U-567

Saga Petroleum a.s.

3

Licence : 089

Partners : SAGA/ESSO/STATOIL/NORSK HYDRO/ELF/DEMINEX/DNO

Date : MAY 1988

Revision no. :

Date of revision :

Word Processing :

FINAL WELL REPORT

34/7-11 & 12

Norwegian Continental Shelf

Classification / Distribution [x] Saga and partners

	Exploration	Petr.Tech.	Drilling	Snorre Dev. Planin
Responsible Author	T. L. Larsen	C. Slungaard	S. Bjørheim	G. Diesen
Reviewed	B. Gustavsen	P. Smestad	P. Alavenes/T. Vatn	B. A. Rasmusse
Accepted				
Approved				

Head Office Oslo
Address
Maries vei 20
P.O.Box 9
1322 Høvik
Norway

Telephone
Nat. (02) 12 66 00
Internat. 47 2 12 66 00

Telex
18852 Saga n
Facsimile
Nat. (02) 53 99 00
Internat. 47 2 53 99 00

Regional Office Stavanger
Address
P.O.Box 117
4033 Forus
Norway

Telephone
Nat. (04) 57 66 55
Internat. 47 4 57 66 55

Telex
33244 sagap n
Facsimile
Nat. (04) 57 02 61
Internat. 47 4 57 02 61

Bl nr 505

DISTRIBUTION LIST

Copy No.	Company
1	NPD
2	"
3	Statoil
4	"
5	Esso Norge A.S
6	" " "
7	Norsk Hydro Produksjon a.s.
8	" " " "
9	Elf Aquitaine Norge A/S
10	" " " "
11	Deminex (Norge) A/S
12	" " "
13	Det Norske Oljeselskap a.s
14	" " " "
15	Saga Petroleum a.s., Høvik
16	" " " "
17	" " " "
18	" " " "
19	" " " "
20	" " " "
21	" " " "
22	" " " "
23	" " " "
24	" " " "
25	" " " "
26	" " " "
27	" " " "
28	" " " "
29	" " " "
30	" " " "
31	" " " "
32	" " " "

Copy No.	Company
33	Saga Petroleum a.s., Høvik
34	" " " "
35	" " " "
36	" " " "
37	" " " "
38	Saga Petroleum a.s., Stavanger
39	" " " "
40	" " " "
42	" " " "
42	" " " "
43	" " " "
44	" " " "
45	" " " "
46	" " " "
47	" " " "

2. SUMMARY

2.1 Exploration

The primary purpose of well 34/7-11, and after respudding 34/7-12, was to assess the hydrocarbon potential of the "B"-structure in the southern part of block 34/7. Further objectives were to establish the thickness and reservoir quality of the prospective Brent Group, assess the potential of the secondary prospects in the Dunlin Cook Formation and the Statfjord Formation, and determine the OWC. The well was to be terminated in the upper Lunde Formation.

Well 34/7-11 was drilled through the Late Miocene to Pliocene Nordland Group down to 861 m RKB. The lithology was sand with minor clay down to 400 m RKB and clay with scattered sand beds in the rest of the well.

Well 34/7-12 was terminated in Late Triassic claystones and siltstones of the upper Lunde Formation at a total depth (T.D.) of 2784 m RKB (driller's depth). Also in this well the Late Miocene to Pliocene Nordland Group was mainly composed of sand with minor clay down to 400 m RKB. Down to Top Utsira at 930 m RKB the lithology was clay with scattered sand beds. The Utsira Formation, from 930 to 1021 m RKB, consisted of alternating sand and clay.

From the Top Hordaland Group at 1021 m RKB down through the Late Paleocene Rogaland Group and the Late Cretaceous Shetland Group to the Top Jurassic at 2160.5 m RKB, the lithology was predominantly claystone apart from some Late Eocene to Early Oligocene sand intervals between 1140 and 1430 m RKB and some limestone and dolomite stringers in the Shetland Group. The claystones in the Late Paleocene Balder Formation from 1643.5 to 1691.5 m RKB was characteristically tuffaceous.

The Jurassic comprised the Middle Jurassic Viking and Brent Groups and the Early Jurassic Dunlin Group and Statfjord Formation.

The Viking Group was only 8.5 m thick and consisted of claystone belonging to the Heather Formation. The Brent Group, from 2169 to 2340.5 m RKB (171.5 m thick) comprised the sandy Tarbert Formation,

the interbedded shaly and sandy Ness Formation, the sandy Etive and Rannoch Formations and at the base the conglomeratic Broom Formation.

The Dunlin Group was penetrated from 2340.5 to 2606 m RKB (265.5 m thick), comprising the shaly Drake Formation at the top, the Cook Formation with interbedded sandstone and claystone, the Burton Formation with claystone and minor sandstone and the Amundsen and Calcareous Amundsen Formations having claystones with minor limestone.

The Statfjord Formation, 157 m thick from 2606 to 2763 m RKB, was dominated by sandstones with minor to interbedded claystone.

The Late Triassic upper Lunde Formation was encountered at 2763 m RKB, and comprised claystone interbedded with siltstone. The well was drilled down to T.D. at 2784 m RKB.

10 cores were cut through the whole Brent Group and 20 m into the Dunlin Group, totalling 191.5 m. 180.8 m were recovered giving a recovery of 94.4%.

34/7-12 was plugged and abandoned after testing as an oil discovery.

2.2 Operation

Well 34/7-11:

The drilling rig "Treasure Saga" arrived on location on October 1, 1987, and the well was spudded on October 2, at 1730 hrs.

The 36" hole section was drilled from 216 m RKB (Seabed) to 332 m RKB with a 36" bottom hole assembly (BHA) in one run. The 30" casing was run and cemented with the shoe at 327 m RKB.

The seabed diverter was run on riser and landed before the 26" BHA was made up and run in hole. The cement and 30" shoe was drilled out with a 17 1/2" bit and 26" underreamer. A 17 1/2" BHA was run in hole prior to displacing to 1.13 SG mud. The pilot hole was drilled to 861 m RKB.

After flowchecking procedures the 17 1/2" pilot hole was opened to 26" using an underreamer, and with a flowcheck at 650 m RKB. At 861 m RKB the mudweight was increased to 1.20 SG due to slight flow on flowchecks. The riser was displaced to seawater and pulled prior to a checktrip with a 26" bit.

The 20" casing was run. One meter above the latch point the casing was stopped to break circulation with mud and to mix/pump cement. After displacing 3700 strokes it was attempted to land the casing with no success. The plug was bumped, and the casing was pressure tested as per programme, but the 18 3/4" wellhead landed 0.6 m high. The BOP was run and tested, but due to movement of the 18 3/4" wellhead it was decided to abandon the well.

A cement plug was set from 455 to 255 m RKB, and the well was finished on October 11, 1987, at 1100 hrs.

Well 34/7-12:

After abandonment of well 34/7-11 the drilling rig "Treasure Saga" was moved 20 m north by pulling on anchors to get in position for

well 34/7-12. The well was spudded on October 11, 1987, at 2200 hrs.

The 36" section was drilled from 216 m RKB (Seabed) to 332 m RKB with a 36" bottom hole assembly (BHA) in one run. The hole was displaced to high viscosity mud before the casing was run and cemented with the shoe at 327 m RKB.

The seabed diverter was on riser and landed before the 17 1/2" BHA was made up. Water was used to drill cement from 321 to 327 m RKB prior to displacing the hole to 1.12 SG mud. The 17 1/2" pilot hole was drilled to 852 m RKB with one BHA. The mudweight was gradually increased to 1.15 SG.

The hole was opened to 26" using an underreamer. The hole was displaced with 1.20 SG mud, and the riser displaced to seawater prior to flowchecking. The riser and seabed diverter were then pulled. A checktrip with a 26" bit was made before the 20" casing was run and cemented with the shoe at 838 m RKB. The BOP was then installed.

The 20" shoetrack was drilled out with a 17 1/2" BHA, using seawater. At 832 m RKB the hole was displaced to KCL-mud, and the 17 1/2" section was drilled to 1865 m RKB (casing point) in 2 bit runs. At casing point the mudweight was up to 1.58 SG. The section was logged before the 13 3/8" casing was run and cemented with the shoe at 1851 m RKB.

The 12 1/4" section was drilled to 2169 m RKB. Then a corebarrel was run in hole, and a total of 10 cores were cut to 2360.5 m RKB. A 12 1/4" hole was drilled to 2480 m RKB before the reservoir was logged. A new 12 1/4" bit was made up and run in hole, and the section was drilled to 2785 m RKB (T.D. of the well). After logging the well was plugged back with cement to 2360 m RKB, and the 9 5/8" casing was run and cemented with the shoe at 2366 m RKB.

The well was tested before it was plugged back with cement and casings were cut. The PGB was recovered with 20"/30" casings, but the TGB was left on location.

The rig left location on December 17, 1987, at 1345 hrs.

2.3 Testing and Formation Evaluation

Well 34/7-12 penetrated the reservoir at 2169.0 m RKB. The oil water contact (OWC) was defined in the Ness Formation at 2250 m RKB (2224 m MSL). The average log porosity in the Tarbert Formation (2169 - 2213 m RKB) is 28.4%, the net to gross ratio is 1.0, and the average water saturation is 10%. The Ness Formation (2213 - 2251.5 m RKB) has an average log porosity of 24.4%, a net to gross ratio of 0.32, and an average water saturation of 41%. The Statfjord Formation is waterbearing.

A total of 10 cores were cut and recovered during drilling of the well. The cores were cut in the interval 2169 - 2360.5 m RKB (driller's depth). A total of 180.8 m of cores were recovered, corresponding to a total recovery of 94.4%.

Production tests were carried out in Lower Brent, Ness and Tarbert. The maximum oil rate, 2600 Sm^3/D, was obtained during test No. 3 in Tarbert with a productivity index of 190 $Sm^3/D/bar$. The corresponding wellhead pressure was 121.3 bar.

Further information on testing and formation evaluation is presented in section 5.

3. GENERAL INFORMATION

3.1 Licence and General Well Information

Licence 089, awarded on March 9, 1984, covers most of block 34/7 on the Tampen Spur, approximately 240 km northwest of Bergen. The location map is shown in fig. 3.1.

Group Members	Working Interest	Net Interest
Saga (operator)	10%	10%
Esso	30%	15%
Statoil	23%	50%
Norsk Hydro	12%	12%
Elf Aquitaine	16%	8%
Deminex	8%	4%
DNO	1%	1%

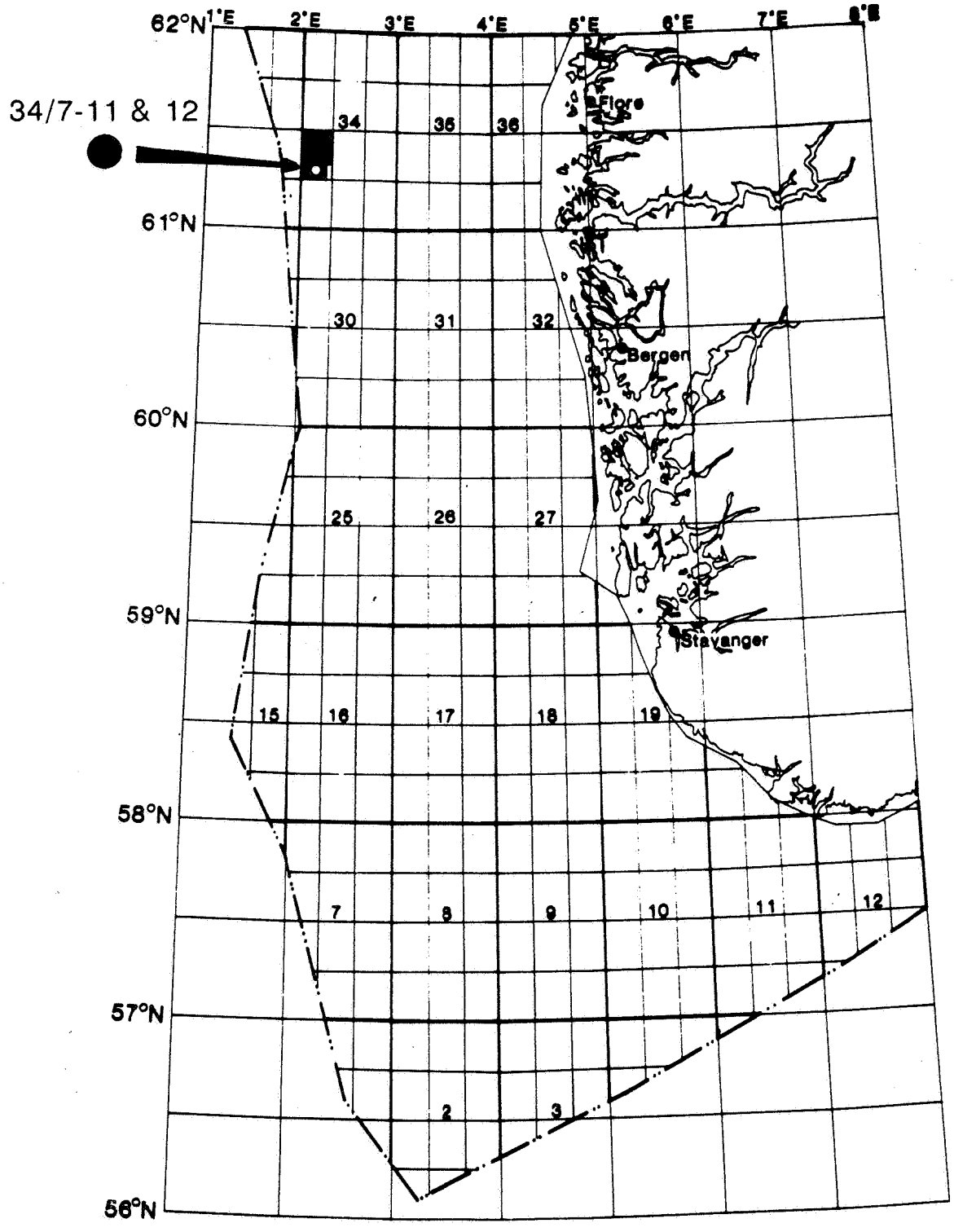
Rig taken over by PL 089:	September 30, 1987.
Spud date, 34/7-11:	October 2, 1987.
Spud date, 34/7-12:	October 11, 1987.
T.D. date, 34/7-11:	October 6, 1987.
T.D. date, 34/7-12:	November 15, 1987.
Rig released from PL 089:	December 16, 1987.

Completion status:	Plugged and abandoned as an oil discovery.

Final location coordinates:	34/7-11	34/7-12
Latitude	61° 16' 17.20" N	61° 16' 17.86" N
Longitude	02° 06' 47.10" E	02° 06' 47.26" E

UTM-coordinates:	34/7-11	34/7-12
	6793 507.0 m N	6793 527.6 m N
	452 438.9 m E	452 441.5 m E

Seismic position:	Line SG 8431, row 155, column 534.
Rig:	"Treasure Saga"
RKB - MSL:	26 m
MSL - Seabed (water depth):	190 m
RKB - Seabed:	216 m
RKB - T.D.	2784 m RKB (driller's depth)
	2785 m RKB (logger's depth)



Small scale map, showing the position of well 34/7-11 & 12.

Fig. 3.1

Date May.88	Auth. TLL	Appr BAG
Draw by RHK	Ref	

3.2 Saga Personnel

3.2.1 Drilling

Onshore:	
Vice President, Drilling Operations:	Reidar O. Nyvik
Senior Manager, Drilling Operation:	Terje Vatn
Ass. Senior Manager, Drilling Operation:	Kristian Sirevaag
Senior Drilling Engineers:	Ole Kristian Brobak
	Jon Arne Aase
Offshore:	
Drilling Supervisors:	Johan Bysveen
	Einar Framnes
	John Nilsen
	Kjell Randulff
	Jan Petter Rød
	Jon Arne Aase
Assistant Drilling Supervisors:	Øivind Holte
	Trond Myrseth

3.2.2 Engineering

Onshore:	
Senior Manager, Engineering:	Paul T. Klavenes
Chief Engineer, Engineering:	Tor Stein Ølberg
Senior Drilling Engineers:	Svein Bjørheim
	Jarle Haga
	Helge Varhaug
Drilling Engineers:	Frode Leraand
	Hilde Ødegaard

3.2.3 Geology

Onshore:

Exploration Department

Vice President, Exploration:	Hans Chr. Rønnevik
Senior Manager, Operation Geology:	Terje Solli
Operation Geologist:	Bjørn Karlstad
Operation Engineer:	Jan Egil Pedersen
Senior Manager, Geophysical Laboratory:	Kristian Kolbjørnsen
Geophysicist:	Steven Helmore
Geologist:	Kirsten Tibballs
Senior Manager, Geological Laboratory:	Hans O. Augedal
Micropaleontologist:	Sven A. Bäckström
Palynologist:	Frøydis Eide
Sedimentologists:	Per Bakøy
Geochemist:	Ellen Sofie Mo
Sample distribution:	Kari Chruchow

Offshore:

Well-site Geologists:	Carl W. Carstens
	Geir Dalen
	Geir W. Diesen
	Brit Riise Fredheim
	Øystein Jacobsen
	Bjørn Karlstad
	Tormod Lid Larsen
	Øystein Mjelde

Snorre Development Planning Department:

Department Manager:	Nils B. Hollander
Senior Geological Manager:	Nils Ræstad
Licence Geologists:	Geir W. Diesen
	Knut Jorde
Senior Geophysical Manager:	Kari Bøyum
Licence Geophysicists:	John Battie
	Atle Edvardsen
	Mona Kjølseth

3.2.4 Petroleum Technology

Onshore:	
Vice President, Petroleum Technology:	Arne Westeng
Senior Manager, Formation Evaluation:	Bjørn A. Rasmussen
Offshore:	
Petrophysicists:	Peter Dempsey
	Cathrine Slungaard
Test Engineers:	Bård Beldring
	Sven-Ove Brandvold
	Bengt Hultberg
	Gabriel Jensen
	Torgeir Opdahl
	Harald Selseng
	Ingeborg Vrenne
Onshore:	
Senior Manager, Reservoir Engineering:	Lars Rasmussen
Reservoir Engineers:	Jon Magne Hvidsten
	Tone Kjenstad
	Kari Solberg

3.3 Contractors and Service Companies

Drilling Contractor:	Wilh. Wilhelmsen
Mud Logging:	Exploration Logging Norge A/S
Wireline Services:	Atlas Wireline Services
VSP:	Seismograph Services Ltd.
Mud Engineering:	Dresser Norway A/S
Cement and Pumping Services:	B.J. Hughes B.V.
Casing Services:	Salvesen
Cutting Services:	Salvesen
Coring Services:	Eastman Christensen
Underreaming:	Tri-State
MWD Logging:	Teleco
ROV Service:	Bergen Underwater Services
Well Head System:	Aker Vetco
Jarring Services:	Eastman Christensen
Stabilizers:	Eastman Christensen
Cement Retainers:	Halliburton
Surface Sampling:	Petrotech a.s
Supply Boat:	"Skandi Beta"
Standby Boat:	"Standby Master"
Helicopter Service:	Helicopter Service A/S
Catering Service:	Wilh. Wilhelmsen

4. GEOLOGY AND GEOPHYSICS

4.1 Geographic and Structural Setting

The 34/7-11 and 12 wells were drilled on the "B"-structure in the southern part of block 34/7, not far from the borderline between blocks 34/7 and 34/10 (fig. 4.1). A northeast-southwest striking fault (the southern Main Fault) with throw down to the east forms the southern boundary of the "B"-structure. Furthermore, an east-west fault (the northern Main Fault) with throw down to the south cuts across the southern part of the structure. A north-south striking fault with a throw down to the west dissects the structure. 34/7-11 and 12 is thus located in the northwestern segment of the "B"-structure, close to the intersection of the northern Main Fault and the north-south striking fault. The geological strata are striking north-south and dip to the west in this area. The structure map is defined at the depth of the Top Brent Group.

4.2 Purpose of the Well

The primary purpose of well 34/7-11 and 12 was to assess the hydrocarbon potential of the "B"-structure. Further objectives were to establish the thickness and reservoir quality of the prospective Brent Group, determine the OWC, assess the potential of the secondary objectives in the Dunlin Cook Formation reservoir and the Statfjord Formation and assess the upper part of the Triassic Lunde unit B/C reservoir section.

B Structure - Top Brent Depth

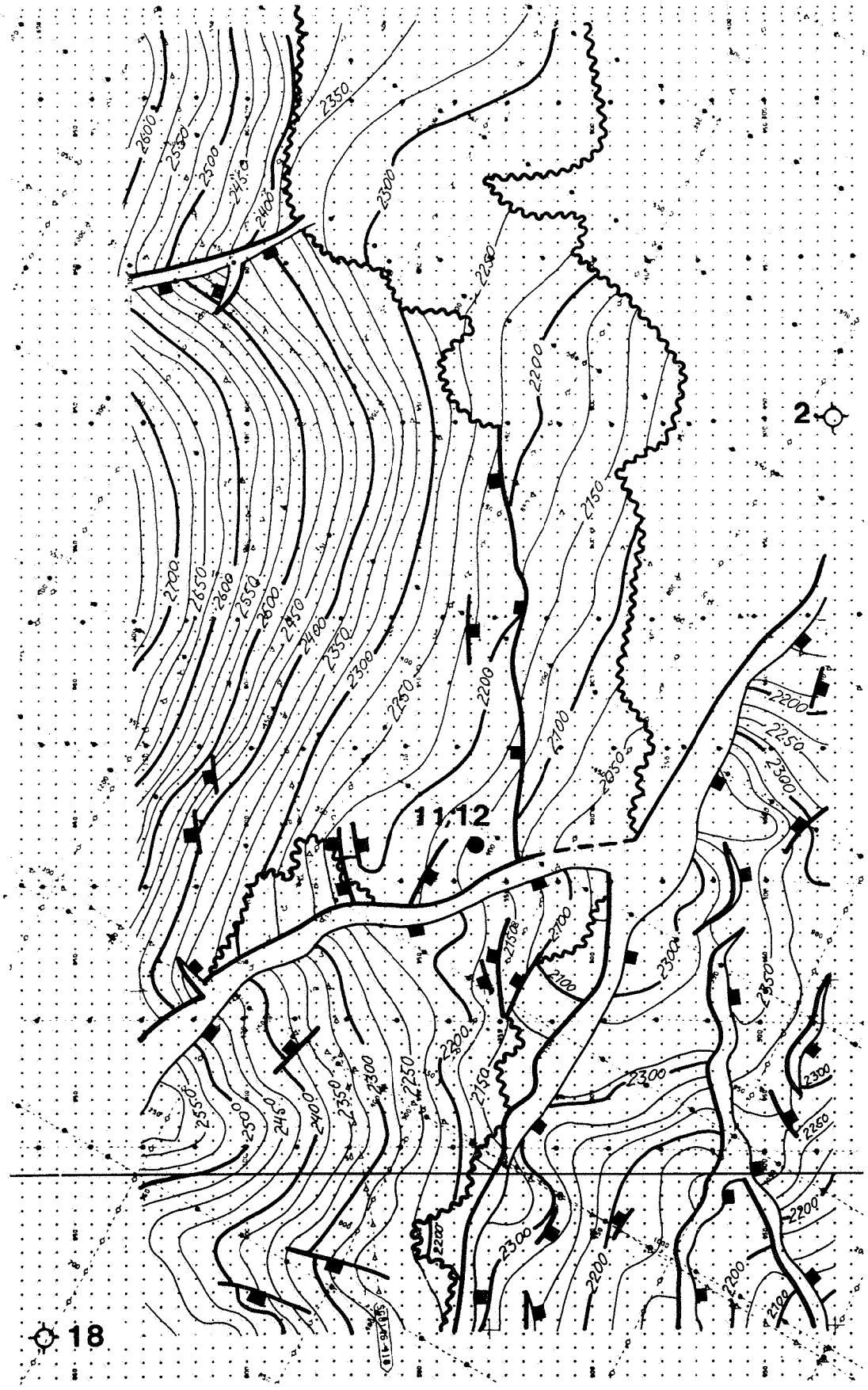


Fig. 4.1

Dato 11/3 88	Forf. GWD	Godkj.	
Tegn.av HBe	Ref.		

4.3 Sampling

4.3.1 Routine Samples

The following routine samples were collected:

a) Six sets of wet ditch cuttings (a 1/2 kg).

b) Two sets of well-site washed and dried cuttings.

No returns:	216 (Seabed) - 340 m RKB
10 m intervals:	340 - 1800 m RKB
5 m intervals:	1800 - 2165 m RKB
3 m intervals:	2165 - 2784 m RKB

c) One set of canned composite wet samples for geochemical analyses.

10 m intervals:	340 - 2160 m RKB
9 m intervals:	2160 - 2784 m RKB

4.3.2 Distribution and Analyses of Samples

Six sets of wet cutting samples, two sets of washed and dried samples, and one set of canned samples were collected from first sample return to total depth. These samples were distributed in the following way:

Wet samples:

a) Sent to Paleoservices for paleodating. The rest material was returned to Saga.

b) Treated according to NPD regulations by Scanwell and sent to NPD.

c) Washed and divided into 10 splits by Scanwell and transferred to Statoil as trade sets.

d) Washed and divided into 6 splits by Scanwell. One split containing one half of this set was transferred to Statoil, and the other splits were sent to partners.

e) Sent to Saga, Høvik, for paleontological and mineralogical analyses.

f) Washed and dried by Scanwell, and sent to Saga, Høvik.

Washed and dried samples directly from the rig:

a) One set transferred to Saga, Høvik.
b) One set transferred to NPD.

Canned samples were sent to Saga, Arkivrommet, Hamang Næringssenter, Eyvind Lychesvei 21C, 1300 Sandvika.

The petrophysical measurements and the slabbing of the cores were carried out by Geco. Cut C was sent to Statoil and cut D to NPD. Cuts A and B were transferred to Arkivrommet, Sandvika, for detailed sedimentological and structural description together with petrographical and paleontological analysis. The A and B cuts will be stored at Arkivrommet, Hamang Næringssenter, Eyvind Lychesvei 21C, 1300 Sandvika, when the analyses are completed.

The sidewall cores (SWC) were sent to Saga, Høvik, for paleontological, geochemical and petrographical analysis. Selected SWC were sent to Paleoservices for paleodating.

