Final Well Report
PL 128
Well 6608/10-10

04Y94*17440

STATOIL

Title:
Final Well Report **PL 128** **Well 6608/10-10**

Document no.:	Contract no./project no.:	Filing no.:
04Y94*17440		

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

Distribution date:	Rev. date:	Rev. no.:	Copy no.:
	2004-01-22	**0**	

Author(s)/Source(s):
Tor-Arild W Johnsen **Sveinung Tysse** **Anne Britt Sommervoll**
Subjects: **General information** **Exemptions and non-conformances** **Health, environment, safety and quality** **Geology and formation data report** **Drilling operations report**
Remarks:

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

Techn. responsible:	Name:	Date/Signature:
Well project manager	for **Dagfinn Alm**	3/2-04 Viggo Larsen
Responsible:	Name:	Date/Signature:
OPR BEV, Manager well eval.	**Jan Skagen**	11/2-04 Jan Skagen
Recommended:	Name:	Date/Signature:
OPR BOR, Manager expl. drlg.	**Harald Mortensen**	11/2-04 Harald Mortensen
Approved:	Name:	Date/Signature:
HNO LET NO, Area manager	**Roger Inge Johansen**	19/2-04

Table of contents

List of Figures and Tables

1 Introduction

1.1 Well data record

Well name	:	6608/10-10	
Type of well	:	Exploration	
Prospect	:	Gråspett	
Country	:	Norway	
Area	:	Nordland II	
License	:	PL 128	
Licencees	:	Statoil ASA (Operator)	40.45 %
		Petoro AS	24.55 %
		Norsk Hydro ASA	13.50 %
		Eni Norge AS	11.50 %
		AS Norske Shell	10.00 %
Drilling unit	:	Stena Don	
Type	:	The Stena Don is a semi-submersible drilling, completion and workover rig equipped with a dynamic positioning system (class 3)	
Water depth	:	374 m MSL	
Air gap	:	24 m	
On license	:	16.07.03	
Rig release	:	07.08.03	
Formation at TD	:	Åre Formation	
Geographic co-ordinates	:	66° 04' 17.97" N 08° 10' 11.48" E	
Datum/Spheroid	:	ED-1950 / Int. 1924	
UTM	:	UTM Zone 32, CM 09° E 7 328 330 m N 462 426 m E	
Seismic location	:	Seismic survey ST0103, Inline 1070, Cross-line 2281.	

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

PL128, Blocks 6608/10 & 11
Location Map
WELL 6608/10-10

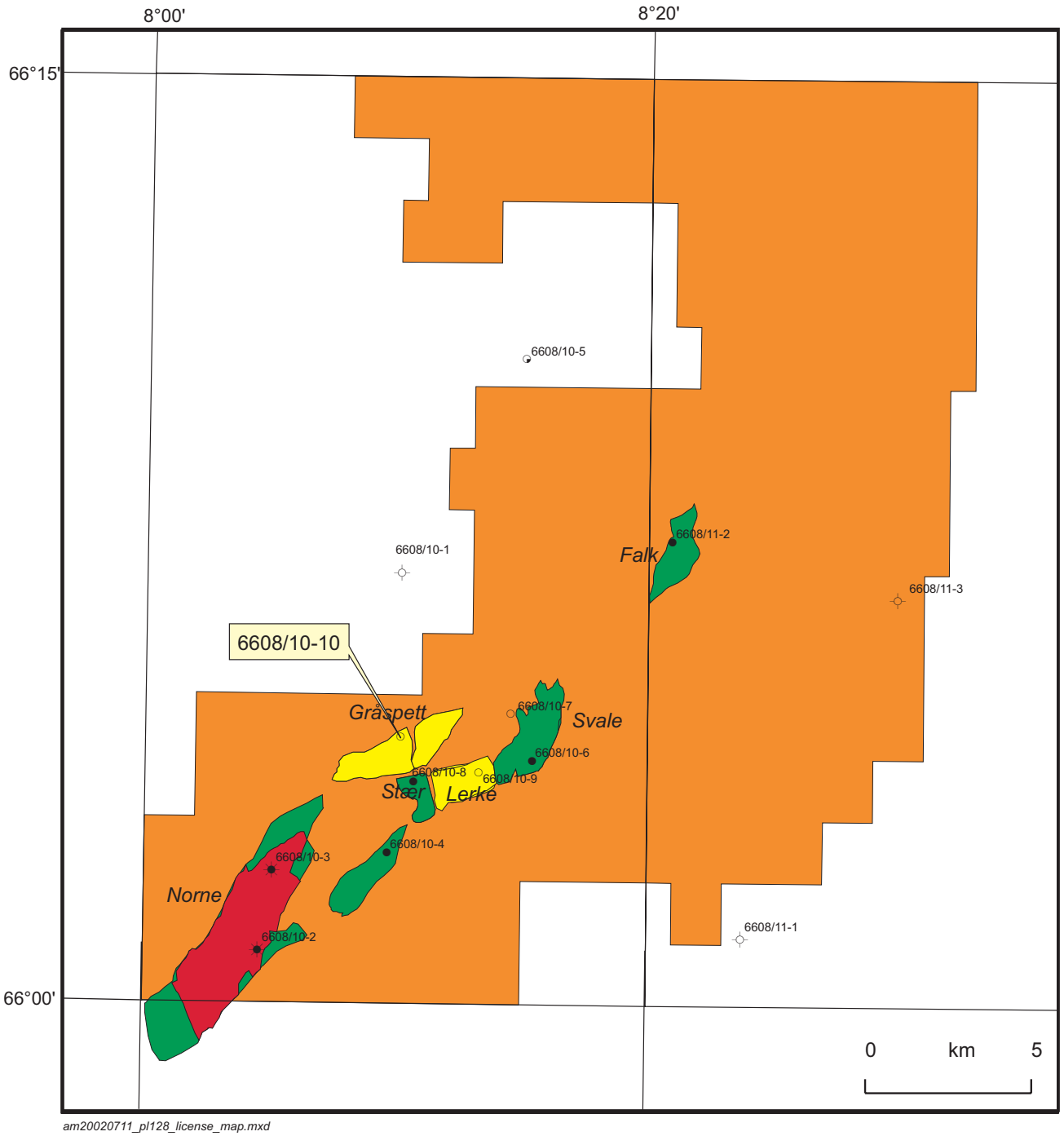


Fig. 1.1

1.2 Well objectives

The objective of well 6608/10-10 was to prove hydrocarbons in the Middle and Lower Jurassic sandstones of the Not and Åre Formations; the secondary objective was to prove hydrocarbons in the Upper Jurassic sandstones of the Melke Formation.

1.3 Result of the wells

Well 6608/10-10 was spudded in a water depth of 374 m MSL and drilled to a total depth of 2800 m. No shallow gas was observed by the ROV at the wellhead.

Three sandstone beds were penetrated and proven to be water wet in the Melke Formation. The sandstones in the Fangst and Båt Groups were also water wet. No hydrocarbons were proven in the well. Due to severe hole problems the reservoirs were not logged with wireline logs.

1.4 Drilling summary

1.4.1 Casing

Table 1.1 Casing

Casing	Shoe depth [m MD / m TVD RT]	LOT / FIT [Equivalent mud weight]
30"	445 / 445	NA
18 ¾" WH x 13 3/8" casing	1365 / 1365	FIT: 1.55 g/cm³

1.4.2 Drilling fluids

Table 1.2 Drilling fluids

Section	Section TD [m MD RT]	Maximum mud weight [g/cm³]	Mud type
36"	445 (17 ½" @ 447)	1.03	Seawater / high visc. sweeps
17 1/2"	1377	1.03	Seawater / high visc. sweeps
12 1/4"	2800	1.42	Glydril (water based KCl/Pac/glycol)

1.5 Data acquisition summary

See Figure 1.2.

PL 128

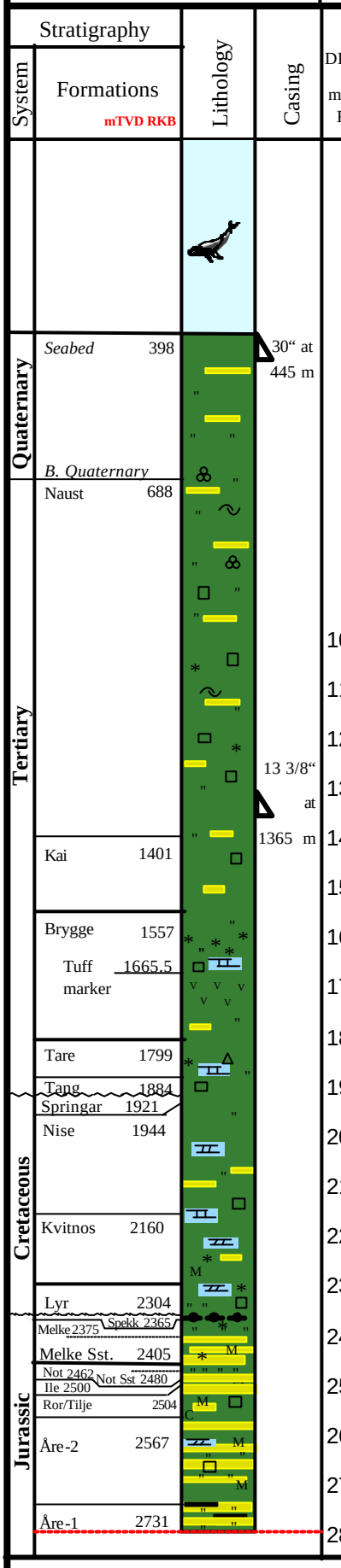
RKB - MSL: 24 m

Water depth: 374 m MSL

Well 6608/10-10 Gråspett
Formation Evaluation

STATOIL

Made by: MART | Date: 26.01.2004



Conv. Coring	Sampling Cuttings & Mud	Logging MWD & Electric
	398 – 1377 mMD: All returns to seabed	**MWD** **MPR-LITE** **RES-DIR** **(GR failed when drilling 30" shoe track)** **WIRELINE:** Logged GR inside casing up to surface.
No coring	**Bulk samples (ca. 5 lt):** ✓1390 – 1880 mMD. One sample every 10 m. ✓1887-1968 mMD. One sample every 3 m. ✓1970-2300 mMD. One sample every 10 m ✓2303-2604 mMD. One sample every 3 m. ✓2610-2800 mMD. One sample every 6 m. **Dry samples:** ✓1390 – 1880 mMD. One sample every 10 m. ✓1887-1968 mMD. One sample every 3 m ✓1970-2300 mMD. One sample every 3 m ✓2303-2604 mMD. One sample every 3 m. ✓2610-2800 mMD. One sample every 6 m. **Mud samples (1 lt):** ✓1400-2700 mMD. One sample every 100 m.	**MWD** **MPR-LITE** **GR-RES-DIR** **WIRELINE:** 1365 – 1701 mMD Logged PEXlite-FMI-DSI-HNGS Unable to get wireline logging tools below 1701 mMD

TD 2800 m TVD RKB

Fig. 1.2

2 Exemptions and non-conformances

2.1 Exemptions and non-conformances from NPD's regulations

None

2.2 Exemptions and non-conformances from Statoil's regulations

None

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

3.1 Stop Card and Synergi reports

A total number of 326 Stop Card and 20 Synergi reports were registered while drilling the Gråspett well.

3.2 Comments to the cards/reports

Of the above mentioned cards/reports, there were:

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

The three yellow incidents were:

- Two persons did not follow the procedure and instructions in connection with work on the BOP.
- Economical impact: Hydraracker failed causing 14.5 hrs down time on the rig.
- Economical impact: Had to POOH for re-programming MWD tool (wrong data transfer rate) causing 9.0 hrs down time.

The one spill to sea were (rated green):

- Loss of mixing water during cement operations in the permanent plug and abandonment phase. Consisted of green chemicals only.

The falling object (rated green) was:

- An "rubber gasket" on portside crane had fallen down

Even though none of the incidents above led to serious personnel injuries, they are all taken very seriously and effort is made to prevent similar and other incidents.

3.3 Experience summary

Table 3.1 Experience summary

Section	Down time (hrs)	Time Impr. (hrs)	Experience (subject and description)	Immediate solution	Solution recommended for future	Ref.	Doc Att.
36"							
			X-lite reduced WOC. 30" conductor successfully cemented with X-lite cement on Stena Don. The conductor did not change angle.		**Use X-lite** for conductor cementing (also possible for Stena Don as DP rig).		
		5	**Run 4 joints conductor**. In these hard formations with known support from the formation to the conductor, it is time and cost saving to run 4 joints conductor and not 5 joints as earlier.		**Continue running only 4 joints when formation allows.**		
			Too high stickup on DF when landing 30" housing joint. Experienced 2,3 m stickup on DF when running 30" housing joint.	Removed elevator and landed 30" housing in bushings.	**Use Dril-Quip handling clamp** for 30"/36" housing joint.		
17 1/2"							
			Wrong data format in use reduced overall ROP performance. For the riser less 17 1/2" section a ROP limitation of 90 m/hr was set by the project to achieve sufficient data points in the memory log. Unfortunately, the data format was set up to record equal amount of ECD as GR/Res. There is no need for any pressure data in the memory for this section. If the memory had been set up to only record GR/Res, the max. ROP could have been higher. Especially down to approx. 800-900 m, this limited the overall ROP. No problems were observed while pulling out of hole or running casing.		**Reduce number of data trans. points of pressure vs. GR/Res.**		
			Shoe track drilling, with mud or SW? The 13 3/8" shoe was drilled with SW to prevent contamination of the low		**1) Displace to mud before FIT/LOT to prevent stuck pipe.**		

			sulphate Glydril mud to be used in the 12 1/4" reservoir section. Performed FIT with SW. Had to pull BHA to change MWD. Got stuck in casing shoe while pulling out because of poor lifting capacity of SW.		**2)Perform contamination tests between low sulphate mud and drilling cement.** This to be done with involvement from B&B PE.		
	2,5		*Damaged threads in box on joint in rotary table when attempting to MU 18 3/4" WH housing joint .*	MU joint w/special no-cross collar to string. PU WH housing and dressed threads on pin. MU WH housing to string.	**Use special no-cross collar below WH housing** and run as primary. This new concept eliminates crossed threads.		
12 1/4"							
			Experienced cavings from the well. May be a chemical problem; KCl content of 155 g/cm3 and Glycol 3,6 %. Had to back ream the hole to casing shoe at 1365 m and to do a wiper trip before logging. Cavings seemed to be dehydrated.	Back reamed and circulated out of hole. Performed wiper trip.	**Special study on the cuttings is ongoing**, Conclusion in the Geology end of well report. Consider to reduce the KCl content to 140 g/cm3.		

3.4 Time distribution

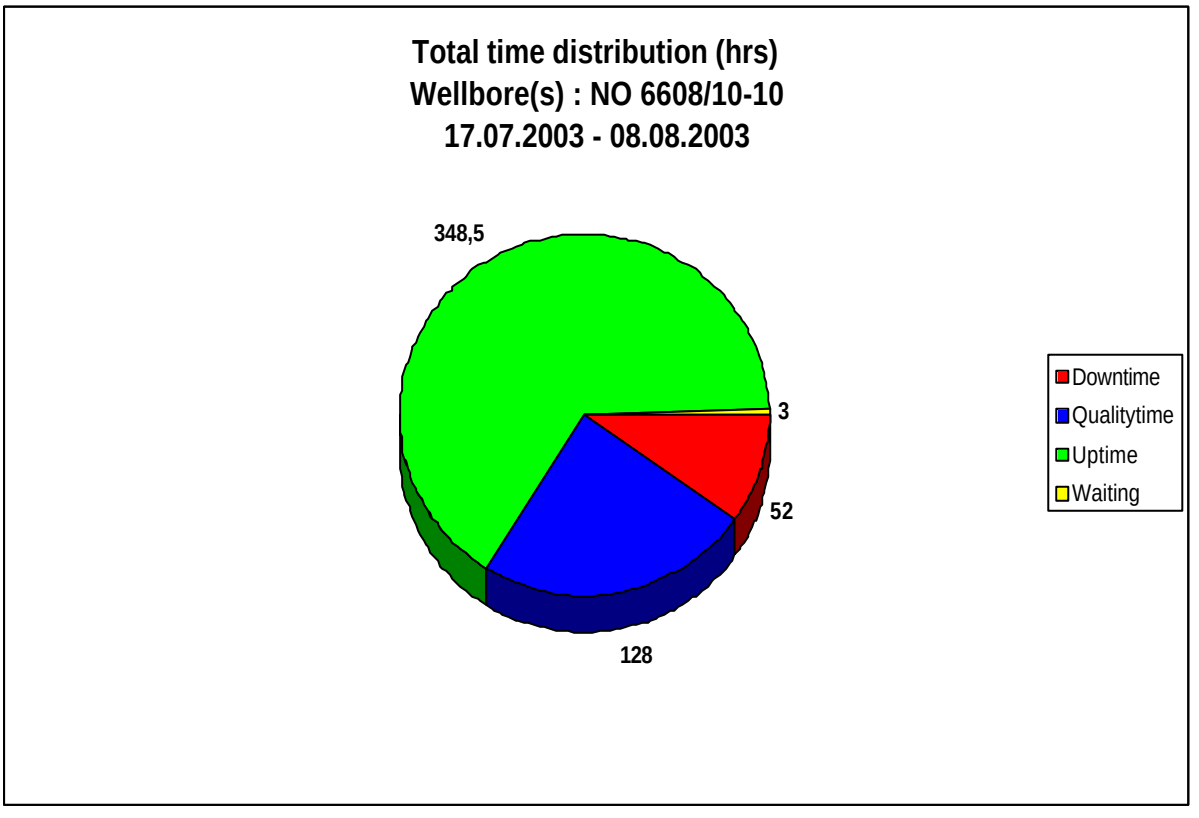
Table 3.2 Time distribution

Total time, planned	**28.5 days**
Total time	**22.1 days**
Total down time	**52.0 hrs**
Waiting on weather (WOW)	**0.0 hrs**

Table 3.3 Operations factor

Ops. Factor: $= \frac{Total\_time - Down\_time - WOW}{Total\_time - WOW} * 100$	**90.3%**

Fig. 3.1 D-time distribution



4 Geology and formation data report

4.1 Geological setting and results

The structural framework on the Dønna Terrace was established during the Upper Jurassic/Lower Cretaceous extensional tectonics in the region. Later structuring is mainly related to the Cretaceous and Tertiary basinal subsidence. The Gråspett structure are two rotated fault blocks north of the Norne and Stær Fields and northwest of the Lerke structure (Fig. 1.1)

Block 6608/10 is situated in the southern part of the Nordland II area. The NE-SW trending Revfallet Fault Complex separates the block in two structural provinces, the Nordland Ridge and the Dønna Terrace. Well 6608/10-10 is located on the Dønna Terrace in the south central part of block 6608/10. (Fig. 4-1)

Well 6608/10-10 penetrates rocks of Quaternary, Tertiary, Cretaceous and Jurassic age. TD of the well is in rocks of Jurassic age in the Åre Formation (Fig. 4.2a).

4.2 Shallow gas results

The well was classified as class 0 - no shallow gas expected. The well was drilled with seawater down to 1377 mMD. No shallow gas was observed.

4.3 Stratigraphy

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

4.3.1 Table of chronostratigraphy

Table 4.1 Chronostratigraphy

Stratigraphic succession		**mMD**	
	Studied interval 1390 – 2652 mMD	**From**	**To**
Tertiary	Lower Pliocence	1390	1470
	Upper Miocene	1480	1510
	Middle Miocene	1520	1600
	Lower Miocene	1610	1650
	---------- Hiatus ----------		
	Upper Oligocene	1660	
	---------- Hiatus ----------		
	Upper Eocene	1670	
	---------- Hiatus ----------		
	Middle Eocene	1680	1760
	Lower Eocene	1760	1870
	Upper Paleocene	1880	1917
---------- Base Tertiary unconformity ---------			
Cretaceous	Campanian	1932	2210
	Upper Santonian	2220	2280
	---------- Hiatus ----------		
	Conacian	2290	2310
	---------- Hiatus ----------		
	Barremian	2313	2334
---------- Base Cretaceous unconformity ---------			
Jurassic	Middle Volgian	2373	2379
	---------- Hiatus ----------		
	Callovian	2385	2403
	---------- Hiatus ----------		
	Bathonian - Bajocian	2406	2472
	Aalenian – Toarcian	2475	2526
	---------- Hiatus ----------		
	Upper Pliensbachian – Sinemurian	2529	2800
	TD	2800	

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.**
QUATERNARY	NORDLAND GROUP. (Sea Floor)	398.0	398.0	374.0	0.506
TERTIARY	Naust Formation	688.0	688.0	664.0	0.794
	Kai Formation	1401.0	1401.0	1377.0	1.383
	HORDALAND GROUP	1557.0	1557.0	1533.0	1.521
	Brygge Formation	1557.0	1557.0	1533.0	1.521
	Tuff Marker	1665.5	1665.5	1641.5	-
	ROGALAND GROUP	1799.0	1799.0	1775.0	1.788
	Tare Formation	1799.0	1799.0	1775.0	1.788
	Tang Formation	1884.0	1884.0	1860.0	1.836
CRETACEOUS	SHETLAND GROUP	1921.0	1921.0	1897.0	1.877
	Springar Formation	1921.0	1921.0	1897.0	1.877
	Nise Formation	1944.0	1944.0	1920.0	-
	Kvitnos Formation	2160.0	2160.0	2136.0	-
	CROMER KNOLL GP.	2304.0	2304.0	2280.0	2.192
	Lyr Formation	2304.0	2304.0	2280.0	2.192
JURASSIC	VIKING GROUP	2365.0	2365.0	2341.0	2.235
	Spekk Formation	2365.0	2365.0	2341.0	2.235
	Melke Formation	2375.5	2375.5	2351.5	2.242
	Melke Fm, Sst mbr	2405.0	2405.0	2381.0	2.284
	FANGST GROUP	2462.0	2462.0	2438.0	2.304
	Not Formation	2462.0	2462.0	2438.0	2.304
	Not Fm, Sst mbr	2480.0	2480.0	2456.0	2.321
	Ile Formation	2500.0	2500.0	2476.0	-
	BÅT GROUP	2504.0	2504.0	2480.0	-
	Ror Formaton	2504.0	2504.0	2480.0	-
	Tilje Formation	2529.0	2529.0	2505.0	-
	Åre 2 Formation	2567.0	2567.0	2543.0	2.363
	Åre 1 Formation	2731.0	2731.0	2707.0	2.478
	TD	2800.0	2800.0	2776.0	-

4.4 Lithostratigraphic description

NORDLAND GROUP **398.0 - 1557 mMD, 398 – 1557 mTVD (374.0 – 1533.0 mTVD 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 all returns to the seabed. Lithology down to 1377 mMD is inferred from the recorded MWD memory log and information from the offset wells.

Quaternary **398.0 – 688.0 mMD, 398.0 – 688.0 mTVD (374.0 – 664.0 mTVD MSL)**

System: Tertiary
Series: Pleistocene (samples analysed from 1390 mMD)

The Quaternary sediments consist mainly of thick clay units interbedded with sandy intervals and layers. Based on the MWD gamma ray and resistivity logs the sandy layers are inferred to be silty and argillaceous.

Naust Formation **688.0 – 1401.0 mMD, 688.0 – 1401.0 mTVD (664.0 – 1377.0 mTVD MSL)**

System: Tertiary
Series: Upper Pliocene (samples analysed from 1390 mMD)
Depositional environment: Marine, inner shelf

The boundary to the overlying Quaternary sediments is picked at an increase on the resistivity log after a 14 m drop (trough) above, consistent with previous wells in the area. The MWD logs suggest that the predominant lithology in the Naust Formation is claystone. Cuttings returns were initiated below 1377 mMD, from which depth well-site descriptions were undertaken.

The claystone is olive grey to medium dark grey. It is soft to slightly firm, amorphous, slightly hygroturgid, slightly silty, with trace micromica, trace fine calcite and is slightly to non calcareous.

Kai Formation **1401.0 – 1557.0 mMD, 1401.0 – 1557.0 mTVD (1377.0 – 1533.0 mTVD MSL)**

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

The top of the Kai Formation is picked at a very slight downward trendshift on resistivity log readings, followed by higher gamma ray response than seen in the overlying Naust Formation. The Kai Formation consists mainly of claystone with minor to good traces of sand.

The claystone is olive grey to medium dark grey and occasionally dark green grey. The claystone is persistently soft, with silty and sandy laminae or floating very fine arenaceous component. There are traces to abundant amounts of glauconite specks and often good traces of pyrite and pyrite nodules. The claystone has slight to moderate traces of micromica, and it is generally non calcareous and only very occasionally very slightly calcareous

The sand is present as loose quartz grains which are clear, transparent, milky white and translucent in colour. The sand is composed of very fine to medium occasionally coarse grains. It is poorly sorted, angular to subrounded and has moderate to poor sphericity. Traces of microfossil fragments are also encountered as well as traces of pyrite and pyritised fossil fragments

HORDALAND GROUP **1557.0 – 1799.0 mMD, 1557.0 – 1799.0 mTVD (1533.0 – 1775.0mTVD MSL)**

The top of the Hordaland Group is picked at the break of a slightly decreasing gamma ray trend and a slight decreasing trend in resistivity, before the resistivity subtly increases again for about 25m. The Hordaland Group comprises the Brygge Formation.

Brygge Formation **1557.0 – 1799.0 mMD, 1557.0 – 1799.0 mTVD (1533.0 – 1775.0mTVD MSL)**

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

The Brygge Formation consists of an upper claystone / silty claystone unit with some traces of sand.

The claystone is initially predominantly olive grey, becoming olive grey to brownish grey, occasionally medium dark grey, rare dark green to dark greenish grey. It is soft to slightly

firm in part and silty in part. The claystone contains micromica, traces to occasionally abundant glauconite specks and is generally non calcareous, occasionally very slightly calcareous.

From 1665.5 mMD an undifferentiated tuffaceous claystone zone was encountered. The transition is recognized by a shift in the MWD gamma ray and resistivity logs. Generally there is a shift to lower values compared to the very steady values just prior to this zone. A some more irregular appearance is seen on the resistivity log and gamma ray log when the maximum frequency of tuff events are observed from the ditch cuttings towards the base of Brygge Formation.

In the tuffaceous zone the claystone becomes predominantly light greenish grey to blue grey, light grey, firm to moderately hard, subblocky to platy and locally waxy. The claystone has trace of glauconite, trace white specks and occasional trace micropyrite. It is locally sucrosic and is non calcareous.

Just above the base of the Brygge there is a moderate brown to pale yellow brown claystone interval seen from 1770 mMD to 1799 mMD which comprises 10 to 30 % of the sample.

The sand present, is predominantly loose quartz, graines which are clear, milky, occasionally yellow and rarely red, transparent to translucent, very fine to fine, occasionally medium, moderate to poorly sorted and angular to subrounded.

Traces of limestone is also seen. The limestone is grey white to white, firm, subblocky, argillaceous and microcrystalline with traces of glauconite

ROGALAND GROUP **1799.0 – 1921.0 mMD, 1799.0 – 1921.0 mTVD (1775.0 – 1897.0 mTVD MSL)**

The top of the Rogaland Group is picked by gamma ray correlation with neighbour well 6608/10-9 logs and shows a steady decreasing trend for the first 27m or so. The resistivity log response is building to lower conductivity than the variable lower resistivity in the Brygge Tuff/Tuffaceous unit above.

Tare Formation **1799.0 – 1884.0 mMD, 1799.0 – 1884.0 mTVD (1775.0 - 1860.0 mTVD MSL)**

System: Tertiary
Series: Upper Eocene – Upper Paleocene
Depositional environment: Marine, outer shelf to upper bathyal

The Tare Formation is composed of claystone and tuffaceous claystone with minor stringers limestone.

In the upper part of the Tare Formation the claystone is olive grey to medium dark olive grey/olive black and medium dark grey. It is soft to firm with some glauconite specks. In the lower part the claystone gets an increasingly tuffaceous looking appearance. The tuffaceous claystone is predominantly medium blue grey to blue grey and medium green grey to light greenish grey as well as light grey. It is firm and has a waxy appearance.

The traces of limestone are white to cream white, very pale grey and are moderately hard to hard, angular, brittle and cryptocrystalline to microcrystalline. Traces of nodular pyrite are also found throughout this section

Tang Formation **1884.0 – 1921.0 mMD, 1884.0 – 1921.0 mTVD (1860.0 - 1897.0 mTVD MSL)**

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

The top of the Tang Formation is picked at an increase in the gamma log response. There is little change in the resistivity log, but there is a small downwards shift compared to the overlying formation. The Tang Formation consists predominantly of claystone with traces of limestone.

The claystone is predominantly dark green grey to medium bluish grey in colour, though it is also bright green grey, medium dark green grey and olive grey to olive black. It is generally firm to moderately hard in parts and angular to blocky. In parts it is tuffaceous and is occasionally slightly silty. Traces of micromica and nodular pyrite are also seen. The claystone is also consistently non calcareous.

The traces of limestone are white to cream white, very pale grey and are moderately hard to hard, angular, brittle and cryptocrystalline to microcrystalline

SHETLAND GROUP **1921.0 – 2304.0 mMD, 1921.0 – 2304.0 mTVD (1897.0 – 2280.0 mTVD MSL)**

The top of the Shetland Group is defined by a trend shift towards higher values both on the gamma ray and resisitivity log. In this well the Shetland Group comprises the Springar, Nise and Kvitnos Formations.

Springar Formation **1921.0 – 1944.0 mMD, 1921.0 – 1944.0 mTVD (1897.0 – 1920.0 mTVD MSL)**

System: Cretaceous
Series: Upper Cretaceous
Stage: Campanian
Depositional environment: Marine, outer shelf

The Springar Formation consists of claystone. The claystone is medium dark grey to dark grey, occasionally dark greenish grey and traces of light to moderate brown in the upper part. It is soft to moderately hard, angular to subblocky and blocky, occasionally slightly silty and contains traces of micromica, disseminated micropyrite, and nodular pyrite as well as local traces of glauconite and is generally non calcareous.

Nise Formation **1944.0 – 2160.0 mMD, 1944.0 – 2160.0 mTVD (1920.0 – 2136.0 mTVD MSL)**

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

The Nise Formation consists of claystone with minor stringers of dolomite.

The claystone is medium dark grey, occasionally dark grey and dark olive grey. It is soft to moderate hard, angular to blocky and subblocky. The calystone contains trace of micromica, disseminated pyrite and pyrite nodules, occasionally trace of galuconite and it is non calcareous.

