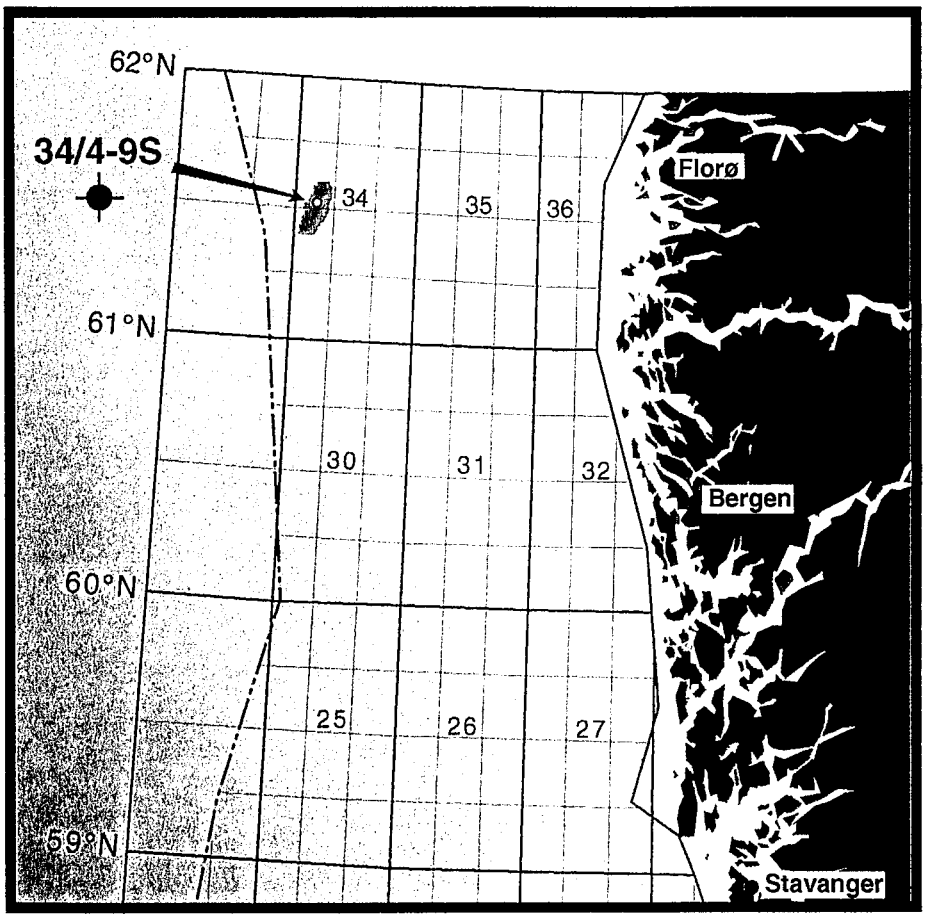
Saga Petroleum



Final Well Report

34/4-9S

RA97-311/SDE
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Saga Petroleum

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Title
Final Well Report 34/4-9S

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Abstract

The report summarises the operation and evaluation results of the well 34/4-9S

Key words
General information, geology, geophysics, formation evaluation, drilling, operation

Classification:

☐ Open ☒ Saga and partners ☐ Internal ☐ Confidential ☐ Strictly confidential

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Approved				Ole Langen	

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2 SUMMARY

2.1 Appraisal

The appraisal 34/4-9S well was drilled in the western part of the Snorre Field, localized in the northern part of the Western Central Fault Block (WCFB). The WCFB is a downfaulted terrace between the Murchison Fault to the west and the Outer Snorre Fault to the east. The well penetrated the reservoir zone L02 - ML2 of the Lunde Formation as prognosed, in addition an eroded reservoir zone L01 was present due to the L02 truncation beeing located further east than prognosed. TD was prognosed to be in the Middle Lunde reservoir zone ML2. However, also ML3 was partly penetrated. The Lunde Formation is truncated by the "Base Cretaceous Unconformity".

The main objective was to contribute to the technical basis for Snorre North PDO.

A secondary objective was to reduce the uncertainties in reservoir quality.

Well 34/4-9S was spudded on January 8th, 1997. Since possible shallow gas levels had been predicted, a 9 7/8" pilot was drilled. However no shallow gas was encountered.

The Nordland and Hordaland Groups has not been separated because no logs or cuttings return has been available above 1240 m MDRKB. The interval 1240 - 1680 m MDRKB probably belongs to the Hordaland Group.

The Rogaland Group consists of the Sele/Lista and Balder Formations. The lithology of the Balder Formation is dominated by tuff and tuffaceous claystone. The Sele/Lista Formation is dominated by dark to green grey, non-calcaeous, tuffaceous claystone with traces of limestone and dolomite.

At 1850 m MDRKB the Shetland Group was penetrated. The lithology is dominated by medium dark grey to olive black calcareous claystone with thin beds of limestone and trace of very fine-grained sandstone.

The Cromer Knoll Group was penetrated at 2473 m MDRKB. It consists mainly of marls, claystone and limestone with some sandstone.

The Hegre Group was penetrated at 2512.5 m MDRKB. This was 12.5 m deeper than prognosed. The penetrated section display a classical Lunde Formation which consists of interbedded sandstone and mudstone. Three cores where cut in the section from 2512 to 2723.5 m MDRKB with a recovery of 99.7 %.

The upper part of the Lunde Formation, reservoir zones L01 - L03, contained hydrocarbon. The oil-water contact was interpreted to be at 2590 m TVDMSL.

On February 4th, 1997, the well reached its total depth (TD) in the Hegre Group at 3437 m MDRKB.The well was plugged and abandoned on February 15th, 1997.
An overview of the well data is given in Figure 2.1; Well Data Summary.

Final Well Report 34/4-9S

KEY INFO

Unit Members	Interest
Saga Petroleum ASA (opetator)	11.9447 %
Den norske stats Oljeselskap a.s.	41.4000 %
Esso Norge a.s.	10.3323 %
Deminex (Norge) a.s.	10.0348%
Idemitsu Oil Exploration (Norge a.s.)	9.6000 %
Norsk Hydro Produksjon ASA	8.2658 %
Elf Aquitaine Norge a.s.	5.5106 %
Amerada Hess Norge a.s.	1.4559 %
Enterprise Oil Norge Ltd.	1.4559 %

Rig taken over by Snorre Unit:	07.01.97
Spud Date :	08.01.97
TD Date:	04.02.97
Rig Release Date:	15.02.97
Completion Satus:	P & A as oil well
Final Location Coordinates:	Latitude 61° 30' 44.75" N Longitude 02° 10' 18.12" E
UTM-Coordinates:	6 820 309.2 m N 455 922.8 m E
Position refers to:	UTM zone 31 CM = 03° E
Seismic Position: (surface)	SG-8420 row 68 SG-8420 col 835
Rig:	Scarabeo 5
RKB-MSL:	25 m
MSL-Seabed: (water depth)	334 m
RKB-Seabed:	359 m
RKB-TD: (driller's depth)	3440 m MD
RKB-TD (logger's depth)	3437 m MD

FORMATION TOPS

Formation	Depth m MD RKB	Thickness m
Nordland Group (seabed)	359	
Hordaland Group	**	
Rogaland Group	1680*	170
Balder Formation	1680*	40
Sele/Lista Formations	1720*	130
Shetland Group	1850*	623
Cromer Knoll Group	2473.6	38.9
Sola/Rødby Formations	2473.6	21.4
Mime Formation	2495.0	17.5
Hegre Group	2512.5	> 836.5 (TD)
Lunde Formation	2512.5	> 836.5 (TD)

** Top Hordalsnd not separated
* Tops estimated from cuttings lithology

CORE SUMMARY

Core no.	Cut Int. mRKB	Recovered m	Recovered %
1	2515.0-2598.0	82.5	99.4
2	2598.0-2659.0	60.8	99.7
3	2659.0-2723.5	64.5	100.0
Total		207.8	99.7

CASING

Type	Depth m RKB	LOT g/cc EMW
30"	397	
18 5/8"	507	
13 3/8"	1228	1.86
9 5/8"	1858	2.21

PORE PRESSURE

Max pressure at 1.56 g/cc at >2512.5 mRKB

WIRELINE AND MWD LOGS

Logged Int.	Type of log	Run	Date
397.0-3440.0	MWD		
1857.4-3402.1	AIT/DSI/LDL/ CNL/NGT/ACTS/ CMR	1A	01.02.97
2564.5-3055.5	MDT/GR/ACTS	1A	02.02.97
3430.0-1470.0	VSP	1A	05.02.97

2.2 Operation

2.2.1 Summary

The appraisal well 34/4-9S was drilled by the drilling rig Scarabeo 5.

The well was spudded January 8th, 1997 and successfully drilled to TD without any major problems to 3440 m MDRKB in 39.1 days, 8 days behind budgettary plan.

If not otherwise is mentioned, all depths refers to m RKB (Rotary Kelly Bushing). For Scarabeo 5 25 m above MSL.

2.2.2 Rig Move and Anchor handling

Scarabeo 5 left Vigdis on the 7th of January 1997 at 10:30 hours and arrived location 34/4-9S at 12:10 hours the same date. The anchor handling and positioning of the rig was finished by 2:15 hours on the 8th of January.

2.2.3 9 7/8" Pilot hole/36" x 26" hole section/30" x 18 5/8" casing

A 158 m 9 7/8" pilot hole was drilled to 520 m MD. No shallow gas was encountered. During drilling the pilot hole, it was difficult to keep it vertical. Maximum hole angle was 6.4 deg. The rig was positioned several times in an attempt to straighten up the hole without any success.
Four joints including the housing of 30" casing was made up prior to open up the pilot hole. Since the 30" string should be run in combination with 18 5/8" string, no 30" shoe joint was installed. The string was hang off in a retrievable drilling guide base. After the string was installed in the base the base was secured to the trolley and left for approximately 24 hrs. Approx. 25 to 30 m of the string was submerged into the sea. After some initial problems to relocate the pilot hole, the hole was opened up using a 26" bit and 36" hole opener. Even if no boulders was experienced in the pilot hole, boulders was experienced during the hole opening at 410m. This reduced the average ROP for this section. The section was drilled in 13,5 hrs with an ROP of 13.8 m/hr.
While preparing to run the combined 30" x 18 5/8" casing it was discovered that the premade 30" casing string had dropped into the sea. Hence the back up 30" string was made up and hang off in the rotary table. A false rotary was used with an elevator as slips and the 18 5/8" casing was run and hanged off in the 30" casing. The 30 x 18 5/8" string was run and cemented without futher incidents. A grouting stinger was run after the lost 30" string was fished and 15 m^3 of cement was pumped.

Section depth	:	520 m MD/520 m TVD
30" Shoe depth	:	397 m MD/397 m TVD
18 5/8" shoe depth	:	507 m MD/507 m TVD
Min/max mud density	:	1.03 sg/1.18 sg
Max pore pressure	:	1.03 sg

2.2.4 17 1/2" section/13 3/8" casing.

This hole section was drilled to below Utsira to 1235 m MD with a Security SS33SG bit and a rotary holding assembly. The assembly held the angle to almost vertical throughout the section and maximum hole angle in this section was 1.7 degree.
A 1.12 sg bentonite mud was initially used. The mudweight was gradually increased to 1.2 sg at TD. This hole section is normally drilled riserless with seawater and bentonite pills.
During drilling this section, problems with clay blocking surface lines, shaker box, shakers etc. was experienced. This contributed to 7 hrs with no drilling, due to cleaning blocked lines etc. and reduced ROP in several intervals, due to reduced flow rate. The average ROP for this section was 21.7 m/hr with average bit ROP of 35 m/hr. It was no problem with bit balling during drilling of this section, but the stabilizers and the bit came up severe balled up after POOH.
The main reason for drilling this section with riser was due to prognosed shallow gas. No intervals with gas was experienced.
Prior to running the casing two attempts was made to retrieve the seat protector. After the first run the running tool came out completly balled up with clay. Prior to both runs with seat protector retrieving tool a jet sub and washing stinger was run.
After some initial problems with the casing modem the running of the 13 3/8" casing went quite well. For first time a flush mounted spider was used on a casing job on Scarabeo 5.
Under the cement job the mud return was lost during the condition of the mud. It was probably due to blocked flowports in the hanger. Hence the cement job was performed without return, but all indications of a good cement job was achieved. Prior to drilling the next section a LOT was performed to 1.86 sg EMW.

Section depth	:	1235 m MD/1235 m TVD
13 3/8" Shoe depth	:	1228 m MD/1228m TVD
Max hole angle	:	1.7 deg.
Min/max mud density	:	1.35 sg/1.48 sg
Max est. pore pressure	:	1.03 sg

2.2.5 12 1/4" section/10 3/4" x 9 5/8" casing.

Even if this section was planned as a vertical section a steerable BHA was run. This in an attempt to achieve as optimum drilling parametres as possible and give the possibility to correct any discrepency in the hole angle as early as possible. This assembly behave quite well and kept the hole angle below 1.6 deg without any particular steering.
This section was drilled with KCl mud, starting up with 1.35 sg and increased stepwise to TD to a final mudweight of 1.40 sg. At TD the mudweight was increased to 1.48 sg. No hole problems was encountered during this section and the string was pulled out of hole without any wiper trip.
The bit behave very well and an average bit ROP of 53.8 m/hr was achieved.
The casing string was run without any problems. As for the 13 3/8" job a flush mounted spider was used for the 9 5/8" casing. The hole was slick while running the casing and no loss was experienced.
While circulating prior to the cement job, the circulation was partly lost and the cement job was performed with approx. 50% return. But had good indications of a succesfull cement job, because a pump pressure increase was experienced either when the the spacer and the cement entered annulus.
A LOT was performed to 2.21 sg EMW.

Section depth	:	1866 m MD/1866 m TVD
9 5/8" Shoe depth	:	1858 m MD/1858m TVD

Max hole angle	:	1.6 deg.
Min/max mud density	:	1.35 sg/1.48 sg
Max est. pore pressure	:	1.35 sg

2.2.6 8 1/2" section.

A 8 1/2" steerable assembly was run to drill the first 630 m with Shetland down to the reservoir and coring point. After the LOT was performed the KCl mud was displaced to 1.60 sg mineral oil mud. Hence the cuttings had to be collected in big bags and shipped onshore.

The 8 1/2" hole was drilled to prognosed top reservoir and the routine with circulating bottoms up, drill furter 5 to 10 m was repeated three times prior to entering into top reservoir.
The top reservoir was cored and totally 208 m core was cut in three runs with 2 times 270 feet corebarrels and one 210 feet barrel. At the first run the 270 feet barrel was filled, while on the second run the core jammed off after 200 feet. The last run the 210 feet corebarrel was filled. The 208 m of core was cut in total of 61.5 hrs including trips etc with a totally recovery of 99.7%. This gave an average coring progress of 81.1 m/day. Below the cored interval the well should be kicked off to 26°, to avoid faults. Due to bad weather and some problems with the update rate on the MWD toolface, it was decided to perform the kick off with a rock bit. This rock bit did not manage to drill more than half the kick off section before it has to be pulled due to two lost cones. After the reverse circulation basket was run twice and a run with junk bit in between, the build up section was completed with a rock bit.
The last interval was drilled with a Lyng LA 250 BZ and a F2000S mudmotor and the same steerable assembly as run initially in this section. At the prognosed TD the mudmotor failed.
The logging program took overall much longer time than planned, without having any major downtime.

After the pressure measurement was completed it was decided to take a wiper trip prior to the VSP log and to deepen the well to get sufficient rathole below top ML2. The well was deepened by 39 m.

Section depth	:	3388 m MD/3440 m TVD
Max hole angle	:	29.6 deg.
Min/max mud density	:	1.60 sg/1.60 sg
Max est. pore pressure	:	1.56 sg

2.2.7 Plug & Abandonment

A cement plug was set from 2650 m, which is approximately 35 m below OWC, to 2400 m, which is approximately 110 m above top reservoir. A second cement plug was set from 1910 m to 1758 m, which are 100 m above 9 5/8" shoe. The string was POOH and a bridge plug was run and set at 1650 m. This plug was weight tested to 10 ton and pressure tested to 70 bar above LOT (181 bar). The well was displaced to 1.43 sg KCl mud.

The 10 3/4" casing was cut at 617 m. When retrieving the 10 3/4" hanger it went stuck in the BOP. The casing was worked free with 110 tons overpull. At surface the 10 3/4" lock ring was missing. Based on this the rest of the program was slightly changed. Instead of running a cement retainer a balanced cement plug was set from 615 m to 475 m. It was not possible to inject any cement into 9 5/8" x 13 3/8" annulus. Soft cement was washed down to 525 m and the cement plug was tagged with 10 ton at 530 m.

Due to the lost 10 3/4" lock ring the 13 3/8" casing was cut at 477 m, then the BOP was pulled to avoid pulling the 13 3/8" casing through the BOP. The 13 3/8" casing was retrieved and a balanced cement plug was set from 530 m to 380 m. 18 5/8" x 30" casing was cut at 368 m and retrieved in the same operation.

2.3 Testing and Formation Evaluation

A summary of the net sand average log values for the different intervals is given in Table 5.1.2.

3 GENERAL INFORMATION

3.1 Licence and General Well Information

Snorre Unit, covers block 34/4 and 34/7. The 34/4-9S well location is positioned in block 34/4 approximately 240 km northwest of Bergen. The location map is shown in Figure 3.1.

Rig General

Field:	Snorre
Licence:	Snorre Unit (PL057/PL089)
Well Name:	34/4-9S
Well Type:	Appraisal
Stratigraphic Target:	Lunde Formation
Rig Takeover:	January 7, 1997
Spud Date:	January 8, 1997
TD Date:	February 4, 1997
Rig Release Date:	February 15, 1997
Drilling Rig:	Scarabeo 5

Final Coordinates

ED-50 :	Latidude : 61°30'44.75" m N
	Longitude : 02°10'18.12" m E
UTM-coordinates :	Zone 31
	CM = 3° E
	6 820 309.2 m N
	455 922.8 m E
Seismic position (surface) :	SG-8420 row 68
	SG-8420 column 835

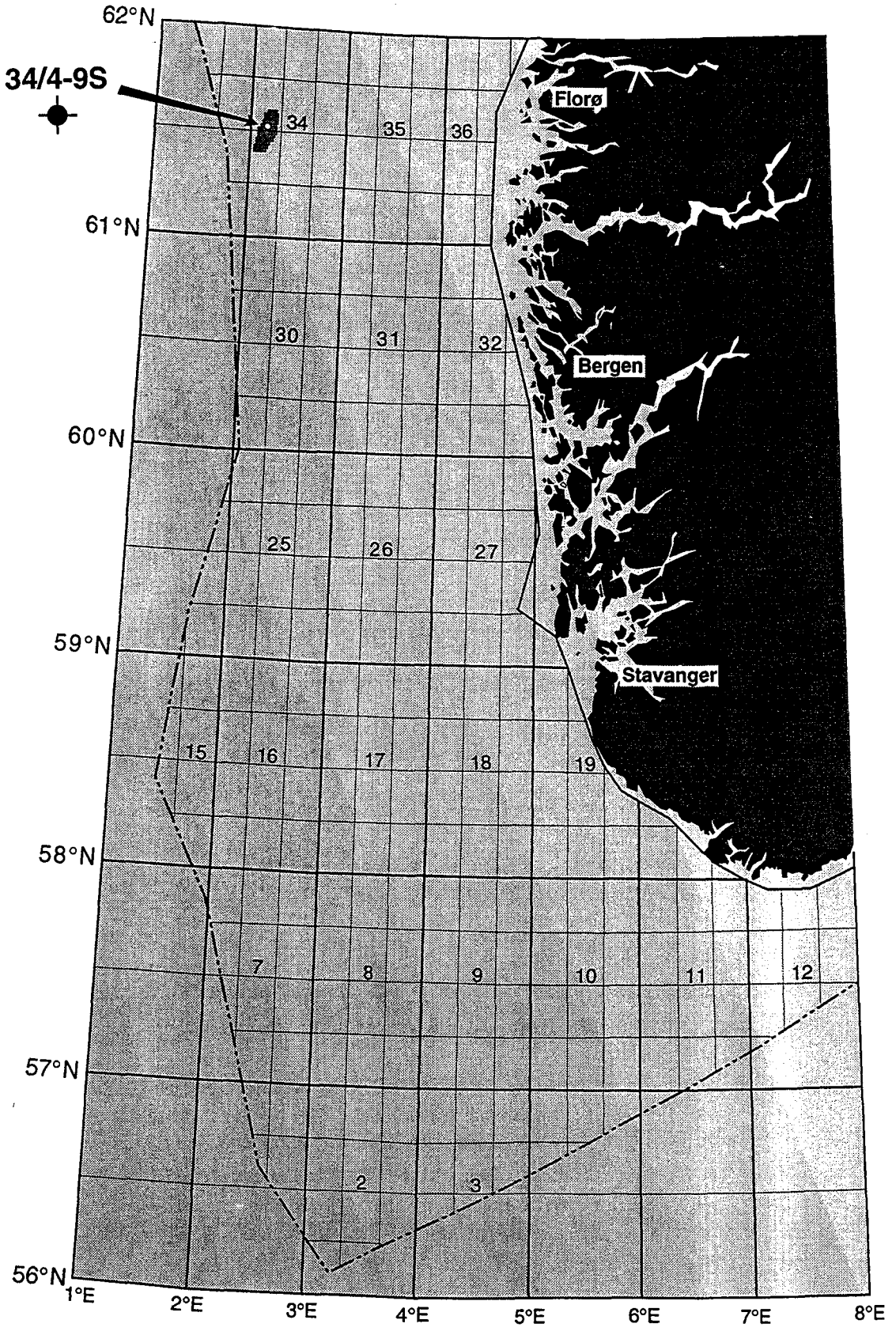
Elevation

RKB - MSL :	25 m
MSL - Seabed (water depth) :	334 m
RKB - Seabed :	359 m
RKB - TD (driller's depth) :	3440 m MD
RKB - TD (logger's depth) :	3437 m MD

Participating Members	Net Interest
Saga Petroleum ASA (operator)	11.9447 %
Den norske stats Oljeselskap a.s.	41.4000 %
Esso Norge a.s.	10.3323 %
Deminex (Norge) a.s.	10.0348 %
Idemitsu Oil Exploration (Norge a.s.)	9.6000 %
Norsk Hydro Produksjon ASA	8.2658 %
Elf Aquitaine Norge a.s.	5.5106 %
Amerada Hess Norge a.s.	1.4559 %
Enterprise Oil Norge Ltd.	1.4559 %

3.2 Contractors and Service Companies

Drilling Contractor :	Saipem
Mud Logging :	Geoservices
MWD Logging :	Baker Hughes Inteq
Wireline Logging Services :	Schlumberger
VSP :	READ Wellservices
Mud Engineering :	M-I Norge A/S
Cement and Pumping Services :	B.J. Services
Casing Running Services :	Weatherford Norge A/S
ROV Service :	Oceaneering
Coring Services :	Security/DBS
Core Analyses :	
Cuttings Services :	
Well Head System :	Vetco Gray
Supply Boats :	"Far Superior"
Standby Boat :	"Sølvbas"/"Sator"
Helicopter Service :	Helicopter Service A/S
Catering Service :	



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Location map showing the position of well 34/4-9 S

Figure 3.1

4 GEOLOGY AND GEOPHYSICS

4.1 Geographical and Geological Setting

Well 34/4-9S is located in the western part of the Snorre Field on an downfaulted terrace between the Murchison Fault and the Outer Snorre Fault (Figure 4.1.1 and 4.1.2).