4.3.3 Conventional Cores

Core No. 1	Cut	:	2169.0 - 2196.5 m RKB
	Recovered	:	2169.0 - 2196.3 m RKB
	Recovery	:	27.3 m (99.3%)
	Correction factor	:	+2.5 m
	Recovered interval, log	:	2171.5 - 2198.8 m RKB
Core No. 2	Cut	:	2196.5 - 2214.0 m RKB
	Recovered	:	2196.5 - 2212.9 m RKB
	Recovery	:	16.4 m (93.4%)
	Correction Factor	:	+2.5 m
	Recovered interval, log	:	2199.0 - 2215.4 m RKB
Core No. 3	Cut	:	2214.0 - 2216.0 m RKB
	Recovered	:	2214.0 - 2215.5 m RKB
	Recovery	:	1.5 m (75%)
	Correction Factor	:	+1.75 m
	Recovered interval, log	:	2215.75 - 2217.25 m RKB
Core No. 4	Cut	:	2216.0 - 2228.0 m RKB
	Recovered	:	2216.0 - 2224.9 m RKB
	Recovery	:	8.9 m (74.2%)
	Correction Factor	:	+1.75 m
	Recovered interval, log	:	2217.75 - 2226.65 m RKB
Core No. 5	Cut	:	2228.0 - 2242.0 m RKB
	Recovered	:	2228.0 - 2242.0 m RKB
	Recovery	:	14.0 m (100%)
	Correction Factor	:	+1.75 m
	Recovered interval, log	:	2229.75 - 2243.75 m RKB
Core No. 6	Cut	:	2242.0 - 2262.0 m RKB
	Recovered	:	2242.0 - 2261.5 m RKB
	Recovery	:	19.5 m (97.5%)
	Correction Factor	:	+2.25 m
	Recovered interval, log	:	2244.25 - 2263.75 m RKB

Core No. 7	Cut	:	2261.0 - 2290.0 m RKB
	Recovered	:	2262.0 - 2289.9 m RKB
	Recovery	:	27.9 m (99.6%)
	Correction Factor	:	+1.75 m
	Recovered interval, log	:	2263.75 - 2291.65 m RKB
Core No. 8	Cut	:	2290.0 - 2305.5 m RKB
	Recovered	:	2290.0 - 2305.0 m RKB
	Recovery	:	15 m (96.8%)
	Correction Factor	:	+1.75 m
	Recovered interval, log	:	2291.75 - 2306.75 m RKB
Core No. 9	Cut	:	2305.5 - 2333.0 m RKB
	Recovered	:	2305.5 - 2332.5 m RKB
	Recovery	:	27 m (98.2%)
	Correction Factor	:	+1.25 m
	Recovered interval, log	:	2306.75 - 2333.75 m RKB
Core No. 10	Cut	:	2333.0 - 2360.5 m RKB
	Recovered	:	2333.0 - 2356.3 m RKB
	Recovery	:	23.3 m (84.7%)
	Correction Factor	:	+1 m
	Recovered interval, log	:	2334.0 - 2357.3 m RKB

Comments:

All core depths (cut) in section 4.3.3 correspond to driller's depth. The log depths correspond to the CDL log. The wellsite core descriptions are presented in Enclosure III, and the core analyses are given in chapter 5.2.

4.3.4 Sidewall Cores

Three runs were made with a coregun attempting a total of 150 sidewall cores.

101 cores were recovered (67.3%), 37 were lost and 12 were empty or had only trace recovery (too small to be paid for).

The geological descriptions are given in table 4.1.

Table 4.1: Sidewall Core Description, well 34/7-12

No. on log	Depth m RKB	Lithology
1	858	Clyst: olv gy, sft, sl mic-mica, calc Tr: rk frag
2	897	Sample as above
3	918	Clyst: olv gy - dk gn gy, else as above
4	925	Clyst: sl calc, else as above
5	930	Clyst: sl aren, olv gy - dk gn gy, sft, sbfis, sl mic-mica, calc, v microf, burrows (pyr micxl)
6	942	Clyst: olv gy, sft, sl calc
7	961.5	Clyst: slty, /thn str ss Clyst: slty, olv gy, sft, mic-mica, calc, tr rk frag Ss: wh, occ orng, slt-vf, w srtd, sbrnd, lse
8	995	Sample as above
9	1014	Sample as above
10	1021	Ss: v arg, v glauc, olv gy, vf-vc, occ bldr, p srtd, sbrnd-rnd, occ ang, fri-frm, mica, sl calc
11	1025	Clyst: v slty, pa brn - olv gy - dk yel brn, frm, mica, glauc, non calc
12	1038	Clyst as above /str of ss Ss: lt brn gy - lt gy, vf-f, w srtd, sbrnd-rnd, lse, v glauc, mica, calc
13	1061	Clyst: slty, pa brn - dk yel brn, frm, mic-mica, glauc, non calc
14	1099.5	Clyst: olv gy, frm, sl mic-mica, non calc
15	1150	Sample as above
16	1228	Clyst: olv gy - dk gn gy, wxy, frm, occ hd, sbfis, sl mic-mica, non calc, sks
17	1265	Clyst, v aren, /thk lam ss, clyst as above Ss: clr-wh, vf-f, w srtd, sbang-rnd, lse, tr mica, pyr
18	1310.5	Clyst: m dk gy - m bl gy, wxy, frm, occ hd, sbfis, sl mic-mica, non calc
19	1356	Clyst: m dk gy - m gy - m bl gy, else as above

No. on log	Depth m RKB	Lithology
20	1382	Ss: sl arg, m lt gy - olv gy, qtz, clr-wh, f-m, occ c, mod srtd, sbrnd-rnd, lse, tr glauc
21	1400	Clyst: m gy - m bl gy, else as above
22	1427	Ss: wh, qtz, clr, pred f, occ m, w-mod srtd, sbrnd-rnd, frm, v calc cmt
23	1438	Clyst: dk gn gy, wxy, frm occ hd, sbfis, non calc
24	1467	Clyst /thk lam ss
		Clyst as above
		Ss: sl arg, v lt gy, clr-wh, f-m, w srtd, sbrnd-rnd, lse, non calc, tr of mica
25	1497	Clyst: m dk gy - dk gn gy, wxy, frm-hd, sbfis, non calc
26	1544	Sample as above
27	1587	Sample as above
28	1632.5	Clyst: brn gy, wxy, frm-hd, sbfis, calc
29	1640.5	Clyst: m gy - m bl gy, wxy, frm, sbfis, non calc
30	1645	Clyst: occ slty, olv gy - gy brn, frm, non calc
31	1649.5	Clyst: dk gn gy - m dk gy, frm, non calc
32	1657	Sample as above
33	1680	Clyst: pt tuff, dk gy - gy blk, occ m lt gy /wh & blk spec, sft-frm, occ v calc
34	1687	Clyst: tuff, else as above
35	1692	Clyst: dk gy - m dk gy, frm-hd, non calc
36	1696	Clyst: dk gn gy, wxy, frm, sbfis, non calc
37	1703	Clyst: dk gn gy - olv gy, micxl pyr, else as above
38	1730	Sample as above
39	1770	Clyst: dk gy, hd-frm, blky, non calc
40	1803	Clyst and ss
		Clyst: dk gy, hd-frm, wxy, non calc
		Ss: v-sl arg, mod brn - dk yel brn, vf-f, occ m, w srtd, sbang-sbrnd, occ rnd, lse, g vis por, non calc
		Shows: strong hc od, exc brn stn, 100% strong-mod yel flor, inst-fast strmg strong wh-yel cut, yel res upon evap
41	1814	Clyst: dk gy, frm, non calc
42	1827.5	Clyst: m gy - m lt gy, frm, non calc, micxl pyr

No. on log	Depth m RKB	Lithology
43	1831	Clyst: m lt gy - gn gy, frm, v calc Tr: ls, wh, sft
44	1833.5	Clyst: lt gy - lt olv gy, frm, non calc
45	1837	Clyst: v calc, else as above
46	1841	Clyst: m dk gy, sft-frm, v calc
47	1848.7	Clyst: aren, m dk gy - olv gy, frm, v calc
48	1875	Clyst: sl slty, m gy - m lt gy, fros surf, frm, sl mic-mica, calc
49	1885	Clyst: sl darker, else as above
50	1900	Clyst: pred m gy, else as above
51	1917	Clyst: m gy, sl fros surf, sl plas, frm, sl mic-mica, sl calc
52	1935	Clyst: m dk gy - m gy, else as above
53	2055	Clyst: m dk gy, non-sl calc, else as above
54	2070	Clyst: sl slty, m dk gy - dk gn gy - gn gy, sl fros surf, sl plas, frm, sl mic-mica, non-sl calc Tr: sltst occuring as irregular lam and specs, lt gy, sl mica Shows in sltst: no stn, no od, 80-100% mod pale yel flor, slow strmg pale yel - bl wh cut, yel wh res
55	2085	Sample as above Shows in sltst: p od, else as above
56	2130	Clyst: slty, else as above A good tr of sltst: sl aren, else as above Shows in sltst: as above
57	2162	Clyst: gy blk - brn blk, sl gsy surf, plas, frm, sl mic-mica, non calc
58	2165	Clyst: gy blk - brn blk, sl gsy surf, sl plas surf, sbfis, frm, mic-mica, non calc
59	2171.5	Ss: slty, gy brn, grns clr-trnsl /lt brn o stn, vf-m, pred vf-f, w srtd, sbrnd, lse, sl mica, g por Shows: lt brn o stn, fr od, 90-100% mod-strong pale yel - bri yel flor, inst strmg mlky wh - bl wh cut, pale yel - wh res

No. on log	Depth m RKB	Lithology
60	2227	Ss: v slty, arg, col as above, vf, occ f and m, fri, mica, p por Shows: p od, 60-80% flor as above, slow strmg cut as above, else as above
61	2358	Slty clyst alt /sltst Clyst: v slty, dk yel brn, frm, mic-mica, non calc Sltst: sl aren, pale yel brn, frm, sl mica, non calc Shows in sltst: p od, weak lt brn o stn, 80% mod yel brn flor, slow strmg mlky wh-bl wh cut, pale yel res
62	2472	Ss /clyst lam Ss: slty, lt olv gy, grns clr-trnsl, vf, w srtd, sbang, fri, mica, sl calc, p por Clyst: m gy, frm, mic-mica, sl calc
63	2485	Clyst: sl slty, olv gy - m gy, sl gsy surf, sl plas, frm, mic-mica, sl calc
64	2490	Clyst: slty, olv gy, fros surf, frm, v mic-mica, sl calc - calc
65	2500	Sample as above
66	2534	Clyst: brn gy - olv gy, frm-hd, blky, occurence of one thin "vein" of recryst ls in clyst, else clyst is calc
67	2540	Clyst: sl slty, brn gy, sl plas, frm, sl calc
68	2545	Sample as above
69	2550	Clyst: slty, brn gy - olv gy, fros surf, sl brit, sks, frm, v mic-mica, sl calc
70	2553	Clyst: brn gy, sl brit, frm, sl calc
71	2555	Clyst: brn gy - brn blk, sl gsy surf, sl plas, frm, sl mic-mica, sl calc
72	2560	Clyst: sl slty, brn gy - olv blk, fros surf, sft-frm, sl mic-mica, sl calc
73	2563	Sample as above
74	2565	Clyst: slty, olv gy, fros surf, frm, v mic-mica, calc
75	2567	Sltst: v arg, olv gy - m gy, sft-frm, mica, sl calc
76	2568	Sample as above
77	2572	Sltst: v mica, else as above
78	2577	Sltst/clyst, else as above
79	2580	Clyst: slty, col as above, fros surf, else as above

No. on log	Depth m RKB	Lithology
80	2582	Sltst: arg, sl aren, m gy - m lt gy, brit, frm, mica, v calc
81	2585	Clyst: slty, m gy, fros surf, frm, mica, calc
82	2587	Clyst: slty, m gy - olv gy, sl calc - calc, else as above
83	2590	Clyst: v slty, sl calc, else as above
84	2595	Sltst: v arg, m dk gy, frm, mica, sl calc
85	2598	Sample as above
86	2600	Sample as above
87	2603	Sample as above
88	2605	Sltst: v arg, m dk gy - dk gy, frm, v mic-mica, sl calc - calc
89	2606	Ss: lt gy - v lt gy, vf-vc, p srtd, sbang, lse-fri, kaol, sl mica, g por
90	2610	Ss: lt gy, vf-c, occ vc, p-mod srtd, else as above
91	2613	Ss: sl arg, slty, lt gy, vf-f, occ m, mod-w srtd, ang-sbang, lse-fri, sl mica, somewhat lam /clyst, p-fr por
92	2617	Ss: sl arg, lt gy - v lt gy, vf-vc, p srtd, sbang, lse-fri, sl kaol, sl mica, g por
93	2622	Ss: v lt gy, vf-c, occ vc, pred vf-f, mod-w srtd, else as above
94	2645	Ss: lt gy - v lt gy, vf-c, pred f, mod srtd, sbang, fri, sl kaol, occ sl mica, g por
95	2665	Clyst: sl slty, brn gy, sl plas, frm, sl mic-mica, non calc
96	2668	Clyst: slty, shy, brn-blk, frm, brit, mic-mica, non calc
97	2678	Ss: v lt gy, vf-m, occ c, pred f, mod-w srtd, sbang-sbrnd, kaol, sl mica, g por
98	2695	Clyst: v aren, vf-m, sd grns, slty, gy brn, frm, mic-mica, non calc
99	2712	Clyst: v aren, slty, brn gy, frm, brit, sl mic-mica, sl calc
100	2719	Clyst: sl slty, dk gn gy, fros surf, frm, sl brit, mic-mica, non calc
101	2742	Ss: v arg and slty mtx, lt olv gy, vf-f, occ m, mod srtd, sbang, fri, mica, p por
102	2750	Ss: arg, v slty, m gy - m lt gy, slt-vf, occ f, mod srtd, sbang, fri, sl mica, non-sl calc, p por

No. on log	Depth m RKB	Lithology
103	2754	Sltst: arg, m gy, fri, mica, non calc
104	2761	Ss: conglomeratic, lt gy - v lt gy, grns clr-trnsl, vf-pbl (max. diameter 5 mm), p srtd, ang-sbrnd, fri, sl mica, kaol, fr-g por
105	2763	Clyst: slty, gy brn, frm, occ hd, brit, non-sl calc
106	2765	Sltst: arg and v aren, vf-f, occ m grns, olv gy - dk gn gy, frm, sl mica, non calc
107	2767	Sltst: arg, olv gy, frm, mica, non calc
108	2768	Clyst: olv gy - brn gy, frm, occ hd, brit, sbfis, sl calc
109	2770	Clyst: slty, aren, gy brn - olv gy, sdy specs, frm, mic-mica, occ sl calc
110	2773	Clyst: v slty, v aren grdg to greywacke (sd grns vf-f), gn gy - gy brn specs, frm, mica - mic-mica, non calc
111	2775	Clyst: slty, sl aren, dk gn gy - frequent gy brn specs, else as above

4.4 Measurement While Drilling

The Measurement While Drilling (MWD) services on wells 34/7-11 and 12 were performed by Teleco Oilfield Services Ltd. The downhole recordings included Resistivity, Gamma Ray and Directional Survey. For technical tool specifications, see Teleco's End of Well Report.

Well 34/7-11

The MWD were recorded during drilling of the 17 1/2" pilot hole for the 26" section from 327 to 861 m RKB. The hole was completed in one bit run. No tool or recording problems were encountered and good quality log was obtained.

Well 34/7-12

A 17 1/2" pilot hole for 26" section was drilled from 327 to 852 m RKB in one bit run. Down to 379 m RKB there were some erratic GR-readings due probably to flushing of highly radioactive KCl-mud into the active mud system. The resistivity values were probably also affected. In the rest of the section there were no recording or tool problems, and a good quality log was obtained.

The 17 1/2" hole section down to 1865 m RKB was performed in two bit runs. Apart from some erratic resistivity readings around 1425 - 1430 m RKB, there were no recording or tool problems in this section. The log was of good quality.

The 12 1/4" hole section was drilled from the casing shoe at 1851 m RKB down to T.D. at 2784 m RKB (driller's depth). There were no MWD-recordings during the coring from 2169 to 2360 m RKB. The rest of the section was drilled in 7 bit runs. There were, however, no recording problems or tool problems during these runs, and the final log that was obtained was of good quality.

Apart from the coring section from 2169 to 2360 m RKB, Teleco produced a continuous log through the whole well of good quality.

4.5 Open Hole Logs, well 34/7-11

Casing Record	Hole Size	Logged Interval (m RKB)	Type of Log	Run No.	Date
30" 327 m	36" to 332 m				
20" 845 m	26" to 861 m	332.0 - 861.0	MWD (GR, Res, Dir)		5-6.10.87

4.6 Open Hole Logs, well 34/7-12

Casing Record	Hole Size	Logged Interval (m RKB)	Type of Log	Run No.	Date
30" 327 m	36" to 332 m	216.0 - 327.0	GR to surface	1A	25.10.87
20" 838 m	17 1/2" (26") to 852 m	327.0 - 852.0	MWD (GR, Res, Dir) GR to surface	1A	25.10.87
13 3/8" 1851 m	17 1/2" to 1865 m	837.7 - 1852.6 837.7 - 1836.1 858.0 - 1848.7	MWD DIFL-LSBHC-GR CDL-GR COREGUN	1A 1A 1A	25.10.87 25.10.87 25.10.87
9 5/8" 2366 m	12 1/4" to T.D.	2100.0 - 2476.0 2100.0 - 2479.5 2171.0 - 2312.0	MWD DLL-MLL-GR CDL-CNL-GR FMT	2A 2A-B 2A-E	06.11.87 06.11.87 06.11.87
T.D. 2785 m (logger's depth)		1852.0 - 2784.3 600.0 - 1852.0 1852.0 - 2784.4 2210.0 - 2474.0 2210.0 - 2692.0 MISRUN 1850.0 - 2784.0 2140.0 - 2784.0 2125.0 - 2784.0 1875.0 - 2775.0	MWD DIFL-LSBHC-GR ACBL CNL-CDL-GR FMT FMT DIPMETER DIPMETER CNL-CDL-GR DLL-MLL-GR VSP COREGUN	3B 3A 3C 3G 3H 3A 3B 3D 3B 3A 3B-C	15.11.87 15.11.87 15.11.87 15.11.87 17.11.87 17.11.87 18.11.87 18.11.87 18.11.87 18.11.87 19.11.87

4.7 Well Velocity Survey

A zero offset VSP was conducted, recorded and processed by Seismograph Services Limited (SSL). The VSP data were recorded from T.D. (2784 m RKB) to 1525 m RKB. The VSP survey was conducted on 18.11.87. The nominal recording interval was 20 m from T.D. to 1800 m RKB and 25 m from 1800 m RKB to the end of the VSP survey at 1525 m RKB.

The seismic source was one 160 cu.in. airgun at a depth of 9 m and an offset of 59 m. Full details are contained in the VSP and check shot/synthetic seismogram processing report.

For check shot and VSP processing details the reader is referred to the final report. The sonic log was edited by SSL and Saga, and the sonic log was drift corrected by the check shot values. A set of interpreters composites showing velocity log, density log, acoustic impedance log, reflection coefficient series, synthetic seismogram and VSP were produced. These were at minimum and zero phase and both polarities.

A seismic summary is given in fig. 4.2 and in table 4.2.

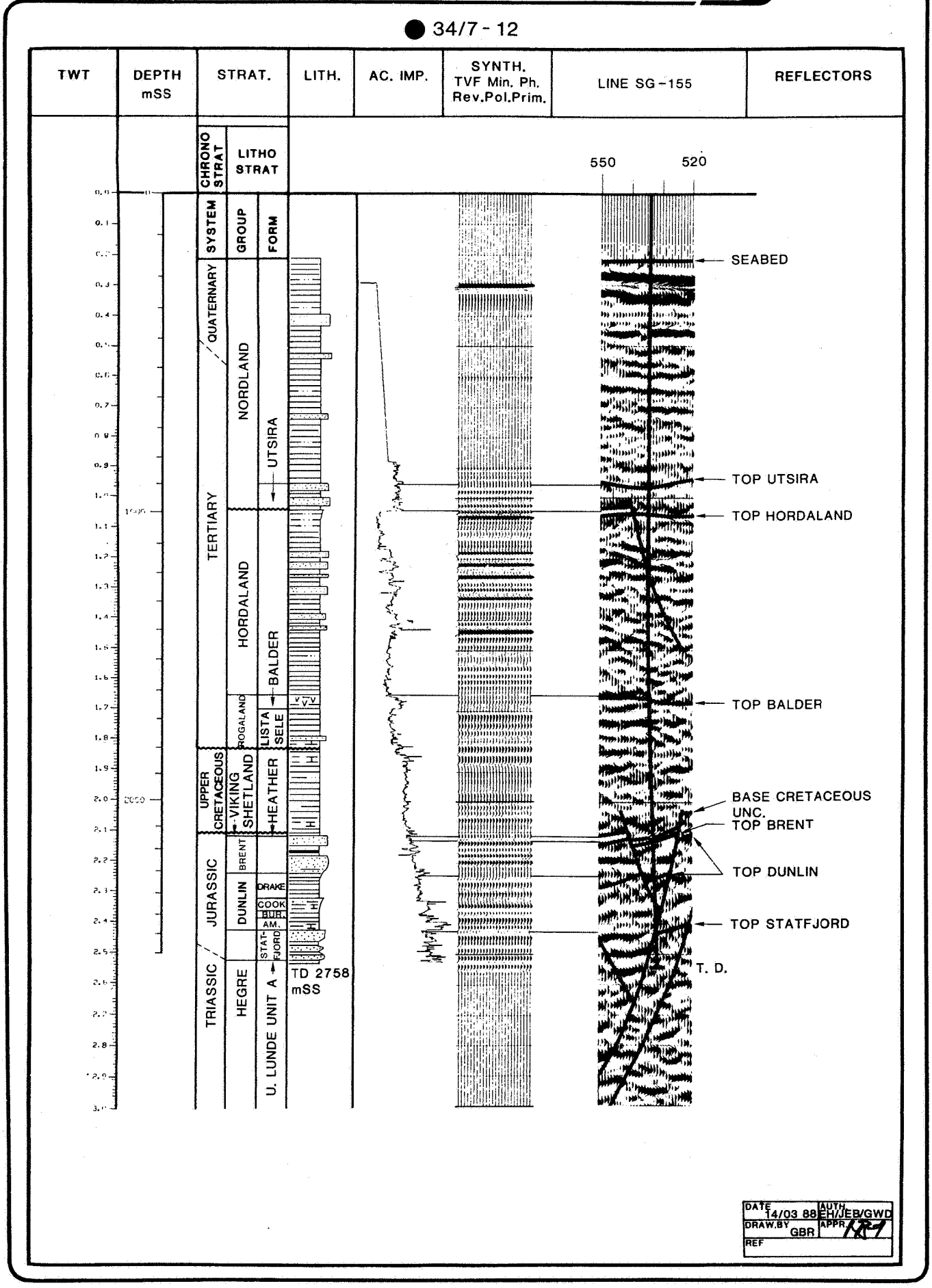


Fig. 4.2

Dato 4/5 88	For. EH/ JEB/GWD	Godkj	
Tegn.av GBR	Ref.		

B - Field

WELL DATA SUMMARY KB: 26 WELL : 34/7-12

REFLECTOR	UNIT	TWT (ms)	INTERVAL TWT	DEPTH mRKB	DEPTH mMSL	INTERVAL THICKNESS	INTERVAL VELOCITY
1 SEABED	T.NORDLAND GR.	0.2216		216.0	190.0		
			0.7430			740.0	1992
2 T.UTSIRA	T.UTSIRA FM.	0.9646		930.0	904.0		
			0.0814			91.0	2236
3 T.HORDALAND	T.HORDALAND GR	1.0460		1021.0	995.0		
			0.6132			622.5	2030
4 T.BALDER	T.ROGALAND/	1.6592		1643.5	1617.5		
	T.BALDER FM.		0.0412			47.5	2306
	T.LISTA/SELE FM.	1.7004		1691.0	1665.0		
			0.1350				
5 T.CRETACEOUS	T.SHETLAND GR.	1.8354		1832.0	1806.0		
			0.4128			469.5	2275
6 B.CRETACEOUS	T.VIKING	2.1132		2160.5	2134.5		
			0.0070			8.5	2429
7 T.BRENT	T.BRENT GR.	2.1202		2169.0	2143.0		
			0.1234			171.5	2780
8 T.DUNLIN	T.DUNLIN GR.	2.2436		2340.5	2314.5		
			0.1580			224.0	2835
	CALC.AMUNDSEN	2.4016		2564.5	2538.5		
			0.0246			41.5	3374
9 T.STATFJORD	FM.	2.4262		2606.0	2580.0		
			0.0978			157.0	3211
10 U. LUNDE	U. LUNDE MB/	2.5240		2763.0	2737.0		
	UNIT A		0.0126			21.0	3333
11	T.D.	2.5366		2784.0	2758.0		

Table 4.1: 34/7-12 Well Data Summary

Date MAY 88	Auth. GWD	Appr.
Draw by GWD	Ref. ESG	

SAGA
34/7 - 12

4.8 Formation Temperature

The maximum recorded temperatures (BHT) obtained during logging have been converted to static formation temperatures (T_f) using a Horner plot technique. The recorded BHTs and the estimated static formation temperatures are listed in table 4.3. The data used for the calculations are listed in table 4.4.

All the data have been plotted in fig. 4.3.

In addition to the calculated static formation temperatures, the following bottom hole temperatures were measured during testing:

m RKB	Temp. °C
2230.7	84.2
2202.6	83.4
2161.3	82.1

Table 4.3: Average bottom hole temperatures (BHT) and static formation temperatures (T_f).

Depth m RKB	No. of BHT readings	Average BHT °C	T_f °C
1830	3	46	60
2462	3	62	
2468	3	72	78
2763	3	65	
2767	3	84	
2770	3	80	96
2773	3	81	
2775	2	83	

Table 4.4: Temperature Data

Log	Date	Run No.	Btm log interval (m RKB)	Avg. rec. temp. °C (BHT)	Time since circ. hrs. (d t)	Circ. time hrs. (t)
DIFL-LSBHC-CDL-GR	25.10.87	1A	1830	46	7.6	9.3
DLL-MLL-GR	06.11.87	2A	2462	62	4.8	8.5
CNL-CDL-GR	06.11.87	2A	2468	72	12.8	6.3
DIFL-LSBHC-GR	15.11.87	3B	2763	65	6.0	7.0
DLL-MLL-GR	18.11.87	3B	2767	84	22.7	2.7
DIPMETER	17.11.87	3A	2770	80	10.3	8.0
CNL-CDL-GR	18.11.87	3D	2773	81	17.2	7.0
CNL-CDL-GR	15.11.87	3C	2775	83	14.3	5.0

FORMATION TEMPERATURE

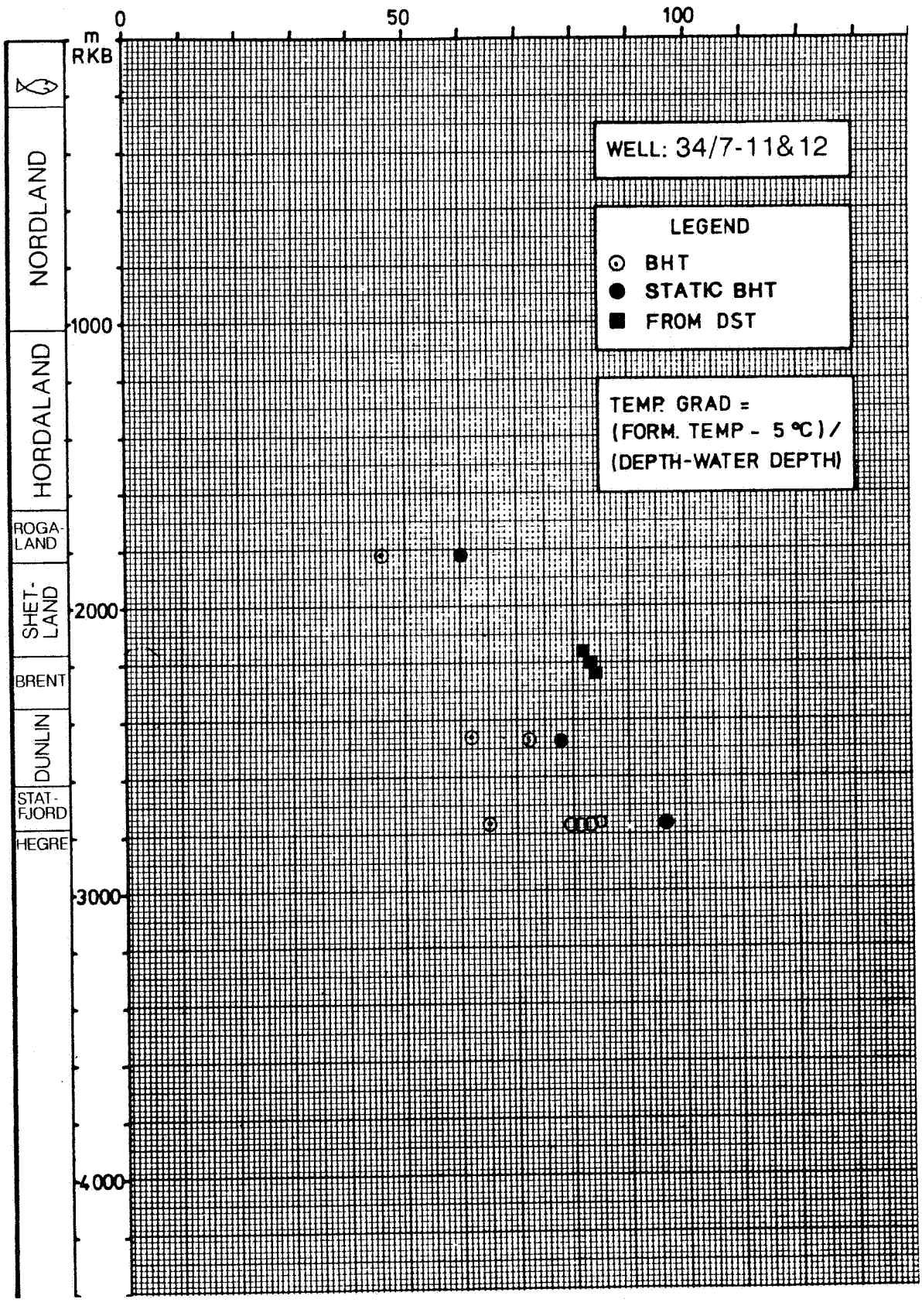


Fig. 4.3

Date April.88	Auth. TLL	Appr BAG
Draw by RHK	Ref	

4.9 Formation Pressure

The most relevant parameters used in this pressure evaluation are plotted in the Formation Pressure Evaluation Sheet (Enclosure II). Parameters as the d_c-exponent, the sonic log, gas data related to the mud weight and of course pressure measurements are looked upon as the most reliable in this context. In fig. 4.4 an interpreted pressure gradient profile is given.