The dolomite is pale to moderate dark yellow brown and occasionally cream. It is hard becoming firm to hard, blocky to angular, sub splintery in part, sucrosic in part, microcrystalline and occasionally grading to limestone.

Kvitnos Formation **2160.0 – 2304.0 mMD, 2160.0 – 2304.0 mTVD (2136.0 – 2280.0 mTVD MSL)**

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

The Kvitnos Formation consists of claystone with minor stingers of limestone and dolomite.

The claystone is olive grey to medium dark grey, firm to moderate hard, blocky, locally angular, non calcareous only slightly calcareous near the base and slilghtly silty. It has traces of micromica, pyrite and occasionally glauconite.

The dolomite is pale to moderate dark yellow brown, firm to hard, blocky to angular, sub splintery in part, sucrosic in part and microcrystalline and occasionally grading to limestone.

The limestone is grey white to white, locally pale yellow brown, firm to moderate hard, blocky, locally argillaceous and grading to dolomite.

CROMER KNOLL GROUP **2304.0 – 2365.0 mMD, 2304.0 – 2365.0 mTVD (2280.0 – 2341.0 mTVD MSL)**

The top of the Cromer Knoll Group, which comprises the Lyr Formation in this well, is defined by a significant increase in resistivity values compared to the Shetland Group. The gamma ray readings show a continued slow increase throughout the interval compared to the general level in the Shetland Group.

Lyr Formation **2304.0 – 2365.0 mMD, 2304.0 – 2365.0 mTVD (2280.0 – 2341.0 mTVD MSL)**

System: Cretaceous
Series: Lower Cretaceous
Stage: Coniacian to Barremian
Depositional environment: Marine, middle shelf

The Lyr Formation consists of claystone with interbedded limestone and dolomite stringers, and occasional thin sandstone stringers.

The claystone of the Lyr Formation is described as olive grey to medium dark grey, but also occasional dark greenish grey, light grey and pale yellow brown colours are seen. The claystone is very soft to hard, sticky, slightly silty to silty in part, subblocky to flaky and occasionally splintery. It contains some traces of micromica and abundant small nodules of

pyrite. It is generally non to slightly calcareous in parts but occasionally very calcareous as the pale yellow brown material graded to argillaceous limestone.
The formation also seems to be more sensitive to water than in the upper parts, often washing away in the samples.

The limestone is pale grey, grey white, pale yellow brown later and occasionally medium grey. It is blocky, angular, occasionally flaky, firm to moderately hard, crumbly, chalky in part, often very argillaceous, micritic to microcrystalline and dolomitic in part.

The dolomite is yellow brown to greyish brown in colour. It is moderate hard to very hard, slightly argillaceous to argillaceous, and microcrystalline to micritic.

The sandstone is composed of clear, and milky translucent quartz grains. Some yellow brown grains are also seen. It is predominantly very fine to fine, well sorted, angular to subangular and appears as loose grains throughout the entire formation.

There are traces of pyrite as nodules and occasionally as cubes and occasional glauconite throughout the entire formation.

VIKING GROUP **2365.0 – 2462.0 mMD, 2365.0 – 2462.0 mTVD (2341.0 – 2438.0 mTVD MSL)**

The top of the Viking Group is picked at a very sharp and large increase in the gamma log response together with a drop in the resistivity readings when entering the Spekk Formation and marks an unconformity from the Cretaceous into the Jurassic. The Viking Group comprises the Spekk and the Melke Formations in this well.

Spekk Formation **2365.0 – 2375.5 mMD, 2365.0 – 2375.5 mTVD (2341.0 – 2351.5 mTVD MSL)**

System: Jurassic
Series: Middle Jurassic
Stage: Middle Volgian
Depositional environment: Marine, inner shelf

The Spekk Formation is only 10.5 meters thick and consists of a dark organic rich claystone with thin limestone/dolomitic limestone stringers.

The claystone is described as olive grey, medium dark grey, becoming predominantly olive black to very dark grey, soft to moderately hard, angular to subblocky, splintery and flaky in parts. It is locally silty, non calcareous with micromica, traces of micropyrite and contains carbonaceous material.

The limestone is very pale grey, white, pale yellow brown, soft to moderately hard. It is angular, flaky, subblocky, very argillaceous in part, dolomitic in part and microcrystalline to micritic.

Melke Formation **2375.5 - 2462.0 mMD, 2375.5 - 2462.0 mTVD (2351.5 - 2438.0 mTVD MSL)**

System: Jurassic
Series: Middle Jurassic
Stage: Middle Volgian to Bathonian - Bajocian
Depositional environment: Marine, inner shelf (restricted circulation) – inner shelf

The Melke Formation can be divided into two sections, an upper part (30.5m) consisting of claystone, and by the Melke sandstone interval which exhibits three coarsening upwards sequences. This is seen on the gamma ray response as the formation grades from clays to silty claystone to fine sand which is generally a poorly developed dirty sandstone section with some limestone stringers.

The claystone is olive black to very dark grey becoming predominantly olive grey with occasionally dark grey, dark greenish grey and light brown. It is soft to firm, occasionally moderately hard, slightly silty to very silty and arenaceous as well as often locally sticky. The cuttings are amorphous to subblocky occasionally blocky, angular and rarely splintery. It contains micromica and traces of pyrite and nodular pyrite as well as microcarbonaceous material. The claystone is locally non to slightly calcareous and grades to argillaceous siltstone in part.

The limestone is yellowish white to pale yellowish brown and pale grey. It is firm, crumbly, argillaceous and micritic and is often dolomitic.

Sand is seen as loose quartz consists of predominantly clear, occasionally milky and yellow brown grains. The sand is very fine to fine, rarely medium, generally fine, well sorted and angular to subrounded. Locally, rare fragments of white to light grey, very fine calcareous cemented sandstone are seen.

FANGST GROUP **2462.0 - 2504.0 mMD, 2462.0 - 2504.0 mTVD (2438.0 - 2480.0 mTVD MSL)**

The top of the Fangst Group is defined by an increase in the gamma ray readings associated with a slight decrease in the resistivity readings. The Fangst Group comprises the Not and Ile Formations in this well.

Not Formation **2462.0 - 2500.0 mMD, 2462.0 - 2500.0 mTVD (2438.0 - 2476.0 mTVD MSL)**

System: Jurassic
Series: Middle Jurassic
Stage: Bathonian – Bajocian to Aalenian -Toarcian
Depositional environment: Marine inner shelf – inner shelf/restricted circulation

The Not Formation consists of a silty and occasionally sandy claystone with thin stringers of limestone in the upper part of the formation down to 2480m MD, followed by the Not sandstone member.

The claystone is olive grey to medium dark grey, locally greenish grey, firm to moderately hard, locally soft and sticky in part. It is silty to very finely arenaceous in part, grading to siltstone in part and has traces of micromica and pyrite. It is very slighty to generally non calcareous.

Initially from 2480 – 2500m MD the sand consist of loose quartz, graines which are clear, milky, yellow brown in part, very fine to fine, generally fine, rare medium, well sorted with some clay matrix. The sand is often very micaceous with traces of chlorite as well as traces of carbonaceous material and pyrite.

Below 2500m MD, the sand consists again of predominantly loose quartz being initially very fine to fine, rare medium, becoming very fine to medium generally fine and then very fine to coarse. The graines are initially well sorted becoming poorly sorted, subangular to subrounded and has occasional locally calcareous cement. The sand containes mica, traces of carbonaceous material and traces of pyrite with pyrite coating on some grains.

Thin stringers of limestone are seen both in the claystone as well as the upper section of the sand.

The limestone is light grey, pale grey, white grey, crumbly, argillaceous and micritic to microcrystalline and grades to dolomite in places.

Ile Formation **2500.0 - 2504.0 mMD, 2500.0 - 2504.0 mTVD (2476.0 - 2480.0 mTVD MSL)**

System: Jurassic
Series: Middle Jurassic
Stage: Aalenian -Toarcian
Depositional environment: Marine inner shelf/restricted circulation

The Ile Formation consists of sandstone. The sand consists of loose quartz, graines which are clear, generally very fine, well sorted, subangular to subrounded, loose and micaceous. The sand is locally argillaceous and calcareous cemented, pyritic and with trace of carbonaceous material.

BÅT GROUP **2504.0 - 2800.0 mMD, 2504.0 - 2800.0 mTVD (2480.0 - 2776.0 mTVD MSL)**

The top of the Båt Group is defined by a more erratic gamma ray pattern associated with a decrease in resistivity readings. The Båt Group consists of the Ror, Tilje and Åre Formations in this well.

Ror Formation **2504.0 - 2529.0 mMD, 2504.0 - 2529.0 mTVD (2480.0 - 2505.0 mTVD MSL)**

System: Jurassic
Series: Middle Jurassic
Stage: Aalenian -Toarcian
Depositional environment: Marine inner shelf/restricted circulation

The Ror Formation consists of sandstone with a claystone interval in the lower part.

The sand consists of loose quartz, graines which are predominantly clear, very fine to coarse grained and poorly sorted. It appears to be bimodal with coarse to very coarse, very fine to fine and medium sized grains in the upper part. The grains are subangular to subrounded with some locally silica cement, traces of clay matrix material and pyrite coating in places. Traces of mica and carbonaceous material are also present.

The claystone is olive grey to brownish grey and dark greenish grey. It is firm, blocky to subblocky, silty, and carbonaceous in parts with micropyrite present. It is non calcareous.

Tilje Formation **2529.0 – 2567.0 mMD, 2529.0 – 2567.0 mTVD (2505.0 – 2543.0 mTVD MSL)**

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

The Tilje formation consists of sandstone interbedded with siltstone and claystone.

The sand is initially very fine to coarse becoming very fine to fine with occasional medium and coarse grains. It is initially poorly sorted and becomes moderate to well sorted by the end of the interval. The grains are clear, milky and yellow brown and are angular to subrounded with moderate to good sphericity. Some very fine white, pale grey and yellow brown sandstone are friable with weak or no silica cement. A fair amount of pale brown argillaceous and silty material are seen as the sandstone grades towards siltstone. Mica and pyrite are also seen.

The siltstone is brownish grey to brown, dark brownish grey, firm, blocky to sub blocky. It is often very micaceous with some carbonaceous material and is often very sandy grading to argillaceous sandstone.

The claystone is medium dark grey, dark grey and dark greenish grey. It is moderately hard, occasionally soft, angular, subblocky, sub-splintery and flaky in part as it becomes sub fissile to fissile. It is occasionally silty, containing traces of micromica and pyrite and is non calcareous.

Åre Formation **2567.0- 2800.0 mMD, 2567.0- 2800.0 mTVD (2543.0 – 2776.0 mTVD MSL)**

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

The Åre Formation consists of a silty sandstone interbedded with claystone and siltstone. In the upper part, above 2731 mMD, coal is only seen a few times, while below coal is a constant member of the lithology.

The sandstone predominantly consists of loose quartz but with some pale brownish grey, greyish brown argillaceous and silty sandstone, occasionally white and clean, generally very fine to fine grained. The graines are well sorted and angular to subrounded. They are coarser in the lower part, very fine to very coarse, predominantly fine to medium, poorly sorted, angular to sub-angular with occasionally sub-round grains. The grains are clear, milky, occasionally pale yellow brown & smoky. The sandstone has weak to no silica cement and often contains abundant pale brown, greyish brown & white (Kao?) silty and argillaceous material. It is frequently very micaceous including traces of chlorite in addition to traces of pyrite and pyrite nodules and traces of carbonaceous material.

The claystone is olive grey, dark greenish grey, dark grey becoming olive black, dark brownish black and greyish brown. It is moderately hard to occasionally hard, blocky to subblocky, becoming more flaky and sub splintery and is subfissile to fissile in part and slightly silty to silty. It is locally very carbonaceous in the lower section with carbonaceous laminae in places. Traces of micromica and micropyrite are also seen and the claystone is non calcareous

The siltstone is generally brownish grey, greyish brown, occasionally dark brownish grey to brownish black and is generally firm but occasionally soft. It is very argillaceous, often sandy grading to very fine argillaceous sandstone, becoming very micromicaceous and carbonaceous and non calcareous.

Some traces of limestone are seen . The limestone is white to pale grey, firm to moderate hard and microcrystalline.

The coal below 2730m is black to dark brownish black, medium hard, brittle, shining / waxy texture, earthy in part and with some evidence of slickensides. Traces of micromica and micropyrite are present and at times the coal grades to very carbonaceous shale / claystone.

TD: 2800.0 mMD, 2800.0 mTVD, (2800.0 mTVD MSL)

4.5 Hydrocarbon indications

All cuttings were returned to seabed while drilling down to 1377m MD. There were no indications of gas saturations from the MWD resistivity log or by monitoring the wellhead using short range sonar/visual CCD on the ROV.

There were no shows seen in the drilled cuttings and gas readings were very low although heavy components were present. Gas ratio analysis did not indicate oil (Fig 4.6). MWD resistivities in the sandstones for the Viking, Fangst and Båt Groups indicates that the sands are water wet.

Table 4.3 Gas peaks (FID)

DEPTH m RKB	GAS %	C_1 ppm	C_2 ppm	C_3 ppm	iC_4 ppm	nC_4 ppm	C_5 ppm	TYPE	BG %
2313	0.11	840	30	19	10	7	6	FG	0.06
2373	0.24	2141	73	36	14	10	6	FG	0.19
2500	0.09	864	25	12	4	2	1	FG	0.02
2591	0.14	1305	37	18	5	4	2	FG	0.03
2750	0.24	2156	94	37	8	5	2	FG	0.15
2752	0.27	2502	110	44	10	6	3	FG	0.15
2576	0.45	4296	182	66	14	6	2	FG	0.15
2778	0.36	3338	155	62	13	7	5	FG	0.15
2790	0.29	2714	134	56	11	7	6	FG	0.15
2800	0.34	3045	31	13	4	3	2	TG	0.06

4.6 Geophysical results

Refer to Figure 4.3.

The observed formation tops in the Tertiary and Cretaceous and Jurassic sections were encountered well within the uncertainties of the prognosis. The observed reservoir zonation within the Fangst Group and upper part of the Båt Group is very close to the prognosed zonation, even though the seismic resolution limits the possibility to interpret which

formations that are present. The lack of VSP data limits the ability to update the seismic interpretation and velocity model in the area.

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 from 1390 mMD to 2800 mMD (TD).
- Mud samples were sampled every 100 m from 1400 mMD to 2700 mMD. (Figure 1.2).

4.7.2 Conventional coring

No cores were cut due to dry well.

4.7.3 MWD/LWD

The MWD-logging was performed by Baker Hughes Inteq.
Table 4.4 MWD logging

Run no.	Depth interval mMD	Collar diam.	Tool type	Comments
1	445 – 1377	8 1/4"	MPR	MPR-lite service 17 ½" section. GR failed when drilling cement, and memory data was not recovered on the rig.
2	1377 – 2800	8 ¼"	MPR	MPR-lite service 12 1/4" section. Missing realtime data from 2677 – 2693 due to WITS problem with depth measurement from mud logging computer. Else the tool worked OK. The missing part was re logged on the way out.

4.7.4 Wireline logging

Table 4.5 Wireline logging summary

Wireline logging program			
#	TOOL COMBINATION	RUN	INTERVAL m MD RKB
1	FMI - DSI - PEXlite - HNGS - ERCD	1A	374.0 – 1701.0 m
2	FMI - DSI - PEXlite - HNGS - ERCD	1B	no logging, unable to pass 1397 m
3	FMI - DSI - PEXlite - HNGS - ERCD	1C	no logging, unable to pass 1491 m
4	PEXlite-MDT (TLC)	1D	no logging, unable to pass 1500 m

The wireline logging was performed by Schlumberger. Different log curves are shown in Figure 4.5 A and B.

As seen from Table 4.6, the logging tool was not able to pass 1701 m. It was decided to log the PEXlite up to the casing shoe, and log the GR inside the casing to the seabed.
Between logging run 1A and 1B a wiper trip was performed and KCL content was reduced from 140 to 120 kg/m^3. The mud weight was increased from 1.42 to 1.46 sg.
The logging tool stood up at 1397 m, several attempts were made to pass but with no success. A new wiper trip was performed. The third attempt stood up at 1491 m. Several attempts were made to pass 1491 m, due to no success it was decided to try with TLC.

Run 1D stood up at the same depth as run 1C. After working it down to 1500 m maximum compression of 8000 lbs for the PEXlite tool was reached. The tool could not be worked further down without risking tool damage or stuck situation. After this the logging program was aborted.

4.7.5 Data quality

Due to bad hole conditions the logging tools was not able to pass 1701 m.
Due to this there is no wireline logging data in the reservoir zone.

The MWD logging performance was not satisfactory in this well, but the data quality was good. The service from the personnel was also good. The mud logging crew worked well and the mud loggers did an excellent job to keep up with the sampling requirements especially when drilling fast. On the mud logging data side, things were generally good.

4.8 Formation pressure

The resistivity log from MWD and the D-exponent is used to calculate the pore pressure in this well using different methods, but it is difficult to verify since there is no sonic data and

that a PDC bit is used. The resistivity and the D-exponent from MWD follows the same trend as the prognosed pore pressure. The calculated pore pressure from the resistivity log is slightly higher than the predicted pressure and the D-exponent is little bit lower. Data from 6608/10-8 and 6608/10-9 is used to predict the prognosed pore pressure. The formation pressure is well known in this area since several wells have been drilled here, and the formation pressure is therefore expected to be the same as the prognosed pressure.

The overburden gradient is calculated using the density log from wireline run 1A from 1300 down to 1701 mMD. Above the 13 3/8" casing shoe and beneath 1701 mMD data from 6506/12-1, 6608/11-2 and 6608/10-1 is used.

4.8.1 Reservoir pressure summary

There are no MDT measurements in the well. It is expected to be normal pressure in the reservoir zone due to no hydrocarbons.

4.9 Reservoir fluid sampling

No samples were collected.

4.10 Leak off test

No LOT was performed in this well. A FIT of 1.55 g/cc was performed under the 13 3/8" casing shoe, see Figure 4.5.

4.11 Formation temperature

An average temperature gradient of 4.2 ^{o}C /100 meter is calculated from seabed down to TD of the well. This gradient gives a formation temperature of 104.8 ^{o}C at TD.

4.12 Experiences / recommendations

In spite of the hole conditions and the fact that there were no wireline logging in the reservoir section, the wireline operation went well.

The KCl content in the mud used in 6608/10-10 represents the largest concentrations compared to the previous nearby wells. It is believed that this KCl content caused the instability in the Brygge, Tare and Tang Formations. In future wells a casing should be considered ran to case off the problems zone in order to get necessary logging data.

