmg bl to bl wh cut fluor

Appendix F Other reports

NPD standard sheet for reporting shallow gas (in Norwegian)

1. Avstand fra boredekk til havnivå: 24m

2. Vanndyp: 273m

3a. Settedyp for 30" lederør: 357m MD RKB

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

4a. Settedyp for foringsrør hvorpå BOP settes: 1773.0 mMD RKB

4b. Formasjonstyrketest (g/cc): 1.83 g/cc

6. *Dybdeintervall (mRKB og mTVD) og alder for sandlag grunnere enn 1000 m under havbunnen. Oppgi hvilke lag som evt. inneholder gass.* (eks. Kvartær 175-177 mRKB, Pliocene 341-343 mRKB)
Kvartær sandlag, ingen signifikante lag påtruffet, alle semipermeable lag vannvåte.

7. Grunn gass er ikke påvist i brønnen.

8. Sammensetning og opprinnelse til gassen: N/A

9. Beskriv alle målinger i gassførende lag: N/A

10. *Angi dyp (mRKB og TVG) til inkonformiteter i borehullsposisjonen.*
Topp Naust Fm.: 507 mRKB / 483m TVG MSL (formasjonsgrense).
Intra Kai Fm. : 1722m RKB / 1698m TVG MSL

11. Angi utbredelsen av sandlagene (kommunikasjon, kontinuitet, trunkering, etc.): Ingen

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

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

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

- grunn gass

Stemmer bra. Ingen grunn gass prognosert og ingen grunn gass observert. Ikke observert vannstrømming =>ikke overtrykk i semipermeable (vannmettede) lag.

- korrelasjon til nærliggende borehull

God korrelasjon til nærmeste referansebrønn 6407/1-2 som ligger ca. 3 km rett mot øst. Kvaliteten på loggene i korrelasjonsbrønnen er gode (Schlumberger wireline).

Listing of other reports

COMPANY	REPORTS
Baker Hughes Inteq	End of Well Report, MWD and Directional Drilling
Halliburton-Sperry Sun	End of Well Report, Measurement While Drilling
Halliburton-Sperry Sun	End of Well Report, Surface Data Logging
BioStrat	Biostratigraphy of well N6406/3-6 (3562m-4175m)
GeoStrat	Statoil Well 6406/3-6, Biostratigraphy of the Interval 1790m-3559m
Halliburton Cementing Services	Cementing
MI	Summary drilling fluids
Smith Bits	End of well report
Altinex	Sample Qualification Report, Report No : AN-73006-01
Reslab	Conventional Core Analysis, Report no: 10352-03
Reslab	CT scans, digitale core photos only available in pdf format
Statoil	XLOT in Well 6406/3-6 (Tyrihans), Doc. No: 03Y94*12776
Oilphase	Field Operations Report

7 Enclosures

7.1 Composite log

7.2 Formation evaluation log

7.3 Pressure evaluation log