STATOIL

Final Well Report
6507/3-4
Alve, PL159 B

04Y94*24013

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Title:
Final Well Report **6507/3-4** **Alve, PL159 B**

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1 Introduction

1.1 Well data record

Well name	:	6507/3-4	
Type of well	:	Appraisal	
Prospect	:	Alve	
Country	:	Norway	
Area	:	Nordland II	
License	:	PL 159B	
Licencees	:	Statoil ASA (Operator)	50 %
		AS Norske Shell	25 %
		Dong Norge AS	15 %
		Norsk Hydro Produksjon AS	10 %
Drilling unit	:	West Navigator	
Type	:	Drillship (DP)	
Water depth	:	372 m MSL	
Air gap	:	36 m	
On license	:	13.03.04	
Rig release	:	29.04.04	
Formation at TD	:	Åre Formation	
Geographic co-ordinates	:	65^{o} 59' 16.61" N 07^{o} 50' 45.74" E	
Datum/Spheroid	:	ED-1950 / Int. 1924	
UTM	:	UTM Zone 32, CM 09^{o} E 7 319 234 m N 447 601 m E	
Seismic location	:	Seismic survey ST9203R03, Inline 4810, Cross-line 3346	

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

Well 6507/3-4 Alve, PL159 B
Location map

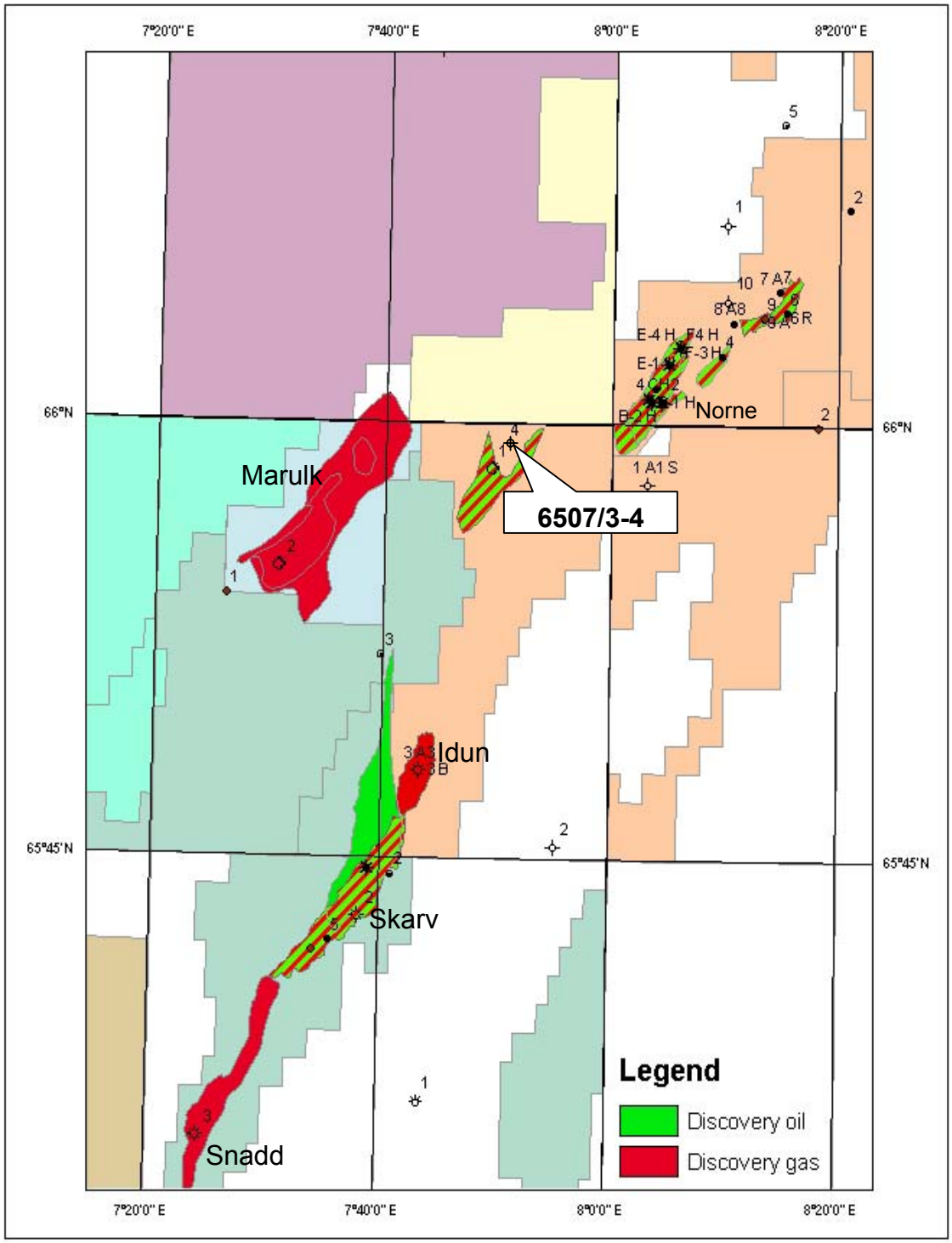


Fig. 1.1

1.2 Well objectives

The main objective of Alve appraisal well, 6507/3-4 was to prove downflank oil resources in the Middle Jurassic sandstones of the Garn and upper Not Formations. The secondary objective was to prove oil in the Ile Formation.

1.3 Result of the well

Well 6507/3-4 was spudded in a water depth of 372 m MSL and drilled to a total depth of 4092 m MD/4089 m TVD. No shallow gas was observed by the ROV at the wellhead.

The well penetrated the reservoir below the hydrocarbon-water contact in the Garn, Not and Ile Formations. Top Garn Formation was encountered 7 m below prognosis. Moveable hydrocarbons were not proven in well 6507/3-4. Two cores were cut in the Garn, Not and Ile Formations and nine MDT water samples were collected in Garn, Ile and Tilje Formations.

1.4 Drilling summary

1.4.1 Casing

Table 1.1 Casing program summary

Casing	**Shoe depth [mMD / mTVD]**	**LOT / FIT [Equivalent mud weight]**
30”	468 / 468	N/A
20”	1241 / 1241	FIT: 1.57 g/cm^3
13 3/8”	2300 / 2300	XLOT: 1.81 g/cm^3
9 5/8”	3677 / 3675	FIT: 1.55 g/cm^3

1.4.2 Drilling fluids

Table 1.2 Drilling fluids summary

Table 1.2 Drilling fluids summary **Section**	**Section TD [m MD]**	**Max mud weight [g/cm^3]**	**Mud type**
36”	470	1.03	Seawater / high visc. Sweeps
9 7/8” pilot hole	1250	1.03	Seawater / high visc. Sweeps
26”	1250	1.03	Seawater / high visc. Sweeps
17”	2310	1.54	Glydril WBM
12 ¼”	3686	1.50	Paratherm OBM
8 ½”	4092	1.38	Paratherm OBM

1.5 Data acquisition summary

See Figure 1.2.

PL 159 B

RKB - MSL: 36m

Water Depth: 372m

Formation Evaluation
Well 6507/3-4

STATOIL

Made by: TAWJ

Date: 05.10.04

System	Group	Formations mTVD RKB	Lithology	Casing	DEPTH (m TVD RT)	Coring	Sampling	Logging
		Seabed 408			100–500			
Quat.	Nordland			30" at 468 m	500–600			
Tertiary	Nordland	Naust 704			600–1200		Returns to Seabed No sampling	MWD: Gamma-Res-Dir-Pressure
Tertiary	Nordland	Kai 1312.5		20" at 1241 m	1200–1300			
Tertiary	Hord.	Brygge 1620			1300–1900		One bulk (5 l), and one washed and dried sample every 10m from 20" shoe down to 2800 mTVD RT and thereafter every 3m down To TD One 1l mud sample every 100m.	MWD: Gamma-Res-Dir-Pressure
Tertiary	Rog.	Tare 1899.5			1900–1942			
Tertiary	Rog.	Tang 1942			1942			
Cretaceous	Shetland	Springar 1994.5			1942–2300			
Cretaceous	Shetland	Nise 2124		13 3/8" at 2300 m	2300–2823			MWD: Gamma-Res-Dir-Pressure Wireline: Gamma-AIT-IPLT-DSI-GR
Cretaceous	Shetland	Kvitnos 2823			2823			
Cretaceous	Cr. Kn.	Lange 2882			2882–3159.5			
Cretaceous	Cr. Kn.	Lyr 3039			3039			
Jurassic	Viking	Spekk 3159.5			3159.5–3675			
Jurassic	Viking	Melke 3184		9 5/8" at 3675 m	3184–3722.5			
Jurassic	Fg.	Garn 3722.5			3722.5–3736	Core #1 Garn/Not 3728–3764 m 95 % rec. Core#2 Not/Ile 3764–3818 m 100 % rec.		MWD: Gamma-Res-Dir-Pressure Wireline: 1.AIT-MSIP-EMS-GR-ACTS-ECRD 2.IPLT-ECS-CMR200-GR-ACTS-ECRD 3.MDT-GR- (pressures with large area probe) 4.MDT-GR (dual packer sampling) –failed 5.MDT-GR (sampling with large area probe) 6.DSI-ZVSP-GPIT-GR 7.MSCT-GR-ACTS
Jurassic	Fg.	Not 3736			3736			
Jurassic	Fg.	Ile 3783.5			3783.5			
Jurassic	Båt	Ror 3854			3854–3916.5			
Jurassic	Båt	Tilje 3916.5			3916.5–4043.5			
Jurassic	Båt	Åre 4043.5			4043.5–4100			
		TD 4089 m TVD RKB						

Fig. 1.2

2 Dispensations

Table 2.1 Summary of dispensations

Dispensation from	Synergi no.	Date	Title
WR0442 / WR1182	252562	05.02.2004	Short planning time for the Alve well project
WR0436	257128	09.03.2004	Pressure test of well head connector at initial installation of BOP
WR0436	257193	09.03.2004	Drilling of 17" section without riser margin

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

3.1 General comments

Statoil is satisfied with the HSE performance of the drilling contractor and the service companies during the Alve well. High focus on reporting unsafe conditions, near misses and accidents was maintained throughout the operation.

3.2 MUF and Synergi reports

A total number of 924 MUF (Incident/Condition observation) reports were filed on the rig during the operation, averaging approximately 20 a day.

Of these reports Statoil and service companies generated 231, or 25%.

68 entries were made in Statoils Synergi system.

3.3 Comments to the MUF/Synergi reports

Of the above accidents/incidents/conditions, there were:

- No LTI
- No red (High risk potential) incidents
- No first aid - or medical treatment incidents
- 5 yellow (Medium risk potential) incidents
- 2 acute discharges to the sea
- 4 falling objects and 14 potential falling objects

The yellow incidents comprised the following;

- 20" casing test failed. No cement in return and no cement in shoe
- Lost GPS signals to radar and electronic map plotter for backup DP computer
- Back up DP computer lost reference system after alarm; "Backup status reference system"
- Lost satellite signaler to DGPS no 1 and 3 and the operation went into yellow DP status
- Grease gun fell 22 m down from derrick and landed on deck (deck was secured during operation)

The two spills to sea were both rated green (5):

- Leak on ROV vehicle - 10 l hydraulic oil
- Leakage on blue conduit line - 600 liter Pelagic 50 and 2900 liters MEG

3.4 Non conformance

Table 3.1 Summary of registered Non Conformances

Synergi No.	Date	Title
257783	14.03.2004	Hydraulic tilt on iron roughneck failed.
258171	15.03.2004	Problems with rig up and operation of BHI MWD.
258218	17.03.2004	Waited on ROV to find well due to malfunction on sonar.
258465	19.03.2004	Halliburton did not supply backup equaliser sub for 18 3/4" running tool.
258769	20.03.2004	Low oil level on HPU system.
259151	22.03.2004	20" casing test failed. No cement in return and no cement in shoe.
260314	22.03.2004	Different kinds of waste were mixed together.
259515	25.03.2004	Agitator in mixing pit was off when MW was increased.
259712	25.03.2004	Agitator stopped in active pit.
259710	27.03.2004	Wash out on valves and valve seats on mud pump 1. Changed liner on pump 3.
260025	27.03.2004	West Navigator was 8.5 m out of position and in yellow status during a storm.
260026	28.03.2004	Taut wire has a problem with compensating. Symbol "jumps" 30-50 meters with max 10 m sea.
260023	29.03.2004	Swedge for 13 3/8" casing was not mobilised according to plan.
260435	31.03.2004	Cement bottom plug did not shear at rated pressure. 340 bar was needed to shear out plug.
260873	03.04.2004	Emulsifier for OBM was too hard for mixing.
261074	04.04.2004	Imperfect ship manifesto was faxed to the rig.
261561	09.04.2004	Encountered problems with the voltage and cable head when powering the Schlumberger wireline logging tools.
261787	12.04.2004	Sheared out wiperplug instead of ball seat after setting 9 5/8" liner hanger.
261794	12.04.2004	Problems with Halliburton circulation mix pump on the cement unit.
262422	17.04.2004	Repaired VPH on main Rig.
262766	20.04.2004	Drive chain on Schlumberger wireline winch cable drum broke - Winch T-Bar installed upside down.
263098	21.04.2004	Hydraulic leak in Schlumberger MDT tool.
263765	01.05.2004	Was not able to disconnect wearbushing from Dril-Quip multi purpose tool.

3.5 Time distribution

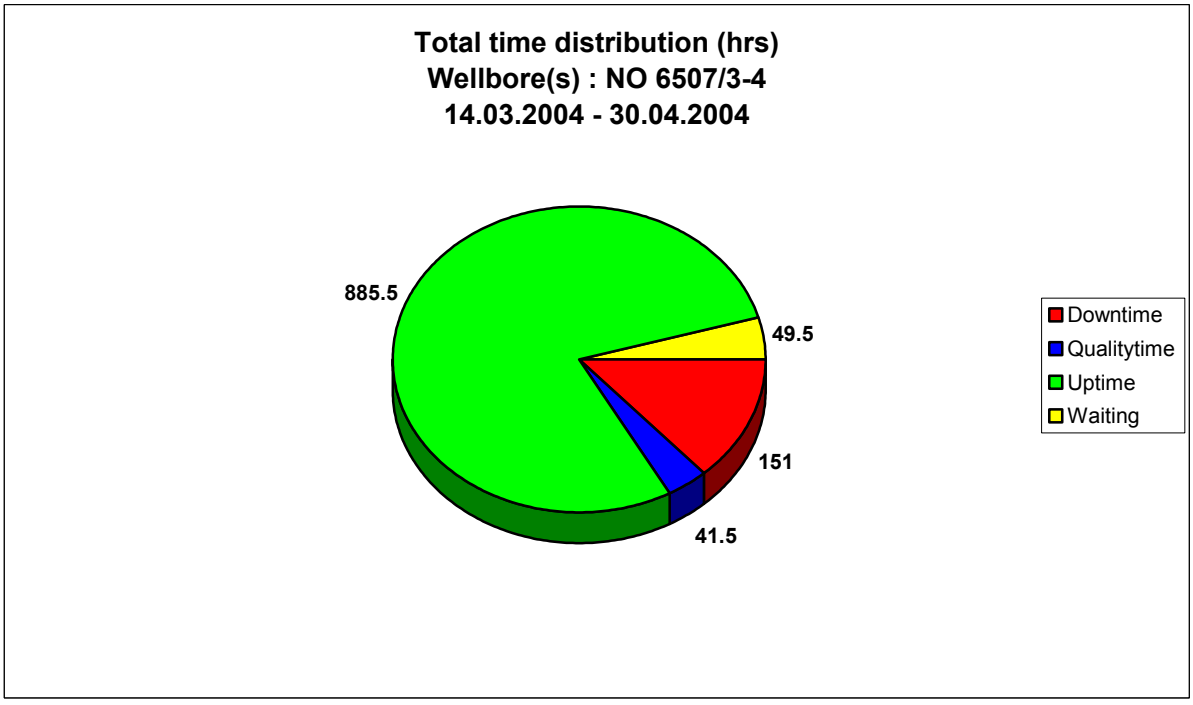
Table 3.2 Time distribution

Total time	**47.0 days**
Total down time	**151.0 hrs**
Waiting on weather (WOW)	**33.5 hrs**

Table 3.3 Operations factor

Ops. Factor: $= \frac{Total\_time - Down\_time - WOW}{Total\_time - WOW} * 100$	**86.2%**

Fig. 3.1 Time distribution



4 Geology and formation data report

4.1 Geological setting and results

Block 6507/3 and PL159 comprise the Dønna Terrace and the Nordland Ridge, separated by the Revfallet Fault Complex (Fig. 4.1). The Dønna Terrace is a sub-platform containing local horsts, grabens and rotated fault blocks. Well 6507/3-4 is located on the Alve structure, which is a horst, located in the north central part of block 6507/3 on the Dønna Terrace.

The structural framework on the Dønna Terrace was established during the Upper Jurassic to Lower Cretaceous extensional tectonics in the region. Later structuring is mainly related to the Cretaceous and Tertiary basin subsidence.

The Dønna Terrace has a relatively thick sequence of Late Triassic and Jurassic sediments. These are overlain by a gradually thickening westward sequence of Lower Cretaceous sediments, and Upper Cretaceous to recent sediments.

Well 6608/3-4 penetrates rocks of Quaternary, Tertiary, Cretaceous and Jurassic age. TD of the well is in rocks of Jurassic age in the Åre Formation (Fig. 4.2).

4.2 Shallow gas results

A shallow gas warning (Class 1) was given for the interval between 950 m to 1370 m. This was based on gas peaks observed in well 6507/3-1 when drilling through sand layers in the same interval. The well was drilled with seawater down to 1250 m MD. No shallow gas was observed.

4.3 Stratigraphy

The stratigraphical division is based on interpretation of the biostratigraphic report, log curves and on correlation with nearby wells. The stratigraphy of the entire well is shown in Figures 4.2-3.

4.3.1 Table of chronostratigraphy

Table 4.1 Chronostratigraphy

Stratigraphic succession		m MD	
Studied interval 1260 – 4092 mMD RKB		From	To
Tertiary	Lower Pliocene	1260	1320
	Upper Miocene	1340	1540
	Middle Miocene	1560	1625
	Lower Miocene	1640	1725
	Lower Oligocene	1740	1765
	---------- Late Eocene UNC ----------		
	Middle Eocene	1780	1840
	Lower Eocene	1860	1940
	Upper Paleocene	1960	1985
---------- Base Tertiary UNC ----------			
Cretaceous	Lower Maastrichtian	2000	2040
	Upper Campanian	2060	2140
	Middle Campanian	2160	2240
	Lower Campanian	2260	2300
	Lower Campanian – Upper Santonian	2320	2420
	Upper Santonian	2440	2560
	Upper – Middle Santon.	2580	2660
	Lower Santonian	2680	2730
	Upper Coniacian	2740	2820
	Middle Coniacian	2826	2859
	Lower Coniacian?	2865	2883
	Turonian	2886	2904
	Cenomanian - Turonian	2910	2976
	Cenomanian	2982	2899
	Upper Albian	2994	3018
	Lower Albian	3024	3048
	Upper Aptian	3054	3057
	Upper Barremian	3060	3084
	Lower Barremian	3090	3126
	Upper Hauterivian	3129	3135
	Lower Valanginian	3138	3156
	Lower Ryazanian	3159	3160
---------- Base Cretaceous UNC ----------			
Jurassic	Lower Volgian	3162	3176
	Kimmeridgian	3177	3182
	Upper Oxfordian	3183	3189
	Middle.Oxfordian	3192	3204
	Lower Oxfordian	3207	3231
	Upper Callovian	3243	3315

	Stratigraphic succession Studied interval 1260 – 4092 m MD RKB		
Jurassic	Lower Callovian	3321	3399
	Upper Bathonian	3402	3420
	Middle Bathonian	3423	3498
	Lower Bathonian	3504	3591
	Upper Bajocian	3594	3702
	Lower Bajocian	3705	3717
	Upper Aalenian	3720	3760.4
	Middle Aalenian	3761.7	3796.5
	Upper Toarcian	3798.7	3834
	Upper/Lower Toacian	3837	3876
	Lower Toarcian	3879	3912
	Upper Pliensbachian	3915	4053
	Lower Pliensbachian/Upper Sinemurian	4056	4092
	TD	4092	

4.3.2 Table of lithostratigraphy

Table 4.2 Lithostratigraphy

Table of lithostratigraphy					
Period	**Group / Formation**	**Observed depth**			**TWT**
		mMD	**m TVD**	**m MSL**	**sec. (From VSP)**
QUATERNARY	NORDLAND GROUP. (Sea Floor)	408.0	408.0	372.0	N/A
TERTIARY	Naust Formation	704.0	704.0	668.0	N/A
	Kai Formation	1312.5	1312.5	1276.5	N/A
	HORDALAND GROUP	1620.0	1620.0	1584.0	N/A
	Brygge Formation	1620.0	1620.0	1584.0	N/A
	ROGALAND GROUP	1899.5	1899.5	1863.5	1.914
	Tare Formation	1899.5	1899.5	1863.5	1.914
	Tang Formation	1942.0	1942.0	1906.0	1.952
CRETACEOUS	SHETLAND GROUP	1994.5	1994.5	1958.5	2.005
	Springar Formation	1994.5	1994.5	1958.5	2.005
	Nise Formation	2124.0	2124.0	2088.0	2.130
	Kvitnos Formation	2823.5	2823.0	2787.0	2.702
	CROMER KNOLL GP.	2882.5	2882.0	2846.0	2.745
	Lange Formation	2882.5	2882.0	2846.0	2.745
	Lyr Formation	3039.5	3039.0	3003.0	2.851
JURASSIC	VIKING GROUP	3160.5	3159.5	3123.5	2.927
	Spekk Formation	3160.5	3159.5	3123.5	2.927
	Melke Formation	3185.0	3184.0	3148.0	2.946
	FANGST GROUP	3724.5	3722.5	3686.5	3.292
	Garn Formation	3724.5	3722.5	3686.5	3.292
	Not Formation	3738.0	3736.0	3700.0	3.299
	Ile Formation	3785.5	3783.5	3747.5	3.322
	BÅT GROUP	3856.0	3854.0	3818.0	3.352
	Ror Formaton	3856.0	3854.0	3818.0	3.352
	Tilje Formation	3918.5	3916.0	3880.0	3.387
	Åre Formation	4046.5	4043.5	4007.5	3.450
	TD	4092.0	4089.0	4053.0	-

4.4 Lithostratigraphic description

NORDLAND GROUP **408.0 - 1620.0 m MD, 408 – 1620 m TVD (372.0 – 1584.0 m MSL)**

The Nordland Group comprises the Quaternary, the Naust and the Kai Formations.
The upper part of the Nordland Group, including Quaternary and the major part of the Naust Formation, was drilled with returns to the seafloor. Description of lithology down to 1250 m MD is inferred from the recorded MWD memory log and relevant information from the offset wells.

Quaternary **408.0 – 704.0 m MD, 408.0 – 704.0 m TVD (372.0 – 668.0 m MSL)**

System: Quaternary
Series: Pleistocene (Samples analysed from 1260 m MD)

The Quaternary sediments consist mainly of thick clay units interbedded with thin silty sand layers or stringers. Based on the logs, the sand layers seem to be silty or argillaceous and water bearing.

Naust Formation **704.0 – 1312.5 m MD, 704.0 – 1312.5 m TVD (668.0 – 1276.5 m MSL)**

System: Tertiary - Quaternary
Series: Lower Pliocene (Samples analysed from 1260 m MD)
Depositional environment: Marine, inner shelf

The top of the Naust Formation is picked at a slight decrease on the resistivity log.
The Naust Formation consists predominantly of claystone, with some sandstone beds in the lower part.

The claystone is to medium dark grey, soft, soluble, amorphous to subblocky, non calcareous, very silty and sandy, has abundant black microspecks, locally traces of shell fragments and is locally grading to sandstone/siltstone.

The sandstone consists of loose quartz and metamorphic fragments. The grains are very fine to very coarse, also trace pebbles to boulder sized and angular to subrounded.

Kai Formation **1312.5 – 1620.0 m MD, 1312.5 – 1620.0 m TVD (1276.5 – 1584.0 m MSL)**

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

The top of the Kai Formation is picked at the start of a downward decrease in the resistivity log.

It is composed of claystone which in the upper part is medium dark grey to dark greenish grey, soft to firm, amorphous to blocky, generally sily and sandy, moderately to locally very micaceous and calcareous. Below 1390 m MD it becomes glauconitic. Below 1480 m MD the claystone becomes olive grey to olive black, dark grey, firm, blocky, silty, slightly sandy, micromicaceous, non to slightly calcareous and slightly microglauconitic.

HORDALAND GROUP **1620.0 – 1899.5 m MD, 1620.0 – 1899.5 m TVD (1584.0 – 1863.5 m MSL)**

The top of the Hordaland Group is picked at a trend shift towards lower values in the gamma ray log. The Hordaland Group comprises the Brygge Formation.

Brygge Formation **1620.0 – 1899.5 m MD, 1620.0 – 1899.5 m TVD (1584.0 – 1863.5 m MSL)**

System: Tertiary
Series: Middle Miocene – Lower Eocene
Depositional environment: Marine, mid to outer shelf to upper bathyal

The Brygge Formation consists of claystone with stringers of limestone, and dolomite in the bottom half, and minor tuff layers near the base.

In the top half the claystone is medium dark grey to olive black, firm, blocky to subblocky, non calcareous, moderately silty to very silty, slightly to very micromicaceous, slightly to very glauconitic and locally slightly to moderately micropyritic.

The lower half is more varicoloured, mainly pale to medium greenish grey to minor grey and bluish grey. Below 1820 m MD the claystone is also partly medium brown to medium dark brown to greyish brown and medium dark to dark grey. It is soft to firm, slightly waxy, non calcareous, trace to moderately micromicaceous, generally trace glauconitic, slightly to very glauconitic, generally trace micropyritic, slightly to moderately micropyritic, and with traces of white tuffaceous inclusions.

The limestone is off-white to pale green and pale grey, moderately hard, microcrystalline, slightly dolomitic in part and argillaceous.

The dolomite is pale to light brown, pale grey, poorly to moderately indurated, microcrystalline and argillaceous in part.

The tuff is medium dark greyish brown and grey, speckled/mottled off-white to light brown and with occasionally dark grey to black specks. It is firm, blocky, commonly with a silty appearance and also locally very calcareous.

ROGALAND GROUP **1899.5 – 1994.5 m MD, 1899.5 – 1994.5 m TVD (1863.5 – 1958.5 m MSL)**

The top of the Rogaland Group is picked from log correlation of gamma ray and resistivity with reference well 6507/3-1. The Rogaland Group comprises the Tare and Tang Formations.

Tare Formation **1899.5 – 1942.0 m MD, 1899.5 – 1942.0 m TVD (1863.5 – 1906.0 m MSL)**

System: Tertiary
Series: Lower Eocene
Depositional environment: Marine, outer shelf to upper bathyal

The Tare Formation is an interbedded and tuffaceous claystone with minor tuffs and traces of limestone.

The claystone is predominantly medium grey to medium dark grey, becoming medium dark to dark olive grey. It is soft to mainly firm, blocky to occasionally subfissile, non calcareous, moderately micromicaceous, and slightly to occasionally moderately micropyritic. Minor amounts of varicoloured claystone as in the basal Brygge Formation are also found.

The tuffaceous claystone is medium grey, with occasional to common dark grey to black specks, trace off-white specks, soft to firm, non calcareous, slightly silty and slightly micropyritic.

The tuff is medium dark greyish brown to dark brownish grey and grey, speckled/mottled off-white to light brown, with occasionally dark grey to black specks. It is firm, blocky, commonly with a silty appearance and some parts are very calcareous.

The limestone is pale to light grey, moderately hard, micritic and slightly to moderately argillaceous.

Tang Formation **1942.0 – 1994.5 m MD, 1942.0 – 1994.5 m TVD (1906.0 – 1958.5 m MSL)**

System: Tertiary
Series: Upper Palaeocene
Depositional environment: Marine, outer shelf to upper bathyal

The top of the Tang Formation is picked at the base of a resistivity peak, and the formation consists of claystone and minor tuffaceous claystone.

There are two types of claystone, one being medium dark grey to dark olive grey, becoming medium grey to medium dark grey. It is blocky to subfissile, soft to firm, non calcareous, slightly to moderately micromicaceous and with traces of silt and pyrite. The second type of claystone is greyish blue to pale green, waxy, amorphous to subblocky, soft, non calcareous and with common glauconite near the base.

The tuffaceous claystone is the same as in the overlying Tare Formation.

SHETLAND GROUP **1994.5 – 2882.5 m MD, (1994.5 – 2882.0 mTVD (1958.5 – 2846.0 mTVD MSL)**

The top of the Shetland Group is picked at an increase in resistivity and sonic velocity. The Shetland Group comprises the Springar, Nise and Kvitnos Formations.

Springar Formation **1994.5 – 2124.0 m MD, 1994.5 – 2124.0 m TVD (1958.5 – 2088.0 m MSL)**

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

The Springar Formation comprises claystone with thin stringers of dolomite.

The claystone is medium light to medium dark grey to greenish grey and dark greenish grey. It is firm, blocky, non calcareous and locally slightly micromicaceous. The claystone contains traces of pyrite nodules.

The dolomite is medium light olive brown, hard, brittle, crypto- to microcrystalline, pyritic and argillaceous.

Nise Formation **2124.0 – 2823.5 m MD, 2124.0 – 2823.0 m TVD (2088.0 – 2787.0 m MSL)**

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

The top of the Nise Formation is picked at a slight increase in resistivity and sonic velocity. The formation consists of claystone with minor dolomite and limestone stringers.

The claystone is medium dark to dark grey to locally greenish black. It is firm, non to locally calcareous, non to very slightly dolomitic, trace to slightly micromicaceous and slightly silty. It is becoming non silty with trace of microcarbonaceous material and locally rare micropyrite.

The dolomite is light to medium dark brown to greyish brown to brownish grey. It is crumbly, mainly moderately to well indurated, occasionally micritic, mainly microcrystalline, argillaceous and is grading to marl.

The limestone is pale to medium light grey to occasionally brownish grey. It is moderately hard, micritic in part, microcrystalline in part, dolomitic in part, slightly to very argillaceous and occasionally grading to marl.

Kvitnos Formation **2823.5 – 2882.5 m MD, 2823.0 – 2882.0 m MD (2787.0 – 2846.0 m MSL)**

System: Upper Cretaceous
Series: Middle Coniacian – Lower Coniacian?
Depositional environment: Marine, outer shelf to upper bathyal

The top of the Kvitnos Formation is picked at a slight increase in the gamma ray, resistivity and sonic velocity trend. The formation consists of claystone with dolomite stringers.

The claystone is essentially the same as in the overlying Nise Formation, being medium dark to dark grey, firm, non calcareous, slightly micromicaceous and trace microcarbonaceous.

The dolomite is medium dark greyish brown to brownish grey, firm to very firm, brittle, micritic in part, microcrystalline in part and moderately to very argillaceous.

CROMER KNOLL GROUP **2882.5 – 3160.5 m MD, 2882.0 – 3159.5 m TVD (2846.0 – 3123.5 m MSL)**

The top of the Cromer Knoll Group, is defined by a significant trend shift in resistivity values compared to the Shetland Group. The gamma ray readings decreases slightly compared to the general level in the lower part of the Shetland Group. The Cromer Knoll Group comprises the Lange and Lyr Formations.

Lange Formation **2882.5 – 3039.5 m MD, 2882.0 – 3039.0 m TVD (2846.0 – 3003.0 m MSL)**

System: Upper - Lower Cretaceous
Series: Lower Coniacian? – Lower Albian
Depositional environment: Marine, outer shelf to upper bathyal to mid shelf

The Lange Formation consists of claystone with several limestone stringers, and locally thin sandstone stringers and marl at the base.

The claystone is predominantly medium dark to dark grey, also dark greenish grey below 3010 m MD, firm, non calcareus, slightly micromicaceous, slightly silty and trace microcarbonaceous. The basal 10 m becomes varicoloured; medium to medium dark brown to reddish brown to yellowish brown and medium to dark grey. The claystone is firm, non calcareous, non to slightly dolomitic, slightly to moderately micromicaceous, slightly to moderately silty, trace to slightly micropyritic and locally trace microcarbonaceous.

The limestone is grey white to light brown grey, medium dark greyish brown to brownish grey, firm to brittle, microcrystalline in part, micritic in part, slightly dolomitic in part and argillacous.

The sandstone is clear to translucent, very fine to fine and locally medium grained, moderately to well sorted, angular to subangular, firm to moderately hard and with silica cement.

The marl is light to medium brown to reddish brown, firm and dolomitic, slightly to moderately silty, trace micromicaceous and grading to argillaceous limestone in part.

Lyr Formation **3039.5 – 3160.5 m MD, 3039.0 – 3159.5 m MD (3003.0 – 3123.5 m MSL)**

System: Lower Cretaceous
Series: Lower Albian – Lower Ryazanian
Depositional environment: Marine, mid to outer shelf

The top of the Lyr Formayion is picked at a sharp increase in the resistivity log, associated with an increase in the sonic velocity. The formation consists of claystone, with several dolomitic stringers at the very top, and limestone stringers at the very base.

The claystone is mainly medium dark to dark grey to greyish black, but is becoming more varicoloured near the base with very dusky red to blackish red and medium to dark greenish grey colours. It is firm to very firm, non to slightly calcareous, becoming slightly to moderately calcareous towards the base and occasionally very calcareous at the base. The claystone is slightly dolomitic near the top, slightly to moderately micromicaeous, slightly to mainly moderately silty, trace to slightly sandy, slightly micropyritic and trace to slightly microcarbonaceous.

The marl is medium light to medium greyish brown to brownish grey, crumbly and firm. It is non to moderately silty, trace microcarbonaceous, trace carbonaceous streaks and grades to argillaceous dolomite in part.

The basal limestone is greyish white to very pale orange, soft to mainly firm, slightly dolomitic and slightly argillaceous.

VIKING GROUP **3160.5 – 3724.5 m MD, 3159.5 – 3722.5 mTVD (3123.5 – 3686.5 mTVD MSL)**

The top of the Viking Group is defined by a sharp increase in the gamma ray log response. This is associated with a drop in the resistivity log readings and a signifcant drop in sonic velocity. The Viking Group comprises the Spekk and the Melke Formations in this well.

Spekk Formation **3160.5 – 3185.0 m MD, 3159.5 – 3184.0 m TVD (3123.5 – 3148.0 m MSL)**

System: Upper Jurassic
Series: Lower Volgian – Upper Oxfordian
Depositional environment: Marine, mid to outer shelf to inner shelf

The Spekk Formation consists of of claystone. The claystone is brownish black, dusky yellowish brown, firm, slightly silty, micromicaceous, occasionally micropyritic, non to slightly calcareous and contains traces of carbonaceous material.

Melke Formation **3185.0 – 3724.5 m MD, 3184.0 – 3722.5 m TVD (3148.0 – 3686.5 m MSL)**

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

The Melke Formation is picked below the high gamma ray signature of the Spekk Formation. The Melke Formation consists of claystone with occasional marl beds and minor limestone stringers.

The claystone is dark grey to greyish black and dark brownish grey to brownish black. It is firm to very firm, slightly calcareous and dolomitic, moderately to very micromicaceous, trace silty to slightly silty and is occasional very pyritic. Below 3650 m the claystone becomes medium dark to dark grey to brownish grey, firm to very firm, non calcareous, trace to slightly dolomitic, locally slightly to moderately micromicaceous, trace silty to slightly silty, trace microcarbonaceous, with trace of micropyrite and very pyritic patches.

The marl is light to medium dark greyish brown to brownish grey, crumbly to firm, trace to slightly silty, trace to slightly microcarbonaceous, trace micropyritic, and grades occasionally to argillaceous dolomite. Below 3650 m MD the marl is slighly to very dolomitic.

The limestone is off-white to light grey, light brownish grey in part and medium brown to medium dark greyish brown in part. It is moderately hard to hard, brittle in part, micritic to cryptocrystalline, moderately to very argillaceous and slightly carbonaceous. Locally there is trace of micromica, micropyrite and silt. The limestone grades occasionally to marl.

FANGST GROUP **3724.5 – 3856.0 mMD, 3722.5 – 3854.0 mTVD (3686.5 – 3818.0 m MSL)**

The top of the Fangst Group is seen as a sharp decrease in the gamma ray readings along with a significant increase in the sonic log velocity. The Fangst Group consists of the Garn, Not and Ile Formations in this well.

Garn Formation **3724.5 – 3738.0 m MD, 3722.5 – 3736.0 m TVD (3686.5 – 3700.0 m MSL)**

System: Middle Jurassic
Series: Upper Aalenian
Depositional environment: Marginal marine

The Garn Formation comprises massive sandstone which is dark to pale yellowish brown with clear to translucent to pale brown quartz. The grains are very fine to medium, occasionally coarse, moderately sorted, subrounded to angular and silica to very silica cemented. The sandstone is tight and moderately hard to hard to occasionally very hard,

micaceous to very micaceous, occasionally with thin lamina of mica and occasionally slightly carbonaceous. The visual porosity is generally poor.

Not Formation **3738.0 – 3785.5 m MD, 3736.0 – 3783.5 m TVD (3700.0 – 3747.5 m MSL)**

System: Middle Jurassic
Series: Upper Aalenian
Depositional environment: Marginal marine

The top of the Not Formation is marked by the onset of very high gamma ray readings, which represent the presence of heavy minerals within the sandstone matrix.

The Not Formation is composed of a sequence, consisting of sandstone with beds of claystone in the upper part, interbedded and laminated siltstone and claystone in the middle part and massive shale in the lower part.

The sandstone is similar to the Garn sandstone, but is occasionally light grey and very silica cemented and generally more argillaceous and contains occasionally pyrite and heavy minerals within the matrix.

The siltstone is olive black to olive grey, in parts grading to very fine sandstone, furthermore silica cemented and argillaceous, micaceous with mica lamina, carbonaceous and bioturbated in parts.

The claystone and shale is brownish black to greyish black and olive black to black, moderately hard, subfissile to fissile, micaceous to very micaceous, carbonaceous with black coaly fragments, non calcareous and in parts bioturbated with pyritized burrows.

Ile Formation **3785.5 – 3856.0 m MD, 3783.5 – 3854.0 m TVD (3747.5 – 3818.0 m MSL)**

System: Middle – Lower Jurassic
Series: Middle Aalenian – Upper/Lower Toarcian
Depositional environment: Fluviodeltaic to marginal marine

The top Ile Formation is defined by a clear drop in gamma ray readings, representing the top of a sandstone sequence underlying the Not shales. The Ile Formation consists of sandstone, with beds and lamina of silty sandstone and claystone/shale.

The sandstone is light olive grey to pale yellowish brown, occasionally olive grey and occasionally olive grey to olive black. It is very silty grading to siltstone. The grains are predominantly very fine to fine and well sorted, rarely lamina of medium to very coarse, subangular to subrounded, silica to very silica cemented, with light grey to off white to rarely pale brown argillaceous matrix. The sandstone is moderately hard to hard, occasionally very

hard, tight, slightly micaceous to very micaceous (lamina), in parts bioturbated with brownish black argillaceous and carbonaceous patches with occasional micropyrite. The sandstone exhibits predominantly poor to occasionally no visual porosity.

The claystone/shale is black to greyish black, moderately hard, subfissile to fissile, carbonaceous, micaceous, silty in parts and non calcareous.

BÅT GROUP **3856.0- 4092.0 m MD (TD), 3854.0- 4089.0 m TVD (3818.0 – 4053.0 m MSL)**

The Båt Group comprises the Ror, Tilje and Åre Formations

Ror Formation **3856.0 – 3918.5 mMD, 3854.0 – 3916.0 mMD (3818.0 – 3880.0 mTVD MSL)**

System: Lower Jurassic
Series: Upper/Lower Toarcian – Upper Pliensbachian
Depositional environment: Fluviodeltaic to marginal marine

The top of the Ror Formation is picked at a gamma peak representing the onset of higher gamma ray readings and more argillaceous sediments. The formation comprises sandstone with beds and lamina of claystone/shale.

The sandstone is light to medium grey to dark grey. The grains are generally very fine, well sorted, and subangular. The sandstone is argillaceous to very argillaceous grading to siltstone in parts, silica cemented and moderately hard with poor visual porosity.

The claystone/shale is greyish black, firm to moderately hard, subfissile, silty in parts and non calcareous.