Pl128, Blocks 6608/10 & 11
Structual Geology Map

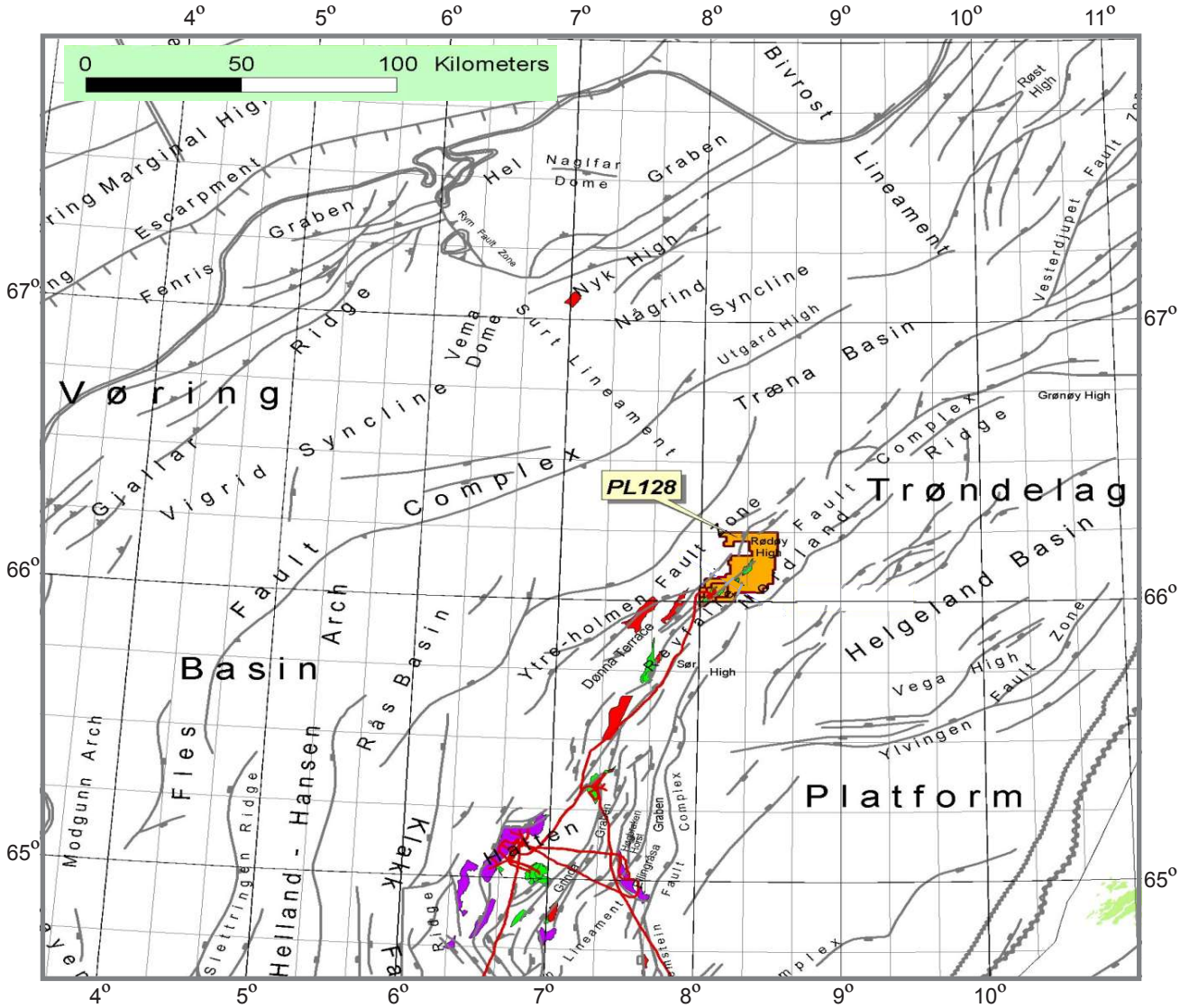


Fig. 4.1

HA/2002_0072/AF/25.07.02/hs

PL 128

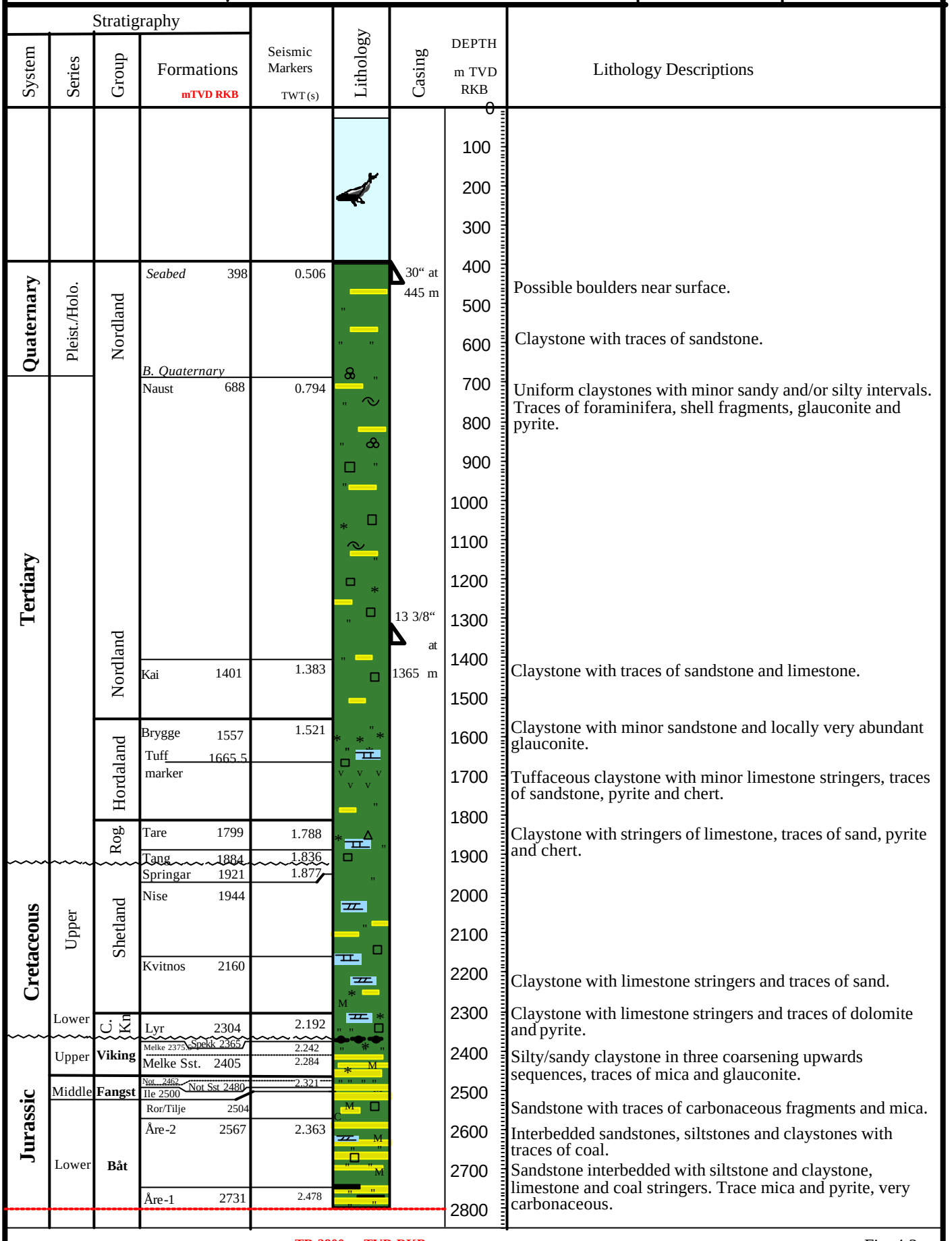
RKB - MSL: 24 m

Water depth: 374 m MSL

Well 6608/10-10 Gråspett
Well Stratigraphy

STATOIL

Made by: MART | Date: 26.01.2004



TD 2800 m TVD RKB

Fig. 4.2a

PL 128

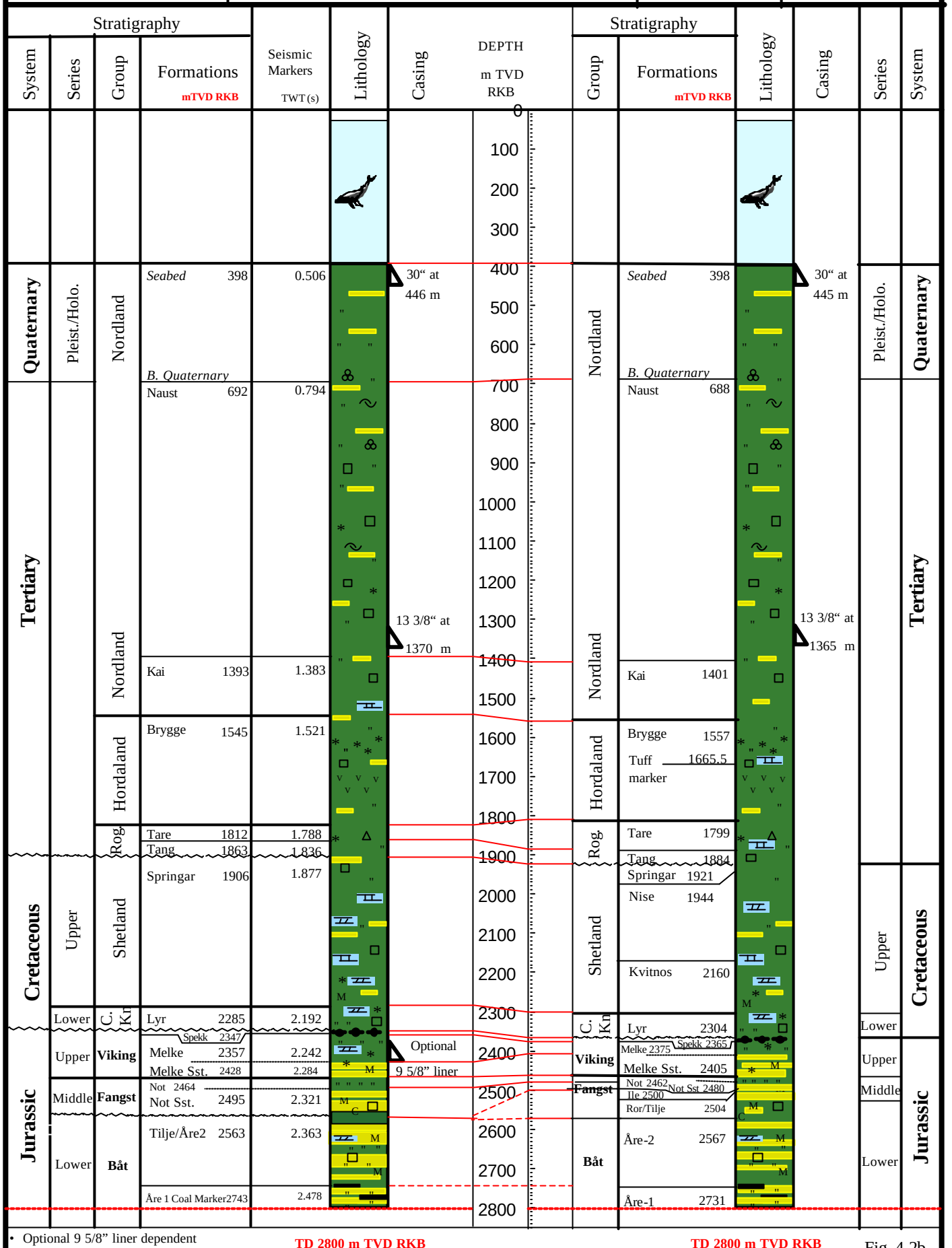
RKB - MSL: 24 m

Water depth: 374 m MSL

Well 6608/10-10 Gråspett
Prognosis vs. Actual

STATOIL

Made by: MART | Date: 26.01.2004



- Optional 9 5/8” liner dependent on presence of hydrocarbons

TD 2800 m TVD RKB

TD 2800 m TVD RKB

Fig. 4.2b

PL 128

RKB - MSL: 24 m

Water Depth: 374 m MSL

Pressure prognosis Well 6608/10-10 Gråspett

STATOIL

Made by: SVTY

Date: 16/1 - 2004

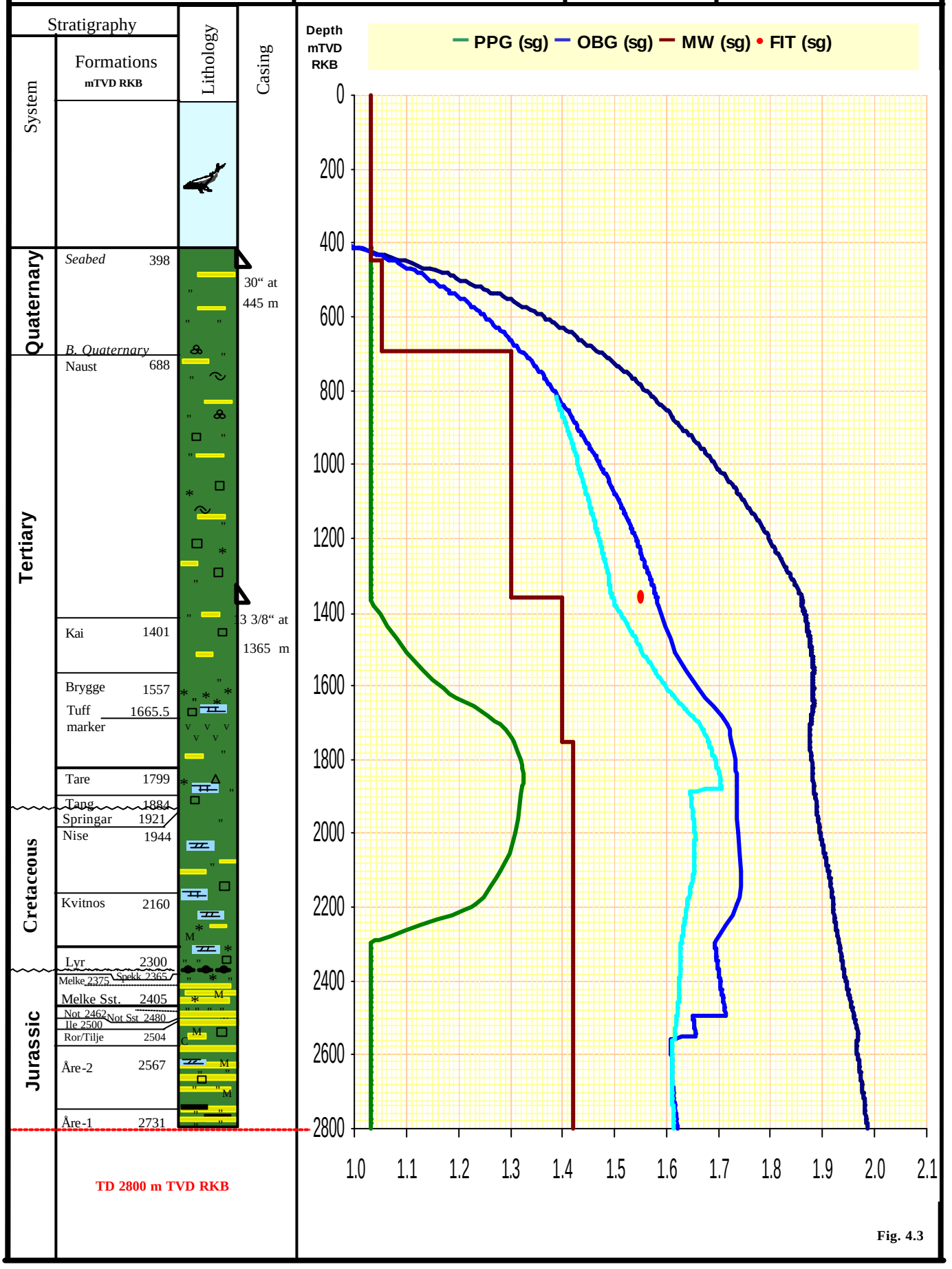


Fig. 4.3

PL 128

RKB - MSL: 24 m

Water Depth: 374 m MSL

Temperature gradient
Well 6608/10-10
Gråspett

STATOIL

Made by: SVTY

Date: 16/1 - 2004

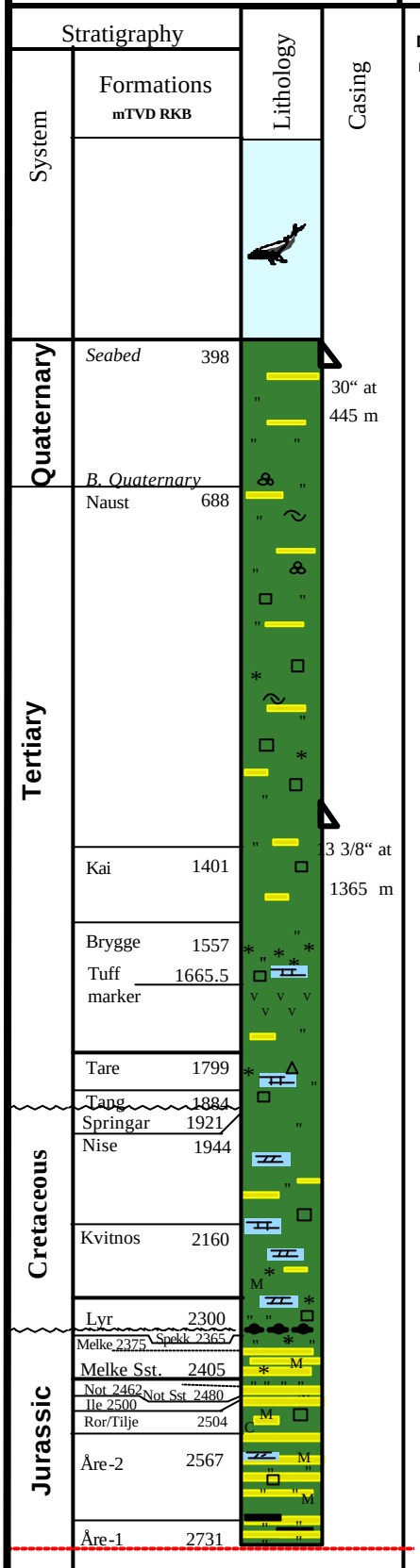


Fig. 4.4

PL 128

RKB - Sea 24 m

Water depth 374 m MSL

Composite plot
Well 6608/10-10

STATOIL

Made by: SVTY

Date:16.01.2004

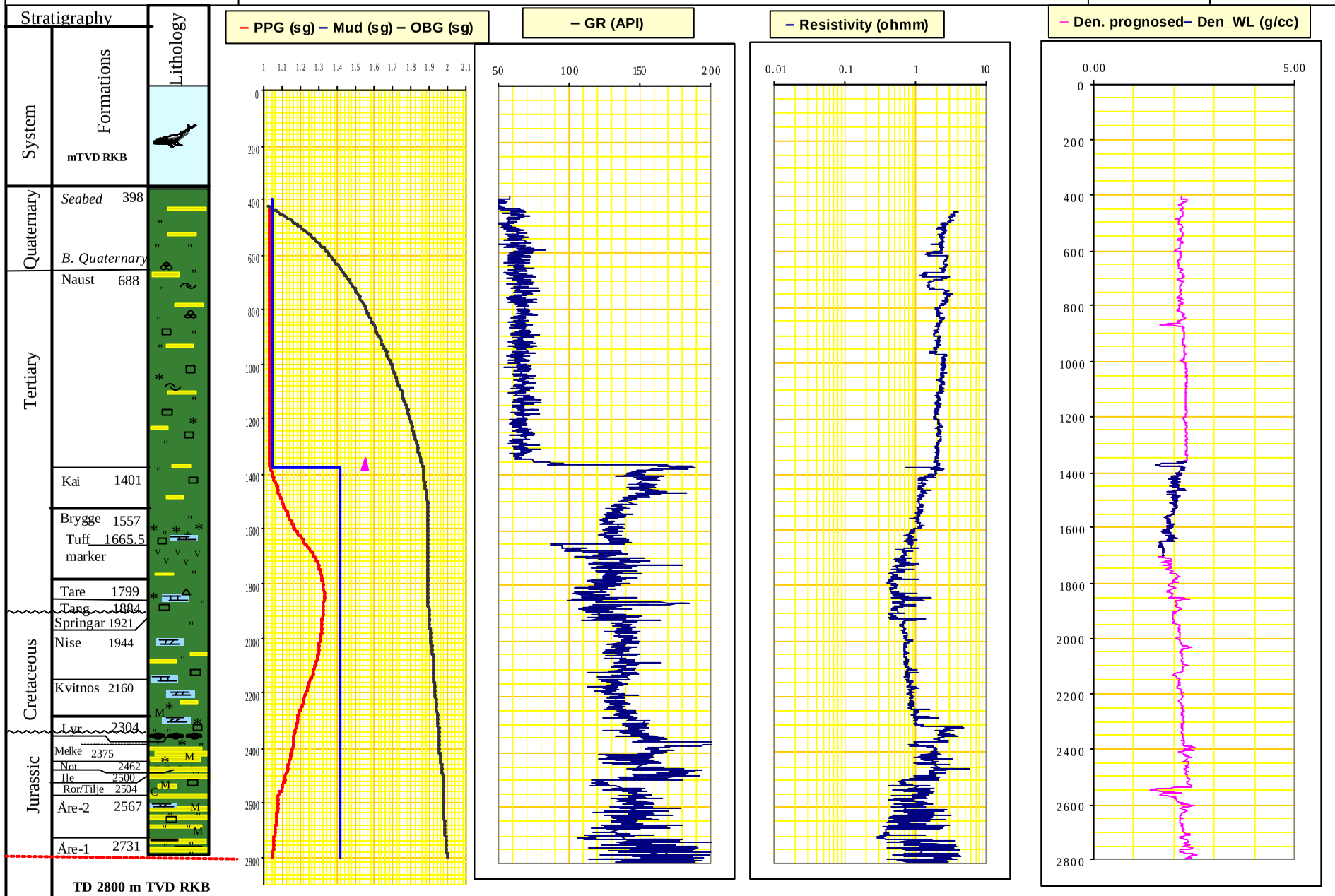


Fig 4.5A

PL 128

RKB - Sea 24 m

Water depth 374 m MSL

Composite plot
Well 6608/10-10

STATOIL

Made by: Svty

Date:16.01.2004

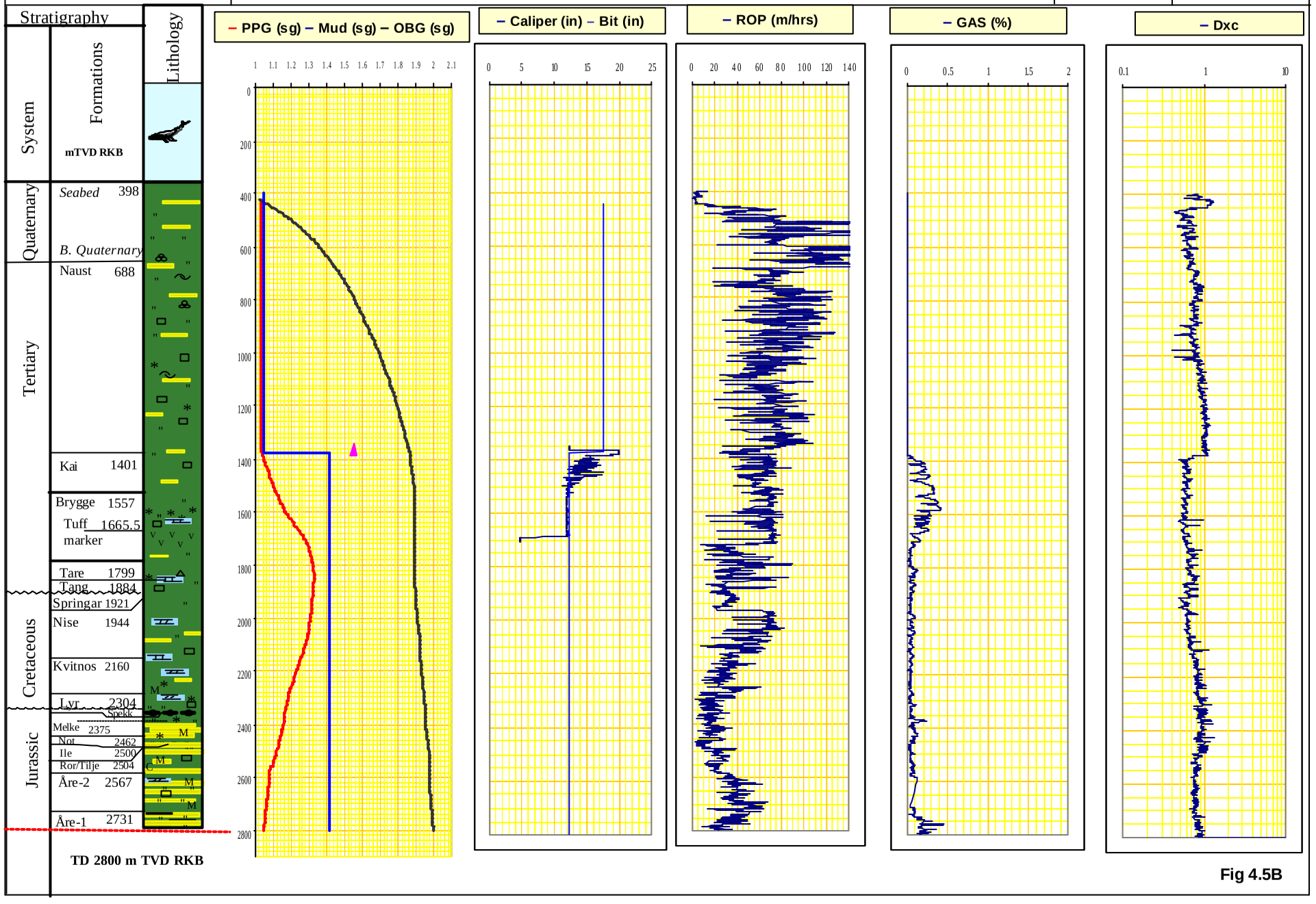


Fig 4.5B

Gas Interpretation Plots

Well no: 6608/10-10 **Licence: PL 128**

Hole diameter: 12 1/4 " **Depth interval:** 1378 - 2800 mMD

Formation	mMD
Springar Fm	1921
Lyr Fm	2304
Spekk Fm	2365
Melke Fm	2375,5
Melke sst	2405

Formation	mMD
Not Fm	2462
Not sst	2480
Ror Fm	2504
Tilje Fm	2529
Åre Fm	2567

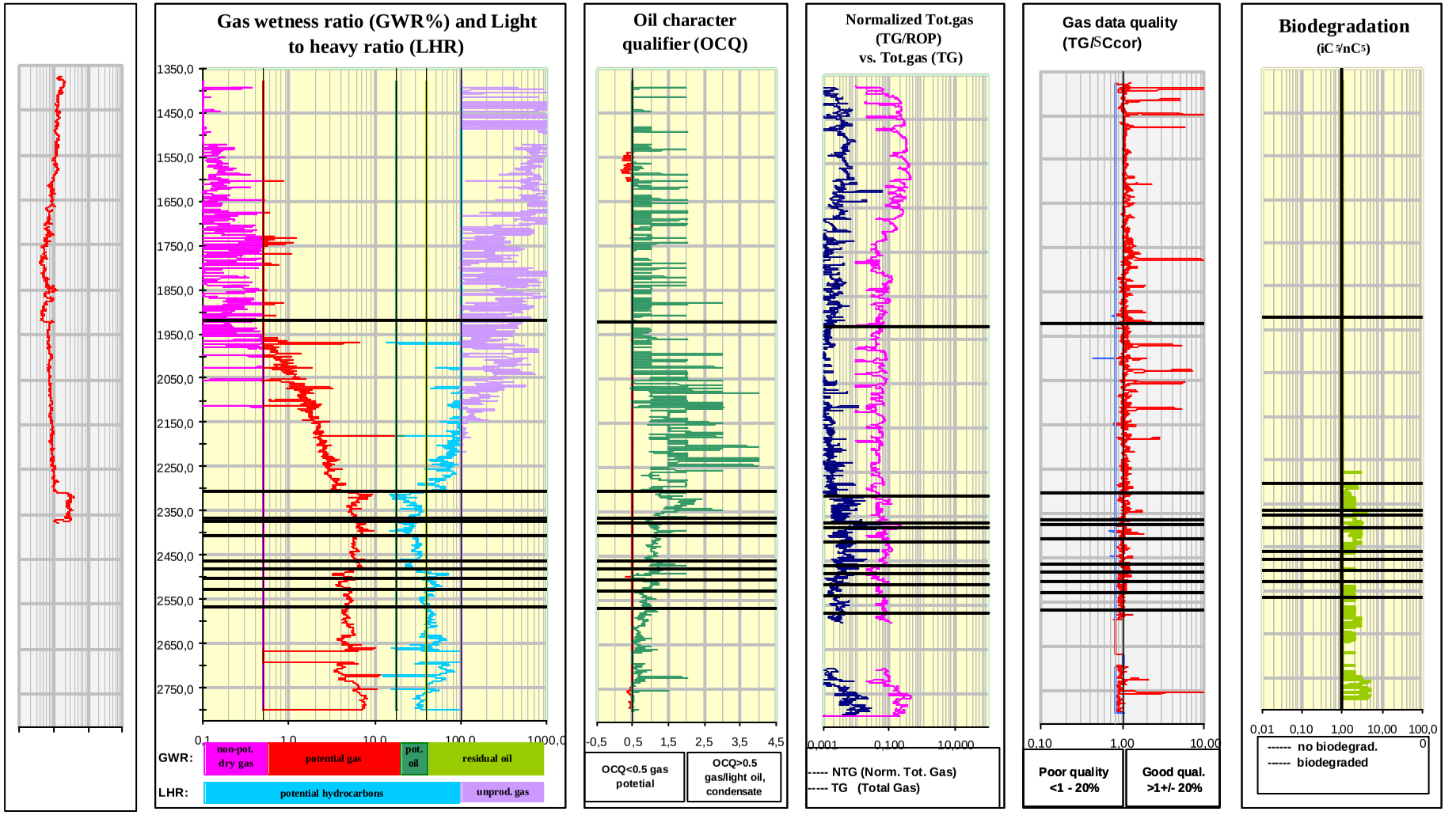


Fig. 4.6

5 Drilling operations report

5.1 Rig move and positioning

5.1.1 Summary

The semi-submersible and dynamic positioned (DP) rig Stena Don was moved from the well 6608/10-D1BH at the Norne field to the Gråspett location 6608/10-10. The transit time was 3 hours and no towing vessel was needed.

At location transponders and taut wire were deployed, meanwhile service and maintenance on rig equipment were carried out.

5.2 Drilling top hole section

5.2.1 Summary

The 36" hole was drilled from sea bed at 398 m to section TD at 447 m (depth of 17 ½" bit). Low weight on bit was used to ensure vertical hole. The top hole section was drilled using sea water and high viscosity pills as drilling fluid. The maximum inclination measured by the Anderdrift tool was 1.5° at TD. The hole was displaced to 1.35 g/cm³ mud prior to pulling out. No overpull was experienced when pulling out of hole.

The top hole was drilled with high flow, 4500 lpm, high rotational speed of 50 - 125 PRM and low WOB, 0-3 mt. The average ROP was 2.7 m/hrs (18 hrs. total drilling time).

The 30" conductor was run to 445 m and cemented in place with 30" WH and 3 metres stick up and an angle of 1.0 ° inclination. The cement slurry used for the conductor was X-LITE, 1.52 g/cm³ on surface and 1.54 g/cm³ down hole due to compression, and 300% OH excess was used.

Drilled out the 30" conductor shoe and cleaned the rat hole in 2 hours.

5.2.2 Experiences / recommendations

- Four joints of conductor
  It is recommended to reduce number of conductor joints from five to four when formation capacity allows.

- Cement slurry / Waiting on cement:
  Use X-LITE cement, to avoid waiting on cement to set up to allow for release of the 30" conductor running tool.

5.3 Drilling 17 1/2" section

5.3.1 Summary

The 17 1/2" section was drilled out of the 30" conductor and to section TD at 1377 m in one bit run. A pendulum rotary assembly with a milled tooth bit, IADC-code 115, was used. The 17 1/2" section was drilled with an average on bottom ROP of 63.7 m/hr, included the 2 hrs used on drilling out the 30" conductor. Wrong data format in the W`MWD tool in use reduced the overall ROP. Seawater and high viscosity pills were used as drilling fluid. At section TD the hole was circulated clean and displaced to 1.30 g/cm³ mud. The hole was slick with no tight spots, max overpull 10 ton.

Drilled section with about 4500 lpm, 120 – 150 rpm, 5 – 25 ton WOB. These parameters resulted in a high ROP compared to offset wells.

The 13 3/8" casing was run and set at 1365 m with an average running speed of 9.2 joints per hour. The casing was successfully cemented, and a single plug system was utilized. Had full returns during the cement job and bumped the cement plug with 97% pump efficiency.

Ran and installed the riser and the BOP, and pressure tested the well to 275 bar.

The 13 3/8" casing shoe and rat hole was drilled out and cleaned in 3.5 hours. Below the 13 3/8" casing shoe a formation integrity test (FIT) was performed to 1.55 g/cm³ EMW.

5.3.2 Experiences / recommendations

- 13 3/8" casing running time:
  Prior to spud of the well, the project had run a process with focus on "technical limit" of running 13 3/8" casing. The casing crew, Stena offshore personnel and Statoil representatives attended a workshop. This resulted in increased efficiency running the 13 3/8" casing with this rig, the average running speed was 9.2 joints per hour.

- No-cross coupling below wellhead:
  It is recommended to use a special No-cross collar on this first casing joint below the well head to avoid damaged threads during make up of wellhead to casing.

- MWD sampling rate:
  It is important to optimize MWD sampling rate to allow for high ROP in this section.

5.4 Drilling 12 1/4" section

5.4.1 Summary

The 12 1/4" section was drilled from the 13 3/8" casing shoe at 1365 m and vertically to the well TD at 2800 m in one bit run. After performing the FIT the well was displaced to KCl/Pac/glycol water based drilling fluid. The mud weight started out at 1.40 g/cm³ and was increased to 1.42 g/cm³ while drilling before reaching 1800 m. The rate of penetration was 30 – 100 m/hr down to 2307 m, where the ROP was restricted to be able to evaluate possible coring point. The section was drilled using a packed rotary assembly and a PDC bit, IADC-code M323.

The section was drilled with 3800 lpm / 80-180 rpm / 2-18 mT WOB. No bit balling was observed.

Pulling out the BHA after reaching section TD, the string got stuck at 2743 m. The string came free by jarring up with 50 ton overpull. Started to back ream and the string stalled out several times between 2719 and 2705 m. There were no indications of hole packing off. Continued back reaming to 2000 m and worked several tight spots, otherwise the hole was OK. Continued pumping out of hole and reamed tight spots from 2000 m to 1670 m. At this point it was observed a large increase of cuttings/cavings over the shakers, large and rounded cement cavings/lumps of 2 – 5 cm. A wiper trip to TD and preparations for wireline logging was performed.

Fig. 5.1 Cavings over shakers

Running in hole with wireline log #1 the string hung up at 1700 m and it was not possible to pass at several attempts. Pulled out of hole and performed a clean up run with bit and also increased the mud weight from 1.42 to 1.46 g/cm³. During the clean up run large amounts of cavings were observed over the shakers. Wireline log #1 was rerun and meet restriction at 1397 m, unable to pass same. Did a second clean up run, again large amounts of cavings were in the returns. Performed a second re-run of wireline log#1, string stood up at 1491 m. Pulled WL-tool string #1 out of hole and removed radioactive sources. Ran PEXlite / MDT as TLC. The TLC tool string stood up at 1500 m.

Ended the logging operations and prepared for permanent plug and abandonment of the well.

5.4.2 Experiences / recommendations

What caused the severe hole stability problems:

Ref chapther 4.12.

5.5 Permanent P&A

5.5.1 Summary

Ran in hole with cement stinger (292 m of 3 ½" DP and 5" DP to surface) to plug back the water filled Not/Åre sands. The string took weight at 1498 m. Washed past this restriction and continued washing down to 2800 m. While circulating prior to the cement job, large amounts of cavings came over the shakers.

Two open hole non-gas tight cement plug was planned for. Plug #1 was set at 2800 – 2575 m. The cement stinger was pulled out to 2565 m to avoid cement in returns. Cement plug #2 was set from 2565 to 2442 m and was cut short due to loss of mixing water. A cement plug #3 therefore had to be placed to cover the intended interval from 2442 to 2350 m.

Due to severe washouts the intended Perigon cement support tool (CST) was replaced by a 10.7 m³ high viscosity pill of 1.70 g/cm³ in the interval 1565 - 1465 m as support for the transition zone cement plug. The caliper had shown hole diameter larger than 17 ½".

Plug #4, in the transition zone between open hole and 13 3/8" casing, was placed between 1460 and 1260 m. The cement plug was tested to 88 bar, which is 72 bar above the EMW FIT of 1.55 g/cm³ at the 13 3/8" casing shoe. A 13 3/8" EZSV plug was the set at 655 m and tested to 88 bar. Displaced the well to seawater and set a surface cement plug, plug #5, from 650 to 450 m. Washed BOP and pulled Wear Bushing (WB). Pulled the BOP.

Cut the 20" x 30" casing at 403 m for 2.5 hrs, when the PDM stalled out. Engaged and locked MOST to Wellhead and pulled to 230 MT overpull without pulling 20" x 30" casing free.

Disengaged MOST, and function tested/inspected tool and continued cutting 20" x 30" casing. Observed cement in returns to sea bed. Pulled WH free with 80 tons overpull and retrieved same to surface. Removed bull's eye brackets from the Wellhead in the moon pool area. Laid out 20"x30" casing on deck. The ROV retrieved the transponders.

A canvas sleeve was installed on the 30" conductor wellhead to reduce the necessary over pull needed when pulling it.

The rig was transferred to Norne operations well 6608/B-4BH, the 07.08.2003 at 21:30 hrs.

5.5.2 Experiences / recommendations

- Software crash on the cement unit:
  The computer on the cement unit crashed. As a consequence of this the cement operation had to be done manually, as first time on Stena Don. As a result some operations went wrong; as loss of mixing water to the sea and pumping of 6.3 m^3 spacer into the mixing water.