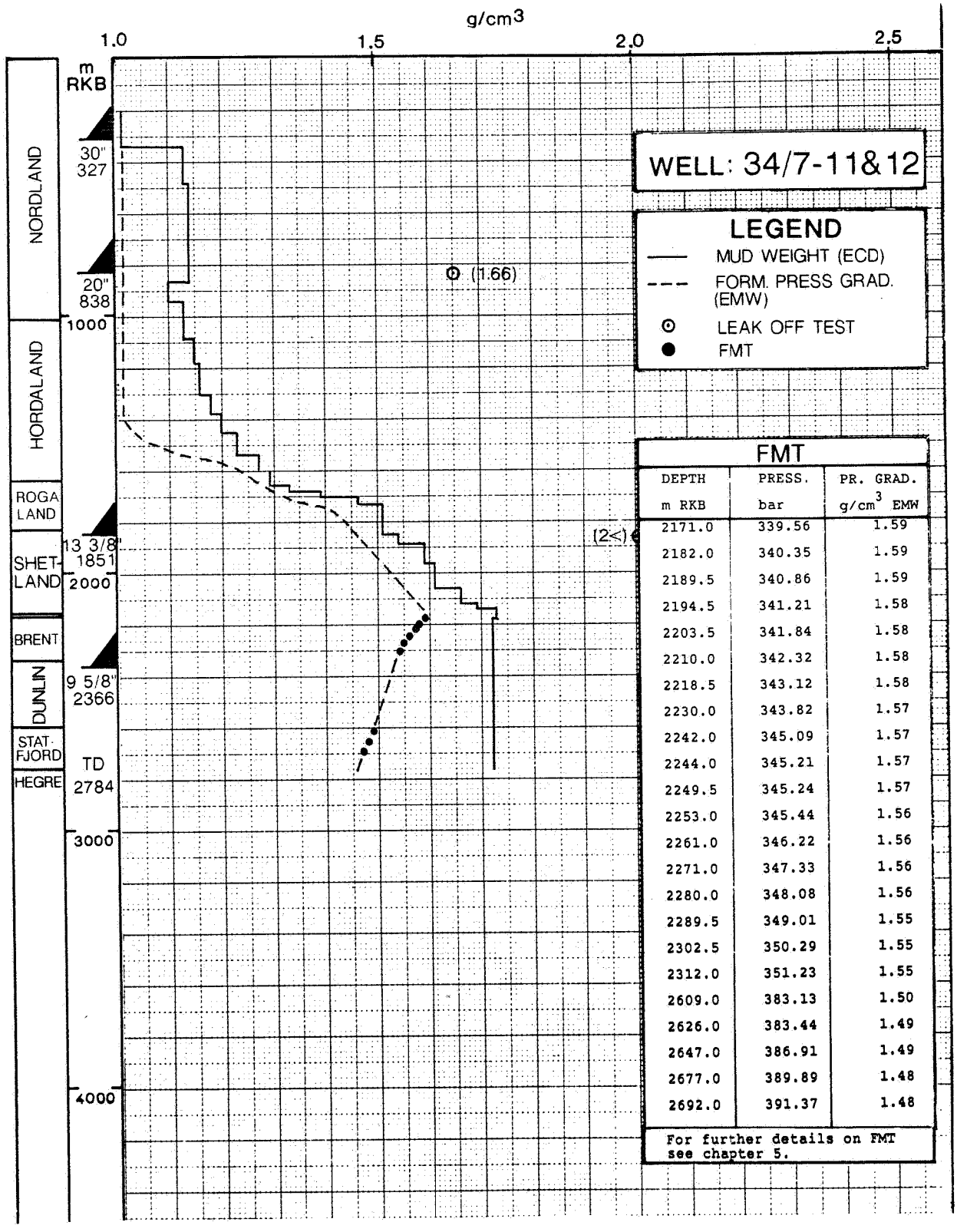
In the sediments of the Nordland Group (190 - 1021 m RKB) normal pressure conditions prevail, that is a pressure gradient of 1.04 g/cm^3 subsea.

The d_c-exponent displays an overall normal trend, some shifts are seen, but these are due to bit changes and change in the lithology. Trend shift to the left is seen in the d_c-exponent curve especially in the Utsira sands at 930 m RKB. Background gas data averages 0.5% down to approximately 850 m RKB, below this level even lower values were recorded. The maximum mud weight (ECD) in this section was 1.15 g/cm^3. At approximately 354 - 360 m RKB a gas charged sand was encountered. The gas column might create a slight overpressure in this sand sequence, but a gradient higher than 1.05 g/cm^3 subsea is not likely.

The uppermost part of the Hordaland Group is also believed to be normally pressured at least down to approximately 1400 m RKB. The normal trend line on the d_c-exponent has to be adjusted to the left due to changes in formation characteristics. A trend parallel to the one above is then displayed over the discussed section. Some scattering occurs, but again this is due to variations in lithology. Background gas data read close to zero with a maximum mud weight (ECD) of 1.19 g/cm^3. The sonic data display slightly decreasing Δts in this section with some scattering due to the lithology. This again is a confirmation of normally pressured sediments.

Below 1400 m RKB a build-up in pressure gradient seems to take place. A clear cut back is seen in the d_c-exponent curve. This correlates well with a increase in the background gas. The increase

Formation Pressure Gradient



FMT

DEPTH m RKB	PRESS. bar	PR. GRAD. g/cm^3 EMW
2171.0	339.56	1.59
2182.0	340.35	1.59
2189.5	340.86	1.59
2194.5	341.21	1.58
2203.5	341.84	1.58
2210.0	342.32	1.58
2218.5	343.12	1.58
2230.0	343.82	1.57
2242.0	345.09	1.57
2244.0	345.21	1.57
2249.5	345.24	1.57
2253.0	345.44	1.56
2261.0	346.22	1.56
2271.0	347.33	1.56
2280.0	348.08	1.56
2289.5	349.01	1.55
2302.5	350.29	1.55
2312.0	351.23	1.55
2609.0	383.13	1.50
2626.0	383.44	1.49
2647.0	386.91	1.49
2677.0	389.89	1.48
2692.0	391.37	1.48

For further details on FMT see chapter 5.

Fig. 4.4

Date May.1988	Auth JEP	Appr BAG
Draw by RHK	Ref	

in background gas level takes place parallel with a steady increase in the mud weight (ECD) from 1.20 g/cm^3 to 1.52 g/cm^3. These facts clearly indicate a build-up in pressure gradient. Sonic data confirm the build-up in pressure gradient by plotting with increasing Δts.

The increase in pressure gradient continues steadily throughout the Hordaland Group and Rogaland Group into the Shetland Group at 1832 m RKB. Pressure estimates (mainly based on the sonic log) performed at 1600 m RKB (Hordaland Group), 1675 m RKB (Rogaland Group) and 1900 m RKB (Shetland Group) indicate pressure gradients of 1.22 g/cm^3 EMW, 1.32 g/cm^3 EMW and 1.49 g/cm^3 EMW respectively.

The pressure development throughout the Shetland Group is uncertain. Below 1900 m RKB the d_c-exponent indicates a regression in pressure gradient by plotting on an increasing trend followed by a new cut back around 2050 m RKB. However, the sonic log displays a close to vertical trend throughout the entire Shetland Group sequence which is indicative of a steady increase in pressure gradient. In this context the sonic log is believed to be the most reliable parameter. Hence the pressure gradient is said to increase steadily towards the Brent Group (reservoir) at 2169 m RKB.

Several pressure measurements were performed in the Brent Group sandstones giving a maximum pressure gradient of 1.59 g/cm^3 EMW at 2171 m RKB decreasing to 1.55 g/cm^3 EMW at 2312 m RKB. This is according to an oil gradient of 0.07 bar/m and a water gradient of 0.098 bar/m. It seems that the pressure gradient continues to decrease throughout the Dunlin Group.

Further pressure measurements were performed in the Statfjord Formation at 2606 m RKB. The deepest reading at 2692 m RKB gives a pressure gradient of 1.48 g/cm^3 EMW. The well was terminated at 2784 m RKB in the Hegre Group.

4.10 Shallow Gas

Site survey interpretation:

The shallow seismic sections close to the well sites (fig. 4.5) indicated shallow gas at 360, 484 and 600 m RKB.

Attention was also drawn to frequent gas observations in the Gullfaks area within the 308 - 460 m MSL interval (corresponding to 334 - 486 m RKB at the present site) and to the fact that these were not always marked by distinct seismic anomalies.

Well log interpretation:

Well logs (Well Site Lithology Log, Composite Log) revealed certain differences between the two wells with respect to gas distribution and concentration. The shallowest gas sand was present only at 34/7-11, between 348.5 and 351 m RKB. Its maximum value of 3.1% (mud weight 1.12 - 1.15) was the highest recorded from the combined locations. 20 m away at 34/7-12 there was no sign of either gas or a coherent sand unit.

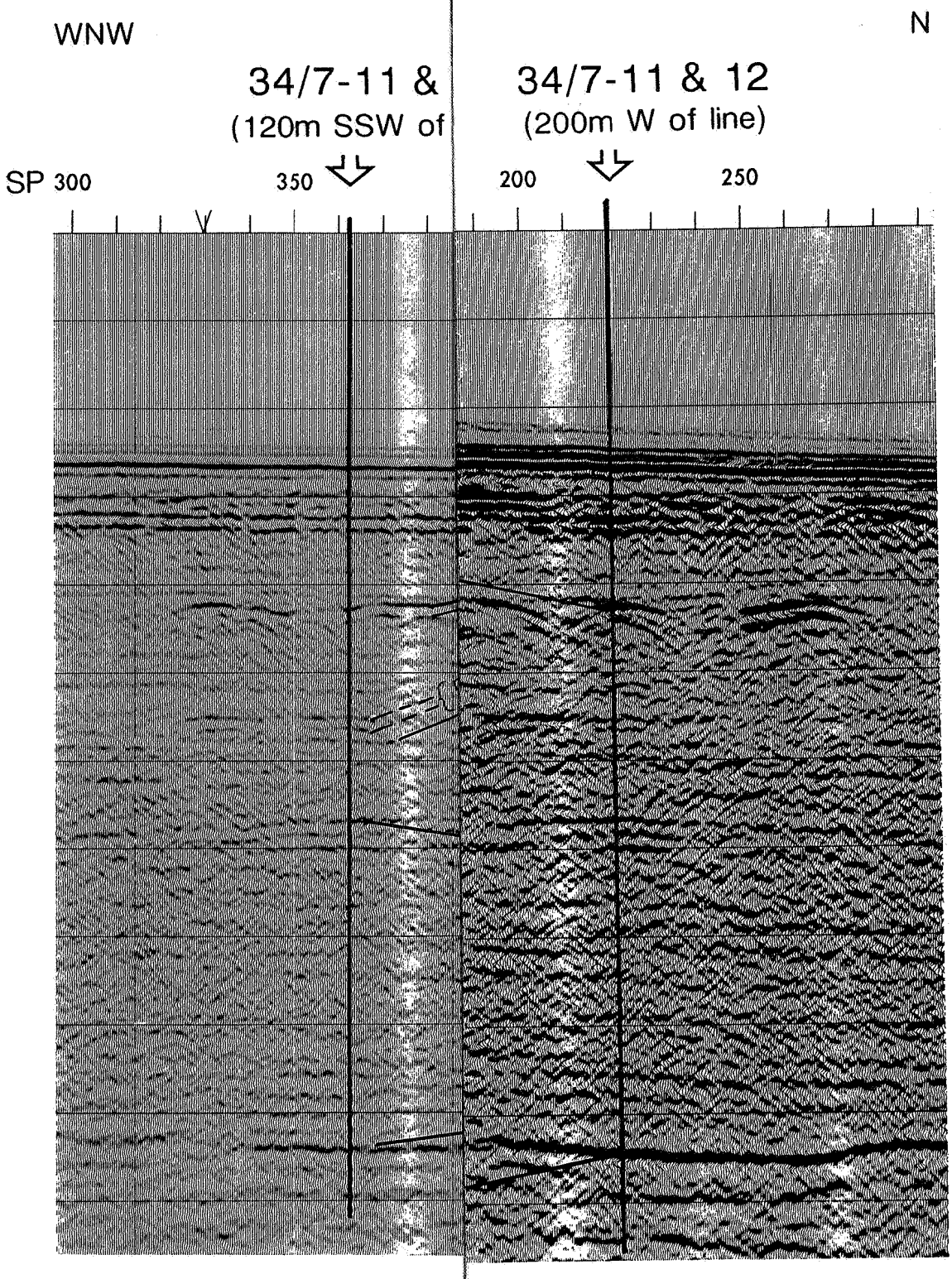
A few metres deeper both wells encountered gas at the top of a 35-40 m thick sand body. At 34/7-11 gas readings reached 2.8% in the interval 357.5 - 361 m RKB (mud weight 1.12 - 1.15) but at 34/7-12 only 1.7% in the interval 355 - 360.5 m RKB (mud weight 1.12 - 1.13).

The seismic anomaly reported as "360 m RKB" could represent either of these sands. Fig. 4.5 clearly shows several anomalies at approximately this depth in the general vicinity of the site, but also demonstrates depth variations of the equivalent of 10 m for these "shallow gas pockets" over distances of 10-15 shot points, which corresponds to the well locations' offset from the two profile lines. It is possible that the gas is associated with buried channels of Late Pliocene age, capped by impermeable beds.

At 34/7-11 a gas value of 1.3% (mud weight 1.15) was observed at 516 - 517 m RKB at the top of a 5 m thick sand unit. At 34/7-12 a similar gas value was logged (mud weight 1.13 - 1.14) at 511 - 512 m RKB. Although only thin sands are indicated in this well, a distinctly clayey horizon at 510 m RKB could provide a trap.

The wells apparently missed the local anomalies where gas was predicted some 30 m shallower (at 458 m RKB) and intercepted an even smaller anomaly just discernible on the relative amplitude plot of line 805 at c. 575 ms.

Shallow Gas - Well and S



Seismic line SG84
(Relative amplitu

Seismic line SG8431-717

Fig. 4.5

Dato	May.88	Forf.	AJR	Godkj.	BUH
Tegn.av	RHK	Ref.			

4.11 Stratigraphy

4.11.1 Lithostratigraphic Summary

The lithostratigraphic subdivision of well 34/7-11 and 12 (table 4.5) is based on wireline log responses, conventional cores, sidewall cores and cutting descriptions, supported by the biostratigraphic breakdown prepared by Paleoservices.

Table 4.5: Lithostratigraphic Summary, wells 34/7-11 and 12

Formation Tops	Depths (m RKB)	Thickness m
Nordland Group (Seabed), 34/7-11	216.0	645.0
Nordland Group (Seabed), 34/7-12	216.0	805.0
Utsira Formation	930.0	91.0
Hordaland Group	1021.0	622.5
Rogaland Group	1643.5	188.5
Balder Formation	1643.5	48.0
Lista/Sele Formation	1691.5	140.5
Shetland Group	1832.0	328.5
Viking Group	2160.5	8.5
Heather Formation	2160.5	8.5
Brent Group	2169.0	171.5
Tarbert Formation	2169.0	44.0
Ness Formation	2213.0	38.5
Etive Formation	2251.5	17.0
Rannoch Formation	2268.5	65.0
Broom Formation	2333.5	7.0
Dunlin Group	2340.5	265.5
Drake Formation	2340.5	121.5
Cook Formation	2462.0	56.0
Burton Formation	2518.0	29.0
Amundsen Formation	2547.0	17.5
Calc. Amundsen	2564.5	41.5
Statfjord Formation	2606.0	157.0
Hegre Group	2763.0	21.0
Upper Lunde	2763.0	21.0
T.D.	2784.0 (driller's depth)	

4.11.2 Biostratigraphic Summary

The routine biostratigraphic interpretation was prepared by Paleoservices. The following analyses were carried out:

1. Paleoservices:

Micropaleontology:	277 ditch cutting samples, 47 sidewall core samples and 3 core samples.
Palynology:	98 ditch cutting samples, 36 sidewall core samples and 22 core samples.

2. Saga:

Micropaleontology:	27 sidewall core samples.
Palynology:	17 sidewall core samples and 26 core samples.

The biostratigraphic interpretations from Paleoservices have been somewhat modified by Saga.

The biostratigraphic breakdown is given in table 4.6. The Cainozoic and Mesozoic stratigraphic history is given in figs. 4.6 and 4.7.

Table 4.6: Biostratigraphic Summary, wells 34/7-11 and 12

Age	Depth m RKB	Thick-ness m	Remarks
Seabed	216.0		
Pliocene - Late Miocene	360.0	661.0	Top not seen
UNCONFORMITY			
Late Oligocene	1021.0	78.5	Log
Early Oligocene	1099.5	260.5	
?UNCONFORMITY			
Late Eocene	1360.0	100.0	
Middle Eocene	1460.0	120.0	
Early Eocene	1580.0	63.5	
Late Paleocene	1643.5	88.5	Log
UNCONFORMITY			
Maastrichtian	1832.0	163.0	Log
Late Campanian	1995.0	60.0	
Early Campanian	2055.0	105.5	
UNCONFORMITY			
Bathonian - Bajocian	2160.5	180.0	Log
Aalenian - Late Toarcian	2340.5	104.5	Log
Early Toarcian	2445.0	17.0	
UNCONFORMITY			
Late Pliensbachian	2462.0	102.5	Log
UNCONFORMITY			
Early Pliensbachian	2564.5	41.5	Log
Early Jurassic - ?Late Triassic	2606.0	166.0	Log
Late Triassic	2772.0	12.0	
T.D.	2784.0	(driller's depth)	

Well 34/7-11 & 12
CAINOZOIC STRATIGRAPHIC HISTORY

PAGE ONE OF TWO

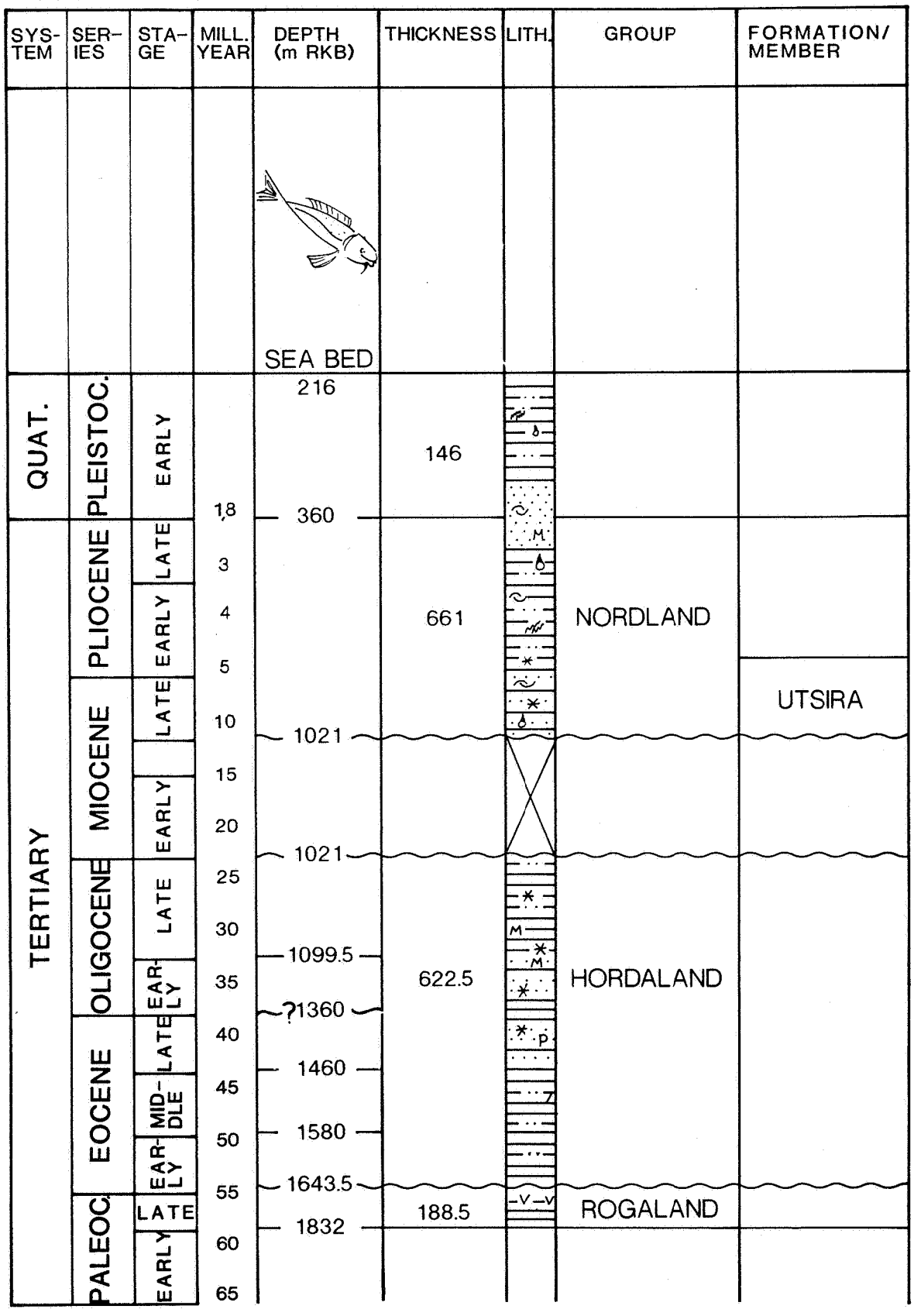


Fig. 4.6

Date May.88	Auth TLL	Appr BAG
Draw by RHK	Ref	

Well 34/7-11 & 12
MESOZOIC STRATIGRAPHIC HISTORY

PAGE TWO OF TWO

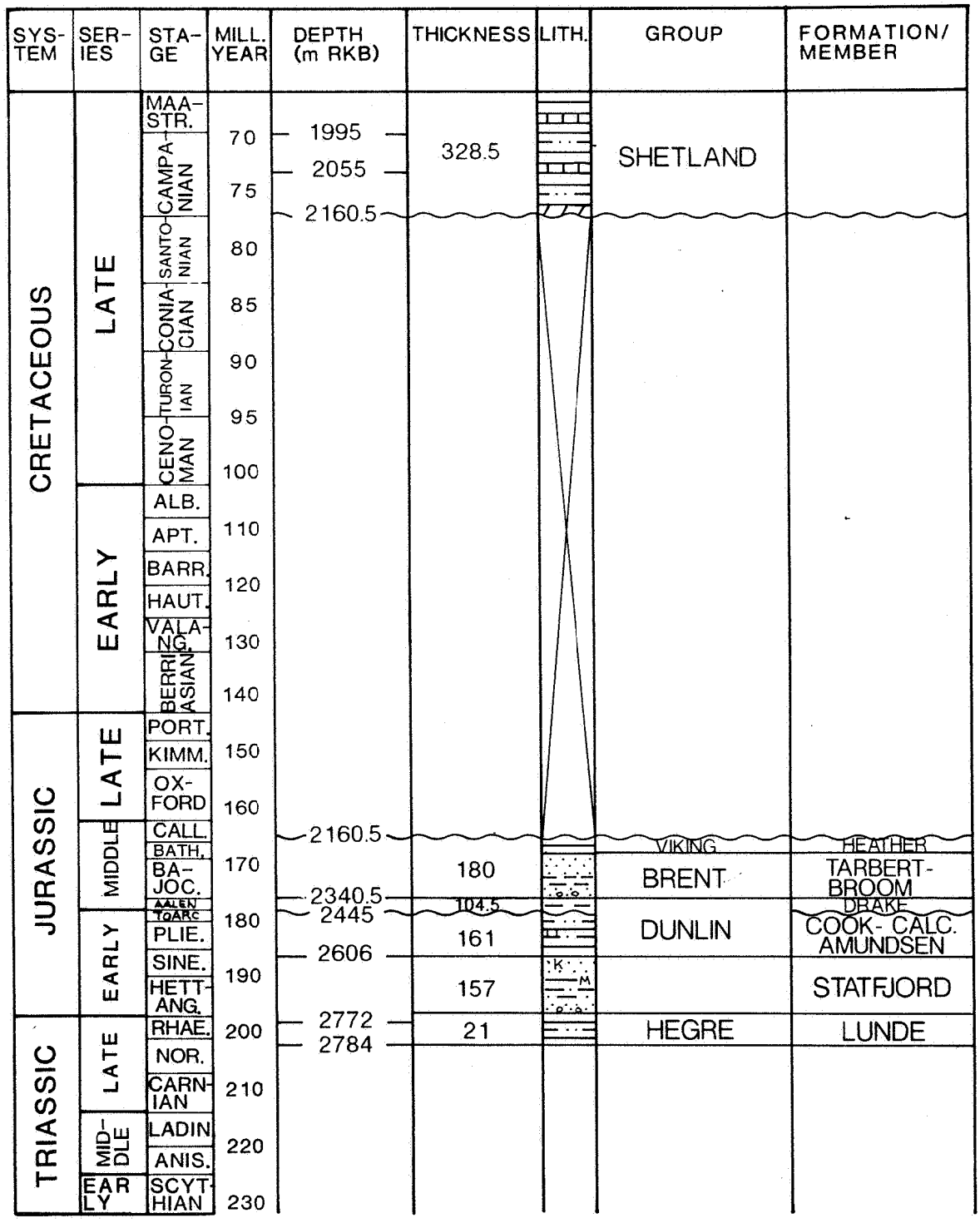


Fig. 4.7

Date	May.88	Auth.	TLL	Appr	BAG
Draw by	RHK	Ref			

4.11.3 Hegre Group

Lunde Formation, upper Lunde member

Depth interval: 2763 - 2784 m RKB (T.D., driller's depth)
Thickness: 21 m
Age: Late Triassic

This short sequence of the upper Lunde member is composed of claystone interbedded with siltstone. The claystones are occasionally silty, olive grey to grey brown to dark green grey, firm, brittle, subfissile and slightly calcareous.