Tilje Formation **3918.5 – 4046.5 m MD, 3916.0 – 4043.5 m TVD (3880.0 – 4007.5 m MSL)**

System: Lower Jurassic
Series: Upper Pliensbachian
Depositional environment: Fluvial becoming fluviodeltaic to marginal marine

The top Tilje Formation is picked at a drop in gamma ray and resistivity readings, marking the onset of a sequence with more interbedded lithology compared to the above Ror Formation. The formation consists of sandstone with beds of siltstone and claystone.

The sandstone intervals frequently show coarsening upwards pattern, it is furthermore predominantly light grey with clear to translucent quartz. The grains are very fine to medium to occasionally coarse, well to moderately sorted and subrounded to angular. The sandstone is

silica cemented, silty and argillaceous in parts, moderately hard and with poor visual porosity.

The siltstone is light grey to yellowish grey, in parts grading to very fine sandstone, silica and occasionally carbonate cemented, argillaceous and moderately hard.

The claystone is dark grey and brownish black, firm to hard, blocky to subfissile, occasionally micromicaceous and non calcareous.

Åre Formation **4046.5 – 4092.0 m MD, 4043.5 – 4089.0 m TVD (4007.5 – 4053.0 m MSL)**

System: Lower Jurassic
Series: Upper Pliensbachian – Upper Sinemurian
Depositional environment: Fluvial becoming fluviodeltaic to marginal marine

The Åre Formation comprises interbedded sandstone and claystone with stringers of coal.

The sandstone is light grey with clear to translucent quartz. The grains are very fine to coarse, occasionally very coarse, poorly sorted and subrounded to angular. The sandstone is silica and occasionally carbonate cemented, with off white argillaceous matrix. It is friable to moderately hard with poor to fair visible porosity.

The claystone is dark grey to brownish black, firm to moderately hard, blocky to subfissile, slightly micromicaceous, in parts carbonaceous and coaly and non calcareous.

The coal is black, shiny and argillaceous in parts.

TD: 4092.0 m MD, 4089.0 m TVD, (-4053.0 m MSL)

4.5 Hydrocarbon indications

All cuttings were returned to seabed while drilling down to 1250 m MD. Three gas peaks of between 2.5 % - 2.8 % (C1 only) came from thin sands at 1288 m MD, 1295 m MD, and 1337 m MD (Table 4.3). The low resistivity in these sands indicates that this is in-situ biogenic methane trapped in water. No shows were seen in these sands.

Minor gas peaks were seen in the Lange, Spekk and Melke Formations, between 0.2 % and 0.5 %. No shows were seen. Background levels were below 0.1 % down to the top of the Lange Formation, and then between 0.1 – 0.2 %, down to 3020 m MD. Except for a short section near the top of the Lyr Formation, which was close to 0.2 %, backgroud gas levels were between 0.05 % - 0.12 % from 3020 m MD to the top of the Spekk Formation. Gas levels varied between 0.2 and 0.46 % in the Spekk Fm, before quickly coming down to background levels of 0.07 – 0.12 % in the top of the Melke Formation. The gas was low, and no shows were observed in the Melke Formation.

The drillgas and gaspeaks were still low when entering the Garn Formation and continued being very low throughout the Fangst and Båt Group reservoir sandstones. The recorded composition was C1 to nC5, plotting in the oil window.

Fluorescence was recorded from the onset of the Garn Formation and throughout the sandy sections of the Garn and Not Formations. Weak HC odour was observed from some of the core chips, while the fluorescence was mainly described as even to patchy, dull to moderately bright, pale yellowish white, and the cut florescence as slow to very slow, streaming to cloudy and yellowish white.

Within the sandstones of the Ile Formation, the shows were not continuous and consistent. No shows were recorded in the very top of the Ile sandstone, while no to poor to moderate shows were recorded from approximately 3805 m MD and down to the base of core no. 2, at 3818 m MD. No to occasional weak HC odour was observed from the core chips, while the fluorescence was mainly described as no to patchy to occasional pin point, dull to rarely moderately bright, pale yellow, and the cut fluorescence as no to weak, slow, cloudy to rarely streaming and pale yellowish white.

Below the cored interval, through the rest of the Ile and Ror and most of the Tilje Formations, no to weak visual shows were recorded. Weak, mostly dull, pale yellow fluorescence was recorded in sand grains, with no to slow, cloudy to streaming, pale yellow to bluish white cut fluorescence. No HC odour was recorded. Below approximately 4000 m MD, the shows more or less disappeared.

The shows in the Garn and Not Formation sandstones was at the time interpreted to represent light oil, but with uncertain and probably relatively low saturation together with very tight

formation. The shows within the Ile Formation and further downwards, were interpreted as residual or representing a transition zone with low HC saturation.

Subsequent MDT pressures and samples confirmed water in the Garn, Ile and Tilje Formations. In the Garn 1 gal sample chamber, however, approx 2 dl of hydrocarbon fluid was found on the top of the water. Analyses indicated that most of it being mud filtrate (base oil), but with some dissolved residual oil from the formation.

Table 4.3 Gas peaks

Gas

Wellbore: NO 6507/3-4

Gas peaks:					Chromatographic analysis (ppm)						
mMD	mTVD	%	Type	Background %	C1	C2	C3	i-C4	n-C4	i-C5	n-C5
1288.0	1288.0	2.80	Formation gas	0.2	25000						
1295.0	1295.0	2.65	Formation gas	0.3	23000						
1337.0	1337.0	2.50	Formation gas	0.3	21000						
1482.0	1482.0	0.80	Formation gas	0.4	7097						
1525.0	1525.0	0.85	Formation gas	0.4	6983						
1551.0	1551.0	0.71	Formation gas	0.4	6286						
1613.0	1613.0	0.93	Formation gas	0.4	6382						
1669.0	1669.0	1.57	Formation gas	1.1	15580						
1929.0	1929.0	0.20	Formation gas	0.05	1917						
2113.0	2113.0	0.08	Formation gas	0.02	802		1	0	1		
2290.0	2290.0	0.10	Formation gas	0.03	900	14	3	2	2	2	1
2299.0	2299.0	0.09	Formation gas	0.05	769	12	4	2	2	2	1
2720.0	2720.0	0.52	Trip gas	0.18	4990	105	16	2	2	1	1
2894.0	2894.0	0.20	Formation gas	0.06	1878	69	16	3	3	2	1
2900.0	2900.0	0.22	Formation gas	0.13	2090	101	25	3	4	1	1
2913.0	2913.0	0.31	Formation gas	0.1	3014	123	29	3	4	3	1
2941.0	2940.0	0.51	Formation gas	0.14	5032	208	49	4	6	2	1
2947.0	2946.0	0.69	Formation gas	0.2	6420	270	66	6	7	2	2
2954.0	2953.0	0.31	Formation gas	0.12	2857	130	32	4	4	2	1
2987.0	2986.0	0.30	Formation gas	0.1	2859	148	39	4	6	2	1
3111.0	3110.0	0.34	Pumps off gas	0.05	3249	108	25	4	5	3	2
3162.0	3161.0	0.46	Formation gas	0.07	4225	134	73	7	12	3	3
3169.0	3168.0	0.40	Formation gas	0.25	3637	104	60	6	11	3	2
3181.0	3180.0	0.36	Formation gas	0.22	3188	87	56	6	10	3	3
3196.0	3195.0	0.52	Formation gas	0.14	4866	175	54	6	9	3	2
3223.0	3222.0	1.34	Trip gas	0.08	11739	527	43	8	7	6	29
3279.0	3278.0	0.57	Formation gas	0.4	4756	125	94	9	15	4	2
3337.0	3336.0	0.60	Formation gas	0.42	4922	144	123	12	21	6	4
3369.0	3368.0	0.40	Trip gas	0.18	3678	98	40	9	5	3	2
3392.0	3391.0	0.48	Formation gas	0.2	3981	118	102	10	21	5	4
3686.0	3684.2	0.53	Formation gas	0.17	3630	280	139	9	23	5	6
3686.0	3684.2	39.80	Trip gas		387854	9714	1720	149	120	20	18

Gas

Wellbore: NO 6507/3-4

Gas peaks:

mMD	mTVD	%	Type	Background %	Chromatographic analysis (ppm) C1	C2	C3	i-C4	n-C4	i-C5	n-C5
3686.0	3684.0	0.53	Formation gas	0.05	3630	280	139	9	23	5	6
3727.0	3725.0	0.19	Formation gas	0.06	1982	1127	150	46	5	10	5
3731.0	3729.0	0.31	Formation gas	0.02	2650	189	33	1	4	3	1
3743.0	3741.0	0.33	Formation gas	0.2	2537	203	48	3	4	2	1
3751.0	3749.0	0.30	Formation gas	0.2	2329	173	39	2	4	2	1
3817.0	3816.0	0.41	Formation gas	0.1	3398	283	62	3	8	4	1
3980.0	3978.0	0.36	Formation gas	0.15	3086	139	28	2	5	3	1
4045.0	4042.0	0.20	Formation gas	0.1	1303	169	37	2	7	3	1
4056.0	4053.0	0.22	Formation gas	0.1	1603	142	27	1	5	3	1
4070.0	4067.0	0.30	Formation gas	0.1	1889	415	54	1	7	6	1

4.6 Geophysical results

Refer to Figure 4.3.

The observed formation tops in the Tertiary, Cretaceous and Jurassic sections were encountered well within the uncertainties of the prognosis. The observed reservoir zonation within the Fangst and Båt Groups was very close to the prognosed zonation.

4.7 Data acquisition

4.7.1 Cuttings and mud samples

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

- Cuttings were sampled every 10 m from 1260 m MD to 2800 m MD, and every 3 m from 2800 m MD to 4092 m MD (TD).
- Mud samples were sampled every 100 m from 1300 m MD to 4092 m MD (TD). (Figure 1.2).

4.7.2 Conventional coring

Table 4.4 Coring summary

Core#	Bit#	Depth int. mMD	Rec. m	Rec. %	Barrel type/length	Barrel util. %	Spec. Preserv.	Core system	Comment
1	9	3728 - 3764	34.2	95	Al / 54	63.3	No	Jam buster	3 jams
2	9rr	3764 - 3818	54.3	100.6	Al / 54	100.6	No	Jam buster	OK

The cutting of cores and handling on drill floor and pipe deck in general went well, no accidents or near accidents. Marking, cutting and general processing of the core was also done well.

Core # 1 jammed after 36 m of coring. When pulling out the inner barrels, it was revealed that the jam buster system had been released: both telescopic inner tubes had been activated due to two different jams within the inner barrel. These jams seemed to have happened close together, after approx. 3.5 m and 4 m of coring, respectively. The last and fatal jam, seem to have happened in the inner barrel, approx. 4 m above bottom, after 36 m of coring. At this depth within the barrel, the core was crushed and squeezed towards the inner walls of the barrel. The rest of the core, and core # 2, seemed to be of good quality.

RESLAB personnel were rig site, taking core plugs for hotshot porosity & permeability measurements and also plugs for Dean & Stark saturation measurements.

4.7.3 MWD

Table 4.5 MWD logging

Run no.	Depth interval MMD	Collar diam.	Tool type	Comments
1	470 - 470	9 ½"		Inclination surveys taken by AnderGauge
2	470 - 1250	8 ¼"	MPR/DCP	Memory data not recorded. Memory not tested at surface.
3	470 - 1250	9 ½"	DIR	Directional only in 26" hole. OK.
4	1153 - 1210	8 ¼"		Drilled cement
5	1253 - 2310	8 ¼"	DIR/GR/RES/PRESS	Tool occasionally turned off for short periods and turned itself back on again down to 1720m. Thereafter this only happened rarely. The memory curves are generally very good with only one minor dropout at approx. 1300m.
6	2310 - 3223	8 ¼"	MPR/DCP (DIR/GR/RES/PRESS)	POOH due to low ROP. 400 m of memory data missing from start of run.
7	3223 – 3369	8 ¼"	MPR/DCP (DIR/GR/RES/PRESS	It was necessary to ream from 2600 m to bottom because the previous bit run made an undergauge hole. It was then decided to pull out of hole because the MWD failed.
8	3369 - 3686	8 ¼"	MPR/DCP (DIR/GR/RES/PRESS	Good data quality
9	3686 - 3728	6 ¾"	Ontrack (GR/RES/ PWD/SURV)	Good data quality
10	3819 - 4092	6 ¾"	Ontrack (GR/RES/ PWD/SURV) + Halliburton MRIL	Good data quality

4.7.4 Wireline logging

Schlumberger performed the wireline logging. In the 12 ¼" section one run was performed with no severe problems. In the 8 ½" section a full reservoir logging program with sampling were performed, and a lot of problems were experienced (see chapter 4.12).

Table 4.6 Wireline logging program

LOGGING PROGRAM			
No#	**TOOL COMBINATION**	**RUN**	**INTERVAL m MD RKB**
12 ¼" section			
1	DSI-IPLT-GR-ACTS	1A	1700 - 3686
2	MSIP-GR-ACTS	1A	Was not run due to poor weather
8 ½" section			
1	AIT-MSIP-EMS-GR-ACTS-ECRD	2A	3600-4092
2	IPLT-ECS-CMR200-GR-ACTS-ECRD	2A	3650-4092
3	MDT-GR-ACTS-ECRD pressures with large area probe	2A	3725.5-4045.6
4	MDT-GR-ACTS-ECRD (dual packer sampling attempt) -failed	2B	3736.6
5	MDT-GR-ACTS-ECRD (sampling with large area probe)	2C	3725.5-3949.9
6	DSI-ZVSP-GPIT-GR	2B/A	1250-4055.0
7	MSCT-GR-ACTS	2A	3725.0-3980.0

The sonic, gamma ray, density and resistivity logs are graphically presented in figure in Figure 4.7 a.

4.7.5 Data quality

In general the data quality from wireline logging was good. A major reason for this was the excellent hole conditions in both sections.

From the CMR log only data from the down-log in BVI mode could be collected. The tool failed and the up-log in full porosity mode could not be performed.

The MWD logging performance was not satisfactory in this well, but the general data quality was good. Some memory data is missing due to tool failures and wrong programming of the tool (Table 4.5). The mud logging crew worked well and the mud loggers did an excellent job to keep up with the sampling requirements especially during fast drilling. The mud logging data and the services were generally good. Both cores, cut in the Garn, Not and Ile Formations, were of very good quality.

4.8 Formation pressure

The calculated formation pressure profile corresponds well with observations from the area. Down to approximately 1460 m TVD a pressure of 1.03 sg is present. From this depth a rapid increase is calculated and at the border between Tertiary and Cretaceous at 2000 m TVD the pressure has reached 1.47 sg that is the maximum calculated pressure gradient for the well. A decline then starts and at 2400 m TVD a gradient of 1.35 sg is estimated. An increase then appears and at 3200 m TVD the pressure is calculated to 1.46 sg. From this depth a gradual decline in pressure gradient is estimated and at top of the Garn sandstone the pressure gradient is measured to 1.31 sg by the MDT log.

The formation pressure is calculated using several methods. The resistivity and the sonic log give similar pressure calculations, while the D-exponent from the drilling parameters is difficult to use. The reason for this may be the PDC bit used, and that a gradual bit wear especially in the 12 ¼" section effected the D exponent.

The overburden gradient is calculated using the density log below 13 3/8" casing. Above this depth density data from other wells is used. In the section from 810 to 2310 m data from well 6507/3-1 is used, while in the top section log data from well 6506/12-1 is applied.

Pressure profile is presented in figure 4.5.

4.8.1 Reservoir pressure summary

The sandstones were in general of poor reservoir quality, which caused problems to find intervals with sufficient properties to get good quality pressure readings from the MDT log. Exceptions from this were parts of the Tilje Formation that had good quality reservoir due to chloride coating of the sand grains.

A total of 3 MDT run were performed in the well (Table 4.7-9) In the first run 24 pressure points were attempted before the tool failed. Out of this 10 were good, 4 were supercharged, 1 had lost seal while 9 showed a tight formation. In the second run just one pressure measurement was obtained before the tool failed.

The third run was primary a sampling run, and 3 samples were collected. Pressure points were collected before the sampling started to check if the mobility was sufficient. One of these pressure points had no seal and one was leaking. The tool had to be moved to another level. A total of 5 pressure points were collected in this run.

The formation pressure measurements are plotted in figure 4.6. In this plot the water gradient is based on laboratory density of sampled formation water. The water gradient in the reservoir is estimated to 0.98 g/cm3. This low gradient is due to salinity lower than regionally observations.

The different sandstone reservoirs are not in pressure communication. From Garn Formation down to the Ile formation there is a pressure drop of 2.0 Bar, while from the Ile down to the Tilje formation the pressure drop is 3.8 Bar.

Table 4.7 MDT-GR Run 2A

Test #	Fm. name	Depth m MD RKB	Depth m TVD MSL	Formation pressure (bar)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Mobility mD/CP	Temp. °C	Comments
1	Garn	3725.5	3687.6	477.68	515.36	515.31	76	128	Good test
2	Garn	3726.1	3688.2	477.75	515.55	515.45	29	128.7	Good test
3	Garn	3727.8	3689.9	477.92	515.88	513.63	27	-	Stabilized at 477.92 but then partially lost seal and restabilized at 478.79
4	Garn	3730.9	3693.0	478.48*	516.32	516.08	-	-	Low perm, supercharged
5	Garn	3732.0	3694.1	478.19*	516.43	516.28	0.8	130.4	Low perm, supercharged
6	Garn	3735.3	3697.4	480.36*	516.99	515.79	0.1	130.7	Low perm, supercharged
7	Not	3748.8	3710.9	-	519.51	-	-	-	Lost seal
8	Not	3761.3	3723.4	481.25	521.27	521.04	1.3	-	Poor test, 4.8 cc
9	Ile	3793.2	3755.0	-	524.66	524.49	-	-	Tight test
10	Ile	3798.6	3760.4	522.43*	525.45	525.20	0.1	-	Tight test, 2.8 cc
11	Ile	3821.5	3783.3	484.89	529.06	528.82	4.5	135.0	Good test
12	Ile	3829.5	3791.3	485.63	530.08	529.87	30.1	135.3	Good test
13	Ile	3831.2	3793.0	485.27	530.20	530.00	19.6	135.8	Good test
14	Ile	3848.0	3809.7	-	533.33	532.23	3.2	136.6	Tight test, 3.2 cc
15	Ile	3851.3	3813.0	-	533.20	533.03	-	136.0	Tight test, 3.1 cc
16	Ror	3885.5	3847.1	-	538.06	537.75	-	137.0	Tight test, 3.9 cc
17	Ror	3891.3	3852.9	-	538.57	538.37	-	137.6	Tight tes, 3.2 cc
18	Tilje	3931.6	3893.1	503.09*	543.57	543.33	-	-	Supercharged, 3.3 cc
19	Tilje	3949.9	3911.4	493.41	546.77	545.98	30	139.1	Good test
20	Tilje	3953.4	3914.8	-	546.60	-	-	139.6	Tight test, 3.5 cc
21	Tilje	3965.6	3926.9	494.81	548.36	548.18	400	139.7	Good test
22	Tilje	3973.7	3935	-	549.45	549.27	-	140.1	Tight test
23	Tilje	3978.5	3939.8	496.06	550.10	549.9	15.2	140.2	Good test
24	Tilje	4032.2	3993.3	-	557.88	557.72	-	140.7	Tight test, 3.1 cc
25	Åre	4045.6	4006.7	-	559.63	-	-	141.1	Tool failed while setting

Table 4.8 MDT-GR Run 2B

Test #	Fm. name	Depth m MD RKB	Depth m TVD MSL	Formation pressure (bar)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Mobility mD/CP	Temp. °C	Comments
1	Garn	3726.6	3688.7	477.806	515.83	-	-	-	Lost communication with tool, 2.5 cc

Table 4.9 MDT-GR Run 2C

Test #	Fm. name	Depth m MD RKB	Depth m TVD MSL	Formation pressure (bar)	Hydrost. pressure Before (bar)	Hydrost. pressure After (bar)	Mobility mD/CP	Temp. °C	Comments
1	Garn	3725.5	3687.6	-	515.11	-	-	132.2	No seal obtained
2	Garn	3728.0	3692.0	477.90	515.67	515.49	2.9	132.3	Leaking
3	Garn	3726.0	3688.1	477.72	515.24	515.25	9.2	132.4	Pretest before sample-1gal + 3 x 450 cc water
4	Garn	3726.0	3688.1	477.71	-	516.23	298	133.8	Pretest after sample
5	Ile	3829.8	3791.6	485.76	529.52	530.19	53.9	137.6	Pretest before sample – 1 x 450 cc
6	Tilje	3949.9	3911.4	493.551	546.53	546.54	191.1	140.8	Pretest before sample – 1gal + 2 x 450 cc

4.9 Reservoir fluid sampling

Fluid samples were collected in Garn, Ile and Tilje Formations. For all the intervals the sampled fluid were water.
In the Garn Formation some traces of a reservoir oil was mixed in the mud filtrate. This reservoir oil is dissolved residual oil.

Table 4.10 Samples collected

Sample depth (m MD)	Run No.	Formation	Chamber (volume)	Drawdown (bar)	Formation Pressure (bar)	Pump Volume (liters)	Mobility (mD/CP)
3725.5	2C	Garn	1 gal	9-12	477.71	119	9.2
3725.5	2C	Garn	450 cc	9-12	477.71	132	9.2
3725.5	2C	Garn	450 cc	9-12	477.71	137	9.2
3725.5	2C	Garn	450 cc	9-12	477.71	140	9.2
3829.8	2C	Ile	1 gal	1-2	485.76	70	53.9
3829.8	2C	Ile	450 cc	37	48576	76	53.9
3949.9	2C	Tilje	1 gal	9	493.55	73	191.1
3949.9	2C	Tilje	450 cc	8	493.55	86	191.1
3949.9	2C	Tilje	450 cc	9.5	493.55	94	191.1

4.10 Leak off test

One extended leak-off test was performed below 13 3/8" casing shoe at 2300 m MD. The test consists of two sequences. In the first sequence a fracture is made and approximately 1 m^3 mud is injected into the fracture. The mud is bled back and the closure pressure is measured. After a short time a second injection and bleed off is performed.
This test gave the following results: Minimum horizontal stress was measured to 1.68 sg with an uncertainty of +/- 0.03 sg.
The formation breakdown pressure is 2.01 sg at the first sequence, which is higher than the overburden pressure. In the second sequence the fracture reopening pressure was observed at 1.81 sg, and this pressure is reported as the actual LOT.

Two FIT were performed in the well. Below the 20" casing shoe at 1250 m A FIT of 1.55 sg, while below the 9 5/8" shoe at 3677 m MD a FIT of 1.55 sg was performed.

4.11 Formation temperature

Based on log temperatures, an average temperature gradient of 4.08 ^oC /100 meter is calculated from seabed down to TD top reservoir. From top of the reservoir down to TD of the well a temperature gradient of 2.6 ^oC /100 used. The lower gradient in the sandstone section is based on regional observations. This gives a temperature of approximately 150 ^oC at TD of the well. The calculated temperature is in agreements with observations from DST in well 6507/3-1.

In the 8 ½" section several logging runs were performed. Due to technical problems the logging took long time resulting in that the last log run was performed 135 hours after the mud circulation was stopped. 3 water samples were also collected, and a temperature measurement at the end of the sampling period is also a good indication of the formation temperature.

Formation temperature is calculated using an in-house formula that take into consideration recorded temperature and time since circulation. In the 8 ½" section the Horner method has been used.

Table 4.11 Well 6507/3-4: Measured and evaluated temperatures

Tool Combination	Depth of measurement m TVD RT	Max recorded temperature ^{0}C	Time since last circulation hrs	Evaluated temperature – inhouse formula Deg C	Horner evaluated temperature ^{0}C
DSI-IPLT-GR	3635	124	20.9	138.9	
AIT-MSIP-EMS-GR	4051	134	25.4	146.6	147.5 deg C at 4092 m (TD)
IPLT-ECS-CMR-GR	4061	138	40.5	145.9	
DSI-ZVSP-GPIT	4045	141	113.0	144.7	
MSCT-GR	3972	143	134.8	142.2	

MDT sampling	Depth of measurement m TVD RT	Max recorded temperature ^{0}C	Pumped volume	Evaluated temperature ^{0}C
MDT-Sample Garn	3726	138	140	Close to Max recorded temperature
MDT-Sample Ile	3829.8	139	76	
MDT-Sample Tilje	3949.9	142.6	94	

4.12 Experiences / recommendations

There was a discussion after drilling into the reservoir, if a discovery had been made. Lower salinity in the formation water than in the reference wells resulted in a resistivity up to 15 ohmm in the top of the reservoir. The background gas on the other hand dropped when entering the reservoir. Two cores were cut and the discovery scenario of wireline logging program was run.

If the gas readings were given more weight maybe the coring and additional logging could have been reduced or skipped.

Approximately 32 hours were lost due to wireline logging problems. Most of the problems were related to the MDT tool, but other tools had also failures. Some of the lost time was related to testing of new technology like MSIP sonic tool and high temperature MDT packer.

Failures:

- *Run 2A IT/MSIP* Problems with the winch. Low logging speed for the MSIP log related to the large amount of data transferred to surface
- *Run 2A: IPLT/ECS* CMR. CMR log stopped function at TD. Just BVI data collected.
- *Run 2A: MDT/GR.* Could not set the probe after a while due to a hydraulic leak.

- *Run 2B: MDT/GR*. Leak in the hight temperature packer shortly after it was set. Lost communication with the tool after 1 pressure point.
- *Run 2C: MDT/GR* . Sampling run. Not all the chambers were filled.
- *Run 2A: MSCT/GR* Have to change to the backup tool after run in hole with the primary tool.

The Halliburton MRILWD tool was included in the drill string as a test run after the coring was completed. This NMR tool gave good porosity measurement, but the calculated bound volume was too high. The calculated permeability was also too high, but this is also experienced from wireline NMR tools in the same type of tight formation.

PL159 B Alve
Regional structural setting

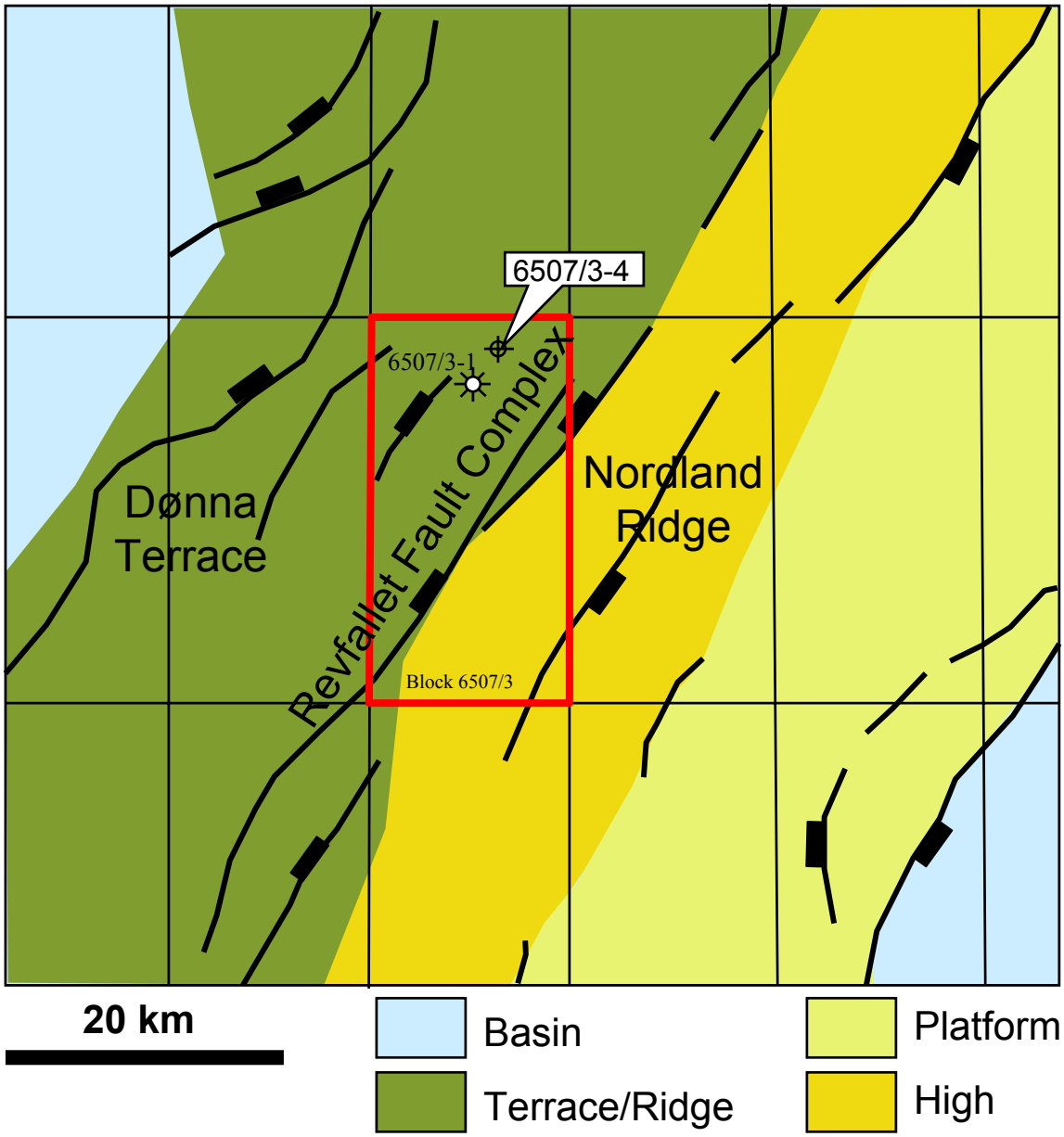


Fig. 4.1

PL 159 B Alve

RKB - MSL: 36 m

Water Depth: 372 m

Stratigraphy
Well 6507/3-4

STATOIL

Made by: TAWJ

Date: 05.10.04

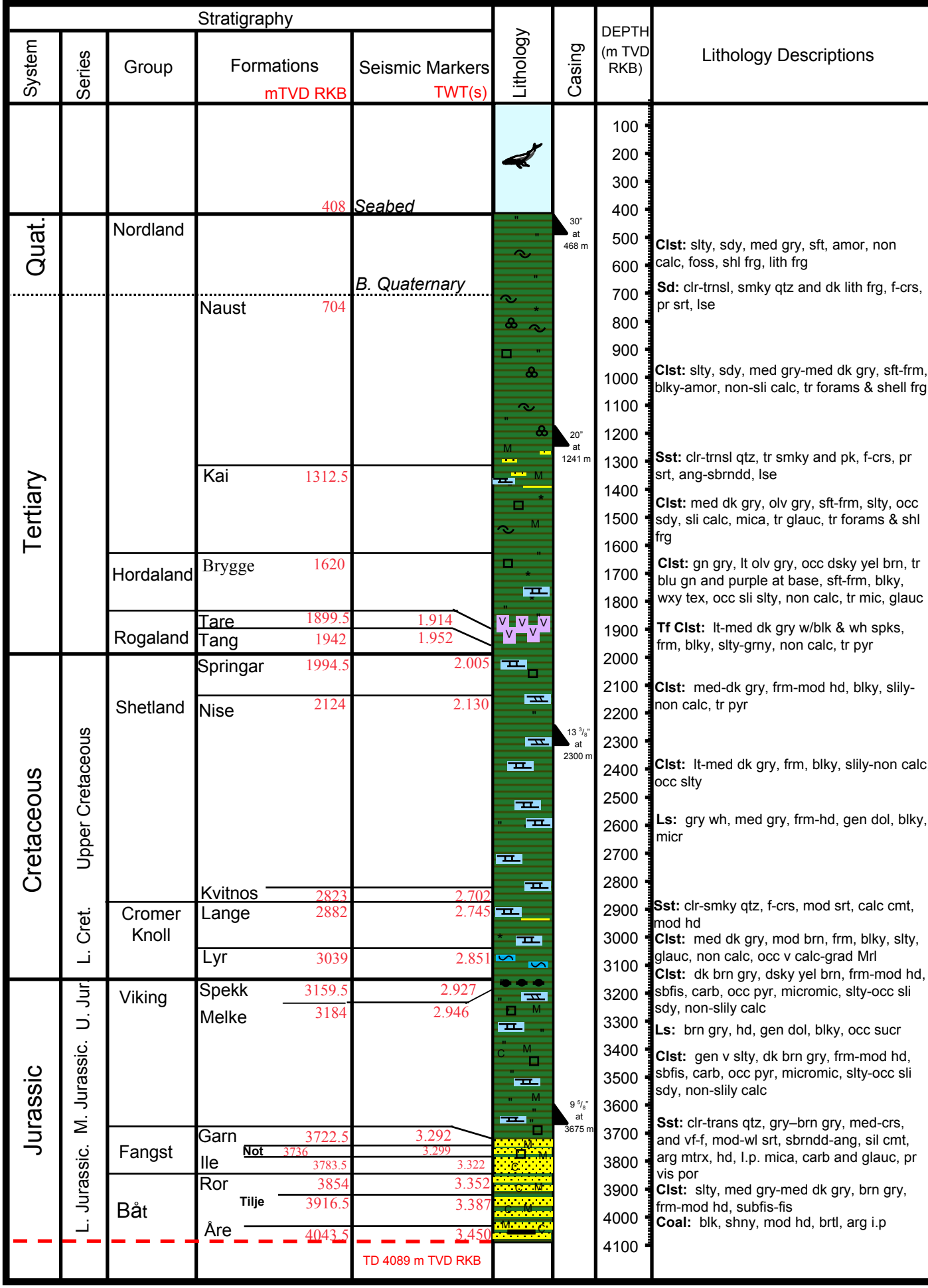


Fig. 4.2

PL 159 B

RKB - MSL: 36 m

Water Depth: 372 m MSL

Reservoir section
Well 6507/3-4

STATOIL

Made by: TAWJ | Date: 05.10.2004

Stratigraphy					Lithology	Coring	Shows	DEPTH m TVD RKB	Lithology Descriptions
System	Series	Group	Formations mTVD RKB	Seismic Markers TWT (s)					
Jurassic	Upper	Viking	Melke					3600	LIMESTONE: greyish white - pale orange grey, firm - moderate hard, blocky - platy, slightly, argillaceous. CLAYSTONE: medium dark grey - greyish black, brownish grey - brownish black, becoming lighter in color towards base, blocky, firm - moderate hard, micromicaceous, silty - very silty occasionally grading to Siltstone, slightly micromicaceous, occasionally microcarbonaceous, non calcareous.
								3650	
								3700	
			3722.5	3.292					
	Middle	Fangst	Garn						SANDSTONE: dark - pale yellowish brown with clear - translucent - pale brown quartz, very fine to medium, occasionally coarse, moderately sorted, subrounded to angular, silica to very silica cemented, tight, moderately hard to hard - occasionally very hard, micaceous - very micaceous with thin lamina of mica, occasionally slightly carbonaceous, poor visual porosity SHOWS: Weak odour, patchy moderately bright, pale yellow fluorescence, slow streaming, yellow white cut fluorescence
			3736	3.299		Core #1 3728– 3764 m 95% rec.		3750	
			Not			Core#2 3764– 3818 m 100% rec.			SHALE: brownish black - greyish black, olive black to black, moderately hard, subfissile - fissile, micaceous - very micaceous, carbonaceous with black coaly fragments, non calcareous, in parts bioturbated with pyritized burrows
			3783.5	3.322				3800	SANDSTONE: light olive grey - pale yellowish brown, occasionally olive grey and olive grey - olive black and very silty grading to SILTSTONE, predominantly very fine - fine, well sorted, rarely lamina of medium - very coarse, subangular - subrounded, silica - very silica cemented, with light grey - off white - rarely pale brown argillaceous matrix, moderately hard - hard, occasionally very hard, tight, slightly micaceous - very micaceous (lamina), in parts bioturbated with brownish black argillaceous and carbonaceous patches with occasional micropyrite, predominantly poor - occasionally no visual porosity.
	Lower	Båt	Ile					3850	
			Ror	3854	3.352				SANDSTONE: light - medium grey - dark grey, generally very fine, argillaceous - very argillaceous grading to SILTSTONE in parts, well sorted, subangular, silica cemented, moderately hard, poor visual porosity.
								3900	CLAYSTONE/SHALE: greyish black, firm - moderately hard, subfissile, silty in parts, non calcareous
			Tilje	3916.5	3.387				SANDSTONE: predominantly light grey with clear to translucent quartz, very fine - medium - occasionally coarse, well - moderately sorted, subrounded - angular, silica cemented, silty and argillaceous in parts, moderately hard, poor visual porosity
								3950	SILTSTONE: light grey - yellowish grey, in parts grading to very fine SANDSTONE, silica and occasionally carbonate cemented, argillaceous, moderately hard
									CLAYSTONE: dark grey, brownish black, firm - hard, blocky - subfissile, occasionally micromicaceous, non calcareous
								4000	CLAYSTONE: as above, with stringers of LIMESTONE
									SANDSTONE: light grey with clear to translucent quartz, very fine - coarse, occasionally very coarse, poorly sorted, subrounded - angular, silica and occasionally carbonate cemented, with off white argillaceous matrix, friable - moderately hard, poor to fair visible porosity CLAYSTONE: dark grey - brownish black, firm - moderately hard, blocky - subfissile, slightly micromicaceous, in parts carbonaceous and coaly, non calcareous SILTSTONE: as above COAL: black, shiny,argillaceous in parts
			Åre	4043.5	3.450			4050	