4.2 Purpose and Result of Well

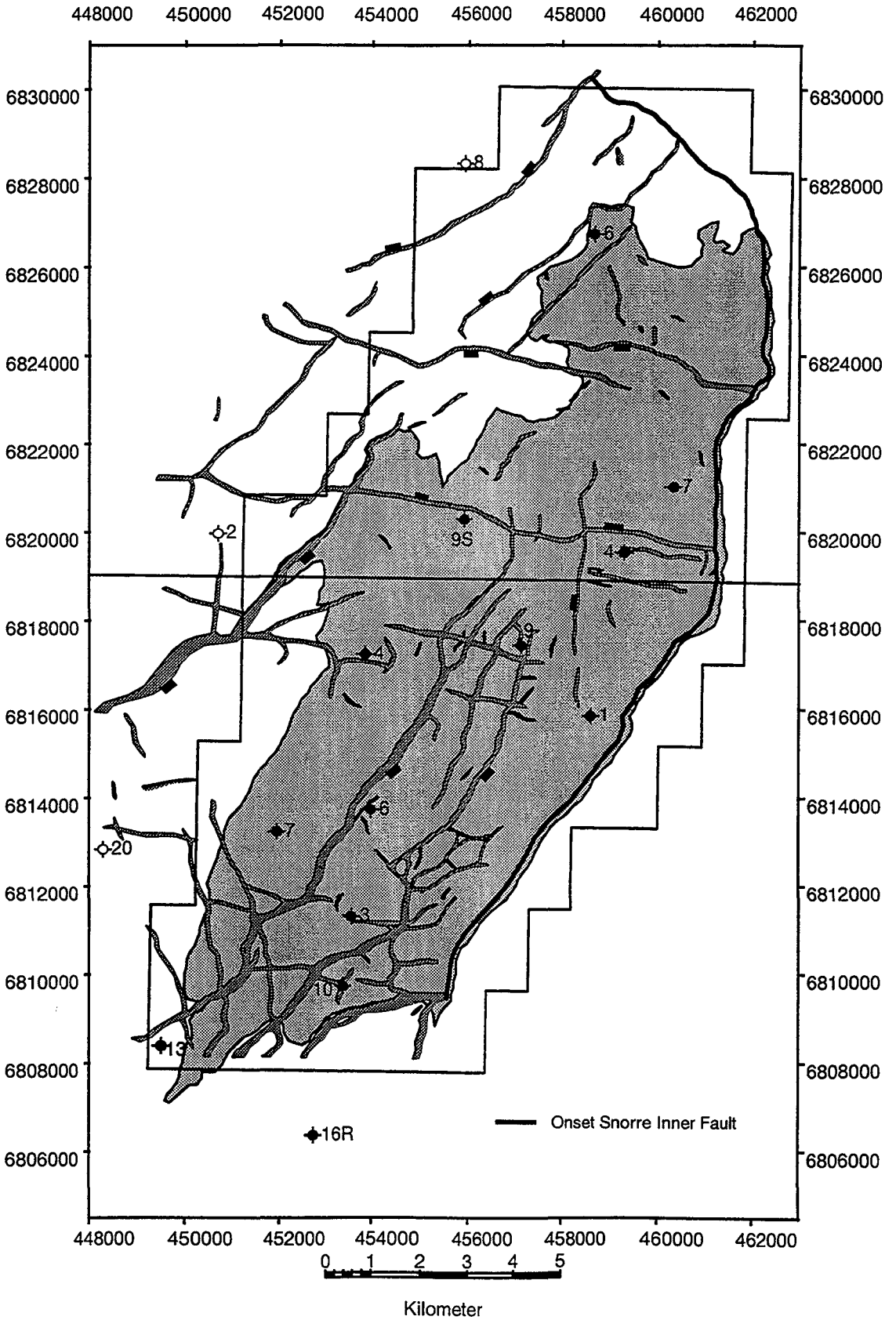
The main objective of the well was to contribute to the technical basis for the Snorre North PDO.

A secondary objective was to redue the uncertainties in reservoir quality.

The well was drilled in the northern part of West Central Fault Block (WCFB), it penetrated the reservoir zones L02 - ML2 of the Lunde Formation as prognosed. In addition an eroded L01 was present due to the L02 truncation beeing located further to the east than prognosed. TD was prognosed to be in the Middle Lunde Member reservoir zone ML2, however also ML3 was partly penetrated.

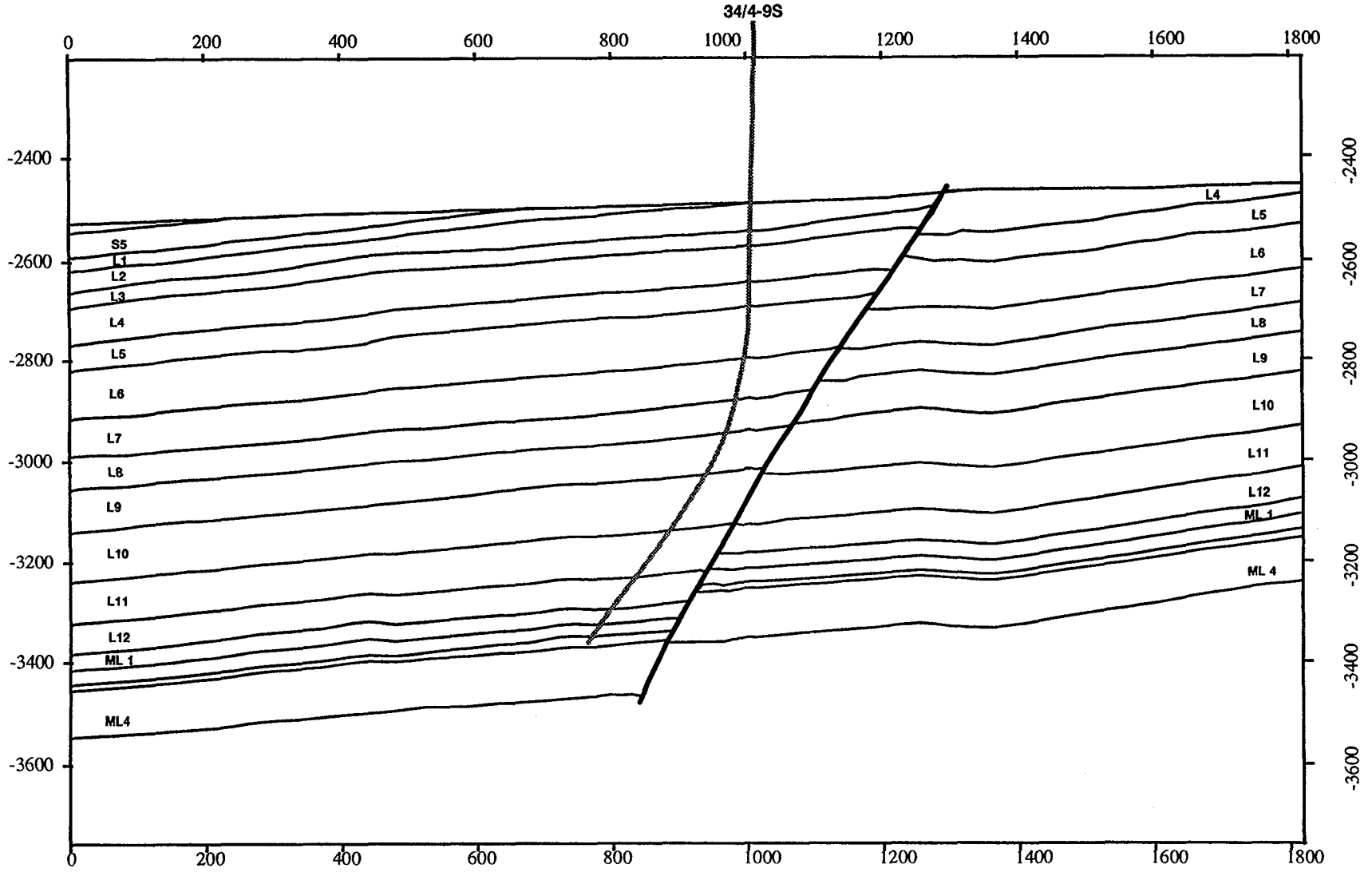
Top of reservoir (L01) was encountered at 2512.5 m MDRKB, 12.5 m deeper than prognosed.

The oil-water contact is interpretated at 2590 m TVDMSL in reservoir zone L03. This is deeper than prognosed.



Well Location Map, Snorre Field outline shadowed

Figure 4.1.1



Cross section through wellpath

Figure 4.1.2

4.3 Sampling

4.3.1 Routine Samples

Three wet samples in the interval 1870 to 3440 MDRKB.

One MDT fluid sample was collected at 2583 m MD RKB.

4.3.2 Conventional Core

Three cores totalling 208 m was cut in the Lunde Formation.

Core No. 1	Cut:	2515.0 - 2598.0 m MDRKB
	Recovered:	82.5 m
	Recovery:	99.4 %
	Core - Log shift:	-0.61 m
Core No. 2	Cut:	2598.0 - 2659.0 m MDRKB
	Recoverd:	60.8 m
	Recovery:	99.7 %
	Core - Log shif:	-1.11 m
Core No. 3	Cut:	2659.0 - 2723.5 m MDRKB
	Recoverd:	64.5 m
	Recovery:	100.0 %
	Core - Log shift:	-0.36 m

4.3.3 Sidewall Cores

No sidewall cores were taken in this well.

4.4 Measurement While Drilling and Wireline Logs

The MWD services were provided by Baker Hughes Inteq. MWD services includes directional survey, gamma ray and resistivity.

MWD logging and respective interval are given in Table 4.4.1.

Details on wireline logging are given in Chapter 5 "Formation Evaluation".

Casing Record m RKB MD	Hole Size	Log Type	Logged Interval	Run no.	Date
30" at 397 m	36" to 411 m	MWD (DIR)			
18 5/8" at 507 m	26" to 514 m	MWD (DIR)			
13 3/8" at 1228 m	17 1/2" to 1235 m	MWD (DIR)			
9 5/8" at 1858 m	12 1/4" to 1866 m	MWD (DIR)			
	8 1/2" to 3440 m	MWD (GR, resistivity, DIR)			
		AIT/DSI/LDL/CNL/NGT/ACTS/CMR	1857.4 - 3402.1	1A	02.02.97
		MTD/GR/ACTS	2564.5 - 3055.5	1A	03.02.97
		VSP	1470.0 - 3470.0	1A	05.02.97

4.5 Geophysical Update

4.5.1 VSP

A zero offset VSP and a fixed offset VSP (planed source position 456697 E 6818455 N) were required and processed by READ Wellservices.

The survey was performed with a 8 level, 3 component tool with 1 ms recording length (WAW), and a 4 level, 3 component, 1 ms sampling tool in combination with a down hole source (DHS). The energy source used on the rigside was a single 550 cu. in. air gun. For the boat source a 3 × 150 cu. in. sleeve gun was used.

The levels acquired are of 10 m spacing from 3430 to 1470 (m MD RKB) with 197 zero levels and 93 offset levels.

Figure 4.5.1 shows a composite display of the zero offset VSP in surface seismic.

4.5.2 Synthetic Seismogram

The corrected velocity and density data were used in the production of the synthetic seismograms by READ.

Synthetic seismograms are produced for the frequencies of 8/18 -30, 40, 50, 60, 70, 80, 90/24 Hz (dB/Oct) Butterworth wavelets and 20, 25, 30, 35, 40, 45, 50, 55 Hz Ricker wavelets. All synthetic seismograms are displayed in both normal and reverse polarity, minimum and zero phase. The display scale is both 10 and 20 cm/s.

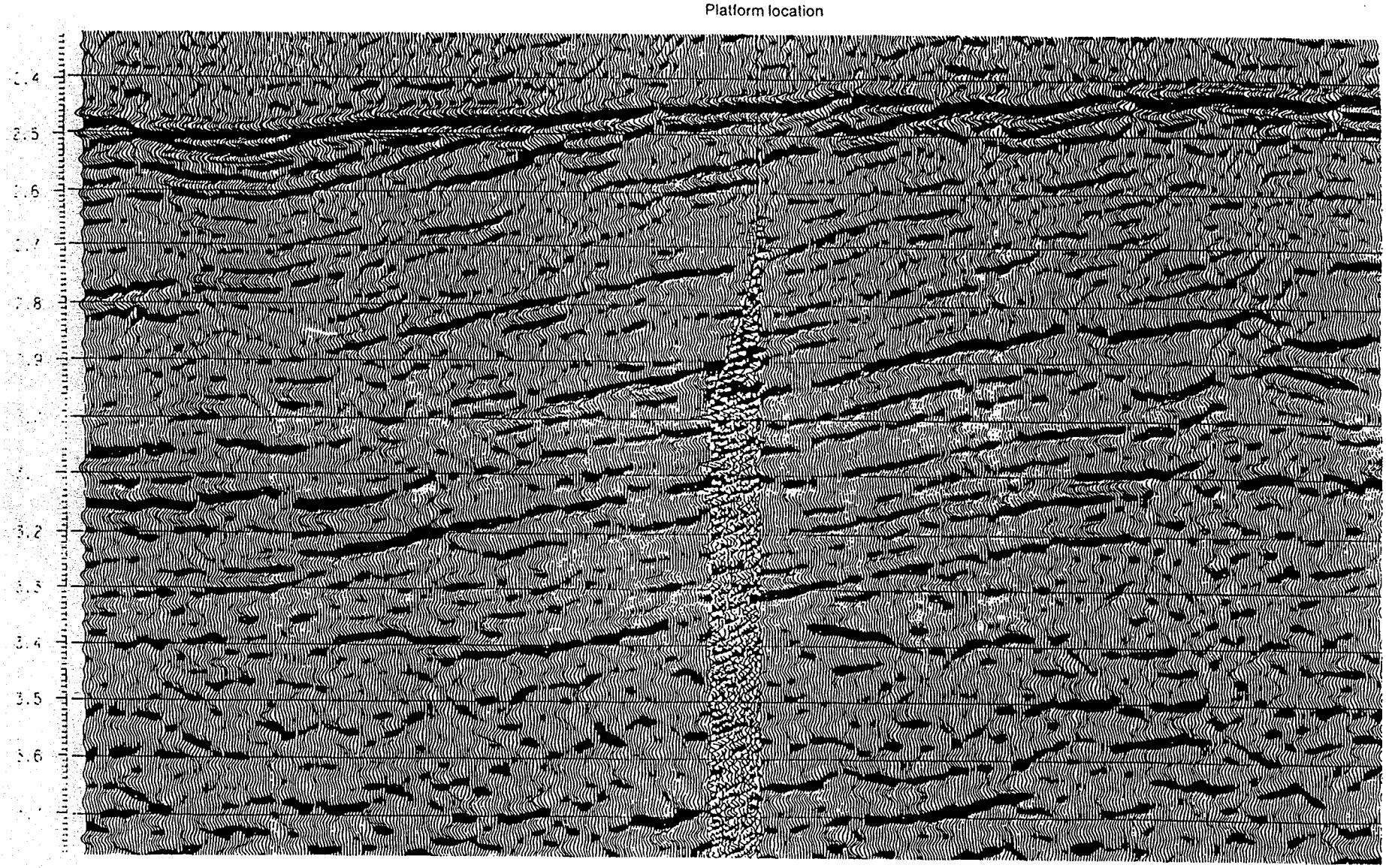
A selection of a random line through the wellpath and the 50 Hz min. phase Butterworth normal seismogram is shown in Figure 4.5.2

Seismic summary for well 34/4-9S is given in Table 4.5.1

4.5.3 Map Updating

Actual depth down to Top Reservoir (Base Cretaceous Unconformity) was in good accordance with the prognosed depth. The other reservoirs zone were somewhat deeper than prognosed. All Snorre Field depth maps have been updated with 34/4-9 well observations. Maps of BCU, top L02 and top Middle Lunde are shown in figures 4.5.3, 4.5.4 and 4.5.5.

Horizons	Depth (m)			UTM Coordinates		Seismic Position		Time (ms)
						SG-8420		
	MD RKB	TVD RKB	TVD MSL	North	East	Line	CDP	TWT
Top Mime	2495	2495	2470	455915	6820280	67	834	2421
Base Cret. Unc.	2512	2512	2487	455916	6820280	67	834	2433
Top L02	2524	2524	2499	455917	6820280	67	835	2442
Top L03	2597	2596	2571	455918	6820279	67	835	2494
Top L06	2732	2732	2707	455918	6820281	67	833	2579
Top L08	2939	2936	2911	455839	6820287	67	828	2705
Top L10	3099	3087	3062	455750	6820298	67	821	2793
Top M. Lunde	3364	3321	3296	455716	6820302	67	818	2924
TD	3440	3388	3363					



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Random line with zero offset VSP
(8-100 Hz) ZPH sliced in

Figure
4.5.1

Time TWT (s)	Depth mTVD MSL	Strati-graphy	Lithology	Acoustic Impedance	Synth. seis. Butterworth wavelet 50 Hz min. phase norm. polarity	Random line through well 34/4-9