The siltstones are arenaceous, grading to fine grained sandstones, olive grey to dark green grey, firm, slightly micaceous and non calcareous.

Trace occurence of white to grey white and firm limestone.

Upper boundary

The transition from the Statfjord Formation to the upper Lunde member is marked on the logs by an increase in the gamma ray and the resistivity.

4.11.4 Statfjord Formation

Depth interval: 2606 - 2763 m RKB
Thickness: 157 m
Age: Early Jurassic - ?Late Triassic

The Statfjord Formation is dominated by fluvial channel sandstones with minor to interbedded claystone.

The sandstones are light grey to very light grey and predominantly fine to coarse, moderately sorted, subrounded to subangular, loose to

friable with occasional kaolinite and mica and a good visible porosity. They are very coarse to conglomeratic at the base of two sand intervals (2693 and 2762 m RKB). Occasionally the sandstones are silty and argillaceous, very fine to fine and well sorted. The sandstones are non to slightly calcareous throughout the Statfjord Formation.

The claystones are occasionally silty and shaly and occasionally arenaceous, brown grey to dark green grey to brown black, firm, brittle, micro-micaceous and non to slightly calcareous.

There are sporadic stringers of white to grey white and firm limestones and trace occurence of pyrite.

Upper boundary

The top Statfjord is marked on the logs by a marked decrease on both the gamma ray reading and the resistivity.

4.11.5 Dunlin Group

Calcareous Amundsen

Depth interval: 2564.5 - 2606 m RKB
Thickness: 41.5 m
Age: Early Pliensbachian

The Calcareous Amundsen Formation consists of claystone and siltstone with minor limestone.

The claystone is silty, olive grey to medium grey, firm, micro-micaceous and calareous.

The silststone is argillaceous, olive grey to medium dark grey, firm, micaceous and slightly calcareous to calcareous. The limestone is white to grey white and soft to firm. Trace occurence of pyrite.

Upper boundary

The Top Calcareous Amundsen Formation is characterized on the logs by a slight decrease in the gamma ray readings together with a marked decrease in the sonic transit time.

Amundsen Formation

Depth interval: 2547 - 2564.5 m RKB
Thickness: 17.5 m
Age: Late Pliensbachian

The Amundsen Formation consists of claystone with minor limestone.

The claystone is silty, brown grey to olive black, firm, brittle, slightly micro-micaceous and slightly calcareous.

The limestone is grey white and soft to firm. Trace occurence of pyrite.

Upper boundary

The Top Amundsen Formation is marked on the logs by an increased and more erratic resistivity reading than the Burton Formation.

Burton Formation

Depth interval: 2518 - 2547 m RKB
Thickness: 29 m
Age: Late Pliensbachian

The Burton Formation consists of claystone with minor sandstone and limestone.

The claystone is silty, olive grey to brown grey, firm and slightly calcareous to calcareous.

The sandstone is silty, clear, predominantly very fine, occasionally fine to medium, well to moderately sorted, subangular to subrounded and loose.

The limestone is white to grey white and soft to firm. Trace occurence of dolomite and pyrite.

Upper boundary

The Top Burton Formation is characterized on the logs by a slight increase in gamma ray and slight increase in sonic transit time.

Cook Formation

Depth interval: 2462 - 2518 m RKB
Thickness: 56 m
Age: Late Pliensbachian

The Cook Formation is represented by an interbedded sequence of claystone and sandstone and minor limestone.

The claystones are silty, olive grey to medium grey to grey brown, firm, micro-micaceous and slightly calcareous.

The sandstones are silty, clear to light olive grey, predominantly very fine, occasionally fine to medium, well to moderately sorted, subangular to subrounded, loose to friable, micaceous, occasionally calcareous cemented, and they have a poor porosity.

The limestone is arenaceous, white to grey white and soft to firm. Trace occurence of yellow white firm to hard dolomite and pyrite.

Upper boundary

The Top Cook Formation is characterized by a decrease in gamma ray reading and sonic transit time.

Drake Formation

Depth interval: 2340.5 - 2462 m RKB
Thickness: 121.5 m
Age: Aalenian - Early Toarcian

The Drake Formation consists of silty shales varying in colour from brown grey to medium dark grey to grey black. They are firm, brittle, micro-micaceous, slightly calcareous and dolomitic.

There is trace occurence of sandstone, limestone and dolomite. The sandstones are clear, very fine to medium, moderately sorted, subrounded and loose.

The limestones are partly nodular, 4 cm in diameter, partly bedded, grey white to yellow white, soft to firm.

The dolomite is slightly arenaceous, light brown and very hard. Pyrite occurs sporadic.

Upper boundary

Top Drake is characterized by an increased and steady gamma ray reading.

4.11.6 Brent Group

Broom Formation

Depth interval: 2333.5 - 2340.5 m RKB
Thickness: 7 m
Age: Bathonian - Bajocian

The Broom Formation is the basal formation of the Brent Group. The upper 2-3 m is a shale, occasionally interlaminated with thin sand stringers. The shale is medium to dark grey, firm to brittle and very

micaceous. The sandstone is very fine and slightly dolomitic, else as in the Rannoch Formation.

The next 3-4 m is a mudstone intercalated with matrix supported conglomeratic sandstones where grain sizes are ranging from very fine to pebbly (4 mm in diameter), subangular to subrounded, poorly sorted, firm to hard, calcareous and dolomite cemented, pyritic and with a poor visible porosity.

At the base there is a 1 m thick dolomite bed. The dolomite is slightly arenaceous, light brown and very hard.

Upper boundary

The Top Broom is characterized by a decrease in the gamma ray log reading together with a decreased sonic velocity.

Rannoch Formation

Depth interval: 2268.5 - 2333.5 m RKB
Thickness: 65 m
Age: Bathonian - Bajocian

The Rannoch Formation is a massive sandstone deposit, becoming shaly towards the base.

From the top and down to 2317 m RKB the Rannoch Formation consists of light grey sandstone, very fine to fine, coarsening upwards, well sorted, rounded to subrounded, loose to friable, occasionally kaolonitic, micaceous, non calcareous and with a fair to good visible porosity. Only trace occurence of shale laminae.

From 2317 m RKB and down to the bottom there is a tight interbedded sequence of sandstone and shale in cm to dm scale. The sandstone is as above. The shale is dark grey to grey black, brittle to firm and very micaceous.

Upper boundary

The Top Rannoch is marked by a slight increase in the gamma ray and the density log readings.

Etive Formation

Depth interval: 2251.5 - 2268.5 m RKB
Thickness: 17 m
Age: Bathonian - Bajocian

The Etive Formation consists of fining upwards sandstone of inner foreshore facies.

The sandstones are light grey, but dusky yellow brown to weak yellow brown where they are oil stained, very fine to medium with a pebbly zone at the bottom, well to moderately sorted, subangular to subrounded, loose to friable, occasionally micaceous and with a good visible porosity. Trace occurence of mm to cm thick coal layers. The coal is black, hard and brittle.

Upper boundary

The Top Etive Formation is marked on the logs by a distinctive decrease in the resistivity and an overall reduced gamma ray reading.

Ness Formation

Depth interval: 2213 - 2251.5 m RKB
Thickness: 38.5 m
Age: Bathonian - Bajocian

The Ness Formation is a delta plain deposit constituting and interbedded sequence of shale, sandstone and minor coal.

The shales are occasionally silty, medium to dark grey, micro-micaceous, firm and brittle with occasional occurence of slickenslides and non calcareous.

The sandstones are moderately to dark yellow brown where they are oil stained, elsewhere light grey, fine to medium down to 2235 m, very fine to fine lower down, well sorted, subangular to subrounded, loose to friable, non calcareous and have a good visible porosity.

The coal is black, occasionally shaly, hard and brittle.

Upper boundary

The Top Ness Formation is marked on the logs by a distinctive increase in the gamma ray.

Tarbert Formation

Depth interval: 2169 - 2213 m RKB
Thickness: 44 m
Age: Bathonian - Bajocian

The Tarbert Formation consists of marginal marine sandstones with minor occurence of shale and coal beds.

The sandstones are yellowish brown to dark brown where there is oil staining, elsewhere clear, fine to medium and medium to coarse, well sorted, rounded to subrounded, loose, friable, micaceous, non calcareous and with a fine to good porosity.

The shale is dark grey to grey black, firm, brittle and micaceous.

The coal is black, hard and brittle.

Upper boundary

The Top Tarbert Formation represents the top reservoir and is marked on the logs by a distinctive reduction in the gamma ray reading and a marked increase in the resistivity.

4.11.7 Viking Group

Heather Formation

Depth interval: 2160.5 - 2169 m RKB
Thickness: 8.5 m
Age: Bathonian - Bajocian

The Heather Formation is an 8.5 m thick sequence of claystone. The claystones are grey black to brown black, firm, subfissile, micro-micaceous and non calcareous. Trace occurence of fossils.

Upper boundary

The Top Heather Formation is marked on the logs by an increased gamma ray reading.

4.11.8 Shetland Group

Depth interval: 1832 - 2160.5 m RKB
Thickness: 328.5 m
Age: Maastrichtian - Early Campanian

The lithology of the Shetland Group is predominantly claystone with occasional stringers of limestone and dolomite.

The claystone is occasionally silty and arenaceous, medium grey to medium dark grey to brown grey, occasionally green grey to dark green grey, predominantly firm, occasionally sticky, calcareous from the top becoming non to slightly calcareous from 2000 m.

There is also trace occurence of sandstone which is clear, occasionally orange, predominantly fine to coarse, occasionally very fine to fine, moderately sorted, subangular to subrounded, loose and friable.

From 2060 m there is scattered occurence of mm thin laminations of light grey and slightly micaceous siltstone in the claystones. Trace occurence of pyrite and fossil fragments throughout the Shetland Group.

Upper boundary

The Top Shetland Group is marked on the logs by a slight increase in resistivity and gamma ray and a decreased sonic transit time.

4.11.9 Rogaland Group

Depth interval: 1643.5 - 1832 m RKB
Thickness: 1988.5 m
Age: Late Paleocene

Lista/Sele Formation

Depth interval: 1691.5 - 1832 m RKB
Thickness: 140.5 m
Age: Late Paleocene

The lithology of the Lista/Sele Formation is predominantly claystone with minor occurence of sandstone and limestone in the lower half.

The claystones are varicoloured from medium grey to dark grey, olive grey to dark green grey, occasionally brown grey, firm to hard, occasionally sticky and occasionally waxy, non calcareous from the top becoming calcareous to very calcareous towards bottom.

The sandstones are argillaceous, clear to light brown grey, predominantly very fine to fine, occasionally fine to coarse, well to moderately sorted, rounded to subangular, loose to firm, occasionally calcareous cemented and have a good visible porosity.

The limestones are argillaceous, white to light grey and soft to firm.

There is also trace occurence of dolomite and pyrite. The dolomite is brown to dark orange brown and hard.

Upper boundary

The Top Lista/Sele Formation is marked on the logs by a sharp increase in gamma ray and a slight decrease in the resistivity.

Balder Formation

Depth interval: 1643.5 - 1691.5 m RKB
Thickness: 48 m
Age: Late Paleocene

The Balder Formation consists of tuffaceous and marly claystone. These are varicoloured, olive grey to grey brown, medium dark grey to grey black, occasionally light grey with occasional white and black specks, soft to firm and non to very calcareous. There is also trace occurence of pyrite, fossils, limestone and dolomite.

Upper boundary

The Top Balder Formation is characterized by a decrease in the gamma ray reading and an increase in the resistivity.

4.11.10 Hordaland Group

Depth interval: 1021 - 1643.5 m RKB
Thickness: 622.5 m
Age: Late Oligocene - Early Eocene

We can lithologically divide the Hordaland Group into 3 sections.

Down to 1140 m RKB the lithology is claystone with trace of sandstone. The claystone is silty with colours from brown grey to olive grey to dark yellow brown, firm, micro-micaceous and non to slightly calcareous.

The sandstone is light grey to light brown grey, very fine to fine, well sorted, rounded to subrounded, loose, micaceous and calcareous. There are also traces of glauconite and pyrite.

Between 1140 and 1430 m RKB there are alternating beds of claystone and sandstone. The claystones are silty to arenaceous, olive grey to dark green grey, medium dark grey to medium bluish grey, waxy, firm, occasionally hard, subfissile, slightly micro-micaceous, predominantly non calcareous, occasionally calcareous. The sandstones are slightly argillaceous, clear to white and medium light grey to olive grey, fine to medium, occasionally coarse, well to moderately sorted, rounded to subrounded, loose and occasionally calcite cemented. Occasional stringers of limestone and dolomite and traces of glauconite, pyrite and mica.

From 1430 m RKB and down to Top Balder at 1643.5 m RKB the lithology is again dominated by claystone with trace occurence of sandstone stringers. The claystones are occasionally silty with colours varying from medium grey to medium bluish grey to dark green grey, occasionally brown grey, waxy, firm to hard, subfissile, predominantly non calcareous, occasionally calcareous.

The sandstones are slightly argillaceous, clear to white and very light grey, fine to medium, well sorted, rounded to subrounded, loose, non calcareous and slightly micaceous.

There is also trace occurence of limestone, dolomite, pyrite and foraminifera. The limestone is white to light grey brown, soft to firm while the dolomite is brown to dark orange brown and hard.

Upper boundary

The transition from the Utsira Formation to the Hordaland Group is characterized by a reduced and steady reading on both the gamma ray and resistivity logs and an increased sonic transit time.

4.11.11 Nordland Group, well 34/-12

Depth interval: 216 (Seabed) - 1021 m RKB
Thickness: 805 m
Age: Pliocene - Late Miocene

Utsira Formation

Depth interval: 930 - 1021 m RKB
Thickness: 91 m
Age: Pliocene - Late Miocene

The Utsira Formation is composed of sand alternating with clay.

The sand is clear to white, occasionally orange and loose quartz grains. They vary from very fine to medium, are well sorted, rounded to subrounded and glauconitic.

The clay is slightly arenaceous, olive grey to brown grey, soft to firm, micro-micaceous, subfissile and slightly calcareous.

Traces of glauconite, shell fragments, fossils and foraminiferas.

Upper boundary

The Top Utsira Formation is marked on the logs by a decrease in both the gamma ray and resistivity

Nordland Group above the Utsira Formation

Depth interval: 216 - 930 m RKB
Thickness: 714 m
Age: Pliocene - Late Miocene

The Nordland Group above the Utsira Formation consists of clay with occasional beds of sand.

The clay is arenaceous, medium grey, soft, sticky and non to slightly calcareous.

Down to 400 m RKB sand is dominating. The sand is clear to white subangular quartz grains, predominantly fine, occasionally medium to coarse, moderately to well sorted, loose and slightly micaceous. Further down the sand is silty, clear to white, very fine to fine, occasionally medium, well to moderately sorted, subangular to subrounded, loose and slightly micaceous.

There is trace occurence of rock and shell fragments, fossils and pyrite.

4.11.12 Nordland Group, well 34/7-11

Depth interval: 216 (Seabed) - 861 m RKB
Thickness: 645 m
Age: Pliocene - Late Miocene

Clay with occasional interbedded sand bodies.

The clay is arenaceous becoming lesser arenaceous towards bottom, predominantly medium to medium light grey becoming darker grey towards bottom, soft and sticky and slightly calcareous.

The sand consists of clear, loose quartz grains with occasional content of mica. Down to 400 m RKB the sand is predominantly medium to very coarse, subangular to subrounded and poorly sorted. Further down the sand is clear, very fine to medium, moderately to poorly sorted, subrounded and occasionally micaceous.

There are also traces of rock fragments, shell fragments, grey white arenaceous and soft limestone, fossil fragments and pyrite.

4.12 Hydrocarbon Indications

Well 34/7-11 was drilled down to 861 m RKB through the Late Miocene to Pliocene Nordland Group before it was abandoned. Apart from the shallow gas sands, which will be referred to in section 4.10, the total background gas was 0.2 - 0.6% through the well. Only C1 was recorded. The mud weight averaged 1.15 g/cc.

In well 34/7-12 the 26" hole was drilled down to 852 m RKB before the 20" casing was set. Apart from the shallow gas sands (section 4.10), the total background gas averaged 0.4 - 0.5% in this section. Only C1 was recorded. The mud weight was 1.14 - 1.15 g/cc.

The 17 1/2" hole was drilled down to 1865 m RKB. From 852 m RKB down through the Utsira Formation and into the Hordaland Group down to 1370 m RKB, the well was normally pressured. The mud weight was increased from 1.10 g/cc to 1.19 g/cc, and the background gas decreased accordingly from 0.2% at the top down to 0.08% below 1140 m RKB. A maximum gas peak of 0.55% at 885 m RKB and a trip gas of 0.2% at 1200 m RKB was recorded. Only C1 was recorded.

From 1370 m RKB there is a gradual pressure build-up through the rest of the section to 1865 m RKB at the top of the Shetland Group. The mud weight was gradually increased from 1.19 g/cc to 1.55 g/cc at 1865 m RKB. The background gas increased to 0.2% down to 1580 m RKB. Between 1580 and 1700 m RKB it increased to 0.4 - 0.5%. Then it decreased to 0.2 - 0.3% down to 1865 m RKB. Gas peaks of 1.8% at 1713 m RKB and 4.41% at 1798 m RKB were recorded. C2 was recorded from 1480 m RKB, C3 from 1510 m RKB and iC4 from 1590 m RKB.

The first sign of shows in the well were recorded in a sandstone between 1800 and 1805 m RKB. It had strong HC-odour, a strong brown oil staining, 100% moderate to strong yellow flourescence, and instant to fast streaming strong yellow - white cut and a yellow residue upon evaporation.

The pressure build-up continued down from 1865 m RKB to Top Brent at 2169 m RKB, and the mud weight was gradually increased from 1.55 g/cc

to 1.72 g/cc. Down to 2060 m RKB the background gas was 0.2%. From 2060 m RKB the gas increased markedly with a maximum registration of 2.76% at 2123 m RKB. A gas peak of 2.17% at 2120 m RKB was decomposed to 12529 ppm C1, 1632 ppm C2, 917 ppm C3, 97 ppm iC4 and 272 ppm nC4. A trip gas of 3.2% was recorded at 2169 m RKB. nC4 was recorded from 2015 m RKB.

Shows were recorded in siltstones from 2060 m RKB just where the gas registrations started to increase. The siltstones showed no oil stain or odour, 80-100% moderate pale yellow flouresence, slow streaming pale yellow to bluish white cut and a yellow white residue.

From the Top Brent at 2169 m RKB there were good oil shows in the sandstones all the way down to Top Rannoch at 2268.5 m RKB. Down to the OWC at 2250 m RKB the sandstones showed a good to strong HC-odour, 80-100% brown to yellow brown oil stain, 80-100% bright yellow moderate to strong flourescence, instant to fast streaming milky to bluish white cut and yellow white residue upon evaporation. Below the OWC there were only weak oil stains, 20-80% weak yellow white - strong yellow-white flourescence, moderate to fast streaming milky white to bluish white cut and yellow white to yellow brown residue upon evaporation. From Top Rannoch there were no shows.

The mud weight was held constant at 1.72 g/cc in this interval. The background gas was 0.8% at the top decreasing to 0.2% at 2268.5 m RKB. All the components from C1 to C5 were recorded. Gas peaks of 3.86% at 2223 m RKB and 2.62% at 2250 m RKB were recorded. The gas peak of 3.86% was decomposed to 26428 ppm C1, 3221 ppm C2, 1800 ppm C3, 76 ppm iC4, 206 ppm nC4 and 68 ppm nC5.

From 2268.5 m RKB down to T.D. at 2784 m RKB the shows disappeared, and the mud weight was kept constant at 1.72 g/cc. The background gas dropped below 0.1% and was kept predominantly below 0.1% for the rest of the well. Gas peaks of 0.2% at 2330 m RKB, 1.13% at 2623 m RKB (in the top part of Statfjord) and 0.21% at 2724 m RKB. Concerning the different components iC4 disappears at 2285 m RKB, nC4 at 2330 m RKB, C3 at 2740 m RKB and C2 at 2766 m RKB. A trip gas of 1.8% was recorded at 2484 m RKB.

5. FORMATION EVALUATION

5.1 Logging

The logging programme included 3 runs (Section 4.6.) The density/ neutron logs from run 2a and the neutron log from run 3b are not of reliable quality. In the log analysis density neutron logs from run 3c are used, ref. Petrophysical Report R-EPF 0055 34/7-12, June 1988.

The logs have been analysed with a computer model based on a complex lithology method. Net sand averages have been calculated using a porosity cutoff of 12% in the Brent Group, except for the lowermost part of the Rannoch Formation (Rannoch I) and the Broom Formation, where a porosity cutoff of 16% is used. The porosity cutoff in the Statfjord Formation is 12%. The shale volume cutoff used is 40% for all formations.

Shows are reported from a sidewall core cut at 1803 m RKB in a Paleocene sand. Logs also seem to indicate the presence of a two metres thick residual or hydrocarbon bearing zone from 1801 m RKB to 1803 m RKB (fig. 5.1).

An oil water contact of 2250 m RKB (2224 m MSL) has been defined in the Ness Formation. The net sand averages for the separate zones are given in table 5.1, a-d.

5.2 Core Analyses

A total of 10 cores were cut through the Brent Formation and 20 m into the top of the Dunlin Group. The cores were taken in the interval 2169.0 - 2360.5 m RKB. A total of 180.8 m were cored with a recovery of 94.4%.

Conventional core analyses were performed on all cores except core No. 3. Horizontal air permeability, helium porosity and grain density were measured every 0.25 m while vertical permeability, summation porosity and pore saturation were measured every metre. The analysis results are listed in table 5.2, a-e. Core depth shifts are given in section 4.3.3.

5.3 Formation Pressure Measurements

An Atlas Wireline Services Formation Multi Tester (FMT) with a Hewlett Packard crystal gauge was used to obtain formation pressures (table 5.4, a-b).

An OWC at 2250 m RKB (2224 m MSL) is defined from formation pressure measurements, and is in agreement with logs. In the Brent Group an oil gradient of 0.070 bar/m and a water gradient of 0.098 bar/m were determined. The pressure points measured in the Cook Formation were not of reliable quality. The water gradient in the Statfjord Formation is 0.100 bar/m. The Stafjord Formation is 1.4 bar overpressured compared to the pressure regime in the Brent Group.

Results from 2 3/4 gallon chambers (segregated samples) opened on the rig floor are listed in table 5.4. The 1 gallon chambers were sent to laboratory for PVT studies, with the results presented in section 5.5.

5.4 Testing

The following production tests were performed in well 34/7-12:

Formation	Test No.	Fluid	Perforation Interval (m RKB)
Lower Brent	1	Water	2276.2 - 2282.2
Ness	2	Oil	2229.0 - 2235.0
Tarbert	3	Oil	2205.5 - 2209.5

The objectives of the tests were to:

Test No. 1:

- obtain formation water samples
- estimate the productivity
- estimate the formation characteristics

Test No. 2:

- measure the productivity
- investigate formation characteristics and sand continuity
- obtain formation fluid samples
- estimate sand free production rate
- investigate the continuity of the shale interval 2235 - 2241 m RKB

Test No. 3:

- measure the productivity
- estimate sandfree production rate
- obtain formation fluid samples
- estimate the formation characteristics

Operations:

Production test No. 1:

The interval 2276.2 - 2282.5 m RKB was perforated underbalanced with a 5 inch Schlumberger tubing conveyed perforation gun, 5 shots/foot. After perforation, the well was shut-in for 1 hour in order to get the initial reservoir pressure.

The well was opened through an adjustable choke. Due to sand production it was necessary to go straight into the main flow to avoid sand settling in the test string. During the 29.8 hours main flow, an 11 mm fixed choke was used. The last recorded water rate was 1284 Sm^3/D with a corresponding wellhead pressure of 106 bar and a productivity index of 186 $m^3/D/bar$. The sand production at the beginning of the main flow was 10% of the total flow. It decreased during the flow, and for the last 10 hours of the main flow it was approximately zero. The well was then shut-in for 30 hours.

During the sand detection flow, the well was flowed at different rates using choke sizes between 8 mm and 16 mm, with a maximum rate of 1810 m^3/D. When the flow rate was increased the sand production increased to a peak and thereafter decreased.

The pressures and rates are shown in fig. 5.2. A summary of the flow periods and flow data are listed in table 5.5.

Production test No. 2:

The interval 2229 - 2235 m RKB was perforated overbalanced with a 4 inch Atlas Wireline Services Jumbo Jet casing gun (120° phasing, 4 shots/foot).

Prior to opening the well for flow, 1 hour stabilization period was performed by opening the PCT valve underbalanced against a closed choke manifold to obtain the initial reservoir pressure.

The well was opened for a 6.3 hours clean-up flow through a 8 mm adjustable choke. The choke size was then stepwise increased to a 21 mm fixed choke. A final oil rate of 1670 Sm^3/D was recorded with a corresponding wellhead pressure of 104.8 bar. The total pressure drawdown was 46.3 bar. The well was then shut-in for 9 hours.

After installing the surface read-out system for pressure (MUST), the well was opened through a 13 mm fixed choke. The well was flowed for 73 hours through the same choke giving a final oilrate of 880 Sm^3/D with a corresponding wellhead pressure of 127 bar. The total pressure drawdown was 46.7 bar, giving a productivity index of 19 $Sm^3/D/bar$.

After the main build-up the well was opened for a 6 hours sampling flow, mainly through a 6 mm fixed choke. After the sampling flow, attempts were made to unlatch the MUST. This was not successful, and the weak point eventually broke.

The pressures and rates are shown in fig. 5.3. A summary of the flow periods and flow data are listed in table 5.6.

Production test No. 3:

The interval 2205.5 - 2209.5 m RKB was perforated underbalanced with a 5 inch Schlumberger tubing conveyed perforation gun, 5 shots/foot. After perforation, the well was shut-in for 1 hour to get the initial reservoir pressure.

The well was opened for a 10.1 hour clean-up flow through a 5 mm adjustable choke. The choke size was then stepwise increased to 26 mm. The last recorded oil rate was 2600 Sm^3/D with a corresponding wellhead pressure of 121.3 bar. The total pressure drawdown was 10.9 bar. The well was then shut in for 7.9 hours.

After installing the MUST, several attempts were made to open the well for the main flow. A large pressure drop was observed across the MUST, indicating a closed MUST valve, which only allowed fluid to flow through the equalizing ports. After cycling the MUST, the MUST opened and the well was flowed for 23.4 hours through a 11 mm fixed choke. After approximately 11.5 hours of sampling, the choke size was increased to 14 mm fixed.

The final oil rate was 1460 Sm^3/D with a corresponding wellhead pressure of 156.3 bar. The total pressure drawdown was 5.4 bar, giving a productivity index of 270 $Sm^3/D/bar$.

After the main build-up a minifracture test was performed to determine the formation strength.

The pressures and rates are shown in fig. 5.4. A summary of the flow periods and flow data are listed in table 5.7.

5.5 Fluid Analyses

FMT samples

5 one gallon chambers were brought to the laboratory. The FMT-chambre from 2249.5 m RKB was empty while the FMT-chambre from 2252.5 m RKB contained water. The others were filled with oil. PVT analyses were carried out on the three oil samples (table 5.8). The water sample was contaminated with mudfiltrate.

Test No. 1:

Water samples were taken regularly during the different flow periods and analysed offshore for pH, chloride, conductivity, density, alkalinity, barium/strontium, sulfate and turbidity to establish when formation water was produced to surface. Seven sample sets of true formation water were then collected at inlet test separator for onshore analyses.

A representative formation water composition is given in table 5.9.

Test No. 2:

During production test No. 2, six sets of separator samples containing separator gas and oil were collected. For five of the sets, the separator gas was sampled isokinetically to establish the correct recombination GOR and to examine the separator efficiency. Nine monophasic oil samples were taken at the wellhead, since the wellhead flowing pressure exceeded the bubble point pressure at wellhead temperature.