Fig. 4.3

PL 159 B

RKB - MSL: 36 m

Water Depth: 372 m

Prog. VS observed stratigraphy
Well 6507/3-4

STATOIL

Made by: TAWJ

Date: 05.10.04

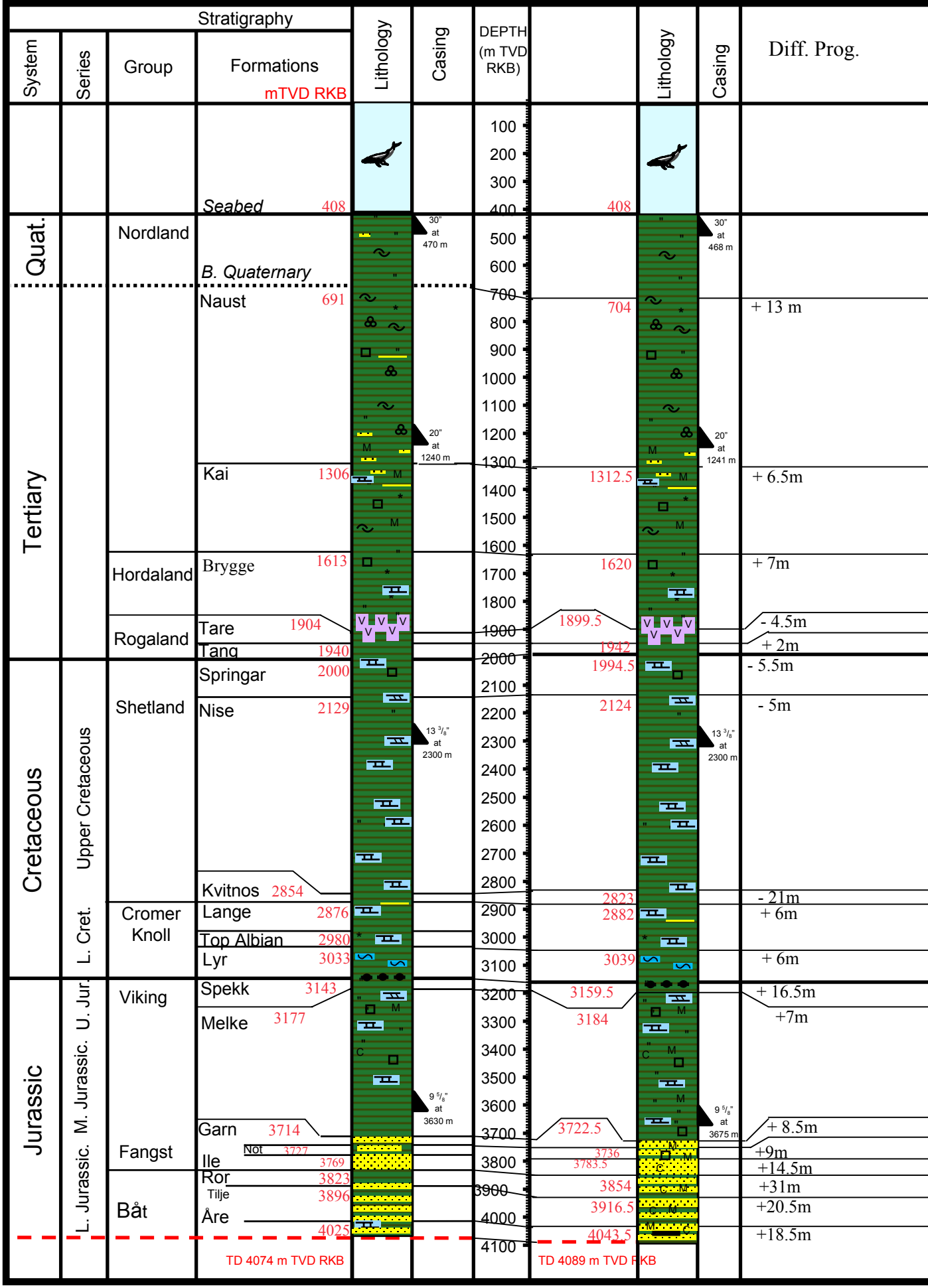


Fig. 4.4

PL 159 B

RT - MSL: 36 m

Water Depth: 372 m

Pressure Profile
Well 6507/3-4

STATOIL

Made by: TM

Date: 05.10.04

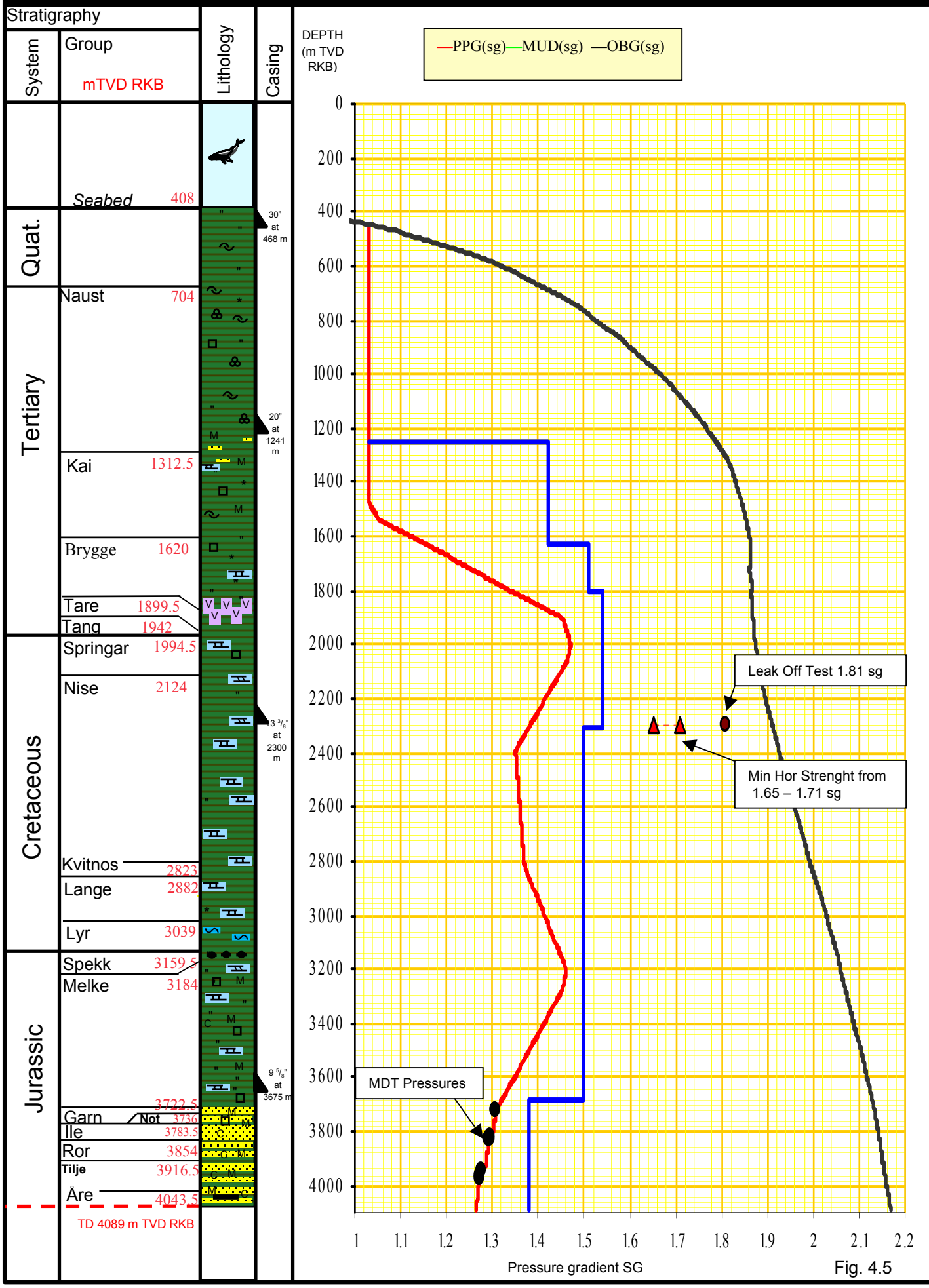


Fig. 4.5

PL 159 B	MDT Pressures Well 6507/3-4	STATOIL	
RT - MSL: 36 m			
Water Depth: 372 m		Made by: TM	Date: 05.10.04

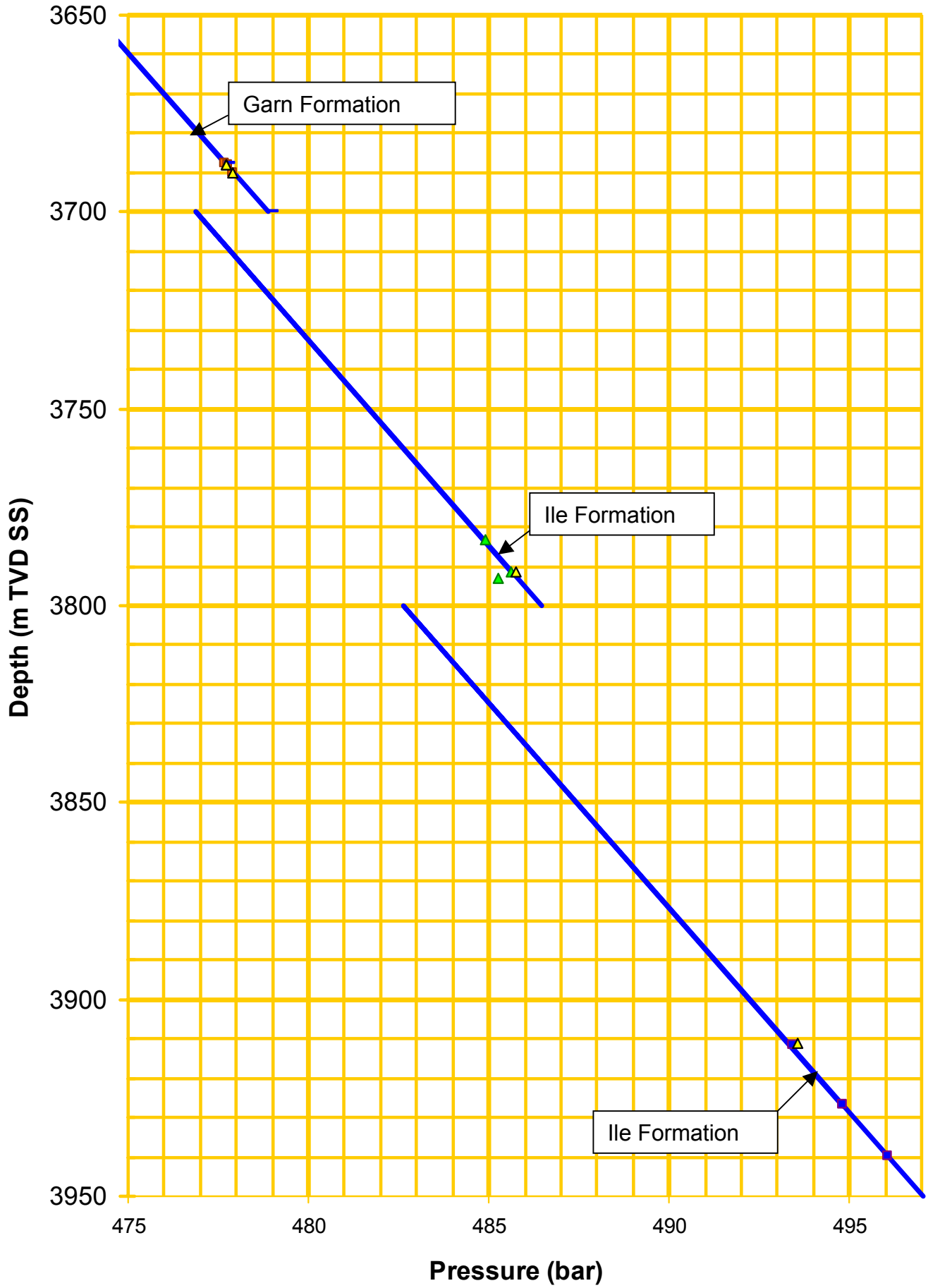


Fig. 4.6

PL 159 B

RKB – MSL: 36 m

Water depth: 372 m

Composite plot
Well 6507/3-4

STATOIL

Made by: TM | Date:03.10.2004

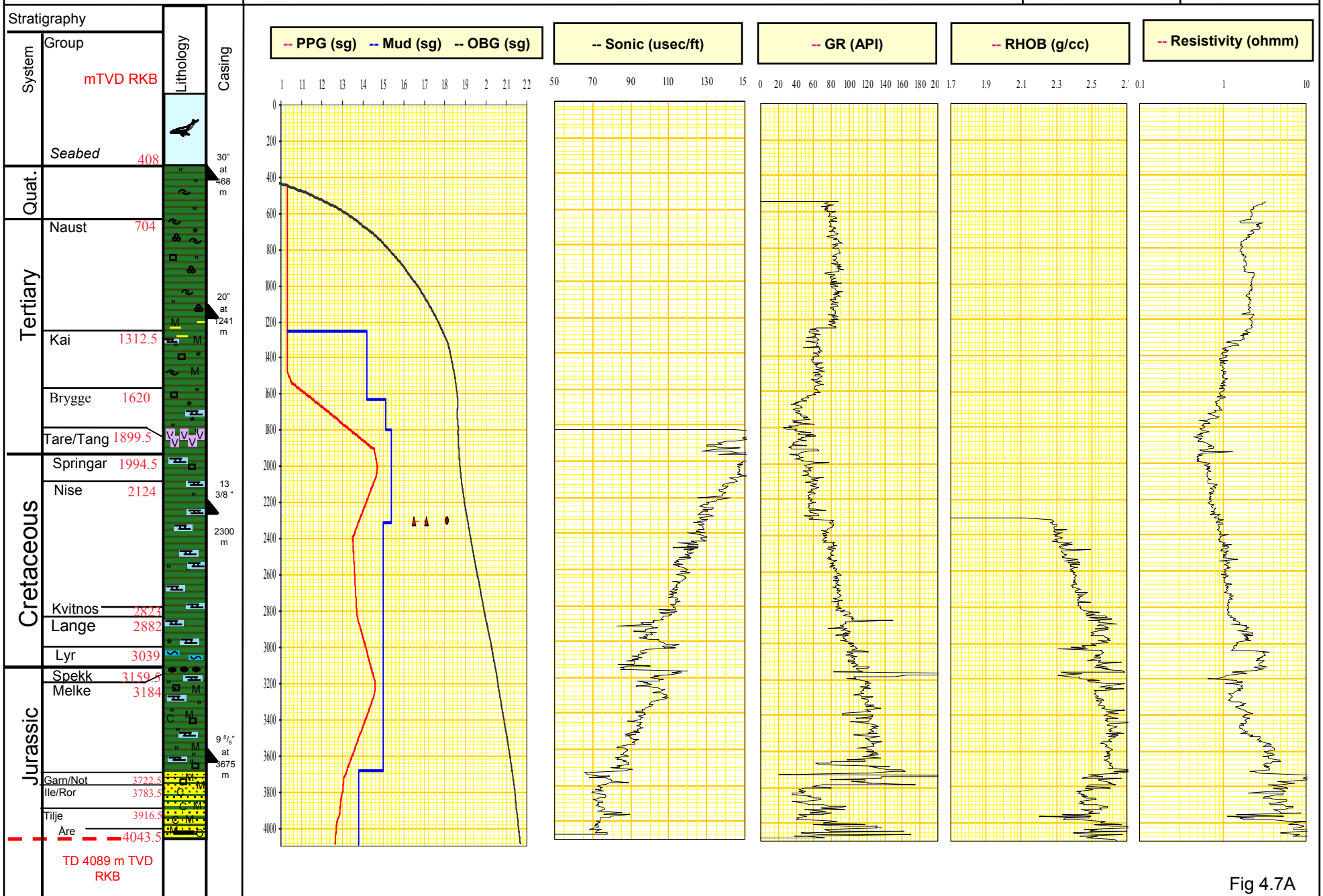


Fig 4.7A

PL 159 B

RKB – MSL: 36 m

Water depth: 372 m

Composite plot
Well 6507/3-4

STATOIL

Made by: TM | Date:19.19.2004

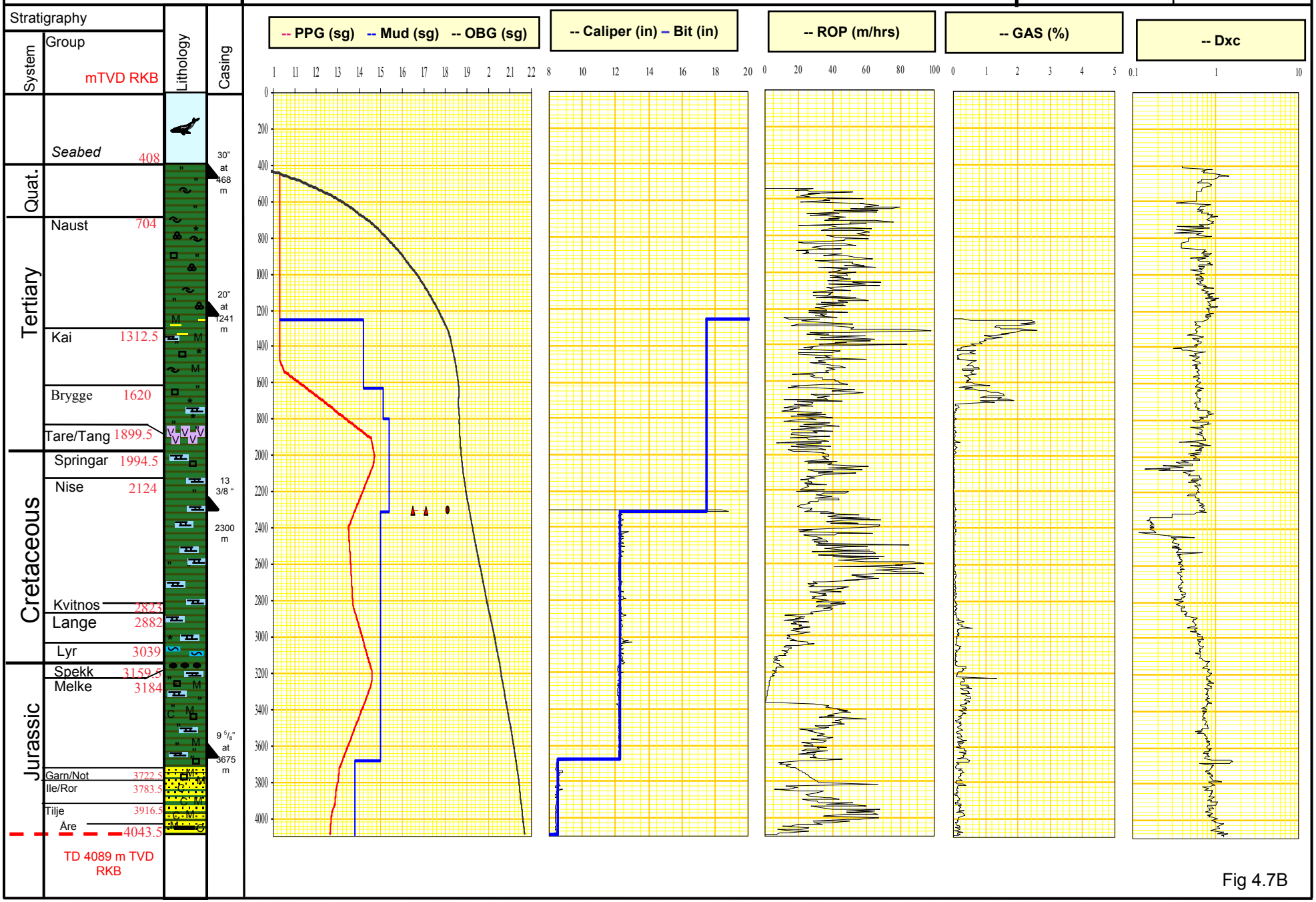


Fig 4.7B

PL 159 B

RT - MSL: 36 m

Water Depth: 372 m

Temparature Profile
Well 6507/3-4

STATOIL

Made by: TM

Date: 05.10.04

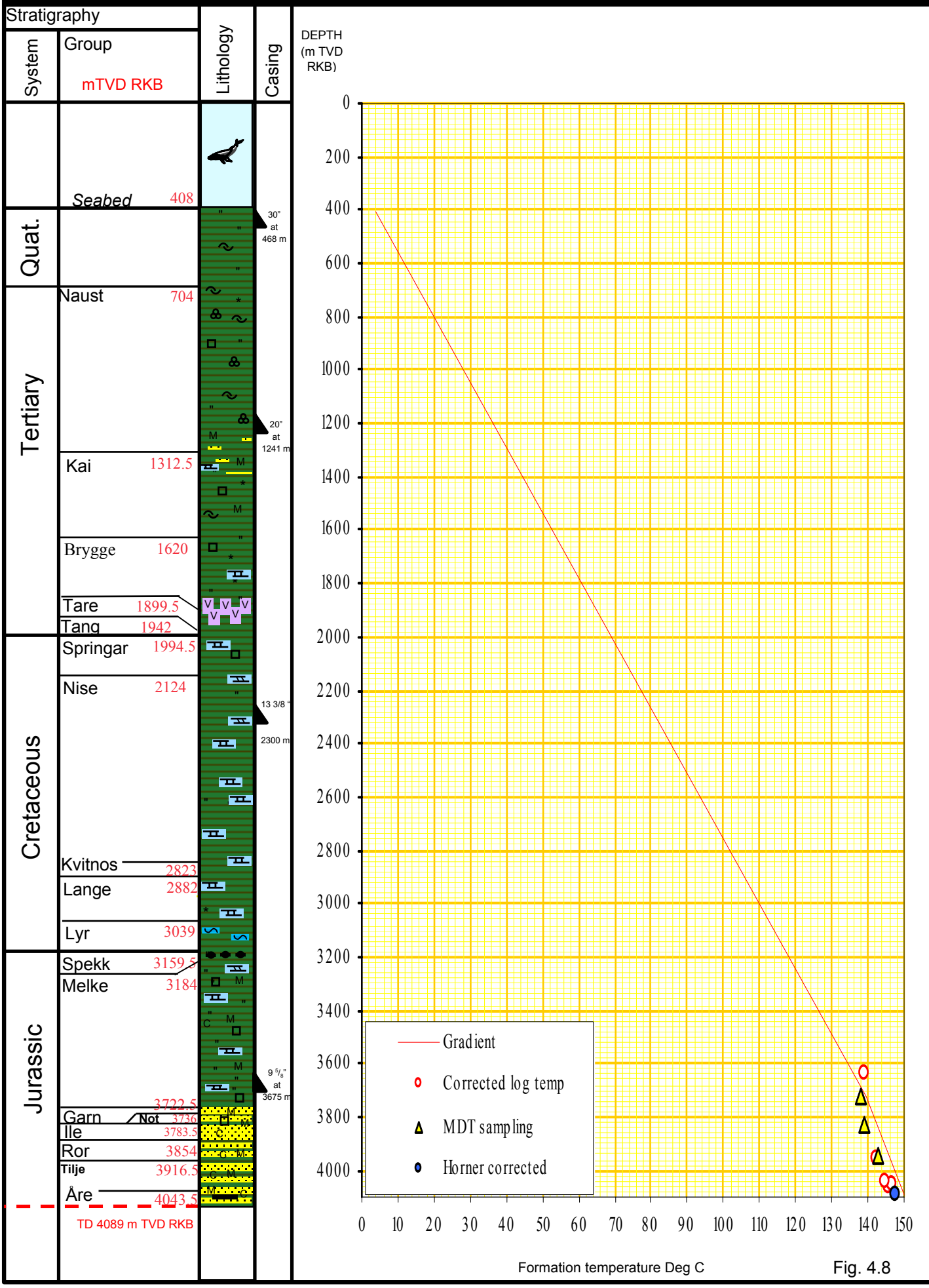


Fig. 4.8

5 Drilling operations report

5.1 Rig move and positioning

After completing a classification scheme in Algeciras, Spain, the drill ship West Navigator moved to the Alve location. The transit time was close 11 days, including a 36 hr stop in Kristiansund for mobilization of equipment.

At location transponders and marker buoys were deployed, and the DP (dynamic positioning) system was calibrated and tested. During transit, the 30" conductor was made up and hung off in the auxiliary rig. In the main rig the spud BHA was made up and RIH to seabed.

5.2 Drilling top-hole section (408 – 470 m)

BHA: 17 ½" pilot bit, float sub, 2-stage 26"/36" Odfjell hole opener and an Anderdrift survey tool.

Ran in hole and tagged seabed at 408 m. Washed down from 408 m to 418 m. Verified spud location with ROV at 4 different ship headings. Drilled 36" hole from 418 m to 470.5 m (at 17 ½" bit).

Average parameters: 2 tons WOB, 80-140 RPM, 4500-5000 LPM.

Survey with Anderdrift showed 1.5 degrees hole inclination at TD. The inclination increased from vertical to 1.5 degrees the last 20 m of drilling. Scattered boulders were encountered in the upper half of the section. Displaced the hole to 1.35 sg WBM prior to pulling out of hole.

Ran 30" conductor in the auxiliary rig while drilling 36" hole in the main rig. Stabbed in the 30" conductor after pulling out of hole with the drilling BHA. Landed the conductor at the 26" hole shoulder with approximate 3 m stick up. Bulls-eyes showed 0 and 1 degrees respectively. Pulled the conductor 1 m off bottom and prepared to perform cement job. Had an one-hour stop in operation due to problems with the weight cell in the surge tank. Pumped 46.7 m3 X-LITE cement (300 % excess) and observed full returns at seabed.

The heave compensator was unable to compensate the conductor sufficiently, giving the conductor a piston effect induced by the rig heave. The plan was to land the conductor at the 26" shoulder with sufficient stick up during the cement job, but this was not possible due to the deepening of the hole. As a consequence, the conductor was held in suspension while waiting on cement to ensure correct stick-up. Waited on cement for 5 hours (bucket sample) and released conductor running tool. Recorded 2.5 m stick up and bulls-eyes 0 and 1 degrees.

POOH with 30" conductor running tool in the auxiliary rig and ran in hole with 26" assembly in the same rig. Drilled out 30" shoetrack with 26" assembly. Pulled same above conductor and stabbed in 9 7/8" pilot hole assembly from main rig.

5.3 Drilling 9 7/8" pilot hole (470 – 1250 m)

BHA: 9 7/8" bit, MPR, MWD and 150 m 8" DC

Drilled 9 7/8" pilot hole from 470 m to 950 m with average ROP of 34.9 m/hr. Had no ROP restrictions in this interval as the possible gas filled sands were prognosed between 950 m and 1250 m. Some boulders were experienced in this interval.

Average parameters: 1-5 tons WOB, 114-124 RPM, 3000-3500 LPM, 95-140 bar SPP.

Had problems with decoding of MWD signals (software related). The problem was solved before drilling into potential shallow gas interval.

From 950 m down to 1250 m the ROP was limited to ensure sufficient MWD data density for gas interpretation.

Average parameters: 1-7 tons WOB, 116-124 RPM, 3000-3500 LPM, 115-150 bar SPP.

Had no indications of shallow gas throughout the section, neither from MWD readings nor ROV observations around wellhead.

Pumped 5-10 m3 hivis-pills every 15 meters drilled.

Flowchecked the well for 30 minutes at TD. Displaced the hole to 1.35 sg WBM and POOH.

5.4 Drilling 26” section (470 – 1250 m)

The 26” assembly was used to drill out the 30" conductor shoe prior to drilling 9 7/8" pilot hole. The assembly was stand-by at 345 m in the auxiliary rig while drilling the pilot hole in the main rig.

BHA: 26” milled tooth bit on a pendulum assembly.

Drilled out from below the 30" conductor shoe at 468 m, opening up the 9 7/8" pilot hole to 26” down to 1250 m. Experienced boulders in some intervals, as seen in the pilot hole.

Average parameters: 1-10 tons WOB, 100-125 RPM, 4500 LPM, 210 bar SPP

Circulated the hole clean at TD, displaced the hole to 1.35 sg WBM and pulled out of hole. Had only one tight spot (at 740 m) when pulling out of hole.

Ran and cemented 20” casing with shoe at 1241 m. Took weight and had to wash down last 2 m. An adaptor ring for a contingency 16" liner was installed at 1125 m. Pumped teoretical casing volume + 3/4 shoetrack (plan was max ½ shoetrack if plug did not bump), but the plug did not bump. Had full return during cement job. Collected sample with ROV to surface and checked for cement, no cement. Concluded that 20" casing was not cemented to surface.

Ran BOP in the main rig while drilling 26" hole and running 20" casing. Landed BOP.

Casing test to 145 bar failed. Ran in hole with junk bit and DC to verify cement in the shoe area. Took 8 ton weight at 1085 m. Continued to run in hole to 1228 m, drilled float and shoe, but still no cement. POOH and prepared for cement squeeze job. Pumped 26.5 m3 tail slurry and squeezed 8.8 m3 into the formation, held pressure for 6 hours and then bled off.

Ran in hole with 17" drilling assembly. Tagged hard cement @ 1152 m. Drilled hard cement from 1152 m to 1212 m. Spotted 10 m3 hi-vis pill every 15 meters. Displaced to 1.42 sg WBM. After pumping 9.5 m^3 of 1.42 sg WBM, the drill string packed off and stalled out. Worked pipe partly free with slow rotation on drill string, unable to regain circulation. Worked pipe upwards and string got free at 1190 meter. POOH. Observed that all nozzles were blocked off by cement. Cleaned bit and ran in hole. Found 15 m fill on bottom. Displaced the well to 1.42 sg WBM and continued drilling cement and 3 m new formation.

Performed FIT to 1.57 sg.

5.5 Drilling 17” section (1250 – 2310 m)

BHA: 17” milled tooth bit on a pendulum assembly (17" stabilizers and 8" DC). This section was drilled with a 17” assembly due to the restriction in the adaptor ring for 16” liner installed in the 20” casing.

After performing an FIT to 1.57 sg at 1256 m, the section was drilled in one bit run to the section TD at 2310 m. Due to the risk for breakdown (fracturing which causes a lower re-opening pressure), an FIT was performed instead of an LOT in order to avoid fracturing the formation. Also, a dispensation for drilling without riser margin was approved in advance in order to minimize the risk for fracturing the formation.

The mud weight was increased at 1625 m from 1.42 sg to 1.48 sg. The drilling continued to 1635 m, where significant mud weight variations were observed. The mud weight variations were caused by problems with the pit agitator. Drilling was stopped and the well was circulated to get even mud weight in and out (1.50 sg).

At 1704 m the well was flow checked due to unstable pit level. Static loss of 1.5 m3 in 0.5 hrs was reported with dropping trend. The hole was circulated clean with 3400 lpm, observing gradually disappearing loss. It is possible that the reported loss is related to the problems with the pit agitator and confusion regarding mud weight.

Further drilling was done with restricted ROP to 30 m/hr to reduce the ECD. At 1725 m the hole was circulated clean, and mud weight verified to 1.51 sg. Due to several problems with the mud-pumps, part of the interval was drilled with 2 pumps, restricting the flow to +/- 3950 LPM in these periods.

At 1800 m the hole was circulated and the mud weight was increased to 1.54 sg. From this depth the penetration rate was restricted to 20 m/hr, to control the ECD.

At 2021 m a wiper trip out to the 20" casing shoe was performed due to a bad weather forecast possibly resulting in disconnect. The well was circulated bottoms up before starting pulling out. From 1871 m the string was pumped out of the hole due to increasing drag (max 30 ton over pull). The hole was circulated clean at the 20" casing shoe, and large quantities of cuttings were observed at the shakers. Some cavings (not pressure cavings) were observed among the cuttings. The drilling operation commenced after 4 hours circulating due to improving weather forecast. No restrictions were seen during tripping in. The last 2 stands were washed down, reaming a tight spot at 2006 m.

The drilling continued to section TD at 2310 m with penetration rate restricted to 20 m/hr to reduce the ECD. The hole was circulated clean, and the mud was conditioned before the string was pulled. Several tight spots were wiped while pulling up to 1843 m (max overpull

35 ton). Tight spots disappeared on 2nd wipe. Pumped slug before POOH to 20” shoe (max overpull 15 ton). Circulated bottoms up and pulled the assembly out.

Average parameters: 2-20 tons WOB, 120-150 RPM, 3900-4250 LPM, 290-340 bar SPP.

Only small amounts of gas were seen during the drilling. The maximum gas monitored was 2.8 % (from sandy stringers near the top of the section).

The 13 3/8" casing was run to 2300 m, 50 stands (of 2 casing joints) were run inside the 20" casing. 7 hours waiting on weather was done with the 13 3/8" casing above the BOP. Single casing joints were run as the casing shoe entered the open hole. The casing was successfully landed using a 5 ½" HT55 landing string, while circulating with 500 lpm. No losses were observed while running the casing.

The casing was cemented with theoretical top of cement at 1800 m (+ 30% open hole excess). During the displacement of the cement, a rapid pressure increase up to 250 bars was observed. It was concluded that the bottom plug had landed, but did not burst as per specification. The plug was then burst by applying 340 bar pressure. The remaining displacement of the cement was done. Positive correlation with the displacement pressure trend indicated the cement was pumped out of the 13 3/8" casing and up the annulus. The displacement was stopped before bumping the top plug, after an excess of 1/2 shoe track was pumped.

Ran in with 12 ¼" BHA. A successful casing test was performed to 360 bar.

Firm cement was tagged at 2262 m. Re-calculations showed that 97% pump efficiency should have been used in the cement displacement calculations instead of 98%.

Drilled out the shoetrack and 3 m new formation with 1.54 sg Glydril WBM. Performed an XLOT. The formation fractured at a pressure equal to 2.02 sg. Based on the measured fracture re-opening pressure, the integrity was estimated to 1.81 sg, which is reported as the XLOT value.

5.6 Drilling 12 ¼" section (2310 – 3686 m)

BHA: A 12 ¼" PDC bit on an assembly containing a mud motor with 1.0 deg bend.

After performing an XLOT to 1.81 sg, the well was displaced to 1.50 sg Paratherm OBM.

Drilled ahead with a LYNG 575AHG PDC bit and a XL mud motor, with a ROP varying between 12 - 45 m/hr. In the beginning of the section, some problems were experienced with the MWD-sensors failing, and/or the tool not transmitting properly. After some hundred meters drilling, these problems seemed to heal themselves. The ROP decreased gradually, but this was interpreted to be due to hard shale formations and occasional limestone stringers. The Spekk formation, prognosed to come in at 3150 m, was expected to give a reduced ROP, while the underlying Melke Fm in turn was expected to show increased ROP. The Spekk Fm came in 18 m deep, and after drilling through this, it was observed that no variation in ROP was seen, now varying between 3-6 m/hr. It was decided to pull out, and when the bit surfaced, it turned out to be severely worn, graded as 2-5-RO-N-X-2-BT-PR.

A new LYNG 460 AHG was picked up, and it was decided to run back in with the same assembly. It was necessary to ream from 2600 m to bottom. It was then decided to pull out of hole because the MWD failed.

The bit and motor was re-run after inspection, MWD was changed out, and the assembly was run back in to drill ahead. The section was drilled to TD at 3686 m MD (3684 m TVD) without significant problems. Circulated bottoms up, pumped slug and started to POOH. Bit was graded 1-1-WT-A-X-I-CT-TD.

A formation strength calculation (UCS) based on the sonic log, showed that the entire section should have been easy drillable due to soft formations. It appears that the problem with the first Lyng bit, most likely was related to the limestone stringers. The bit is probably not suited for drilling such limestone stringers.

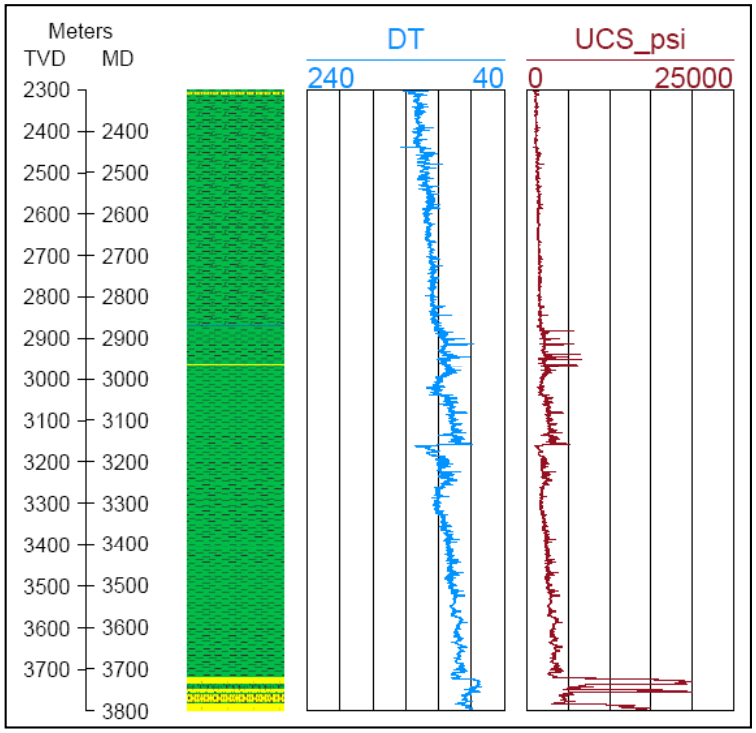


Fig 5.1 UCS-calculations in the 12 ¼" section

Performed one logging run on wireline (DSI-IPLT). Another logging run was planned to be performed, but was cancelled due to problems with voltage and the cable head.

Due to deteriorating weather, the riser was displaced from OBM to seawater in case it would be necessary to disconnect. Waited on weather for 16 hours.

Rigged up and ran 9 5/8" liner in stands. Some extra time was used due to relatively high rig movements (pitch and roll). No hole problems were experienced when running liner down to 3672 m, even though the hole had been exposed for 72 hours after POOH with drilling assembly. The displacement of the riser to seawater did not have any effect on the hole. The Paratherm OBM is therefore recommended for future wells in this area. Took 20 ton weight at 3672 m. Broke circulation and washed down to 3677 m. Took 20 ton weight and 10-15 bar pressure increase at 3677 m. Was unable to pass this depth. The response of the string when attempting to pass 3677 m ("shooting" instantly 30-40 cm upwards) indicated a potential restriction at the liner hanger depth. Decided to set liner with shoe at 3674 m, leaving a 12 m 12 1/4" rathole below. Top of liner at 2235 m (65 m liner lap in 13 3/8" casing).

Circulated bottoms up and got max 38 % gas in returns. Set the liner hanger. Due to a tool failure, the wiperplug was sheared out instead of the ball seat after setting the hanger. Pumped down and landed the wiperplug in the landing collar. Pressured up to 203 bar and sheared out ball seat. Commenced cement operation by pumping 20 m3 of 1.70 sg Tuned Spacer. Was unable to proceed with mixing cement due to problems with circulation mix pump. Had a 2 hours stop in operation to troubleshoot and fix problem. Continued cement operation by pumping 29.3 m3 1.90 sg tail cement. Displaced same with OBM and underdisplaced with

one shoetrack due to no wiper plug. Float did not hold backpressure. Held pressure for 45 min. Bled off pressure and set liner packer. Tested same - OK. Maintained 35 bar pressure on drill pipe and annulus side with lower annular closed. Released and pulled liner running tool above PBR by stripping through closed lower annular (to ensure free pipe). WOC in 6.5 hrs while maintaining lower annular closed and 41 bar pressure on cement. Bled off and POOH with liner running tool.

Ran in hole with BOP test tool and tested BOP to 360 bar.

Made up and ran in hole with 8 1/2" assembly. Tagged wiperplug/float at 3650 m. No cement above wiperplug. Drilled hard cement from 3652 - 3676 m. Displaced the well to 1.38 sg Paratherm OBM while drilling cement. Got some metal (steel) swarf in returns. Drilled through shoe and continued to drill hard cement down to 3686 m. Drilled new formation from 3686 - 3692 m. Pulled into liner shoe and performed FIT to 1.55 sg.

5.7 Drilling 8 ½" section (3686 – 4092 m)

BHA: 8 ½" PDC bit (Hycalog DSX146) on a packed rotary (core point finder) assembly. 5" drill pipe to above 9 5/8" liner and 5 ½" drill pipe to surface.

Drilled ahead to core point after performing an FIT to 1.55 sg.

Average parameters: 4-8 tons WOB, 120-150 RPM, 1700-2400 LPM, 180-260 bar SPP.

ROP varying between 5 - 15 m/hr. Observed a drilling break at 3722 m. Drilled 5 m into the reservoir and circulated bottom up. Decided to POOH to cut core. Bit graded 1-2-WT-G-X-In-NO-CP. The gauge cutters were worn down and the hardfacing on the gauge was partly chipped off.

Ran in hole with a 54 m core assembly ("jam buster") to cut core. Cut core from 3728 to 3764 m.

Average parameters: 2-5 tons WOB, 60-90 RPM, 1000 LPM, 66-68 bar SPP, 10-11 kNm and 4.8 m/hr. Had a connection at 3755 m. Cored jammed off at 3764 m. Both telescope inner barrels was sheared, indicating that the core was jammed off 3 times. 95 % recovery and 63 % utilization.

Ran in hole again with core BHA #2 (54 m). Cut core from 3764 - 3818 m with 10.8 m/hr. Picked off bottom with 6 tons and POOH (100 % recovery / 100 % utility).

Both runs were cored with an ARC427C3 (13 mm PDC) core head and no wear of bit was observed.

Ran in hole with a packed 8 1/2" BHA, including a roller reamer as a near bit stab and a prototype MRIL sub (stand-alone, memory only) from Halliburton behind the MWD. Replaced the Hycalog bit with a Lyng LD470AHG (7 blades, 13 mm). No resistance was observed while running in hole. The cored interval was reamed and logged with MWD.

Drilled 8 1/2" hole from 3818 - 4077 m with an average ROP of 21 m/hr. High stick-slip values from the MWD were common during the entire section, but a clear increase was observed while drilling into the Åre formation, where also a clear reduction in ROP down to 5-10 m/hr was observed.

POOH and logged the cored interval with 55 m/hr with MRIL prototype tool. No resistance was observed while POOH. The bit was graded 2-4-WT-S-X-1/16-CT-TD.

Performed a total of 7 logging runs on wire line in approximately 5 days. No wiper trips were performed during logging.

5.8 Permanent P&A

Ran in hole with 3 ½" cement stinger. Plugged the 8 1/2" open hole with two balanced gas-tight cement plugs, the top one to stretching 100 m into the 9 5/8" liner.

Ran in hole for setting a 13 3/8" EZSV (on a mechanical setting tool) above top of 9 5/8" liner. Pressure tested the 8 ½" open hole plugs to 272 bar/10 min before setting the EZSV. Sat EZSV at 2200 m. Pressure tested the 13 3/8" EZSV to 272 bar/10 min. Displaced the well from 1.38 sg Paratherm OBM to 1.50 sg Glydril WBM. Placed a 50 m high cement plug on top of the EZSV before pulling out of hole.

Ran in hole for pulling the wear bushing and cutting the 13 3/8" casing in the same run. The Dril-Quip Multi Purpose Tool (MPT), for retrieving the wear bushing, was spaced out for landing in the wear bushing when the 13 3/8" casing cutter was one stand below the planned cutting depth. After the wear bushing was retrieved and pulled above the BOP, the 13 3/8" casing was cut at 760 m with a motor cutter.

The 13 3/8" casing was then pulled with a spear assembly. Due to no lock ring installed, the seal assembly was pulled in the same run as the casing.