5.6 Figures and tables

5.6.1 Well schematic

Well: 6608/10-10
Field: Gråspett
Rig: Stena Don

FINAL WELL SCHEMATIC

All depths referes to RKB
RKB-MSL Stena Don: 24 m
Finished: August 2003

HOLE		CASING				FIT	TOC		CSG. SHOE				
SIZE	TVD MD	SIZE	TYPE / NOTES	CENTRALIZERS	TEST PRESS [BAR]		TVD	MD	TVD	MD	RKB	LWD LOGS	WL LOGS	SURV CSG/OH
Sea Bed	398,0						398,0	398,0						
36"	447 447	**30"**	4 jnts. 30", 309.7 lb/ft, X-52, SL-60 incl 30" WH housing & shoe joint. Canvas sleeve installed on WH.	None	**N/A**		Seabed	Seabed	445	445		None	None	OH: DIR
17 1/2"	1 377 1 377	**13 3/8"**	18 3/4" WH hanger incl. extension jnt. x-over to 13 3/8" 72 lb/ft, P-110, New Vam	Type: NW-ST A4 1 ctr/jt on bottom 6 jnts above this 4 slick joints, then 1 ctr/jt on next 2 jts	275 1.03 g/cm3	FIT 1.55 g/cm3	Seabed	Seabed	1 365	1 365		None	None	OH: GR RES DIR
12 1/4"	2 800 2 800	**NA**										None	None	OH GR RES DIR

5.6.2 P&A well schematic

Well: 6608/10-10
Field: Gråspett
Rig: Stena Don

SCHEMATIC - PLUGGED AND ABANDONED WELL

All depths referes to RKB
RKB-MSL Stena Don: 24 m
Finished: August 2003

HOLE		CASING				LOT / FIT	TOC		CSG. SHOE			TESTS	CUT
SIZE	TVD MD	SIZE	TYPE / RAD. MARKERS	PERMEABLE HC BEARING ZONES	TEST PRESS [BAR]		TVD	MD	TVD	MD	RKB		
Sea Bed	398,0						398,0	398,0					403
36"	445 445	**30"**	4 jnts. 30", 309.7 lb/ft, X-52, SL-60 incl 30" WH housing & shoe joint. Canvas sleeve installed on WH.	None	**N/A**		Seabed 450	Seabed 450	445	445	Seawater		
17 1/2"	1 377 1 377	**13 3/8"**	18 3/4" WH hanger incl. extension jnt. x-over to 13 3/8" 72 lb/ft, P-110, New Vam	None	275 1.03 g/cm³	FIT 1.55 g/cm³	655 1260	655 1260	1 365	1 365	**Cmt. Plug # 5** EZSV 1.46 sg WBM **Cmt. Plug # 4**	70 bar above FIT 70 bar above FIT	
12 1/4"	2 800 2 800			None			1460 1565 2 350 2442 2575 2800	1460 1565 2 350 2442 2575 2800			1.70 sg **Hi-Vis** 1.46 sg WBM **Cmt. Plug # 3** **Cmt. Plug # 2** **Cmt. Plug # 1**		

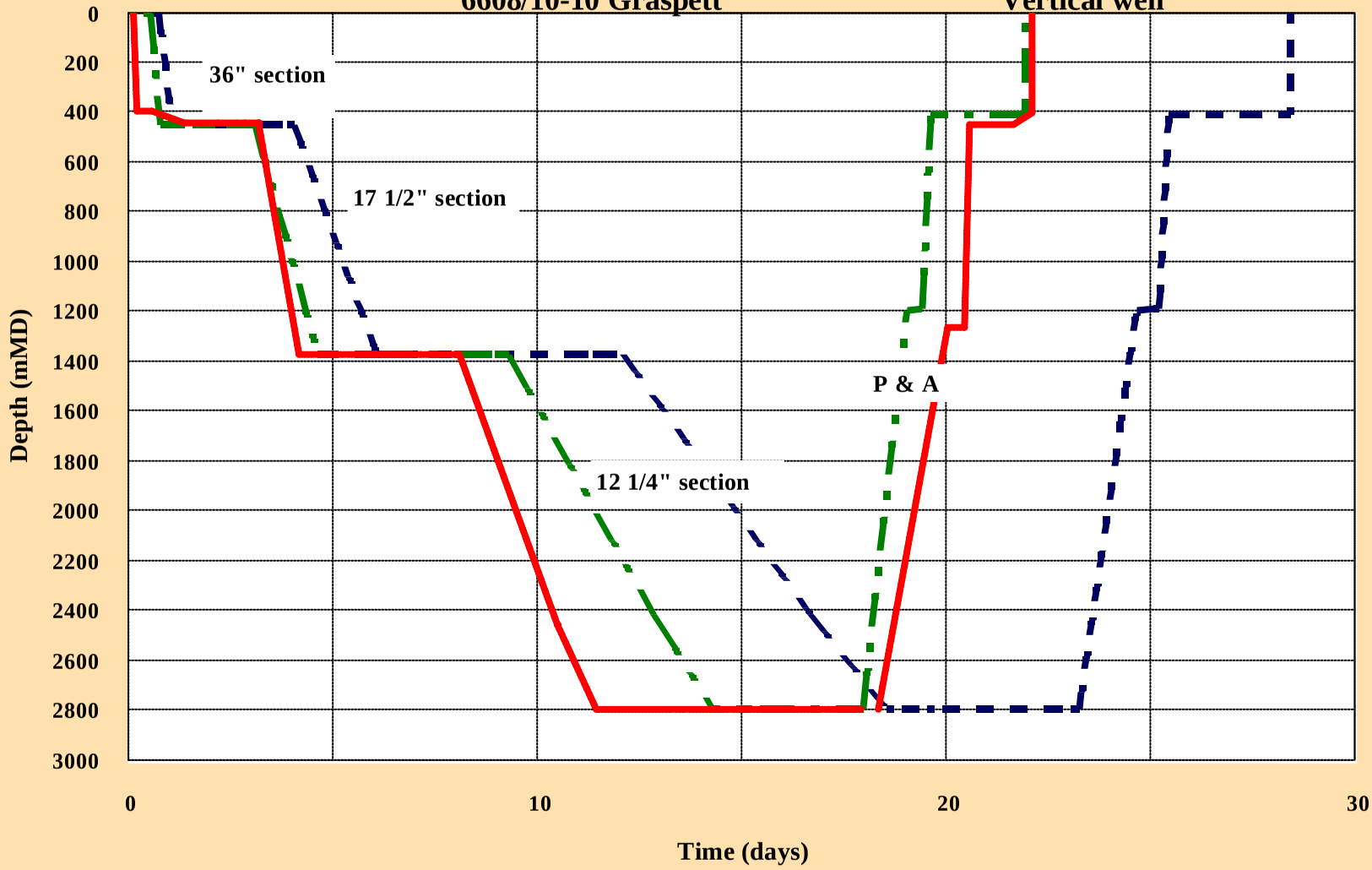
5.6.3 Time/depth curve

STATOIL

Time - Depth Plot

Stena Don
6608/10-10 Gråspett

DRY WELL
Vertical well



Budget time (days)
p10 (days)
Actual time (days)

Updated date/time:
Date: 27.08.2003
Time: 10:24

Start date/time:
Date: 16.07.2003
Time: 18:00

Est. finish date/time:
Date: 07.08.2003
Time: 21:30

Total budget time:
28,5 days

Time used:
22,1 days

Time ahead of budget:
6,4 days

Comments:

5.6.4 Timeplanner

Wed	27.08.2003	10:24	Updated														
Wed	16.07.2003	18:00	Start date														
Thu	07.08.2003	21:30	Finish date														

TIMEPLANNER

STATOIL

Stena Don — DRY WELL

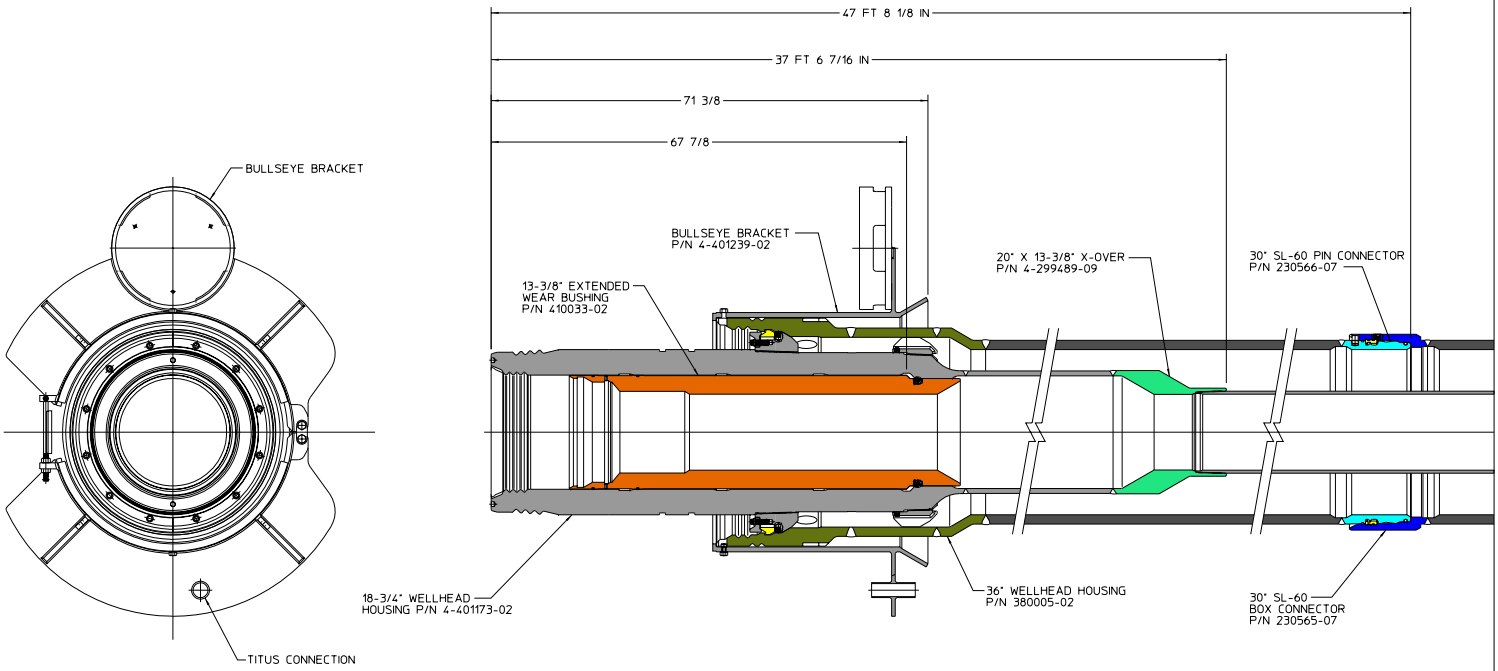
6608/10-10 Gråspett — Vertical well

Time ahead of budget: 6,4 days

DAY	START DATE	START TIME	Budg. time (hrs)	Acc. budg. time (days)	Opt. time (hrs)	Acc. opt. time (days)	Budg./ Opt. depth (mMD)	Plan time (hrs)	Actual time (hrs)	Acc. actual time (days)	Actual Depth (mMD)		Activity description	Company
													36" hole section (398 - 448 m)	
Wed	16.07.2003	18:00	12,0	0,5	9,0	0,4	0	2,0	3,0	0,1	0	F	Transit from Norne to well location. Mix spud mud. Service rig equipment.Adjust rig heading.	
Wed	16.07.2003	21:00	6,0	0,8	4,5	0,6	0	4,5	2,0	0,2	398	F	Deploy DP-transponders. Performed DP trials.	
Wed	16.07.2003	23:00	8,0	1,1	6,0	0,8	448	6,0	9,0	0,6	398	F	MU 30" CART & cmt stand. MU and RIH with 36" BHA. Finalize spud position w/ROV beacon.	
Thu	17.07.2003	08:00	24,0	2,1	18,5	1,6	448	18,5	19,5	1,4	447	F	Drill 36" hole (26" HO depth: +/- 445 m).	
Fri	18.07.2003	03:30	4,0	2,3	3,0	1,7	448	3,0	1,0	1,4	447	F	Circulate hole clean and displace hole to 1.30 sg mud.	
Fri	18.07.2003	04:30	8,0	2,6	6,0	2,0	448	6,0	18,5	2,2	447	F	POOH with 36" BHA. Rack same.	
Fri	18.07.2003	23:00	14,0	3,2	11,0	2,4	448	11,0	8,0	2,5	447	F	PU 30" conductor and install slope indicators. Run conductor and cement stinger.	
Sat	19.07.2003	07:00	5,0	3,4	4,0	2,6	448	3,5	2,5	2,6	447	F	Circulate, pump and displace cement.	
Sat	19.07.2003	09:30	6,0	3,6	4,5	2,8	448	4,5	5,5	2,9	447	F	Retrieve running tool and landing string. MU Cmt stand for 13 3/8" casing.	
Sat	19.07.2003	15:00	7,0	3,9	5,5	3,0	448	4,5	5,5	3,1	447	F	MU and RIH with 17 1/2" BHA.	
Sat	19.07.2003	20:30	4,0	4,1	3,0	3,1	448	3,0	2,5	3,2	447	F	Drill out cement & 30" shoe.	
Section time (days)			4,1		3,1			2,8	3,2				Section time ahead of/behind (-) budg:0,9 days, Tot. time ahead of/behind (-) budg:0,9 days	
													17 1/2" hole section (448 - 1377 m)	
Sat	19.07.2003	23:00	48,0	6,1	37,0	4,7	1374	37,0	24,0	4,2	1377	F	Drill 17 1/2" hole to TD at 1377 m (shoe depth: 1365 m).	
Sun	20.07.2003	23:00	4,0	6,3	3,0	4,8	1374	3,0	2,0	4,3	1377	F	Circulate hole clean.	
Mon	21.07.2003	01:00	6,0	6,5	4,5	5,0	1374	4,5	7,5	4,6	1377	F	Displace hole to 1.30 sg mud. POOH. Rack back 17 1/2" BHA.	
Mon	21.07.2003	08:30	24,0	7,5	18,5	5,8	1374	18,5	18,0	5,4	1377	F	RU and run 20" x 13 3/8" casing.	
Tue	22.07.2003	02:30	6,0	7,8	4,5	5,9	1374	4,5	6,0	5,6	1377	F	Circulate, pump and displace cement. Release RT	
Tue	22.07.2003	08:30	7,0	8,0	5,5	6,2	1374	5,5	3,0	5,7	1377	F	POOH and wash well head area. LD cement head, RT and 17 1/2" BHA.	
Tue	22.07.2003	11:30	68,0	10,9	53,0	8,4	1374	27,0	28,5	6,9	1377	F	Run BOP / Riser and pressure test same. Test 13 3/8" csg/ BOP connector to 275 bar/ 15 min.	
Wed	23.07.2003	16:00	12,0	11,4	9,0	8,8	1374	9,0	6,0	7,2	1377	F	MU and RIH with 12 1/4" BHA.	
Wed	23.07.2003	22:00	8,0	11,7	6,0	9,0	1374	6,0	5,5	7,4	1377	F	Perform choke drill. Drill out shoe track and 3 m new formation using SW/Hivis.	
Thu	24.07.2003	03:30	2,0	11,8	1,5	9,1	1374	1,5	16,0	8,1	1377	F	Circulate & perform FIT. POOH to reprogram MWD.	
Section time (days)			7,7		5,9			4,9	4,9				Section time ahead of/behind (-) budg:2,9 days, Tot. time ahead of/behind (-) budg:3,7 days	
													12 1/4" hole section (1374 - 2800 m)	
Thu	24.07.2003	19:30	8,0	12,1	6,0	9,3	1377	6,0	1,5	8,1	1377	F	Displace well to 1.40 sg WBM.	
Thu	24.07.2003	21:00	110,0	16,7	85,5	12,9	2420	43,0	57,0	10,5	2458	F	Drill 12 1/4" hole to check for hydrocarbons (2420 - 2560 m). MW to be 1.42 sg from 1800 m.	
Sun	27.07.2003	06:00	0,0	16,7	0,0	12,9	2420	0,0	0,0	10,5	2458	F	Circulate hole clean and POOH.	
Sun	27.07.2003	06:00	45,0	18,6	35,0	14,3	2800	30,0	23,5	11,5	2800	F	Cont drill 12 1/4" hole to TD at +/-2800 m.	
Mon	28.07.2003	05:30	24,0	19,6	18,5	15,1	2800	42,5	45,0	13,4	2800	F	Circulate well clean, back reamed to 13 3/8" shoe. Perform wiper trip no 1.	
Wed	30.07.2003	02:30	0,0	19,6	0,0	15,1	2800	0,0	8,5	13,7	2800	F	Perform open hole logging, Not able to pass 1700 m with WL run #1 (A).	
Wed	30.07.2003	11:00	0,0	19,6	0,0	15,1	2800	28,0	26,0	14,8	2800	F	Perform wiper trip no 2 to TD. Pulled and pumped to shoe, circulate hole clean.	
Thu	31.07.2003	13:00	0,0	19,6	0,0	15,1	2800	24,0	20,0	15,6	2800	F	Wiper trip no 3 to TD. Increase MW to 1.46 sg. PO to shoe, circulate hole clean. POOH.	
Fri	01.08.2003	09:00	0,0	19,6	0,0	15,1	2800	18,0	5,5	15,9	2800	F	Perform open hole logging, Not able to pass 1397 m with WL re-run of #1 (B).	
Fri	01.08.2003	14:30	0,0	19,6	0,0	15,1	2800	24,0	24,5	16,9	2800	F	Wiper trip no 4 to TD. PO to shoe, circulate hole clean. POOH.	
Sat	02.08.2003	15:00	0,0	19,6	0,0	15,1	2800	5,0	4,5	17,1	2800	F	W/L logging, 2nd re run of #1 (C). Not able to pass 1491 m.	
Sat	02.08.2003	19:30	75,0	22,7	58,0	17,5	2800	23,0	20,5	17,9	2800	F	TLC logging, run no1 (PAX/MDT). Not able to pass 1500 m. POOH and LD TLC. (Budget and optimum time was for 3 WL runs.)	
Section time (days)			10,9		8,5			10,1	9,9				Section time ahead of/behind (-) budg:1,1 days, Tot. time ahead of/behind (-) budg:4,8 days	
													Not in use	
Sun	03.08.2003	16:00		22,7		17,5	2800			17,9				
Sun	03.08.2003	16:00		22,7		17,5	2800			17,9				
Section time (days)														
													Not in use	
Sun	03.08.2003	16:00		22,7		17,5	2800			17,9				
Sun	03.08.2003	16:00		22,7		17,5	2800			17,9				
Section time (days)														
													Not in use	
Sun	03.08.2003	16:00		22,7		17,5	2800			17,9				
Sun	03.08.2003	16:00		22,7		17,5				17,9				
Section time (days)														
													Plug & Abandon	
Sun	03.08.2003	16:00	14,0	23,3	11,0	18,0	2800	11,0	10,5	18,4	2800	F	PU cement stinger and RIH to TD. Circulate.	
Mon	04.08.2003	02:30	34,0	24,7	26,5	19,1	1200	44,5	40,5	20,0	1265	F	Plug open hole w/ 3 cmt plugs. (Planned 2).Set hi-vis/hi-wt pill &cement plug across 13 3/8" shoe. POOH.	
Tue	05.08.2003	19:00	12,0	25,2	9,0	19,5	1190	9,0	10,0	20,5	1265	F	RIH with bridge plug. Pressure test cmt. with bridge above BOP. Set bridge plug. Displace well to SW.	
Wed	06.08.2003	05:00	6,0	25,5	4,5	19,6	410	4,0	3,5	20,6	450	F	Set surface cement plug. POOH	
Wed	06.08.2003	08:30	8,0	25,8	6,0	19,9	410	4,0	6,0	20,9	450	F	RIH w/ jet assembly and WB RT. Retrieve WB.	
Wed	06.08.2003	14:30	38,0	27,4	29,5	21,1	410	18,5	20,0	21,7	450	F	Pull Riser / BOP.	
Thu	07.08.2003	10:30	26,0	28,5	20,0	22,0	410	12,0	11,0	22,1	403	F	Cut & retrieve 20" x 30" csg / WH.	
Thu	07.08.2003	21:30	0,0	28,5		22,0	0	0,0		22,1	0	F	END OF WELL.	
Thu	07.08.2003	21:30	5,8		4,4			4,3	4,2				Section time ahead of/behind (-) budg:1,3 days, Tot. time ahead of/behind (-) budg:6,1 days	
End of operation														

5.6.5 Wellhead system

TYPICAL PROJECTION



NOTES:

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, STACK-UP, WELLHEAD, TYPE SS-15, 30" X 20" CASING
PROGRAM W/EXTENDED LENGTH WEAR BUSHING INSTALLED F/
STATOIL WELL 6608/10-10
SALES DRAWING

ESTIMATED WEIGHT	
LBS.	KG.

DRIL-QUIP (EUROPE) LTD.

DWG SIZE	PART NUMBER	LAST REV
A1	4-SD-30347-01CP	

5.6.6 Drilling fluids

Well: 6608/10-10
Field: Gråspett
Rig: Stena Don

DRILLING FLUIDS DATA

All depths referes to RKB
RKB-MSL Stena Don: 24 m
Finished: August 2003

HOLE SIZE	HOLE TVD MD	CASING SIZE	CASING TVD MD	MUD TYPE	MW [g/cm³]	LGS [kg/m³]	10 sec. [Pa]	10 min. [Pa]	Fann 100 rpm [lb/sqft]	Fann 3 rpm [lb/sqft]	PV [cP]	FV [sec]	API FL [ml]	YP [Pa]	pH	Sulphate [mg/ltr]	Glycol [%]	KCl [kg/m³]	MBT [kg/m3]	Total Volume Old Volume New Volume Usage [m³]
36"	447	**30"**	446	SW/ Bentonite sweeps	1,03 - 1,35							>200			8 - 9					423 0 423 180
17 1/2"	1 377	**13 3/8"**	1 365	SW/ Bentonite sweeps	1,03 - 1,30							>200			8 - 9					918 0 918 918
12 1/4"	2 800	**NA**		Glydril (KCL/ Pac/Glycol) 99% KCl	1,40 - 1,46	23 - 128	3 - 5	4 - 9	16 - 38	4 - 9	19 - 21	60 - 80	3,00 - 4,00	14,5 - 20	7,7 - 8	175 - 195	3,5 - 4	120 - 162	14 - 25	789 0 789 306
				NOTE: The P&A section is not included in the volumes listed here.																

5.6.7 Cementing data

Well: 6608/10-10
Field: Gråspett
Rig: Stena Don

CEMENT DATA

All depths referes to RKB
RKB-MSL Stena Don: 24 m
Finished: August 2003

HOLE		CASING SHOE/ PLUG DEPTH		TOC	VOLUME/ EXCESS	CEMENT SLURRY DESIGN										SPACER	DISPLACEMENT
SIZE	TVD MD	SIZE	TVD MD	TVD MD		Components	Lead [ltr/100kg]	Tail [ltr/100kg]	Density [g/cm^3]	Yield [ltr/100kg]	Stat. / Circ. Temp [°C]	Thickening time [hrs to 30 Bc]	API Free Water [%]	API Fluid loss [cc/30min]	24 hrs C. S. [psi]		Fluids and Rates
36"	445	**30"**	445	398	42 m^3 300%	X-lite cmt (100 kg) CaCl2 liquid NF-6 Sea water		4,50 0,10 53,67	1,53	104,50 Code DWLSP	6-8	02:10	n/a	n/a	800	Min. 30 m3 Sea water	Sea water 1200 lpm
17 1/2"	1 377	**13 3/8"**	1 365	398	Lead: 116 m^3 Tail: 20 m^3 100% (Lead)	Norcem "G" Cmt. (100 kg) Halad-613L Econolite HR-4L NF-6 Sea water Fresh Water	- 3,20 2,40 0,10 93,38 -	0,50 - 0,50 0,10 - 42,87	L: 1,56 T: 1,92	L: 130,20 Code STL40 T: 75,09 Code MPT14	44/34	L: 5:50 T: 3:50	n/a T: 1,1	n/a	L: 550 T: 1820	Casing volume Sea water	Sea water 3000 lpm
12 1/4"	2 800	OH Plug #1, #2 & #3	2 800	2 260	Plug #1: 20,5 m3 Plug #2: 9,0 m3 Plug#3: 9,0m3 20 %	Norcem "G" Cmt. (100 kg) Halad-613L HR-5L CFR-5LE+ NF-6 Fresh water		10,00 2,50 0,60 0,10 33,20	1,90	77,52 Code MFL05	104 / 86	03:10	0	136	3300	3 x 6,9 m3 Tuned Spacer	WBM 2500 lpm

5.6.8 Bottom hole assemblies well

Wellbore: NO 6608/10-10

BHA seq: 1 BHA category: Drilling BHA description: Drilling 36" hole.

BHA no: 1

String component	OD in	ID in	Length m	Acc length m
BIT	17,500		0,40	0,40
FLOAT SUB	11,250	3,000	0,90	1,30
HOLE OPENER	36,000	3,000	4,33	5,63
X-OVER	9,500	3,000	1,23	6,86
ANDERDRIFT	8,000	2,813	3,18	10,04
DRILL COLLAR	8,000	2,813	112,42	122,46
X-OVER	8,000	2,813	0,91	123,37
HW DRILL PIPE	5,000	3,000	84,60	207,97
DP 5"				207,97

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

BHA no: 2

String component	OD in	ID in	Length m	Acc length m
ROCK BIT	17,500		0,40	0,40
BIT SUB W/FLOAT	9,480	3,000	0,91	1,31
X-OVER	9,560	3,000	0,37	1,68
MWD MPR	8,250	2,813	5,01	6,69
MWD DCP	8,312		11,17	17,86
SAVER SUB	8,312	2,813	0,65	18,51
STAB STRING W/FLOAT	17,500	2,813	2,02	20,53
8" DRILL COLLAR	8,000	2,813	9,39	29,92
STAB STRING	17,500	2,938	2,22	32,14
8" DRILL COLLAR	8,000	2,813	74,89	107,03
JAR	8,000	3,000	9,60	116,63
8" DRILL COLLAR	8,000	2,813	18,76	135,39
X-OVER	8,000	2,813	0,91	136,30
5" HW DRILL PIPE	5,000	3,000	84,60	220,90
5" DRILL PIPE				220,90

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

BHA no: 3

String component	OD in	ID in	Length m	Acc length m
PDC BIT	12,250		0,35	0,35
BIT SUB	8,250		0,64	0,99
NEAR BIT STAB	12,250	3,000	0,75	1,74
MWD MPR	8,250	3,000	3,72	5,46

	MOD STAB	12,250	2,813	1,32	6,78
	MWD DCP	8,375		11,28	18,06
	SAVER SUB	8,250	2,813	0,75	18,81
	FLOAT SUB	8,000	2,813	0,89	19,70
	STAB. W/TOTCO	12,250	2,813	1,64	21,34
	8" DRILL COLLAR	8,000	2,813	84,28	105,62
	JAR	8,000	3,000	9,60	115,22
	8" DRILL COLLAR	8,000	2,813	18,76	133,98
	X-OVER	8,000	2,813	0,91	134,89
	5" HW DRILL PIPE	5,000	3,000	84,60	219,49
	5" DRILL PIPE				219,49

BHA seq: 4 BHA category: Drilling BHA description: 12 1/4" Wiper trip BHA

BHA no: 4

String component	OD in	ID in	Length m	Acc length m
PDC BIT	12,250		0,35	0,35
STAB. NB W/FLOAT	12,250		2,20	2,55
8" DRILL COLLAR	8,000	2,813	18,78	21,33
STAB STRING	12,250		1,64	22,97
8" DRILL COLLAR	8,000	2,813	65,40	88,37
JAR	8,000	2,813	9,60	97,97
8" DRILL COLLAR	8,000	2,813	18,76	116,73
X-OVER	8,000	2,813	0,91	117,64
5" HW DRILL PIPE	5,000	3,000	84,60	202,24
5" DRILL PIPE				202,24

BHA seq: 5 BHA category: Drilling BHA description: 12 1/4" Wiper trip BHA

BHA no: 4

String component	OD in	ID in	Length m	Acc length m
PDC BIT	12,250		0,35	0,35
STAB. NB W/FLOAT	12,250		2,20	2,55
8" DRILL COLLAR	8,000	2,813	18,78	21,33
STAB STRING	12,250		1,64	22,97
8" DRILL COLLAR	8,000	2,813	65,40	88,37
JAR	8,000	2,813	9,60	97,97
8" DRILL COLLAR	8,000	2,813	18,76	116,73
X-OVER	8,000	2,813	0,91	117,64
5" HW DRILL PIPE	5,000	3,000	84,60	202,24
5" DRILL PIPE				202,24

BHA seq: 6 BHA category: Drilling BHA description: TLC log PEX / MDT.

BHA no: 5

String component	OD in	ID in	Length m	Acc length m
PEX			7,35	7,35
MDT			9,50	16,85

	DTC-H			2,13	18,98
	ACTS			1,22	20,20
	AH-107			0,61	20,81
	DWCH			2,44	23,25
	X-OVER			0,92	24,17
	DP 5"	5,000	4,280	1337,21	1361,38
	PUP JOINT	5,000	4,280	3,09	1364,47
	SIDE ENTRY SUB	6,094	1,875	1,67	1366,14
	DP 5"	5,000	4,280	9,68	1375,82
	SAVER SUB	7,625		0,56	1376,38
	FLOAT SUB	8,000	2,813	0,91	1377,29
	X-OVER	8,000	2,813	0,91	1378,20
	DP 5"	5,000	4,280		1378,20

BHA seq: 7 BHA category: Drilling BHA description: Plug back assembly.

BHA no: 6

String component	OD in	ID in	Length m	Acc length m
DP 3 1/2"	3,500	2,602	292,09	292,09
X-OVER	6,500	4,750	0,91	293,00
DP 5"	5,000	4,280		293,00

BHA seq: 8 BHA category: Drilling BHA description: P & A assembly.

BHA no: 7

String component	OD in	ID in	Length m	Acc length m
EZSV	11,680	1,370	0,92	0,92
SETTING TOOL	7,000	2,000	1,50	2,42
DP 5"	5,000	4,280		2,42

BHA seq: 9 BHA category: Drilling BHA description: Retrieve 13 3/8" WB.

BHA no: 8

String component	OD in	ID in	Length m	Acc length m
BULL NOSE			1,42	1,42
DRILL COLLAR	6,500	2,810	28,20	29,62
JET SUB	13,000	3,000	0,61	30,23
MPT TOOL	18,510	3,000	0,92	31,15
DP 5"	5,000	4,280		31,15

BHA seq: 10 BHA category: Drilling BHA description: Cutting assembly for 20" x 30" casing.

BHA no: 9

String component	OD in	ID in	Length m	Acc length m
BULL NOSE	8,000	2,000	0,38	0,38
CASING CUTTER	12,000	0,750	1,83	2,21
TOP SUB	10,000	2,000	0,96	3,17

MOST TOOL	9,500		8,78	11,95
DRILL COLLAR	8,000	2,800	84,20	96,15
X-OVER	8,000	3,000	0,92	97,07
HWDP 5"	5,000	3,000	84,60	181,67
DP 5"	5,000	4,280		181,67

5.6.9 Bit record well

Run No	Bit Size	Bit No	BHA No	Bit Type	IADC code	Bit manufacturer	Serial No	no x n	no x n	no x n	no x n	Flow Area in2
1	26"/36"		1	HOLEOPENER		Red Baron		6 x 12	6 x 12	x	x	1,326
1	17 1/2"	1RR	1	MXC3T09DDT	435	Hughes Christensen	ZJ93DK	1 x 14	3 x 18	x	x	,896
2	17 1/2"	2	2	MXT1	115	Hughes Christensen	6012795	3 x 20	1 x 14	x	x	1,071
3	12 1/4"	3	3	LD565ATHG	M323	Lyng	2825	2 x 12	6 x 11	x	x	,778
4	12 1/4"	4	3	LD565ATHG	M323	Lyng	2824	3 x 12	5 x 11	x	x	,796
5	12 1/4"	4RR	4	LD565ATHG	M323	Lyng	2824	5 x 13	3 x 12	x	x	,980
6	12 1/4"	4RR2	5	LD565ATHG	M323	Lyng	2824	5 x 13	3 x 12	x	x	,980

Wellbore: NO 6608/10-10

Run No	Bit Size	Pump Rate l/min	Pump Press bar	Depth in mMD	Depth out mMD	Drilled length m	Hours Drilled	ROP	Min WOB ton	Max WOB ton	Min RPM	Max RPM	Torque Min Nm	Torque Max Nm	Con drag Min 1000 daN	Con drag Max 1000 daN
1	26"/36"	4500	120	398	445	47	17,7	2,7	2	7	50	125	3	10		
1	17 1/2"	4500	125	398	447	49	17,9	2,7	2	7	50	120	3	10		
2	17 1/2"	4500	230	447	1377	930	14,6	63,7	2	25	50	150	2	13		
3	12 1/4"	3000	180	1365	1382	17	0,8	21,3	1	5	40	60				
4	12 1/4"	3700	280	1382	2800	1418	52,9	26,8	5	15	80	220	4	12		
5	12 1/4"	4400	300													
6	12 1/4"	3900	310													

Wellbore: NO 6608/10-10

IADC dull grading

Run No	Bit Size									
1	26"/36"	I	O	DC	A	B	G	NO	RP	Reamed on two-stage Heavy Duty HO.
1	17 1/2"	2	1	BT	M	E	I	NO	TD	Used bit from another well.
2	17 1/2"	2	2	BT	M	E	I	WT	TD	Tot revolutions: 118 KRev.
3	12 1/4"	2	2	CT	N	X	I	CT	DTF	Drilled plug, float, shoe and 25 m of firm cmt in shoe track. 12 chipped teeth.
4	12 1/4"	6	7	WT	A	X	I	RO	TD	Drilled with controlled ROP. Back reamed and circulated 45 hrs.
5	12 1/4"	6	7	WT	A	X	I	RO	TD	Wiper trip. Accumulated circulation time : 27,5 hrs.
6	12 1/4"	6	7	WT	A	X	I	RO	TD	Wiper trip. Accumulated circulation time: 32 hrs.