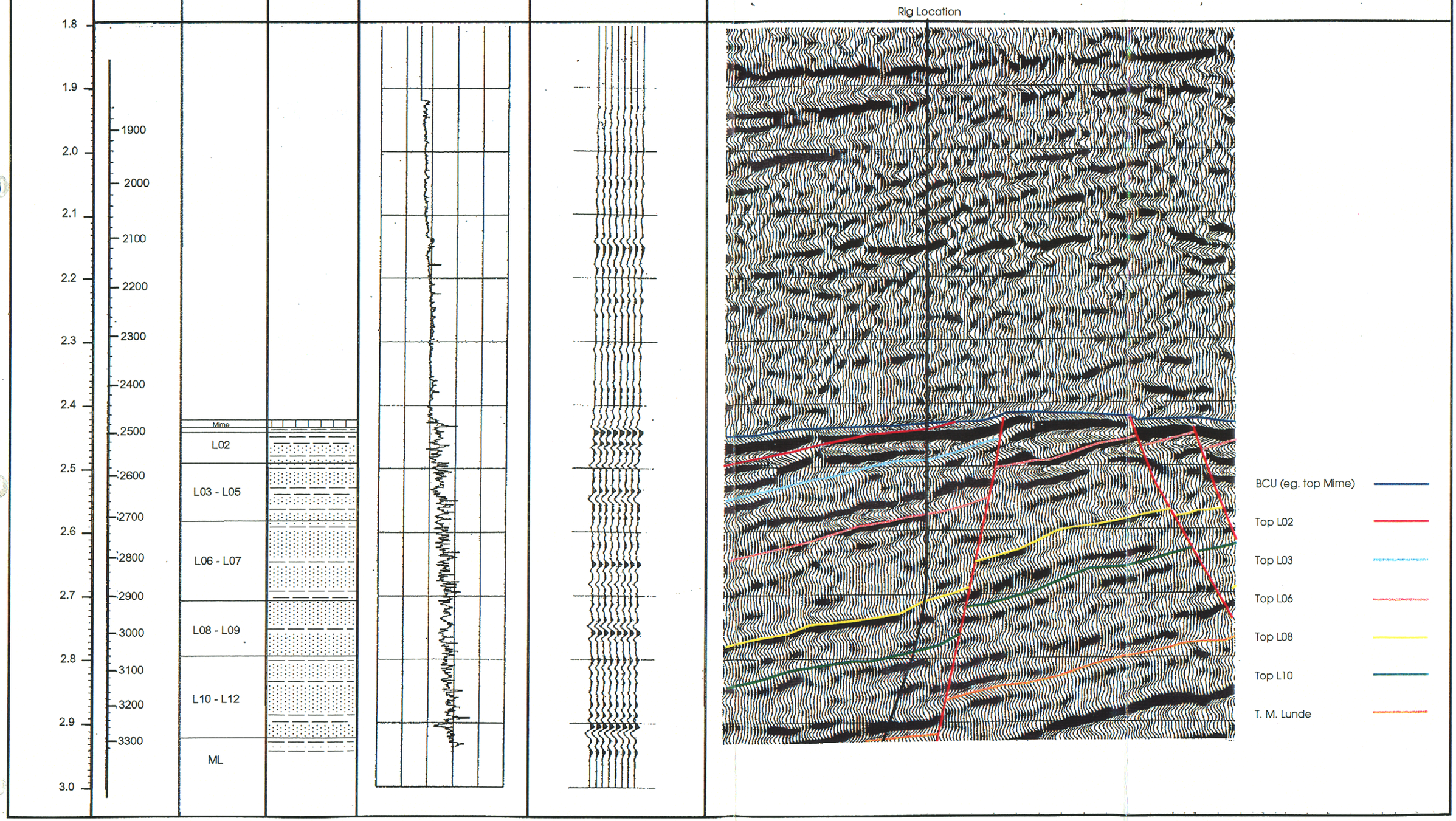

Figure 4.5.2 Gephysical summary

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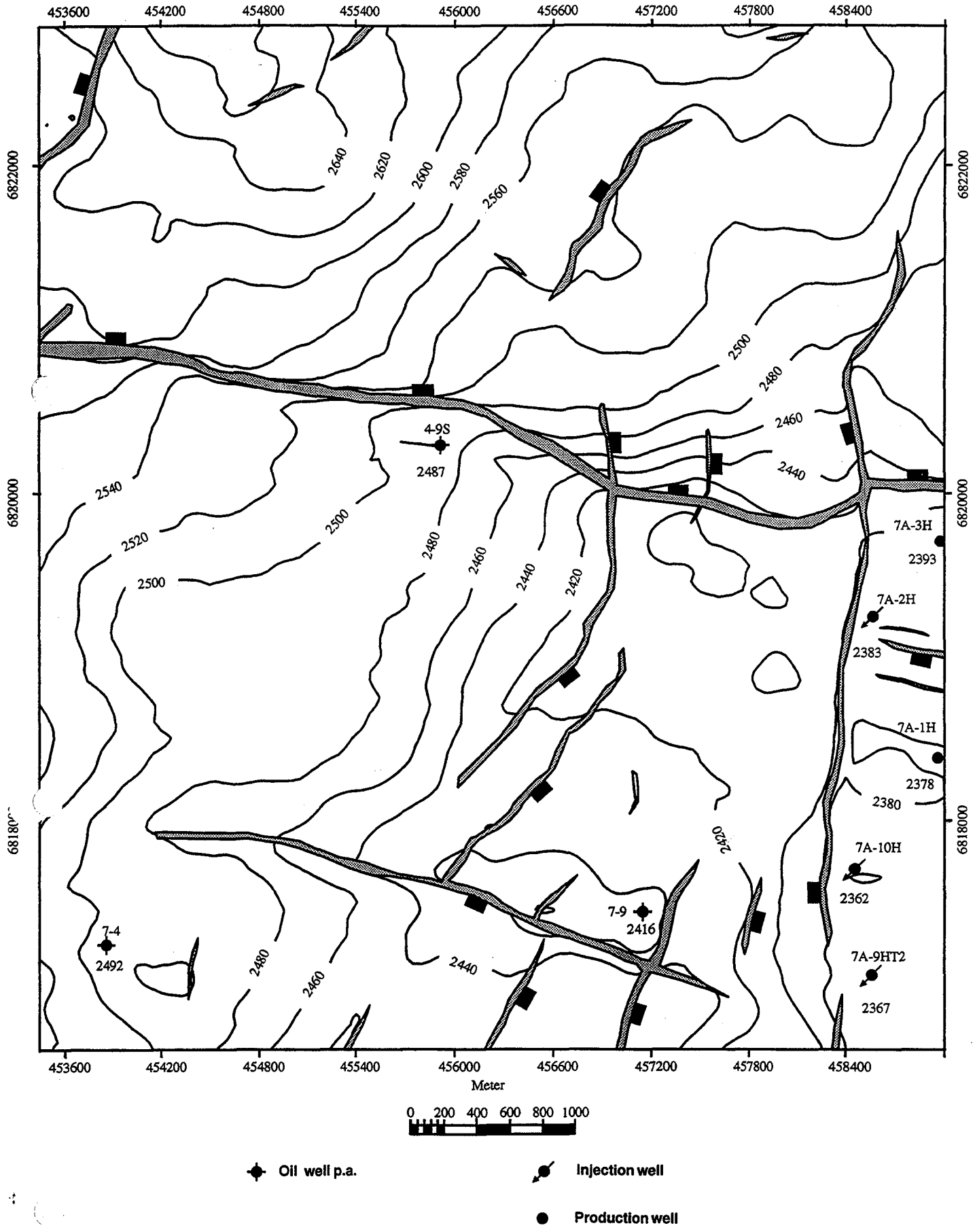
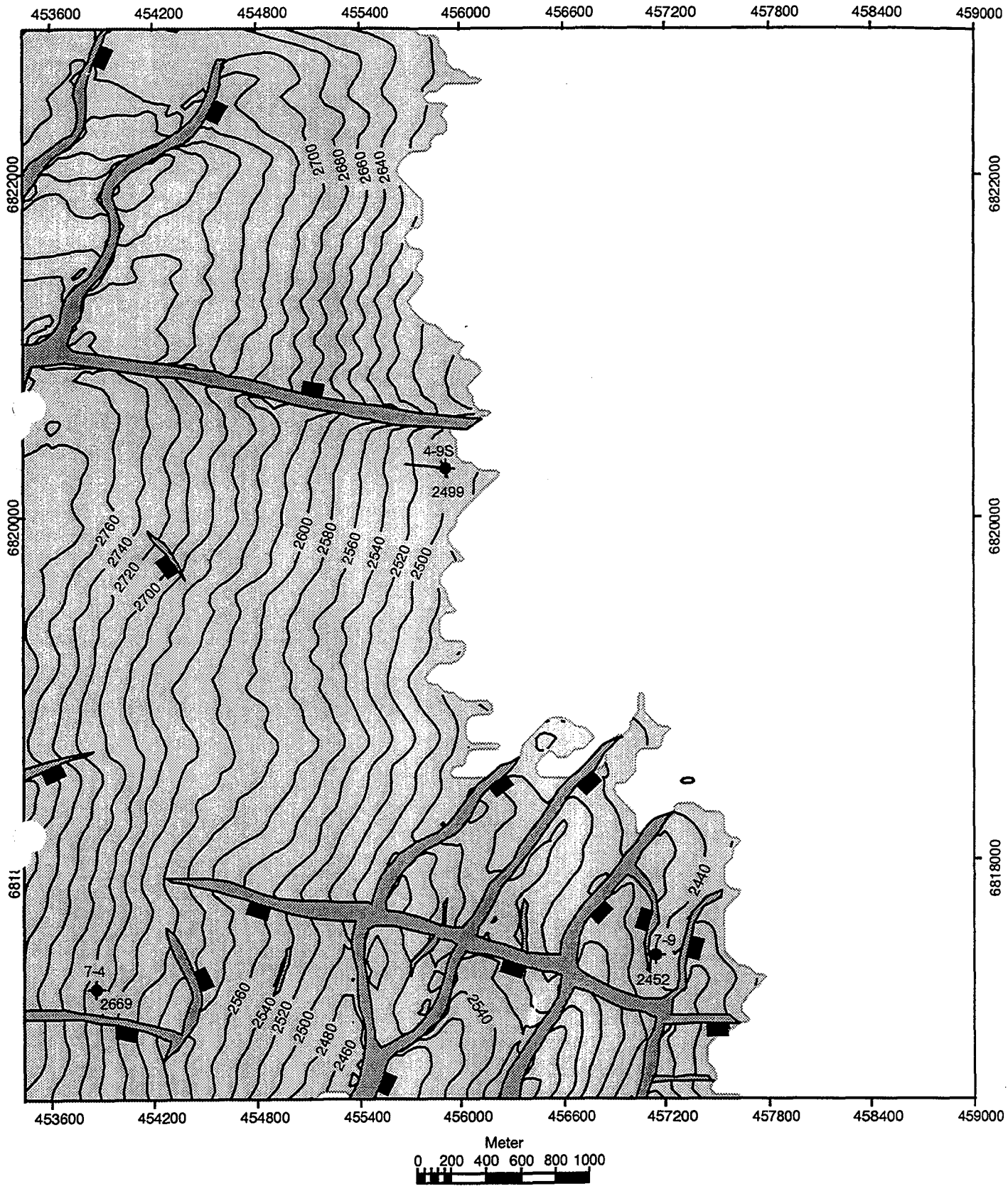


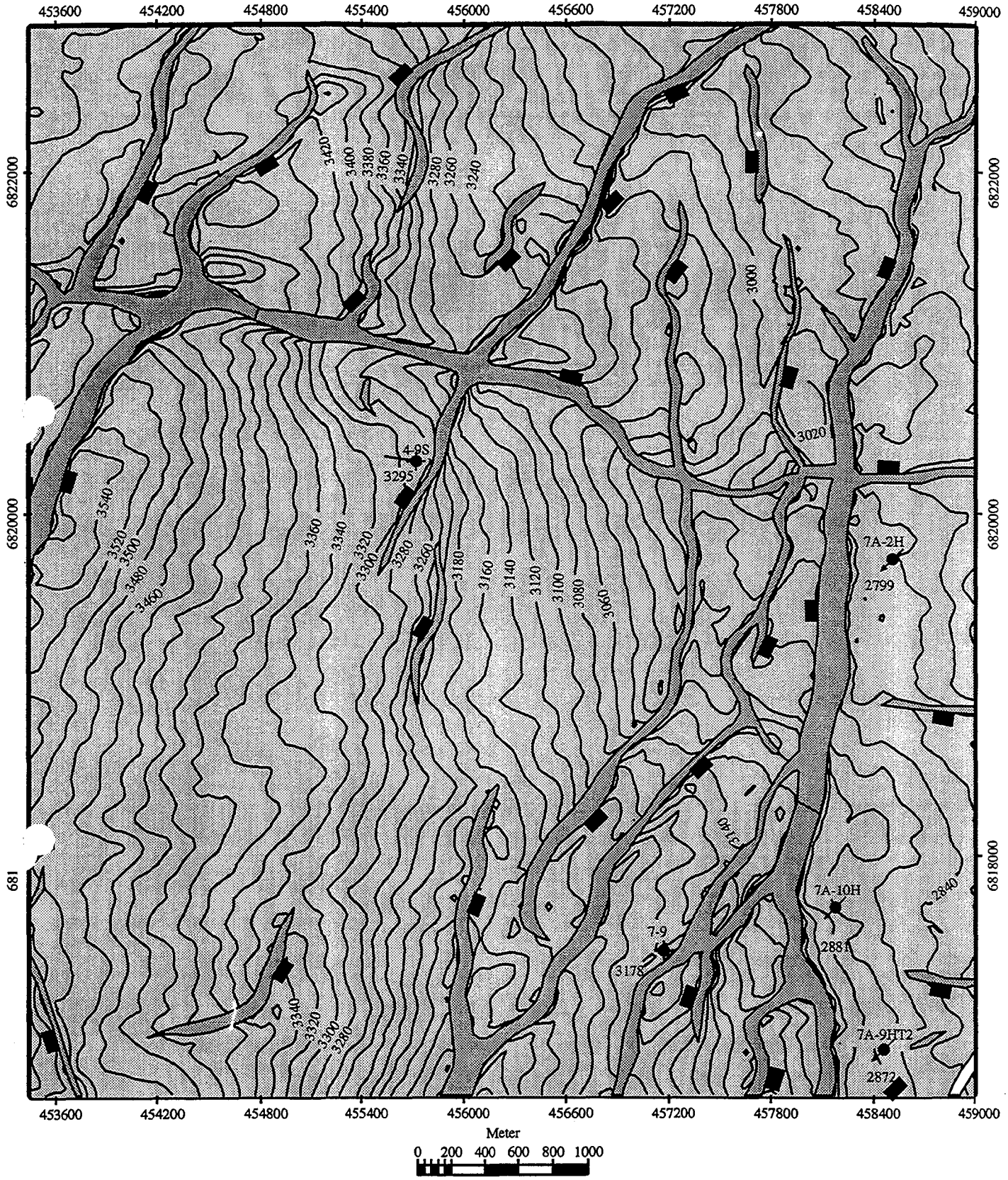
Location of 34/4-9S on top reservoir (BCU) depth map (m MSL)

Figure 4.5.3



Location of 34/4-9S on top L02 depth map (m MSL)

Figure 4.5.4



Location of 34/4-9S on top midle Lunde depth map (m MSL)

Figure 4.5.5

4.6 Formation Temperature

The temperature data used for calculations are listed in Table 4.6.1.

Log	Date	Run No.	Temp. measured point MDRKB TVD	Max. recorded temp. deg C	Tot. circ. time at measured point hrs.	Time since circulation hrs.
AIT-DSI-LDL-CNL-NGT-CMR-ACTS	01.02.97	1A/A/A/A/A/A	3316	106	7.75	20.25
MDT-GR-ACTS	03.02.97	1A/A	3047	99	42.25	44.00
MDT-GR-ACTS	03.02.97	1A/A	2725	89	158.00	40.45

Table 4.6.1 Temperature Data

4.7 Formation Pressure

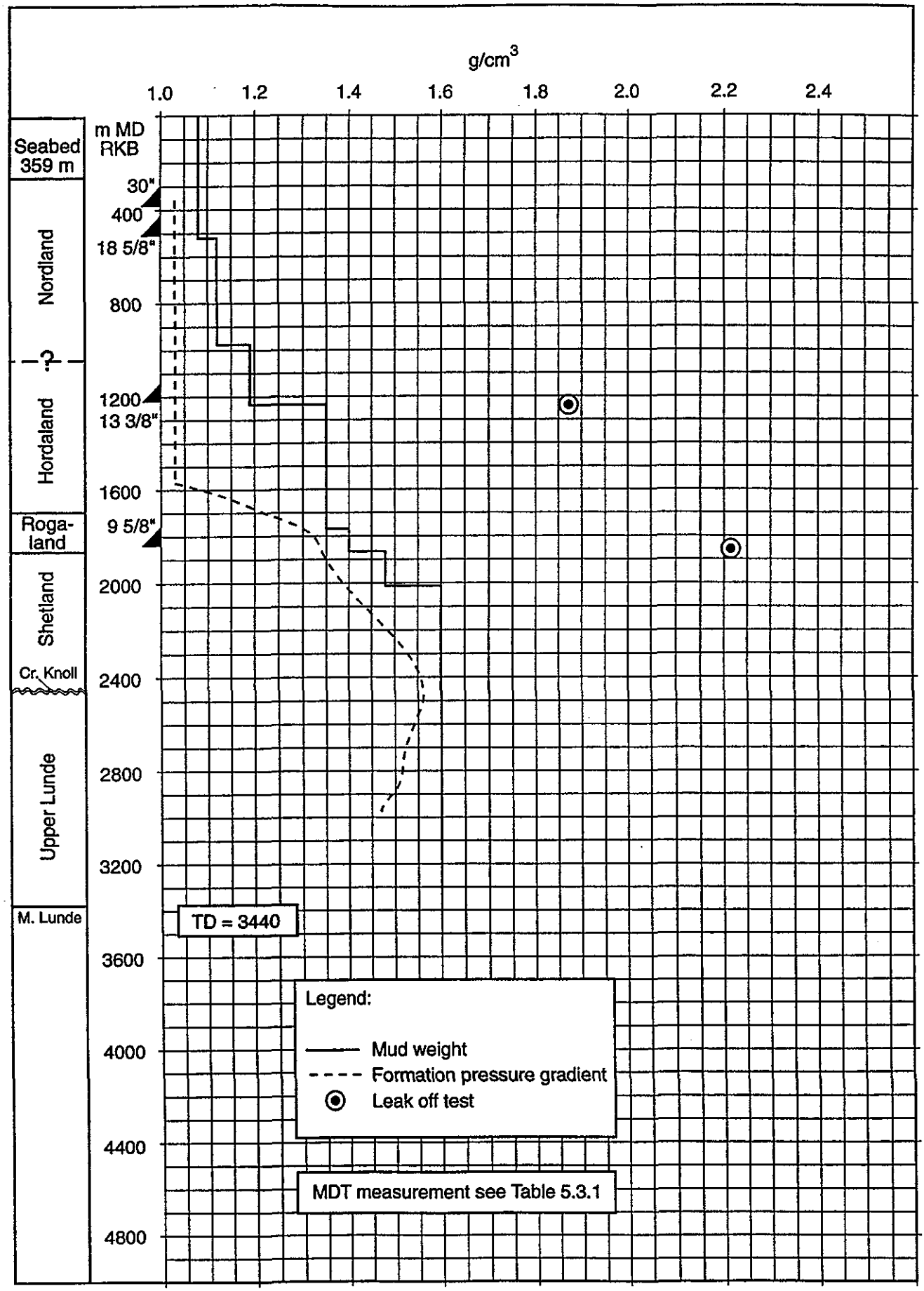
A pressure profile is given in Figure 4.7.1.

The pressure evaluation is based on drilling parameters and pressure measurements (MDT). Details is listed in Table 5.3.1 in Chapter 5 "Formation Evaluation".

No signs of abnormal formation pressure were seen in the Nordland Group and upper part of the Hordaland Group. Below 1570 m MDRKB a steady increase in the pressure gradient occurs. The pressure gradient increased from 1.03 g/cm^3 to 1.3 g/cm^3 EMW at the top of the Rogaland Group at 1680 m MDRKB.

The pressure gradient build up continued in the Rogaland and Shetland Groups reaching its maximum in the upper part of the Lunde Formation 1.56 g/cm^3 EMW.

Downward in the Lunde Formation to TD the pressure gradient decreases. The last pressure point at 3055.5 m MDRKB gave 1.45 g/cm^3 EMW.



Formation pressure gradient

Figure 4.7.1

4.8 Shallow gas

No abnormal gas was observed during the drilling of 34/4-9S.

4.9 Stratigraphy

The stratigraphic subdivision of well 34/4-9S is based on MWD, Wireline logs as well as cuttings description.

A summary is given in Table 4.9.1. Detailes and description are included in the composite log.

4.9.1 Lithostratigraphic Summary

The lithostratigraphic subdivision of well 34/4-9S, Table 4.9.1, is based on wireline log responses below 1858m only (in the 8 1/2" hole). Above this depth, the summary is based on cuttings lithology descriptions and drilling parameters only, the actual tops should therefore be regarded as approximate.

Formation tops	Depths m MDRKB	Thickness m TVT
Nordland Group (seabed)	359	
Hordaland Group	**	
Rogaland Group	1680*	170
Balder Formation	1680*	40
Sele/Lista Formations	1720*	130
Shetland Group	1850*	623
Cromer Knoll Group	2473.6	38.9
Sola/Rødby Formations	2473.6	21.4
Mime Formation	2495.0	17.5
Hegre Group	2512.5	> 836.5 (TD)
Lunde Formation	2512.5	> 836.5 (TD)

Table 4.9.1: Lithostratigraphic summary, well 34/4-9S. * Tops estimated from cuttings lithology and drilling parameters only. ** Top Hordaland not separated (no cuttings return).

4.9.2 Biostratigraphic Summary

Routine biostratigraphic analysis have not been performed. The ages given in the formation descriptions is therefore approximate.

4.9.3 Hegre Group, Lunde Formation

Depth interval:	2512.5 - 3437.0m MDRKB (TD)
	2512.0 - 3385.5m TVDRKB (TD)
Thickness:	> 944.5m MT = >836.5m TVT (isochore)
Age:	Late Triassic

The well penetrated 944.5m MT = 836.5m TVT of the Lunde Formation. Of the penetrated section, 851.5m MT = 777.3m TVT is within the upper, and 71.0m MT = 57.5m TVT is within the middle member of the Lunde Formation respectively. The very uppermost part of the Lunde Formation, approximately 15m, is eroded by the "Base Cretaceous Unconformity". The well TD is within the upper part of the middle member.

The penetrated section display a classical Lunde Formation in which it consists of interbedded sandstones and mudstones. The sandstones are fining-upward to blocky channelbelt sandstones of fluvial origin. They are fine- to coarse-grained, often with conglomeratic bases, and occasionally carbonate cemented. The mudstones are reddish brown in the upper member, greyish in the middle member, with caliche nodules and thin, very fine-grained crevasse splay sand- and siltstones.

The reservoir subdivision have been subdivided based on allostratigraphy - the current reservoir zonation concept at the Snorre Field, and correlated to nearby wells. Well-correlation into the neighbouring wells are particularly good in the Middle Lunde Reservoir, and reasonably good in the lower part of the upper Lunde member and in parts elsewhere. In spite of biostratigraphic data in the formation, magnetostratigraphy have aided the reservoir zonation in the cored interval.

The penetrated well section is unfaulted.

Pressure depletion due to production of the Snorre Field have not been observed.

The oil-water contact is interpreted at 2590mTVDMSL, in reservoir zone L03. Such a contact is 16 m deeper than the prognosed contact, and influences the Snorre Field west of the Outer Snorre Fault (fault blocks WCFB and NWFB).

For reservoir thickness calculations, structural dips and dip directions of 9/270°N have been applied for the Lunde Formation (below BCU). A schematic cross-section is given in Figure 6.1.1 and a table showing the reservoir zonation is given in Table 4.9.3.

Reservoir zones Lunde Formation	Tops mMD RKB	Tops mTVD RKB	Thicknesses Penetrated (mMT)	Thicknesses Isochore (mTVT)
Upper Lunde	2512.5	2512.0	851.5	777.3
L01 (PE)	2512.5	2512.0	11.5	11.5
L02	2524.3	2523.8	72.7	72.9
L03	2597.0	2596.5	31.6	31.7
L04	2628.6	2628.1	66.6	66.7
L05	2695.2	2694.7	36.9	36.9
L06	2732.1	2731.6	98.2	96.5
L07	2830.3	2829.4	108.4	103.8
L08	2938.7	2936.1	65.6	60.8
L09	3004.3	2999.5	94.5	81.3
L10	3098.8	3086.6	111.4	91.6
L11	3210.2	3186.1	83.2	67.0
L12	3293.4	3259.3	70.6	56.2
Middle Lunde (PP)	3364.0	3320.9	73.0	59.2
ML1	3364.0	3320.9	37.8	30.2
ML2	3400.8	3353.1	31.1	25.5
ML3 (PP)	3431.9	3380.9	5.1	4.3
TD loggers	3437.0 *	3385.5 *		
TD drillers	3440.0	3388.2		

Table 4.9.3 Reservoir zonation, KB=25m
PE = Partly eroded, PP = Partly penetrated (i.e. thicknesses are minimum values only).
*TD loggers refer to MWD-logs, TD of wireline logs at 3404.5m MD.

The upper boundary of the Lunde Formation is taken at the significant break at all wireline logs between the Lunde and Mime Formations at the "Base Cretaceous Unconformity".

4.9.4 Cromer Knoll Group

Depth interval: 2473.6 - 2512.5m MDRKB
Thickness: 38.9m MT = mTVT
Age: Early Cretaceous

The Cromer Knoll Group consists of marls, claystones and limestones with some sandstones. The Cromer Knoll Group is subdivided into a lower, well defined Mime Formation and an upper unspecified Sola and/or Rødby Formation. The Mime Formation consists of reddish marls and some claystone, and with a thin, basal limestone. The Sola and/or Rødby Formation consists of varicoloured claystones with marl and minor sandstone beds.

The upper boundary of the Mime Formation is taken at 2495m MDRKB by a distinct increase in gamma ray, and a distinct decrease in resistivity, density and sonic travel time. The upper boundary of the Cromer Knoll Group is difficult, but is taken at a slight drop in gamma ray and a more uniform pattern in most wireline logs above this point as well as on cuttings lithology descriptions.

4.9.5 Shetland Group

Depth interval:	1850 - 2473.0m MDRKB
Thickness:	623m MT
Age:	Late Cretaceous

The lithology of the Shetland Group are dominated by medium dark grey to olive black claystones with thin beds of limestones and traces of very fine-grained sandstone. The present part of the Shetland Group are normally assigned to the Jorsalfar (the upper part) and the Kyrre Formations. No separations into formations have been made herein.

The upper boundary are not seen since no logs are available above 1858m, but is taken on cuttings lithology descriptions and drilling parameters.

4.9.6 Rogaland Group

Depth interval:	1680 -1850m MDRKB
Thickness:	1491m MT
Age:	Paleogene

The Rogaland Group in the area consists of the Sele/Lista and the Balder Formations. The boundary between the two formations is set to 1720m MDRKB.

The lithology of the Sele/Lista Formation (unspecified) is dominated by dark grey to green grey, non-calcareous, tuffaceous claystone with traces of limestone and dolomite.

The lithology of the Balder Formation is tuff and tuffaceous claystone. The tuff is light to dark grey, non-calcareous and the tuffaceous claystone is dark grey to green grey, non-calcareous with traces of limestone and dolomite.