A complete PVT analyses was carried out on one of the monophasic wellhead samples. The main results are given in tables 5.10 and 5.11.

Samples of gas and oil were taken regularly throughout the test for trace component analyses (table 5.12). A small amount of water was produced at the separator and analysed offshore. This water is likely to be seawater from cleaning the separator.

Test No. 3:

Six sets of separator samples containing gas and oil were taken throughout test No. 3. The separator gas was sampled isokinetically to establish the correct recombination GOR and to examine the separator efficiency. At low rates the flow was monophasic at wellhead, as the wellhead flowing pressure was above the bubble point pressure for the actual wellhead temperature. Nine monophasic oil samples were taken on the wellhead.

One monophasic wellhead sample was brought to the laboratory for PVT-analysis. The main results from the PVT-analysis are listed in tables 5.13 and 5.14.

Samples of gas and oil were taken regularly throughout the test for trace component analyses (table 5.15).

A small amount of water was produced at the separator and analysed. This water is likely to be seawater from cleaning the separator.

Log Analysis

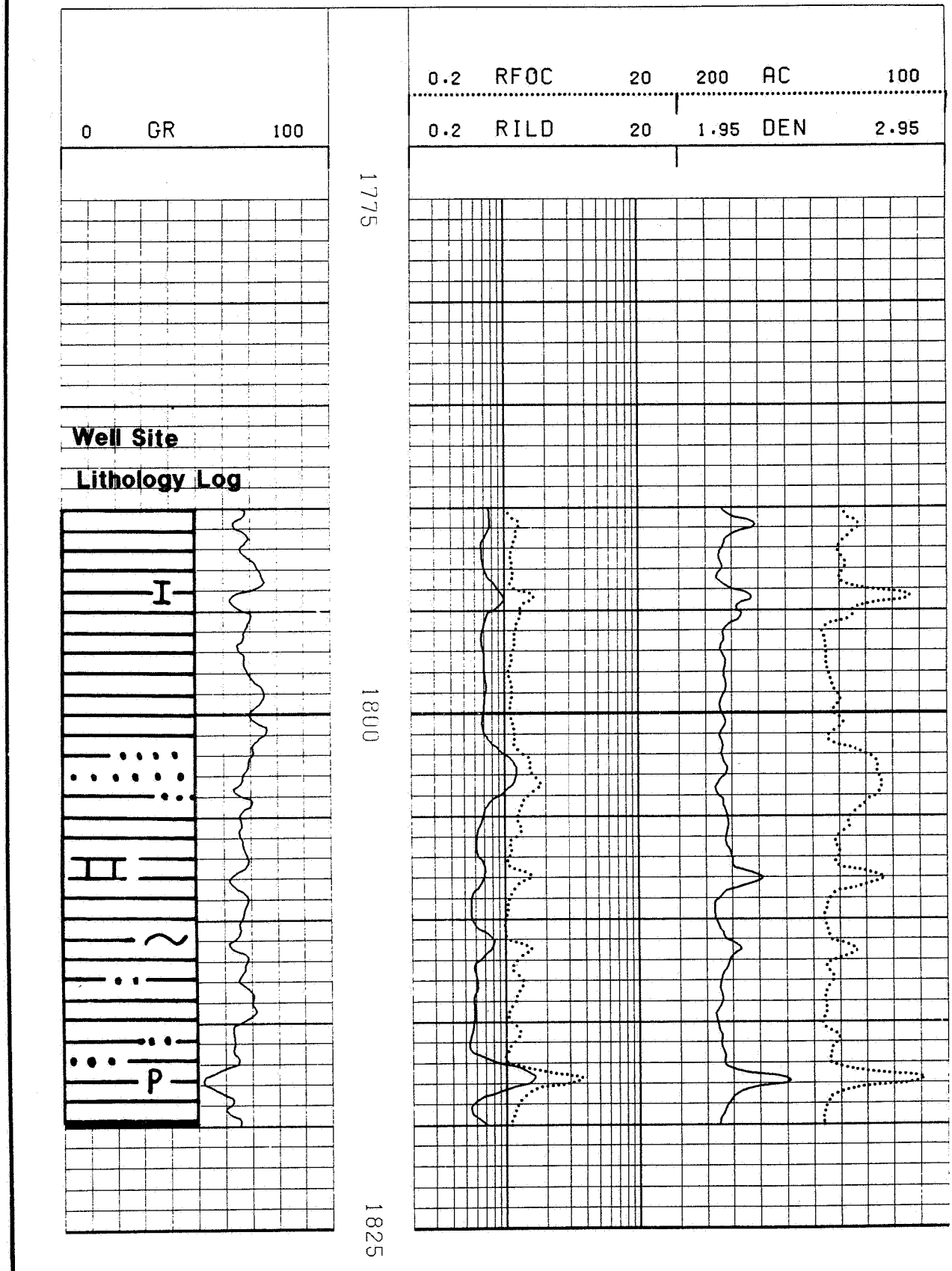


Fig. 5.1 Logs from the Paleocene sequence, well 34/7-12

Date 03-88	Auth CS	Appr BR	
Draw by GAF	Ref EPF		

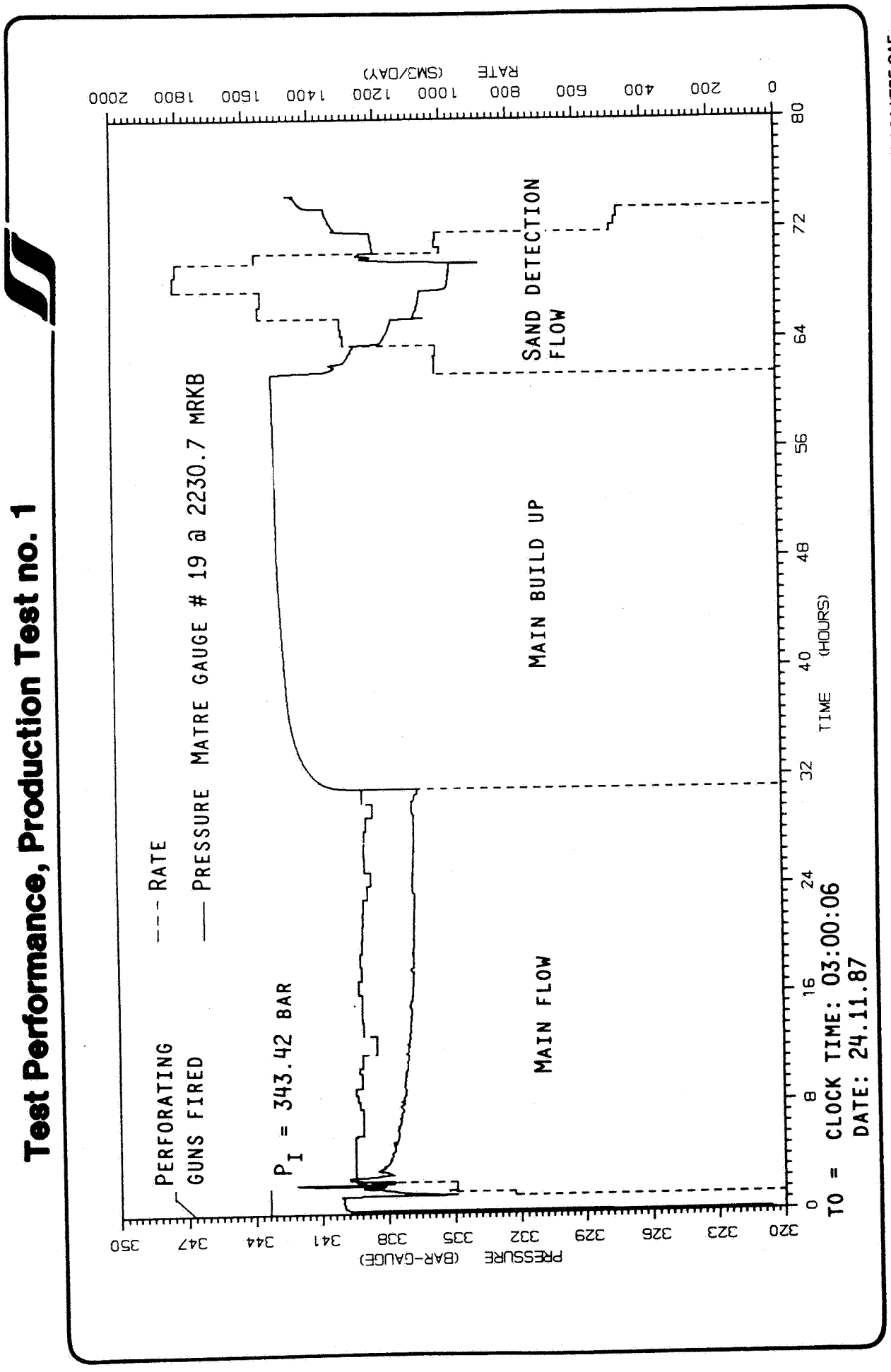


Fig. 5.2 Test performance, test no. 1, well 34/-12

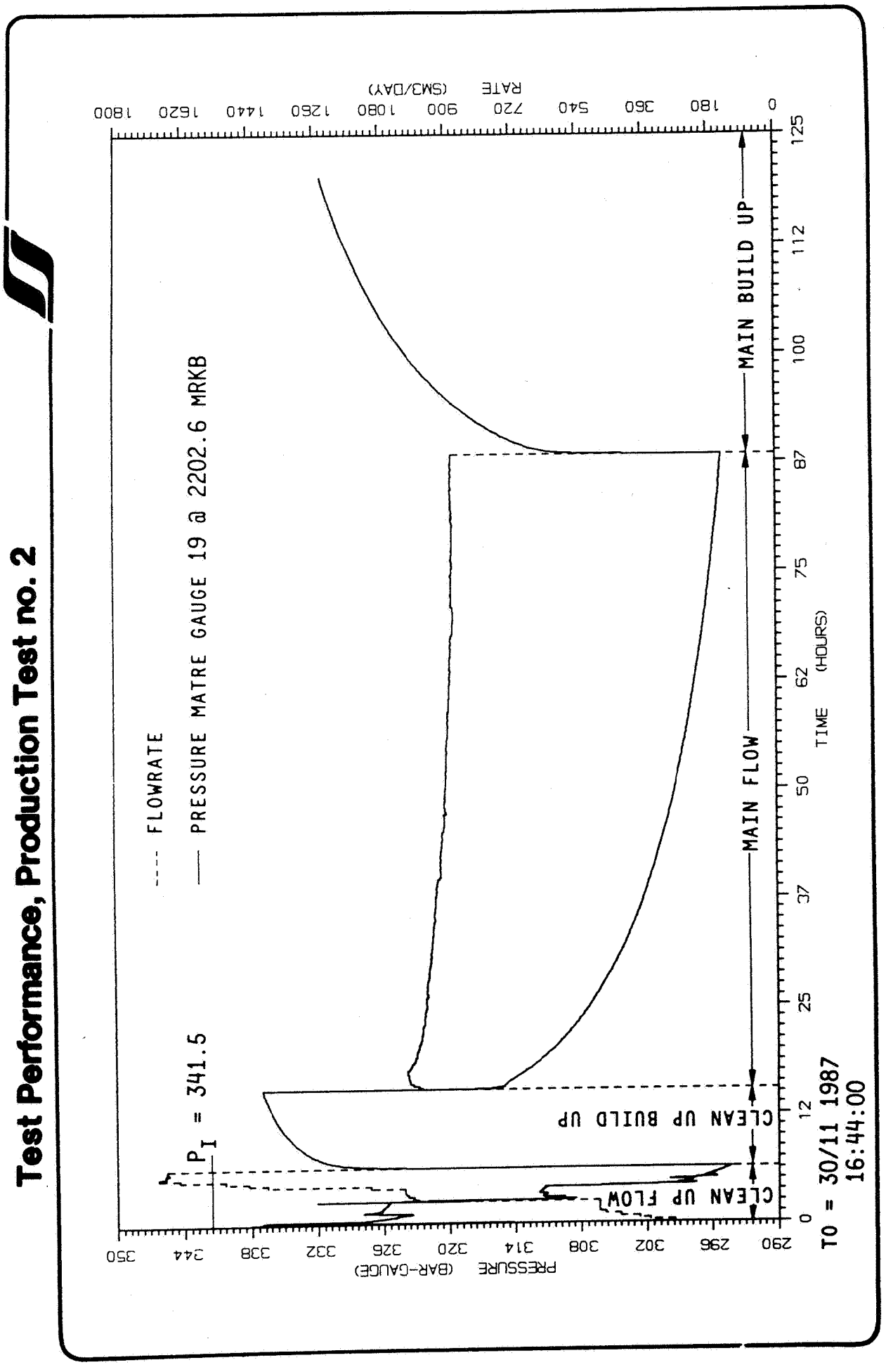


Fig 5.3 Test performance, test no. 2, well 34/7-12

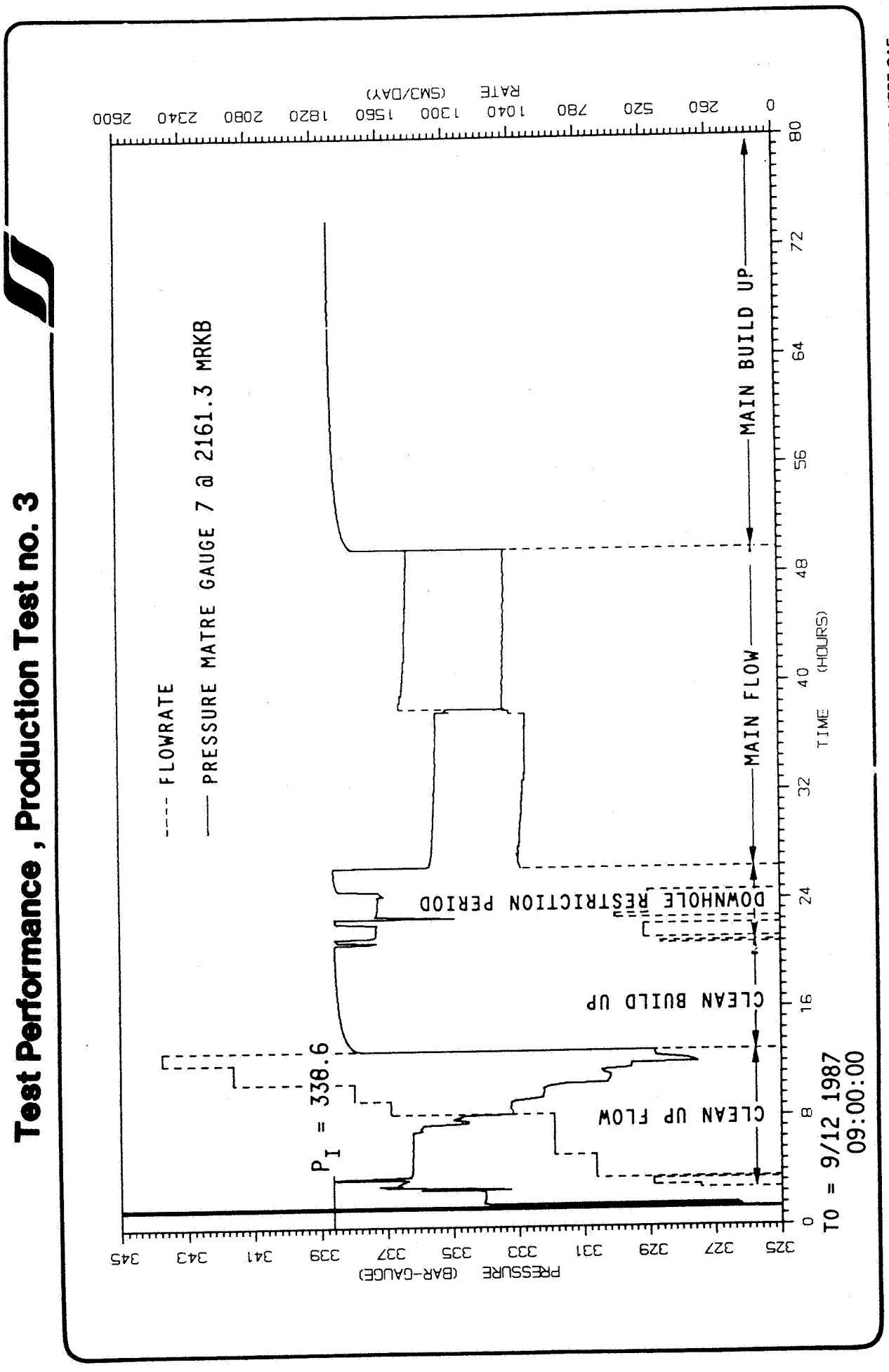


Fig. 5.4 Test performance, test no. 3, well 34/-12

Log Analysis

Well 34/7-12

FORMATION/ UNIT	TARBERT	NESS		ETIVE
			Top down to OWC	
TOP m RKB	2169.0	2213.0	2213.0	2251.5
BOTTOM m RKB	2213.0	2251.5	2250.0	2268.5
GROSS m	44.0	38.5	37.0	17.0
NET SAND m	44.0	12.5	12.5	17.0
N/G	1.0	0.32	0.34	1.0
Φ (%)	28.4	24.4	24.4	31.6
SW (%)	10	41	41	-

CUTOFFS:

Φ (%)	12
Vsh (fraction)	0.4

REMARKS

OWC: 2224 m MSL (2250 m RKB)

KB = 26 m

Table 5.1.a Net Sand Log Averages, well 34/7-12

Date	Auth	Appr
03-88	CS	BR
Draw by RM	Ref EPF	

Log Analysis

Well 34/7-12

FORMATION/ UNIT	RANNOCH III	RANNOCH II	RANNOCH II + III	RANNOCH I
TOP m RKB	2268.5	2286.0	2268.5	2317.5
BOTTOM m RKB	2286.0	2317.5	2317.5	2333.5
GROSS m	17.5	31.5	49.0	16.0
NET SAND m	17.5	31.5	49.0	7.5
N/G	1.0	1.0	1.0	0.47
Φ (%)	30.4	28.4	29.1	19.4
SW (%)	-	-	-	-
CUTOFFS:				
Φ (%)	12	12	12	16
Vsh (fraction)	0.4	0.4	0.4	0.4

REMARKS

KB = 26 m

OWC: 2224 m MSL (2250 m RKB)

Table 5.1 b Net Sand Log Averages, well 34/7-12

Date 03-88	Auth CS	Appr BR
Draw by RM	Ref EPF	

Log Analysis

Well 34/7-12

FORMATION/ UNIT	BROOM	DUNLIN GROUP	STATFJORD
TOP m RKB	2333.5	2340.5	2606.0
BOTTOM mRKB	2340.5	2606.0	2763.0
GROSS m	7.0	265.5	157.0
NET SAND m	-	-	108.5
N/G	-	-	0.69
Φ (%)	-	-	22.0
SW (%)	-	-	-
CUTOFFS:			
Φ (%)	16	15	12
Vsh (fraction)	0.4	0.4	0.4

REMARKS

KB = 26 m

OWC: 2224 m MSL (2250 m RKB)

Table 5.1 c Net Sand Log Averages, well 34/7-12

Date 03-88	Auth CS	Appr BR
Draw by RM	Ref EPF	

Log Analysis

Well 34/7-12

FORMATION/ UNIT	UPPER STATFJORD	MIDDLE STATFJORD	LOWER STATFJORD	UPPER LUNDE UNIT A
TOP m RKB	2606.0	2663.5	2700.0	2763.0
BOTTOM m RKB	2663.5	2700.0	2763.0	2780.0 *
GROSS m	57.5	36.5	63.0	17.0
NET SAND m	56.0	20.0	32.5	-
N/G	0.97	0.55	0.52	-
Φ (%)	22.9	22.9	19.8	-
SW (%)	-	-	-	-

CUTOFFS:

Φ (%)	12
Vsh (fraction)	0.4

REMARKS

* TD LOG

KB = 26 m

OWC: 2224 m MSL (2250 m RKB)

Table 5.1 d Net Sand Log Averages, well 34/7-12

Date	Auth	Appr
03-88	CS	BR
Draw by RM	Ref EPF	

Core Data Listing

Well 34/7-12

DEPTH (Dril.) (mRKB)	POR (%)	HOR. PERM. (mD)	VER. PERM. (mD)	GRN. DEN. (g/cc)
		CORE No 1		
2169.50	29.40	3940.000		2.66
2169.75	29.70	5440.000		2.66
2170.00	31.50	5350.000		2.65
2170.25	25.20	5860.000		2.67
2170.50	31.00	804.000		2.66
2170.75	30.70	774.000		2.65
2171.00	31.60	934.000		2.65
2171.25	32.20	1030.000		2.65
2171.50	31.20	796.000		2.65
2171.75	31.30	514.000		2.65
2172.00	31.10	626.000		2.65
2172.25	32.20	1010.000		2.65
2172.50	31.20	558.000		2.65
2172.75	31.30	689.000		2.65
2173.00	31.50	639.000		2.65
2173.25	30.00	264.000		2.65
2173.50	30.30	534.000		2.65
2173.75	30.10	434.000		2.65
2174.00	30.10	720.000		2.65
2174.25	29.20	388.000		2.65
2174.75	30.10	486.000		2.66
2175.00	29.70	309.000	289.000	2.66
2175.25	30.10	337.000		2.67
2175.50	29.10	400.000		2.68
2175.75	27.50	452.000		2.67
2176.00	27.10	222.000		2.69
2176.25	22.40	442.000		2.65
2176.50	28.10	237.000		2.66
2176.75	22.30	196.000		2.65
2177.00	31.40	516.000	565.000	2.66
2177.25	32.10	639.000		2.66
2177.50	32.00	563.000		2.67
2177.75	31.30	504.000		2.67
2178.00	30.60	430.000	477.000	2.66
2178.25	22.70	4120.000		2.68
2178.50	32.90	416.000		2.68
2179.00			4060.000	
2180.00			6040.000	
2180.25	30.40	2880.000		2.66
2181.00	28.80	3030.000		2.66
2181.25	31.80	11500.000		2.66
2181.75	25.50	1280.000		2.65
2182.00	29.30	11700.000	4300.000	2.65
2182.75	29.00	3810.000		2.66
2183.00	29.80	19200.000		2.65
2183.25	28.70	958.000	14900.000	2.67
2183.75	31.50	2880.000		2.65
2184.00			813.000	
2184.25	27.60	1600.000		2.64
2184.75	27.90	2160.000		2.66
2185.00			1800.000	

DEPTH (Dril.) (mRKB)	POR. (%)	HOR. PERM. (mD)	VER. PERM. (mD)	GRN. DEN. (g/cc)
2185.25	27.20	2500.000		2.66
2186.00			8720.000	
2186.00	26.00	12100.000	1800.000	2.67
2188.00	31.70	3450.000	4410.000	2.66
2188.25	29.30	2910.000		2.66
2188.50	30.50	26500.000		2.65
2189.00	29.80	1930.000	176.000	2.66
2189.25	22.40	63.900		2.66
2189.50	30.30	4060.000		2.67
2189.75	28.80	8160.000		2.65
2190.00	28.60	2530.000	2020.000	2.66
2190.25	27.20	1270.000		2.67
2190.50	28.10	1660.000		2.68
2191.00	27.70	1760.000	2160.000	2.68
2191.25	27.30	1640.000		2.68
2191.75	27.20	3660.000		2.67
2192.00	27.40	3190.000	914.000	2.68
2192.25	27.90	1230.000		2.69
2192.50	26.40	1640.000		2.69
2193.00	28.40	3660.000	3250.000	2.67
2193.25	27.30	3190.000		2.68
2193.75	28.50	2050.000		2.68
2194.00	28.60	6180.000		2.67
2194.25	31.30	5570.000		2.70
2194.50	32.20	4800.000		2.71
2195.00	28.30	2300.000	5460.000	2.69
2195.25	30.20	4040.000		2.68
2195.50	30.40	3430.000		2.69
2195.75	30.90	4000.000		2.68
2196.00	30.70	3890.000	5970.000	2.68
		CORE No 2		
2196.75	30.30	2230.000		2.70
2197.00	31.90	8600.000		2.65
2197.25	29.30	1620.000		2.69
2197.50	31.90	4140.000		2.67
2198.00	31.90	6130.000		2.67
2198.25	30.90	5810.000		2.67
2198.50	30.70	10600.000		2.66
2198.75	31.00	6440.000		2.67
2199.00	28.90	3970.000		2.67
2199.25	28.00	3490.000		2.67
2199.75	30.10	6870.000		2.67
2200.00	31.10	3750.000		2.68
2200.25	30.50	5550.000		2.67
2200.50	31.00	2180.000		2.69
2200.75	27.80	4870.000		2.67
2201.00	29.40	5060.000		2.66
2201.25	28.60	3790.000		2.70
2202.00	30.30	5980.000	2520.000	2.69
2202.25	29.90	1660.000		2.68
2202.50	29.20	2950.000		2.67
2202.75	30.80	4850.000		2.68

Table 5.2 a Conventional Core Analysis, well 34/7-12

(Driller's Depth)

Date 03-88	Auth CS	Appr BR
Draw by CS	Ref EPF	

Core Data Listing

Well 34/7-12

DEPTH (Dril.) (mRKB)	POR (%)	HOR. PERM. (mD)	VER. PERM. (mD)	GRN. DEN. (g/cc)
2203.25	31.90	8900.000		2.65
2204.00	30.80	10000.000		2.66
2204.75	31.90	6150.000		2.65
2205.50	27.70	11900.000		2.65
2207.25	31.40	1790.000		2.68
2208.50	31.70	5220.000		2.66
2208.75	30.60	7110.000		2.67
2209.25	29.20	705.000		2.69
2209.50	29.80	5210.000		2.66
2210.25	30.60	556.000		2.67
2210.50	24.00	32.500		2.69
2211.25	21.80	554.000		2.70
2211.50	27.80	84.600		2.71
2211.75	30.60	256.000		2.69
2212.00	29.70	328.000		2.67
2212.25	30.80	188.000		2.68
----------		CORE No 4	----------	
2216.25	29.40	4820.000		2.66
2216.50	25.90			2.63
2216.75	23.80	249.000		2.65
2217.25		841.000		
2218.00	25.70	56.000		2.67
2218.25	27.20	169.000		2.68
2218.50	33.70	761.000		2.65
----------		CORE No 5	----------	
2228.75	33.80	4430.000		2.66
2230.25	34.40	2070.000		2.67
2230.75	31.00	1730.000		2.64
2231.00	29.00	198.000		2.65
2231.50	28.70	63.300		2.66
2232.00	30.00	1720.000		2.61
2232.25	30.30	477.000		2.65
2232.50	24.20	4.710		2.67
2235.50	22.10	0.456		2.75
2239.50	30.10	185.000		2.77
2240.00	27.30	183.000		2.71
2241.50	21.10	63.200		2.90
2242.00	30.40	370.000	157.000	2.69
2242.25	29.60	309.000		2.78
----------		CORE No 6	----------	
2247.00	31.90	3760.000	1680.000	2.66
2247.25		1520.000		
2249.00	23.00	22.300	79.500	2.48
2249.25		167.000		
2249.75	29.70	433.000		2.65
2250.00	27.00	222.000	796.000	2.66
2250.25		1360.000		
2250.50	2.65	1380.000	33.900	
2250.75	32.20	1050.000		2.66
2251.00	32.60	1230.000	347.000	2.66
2251.25		791.000		
2251.50	33.40	2270.000		2.65