Appendix A

Operational listing

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

Operations

Wellbore: NO 6608/10-10

					---- Status ----		
Time from	**Time to**	**Time used**	**Depth mMD**	**Act code**	**During opr**	**End of opr**	**Description of activities**
16.07.2003 18:00	21:00	3,0	,0	MNMU	OK	OK	Rig in transit from well 6608/10-D1BH. Arrived location and adjusted heading to 225 deg.
16.07.2003 21:00	23:00	2,0	,0	MNPU	OK	OK	Deployed transponders and taut wire. Performed DP trials. Meanwhile worked on IBOP actuator and Hydraracker and performed rig maintenance.
16.07.2003 23:00	00:00	1,0	,0	CAOU	OK	OK	MU 30" CART. Meanwhile continued DP trials.
17.07.2003 00:00	00:30	0,5	,0	CAOU	OK	OK	Continued MU CART and racked in derrick.
17.07.2003 00:30	04:00	3,5	,0	DTPU	OK	OK	MU BHA with 17 1/2" bit and 26"/36" hole opener. Installed Totco ring and continued running in with BHA.
17.07.2003 04:00	06:00	2,0	380,0	DTDU	OK	OK	Ran in with 36" BHA on 5" DP to 380 m. Adjusted rig position prior to spud. Tagged sea bed at 398 m. Tested Anderdrift at 235 m - ok.
17.07.2003 06:00	08:00	2,0	398,0	DTDU	OK	OK	Deployed 3 marker buoys in triangle array with ROV. Placed ROV on DP and logged and finalised preliminary well position using beacon on ROV.
17.07.2003 08:00	10:00	2,0	408,0	DDOU	OK	OK	Spudded well and drilled 17 1/2" x 26" x 36" hole from 398 - 408 m with reduced parameters. Parameters : 1000-2000 LPM / 30 Bar / 50 RPM / 3-8 KNm / 0-2 t WOB.
17.07.2003 10:00	13:30	3,5	418,0	DDOU	OK	E FAIL	Drilled from 408 - 418 m. Pumped 10 m3 Hi-vis every 15 m. Parameters : 4500 LPM / 120 Bar / 100-125 RPM / 3-10 KNm / 3 t WOB.
17.07.2003 13:30	14:00	0,5	418,0	DERD	E FAIL	OK	Observed sudden pump pressure drop. Troubleshot same, found faulty sensor on standpipe. Changed same.
17.07.2003 14:00	19:00	5,0	428,0	DDRU	OK	OK	Drilled 17 1/2" x 36" hole from 418 - 428 m. Pumped 10 m3 Hi-vis every 15 m. Very slow progress, increased WOB to 6-7 t from 428 m.
17.07.2003 19:00	00:00	5,0	439,0	DDRU	OK	OK	Drilled 17 1/2" x 36" hole from 428 - 439 m. Pumped 10 m3 Hi-vis every 15 m. Parameters : 4500 LPM / 120 Bar / 125 RPM / 4-11 KNm / 3-7 t WOB.
18.07.2003 00:00	03:30	3,5	447,1	DDRU	OK	OK	Drilled 17 1/2" x 36" hole from 439 - 447 m (26" : 445 m, 36" : 444 m). Pumped 10 m3 Hi-vis every 15 m. Confirmed space out with ROV. Parameters : 4500 LPM / 120 Bar / 125 RPM / 4-11 KNm / 3-7 t WOB.
18.07.2003 03:30	04:30	1,0	447,0	DCAU	OK	OK	Circulated BU with seawater and swept hole with 30 m3 Hi-vis pill. Displaced hole to 1.35 SG mud with 4500 LPM.
18.07.2003 04:30	05:30	1,0	420,0	DTCU	OK	OK	POOH to 5 m below seabed. Necessary to break off and LD every single onto catwalk due to problems with Hydraracker. Hole OK.
18.07.2003 05:30	06:00	0,5	403,0	DTCU	OK	E FAIL	MU top drive and topped up hole with 1.35 SG mud. Cont. POOH to 390 m.
18.07.2003 06:00	20:00	14,0	395,0	DERD	E FAIL	OK	Waited for spare parts for Hydraracker coming from shore. Received spare moog valve with helicopter from shore at 11:30 hrs. Installed new valve and tested Hvdraracker functions.

							Meanwhile inspected top drive and derrick for loose items after drilling tophole.
18.07.2003 20:00	22:30	2,5	,0	DTCU	OK	OK	POOH from 395 m. Racked back DC's and HWDP.
18.07.2003 22:30	23:00	0,5	,0	DTPU	OK	OK	LD 36" premade HO assembly with Anderdrift.
18.07.2003 23:00	23:30	0,5	,0	CAOU	OK	OK	Held tool box talk and reviewed risk assessment.
18.07.2003 23:30	00:00	0,5	,0	CERU	OK	OK	RU for running 30" conductor; installed shackles and bails and 30" elevators.
19.07.2003 00:00	01:30	1,5	40,0	CERU	OK	OK	PU 30" shoe jnt and checked float for flow through. PU and RIH 2 intermediate jnts and Housing jnt. Filled conductor with SW.
19.07.2003 01:30	02:30	1,0	40,0	CERU	OK	OK	LD schakels and bails and installed 5" elevators. PU and MU 30" RT to housing. Lifted up and removed 30" elevators. Landed housing joint in 30" bushings to get sufficient height to MU cmt stinger.
19.07.2003 02:30	03:30	1,0	40,0	CERU	OK	OK	Installed C-plate and false rotary. Ran 4 jnts of 5" DP as cmt stinger (spaced out appr. 13 m above shoe). MU cmt stinger to RT. Locked RT with 5 counter clockwise turns and performed PU test. Installed ball valve.
19.07.2003 03:30	05:00	1,5	40,0	CERU	OK	OK	Lowered housing through RT. Installed bulls eye arrangement on housing joint. Secured wire slings on bull's eye arrangement (in case of future retrieval of bulls eyes).
19.07.2003 05:00	06:00	1,0	398,0	CARU	OK	OK	Ran 30" conductor string on 5" DP down to seabed. Closed ball valve on RT with ROV and positioned.
19.07.2003 06:00	06:30	0,5	398,0	CARU	OK	OK	Fine tuned rig position. Stabbed conductor into 36" hole assisted by ROV.
19.07.2003 06:30	07:00	0,5	444,0	CARU	OK	OK	RIH with 30" conductor string to 430 m. MU cmt stand and circulated conductor down with 500 LPM to 445 m. Checked bulls eyes and stick-up with ROV (max. 1 deg, 3 m). PU 1 m.
19.07.2003 07:00	08:00	1,0	444,0	CCCU	OK	OK	Circulated 30 m3 SW with 4000 LPM. Verified integrity of ball valves with ROV. Connected and pressure tested cmt line to 150 Bar. Closed IBOP and left 20 Bar above. Held toolbox talk prior to cementing.
19.07.2003 08:00	09:30	1,5	444,0	CSSU	OK	OK	Mixed and pumped 42 m3 1.55 SG XLITE cmt slurry. Displaced cmt with 7.4 m3 SW from cmt unit. Released cmt hose and checked for back flow.
19.07.2003 09:30	10:00	0,5	405,0	CTTU	OK	OK	Set conductor on bottom at 445 m (26" depth). Released RT with 5 right hand turns, PU and LD cmt stand. Checked bull's eyes with ROV (0.5-1.5 deg).
19.07.2003 10:00	11:00	1,0	390,0	CTTU	OK	OK	MU top drive and flushed housing/DP with 4500 LPM while POOH with cmt stinger.
19.07.2003 11:00	13:30	2,5	,0	CTTU	OK	OK	POOH with 5" DP landing string and RT. LD RT and cmt stinger. LD cmt stand. Cleared drillfloor.
19.07.2003 13:30	15:00	1,5	,0	CSOU	OK	OK	PU and MU Halliburton remote operated cmt head to stand. Nippled up hydraulic control lines and racked back cmt stand.
19.07.2003 15:00	19:00	4,0	220,0	DTPU	OK	OK	Held tool box talk. PU 17 1/2" pendulum BHA. Plugged in and verified MWD sensors.
19.07.2003 19:00	19:30	0,5	380,0	DTDU	OK	OK	RIH with 17 1/2" BHA on 5" DP from 220-380 m.
19.07.2003 19:30	20:30	1,0	430,0	DTDU	OK	OK	Moved rig over location and stabbed into 30" housing. RIH to 430 m.
19.07.2003 20:30	21:00	0,5	430,0	DTDU	OK	OK	Held tool box talk. Reviewed shallow gas and stuck pipe procedures.
19.07.2003 21:00	23:00	2,0	447,0	CDDU	OK	OK	MU top drive and tested MWD tool. Washed down and tagged TOC at 442 m. Drilled hard cmt from 442-443 m. Drilled soft cement and float from 443-447 m. Reamed shoe track and rat hole several times. Parameters: 4500 LPM / 185 Bar / 50 RPM / 2-5 KNm / 3 t WOB. MWD GR sensor failed while drilling shoe track.
19.07.2003 23:00	00:00	1,0	455,0	DDRU	OK	OK	Drilled 17 1/2" hole with reduced parameters until last 17 1/2" stab below 30" conductor shoe.

							Reamed shoe track and rat hole, checked for free passage without rotation.
20.07.2003 00:00	01:30	1,5	480,0	DDRU	OK	OK	Drilled 17 1/2" hole with reduced parameters until upper 17 1/2" stab below 30" shoe. Parameters: 4500 LPM / 190 Bar / 50 RPM / 2-7 KNm / 3-5 t WOB. Pumped 7-10 m3 Hivis every 15 m, reduced flow rate to 3000 LPM when Hivis pills passed MWD tool.
20.07.2003 01:30	06:00	4,5	689,0	DDRU	OK	OK	Drilled 17 1/2" hole from 480-689 m. Parameters: 4500 LPM / 190-200 Bar / 100-145 RPM / 2-9 KNm / 3-8 t WOB. Pumped 7-10 m3 Hivis every 15 m, reduced flow rate to 3000 LPM when Hivis pills passed MWD tool.
20.07.2003 06:00	23:00	17,0	1377,0	DDRU	OK	OK	Drilled 17 1/2" hole from 689 - 1377 m. Pumped 7-10 m3 hi-vis pills every 15 m, reduced flow rate to 3000 LPM while pills passed MWD tool. Parameters: 4500 LPM / 195 - 235 Bar / 120-150 RPM / 4-13 KNm / 5-25 t WOB.
20.07.2003 23:00	00:00	1,0	1377,0	DCAU	OK	OK	Circulated hole clean (1.5 BU) with 4500 LPM / 230 Bar. Reciprocated string with 150 RPM.
21.07.2003 00:00	01:00	1,0	1377,0	DCAU	OK	OK	Pumped 40 m3 hi-vis pill and circulated out same with 4500 LPM. Flow checked for 15 min with ROV.
21.07.2003 01:00	02:00	1,0	1377,0	DCAU	OK	OK	Displaced hole to 1.30 SG mud with 4500 m.
21.07.2003 02:00	05:00	3,0	220,0	DTCU	OK	OK	POOH with 17 1/2" BHA to 390 m. Hole slick, max overpull 10 ton. Flushed WH and moved rig 50 m off location. Cont. POOH to 220 m.
21.07.2003 05:00	06:00	1,0	, 0	DTCU	OK	OK	POOH and rack back 17 1/2" BHA.
21.07.2003 06:00	07:00	1,0	, 0	DTPU	OK	OK	POOH and racked back 17 1/2" BHA.
21.07.2003 07:00	08:00	1,0	, 0	DTCU	OK	OK	Inspected top drive and derrick for loose items. Cleared drill floor.
21.07.2003 08:00	08:30	0,5	, 0	CAOU	OK	OK	Held toolbox talk prior to csg running.
21.07.2003 08:30	09:30	1,0	,0	CERU	OK	OK	Installed rotators and BX 3 elevators. Pulled master bushings and installed PS30 slips.
21.07.2003 09:30	10:30	1,0	45,0	CARU	OK	OK	PU and RIH shoe track. Thread locked first 4 connections. Checked shoe and float collar for flow through.
21.07.2003 10:30	13:30	3,0	390,0	CARU	OK	OK	RIH with 13 3/8" csg to 10 m above seabed. Filled every jnt with SW until sufficient weight, thereafter every 5th.
21.07.2003 13:30	14:00	0,5	400,0	CARU	OK	OK	Moved rig over well position and fine-tuned rig position. Stabbed 13 3/8" csg shoe into 30" housing assisted by ROV.
21.07.2003 14:00	19:00	5,0	960,0	CARU	OK	OK	RIH with 13 3/8" csg from 400 - 960 m. Filled string with SW every 5th joint. Running speed : 9.2 jnts /hr.
21.07.2003 19:00	21:00	2,0	960,0	CARU	OK	E FAIL	Changed to 5" DP Frame 4 elevators. PU 18 3/4" WH housing joint and attempted to MU same, neg. Damaged threads in box on joint in rotary table.
21.07.2003 21:00	23:30	2,5	960,0	CAOD	E FAIL	OK	LD 18 3/4" WH housing on catwalk. PU and LD jnt with damaged box. PU string; no excessive overpull. MU joint w/ special no-cross collar to string. PU WH housing and dressed threads on pin. MU WH housing to string.
21.07.2003 23:30	00:00	0,5	975,0	CARU	OK	OK	Removed PS30 slips and lowered WH/RT.
22.07.2003 00:00	00:30	0,5	975,0	CARU	OK	OK	Removed 2" bull plug on RT and topped up with SW. Installed ball valve in closed position. Installed master bushings.
22.07.2003 00:30	02:00	1,5	1335,0	CARU	OK	OK	RIH with 13 3/8" csg on 5" DP landing string.
22.07.2003 02:00	02:30	0,5	1365,0	CARU	OK	OK	MU cmt stand and circulated down last stand with 500 LPM. Landed 18 3/4" WH and locked same in 30" housing by setting down all string weight plus 5 t. Performed 25 t overpull test. Checked bull's eyes with ROV, no changes (max. 1.5 deg).

22.07.2003 02:30	03:30	1,0	1365,0	CCCU	OK	OK	Established circulation in steps up to 2300 LPM and circulated 1.5 BU with SW.
22.07.2003 03:30	06:00	2,5	1365,0	CSSU	OK	OK	Mixed and pumped 116 m3 1.56 SG lead slurry from cmt unit with 1000 LPM.
22.07.2003 06:00	07:00	1,0	1365,0	CSSU	OK	OK	Mixed and pumped 20m3 1.92 SG tail slurry from cmt unit.
22.07.2003 07:00	07:15	0,3	1365,0	CSSU	OK	OK	Released dart for wiper plug. Displaced cmt with SW from cmt unit and sheared wiper plug with 149 Bar after 3700 l (equal to theoretical).
22.07.2003 07:15	08:00	0,8	1365,0	CSSU	OK	OK	Switched over to rig pumps and continued displacement of cmt with 3000 LPM. Reduced rate to 1000 LPM after 60 m3 pumped. Bumped plug after 71.9 m3 / 3036 stks (theoretical 72.8 m3/3079 stks w/ 97 % eff.) with 150 Bar / 5 min. Bled off and checked for back flow.
22.07.2003 08:00	08:30	0,5	1365,0	CSSU	OK	OK	Disconnected cmt hose. Opened ball valve on RT with ROV. Released RT from 18 3/4" WH with 4 1/2" right hand turns, PU and racked back cmt stand.
22.07.2003 08:30	09:30	1,0	,0	CTTU	OK	OK	POOH with 18 3/4" RT and 5" DP. Moved rig 50 m off location.
22.07.2003 09:30	11:30	2,0	,0	CTTU	OK	OK	LD 18 3/4" RT and cmt stinger jnt. PU and LD cmt stand.
22.07.2003 11:30	12:00	0,5	,0	BBRU	OK	OK	Cleared drill floor and held tool box talk.
22.07.2003 12:00	14:30	2,5	,0	BBRU	OK	OK	RU for running BOP and riser. RU riser guide head on Hydraracker. LD 350 t bails and bail links and installed 750 t bails and elevator. Installed Gimble and Spider and hydraulic torque tools.
22.07.2003 14:30	17:00	2,5	,0	BBRU	OK	OK	MU 10' and 20' pup jnts and MU to 65' jnt. Installed riser yoke on port crane.
22.07.2003 17:00	19:00	2,0	30,0	BBRU	OK	OK	Skidded BOP under rotary, lowered down riser and MU to BOP.
22.07.2003 19:00	19:30	0,5	45,0	BBRU	OK	OK	Lowered BOP and installed mux clamps. Lowered BOP through splash zone.
22.07.2003 19:30	20:00	0,5	45,0	BBRU	OK	OK	Filled lines and pressure tested K/C/conduit lines to 20/345 Bar for 5/10 min.
22.07.2003 20:00	00:00	4,0	325,0	BBRU	OK	OK	Ran BOP and riser.
23.07.2003 00:00	01:00	1,0	360,0	BBRU	OK	OK	Ran BOP and riser to 346 m. Ran a total of 16 jnts; running speed : 3.2 jnts/hr.
23.07.2003 01:00	02:00	1,0	360,0	BBRU	OK	OK	Filled lines and pressure tested K/C/conduit lines to 20/345 Bar for 5/10 min.
23.07.2003 02:00	03:00	1,0	380,0	BBRU	OK	OK	PU and MU slip joint. Lowered BOP and MU mux clamps.
23.07.2003 03:00	03:30	0,5	380,0	BBRU	OK	OK	PU and MU landing joint and lowered BOP.
23.07.2003 03:30	05:00	1,5	380,0	BBRU	OK	OK	Installed goosenecks and safety slings for K/C/conduit lines.
23.07.2003 05:00	05:30	0,5	380,0	BBRU	OK	OK	Filled lines and pressure tested K/C/Conduit lines to 20/345 Bar for 5/10 min.
23.07.2003 05:30	06:00	0,5	380,0	BBRU	OK	OK	MU mux cables and riser tension wires.
23.07.2003 06:00	07:00	1,0	380,0	BBRU	OK	OK	MU mux saddles and riser tensioners.
23.07.2003 07:00	08:00	1,0	380,0	BBRU	OK	OK	Positioned rig over WH and inspected WH and BOP with ROV.
23.07.2003 08:00	08:30	0,5	394,0	BBRU	OK	OK	Landed BOP. Performed overpull test of 25 t. Checked BOP bull's eyes with ROV (0.25-0.5 deg). No changes on WH bull's eyes.
23.07.2003 08:30	10:00	1,5	394,0	BBRU	OK	OK	Unlocked inner barrel on slip joint. LD landing joint. PU and MU diverter element. Confirmed lock in with 5 t overpull. Pressure tested 13 3/8" csg against BSR to 275 Bar / 10 min.

23.07.2003 10:00	13:00	3,0	394,0	BBRU	OK	OK	RD riser handling gear; spider, gimble, gripper head, torque tools and 750 t bails. Installed master bushings and DP elevators.
23.07.2003 13:00	14:30	1,5	394,0	BBDU	OK	OK	RU cmt hose and pressure tested IBOP/mud hose to 20/275 Bar for 5/10 min.
23.07.2003 14:30	16:00	1,5	394,0	BBRU	OK	OK	MU 500 t bails and bail links.
23.07.2003 16:00	18:00	2,0	20,0	DTPU	OK	OK	MU 12 1/4" bit and MWD collars. Plugged into MWD and initiated memory/verified sensors. Installed mouse hole and broke off 17 1/2" stab from stand of DC.
23.07.2003 18:00	19:30	1,5	220,0	DTDU	OK	OK	MU and RIH with 12 1/4" packed BHA.
23.07.2003 19:30	21:00	1,5	1188,0	DTDU	OK	OK	Installed auto slips and RIH with 12 1/4" BHA on 5" DP.
23.07.2003 21:00	21:30	0,5	1188,0	DTDU	OK	OK	Filled pipe and flow tested MWD. Meanwhile performed service on top drive.
23.07.2003 21:30	22:00	0,5	1326,0	DTDU	OK	OK	RIH, tagged traces of cmt at 1326 m.
23.07.2003 22:00	23:00	1,0	1320,0	BBDU	OK	OK	Function tested BOP on both pods from rig floor and tool pusher's panel. Meanwhile performed toolbox talk prior to displacing and drilling new hole.
23.07.2003 23:00	23:30	0,5	1320,0	BBDU	OK	OK	Flushed and tested diverter system with 1300 LPM / 30 Bar.
23.07.2003 23:30	00:00	0,5	1320,0	DTDU	OK	OK	Took SCR's. Performed kick drill and tool pusher, driller and ass. driller practised on choke.
24.07.2003 00:00	01:00	1,0	1338,0	CDDU	OK	OK	Drilled lumps of soft cement from 1326 m to top of plug at 1338 m.
24.07.2003 01:00	01:30	0,5	1338,0	CDDU	OK	OK	Drilled plug and float. Parameters : 3000 LPM / 150 Bar / 40-60 RPM / 1-5 t WOB.
24.07.2003 01:30	03:00	1,5	1365,0	CDDU	OK	OK	Drilled firm cmt in shoe track from 1338 - 1365 m. Reamed and swept with Hi-vis pills. Parameters : 3500 LPM / 185 Bar / 60 RPM / 5-10 KNm / 5 t WOB.
24.07.2003 03:00	03:30	0,5	1382,0	CDDU	OK	OK	Drilled firm cmt in rat hole and 5 new formation to 1382 m.
24.07.2003 03:30	05:30	2,0	1382,0	ECFU	OK	OK	Pumped Hi-vis pill and circulated BU with 4000 LPM. Reamed rat hole and pulled into csg shoe. Meanwhile PU MWD stand from setback and placed same in 60' rat hole. Broke and LD MWD stand using Hydraracker and iron roughneck
24.07.2003 05:30	06:00	0,5	1362,0	EXFU	OK	OK	Performed FIT to 1.55 SG by pumping down DP and C-line from cmt unit.
24.07.2003 06:00	06:30	0,5	1360,0	EXFU	OK	STUCK	Bled off to Halliburton unit after FIT, all volume pumped in return. Opened UPR and racked back drilling double.
24.07.2003 06:30	09:00	2,5	1360,0	DDJD	STUCK	E FAIL	Started to POOH for re-programming MWD tool. 20 t overpull at first connection. Checked rams and diverter - OK. Attempted to PU. Neg, no rotation or circulation. Jarred string downwards and established 95 RPM / 5-18 KNm. Worked string downwards, not able to pump. Observed torque drop down to 5 Knm when bit entered open hole. Established circulation in steps up to 3500 LPM. Tagged bottom and pulled into csg shoe.
24.07.2003 09:00	10:00	1,0	1360,0	DTMD	E FAIL	OK	Circulated BU with 4000 LPM / 230 Bar. Nothing observed in returns.
24.07.2003 10:00	12:30	2,5	220,0	DTMD	E FAIL	OK	POOH with 12 1/4" BHA to 220 m.
24.07.2003 12:30	16:00	3,5	220,0	DTMD	E FAIL	OK	POOH with 12 1/4" BHA. LD PDC bit (chipped cutters) and re-programmed MWD. MU new bit and RIH with 12 1/4" BHA.
24.07.2003 16:00	18:30	2,5	1360,0	DTMD	E FAIL	OK	RIH with 12 1/4" BHA to 1360 m. Performed trip drill.
24.07.2003 18:30	19:00	0,5	1382,0	DCAU	OK	OK	MU top drive and washed to bottom, 4 m fill. Worked shoe track and rat hole several times with/without pumping and rotation. No excessive drag or torque.

24.07.2003 19:00	19:30	0,5	1382,0	DCAU	OK	OK	Pumped 13 m3 drill water followed by 11 m3 1.40 SG hi-vis pill as spacer.
24.07.2003 19:30	21:00	1,5	1385,0	DCAU	OK	OK	Displaced hole to 1.40 SG Glydrill WBM while washing fill and drilling 3 m of formation. Pulled into shoe. Reduced flow rate to 1000 LPM with mud at surface and verified integrity of active system.
24.07.2003 21:00	22:00	1,0	1385,0	DCAU	OK	OK	Worked and reamed rat hole with 3000 LPM / 50 RPM due to high torque peaks and fill at bottom. Made several passes without rotation, hole OK.
24.07.2003 22:00	00:00	2,0	1457,0	DDRU	OK	OK	Drilled 12 1/4" hole from 1385 - 1457 m. Parameters : 3800 LPM / 270 Bar / 160 RPM / 4-6 KNm / 2-4 t WOB / 1.42 SG ECD.
25.07.2003 00:00	06:00	6,0	1647,0	DDRU	OK	OK	Drilled 12 1/4" hole from 1457 - 1647 m. Performed kick drill. Parameters : 3800 LPM / 275 Bar / 160-180 RPM / 4-10 KNm / 2-5 t WOB / 1.42 SG ECD.
25.07.2003 06:00	11:00	5,0	1768,0	DDRU	OK	E FAIL	Drilled 12 1/4" hole from 1647 - 1768 m. Parameters : 3800 LPM / 282 Bar / 160 RPM / 2-6 KNm / 3-6 t WOB / 1.42-1.43 SG ECD.
25.07.2003 11:00	11:30	0,5	1768,0	DEMD	E FAIL	OK	Stopped drilling due high increasing trend of ECD readings from MWD. Recycled pumps several times and checked pulsation dampers and line up.
25.07.2003 11:30	18:00	6,5	1886,0	DDRU	OK	OK	Drilled 12 1/4" hole from 1768 - 1886 m. Parameters : 3800 LPM / 284 Bar / 165 RPM / 5-8 KNm / 3-6 t WOB. MWD ECD readings out of range. Increased MW to 1.42 SG before 1800 m.
25.07.2003 18:00	22:00	4,0	1971,0	DDRU	OK	OK	Drilled 12 1/4" hole with controlled ROP of 30 m/hr from 1886 - 1971 m.
25.07.2003 22:00	00:00	2,0	2050,0	DDRU	OK	OK	Drilled 12 1/4" hole from 1971 - 2050 m. Parameters : 3800 LPM / 300 Bar / 165 RPM / 5-8 KNm / 5-8 t WOB.
26.07.2003 00:00	06:00	6,0	2185,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2050 - 2185 m. Parameters : 3700 LPM / 310 Bar / 80-165 RPM / 5- KNm / 5-10 t WOB. Meanwhile PU from deck and MU 9 stds of 5" DP in mouse hole.
26.07.2003 06:00	00:00	18,0	2380,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2185 - 2380 m. Parameters : 3700 LPM / 315 bar / 80-180 RPM / 5-12 KNm / 5-18 t WOB.
27.07.2003 00:00	06:00	6,0	2458,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2380 - 2458 m. Parameters : 3700 LPM / 315 bar / 80-180 RPM / 5-12 KNm / 5-18 t WOB.
27.07.2003 06:00	11:30	5,5	2487,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2458 - 2487 m. Parameters: 3700 LPM / 310 Bar / 90-110 RPM / 6-12 KNm / 4-16 t WOB.
27.07.2003 11:30	13:00	1,5	2487,0	ECSU	OK	OK	Circulated BU for geological samples.
27.07.2003 13:00	21:00	8,0	2657,0	DDRU	OK	E FAIL	Drilled 12 1/4" hole from 2487 - 2657 m. Parameters: 3700 LPM / 312 Bar / 90-116 RPM / 6-12 KNm / 4-10 t WOB.
27.07.2003 21:00	21:30	0,5	2657,0	DERD	E FAIL	OK	Observed sudden pressure drop. Troubleshot, found faulty pressure sensor on standpipe manifold. Changed out and replaced same.
27.07.2003 21:30	23:30	2,0	2691,0	DDRU	OK	E FAIL	Drilled 12 1/4" hole from 2657 - 2691 m.
27.07.2003 23:30	00:00	0,5	2691,0	EESD	E FAIL	OK	Shutdown of Geoservices' software.
28.07.2003 00:00	00:30	0,5	2691,0	EESD	E FAIL	OK	Troubleshot and re-booted mud logging software.
28.07.2003 00:30	05:30	5,0	2800,0	DDRU	OK	OK	Drilled 12 1/4" hole from 2691 m to TD at 2800 m. Parameters: 3700 LPM / 320 Bar / 90-220 RPM / 6-12 KNm / 6-15 t WOB.
28.07.2003 05:30	06:00	0,5	2800,0	DCAU	OK	OK	Circulated hole clean and reciprocated string with 3700 LPM / 320 Bar / 100 RPM / 3-5 KNm.
28.07.2003 06:00	07:00	1,0	2800,0	DCAU	OK	OK	Circulated hole clean with 3700 LPM / 315 Bar / 100 RPM.
28.07.2003 07:00	07:30	0,5	2743,0	DTDU	OK	STUCK	Flow checked and POOH to 2743 m.
28.07.2003 07:30	09:30	2,0	2743,0	DDJD	STUCK	OK	Got 20 t overpull at 2743 m, string stuck. Jarred down, string free. MU top drive and attempted to rotate string, neg. Attempted to free string by jarring down 3 times, neg. Established full circulation, 3600 LPM / 305 Bar.