Ran in with a 5 ½" cement stinger and isolated the casing cut with a cement plug stretching 50 m below and 100 m above the casing cut, supported by a CST (Cement Support Tool). Waited on cement in 6 hours and pressure tested same to 80 bar/10 min. Placed a 200 m high surface cement plug on top. Pulled out of hole with the cement stinger.

Disconnected the BOP and positioned the auxiliary rig over the wellhead. While pulling the BOP in the main rig, the casing cutting and MOST tool assembly was stabbed in from the auxiliary rig. Cut the casing 5 m below the seabed at 413 m. Retrieved the wellhead to surface. ROV retrieved transponders and performed seabed survey, while the main rig continued to pull riser and BOP. The rig went off contract 30.04.04 at 20:30 hrs, and moved to the next well location ("Linerle", 6608/11-4) with the BOP at 311 m. The pulling of the BOP was completed at the next well location.

5.9 Experience listing

Table 5.1 Experience listing

Section	Experience (Subject and description)	Immediate solution	Solution recommended for future
Dual ops phase	Two drilling engineers were mobilised offshore during the spud phase to ensure 24 hours continuity on the rig. This was done due to the heavy work load during this phase because of the efficiency of dual operation in the top hole sections. By having two engineers out, there was 24 hours coverage, giving administrational and technical support to the drilling supervisor.		This solution is recommended for new wells to be drilled with West Navigator or other dual operation rigs.
36”	During cementing of the 30” conductor: The heave compensator was unable to compensate the conductor sufficiently, giving the conductor a piston effect induced by the rig heave. The plan was to land the conductor at the 26” shoulder with sufficient stick up during the cement job, but this was not possible due to the deepening of the hole.	As a consequence, the conductor was held in suspension while waiting on cement to ensure correct stick-up. Waited on cement for 5 hours (bucket sample) and released conductor running tool.	Ensure correct setup of heave compensator prior to conductor cement operation
9 7/8” pilot hole	When drilling the 9 7/8" pilot hole, a medium flow (Spec. 1700-3400 lpm) BHI MWD tool was used. Throughout the section, the flow was held at the maximum rate.		It is recommended to use a Hi-flow tool with a flow range of 2650-4500 lpm in future pilot holes, to ensure that the tool is not limiting for the pumping, and thus optimise for hole cleaning and killing of the well.
26”	Drilled hard cement from 1152 - 1212 m inside 20" casing with seawater and hi-vis pills pumped each 15 m. Packed off due to poor hole cleaning.	Worked string free and POOH. RIH and displaced well to 1.42 sg mud and circulated down last 80 m. Had large amount of cement cuttings over shakers.	When drilling hard cement seawater and hi-vis does not provide sufficient hole cleaning. In future wells use WBM.
26”	Did not bump 20” plug. Had full return during cement job. Bucket sample with ROV indicated no cement in return. Recorded backpressure of 26 bar after the cement was in place. Suspect that cement stringed out during the displacement.		Consider to use dual plug system for long 20” casing cement jobs.

Section	Experience (Subject and description)	Immediate solution	Solution recommended for future
12 ¼"	The 12 1/4" section was drilled with 1.50 sg Paratherm OBM. After POOH with drilling assembly, the hole was exposed for 72 hours before running 9 5/8" liner. Due to deteriorating weather, the riser was displaced to seawater to prepare for disconnect. No wipertrip was performed before running liner. When running 9 5/8" liner, no hole problems were encountered. No losses were experienced during liner running and cement job.		Ref. the hole problems experienced in 6507/3-1. OBM seems to be the best mud system for this section. Hence, OBM is recommended for drilling this section in future wells in this area.
12 ¼"	The 12 ¼" section was drilled with a motor BHA with 1.0 deg bend. A Lyng AHG 575 PDC bit with 19 mm cutters was used. After drilling some hundred meters, the ROP decreased gradually from 30-40 m/hr to about 3-8 m/hr. Around 500 m prior to section TD, it was decided to pull out with the assembly. Upon inspection of the bit, it turned out to be badly worn (2-5-RO-N-X-2-BT-PR). A new Lyng AHG 460 PDC with 13/16 mm cutters were run in hole, but several hundred meters of the section had to be reamed due to undergauge hole.	Pulled out and changed bit.	The Lyng AHG575 PDC bit is not suited for this application. Run bit with better gauge protection, and preferably with smaller and more cutters. Recommend Lyng Drilling to improve their gauge protection on motor bits.

5.10 Figures and tables

5.10.1 Well schematic

Fig. 5.2 Well Schematic

WELL SCHEMATIC

Well: 6507/3-4
Field: PL159, Alve
West Navigator

HOLE		CASING			LOT / FIT	TOC		CSG. SHOE				LWD LOGS	SURV CSG/ OH
SIZE	TVD MD	SIZE	TYPE	CENTRALIZERS	[SG]	TVD	MD	TVD	MD	RKB			
SB	408												
36"	470 470	30"	Interval: 406 - 468 m : Type: 309.7 lb/ft, X-52, SL-60 Drift: 26,875"		N/A			468	468			N/A	Anderdrift
26"	1250 1250	20"	Interval: 406 - 1240 m : Type: 133 lb/ft, X-56, E-60/MT Drift: 18,542"	1 x Bow type / 4 first joints	FIT 1.57 sg			1241	1241			Pilot hole: Resistivity Gamma Ray Pressure	MWD
17"	2310 2310	13 3/8"	Interval: 406 - 2300 m : Type: 72 lb/ft, P-110, Vam Top Drift: 12,258"	1 x Bow type / 5 first joints	XLOT 1.81 sg	1800	1800	Top liner: 2233 2300	Top liner: 2235 2300			Resistivity Gamma Ray Pressure	MWD
12 1/4"	3684 3686	9 5/8"	Interval: 2235 - 3677 m Type: 53,5 lb/ft, P-110, Vam Top Drift: 8.508"	1 x SpiraGlider / 5 first joints	FIT 1.55 sg	2800	2800	3675	3677			Resistivity Gamma Ray Pressure	MWD
8 1/2"	4089 4092							N/A	N/A			Resistivity Gamma Ray Pressure	MWD

5.10.2 P&A wellbore schematic

Fig. 5.3 P&A Schematic

P&A - WELL SCHEMATIC

Well: 6507/3-4
Field: PL159, Alve
West Navigator

HOLE		CASING		LOT / FIT	TOC		CSG. SHOE			CUTTING AND PLUGGING		PRESSURE TESTING
SIZE	TVD MD	SIZE	TYPE / RAD. MARKERS	[SG]	TVD	MD	TVD	MD	RKB	MD		
SB	408											
36"	470 470	30"	Interval: 406 - 468 m : Type: 309.7 lb/ft, X-52, SL-60 Drift: 26,875"	N/A			468	468		413 450 660	20" / 30" casing cut Top of Surface cement plug Base for Surface cement plug	85 bar (with 1.50 sg WBM)
26"	1250 1250	20"	Interval: 406 - 1241 m : Type: 133 lb/ft, X-56, E-60/MT Drift: 18,542"	FIT 1.57 sg			1241	1241		760 810	13 3/8" casing cut Base for cement plug across casing cut CST	
17"	2310 2310	13 3/8"	Interval: 406 - 2300 m : Type: 72 lb/ft, P-110, Vam Top Drift: 12,258"	XLOT 1.81 sg	1800	1800	Top liner: 2233 2300	Top liner: 2235 2300	1.50 sg WBM	2150 2200	Top of cement above 13 3/8" EZSV 13 3/8" EZSV setting depth	272 bar (with 1.38 sg OBM)
12 1/4"	3684 3686	9 5/8"	Interval: 2235 - 3677 m Type: 53,5 lb/ft, P-110, Vam Top Drift: 8.508"	FIT 1.55 sg	2800	2800	3675	3677	1.38 sg OBM	3577	Top of cement plug in 8 1/2" open hole	272 bar (with 1.38 sg OBM)
8 1/2"	4089 4092						NA	NA		4092		

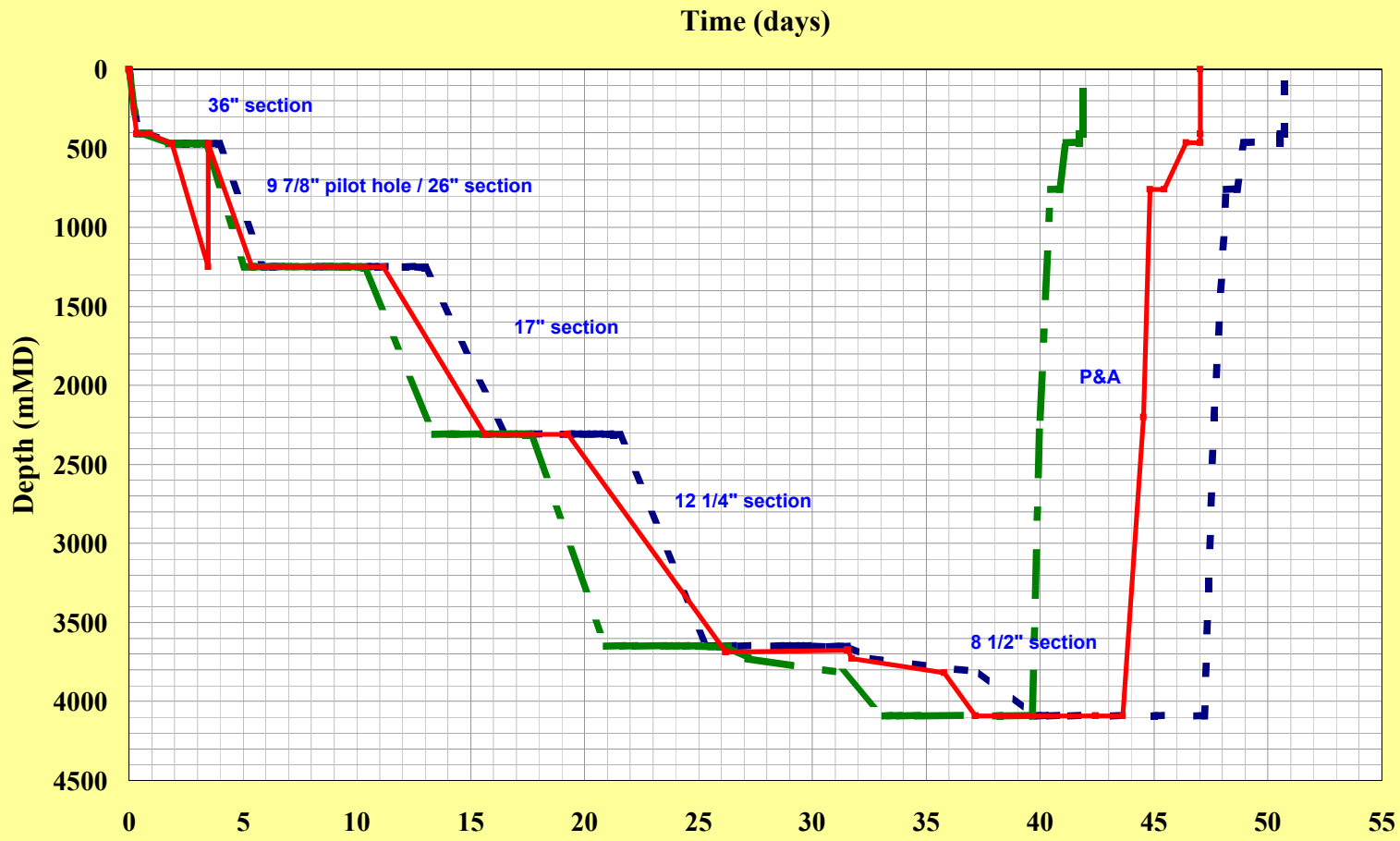
5.10.3 Time/depth curve

Fig. 5.4 Time/Depth curve

STATOIL

Time - Depth Plot

PL 159, 6507/3-4 Alve



Start date/time:
Date: 13.03.2004
Time: 20:00

Finish date/time:
Date: 29.04.2004
Time: 20:30

Total budget time:
50.7 days

Time used:
47.0 days

Time ahead of budget:
3.7 days

5.10.4 Timeplanner

Table 5.3 Timeplanner

Project planner

Drilling 6507/3-4 Alve

T.O159A.AP.20700

		Start time	End time	Budget time hrs	Acc Budget days	Tech limit hrs	Acc tech days	Planned time hrs	Actual time hrs	Acc actual days	% comp	Description	Companies
		13.03.04 20:00	**14.03.04 04:00**	**10.0**	**0.4**	**9.0**	**0.4**	**9.0**	**8.0**	**0.3**		**MOVE [NO 6507/3-4]**	
1	Sat	13.03.04 20:00	14.03.04 04:00	10.0	0.4	**9.0**	0.4	9.0	**8.0**	**0.3**	100	1 Positioning and ballasting. Set out transponders and prepare for operation.	Ocean,Smed
		14.03.04 04:00	**15.03.04 17:30**	**84.5**	**3.5**	**29.0**	**1.2**	**36.1**	**37.5**	**1.6**		**36" [NO 6507/3-4]**	
2	Sun	14.03.04 04:00	14.03.04 12:30	27.0	1.5	**10.0**	0.8	10.0	**8.5**	**0.7**	100	4 Drill 36" hole, including time to fineposition location, prior to spud.	BHI,Geo,MI,Ocean,Smed
3	Sun	14.03.04 12:29	14.03.04 12:30	4.0	1.7	**0.0**	0.8	0.0	**0.0**	**0.7**	100	2 Offline: MU 30" running tool & cmt stand, rack back same.	Geo,MI,Ocean,Smed
4	Sun	14.03.04 12:29	14.03.04 12:30	8.0	2.0	**0.0**	0.8	0.0	**0.0**	**0.7**	100	3 Offline: MU and RIH with 36" BHA. (meanwhile place bouys, mix spud mud)	BHI,Geo,MI,Ocean,Smed
5	Sun	14.03.04 12:30	14.03.04 18:00	8.0	2.4	**3.0**	0.9	3.0	**5.5**	**0.9**	100	5 Circulate hole clean, wiper trip and displace hole to 1.35sg mud.	BHI,Geo,MI,Ocean,Smed
6	Sun	14.03.04 17:59	14.03.04 18:00	3.0	2.5	**1.0**	1.0	1.0	**0.0**	**0.9**	100	6 POOH to seabed.	BHI,Geo,MI,Ocean,Smed
7	Sun	14.03.04 17:59	14.03.04 18:00	0.0	2.5	**0.0**	1.0	0.0	**0.0**	**0.9**	100	7 Offline (MAIN): POOH with 36" BHA. L/D HO assy.	BHI,Geo,MI,Ocean,Smed
8	Sun	14.03.04 17:59	14.03.04 18:00	0.0	2.5	**0.0**	1.0	0.0	**0.0**	**0.9**	100	8 Offline (AUX while drilling 36" hole): RU and run 30" conductor and cement stinger to seabed.	DQ,Geo,Hall,MI,Ocean,Smed
9	Sun	14.03.04 17:59	14.03.04 18:00	2.0	2.6	**2.0**	1.0	2.0	**0.0**	**0.9**	100	9 Stab in and land 30" conductor.	DQ,Geo,MI,Ocean,Smed
10	Sun	14.03.04 18:00	14.03.04 21:00	10.5	3.0	**3.0**	1.2	3.0	**3.0**	**1.0**	100	10 Pump and displace X-Lite cement, incl. hook-up and test of cement lines.	Geo,Hall,MI,Ocean,Smed
11	Sun	14.03.04 21:00	15.03.04 02:30	10.5	3.5	**8.5**	1.5	8.5	**5.5**	**1.3**	100	11 WOC. (Not done: While WOC: Release RT and POOH. RIH with 26" assembly and drill out 30" shoetrack. Offline (AUX): POOH.)	BHI,Geo,Hall,MI,Ocean,Smed
12	Mon	15.03.04 02:29	15.03.04 02:30	0.0	3.5	**0.0**	1.5	0.0	**0.0**	**1.3**	100	12 Offline (MAIN while installing conductor): MU and RIH with 9 7/8" pilot hole BHA.	BHI,Geo,MI,Ocean,Smed
13	Mon	15.03.04 02:29	15.03.04 02:30	6.0	3.7	**0.5**	1.5	0.5	**0.0**	**1.3**	100	13 Stab in with 9 7/8" pilot hole BHA	BHI,Geo,MI,Ocean,Smed
14	Mon	15.03.04 02:29	15.03.04 02:30	5.5	3.9	**1.0**	1.6	0.0	**0.0**	**1.3**	100	14 Already done with 26" bit: Drill out cement and 30" shoe	BHI,Geo,MI,Ocean,Smed
15	Mon	15.03.04 02:30	15.03.04 17:30	0.0	3.9	**0.0**	1.6	8.0	**15.0**	**1.9**	100	11b Release RT and POOH. RIH with 26" assembly in AUX and drill out 30" shoetrack. Offline (AUX): POOH.	BHI,DQ,Geo,Ocean,Smed
		15.03.04 17:30	**17.03.04 07:30**	**57.0**	**2.4**	**29.0**	**1.2**	**29.0**	**38.0**	**1.6**		**9 7/8" [NO 6507/3-4]**	
16	Mon	15.03.04 17:30	17.03.04 01:00	48.0	5.9	**24.0**	2.6	24.0	**31.5**	**3.2**	100	15 Drill 9 7/8" pilot hole from 470 m to 1250 m MD.	BHI,BHI,Geo,MI,Ocean,Smed
17	Wed	17.03.04 00:59	17.03.04 01:00	0.0	5.9	**0.0**	2.6	0.0	**0.0**	**3.2**	100	17 Offline (MAIN): MU Cmt stand. MU 26" BHA and RIH to seabed.	BHI,BHI,Geo,MI,Ocean,Smed
18	Wed	17.03.04 01:00	17.03.04 07:30	9.0	6.3	**5.0**	2.8	5.0	**6.5**	**3.5**	100	16 Circ. hole clean. Flowcheck. Displace to 1.35 sg mud. POOH until bit above 30" WH.	BHI,BHI,Geo,MI,Ocean,Smed
		17.03.04 07:30	**25.03.04 00:00**	**160.0**	**6.7**	**103.0**	**4.3**	**127.0**	**184.5**	**7.7**		**26" [NO 6507/3-4]**	
19	Wed	17.03.04 07:30	17.03.04 10:30	2.0	6.4	**1.0**	2.8	1.0	**3.0**	**3.6**	100	18 Stab in with 26" BHA.	BHI,Geo,MI,Ocean,Smed
20	Wed	17.03.04 10:29	17.03.04 10:30	8.0	6.7	**2.0**	2.9	2.0	**0.0**	**3.6**	100	20 Circulate hole clean.	BHI,Geo,MI,Ocean,Smed
21	Wed	17.03.04 10:30	18.03.04 20:30	43.0	8.5	**39.0**	4.5	39.0	**34.0**	**5.0**	100	19 Drill 26" hole to 1250 m.	BHI,Geo,MI,Ocean,Smed
22	Thu	18.03.04 20:30	19.03.04 05:30	16.0	9.2	**6.0**	4.8	6.0	**9.0**	**5.4**	100	21 Displace to 1.35 sg mud and POOH.	BHI,Geo,MI,Ocean,Smed
23	Fri	19.03.04 05:30	20.03.04 10:00	25.0	10.2	**20.0**	5.6	20.0	**28.5**	**6.6**	100	22 RU and run 20" casing.	DQ,Geo,Hall,MI,Ocean,Smed,Weath
24	Sat	20.03.04 10:00	20.03.04 17:00	6.5	10.5	**6.0**	5.9	6.0	**7.0**	**6.9**	100	23 Circulate, pump and displace cement.	DQ,Geo,Hall,MI,Ocean,Smed
25	Sat	20.03.04 17:00	20.03.04 18:00	10.5	10.9	**3.0**	6.0	3.0	**1.0**	**6.9**	100	24 Release RT, POOH and wash well head area. LD cement head and RT	DQ,Geo,Hall,MI,Ocean,Smed
26	Sat	20.03.04 17:59	20.03.04 18:00	0.0	10.9	**0.0**	6.0	0.0	**0.0**	**6.9**	100	25 Offline (MAIN): Run BOP/riser	Geo,Hall,Ocean,Smed
27	Sat	20.03.04 17:59	20.03.04 18:00	0.0	10.9	**0.0**	6.0	0.0	**0.0**	**6.9**	100	27 Offline (AUX): LD 26" BHA.	BHI,Geo,Smed
28	Sat	20.03.04 18:00	21.03.04 16:00	28.5	12.1	**10.0**	6.4	10.0	**22.0**	**7.8**	100	26 Land BOP, latch and pull-test.(budg.incl.allowance for 22,5hrs WOW).Install diverter, r/d	Geo,Hall,Ocean,Smed
29	Sun	21.03.04 16:00	22.03.04 04:30	13.5	12.7	**10.0**	6.8	10.0	**12.5**	**8.4**	100	28 MU and RIH with 17" BHA.Test csg - Neg.	BHI,BHI,Geo,Hall,MI,Ocean,Smed
30	Mon	22.03.04 04:30	22.03.04 06:00	4.0	12.9	**4.0**	7.0	4.0	**1.5**	**8.4**	100	29a Drill out shoe track and 3 m new formation.	BHI,BHI,Geo,MI,Smed
31	Mon	22.03.04 06:00	22.03.04 20:30	0.0	12.9	**0.0**	7.0	0.0	**14.5**	**9.0**	100	29b POOH w/ bit. Prepare for cement squize job. Perform connection test.	Geo,Hall,Smed

Project planner

Drilling 6507/3-4 Alve

T.O159A.AP.20700

		Start time	End time	Budget time hrs	Acc Budget days	Tech limit hrs	Acc tech days	Planned time hrs	Actual time hrs	Acc actual days	% comp	Description	Companies
		17.03.04 07:30	**25.03.04 00:00**	**160.0**	**6.7**	**103.0**	**4.3**	**127.0**	**184.5**	**7.7**		**26" [NO 6507/3-4]**	
32	Mon	22.03.04 20:30	23.03.04 06:00	0.0	12.9	0.0	7.0	0.0	9.5	9.4	100	29c RIH w/ cement stinger. Pump cement and perform Hazitation squize. POOH w/ cementr stinger.	Geo,Hall,Smed
33	Tue	23.03.04 06:00	24.03.04 15:00	0.0	12.9	0.0	7.0	20.0	33.0	10.8	100	29d RIH w/ 17" BHA. Drill part of cement in 20" Casing. Perform casing test.	BHI,BHI,Geo,MI,Smed
34	Wed	24.03.04 15:00	24.03.04 20:00	0.0	12.9	0.0	7.0	4.0	5.0	11.0	100	29e Drill out rest of cement and 3 m new formation. Displace to 1.42 sg Glydril WBM while drilling out shoetrack.	BHI,BHI,Geo,MI,Smed
35	Wed	24.03.04 20:00	25.03.04 00:00	3.0	13.0	2.0	7.1	2.0	4.0	11.2	100	30 Circulate and perform FIT.	BHI,BHI,Geo,Hall,MI,Smed
		25.03.04 00:00	**02.04.04 02:30**	**199.0**	**8.3**	**107.0**	**4.5**	**114.5**	**194.5**	**8.1**		**17" [NO 6507/3-4]**	
36	Thu	25.03.04 00:00	28.03.04 18:30	84.0	16.5	42.0	8.8	42.0	90.5	14.9	100	31 Drill 17" hole to 2310 m.	BHI,BHI,Geo,MI,Smed
37	Sun	28.03.04 18:30	29.03.04 11:00	18.0	17.2	10.0	9.3	10.0	16.5	15.6	100	32 Circulate bottoms up and POOH.	BHI,BHI,Geo,MI,Smed
38	Mon	29.03.04 11:00	29.03.04 12:30	2.0	17.3	1.0	9.3	1.0	1.5	15.7	100	35a Rig up to run 13 3/8" casing (13 3/8" premade in stands).	DQ,Geo,Hall,MI,Smed,Weath
39	Mon	29.03.04 12:30	29.03.04 15:30	4.0	17.5	1.5	9.4	1.5	3.0	15.8	100	33 RIH w/ retrieving tool for seat protector. Flush latch area and latch tool.	DQ,Geo,MI,Smed
40	Mon	29.03.04 15:30	29.03.04 19:00	4.0	17.6	1.5	9.4	1.5	3.5	16.0	100	34 Pull bore protector. Wash WH area. POOH.	DQ,Geo,MI,Smed
41	Mon	29.03.04 19:00	30.03.04 04:30	8.0	18.0	5.0	9.6	5.0	9.5	16.4	100	35b Rig up and run the 13 3/8" casing (13 3/8" premade in stands).	Geo,MI,Smed,Weath
42	Tue	30.03.04 04:30	30.03.04 11:30	0.0	18.0	0.0	9.6	7.5	7.0	16.6	100	35c WOW to continue run 13 3/8" casing	Geo,MI,Smed
43	Tue	30.03.04 11:30	31.03.04 09:00	20.0	18.8	12.0	10.1	12.0	21.5	17.5	100	35d Run the 13 3/8" casing (13 3/8" premade in stands).	DQ,Geo,MI,Smed,Weath
44	Wed	31.03.04 09:00	31.03.04 14:30	7.0	19.1	5.0	10.3	5.0	5.5	17.8	100	36 Circulate, pump and displace cement.	Geo,Hall,MI,Smed
45	Wed	31.03.04 14:30	31.03.04 20:00	8.0	19.4	7.0	10.6	7.0	5.5	18.0	100	37 Set and test seal assy. Pressure/function test BOP.	DQ,Geo,Hall,MI,Smed
46	Wed	31.03.04 20:00	01.04.04 00:00	12.0	19.9	3.0	10.8	3.0	4.0	18.2	100	38 Release RT and POOH with landingstring. LD cement head and RT.	DQ,Geo,Hall,MI,Smed,Weath
47	Thu	01.04.04 00:00	01.04.04 02:30	4.0	20.1	1.5	10.8	1.5	2.5	18.3	100	39 RIH with 13 3/8" casing wear bushing on WBRRT	DQ,Geo,MI,Smed
48	Thu	01.04.04 02:30	01.04.04 05:00	6.0	20.4	1.5	10.9	1.5	2.5	18.4	100	40 Install wear bushing. POOH	DQ,Geo,MI,Smed
49	Thu	01.04.04 05:00	01.04.04 20:30	13.0	20.9	10.0	11.3	10.0	15.5	19.0	100	41 MU and RIH with 12 1/4" BHA. Test 13 3/8" casing. Perform chokedrill.	BHI,BHI,Geo,Hall,MI,Smed
50	Thu	01.04.04 20:30	01.04.04 23:30	6.0	21.1	3.0	11.4	3.0	3.0	19.1	100	42 Drill out shoe track and 3 m new formation.	BHI,BHI,Geo,MI,Smed
51	Thu	01.04.04 23:30	02.04.04 02:30	3.0	21.3	3.0	11.5	3.0	3.0	19.3	100	43 Circulate and perform LOT.	BHI,BHI,Geo,Hall,MI,Smed
		02.04.04 02:30	**14.04.04 09:00**	**238.5**	**9.9**	**175.0**	**7.3**	**270.0**	**294.5**	**12.3**		**12 1/4" [NO 6507/3-4]**	
52	Fri	02.04.04 02:30	02.04.04 06:00	6.0	21.5	4.0	11.7	4.0	3.5	19.4	100	44 Displace well to 1.50 sg OBM	BHI,BHI,Geo,MI,Smed
53	Fri	02.04.04 06:00	04.04.04 23:00	65.0	24.2	89.0	15.4	89.0	65.0	22.1	100	45 Drill 12 1/4" hole to 3650m (15 m/hr avg).	BHI,BHI,Geo,MI,Smed
54	Sun	04.04.04 23:00	06.04.04 10:30	0.0	24.2	0.0	15.4	24.0	35.5	23.6	100	45a Trip for bit change.	BHI,BHI,Geo,MI,Smed
55	Tue	06.04.04 10:30	08.04.04 10:30	28.0	25.4	0.0	15.4	44.5	48.0	25.6	100	45b Drill 12 1/4" hole from 3223 - 3685, incl trip for MWD ch	BHI,BHI,Geo,MI,Smed
56	Thu	08.04.04 10:30	09.04.04 01:00	20.0	26.2	12.0	15.9	12.0	14.5	26.2	100	46 Circulate bottoms up and POOH	BHI,BHI,Geo,MI,Smed
57	Fri	09.04.04 01:00	09.04.04 23:00	15.0	26.9	12.0	16.4	14.0	22.0	27.1	100	47 Perform wireline logging (1 run)	Geo,MI,Schlum,Smed
58	Fri	09.04.04 23:00	10.04.04 15:00	0.0	26.9	0.0	16.4	12.0	16.0	27.8	100	47b Waiting on weather	Smed
59	Sat	10.04.04 15:00	12.04.04 01:00	35.0	28.3	20.0	17.3	20.0	34.0	29.2	100	48 RU and run 9 5/8" liner (9 5/8" csg premade in stands).	Geo,Hall,MI,Smed,Weath,Weath
60	Mon	12.04.04 01:00	12.04.04 04:00	7.0	28.6	2.0	17.3	2.0	3.0	29.3	100	49 Set liner hanger	Geo,Hall,MI,Smed,Weath
61	Mon	12.04.04 04:00	12.04.04 16:00	9.0	29.0	4.0	17.5	10.5	12.0	29.8	100	50 Circulate, pump and displace cement. Set liner packer and pressure test liner.	Geo,Hall,MI,Smed
62	Mon	12.04.04 16:00	13.04.04 01:30	11.0	29.4	5.0	17.7	5.0	9.5	30.2	100	51 POOH with landing string	Geo,MI,Smed,Weath
63	Tue	13.04.04 01:29	13.04.04 01:30	1.5	29.5	1.0	17.8	1.0	0.0	30.2	100	52 LD cement head & liner hanger r/t (offline)	Geo,Hall,Smed,Weath
64	Tue	13.04.04 01:30	13.04.04 11:00	15.0	30.1	10.0	18.2	10.0	9.5	30.6	100	53 RIH with BOP test plug. Test BOP, POOH	DQ,Geo,Hall,MI,Smed
65	Tue	13.04.04 11:00	14.04.04 00:00	15.0	30.8	12.0	18.7	12.0	13.0	31.2	100	54 MU and RIH with 8 1/2" BHA	BHI,BHI,Geo,MI,Smed

Project planner

Drilling 6507/3-4 Alve

T.O159A.AP.20700

		Start time	End time	Budget time hrs	Acc Budget days	Tech limit hrs	Acc tech days	Planned time hrs	Actual time hrs	Acc actual days	% comp	Description	Companies
		02.04.04 02:30	**14.04.04 09:00**	**238.5**	**9.9**	**175.0**	**7.3**	**270.0**	**294.5**	**12.3**		**12 1/4" [NO 6507/3-4]**	
66	Wed	14.04.04 00:00	14.04.04 06:30	8.0	31.1	2.0	18.8	8.0	6.5	31.4	100	55 Drill shoetrack and 3 m new formation. Lower mud weight while drilling out shoetrack	BHI,BHI,Geo,MI,Smed
67	Wed	14.04.04 06:30	14.04.04 09:00	3.0	31.2	2.0	18.8	2.0	2.5	31.5	100	56 Circulate and perform FIT.	BHI,BHI,Geo,Hall,Smed
		14.04.04 09:00	**25.04.04 06:30**	**333.0**	**13.9**	**229.0**	**9.5**	**218.0**	**261.5**	**10.9**		**8 1/2" [NO 6507/3-4]**	
68	Wed	14.04.04 09:00	14.04.04 13:30	15.0	31.8	9.0	19.2	5.0	4.5	31.7	100	57 Drill 8 1/2" hole to core point at 3727 m.	BHI,BHI,BHI,Geo,MI,Smed
69	Wed	14.04.04 13:30	15.04.04 02:00	20.0	32.7	8.0	19.5	12.0	12.5	32.3	100	58a Circulate B/U. POOH to cut core (revised budget)	BHI,BHI,BHI,Geo,MI,Smed
70	Thu	15.04.04 02:00	16.04.04 15:00	40.0	34.3	31.0	20.8	24.0	37.0	33.8	100	58b M/U and RIH with core assembly. Cut core. POOH with core assembly (revised budget)	BHI,Geo,MI,Smed
71	Fri	16.04.04 15:00	18.04.04 01:30	40.0	36.0	31.0	22.1	36.0	34.5	35.2	100	58b1 MU and RIH with core BHA#2 (54 m). Cut core and POOH (revised budget)	BHI,Geo,MI,Smed
72	Sun	18.04.04 01:30	18.04.04 15:00	15.0	36.6	12.0	22.6	10.0	13.5	35.8	100	58c M/U and RIH with 8 1/2" drilling assembly (revised budget)	BHI,BHI,Geo,MI,Smed
73	Sun	18.04.04 15:00	19.04.04 08:00	63.0	39.3	44.0	24.5	35.0	17.0	36.5	100	58d Continue drilling of 8 1/2" hole to well TD at 4074 m.	BHI,BHI,Geo,MI,Smed
74	Mon	19.04.04 08:00	19.04.04 10:00	6.0	39.5	3.0	24.6	3.0	2.0	36.6	100	59 Circulate hole clean.	BHI,BHI,Geo,MI,Smed
75	Mon	19.04.04 10:00	20.04.04 00:00	22.0	40.4	8.0	24.9	8.0	14.0	37.2	100	61 (Circulate bottoms up). POOH for wireline logging.	BHI,BHI,Geo,MI,Smed
76	Mon	19.04.04 23:59	20.04.04 00:00	12.0	40.9	0.0	24.9	0.0	0.0	37.2	100	60 Optional: Wiper trip open hole.	BHI,BHI,Geo,MI,Smed
77	Tue	20.04.04 00:00	20.04.04 02:00	0.0	40.9	0.0	24.9	1.0	2.0	37.3	100	RU for WL logging.	Geo,MI,Schlum,Smed
78	Tue	20.04.04 02:00	20.04.04 22:00	10.0	41.3	8.0	25.3	8.0	20.0	38.1	100	WL run 1: AIT-MSIP-EMS (revised budget)	Geo,MI,Schlum,Smed
79	Tue	20.04.04 22:00	21.04.04 11:30	15.0	42.0	11.0	25.7	11.0	13.5	38.6	100	WL run 2 : ECS-IPLT-CMR200 (in original budget)	Geo,MI,Schlum,Smed
80	Wed	21.04.04 11:30	22.04.04 03:30	15.0	42.6	20.0	26.5	20.0	16.0	39.3	100	WL run 3 : MDT pressure and water sample (in original budget)	Geo,MI,Schlum,Smed
81	Thu	22.04.04 03:29	22.04.04 03:30	0.0	42.6	0.0	26.5	0.0	0.0	39.3	100	Canceled: Wiper trip (not included in budget)	Smed
82	Thu	22.04.04 03:29	22.04.04 03:30	0.0	42.6	0.0	26.5	0.0	0.0	39.3	100	Canceled: WL run 5 : MDT Mini-DST and sample (not included in budget)	Geo,MI,Schlum,Smed
83	Thu	22.04.04 03:30	23.04.04 21:00	25.0	43.6	20.0	27.4	20.0	41.5	41.0	100	WL run 4 : MDT Dual Packer and sample (revised budget)	Geo,MI,Schlum,Smed
84	Fri	23.04.04 21:00	24.04.04 15:00	15.0	44.3	8.0	27.7	8.0	18.0	41.8	100	WL run 6 : DSI-VSP (in original budget)	Geo,MI,Schlum,Smed
85	Sat	24.04.04 15:00	25.04.04 05:30	20.0	45.1	16.0	28.4	16.0	14.5	42.4	100	WL run 7 : MSCT (revised budget)	Geo,MI,Schlum,Smed
86	Sun	25.04.04 05:30	25.04.04 06:30	0.0	45.1	0.0	28.4	1.0	1.0	42.4	100	RD WL equipment.	Geo,MI,Schlum,Smed
		25.04.04 06:30	**29.04.04 20:30**	**132.5**	**5.5**	**110.0**	**4.6**	**101.0**	**107.0**	**4.5**		**PERM P&A [NO 6507/3-4]**	
87	Sun	25.04.04 06:30	26.04.04 11:00	30.0	46.3	28.0	29.5	24.0	28.5	43.6	100	63 RIH with cement stinger. Plug back open hole with cement. POOH	Geo,Hall,MI,Smed
88	Mon	26.04.04 11:00	26.04.04 17:30	5.0	46.5	6.0	29.8	5.0	6.5	43.9	100	64 RIH and set 13 3/8" bridge plug. Pressure test same.	Geo,Hall,MI,Smed
89	Mon	26.04.04 17:30	27.04.04 09:00	12.5	47.1	8.0	30.1	10.0	15.5	44.5	100	65 Displace well to 1.50 sg WBM. Place a 50 m cement plug above EZSV. POOH	Geo,Hall,MI,Smed
90	Tue	27.04.04 09:00	27.04.04 15:30	13.0	47.6	10.0	30.5	10.0	6.5	44.8	100	66 RIH w/ cutting assembly and MPT. Engage WB. Cut 13 3/8" casing. POOH	DQ,Geo,MI,Smed,Weath
91	Tue	27.04.04 15:30	28.04.04 06:30	11.0	48.1	10.0	31.0	9.0	15.0	45.4	100	67 RIH with spear assy and retrieve seal assy and 13 3/8" casing	Geo,MI,Smed,Weath,Weath
92	Wed	28.04.04 06:29	28.04.04 06:30	8.0	48.4	8.0	31.3	6.0	0.0	45.4	100	68 RIH. Set cmt plug across 13 3/8" cut.	Smed
93	Wed	28.04.04 06:30	29.04.04 06:00	15.0	49.0	14.0	31.9	10.0	23.5	46.4	100	69 WOC. Pressure test plug. Displace well to SW. Set surface cement plug. POOH	Geo,Hall,MI,Smed
94	Thu	29.04.04 06:00	29.04.04 17:30	38.0	50.6	26.0	33.0	27.0	11.5	46.9	100	70 Pull riser/BOP (budget includes allowance for 23 hrs WOW).	Geo,Ocean,Smed
95	Thu	29.04.04 17:29	29.04.04 17:30	0.0	50.6	0.0	33.0	0.0	0.0	46.9	100	71 Offline: Cut 20" and 30" casings. Retrieve WH	DQ,Geo,Ocean,Smed,Weath
96	Thu	29.04.04 17:29	29.04.04 17:30	0.0	50.6	0.0	33.0	0.0	0.0	46.9	100	72 Offline: Perform seabed survey	Ocean,Smed
		29.04.04 17:29	**29.04.04 20:30**	**0.0**	**0.0**	**0.0**	**0.0**	**1.0**	**3.0**	**0.1**		**MOVE [NO 6507/3-4]**	
97	Thu	29.04.04 17:29	29.04.04 20:30	0.0	50.6	0.0	33.0	1.0	3.0	47.0	100	72 END WELL Move to new location	Smed

Project planner

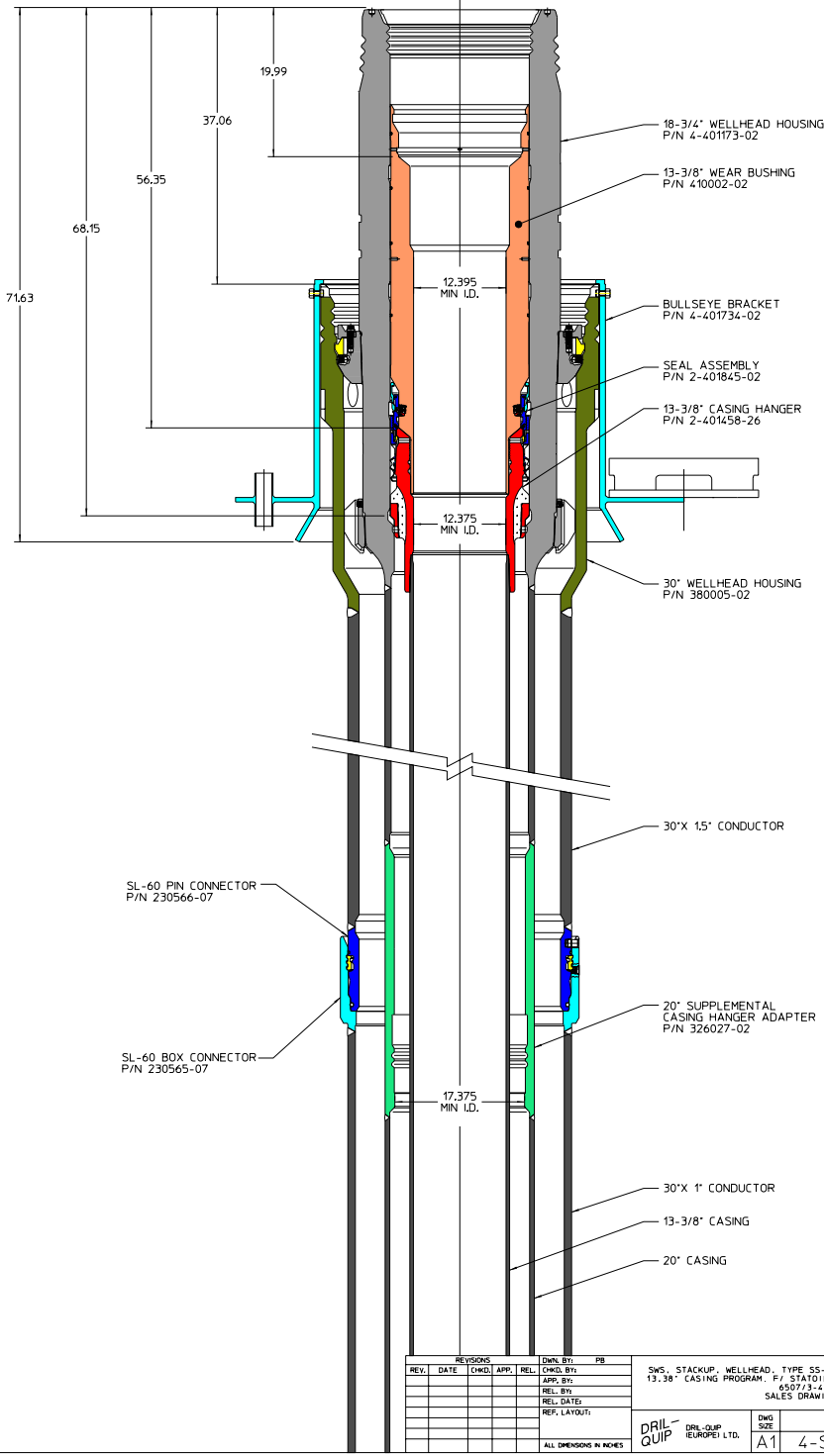
Drilling 6507/3-4 Alve

T.O159A.AP.20700

		Start time	End time	Budget time hrs	Acc Budget days	Tech limit hrs	Acc tech days	Planned time hrs	Actual time hrs	Acc actual days	% comp	Description	Companies
		25.04.04 06:30	**29.04.04 20:30**	**3.0**	**0.1**	**4.0**	**0.2**	**4.0**	**3.0**	**0.1**		**PERM P&A [NO 6507/3-4]**	
98	Thu	29.04.04 17:30	29.04.04 20:30	3.0	50.7	**4.0**	33.1	4.0	**3.0**	**47.1**	100	73 Retrieve transponders and deballast rig	Smed
				50.7	**days**	**33.1**	**days**	**37.9**	**47.1**	**days**			

5.10.5 Wellhead system

Fig. 5.5 Wellhead System Schematic



SHEET 2 OF 2

CAD

REVISIONS				
REV.	DATE	CHKD.	APP.	REL

DWN. BY: PB
CHKD. BY:
APP. BY:
REL. BY:
REL. DATE:
REF. LAYOUT:

ALL DIMENSIONS IN INCHES

SWS, STACKUP, WELLHEAD, TYPE SS-15, W/ 30" X 20"(16") X 13.38" CASING PROGRAM. F/ STATOIL: WEST NAVIGATOR - WELL 6507/3-4
SALES DRAWING

DRIL-QUIP (EUROPE) LTD.