DEPTH (Dril.) (mRKB)	POR. (%)	HOR. PERM. (mD)	VER. PERM. (mD)	GRN. DEN. (g/cc)
2251.75	33.10	1110.000		2.66
2254.50	31.40	1190.000		2.66
2254.75	34.10	1840.000		2.65
2255.00	33.30	721.000		2.66
2255.50	33.90	2150.000		2.65
2256.00	32.40	459.000	886.000	2.67
2256.25	33.00	870.000		2.66
2256.50	34.10	1020.000		2.66
2256.75	35.40	4210.000		2.65
2257.00			356.000	
2257.25		1540.000		
2257.50	33.60	1060.000		2.67
2257.75	36.00	2310.000		2.67
2258.00	34.20	5440.000	2560.000	2.66
2258.25		6210.000		
2258.50	34.60	5470.000		2.66
2258.75	35.40	8420.000		2.65
2259.00	35.70	9350.000	10600.000	2.65
2259.25		8430.000		
2259.50	34.50	4990.000		2.65
2259.75	34.60	3620.000		2.65
2260.00	35.80	4760.000	4110.000	2.65
2260.25		7000.000		
2260.50	35.20	3430.000		2.65
----------		CORE No 7	----------	
2262.25		6100.000		
2262.50	31.90	4500.000		2.65
2263.00	32.70	4600.000	235.000	2.65
2263.25	35.70	3230.000		2.65
2263.75	31.80	3390.000		2.65
2264.00	33.80	5160.000	171.000	2.65
2264.25		2110.000		
2264.50	31.20	1130.000		2.63
2265.00	32.20	3540.000	1160.000	2.65
2265.25	33.60	1110.000		2.64
2265.75	29.20	3910.000		2.64
2266.00	32.40	955.000	411.000	2.67
2266.25	35.10	945.000		2.67
2266.50	33.30	1280.000		2.68
2266.75	22.10	28.400		2.66
2267.00	30.10	400.000	224.000	2.65
2267.25		557.000		
2267.50	30.80	535.000		2.65
2267.75	29.70	415.000		2.66
2268.00	29.70	454.000	242.000	2.66
2268.25	33.60	663.000		2.66
2268.50	30.90	485.000		2.67
2268.75	30.50	429.000		2.68
2269.00	30.50	562.000	329.000	2.70
2269.25		583.000		
2269.50	32.10	815.000		2.67
2269.75	33.30	1070.000		2.68

Table 5.2 b Conventional Core Analysis, well 34/7-12

(Driller's Depth)

Date	Auth	Appr
03-88	CS	JMH
Draw by CS	Ref EPF	

Core Data Listing

Well 34/7-12

DEPTH (Dril.) (mRKB)	POR (%)	HOR. PERM. (mD)	VER. PERM. (mD)	GRN. DEN. (g/cc)
2270.00	32.40	824.000	576.000	2.68
2270.25	37.10	726.000		2.73
2270.50	31.70	638.000		2.67
2270.75	31.50	595.000		2.67
2271.50	33.10	1180.000		2.68
2271.75	34.20	1330.000		2.68
2272.00	33.50	1380.000	1330.000	2.68
2272.25	34.10	549.000		2.70
2272.50	34.20	1350.000		2.67
2273.25		418.000		
2273.75	33.10	703.000		2.71
2274.00	30.20	385.000	307.000	2.70
2274.25		681.000		
2275.25	35.20	868.000		2.66
2277.75	30.20	225.000		2.75
2278.00	33.30	867.000	907.000	2.68
2278.25	33.90	1070.000		2.68
2278.50	33.60	1130.000		2.68
2279.50	33.60	1020.000		2.71
2281.25		1310.000		
2281.50	32.20	512.000		2.70
2281.75	33.30	912.000		2.69
2282.00	33.30	790.000	964.000	2.69
2282.25		1250.000		
2282.75	32.90	901.000		2.71
2283.00	32.70	756.000	907.000	2.71
2283.25		559.000		
2283.50	32.30	731.000		2.71
2283.75	31.30	845.000		2.63
2284.00	30.90	535.000	642.000	2.66
2284.25		566.000		
2284.50	32.10	450.000		2.75
2284.75	31.70	545.000		2.72
2285.00	29.30	390.000	446.000	2.66
2285.25	35.10	423.000		2.73
2285.50	31.00	344.000		2.78
2285.75	31.10	551.000		2.74
2286.00	31.00	486.000	399.000	2.75
2286.25		581.000		
2286.50	30.90	578.000		2.68
2286.75	32.70	495.000		2.76
2287.00	31.60	534.000	575.000	2.71
2287.25	33.80	514.000		2.69
2287.50	31.90	600.000		2.68
2287.75	32.10	732.000		2.68
2288.00	31.50	480.000	534.000	2.70
2288.25		756.000		
2288.50	32.00	830.000		2.69
2289.25	32.60	579.000		2.69
----------		CORE No 8	----------	
2290.00	31.40	459.000	400.000	2.72
2290.25	32.10	582.000		2.72

DEPTH (Dril.) (mRKB)	POR. (%)	HOR. PERM. (mD)	VER. PERM. (mD)	GRN. DEN. (g/cc)
2290.50	32.40	589.000		2.73
2290.75	32.20	581.000		2.72
2291.00	32.40	629.000	636.000	2.71
2291.25	32.60	714.000		2.70
2291.75	32.00	621.000		2.73
2292.00	31.90	603.000	517.000	2.73
2292.25	32.60	890.000		2.71
2292.75	31.90	852.000		2.70
2293.00	32.00	872.000	571.000	2.72
2293.25	31.50	706.000		2.73
2293.75	30.40	535.000		2.73
2294.00	31.30	646.000	561.000	2.72
2294.25	32.20	687.000		2.72
2294.50	32.00	622.000		2.72
2294.75	31.80	623.000		2.72
2295.00	31.60	607.000	487.000	2.72
2295.25	31.90	568.000		2.72
2295.75	32.70	615.000		2.71
2296.00	31.30	413.000	482.000	2.71
2296.50	32.20	514.000		2.70
2296.75	32.60	553.000		2.70
2297.00	31.80	387.000	358.000	2.71
2297.25	31.60	408.000		2.70
2297.50	32.70	577.000		2.70
2297.75	32.40	511.000		2.70
2298.00	32.60	573.000	424.000	2.69
2298.25	29.20	225.000		2.71
2298.50	32.80	665.000		2.68
2298.75	31.60	457.000		2.68
2299.00	31.80	466.000	90.300	2.69
2299.25	31.30	368.000		2.67
2299.50	31.40	360.000		2.68
2299.75	31.90	404.000		2.68
2300.00	29.80	278.000	31.100	2.69
2300.25	30.70	332.000		2.69
2300.50	30.50	301.000		2.70
2300.75	31.50	421.000		2.69
2301.00	31.80	441.000	294.000	2.69
2301.25	32.10	488.000		2.69
2301.50	32.60	648.000		2.67
2301.75	33.30	774.000		2.67
2302.25	25.90	39.100		2.70
2302.50	23.30	8.000		2.67
2302.75	26.30	72.800		2.68
2303.00	30.70	256.000	84.600	2.67
2303.25	31.70	321.000		2.67
2303.50	31.10	290.000		2.69
2303.75	31.50	323.000		2.68
----------		CORE No 9	----------	
2306.00	29.50	147.000	27.000	2.70
2306.25	32.60	400.000		2.68
2306.50	31.10	257.000		2.70

Table 5.2 c Conventional Core Analysis, well 34/7-12

(Driller's Depth)

Date	Auth	Appr
03-88	CS	JMH
Draw by CS	Ref EPF	

Core Data Listing

Well 34/7-12

DEPTH (Dril.) (mRKB)	POR (%)	HOR. PERM. (mD)	VER. PERM. (mD)	GRN. DEN. (g/cc)
2307.00	29.90	168.000	118.000	2.73
2307.25	31.90	316.000		2.69
2307.50	32.30	355.000		2.68
2307.75	31.90	323.000		2.68
2308.00	31.20	275.000	213.000	2.68
2308.25	30.40	139.000		2.69
2308.50	28.20	111.000		2.70
2308.75	29.10	131.000		2.70
2309.00	28.00	81.500	51.000	2.70
2309.25	30.70	219.000		2.68
2309.50	28.50	92.100		2.70
2309.75	29.50	144.000		2.70
2310.00	31.50	297.000	247.000	2.68
2310.25	30.50	261.000		2.70
2310.50	33.10	615.000		2.67
2310.75	31.60	430.000		2.67
2311.00	31.40	308.000	226.000	2.68
2311.25	31.80	63.500		2.67
2311.50	32.20	326.000		2.67
2311.75	30.70	196.000		2.68
2312.00	30.30	166.000	51.500	2.68
2312.25	29.60	139.000		2.68
2312.50	30.60	165.000		2.68
2312.75	28.20	102.000		2.69
2313.00	29.60	26.700	86.500	2.67
2313.25	26.30	38.400		2.70
2313.50	25.60	55.000		2.70
2313.75	28.40	157.000		2.67
2314.00	30.40	90.200	43.100	2.67
2314.25	28.40	95.100		2.70
2314.50	32.30	294.000		2.67
2315.00	27.80	90.900	13.600	2.68
2315.25	28.80	83.600		2.68
2315.50	27.00	68.500		2.68
2315.75	31.10	294.000		2.68
2316.00	29.40	227.000	5.210	2.66
2316.25	25.90	31.800		2.66
2320.75	20.60	1.850		2.66
2321.00	20.10	3.960	15.500	2.66
2321.25	19.70	1.240		2.67
2321.50	17.50	0.356		2.64
2321.75	20.80	3.510		2.66
2322.00	21.90	11.200	0.394	2.66
2322.25	22.40	6.490		2.67
2322.50	23.70	10.600		2.67
2323.00	30.30	189.000	110.000	2.68
2323.25	30.70	223.000		2.69
2323.50	30.70	221.000		2.69
2323.75	31.00	186.000		2.70
2324.00	20.90	5.040	0.192	2.70
2324.25	18.60	0.562		2.65
2324.50	19.20	0.385		2.68
2324.75	19.60	0.534		2.71
2325.00	19.30	0.274	<0.040	2.70
2325.25	21.20	2.390		2.66
2325.50	21.80	2.900		2.69
2325.75	21.40	1.190		2.85
2326.00	20.30	1.480	0.090	2.70
2326.25	18.60	0.205		2.68
2326.50	18.90	0.378		2.71
2326.75	25.90	48.100		2.67
2327.25	12.00	0.091	<0.040	2.76
2327.50	20.70	1.740		2.74
2327.75	21.10	1.950		2.72
2328.00	22.70	4.950	0.288	2.70
2328.25	23.60	22.900		2.67
2328.50	21.90	0.865		2.82
2328.75	19.60	0.200		2.69
2329.00	21.00	0.289	0.122	2.79
2329.25	22.20	0.656		2.84
2329.50	22.80			2.80
2329.75	21.10			2.71
2330.00	21.90	2.480	0.116	2.69
2330.25	21.10	1.560		2.74
2331.00	21.70	0.831	0.064	2.71
2331.25	20.70	0.532		2.65
----------		CORE No 10	----------	----------
2333.25	13.90	0.275	0.064	2.73
2333.50	20.80	5.350		2.68
2333.75	20.20	2.400		2.81
2334.00	21.80	3.990	0.660	2.71
2334.25	20.60	1.850		2.71
2334.50	21.60	4.460		2.77
2334.75	4.50	<0.040		2.79
2335.00	21.10	1.030	0.342	2.68
2335.25	15.10	0.141		2.63
2335.50	15.80	0.421		2.65
2335.75	16.80	0.418		2.66
2336.25	17.80			2.75
2336.50	12.00	0.130		2.61
2337.00	14.90	0.194		2.66
2337.25	13.80	0.257		2.65
2337.50	13.50			2.65
2337.75	13.60			2.66
2338.00	14.30		<0.040	2.61
2338.25	15.00			2.61
2338.50	17.60	0.847		2.62
2339.00	12.50			2.86
2339.25	13.30			2.64
2339.50	13.80	0.099		2.64
2340.50	13.40	0.122	3.530	2.63
2340.75	13.70	0.218		2.63
2341.00	13.30		<0.040	2.64
2341.50	5.80	<0.040		2.82

Table 5.2 d Conventional Core Analysis, well 34/7-12

(Driller's Depth)

Date 03-88	Auth CS	Appr BR
Draw by RM	Ref EPF	

Core Data Listing

Well 34/7-12

DEPTH (Dril.) (mRKB)	POR (%)	HOR. PERM. (mD)	VER. PERM. (mD)	GRN. DEN. (g/cc)
2341.75	11.90			2.63
2342.25	14.00		<0.040	2.65
2342.50	15.90			2.64
2342.75	14.20			2.62
2343.00			<0.040	
2343.25	14.90			2.64
2343.50	15.40			2.64
2343.75	15.50			2.66
2344.00	15.70		<0.040	2.63
2344.25	16.10			2.64
2344.50	15.60			2.63
2344.75	14.90			2.63
2345.00	15.30			2.67
2345.25	15.70	<0.040		2.25
2345.50	14.60			2.62
2345.75	16.30			2.67
2346.00	15.00		<0.040	2.64
2346.25	16.90			2.67
2347.00	14.50		<0.040	2.69
2347.50	14.80			2.70
2347.75	12.10			2.69
2348.25	14.20		<0.040	2.69
2348.50	13.70	0.185		2.68
2348.75	14.80			2.67
2349.00	15.70		<0.040	2.68
2349.25	15.30			2.65
2349.50	16.30			2.67
2350.00	15.00		<0.040	2.70
2350.25	15.60			2.66
2350.75	14.80	0.337		2.64
2351.00	9.30		<0.040	2.71
2351.25	16.20			2.67
2351.50	15.80			2.66
2351.75	16.10			2.65
2352.00	15.90		<0.040	2.90
2352.25	15.90			2.66
2352.50	15.80			2.65
2353.00	16.30		<0.040	2.65
2353.25	14.00			2.67
2353.50	16.00			2.65
2353.75	15.70			2.65
2354.00	15.70		<0.040	2.64
2354.25	16.00			2.63
2354.50	16.10			2.65
2354.75	16.10			2.66
2355.00			<0.040	
2235.25	15.60	0.687		2.63
2355.50	16.10			2.64
2355.75	15.80	0.144		2.62

Table 5.2 e Conventional Core Analysis, well 34/7-12 (Driller's Depth)

Date 03-88	Auth CS	Appr BR
Draw by RM	Ref EPF	

Formation Pressures

Well 34/7-12

Depth (m RKB)	Hydrostatic mud pressures Before (psia)	Hydrostatic mud pressures After (psia)	Formation pressures (psia)	Formation pressures (bar)	Comments
Run 2A					
2171.0	5372.7	5372.3	4924.9	339.56	
2182.0	5399.4	5399.4	4936.3	340.35	
2189.5	5418.2	5417.9	4943.8	340.86	
2194.5	5430.4	5430.0	4948.9	341.21	
2203.5	5452.5	5452.5	4958.1	341.84	
2210.0	5468.7	5468.5	4964.9	342.32	
2218.5	5489.5	5489.4	4976.6	343.12	
2230.0	5517.3	5517.4	4986.7	343.82	
2242.0	5546.5	5546.6	5005.1	345.09	
2244.0	5551.3	5551.3	5006.9	345.21	
2249.5	5564.6	5564.7	5007.3	345.24	
2253.0	5573.0	5573.0	5010.2	345.44	
2261.0	5592.4	5592.5	5021.5	346.22	
2271.0	5516.8	5617.0	5037.7	347.33	
2280.0	5639.0	5639.2	5048.5	348.08	
2289.5	5662.5	5662.5	5062.0	349.01	
2302.5	5694.2	5694.5	5080.5	350.29	
2312.0	5717.5	5717.5	5094.2	351.23	
2171.0	5372.8	5371.5	4925.3	339.59	Segregated sample 1 gallon chamber empty
Run 2B					
2171.5	5371.7	5371.6	4925.8	339.62	Segregated sample 1 gallon chamber empty

REMARKS:

The pressures are temperature corrected

KB = 26 m

Table 5.3 a Formation Pressures, well 34/7-12

Date	Auth	Appr
03-88	CS	BR
Draw by RM	Ref EPF	

Formation Pressures

Well 34/7-12

Depth (m RKB)	Hydrostatic mud pressures Before (psia)	Hydrostatic mud pressures After (psia)	Formation pressures (psia)	Formation pressures (bar)	Comments
Run 2C					
2189.5	5419.5	5418.6	4943.4	340.84	Segregated sample
Run 2D					
2189.5	5420.0	-	4943.9	340.87	Segregated sample
Run 2E					
2249.5	5565.0	5564.4	5006.9	345.21	Segregated sample 1 gallon chamber empty
Run 3G					
2210.0	5477.2	5477.4	4964.9	342.32	
2312.0	5729.8	5729.9	5094.8	351.27	
2471.0	6122.3	6122.2	5363.2	369.78	Pressure draw down 3000 psi
2474.0	6121.8	6122.1	5362.3	369.72	Pressure draw down 3500 psi. Tool differential stuck at 2465 m RKB
Run 3H					
2210.0	5294.9	5294.9	4970.8	342.72	
2210.0	5261.4	5281.6	4964.9	342.32	
2312.0	5531.6	5533.2	5093.6	351.19	
2609.0	6259.5	6258.9	5556.9	383.13	
2626.0	6278.2	6297.6	5581.4	383.44	
2647.0	6348.1	6347.6	5611.7	386.91	
2677.0	6420.2	6420.2	5654.9	389.89	Pressure draw down 1500 psi
2692.0	6459.1	-	5676.4	391.37	
2252.5	5384.9	-	5009.9	345.42	Segregated sample

REMARKS: The pressures are temperature corrected

KB = 26 m

Table 5.3 b Formation Pressures, well 34/7-12

Date 03-88	Auth CS	Appr BR
Draw by RM	Ref EPF	

Segregated Samples

Well 34/7-12

Run	Depth	2 3/4 gallon[1]	1 gallon[2]
2A	2171.0	Opening pressure: 1700 psi Gas: 18.4 cuft Oil: 8000 cc	
2B	2171.5	Opening pressure: 100 psi Gas: 15.5 cuft Oil: 8000 cc	Empty[3]
2C	2189.5	Opening pressure: 1700 psi Gas: 14.6 cuft Oil: 7500 cc	
2D	2189.5	Opening pressure: 1600 psi Gas: 19.0 cuft Oil: 7750 cc	
2E	2249.5	Opening pressure: 450 psi Gas: 4.9 cuft Oil/mud: 8800 cc	Empty[3]
3H	2252.5	Opening pressure: 150 psi Water: 9600 cc	

Remarks

1. 2 3/4 gallon chambers opened at rig floor.

2. 1 gallon chambers sent ashore for PVT studies.

3. Empty, probably, due to plugging.

Table 5.4 Results from 2 3/4 gallon chambers (segregated samples), well 34/7-12

Date 03-88	Auth CS	Appr BR
Draw by RM	Ref EPF	

Summary of Flowperiods, Production Test no 1

EVENT		TIME	FLOW-RATE (Sm3/D)	BOTTOM HOLE PRESSURE/TEMP. (bar) (DegC)	WELLHEAD PRESSURE/TEMP. (bar) (Degc)	GWR (Sm3/Sm3)	SEPARATOR PRESSURE/TEMP. (bar) (DegC)	CHOKE (mm)
Main flow	Open	24/11/87 04:16						
		05:00		341.1/81.2	103.9/34.3			11.1
		09:00		337.6/83.5	105.9/59.7			12.7
		17:00	1269	336.9/83.9	105.2/61.7		7.7/30.3	12.7
		25/11/87 02:00	1271	336.7/84.1	104.8/64.0	1.3	9.2/30.9	12.7
	Shut-in	10:04	1297	336.5/84.2	104.6/65.5	1.4	9.1/32.7	12.7
Sand-prod. flow	Open	26/11/87 16:26						
		17:00	1025	340.0/83.1	112.5/37.1			11.1
		21:00	1555	336.2/84.2	98.8/68.1			14.3
		27/11/87 01:00	1570	338.5/84.2	112.7/65.0			11.1
	Shut-in	04:30	475	340.9/84.2	118.0/56.4			7.9

Bottomhole pressures measured at 2230.7 mRKB

Table 5.5 Flowperiods and flow data, 34/7-12

Date	04-88	Auth.	HaS
Draw by		Ref	EDF
		Appr	GaJ

Summary of Flowperiodes, Production Test no. 2

EVENT		TIME	FLOW-RATE (Sm3/D)	BOTTOM HOLE PRESSURE/TEMP. (bar) (DegC)	WELLHEAD PRESSURE/TEMP. (bar) (Degc)	GOR (Sm3/Sm3)	SEPARATOR PRESSURE/TEMP. (bar) (DegC)	CHOKE (mm)
Clean-up flow	Open	30/11/87 16:45						7.1
		17:00		336.7/74.1	115.9/9.3			12.7
		20:00		311.1/81.2	139.0/50.3			20.64
	Shut-in	30/11/87 23:05	1666	294.3/82.8	104.8/63.6	67	44.6/57.7	
Main flow	Open	1/12/87 08:07						
		09:00		314.5/82.1	139.8/50.5			
		13:00	895	310.2/82.9	138.3/61.1	68	40.4/53.8	12.7
		2/12/87 11:00	922	300.8/83.2	131.6/62.7	68	39.9/55.0	12.7
		3/11/87 10:00	894	297.0/83.3	128.6/63.4	68	40.2/55.9	12.7
	Shut-in	4/11/87 09:06	888	294.8/83.4	127.0/63.2	68	40.0/55.3	12.7

Bottomhole pressures measured at 2202.6 mRKB

Table 5.6 Flowperiods and flow data, 34/7-12

Date 04-88	Auth. HaS	Appr. GaJ	
Drawn by	Ref. EPF		

Summary of Flowperiods, Production Test no. 3

EVENT		TIME	FLOW-RATE (Sm3/D)	BOTTOM HOLE PRESSURE/TEMP. (bar) (DegC)	WELLHEAD PRESSURE/TEMP. (bar) (Degc)	GOR (Sm3/Sm3)	SEPARATOR PRESSURE/TEMP. (bar) (DegC)	CHOKE (mm)
Clean-up flow	Open	9/12/87 11:45						
		12:00		336.6/74.5	112.9/10.6			9.5
		16:00	791	336.2/80.0	174.2/33.9	35.3/44.3	67	12.7
	Shut-in	21:53	2470	328.8/81.6	129.8/56.6	69.7/55.2	54	25.4
Main flow	Open	10/12/87 11:21						
		12:00	1032	335.6/81.3	169.2/29.0	42.7/23.8	70	11.1
		16:00	1014	335.3/81.6	170.1/37.2	42.8/35.2	66	11.1
		22:00	999	335.4/81.8	170.5/38.5	35.3/34.4	70	11.1
		11/12/87 04:00	1477	333.3/82.0	155.8/48.5	48.1/44.7	65	14.3
	Shut-in	10:45	1460	333.2/82.1	156.3/50.3	48.0/46.4	68	14.3

Bottomhole pressures measured at 2161.3 mMRKB

Table 5.7 Flowperiods and flow data, 34/7-12

Date	04-88	Auth.	HaS
Draw by		Ref.	EPF
		Appr.	GaJ

Fluid Analysis

FMT Sample	ST 014	ST015	ST019
Sampling depth [mRKB]	2171.0	2189.5	2189.5
Bubblepoint pressure at 82.0°C [bar]	171.0	171.0	170.0
From single stage flash:			
Gas oil ratio [Sm^3/Sm^3]	100.8	113.9	108.9
Density of oil at 15°C [kg/m^3]	845.7	844.7	845.3
Gas gravity (air = 1)	0.863	0.854	0.879
Composition of reservoir fluid [mol%]			
CO_2	0.29	0.25	0.22
N_2	0.64	0.67	0.65
C_1	33.51	35.72	34.31
C_2	6.69	6.98	6.81
C_3	6.26	6.76	6.60
i-C_4	1.10	1.15	1.16
n-C_4	3.34	3.41	3.54
i-C_5	1.27	1.24	1.29
n-C_5	1.85	1.79	1.85
C_6	2.63	2.47	2.48
C_{7+}	42.42	39.56	41.09
Molecular weight of C_{7+}	227	228	226
Density of C_{7+} [kg/m^3]	862	861	861

Table 5.8 Analyses of oil from FMT-sampling.
Well 34/7-12.

Dato 04.88	Forf ToK	Godkj JMH
Tegn av	Ref. EPR	

Fluid Analysis

SAMPLING TIME: 03.00 **SAMPLING DATE: 27.11.87**

CATIONS			1	2	
1.	Lithium	(Li)	3.3		mg/l
2.	Aluminium	(Al)	<0,5		mg/l
3.	Boron	(B)	67		mg/l
4.	Barium	(Ba)	35	39	mg/l
5.	Calcium	(Ca)	560	690	mg/l
6.	Cobalt	(Co)	<0,1		mg/l
7.	Cromium	(Cr)	<0,1		mg/l
8.	Cupper	(Cu)	<0,1		mg/l
9.	Iron	(Fe)	5.0	0.3	mg/l
10.	Potassium	(K)	200	172	mg/l
11.	Magnesium	(Mg)	110	106	mg/l
12.	Manganese	(Mn)	0.27		mg/l
13.	Molybdenum	(Mo)	<0,1		mg/l
14.	Sodium	(Na)	11000	11093	mg/l
15.	Nickel	(Ni)	<0,1		mg/l
16.	Silicon	(Si)	17		mg/l
17.	Strontium	(Sr)	100	105	mg/l
18.	Zinc	(Zn)	<0.1		mg/l
19.	Phosphorus	(P)	<1		mg/l

ANIONS				
1.	Chloride	(Cl)	18500	mg/l
2.	Sulfate	(SO4)	4	mg/l
3.	Carbonate	(CO3)	<1	mg/l
4.	Bicarbonate	(HCO3)	677	mg/l

OTHER PROPERTIES		
pH	7.44	6.39 *
Specific gravity 60/60 F	1.0221	g/cm3
Resistivity (25oC)	0.208	ohm-m
Iron (total)	13	mg/l

***The pH-value is measured offshore**

1. Cations are analysed by ICP-technique
2. Cations are analysed by atom absorbtion technique

Table 5.9 Formation Water Composition.
Well 34/7-12.

Dato 04.88	Forf ToK	Godkj JMH
Tegn.av	Ref. EPR	

Fluid Analysis

RESERVOIR FLUID COMPOSITION, PT 2

Component	Weight %	Mol %
CO_2	0.10	0.26
N_2	0.12	0.49
C_1	4.97	34.36
C_2	1.80	6.64
C_3	2.76	6.95
i-C_4	0.65	1.25
n-C_4	2.00	3.82
i-C_5	0.92	1.41
n-C_5	1.34	2.06
C_6	2.12	2.78
C_7	3.25	3.91
C_8	4.34	4.56
C_9	2.94	2.75
C_{10+}	72.69	28.76

Average molecular weight	:	111.0
Molecular weight C_{7+} (calculated)	:	231
Density of C_{7+} (calculated)	:	859 kg/m^3
Molecular weight of C_{10+} (measured)	:	280
Density of C_{10+} (calculated)	:	876 kg/m^3

Table 5.10 Reservoir Oil Composition, PT 2.
Well 34/7-12.

Fluid Analysis

SUMMARY OF GENERAL PVT DATA
WELL 34/7-12 , PT 2

Initial pressure used in analysis	[bar]	:	343.8
Temperature used in analysis	[° C]	:	83.5
Saturation pressure	[bar]	:	160.0
Reservoir oil density	[kg/m3]	:	715
Viscosity at initial pressure	[cP]	:	0.540
Viscosity at reservior pressure	[cP]	:	0.441

Differential liberation

Bo at reservoir conditions	[m3/Sm3] :	1.363
GOR	[Sm3/Sm3] :	112.4
Residal oil density	[kg/m3] :	843

Flash data		SINGLE	MULTI
Bo at reservoir conditions	[m3/Sm3] :	1.339	1.290
GOR	[Sm3/Sm3] :	108.9	93.6
Stock tank oil density	[kg/m3] :	841.7	835.4

Separator conditions for single stage flash :

1) 1.01 bar and 15 ° C

Separator conditions for multi stage flash :

1) 63 bar and 66 ° C
2) 31 bar and 60 ° C
3) 11 bar and 54 ° C
4) 1 bar and 15 ° C

Table 5.11 Summary of general PVT-data, PT 2. Well 34/7-12.