							Made several attempts to jar up, neg. Reduced flow rate and came free by jarring string up with 50 ton overpull.
28.07.2003 09:30	10:00	0,5	2728,0	DCBK	OK	OK	Reamed from 2743 - 2728 m. 3600 LPM / 305 BAR / 100 RPM.
28.07.2003 10:00	11:30	1,5	2800,0	DCAU	OK	OK	RIH back to TD, hole OK. Circulated hole clean with 3700 LPM / 310 Bar / 100 RPM.
28.07.2003 11:30	13:00	1,5	2705,0	DCBK	OK	OK	Started to POOH, got 10 t over pull at 2719 m. MU top drive and started to back ream, string stalled out several times between 2719 - 2705 m. Worked tight interval with 3700 LPM / 314 Bar / 80-160 RPM. No indications of hole packing off.
28.07.2003 13:00	14:30	1,5	2670,0	DCBK	OK	OK	Back reamed and logged with MWD from 2705 - 2670 m.
28.07.2003 14:30	15:30	1,0	2670,0	DCAU	OK	OK	Circulated BU with 3700 LPM / 310 Bar / 90 RPM.
28.07.2003 15:30	20:00	4,5	2000,0	DCBK	OK	OK	Back reamed from 2670 - 2000 m, string stalled out 6-7 times at start of back reaming. Worked several tight spots otherwise hole OK. 3700 LPM / 290 Bar / 90 RPM.
28.07.2003 20:00	21:30	1,5	1670,0	DTDU	OK	OK	Pumped out of hole without rotation from 2000 - 1670 m. Reamed tight spots with 3700 LPM / 100 RPM.
28.07.2003 21:30	22:30	1,0	1670,0	DCBK	OK	OK	Worked and reamed tight interval from 1670-1700 m. Observed sudden and large increase of cuttings/cavings over the shakers (appr. 30 % rounded cmt cavings/lumps in returns). Circulated until clean at shakers, pump pressure decreased by 15-20 Bar.
28.07.2003 22:30	00:00	1,5	1553,0	DCBK	OK	OK	Attempted to continue pump out of hole with no rotation, neg. Back reamed out of hole from 1670 - 1553 m. Worked pipe up/down and wiped every stand once prior to connection, OK. Parameters : 3700 LPM / 250 Bar / 100 RPM / 4-20 KNm.
29.07.2003 00:00	02:30	2,5	1340,0	DCBK	OK	OK	Back reamed out of hole from 1553 - 1400 m (upper stab below rat hole). Pumped and pulled BHA carefully past rat hole without any rotation and into 13 3/8" csg.
29.07.2003 02:30	04:30	2,0	1340,0	DCAU	OK	OK	Circulated until clean at shakers. Increased flow rate in steps to 4400 LPM / 320 Bar. Large amount of formation cavings at BU, mostly large and rounded cmt cavings/lumps (2-5 cm) after BU.
29.07.2003 04:30	06:00	1,5	1830,0	ECWK	OK	OK	RIH. Took weight at 1391 m, MU top drive and reamed same. Continued RIH to 1830 m, hole OK.
29.07.2003 06:00	09:00	3,0	2757,0	ECWK	OK	OK	RIH from 1880 - 2760 m. Washed and reamed tight spots at 1884 m, 2554 m, 2730 m. String stood up at 2757 m.
29.07.2003 09:00	10:00	1,0	2800,0	ECWK	OK	OK	MU top drive and washed from 2757 -2800 m. 2 m fill.
29.07.2003 10:00	12:30	2,5	2800,0	ECFU	OK	OK	Circulated hole clean with 3700 LPM / 310 Bar / 90 RPM.
29.07.2003 12:30	14:00	1,5	2660,0	ECWK	OK	OK	POOH from 2800 - 2660 m. Got 20 t overpull at tight spot 2660 m. Worked pipe, neg.
29.07.2003 14:00	19:30	5,5	1400,0	ECWK	OK	OK	Pumped out of hole from 2660 - 1400 m with 3700 LPM, hole OK.
29.07.2003 19:30	21:00	1,5	1340,0	ECWK	OK	OK	Wiped shoe track several times until clean and pumped into 13 3/8" csg shoe. Circulated hole clean with 4200 LPM (large amount of cavings over the shakers).
29.07.2003 21:00	22:00	1,0	1340,0	BBDU	OK	OK	Function tested BOP. Boosted riser with 2000 LPM.
29.07.2003 22:00	23:30	1,5	220,0	DTDU	OK	OK	POOH from 1340 - 220 m.
29.07.2003 23:30	00:00	0,5	220,0	DTDU	OK	OK	POOH with 12 1/4" BHA.
30.07.2003 00:00	02:30	2,5	,0	DTDU	OK	OK	POOH with 12 1/4" BHA. Plugged into MWD and verified sensors. LD MWD collars and bit.

							Cleared drill floor.
30.07.2003 02:30	03:15	0,8	,0	ELWU	OK	OK	Held toolbox talk and RU for WL. Installed sheaves and slip joint compensating wire.
30.07.2003 03:15	04:15	1,0	38,0	ELWU	OK	OK	MU tool string no #1 : FMI/DSI/PEX/HNGS. Installed radioactive sources.
30.07.2003 04:15	06:00	1,8	1700,0	ELWU	OK	OK	RIH with tool string #1. String hung up at 1700 m, unable to pass @06:00.
30.07.2003 06:00	10:15	4,3	,0	ELWU	OK	OK	Made several attempts to pass restriction at 1700 m, neg. POOH and logged upwards (GR up to WH).
30.07.2003 10:15	11:00	0,8	,0	ELWU	OK	OK	LD tool string and RD WL equipment.
30.07.2003 11:00	13:30	2,5	202,0	ELWK	OK	OK	MU and RIH with 12 1/4" clean up BHA.
30.07.2003 13:30	15:30	2,0	1350,0	ELWK	OK	OK	RIH with 12 1/4" BHA on 5" DP to 1350 m. Boosted riser and decreased KCl content in active system. Running speed down to csg shoe : 870 m/hr.
30.07.2003 15:30	20:00	4,5	2023,0	ELWK	OK	OK	RIH, string took weight at 1695 m. Not able to pass with 10-12 t WOB. MU top drive and wiped clean with 3600 LPM. Continued RIH to 2023 m, washed tight spots at 1709 m and 1917 m. Washed and reamed tight spots at 1946 m, 1994 m, 2023 m with 3700 LPM / 20-50 RPM.
30.07.2003 20:00	00:00	4,0	2440,0	ELWK	OK	OK	Washed down from 2023 - 2440 m with 3700-4000 LPM. Reamed tight spots at 2035 m, 2135 m, 2165 m, 2170 m, 2205 m, 2226 m, 2243 m, 2287 m, 2350 m, 2400 m. Necessary to rotate with 20-50 RPM to pass tight spots.
31.07.2003 00:00	02:00	2,0	2767,0	ELWK	OK	OK	Washed down from 2440 -2767 m with 4000 LPM. Washed and reamed tight spot at 2489 m. Less resistance while washing down from 2440 m.
31.07.2003 02:00	03:30	1,5	2800,0	ELWK	OK	OK	Reamed and back reamed tight interval from 2767 - 2800 m with 3700 LPM / 50-100 RPM. Top drive stalled out twice. Worked interval clean and passed without rotation.
31.07.2003 03:30	06:00	2,5	2800,0	ELWK	OK	OK	Circulated hole clean with 4100 LPM / 315 Bar while reciprocating string without rotation. Whilst working pipe hole became tight at 2785 m again, reamed clean. Large amount of cavings over the shakers (> 5 x BU).
31.07.2003 06:00	06:30	0,5	2780,0	ELWK	OK	OK	Continued to circulate hole clean at 4100 LPM, 312 Bar while reciprocating string from 2787 m to 2760 m without rotation.
31.07.2003 06:30	12:00	5,5	1335,0	ELWK	OK	OK	Pulled out from 2760 m to 2689 m without pumping, took 15 MT overpull. Pumped out of hole from 2689 m to 1335 m with 3800 LPM / 273-204 Bar.
31.07.2003 12:00	13:00	1,0	1335,0	ELWK	OK	OK	Circulated hole clean from 1335 m at 4300 LPM / 220 Bar.
31.07.2003 13:00	14:30	1,5	1596,0	ELWK	OK	OK	RIH from 1335 to 1453 m, took 15 MT weight. MU top drive and washed down from 1543 m to 1596 m with 3700 LPM / 210 Bar.
31.07.2003 14:30	16:00	1,5	2004,0	ELWK	OK	OK	RIH from 1596 m to 1917 m, took 15 mt weight. MU top drive and washed down from 1917 m to 2004 m with 3500 LPM / 220 Bar.
31.07.2003 16:00	18:30	2,5	2767,0	ELWK	OK	OK	RIH from 2004 m to 2767 m. Washed tight spot at 2177 m.
31.07.2003 18:30	19:00	0,5	2800,0	ELWK	OK	OK	Washed and reamed from 2767 m to 2800 m. Found 2 m fill on bottom.
31.07.2003 19:00	21:30	2,5	2800,0	ELWK	OK	OK	Circulated hole clean while increasing MW from 1.42 to 1.46 SG at 3900 LPM / 310 Bar. Reciprocated string without rotation. Large amounts of cavings over the shakers during the first 1.5 x BU, later small amounts of cavings.
31.07.2003 21:30	22:00	0,5	2680,0	ELWK	OK	OK	Flow checked well. POOH from 2800 m to 2680 m. Reamed tight spots (15 MT overpull) at 2720 m and 2680 m with 3800 LPM / 310 Bar / 50 RPM / 0-20 kNm.
31.07.2003 22:00	00:00	2,0	2410,0	ELWK	OK	OK	Pumped out of hole from 2680 m to 2410 m, reamed tight spot at 2638 m, 3900-4000 LPM / 310-320 Bar.
01.08.2003 00:00	04:00	4,0	1392,0	ELWK	OK	OK	Continued to pump out of hole from 2410 m to 1392 m, 4050 LPM / 300 Bar.

01.08.2003 04:00	04:30	0,5	1360,0	ELWK	OK	OK	Washed and reamed rat hole area from 1392 m to 1360 m, 4150 LPM / 260 Bar.
01.08.2003 04:30	05:30	1,0	1345,0	ELWK	OK	OK	Pulled out to 1345 m and circulated hole clean with 4400 LPM / 285 Bar / 10 RPM / 2 kNm.
01.08.2003 05:30	06:00	0,5	1336,0	ELWK	OK	OK	Displaced K & C lines to 1.46 sg mud, flow checked well. Pumped slug and POOH to 1336 m.
01.08.2003 06:00	09:00	3,0	,0	ELWK	OK	OK	POOH from 1336 m (920 m/hr). Flow checked well before pulling through BOP. Cleaned and cleared rig floor.
01.08.2003 09:00	11:00	2,0	,0	ELHK	OK	OK	Performed pre-job meeting and RU for WL. Installed sheaves and slip joint compensating wire. MU tool string no 1: FMI/DSI/PEX/HNGS. Tested tool string and loaded RA-sources.
01.08.2003 11:00	14:30	3,5	,0	ELHK	OK	OK	RIH tool string no 1. String hung up at 1397 m, unable to pass same. POOH and LD tool string no 1. RD WL equipment, clean and cleared rig floor.
01.08.2003 14:30	18:00	3,5	1479,0	ELWK	OK	OK	MU and RIH 12 1/4" BHA on 5" DP. String stood up at 1464 m, washed area down to 1479 m.
01.08.2003 18:00	00:00	6,0	2635,0	ELWK	OK	OK	Continued to RIH from 1479 m, washed and reamed tight spots to 2635 m. Reamed at 1481 m and 1881 m with 3800 LPM / 260 Bar / 50 RPM / 0-8 kNm. Washed at 1997 m, 2005 m, 2034 m / 2048 m / 2090 m / 2463 m with 3800 LPM / 260-290 Bar. Reamed at 2474 m, 2498 m, 2504 m with 3800 LPM / 295 Bar / 30 RPM / 0-12 kNm.
02.08.2003 00:00	00:30	0,5	2688,0	ELWK	OK	OK	Continued to RIH from 2635 m to 2688 m, took 10 MT weight.
02.08.2003 00:30	01:30	1,0	2688,0	ELWK	OK	OK	MU top drive to DP and attempted to break circulation, hole packed off with 100 Bar below. Was not able to establish circulation, able to rotate and reciprocate pipe. Racked back stand, rotated and worked string slowly. Managed to establish full circulation in steps.
02.08.2003 01:30	02:00	0,5	2691,0	ELWK	OK	OK	Circulated hole clean while reciprocating from 2663 to 2691 m, 3800 LPM / 310 Bar / 30 RPM / 0-3kNm.
02.08.2003 02:00	03:00	1,0	2800,0	ELWK	OK	OK	Continued washing down from 2690 m to 2800 m.
02.08.2003 03:00	05:30	2,5	2800,0	ELWK	OK	OK	Circulated hole clean while reciprocating from 2780 m to 2800 m, 3800-3900 LPM / 310-320 Bar / 10-45 RPM / 2-15 kNm.
02.08.2003 05:30	06:00	0,5	2750,0	ELWK	OK	OK	POOH from 2800 m to 2750 m.
02.08.2003 06:00	11:00	5,0	1350,0	ELWK	OK	OK	Continued pumping out of hole from 2750 m to 1350 m. Worked tight spots at 2688 m, 2630 m, 2430 m.
02.08.2003 11:00	12:30	1,5	1350,0	ELWK	OK	OK	Circulated hole clean at 1350 m with 4600 LPM / 303 Bar.
02.08.2003 12:30	15:00	2,5	,0	ELWK	OK	OK	Flow checked well and POOH. Flow checked again with bit at BOP. Cleared and cleaned rig floor of excess equipment.
02.08.2003 15:00	15:30	0,5	,0	ELHK	OK	OK	Performed pre-job meeting prior to wire line operation.
02.08.2003 15:30	16:30	1,0	,0	ELHK	OK	OK	RU wire line equipment, MU tool string and loaded RA-sources.
02.08.2003 16:30	18:00	1,5	1491,0	ELHK	OK	OK	RIH with tool string no 1 (second re-run), string stood up at 1491 m.
02.08.2003 18:00	19:30	1,5	,0	ELHK	OK	OK	POOH WL-tool string no 1. Removed RA-sources, RD wire line equipment and tool string.
02.08.2003 19:30	21:30	2,0	,0	ELHK	OK	OK	RU to run PEX / MDT as TLC. Changed out master bushings. MU tool string, reterminated new cable head and function tested connection to tool string. MU X-overs to 5" DP and racked same in derrick.
02.08.2003 21:30	22:00	0,5	,0	ELHK	OK	OK	Performed pre-job meeting prior to TLC run
02.08.2003 22:00	22:30	0,5	,0	ELHK	OK	OK	Loaded RA-source in tool string.
02.08.2003	00:00	1,5	488,0	ELHK	OK	OK	RIH with TLC tool string no 1 to 488 m. Broke circulation at 314 m. 2500

22:30							LPM / 21 Bar.
03.08.2003 00:00	02:30	2,5	1361,0	ELHK	OK	OK	Continued RIH TLC tool string from 488 m to 1361 m. Broke circulation every 10 stands, 2500 LPM / 32-55 Bar.
03.08.2003 02:30	03:00	0,5	1364,0	ELHK	OK	OK	MU pup joint. Performed pre-job meeting and risk assessment prior to RU sheaves in derrick and start TLC in open hole.
03.08.2003 03:00	05:00	2,0	1364,0	ELHK	OK	OK	Removed auto slips and rigged up sheaves in derrick.
03.08.2003 05:00	05:30	0,5	1364,0	ELHK	OK	OK	MU side entry sub and cable to string. MU single joint and connected top drive to string.
03.08.2003 05:30	06:00	0,5	1364,0	ELHK	OK	OK	Ran in with cable to 700 m. Started to pump locomotive down with 1000 LPM / 18 Bar.
03.08.2003 06:00	06:30	0,5	1378,0	ELHK	OK	OK	Continued to pump down locomotive to tool string docking head, 1000 LPM / 30 Bar. Pumped 3,0 m3 drill water from cement unit and spotted same in docking head. Latched to tool string.
03.08.2003 06:30	07:30	1,0	1378,0	ELHK	OK	OK	Function tested tool string and installed cable clamp.
03.08.2003 07:30	09:00	1,5	1500,0	ELHK	OK	OK	RIH TLC tool string from 1378 m to 1498 m. String stood up at 1500 m.
03.08.2003 09:00	10:00	1,0	1378,0	ELHK	OK	OK	Displaced string to 1.46 sg WBM and POOH to 1378 m.
03.08.2003 10:00	12:00	2,0	1366,0	ELHK	OK	OK	Sheared out wet connector and pulled cable and locomotive to surface. Broke out side entry sub and RD cable and wire line equipment.
03.08.2003 12:00	15:30	3,5	,0	ELHK	OK	OK	POOH tool string and LD same.
03.08.2003 15:30	16:00	0,5	,0	ELHK	OK	OK	Cleared rig floor of excess equipment.
03.08.2003 16:00	17:00	1,0	292,0	PTTU	OK	OK	MU and RIH 3 1/2" DP cement stinger to 292 m.
03.08.2003 17:00	00:00	7,0	2740,0	PTTU	OK	OK	Changed to 5" handling equipment and continued to RIH on 5" DP from 292 m to 2740 m. Broke circulation at shoe, 4000 LPM / 215 Bar. String took weight at 1498 m, worked tight area with 1400 LPM / 45 Bar / 50 RPM / 0-3 kNm. Washed tight spots at 1780 m, 1891 m, 2015 m, 2277 m. Washed down from 2726 m to 2740 m, 1500 LPM / 60 Bar / 20 RPM, 0-3 kNm.
04.08.2003 00:00	00:30	0,5	2800,0	PTTU	OK	OK	Continued to wash down from 2740 m to 2800 m, 1500 LPM / 60 Bar / 20 RPM / 0-3 kNm.
04.08.2003 00:30	02:30	2,0	2800,0	PTTU	OK	OK	Circulated hole clean, 4000 LPM / 310 Bar / 5 RPM / 0 kNm. Meanwhile MU cement stand and replaced dies in Hydraracker head. Performed pre-job meeting prior to set cement plug no 1.
04.08.2003 02:30	03:00	0,5	2800,0	PTTU	OK	OK	MU cement stand to DP, connected top drive to string. RU cement hose and leak tested line to 200 Bar / 5 min.
04.08.2003 03:00	04:30	1,5	2800,0	PSSU	OK	OK	Set OH cement plug no 1 from 2800 m to 2575 m. Pumped 6.9 m3 1.66 tuned spacer, 20.5 m3 1.90 sg slurry. Displaced cement by pumping 900 l spacer and 1.46 sg WBM using rig pumps at 2500 LPM / 220 Bar.
04.08.2003 04:30	05:00	0,5	2565,0	PTTU	OK	OK	Pulled out wet from 2800 m to 2565 m.
04.08.2003 05:00	06:00	1,0	2565,0	PCCU	OK	OK	Dropped sponge ball and circulated BU at 2500-4000 LPM / 135-290 Bar / 150 RPM / 0-4 kNm.
04.08.2003 06:00	07:00	1,0	2565,0	PCCU	OK	OK	Continued circulating BU at 4000 LPM / 290 Bar. Diverted cement contaminated WBM.
04.08.2003 07:00	08:30	1,5	2565,0	PSSU	OK	OK	MU cement pup and connected top drive to string. MU cement hose, leak tested line to 200 Bar / 5 min. Set OH cement plug no 2 from 2565 m to 2442 m. Pumped 6.9 m3 1.66 sg tuned spacer with rig pumps. Mixed and pumped 9,0 m3 1.90 sg slurry. Displaced cement by pumping 900 l spacer and 1.46 sg WBM using rig pumps. Cement job was cut short due to loss of mix water.
04.08.2003 08:30	09:30	1,0	2427,0	PTTU	OK	OK	POOH from 2565 m to 2427 m.
04.08.2003	10:00	0,5	2427,0	PCCU	OK	O FAIL	Dropped sponge ball and cleaned DP.

09:30							
04.08.2003 10:00	16:00	6,0	2427,0	PAOD	O FAIL	OK	Circulated well while mixing mix water for reminder of slurry plug no 2, i.e. new plug no 3. Meanwhile carried out maintenance on top drive and Hydraracker. Checked and adjusted disc brake on Hydraracker. Built extra spacer volume. Performed pre-job meeting prior to set reminder of cement plug.
04.08.2003 16:00	16:30	0,5	2427,0	PAOD	O FAIL	OK	MU cement pup and connected top drive to string. MU cement hose, leak tested line to 200 Bar / 5 min.
04.08.2003 16:30	17:00	0,5	2427,0	PAOD	O FAIL	O FAIL	Pumped 6.9 m3 1.66 sg tuned spacer with rig pumps. Discovered that 6 m3 tuned spacer had been transferred into mix water pit by mistake. Aborted cement job.
04.08.2003 17:00	00:00	7,0	2427,0	PAOD	O FAIL	OK	Reinstalled software in cement control unit. Emptied contaminated mix water from cement mix-tub into 1 m3 barrels and cleaned unit. Checked cement unit and CMS.
05.08.2003 00:00	03:00	3,0	2427,0	PAOD	O FAIL	OK	Continued preparing and checking cement unit before operation.
05.08.2003 03:00	04:30	1,5	2427,0	PAOD	O FAIL	OK	Performed pre-job meeting. Set OH plug no 3 from 2442 m to 2350 m. Pumped 9.0 m3 1.90 sg slurry. Displaced cement by pumping 900 l spacer and 1.46 sg WBM using rig pumps at 2500 LPM / 160-238 Bar.
05.08.2003 04:30	05:30	1,0	2260,0	PTTU	OK	OK	POOH from 2427 m 2260 m while rotating 100 RPM / 3-4 kNm.
05.08.2003 05:30	06:00	0,5	2260,0	PAOD	O FAIL	OK	Dropped sponge ball and displaced string volume x 1.5 times at 250 LPM / 120 Bar. Flow checked well.
05.08.2003 06:00	07:30	1,5	1565,0	PTTU	OK	OK	POOH wet from 2260 m to 1565 m.
05.08.2003 07:30	08:00	0,5	1565,0	PCCU	OK	OK	Set 10.7 m3 high viscosity 1.70 SG pill from 1565 m to 1465 m.
05.08.2003 08:00	10:30	2,5	1465,0	PTTU	OK	OK	POOH from 1565 m to 1465 m, MU top drive and circulated 2 xBU at 3500 LPM / 175 Bar / 5 RPM / 0 kNm.
05.08.2003 10:30	12:00	1,5	1460,0	PAOW	OK	OK	Waited on cementer to fulfil resting hours. Meanwhile performed pre-job meeting. POOH from 1465 m to 1460 m. Mu cement pup and leak tested line to 200 Bar / 5 min. Circulated well at 2300 LPM / 95 Bar.
05.08.2003 12:00	12:30	0,5	1460,0	PSSU	OK	OK	Pumped 8.9 m3 1.66 SG tuned spacer at 1500 LPM / 62 Bar.
05.08.2003 12:30	14:00	1,5	1460,0	PSSU	OK	OK	Set plug 4 in OH/13 3/8" csg from 1460 m to 1260 m. Mixed and pumped 30.0 m3 1.92 SG slurry at 650 LPM / 20 Bar. Displaced cement by pumping 900 spacer and 1.46 SG WBM using rig pumps at 2500 LPM / 170 Bar.
05.08.2003 14:00	15:30	1,5	1100,0	PTTU	OK	OK	POOH dry from 1460 m to 1100 m, rotated 100 RPM. Dropped sponge ball. Spotted excess contaminated cement mix water. Displaced string volume.
05.08.2003 15:30	19:00	3,5	,0	PTTU	OK	OK	POOH 5" DP and 3 1/2" cement stinger. Washed well head and BOP area on way out.
05.08.2003 19:00	20:30	1,5	,0	PTTU	OK	OK	LD string stab and jar from derrick.
05.08.2003 20:30	22:00	1,5	350,0	PTTU	OK	OK	MU 13 3/8" EZSV with setting tool and RIH on 5" DP to 350 m.
05.08.2003 22:00	23:30	1,5	350,0	PSCW	OK	OK	WOC. Performed derrick inspection for dropped objects with drill crew and tool pusher. Performed de-briefing after inspection. Total 7 findings, none classified as potential dropped objections. 5 findings closed.
05.08.2003 23:30	00:00	0,5	350,0	PSTU	OK	OK	Tested cement lines to 90 Bar / 5 min.
06.08.2003 00:00	00:30	0,5	350,0	PSTU	OK	OK	Closed BSR. Pressure tested cement plug no 4 against BSR to 88 Bar / 10 min. Opened BSR.
06.08.2003 00:30	02:00	1,5	655,0	PSMU	OK	OK	RIH from 350 m to 655 m with 13 3/8" EZSV on 5" DP. Set EZSV by rotating 36 RH turns, sheared off plug with 25 MT overpull. Verified setting depth by setting down 5 MT on plug.
06.08.2003 02:00	03:30	1,5	650,0	PSMU	OK	OK	Closed MPR and pressure tested 13 3/8" EZSV to 88 Bar / 10 min. Performed pre-job meeting prior to displacing well.

06.08.2003 03:30	05:00	1,5	650,0	PCCU	OK	OK	Displaced K&C and booster line to sea water. Displaced well from 1.46 SG WBM to sea water, 3000 LPM / 45 Bar. Performed pre-job meeting prior to setting cement plug no 5.
06.08.2003 05:00	06:00	1,0	650,0	PSSU	OK	OK	MU cement hose and leak tested line to 200 Bar / 10 min. Commenced setting cement plug no 5.
06.08.2003 06:00	06:30	0,5	650,0	PSSU	OK	OK	Set cement plug no 5 from 650 m to 450 m. Mixed and pumped 16,0 m3 1.90 SG slurry at 860 LPM / 15 Bar. Displaced cement by pumping sea water at 2500 LPM / 35 Bar. RD cement hose and cement pup.
06.08.2003 06:30	07:00	0,5	420,0	PTTU	OK	OK	POOH dry from 650 m from 420 m.
06.08.2003 07:00	07:30	0,5	420,0	PCCU	OK	OK	Dropped sponge ball, MU top drive to string and circulated string volume.
06.08.2003 07:30	08:30	1,0	,0	PTTU	OK	OK	POOH. LD EZSV setting tool.
06.08.2003 08:30	10:30	2,0	379,0	BHRU	OK	OK	Performed pre-job meeting. MU WB retrieval / BOP washing BHA and RIH to 379 m.
06.08.2003 10:30	11:00	0,5	394,0	BHRU	OK	OK	MU top drive to string. Washed BOP area. Ran in and engaged WB, set down 10 MT. Pulled WB free, 35 MT overpull.
06.08.2003 11:00	12:00	1,0	,0	BHRU	OK	OK	POOH with WB on 5" DP.
06.08.2003 12:00	12:30	0,5	,0	BHRU	OK	OK	Disengaged WB from MPT.
06.08.2003 12:30	14:30	2,0	,0	PTPU	OK	OK	LD MPT (multi purpose tool) jetting sub and racked 6 1/2" DC in derrick. Cleared rig floor of excess equipment. LD cement pup and RD mud bucket.
06.08.2003 14:30	19:00	4,5	,0	BBRU	OK	OK	Perform pre-job meeting and RU to pull BOP. RU riser guide head on Hydraracker, installed 750 MT bails and elevator. Installed gimble and spider and hydraulic torque tools. Nippled down and laid out diverter.
06.08.2003 19:00	20:00	1,0	,0	BBRU	OK	OK	MU landing joint, closed and locked slip joint.
06.08.2003 20:00	20:30	0,5	,0	BBRU	OK	OK	Unlatched BOP, pulled clear of WH. Moved rig 40 m off location, starboard side.
06.08.2003 20:30	00:00	3,5	,0	BBRU	OK	OK	Removed tensioners, goosenecks and MUX saddles. Pulled and laid out landing joint. Pulled and laid out slip joint.
07.08.2003 00:00	00:30	0,5	,0	BBRU	OK	OK	Pulled riser and BOP to 322 m.
07.08.2003 00:30	01:00	0,5	,0	BBRU	OK	OK	Installed riser yoke on port crane.
07.08.2003 01:00	05:00	4,0	,0	BBRU	OK	OK	Pulled riser and BOP to surface.
07.08.2003 05:00	06:00	1,0	,0	BBRU	OK	OK	Disconnected riser from BOP, skidded BOP to port side of moon pool.
07.08.2003 06:00	10:30	4,5	,0	BBRU	OK	OK	Performed pre-job meeting. LD landing joint, 20' and 10' riser pup. RD riser handling equipment and riser yoke from port crane.
07.08.2003 10:30	11:00	0,5	,0	PTPU	OK	OK	Performed pre-job meeting. MU MOST & PDM cutter assembly. Spaced out and function tested tool.
07.08.2003 11:00	13:30	2,5	388,0	PTTU	OK	OK	RIH cutter assembly to 388 m. Moved rig above well centre.
07.08.2003 13:30	16:00	2,5	403,0	PACU	OK	OK	RIH and stabbed into well from 388 m to 403 m. Set down 5 MT and cut 20" x 30 " casing, 3100 LPM / 120 Bar. PDM stalled out. Made several attempts to restart, no success.
07.08.2003 16:00	17:00	1,0	403,0	PACU	OK	OK	Engaged and locked MOST to WH, pulled up to 230 MT overpull. No able to pull 20" x 30" casings free. Disengaged MO ST, pulled assembly above WH and function tested/inspected tool.
07.08.2003 17:00	19:30	2,5	403,0	PACU	OK	OK	Ran back in to 403 m, set down 5-10 MT and continued to cut 20" x 30" casing with 3000 LPM / 145/195 Bar. Observed cement in returns to sea at MOST, pressure decreased from 175 to 145 Bar. No pressure drop over the PDM.
07.08.2003	20:00	0,5	403,0	PACU	OK	OK	Engaged MOST and locked MOST to WH. Pulled 20 x 30 casing free. 80

19:30							MT overpull.
07.08.2003 20:00	21:30	1,5	,0	PACU	OK	OK	POOH. Removed bull's-eyes from WH in moon pool. Disengaged MOST from WH. LD MOST assembly. MU CART to WH. LD WH and 20" x 30 casing. ROV retrieved transponders. Transferred rig to Norne operations, commenced rig move to well 6608/B-4BH. ++++++ END OF OPERATION++++++

App B Directional data, survey listing

STATOIL

Statoil,6608/10-10
6608/10 Exploration,6608/10
EXPLORATION ZONE 32,Norway

Wellbore: 6608/10-10
Wellpath: 6608/10-10 Definitive
(TD@2800)
Date Printed: 1-Aug-2003

BAKER HUGHES INTEQ

Errors start at Mudline/Ground Level (398.00)
Ellipses reported at a confidence limit of 95.00%.
Ellipse error terms are CORRELATED across ties between tools of the SAME CLASS

Wellbore

Name	Created	Last Revised
6608/10-10	31-Jul-2003	31-Jul-2003

Well

Name	Government ID	Last Revised
6608/10-10		31-Jul-2003

Slot

Name	Grid Northing	Grid Easting	Latitude	Longitude	North	East
6608/10-10	7328331.9064	462427.3000	N66 4 17.9700	E8 10 11.4800	5195.88N	3761.73E

Installation

Name	Easting	Northing	Coord System Name	North Alignment
6608/10 Exploration	458667.000	7323138.000	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 (Stena Don (RT) 24.0m above Mean Sea Level)
Vertical Section is from 5195.88N 3761.73E on azimuth 63.56 degrees
Bottom hole distance is 24.13 Metres on azimuth 63.56 degrees from Wellhead
Calculation method uses Minimum Curvature method
Confidence Limit of 95.00%
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,6608/10-10
6608/10 Exploration,6608/10
EXPLORATION ZONE 32,Norway

Wellbore: 6608/10-10
Wellpath: 6608/10-10 Definitive
(TD@2800)
Date Printed: 1-Aug-2003