The upper, as well as the lower, boundary are not seen since no logs are available above 1858m, but is taken on cuttings lithology descriptions and drilling parameters.

4.9.7 Hordaland and Nordland Groups

Depth interval:	359 (seabed) -1680m MDRKB
Thickness:	1321m MT
Age:	Eocene-Quaternary

The separation of the Hordaland and Nordland Groups have not been possible since no logs nor cuttings return have not been available above 1240m MDRKB. Below 1240m, the entire interval probably belongs to the Hordaland Group.

The lithology herein is olive grey to green grey, silty, non-calcareous claystone with minor limestone and dolomite stringers and with traces of sand, glauconite and pyrite. Some medium to coarse sand is present in the interval of 1390 to 1415m.

4.10 Hydrocarbon Indication

A 9 7/8" pilot hole was drilled down to 520m MDRKB. No shallow gas was encountered.

In the reservoir section of the Lunde Formation hydrocarbons shows and gas values were encountered. Shows are described from 2510m MD RKB with light brown stain with fair to strong hydrocarbon odour, a yellow white fluorescence and an instant streaming blue white cut. Gas values increased to a maximum of 2.7% @ 2608.5m MD RKB, consisting of 12323 ppm C1, 7137 ppm C2, 1057 ppm C3, and < 350 ppm of the higher components. No shows reported below 2622m MD RKB.

The conventional core indicate oil down to 2596m TVD MSL (oil stained sandstones) , and the interpretation of pressure gradients (MDT data) indicate an OWC @ 2594m TVD MSL. However, the wireline logs indicate high water saturation in the sandstone from 2590.5-2597m TVD MSL with deepest oil down to 2583m TVD MSL. The oil-water contact is therefore set to 2590m TVD MSL.

5 Formation Evaluation

5.1 Wireline Logging

The wireline logging in well 34/4-9S was performed by Schlumberger Wireline & Testing, Bergen. The planned and actual logging programme is shown in Table 5.1.1. The borehole was generally in gauge with only minor wash outs over short intervals and log data quality is overall very good.

Hole size	Planned logging program	Actual logging program
8 1/2"	MWD (resistivity, gr, dir) DITE-DSI-LDL-CNL-NGT-CMR-ACTS MDT-GR-ACTS VSP	MWD (resistivity, gr, dir) AIT-DSI-LDL-CNL-NGT-CMR-ACTS MDT-GR-ACTS VSP

* Fluid sample if hydrocarbons are encountered.

Table 5.1.1: 34/4-9S; Planned and actual logging program.

Raw logs from the 8 1/2" section and established standard parameters for the Snorre area have been used as input to a preliminary petrophysical evaluation using the Western Atlas Complex Reservoir Analysis (CRA) program. This evaluation is presented in Appendix 3 and 4. A preliminary permeability estimate has also been generated from the WA Horizon programme using the same raw logs and a fieldwide database/histogram based on core and log data from the Snorre area. Table 5.1.2 presents the preliminary average reservoir parameters and net sand calculation for reservoir zones L01 to L12 in the Lunde formation.

A final detailed petrophysical evaluation will be performed and presented in a separate Formation Evaluation Report. This report will also incorporate estimates of permeability and moveable fluids derived from the CMR measurements together with results from the conventional and special core analysis.

Reservoir Zones	L01	L02	L03	L04	L05	L06	L07	L08	L09	L10	L11	L12	U.L	M.L
Top (m MD RKB)	2512.5	2524.3	2597.0	2628.6	2695.2	2732.1	2830.3	2938.7	3004.3	3098.8	3210.2	3293.4	2512.5	3364.0
Base (m MD RKB)	2524.3	2597.0	2628.6	2695.2	2732.1	2830.3	2938.7	3004.3	3098.8	3210.2	3293.4	3364.0	3364.0	3437.0 *
Gross (m MT)	11.8	72.9	31.6	66.6	36.9	98.2	108.4	65.6	94.5	111.4	83.2	70.6	851.5	73.0
Net sand (m MT)	0	20.1	8.8	23.2	12.3	53.6	40.2	24.1	52.6	62.6	46.8	47.1	391.5	
Top (m TVD msl)	2487.0	2498.8	2571.5	2603.1	2669.7	2706.6	2804.4	2911.1	2974.5	3061.6	3161.1	3234.3	2487.0	3295.9
Base (m TVD msl)	2498.8	2571.5	2603.1	2669.7	2706.6	2804.4	2911.1	2974.5	3061.6	3161.1	3234.3	3295.9	3295.9	3360.5 *
Gross (m TVT)	11.8	72.9	31.7	66.7	36.9	96.5	103.8	60.8	81.3	91.6	67.1	56.2	777.3	56.2
Net sand (m TVT)	0	20.2	8.9	23.2	12.4	52.8	38.6	22.2	45.0	51.5	37.7	37.5	349.8	
Net/Gross (fract.)	0	0.28	0.28	0.35	0.33	0.55	0.37	0.36	0.55	0.56	0.56	0.67	0.45	
Porosity (%)	-	24.1	25.4	23.7	22.6	21.7	22.1	20.0	21.6	20.6	19.6	22.2	21.7	16.6
Sw (%)	-	33.2	69	99	98	98	97	92	94	92	97	96	91	96
Log permeability arith. (mD)	-	383	589	741	603	478	530	208	356	237	175	805	437	59

Cutoff criteria used: Porosity > 15% and volume shale (VSH) < 40%
* TD

Table 5.1.2: Petrophysical net sand averages, well 34/4-9S

5.2 Conventional Core Analysis

3 cores were cut over a 209m long section in the upper part of the Lunde formation with a total recovery of 99,7 %. Cored intervals, recovery and depth shifts applied to match the wireline data are detailed in table 5.2.1.

Conventional core analysis, including measurements of horizontal and vertical permeability, porosity, saturation and grain density has been performed by GeoQuest. A detailed summary of this is given in a separate report: "Conventional Core Analysis, Well 34/4-9S"

A program for special core analysis (SCAL) is initiated and results will be used in the final detailed petrophysical interpretation.

Core no.	Top(m MD RKB drillers depth)	Bottom(m MD RKB drillers depth)	Recovery	Shift applied to match loggers depth (m)
1	2515.0	2598.0	99.4 %	-0.61
2	2598.0	2659.0	99.7 %	-1.11
3	2659.0	2723.5	100.0 %	-0.36

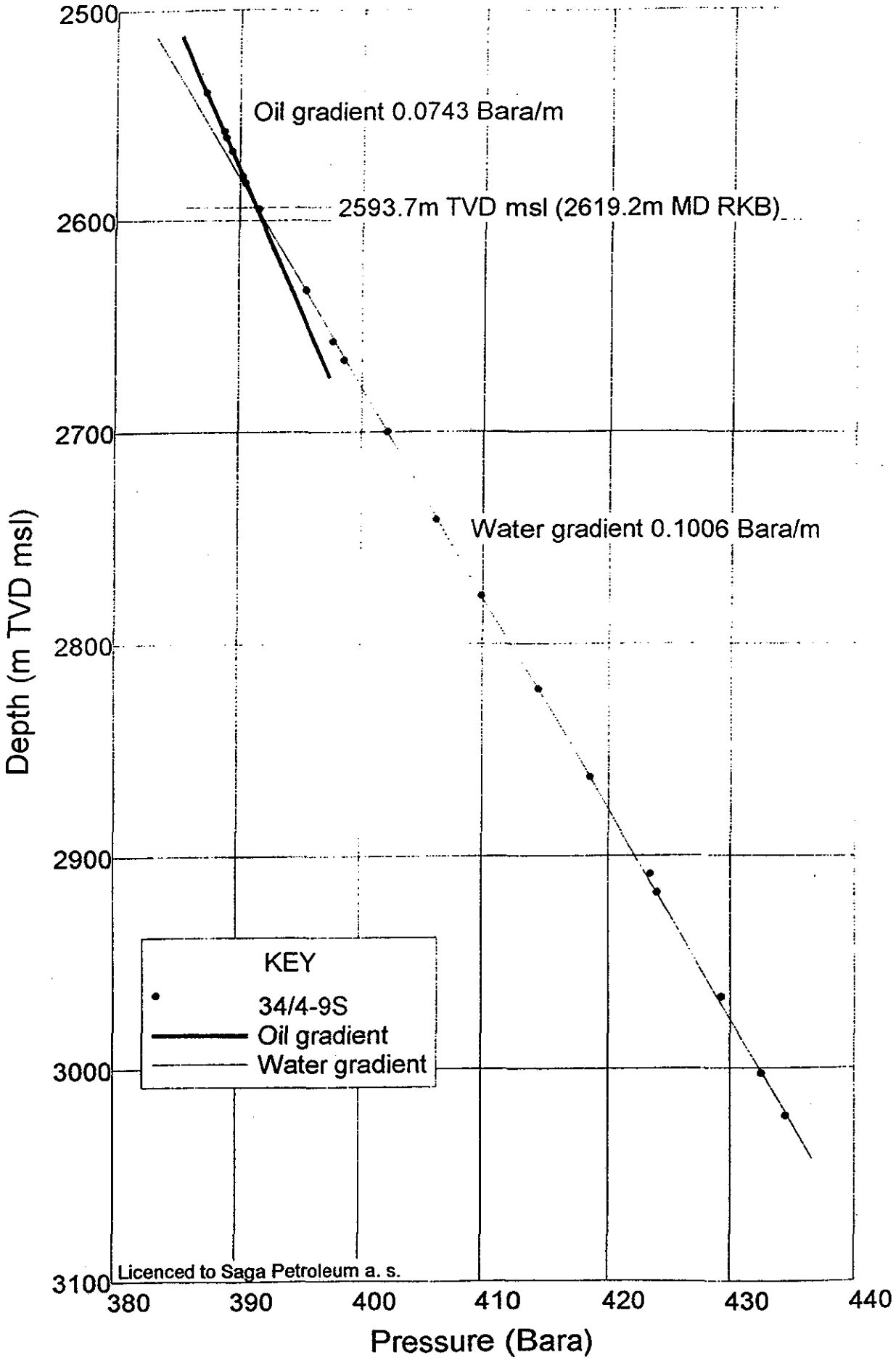
Table 5.2.1: Cored intervals and shifts applied to match loggers depth.

5.3 Formation Pressure Measurements, OWC and Fluid Samples

A Modular Formation Dynamics Tester (MDT) with a Combinable Quartz Gauge sensor (CQG) was used to obtain formation pressure measurements. The MDT wellsite worksheet is presented in table 5.3.1. A total of 20 pretests were made, of which 18 appear to be of good quality and 2 are slightly supercharged. A preliminary interpretation of the results is presented in figure 5.1 indicating a fluid contact around 2594m TVD MSL +- 3-4m assuming 0.05% uncertainty in pessure measurements. Gradients presented here are calculated after exclusion of the two supercharged tests (number 16 and 18) and test number 7 which appears to be very close to the fluid contact.

An apparent fluid contact @ 2596 m TVD MSL is indicated from the core data whereas the wireline resistivity and porosity logs indicate hydrocarbons down to 2583m TVD MSL and high water saturation in the sand from 2590.5 - 2597m TVD MSL. An OWC @2590m TVD MSL have so far been used as input to the Snorre Field reservoir model. Combined results from the special core analysis (SCAL) and a more detailed petrophysical evaluation to be presented in the Formation Evaluation Report may help pinpoint the OWC more accurately.

A 2 3/4 gal fluid sample was obtained at 2583 m MD RKB. Prior to sampling the MDT Pumpout Module was used to pump a total of 70 litres fluid from the formation into the borehole. This was done in order to obtain a representative sample of the reservoir fluid. Preliminary laboratory measurements indicate that the fluid sample is contaminated by 18-22% base oil.


Oil gradient 0.0743 Bara/m
2593.7m TVD msl (2619.2m MD RKB)
Water gradient 0.1006 Bara/m
KEY
34/4-9S
Oil gradient
Water gradient
Licenced to Saga Petroleum a. s.
Depth (m TVD msl)
Pressure (Bara)
2500
2600
2700
2800
2900
3000
3100
380
390
400
410
420
430
440

6 DRILLING DATA

6.1 Daily Drilling Reports

A short version of the Daily Drilling Report is presented in Appendix 1.

Drilled depth versus rig time is shown in Figure 6.1.1.

6.2 Bit Record

The bit records are listed in Table 6.2.1

6.3 Mud Data

Table 6.3.1, part 1 and 2 list the daily reported mud properties. The mud consumption is shown in Table 6.3.2.

6.4 Casing Data

Casing data is given in Table 6.4.1.

6.5 Cementation

6.5.1 Cement Data

Cement data and operation comments are given in Table 6.5.1

6.5.2 Cement Evaluation

30" x 18 5/8" casing

The 30" x 18 5/8" casing was planned cemented from the 18 5/8" casing shoe to seabed at 359 m. The cement was tagged in the 30" annulus with a grouting stinger at 375 m. 15 m^3 cement was pumped to fulfill the requirements.

13 3/8" / 9 5/8" casing.

Even experienced lost circulation during both cement jobs, both cement jobs was evaluated to be sucessfull. This was based on the pump pressure developement during the jobs and the good LOT which was achieved.

6.6 Directional Data

The deviation data based on Baker Hughes Inteq's MWD survey, are listed in Table 6.6.1. The azimuth reference is UTM Grid North, and all displacements are relative to the well slot reference point (6820309.2 mN, 455922.8 mE). The correction used from Magnetic North reference to UTM grid north reference is -4.69^0.

A well profile is shown in Figure 6.6.2.

6.7 Wellbore Stability

No particular well stability problems were observed.

6.8 Formation Leak Off/Integrity Tests

The results are given in Figures 6.8.1 part 1 & 2.

6.9 Rig Time Distribution

Time consumption versus main operations is given in Figure 6.9.1.

6.10 Experience Transfer Report

The experience transfer is covered in a separate Experience Transfer Report.

The report cover items as:

Dropped premade 30" casing from trolley.

Four joints including the housing of 30" casing was made up prior to open up the pilot hole. Since the 30" string should be run in combination with 18 5/8" string, no 30" shoe joint was installed. The string was hang off in a retrievable drilling guide base. The housing was locked to the guide base with a latch assembly. This latch mechanism locates and supports the 30" housing within the guide base and provides the facility to release the base and allow it to be recovered to surface. The housing is held on place in the base with a lock ring.
After the string was installed in the base the base was secured to the trolley and left for approx. 24 hrs. Approx. 25 to 30 m of the string was submerged into the sea. It is assumed that the casing string dropped approx. 1 to 2 hrs prior to the planned casing running time.

Cut 208 m core in 3 run

It was totally cut 208 m in three runs with 2 times 270 feet corebarrels and one 210 feet barrel. At the first run the 270 feet barrel was filled, while on the second run the core jammed off after 200 feet. The last run the 210 feet corebarrel was filled. The 208 m of core was cut in total of 61.5 hrs including

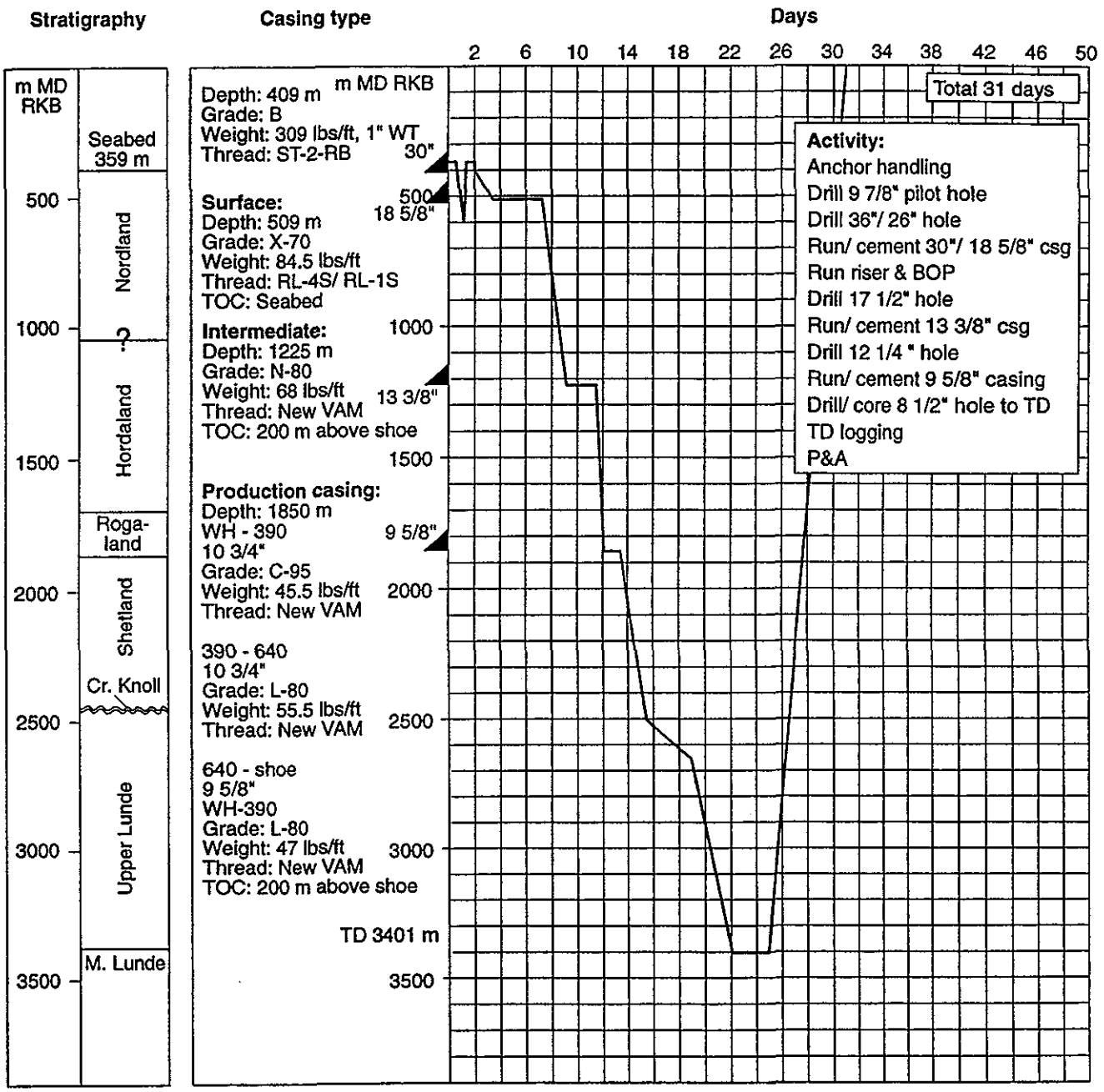
trips etc with a totally recovery of 99.9%. CD 93 QFDIL corebits was used on the tree runs and the average ROP for the coring section was approx. 15 m/hr.
It was first time ever both for Saga and DBS that a 270 feet core was cut. Previous record run was 240 feet on 34/7A-2H. On 34/7A-2H 185 m of core was cut in three run with an average coring progress of 65.8 m/day. The coring progress on 34/4-9S was increased by 23.4% to 81.1 m/day.

Lost two cones on the bit.

To avoid a fault the well should be kicked off to 26 deg below the cored interval. Based on a combination off some problems/low update rate of MWD toolface readings and bad weather a Hughes ATMGTP09 rock bit was used for the kick off instead of a PDC bit. The kick off went well, but after only 252 m drilled, it was not possible to run back on bottom after the stand was pulled off bottom at a connection. At surface it was discovered that two cones was lost. The bit drilled for 18.4 hrs on bottom and with approx. 240 - 250000 revs on bottom and total 347000 revs. The bit was used in bad weather with quite much rig heave which pulled bit off/on bottom. The formation drilled was a well cemented, hard sandstone.

Mud motor failure/wiper trip.

At the prognosed TD of the well at 3402 m MD it was not possible to make any more progress. At bottoms up it was discovered rubber coming from the F2000S mudmotor.