Date 04.88	Auth ToK	Appr JMH
Draw by	Ref EPR	

Fluid Analysis

TRACE ELEMENT ANALYSES, PT 2

		Range	Arithmetic average	# of measure-ments
GASPHASE				
Hydrogen Sulphide	[ppm-mol]	< 0.45	0.29	25
Mercaptans	[ppm-mol]	< 0.1		19
Carbon Dioxide	[mol%]	0.5-0.6	0.5	22
Radon 222	[Bq/l]	0.008-0.092	0.038	14
Water	[mg/l]	0.3-0.7	0.5	13
Total Mercury	[µg/m^3]	0.26-6.9	2.7	6
Helium	[mol%]	0.008-0.012	0.009	6
OILPHASE				
Density @25°C	[g/cm^3]	0.840-0.841	0.840	14
Water in Oil	[mg/l]	39.5-146.5	57.5	14
Total Sulphur	[weight %]	0.25-0.29	0.26	6
Polonium - 210	[Bq/l]	0.2-2.5	1.7	3
Nickel	[ppm-weight]	0.2-0.5	0.3	6
Vanadium	[ppm-weight]	1.6-1.7	1.7	6
Mercury	[ppm-weight]	0.4-4.1	1.4	6

Table 5.12 Trace Element Analyses, PT 2.
Well 34/7-12.

Date 04.88	Auth ToK	Appr JMH
Draw by	Ref EPR	

Fluid Analysis

RESERVOIR FLUID COMPOSITION, PT 3

Component	Weight %	Mol %
CO_2	0.11	0.27
N_2	0.16	0.60
C_1	5.42	36.39
C_2	1.96	7.03
C_3	2.80	6.85
i-C_4	0.64	1.18
n-C_4	1.87	3.47
i-C_5	0.85	1.27
n-C_5	1.19	1.78
C_6	1.91	2.44
C_7	3.09	3.63
C_8	4.11	4.24
C_9	2.99	2.71
C_{10+}	72.90	28.14

Average molecular weight	:	107.8
Molecular weight C_{7+} (calculated)	:	231
Density of C_{7+} (calculated)	:	862 kg/m^3
Molecular weight of C_{10+} (measured)	:	279
Density of C_{10+} (calculated)	:	878 kg/m^3

Table 5.13 Reservoir Oil Composition, PT 3.
Well 34/7-12.

Fluid Analysis

SUMMARY OF GENERAL PVT DATA
WELL 34/7-12 , PT 3

Initial pressure used in analysis	[bar]	:	342.1
Temperature used in analysis	[° C]	:	82.0
Saturation pressure	[bar]	:	171.5
Reservoir oil density	[kg/m3]	:	709
Viscosity at initial pressure	[cP]	:	0.554
Viscosity at reservior pressure	[cP]	:	0.461

Differential liberation

Bo at reservoir conditions	[m3/Sm3] :	1.380
GOR	[Sm3/Sm3] :	118.9
Residal oil density	[kg/m3] :	847

Flash data		SINGLE	MULTI
Bo at reservoir conditions	[m3/Sm3] :	1.355	1.303
GOR	[Sm3/Sm3] :	115.8	101.8
Stock tank oil density	[kg/m3] :	845.0	837.4

Separator conditions for single stage flash :

1) 1.01 bar and 15 ° C

Separator conditions for multi stage flash :

1) 63 bar and 66 ° C
2) 31 bar and 60 ° C
3) 11 bar and 54 ° C
4) 1 bar and 15 ° C

Table 5.14 Summary of general PVT-data, PT 3. Well 34/7-12.

Date 04.88	Auth ToK	Appr JMH	
Draw by	Ref EPR		

Fluid Analysis

TRACE ELEMENT ANALYSES, PT 3

		Range	Arithmetic average	# of measure-ments
GASPHASE				
Hydrogen Sulphide	[ppm-mol]	< 0.20	0.11	14
Mercaptans	[ppm-mol]	< 0.1		9
Carbon Dioxide	[mol%]	0.5	0.5	12
Radon 222	[Bq/l]	0.031-0.075	0.055	5
Water	[mg/l]	0.03-0.56	0.29	7
Total Mercury	[$\mu g/m^3$]	2.8-3.8	3.2	3
Helium	[mol%]	0.010-0.012	0.011	2
OILPHASE				
Density @25°C	[g/cm^3]	0.840-0.845	0.844	8
Water in Oil	[mg/l]	45-500	294	6
Total Sulphur	[weight %]	0.22-0.26	0.24	3
Polonium - 210	[Bq/l]	4.1	4.1	1
Nickel	[ppm-weight]	< 0.1		3
Vanadium	[ppm-weight]	1.3	1.3	3
Mercury	[ppm-weight]	0.8-9.3	4.2	3

Table 5.15 Trace Element Analyses, PT 2.
Well 34/7-12.

Date 04.88	Auth ToK	Appr JMH
Draw by	Ref EPR	

6. DRILLING DATA

If not otherwise mentioned, all depths in this chapter refer to m RKB (Rotary Kelly Bushing).

SAGA PETROLEUM A.S. 6.1 DAILY OPERATIONAL DESCRIPTION

Page 1 of 4 Well no: 34/7-11

Date	Stop	Operational Description
29.09.87	2400	On tow to location 34/7-11.Last anchor in bolster at 2030 hrs.Skandi Beta back in bridle after hook up of anchor no. 2 and 3. Total distance : 213 nm. Average speed : 6 kts. ETA location : 1100 hrs oct. 1.
30.09.87	2400	On tow to location 34/7-11. Distance gone 138 nm. Distance to go 57 nm. Average speed 6 kts.
01.10.87	1330	On tow to location 34/7-11.
	2130	Anchorhandling: 1300: Drop anchor no 5. 1735 : anchor no 1 on bottom. 1800: anchor no 8 on bottom. 1840 : anchor no 4 on bottom. 2105 : anchor no 3 on bottom.
	2400	2140 : piggy back on anchor no 3 on bottom. 2215 : anchor no 2 on bottom (not holding). 2240 : piggy back on anchor no 2 on bottom. 2255 : anchor no 7 on bottom. 2330 : piggy back on anchor no 7 on bottom.
02.10.87	0600	Anchor handling. 0230 hrs : Anchor no 6 on btm. 0300 hrs : Piggy back on no 6 on btm. 0315 hrs : Resat anchor no 1. 0500 hrs : Anchor no 1 on bottom. Attempted to reset 2nd time. Sat piggy back on anchor no 1.
	1000	Ballasted rig down to operating draft.
	1200	Pretensioned anchors to 160 tons. Anchor no 5 slipped. Resat same and pretensioned to 160 tons. OK.
	1500	Ran TGB and landed same while checking orientation with ROV, 182 deg. RKB - seabed 216 m. Pulled TGB-running tool. TGB slope indicator: 1.5 deg.
	1730	Made up 36" spud assembly and ran in hole.
	2030	Pumped first meters down. Drilled to 230 m.
	2100	Ran MSS on slick line. Recovered same.
	2300	Drilled to 241 m. Swept hole with hi-vis pills on each connections.
	2330	Ran MSS on slick line. Recovered same.
	2400	Drilled 36 " hole to 248 m.

Date	Stop	Operational Description
03.10.87	0230	Drilled 36" hole from 248 to 270 m.
	0300	Ran MSS survey at 270 m.
	0500	Drilled 36" hole from 270 to 297 m.
	0530	Ran MSS survey at 297 m.
	0830	Drilled 36" hole from 297 to 330 m.
	0930	Pumped 8 m3 hi-vis pill around to clean hole.
	1000	Ran MSS survey at 330 m.
	1030	Wiper trip to seabed. Hole in good condition.Ran in hole to bottom.
	1100	Drilled 36" hole to 332 m due to 2-3 m sunk in of TGB.
	1130	Pumped hi-vis mud to clean hole. Displaced with a total of 1100 m3 mud.
	1400	Pulled out of hole with bit and hole opener. Hole in good shape.
	1730	Made up 30" running tool and stand back in derrick Rigged up and ran 30" casing and drill pipe stinger.
	1800	Lock ring on 30" housing was damaged when housing was landed in PGB. Repaired same.
	2000	Landed 30" casing with top housing at 214.5 m. PGB visible above mudline. 30" shoe at 327 m.
	2200	Rigged up cement lines. Pumped 10 m3 of seawater prior to mixing and pumping 51.5 m3 of 1.58 SG lead slurry and 16 m3 of 1.92 SG tail slurry. Displaced with 110.8 m3 seawater.
	2400	Waited for cement to set while holding 30" casing in tension.
04.10.87	0700	Waited on cement to set up. Held 30" casing in tension in meantime.
	0830	Released 30" casing running tool. Pulled same. Depth RKB-30" hanger: 215 m.
	2000	Rigged up and ran seabed diverter on riser. Pressure tested every 4 joints of kill/choke lines.Made up kill choke and booster line to slip joint. Landed SBD, latched onto 30" housing and made overpull test with 10 ton.
	2330	Broke down and laid out 26" bit and 36" holeopener Picked up 26" underreamer. Function tested same. Made up 26" bottom hole assembly and ran in hole. Tagged cement inside 30" casing at 323 m.
	2400	Attempted to hang off string weight on surface diverter bag. Negative. String started slipping through with 7 MT weight down on it. Function tested surface diverter system. Flushed through over board lines.

Date	Stop	Operational Description
05.10.87	0030	Closed annular preventer on SBD and pressure tested same and 30" casing to 35 bar for 10 min. OK. Function tested dump valve.
	0130	Drilled out cement and shoe in 30" casingand clean out rathole from 323 to 332 m.
	0300	POOH. Broke down bit. Racked back stands with 9 1/2" DC's and 26 " underreamer in derrick.
	0700	Picked up 9 1/2" MWD-tool, made up 17 1/2" bit and bit sub and function tested MWD-tool in rotary table. Made up 17 1/2" bottom hole assembly and RIH.
	0730	Displaced hole to mud. Flushed kill and choke lines with mud.
	0830	Drilled 5 m of new hole from 332 to 337 m.
	0930	Performed leak off test. EMW at 30" casing shoe = 1.17 SG (RKB)
	2400	Drilled 17 1/2" pilot hole from 337 to 664 m. Gas peaks: 350 m =3.2%, 360 m =2.79%, 394 m =2.2%, 517 m=1.28% .
06.10.87	0830	Continued to drill 17 1/2" pilot hole from 664 to 861 m.
	1030	Circulated hole clean and 1.14 SG mud through system.
	1100	Closed seabed diverter and opened dump valve. Flowchecked for 40 minutes. Negative.
	1200	Circulated bottoms up to check for gas. Negative.
	1430	POOH.
	1600	Made up new assembly with 26" underreamer and RIH.
	2200	Opened hole to 26" from 332 to 455 m.
	2300	Pump pressure dropped 30 bar. Checked surface system. Negative. Suspected washout. POOH. Found washout in connection on third stand. Laid down damaged joints and RIH.
	2400	Opened hole to 26" from 455 to 465 m.
07.10.87	1100	Opened hole to 26" from 465 to 702 m. Flowcheck at 650 m. Negative.
	1130	Circulated while repairing mud pump no.1
	1800	Opened hole to 26" from 702 to 861 m.
	2000	Circulated hole clean.
	2200	POOH to wellhead. Broke down and laid down drill-pipe on way out.
	2300	Closed SBD-bag. Opened dump valve. Flowchecked. Well flowing.
	2400	RIH to TD and circulated bottoms up.

SAGA PETROLEUM A.S. 6.1 DAILY OPERATIONAL DESCRIPTION

Page 4 of 4 Well no: 34/7-11

Date	Stop	Operational Description
08.10.87	0900	RIH to TD and circulated bottoms up. Max gas 0.91% Closed SBD-bag, opened dump valve and flowchecked. Positive. Increase mudweight to 1.18 SG. Flow-checked. Positive. Increased mudweight to 1.20 SG POOH to wellhead. Flowchecked . Well stable.
	1100	POOH. Laid down 9 1/2" DC's, 26" underreamer and 17 1/2" bit.
	1800	Rigged up and pulled seabed diverter.
	2000	Picked up 18 3/4" wellhead. Made up running tool to same and laid down.
	2400	Made check trip to TD with 26" bit. POOH. Refilled hole at 360 m.
09.10.87	0130	POOH. Laid down 26" bit, bit sub and X-over.
	1500	Rigged up and ran 56 joints of 20" casing on drill pipe. Stop 1m above landing point. Break circ-ulation.Pump 3M3 of seawater. Mixed and pumped lead with and without Emsac and tail.Attempted to land casing after displacing 2/3. No go.
	1700	Continued to displace cement. Bumped plug and pressure tested casing to 115 bar for 10 minutes. OK. 18 3/4" wellhead landed 0.6 meters high. Released running tool and pulled same.
	2400	Rigged up and ran BOP on riser. Pressure tested every third connection.
10.10.87	0800	Continued to run BOP. Tested kill/choke lines every third joint. Hooked up kill/choke and booster lines to slip joint while positioning rig for alignment. Landed stack at 0700 hrs. Overpull tested with 30 MT. OK. Made up diverter.
	1100	Ran in hole with BOP test plug. Pressure tested BOP to 115 bar.POOH with testplug.
	1200	RIH and set seatprotector. POOH with running tool.
	1400	Made up hang off tool and stand back same.
	2030	Made up 11 1/4" overshot,15" lipguide and 5" basket grapple and RIH to 832 m to retrieve broken part of running mandrel for cement plug lost after cementing 20" casing. POOH. No fish.Replaced grapple with taper tap and RIH. No fish recovered.
	2130	Cut 34m and slipped 17m of drill-line.
	2300	Laid down fishing tools. Decided to abandon well due to movement of 18 3/4" wellhead inside 30" casing.
	2400	RIH with open ended drillpipe and sat a balanced cement plug from 455 to 255 m.
11.10.87	0130	Sat balanced cement plugs from 455 to 255 m. POOH to 235 m and reverse circulate string volume. POOH.
	0200	Made up seatprotector running tool. RIH and retrieved seatprotector. POOH with same.
	1100	Rigged up and pulled BOP and riser. Cut all guide-lines with ROV.

SAGA PETROLEUM A.S. 6.1 DAILY OPERATIONAL DESCRIPTION

Page 1 of 19 Well no: 34/7-12

Date	Stop	Operational Description
11.10.87	1200	Moved rig 20 m north by pulling on anchors to get in position for spudin of well 34/7-12.
	1600	Made up stand with 9 1/2" monel, 2x9 1/2" DC, 36" holeopener and 26" bit. Prepair spud in of well 34/7-12 by welding arms on TGB for TV-guide-lines and installed all guidelines and slope-indicator on TGB.
	1930	Made up TGB running tool and installed same in TGB RIH with same and land TGB. Check orientation of same with ROV. Heading 175 deg. Slope indicator reading 0.5 deg. POOH with TGB running tool.
	2200	RIH with 36" spud assembly. Installed guideframe on same.
	2300	Spud in at 2200 hrs. Drilled 36 " hole from 216 to 223 m.
	2330	Ran MSS-survey on slickline.
	2400	Drilled 36" hole from 223 to 225 m.
12.10.87	0030	Drilled 36" hole from 225 to 232 m.
	0100	Ran magnetic single shot survey on slickline.
	0730	Drilled 36" hole from 232 to 279 m.
	0800	Ran magnetic single shot survey on slickline.
	1200	Drilled 36" hole from 279 to 332 m.
	1230	Swept hole with 10 m3 hi-visc pill.
	1300	Ran magnetic single shot on slickline.
	1330	Made wiper trip to seabed. 2 m fill when back at bottom.
	1400	Displaced hole to hi-visc mud. Pumped a total of 110 m3.
	1500	POOH.
	1600	Made up 30" casing running tool on drillpipe. Stood back in derrick.
	2230	Rigged up and ran 9 joints of 30" casing. Ran 3 stands of drillpipe as stinger. Installed running tool. Landed casing on drillpipe. Had to move rig to stab into TGB. TGB had sunk approx 2 m. Circ-ulated casing down last 3m. Housing at 215 m.
	2400	Circulated 500 strokes with seawater prior to cement job. Mixed and pumped 51.5 m3 of 1.58 SG lead slurry and 16 m3 of 1.92 SG tail slurry.

Date	Stop	Operational Description
13.10.87	0030	Continued cement casing.Displaced slurries with 11.1 m3 of seawater.
	0800	Held casing in tension while waiting on cement to set up.
	0830	Released casing running tool.Pulled out with landing string and stinger.
	1600	Rigged up and ran pinconnector on riser.Landed and latched same.
	1930	Made up new BHA.Tested MWD on surface.Continued RIH.Tagged top of cement at 321m.Function tested diverter system by flushing through both lines before drilling out of shoe.
	2100	Drilled cement from 321m and through shoe at 327m. Cleaned rathole.Displaced hole from seawater to 1.12 sg mud while drilling out of shoe.
	2400	Drilled 17-1/2" hole from 332m to 379m.
14.10.87	0900	Drilled 17-1/2" pilothole from 379m to 609m.
	0930	Circulated with mudpump §1 while repaired pump §2.
	1830	Drilled 17-1/2" pilothole to 852m.Flowchecked at 704m.Negativ.
	2000	Circulated and swept hole with 8 m3 hivisc.pill. Circulated until shakers clean.
	2400	POOH.Laid down excess drillpipe on way out.Tight hole .Max overpull 20 tons.
15.10.87	0300	Laid down 36" holeopener and 26" bit.Made up 26" underreamer.Tested same.RIH.
	1300	Opened hole to 26" from 321m to 557m.
	1500	Repaired pop-off on mudpump § 2.
	2100	Opened hole to 26" from 557m to 758m.
	2200	Repaired mudpump § 1.Changed cap and capseal.
	2400	Opened hole to 26" from 758m to 825m.
16.10.87	0100	Opened hole to 26" from 825m to 852m.
	0230	Circulated and conditioned hole.
	0400	Displaced hole with 1.2 SG mud.
	0500	POOH to wellhead.
	0630	Displaced riser to seawater.Flowchecked for 10 min Opened dump valve and flowchecked for 30 minutes. Observed with subsea T.V.
	0700	POOH.
	1300	Pulled riser and pin connector.
	1430	Made up 18-3/4" wellhead and running tool.
	1930	Check trip to TD at 852m with 26" bit.No fill. No drag.
	2400	Rigged up and ran 20" casing.

Date	Stop	Operational Description
17.10.87	1300	Waiting on weather.

TIME	WIND (m/s)	HEAVE(m)	ROLL(deg)	PITCH(deg)
0000	35	2.1	3.4	3.0
0300	37	2.3	4.6	3.0
0900	30	2.9	4.4	3.6

2200 Continued to run 20" casing.
2330 Made up 18-3/4" wellhead.Ran in with landing string.Broke circulation with 1,2 SG mud.Landed wellhead.Overpull tested to 12 tons.
2400 Pressure tested cement line.Prepared to mix and pump cement.

18.10.87 0400 Mixed and pumped cement .
0630 Displaced cement with 110.5m3 seawater.Bumped plug and pressure tested casing to 115 bar for 10 min. No back flow.Floats OK.Backed out running tool and flushed wellhead.
0700 Pulled running tool.
0730 Slipped 56` drill line.
1730 Rigged up and ran BOP.Possitioned rig and attempted to land BOP.Broke guide wire § 1,3 & 4 on post tops.Posts OK.
1900 Disconnected kill and choke lines.Pulled and racked back slip joint.
2400 Waiting on weather.

TIME	WIND (m/s)	HEAVE(m)	ROLL(deg)	PITCH(deg)
1900	34	2.3	4.2	3.4
2100	33	2.5	3.4	4.4
2300	34	3.1	4.8	3.6

19.10.87 2400 Waiting on weather.

TIME	WIND(M/S)	HEAVE(M)	ROLL(deg)	PITCH(deg).
0200	36	3	3.4	4.4
1000	31	2.6	4.4	5.6
2200	30	2	3.6	3.4

20.10.87 0500 Waiting on weather.

TIME	WIND(m/s)	HEAVE(m)	ROLL(deg)	PITCH(deg)
0200	31	1.7	3.4	3.4
0500	27	1.2	3.2	3.4

0730 Pulled 9 joints riser.
1000 Waiting on weather.

TIME	WIND(m/s)	HEAVE(m)	ROLL(deg)	PITCH(deg)
0800	27	1.2	2.8	3.4
1000	24	1.6	2.6	3.6

1330 Continued to pull riser.Landed BOP on stump.
2100 Laid down excess drillpipe and made up 3 stands 8" collar while waiting on weather.Sea to rough to dive with ROV.
2400 Made up guide line re-establish frame on drillpipe Ran in with drillpipe.Re-established guideline §4. Pull tested to 5 klbs.

Date	Stop	Operational Description
21.10.87	0100	Re-established guidelines no. 1 and 3.
	0130	Pulled out drillpipe and guideline re-establish frame.
	1130	Ran BOP and riser. Hooked up choke-, kill- and boosterline.
	1430	RIH with BOP test plug. Pressure tested BOP to 115 bar. POOH with test plug.
	1530	RIH and set nominal seat protector. POOH with running tool.
	1800	RIH with 17 1/2" bottom hole assembly. Tested MWD tool, ok. Tagged cement at 822 m.
	2000	Drilled out shoe track from 822 to 838 m with sea-water-. Switched to KCL-mud. Cleaned out rathole.
	2030	Drilled 17 1/2" hole from 852 to 856 m.
	2200	Circulated and conditioned mud. Pulled into 20" casing shoe. Performed leak-off test, EMW = 1.66.
	2400	Drilled 17 1/2" from 856 to 870 m.
22.10.87	1100	Drilled 17-1/2" hole from 870m to 1154m.
	1130	Circulated while repair mudpump § 2.
	1300	Drilled 17-1/2" hole from 1154m to 1200m.
	1330	Circulated prior to wipertrip.
	1430	Wipertrip to 20" shoe and back to 1190m.
	1500	Reamed and washed from 1190m to 1200m.
	1630	Drilled 17-1/2" hole from 1200m to 1230m.
	1700	Circulated while repair mudpump § 1.
	2400	Drilled 17-1/2" hole from 1230m to 1334m.
23.10.87	1000	Drilled 17-1/2" hole from 1334m to 1425m. Erratic torque,slow drilling.
	1030	POOH.Max overpull 18 tons.
	1100	Held complete kick drills.
	1300	Continued POOH.Laid down MWD-tool(cuts in rubber insulator) and NB-stab (worn blades).
	1600	Made up new NB-stab and MWD-tool.Tested MWD-tool. RIH to 1385m.
	1830	Washed from 1385m to 1414m.Washed and reamed from 1414m to 1425m.
	2400	Drilled 17-1/2" hole from 1425m to 1544m.
24.10.87	1430	Drilled 17-1/2" hole from 1544m to 1834m.
	1500	Circulated while repair mudpump § 2.
	1730	Drilled 17-1/2" hole from 1834m to 1865m.
	2030	Circulated clean
	2200	POOH to 840m.Max overpull 36 tons.Tight spot at 1425m-68 tons overpull.
	2230	Washed 26" rathole from 838m to 852m.
	2400	RIH.Reamed and washed tight spots at 1580m and 1740m.

Date	Stop	Operational Description
25.10.87	0100	Continued RIH.Reamed and washed tight hole from 1750m to 1795m and 1844m to 1865m.
	0330	Circulated clean.
	0630	POOH.Laid down MWD,NB stab and bit.(NB stab worn on lower part of blades).
	1900	Rigged up Dresser Atlas. Log §1:DIFL-LSBHC-CDL-GR in 0745 hrs-out 0910hrs Changed pulse modulator. in 1000 hrs-out 1340 hrs SWC §1: 50 shots in 1520 hrs-out 1840 hrs 92 % recovery.Lost 3. Rigged down Dresser
	2000	Made up 13-3/8" casing hanger with plugs and seal assembly.
	2200	Made up 17-1/2" bit and RIH to shoe.Strapped pipe.
	2300	Slipped and cut drill line.
	2400	Continued RIH.
26.10.87	0100	Continued RIH.Washed and reamed tight hole from 1630m to 1645m and fill from 1848m to 1865m.
	0330	Circulated clean.
	0530	POOH.
	0700	Made up jet sub and RIH.Washed wellhead.Continued RIH and retrieved seat protector.POOH.
	2400	Rigged up and ran 138joints 13-3/8" casing.Picked up casing hanger.
27.10.87	0130	RIH with 13 3/8" casing on DP. Picked up cement kelly.
	0400	Breaked circulation and landed casing with shoe at 1851 m.Circulated 95 cum.Pumped 32 cum KCL mud with YP = 10 ahead of 5 cum FW spacer.Pressure tested surface lines to 345 bar,cement hose bursted.Rigged up new hose,pressure tested,ok.
	0600	Cemented casing with 70.6 tons lead slurry at 1.60 SG and 21.3 tons tail slurry at 1.90 SG. Dropped dart and sheared top plug.
	0830	Displaced cement with rig pumps.Bumped plug and pressure tested casing to 290 bar.
	1000	Set seal assembly.Pressure tested BOP to 290 bar except UPR due to malplaced pup joint above casing running tool.
	1030	POOH with casing running tool.
	1130	Set wearbushing.
	1300	Pressure tested kelly and valves.
	1730	Laid down 17 1/2" BHA.Made up 12 1/4" BHA.Tested MWD tool.RIH. Tagged cement at 1824 m.
	1800	Pressure tested UPR to 290 bar,ok.
	2200	Drilled out 13 3/8" shoe track.Cleaned out rat hole.
	2330	Drilled 12 1/4" hole from 1865 to 1870 m.
	2400	Circulated for leak off test.

Date	Stop	Operational Description
28.10.87	0100	Pressure tested surface lines.Performed formation integrity test to 2.23 SG EMW.
	1000	Drilled 12-1/4" hole from 1870 to 1943 m.
	1030	Circulated and conditioned mud for leak off test.
	1130	Pulled into shoe.Repeated formation integity test to 2.0 SG EMW. RIH to bottom.
	2400	Drilled 12-1/4" hole from 1943 to 2106 m.
29.10.87	0100	Changed washpipe on swivel. Made up circulating head.Circulated and worked pipe.
	0830	Drilled 12-1/4" hole from 2106 to 2169 m.Drilling break at 2167 m.
	1130	Circulated for sample.Conditioned mud.
	1400	POOH.
	1530	Picked up core barrel.
	1800	RIH to 1851 m.
	1830	Slipped drill line.
	1900	RIH to 2169 m.
	1930	Circulated.Dropped ball.Measured SCR.
	2400	Cut core no.1 from 2169 to 2183 m.
30.10.87	0300	Cut core no 1 from 2183-2196.5m.
	0530	POOH.
	0630	Recovered core no 1: 27.3m-99.3%.
	0730	Made up new inner barrel and serviced core barrel.
	0930	RIH to bottom.
	1000	Circulated,dropped ball and took SCR.
	1530	Cut core no 2 from 2196.5-2214m.Core jammed of.
	1800	POOH.
	1900	Recovered core no 2 : 16.4m-93.4%.
	2000	Made up aluminum inner barrel and serviced core barrel.
	2230	RIH to bottom.
	2300	Circulated,dropped ball and took SCR.
	2330	Repaired kelly spinner motor.
	2400	Cut core no 3 from 2214-2216m.Observed leaking washpipe.
31.10.87	0100	Made up circulating head.Circulated and worked pipe while changing wash pipe.
	0200	Attempted to restart coring.Negative.
	0500	POOH.
	0600	Recovered core no 3: 1.5m-75%.
	0730	RIH to 13-3/8 casing shoe.
	0830	Slipped 56 feet and cut 112 feet of drilline.
	0900	RIH to bottom.
	0930	Circulated,spaced out and dropped ball.
	1630	Cut core no 4 from 2216-2228m.Core jammed.
	1900	POOH.
	2000	Recovered core no 4 : 8.9m-74.2%.
	2030	Serviced core barrel.
	2230	RIH to bottom.
	2400	Took SCR,spaced out and cut core no 5 from 2228-2234m.