DWG SIZE	PART NUMBER	LAST REV.
A1	4-SD-30381CP	

5.10.6 Drilling fluids

Table 5.4 Summary of Drilling fluids program

Well: 6507/3-4

Field: PL159, Alve

Rig: West Navigator

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. [%]	Usage Volume [m³]
36"	470 470	30"	468 468	Seawater/ Bentonite	1.03 - 1.35															>150	147
				Made up 160 m³ Bentonite HiVis mud and 75 m³ 1.35sg displacement mud. The displacement mud was made with 20 kg/m³ Bentonite and 3 kg/m³ CMC, and gave an API fluid loss of 9 ml.																	
26"	1250 1250	20"	1241 1241	Seawater/ Bentonite	1.03 - 1.35															>150	1289 (includes 9 7/8" pilothole)
				Cut 1.6sg mud with seawater and CMC to make up displacement mud with fluid loss of 8 ml and mud weight of 1.35sg. Pumped 375 m³ 1.35sg mud. Converted 40 m³ displacement mud to HiVis and used it for sweeps when drilling out cement. Spotted 5 m³ HiVis on TD before setting the squeeze plug. Had to make additional HiVis for use when drilling out cement.																
17"	2310 2310	13 3/8"	2300 2300	KCl/ Polymer/ Glycol	1.42 - 1.54	63 - 118	4.5 - 6	9 - 13	35 - 37	9 - 11	na	20 - 28	2.6 - 3	na	21 - 45	8 - 8.5	122 - 140	3.5 - 4	na	60 - 80	387
				The well was displaced to 1.42sg Glydril, and a FIT was performed. During drilling the properties were mainly maintained by addition of premix. The mud weight was increased in steps, starting at 1625m where it was increased to 1.48sg. At 1720m it was increased further to 1.51sg and at 1800m to 1.54sg, where it was kept the rest of the section. Built a 22 m³ LCM pill @ 1704m due to down hole losses. The losses stopped, and the pill was later screened over the shakers.																		
12 1/4"	3684 3686	9 5/8"	3675 3677	Paratherm	1.5	86 - 99	5 - 7	6 - 9	22 - 27	8 - 10	68/32 - 72/28	26 - 31	na	2.4 - 3	na	na	na	na	580 - 761	na	158
				360 m³ new Paratherm OBM at 1,50sg was received from shore. After the displacement new premixes were made with slightly higher O/W ratio than programmed, as the O/W ratio decreased during the displacement. All new premix was sheared with the rig pump. While drilling, the 3-rpm rheology was maintained at 9 by adding VG Supreme directly to active. As the stability picked up, the fluid loss stayed below 3 ml without prob The hole cleaning was good, and the mud weight was stable after trips and running liner.																		
8 1/2"	4089 4092			Paratherm	1.38 - 1.4	36 - 69	6 - 7	7 - 8	20 - 22	7 - 8	71/29 - 72/28	23 - 24	na	2.3 - 2.8	na	na	na	na	567 - 659	na	100
				100 m³ of un-weighted premix was made up prior to start of this section, and used to cut the weight to 1.38sg. The influx of water from liner cement job and drilling rat hole decreased the oil water ratio from 72/28 to 69/19. This necessitated a higher oil water ratio in the dilution volume than normal (90/10). As a consequence extra sheering on surface was necessary as shearing through the bit was inadequate.																		

5.10.7 Cementing data

Table 5.5 Summary of cementing data

Well: 6507/3-4
Field: PL159, Alve
Rig: West Navigator

CEMENT PROGRAMME

HOLE		CASING SHOE		TOC	VOLUME/ EXCESS										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 30 Bc]	API Free Water [%]	API Fluid loss [cc/30min]	24 hrs C.S. [psi]		Fluids and Rates
36"	470 470	**30"**	468 468	Sea bed Sea bed	46.7 m^3 300 %	X-lite cement CaCl2 liquid NF-6 Seawater		4.50 0.10 55.83	1.52	107.40 Code DWLSP	6 - 8	02:59	n/a	n/a	1900	30 m3 Sea Water	Sea Water 2000 lpm
26"	1250 1250	**20"**	1241 1241	Sea bed Sea bed	Lead:157.9 m^3 Tail: 20 m^3 50%(Lead) Shoe squeeze: 26.5 m^3	Norcem "G" + 0,1 % EZ-FLO Econolite HR-4L NF-6 Sea water	3.20 1.00 0.10 94.27	- - 0.10 44.94	L: 1.56 T:1.92	L:129.65 Code STL40 T:76.13 Code STTNT	38/18	L:6:35 T:4:05	n/a	n/a	T:1330	140 m^3 Sea Water	Sea Water 3000 lpm
17"	2310 2310	**13 3/8"**	2300 2300	1800 1800	38.3 m^3 30%	Norcem "G" + 0,1 % EZ-FLO HR-4L Halad-613L Nf-6 Fresh water		1.25 0.50 0.10 42.29	1.92	75.20 Code MPT05	81/40	05:14	0.47	n/a	1100	20 m^3 1.74 SG Tuned Spacer	WBM 2000 lpm
12 1/4"	3684 3686	**9 5/8"**	3675 3677	2800 2800	29.3 m^3 30 %	Norcem "G" cement SCR-100L Fesil CFR-5LE+ SCR-100L Halad-600LE+ NF-6 Fresh water		35 % 12.00 1.00 5.70 10.00 0.10 34.32	1.90	107.49 Code GTTTZ	136/90	04:51	0	70	n/a	20 m^3 1.70 SG Tuned Spacer	OBM 2000 lpm

Well: **6507/3-4**

Field: **PL159, Alve**

Rig: **West Navigator**

CEMENT PROGRAMME

HOLE		CASING SHOE		TOC	VOLUME/ EXCESS										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 30 Bc]	API Free Water [%]	API Fluid loss [cc/30min]	24 hrs C.S. [psi]		Fluids and Rates
8 1/2"	4089 4092	**OH Plug #1**	4092	3792	13.2 m^3 20 %	Norcem "G" cement Halad 413L Fesil SCR-500L CFR-3L SSA-1 NF-6 Fresh water		8.00 20.00 4.50 1.50 35.00 0.10 32.05	1.90	110.52 Code HTG90	150/115	05:06	0	32	2600	7.9 m^3 1.65 SG Tuned Spacer	OBM 3000 lpm
9 5/8"	2233 2235	**OH Plug #2**	3762	3792	7.4 m^3 20 %	Norcem "G" cement Halad 413L Fesil SCR-500L CFR-3L SSA-1 NF-6 Fresh water		8.00 20.00 4.50 1.50 35.00 0.10 32.05	1.90	110.52 Code HTG90	150/115	05:06	0	32	2200	7.0 m^3 1.65 SG Tuned Spacer	OBM 3000 lpm
		Plug #3	2200	2150	3.9 m^3	Norcem "G" cement+0.10% EZ-FLO Halad-613L CFR-3L HR-4L NF-6 Fresh water		0.50 0,20 0,60 0,10 42,65	1.92	75.11 Code MPT05	78/64	03:35	0	n/a	2500	9.5 m^3 Fresh water	WBM 1500
		Plug #4	810	660	21.7 m^3	Norcem "G" cement+0.10% EZ-FLO $CaCl_2$ liquid NF-6 Sea water		4,35 0,10 39,50	1.95	75.04 Code STT10	18/15	04:52	n/a	n/a	2800	10.7 m^3 1.75 SG Tuned Spacer	WBM 1500
		Plug #5	440	650	37.4 m^3	Norcem "G" cement+35% SSA-1 NF-6 Sea water		0.1 57.84	1.90	102.31 Code STTNT	08/08	> 4	n/a	n/a	+/- 1000	Sea water	Sea water

5.10.8 Bottom hole assemblies

BHA seq: 1 BHA category: Drilling BHA description: 36" HO assembly

BHA no: 1

String component	OD in	ID in	Length m	Acc length m
BIT	17.500		0.48	0.48
FLOAT SUB	10.500	3.000	0.91	1.39
HOLE OPENER	36.000	3.000	3.94	5.33
BIT SUB	9.500	3.000	0.88	6.21
ANDERDRIFT	9.500	2.813	2.98	9.19
DRILL COLLAR	9.500	3.000	46.13	55.32
X-OVER	9.500	3.250	0.93	56.25
DRILL COLLAR	8.000	3.000	54.00	110.25
X-OVER	8.000	2.813	1.11	111.36
HWDP 5 1/2"	5.500	3.500	84.33	195.69

BHA seq: 2 BHA category: Drilling BHA description: 26" drilling assembly

BHA no: 2

String component	OD in	ID in	Length m	Acc length m
BIT	26.000		0.63	0.63
BIT SUB	9.500		0.88	1.51
PIN X PIN SUB	9.500		0.48	1.99
MWD DIRECTIONAL	9.625		9.04	11.03
SAVER SUB	9.500		0.78	11.81
DRILL COL, NM	9.500		8.58	20.39
STRING STAB	26.000		2.26	22.65
DRILL COLLAR, NM	9.500		8.73	31.38
STRING STAB	26.000		2.33	33.71
DRILL COLLAR	9.500		9.38	43.09
DRILL COLLAR	9.500		9.17	52.26
DRILL COLLAR	9.500		9.16	61.42
DRILL COLLAR	9.500		9.36	70.78
X-OVER	9.500	3.250	0.93	71.71
DRILL COLLAR	8.000	2.750	8.89	80.60
DRILL COLLAR	8.000	2.750	9.13	89.73
DRILL COLLAR	8.000	2.750	9.32	99.05
DRILL COLLAR	8.000	2.750	8.88	107.93
DRILL COLLAR	8.000	2.750	8.90	116.83
JAR	7.875	3.000	9.65	126.48
DRILL COLLAR	8.000	2.750	9.42	135.90
DRILL COLLAR	8.000	2.750	9.42	145.32
DRILL COLLAR	8.000	2.750	9.32	154.64

		X-OVER			8.000	2.813	1.11	155.75
		HWDP 5 1/2"			5.500		84.33	240.08
BHA seq:	3	BHA category:	Drilling	BHA description:		9 7/8" pilot hole assembly		
BHA no:	3							
		String component			OD in	ID in	Length m	Acc length m
		BIT			9.875		0.27	0.27
		MPR SUB			8.250		5.16	5.43
		MWD, DCP			8.313		11.23	16.66
		SAVER SUB			8.313		0.64	17.30
		FLOAT SUB			7.938		1.02	18.32
		DRILL COLLAR			8.000	2.750	99.66	117.98
		JAR			8.000	3.000	9.49	127.47
		DRILL COLLAR			8.000	2.750	27.00	154.47
		X-OVER			8.000	2.813	1.22	155.69
		H W DRILL PIPE			5.000		83.35	239.04
BHA seq:	4	BHA category:	Drilling	BHA description:		17" Clean up assembly		
BHA no:	4							
		String component			OD in	ID in	Length m	Acc length m
		BIT			17.000		0.54	0.54
		NEAR BIT STAB			17.000	3.000	2.18	2.72
		X-OVER			9.500	3.000	0.93	3.65
		DRIL COL			8.000	2.750	82.70	86.35
		JAR			8.000	2.875	9.65	96.00
		X-OVER			8.000	2.875	1.11	97.11
		H W DRILL PIPE			5.500		84.33	181.44
BHA seq:	5	BHA category:	Drilling	BHA description:		17" drlg assy		
BHA no:	5							
		String component			OD in	ID in	Length m	Acc length m
		BIT			17.000		0.41	0.41
		BIT SUB,			9.620	3.000	0.89	1.30
		X-O PIN X PIN			9.620	3.000	1.00	2.30
		MPR SUB			8.250	2.750	5.16	7.46
		MWD			8.250	2.750	11.26	18.72
		SAVER SUB			8.250	2.750	0.81	19.53
		DRILL COLLAR, NM			7.870	2.870	2.95	22.48
		STAB STRING			17.000	2.870	2.41	24.89
		DRILL COL, NM			7.870	2.870	9.22	34.11
		STAB STRING			17.000	2.870	2.52	36.63
		DRILL COL			8.000	2.750	73.28	109.91
		JAR,			8.000	3.000	9.65	119.56
		DRILL COL			8.000	2.750	27.36	146.92
		XO SUB			8.000	2.870	1.11	148.03

		H W DRILL PIPE			5.500	3.500	84.33	232.36
BHA seq:	6	BHA category:	Drilling	BHA description:		12 1/4" drlg assy		

BHA no: 6

String component	OD in	ID in	Length m	Acc length m
BIT	12.250		0.36	0.36
NAVIDRILL M1/XL 1,0	9.500	3.000	10.93	11.29
STAB SPIRAL IB	12.125	2.813	2.00	13.29
X-O PIN X PIN	8.250	3.000	1.12	14.41
MPR SUB	8.250	4.000	5.17	19.58
MWD	8.250	4.000	11.13	30.71
STAB SPIRAL IB	12.250	2.813	1.78	32.49
DRILL COL	8.000	2.750	73.28	105.77
JAR,	7.875	3.000	9.65	115.42
DRILL COL	8.000	2.750	27.36	142.78
XO SUB	8.000	2.875	1.22	144.00
H W DRILL PIPE	5.500	3.500	84.33	228.33
DP 5 1/2"	5.500	4.778		228.33

BHA seq:	7	BHA category:	Drilling	BHA description:		12 1/4" drlg assy		

BHA no: 7

String component	OD in	ID in	Length m	Acc length m
BIT	12.250		0.34	0.34
NAVIDRILL M1/XL 1,0	9.500	3.000	10.93	11.27
STAB SPIRAL IB	12.125	2.813	2.00	13.27
X-O PIN X PIN	8.250	3.000	1.12	14.39
MPR SUB	8.250	4.000	5.17	19.56
MWD	8.250	4.000	11.13	30.69
STAB SPIRAL IB	12.250	2.813	1.78	32.47
DRILL COL	8.000	2.750	127.90	160.37
JAR,	7.875	3.000	9.65	170.02
DRILL COL	8.000	2.750	26.55	196.57
XO SUB	8.000	2.875	1.22	197.79
H W DRILL PIPE	5.500	3.500	84.33	282.12
DP 5 1/2"	5.500	4.778		282.12

BHA seq:	8	BHA category:	Drilling	BHA description:		12 1/4" drlg assy		

BHA no: 8

String component	OD in	ID in	Length m	Acc length m
BIT	12.250		0.34	0.34
NAVIDRILL M1/XL 1,0	9.500	3.000	10.93	11.27
STAB SPIRAL IB	12.125	2.813	2.00	13.27
X-O PIN X PIN	8.250	3.000	1.12	14.39
MPR SUB	8.250	4.000	4.95	19.34
MWD	8.250	4.000	12.01	31.35

		STAB SPIRAL IB			12.250	2.813	1.78	33.13
		DRILL COL			8.000	2.750	127.90	161.03
		JAR,			7.875	3.000	9.65	170.68
		DRILL COL			8.000	2.750	26.55	197.23
		XO SUB			8.000	2.875	1.22	198.45
		H W DRILL PIPE			5.500	3.500	84.33	282.78
		DP 5 1/2"			5.500	4.778		282.78
BHA seq:	9	BHA category:	Drilling	BHA description:		8 1/2" drlg assy		

BHA no: 9

String component	OD in	ID in	Length m	Acc length m
BIT, PDC	8.500		0.24	0.24
STAB NB CPF	8.500		1.20	1.44
MWD, ONTRAK W/GR&RES	7.000		5.14	6.58
STAB MODULAR	8.500		1.29	7.87
MWD BCPM (PULSER)	6.750		3.21	11.08
X-OVER STOP SUB	6.750		0.50	11.58
FLOAT SUB	6.500	2.750	0.46	12.04
STAB STRING	8.500	2.750	1.64	13.68
DRILL COLLAR	6.500	2.810	75.29	88.97
JAR	6.500		8.52	97.49
DRILL COLLAR	6.500	2.810	28.28	125.77
HWDP 5"	5.000	3.000	83.06	208.83
DRILL PIPE	5.000		1932.49	2141.32
X-OVER	7.500	2.875	1.04	2142.36
DRILL PIPE	5.500			2142.36

BHA seq: 10 BHA category: Drilling BHA description: 8 1/2" Coring assy

BHA no: 10

String component	OD in	ID in	Length m	Acc length m
CORE HEAD	8.500	3.500	0.42	0.42
CORE BARREL EXT	6.750	5.375	0.30	0.72
STABILIZER	8.469	5.375	1.22	1.94
CORE BARREL	6.750	5.375	3.35	5.29
STABILIZER	8.469	5.375	1.22	6.51
CORE BARREL	6.750	5.375	3.35	9.86
STABILIZER	8.469	5.375	1.22	11.08
CORE BARREL	6.750	5.375	7.92	19.00
STABILIZER	8.469	5.375	1.22	20.22
CORE BARREL	6.750	5.375	7.92	28.14
STABILIZER	8.469	5.375	1.22	29.36
CORE BARREL	6.750	5.375	7.92	37.28
STABILIZER	8.469	5.375	1.22	38.50
CORE BARREL	6.750	5.375	7.92	46.42
STABILIZER	8.469	5.375	1.22	47.64
CORE BARREL	6.750	5.375	7.92	55.56

		STABILIZER			8.469	5.375	1.22	56.78
		CORE BARREL EXT			6.750	5.375	1.14	57.92
		TOP SUB			6.750	3.156	0.64	58.56
		FLOAT SUB			6.500	2.812	0.61	59.17
		DRILL COLLAR			6.500	2.813	75.29	134.46
		JAR			6.500		8.52	142.98
		DRILL COLLAR			6.500	2.813	28.28	171.26
		HWDP 5"			5.000	3.000	83.06	254.32
		DRILL PIPE			5.000		1932.49	2186.81
		X-OVER			7.500	2.875	1.04	2187.85
		DRILL PIPE			5.500			2187.85

BHA seq: 11 BHA category: Drilling BHA description: 8 1/2" Coring assy

BHA no: 11

String component	OD in	ID in	Length m	Acc length m
CORE HEAD	8.500	3.500	0.42	0.42
CORE BARREL EXT	6.750	5.375	0.30	0.72
STABILIZER	8.469	5.375	1.22	1.94
CORE BARREL	6.750	5.375	3.35	5.29
STABILIZER	8.469	5.375	1.22	6.51
CORE BARREL	6.750	5.375	3.35	9.86
STABILIZER	8.469	5.375	1.22	11.08
CORE BARREL	6.750	5.375	7.92	19.00
STABILIZER	8.469	5.375	1.22	20.22
CORE BARREL	6.750	5.375	7.92	28.14
STABILIZER	8.469	5.375	1.22	29.36
CORE BARREL	6.750	5.375	7.92	37.28
STABILIZER	8.469	5.375	1.22	38.50
CORE BARREL	6.750	5.375	7.92	46.42
STABILIZER	8.469	5.375	1.22	47.64
CORE BARREL	6.750	5.375	7.92	55.56
STABILIZER	8.469	5.375	1.22	56.78
CORE BARREL EXT	6.750	5.375	1.14	57.92
TOP SUB	6.750	3.156	0.64	58.56
FLOAT SUB	6.500	2.812	0.61	59.17
DRILL COLLAR	6.500	2.813	75.29	134.46
JAR	6.500		8.52	142.98
DRILL COLLAR	6.500	2.813	28.28	171.26
HWDP 5"	5.000	3.000	83.06	254.32
DRILL PIPE	5.000		1932.49	2186.81
X-OVER	7.500	2.875	1.04	2187.85
DRILL PIPE	5.500			2187.85

BHA seq: 12 BHA category: Drilling BHA description: 8 1/2" drlg assy

BHA no: 12

String component	OD in	ID in	Length m	Acc length m

BIT, PDC	8.500		0.28	0.28
ROLLER REAMER	8.500		3.21	3.49
STOP SUB	8.500		0.50	3.99
MWD, ONTRAK W/GR&RES	7.000		5.14	9.13
STAB MODULAR	8.500		1.29	10.42
MWD BCPM (PULSER)	6.750		3.21	13.63
X-OVER STOP SUB	6.750		0.50	14.13
FLOAT SUB	6.500	2.750	0.46	14.59
STAB STRING	8.500	2.750	1.64	16.23
DRILL COLLAR	6.500	2.810	9.46	25.69
MRIL	6.500	2.750	11.70	37.39
DRILL COLLAR	6.500	2.810	75.29	112.68
JAR	6.500		8.52	121.20
DRILL COLLAR	6.500	2.810	28.28	149.48
HWDP 5"	5.000	3.000	83.06	232.54
DRILL PIPE	5.000		1932.49	2165.03
X-OVER	7.500	2.875	1.04	2166.07
DRILL PIPE	5.500			2166.07

5.10.9 Bit record

Bit record

Wellbore: NO 6507/3-4

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	MX1	115	Hughes Christensen	T65DP	4 x 14	x	x	x	.602
2	26"	2	2	MSDSSHC	115	Smith Bits	MM7727	4 x 18	x	x	x	.995
3	9 7/8"	3	3	FGSS+2C	117	Smith Bits	MK7903	3 x 20	1 x 18	x	x	1.169
4	26"	2RR	2	MSDSSHC	115	Smith Bits	MM7727	4 x 18	x	x	x	.995
5	17"	4	4	MX3	137	Hughes Christensen	6019078	2 x 20	1 x 20	x	x	.921
6	17"	5	5	MX-1 T3	115	Hughes Christensen	6023454	1 x 14	1 x 16	2 x 18	x	.844
7	12 1/4"	6	6	LD575AHG	M323	Lyng	2869	10 x 12	x	x	x	1.105
8	12 1/4"	7	7	LA460AHG	M648	Lyng	2777	9 x 13	x	x	x	1.167
9	12 1/4"	7RR1	8	LA460AHG	M648	Lyng	2777	9 x 13	x	x	x	1.167
10	8 1/2"	8	9	DSX146	M332	Reed-Hycalog	105836	3 x 13	3 x 12	x	x	.721
11	8 1/2"	9	10	ARC427C3	M356	Hughes Christensen	1905243	x	x	x	x	1.730
12	8 1/2"	9RR	11	ARC427C3	M356	Hughes Christensen	1905243	x	x	x	x	1.730
13	8 1/2"	10	12	LD470AHG	M333	Lyng	2914	4 x 12	3 x 11	x	x	.721

Wellbore: NO 6507/3-4

Run no	Bit size	Pump rate l/min	Pump press bar	Depth in mMD	Depth out mMD	Form drld m	Total drld m	Drld hrs	Circ hrs	ROP m/hr	Min WOB ton	Max WOB ton	Min RPM	Max RPM	Torque Min Nm	Torque Max Nm	Con drag Min 1000 daN	Con drag Max 1000 daN
1	17 1/2"	5000	123	408	470	62.0	62.0	6.2	8.3	10.0	0	2	50	140	10000	20000		
2	26"	4500	118	468	470	2.0	5.0	1.0	0.3	2.0	1	3	0	60	6000	6000		
3	9 7/8"	3400	120	470	1250	780.0	780.0	21.4	35.3	36.4	0	10	50	120	2000	10000		
4	26"	4500	210	470	1250	780.0	780.0	22.3	26.2	35.0	1	10	100	125	8	16		
5	17"	4500	85	1250	1253	3.0	3.0	0.5	4.3	6.0	0	8	50	100	0	5000		
6	17"	4200	336	1253	2310	1057.0	1057.0	37.7	92.0	28.0	2	20	110	154	5000	14600	99	131
7	12 1/4"	3500	330	2310	3223	913.0	913.0	50.7	69.2	18.0	5	20	220	245	5000	30000		
8	12 1/4"	3500	325	3223	3370	147.0	147.0	4.1	18.9	35.9	2	10	230	240	4000	18000		

9	12 1/4"	3300	345	3370	3686	316.0	463.0	10.0	17.4	31.6	3	10	246	252	12000	19000
10	8 1/2"	2000	180	3686	3728	42.0	78.0	3.4	14.8	12.4	0	8	30	150	5000	20000
11	8 1/2"	1000	68	3728	3764	36.0	36.0	3.8	11.5	9.5	2	5	60	90	8000	13000
12	8 1/2"	1000	72	3764	3818	54.0	54.0	5.0	7.1	10.8	4	6	90	110	6000	15000
13	8 1/2"	2500	298	3818	4092	274.0	274.0	13.0	21.7	21.1	5	15	80	150	11000	24000

Wellbore: NO 6507/3-4

		IADC dull grading								
Run no	Bit size	I	O	DC	L	B	G	OC	RP	Remarks
1	17 1/2"	1	1	WT	A	E	I	NO	TD	Used bit. Dull graded 1-1-WT-A-E-I-NO before run in hole. Run with 2 stage 26" / 36" Odfjell hole opener
2	26"	0	0	NO	A	E		NO	TD	26" ass'y used to drill out cement in 30" conductor shoetrack prior to drilling 9 7/8" pilot hole. To be used after drilling of pilot hole.
3	9 7/8"	1	1	NO	A	E	i	NO	TD	
4	26"	2	2	RR	S	E	I	RR	TD	Re-run bit (drilled out 30" shoe). Graded 0-0-NO-A-E-NO-TD before RIH.
5	17"									Junk bit, 3x20/32" + open center nozzle. Bit used to drill float collar and shoe and cleaned out rat hole. Drilled 3 meter new formation
6	17"	1	2	WT	A	F	4	NO	TD	Drilled firm cement from 1152 m to 1253 m.
7	12 1/4"	2	4	RO	N	X	2	BT	PR	Extended Bit grading: HC, LT. Heavy wear of gauge. RO: 30 mm wide, deep into matrix = major wear. Bit is destroyed.
8	12 1/4"	1	1	NO	A	X	In	RR	DTF	Also reamed 716 m tight hole from 2507 - 3223 m.
9	12 1/4"	1	1	WT	A	X	In	CT	TD	Reamed 716 m tight hole from 2507 - 3223 m and drilled 147 m from previous run. 4 chipped teeth.
10	8 1/2"	1	2	WT	G	X	In	NO	CP	Drilled shoetrack from 3650 - 3677 m. New formation from 3686 m. Gauge cutter worn down. Hardfacing on gauge partly chipped off. Not recommended for re-
11	8 1/2"	1	1	WT	A	X	In	PN	PR	Core run #1.
12	8 1/2"	1	1	WT	A	X	In	NO	TD	Core run #2.
13	8 1/2"	2	4	WT	S	X	1/16	CT	TD	

6 Appendices

App A Extract of daily activities (DBR summary of activities)

14.03.2004	On Alve location 19:45 hrs, dropped first positioning beacon at 20:15 hrs. Spudded well 6507/3-4 at 04:00 hrs. Drilled 36" hole from 408 meter to 418 meter. Verified spud location by ROV.
15.03.2004	Verified spud position by ROV at 4 different ship headings. Drilled 36" hole to 470,5 meter. Ran 30" conductor and cemented same. POOH with running tool and stinger. Prepared to RIH with 9 7/8" pilot assembly.
16.03.2004	M/U 26" BHA. RIH and drilled out of 30" shoe with 26" bit. POOH with 26" BHA. Stab in hole with 9 7/8" pilot assembly and drilled 9 7/8" pilot hole from 470 m to 716 meter.
17.03.2004	Drilled 9 7/8" pilot hole from 716 m to section TD at 1250 m. No shallow gas observed. Circulated hole clean and displaced hole to 1.35 sg WBM. POOH with 9 7/8" pilot hole assembly.
18.03.2004	Pulled 9 7/8" pilot hole BHA above 30" conductor. Stabbed in with 26" BHA from AUX rig and drilled 26" hole from 470 m to 982 m. Pulled out 9 7/8" pilot hole BHA in MAIN rig, and prepared to run BOP.
19.03.2004	Drilled 26" hole from 982 m to 1250 meter. Circulated well and POOH to surface with Aux rig. Prepared and ran BOP and 13 joints riser + pup joint to 310 meter with main rig.
20.03.2004	Aux Rig - Performed TBRA meetings w/ all personnel involved. R/U and ran 20" casing to sea-bed. Positioned rig and continued running 20" casing to 1099 meter. Main Rig - R/U kill, choke, booster and conduite lines and pressure tested same. P/U and installed termination spool, slip joint and keel joint.
21.03.2004	Continued to run and landed 18 3/4" WH housing in 30" conductor with 20" casing shoe at 1241 meter. Cemented 20" casing. Run and landed BOP on 18 3/4" WH and tension loaded same. R/D riser handling equipment and P/U diverter. M/U 17 " BHA.
22.03.2004	P/U and installed diverter.Released slip joint and stroked out inner barrel. Removed spider and install master bushing. Changed bails and hook up IR. Pressure tested BOP connector / 20" casing - Neg. M/U 17" BHA and RIH and tag cement at 1085 m. Washed down to top of float collar and drilled same. Drilled float shoe and 3 meter new formation.
23.03.2004	POOH w/ 17" clean out assembly. M/U 3 1/2" cement stinger and RIH to bottom w/ 5 1/2" DP. Performed injection test and squeeze cemented 20" shoe with max 100 bar. WOC while kept backpressure on plug for 6 hrs. POOH w/ cement stinger.
24.03.2004	P/U and RIH w/ 17" BHA. Function tested BOP and performed kick drill w/ crew. Performed BOP connector / casing test to 145 bar - ok. Drilled hard cement from 1152 m to 1212 meter. Drill string packed off and plugged yet nozzles on bit. Attempted to unplug nozzles - Neg. POOH with drill string. P/U 10 stand 5" drill pipe from deck and racked same back in derrick.
25.03.2004	RIH w/17" BHA. Tagged cement at 1197 m, after washing from 1150 m. Displaced the hole to 1.42 sg glydrill WBM, with 18 m3 hivisc pill ahead. Drilled out cement in casing and cleaned the rathole. Drilled 3 m new formation to 1256 m. Circulated to clean the hole and condition the mud. Performed FIT to 1.57 sg. Continued drilling 17" hole to 1386 m.
26.03.2004	Drilled 17" hole from 1386m to 1625m. Stopped drilling and increased MW. Observed slight mud losses. Investigated reasons for mudlosses, meanwhile circulating well clean and boosting the riser. Continued drilling 17" hole from 1625 meter to 1725 meter. Circulated hole clean.
27.03.2004	Circulated the hole clean at 1725m. Drilled to 1800m with 1.51sg MW. No losses. Circulated the hole clean and increased the MW to 1.54sg. Drilled to 1963m, limiting the ROP to 20m/hr. No losses observed.
28.03.2004	Drilled 17" hole from 1963 m to 2021 m. Stopped drilling and pumped out of the shoe to the 20" casing shoe, due to upcoming weather. Circulated hole clean inside the casing shoe while evaluating weather and weather forecasts. Tripped in to TD, washing down last 2 stands. Drilled 17" hole to 2090 m.
29.03.2004	Drilled 17" hole to TD of section at 2310m. Circulated the hole clean. Pulled out to 20" casing shoe. Circulated bottoms up and until shakers cleaned. Continued pulling out with 17" BHA, to run 13 3/8" casing.
30.03.2004	POOH w/17" BHA. Rigged up the remote operated casing tong. Retrieved the seatprotector. Rigged up and started running the 13 3/8" casing to 378m. Waited for the weather to improve to continue running 13 3/8" casing below the BOP, meanwhile keeping the blind shearram closed.
31.03.2004	Waited on weather. Continued running the 13 3/8" casing to 1890m. Made up the casing hanger and continued running the landing string, to 1935 m.
01.04.2004	Ran and landed the 13 3/8" casing. Circulated annulus volume at 2000lpm/56 bar. Pumped 20 m3 1,74sg spacer ahead of 38,3 m3 1.92 sg slurry. Displaced the cement theoretical number of strokes, without bumping the plug. Set seal assembly and pressuretested same, and BOP. Pulled the landing string, before installing the wear bushing. Changed bails and saver sub on DDM. Prepared to make up 12 1/4" bit and start RIH.
02.04.2004	M/u and RIH w/ 12 1/4" BHA to 1000m. Tested the MWD/LWD tool. Pressure tested mud hose and 2 IBOP on DDM to 20/360 bar for 5/10 min. Continued RIH to 2215m. Performed choke drill with crew. Pressure tested the casing to 360bar / 10 min. Washed down to TOC at 2262m. Drilled cement in shoe track to 2300m, cleaned rathole and drilled new formation to 2313m. Circulated hole clean and performed an extended LOT. EMW based on fracture-opening pressure: 1.81sg. Displaced the well to 1.50sg oil based mud. Prepared to

start drilling 12 1/4" hole.

03.04.2004 Drilled 12 1/4" hole from 2313 m - 2896 m.

04.04.2004 Drilled 12 1/4" hole from 2896 - 3141 m.

05.04.2004 Drilled 12 1/4" hole from 3141 - 3223 m. POOH to 1350 m due to low ROP.

06.04.2004 POOH. Changed bit. Downloaded MWD. RIH to 2507 m. Reamed from 2507 - 2817 m. Changed saver sub on top drive. Reamed from 2817 - 2942 m.

07.04.2004 Reamed tight hole from 2942 to TD at 3223 m. Drilled 12 1/4" hole from 3223 - 3370 m. Unable to receive azimut info from MWD. Circulated hole clean. POOH to 144 m to change MWD.

08.04.2004 POOH. Changed MWD. RIH to 1800 m. Function tested BOP. RIH to bottom at 3370 M. Drilled 12 1/4" hole from 3370 - 3602 m.

09.04.2004 Drilled 12 1/4" hole from 3602 - 3686 m. Circulated well clean and POOH. Rigged up for wire line logging. RIH with logging string no. 1 (DSI-IPLT) to 250 m.

10.04.2004 Performed wire line logging run no. 1 (DSI-IPLT). Attempted logging run no. 2 (MSIP). Problems with voltage / cable head. Aborted wire line operations due to increasing heavy weather. Waited on weather.

11.04.2004 Waited on weather. Rigged up casing equipment and ran 9 5/8" liner to 1180 m.

12.04.2004 RIH with 9 5/8" liner to 3677 m. Unable to pass 3677 m. Set 9 5/8" liner with shoe at 3674 m. When attempting to shear ball seat after setting the liner hanger, the wiper plug released. Sheared ball set with wiperplug landed in landing collar. Commenced cement job. Pumped 20 m3 spacer but was unable to proceed with mixing cement due to problems with circulation mix pump on cement unit.

13.04.2004 Cemented 9 5/8" liner. Waited on cement due to leaking float. POOH with liner running tool. MU and RIH with BOP test tool. Commenced pressure testing of BOP.

14.04.2004 Pressure tested BOP and POOH with BOP test tool. RIH with 8 1/2" BHA. Tagged wiperplug at 3650 m. Drilled out 9 5/8" liner. Displaced well to 1,38 sg mud while drilling cement. Drilled out rat hole and 2 m new formation to 3688 m.

15.04.2004 Drilled 8 1/2" hole from 3688 - 3692 m. Performed FIT to 1,55 sg. Drilled 8 1/2" hole from 3692 - 3728 m. POOH with 8 1/2" BHA. MU and RIH with 8 1/2" coring assy to 400 m.

16.04.2004 RIH with 8 1/2" coring assy. Cut core from 3728 - 3764 m. Core jammed off. POOH with 8 1/2" coring assy to 1668 m.

17.04.2004 POOH with 8 1/2" coring assy. Recovered 34,21 m core (95 % recovery). MU and RIH with 8 1/2" coring assy. Cut core no.2 from 3764 m - 3776 m.

18.04.2004 Cut core no.2 from 3776 - 3818 m. POOH with 8 1/2" coring assy. Recovered 54,3 m core (100,6 % recovery). MU and RIH with 8 1/2" BHA to 1655 m.

19.04.2004 RIH with 8 1/2" BHA. Drilled 8 1/2" hole from 3818 m to 4077 m. Commenced circulating well clean.

20.04.2004 Drilled 8 1/2" hole from 4077 - 4092 m (TD of well). Circulated well clean and POOH with 8 1/2" BHA. RU for wireline logging and PU logging string No.1 (AIT-MSIP-EMS).

21.04.2004 Performed wire line run no.1 (AIT-MSIP-EMS). Commenced wire line run no.2 (ECS-IPLT-CMR200).

22.04.2004 Completed logging run no.2 (ECS-IPLT-CMR) and logging run no.3 (MDT-GR, pressure points). Aborted logging run no.3 prior to taking fluid samples due to hydraulic leak in MDT tool. Reconfigured logging string and implemented dual packer. RIH with logging string no.4 (MDT dual packer) to 1300 m.

23.04.2004 RIH with logging string no.4 (MDT-dual packer). Dual packer failed while attempting to set at 3727 m, unable to increase pressure in elements. Lost communication with tools. POOH. Trouble shot problems. RIH with logging string no.5 (MDT-GR). Set tool at 3726 m. Pumped for clean up and collected fluid samples. Commenced setting tool at next level, 3821 m.

24.04.2004 Took samples with MDT logg on wireline. POOH and changed logging tools to DSI-ZVSP. Logged bottom hole section with DSI and VSP.