Stratigraphy
Casing type
Days
2 6 10 14 18 22 26 30 34 38 42 46 50
m MD RKB
Seabed 359 m
Nordland
Hordaland
Roga-land
Shetland
Cr. Knoll
Upper Lunde
M. Lunde
500
1000
1500
2000
2500
3000
3500
Depth: 409 m m MD RKB
Grade: B
Weight: 309 lbs/ft, 1" WT
Thread: ST-2-RB
30"
500
Surface:
Depth: 509 m
Grade: X-70
Weight: 84.5 lbs/ft
Thread: RL-4S/ RL-1S
TOC: Seabed
18 5/8"
Intermediate:
Depth: 1225 m
Grade: N-80
Weight: 68 lbs/ft
Thread: New VAM
TOC: 200 m above shoe
1000
13 3/8"
1500
Production casing:
Depth: 1850 m
WH - 390
10 3/4"
Grade: C-95
Weight: 45.5 lbs/ft
Thread: New VAM
9 5/8"
2000
390 - 640
10 3/4"
Grade: L-80
Weight: 55.5 lbs/ft
Thread: New VAM
2500
640 - shoe
9 5/8"
WH-390
Grade: L-80
Weight: 47 lbs/ft
Thread: New VAM
TOC: 200 m above shoe
3000
TD 3401 m
3500
Total 31 days
Activity:
Anchor handling
Drill 9 7/8" pilot hole
Drill 36"/ 26" hole
Run/ cement 30"/ 18 5/8" csg
Run riser & BOP
Drill 17 1/2" hole
Run/ cement 13 3/8" csg
Drill 12 1/4 " hole
Run/ cement 9 5/8" casing
Drill/ core 8 1/2" hole to TD
TD logging
P&A

Bit No.	Size	Make Type	Serial No.	Jets	Depth Out (m)	Int. (m)	Hrs. Act. IADC	ROP Act. IADC	WOB	RPM TDS Motor	Flow Press	Condition I-O-D-L-B-G-O-R	Act.	Remarks
1	9 7/8"	Security S44G	653722	24, 2x28	520.0	158.0	12.5 12.5	12.6	3.0	0/0 0/0	2850.0	2-2-WT-A-E-I-NO-TD	DRILLING	
2	26"	HTC GTX-CMG	F86CX	16,18,2x24	514.0	152.0	11.0 13.5	13.8 11.3	15.0	50/100 0/0	4500.0 90.0	2-2-WT-A-E-I-NO-TD	HOLE OPEN	
3	17 1/2"	Security SS33SG	680429	2x20,2x22	1235.0	715.0	20.4 33.0	35.0 21.7	20.0	130/130 0/0	4400.0 165.0	3-3-WT-A-E-I-BU-TD	DRILLING	
4RR	12 1/4"	LYNG LA350B	1445	5x14	1866.0	662.0	12.3 24.0	53.8 27.6	5.0	100/120 170/170	3400.0 165.0	2-2-WT-T-X-I-NO-TD	DRILLING	Used to drill out of 13 3/8" and to drill 12 1/4" new hole.
5RR	8 1/2"	LYNG LA 250 BZ	1458	4x18	2515.0	649.0	20.1 29.0	32.3 22.4	7.0	100/115 190/210	1850.0 260.0	1-2-WT-T-X-I-PN-CP	DRILLING	
6	8 1/2"	Diamant CD93FDIL	7960307	TFA 0.7	2723.0	208.0	13.5 17.0	15.4 12.2	10.0	90/120 0/0	1000.0 150.0	0-0-NO-A-X-I-NO-TD	CORING	Cut cores: No.1 : 2515 - 2598 m. No.2 : 2598 - 2659
7	8 1/2"	HTC ATMGT PC	D00CK	3x20	2975.0	252.0	18.4 27.0	13.7 9.3	12.0	0/60 170/0	1650.0 240.0	8-8-LC-#-8-1/8-LC-PR	DRILLING	2 cones missing.
8	8 1/2"	HTC JG8	V60TF	3x20	2976.0	1.0	2.0 2.0	0.5 0.5	12.0	30/100 0/0	2000.0 260.0	8-8-WT-A-E-1/16-CD-PR	MILL JUNK	
9	8 1/2"	HTC ATMGT PC	K59 CT	3X20	3096.0	120.0	6.6 9.5	18.2 12.6	15.0	0/60 0/110	1700.0 260.0	3-3-BT-A-E-I-CT-TQ	DRILLING	
5RR	8 1/2"	LYNG LA 250 BZ	1458	4X18	3402.0	306.0	20.8 27.5	14.7 11.1	9.0	80/120 0/170	1700.0 265.0	4-2-WT-N-X-1/8-NO-DMF	DRILLING	
10RR	8 1/2"	LYNG LA 250 BZ	1485	4X18	3440.0	38.0	4.0 5.0	9.5 7.6	14.0	127/127 0/0	1850.0 250.0	3-2-WT-N-X-I-NO-TD	DRILLING	

Well: 34/4-9S

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf /Mf	Ca++ mg/l	Cl- mg/l	Sand %	Solids %	Mudtype
970107	9 7/8"		1.08			/		/					
970108	9 7/8"		1.08			/		/					SPUD MUD
970109	36"		1.08			/		/					SPUD MUD
970110	36"		1.03			/		/					SPUD MUD
970111	26"		1.03			/		/					SPUD MUD
970112	26"		1.03			/		/					SPUD MUD
970113	26"		1.03			/		/					SPUD MUD
970114	17 1/2"	520.0	1.12	8.0	29.0	18/34	9.2	/	1050				SPUD MUD
970115	17 1/2"	974.0	1.18	14.0	32.0	22/46	9.0	.1/.8	1050	10500	.3	8.2	SPUD MUD
970116	17 1/2"	1235.0	1.19	21.0	23.0	22/62	9.1	.1/.8		10500	.8		SPUD MUD
970117	17 1/2"	1235.0	1.19	21.0	22.0	22/60	9.1	/			.8		SPUD MUD
970118	12 1/4"	1235.0	1.35	22.0	20.0	4/8	8.0	/.4	360	85000		13.0	KCl MUD
970119	12 1/4"	1768.0	1.40	26.0	33.0	7/17	8.0	/.6	1800	95000	.5	15.5	KCl MUD
970120	12 1/4"	1866.0	1.48	29.0	36.0	8/22	8.1	/.6	1800	96000	.5	19.0	KCl MUD
970121	8 1/2"	1866.0	1.48	29.0	36.0	8/22	8.1	/.6	1800	96000	.5	19.0	KCl MUD
970122	8 1/2"	2013.0	1.48	33.0	14.0	7/18		/.6	14	101000		20.0	OIL BASED
970123	8 1/2"	2500.0	1.60	38.0	19.0	11/24		/	17	126000	.5	24.5	OIL BASED
970124	8 1/2"	2500.0	1.60	38.0	18.0	11/26		/	17	127000	.8	24.5	OIL BASED
970125	8 1/2"	2500.0	1.60	39.0	19.0	11/26		/	17	125000	.5	24.0	OIL BASED
970126	8 1/2"	2500.0	1.60	38.0	19.0	11/25		/	17	124000	.5	24.0	OIL BASED
970127	8 1/2"	2500.0	1.60	38.0	18.0	11/25		/	17	129000	1.0	24.0	OIL BASED
970128	8 1/2"	2500.0	1.60	39.0	19.0	12/27		/	17	132000	1.0	24.0	OIL BASED
970129	8 1/2"	2500.0	1.60	39.0	18.0	11/26		/	17	132000	1.0	24.5	OIL BASED
970130	8 1/2"	2500.0	1.60	37.0	18.0	12/25		/	18	134000	.8	25.0	OIL BASED
970131	8 1/2"	2500.0	1.60	35.0	17.0	11/21		/	18	133000	.5	24.0	OIL BASED
970201	8 1/2"	2500.0	1.60	36.0	17.0	11/22		/	18	132000	.5	24.5	OIL BASED
970202	8 1/2"	2500.0	1.60	36.0	17.0	11/22		/	18	132000	.5	24.5	OIL BASED

Well: 34/4-9S

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf /Mf	Ca++ mg/l	Cl- mg/l	Sand %	Solids %	Mudtype
970203	8 1/2"	2500.0	1.60	37.0	16.0	11/22		/	18	132000	.5	24.5	OIL BASED
970204	8 1/2"	2500.0	1.60	38.0	15.0	11/22		/	18	132000	.5	25.0	OIL BASED
970205	8 1/2"	2500.0	1.60	36.0	17.0	11/22		/	18	132000	.5	25.0	OIL BASED
970206	P&A		1.60	36.0	17.0	11/22		/	18	132000	.5	25.0	OIL BASED
970207	P&A		1.43	26.0	36.0	11/25	9.0	/	2000	99000			KCl MUD
970208	P&A		1.43	26.0	36.0	11/25	9.0	/	2000	99000			KCl MUD
970209	P&A		1.43	26.0	36.0	11/25	9.0	/	2000	99000			KCl MUD
970210	P&A		1.43	26.0	36.0	11/25	9.0	/	2000	99000			KCl MUD
970211	P&A					/		/					KCl MUD

Material	Unit	36" x 26"	17 1/2"	12 1/4"	8 1/2"	Total
Ancotec B	Liter				10000	10000
Ancovert F	Liter				620	620
Ancovert P	Liter				3600	3600
Ancovert S	Liter				1740	1740
Ancovert Vis	KG				1450	1450
Antisol FL 30	KG		1875	4875		6750
Barite	MT	30	59	169	194	452
Bentonite	MT	29	47			76
Borewell	KG		50			50
Cal. Chloride	KG				10000	10000
Citric Acid	KG		275		150	425
Flowzan	KG			1800	200	2000
Glycol	M3			6		6
HDF 200	M3				79	79
KCL Brine + 3% glycol	M3			302		302
KCL big bag	MT			18		18
Lime	KG	180	225		2840	3245
Soda Ash	KG	200	300	275		775
Sodium Bicarbonate	KG		650	250	100	1000
XC Polymer	KG				50	50

Size Inches	Date Run	Grade	No. of joints	Total length m	Weight kg/m (lbs/ft)	Couplings	Shoe depth m-RKB	Float Collar depth m-RKB	Centralizers		Remarks
									Type	Depth - m	
30"	10.1.97	B	3	37.07	459.8 (309)	ST-2RB	397	-	-	-	
18 5/8"	10.1.97	X-70	13	148	125.7 (84.5)	RL-1S	507	494	Bow	494 482	2 centr. on shoe jnt. 2 centr. on float jnt. XO between RL-1S and RL-4S threads at 353 m
13 3/8"	17.1.97	N-80	74	868	101.2 (68)	New Vam	1228	1202	Bow	1216 1204-1180 1144-1037	2 centr. on shoe jnt. 1 centr. per jnt. next 3 jnts. 1 centr. per jnt.
9 5/8"	21.1.97	L-80	127	1498	70 (47)	New Vam	1858	1822	Bow	1846 1834-1656	2 centr. on shoe jnt. 1 centr. per jnt. next 16 jnts.

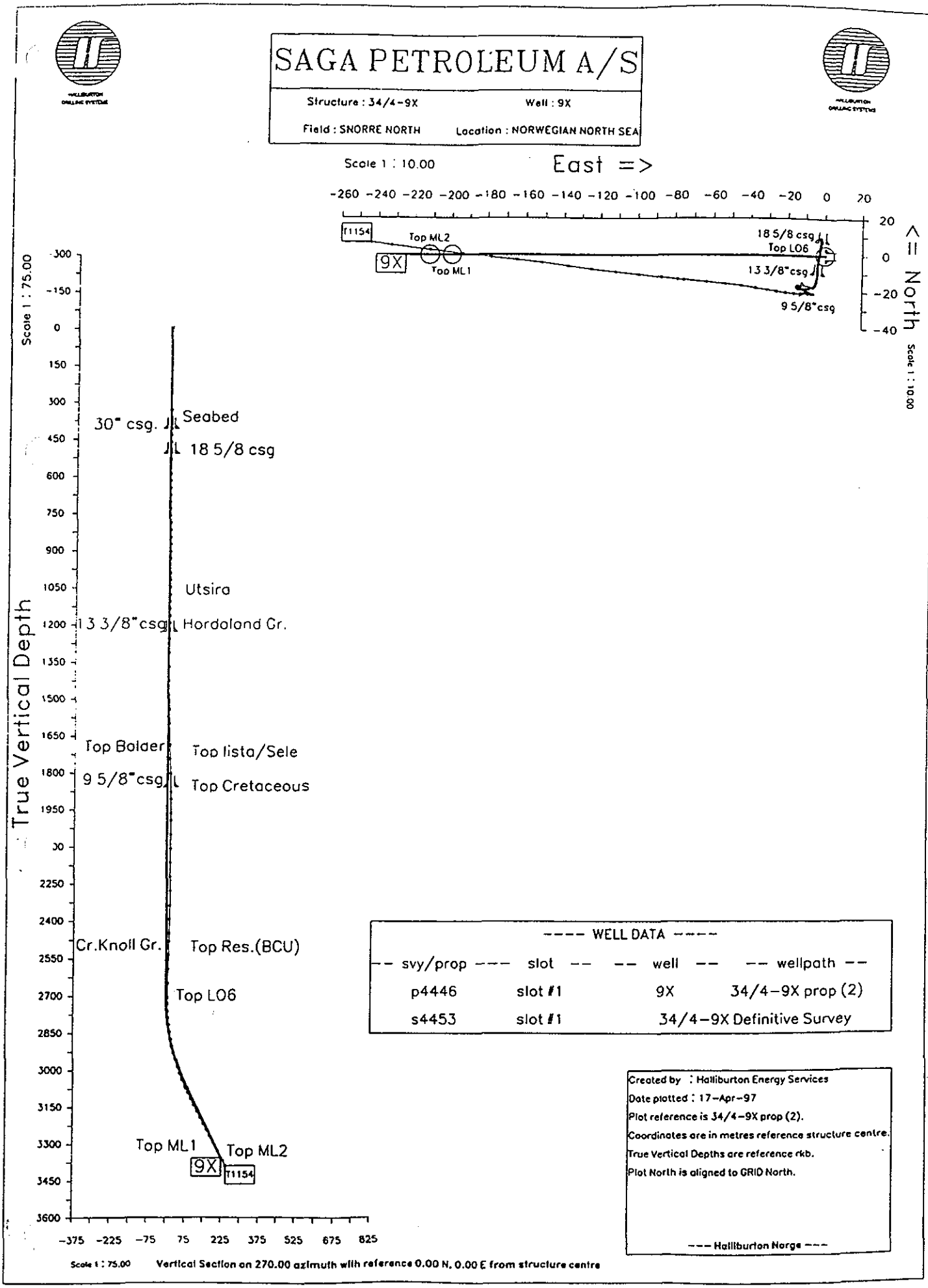
Date	Job Description	Shoe Depth m-RKB	Cement Type	Slurry Weight SG	Slurry Volume Used m3	Additives L/100 kg Cement	Mix Water L/100 kg Cement	Losses m3	Remarks
11.1.97	30" x 18 5/8" Casing	30": 397 18 5/8": 507	G	T: 1,90	60.60	A-7L: 3.55 FP-9L: 0.2	SW: 44.19	-	Yield: 78.99 l/100 kg Bumped plug and tested casing to 70 bar.
12.1.97	Grouting 30" csg.	397	G	T: 1,90	15.00	A-7L: 3.55 FP-9L: 0.2	SW: 44.19	-	Yield: 78.99 l/100 kg
17.1.97	13 3/8" Casing	1228	G	T: 1,90	27.60	FP-9L: 0.2 R-12L: 0.75	FW: 44.73	-	Yield: 76.73 l/100 kg Bumped plug and tested casing to 110 bar.
21.1.97	9 5/8" Casing	1858	G	L: 1.90	13.00	FP-9L: 0.2 R-12L: 1.2 Microblock: 5	FW: 41.58	51	Yield: 79.03 l/100kg Bumped plug
6.2.97	Balanced Plug I	-	G	1.9	9.00	FP-9L: 0.2 R-12L: 0.75 Microblock: 10.5 CD-31L: 0.7 FL-45LN: 5.75	FW: 32.76	-	Yield: 81.71 l/100 kg
6.2.97	Balanced Plug II	-	G	1.9	6 00	FP-9L: 0.2 R-12L: 0.8	FW: 44.87	-	Yield: 76.73 l/100 kg
9.2.97	Balanced Plug III	-	G	1.9	7.50	A-7L: 3.55 FP-9L: 0.2	SW: 44.17	-	Yield: 78.98 l/100 kg
11.2.97	Cement Plug	-	G	1.9	22.90	A-7L: 3.55 FP-9L: 0.2	SW: 44.17	-	Yield: 78.98 l/100 kg

Saga Petroleum A/S 6.5 DEVIATION DATA
Depth.ref:Loggers md.rkb(25.0) (Original rkb) Well:34/4-9S
Horizontal.ref:Relative to Wellhead GRID NORTH

MD meter	TVD meter	INCLIN deg.	AZIMUT deg.	DOGLEG deg/30m	+N,-S meter	+E,-W meter
0.0	0.0	0.00	0.0	0.00	9.20	-2.20
362.0	362.0	0.00	0.0	0.00	9.20	-2.20
372.0	372.0	1.40	277.0	4.20	9.21	-2.32
390.0	390.0	0.40	203.0	2.24	9.18	-2.56
435.0	435.0	1.30	151.0	0.73	8.59	-2.38
463.0	463.0	1.30	163.0	0.29	8.01	-2.13
492.0	492.0	1.00	172.0	0.36	7.45	-2.00
533.0	533.0	1.10	203.2	0.42	6.73	-2.10
591.0	591.0	1.10	192.2	0.11	5.67	-2.44
618.0	618.0	1.20	184.8	0.20	5.14	-2.52
647.0	646.9	1.30	183.2	0.11	4.51	-2.56
676.0	675.9	1.20	187.9	0.15	3.88	-2.62
704.0	703.9	1.60	194.4	0.46	3.21	-2.76
731.0	730.9	1.70	187.8	0.24	2.45	-2.91
759.0	758.9	1.80	185.3	0.13	1.60	-3.01
788.0	787.9	1.40	190.6	0.44	0.80	-3.11
818.0	817.9	1.60	191.3	0.20	0.03	-3.26
847.0	846.9	1.40	190.7	0.21	-0.72	-3.41
875.0	874.9	1.70	187.9	0.33	-1.47	-3.53
905.0	904.9	1.50	191.0	0.22	-2.29	-3.67
934.0	933.8	1.40	184.0	0.21	-3.02	-3.76
992.0	991.8	1.50	185.7	0.06	-4.48	-3.89
1020.0	1019.8	1.50	191.3	0.16	-5.21	-4.00
1049.0	1048.8	1.60	180.0	0.33	-5.98	-4.07
1078.0	1077.8	1.50	182.3	0.12	-6.77	-4.09
1106.0	1105.8	1.60	176.9	0.19	-7.52	-4.08
1136.0	1135.8	1.40	184.5	0.28	-8.31	-4.08
1165.0	1164.8	1.40	176.4	0.20	-9.01	-4.09
1193.0	1192.8	1.30	185.1	0.24	-9.67	-4.10
1219.0	1218.8	1.30	187.1	0.05	-10.26	-4.16
1259.0	1258.7	1.20	181.8	0.11	-11.13	-4.23
1313.0	1312.7	1.30	189.1	0.10	-12.30	-4.34
1370.0	1369.7	1.30	190.9	0.02	-13.57	-4.57
1427.0	1426.7	1.20	198.4	0.10	-14.77	-4.88
1485.0	1484.7	0.70	201.2	0.26	-15.68	-5.20
1543.0	1542.7	1.10	208.7	0.22	-16.50	-5.59
1600.0	1599.7	1.50	246.1	0.48	-17.28	-6.54
1686.0	1685.6	1.50	259.8	0.12	-17.93	-8.68
1744.0	1743.6	1.40	269.3	0.13	-18.08	-10.13
1804.0	1803.6	1.60	266.8	0.11	-18.13	-11.70
1879.0	1878.6	1.70	281.3	0.17	-17.97	-13.84
1907.0	1906.6	1.70	280.0	0.04	-17.82	-14.65
1965.0	1964.6	0.60	15.7	0.96	-17.38	-15.42
1994.0	1993.6	0.50	18.0	0.11	-17.11	-15.34
2050.0	2049.5	0.50	31.3	0.06	-16.67	-15.14
2107.0	2106.5	0.50	60.0	0.13	-16.33	-14.79
2163.0	2162.5	0.50	97.9	0.17	-16.24	-14.34
2221.0	2220.5	0.70	141.2	0.25	-16.56	-13.87
2278.0	2277.5	1.30	140.4	0.32	-17.33	-13.23
2336.0	2335.5	0.90	129.8	0.23	-18.12	-12.47

Saga Petroleum A/S 6.5 DEVIATION DATA
Depth.ref:Loggers md.rkb(25.0) (Original rkb) Well:34/4-9S
Horizontal.ref:Relative to Wellhead GRID NORTH

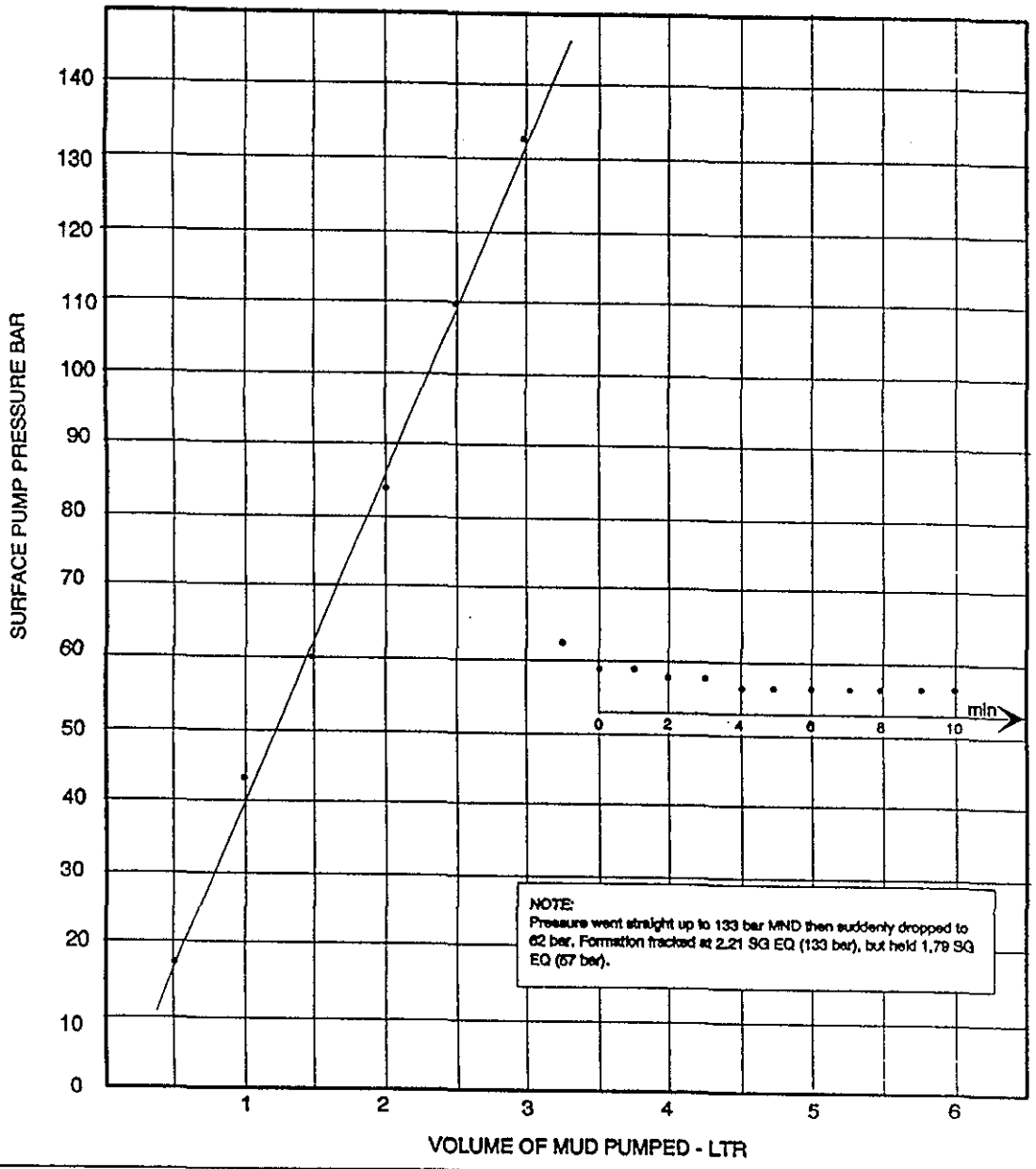
MD meter	TVD meter	INCLIN deg.	AZIMUT deg.	DOGLEG deg/30m	+N,-S meter	+E,-W meter
2391.0	2390.5	1.30	124.3	0.23	-18.75	-11.62
2448.0	2447.5	1.00	105.6	0.25	-19.25	-10.60
2480.0	2479.5	1.20	107.8	0.19	-19.43	-10.02
2535.0	2534.5	1.20	117.9	0.12	-19.87	-8.96
2592.0	2591.5	1.10	122.0	0.07	-20.44	-7.97
2649.0	2648.5	0.80	110.4	0.19	-20.87	-7.13
2731.0	2730.5	0.20	261.7	0.36	-21.09	-6.74
2760.0	2759.4	3.30	272.0	3.21	-21.07	-7.62
2788.0	2787.4	5.40	274.8	2.26	-20.93	-9.74
2816.0	2815.2	7.50	269.4	2.34	-20.84	-12.88
2846.0	2844.9	8.90	274.7	1.59	-20.67	-17.15
2875.0	2873.5	9.40	274.8	0.52	-20.29	-21.75
2903.0	2901.1	10.20	279.8	1.25	-19.67	-26.47
2931.0	2928.6	11.90	278.1	1.85	-18.85	-31.77
2958.0	2954.9	13.90	278.9	2.23	-17.95	-37.73
2988.0	2983.9	15.80	278.3	1.91	-16.80	-45.33
3017.0	3011.5	19.50	275.3	3.94	-15.79	-54.06
3045.0	3037.7	22.50	275.6	3.22	-14.83	-64.05
3074.0	3064.2	25.30	275.4	2.90	-13.71	-75.74
3082.0	3071.4	25.20	276.2	1.33	-13.36	-79.14
3102.0	3089.5	25.80	277.0	1.04	-12.37	-87.69
3130.0	3114.6	26.40	276.9	0.64	-10.88	-99.92
3158.0	3139.7	26.50	275.8	0.54	-9.50	-112.31
3187.0	3165.5	27.40	277.3	1.17	-8.00	-125.37
3215.0	3190.3	28.00	277.2	0.64	-6.36	-138.28
3245.0	3216.8	28.40	277.1	0.40	-4.59	-152.35
3273.0	3241.4	28.30	275.5	0.82	-3.14	-165.56
3301.0	3266.0	28.80	276.9	0.89	-1.69	-178.86
3334.0	3294.8	29.40	277.0	0.55	0.25	-194.80
3370.0	3326.2	29.60	276.7	0.21	2.37	-212.40
3415.0	3365.7	27.20	277.0	1.60	4.92	-233.65
3430.0	3379.2	25.80	277.5	2.84	5.76	-240.28
3440.0	3388.2	24.90	277.8	2.73	6.33	-244.53