BAKER HUGHES INTEQ

Wellpath (Ellipse Semi-Axis) Report

MD [m]	Inc [deg]	Dir [deg]	TVD [m]	North [m]	East [m]	Dogleg [deg/30m]	Vertical Section[m]	Ellipse Major Semi-Axis [m]	Ellipse Minor Semi-Axis [m]	Ellipse Vertical Semi-Axis [m]	Ellipse Minor Azi. [deg]
398.00	0.00	0.00	398.00	5195.88N	3761.73E	0.00	0.00	0.00	0.00	0.69	N/A
473.00	1.00	2.81	473.00	5196.53N	3761.76E	0.40	0.32	0.21	0.21	0.69	N/A
589.00	0.82	28.80	588.98	5198.27N	3762.21E	0.12	1.50	0.38	0.38	0.72	N/A
735.30	0.58	87.24	735.27	5199.22N	3763.45E	0.15	3.03	0.54	0.54	0.79	N/A
850.30	0.31	100.48	850.27	5199.19N	3764.34E	0.07	3.82	0.63	0.62	0.87	N/A
1024.50	0.81	51.97	1024.46	5199.87N	3765.77E	0.11	5.40	0.79	0.78	1.02	52.99
1111.50	0.61	27.37	1111.45	5200.66N	3766.47E	0.12	6.38	0.83	0.82	1.11	49.90
1198.50	0.33	38.83	1198.45	5201.26N	3766.84E	0.10	6.98	0.87	0.85	1.21	48.41
1285.50	0.47	342.96	1285.45	5201.80N	3766.89E	0.14	7.26	0.90	0.88	1.31	44.78
1364.90	0.71	357.97	1364.85	5202.60N	3766.78E	0.11	7.52	0.93	0.91	1.56	39.83
1459.00	0.34	33.04	1458.94	5203.42N	3766.91E	0.15	8.00	0.97	0.94	1.67	37.65
1574.80	0.30	27.31	1574.74	5203.98N	3767.24E	0.01	8.54	1.02	0.99	1.82	37.05
1661.60	0.19	8.89	1661.54	5204.32N	3767.36E	0.05	8.81	1.05	1.02	1.94	36.29
1748.60	0.16	46.67	1748.54	5204.55N	3767.47E	0.04	9.01	1.08	1.05	2.06	36.27
1837.30	0.16	17.00	1837.24	5204.75N	3767.60E	0.03	9.21	1.11	1.08	2.20	35.98
1924.40	0.13	44.57	1924.34	5204.94N	3767.70E	0.03	9.39	1.13	1.10	2.34	35.98
2011.60	0.35	20.30	2011.54	5205.26N	3767.87E	0.08	9.68	1.16	1.13	2.48	35.42
2097.50	0.34	30.72	2097.44	5205.72N	3768.09E	0.02	10.08	1.19	1.15	2.63	35.06
2184.40	0.37	67.92	2184.33	5206.05N	3768.48E	0.08	10.58	1.21	1.18	2.79	36.12
2271.70	0.77	102.81	2271.63	5206.02N	3769.31E	0.18	11.31	1.24	1.20	2.96	39.96
2359.10	0.98	96.00	2359.02	5205.82N	3770.63E	0.08	12.40	1.27	1.22	3.13	45.23
2446.70	1.28	92.04	2446.60	5205.70N	3772.35E	0.11	13.89	1.30	1.25	3.31	50.71
2534.50	1.42	87.00	2534.38	5205.73N	3774.42E	0.06	15.75	1.34	1.27	3.50	55.35
2620.70	1.81	77.38	2620.54	5206.08N	3776.81E	0.16	18.05	1.38	1.29	3.69	58.64
2737.10	1.93	108.73	2736.89	5205.85N	3780.46E	0.26	21.22	1.44	1.33	3.96	64.98
2788.00	3.53	63.09	2787.73	5206.28N	3782.67E	1.52	23.39	1.47	1.34	4.14	66.00
2800.00	3.53	63.09	2799.71	5206.62N	3783.33E	0.00	24.13	1.48	1.34	4.17	65.86

All data is in Metres unless otherwise stated
Coordinates are from Installation MD's are from Rig and TVD's are from Rig (Stena Don (RT) 24.0m above Mean Sea Level)
Vertical Section is from 5195.88N 3761.73E on azimuth 63.56 degrees
Bottom hole distance is 24.13 Metres on azimuth 63.56 degrees from Wellhead
Calculation method uses Minimum Curvature method
Confidence Limit of 95.00%
Prepared by Baker Hughes Incorporated

STATOIL

Statoil,6608/10-10
6608/10 Exploration,6608/10
EXPLORATION ZONE 32,Norway

Wellbore: 6608/10-10
Wellpath: 6608/10-10 Definitive
(TD@2800)
Date Printed: 1-Aug-2003

BAKER HUGHES INTEQ

Hole Sections

Diameter [in]	Start MD[m]	Start TVD[m]	Start North[m]	Start East[m]	End MD[m]	End TVD[m]	End North[m]	Start East[m]	Wellbore
36.000	398.00	398.00	5195.88N	3761.73E	447.00	447.00	5196.15N	3761.74E	6608/10-10
17 1/2	447.00	447.00	5196.15N	3761.74E	1377.00	1376.94	5202.75N	3766.78E	6608/10-10
12 1/4	1377.00	1376.94	5202.75N	3766.78E	2800.00	2799.71	5206.62N	3783.33E	6608/10-10

Casings

Name	Top MD[m]	Top TVD[m]	Top North[m]	Top East[m]	Shoe MD[m]	Shoe TVD[m]	Shoe North[m]	Shoe East[m]	Wellbore
30.000in Conductor	398.00	398.00	5195.88N	3761.73E	445.00	445.00	5196.13N	3761.74E	6608/10-10
13 3/8in Casing	398.00	398.00	5195.88N	3761.73E	1365.00	1364.95	5202.60N	3766.78E	6608/10-10

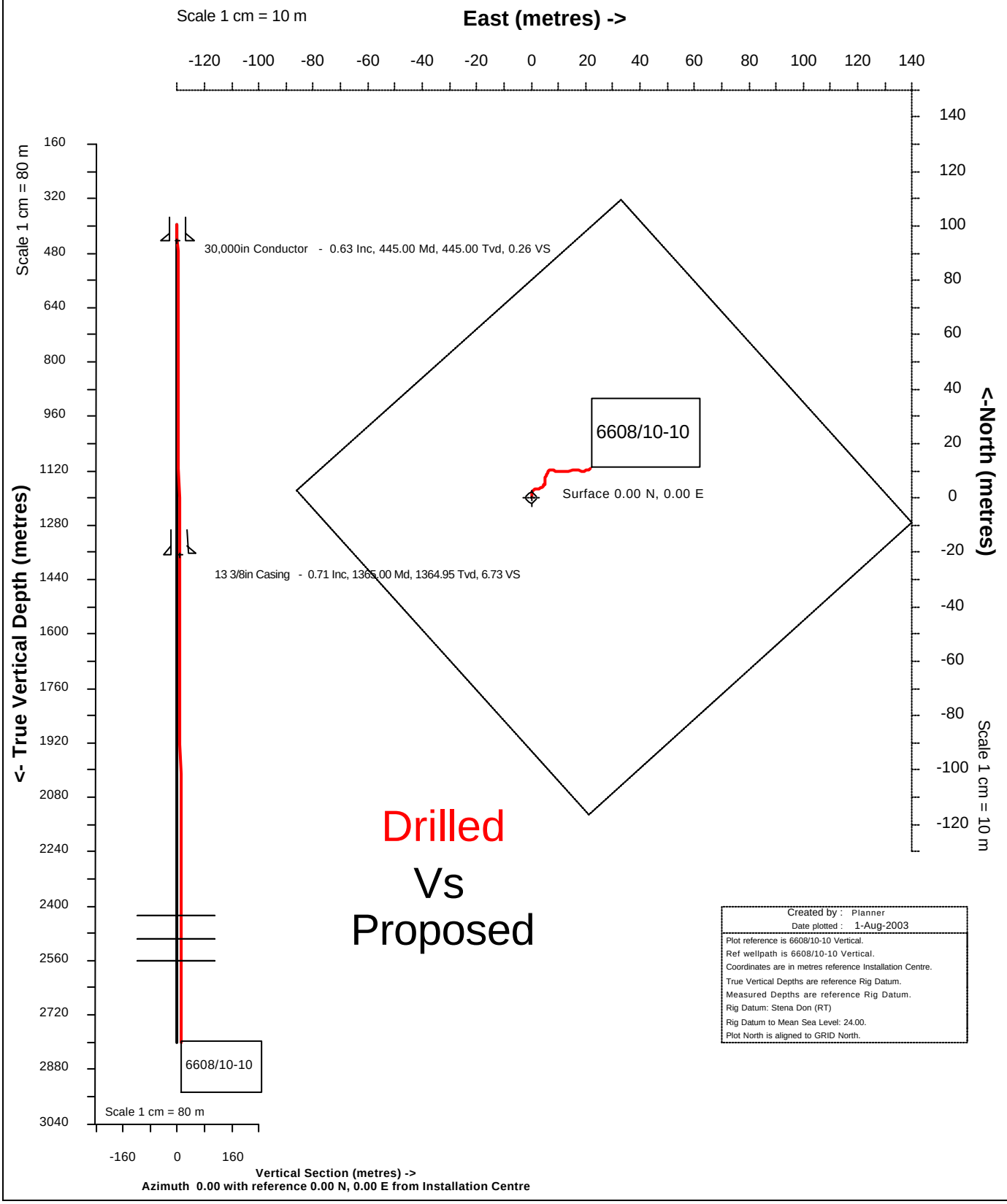
Survey Tool Program

Reference	Survey Name	MD[m]	TVD[m]	Survey Tool	Error Model
679530	6608/10-10 BHI.MWD 17 1/2" (473-1364)	1364.90	1364.85	Magnetic (MWD, EMS)	MWD, standard, mag-corr
679550	6608/10-10 BHI.MWD 12 1/4" (1459-2788)	2788.00	2787.73	Magnetic (MWD, EMS)	MWD, standard, mag-corr
679554	6608/10-10 Extrapolation (TD@2800)	2800.00	2799.71	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 (Stena Don (RT) 24.0m above Mean Sea Level)
Vertical Section is from 5195.88N 3761.73E on azimuth 63.56 degrees
Bottom hole distance is 24.13 Metres on azimuth 63.56 degrees from Wellhead
Calculation method uses Minimum Curvature method
Confidence Limit of 95.00%
Prepared by Baker Hughes Incorporated

Statoil

Location:	**Norway**	**Slot:**	**Main slot 6608/10-10**
Field:	**EXPLORATION ZONE 32**	**Well:**	**6608/10-10**
Installation:	**Stena Don 6608/10-10**		



Drilled

Vs

Proposed

Created by : Planner
Date plotted : 1-Aug-2003

Plot reference is 6608/10-10 Vertical.
Ref wellpath is 6608/10-10 Vertical.
Coordinates are in metres reference Installation Centre.
True Vertical Depths are reference Rig Datum.
Measured Depths are reference Rig Datum.
Rig Datum: Stena Don (RT)
Rig Datum to Mean Sea Level: 24.00.
Plot North is aligned to GRID North.

App C Contractors list

SERVICE	COMPANY
Casing/Casing hanger	Weatherford
Cementing	Halliburton
Coring	Security DBS
Directional Drilling	Baker Hughes INTEQ
Diving	Oceaneering AS
Drilling Contractor	Stena Don AS
Electric Logging	Schlumberger Offshore Service NV
Helicopter	Norsk helikopter
Helicopter Booking	Lufttransport (Statoil)
Mud	M-I Norge AS
Mud Logging	Geoservices
MWD	Baker Hughes INTEQ
Rig Positioning	Thales Geosolutions
Site Survey	Fugro-Geoteam AS
Wellhead System	Dril-Quip

App D Wellsite sample description

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 1 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 24.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1390	100	Cement	
1400	100	Clst: olv gry – med dk gry, sft – sli frm, amor, sli hygroturgid IP, sli slty, tr micromic, tr f calcite, sli calc – non calc	No Shows
1410	100	Clst: A/A	
	Tr	Sd: clr, vf – m, ang – sb rnd	a.a
1420	95	Clst: A/A + tr micropyrite, sli calc	
	5	Sd: A/A	
1430	95	Clst: A/A + sli dk grnsh gry IP, tr microfoss, occ pyritised microfoss	
	HTr-5	Sd: A/A + rare crse, clr, mlky, r yell	a.a
1440	95	Clst: med dk gry – olv gry, sft – occ frm, amor-sb blky, sli slty, tr micromic, tr micropyr IP, tr nod micropyr, sli – non calc	
	5	Sd: lse Qtz, clr, mlky, r yell, r red, vf – m, r crse, gen vf – f, poor srt, ang – sb rnd	a.a
1450	100	Clst: A/A + r tr carb flecks	
	Tr	Sd: A/A	a.a
1460	100	Clst: med dk gry – olv gry, sft, amor – sb blky, occ sli slty, tr micromic, tr pyr, r tr glauc, non – v sli calc	
	Htr	Sd: A/A	a.a
1470	100	Clst: med dk gry – olv gry, dk grnsh gry – dk grn (spkld w/glauc) IP, sft, amor – sb blky, tr micromic, tr pyr, v abnt glauc, non – v sli calc	
	Tr	Sd: A/A	a.a
1480	100	Clst: olv gry – med dk gry, occ dk grn – dk grnsh gry and spkld (w/glauc), sft, amor – sb blky, occ blky, sli slty – slty IP, micromic, tr pyr IP, r tr calcite, abnt glauc, non – v sli calc IP	
	Tr	Sd: clr, mlky, occ yell, vf – f, occ med, mod – pr srt, ang – sb rnd	a.a
1490	100	Clst: predom olv gry, sft – occ sli frm, amor – blky IP, sl slty, tr galuc, non calc	
	Tr	Sd: A/A	a.a
1500	95	Clst: as 1490m, tr glauc IP	
	5	Sd: pred vf –f, wl srtd, else A/A	a.a
1510	100	Clst: Predom olv gry A/A, slty – vf aren IP, micromic, occ tr glauc, non calc	No Shows a.a
	Tr	Sd: pred vf –f , A/A	
1520	100	Clst: olv gry – occ lsi brnsh gry, r grnsh gry, sft – sli frm Ip, sb blky – blky IP, slty, micromic, tr glauc, non calc	
	Tr	Sd: vf – f	a.a
1530	100	Clst: olv gry – brnsh gry, occ med dk gry, else A/A	
	Htr	Sd: vf – f	a.a

WELLSITE SAMPLE DESCRIPTION			Page 2 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 25.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1540	100	Clst: A/A, Htr Glauc	
	Tr	Sd: A/A	No Shows
1550	100	Clst: brnsh gry – olv gry, sft – occ sli frm, sb blky – blky, slty, micromic, Htr glauc, non calc	
	Tr	Sd: vf –f, A/A	a.a
1560	100	Clst: olv gry – brnsh gry / dk brnsh gry, rare grn, sft – occ sl frm, sb blky – blky, slty, micromic, Htr glauc, non – v sli calc	a.a
	Tr	Lse qtz, clr, mlky, vf – f, wl srtd, ang – sb rnd	
1570	100	Clst: A/A	
	Tr	Sd: A/A	a.a
1580	100	Clst: A/A	
	Tr	Sd: A/A	a.a
1590	100	Clst: A/A	
	Tr	Sd: A/A	a.a
1600	100	Clst: A/A + v r tr lightish gry	
	Tr	Sd: A/A	a.a
1610	100	Clst: A/A, + abnt glauc	
	Tr	Sd: A/A	a.a
1620	100	Clst: A/A	
	Tr	Sd: A/A	a.a
1630	100	Clst: A/A	
	Tr	Ls: gry wh – wh, frm, sbblky, Tr Glauc, arg , microxln	a.a
1640	100	Clst: A/A	
	Tr	Ls: A/A	a.a
1650	100	Clst: A/A	
	Tr	Ls: also Tr pl yel brn, else A/A	a.a
1660	100	Clst: A/A	
	Tr	Ls: A/A	a.a
1670	70	Clst: olv gry – brnsh gry A/A	
	30	Tf Clst: lt gn – bl gry, loc v lt gry, frm – Tr mod hd, sbblky – plty, non calc, loc wxy, r Glauc	a.a
	Tr	Ls: A/A	
1680	80	Tf Clst: lt gn – bl gry, loc v lt gry, frm – Tr mod hd, sbblky – plty, non calc, loc wxy, r Glauc, loc suc, r wh Spk	Tr cavings
	20	Clst: olv gry – brnsh gry A/A	
	Tr	Ls: A/A	

WELLSITE SAMPLE DESCRIPTION			Page 3 of 19
Country: Norway	Area: North Sea		Field: .GRÅSPETT
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol		Date: 25.07.2003

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1690	100	Tf Clst: lt gn – bl gry, loc v lt gry, frm – Tr mod hd, sbblky – plty, non calc, loc wxy, r Glauc, loc suc, r wh Spc	Tr cavings No shows
	Tr	Clst: olv gry – brnsh gry / dk brnsh gry, rare grn, sft – occ sl frm, sb blky – blky, slty, micromic, Htr glauc, non – v sli calc	
	Tr	Ls: gry wh – wh, frm, sbblky, Tr Glauc, arg , microxln	
1700	100	Tf Clst: also Tr micropyr else A/A	a.a
	Tr	Ls: A/A	
1710	100	Tf Clst: A/A	a.a
1720	100	Tf Clst: A/A	a.a
1730	100	Tf Clst: A/A	a.a
1740	100	Tf Clst: A/A	a.a
1750	100	Tf Clst: A/A also Tr Glauc, loc sli calc	a.a
1760	100	Tf Clst: A/A	a.a
1770	70	Tf Clst: A/A	
	30	Clst: mod brn – pl yel brn, frm, blky – sbblky, non calc, loc sli calc	a.a
1780	80	Tf Clst: A/A	a.a
	20	Clst: mod brn – pl yel brn A/A	
	Tr	Ls: gry wh – wh, frm, sbblky, Tr Glauc, arg , microxln	
1790	90	Tf Clst: lt gn – bl gry, loc v lt gry, frm – Tr mod hd, sbblky – plty, non calc, loc wxy, r Glauc, loc suc, r wh Spc	a.a
	10	Clst: mod brn – pl yel brn A/A	
	Tr	Ls: A/A	
1800	100	Tf Clst: also Tr Pyr nod, else A/A	a.a
	Tr	Ls:A/A	
1810	80	Clst: olv gry – m dk gry, frm – sft, blky – sbblky, non calc, sli slty, r Glauc, micropyr I.P.	a.a
	20	Clst: mod brn – pl yel brn A/A	
1820	100	Clst: A/A	a.a
1830	100	Clst: A/A	a.a
1840	100	Clst: also Tr Pyr nod, else A/A	a.a
1850	100	Clst: A/A	a.a
	Tr	Tf Clst: lt gry – bl gry, sft, blky, non calc, suc, blk and wh Spc	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 4 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 25.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1860	100	Clst: olv gry – m dk gry, frm – sft, blky – sbblky, non calc, sli slty, r Glauc, micropyr I.P.	No shows
	Tr	Tf Clst: lt gry – bl gry, sft, blky, non calc, suc, blk and wh Spc	
1870	100	Clst: A/A	a.a
	Tr	Tf Clst: A/A	
1880	70	Clst: olv gry – olv blk, frm – sft, occ mod hd, blky – ang, sb blky IP, occ loc wxy, sli slty IP, tr micro pyr IP, non calc	a.a
	30	Clst: med blsh gry, lt gmsh gry – grnsh gry, frm – mod hd IP, loc wxy, loc sli suc, non calc, Tuffaceous?	
1887	15	Clst: olv gry – olv blk A/A	a.a
	85	Clst: pa grnsh gry – m blsh gry, else A/A, tuffaceous IP?	Start 3m samples
	Tr	Ls: wh – crm, v pa gry, mod hd – hd, ang brit, crypto – mxln	
1890	15	Clst: olv gry – olv blk A/A	a.a
	85	Clst: pa grnsh gry , grnsh gry – m blsh gry A/A, tuffaceous IP?	
1893	40	Clst: olv gry, occ olv blk, else A/A, tr nod pyr	a.a
	60	Clst: pa grnsh gry – m blsh gry A/A	
1896	15	Clst: olv gry A/A	a.a
	85	Clst: m blsh gry, grnsh gry, A/A	
	Tr	Ls: A/A	
1899	50	Clst: olv gry, ovv olv blk, occ m dk gry – dk gry, else A/A	a.a
	50	Clst: m blsh gry, dk grnsh gry, occ grnsh gry A/A	
1902	60	Clst: olv gry, occ olv blk & m dk gry, gen frm, occ mod hd, ang – blky, occ loc wxy, tr nod pyr, non calc	a.a
	40	Clst : dk grnsh gry – m blsh gry, occ dk grn, frm – mod hd IP, occ sft, loc wxy, tr glauc IP, non calc, tuffaceous IP?	
	Tr	Ls : pa gry, off wh, blky, ang, frm – occ mod hd, crypto – mxln	
1905	40	Clst : olv gry etc A/A	a.a
	60	Clst: dk grnsh gry – blsh gry, occ grn, A/A	
	Tr	Ls: A/A	
1908	50	Clst: olv gry etc A/A	a.a
	50	Clst: A/A + lt grnsh gry IP + grn, tr glauc	
	RTr	Ls: A/A	
1911	70	Clst: olv gry etc A/A	a.a
	30	Clst: dk grnsh gry – m blsh gry etc A/A	
	RTr	Ls: A/A	
1914	75	Clst: olv gry, occ olv blk IP, A/A	a.a
	25	Clst: dk grnsh gry, dk grn, m blsh gry, else A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 5 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 25.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
1917	60	Clst: olv gry, occ olv blk, occ dk gry, frm – mod hd IP, loc occ wxy, micromic IP, non calc	No shows
	40	Clst: dk grnsh gry, dk grn, m blsh gry, frm – mod hd IP, loc wxy, tr glauc, non calc	
1920	70	Clst: olv gry etc A/A + Tr lt brn – mod brn, frm – sft , occ mod hd	a.a
	30	Clst: dk grnsh gry – m blsh gry, occ dk grn, frm – mod hd, occ sft, loc wxy, non calc	
1923	75	Clst: olv gry – olv blk, occ md dk gry, ovv lt – mod brn, A/A	a.a
	25	Clst: dk grnsh gry – m blsh gry, occ dk grn A/A	
1926	100	Clst: olv gry – m dk gry, occ dk grnsh gry, v occ lt – mod brn, ang, sb tab, sb flky IP, occ loc wxy, tr micromic IP, tr nod pyr, non calc	
	Tr	Clst: dk grnsh gry – m blsh gry A/A	
1929	100	Clst: m dk gry – dk gry, olv gry, occ dk grnsh gry, occ lt – mod brn, A/A, tr Glauc Tr disem pyr	a.a
	Tr	Clst: dk grnsh gry – m blsh gry A/A	
1932	100	Clst: A/A	a.a
1935	100	Clst: m dk gry – dk gry IP, occ olv gry, occ lt – mod brn, frm – mod hd, ang, sb blky, tr micromic, tr micropyr, tr glauc, non calc	a.a
1938	100	Clst : A/A + loc wxy	a.a
1941	100	Clst: predom m dk gry A/A, tr nod pyr	a.a
1944	100	Clst: A/A	a.a
1947	100	Clst: A/A, sft – mod hd, ang – sb blky, tr dissem pyr, tr nod pyr	a.a
1950	100	Clst: m dk gry, occ dk gry, r olv gry, else A/A	a.a
1953	100	Clst: A/A	a.a
1956	100	Clst: A/A	a.a
1959	100	Clst: m dk gry, occ dk gry, v occ dk olv gry, sft – mod hd, ang – blky, sb blky, tr micromic, tr dissem pyr, tr nod pyr, tr pyr microfoss, non calc	a.a
1962	100	Clst: A/A + v r dk grnsh gry	a.a
1965	100	Clst: A/A + Tr nod pyr	a.a
1968	100	Clst: m dk gry – dk gry, olv gry – dk olv gry IP, occ dk grnsh gry, else A/A	a.a
1970	100	Clst: A/A	a.a
1980	100	Clst: dk gry – m dk gry, dk olv gry, occ dk grnsh gry, sft – mod hd IP, non calc	
	Tr	Dol: lt – mod brn, hd, ang, mxln	a.a

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 6 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 25-26.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
1980	100	Clst: dk gry – m dk gry, dk olv gry, occ dk grnsh gry, sft – mod hd IP, ang – blky, tr micromic, tr dissem pyr IP, Tr nod pyr, non calc	
	Tr	Dol: lt – mod brn, hd, ang, mxln	No shows
1990	100	Clst: A/A + nod pyur	a.a
	Tr	Dol: A/A	
2000	100	Clst: A/A	a.a
2010	100	Clst: A/A + tr nod pyr	a.a
	RTr	Dol: A/A	
2020	100	Clst: m dk gry – dk gry, v occ dk grnsh gry, sft – frm, occ mod hd, sb blky, ang, sli micromic, tr nod pyr, occ tr glauc, non calc	a.a
2030	100	Clst: A/A	a.a
2040	100	Clst: A/A	a.a
2050	100	Clst: m dk grey – sli olv gry, else A/A, no glauc, tr nod pyr	a.a
2060	100	Clst: A/A loc sli slty, micromic IP	a.a
2070	100	Clst: olv gry – m dk gry, else A/A, tr glauc, tr nod pyr	a.a
	RTr	Dol: A/A	
2080	100	Clst: olv gry – m dk gry, occ dk gry, A/A	a.a
	HTr	Dol: A/A	
2090	100	Clst: m dk gry – olv gry, occ dk gry, A/A, tr glauc, tr nod pyr, non calc	a.a
	Tr	Dol: A/A	
2100	100	Clst: A/A	a.a
2110	100	Clst: med dk gry, occ olv gry, frm – v frm, occ mod hd, blky, ang, occ sb flky IP, occ sli slty IP, tr micromic, tr nod pyr, tr dissem pyr, occ tr glauc, non calc	a.a
	Tr	Dol: A/A	
2120	100	Clst: A/A	a.a
	Tr	Dol: A/A + crm, hd – frm, sucrosic IP	
	RTr	Ls: wh – off wh, frm, micxln	
2130	100	Clst: A/A	a.a
	Tr	Dol: A/A	
2140	100	Clst: A/A	a.a
	Tr	Dol: pa brn, crm, frm – hd, sucrosic IP, micxln	
2150	100	Clst: A/A	a.a
	Tr	Dol: A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 7 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 26.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
2160	100	Clst: olv gry – m dk gry, frm – mod hd, blky, loc ang, non calc, sli slty, Tr micromic, Tr Pyr, occ Tr Glauc	
	Tr	Dol: pa brn, crm, frm – hd, sucrosic IP, micxln	No Shows
2170	100	Clst: A/A	a.a
	Tr	Dol: A/A	
2180	100	Clst: pred olv gry, frm – sft, occ stky, else A/A	a.a
	Tr	Dol: A/A	
2190	100	Clst: A/A	a.a
	Tr	Dol: occ arg Grad Ls, else A/A	
2200	100	Clst: A/A	a.a
	Tr	Dol: A/A	
2210	100	Clst: A/A	a.a
	Tr	Dol: A/A	
2220	100	Clst: A/A	a.a
	Tr	Dol: A/A	
2230	100	Clst: A/A	a.a
	Tr	Dol/Ls: A/A	
2240	100	Clst: A/A	a.a
	Tr	Dol/Ls: A/A	
2250	100	Clst: Tr dk gn gry else A/A	a.a
	Tr	Dol/Ls: A/A	
2260	100	Clst: A/A	a.a
	Tr	Ls: gry wh – wh, loc pl yel brn, frm – mod hd, blky, loc arg, I.P. Grad Dol	
2270	100	Clst: A/A loc bcm sli calc – calc	a.a
	Tr	Ls/Dol: A/A	
2280	100	Clst: A/A	a.a
	Tr	Ls/Dol: A/A	
2290	100	Clst: A/A	a.a
	Tr	Ls/Dol: A/A	
2300	100	Clst: A/A	a.a
	Tr	Ls/Dol: A/A	
2303	100	Clst: A/A	a.a
	Tr	Ls/Dol: A/A	

WELLSITE SAMPLE DESCRIPTION				Page 8 of 19
Country: Norway		Area: North Sea		Field: .GRÅSPETT
Well no: 6608/10-10		Company:	Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell	
RKB: 24 meters		Geologist:	O.Giskeødegaard, J.Gilpin	
Hole size: 12 1/4"		Cut solvent:	Iso Propyl Alcohol	Date: 26.07.2003