25.04.2004 Completed logging with DSI and VSP. M/U MSCT-GR and took sidewalls cores in GARN,ILE and TILJE formations. POOH and R/D logging tools and wireline equipment. M/U 9 5/8" casing in stand and stored same in derrick.

26.04.2004 L/D wireline equipment and logging tools. P/U cement stinger and RIH w/ 3 1/2" - 5" and 5 1/2" drillpipe to TD. Circulated hole clean and set 2 cement plugs from 4092-3792 metre and from 3762-3577 metre. POOH with drillpipe and cement stinger.

27.04.2004 RIH to 2200 meter and pressure tested cement plugs in open hole and transition zone to 272 bar - ok. Installed EZSV bridge plug at 2200 meter and pressure tested same to 272 bar - ok. Sat balanced cement plug from 2200-2150 meter. POOH w/ running tool and 5 1/2" drillpipe.

28.04.2004 Completed POOH . M/U 13 3/8" cutter assembly w/ Multipurpose tool. RIH and retrieved wear bushing and cut 13 3/8" casing at 760 meter. Circulated well to check for any gas. Retrieved 13 3/8" casing with spear, POOH and laid down casing on deck.

29.04.2004 RD Casing Equipment. RIH with 5 1/2" DP to 810 m. Set balanced cement plug from 810-660 m. POOH to 623 m. WOC. Tested Cement plug to 85 bar - ok. Displaced well to seawater. Washed down to 650 m. Set balanced cement plug from 650 m to 450 m. POOH. Prepared to pull BOP.

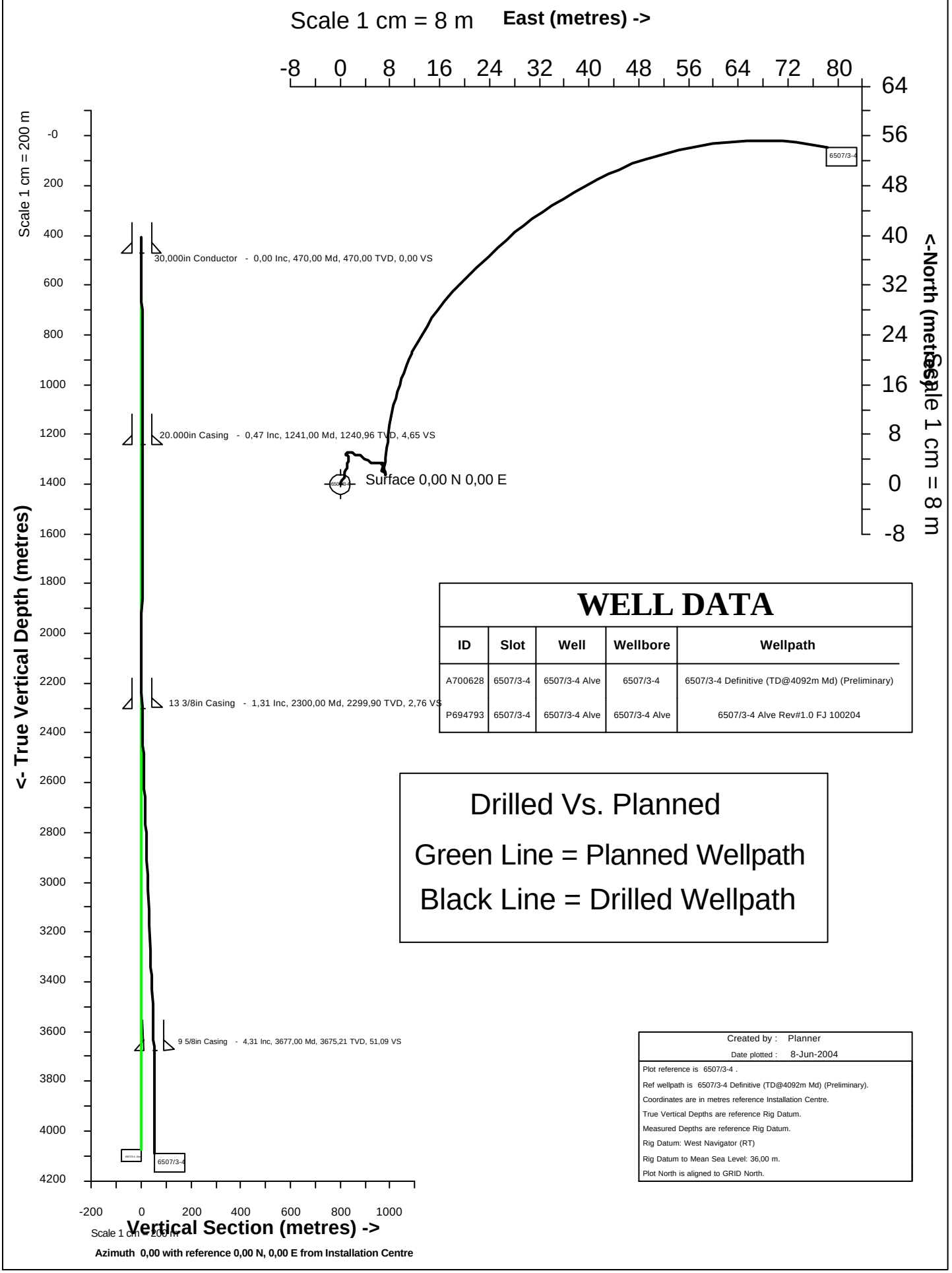
30.04.2004 R/U to pull BOP and Riser. Disconnected BOP from Wellhead. Ran 20" x 30" casing cutter w/ MOST tool and cut 20" x 30" casing at 413 meter. Pulled wellhead and 20" x 30" casing stump to surface and laid down same. Pulled slip joint and landing joint and laid down same. Abandoned well.

App B Directional data, survey listing

Well plot

Statoil

Location:	**Norway**	**Slot:**	**6507/3-4**
Field:	**EXPLORATION ZONE 32**	**Well:**	**6507/3-4 Alve**
Installation:	**6507/3 Exploration**	**Wellbore:**	**6507/3-4**



Azimuth 0,00 with reference 0,00 N, 0,00 E from Installation Centre

WELL DATA

ID	Slot	Well	Wellbore	Wellpath
A700628	6507/3-4	6507/3-4 Alve	6507/3-4	6507/3-4 Definitive (TD@4092m Md) (Preliminary)
P694793	6507/3-4	6507/3-4 Alve	6507/3-4 Alve	6507/3-4 Alve Rev#1.0 FJ 100204

Drilled Vs. Planned

Green Line = Planned Wellpath

Black Line = Drilled Wellpath

Created by : Planner

Date plotted : 8-Jun-2004

Plot reference is 6507/3-4 .

Ref wellpath is 6507/3-4 Definitive (TD@4092m Md) (Preliminary).

Coordinates are in metres reference Installation Centre.

True Vertical Depths are reference Rig Datum.

Measured Depths are reference Rig Datum.

Rig Datum: West Navigator (RT)

Rig Datum to Mean Sea Level: 36,00 m.

Plot North is aligned to GRID North.

Well survey listing

STATOIL

Statoil,6507/3-4
6507/3 Exploration,6507/3
EXPLORATION ZONE 32,Norway

Wellbore: 6507/3-4
Wellpath: 6507/3-4 Definitive
(TD@4092m Md)
Date Printed: 9-Jun-2004

BAKER HUGHES INTEQ

Wellbore

Name	Created	Last Revised
6507/3-4	17-Mar-2004	9-Jun-2004

Well

Name	Government ID	Last Revised
6507/3-4 Alve		28-Nov-2003

Slot

Name	Grid Northing	Grid Easting	Latitude	Longitude	North	East
6507/3-4	7319234.0000	447601.0000	N65 59 16.6107	E7 50 45.7690	0.00N	0.00E

Installation

Name	Easting	Northing	Coord System Name	North Alignment
6507/3 Exploration	447601,000	7319234,000	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 (West Navigator (RT) 36.0m above Mean Sea Level)
Vertical Section is from 0,00N 0,00E on azimuth 0,00 degrees
Bottom hole distance is 95,18 Metres on azimuth 55,35 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,6507/3-4
6507/3 Exploration,6507/3
EXPLORATION ZONE 32,Norway

Wellbore: 6507/3-4
Wellpath: 6507/3-4 Definitive
(TD@4092m Md)
Date Printed: 9-Jun-2004

BAKER HUGHES INTEQ

Wellpath Report

MD[m]	Inc[deg]	Azi[deg]	TVD[m]	North[m]	East[m]	Dogleg [deg/30m]	Vertical Section[m]
408,00	0,00	0,00	408,00	0,00N	0,00E	0,00	0,00
524,70	0,61	22,86	524,70	0,57N	0,24E	0,16	0,57
553,60	1,00	39,55	553,60	0,91N	0,46E	0,47	0,91
582,30	0,58	8,06	582,29	1,25N	0,64E	0,62	1,25
611,10	0,83	7,45	611,09	1,60N	0,69E	0,26	1,60
639,90	0,67	24,57	639,89	1,96N	0,79E	0,29	1,96
668,60	0,64	25,42	668,59	2,25N	0,93E	0,03	2,25
697,50	0,64	6,17	697,48	2,56N	1,01E	0,22	2,56
726,20	0,70	5,05	726,18	2,89N	1,04E	0,06	2,89
754,20	0,91	15,88	754,18	3,28N	1,12E	0,28	3,28
783,50	0,54	53,32	783,48	3,59N	1,29E	0,60	3,58
812,50	0,08	0,44	812,48	3,69N	1,40E	0,51	3,69
840,70	0,50	352,10	840,68	3,83N	1,39E	0,45	3,83
872,30	0,62	354,32	872,27	4,13N	1,35E	0,12	4,13
897,20	0,64	346,64	897,17	4,40N	1,31E	0,10	4,40
926,80	0,50	293,91	926,77	4,62N	1,15E	0,53	4,62
957,70	0,42	334,18	957,67	4,77N	0,98E	0,32	4,77
984,60	0,37	44,02	984,57	4,92N	0,99E	0,51	4,93
1014,14	0,23	120,72	1014,11	4,96N	1,11E	0,39	4,96
1043,50	0,16	348,82	1043,47	4,97N	1,15E	0,37	4,97
1072,30	0,27	68,64	1072,27	5,04N	1,21E	0,30	5,04
1129,80	0,72	82,82	1129,77	5,13N	1,69E	0,24	5,13
1158,60	0,53	116,63	1158,57	5,09N	1,99E	0,42	5,10
1187,30	0,82	134,19	1187,26	4,89N	2,26E	0,37	4,89
1216,00	0,96	102,25	1215,96	4,70N	2,64E	0,53	4,70
1242,50	0,44	91,88	1242,46	4,65N	2,96E	0,60	4,65
1268,00	1,99	123,28	1267,95	4,40N	3,43E	1,92	4,40
1287,00	1,53	120,38	1286,94	4,09N	3,92E	0,74	4,09
1314,00	1,34	125,09	1313,93	3,73N	4,49E	0,25	3,73
1340,30	0,85	105,14	1340,23	3,50N	4,93E	0,70	3,50
1371,50	0,51	100,69	1371,43	3,42N	5,29E	0,33	3,41
1383,50	0,75	88,98	1383,43	3,41N	5,42E	0,68	3,41
1407,90	0,24	103,09	1407,83	3,40N	5,63E	0,64	3,40
1439,40	0,41	81,88	1439,33	3,40N	5,81E	0,20	3,40
1514,80	0,20	77,02	1514,72	3,47N	6,20E	0,08	3,47
1601,60	0,18	100,81	1601,52	3,48N	6,49E	0,03	3,47
1631,60	0,45	105,84	1631,52	3,43N	6,64E	0,27	3,43
1689,30	0,15	154,06	1689,22	3,30N	6,89E	0,19	3,30
1716,80	0,23	337,10	1716,72	3,32N	6,89E	0,41	3,32
1775,20	0,20	235,97	1775,12	3,37N	6,76E	0,17	3,37
1833,20	0,42	154,02	1833,12	3,13N	6,77E	0,23	3,13
1861,90	0,48	155,84	1861,82	2,92N	6,86E	0,06	2,92
1920,10	0,85	161,01	1920,02	2,29N	7,10E	0,19	2,29
1949,30	0,66	162,49	1949,21	1,93N	7,22E	0,20	1,93
2004,10	0,17	223,36	2004,01	1,56N	7,26E	0,33	1,57
2034,50	0,15	111,48	2034,41	1,52N	7,27E	0,26	1,52
2065,50	0,24	358,99	2065,41	1,57N	7,31E	0,32	1,57
2093,50	0,35	332,67	2093,41	1,70N	7,27E	0,18	1,70
2151,50	0,51	302,70	2151,41	2,00N	6,97E	0,14	2,00
2238,40	0,14	175,89	2238,31	2,10N	6,65E	0,21	2,10
2296,90	1,40	22,74	2296,80	2,69N	6,93E	0,78	2,69
2303,80	1,20	17,61	2303,70	2,84N	6,99E	1,01	2,84
2366,90	1,63	8,59	2366,78	4,35N	7,32E	0,23	4,35
2421,70	1,73	7,26	2421,56	5,95N	7,54E	0,06	5,95
2452,00	1,80	5,53	2451,84	6,87N	7,64E	0,09	6,87
2480,90	1,80	5,73	2480,73	7,78N	7,73E	0,01	7,78
2538,90	1,91	8,18	2538,70	9,64N	7,96E	0,07	9,64

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (West Navigator (RT) 36.0m above Mean Sea Level)
Vertical Section is from 0,00N 0,00E on azimuth 0,00 degrees
Bottom hole distance is 95,18 Metres on azimuth 55,35 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,6507/3-4
6507/3 Exploration,6507/3
EXPLORATION ZONE 32,Norway

Wellbore: 6507/3-4
Wellpath: 6507/3-4 Definitive
(TD@4092m Md)
Date Printed: 9-Jun-2004

BAKER HUGHES INTEQ

Wellpath Report

MD[m]	Inc[deg]	Azi[deg]	TVD[m]	North[m]	East[m]	Dogleg [deg/30m]	Vertical Section[m]
2567,90	1,95	11,27	2567,68	10,60N	8,13E	0,12	10,60
2598,70	2,10	14,06	2598,47	11,66N	8,37E	0,17	11,66
2627,60	2,15	13,04	2627,34	12,71N	8,62E	0,07	12,70
2657,20	2,07	14,30	2656,93	13,76N	8,88E	0,09	13,76
2686,10	2,13	17,57	2685,81	14,78N	9,17E	0,14	14,78
2715,20	2,32	17,92	2714,88	15,86N	9,51E	0,20	15,86
2744,30	2,26	19,38	2743,96	16,96N	9,88E	0,09	16,96
2770,40	2,33	20,54	2770,04	17,94N	10,24E	0,10	17,94
2798,70	2,45	22,80	2798,32	19,04N	10,68E	0,16	19,04
2827,90	2,39	23,44	2827,49	20,17N	11,16E	0,07	20,17
2854,10	2,37	25,31	2853,67	21,16N	11,61E	0,09	21,16
2882,40	2,45	27,36	2881,94	22,23N	12,14E	0,12	22,23
2913,10	2,44	29,79	2912,61	23,38N	12,76E	0,10	23,38
2971,40	2,57	30,14	2970,86	25,59N	14,04E	0,07	25,59
2999,50	2,66	32,20	2998,93	26,68N	14,70E	0,14	26,68
3029,60	2,69	35,84	3028,99	27,85N	15,48E	0,17	27,85
3116,50	2,81	44,36	3115,80	31,02N	18,17E	0,15	31,02
3175,50	2,81	43,42	3174,72	33,11N	20,17E	0,02	33,11
3272,30	3,11	47,64	3271,40	36,60N	23,75E	0,11	36,60
3344,80	3,32	48,16	3343,78	39,33N	26,76E	0,09	39,32
3375,10	3,41	51,17	3374,03	40,48N	28,12E	0,20	40,48
3403,90	3,42	53,26	3402,78	41,53N	29,47E	0,13	41,53
3433,10	3,63	53,43	3431,92	42,60N	30,91E	0,22	42,60
3491,80	3,98	56,33	3490,49	44,83N	34,10E	0,20	44,83
3521,20	4,05	58,15	3519,82	45,95N	35,83E	0,15	45,95
3550,60	4,09	61,40	3549,15	47,00N	37,63E	0,24	47,00
3579,70	4,11	61,20	3578,17	48,00N	39,46E	0,03	48,00
3609,30	4,22	62,93	3607,70	49,00N	41,36E	0,17	49,00
3637,00	4,16	66,01	3635,32	49,88N	43,19E	0,25	49,88
3661,90	4,25	65,02	3660,15	50,63N	44,85E	0,14	50,63
3721,10	4,50	72,20	3719,18	52,27N	49,05E	0,30	52,27
4003,80	4,70	92,40	4000,99	55,17N	71,18E	0,17	55,17
4030,30	4,70	97,50	4027,40	54,99N	73,34E	0,47	54,99
4061,20	4,67	100,71	4058,20	54,59N	75,83E	0,26	54,59
4092,00	4,67	100,71	4088,90	54,12N	78,30E	0,00	54,12

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (West Navigator (RT) 36.0m above Mean Sea Level)
Vertical Section is from 0,00N 0,00E on azimuth 0,00 degrees
Bottom hole distance is 95,18 Metres on azimuth 55,35 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,6507/3-4
6507/3 Exploration,6507/3
EXPLORATION ZONE 32,Norway

Wellbore: 6507/3-4
Wellpath: 6507/3-4 Definitive
(TD@4092m Md)
Date Printed: 9-Jun-2004

BAKER HUGHES INTEQ

Hole Sections

Diameter [in]	Start MD[m]	Start TVD[m]	Start North[m]	Start East[m]	End MD[m]	End TVD[m]	End North[m]	Start East[m]	Wellbore
26,000	408,00	408,00	0,00N	0,00E	1242,50	1242,46	4,65N	2,96E	6507/3-4
17,000	408,00	408,00	0,00N	0,00E	2310,00	2309,90	2,96N	7,03E	6507/3-4
9 7/8	408,00	408,00	0,00N	0,00E	1237,60	1237,56	4,65N	2,92E	6507/3-4
12 1/4	2310,00	2309,90	2,96N	7,03E	3686,00	3684,19	51,35N	46,50E	6507/3-4
8 1/2	3686,00	3684,19	51,35N	46,50E	4092,00	4088,90	54,12N	78,30E	6507/3-4

Casings

Name	Top MD[m]	Top TVD[m]	Top North[m]	Top East[m]	Shoe MD[m]	Shoe TVD[m]	Shoe North[m]	Shoe East[m]	Wellbore
20.000in Casing	408,00	408,00	0,00N	0,00E	1241,00	1240,96	4,65N	2,95E	6507/3-4
13 3/8in Casing	408,00	408,00	0,00N	0,00E	2300,00	2299,90	2,76N	6,96E	6507/3-4
9 5/8in Casing	408,00	408,00	0,00N	0,00E	3677,00	3675,21	51,09N	45,88E	6507/3-4

Survey Tool Program

Reference	Survey Name	MD[m]	TVD[m]	Survey Tool	Error Model
700743	6507/3-4 BHI.MWD 26" (0-1242.50)	1242,50	1242,46	Magnetic (MWD, EMS)	MWD, standard, mag-corr
700984	6507/3-4 BHI.MWD 17" (1223.60-2296.90)	2296,90	2296,80	Magnetic (MWD, EMS)	MWD, standard, mag-corr
701304	6507/3-4 BHI.MWD 12 1/4" (2303.80-3661.90)	3661,90	3660,15	Magnetic (MWD, EMS)	MWD, standard, mag-corr
701547	6507/3-4 BHI MWD 8 1/2" (3721.10-4061.20)	4061,20	4058,20	Magnetic (MWD, EMS)	MWD, standard, mag-corr
701704	6507/3-4 Extrapolation (TD@4092)	4092,00	4088,90	Magnetic (MWD, EMS)	MWD, standard, mag-corr

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (West Navigator (RT) 36.0m above Mean Sea Level)
Vertical Section is from 0,00N 0,00E on azimuth 0,00 degrees
Bottom hole distance is 95,18 Metres on azimuth 55,35 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Baker Hughes Incorporated

App C List of contractors

SERVICE	COMPANY
Casing	Weatherford
Cementing	Halliburton
Coring	Hughes Christensen
Directional Drilling	Baker Hughes INTEQ
Diving	Oceaneering AS
Drilling Contractor	Smedvig offshore AS
Electric Logging	Schlumberger Wireline
Helicopter	Norsk helikopter
Helicopter Booking	Lufttransport (Statoil)
Mud	M-I Norge AS
Mud Logging	Geoservices
MWD	Baker Hughes INTEQ
Wellhead System	Dril-Quip

App D Wellsite sample description

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 1 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Per, Furmyr, Olav Beyer		
Hole size: 17"	Cut solvent: Iso Propanol	Date: 25.03.2004	

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.
1260	45 Cmt:	Contamination from cement	
	45 Cly:	med dk gry – med gry, sft – sol, amor - sbblky, v slty – vf sdy, abn blk microspks, non calc	No shows
	10 Sd/Pbl:	lse Qtz and meta frags (mafic min), v f – vcrs, tr pbl, pr srt, ang – sbrnd, also frag of boulders	
			a.a.
1270	80 Clst	Pred amor – sbblky, pred sft, a.a.	
	15 Cmt:	Contamination from cement	
	15 Sd/Pbl:	Pred a.a.	
1280	90 Clst	Pred amor – sbblky, pred sft, v slty – vf sdy, grdg Slt/Sd	a.a.
	5 Cmt:	Contamination from cement	
	5 Sd/Pbl:	Pred a.a.	
	Tr Shell frgs		
1290	95 Clst	Pred amor – sbblky, pred sft, , v slty – vf sdy, grdg Slt/Sd, a.a.	a.a.
	5 Sd/Pbl:	Pred a.a.	
	Tr Cmt:	Contamination from cement	
	Tr Shell frgs		
1300	95 Clst	Pred amor – sbblky, pred sft, aren, a.a.	a.a.
	5 Sd/Pbl:	Pred a.a.	
	Tr Cmt:	Contamination from cement	
1310	95 Clst	Pred amor – sbblky, pred sft, aren, a.a.	a.a.
	5 Sd:	Pred a.a.	
	Tr Pbls	From boulders	
1320	95 Clst	Pred amor – sbblky, pred sft, aren, a.a.	a.a.
	5 Sd:	Pred a.a.	
	Tr Pbls	From boulders	
1330	100 Clst	Med dk gry, dk gn gry, sft – frm, blky – amor, occ sft, sol and stky in samples, gen slty and sdy, mica, occ v mica, calc	a.a.
	Tr Sst	Lt gry, qtz, vf – f, v arg, abd mica and mafic min	
	Tr Rk frag	Dk gry, blk, hd, ang	
1340	a.a.		a.a.
1350	a.a.		a.a.
1360	a.a.		a.a.
1370	a.a.		a.a.
1380	a.a.		a.a.
1390	a.a.		a.a.
1400	100 Clst	a.a.	a.a.
	Gd tr Glauc	Gnsh blk, nod	
	Tr Sst	Pred lse qtz, clr, vf - f	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 2 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Per, Furmyr, Olav Beyer		
Hole size: 17”	Cut solvent: Iso Propanol	Date: 25.03.2004	

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.
1410	100 Clst	Med dk gry, dk gn gry, sft – frm, blky – amor, occ sft, sol and stky in samples, gen slty and sdy, mica, calc	No shows
	Gd tr Glauc	Gnsh blk, nod	
	Tr Sst	Pred lse qtz, clr, vf - f	
1420	a.a.		a.a.
1430	100 Clst	a.a.	a.a.
	Tr Glauc	a.a.	
	Tr Sst	a.a.	
	Tr Ls	Off wh, pa yel brn, frm – mod hd, brit	
1440	a.a.		a.a.
1450	a.a.		a.a.
1460	100 Clst	Sli calc, else a.a	a.a.
1470	100 Clst	a.a.	a.a.
	Tr Glauc	a..a.	
	Tr Sst	a.a.	
1480	100 Clst	Non calc, else a.a.	a.a.
	Tr Sst	a.a.	
	Tr Glauc	a.a.	
	Tr Ls	a.a.	
1490	100 Clst:	Olv gry – olv blk, dk gry, frm, blky, slty, sli sdy, micromic, sli microglauc, non – sli calc	a.a.
1500	a.a.		a.a.
1510	a.a.		a.a.
1520	a.a.		a.a.
1530	a.a.		a.a.
1540	a.a.		a.a.
1550	a.a.		a.a.
1560	a.a.		a.a.
1570	a.a.		a.a.
1580	a.a.		a.a.
1590	a.a.		a.a.

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 3 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Per, Furmyr, Olav Beyer		
Hole size: 17”	Cut solvent: Iso Propanol	Date: 25.03.2004	

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.
1600	100 Clst	Olv blk – brn blk, frm, blky – sbblky, slty, sli micromic, non calc	No Shows
1610	100 Clst	Dk olv – med dk gry, frm, blky – sbblky, slty, sli micromic, non calc	a.a
1620	100 Clst	Bec gen slty – v.slty, i/p blk Glau microspks, mod dissem micropyr	a.a.
1630	100 Clst	Bec pred dk olv gry, else a.a.	a.a.
1640	100 Clst	Bec pred dk olv - olv blk – brnsh blk, crmbly, i/p slily earthy txt, mod-v. micromic, bec i/p abun Glau microspks, else a.a.	a.a.
1650	100 Clst	Pred olv blk, v. slty, else a.a.	a.a.
1660	100 Clst	Pred olv blk, v. slty, else a.a.	a.a.
1670	100 Clst	Pred olv blk, v. slty, i/p v. abn Glau microspks, else a.a.	a.a.
1680	100 Clst	Pred olv blk, mod slty, abn Glau microspks, else abn micromic	a.a.
1690	100 Clst	Pred olv blk, slily slty, gdtr Glau microspks, else abn micromic	a.a.
1700	100 Clst	Pred olv blk, slty, a.a.	a.a.
1710	100 Clst	Pred olv blk, med dk gry, (1) non slty , (2) mod slty, sbblky – blky, frm, tr mod hd, non calc, mod micromic & micropyr	a.a.
1720	100 Clst	Pred olv blk, mod dk gry, a.a.	a.a.
1730	100 Clst	Pred olv blk, mod dk gry, i/p slty, a.a.	a.a.
	Tr Sd	Clr Qtz, crs, lse float grns	
1740	50 Clst	Pred olv blk, mod dk gry, i/p slty, a.a.	a.a.
	50 Clst	Pa blu gry, sft-frm, sbblky, abun blk Glauc, pred non calc	
1750	20 Clst	Pred dk olv - olv blk, slily-v.slty, else a.a.	a.a.
	80 Clst	Pa blu gry, a.a.	
	Gdtr Lst	Off wh-pa gn, frm-mod hd, unif micr	
1760	95 Clst	Pred pa blu gry,grnsh gry, bec slily wxy, a.a.	a.a.
	tr Lst	Off wh-pa gn, frm, unif micr	
1770	95 Clst	Pred pa blu gry,grnsh gry, wxy, a.a.	a.a.
	5 Tuffac Clst	Varicol blu gry – med gry, tr off wh spks, frm-mod hd, blky, non calc	
1780	90 Clst	Pred pa blu gry,grnsh gry, wxy, a.a.	a.a.
	10 Tuffac Clst	pred blu gry – med gry, a.a.	
1790	100 Clst	a.a.	a.a.
	Tr Tuffac Clst	a.a.	Trace LCM

WELLSITE SAMPLE DESCRIPTION			Page 4 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Olav Beyer, Peter Sergeant		
Hole size: 17”	Cut solvent: Iso Propanol	Date: 26.03.2004	

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.
1800	100 Clst	Lt – med gnsh gry, tr gry – blsh gry, sft – frm, sli wxy, non calc, sli micromic, Tr glauc, Tr micropyr, r microcarb, R wh tf incls	a.a.
1810	100 Clst	a.a.	a.a.
1820	100 Clst	a.a., Tr med – dk brn	No shows Trace LCM
1830	100 Clst	Varicol, dom lt – med dk gnsh gry – occ gry – Tr blsh gry, occ med – med dk brn – occ grysh brn, sft – frm, sli wxy, non calc, Tr – sli micromic, Tr glauc, Tr bcm sli – v glauc, Tr microcarb, r micropyr, R wh tf incls	a.a.
1840	100 Clst	Varicol, a.a.	a.a.
1850	100 Clst	Varicol, a.a.	a.a.
	Tr Dol	Pa – lt brn, pa gry, pr – mod ind, microxln, arg, calc I.P.	
	R Ls	Pa gry, mod ind, microxln, sli dol, arg	
1860	100 Clst	Varicol, a.a., mnr med dk – dk gry	a.a.
	R Dol	a.a.	
1870	50 Clst	Varicol, a.a.	a.a.
	50 Clst	Med dk – dk gry, sft – dom frm, blky – occ sbfiss, non calc, mod micromic, sli – occ mod micropyr	
	Tr Dol	a.a.	
1880	20 Clst	Varicol, a.a.	a.a.
	80 Clst	Med dk – dk gry, a.a.	
	Tr Dol	a.a.	
1890	70 Clst	Med dk – dk gry, a.a.	a.a.
	20 Clst	Varicol, a.a.	
	10 Tf	Med dk grysh brn & gry, spkd/mott off wh – lt brn, occ dk gry – blk spks, frm, blky, non calc, tr v calc, com slty app	
1900	10 Clst	Varicol, a.a.	a.a.
	80 Clst	Med dk – dk gry, a.a.	
	10 Tf Clst	Med gry, occ – com dk gry – blk spks, Tr off wh spks, sft – frm, non calc, sli slty, sli micropyr	
1910	10 Clst	Varicol, a.a.	a.a.
	30 Clst	Med dk – dk gry, a.a.	
	50 Tf Clst	a.a.	
	10 Tf	a.a., also dk brnsh gry	
	R Ls	Pa – lt gry, mod ind, micr, sli – mod arg	
	Tr Volc	Dk gryish brn, hd, brit, cryptoxln	
1920	10 Clst	Varicol, a.a.	
	30 Clst	Med dk – dk gry ,a.a.	
	60 Tf Clst	a.a.	
	Tr Tf	a.a.	
	R Ls	a.a.	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 5 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Olav Beyer, Peter Sergeant		
Hole size: 17”	Cut solvent: Iso Propanol	Date: 27.03.2004	

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.
1930	Tr Clst	Varicol, a.a.	No Shows
	40 Tf Clst	a.a.	
	Tr Tf	a.a.	
	60 Clst	Med dk – dk olv gry, blky – sbfiss, sft – frm, non calc, sli – mod micromic, Tr slty, Tr Pyr	
1940	70 Clst	Med dk – dk olv grey, a.a.	a.a.
	30 Tf Clst	a.a.	
	Gdtr Tf	a.a.	
1950	80 Clst	Med dk – dk olv grey, a.a.	a.a.
	20 Tf Clst	a.a.	
	Tr Tf	a.a.	
1960	80 Clst	Bec also grysh blu – pa gn, wxy, amor - sbblky, sft, non calc	a.a.
	20 Tf Clst	a.a.	
	Tr Tf	a.a.	
1970	90 Clst	Dom grysh blu , pa gn, wxy, a.a.	a.a.
	10 Tf Clst	a.a.	
1980	100 Clst	Bec dom med dk gry – med gry, tr olv gry, frm, blky, non calc	a.a.
	Gdtr Tf Clst	a.a.	
1990	100 Clst	Dom med dk gry – med gry, tr olv gry, frm, blky, non calc, unif	a.a.
	Tr Tf Clst	a.a.	
2000	100 Clst	Pred a.a., i/p abn Glau spks & Glau nods	a.a.
2010	100 Clst	Bec again pa gn – grysh gn, slily wxy, else a.a.	a.a.
2020	100 Clst	Pred a.a., i/p also pa brn-olv gry, frm, blky, non calc	a.a.
		Pull back to shoe due to bad weather Had cavings during trip. Platy and occasional thin splintery fragments Up to 7cm long	
2030	100 Clst	Med lt – med dk gry – occ grnsh gry, frm, blky, non calc, sli micromic, Tr – loc sli – mod micromic, Tr Pyr nods, R Glauc nods	Tr platy – splnty cvgs upto 4cm long
2040	100 Clst	a.a.	a.a.
	R Dol	Med lt olv brn, hd, brit, crypto – microxln, pyr, arg	
2050	100 Clst	a.a.	a.a.
	R Dol	a.a.	
2060	100 Clst	Med dk gry – dk grnsh gry, a.a.	
	Tr	Pyr nods, R Glauc nods	
2070	100 Clst	a.a.	
	Tr	Pyr nods, R Glauc nods	

WELLSITE SAMPLE DESCRIPTION			Page 6 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Olav Beyer, Peter Sergeant		
Hole size: 17"+ 12 1/4"	Cut solvent: Iso Propanol	Date: 28.03.2004	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2080	100 Clst Tr	Pred dk grnsh gry, frm, blky, slily micromic, i/p dissem micropyr , non calc Pyr nods, R Ls/Dol	No shows
2090		Not recovered	
2100		Not recovered	
2110	100 Clst Tr	Pred dk grnsh gry, a.a Pyr nods, R Ls/Dol	a.a
2120	100 Clst Tr	Pred dk grnsh gry – grnsh gry, a.a Pyr nods, Ls/Dol	a.a
2130	100 Clst Tr	Pred a.a Pyr nods, Ls/Dol	a.a
2140	100 Clst Tr	Pred a.a Pyr nods, Ls	a.a
2150	100 Clst Tr	Pred grnsh gry – med dk gry, else a.a Pyr nods, Ls, R Qtz	a.a
2160	100 Clst Tr	Pred a.a Pyr nods, Ls/Dol	a.a
2170	100 Clst Tr	Bec pred med dk gry, else a.a Pyr nods, Ls/Dol	a.a
2180	100 Clst Tr	Pred a.a Pyr nods	a.a
2190	100 Clst Tr	Pred a.a Pyr nods, Ls/Dol	a.a
2200	100 Clst Tr	Pred a.a Ls/Dol	a.a
2210	100 Clst Tr	Pred a.a Pyr nods, Gdtr Ls/Dol: off wh, mod hd, dom micr	a.a
2220	100 Clst Tr	Pred a.a Pyr nods, Ls/Dol	a.a
2230	100 Clst Tr	Pred a.a Pyr nods, Ls/Dol, R Glau	a.a
2240	100 Clst Tr	Pred a.a Pyr nods, Ls/Dol	a.a
2250	100 Clst Tr	Pred a.a Pyr nods, Ls/Dol	a.a

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 7 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Olav Beyer, Peter Sergeant		
Hole size: 17"+ 12 1/4"	Cut solvent: Iso Propanol	Date: 28.03.2004	

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.
2260	100 Clst	Pred med dk gry grnsh gry, frm, blky, i/p slily micromic & dissem micropyr , non calc, unif	No shows
	Tr	Pyr nods, R Ls/Dol, R Qtz	
2270	100 Clst	Pred a.a	a.a
	Tr	Pyr nods, Ls/Dol	
2280	100 Clst	Pred med dk gry grnsh gry, frm, blky, i/p slily micromic & dissem micropyr , canon calc, unif	a.a
	Tr	Pyr nods, Ls/Dol	
2290	100 Clst	Med – med dk gry, frm, blky, non calc, sli micromic, sli slty, Tr microcarb, Tr pyr, R glauc, Tr bcm mod slty & Tr sndy & sli glauc	a.a.
	Tr Dol	Lt – dk brn – olv brn – or brn, hd, brit, micro – v fn xln, calc I.P., arg, sli – Mod pyr I.P.	Tr fn cvgs from Brygge - Tang Fms
2300	100 Clst	a.a.	a.a.
	Tr Dol	a.a.	
	R Ls	Med – med dk gry – brnsh gry, mod hd, microxln, sli – mod arg, Tr – v glauc, Tr – mod sndy, Tr – mod pyr, sli slty I.P.	
2310	100 Clst	a.a., Tr Glauc nods & Pyr nods	a.a.
	Tr Dol	a.a.	
	Tr Ls	a.a.	
		SET 13 3/8" casing	
2313	80 Cmt	Contamination from cement job	12 ¼" section
	20 Clst	a.a., Tr Glauc nods & Pyr nods	a.a.
2320	LOST		
2330	100 Clst	Pred med dk gry-grnsh blk, frm, blky, slily micromic, non calc, unif	a.a.
2340	100 Clst	Pred a.a	a.a
2350	100 Clst	Pred a.a	a.a
2360	100 Clst	Pred a.a	a.a
2370	A.A.		a.a
2380	A.A.		a.a
2390	100 Clst	Slily slty, also tr fn carb mat, else a.a.	a.a
2400	A.A.		a.a
2410	A.A.		a.a
2420	A.A.		a.a
2430	A.A.		a.a

WELLSITE SAMPLE DESCRIPTION			Page 8 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12 ¼"	Cut solvent: Iso Propanol	Date: 02.04.2004	

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.
2440	100 Clst	Pred med dk gry-grnsh blk, frm, blky, slily micromic, slily slty, non calc, unif, also tr fn carb mat	
	TR Ls	Gry wh, frm – mod hd, blky – plty, arg, dol I.P.	
2450	A.A		
2460	A.A		
2470	A.A		
2480	A.A		
2490	A.A		
2500	A.A		
2510	A.A		
2520	A.A		
2530	A.A		
2540	100 Clst	Non – slily calc, else a.a.	
	Tr Ls	a.a.	
2550	100 Clst	Medium dark – dark grey, firm, non – slily calc, slily dol I.P., slily micromic, Tr – slily silty, Tr v slty, Tr microcarb, R micropyr, Tr med gry & v calc	
	Tr Ls	Mott lt – med gry, mod hd, micr I.P., microxln I.P., v arg, dol, slily slty I.P., grds Mrl	
2560	A.A.		
2570	100 Clst	a.a.	
	Gd Tr Ls	Pa – med lt grr – occ brnsh grey, mod hd, micr I.P., microxln I.P., slily – dom mod – v arg, dol, Tr microcarb, slily slty, grds Mrl	
2580	A.A.		
2590	A.A.		
2600	100 Clst	a.a., bcm non calc, Tr – v slily dol	
	Tr Ls	a.a.	
2610	100 Clst	a.a.	Com barite
	Tr Ls	a.a.	
	Tr Dol		
2620	90 Clst	a.a.	a.a.
	10 Dol	Lt – med dk brn – grysh brn – brnsh gry, mod hd – hd, brit I.P., microxln, calc I.P., v arg, Tr micropyr, grds occ dol Mrl	
	Tr Ls	a.a.	