RA97-311/SDE

Well profile plot

Figure 6.6.2



WELL	34/4-9S	DATE	22.1.97

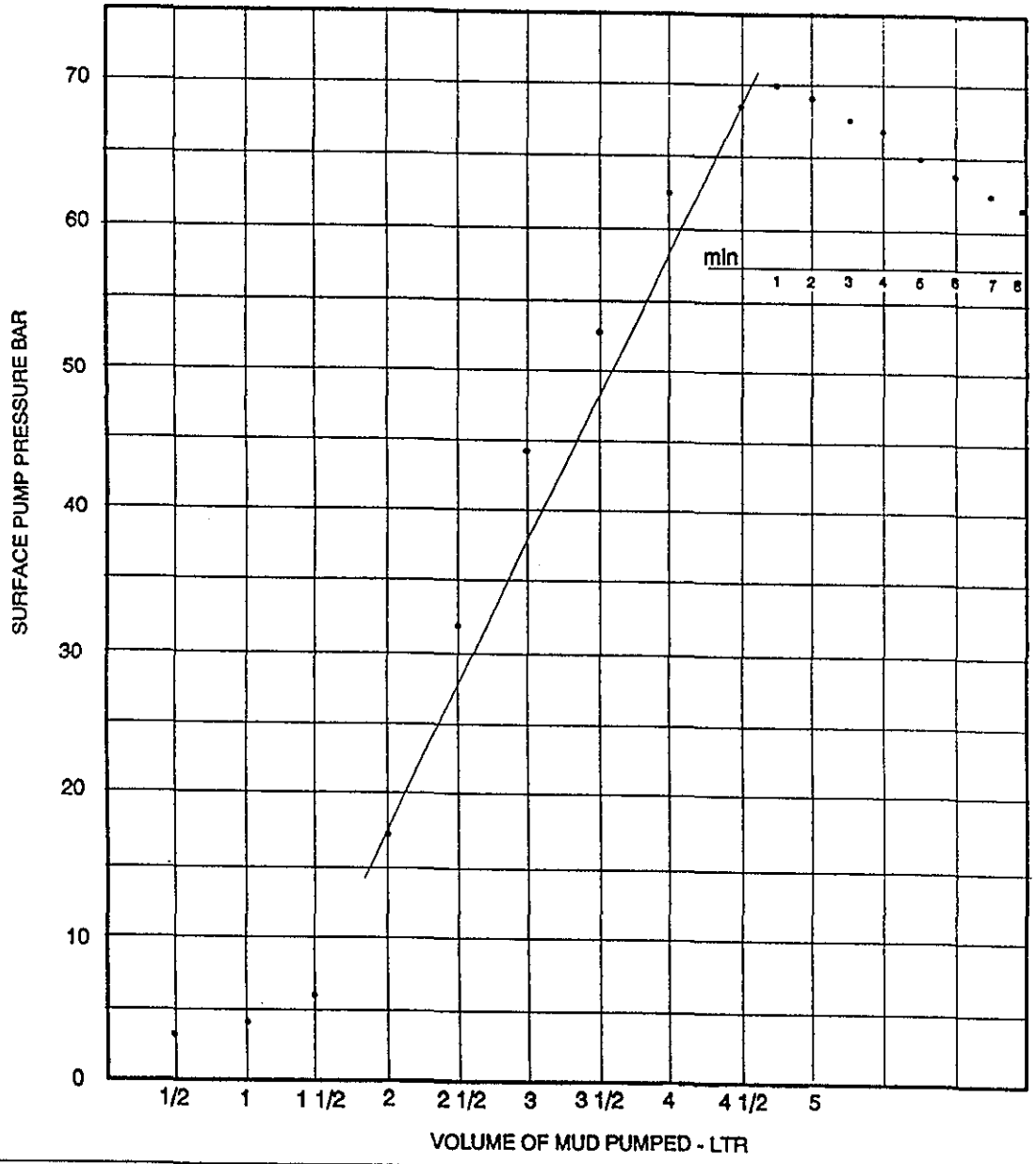
CSG.SIZE	9 5/8"	VOLUME PUMPED	3,75 bbl
CSG.SHOE DEPTH	1858	VOLUME RECOVERED	2,75 bbl
WATER DEPTH	337	FORMATION TYPE	Claystone
HOLE SIZE	8 1/2"	LEAK OFF PRESSURE	133 bar
HOLE DEPTH	1870	SHUT-IN PRESSURE	59 bar
MUD WEIGHT	1,48	SHUT-IN TIME	10 mins
PUMP RATE	0,5 bpm		

EQV. MUD WEIGHT AT CSG. SHOE: 2,21 sg

bbl	bar	min	bar
0,5	18	0	59
1	42	1	59
1,5	60	2	58
2	84	3	58
2,5	110	4	57
3	133	5	57
3,25	62	6	57
		7	57
		8	57
		9	57
		10	57

Formation leak-off test data, part 2

Figure 6.8.1



WELL 34/4-9S	DATE 19.1.97

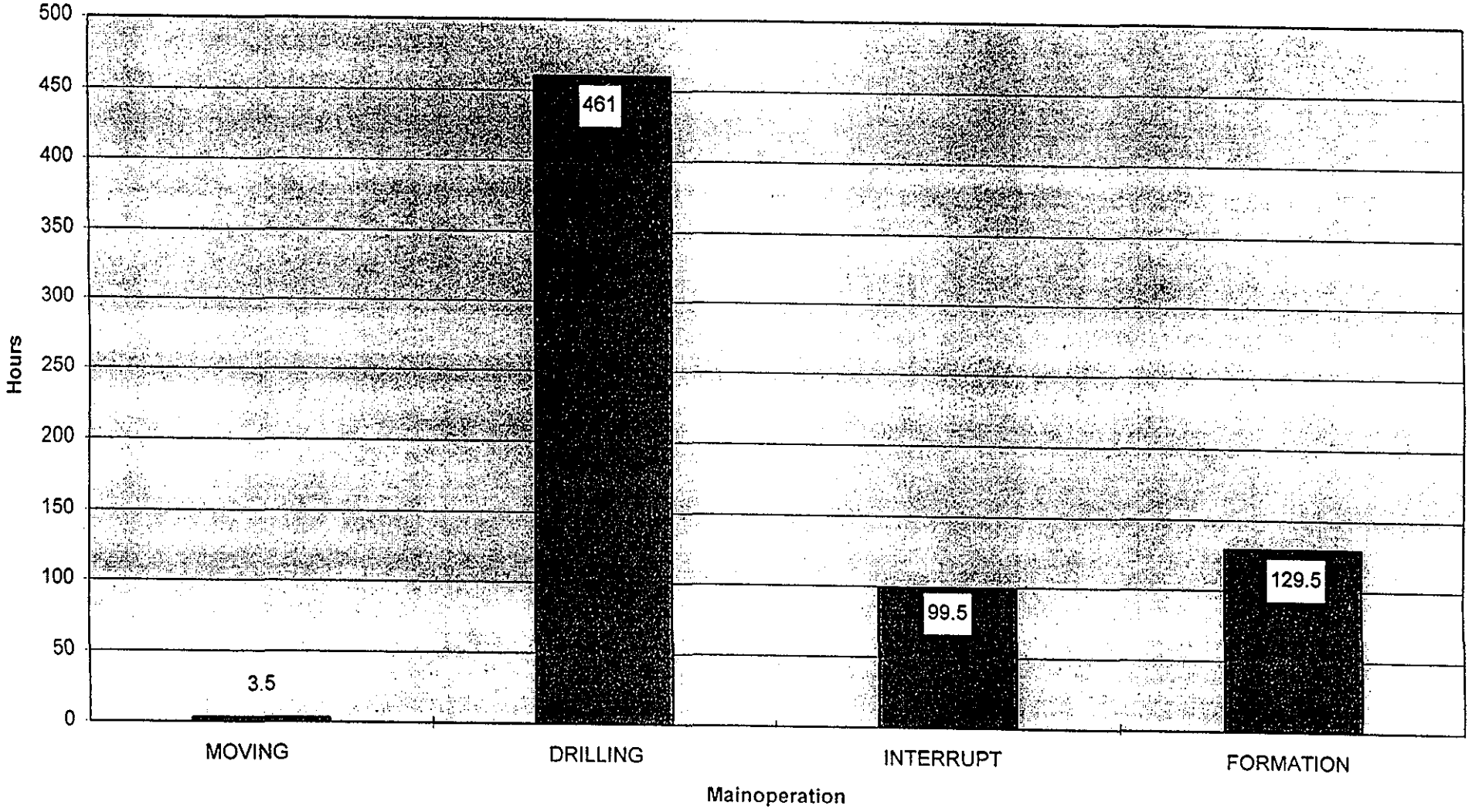
CSG.SIZE 13 3/8"	VOLUME PUMPED 4,5 bbl
CSG.SHOE DEPTH 1228 m	VOLUME RECOVERED 4,5 bbl
WATER DEPTH 337 m	FORMATION TYPE Claystone
HOLE SIZE 12 1/4"	LEAK OFF PRESSURE 625 bar
HOLE DEPTH 1240 m	SHUT-IN PRESSURE 67 bar
MUD WEIGHT 1,35 sg	SHUT-IN TIME 12 min
PUMP RATE 1/2 bpm	

EQV. MUD WEIGHT AT CSG. SHOE: 1,86 sg

bbl	bar	bbl	bar
1/2	3		
1	4		
1 1/2	6		
2	16		
2 1/2	32		
3	43		
3 1/2	53		
4	63		
4 1/2	67		

Formation leak-off test data, part 1

Figure 6.8.1

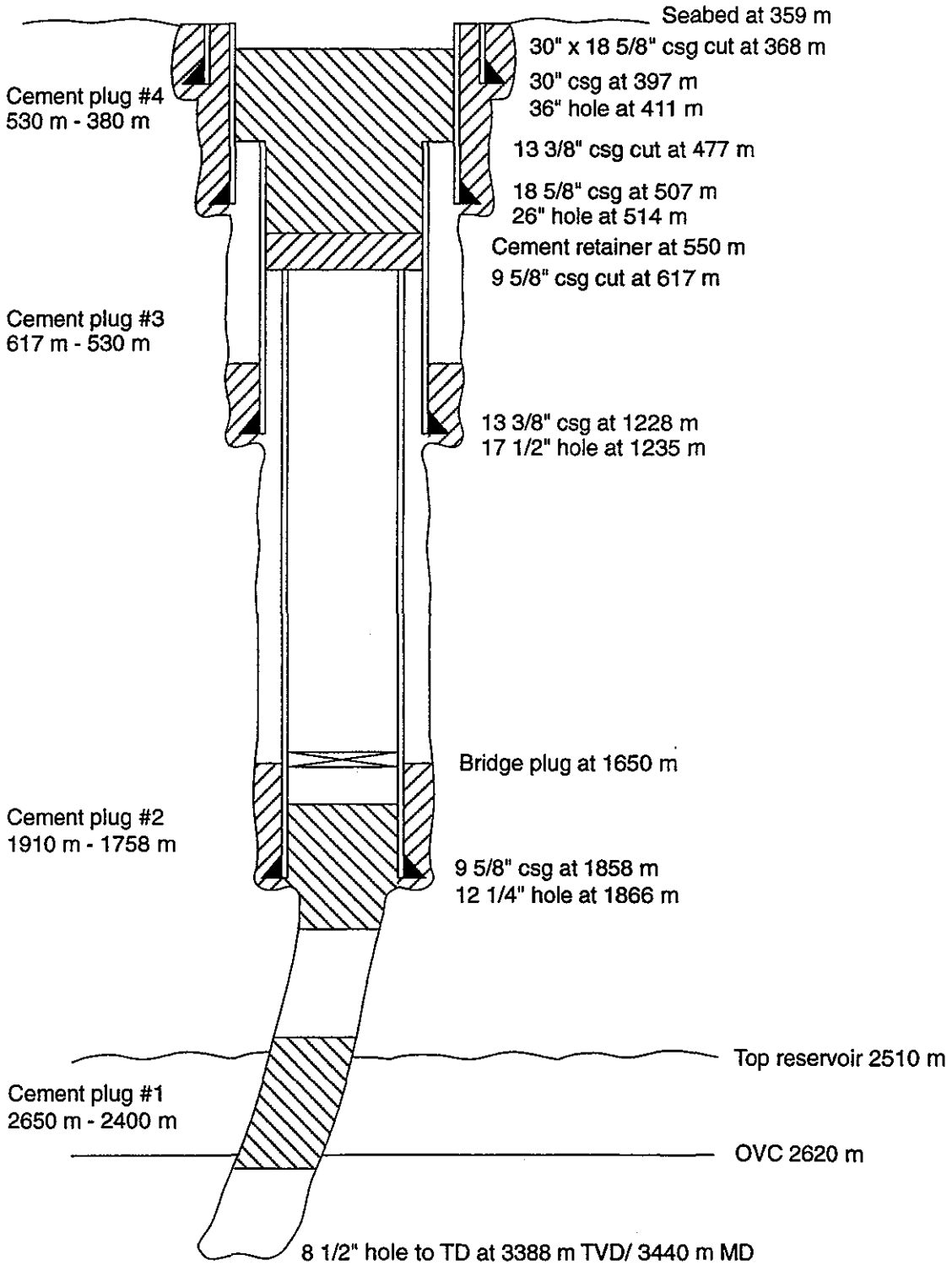


Time consumption vs. mainoperations

Figure 6.9.1

7 WELL PROFILES

All depths are m RKB
Not to scale



Date	Stop	Operational Description
970107	20:30	First anchor on bottom at 15:00 hrs.End of demob Vigdis. Left Vigdis at 10:30 hrs,arrived at location 34/4-9S at 12:10 hrs. Start anchor handling. Anchor #1 on bottom at 15:08 hrs Anchor #5 on bottom at 15:39 hrs Anchor #4 on bottom at 17:27 hrs Anchor #8 on bottom at 17:30 hrs Anchor #6 on bottom at 18:56 hrs Anchor #2 on bottom at 19:25 hrs
	22:30	Man overbord at 20:20 hrs. Picked up by mob.boat from N.Jarl at 20:25 hrs.All operation stopped. Man transported to Snorre TLP and from there to hospital for medical check.Performed investigation Allerted emergency organization. Resumed operation after agreement with Saga onshore/police. Meanwhile performed SJA.
	24:00	Continued anchor handling.
970108	02:30	Continued anchor handling. Anchor #3 on bottom at 00:15 hrs Anchor #7 on bottom at 00:42 hrs All piggy back set and anchor handling completed at 02:15 hrs. Piggy back on anchor 5,6 and 7.
	06:00	Prepared for and deballasted rig.
	09:30	Prepared to RIH.Picked up MWD-DPR and made up BHA #1. Tested MWD-DPR and ran in to 340 m.
	11:00	Moved transponder away from well.
	11:30	Landed bit on sea bottom.Spudded well at 11:30 hrs Seabed estimated at 362 mRKB.
	24:00	Drilled and surveyed 9 7/8" pilot hole from 362 m to TD at 520 m. Reamed hole and repositioned rig several times due to problems with high angel.
970109	00:30	Flow checked well with ROV, OK.
	01:30	Pumped 15 m3 1.18 sg mud and POOH to 400 m.
	02:00	ROV positioned buoy on seabed close to well.
	04:00	POOH. Laid down 9 7/8" stabilizer, bit and sub. Dumped MWD.
	06:00	Picked up 18 3/4" wellhead housing. Made up running tool and racked assembly back in derrick.
	11:00	Prepared and ran 30" casing. Landed in Retrievable Drilling Guide Base (RDGB) on trolley. Installed grouting hose outside of housing joint.
	15:00	Made up 26" x 36" BHA and RIH to seabed.
	16:00	Positioned rig and stabbed in with BHA.
	24:00	Opened hole from 362 m to 429 m. Boulders at 410m Slow progress.

Date	Stop	Operational Description
970110	05:30	Opened up hole to 26" from 429-514m (36" hole down to 412m).
	06:00	Swept hole with 15cum high viscous pill.
	06:30	Made wiper trip up to 412m, OK.
	07:00	Displaced hole to 1,18 sg mud, 90 cum.
	09:00	POOH and racked back BHA.
	10:30	Rigged to run 18 5/8" casing. Found 30" casing missing from RDGB on guidebase trolley.
	12:00	Investigated latch assembly on RDGB.
	13:00	Released latch assembly from RDGB.
	13:30	Removed grouting sub from 18 3/4" housing running tool. Racked back.
	15:30	Prepared to run back up 30" casing. Removed float shoe and ran 3 joints, housing included. Installed RDGB latch assembly to housing. Hung of housing in rotary table.
	21:30	Installed false rotary on top of 30" housing and ran 18 5/8" casing through. Picked up 18 3/4" housing and locked into 30" housing. Made pick up test. Lowered 30"/18 5/8" casing and latched 30" housing to RDGB. Installed Imenco guideline anchors.
	23:00	Ran landing string. 18 5/8" shoe at seabed.
	24:00	ROV attempting to locate hole. Low visibility.
970111	02:00	ROV attempted to locate hole, no go. Sonar out of work and very low visibility. Stabbed blind, took weight after 13 m. Moved rig 3m aft.
	04:00	Stabbed blind, OK. Ran landing string.
	05:30	Rigged up and tested cement hose while checking bulls eye and RDGB clearance to seabed. Adjusted rig position. Bulls eye below 1 degree.
	07:30	Pumped 20 m3 seawater and 60 m3 1,9 sg slurry. Displaced cement with seawater and bumped plug. Tested casing to 70 bar.
	17:30	Held casing in suspension while WOC.
	19:00	Unscrewed running tool and POOH. Laid down tool. Bulls eye 1,5 degrees.
	22:30	Made up fishing assembly out of two 60 t SWL conductor casing wire slings.
	23:30	Ran fishing assembly down to seabed.
	24:00	ROV attempting to locate lost 30" casing on seabed

Date	Stop	Operational Description
970112	02:00	ROV located casing on seabed. Moved rig to position fishing sling. Deballasted rig 2m due to high waves.
	08:30	WOW Time Wind Heave Wave (all in max values) 0300 28 6.6 10.8 0500 25 5.4 10.9 0700 20 3.8 11.2
	14:30	Positioned rig. ROV guided wire loop onto casing. Tightened loop after repositioned rig. Pulled casing loose with 10 t overpull. POOH.
	16:30	Laid down 3 joints - 1 joint left on bottom, joint not located.
	18:30	Made up grouting stinger and attached guide ropes. RIH to seabed.
	19:30	Stabbed stinger between PGB beams. Took weight at 375m. Mixed and pumped 15 m3 cement at 1,9 sg. Displaced same down.
	20:00	Pulled stinger above RDGB and flushed string.
	22:00	POOH and laid down 21 joints of DP for inspection. Laid down stinger.
	24:00	WOW to run BOP. 9,5 meters waves. Meanwhile broke and laid down 36"/26" BHA and cement head.
970113	03:30	Prepared to run BOP; removed torque assembly, installed gimble/spider, picked up large bore (xo) riser joint, 1 pup + 1 slickjoint.
	09:30	Skidded BOP below rotary and made up to riser. Inserted guidelines. Changed VX ring. Lowered BOP in water and tested kill/choke- and conduit lines.
	21:30	Ran riser/BOP. Picked up slip- and landing joint. Connected support ring.
	23:00	WOW to get heave below 2 m.
	24:00	Landed BOP, made 20t overpull test. BOP bulls eye 1 degree. Anchor for guidewire #4 released during landing. Unable to restab in post top.

Date	Stop	Operational Description
970114	03:30	Stroked out inner barrel, laid down landing joint and installed diverter. Cleared floor and installed torque assembly.
	05:00	Made up and ran BOP test plug.
	06:00	Pressure tested connector/UPR to 35/345 bar. Function tested on both pods.
	06:30	Pulled and laid down test plug.
	09:00	Made up seat protector and ran same. POOH.
	12:00	Made up and racked back cement head stand.
	14:00	Pressure tested valves on top drive.
	15:30	Made up 17 1/2" BHA.
	17:30	RIH. Tagged cement at 491m.
	18:00	Pumped through and function tested diverter system
	18:30	Performed choke drill.
	21:30	Displaced hole to 1.12 sg mud while drilling float collar and cement down to 503m. Mud heavily cement contaminated.
	23:00	Circulated and conditioned mud.
	24:00	Drilled cement and shoe at 507m.
970115	00:30	Washed and reamed rathole from 507-520m.
	13:00	Drilled 17 1/2" hole from 520-805 m.
	16:00	Worked pipe while clearing shaker box for blocks of cement and lumps of plastic clay. Circulated bottoms up.
	22:30	Drilled 17 1/2" hole from 805-968 m.
	23:30	Cleared shaker box for cement blocks and "gumbo".
	24:00	Drilled 17 1/2" hole from 968-974 m.
970116	01:00	Drilled and surveyed 17 1/2" hole from 974m to 996m.
	01:30	Trouble shoot gumbo plugging in dump line.
	03:00	Drilled 17 1/2" hole from 996m to 1016m.
	04:00	Repaired gumbo plugging problem in dump line.
	07:00	Drilled and surveyed 17 1/2" hole from 1016m to 1073m. Observed Utsira at 1032m. Made flowcheck.
	08:00	Repaired gumbo plugging problem in dump line.
	14:30	Drilled and surveyed 17 1/2" hole from 1073m to 1212m.
	15:00	Repaired gumbo plugging problem in dump line.
	15:30	Drilled 17 1/2" hole from 1212m to 1235m.
	18:30	Circulated hole clean. Pumped slug.
	22:30	POOH. Hole OK. Stabilizers came out completely balled up with gumbo. Also, bit severely balled up with gumbo. Cleaned stabs and bit and broke off bit.
	24:00	Made up jet sub and washing stinger and RIH to wellhead. Cleaned wellhead for 20 mins.