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
2307	90	Clst: olv gry – m dk gry, frm – sft, loc Tr stky, blky – sbblky, sli – v calc I.P., r slty, Tr micromic, r micropyr	No shows
	10	Ls: gry wh – wh, loc lt gry, Tr pl yel brn, frm – mod hd, sli arg, loc microxln, loc Grad Dol	a.a
2310	80	Clst: A/A	a.a
	20	Ls: A/A	
2313	80	Clst: A/A	a.a
	20	Ls: A/A	
2316	90	Clst: m dk gry – olv gry, v sft & hygroturgid – mod hd, occ hd, sb blky – ang, sb splint IP, v sky IP, loca sli slty, tr mica & micromica, nod pyr, some free calcite v calc – non calc	a.a
	10	Ls : A/A	
	Tr	Sd: lse Qtz, clr occ mlky, vf – f, r med, ang – sb ang	
2319	95	Clst: A/A + occ dk grnsh gry	a.a
	5	Ls: A/A + fibrous calcite	
	Tr	Sd: A/A	
2322	80	Clst: A/A, v sky IP, sb blky – amor, ang – sb flky & splint IP, abnt small pyr nod tr micromic, non – v calc IP	a.a
	20	Ls : A/A	
	Tr	Sd: A/A	
2325	65	Clst: A/A non – occ calc	
	35	LS : pa gry, gry wh, pa yel brn IP, occ m gry, blky, ang, frm – mod hd, arg strks, chlky IP, micr – occ micxln	a.a
	Tr	Sd : A/A	
2328	90	Clst: olv gry – m dk gry, occ dk gry, sft – hd, sb blky – blky, splnt & flky IP, sli slty IP, tr micromic, abnt small py nods, non – sli calc, occ v calc, tr calcite	Tr Splint Clst cavings 4-5cm x 0.5-1cm
	10	Ls: pa gry, gry wh, pa yel brn IP, occ m gry, blky, ang, frm – mod hd, crmb, chlky IP, arg, micr – micxln IP, Dol IP	dk gry, r dk grn gry
	Htr	Sd: lse Qtz, clr, mlky trnsp – trnsl, vf –f, gen vf, wl srtd, ang – sb rnd	No Shows
2331	80	Clst: A/A + Htr Pa yel bm & sft, v calc, grad to arg LS	a.a
	20	Ls: pa yel brn + A/A, sft – occ v hd, arg, grad to calc clst IP, Dol IP	
	Tr	Dol: yel brn, v hd, micxln, arg IP	
2334	80	Clst: A/A	Change Shaker screen from 150 – 180
	20	Ls: A/A	
	Tr	Dol: A/A	
	Tr	Sd: A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 9 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 26.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2337	85	Clst: olv gry , m dk gry, pa yel brn, sft – frm, slty, micromic, nod pyr, non – v calc IP, occ grad to arg Ls	No shows
	15	Ls: A/Apa yel brn + A/A, sft – occ v hd, arg, grad to calc clst IP, Dol IP	
	Htr	Dol: yel brn, v hd, micxln, arg IP	
	Htr	Sd: lse Qtz, clr, mlky trnsp – trnsl, vf –f, gen vf, wl srtd, ang – sb ang	(barite?)
2340	90	Clst: olv gry , m dk gry, pa yel brn, sft – frm, slty, micromic, nod pyr, non – v calc IP	CLST washing away
	10	Ls: A/A, Dol IP	
	(15)	Sd: A/A (barite?)	
2343	100	Clst: A/A	Using 200 micr Sieve
	Htr	Ls: A/A	CLST washing away
	(40)	SD: A/A? (barite contam?)	No GR indication
2346	90	Clst: A/A	No shows
	10	Ls: A/A	
	(50)	Sd: A/A?? (barite contam)	
2349	90	Clst: A/A	a.a
	10	LS: A/A	
	(50)	Sd: A/A, barite fines?	No GR indication
2352	60	Clst: olv gry – m dk gry, occ dk gry & dk grnsh gry, occ lt gry, sft – frm, occ mod hd, sb blky – flky, occ splnt, slty IP, micromic & nod pyr, gen non calc. Also pa yel brn, dft – frm, sli calc – calc, dol IP grad to arg Dol LS	No shows
	10	Ls: pa gry, pa yel brn, sft – frm, crmb, v arg, dol IP, grad to calc clst IP	
	(30)	Sd: A/A	% sand not representative barite??
2355	50	Clst: A/A	Clst washing away
	10	Ls: A/A	
	(40)	Sd: A/A	
2358			
2361	85	Clst: A/A	
	15	Ls: A/A	
	(30)	Sd: A/A	No shows
2364	80	Clst: olv gry, m dk gry, dk grnsh gry IP, blky, sb blky, splnt & flky IP, sft – mod hd, occ hd IP, slty IP, micromic, tr pyr, non – sli calc	a.a
	20	Ls: pa yel brn – pa yel grysh brn, off wh, blky, flky, crmb – occ hd, v arg, dol IP, micr – micxln IP	
	Tr	Sd: A/A	
2367	70	Clst: A/A	a.a
	30	Ls: v pale grey, wh, pa yel brn, sft – mod hd, ang, flky, sb blky, v arg IP, dol IP micxln, micritic	
2370	75	Clst: v dk – olv blk + A/A, sft – mod hd	try 63 micron sieve again

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 10 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 26-27.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2373	100	Clst: predom olv blk – v dk gry, v frm – mod hd, ang – sb blky, sli slty IP, micromic IP, tr pyr IP, tr carb, non calc	No shows
	Htr	Ls: pa gry, wh, chlky – micxln, arg IP	
	(10)	Sd: vf –f (barite?)	
2376	90	Clst: A/A	a.a
	10	Ls: A/A	
	(20)	Sd: (barite??)	
2379	100	Clst: A/A, tr carb	a.a
	Htr	Ls: A/A + pal yel brn	
2382	85	Clst: olv gry, olv blk, m dk gry, dk grnsh gry IP, occ lt brn, sft – frm, occ mod hd, sb blky – blky, ang, r splnt, micromic IP, tr pyr, non calc. Also lt brn, sft, calc, grad to arg LS	a.a
	15	Ls: yel brn, brnsh gry, pa gry, arg, crmb, micr	
	(20)	Sd: (barite??)	
2385	90	Clst: olv gry, m dk gry, occ olv blk, dk grnsh gry, nod pyr, else A/A, no lt brn	a.a
	10	Ls: A/A	
	(20)	Sd: (barite?)	
2388	100	Clst: A/A	a.a
	Htr	Ls: A/A	
	(30)	Sd: (barite?)	
2391	100	Clst: A/A, silty, sli vf aren IP?	a.a
	Htr	Ls: A/A	
	(20)	(Sd?)	
2394	100	Clst: A/A, predom olv gry	a.a
	Tr	Ls: A/A	
	(20)	(Sd?) Barite?	
2397	100	Clst: A/A	a.a
	Tr	Ls: A/A	
	(20)	(Sd?) barite?	
2400	100	Clst: predom olv gry, occ m dk gry, dk gry, dk grn gry, sft, occ frm – mod hd, sb blky, occ ang, stky, slty, tr micromic, r pyr, non calc	a.a
	Tr	Ls: A/A	
	(30)	(Sd) Barite?	
2403	100	Clst: A/A	
	Htr	Dol Ls: yel brn – pale yel brn, crmb, arg, micr, dol IP	a.a
	Tr	Sd: clr, mlky, yel brn, vf – f, wl srtd, sub ang	using f sieve again
2406	90	Clst: A/A	a.a
	10	Dol Ls: A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 11 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 27.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2409	80	Clst: olv gry, occ m dk gry, occ dk grnsh gry IP, v sft, amor, stky, slty IP, vf aren IP, micromic, r tr carb clst, non calc	
	10	Dol Ls: yel brn – pale yel brn, crmb, arg, micr, dol IP, grad to calc/dol clst IP	
	10	Sd: clr, mlky, yel brn, vf – f, r med, wl srtd, sub ang – sb rnd	No shows
2412	90	Clst: A/A + v occ olv blk – blk, carb & slty, tr nod pyr	a.a
	Htr	Dol Ls: A/A	
	10	Sd: A/A	
2415	75	Clst: A/A, v slty & vf aren, pyr, v sft, amor	
	10	Dol Ls: A/A	
	15	Sd: A/A	a.a
2418	85	Clst: A/A	
	5	Dol Ls: A/A	
	10	Sd: A/A	a.a
2421	75	Clst: A/A	
	5	Dol Ls: A/A	
	20	Sd: A/A	a.a
2424	80	Clst: A/A, v slty & aren, grad to arg SST IP	
2427	TR	Ls: A/A	
	20	Sd: A/A	a.a
2430	80	Clst: A/A, v sft – r frm, amor, sb blky IP, non calc	a.a
	Tr	Ls: A/A	
	20	Sd: A/A	
2433	80	Clst: predom olv gry, occ m dk gry – dk gry, occ dk grnsh gry & mod hd, v sft, stky, amor – sb blky, slty – vf aren, micromic, tr pyr, non calc	a.a
	Tr	Ls: pale gry, gry wh, crmb, arg, micr – micxln	
	20	Sd: lse Qtz, clr, occ mlky, & yel brn, vf –f, wl srtd, sb ang – sb rnd, occ r lt gry – wh wk calc cmtd sst.	
2436	80	Clst: A/A	a.a
	20	Sd: A/A	
	Tr	Ls: A/A	
2439	60	Clst: A/A	Very bad sample Q.
	40	Sd: vf – f, lse A/A	a.a
2442	40	Clst: v slty, loc vf sdy else A/A	
	60	Sd: pred f A/A	a.a
2445	50	Clst: A/A	
	50	Sd: A/A	a.a
2448	70	Clst: A/A	
	30	Sd: pred vf A/A	a.a

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 12 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 27.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2451	80	Clst: predom olv gry, occ m dk gry – dk gry, occ dk grnsh gry & mod hd, v sft, stky, amor – sb blky, slty, loc vf sdy, micromic, tr pyr, non calc	
	20	Sd: lse Qtz, clr, occ mlky, & yel brn, vf –f, wl srtd, sb ang – sb rnd occ r lt gry – wh wk calc cmtd sst	No Shows
2454	90	Clst: A/A	
	10	Sd: A/A	a.a
2457	80	Clst: A/A	
	10	Sd: A/A	a.a
	10	Ls: pale gry, gry wh, crmb, arg, micr – micxln	
2460	100	Clst: A/A	
	Tr	Sd: vf – f, A/A	a.a
	Tr	Ls: A/A	
2463	100	Clst: A/A	
2466	80	Clst: A/A	
	20	Ls: A/A	a.a
	Tr	Sd: A/A	
2469	70	Clst: olv gry – m dk gry, loc gn gry, sft, loc frm – mod hd, stky I.P., sli – non calc, Tr micromic, slty, loc vf sdy, Tr Pyr	
	30	Ls: : pale gry, gry wh, crmb, arg, micr – micxln	
	Tr	Sd: A/A	a.a
2472	80	Clst: A/A	
	20	Ls: A/A	
	Tr	Sd: A/A	a.a
2478	90	Clst: A/A	
	10	Ls: A/A	
	Tr	Sd: A/A	
2481	80	Clst: gd Tr Pyr, Tr carb, else A/A	
	20	Ls: A/A	
	Tr	Sd: A/A, vf-f	a.a
2484	90	Clst: A/A	
	10	Sd: vf – f, incr Mic	a.a
	Tr	Ls: A/A	
2487	90	Clst: A/A	a.a
	10	Sd: lse Qtz, clr, occ mlky, & yel brn, vf –f, wl srtd, sbang – sbrnd, lse, Mic, gen no cmt, loc cly cmtd, arg	Slt and cly mtrx washed out
	Tr	Ls: A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 13 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 27.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2490	80	Clst: olv gry – m dk gry, loc gn gry, sft, loc frm – mod hd, stky I.P., sli – non calc, Tr micromic, slty, loc vf sdy, Tr Pyr	
	20	Sd: lse Qtz, clr, occ mlky, & yel brn, vf –f, wl srtd, sbang – sbrnd, lse Mic, gen no cmt, loc cly cmtd, arg , Pyr, Tr carb	No Shows
2493	80	Clst: A/A	
	20	Sd: A/A	a.a
	Tr	Ls: pale gry, gry wh, crmb, arg, micr – micxln	
2496	80	Clst: A/A	
	20	Sd: A/A	a.a
2499	80	Clst: A/A	
	20	Sd: A/A	a.a
2502	70	Sd: gen vf, else A/A	a.a
	30	Clst: A/A	
2505	80	Sd: also loc Tr calc cmt	a.a
	20	Clst: A/A	
2508	70	Sd: vf – f, pred vf	a.a
	30	Clst: A/A	
2511	70	Sd: A/A	a.a
	30	Clst: A/A	
	Tr	Ls: A/A	
2514	70	Sd. A/A	a.a
	30	Clst: A/A	
2517	80	Sd: A/A	a.a
	20	Clst: A/A	
2520	90	Sd: vf – f, Tr m, else A/A	a.a
	10	Clst: A/A	
2523	80	Sd: bcm vf – m, gen f	a.a
	20	Clst: A/A	
2526	80	Sd: vf – crs, gen f – m, Pyr cotg on Qtz	a.a
	20	Clst: A/A	
2529	60	Sd: gen f – m A/A	a.a
	40	Clst: A/A	
2532	40	Sd/Sst: lt gry, clr Qtz, bimodale; vf – f and crs – v crs, sbang – sbrndd, pr srtd, gen lse, loc sil cmt and mod hd, Tr cly mtrx, Pyr, Pyr cotg Qtz, Tr carb	a.a
	60	Clst. A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 14 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 27.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2535	40	Sd/Sst: lt gry, clr Qtz, bimodal; vf – f and crs – v crs, sbang – sbrndd, pr srtd, gen lse, loc sil cmt and mod hd, Tr cly mtrx, Pyr, Pyr cotg Qtz, Tr carb	No Shows
	60	Clst: olv gry – m dk gry, loc gn gry, sft, loc frm – mod hd, stky I.P., sli – non calc, Tr micromic, slty, loc vf sdy, Tr Pyr	
2538	50	Sd: A/A	a.a
	50	Clst: A/A	
2541	40	Sd: A/A	a.a
	40	Clst: A/A	
	20	Sltst: br gry – brn, frm, blky – sbblky, non calc, v Mic, carb, loc vf sdy	
2544	20	Sd: A/A	a.a
	20	Clst: A/A	
	40	Sltst: A/A	
2547	30	Sd: A/A	a.a
	30	Clst: A/A	
	40	Sltst: A/A	
2550	40	Sd: lse qtz, vf – crs, pr srtd, ang – sb rnd, mod – gd sph, loc sli sil cmt, arg IP, tr pyr, tr mica	a.a
	30	Clst: dk gry, dk grnsh gry, olv gry, brn gry, sft – mod hd, sb blky – splint, ang, v slty IP, micromic Ip, non calc	
	30	Sltst: A/A	
2553	50	Sd: A/A + wh – v pale brn – v pa gry sst, wk – no cmt, arg mtrx IP	a.a
	30	Clst: m – dk gry, dk grnsh gry, brnsh gry, mod hd, occ sft, ang, sb blky, splnt, flky, else A/A	
	20	Sltst: A/A	
2556	65	Sd: A/A, vf –f, occ m – crse, mod – wl srtd, + sst A/A, r tr glauc	a.a
	20	Clst: A/A	
	15	Sltst: A/A	
2559	80	Sd: lse qtz & v pale brn – v pale brnsh gry sst, clr, mlky, occ yel brn grains, vf – f, occ m & crs, mod – wl srtd, sb ang – sb rnd, mod – gd sph, wk – no sil cmt, friab, tr pyr, tr mica	a.a
	15	Clst: m dk gry, olv gry, dk grnsh gry, mod hd, ang, splnt, flky, fiss – sb fiss, occ sli slty, micromic IP, tr pyr, non calc	
	5	Sltst: brnsh gry, dk brnsh gry, blky – sb blky, micromic, tr micropyr, grad arg sst IP, non calc	
2562	85	Sd/Sst: A/A	a.a
	15	Clst: A/A	
	Tr	Sltst: A/A	
2565	80	Sd/Sst: A/A, v slty & pa brn – pa gry arg sst, grad to Sltst IP	a.a
	20	Clst: A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 15 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 27.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2568	80	lse qtz, vf – f, r m & crs, wl srtd, ang – sb rnd, mica, tr pyr, v pa brn – v pale gry arg mtrx mat & sst	No Shows
	20	Clst: m dk gry, olv gry, dk grnsh gry, mod hd, ang, splnt, flky, fiss – sb fiss, occ sli slty, micromic IP, tr pyr, non calc	
	Htr	Sltst: brnsh gry, dk brnsh gry, blky – sb blky, micromic, tr micropyr, grad arg sst non calc	
2571	85	Sd/Sst: A/A	a.a
	15	Clst: dk grnsh gry, dk gry, mod hd – hd, flky, splnt, sb fiss – fiss, micromic, non calc	
	Htr	Sltst: A/A	
2574	85	Sd/Sst: pred lse qtz A/A, vf –f, occ m & crs, gen f, wl srtd, ang – sb ang, Sst A/A, pa brnsh gry, friab, arg IP, slty	a.a
	15	Clst: A/A	
2577	90	Sd/Sst: A/A	a.a
	10	Clst: A/A + tr v dk brn – blk & v carb grad coal?	
2580	75	Sd/Sst: A/A, vf –f, tr pyr, tr mica	a.a
	25	Clst: A/A, no carb, tr glauc	
2583	90	Sd/Sst: pa brnsh gry, off wh – v pale gry, vf –f, slty, friab, arg, also lse qtz, vf –f , A/A	a.a
	10	Clst: A/A	
2586	90	Sd/Sst: A/A grad to sltst	a.a
	10	Clst: A/A	
2589	90	Sd/Sst: v pa brnsh gry & v pa gry, lt gry IP, vf, occ f, arg, slty, also lse qtz, vf – f, wl srtd, sb ang – sb rnd, tr mica, tr pyr	a.a
	10	Clst: m dk gry, dk grnsh gry, v dk gry IP, mod hd, occ hd, ang, sb flky, splnt IP, sb fiss, slty IP, tr micromic & micropyr, carb IP, non calc	
	Tr	Sltst: brnsh gry, dk grysh brn, v arg, micromic, grad arg Sst	
2592	90	Sd/Sst: A/A	a.a
	10	Clst: A/A, carb IP	
	Tr	Sltst: A/A	
2595	85	Sd/Sst: A/A, vf – f, grad sltst IP	a.a
	5	Clst: A/A	
	10	Sltst: A/A	
2598	85	Sd/Sst: A/A	
	5	Clst: A/A, r carb	a.a
	10	Sltst: A/A	
2601	90	Sd/Sst: A/A	
	Htr	Clst: A/A	a.a
	10	Sltst: A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 16 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 27.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
2604	90	Sd/Sst: predom lse qtz, clr, mlky, yel brn IP, vf – m, mod srtd – pr srtd, ang – sb rnd, + sst A/A, pa brn, v pa gry w abnt arg material, wh sst IP	No Shows
	Htr	Clst: A/A	
	10	Sltst: brnsh gry, dk grysh brn, v arg, micromic, grad arg Sst	
2610	90	Sd/Sst: A/A, mica	No Shows
	Htr	Clst: A/A	6m samples due to
	10	Coal: blk – v dk brn, hd, brit, blky, ang, loc wxy txt, grad v carb clst IP	30-45m/hr ROP
	Tr	Sltst: A/A	
2616	75	Sd/Sst: A/A + brnsh gry, v slty grad to sltst, also wh v slty	a.a
	10	Clst: m dk gry, dk grnsh gry, mod hd – hd IP, ang, sb flky, splnt IP, sli slty, tr micromic, tr micropyr IP, non calc	
	Htr	Coal : A/A	
	Htr	Ls: Wh, ang, micxln	
	15	Sltst: brnsh gry, sft, arg, grad vf sst	
2622	90	Sd/Sst: predom brnsh gry, v pa brnsh gry, off wh, slty, vf –f, arg sst, sft, also lse qtz A/A, + rck flr	a.a
	10	Slst: A/A	
	Htr	Clst: A/A	
	Htr	Ls: A/A	
2628	75	Sd/Sst: predom lse qtz, clr, occ mlky & yel brn, vf – m, occ crs, pr srtd, ang – sb ang, occ sb rnd, v pa brn, v pa gry arg mtrx mat, some rck flr	a.a
	15	Slst: dk brnsh gry, brnsh gry, sft – frm, arg, vf sandy, micromic, carb IP, non calc, grad to arg sst IP	
	10	Clst: dk gry, dk grnsh gry, mod hd, flky, ang, sb splnt, v carb IP grad to coal, micromic & tr micropyr IP, non calc	
2634	65	Sd/Sst : A/A + abnt wh – v pa brn, v pa gry cly mtrx & rck flr, predom vf –f	a.a
	35	Sltst: A/A, grad to v arg vf sst	
	Tr	Clst: A/A	
	Tr	Ls: wh, v pale gry, mod hd, micxln	
2640	70	Sd/Sst: A/A	a.a
	15	Sltst: A/A	
	15	Clst: dk grnsh gry, grnsh gry, m dk gry – dk gry, occ olv blk, mod hd, ang, splnt, flky, micromic & v carb IP	
2646	80	Sd/Sst: A/A	a.a
	5	Clst: A/A	
	10	Sltst: A/A	
2652	75	Sd/Sst: A/A, vf – f	a.a
	10	Clst: A/A, + tr v carb grad to coal	
	15	Sltst: A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 17 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 27-28.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2658	70	Sd/Sst: : predom lse qtz, clr, occ mlky & yel brn, vf – m, occ crs, pr srtd, ang – sb ang, occ sb rnd, abnt v pa brn, v pa gry arg mtrx mat, some rck flr	No Shows
	30	Coal: blk, v dk brnsh blk, v dk gry, hd, brit, blky, ang, sb splnt, erthy IP, sl wxy IP, occ grad to v carb clst	
	Htr	Clst: A/A	
	Tr	Sltst: dk brnsh gry, brnsh gry, sft – frm, arg, vf sandy, micromic, carb IP, non calc, grad to arg sst IP	
2664	75	Sd/Sst: A/A, mica	a.a
	15	Coal: A/A	
	10	Clst: v dk brn – olv blk, v dk gry, occ dk grnsh gry, hd, v carb, v slty IP, micromic, grad to coal IP	
	Htr	Sltst: A/A	
2670	70	Sd/Sst: predom lse qtz, predom clr, vf – m, pr srtd, ang – sb rnd, abnt mica, some clay mtx mat & rck flr, tr calcite	a.a
	10	Clst: A/A	
	Tr	Coal: A/A	
	20	Sltst: olv gry, brnsh gry, frm – sft, sdy, carb IP, micromica, non calc	
2691	70	Sd: predom lse qtz, clr, occ mlky & yel brn, vf – crse, occ v crs, pr srtd, ang – sub ang, abnt mica, including chlorite, abnt pa brn, brnsh gry & crm slty & arg mat/rck flr, tr calcite	a.a
	20	Sltst: olv gry – brnsh gry, sft – frm, vf aren, sli carb, micromic, tr pyr	21m sample due to computer down.
	10	Clst: dk grnsh gry, occ dk gry, brnsh gry – dk brn, mod hd, non calc	
	Tr	Coal: blk, ang, blky, brit, sub fiss	
2694	65	Sd: A/A	No shows
	15	Clst: A/A	
	20	Sltst: A/A	
2700	80	Sd: lse qtz, gen clr – mlky IP, r onk, r yel brn, occ smky, trnsl – trnsp, vf – m, occ crs, ang – sb ang, occ sb rnd, also cly/slty mtrx/rck flr material, tr kao?	a.a
	15	Clst: dk grnsh gry, dk gry, occ gry brn, mod hd – hd, ang – sb blky, sb splnt, sb fiss IP, loc wxy txt, occ sli carb, non calc	
	5	Sltst: A/A	
2706	85	Sd: A/A, sli more rounded?, abnt wh/crm cly (kao?) & slty material/rck flr	a.a
	10	Clst: A/A	
	5	Sltst: A/A	
2712	100	Sd: lse qtz, clr, mlky, vf – crs, occ v crs, gen f – m, pr srtd, ang – sbrnd, abnt mica, tr carb, tr pyr	a.a
	Tr	Clst: A/A	
	Tr	Coal: A/A	
2718	100	Sd: A/A	a.a
	Tr	Clst: A/A	

WELLSITE SAMPLE DESCRIPTION				Page 18 of 19
Country: Norway		Area: North Sea		Field: .GRÅSPETT
Well no: 6608/10-10		Company:	Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell	
RKB: 24 meters		Geologist:	O.Giskeødegaard, J.Gilpin	
Hole size: 12 1/4"		Cut solvent:	Iso Propyl Alcohol	Date: 28.07.2003

Depth (m RKB)	Lithology (%)	Lithological Description Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks Shows, cavings, mud additives, etc.
2724	75	Sd: Lse Qtz , clr, occ mlky, r smky, r pnk, vf – v crs, gen m – v crs, occ small, pebble size, ang – sub rnd, pr srtd, + brnsh gry slty & arg mtrx mat/Rck flr, abnt mica	No Shows
	15	Slst: dk brnsh gry, olv gry, sdy, carb Ip, grad to sst, sft – frm, non calc	
	10	Clst: dk grnsh gry, dk – m dk gry, occ brnsh gry, occ wxy txt, flky, ang, non calc	
2730	100	Sd: A/A, vf – v crs, pr srtd	a.a
	Tr	Clst: A/A	
2736	75	Sd: lse qtz, predom clr, mlky, vf – m, occ crs – crs, predom f – m, pr srtd, gen ang – sb ang, occ sb rnd, abnt mica, also wh vf – slty, friab sst and brnsh gry arg mat. Also dk brnsh gry arg sst w/ carb inclusions	a.a
	15	Coal: blk, brit, ang, blky, slickensides in part, micromic IP	
	5	Clst: dk grnsh gry, dk gry, ang, splnt, flky, occ carb, non calc	
	5	Sltst: brnsh gry – dk brnsh gry, sdy, carb, micromic, grad to vf sst	
2742	75	Sd: A/A incl pa brn/crm slty & arg material / rck flr?, tr pyr	a.a
	5	Clst: A/A	
	5	Coal	
	15	Sltst: A/A	
2748	65	Sd/Sst: lse qtz & Sst, clr, yel brn , mlky, trnsl – trnsp grains, vf – crs, pr srtd, ang – sb ang, abnt mica. Sst: pa brnsh gry, grysh brn, crm – wh, vf, friab, carb IP, abnt mica lamin, slty, grad sltst IP, no cmt, abnt slty/arg mtrx mat	a.a
	15	Sltst: A/A	
	10	Coal: A/A	
	10	Clst: A/A + brnsh gry	
2754	30	Sd/Sst: A/A	a.a
	40	Clst: olv gry, grysh brn, dk grnsh gry IP, brnsh blk IP, ang, blky, sb splnt, sb fiss – fiss IP, carb lamin, slty IP, grad sltst IP, micromic & micropyr IP, non calc	
	15	Coal: blk, dk brnsh blk, blky, ang, fiss, brit, earthy – wxy txt IP, grad to v carb clst IP	
	15	Sltst: grysh brn – brnsh gry, frm, sdy IP, mica, carb IP	
2760	30	Sd: A/A	a.a
	15	Clst: A/A	
	45	Sltst: dk brnsh blk, olv gry, brnsh gry, sdy, carb lamin, micromicaceous, tr pyr, grad to slty clst & arg sst	
	10	Coal: A/A	
2766	45	Sd: lse qtz, vf – m, occ crs, gen f – m, mod – pr srtd, else A/A	a.a
	25	Clst: A/A	
	30	Sltst: A/A	
	10	Coal: A/A	

STATOIL

WELLSITE SAMPLE DESCRIPTION			Page 19 of 19
Country: Norway	Area: North Sea	Field: .GRÅSPETT	
Well no: 6608/10-10	Company: Statoil ASA, Petoro AS, Norsk Agip A/S, Norsk Hydro ASA, AS Norske Shell		
RKB: 24 meters	Geologist: O.Giskeødegaard, J.Gilpin		
Hole size: 12 1/4"	Cut solvent: Iso Propyl Alcohol	Date: 28.07.2003	

Depth (m RKB)	Lithology (%)	Lithological Description: Rock name, mod.lith, colour, grain size, sorting, roundness, matrix, cementation, hardness, sed.structures, accessories, fossils, porosity, contamination	Remarks: Shows, cavings, mud additives, etc.
2772	30	Sd: lse qtz, clr, mlky, r smky, vf – m, occ crs, gen f – m, pr srtd, ang – sb ang, occ sb rnd, some brnsh gry arg material, occ wh vf sst, friab, no cmt	No Shows
	40	Sltst: olv gry – dk brnsh gry, frm – sft, v arg, carb lamin IP, micromic & mica, sdy	
	10	Coal: blk, dk brnsh blk, flky, blky, ang, micromic IP, fiss – sb fiss	
	20	Clst: olv gry – olv blk, dk grsnh gry, brnsh gry IP, olv blk IP, sb fiss IP, carb IP, tr micromic, non calc	
2778	40	Sd : A/A	a.a
	30	Sltst : A/A	
	10	Coal: A/A	
	20	Clst: A/A	
2784	40	Sd: A/A	a.a
	30	Sltst: A/A	
	30	Clst: A/A	
	Tr	Coal: Grad Coaly Clst A/A	
2790	30	Sd: A/A	a.a
	30	Sltst: A/A	
	30	Clst: A/A	
	10	Coal: A/A	
2796	20	Sd: A/A	a.a
	40	Sltst: A/A	
	30	Clst: A/A	
	10	Coal: A/A	
2800	30	Sd: A/A	a.a
	20	Sltst: A/A	
	40	Clst: A/A	
	10	Coal: A/A	
		T.D @ 2800 m	

App E NPD standard sheet for reporting shallow gas

1 .1 NPD standard form for reporting shallow gas

WELL DATA: 6608/10-10

1.	**Distance from drillfloor to sealevel:**	24 m
2.	**Water depth (MSL):**	374 m
3a.	**Setting depth for conductor (m RKB):**	445 m
3b.	**Leak Off/Formation Integrity Test (g/cc).**	N/A
4a.	**Setting depth for casing on which BOP is installed:**	1365 m
4b.	**Leak Off/Formation Integrity Test (g/cc):**	1.55 g/cc

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

Seabed	398.0 m / 0.506 sec.
Base Quaternary/ Top Naust Formation:	688.0 m / 0.794 sec
Top Kai Formation:	1401.0 m / 1.383 sec.
Top Brygge Formation:	1557.0 m / 1.521 sec.

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

The well was classified as class 0 - no shallow gas expected. The section was drilled with seawater down to 1377 mMD. No shallow gas was observed.

The 17 1/2" section (458.5 - 1377 m) was logged with MWD gamma ray and resistivity. This section is from the MWD log interpreted to predominantly consist of clays, in parts sandy clays. Water wet sand/silt layers were observed at:

604.0 – 613.0 m
673.0 – 688.0 m
702.5 – 734.0 m
958.0 – 965.0 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: 688.0 mTVD RKB/ 0.794 sec.
Base Tertiary is interpreted to be at: 1921.0 mTVD RKB/ 1.836 sec.

11. Indicate depth and extension of sand layers (communication, continuity, truncation etc.): Water wet sand layers and sandy intervals are present between 604 – 734 m TVD RKB. The sand layers between 600 – 700 m TVD RKB have good continuity and can be correlated to the 6608/10-8 and 6608/10-9 wells, which are 1.4 km and 2.6 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:** No shallow gas was predicted . No shallow gas was observed.
- **sandlayers:** The interpretation of sandlayers corresponds well with the observed sandlayers.
- **unconformities:** Base Quaternary was predicted at 692 m. Base Quaternary is interpreted to be at 688 m. Base Cretaceous was predicted at 1906 m. Base Cretaceous is interpreted to be at1921 m. 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 wells.

App F Listing of other reports

NO.	REPORTS	COMPANY
1	Site Survey Location Report at Planned Well Location 6608/10-H Gråspett	Fugro-Geoteam AS
2	Samtykkesøknad Stena Don 6608/10-10, Gråspett	Statoil
3	Well Programme, PL128, Well 6608/10-10	Statoil
4	End of Well Report 6608/10-10	Baker Hughes INTEQ
5	Definitive Survey, samt CD-rom nr. 395	Baker Hughes INTEQ
6	Navigation and Positioning Report " Stena Don " at 6608/10-10	Thales Geosolutions
7	Final Drilling Report Well 6608/10-10 Gråspett	Statoil
8	Biostratigraphy of the interval 1390 – 2652 m, well 6608/10-10	Geostrat Ltd.
9	Biostratigraphy of well 6608/10-10 (1390 – 2800 m)	BioStrat Ltd.
10	Mudlogging, Final Well Report. Well 6608/10-10	Geoservices

6 Enclosures

Composite log

Formation evaluation log

Pressure evaluation log