WELLSITE SAMPLE DESCRIPTION			Page 9 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12 ¼"	Cut solvent: Iso Propanol	Date: 02.04.2004	

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.
2630	100 Clst	a.a.	a.a.
	Gd Tr Dol	a.a.	
2640	90 Clst	a.a.	Tr barite
	10 Dol	a.a.	
2650	100 Clst	a.a.	a.a.
	Gd Tr Dol	a.a.	
2660	100 Clst	Med dk – dk gry, frm, non – loc slily calc, non – v slily dol, Tr micromic, Tr – slily slty, Tr microcarb	Com barite
	Tr Dol	a.a.	
2670	A.A.		a.a.
2680	90 Clst	a.a.	a.a.
	10 Dol	a.a.	
2690	100 Clst	a.a.	Tr – minor barite Com Versatrol addit.
	Gd Tr Dol	a.a.	
2700	A.A.		a.a.
2710	90 Clst	a.a.	a.a.
	10 Dol	a.a., also occ pr – mod ind, micr	
2720	100 Clst	a.a.	a.a.
	Gd Tr Dol	a.a.	
2730	90 Clst	a.a.	a.a.
	10 Dol	a.a.	
2740	100 Clst	a.a.	a.a.
	Gd Tr Dol	a.a.	
	Tr Ls	Med – med dk grey, mod – wl ind, micr I.P., microxln I.P., v arg, sli dol	
2750 & 6(		Lost	
2770	100 Clst	a.a.	a.a.
	Tr Ls & Dol	a.a.	
2780	A.A.		a.a.
2790	100 Clst	a.a.	a.a.
	Gd Tr Dol	Med lt – med dk grysh brown – brnsh gry, crmbly – well ind, micr I.P., microxln I.P., arg, grds dol Mrl	
2802	100 Clst	a.a.	a.a.
	Tr Dol	a.a	

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WELLSITE SAMPLE DESCRIPTION			Page 10 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12 ¼"	Cut solvent: Iso Propanol	Date: 03.04.2004	

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.
2808	100 Clst	Med dk – dom dk gry, frm, non calc, non – v slily dol, slily micromic, Tr slty, Tr microcarb	Tr barite Com versaflow contam
	Gd Tr Dol	a.a.	
2811	A.A.		a.a.
2820	100 Clst	a.a., non calc, non dol	Com barite & Versatrol contam
	Tr Dol	a.a.	
2826	A.A.		a.a.
2829	A.A.		a.a.
2835	90 Clst	a.a.	a.a.
	10 Dol	a.a.	
2841	100 Clst	a.a.	Tr barite Com Versatrol contam
	Gd Tr Dol	a.a.	
2847	100 Clst	a.a.	a.a.
	TR Dol	a.a.	
2853	80 Clst	a.a., Tr – sli dol	a.a.
	20 Dol	a.a.	
2859	90 Clst	a.a.	a.a.
	10 Dol	a.a., sli – occ mod calc	
2865	100 Clst	a.a.	a.a.
	Gd Tr Dol	a.a.	
2868	100 Clst	a.a., non dol	a.a.
	Gd Tr Dol	a.a.	
2871	LOST		
2874	LOST		
2877	100 Clst	Med dk gry – dk gry, frm, slily micromic, slily slty, tr microcarb, non calc	Minor barite, com
	Tr Ls/Dol	Med dk grysh brn brn gry, frm – brit, micr I.P., microxln I.P., arg – v arg I.P.	Versatrol addit.
2880	Lost		
2883	A.A.		
2886	80 Clst	a.a.	Only minor fluor from
	20 Ls	Gry wh – lt brn gry, brit crumbly, microxln, arg	

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WELLSITE SAMPLE DESCRIPTION			Page 11 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12 ¼"	Cut solvent: Iso Propanol	Date: 03.04.2004	

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.
2889	95 Clst	Med dk gry – dk gry, frm, slily micromic, slily slty, tr microcarb, non calc	No shows
	5 Ls	Med dk grysh brn – brn gry, gry wh – lt brn gry, frm – brit, microxln, arg	
2892	LOST		
2895	95 Clst	a.a.	
	5 Ls	a.a.	
2898	90 Clst	a.a.	
	10 Ls	Slily dol, else a.a.	
2901	A.A.		
2904	A.A.		
2907	LOST		
2910	80 Clst	a.a.	
	20 Ls	a.a.	
2913	90 Clst	a.a.	No shows,
	10 Ls	Also micr I.P., else a.a.	only minor min fluor
2916	100 Clst	a.a.	
	Gd Tr Ls/Dol	Med dk grysh brn – brn gry, else a.a.	
2919	95 Clst	a.a.	
	5 Ls/Dol	a.a.	
2922	A.A.		
2925	90 Clst	a.a.	
	10 Ls/Dol	a.a.	
2928	A.A.		
2931	80 Clst	a.a.	
	20 Ls/Dol	a.a.	
2934	90 Clst	a.a.	No shows
	10 Ls/Dol	a.a.	
	Tr Sst	Clr – transl Qtz, v f – f, mod srt, sbang – ang, Qtz cmt, frm – mod hd	
2937	80 Clst	a.a.	
	20 Ls/Dol	a.a.	
2940	90 Clst	a.a.	
	10 Ls/Dol	a.a.	
	Tr Sst	a.a.	

WELLSITE SAMPLE DESCRIPTION			Page 12 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12 ¼"	Cut solvent: Iso Propanol	Date: 03.04.2004	

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.
2943	90 Clst	Med dk gry – dk gry, frm, slily micromic, slily slty, tr microcarb, non calc	No shows
	10 Ls/Dol	Med dk grysh brn – brn gry, frm – brit, microxln, arg, slily dol	
	Tr Sst	Clr – transl Qtz, v f – f, occ med, mod srt, sbang – ang, , frm – mod hd, Qtz cmt	
2946	90 Clst	a.a.	
	10 Ls/Dol	a.a.	
2949	A.A.		
2952	A.A.		
2955	A.A.		
2958	A.A.		
2961	A.A.		
2964	A.A.		
2967	A.A.		
2970	LOST		
2973	LOST		
2976	95 Clst	a.a.	
	5 Ls/Dol	a.a.	
2979	A.A.		
2982	A.A.		
2985	LOST		
2988	A.A.		
2991	A.A.		
2994	95 Clst	Also tr dk gn gry, else a.a.	
	5 Ls/Dol	a.a.	
2997	A.A.		
3000	100 Clst	a.a.	
	Tr Ls/Dol	a.a.	
3003	100 Clst	Med dk gry – dk gry, frm, slily micromic, slily slty, tr microcarb, non calc	
	Tr Ls/Dol	a.a.	
3006	A.A.		

WELLSITE SAMPLE DESCRIPTION

Country: Norway	Area: Nordland II	Field: Alve
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell	
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant	
Hole size: 12 ¼"	Cut solvent: Iso Propanol	Date: 03.04.2004

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.
3009	100 Clst	Med dk gry – dk gry, frm, slily micromic, slily slty, tr microcarb, non calc	No shows
	Tr Ls/Dol	Med dk grysh brn – brn gry, frm – brit, microxln, arg, slily dol	
3012	100 Clst	Also dk gn gry, else a.a.	
	Gd Tr Ls/Dol	a.a.	
	Tr Pyr		
3015	100 Clst	a.a.	
	Gd Tr Ls/Dol	a.a.	
3018	100 Clst	Med dk gry – dk gry, dk gn gry, else a.a.	
	Gd Tr Ls/Dol	a.a.	
3021	90 Clst	a.a.	
	10 Ls/Dol	Also gry wh, else a.a.	
3024	95 Clst	a.a.	
	5 Ls/dol	a.a.	
3027	100 Clst	a.a.	
	Gd Tr Ls/Dol	a.a.	
3030	100 Clst	Med dk gry – dk gn gry, also grysh rd – dsky rd, non – slily calc,else a.a.	
	Gd Tr Ls/Dol	a.a.	
3033	100 Clst	Med dk gry – dk gry, dk gn gry, grysh rd – dsky rd, else a.a.	
	Tr Ls/Dol	a.a.	
3036	100 Clst	Mainly dsky rd – grysh rd and grysh gn – dsky yel gn, also med dk gry – dk gry, else a.a.	
	Tr Ls/Dol	a.a.	
3039	80 Clst	Varicol, med – med dk brn – rdsh brn – yelsh brn, med – dk gry, frm, non calc, non – slili dol, slily – mod micromic, slily – occ mod slty, Tr – occ slily micropyr, loc Tr microcarb	
	20 Mrl	Lt – med brn – rdsh brn, frm, dol, slily – mod slty, Tr micromic, grds arg Ls I.P.	No shows above OBM
	Tr Tf	Lt – med lt gry – gnsh gry, spkld/mottld off wh, Tr – occ dk gry spks & pchs, crmb – frm, non – slily calc & dol, Tr micropyr	
3045	80 Clst	a.a., bcms dom med dk – dk gry	
	20 Mrl	Med lt – med brnsh gry, crmb – frm, slily dol, Tr slt, slily microcarb, Grds occ arg Ls	a.a.
3048	100 Clst	Dk gry – grysh blk, frm, slily calc & dol, slily – dom mod slty, Tr – slily sdy, slily – mod micromic, slily micropyr, Tr – slily microcarb	
	Tr Mrl	a.a.	
3051	A.A.		

WELLSITE SAMPLE DESCRIPTION			Page 14 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12 ¼"	Cut solvent: Iso Propanol	Date: 03.04.2004	

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.
3054	90 Clst	a.a.	
	10 Dol Mrl	Med lt – med grysh brn – brnsh gry, crmb – frm, dol,slily – occ mod slty, Tr microcarb, grds occ arg Dol	No shows above OBM
	Tr Calc Mrl	a.a.	
3057	A.A.		a.a.
3060	100 Clst	a.a.	
	Gd Tr Dol Mrl	a.a.	a.a.
3063	100 Clst	a.a.	
	Tr Dol Mrl	a.a.	
3066	90 Clst	a.a., non – slily calc, slili dol	
	10 Dol Mrl	a.a.	a.a.
3069	100 Clst	a.a.	Tr fn bn/rd brn cvgs
	Tr Dol Mrl	a.a.	
3072	A.A.		R fn bn/rd brn cvgs
3075	100 Clst	a.a.	R fn bn/rd brn cvgs
	R Dol Mrl	a.a.	
3078	100 Clst	a.a., non – dom slily calc, slily dol	R fn bn/rd brn cvgs
	Tr Dol Mrl	a.a.	
3081	80 Clst	a.a.	Mnr Verstrol contam
	20 Dol Mrl	a.a.	
3084	100 Clst	a.a., slily calc & slily dol	Mnr Verstrol contam
	Tr Dol Mrl	a.a.	
3087	100 Clst	a.a.	Com Verstrol contam
	Gd Tr Dol Mrl	a.a.	
3090	100 Clst	a.a.	Mnr Verstrol contam
	Tr Dol Mrl	a.a.	
3093	A.A.		Tr fn brn/rd brn cvgs Tr Versatrol contam
3096	A.A.		
3099		Missing	
3102		Missing	
3105	100 Clst	Med dk – dom dk gry – occ grysh blk, fim – occ v frm, sli – occ mod calc, sli – occ mod micromic, Tr micropyr & microcarb, Tr Pyr nods	Mnr Verstrol contam
	Tr Dol Mrl	a.a.	

WELLSITE SAMPLE DESCRIPTION			Page 15 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12 ¼"	Cut solvent: Iso Propanol	Date: 04.04.2004	

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.
3108	80 Clst	a.a.	
	20 Dol Mrl	Lt – med grysh brn – brnsh gry, crnb – mod hd, dol, non – slily slty, Tr carb strks, R vn Calc, grds occ arg Dol	No shows above OBM
3111		Missing	
3114	90 Clst	a.a.	Mnr Versatrol & barite
	10 Dol Mrl	a.a.	
3117	100 Clst	a.a.	a.a.
	Gd Tr Dol Mrl	a.a.	
3120	A.A.		Tr Versatrol & barite
3123	A.A.		a.a.
3126	100 Clst	a.a., med dk – dk gry, mod calc	a.a.
	Gd Tr Dol Mrl	a.a.	
3129	100 Clst	a.a., med dk – dk gry, slily - mod calc	a.a.
	Gd Tr Dol Mrl	a.a.	
3132	100 Clst	Med dk – dom dk gry – occ grysh blk, frm – v frm, Tr – slily calc, mod – v micromic, slily – dom mod slty, Tr pyr	
	Tr Dol Mrl	a.a	
3135	100 Clst	Med dk – dom dk gry – occ grysh blk, frm – mod hd, calc, slily – mod micromic, slily slty	
	Tr Dol Ls	Lt – med grysh brn – brnsh gry, crmbly – mod hd, dol, tr v f gry wh Ls, arg	
3138	95 Clst	a.a.	
	5 Dol Ls	a.a.	
3141	100 Clst	a.a.	
	Tr Dol Ls	a.a.	
3144	90 Clst	a.a.	
	10 Dol Ls	a.a.	
3147	100 Clst	Also v dsky rd – blksh rd, else a.a.	
	Tr Dol Ls	a.a.	
3150	100 Clst	Med dk gry, v dsky rd – blksh rd, gnsh gry – dk gnsh gry, else a.a.	
	Tr Dol Ls	Incr amount of gry wh Ls, else a.a.	
3153	100 Clst	Gnsh gry – dk gnsh gry, frm – mod hd, micromic, slily slty, occ micropyr, calc – occ v calc	
	Tr Dol Ls	a.a.	
3156	100 Clst	Also tr of dsky rd – blksh rd, else a.a.	
	Tr Ls	Gry wh – v pa or, frm – occ sft, slily dol, slily arg	

WELLSITE SAMPLE DESCRIPTION			Page 16 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12 ¼"	Cut solvent: Iso Propanol	Date: 04.04.2004	

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.
3159	100 Clst	Gnsh gry – dk gnsh gry, gnsh blk, frm – mod hd, micromic, slily slty, occ mic calc – occ v calc	
	Tr Ls	Gry wh – v pa or, frm – occ sft, slily dol, slily arg	
3162	100 Clst	Brn blk – dsky yel brn, frm, slily slty, micromic, occ micropyr, non calc – occ slily calc, occ tr carb mat	
	Tr Ls	a.a.	
3165	A.A.		
3168	LOST		
3171	LOST		
3174	A.A.		
3177	LOST		
3180	A.A.		
3183	A.A.		
3186	A.A.		
3189	A.A.		
3192	100 Clst	Dk gry – grysh blk, frm, slily slty, slily micromic, occ micropyr, slily calc - Calc	
	Tr Ls	a.a.	
3195	100 Clst	Dk gry – grysh blk, dk brnsh gry – brnsh blk, firn – v frm, slily calc & dol, mod – v micromic, Tr – slily slty, occ v pyr pchs	
	Gd Tr Dol Mrl	Med lt – med grysh brn – brnsh gry, crmb – frm, dol, tr – slily slty, Tr – slily carb, Tr micropyr, grds occ arg Dol	
	Tr Ls	Off wh – lt gry – ly brnsh gry, mod ind, micr, mod – v arg, slily carb, Tr Slty & micromic & micropyr, grds Mrl	
3198		Missing	
3201	100 Clst	a.a.	
	Tr Dol Mrl	a.a.	
3204	100 Clst	a.a.	Tr barite
	Tr Dol Mrl	a.a.	
	Tr Ls	a.a., also med – med dk grysh brn, hd, brit, micr I.P., cryptoxln I.P., v arg, slily microcarb, grds Mrl	
3207	90 Clst	a.a.	
	10 Dol Mrl	a.a., occ med dk grysh brn – brnsh gry	
	Tr Ls	a.a.	

WELLSITE SAMPLE DESCRIPTION			Page 17 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12¼"	Cut solvent: Iso Propanol	Date: 05.04.2004	

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.
3210	100 Clst	a.a.	
	Gd Tr Dol Mrl	a.a.	
	Tr Ls	a.a.	
3213	100 Clst	a.a., slily – occ mod slty	Mnr barite & Versatrol
	Tr Dol Mrl	a.a.	
3216	80 Clst	a.a.	
	20 Dol Mrl	a.a.	No shows above OBM
3219	100 Clst	a.a.	Tr Versatrol
	Tr Dol Mrl	a.a.	
3222	100 Clst	Dk gry – grysh blk, frm – v frm, tr – slily slty, slily calc, occ slily microcarb	
	Tr Dol Ls	Off wh – lt gry, lt brn gry, mod hd, micr – occ sucrosic, arg	
3225	100 Clst	a.a.	
	Tr Dol Mrl	Grysh brn – brnsh gry, frm, dol, slily – mod calc, arg – v arg, micromic I.P.	
	Tr Dol Ls	a.a.	
3228	LOST		
3231	90 Clst	a.a.	
	10 Dol Mrl	a.a.	
	Tr Dol Ls	a.a.	
3234	LOST		
3237	LOST		
3240	LOST		
3243	100 Clst	a.a.	
	Tr Dol Mrl	a.a.	
	Tr Dol LS	a.a.	
3246	100 Clst	a.a.	
	Tr Dol Mrl	a.a.	
3249	100 Clst	Brnsh gry – dk gry, else a.a.	
	Tr Dol Mrl	a.a.	
3252	A.A.		
3255	A.A.		
3258	A.A.		
3261	LOST		
3264	95 Clst	a.a.	
	5 Dol Mrl	a.a.	

WELLSITE SAMPLE DESCRIPTION			Page 18 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12¼"	Cut solvent: Iso Propanol	Date: 05.04.2004	

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.
3267	LOST			
3270	100	Clst	Dk gry – brnsh gry, frm – v frm, tr – slily slty, slily calc, occ slily microcarb, occ micropyr, else a.a.	
	Tr	Dol Mrl	Grysh brn – brnsh gry, frm, dol, arg – v arg, micromic I.P	
3273	A.A.			
3276	LOST			
3279	A.A.			
3282	A.A.			
3285	LOST			
3288	90	Clst	a.a.	
	10	Dol Mrl	a.a.	
3291	LOST			
3294	95	Clst	a.a.	
	5	Dol Mrl	a.a.	
3297	LOST			
3300	LOST			
3303	A.A.			
3306	100	Clst	a.a.	
	Tr	Dol Mrl	a.a.	
3309	LOST			
3312	LOST			
3315	100	Clst	a.a.	
3318	LOST			
3321	100	Clst	a.a.	
	Tr	Dol Mrl	a.a.	
3324	LOST			
3327	A.A.			
3330	LOST			
3333	95	Clst	a.a.	
	5	Dol Mrl	a.a.	

WELLSITE SAMPLE DESCRIPTION			Page 19 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Peter Sergeant		
Hole size: 12¼"	Cut solvent: Iso Propanol	Date: 05.04.2004	

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.
3336	LOST		
3339	95 Clst	Dk gry – brnsh gry, frm – v frm, tr – slily slty, slily calc, occ slily microcarb, occ micropyr, else a.a.	
	5 Dol Mrl	Grysh brn – brnsh gry, frm, dol, arg – v arg, micromic I.P	
3342	100 Clst	a.a.	
	Tr Dol Mrl	a.a.	
3345	LOST		
3348	A.A.		
3351	A.A.		
3354	LOST		
3357	100 Clst	a.a.	
	Tr Dol Mrl	a.a.	
	Tr Dol Ls	a.a.	
3360	LOST		
3363	A.A.		
3366	95 Clst	a.a.	
	5 Dol Mrl	a.a.	
	Tr Dol Ls		
3369	A.A.		
3372	100 Clst	Med dk – occ dk gry – brnsh gry, frm – v frm, non calc, slily dol, slily – occ mod micromic, Tr – occ slily slty, Tr microcarb, Tr v pyr pchs	Trace barite & Versatr
	Gd Tr Mrl	Med lt – med grysh brn – brnsh gry, crmb – v frm, slily – v dol, Tr carb incls, Tr pyr, grds occ arg/calc Dol & arg/dol Ls	
3375	A.A.		a.a.
3378	LOST		
3381	100 Clst	a.a.	a.a.
	Tr Mrl	a.a.	
3384	LOST		
3387	A.A.		a.a.
3390	LOST		

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 20 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Siren Greve		
Hole size: 8 ½"	Cut solvent: Iso Propanol	Date: 12.04.2004	

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.
3393	100 Clst	Med dk – occ dk gry – brnsh gry, frm – v frm, non calc, slily dol, slily – occ mod micromic, Tr – occ slily slty, Tr microcarb, Tr v pyr pchs	Trace barite & Versatr
	Gd Tr Mrl	Med lt – med grysh brn – brnsh gry, crmb – v frm, slily – v dol, tr carb incls, T grds occ arg Dol & arg/dol Ls	
3396	LOST		
3399	A.A.		a.a.
3402	100 Clst	a.a., loc R vn Calc	a.a.
	Tr Mrl	a.a.	
3405	LOST		
3408	A.A.		a.a.
3411	LOST		
3414	A.A.	Gen less Mrl	a.a.
3417	LOST		
3420	100 Clst	a.a.	
	R Mrl	a.a.	
3423	A.A.		
3426	A.A.		
3429	LOST		
3432	A.A.		a.a.
3435	LOST		
3438	A.A.		a.a.
3441	LOST		
3444	100 Clst	a.a.	a.a.
	Tr Mrl	a.a.	
3447	LOST		
3450	A.A.		a.a.
3453	LOST		
3456	LOST		
3459	LOST		
3462	100 Clst	a.a.	
	R Mrl	a.a.	

WELLSITE SAMPLE DESCRIPTION			Page 21 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Siren Greve		
Hole size: 8 ½"	Cut solvent: Iso Propanol	Date: 12.04.2004	

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.
3465	LOST		
3468	100 Clst	Med dk – occ dk gry – brnsh gry, frm – v frm, non calc, slily dol, slily – occ mod micromic, Tr – occ slily slty, Tr microcarb, Tr v pyr pchs	Trace barite & Versatro
	Gd Tr Mrl	Med lt – med grysh brn – brnsh gry, crmb – v frm, slily – v dol, tr carb incls, T grds occ arg/calc Dol & arg/dol Ls	
3471	LOST		
3474	100 Clst	Med dk – dk grey – brnsh gry, frm – v frm, Tr – slily dol, Tr – slily slty, Tr - slily micromic, Tr micropyr & v pyr pchs, R vn Calc	
	Gd Tr Mrl	Med lt – dom med dk grysh brn – brnsh gry, crmb – v frm, dol I.P., Tr – slily carb, occ grds arg Dol & arg/dol Ls	
3477	LOST		
3480	100 Clst	a.a.	
	Tr Mrl	a.a.	
3483	LOST		
3486	LOST		
3489	A.A.		
3492	A.A.		
3495	LOST		
3498	A.A.		
3501	LOST		
3504	A.A.		
3507	LOST		
3510	A.A.		
3513	LOST		
3516	A.A.		Tr Versatrol
3519	A.A.		
3522	LOST		
3525	100 Clst	a.a., becs dker	
	TR Mrl	a.a.	
3528	100 Clst	Dk grey – brnsh grey – brnsh blk – olv blk, frm – v frm, slily dol, slily slty, mod micromic, Tr – slily microcarb, Tr v pyr pchs & nods	

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.
	Tr	Ls	Pa – med lt brn – grysh brn, mod hd, microxln, Tr dol, slily – mod arg
3531	LOST		
3534	A.A. LOST		
3540	100	Clst	Dk grey – brnsh grey – brnsh blk – olv blk, frm – v frm, slily dol, slily slty, mod micromic, Tr – slily microcarb, Tr v pyr pchs & nods
	Tr	Ls	Pa – med lt brn – grysh brn, mod hd, microxln, Tr dol, slily – mod arg
3543	LOST		
3546	100	Clst	a.a.
	Tr	Ls	a.a.
	R	Mrl	a.a.
3549	100	Clst	a.a.
	R	Ls	a.a.
3552	100	Clst	a.a.
3555	LOST		
3558	100	Clst	a.a., slily – occ mod slty, occ v pyr pchs
3561	A.A.		
3564	LOST		
3567	100	Clst	a.a., Tr med dk brnsh gry
3570	A.A.		
3573	100	Clst	Slty – mod slty, else a.a.
3576	A.A.		
3579	LOST		
3582	A.A.		
3585	LOST		
3588	LOST		
3591	100	Clst	Brnsh gry – med dk bmsh gry, dk gry – olv blk, frm – mod hd, mod micromic slty – mod slty, tr Pyr spcks – occ nod, tr – slily microcarb, non calc
3594	A.A.		
3597	A.A.		

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.
3600	LOST		
3603	A.A.		
3606	100	Clst	Brnsh gry – med dk brnsh gry - dk gry, slty – occ v slty grdg Sltst, else a.a.
3609	100	Clst	Brnsh gry – med dk brnsh gry, dk gry, frm – mod hd, mod micromic, slty – occ v slty grdg Sltst, tr Pyr spcks – occ nod, tr – slily microcarb, non calc
3612	A.A.		
3615	A.A.		
3618	LOST		
3621	LOST		
3624	LOST		
3627	A.A.		
3630	A.A.		
3633	A.A.		
3636	LOST		
3639	A.A.		
3642	A.A.		
3645	LOST		
3648	A.A.		
3651	A.A.		
3654	LOST		
3657	A.A.		
3660	A.A.		
3663	LOST		
3666	A.A.		
3669	LOST		
3672	A.A.		

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WELLSITE SAMPLE DESCRIPTION					Page 24 of 30
Country: Norway		Area: Nordland II		Field: Alve	
Well no: 6507/3-4		Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell			
RKB: 36 meters		Geologist: Lars Rasmussen, Siren Greve			
Hole size: 8 ½"		Cut solvent: Iso Propanol		Date: 12.04.2004	

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.
3675	LOST		
3678	A.A.		
3681	LOST		
3684	100	Clst — Brnsh gry – med dk brnsh gry, dk gry, frm – mod hd, mod micromic, slty – occ v slty grdg Sltst, tr Pyr spcks – occ nod, tr – slily microcarb, non calc	
3686	LOST		

TD for 12 ¼" hole section at 3686mMD/3684mTVD

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WELLSITE SAMPLE DESCRIPTION			Page 25 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Lars Rasmussen, Siren Greve		
Hole size: 8 ½"	Cut solvent: Iso Propanol	Date: 12.04.2004	

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.
3690	100 Clst	gry blk – olv blk, brnsh gry – brnsh blk, blky, frm – mod hd, micromic, slty – mod slty, slily microcarb, non calc	No shows
3693	A.A.		a.a.
3696	100 Clst	occ becom v slty grad Sltst, else a.a.	a.a.
3699	LOST		
3702	100 Clst	med dk gry – dk gry, brnsh gry, else a.a.	a.a.
3705	A.A.		a.a.
3708	A.A.		a.a.
3711	A.A.		a.a.
3714	100 Clst	occ micropyr, else a.a.	a.a.
3717	A.A.		a.a.
3720	100 Clst Tr Ls	a.a. gry wh – pa or gry,, frm – mod hd, blky – plty, slily arg	a.a.
3723	95 Clst 5 Sst	a.a. clr – transl Qtz, lse, v f – f, occ med – crs, sbrnd – rnd, wl srtd	a.a.
3726	50 Clst 50 Sst	a.a. a.a.	minor wk pa yel fluor, diff sl strm wh cut fluo
3727	A.A	spot sample	a.a.
3729	70 Sst 30 Clst Tr Mic	lt brn, clr – trnsl Qtz, pred v f – f, occ med and crs, mod srt, sbang, occ ang, lse gn a.a.	wk, pa yel fluor, wk, v sl, strm, yel wh cut fluor
3728-3764	Core #1		
3764-3818	Core#2		
3822	100 Sst Tr Clst	Pl yel bn, lt gry, clr-trns qtz, vf-f, gd srt, sbang, lse, non calc Gr blc, frm-ls, non calc, subfiss, occ slty	Wk pa yel dir flu, v wk V sl strm, yel-wh cut fl
3825	100 Sst Tr Clst	a.a a.a	a.a
3828		lost	
3831	100 Sst Tr Clst	a.a a.a	a.a

WELLSITE SAMPLE DESCRIPTION

Country: Norway	Area: Nordland II	Field: Alve
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell	
RKB: 36 meters	Geologist: Per Furmyr, Tor Kristian Hals	
Hole size: 8 ½"	Cut solvent: Iso Propanol	Date: 14.04.2004

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.
3834	100 Sst	Pl yel bn, lt gr, vf-f, occ slty, clr-transl qtz, gd srt, sbang, lse, non calc	Wk pa yel dir flu, v wk
	Tr Clst	Gr blc, frm-ls, non calc, subfiss, occ slty	V sl strm, yel-wh cut fl
3837	a.a		
3840	100 Sst	Lt gr, gnsh gr, vf-slty, frm-ls, non calc,	V sl pl yel cldy cut else
	Tr Clst	a.a	a.a
3843	100 Sst	Lt gr, pl yel bn, else a.a	Mod bri pl yel dir flu
	Tr Clst	a.a	Mod-sl pl yel cldy-strn
3846	100 Sst	Lt gry, med dk gry else a.a	a.a
	Tr Clst	a.a	
3849	a.a		Wk pl yel dir flu Poor cut else a.a
3852	100 Sst	Occ frm else a.a	
	Tr Clst	aa	a.a
3855	a.a		a.a
3858	a.a		a.a
3861	a.a		a.a
3864	a.a		a.a
3867	a.a		a.a
3870	a.a		a.a
3873	a.a		V sl bl-wh cut, else a.a
3879	100 Sst	Pl yel bn, else a.a	Wk-mod bri pl yel dir f Mod fst bl-wh cldy cut
3882	lost		
3885	lost		
3888	100 Sst	a.a	Mod bri pl yel dir flu Else a.a
3891	100 Sst	a.a	Wk pl yel dir flu V wk bl-wh cut
3894	a.a		
3897	a.a		a.a
3900	100 Sst	Med gr, dk gr, else a.a	Mod bri pl yel dir flu Mod-sl bl-wh cldy cut

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WELLSITE SAMPLE DESCRIPTION			Page 27 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Per Furmyr, Tor Kristian Hals		
Hole size: 8 ½"	Cut solvent: Iso Propanol	Date: 14.04.2004	

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.
3903	100	Sst	Med gry, dk gry, clr-trnsl qtz, vf-slty, pred ls, occ firm, subfiss	Wk pl yel dir flu Mod fst bl-wh cldy cut
3906	a.a			V wk pl yel dir flu V sl bl-wh cldy cut
3909	100	Sst	Dk gr, md lt gr, arg, else a.a	Ptchy pl yel dir flu Else a.a
3912	100	Sst	V arg else a.a	V wk pl yel dir flu els a
3915	100	Sst	Lt gr else a.a	Wk-mod pl yel dir flu
3918	LOST			
3921	100	Sst	a.a	a.a
3924	100	Sst	a.a	V wk pl yel dir flu V sl bl-wh cldy cut
3927	100	Sst	a.a	a.a
3930	50	Sst	Dk gr, v arg, frm, occ mod hd, vf-slty	
	50	Sst	Lt gr, md lt gr, vf, gd srt, subang, frm-lse, clr-trnsl qtz	a.a
3933	a.a			a.a
3936	a.a			a.a
3939	LOST			
3942	50/50	Sst	a.a	a.a
	Gd Tr	Clst	Dk gr, subfis, md had-hd, non calc	
3945	LOST			
3948	50/50	Sst	a.a	a.a
3951	LOST			
3954	50/50	Sst	a.a	
3957	LOST			
3960	LOST			
			Comment: ROP 100 m/h (Lunch)	
3963	LOST			
3966	LOST			

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 28 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Per Furmyr, Tor Kristian Hals		
Hole size: 8 ½"	Cut solvent: Iso Propanol	Date: 14.04.2004	

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.
3969	100	Sst	Lt gr, vf, occ slty, ls, gd sort, subang, subfis	V wk pl yel dir flu V sl bl-wh cldy cut
3972	LOST			
3975	LOST			
3978	100	Sst	a.a	a.a
3981	100	Sst	a.a	a.a
3984	LOST			
3987	LOST			
3990	100	Sst	Med gr, else a.a	a.a
3993	LOST			
3996	90	Sst/sltst	Lt gr, ls, stcky, calc cem, arg	PP pl yel dir flu
	10	Clst	Dk gr, frm-hd, occ med hd, micromic	No cut
3999	90	Sst/sltst	a.a	a.a
	10	Clst	Frm, blcky, else a.a	
4002	90	Sst/sltst	Lt gr, med dk gr, else a.a	a.a
	10	Clst	a.a	
4005	LOST			
4008	80	Sst/sltst	a.a	Ptchy, else a.a
	20	Clst	a.a	
4011	a.a			a.a
4014	90	Sst/sltst	a.a	PP, else a.a
	10	Clst	a.a	
4017	60	Sst/sltst	a.a	a.a
	40	Clst	Brsh bl, else a.a	
4020	80	Clst	V stcky, else a.a	No shows
	20	Sst/sltst	a.a	
4023	90	Clst	a.a	a.a
	10	Sst/sltst	a.a	
4026	90	Clst	a.a	a.a
	10	Sst/sltst	a.a	

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WELLSITE SAMPLE DESCRIPTION			Page 29 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Per Furmyr, Tor Kristian Hals		
Hole size: 8 ½"	Cut solvent: Iso Propanol	Date: 14.04.2004	

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.
4029	90 Clst	Dk gr, brsh blk, frm-hd, occ mod hd, blky, occ micromic, non calc	No shows
	10 Sst/sltst	Lt gr, lse, stcky, calc cem, arg	
4032	80 Sst/sltst	a.a	V wk pl yel dir flu
	20 Clst	a.a	No cut
4035	90 Sst	Lt gr, yel gr, non calc else a.a	a.a
	10 clst	a.a	
4038	90 Sst	a.a	a.a
	10 Clst	a.a	
4041	90 Sst	a.a	a.a
	10 Clst	a.a	
4044	95 Sst	Clr – trns – occ lt gry qtz, vf - med, occ crs, mod srt, sbrndd – ang, pred lse, oc SST agg, sil cmt, hd	PP, wk, pa yel fluor, nc ct fluor
	5 Clst	a.a.	
4047	50 Sst	Vf – crs, pr srt, off wh arg mtrx, sli calc cmt, sil cmt, else a.a.	a.a.
	50 Clst	Dk gry, brn blk, frm – mod hd, blky – sbfis, sli micromic, non calc	
	Tr Mic		
4050	60 Clst	a.a.	No shows
	40 Sst	a.a.	
	Tr Mic		
4053	50 Clst	a.a.	PP, wk, pa yel fluor, nc cut fluor
	50 Sst	a.a.	
	Tr Mic		
4056	70 Sst	Vf – med, occ crs, mod srt, sbang – ang, else a.a.	a.a.
	30 Clst	a.a.	
4059	50 Sst	Vf – crs, pr srt, else a.a.	No shows
	50 Clst	a.a.	
	Tr Mic		
4062	90 Clst	a.a.	a.a.
	10 Sst	a.a.	
4065	70 Sst	a.a.	a.a.
	30 Clst	a.a.	
4068	70 Sst	Clr – trnsl qtz, vf – crs, pr – mod srt, sbrndd – ang, pred lse, occ sil cmt agg w/off wh arg mtrx	Tr pa yel fluor, no cut fluor
	30 Clst	a.a.	

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WELLSITE SAMPLE DESCRIPTION			Page 30 of 30
Country: Norway	Area: Nordland II	Field: Alve	
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell		
RKB: 36 meters	Geologist: Per Furmyr, Tor Kristian Hals		
Hole size: 8 ½"	Cut solvent: Iso Propanol	Date: 14.04.2004	

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.
4071	90	Clst	Dk gry, brn blk, frm – mod hd, blky – sbfis, sli micromic, non calc, occ blk, Shny, v carb - coaly	No shows
	10	Sst	Clr – trnsl qtz, vf – crs, pr – mod srt, sbrndd – ang, pred lse, occ sil cmt agg w/off wh arg mtrx	
4074	95	Clst	a.a.	a.a.
	5	Sst	a.a.	
4077	40	Sst	a.a.	a.a.
	30	Coal	Blk, shny, occ arg	
	30	Clst	a.a.	
4080	70	Sst	a.a.	a.a.
	30	Clst	a.a.	
	Tr	Coal	a.a.	
4083	75	Clst	a.a.	a.a.
	20	Sst	a.a.	
	5	Coal	a.a.	
4086	50	Clst	a.a.	a.a.
	50	Sst	a.a.	
	Tr	Coal	a.a.	
4089	80	Sst	Clr – trnsl qtz, pred lse, vf – crs, occ v crs, pr srt, sbang – ang, sil cmt and off wh arg mtrx	a.a.
	20	Clst	Also brn gry, else a.a.	
	Tr	Coal	a.a.	
4092	a.a.			a.a.