Date	Stop	Operational Description
970117	01:30	RIH with seat protector R&R tool to retrieve seat protector. Misrun. Found running tool packed with gumbo.
	02:30	Washed and cleaned wellhead area.
	05:00	RIH and retrieved seat protector. Laid down seat protector. Washed and cleaned wellhead area and BOP with washing stinger.
	06:00	Rigged up for running 13 3/8" casing.
	08:00	Picked up and ran shoe joint and float joint while working on casing modem.
	12:30	Ran 13 3/8", 68 PPF, N-80, New Vam casing.
	13:30	Changed to flush mounted spider and air operated 500 T elevator.
	14:00	Repaired link arm on air operated elevator.
	18:00	Continued running 13 3/8" casing.
	18:30	Made up 13 3/8" casing hanger assembly. No lock-ring installed. Changed to 5" DP elevator and slips.
	20:00	RIH with 13 3/8" casing on 5" ITAG HWDP landing string.Hole occasionally tight, but worked through without having to pump. Made up cement stand,broke circulation and landed casing in wellhead.
	21:00	Brought pumps up in steps to 80 SPM, full returns. Suddenly lost all returns, appeared to have plugged off the flowby ports on the hanger. Pumped 10 m3 spacer and tested cement lines to 200 bar.
	22:00	Pumped 27.6 m3 cement slurry mixed at 1.90 sg. Pumprate 7 BPM-no returns during job.Dropped dart.
	23:00	Displaced cement with rig pumps. Had pressure increase both when spacer entered annulus and when the cement slurry went up the annulus-no returns at surface. Bumped plug after 3536 strokes (97.7% efficiency). Tested casing to 110 bar f/10 mins. Checked floats-OK.
	24:00	Set packoff with 21,000 ft-lbs (8 1/2" turns). Tested packoff to 345 bar/10 mins-OK. Started to test BOP.

Date	Stop	Operational Description
970118	02:30	Finished testing BOP. Tested on blue pod. All tests to 35 bar/5 mins and 345 bar/10 mins.
	04:30	Retorqued seal assy to 22,000 ft-lbs. POOH with casing hanger running tool and laid down same. Laid down cement stand. Closed shear rams with acoustics and pressure tested same against casing to 100 bar.
	07:00	Laid down casing modem. RIH and installed 13 3/8 wear bushing.
	09:30	Changed bails. Laid down 17 1/2" BHA.
	12:00	Redressed hangoff stand to hang off on wear bushing. Made up cement head on stand of ITAG HWDP and racked in derrick. Drifted same to 2 3/4".
	14:30	Picked up and RIH with BHA no.4.
	20:30	Picked up 6 5/8" DP from deck and RIH to 800m. Made and breaked drillpipe.
	21:00	Made function test of all rams with acoustics system-OK.
	22:00	Continued RIH with 6 5/8" DP. Broke circulation and tagged cement at 1198m. Picked up 5m.
	22:30	Carried out choke drill with crew.
	24:00	Drilled float and shoetrack down to 1220m.
970119	01:00	Displaced well from seawater to 1.35 sg KCL mud.
	01:30	Drilled rest of shoetrack, shoe and cleaned out rathole.
	02:00	Drilled new formation from 1235 m to 1240m.
	03:00	Circulated and conditioned mud prior to LOT.
	03:30	Carried out LOT to 1.86 sg equivalent mud weight.
	10:00	Drilled and surveyed 12 1/4" hole from 1240m to 1399m.
	11:00	Had drilling break at 1399m, flowchecked well, well flowing. Closed in -no pressures.Investigated mud pumps and found pop off valve had gone. Opened bag-well stable.
	24:00	Continued drilling 12 1/4" hole from 1399m to 1768m. Circulated bottoms up prior to drilling into Balder. Surveyed every second stand with MWD.

Date	Stop	Operational Description
970120	02:30	Drilled 12 1/4" from 1766m to 1866m.
	05:30	Conditioned mud and weighted up from 1.40 sg to 1.48 sg while circulating hole clean.
	10:30	Pumped slug and POOH. Hole slick and taking correct amount of fluid. Flowchecked at shoe and prior to pulling BHA through the BOP.Laid down MWD and motor on way out.
	15:30	Made up jet sub and washing stinger. RIH and washed wellhead area. M/U wearbushing R&R tool and RIH. Retrieve 13 3/8" wearbushing. L/D W.B. R&R tool. Washed wellhead area and POOH with washing stinger.
	16:30	Rigged up for casing. Held safety meeting.
	24:00	Made up and ran shoe joint, two spacer joints and float joint. Bakerlocked connections and checked float equipment in rotary. Ran 9 5/8", L-80, 47 ppf, New Vam casing according to tally.
970121	02:30	Ran 9 5/8" casing.
	03:00	Laid down two joints of casing due to failure to seal.
	06:30	Continued running 9 5/8" casing.
	10:30	Rigged up 10 3/4" equipment. Ran 10 3/4" casing. Last three joints prior to hanger was 10 3/4", C-95, 45 ppf.
	13:00	Made up casing hanger assembly. RIH with casing on 5" ITAG HWDP landing string. Hole slick. No losses while running casing.
	16:00	Landed casing with pumps on. Circulated 40 m3 KCl mud-22 m3 lost. Tested cement lines to 345 bar. Pumped 10 m3 spacer and 13 m3 cement slurry mixed at 1.90 sg- 13 m3 lost. Displaced cement with rig pumps-51 m3 lost.Bumped plug after 3713 strokes (95.8% efficiency).Tested casing to 290 bar for 10 mins. Checked floats-OK.
	17:00	Set seal assembly with 15,000 ft-lbs (8 1/2 turns) Tested seal assembly to 345 bar/10 mins. POOH and laid down running tool and casing equipment.
	19:00	RIH and installed 10 3/4" wearbushing.
	21:00	Changed to drilling bails. Laid down drilling jar and two singles of 8" DC. Laid down cement head.
	24:00	M/U MWD, motor and 8 1/2" drilling BHA. Tested MWD and motor on HWDP.

Date	Stop	Operational Description
970122	10:30	Continued RIH with BHA no.5 while picking up singles of 5" drillpipe from deck.
	11:00	Tagged float at 1820m. Carried out choke drill with crew.
	13:30	Drilled float, shoetrack, shoe and cleaned out rathole to 1866m.
	14:00	Drilled new formation from 1866m to 1870m.
	15:00	Conditioned mud and circulated hole clean.
	16:00	Carried out leak-off test to 2.21 sg equivalent mud weight.Pressure steady (plotting on straight line) until 133 bar, then suddenly dropped to 62 bar (formation fractured). Held 57 bar (1.79 sg equivalent) for 10 mins.
	19:00	Displaced well from KCl mud to 1.48 sg mineral oil base mud.
	24:00	Drilled and surveyed 8 1/2" hole from 1870m to 2013m. Cuttings collected and put in big bags for shipment to shore.
970123	22:30	Drilled and surveyed 8 1/2" hole from 2013 m to 2500 m. Flow checked for 10 min. at 2198 m and at 2289 m.
	24:00	Circulated bottums up for samples. Moved and rotated string.
970124	00:30	Continued to drill 8 1/2" hole from 2500 m to 2505 m.
	02:00	Circulated bottom's up for sample. No sand recovered.
	03:00	Continued to drill from 2505 m to 2515 m.
	04:30	Circulated bottom's up for sample. Sand recovered over shaker.
	08:30	POOH to 1858 m. Flow checked for 10 min. OK. Continued to POOH to 550 m. Flow checked for 20 min. OK.
	09:00	Downloaded MWD tool.
	09:30	Laid down 8 1/2" bit and near bit stabilizer. Racked BHA in derrick.
	13:00	Made up 270' coring assembly.
	14:30	Made up inner barrels and performed space out.
	18:00	Continued to make up BHA and RIH to 2486 m. Worked tight spot from 2188 m to 2207 m.
	18:30	Broke circulation and washed from 2486 m to 2515 m
	20:00	Circulated bottom's up and dropped ball. Pressure increased from 950 psi to 2050 psi. 980 l/min.
	24:00	Cut core no 1. from 2515 m to 2559 m.

Date	Stop	Operational Description
970125	02:30	Continued to cut core no. 1. from 2559 m to 2598 m
	03:00	Pumped out of cored interval. Laid down pup joint and one joint dp.
	07:30	POOH. Flow checked at shoe and at 520 m. OK.
	09:30	Recovered core no.1. 2515 m to 2598 m. 99.9 % recovery.
	12:00	Racked core barrel in derrick. Cleaned and checked core head. 5 out of 10 nozzles found plugged. Made up core barrel and reran core head. Made up new 270' inner barrel.
	14:30	Made up BHA and RIH to 2570 m.
	15:00	Broke circulation and washed down from 2570 m to 2598 m.
	16:00	Conditioned mud and circulated bottoms up. Dropped ball and chased same. 14.1 % gas on bottom's up.
	21:00	Cut core no.2 from 2598 m to 2659 m. Core jammed.
	22:00	Pumped out from 2659 m to 2568 m.
	24:00	POOH. Flow checked at 9 5/8" shoe and at 675 m.OK.
970126	01:30	Continued to POOH w/core no. 2.
	03:00	Recovered core no.2.- 2598 m to 2659 m. 99.7 % recovery.
	04:00	Racked core barrel back in derrick and laid down 2 joints core barrel. Checked corehead - no wear. 4 out of 10 nozzles found plugged.
	05:30	Reran core head. Made up 210' core barrel.
	08:30	Made up BHA and RIH to 2625 m.
	09:00	Broke circulation and washed from 2625 m to 2659 m
	10:30	Conditioned mud and circulated bottoms up. Max. gas 19.2 %.
	16:00	Cut core no.3 from 2659 m to 2723 m.
	20:00	Pumped out to 2650 m. POOH. Flow checked at 9 5/8" shoe and at 658 m.
	21:30	Recovered core no 3. 2659 m to 2723 m. 100 % recovery.
	23:00	Service broke and laid down core barrel.
	23:30	Laid down high speed motor from derrick. Made up new slow speed motor and 8 1/2" rock bit.
	24:00	Checked alignment between mudmotor and MWD. Loaded memory into MWD.
970127	01:00	Continued to make up 8 1/2" BHA.
	04:30	Picked up 63 joints 5" dp. from deck. Picked up 15 joints new 5" dp. from deck and broke in same.
	06:30	Continued to RIH to 2485 m.
	13:30	Broke circulation and logged w/ MWD from 2515 m to 2723 m.
	24:00	Drilled and surveyed 8 1/2" hole from 2723 m to 2884 m.

Date	Stop	Operational Description
970128	16:30	Drilled and surveyed 8 1/2" hole from 2884 m to 2975 m. Had pressure increase and stalled out when attempting to ream back to bottom, prior to connection.
	21:30	POOH. Broke out bit and found 2 cones missing.
	22:00	Down loaded MWD and racked same back in derrick.
	24:00	Made up 8 1/2" Reverse circulating junk basket and 2 x junk baskets. RIH to 700 m.
970129	02:30	Continued to RIH with rev.circ. junk basket to 2970 m.
	03:30	Washed down and tagged T.D. at 2975 m. Dropped ball and chased same. Worked circ basket and junk subs.
	08:00	POOH. No fish recovered.
	10:00	Made up 8 1/2" junk bit, 2 x junk baskets. Made up BHA and RIH to 1850 m
	11:00	Slipped and cut 30 m drilling line.
	12:30	Continued to RIH to 2975 m.
	13:00	Circulated and conditioned mud. Reciprocated pipe.
	15:00	Drilled/milled on fish from 2975 m to 2976 m.
	19:00	POOH. Recoverd 1.0 kg. junk in junk subs, including one "big" piece found stuck between the three cones, locking up same.
	23:00	Made up rev.circ. junk basket, w/two junk subs. RIH to 2970 m.
	24:00	Circulated, dropped ball and chased same. RIH, tight from 2975 m. Reamed from 2975 m to 2976 m.
970130	00:30	Continued working reverse circulating junkbasket.
	05:00	POOH with rev.circ. junk basket. Recovered minor amount of steel cuttings. L/D basket.
	10:00	M/U 8 1/2" bit and 6 3/4" motor. Checked MWD and RIH to TD.
	10:30	Circulated and conditioned mud.
	20:00	Worked bit through junk. Drilled 8 1/2" hole from 2976 to 3096 m. Recorded torque increase.
	21:30	Circulated bottoms up.
	24:00	POOH.
970131	01:30	Continued POOH. Changed bit.
	06:30	RIH to 3096 m.
	24:00	Drilled 8 1/2" hole from 3096 to 3316 meter.

Date	Stop	Operational Description
970201	10:00	Continued drilling 8 1/2" hole from 3316 to 3402m. Pump-pressure increased.
	10:30	Reamed from 3402 m to 3373 m. Pump-pressure deacreased while torque increased.
	11:00	Circulated and attempted to continue drilling. Found rubber-pieces on shaker on bottoms up. Suspect downhole-motor failure.
	16:00	POOH due to Downhole-motor failure and TD of well. Max O/P (first stand):30 tons.
	17:30	L/D 6 1/2" DC, Jar, String stab, Floatsub, MWD, Motor and bit.
	24:00	R/U Wireline equipment. Run in at 1933 hrs w/ AITH/DSI/LDT/CNT/NGT/CMR
970202	20:00	Continued logging AITH/DSI/LDT/CNT/NGT/CMR (log#1) Lost 2 hrs. due to software problem. Out at 1735 hrs. L/D tools.
	23:30	Prepared to run MDT. Reterminated cable head and checked tool.
	24:00	RIH w/ MDT (in at 2317 hrs).
970203	04:00	Ran in with MDT. Correlated depth. Took formation sample at 2583 m and pressure points.
	05:00	Problems with winch hydraulic.
	12:00	Continued taking pressure points (20 / planned 29) Unable to pass 3100 m. POOH (5000 lbs overpull across reservoir section). Cancel further MDT program.
	14:30	Picked up and made up 3 1/2" DP. To be used for plug & abandon operation.
	19:30	Made up 8 1/2" BHA and RIH to 1460 m. Made up hang off stand with grey valve below.
	24:00	WOW.

hrs	1900	2200	2300
max wind(m/s):	31	26	24
max heave (m):	4.0	6.8	5.2

970204	06:00	WOW.	

Hrs:	0200	0400	0600
Roll:	4.6	3.6	3.5
Pitch:	2.2	5.4	4.6
Heave:	5.2	6.2	3.8
Wind:	29	25	18

	07:00	Racked back hang off tool. Made up BOP test tool.
	15:00	RIH w/ BOP test plug. Pressure tested BOP. Pulled out with test plug. Pressure tested IBOP's.
	18:00	Continued RIH to 3402 m.
	23:00	Drilled 8 1/2" hole from 3402 to 3440m (new TD).
	24:00	Circulated bottoms up. Reamed and logged MWD while circulating bottoms up.

Date	Stop	Operational Description
970205	01:00	Circulated bottoms up.
	07:00	POOH. Dumped MWD memory. Laid down MWD/Stabilizer.
	09:30	R/U Wireline. R/U VSP equipment and RIH to 1000 m.
	10:30	WOW to deploy Rig Guns.
	12:00	Tested instruments and made checkshots.
	12:30	Computercrash. Worked on problem.
	16:00	RIH to 3432 m. Started shooting VSP.
	16:30	Stopped shooting due to failure on waterpump on VSP boat.
	24:00	Continued shooting VSP. Fixed offset VSP abandoned at 2590 m due to weather condition. Continued and completed Rig Source VSP up to 1470 m. Decided to cancel VSP Walkaway due to weather-forecast. POOH.
970206	00:30	Rigged down Schlumberger.
	04:30	Made up 3 1/2" diverter tool and 11 stands 3 1/2" drill pipe and RIH to 2750 m.
	05:00	Broke circulation and pumped 5 m3 high viscous pill. Displaced same with 22.8 m3 mud.
	05:30	POOH with 4 stands and installed pump in sub. Pressure tested surface lines.
	07:30	Pumped 3 m3 MCS-G spacer. Mixed and pumped cement plug #1. Pumped 9.2 m3 1.90 SG slurry.
	09:00	Pulled slowly up to 2115 m. Made up cement stand.
	11:00	Closed annular and reverse circulated a total of 26 m3. Opened annular and circulated bottoms up long way.
	11:30	Pulled up to 2010 m.
	12:00	Pumped 5 m3 high viscous pill. Displaced same with 16 m3. Pulled up to 1910 m.
	13:00	Made up cement stand.Pressure tested surface lines Pumped and displaced 3 m3 MCS-G spacer and 6.0 m3 1.90 SG slurry.
	14:30	Pulled up slowly to 1650 m. Made up cement stand.
	15:30	Closed annular and reverse circulated. Lined up and circulated a total of 119 m3 long way. Slugged pipe.
	18:30	POOH.
	20:00	Made up bridge plug, hydraulic setting tool,3 1/2" pup joint,fill up sub,bumper sub and circulation sub. Filled base oil below circulating sub.
	23:00	RIH slowly to 1650 m.
	24:00	Dropped ball and chased same with mud. Lined over to BJ and pressured up to 2700 psi to set bridge plug at 1650 m.Set down 10 tons on bridge plug.OK. Closed middle pipe ram and pressure tested plug to 181 bar for 10 min. OK.

Date	Stop	Operational Description
970207	03:30	Dropped ball. Pumped 4 m3 seawater. Displaced well to 1.43 SG KCL mud.Pumped interface back into well Mixed slug.
	05:30	Pumped slug and POOH.
	06:30	Laid down running equipment.
	07:00	Made up rubber nose and jetting tool. RIH with same to wash wellhead.
	08:00	Made up wear bushing running tool and RIH on 5" drill pipe.
	10:00	Landed and latched on to wear bushing. Released and retrieved same. Laid down wear bushing and wear bushing retrival tool. Washed wellhead on way out.POOH and laid down jetting tool and rubber nose.
	11:00	Cleaned up on rig floor. Made up seal assembly retrieving tool on 6 5/8" drill pipe. Checked every connection to maximum make up torque.
	12:00	Changed to 6 5/8" full hole saver sub on TDS.
	14:00	Checked seal assembly retrieving tool on surface. RIH on 6 5/8" drill pipe. Made up each connection to max. torque.
	15:00	Landed in wellhead. Set down 5 tons. Engaged retrieving tool to seal assembly with right hand torque. Took 5 tons overpull test. Closed annular with reduced pressure. Applied 20000 ftlbs left hand torque. Held 5 tons in tension. Seal assembly came loose after 15 turns.
	16:00	POOH and laid down seal assembly retrieving tool.
	20:00	Prepared and made up 8 1/4" cutter.RIH on 5" drill pipe. Made up swivel assembly. RIH on 6 5/8" drill pipe. Landed swivel in wellhead and set down 10 tons.
	22:30	Filled pipe and checked torque readings. Closed annular. Had problems to get rotation on annular swivel,most probably due to bad weather conditions Cut 9 5/8"/10 3/4" casing at 617 m. Flowchecked for 10 min. OK. Circulated through kill and choke line. Pumped slug.
	24:00	POOH.

Date	Stop	Operational Description
970208	00:30	POOH and laid down cutter.
	11:30	Waited on weather.(Displaced riser to SW) Max weather conditions;

A	B	C	D	E	F	G
0100	32	-	6.1	6.4	7.1	280
0200	29	14.7	7.8	8.0	6.0	282
0400	32	14.3	6.2	5.3	5.0	283
0600	29	15.4	6.6	4.7	4.0	290
0800	25	12.5	5.4	4.9	4.3	290
1000	16	12.4	5.2	4.2	4.8	281
1100	11	-	5.0	3.3	4.7	260

A=Time
B=Wind speed (m/s)
C=Wave hight (m)
D=Heave (m)
E=Roll (m)
F=Pitch (m)
G=Wind direction

12:30	Laid down diverter R-tool. Displaced riser back to KCL mud. Removed handling equipment.
16:00	Prepared and made up spear assembly with 1 stand of 8" drill collar. Ran in with 6 5/8" drill pipe and landed stop sub in wellhead.
17:00	Engaged spear. Pulled casing free with 5 tons over pull. Weight increased after pulling 5 m. circulated and worked pipe free with max. 110 tons overpull.
19:30	Retrieved and racked running string. Lockring on 10 3/4" hanger left in hole, most likely in BOP.
22:30	Held safety meeting and performed SJA prior to laying down 10 3/4" casing manually due to problems with casing modem. Repaired casing modem and used same during pulling and laying down 10 3/4" casing. Rigged down handling equipment.
24:00	Made up 3 1/2" diverting tool with 1 stand of 3 1/2" drill pipe. RIH slowly on 5" drillpipe due to lockring left in hole.

Date	Stop	Operational Description
970209	01:00	RIH to 615 m. Pressure tested surface lines to 200 bar. OK.
	01:30	Attempted to perform injection test. No go. Applied max. pressure of 100 bar with annular closed.
	02:30	Pumped 3 m3 seawater spacer and 7.5 m3 1.90 SG cement slurry. Displaced/balanced same with 0.43 m3 seawater and 3.8 m3 KCL mud. (Underdisplaced with 0.5 m3).
	04:30	POOH to 480m. Closed annular and reverse circulated two string volumes. Lined up to squeeze No go. Circulated long way. Pumped slug.
	05:00	POOH.
	07:30	RIH with 11 stands 3 1/2" drill pipe.POOH and laid down same. Laid down 2 each 6" drill collars and 6" jar from derrick.
	09:00	Made up bullnose and jetting tool on one stand 5" drill pipe. Racked same in derrick. Made up and checked 13 3/8" cutter on one stand 5" drill pipe. Racked same in derrick.
	11:30	Picked up stand with jetting tool and RIH with same on 6 5/8" drill pipe to 470 m.
	13:30	Circulated and washed down to 525 m. Circulated bottoms up. Continued to wash down. Tagged cement with 10 tons at 530 m. Slugged pipe.
	14:30	POOH.
	16:30	Made up mill and flush tool on 1 stand 5" drill pipe and XO to 6 5/8" drill pipe and RIH to top BOP. Broke circulation and washed down to wellhead Worked tool up and down in BOP area. POOH. (Ran mill and flush tool due to missing lockring).
	17:00	Closed blind shear ram and pressure tested cement plug to 120 bar while POOH.
	20:00	Made up 13 3/8" cutting assembly and RIH with same on 6 5/8" drill pipe. Landed marine swivel in wellhead and set down 10 tons. Filled pipe and took torque readings. Closed annular on annular swivel and cut casing at 477 m. OK.
	23:00	Lost approx. 4 m3 mud after cutting 13 3/8" casing Flowchecked. OK. Displaced kill and choke line to seawater. Flowchecked. OK. Displaced riser to seawater (used booster). Opened annular and flowchecked. OK.
	24:00	POOH and laid down casing cutter.