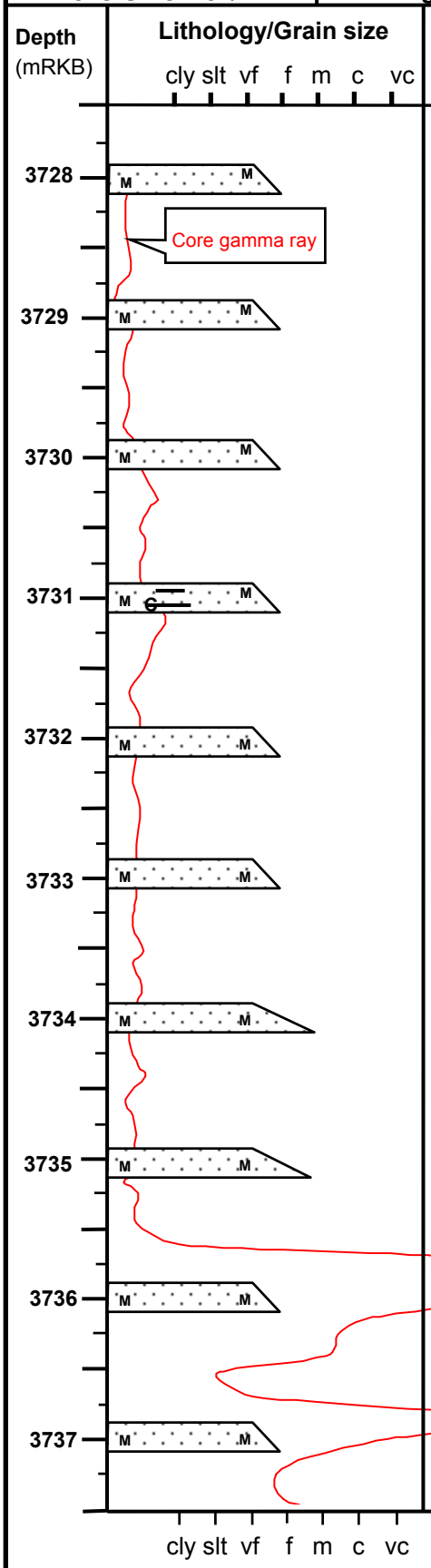
TD of well 6507/3-4 at 4092 mMD RKB, 4089 mTVD RKB

App E Core descriptions

STATOIL

CONVENTIONAL CORE DESCRIPTION

Country: Norway	**Area:** Nordland II	**Field:** Alve structure
Well no: 6507/3-4	**Formation:** Garn & Not Fm.	
Core no: 1	**Interval:** 3728 - 3764 mMD	**Cored:** 36 m **Rec:** 34.21 m 95 %
Core size: 3 ½"	**Geologists:** P. Furmyr, T.K. Hals	**Date:** 16.04.04

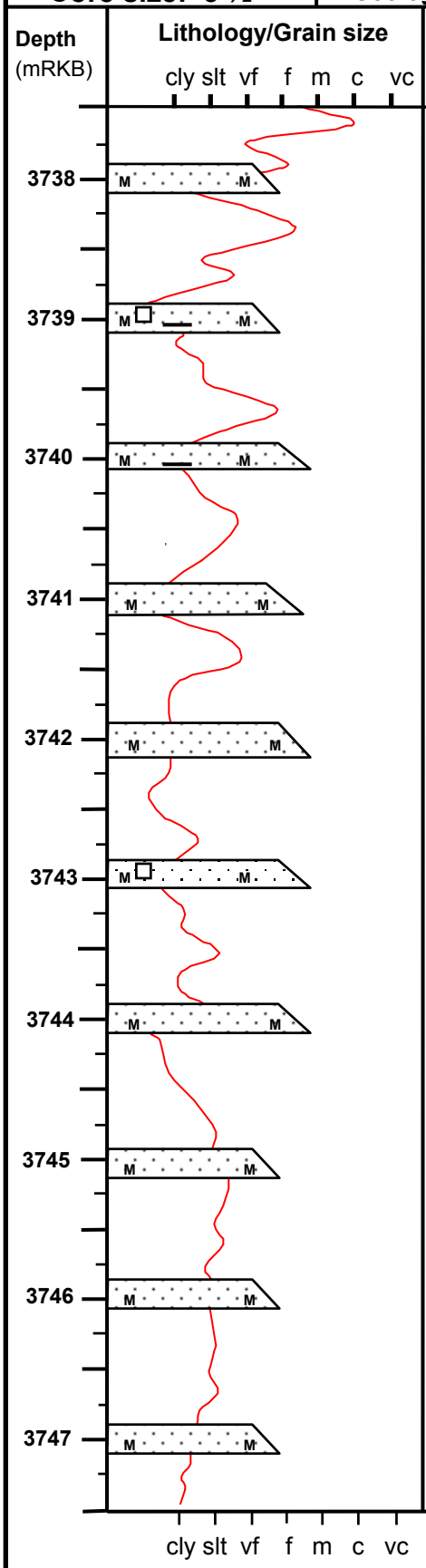


Lithological Description Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination	Remarks Shows, etc
SST: dk yel brn, clr – trns - pa brn qtz, v f – f, occ med, mod srt, ang – sbrndd, sil cmt, mod hd – hd, mic, poor vis por	Wk odor, mod bri, pa yel dir fluor. Sl strm, yel wh - mlky wh cut fluor. Yel wh res ring
SST: a. a.	Pch, mod bri, pa yel dir fluor. V sl strm cut fluor, else a. a
SST: a. a.	a.a
SST: occ carb mat, else a. a.	a.a
SST: a. a.	a.a.
SST: a. a.	a.a.
SST: occ crs, else a. a.	a.a
SST: a. a	a.a
SST: pa yel brn, vf - f, else a. a	a.a
SST: v sil cem, v hd, mic lam, else a. a	Pch, pa yel dir fluor, v sl strm cut fluor, else a.a

STATOIL

CONVENTIONAL CORE DESCRIPTION

Country: Norway	**Area:** Nordland II	**Field:** Alve structure
Well no: 6507/3-4	**Formation:** Garn & Not Fm.	
Core no: 1	**Interval:** 3728 - 3764 mMD	**Cored:** 36 m **Rec:** 34.21 m 95 %
Core size: 3 ½"	**Geologists:** P. Furmyr, T.K. Hals	**Date:** 16.04.04



Shows			Φ			Lithological Description	Remarks
STAIN	FLUOR	CUT	POOR	FAIR	GOOD	Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination	Shows, etc
						SST: pa yel brn, clr – trnsl-pa brn qtz, pred f, occ med, mod srt, ang – sbrndd, sil cmt, hd – v hd, mic, poor vis por	Wk odor, mod bri, pa yel dir fluor. Sl strm, yel wh- mlky wh cut fluor. Yel wh res ring
						SST: v sil cmt lam, v hd, Pyr, no vis por	Pch, mod bri, pa yel fluor. Sl, cldy cut fluor, else a.a
						SST: pa yel brn, clr – trnsl-pa brn qtz, f-med, mod srt, ang – sbrndd, sil cmt, hd – mod hd, mic, poor vis por	Sl cldy-strmg cut fluor, else a.a
						SST: a.a	a.a
						SST: a.a	Bri yel dir fluor, sl strm cut fluor, else a.a.
						SST: slily mic, pyr, else a.a	a.a
						SST: no Pyr, else a.a	a.a
						SST: vf – f, v sil cmt, hd-mod hd, else a. a	a.a
						SST: pa yel brn, dk yel brn (stain?), else a. a	a.a
						SST: pa yel brn, else a. a	a.a

STATOIL

CONVENTIONAL CORE DESCRIPTION

Country: Norway	**Area:** Nordland II	**Field:** Alve structure
Well no: 6507/3-4	**Formation:** Garn & Not Fm.	
Core no: 1	**Interval:** 3728 - 3764 mMD	**Cored:** 36m **Rec:** 34.21 m 95 %
Core size: 3 ½"	**Geologists:** P. Furmyr, T.K. Hals	**Date:** 16.04.04

Depth (mRKB)	Lithology/Grain size (cly slt vf f m c vc)	Apparent dip	Shows: STAIN	FLUOR	CUT	Porosity: POOR	FAIR	GOOD	Lithological Description (Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination)	Remarks (Shows, etc)
3748	M–M								**SST:** pa yel brn, dk yel brn, clr – trnsl-pa brn qtz, v f - f, mod srt, ang – sbrndd, sil cmt, hd – mod hd, mic - v mic (crs), poor vis por	Wk odor, mod bri, pa yel dir fluor. Sl strm, yel wh- mlky wh cut fluor. Yel wh res ring
3749	M–M								**SST:** pa yel brn, vf, else a.a	Pchy yel dir fluor, v slow strm cut fluor
3750	M–M								**SST:** a.a	a.a
3751	M–M								**Sil Cmt SST:** v lt gry, lt gry, v hd, v mic	No shows
3752	M–M								**Sil Cmt SST:** med hd, else a.a	Pchy yel dir fluor, v slow strm cut fluor
3753	M–M								**SST:** pa yel brn, dk yel brn, clr – trnsl-pa brn qtz, v f - f, mod srt, ang – sbrndd, v sil cmt, hd – v hd, v mic, poor vis por	Wh – bl wh dir fluor, sl, bl wh, strm cut fluor
3754	M–M								**SST:** f, mic, sil cem, else a. a	Pa yel wh dir fluor, v sl, cldy cut fluor
3755	M–M								**SST:** a.a	Sl, strm cut fluor, else a. a
3756	M–M								**SST:** vf else a. a	a. a
3757	M–M								**SST:** v mic, else a. a	Wk odor, mod bri, pa yel dir fluor. Sl strm-cldy, yel wh- mlky wh cut fluor. Yel wh res ring

cly slt vf f m c vc

STATOIL

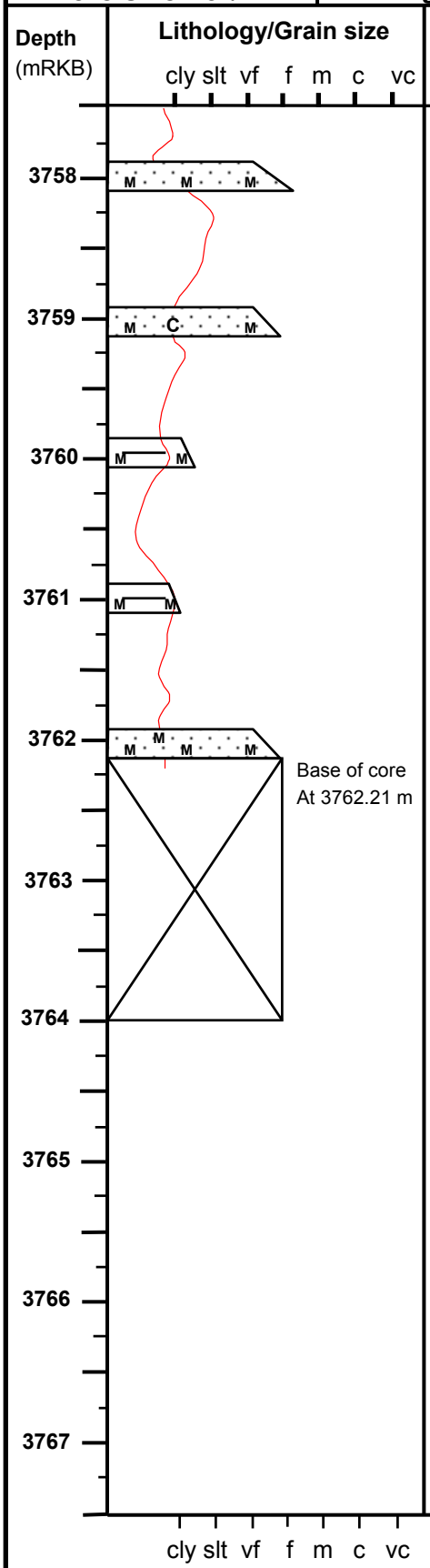
CONVENTIONAL CORE DESCRIPTION

Country: Norway | **Area:** Nordland II | **Field:** Alve structure

Well no: 6507/3-4 | **Formation:** Garn & Not Fm.

Core no: 1 | **Interval:** 3728 - 3764 mMD | **Cored:** 36 m **Rec:** 34.21 m 95 %

Core size: 3 ½" | **Geologists:** P. Furmyr, T.K. Hals | **Date:** 16.04.04

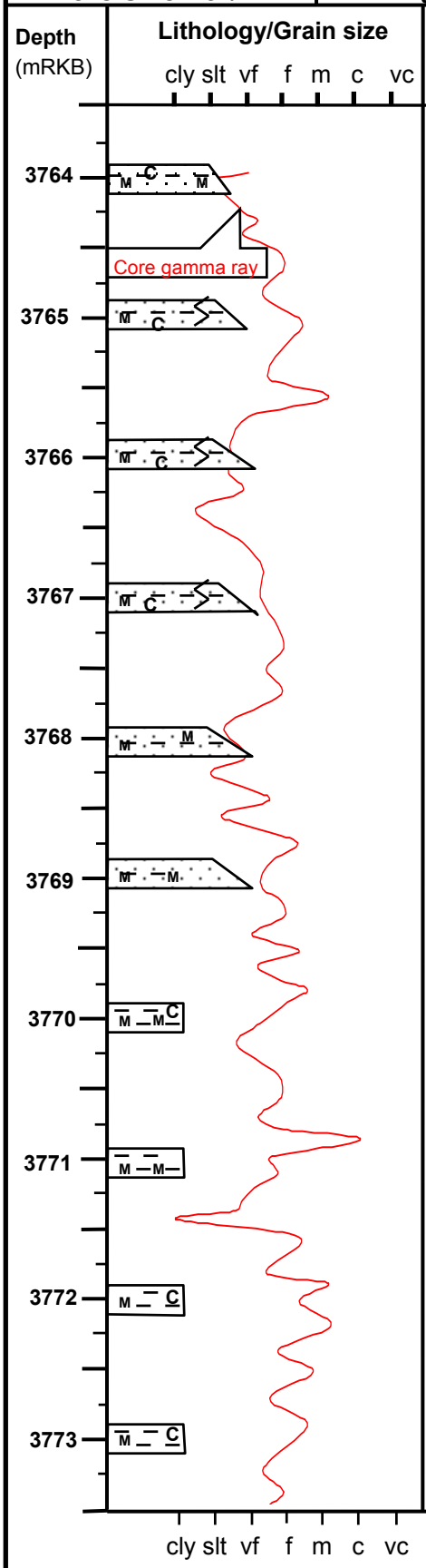


Shows						Lithological Description	Remarks
STAIN	FLUOR	CUT	POOR	FAIR	GOOD	Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination	Shows, etc
						SST: pa yel brn, dk yel brn clr – trnsl-pa brn qtz, f-med, mod srt, ang – sbrndd, v sil cmt, hd – v hd, v mic, poor vis por	Wk, pchy, yel wh dir fluor, sl strm, yel wh-mlky wh cut fluor. Yel wh res. ring
						SST: pa yel brn, f, mod - wl srt, ang – sbrndd, frm, mic, carb, else a. a	Wk, yel wh dir fluor, v sl strm cut fluor, else a. a
						SH: dk gry, occ lt gry, hd - v hd, v mic, non calc, w/ sil cmt SST lenses a.a	No shows
						SH: dk gry, hd, else a.a (no SST lenses)	No shows
						SST: pa yel brn, dk yel brn, clr – trnsl-pa brn qtz, vf, occ f-med, mod srt, ang – sbrndd, v sil cmt, hd – v hd, v mic, thn mic lam, poor vis por	Wk odor, mod bri, pa yel dir fluor. Sl strm, yel wh- mlky wh cut fluor. Yel wh res ring

STATOIL

CONVENTIONAL CORE DESCRIPTION

Country: Norway	**Area:** Nordland II	**Field:** Alve structure
Well no: 6507/3-4	**Formation:** Not & Ile Fm	
Core no: 2	**Interval:** 3764 - 3818 mMD	**Cored:** 54 m **Rec:** 54.33 m 100.6 %
Core size: 3 ½"	**Geologists:** P. Furmyr, T.K. Hals	**Date:** 17.04.04



Shows						Lithological Description	Remarks
STAIN	FLUOR	CUT	POOR	FAIR	GOOD	Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination	Shows, etc
						SLTST w/lam of CLST:	
	▮	▮	▮			**SLTST:** olv blk dk gry, l.p. grad to vf SST, arg, mic, carb, sil cmt, mod hd, no – pr vis por	No odour. Pchy, wk, pa yel fluor. V sl, cldy, pa yel wh cut fluor
						CLST: brn blk – gry blk, mod hd, blky – sbfis, mic, carb, slty, non calc	
	▮		▮			**SLTY SST w/thin lam of CLST:** **SST:** v slty – grad to SLTST, olv gry, mic, vf, wl srt, sbang – sbrndd, sil cmt, mod hd, pr vis por, bioturb **CLST:** a.a.	No odour. Tr fluor a.a. No cut fluor
	▮		▮			**SLTY SST w/thin lam of CLST:** a.a.	a.a.
			▮			**SLTY SST w/thin lam of CLST:** a.a. .	No shows
			▮			**SLTST w/lam of CLST:** **SLTST:** olv blk dk gry, l.p. grad to vf SST, arg, mic, carb, sil cmt, mod hd, no – pr vis por **CLST:** brn blk – gry blk, mod hd, blky – sbfis, v mic, carb, slty, non calc	a.a.
			▮			**SLTST w/lam of mica:** **SLTST**: l.p. v mica, else a. a.	a.a.
						SH: olv blk – blk, mod hd, sbfis – fis, slty i.p., carb w/blk coaly frg (plt rem?), non calc, mic – l.p. v mic	a.a
						SH: v mic, else a.a.	a.a
						SH: olv blk – blk, mod hd, sbfis – fis, slty i.p., carb w/blk coaly frg, non calc, mic – l.p. v mic	a.a
						SH: a.a.	a.a.

STATOIL

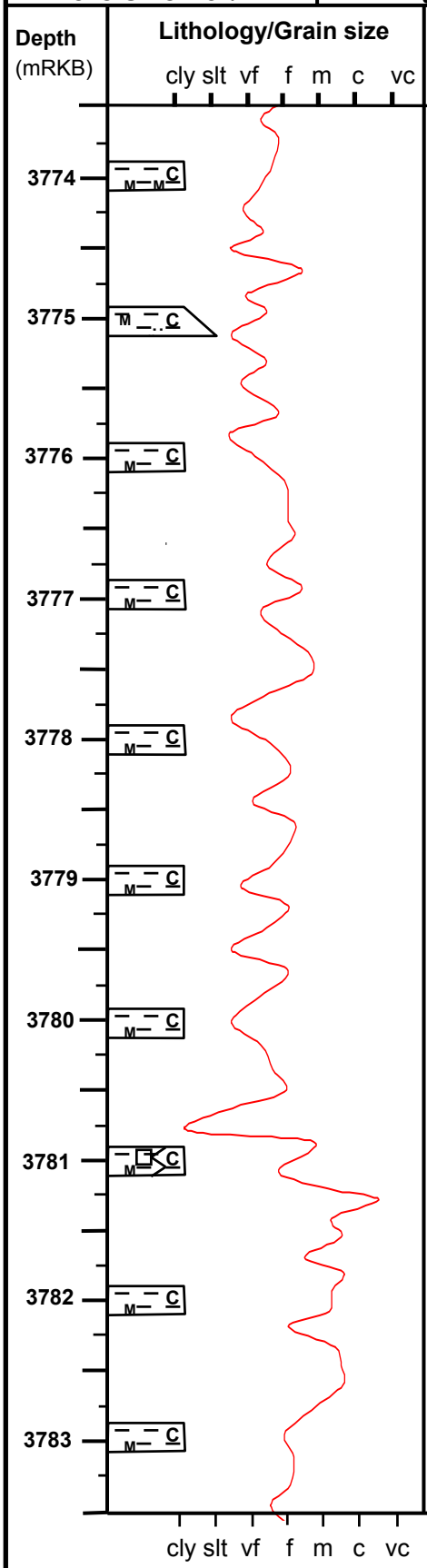
CONVENTIONAL CORE DESCRIPTION

Country: Norway | **Area:** Nordland II | **Field:** Alve structure

Well no: 6507/3-4 | **Formation:** Not & Ile Fm

Core no: 2 | **Interval:** 3764 – 3818 mMD | **Cored:** 54 m **Rec:** 54.33 m 100.6 %

Core size: 3 ½" | **Geologists:** P. Furmyr, T.K. Hals | **Date:** 17.04.04

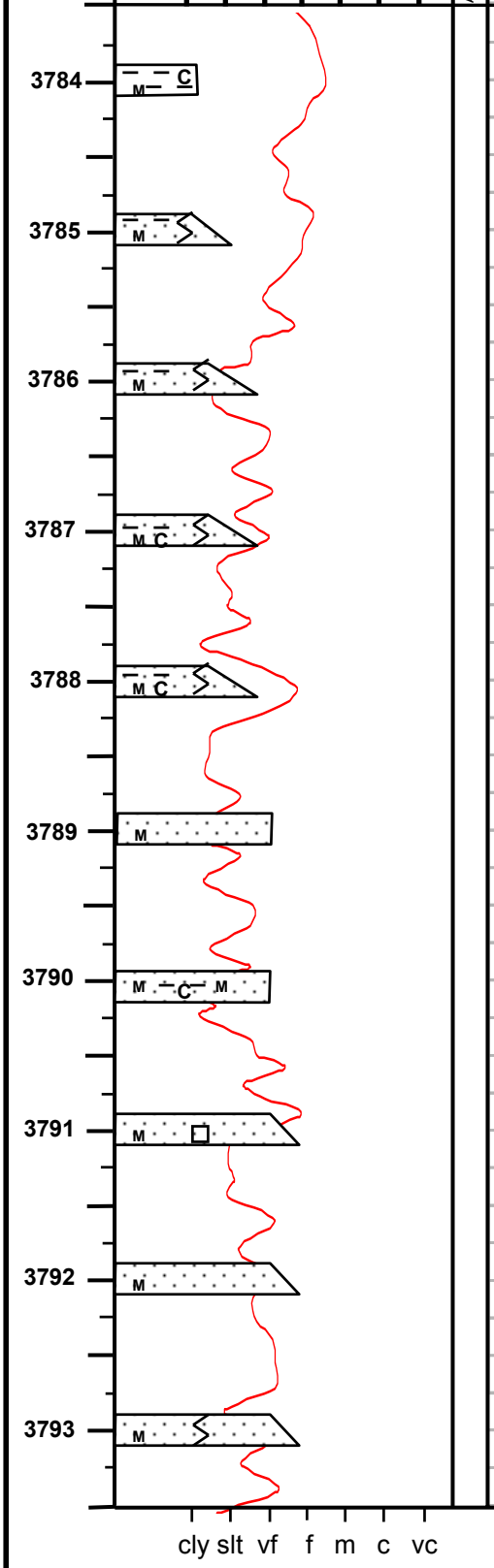


Lithological Description Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination	Remarks Shows, etc
SH: olv blk – blk, mod hd, sbfis – fis, slty i.p., carb w/blk coaly frg, non calc, mic – l.p. v mic	No shows
SH w/thin lam of SLTST: **SH:** a.a. **SLTST:** olv blk, sil cmt, mod hd, mic, non calc	a.a.
SH: a.a.	a.a.
SH: blk – gry blk, mod hd, sbfis – fis, mic, carb, non calc	a.a
SH: a.a	a.a.
SH: a.a	a.a
SH: a.a	a.a
SH: blk, mod hd, sbfis – fis, carb, bioturb w/pyr bur, non calc	a.a
SH: blk, mod hd, fis, w/shny, stri slick	a.a
SH: blk – gry blk, mod hd, sbfis – fis, mic, carb, non calc	a.a

STATOIL

CONVENTIONAL CORE DESCRIPTION

Country: Norway	**Area:** Nordland II	**Field:** Alve structure
Well no: 6507/3-4	**Formation:** Not & Ile Fm	
Core no: 2	**Interval:** 3764 - 3818 mMD	**Cored:** 54 m **Rec:** 54.33 m 100.6 %
Core size: 3 ½"	**Geologists:** P. Furmyr, T.K. Hals	**Date:** 17.04.04



Shows						Lithological Description	Remarks
STAIN	FLUOR	CUT	POOR	FAIR	GOOD	Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination	Shows, etc
						SH: blk – gry blk, mod hd, sbfis – fis, mic, carb, non calc	No shows
						SLTST w/lam of CLST: **SLTST:** olv blk dk gry, l.p. grad to vf SST, arg, mic, carb, sil cmt, mod hd, no – pr vis por, bioturb **CLST:** brn blk – gry blk, mod hd, blky – sbfis, mic, carb, slty, non calc	a.a.
						Slty SST w/thin lam of CLST: **SST:** v slty – grad SLTST, lt olv gry, vf, wl srt, sbang – sbrndd, sil cmt, mod hd, bioturb, pr – no vis por **CLST:** a.a.	a.a
						Slty SST w/thin lam of CLST: a.a.	a.a.
						Slty SST w/thin lam of CLST: a.a	a.a.
						SST: med lt gry – lt olv gry, vf, wl srt, sbang – sbrndd, sil cmt, hd, sli mic, sli bioturb, pr vis por	a.a.
						SST w/thin lam of v mic CLST: **SST:** a.a. **CLST:** blk, carb, v mic	a.a.
						SST: lt olv gry – pa yel brn, vf – f, wl srt, sbang – sbrndd, sil cmt, lt gry arg mtrx, mod hd – hd, sli mic, sli bioturb, tr micropyr, pr vis por	Wk odour. Pchy, dull, pa yel fluor. Wk, v sl, cldy – strm, yel wh cut fluor
						SST: a.a.	Dull – mod bri fluor, else a.a.
						SST: bioturb, else a. a	No shows

STATOIL

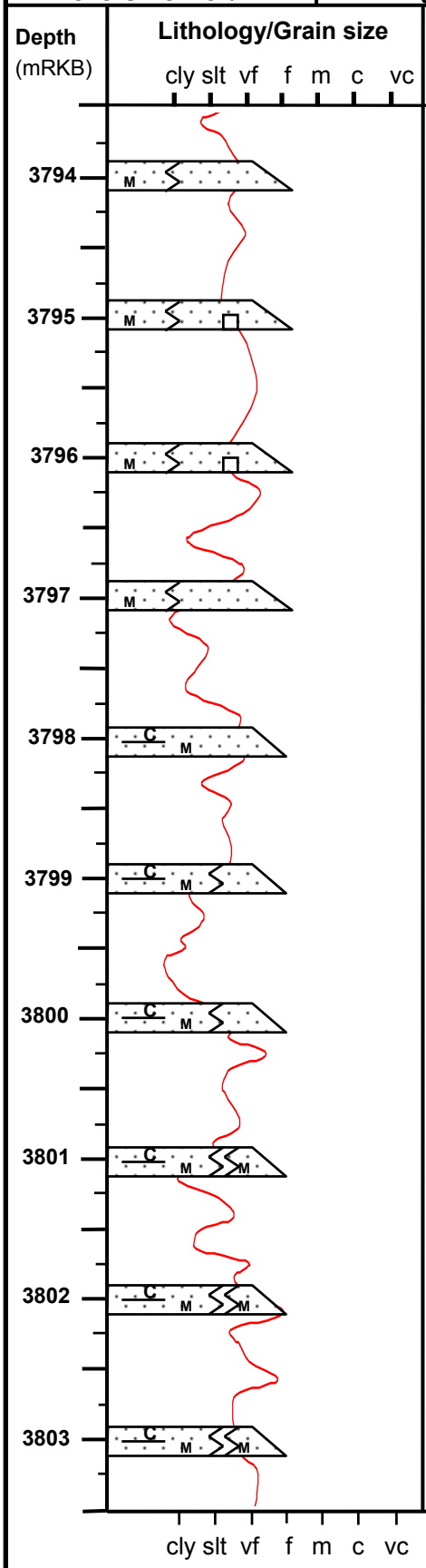
CONVENTIONAL CORE DESCRIPTION

Country: Norway | **Area:** Nordland II | **Field:** Alve structure

Well no: 6507/3-4 | **Formation:** Not & Ile Fm.

Core no: 2 | **Interval:** 3764 - 3818 mMD | **Cored:** 54 m **Rec:** 54.33 m 100.6 %

Core size: 3 ½" | **Geologists:** P. Furmyr, T.K. Hals | **Date:** 17.04.04

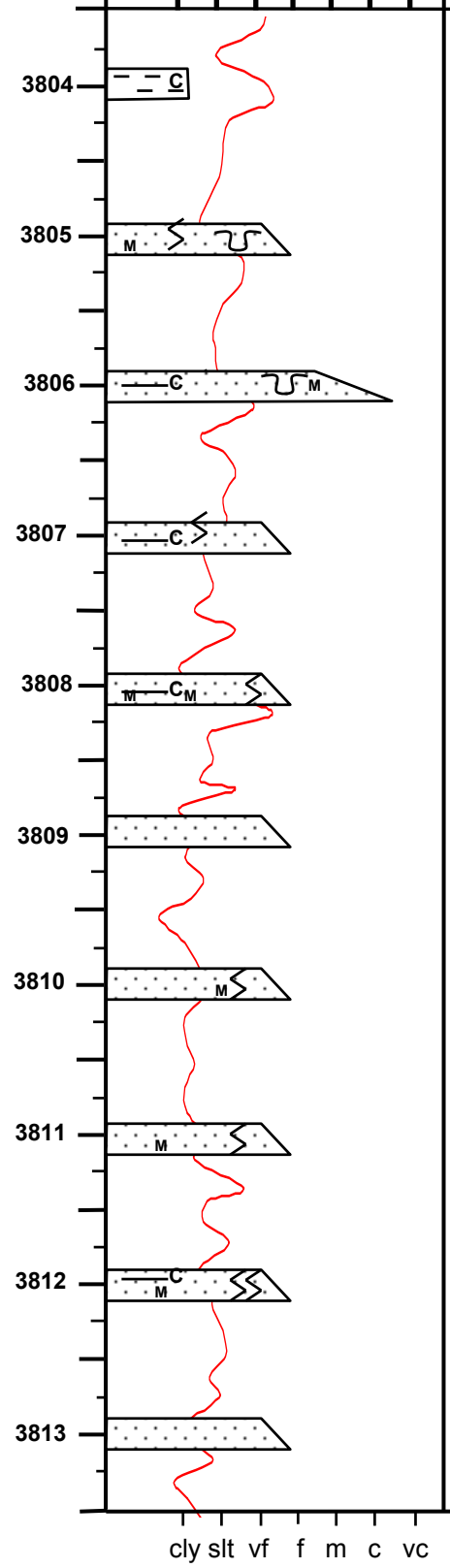


Lithological Description Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination	Remarks Shows, etc
SST: lt olv gry – pa yel brn, vf – f, wl srt, sbang – sbrndd, sil cmt, lt gry arg mtrx, mod hd – hd, sli mic, bioturb, tr micropyr, pr vis por	No shows
SST: a. a	a.a.
SST: a.a	a.a.
SST: vf – f, wl srt, else a.a.	No odour. Pchy, dull yel wh fluor. V sl, cldy, pa yel wh cut fluor
SST: lt olv gry, vf – f, wl srt, sbang – sbrndd, sil cmt, some lt gry arg mtrx, mod hd, sli mic, sli bioturb w/pch of olv gry – olv blk arg, carb mat, pr vis por	No odour. No fluor. No – tr, v sl, cldy, pa yel wh cut fluor
SST: a. a., but mod bioturb	No shows
SST: a. a	a.a.
SST: v bioturb, l.p. v mic, else a.a.	a.a.
SST: a. a	a.a.
SST: a. a	a.a.

STATOIL

CONVENTIONAL CORE DESCRIPTION

Country: Norway	**Area:** Nordland II	**Field:** Alve structure
Well no: 6507/3-4	**Formation:** Not & Ile Fm.	
Core no: 2	**Interval:** 3764 - 3818 mMD	**Cored:** 54 m **Rec:** 54.33 m 100.6 %
Core size: 3 ½"	**Geologists:** P. Furmyr, T.K. Hals	**Date:** 17.04.04

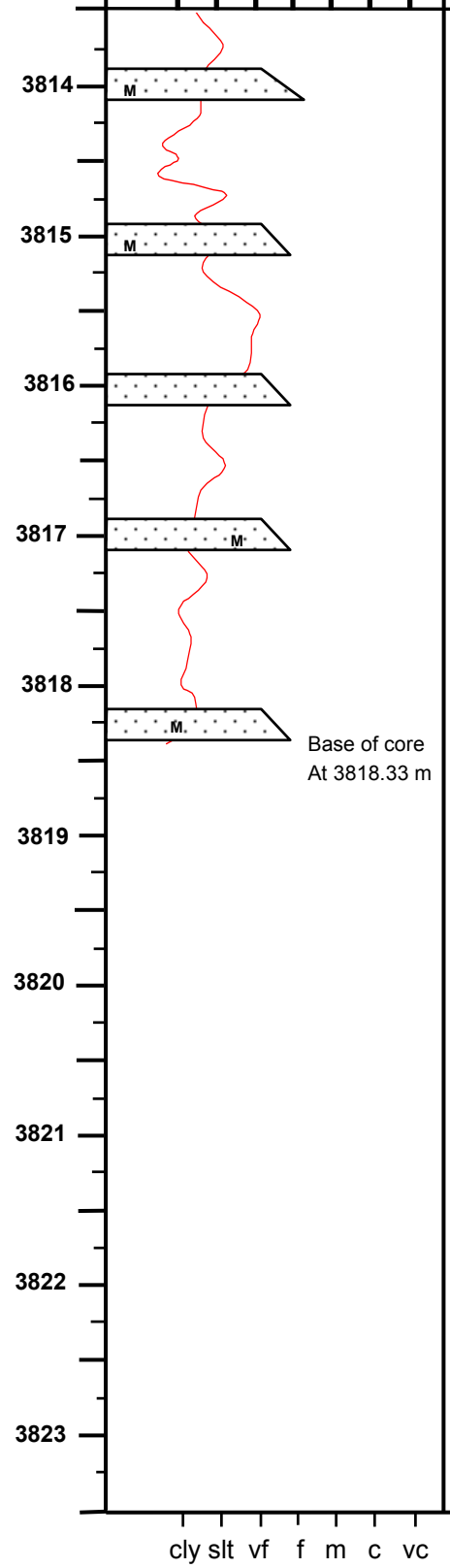


Shows			Porosity			Lithological Description	Remarks
STAIN	FLUOR	CUT	POOR	FAIR	GOOD	Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination	Shows, etc
						SH: blk, mod hd, sbfis – fis, carb, mic, non calc	No shows
						SST: pa yel brn – lt olv gry, vf – f, wl srt, sbang – sbrndd, sil cmt, some lt olv gry arg mtrx, sli mic, sli bioturb w/blk bur, pr vis por	Wk odour. Pchy, wk, dull, yel wh fluor. Sl strm, wk, pa yel wh cut
						SST: olv gry – olv blk, trnsl – clr qtz, med – v crs, pred crs, wl srt, sbang – sbrndd, sil cmt, fri – mod hd, some pa brn and occ gn gry arg mtrx, sli mic, mod bioturb w/brn blk arg and carb pch, vis bur, fair vis por	No odour. P.P. wk, dull yel wh fluor. Sl, cldy, pa yel wh cut
						SST: lt olv gry, vf – f, wl srt, sbang – sbrndd, sil cmt, some lt gry arg mtrx, mod hd, sli mic, sli bioturb w/pch of olv gry – olv blk arg, carb mat, pr vis por	Wk odour. Pchy, dull, yel wh fluor. Cut fluor a.a.
						SST: a.a., but v bioturb w/brn blk arg and carb and v mic pch	No odour. No fluor. No – tr, v sl, wk, pa yel wh cut fluor
						SST: lt olv gry, vf – f, wl srt, sbang – sbrndd, sil cmt, lt gry – off wh arg mtrx, mod hd, sli mic, sli bioturb, pr vis por	No odour. Pchy, dull, pa yel fluor. Sl, cldy, pa yel wh cut fluor
						SST: lt olv gry – pa yel brn, mod bioturb, else a.a.	Wk odour. Dull, pa yel fluor. Sl, cldy, pa yel wh cut fluor
						SST: a.a.	Wk odour. Pchy, dull, pa yel fluor. Sl, cldy, pa yel wh cut fluor
						SST: a.a., but mic and v bioturb w/lam and pch of brn blk, arg, carb and mic mat	No shows
						SST: pa yel brn, vf – f, wl srt, sabng – sbrndd, v sil cmt, hd – v hd, sli mic, sli bioturb, pr – no vis por	No shows

STATOIL

CONVENTIONAL CORE DESCRIPTION

Country: Norway	**Area:** Nordland II	**Field:** Alve structure
Well no: 6507/3-4	**Formation:** Not & Ile Fm.	
Core no: 2	**Interval:** 3764 - 3818 mMD	**Cored:** 54 m **Rec:** 54.33 m 100.6 %
Core size: 3 ½"	**Geologists:** P. Furmyr, T.K. Hals	**Date:** 17.04.04



Lithological Description Rock name, mod. lith., colour, grain size, sorting, round -ness, matrix, cementation, hardness, sed. struct.,accessories, fossils, porosity, contamination	Remarks Shows, etc
SST: pa yel brn, vf – f, wl srt, sabng – sbrndd, v sil cmt, hd – v hd, sli mic, sli bioturb, pr – no vis por	Wk odour. Pchy, dull – mod bri, pa yel fluor. Wk, sl, cldy, yel wh cut fluor
SST: a. a	No shows
SST: lt olv gry – pa yel brn, sil cmt, mod hd, pr vis por, else a.a.	No shows
SST: a. a	Wk odour. Pchy, dull – mod bri, pa yel fluor. Sl, cldy - strm, pa yel wh cut fluor
SST: pa yel brn, vf – f, wl srt, sbang – sbrndd, v sil cmt, hd – v hd, non calc, sli mic l.p., pr – no vis por	Wk odour. Pchy - even, dull – mod bri, pa yel fluor. Sl, cldy - strm, pa yel wh cut fluor

App F Sidewall core descriptions

STATOIL

MSCT - SIDEWALL CORE DESCRIPTION

Country: Norway	Area: Nordland II	Prospect: Alve
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell	
Hole size: 8 1/2 "	Geologist: Per Furmyr	R.T.: 36 meters
Run no.: 2A	Reference log: Run 2B: IPLT-ECS-CMR200-GR-ACTS-ECRD	Date: 25.04.2004

Shot no.	Depth (m RKB)	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.

*Examination and description only superficial, due to cores being covered with mudcake and handling cores very carefully

**Core no. 25 is shorter than acceptable length, and has consequently not been counted as recovered.

1	3725	EMPTY			
2	3725.5	40	SST:	pa yel brn, clr – trnsl qtz, f – crs, mod – pr srt, subang – ang, well sil cmt, cln, mas, hd – v hd, pr vis por	Wk HC odour, pchy, dull pa yel fl, v sl, wk, pa yel wh cut fl
7	3726	45	SST:	a.a.	a.a.
6	3727.5	35	SST:	tr mica, else a.a.	a.a.
5	3728	45	SST:	a.a.	a.a.
4	3728.5	45	SST:	a.a.	a.a.
3	3730.8	40	SST:	sli less cmt, hd, else a.a.	Wk – mod HC odour, else a.a.
25	3821.5	5	SST:	lt olv gry – pa yel brn, clr – trnsl qtz, vf – f, wl srt, sbang – sbrndd, mod cmt, mod hd, sli arg, glauc, pr vis por	V wk HC odour pchy, pa yel fl, v sl, cldy, wk, pa yel wh cut fl
24	3827.6	55	SST:	vf – f – occ med, else a.a.	Mod HC odour, dull, pa yel fl, cut fl a.a.
23	3829	EMPTY			
22	3829.8	40	SST:	a.a.	a.a.
21	3931.5	35	SST:	olv gry, vf – f, wl srt, sbang – sbrndd, mod sil cmt, arg, hd, pr vis por	No HC odour, tr fl a.a., cut a.a.

STATOIL

SIDEWALL CORE DESCRIPTION

Country: Norway	Area: Nordland II	Prospect: Alve
Well no: 6507/3-4	Company: Statoil ASA, Norsk Hydro ASA, AS Norske Shell	
Hole size: 8 1/2 "	Geologist: Per Furmyr	R.T.: 36 meters
Run no.: 2A	Reference log: Run 2B: IPLT-ECS-CMR200-GR-ACTS-ECRD	Date: 25.04.2004

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.
20	3947.4	40	SST: olv gry, vf – f, wl srt, sbang – sbrndd, v sil cmt, arg, v hd, pr - no vis por	No HC odour, tr dull, pa yel fl, v sl, wk, pa yel wh cut fl
19	3949.5	35	SST: olv gry – dk yel brn, vf – crs, pr srt, sbang – ang, sil cmt, arg – v arg, mod hd – hd, pr vis por	No HC odour, no fl, cut a.a.
18	3950	EMPTY		
17	3953	15	SST: olv gry, vf – med, mod srt, else a.a.	a.a.
16	3953.5	EMPTY		
15	3962.9	EMPTY		
14	3963.5	30	SST: a.a.	a.a.
13	3965	30	SST: lt olv gry, pred f, occ med, wl – v wl srt, sbrndd, no sil cmt, cln, mas, fri, gd vis por	No HC odour, pchy, dull pa yel fl, cut fl a.a.
12	3965.5	EMPTY		
11	3973.5	45	SST: dk olv gry, pred vf – f, mod srt, sbang – sbrndd, wl sil cmt, arg – v arg, hd, mic, pr vis por	No HC odour, no fl, cut fl a.a.
10	3974	45	SST: lt olv gry, clr – trnsl qtz, pred vf – f, wl srt, sbrndd - sbang, mod cmt, lt gry – off wh arg mtrx, mod hd - hd, pr – fr vis por	a.a.
9	3978.5	25	SST: a.a.	a.a.
8	3980	40	SST: a.a.	a.a.
??	Unknown depth, probably 3947.4 m			

RECOVERY: 18 OF 25 ATTEMPTED

App G NPD standard sheet for reporting shallow gas

WELL DATA: 6507/3-4

1. Distance from drillfloor to sealevel: 36 m

2. Water depth (MSL): 372 m

3a. Setting depth for conductor (m RKB): 468 m

3b. Leak Off/Formation Integrity Test (g/cc). N/A

4a. Setting depth for casing on which BOP is installed: 1241 m

4b. Leak Off/Formation Integrity Test (g/cc): 1.57 g/cc

5. Depth (m TVD RKB) and two-way time to formation/section/layer tops:

Seabed	408.0 m / 0.502 sec.
Base Qaternary/ Top Naust Formation:	704.0 m / 0.788 sec
Top Kai Formation:	1312.5 m / 1.352 sec.
Top Brygge Formation:	1620.0 m / 1.629 sec.

6. Depth interval (m RKB & TWT) and age of sandlayers shallower than 1000 m below seabed. State which layers if any contain gas:

A shallow gas warning class 1 was given for the interval between 950 to 1370 m. That was based on gas peaks observed in well 6507/3-1 when drilling through sand layers in this interval. In well 6507/3-4 a pilot hole was drilled with seawater down to 1250 mMD. No shallow gas was observed.

This section is from the MWD MWD gamma ray and resistivity log interpreted to predominantly consist of clays, in parts sandy clays. A water wet sand layer of 11 m was observed from 650 – 661 m.

7. How was presence of gas proven:

No shallow gas observed.

8. Composition and origin of gas:

N/A.

9. Describe all measurements performed in gas bearing layers:

Used realtime/memory MWD including gamma ray and resistivity sensors.

10. Indicate the depths (m RKB & TWT) of unconformities in the well bore:
Base Quaternary is interpreted to be at: 704 mTVD RKB/ 0.788 s.
Base Tertiary is interpreted to be at: 1994.5 mTVD RKB/ 2.005 s.

11. Indicate depth and extension of sand layers (communication, continuity, truncation etc.): The water wet sand layer at 650 m have good continuity and can be correlated to the 6507/3-1, which are 1.7 km away.

12. Indicate depth and extension of any gas blanking, seismic anomalies etc:
- No gas blanking or seismic anomalies observed.

13. State possible seismic indications that the gas originates from deeper levels. Description if gas originates from deeper levels: N/A

14. How does the interpretation of the site survey correspond with well data with respect to:

- **shallow gas:** Shallow gas warning given . No shallow gas was observed.
- **sandlayers:** The interpreation of sandlayers corresponds well with the observed sandlayers.
- **unconformities:** The interpretation of the site survey corresponds very well with the well data.
- **correlation with adjacent wells:** Naust Formation, Kai Formation and Brygge Formation has a good correlation with the reference well 6507/3-1 which are only 1.7 km away.

App H Listing of other reports

REPORTS	COMPANY
Site Survey at Location 6507/3-D ST0193 for Statoil	FUGRO GEOTEAM
Well Programme PL 159, Well 6507/3-4	STATOIL
Site Survey at Location 6507/3-E ST0390 for Statoil Vol. I	FUGRO GEOTEAM
Site Survey at Location 6507/3-E ST0390 for Statoil Vol. II	FUGRO GEOTEAM
Navigation and Positioning Report of the "West Navigator", Well 6507/3-4	FUGRO TGS NORGE
Permanent P&A Programme – PL159, Well 6507/3-4 - Alve	STATOIL
Final drilling report –Well 6507/3-4 Alve PL159	STATOIL
End of Well Report - Coring 6507/3-4 Alve	BAKERHUGHES
Final Well Report Mudlogging Well: 6507/3-4	GEOSERVICE
End of Well Report, Well 6507/3-4 – MWD & Dir.Drilling	BAKER HUGHES
Core photographs well 6507/3-4, White & UV-light, Core 1-2	RESLAB
Biostratigraphy of the Interval 1,260m - 4,092m Well 6507/3-4	GeoStrat
VSP Borehole Seismic Report	BakerHughes / VSfusion
Analysis of Oil/Mud MDT Samples from Well 6507/3-4, Alve Field	RESLAB
Conventional core analysis, Well 6507/3-4	RESLAB

7 Enclosures

Composite log

Formation evaluation log

Pressure evaluation log