Date	Stop	Operational Description
970210	04:00	Prepared to pull BOP.Laid down diverter and installed landing joint.
	16:00	Disconnected BOP.Laid down landing joint and slip joint.Pulled BOP and riser.BOP on carrier at 13:45 hrs.Disconnected BOP and laid down remaining risers.
	18:00	Rigged down riser handling equipment.Installed pipe handler.
	24:00	Picked up 13 3/8" pack-off assembly and spear with grapple for 13 3/8" casing.Installed guide ropes on guidelines.RIH on 6 5/8" drill pipe.Engaged 13 3/8" casing and pulled same free with 25 tons overpull.POOH and laid down 13 3/8" casing.
970211	01:30	Continued to lay down 13 3/8" casing.
	03:30	Made up 3 1/2" diverter tool to 5" drill pipe. Installed guide ropes on guide lines.RIH.Tagged cement plug at 527 m.
	04:30	Made up cement equipment.Pressure tested surface equipment.Pumped 3M3 seawater and 23 M3 cement slurry (1.90 SG).Displaced same with seawater.
	06:00	POOH to 380m.Circulated at maximum rate to clean pipe and 18 5/8" casing.POOH.
	09:30	Picked up cutter and adjusted knifes.Installed space out subs and MOST tool.Installed guide ropes and clamps on celler deck.
	10:30	RIH on 6 5/8" drill pipe.Landed assembly and set down 10 tons.
	12:00	Filled pipe.Rotated pipe with 130 RPM.Cut 18 5/8" and 30" at 368 m in 1 hr.
	14:00	Not able to rotate string.Ran in with subsea TV camera.Found wellhead bended over.
	16:00	Engaged MOST tool.Overpull 15 tons.Pulled out using subsea TV-camera.Pulled up to 100 m.
	17:30	Engaged safety pins with ROV prior to pulling through splash zone.
	19:00	Pulled out of water with Retrievable drilling guide base and landed same on trolly. Seafastened same, unlatched guidelines and released MOST tool.
	20:30	Laid down cutting assembly.
	22:30	Made up 18 3/4" running tool and connected same to wellhead on celler deck.Pulled and laid down same.
	23:30	Laid down spear with grapple,pack-off assembly and bumper sub. Laid down cement hose,pump-in sub, kelly cock and X-over.
	24:00	Changed elevator and laid down annular swivel, pup joint and X-over.

Date	Stop	Operational Description

970212 15:30 Anchor handling boats waited on weather prior to start unmooring.

Time	Waves(max)	Waves(sign)
0200	9.0 m	5.2 m
0800	6.7 m	4.3 m
1200	7.0 m	4.1 m
1600	5.1 m	3.3 m

Note: Performed final seabed survey with ROV.
Recovered transponders.

24:00 Started unmooring operations.Changed out anchor chain #8.

970213 08:30 Continued operation to change anchor chain #8 (Katun). Northern Chaser pulled piggy back #5 and #6. Stopped unmooring operations due to bad weather.

24:00 Weather to rough for anchor handling.

Time hrs	Wind m/s	Waves max/sign m
0800	20	4.9/3.0
1200	24	7.1/4.4
1600	26	8.3/4.9
2000	25	11.8/5.6
2400	23	7.8/4.9

970214 21:00 Waited on weather.Sea to rough for anchor handling

24:00 Continued unmooring operations. Started to deballast rig at 21:00 hrs. Meanwhile N.Chaser started to pull anchor #2 at 21:30 hrs. F.Sea started to pull anchor #4 at 22:30 hrs.

970215 09:30 Anchorhandling. Finished deballasting rig at 01:30
Anchor no 2 on bolster at 01:44 hrs
Anchor no 4 on bolster at 02:41 hrs.
Anchor no 6 on bolster at 05:18 hrs.
Anchor no 3 on bolster at 07:30 hrs.
Anchor no 7 on bolster at 04:24 hrs.
Anchor no 1 on bolster at 07:45 hrs.
Anchor no 5 on bolster at 09:30 hrs.
End of well 34/4-9S.

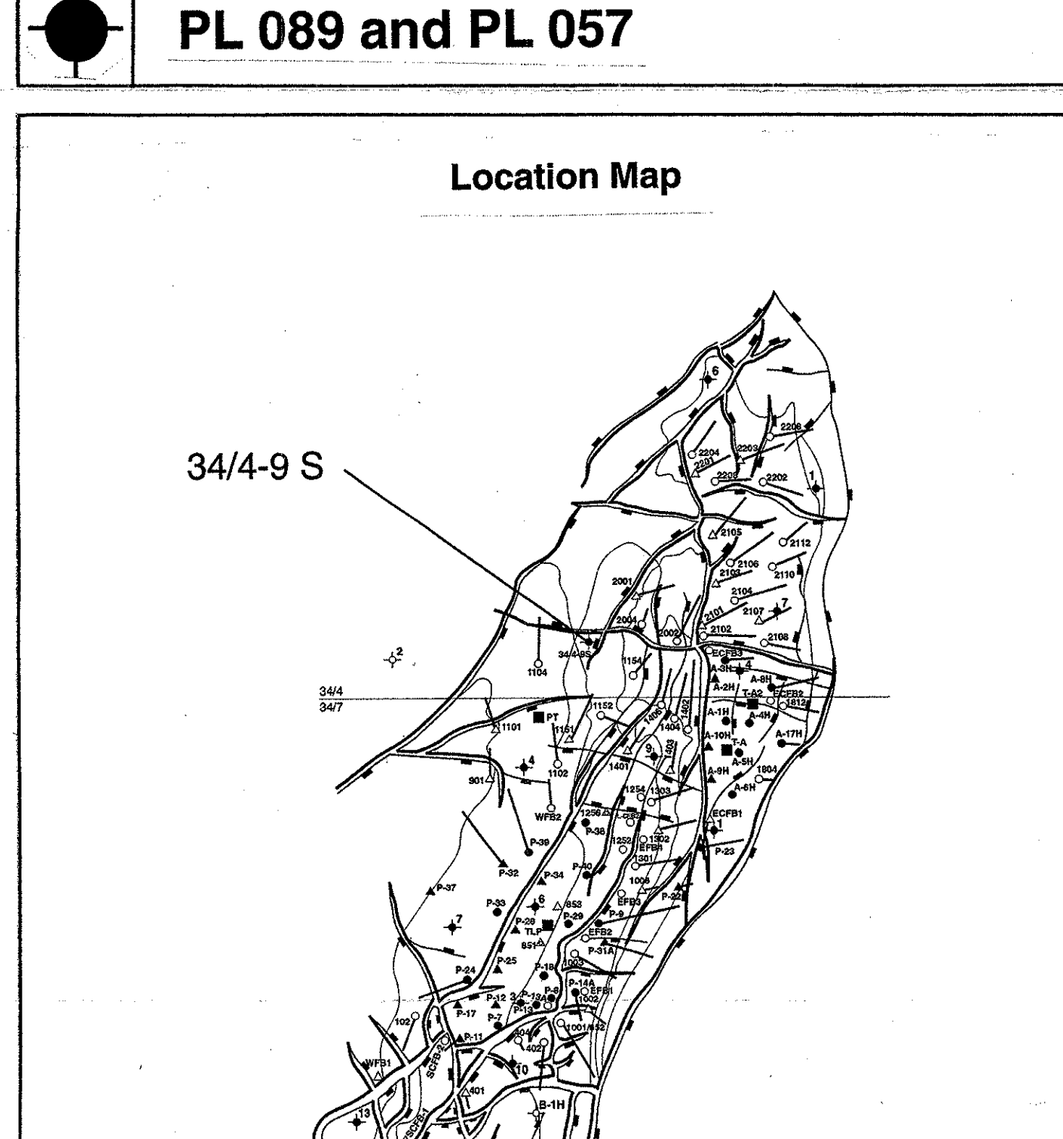
Esso/ Statoil/ Norsk Hydro/ Elf/ Deminex/ Amerada/ Enterprise/ Idemitsu

Saga Petroleum ASA

Composite Well Log 34/4-9 S

PL 089 and PL 057 | **Snorre Field, Norway** | **Scale 1:500**

Location Map



Spud Date	:	January 8, 1997
TD Date	:	February 4, 1997
Rig Release Date	:	February 15, 1997
Rig	:	Scarabeo 5
Elevations		
RKB - Mean Sea Level	:	25 m
RKB - Sea Floor	:	359 m
Water Depth	:	334 m
RKB - TD (driller's depth)	:	3440 mMD
RKB - TD (logger's depth)	:	3437 mMD

MWD and Wireline Log Summary

Hole size	Casing (m MD RKB)	Log type	Logged interval	Run no.	Date
36" to 411 m	30" at 397 m	MWD : (DIR)			
26" to 514 m	18 5/8" at 507	MWD : (DIR)			
17 1/2" to 1235 m	13 3/8" at 1228	MWD : (DIR)			
12 1/4" to 1866 m	9 5/8" at 1858				
8 1/2" to 3440 m		MWD : (GR, resistivity, DIR)			
		WL : AIT/DST/LDT/CMT/NGT/CMR	1858-3440	1A	02.02.97
		WL : MTD/GR/ACTS	3440-1858	1A	03.02.97
		VSP	3440-1470		05.02.97

Author: (M. Bergan)/ R. Sørlie | **Appr.:** M. Bergan | **Drafted by:** Stratlog/ G. B. Røed | **Date:** 28.08.97

Geological Symbols

Breccia, Conglomerate, Sand/ Sandstone Coarse, Sand/ Sandstone Fine-med., Silt/ Siltstone, Clay/ Claystone, Shale, Mudstone, Shaly mudstone, Shaly siltstone, Limestone, Dolomic Limestone, Dolomite, Calcerous Dolomite, Chalk, Siderite, Marl, Volcanics, Coal, Salt

Lith. Prefixes

⊥ Calcareous; Dolomitic; — Argillaceous; • Sandy; ○ Pebbly; ▽ Cherty; Glauconitic; M Micaceous; □ Pyritic; V Tuffaceous; S Siderite; C Carbonaceous; K Kaolintic; Shell fragments; Foraminifera; F Fault

Well Log Symbols

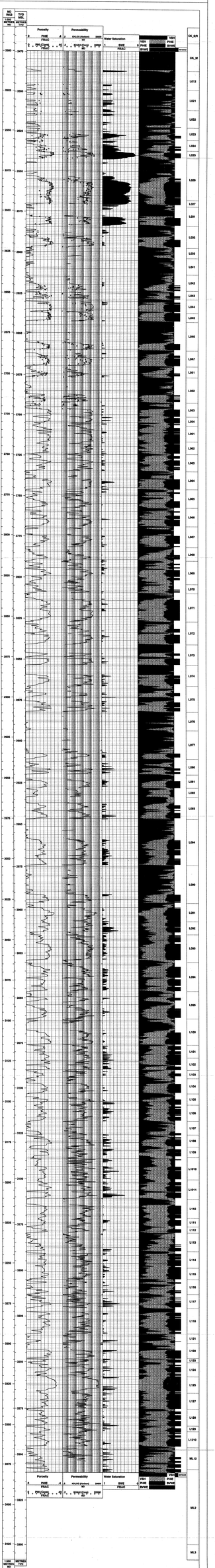
FMT/ MDT; Tight test; Sidewall core; Core; Oil well; Water injection


34/4-9S
FWR
MD Measured Depth
DEPTH TVD
STRATIGRAPHY Geologic Time Panel
RESZONE
STAGE
GROUP
FM
GR/CAL
CALI (inch) 8.0 11.0
GR (api) 35.0 135.0
Lithology
CORES
res
RD (ohmm) 0.2 20.0
RM (ohmm) 0.2 20.0
sonic
DTCO (us/ft) 140.0 40.0
34/4-9S4001 Annotation Panel
neutron/density
RHOB (g/cm3) 1.95 2.95
NPHI (fraction) 0.45 −0.15
PALEOGENE
ROGALAND
SELE/LISTA
LATE CRETACEOUS
SHETLAND
EARLY CRETACEOUS
CROMER KNOLL
MIME.
SOLA/RODBY
LATE TRIASSIC
HEGRE
LUNDE
L01 L02 L03 L04 L05 L06 L07 L08 L09 L10 L11 L12 ML1 ML2 ML3
CALCAREOUS CLAYSTONE
Clst: m gy, sft-frm, amor, v calc
Calc Clst: m gy - gn gy, sft - frm, amor - sbblky, pt stc, mic mica, sl slty, calc - v calc, loc glauc
Tr Ls: wh - gy wh, frm, micxln
Tr Sst: clr - mlky wh, vf - m, sbang - sbrnd, mod srtd
CLAYSTONE
Clst: slty, m - dk gy, mod brn, non calc - calc, mic mica
Tr Ls: pk gy - off wh, frm, blky
Tr Ls: pa yel brn, frm - fri, blky,
Clst: slty, sl sdy, dk gy - olv blk, frm, mod hd, blky, non calc
Tr Ls: occ dol, v lt gy, pa yel brn, frm, blky, occ v arg
Sst: v lt gy, vf, w srtd, sbrnd, fri, non calc cmt, mod vis por
Clst: olv gy, frm - hd, blky, mic mica, calc
MARL AND CLAYSTONE INTERBEDDED WITH LIMESTONE STRINGERS
Mrl: mod brn, frm, blky, slty, mic mica
Clst: olv blk, dk-olv gy, slty, mic mica, calc
Ls: wh-gy wh, frm, blky, sl arg
MUDSTONE INTERBEDDED WITH SANDSTONE AND LIMESTONE STRINGERS
Mdst: mod brn, frm-mod hd, non calc, micmica
Shows in Sst from 2540m no stn - 100% lt brn stn, yel wh flor, inst strmg bl wh cut, bri yel flor resd, pl brn vis resd
Sst: lt gy - lt brn gy, vf-m occ crs, mod-p srtd, ang-sbrnd, fri-frm, mica - v mica, fr-ex vis por
MUDSTONE INTERBEDDED WITH SANDSTONE
Mdst: mod brn occ gn gy, mod hd-hd, non calc-calc, micmica
Shows: no shows below 2622m
SANDSTONE INTERBEDDED WITH MUDSTONE
Mdst: mod brn, mod hd, non calc - calc, micmica, in pt grdg Sltst
Sst: lt gy, lt gn gy, pred vf-f, loc vf-crs, w-mod srtd, sbang-sbrnd, frm-hd, sl kao cmt, occ v calc cmt, tr micmica, p-fr vis por
Sst: lt brn - lt gy occ lt gn gy, vf-m occ crs, mod srtd, sbang-sbrnd, lse-fri-frm, sl v calc cmt, in pt kao cmt, chlor in pt, fspr, mica, mod-pr vis por
Tr Ls nods: lt gy - lt brn, fri-frm, blky, arg, occ sdy
Sst: lt gy, gn gy, vf-m occ crs, mod-p srtd, sbang-sbrnd, lse-fri occ hd, sl-v calc cmt, in pt kao cmt, chlor in pt, loc slty, mica, fr-p vis por
Mdst: mod brn, occ gn gy, frm-hd, blky, non-sl calc, micmica
Tr Ls: mod brn, hd, blky, arg grdg mrl
Mdst: gy brn, frm - mod hd, sbblky - blky, sl calc - calc, mic mica
Sst: lt gy, gn gy, vf - crs occ v crs, mod srtd, sbang - sbrnd, lse - fri - frm occ hd, in pt calc cmt, in pt kao cmt, chlor in pt, mica, p - fr vis por
Tr Ls: wh - mod brn, frm - mod hd, blky, arg
SANDSTONE INTERBEDDED WITH MUDSTONE
No show
SANDSTONE INTERBEDDED WITH MUDSTONE AND LIMESTONE
Ls: wh-lt gy, mod hd-hd, blky
No show
49S29083337 u81954 29-Aug-1997 08:33

"Appendix 3"

WELL NAME: 34/4-9S

SAGA Petroleum ASA
FINAL WELL REPORT, AUG. 97
SCALE 1:500 m MD RKB



Saga Petroleum ASA

Wellsite Core Description, Well 34/4-9S

WELL: 34/4-9S	DATE: 25.01.97	GEOL: Ew/EiS	SCALE 1: 50
CORE NO: 1	FROM: 2515 m TO: 2598 m CORED: 83.0 m REC: 82.7 m. 99.6 %.		FORMATION: LUNDE

DESCRIPTION

Mdst: mod brn, frm - mod hd, blky, sl calc - calc, tr mic mica, mic pyr, occ v calc, grdg mrl, occ w/ carb nods

Sst: v arg, pa brn, hd, vf, psrtd, sbang - sbrnd, calc cmtd, ab mica, no vis por, grdg sltst
No Shows

Mdst: occ lt gy pch, else a/a

Sst: lt gy, arg, fri, vf-f, mod srtd, ab mica, g vis por
No Shows

Sst: v slty grdg sltst, gn gy, vf-f, mod srtd, frm, ab mica, p vis por
No Shows

Mdst: mod brn, frm, fis, v calc, sl mic mica

Sltst: mod brn, frm, blky, mic mica, v calc

Sst: m gy, vf-f, calc cmtd, frm, ab mica, p vis por, arg
No Shows

Mdst: mod brn, frm, blky, non calc - calc, occ lt gn gy pch

Sltst: mod brn, spk, lt gn gy, sft - frm, blky, ab mica, non calc
No Shows

Mdst: a/a

Sltst: sl sdy, lt gn gy, blky, v calc, mic mica
No Shows

Mdst: mod brn, frm - mod hd, blky, calc, ab mica

Sst: lt gy, lt brn, vf-m, pred f-m, arg mtx, p srtd, sl calc cmtd, mod vis por
Shows: lt brn stn, wk - fr hc od, yel flor, inst strng bl wh cut, wh res upon evap

Sltst: sl sdy, lt gy, frm - mod hd, non calc, v mic mica

Sst: brn hc stn, pred f, mod srtd, ang - sbrnd, fri, ex vis por
Shows: strng hc od, brn stn, yel brn flor, inst - fst strng bl wh - milky wh, cut, lt brn vis res, brt yel wh flor resd

Mdst: pred mod brn, occ gn gy spk, frm - mod hd, non calc - calc, sl mic mica

Sst: lt gy - lt brn gy, vf-f, mod srtd, v mica, arg, fr vis por

Sst: mod brn, f-crs, pred m-c, mod srtd, ang - sbrnd, fri, sl calc cmtd, mica, fr-g vis por

Sst: lt brn, f-crs, pred m, p srtd, sbang, spt m gy sltst, mod vis por
Shows: wk - strng hc od, fr-ex lt brn stn, yel - yel brn flor, inst strng pa bl cut, lt brn vis resd, brt yel flor resd

Sst: grdg sltst, lt gy, vf-f, arg mtx, fri, v mica, fr vis por

Sst: mod brn, vf-m, pred f-m, p srtd, sbang - sbrnd, fri, sl calc cmtd, mica, g vis por
Shows: a/a

Sltst: lt gy, frm - mod hd, blky, v calc

END OF CORE #1

Sst: lt gy - lt gn gy, vf, occ crs, w srtd, occ mod srtd, sbrnd, frm, calc & Kao cmtd, ab mic mica, p vis por

Mdst: mod brn, mod hd, blky, non calc, ab mic mica

Sst: vf-m, w srtd, sbang - sbrnd, lt gy, lt brn gy, fri, sl kao cmtd, tr mic mica, fr - ex vis por
Shows: Hc od, lt brn stn, brt even lt yel flor, inst yel wh cut, yel wh res upon evap

Mdst: mod brn, hd, blky, non calc, tr mic mica, occ gn gy, hd, blky, v calc, gsy surf

Sst: lt gy - lt gn gy, vf-m, w srtd, sbrnd, fri - frm, occ hd, occ v calc cmtd, tr mic mica, p - fr vis por
Shows: Wk hc od, no stn, pch brt/dull, yel wh flor, fst - slw strng dull bl wh cut

Mdst: mod brn, occ gn gy, hd, blky, sl calc - calc, tr mic mica

Mdst: mod brn, hd, blky, non calc - calc, tr mic mica

Sst: grdg sltst, lt gy - lt gn gy, vf, mod srtd, sbrnd, frm, blky, kao cmt, mic mica p vis por

Sst: lt gy, pred f, w srtd, sbrnd, frm, non calc - calc cmtd, p - fr vis por

Sst: vf-f, 1/P calc cmtd, else a/a

Sst: lt gy, vf, w srtd, sbrnd, fri, kao cmt, mic mica, fr vis por, occ arg

Sst: lt gy, f-m, w srtd, sbrnd, frm, sil cmtd, calc cmtd, tr mic mica, p-fr vis por

Mdst: mod brn, hd, blky, non calc, mic mica

Sst: lt gy - lt gn gy, pred f, w srtd, sbrnd, fri, calc cmtd, mic mica, chlor, fspr, fr vis por

END OF CORE #2

Sst: lt gy - lt gn gy, vf-c, mod srtd - w srtd, sbrnd, fri, calc & kao cmtd, tr mic mica, fspr, p - fr vis por

Mdst: mod brn, hd, blky, non calc, mic mica, occ w/ m gy pch

Sltst: arg, gn gy, hd, blky, calc, mic mica

Sst: lt gy - lt gn gy, f-m, w srtd, sbang - sbrnd, fri - frm, kao & calc cmt, tr mic mica, fspr, p - fr vis por

Sltst: non calc, else a/a

Sst: a/a

Mdst: grdg sltst, mod hd, mod brn, blky, non calc, ab mic mica

Sltst: gn gy, hd, blky, non calc

Sst: lt gy - lt gn gy, vf, w srtd, sbrnd, frm, sil cmtd, occ v calc cmtd, mic mica, p - fr vis por

Mdst: mod brn, mod hd, blky, non calc - calc, mic mica

Sst: a/a

Mdst: a/a

Sst: a/a

Sst: lt gy, m - c, w srtd, sbrnd, hd, v calc cmtd, grdg sdy Ls, no vis por

Mdst: a/a

Sst: grdg sltst, gn gy - dk gn gy, vf, mod srtd, sbang - sbrnd, mod hd, non calc, mic mica,

Sst: lt gy, f-m, w srtd, sbrnd, frm, non calc, ab mica, p - fr vis por

END OF CORE #3