Date	Stop	Operational Description
01.11.87	0300	Cut core no.5 from 2234 to 2242 m. Core jammed.
	0530	POOH.
	0600	Recovered core no.5 (14 m , 100 %).
	0630	Serviced corebarrel.
	0830	RIH to 2242 m.
	0900	Circulated.Spaced out.Dropped ball.Took SCR.
	1400	Cut core no.6 from 2242 m to 2262 m.Core jammed.
	1630	POOH.
	1730	Recovered core no.6 (19.5 m 97.5 %).
	1800	Serviced corebarrel.
	2030	RIH to 2262 m.
	2100	Circulated.Spaced out.Dropped ball.Took SCR.
	2400	Cut core no.7 from 2262 to 2276 m.
02.11.87	0230	Cut core § 7 from 2276m to 2290m.
	0500	POOH.
	0600	Recovered core § 7.Recovery:99.6%.
	0630	Made up innerbarrel and serviced core barrel.
	0800	RIH to 1851m.
	0830	Slipped 17m of drilline.
	0900	RIH to 2290m.
	0930	Circulated.Spaced out.Dropped ball.Took slow circulating rate.
	1500	Cut core § 8 from 2290m to 2305.5m.
	1730	POOH.
	1800	Recovered core § 8.Recovery:96.8 %.
	1930	Made up inner barrel.Serviced corebarrel.
	2130	RIH to 2305.5m.
	2200	Circulated.Spaced out.Dropped ball.Took slow circulating rate.
	2400	Cut core § 9 from 2305.5m to 2314m.
03.11.87	0530	Cut core § 9 from 2314m to 2333m.
	0800	POOH.
	0830	Recovered core § 9.Recovery:98.2%.
	0930	Made up innerbarrel.Serviced corebarrel.
	1130	RIH to 2330m.
	1200	Circulated while repair valve on DSC manifold.
	1230	Circulated.Spaced out.Dropped ball.Took slow circulating rate.
	2400	Cut core § 10 from 2333m to 2357m.

Date	Stop	Operational Description
04.11.87	0230	Cut core § 10 from 2357m to 2360.5m.
	0500	POOH.12 tons overpull on 1st.stand.
	0600	Recovered core § 10.Recovery: 84.7 %.
	0700	RIH with bull nose and jet sub.Washed wellhead area.Made up BOP test tool.Continued to RIH.
	1030	Pressure tested BOP to 290 bar on blue pod. Function tested on yellow pod.
	1500	POOH.Ran travelling block into upper racking arm. Damaged same.Repaired upper racking arm.
	1600	Pressure tested kelly valves and kelly hose to 345 bar while repairing upper racking arm.
	1700	Continued repairing upper racking arm.
	1800	POOH.Laid down BOP test tool,bull nose and jetsub.
	2100	Made up bit and BHA.Function tested MWD-tool. RIH to 1851m.
	2200	Slipped and cut drilline.
	2230	RIH to 2281m.Took weight.Work pipe.
	2330	Reamed from 2281m to 2360.5m.
	2400	Drilled 12-1/4" hole from 2360.5m to 2364m.
05.11.87	1800	Drilled 12-1/4" hole from 2364m to 2465m. Drilling break at 2461m.
	2000	Circulated bottoms up to check for hydrocarbons. Negativ.
	2130	Drilled 12-1/4" hole from 2465m to 2480m. Drilling break at 2469m.No indications of hydro-carbon formation on MWD tool.
	2300	Circulated hole clean prior to logging.
	2400	POOH.Tight hole from 2235m to 2300m.Max overpull 40 tons.
06.11.87	0230	Wiper trip to shoe.RIH to 2262m.Tight hole.Reamed down to 2297m.RIH with one stand.Took weight. Reamed to 2355m.RIH to TD at 2480m.
	0430	Circulated bottoms up.
	0800	POOH for logging.Hole in good shape.
	2100	Rigged up Dresser Atlas.Log § 1:MLL-DLL-GR in 0850 hrs-out 1210 hrs.Log § 2:CDL-CNL-GR.Pulled in 1305 hrs.Pulled out due to malfunction.out 1540 hrs.in 1625 hrs with back up tool. out 1935 hrs.
	2400	FMT §1. in 2105 hrs for pressure measurements and sampling.
07.11.87	2200	Logging.FMT § 1: FMT § 2:in 0520 hrs - out 0825 hrs. FMT § 3:in 0920 hrs - out 1130 hrs. FMT § 4:in 1230 hrs - out 1440 hrs.Misrun.Repair gamma ray tool.FMT § 5:in 1730 hrs - out 2035 hrs.
	2400	Made up 12-1/4" bit and RIH.Tested MWD tool.

Date	Stop	Operational Description
08.11.87	0130	RIH. Tight hole at 2177 m.
	0600	Reamed from 2177 to 2337 m. Continued RIH with 4 stands, tight hole. Reamed last 3 joints to TD.
	1130	Drilled 12 1/4" hole from 2480 to 2492 m.
	1500	POOH due to low ROP. Hole tight through reservoir, max overpull 30 tons.
	1830	Changed bit and RIH. Tested MWD tool, ok.
	2330	Drilled 12 1/4" hole from 2492 to 2510 m.
	2400	Repaired kelly spinner.
09.11.87	2400	Drilled 12 1/4" hole from 2510 to 2595 m.
10.11.87	0500	Drilled 12 1/4" hole from 2595 to 2605 m.
	0730	Changed hinge pin on lower dolly.
	1100	POOH due to low ROP.
	1330	Changed bit. Made up junk sub and RIH. Tested MWD tool, ok.
	1400	Slipped 56 ft of drilline.
	1430	Continued RIH to TD.
	1530	Worked junk sub.
	2000	Drilled 12 1/4" hole from 2605 to 2609 m. Got erratic torque.
	2300	POOH, hole in good shape. Found inserts and metal pieces in junk sub.
	2400	Made up new bit and RIH.
11.11.87	0030	RIH.
	0100	Changed airhose on drillpipe elevator.
	0300	RIH to TD.
	0330	Worked junk basket.
	1130	Drilled 12 1/4" hole from 2609 to 2622 m.
	1500	POOH due to high torque and low ROP. L/D junk basket.
	2030	RIH with BOP test plug. Tested BOP to 290 bar. Tested stab-in-valve and kelly cocks to 345 bar. POOH with test plug.
	2300	Made up new bit and RIH. Tested MWD tool, ok.
	2400	Cut 112 ft and slipped 56 ft of drilline.

Date	Stop	Operational Description
12.11.87	0100	RIH to 2621m.
	0300	Reamed 1m to bottom.Drilled 12-1/4" hole from 2622m to 2632m.
	0330	Got 1.6 m3 pitgain corresponding with bottoms up. Flowchecked.Gained 0.3 m3 in 20 mins.Shut in well and observed pressures while displacing gas cut mud in riser.No pressures recorded.Opened bag and circulated.Well stable.
	1500	Drilled 12-1/4" hole from 2632m to 2655m.
	1800	POOH due to erratic torque and slow drilling.
	2030	Laid down nearbit stabilizer,crossover,MWD and bit Made up new MWD,crossover,nearbit stabilizer and bit.Tested MWD tool.OK!
	2330	RIH to 2655m.Filled pipe at 1850m.
	2400	Circulated.Tagged bottom.
13.11.87	1700	Drilled 12-1/4" hole from 2655m to 2703m.
	2000	POOH due to slow drilling.Max overpull 70 tons from 2643m to 2633m.
	2300	Changed bit,RIH,filled pipe and tested MWD. Continued RIH to 2703m.
	2400	Drilled 12-1/4" hole from 2703m to 2705m.
14.11.87	0730	Drilled 12-1/4" hole from 2705m to 2744m.
	1030	POOH due to slow drilling.Max overpull 45 tons.
	1200	Changed bit.RIH.
	1230	Slipped 56` drilline.
	1330	Continued RIH.
	1400	Reamed from 2728m to bottom at 2744m.
	2400	Drilled 12-1/4" hole from 2744m to 2778m.
15.11.87	0200	Drilled 12-1/4" hole from 2778m to 2784m.
	0400	Circulated bottoms up.
	0700	POOH.Max overpull 25 tons.
	2400	Rigged up Dresser Atlas for logging. Log § 1:DIFL-GR-CAL in 0752 hrs-out 1615 hrs. Log § 2:CNL-CBL-GR in 1700 hrs-out 2115 hrs. Log § 3:FMT-GR in 2245 hrs.
16.11.87	0230	Logging.FMT stuck at 2465m.
	0630	Displaced riser to seawater.Worked stuck FMT. No go.Displaced riser to mud.
	0800	Prepared for cut and thread operation.
	1400	Made up overshot.RIH to 2465m.
	1600	Pulled FMT into overshot.Got positive indication that FMT was inside grapple.Broke wireline weak-point and recovered cable.
	1800	POOH.Lost FMT on way out.
	2230	Made up new overshot with 11" lopguide.RIH to bottom.Circulated.
	2400	Entered fish.Washed over and set down 9 tons. Pulled 2 stands,got backflow.Pumped slug.Ran back to bottom to ensure that fish was engaged.

Date	Stop	Operational Description
17.11.87	0430	POOH with fish.Got increasing backflow after eight stands.Pumped new slug.Continued POOH.Laid down FMT and fishing equipment.
	0530	Slipped 56` and cut 112` drilline.
	0800	Made up bit and RIH to 2750m.
	0830	Reamed and circulated from 2750m to 2784m.
	1100	Circulated.
	1330	POOH.
	2400	Rigged up Dresser Atlas. FMT in at 1415 hrs.- out at 1830 hrs. DIP-GR in at 2000 hrs - out at 2225 hrs. POOH due to GR influenced the azimuth readings. DIP in at 2230 hrs.
18.11.87	2400	Logging. DIPLOG out 0140 hrs. CDL-CNL-GR in 0255 -out 0640 hrs. MLL-DLL-GR in 0820 -out 1135 hrs. VSP in 1235 - out 1415 hrs.Misrun. in 1455 - out 2320 hrs. SWC § 1 in 2345 hrs.
19.11.87	1000	Logging.SWC § 1: out 0250 hrs. SWC § 2: in 0300 hrs - out 0830 hrs. Rigged down Dresser Atlas.
	1200	RIH with open ended drillpipe to 2784m.
	1300	Circulated.
	1730	Set cement plug from 2780m to 2580m.Pulled out to 2570m.Reversed circulated.Set cement plug from 2570m to 2370m.Reversed circulated at 2360m.
	1900	POOH.
	2030	Made up 9-5/8" casing hanger and cement plug on running tool.
	2230	RIH with 12-1/4" bit to 2381m.
	2400	Circulated while adding corrosion inhibitor to mud system.
20.11.87	0100	Circulated and added corrosion inhibitor to mud.
	0200	POOH.
	0230	Repair broken elevator hose.
	0400	POOH.Washed wellhead on way out.
	0600	RIH with wearbushing running tool.Worked stuck wearbushing.No go.Sheared "hold down" pins using 90 tons overpull.POOH.Laid down wearbushing and running tool.
	0630	Slipped 56` drilline.
	2100	Rigged up and ran 9-5/8" casing.Broke circulation and landed casing.
	2300	Circulated.
	2400	Pressure tested cement lines.Mixed and pumped 39 tons cement,1.9 SG slurry with 5 m3 freshwater as spacer.Dropped dart and sheared top plug.

Date	Stop	Operational Description
21.11.87	0030	Continued cementing.
	0200	Displaced cement.Bumped plug with 140 bar.Switched to BJ and pressure tested casing to 385 bar.
	0430	Made up sealassembly.Tested BOP to 385 bar.
	0600	POOH with casing running tool.Laid down drillpipe.
	0700	RIH with wearbushing.Set same.POOH.Laid down DP.
	1030	Laid down excess drillpipe,8" drillcollar and corebarrel.
	1300	Picked up and made up Matre gauge carrier,flow-head,EZ-tree and lubricator valve.
	2400	Made up bit,scraper,18 6-1/2" drillcollars.RIH. Made up 5" tubing.
22.11.87	0030	RIH with 5" tubing.Tagged top of cement & 2327.5m.
	0200	Circulated and conditioned mud.
	0600	POOH.Worked scraper from 2245m to 2225m.
	1100	Rigged up Dresser Atlas.Run CBL. in 0640 hrs - out 1025 hrs.Rigged down Dresser Atlas.
	1700	Made up downhole test-tools.Tested as per program.
	2300	Got leak when pressure testing on top of slip-joints.Pulled out.Found leak between crossover and must extention joint.Laid down same.Made 2.8" drift.Drifted one 6-1/2" drillcollar and made up same onto extention joint.Continued RIH.
	2400	Pressure tested downhole tools.OK!.Continued RIH with 5" tubing.
23.11.87	0600	RIH with 5" tubing.Made up fluted hanger.RIH with landing string.Landed hanger in wellhead.Closed middle pipe ram.
	0900	Rigged up Dresser Atlas.Ran GR-CCL for depth correlation.Rigged down Dresser Atlas.
	1230	POOH with landing string.Laid down fluted hanger. Changed out one pupjoint.Made up subsea-test-tree with fluted hanger.Pressure and function tested same.
	1600	RIH with landing string.Made up lubricator valve and flowhead.Landed hanger in wellhead.
	2330	Pressure testing.Got leak when testing flowhead. Serviced and pressure tested flowhead in mouse-hole.Made up flowhead in string.Continued pressure testing.
	2400	Sat packer.

Date	Stop	Operational Description
24.11.87	0200	Rigged up Dresser Atlas.Ran GR-CCL for depth correlation.Perforations at 2276.22 to 2282.22m. Rigged down Dresser Atlas.
	0300	Closed middle pipe ram.Opened PCT.Checked for leak across packer for 10 minutes.Pressured up test-string to 380 bar.Bled of on choke-manifold to 93 bar.Closed kill-valve and choke.
	0400	Guns fired at 0310 hrs.Wellhead pressure increased 20 bar.Closed PCT for initial build up.
	2400	Opened PCT and choke and flow well.Switch to fixed 28/64" choke.Got sand production.Switched back to adjustable choke and reduced flow.Sandproduction decreased.Switched flow through seperator at 1450 hrs.Choke:32/64",rate:1260m3/day,WHP:105.3bar
25.11.87	1000	Flowed well:Choke:32/64",Rate:1260 m3/day, WHP:105 bar.
	2400	Closed PCT at 1005 hrs. and shut in well for main build up.
26.11.87	1600	Well shut in for main build up.
	2100	Opened well on PCT at 1620 hrs.Sand detection flow

Time	Choke	Water rate(cum/d)	WHP(bar)	BSW(%)
1700	28/64	1024	112.5	0.15
1900	32/64	1302	105.4	0.15
2100	36/64	1559	98.8	1.2
2400 Time	Choke	Water rate(cum/d)	WHP(bar)	BSW(%)
2300	40/64	1814	91.9	1.7

27.11.87	0430	Flowed well for sand detection.
	0530	Well shut in at PCT for build up.
	0630	Bullheaded well with 25 cum 1.72 SG mud , 5.6 cum overdisplacement.Final squeeze pressure : 200 psi at 4.5 BPM.Flowchecked 10 min,ok.
	0730	Opened SSARV .Reverse circulated.Max gas 0.2 %.
	0900	Opened MPR.Unseated packer.Relanded fluted hanger in wellhead.Closed MPR and bullheaded 1 cum. Reverse circulated.
	1230	Laid down flowhead.POOH with teststring DST no. 1.
	1300	Repaired hydraulics on upper racking arm.
	1900	Continued POOH with teststring.Laid down all test tools.Flowchecked at 1/3 and 1/2 way out.
	1930	Made up 9 5/8" EZSV retainer on drillpipe.RIH to 300 m.
	2030	Slipped 56 ft and cut 112 ft drill line.
	2300	Continued RIH.
	2400	Set cement retainer at 2267 m.Stinged out. Circulated.

Date	Stop	Operational Description
28.11.87	0100	Circulated drillpipe content.Attempted injection-negative.Stung out and rotated additional 10 turns and released setting sleeve.Stung in and established injection rate:1.5 BPM-1000 psi.
	0200	Pumped 0.8 m3 freshwater spacer.Mixed and pumped 4.8 m3 cement slurry at 1.9 SG.Pumped 0.159 m3 freshwater behind.Displaced and squeezed 0.95 m3 into perforation at 2276.2m to 2282.2m.Final squeeze pressure 186 bar.
	0230	Reverse circulated from 2265m.
	0400	POOH.
	0730	Made up 21 joints thermocase tubing and racked in derrick.
	0800	Made up connections on EZ-tree.
	1530	Rigged up Dresser Atlas.Ran CBL-VDL from 2267m to 2150m.Perforated from 2228m to 2230m with 4" gun. Rigged down Dresser Atlas.
	1800	Made up 12 joints 3-1/2" tubing stringer and ran in on drillpipe to 2235m.
	2130	Circulated string content.Attempted injection rate test-241 bar.Negative.Sat balanced cement plug from 2235m to 2164m.Pulled back to 2145m.Reversed circulated.Squeezed 0.64 m3 cement into perforations.Final squeeze pressure 241 bar.
	2400	Slugged pipe and POOH.
29.11.87	0030	Continued POOH with drillpipe and 3 1/2 tubing
	0100	Ran BOP test plug.
	0330	Tested BOP to 385 bar.
	0400	POOH with test plug.
	0500	Tested kelly and kelly valves.
	0700	Made up 8-1/2 bit and 9-5/8 casing scraper. RIH.
	0930	Tagged cement at 2204m. Drilled cement from 2204m to 2245m.
	1030	Washed down to 2267m. Circulated bottoms up.
	1230	POOH.
	1830	Rigged up Dresser Atlas. Ran CBL-VDL log from 2267m to 2142m. Perforated casing for DST no.2 from 2229m to 2235m.
	1900	Picked up flowhead. Serviced same.
	2400	Picked up and RIH with test tools for DST no.2. Pressure tested as per program.

Date	Stop	Operational Description
30.11.87	0530	continued RIH with DST no.2. Test as per program.
	0800	Installed S.S.T.T. and RIH one stand 5 1/2 thermocase tubing. Pressure tested string,380 bar.
	0930	RIH with 5 1/2 thermocase tubing.
	1200	Picked up lubricator valve and flowhead.
	1530	Pressure tested as pr. program
	1600	Set packer at 2218.5m. Closed MPR and pressur-tested against packer with 35 bar. Open PCT.
	1700	Observed pressure build up. Open well on choke 1645 hrs.
		//
	2300	Flow well.

Time	Choke(1/16)	Oil rate(cum/D)	WHP(bar)	BSW(%)
2050	32	941	140	.1
2130	44	1408	115	.1
2300	52	1706	105	0

	2400	Shut in well at PCT 2305 hrs. Build up.
01.12.87	0800	Well shut in for build up. Meanwhile rigged up MUST assembly. Changed out wireline jar due to el. failure. Open PCT.
	2400	Open well up on 32/64" choke. Flowed well.

Time	Choke(64th)	Oilrate(cum/D)	WHP(bar)
1000	32	1065	140
1800	32	1010	136
2400	32	994	134

02.12.87 2400 Flowed well.

Time	Choke	Oil(cum/D)	WHP(bar)
0400	32/64	935	133
0800	32/64	926	132
1600	32/64	901	131
2000	32/64	902	130

03.12.87 2400 Flowed well.

Time	Choke(64th)	Oil(cum/d)	WHP(bar)
0400	32	895	129
1200	32	888	128.4
2000	32	884	127.8
2400	32	881	127.6

04.12.87 0900 Flowed well on 32/64" choke.

Time	Oil rate(cum/D)	WHP(bar)
0400	884	127.3
0800	884	127.1

2400 Shut in well at MUST for build up.

Time:	0910	1200	1600	2000	2400
BHP(bar):	301.4	310.3	314.5	317.4	319.7

Date	Stop	Operational Description
05.12.87	1500	Well shut in at MUST for build up. Final BHP 325 bar.
	1630	Closed PCT and equalized pressure across MUST. Attempted to pull free MUST assembly. Failed.
	2300	Opened PCT and flowed well for surface sampling.
	2400	Shut in well at PCT and chokemanifold. Worked wireline to release MUST. Broke weakpoint on wireline. Bled off pressure above PCT.
06.12.87	0200	Pulled wireline out off DST string. Pumped 8 cum mud to equalize pressure across PCT. Open PCT.
	0300	Bullheaded tubing content with 1.72 s.g. mud. Overdisplaced with 4 cum. Final squeeze holding pressure 70 bar.
	0500	Closed PCT. Bled off pressure. Open SSARV. Reversed circulate. Max gas: .25%
	0630	Released packer. Flowchecked. Bullheaded .16 cum. down annulus. Holding pressure 83 bar. Reverse circulated. Max gas: .5%.
	1200	Laid down flowhead, lub.valve and thermotubing.
	1900	POOH with teststring.
	2400	Rigged up Dresser Atlas. Ran in with cased hole FMT at 1950 hrs. Not able to pass 2258.5m. Took pressure readings at 2242.5m. Out: 2330 hrs.
07.12.87	0200	Cased hole FMT run no.2. Attempted to take pressure readings at 2253m. No seal. POOH.
	0500	RIH Flopetrol 1-1/2" sandbailer. Passed obstruction at 2258.5m. Tagged cement retainer at 2267m. POOH. No sand.
	0830	Cased hole FMT no.3. Attempted to take pressure reading at 2254m. No seal. POOH. Found FMT plugged by scale from casing. Rigged down D.A.
	1200	RIH with cement retainer on DP.
	1330	Circulated 10 min. Set cement retainer at 2224m. Perform injection test.
	1500	Mixed and pumped cement. Squeeze 3.2 cum. cement. Max. pressure: 255 bar. Holding pressure:97 bar.
	1630	Stung out off cement retainer. Reverce circulated. Circulated long way. Max. gas: 10.5%
	1830	POOH.
	1930	Made up one single tubing on flowhead and lubricator valve.
	2300	Pressure tested BOP stack and cement retainer to 385 bar.
	2400	Made up downhole test tools.

Date	Stop	Operational Description
08.12.87	0430	Made up and RIH with downhole test tools.
	0900	Attempted to test down hole test tools. Failed. Checked for leaks. Changed out slipjoints. Pressure test to 385 bar, ok.
	2030	RIH 5" tubing, S.S.T.T., and landingstring.
	2230	Rigged up Dresser Atlas. Correlated tubing depth, ok. Rigged down D.A.
	2400	Made up flowhead.
09.12.87	0100	Made up flowhead and landed fluted hanger in wellhead.
	0330	Pressure tested as pr program.
	0700	Lubricator valve leaked. Changed out lubricator with new one.
	0730	Cycled MORV into start position again.
	0930	Continued pressure testing after flowhead was made up again after changing lubricator valve.
	1100	Set packer 2177.2m. Pressure tested packer on annulus side. Perforated from 2205.5 to 2209.5 m. Gun fired at 1035 hrs. Closed PCT 1039 hrs.
	1200	Well closed in for buildup. Open PCT 1142 hrs. Opened well for cleanup and sanddetection at 1145 hrs.
	2200	Flowed well on several different chokesizes from 4.8 to 26 mm. No sandproduction. Closed in well on PCT at 2153 hrs.
	2400	Clean up build-up.
10.12.87	0600	Cleanup build-up. RIH with MUST. Open well 0544hrs Shut in well 0553 hrs due to excessiv pressure drop down hole.
	1130	Functioned PCT and MUST to check for restrictions. Shut well in 0937 hrs. Attempted to unlatch MUST. Failed. Opened well for sampling flow. Pressure normale, no evidence of downhole choke effect.
	2400	Flowed well.

Time	Choke	WHP(bar)	BHP(bar)	Oil(cum/D)
2200	28/64	170	327	1000
2400	36/64	155	323	1516

11.12.87	1100	Flowed well on 36/64" choke.

Time	WHP(bar)	BHP(bar)	Oil(cum/D)	GOR
0220	155.6	323.7	1480	66
0600	156.1	323.6	1469	67
1000	156.2	323.6	1459	67

	2400	Shut in well on PCT 1045 hrs. Main build-up.

Date	Stop	Operational Description
12.12.87	1100	Build-up at PCT.
	1700	Open PCT 1106 hrs. Bullheaded string content with HEC fluid. Performed steprate and minifracture tests. Bottom hole fracture pressure: 506 bar.
	1830	Closed PCT 1704 hrs. Attempted to release MUST Failed. Broke weakpoint. POOH with wireline.
	1930	Bullhead string content with mud. Overdisplaced with 2.4 cum. mud. Observed well.
	2100	Open SSARV. Reversed circulated. Max. gas 0.55 %
	2300	Pull packer free. Landed fluted hanger in W.H. Bullheaded 0.8 cum. down annulus. Reversed circulated. Max. gas 0.51 %.
	2400	Rigged down flowhead.
13.12.87	1500	POOH test string. Laid down tubing in singles.
	1700	RIH with 9-5/8"cement retainer on drillpipe.
	1800	Circulated 10 min. Set cement retainer at 2195 m.
	2100	Established injection rate. Mixed and pumped 6.3 cum. 1.9 s.g. cement slurry. Squeezed 3.2 cum. Max. squeeze pressure: 280 bar. Dumped 3.1 cum. on top off cement retainer. Pulled back to 2120 m. Reverse circulated.
	2200	Circulated long way. Max. gas 0.2%.
	2400	POOH. Laid down excess drillpipe.
14.12.87	0300	POOH. Laid down excess drillpipe
	0530	Made up and RIH with 9-5/8 casing cutting assy.
	0630	Cut 9-5/8" casing at 401m with bag closed around annular swivel sub. No pressure drop.
	0800	POOH with 9-5/8" cutting assembly.
	0900	Made up and RIH with 9-5/8" casing spear.
	1000	Attempted to enter casing with spear. Failed.
	1100	POOH with spear. Landingplate on marine swivel lost in wellhead.
	1200	RIH with 11-1/2" magnet on drillpipe. Attempted to fish marine swivel ring. Failed. POOH.
	1500	Made up taper tap below 9-5/8" spear assy. Entered through marine landing ring lost in W.H. Attempted to pull 9-5/8" casing free. Failed. Overpull 100 tonnes. Worked to catch landing ring. POOH and recovered marine swivel landing ring.
	1700	RIH with 9-5/8" cutting assy.
	1800	Cut 9-5/8" casing second time at 389m with 30 bar on annulus
	1830	POOH with 9-5/8" cutting assy.
	2200	RIH and recovered 9-5/8" casing. Overpull 100 ton. Pressure tested 9-5/8" - 13-3/8" annulus to 50 bar while laying down casing. Annulus tested ok.
	2330	Made up and RIH with 13-3/8" cutting assy.
	2400	Cut 13-3/8" casing at 329m with 30 bar on annulus.

Date	Stop	Operational Description
15.12.87	0030	Cut 13-3/8" casing at 329m with 30 bar pressure on annulus.
	0130	POOH with cutting assembly.
	0300	Made up spear and RIH.
	0530	Recovered 13-3/8" cut-off casing. Max. overpull 70 tonnes.
	0600	RIH with drillpipe to 460m.
	0700	Set balanced cement plug from 460m to 260m.
	0800	POOH to 240m. Reversed circulated drillpipe free off cement.
	0900	Displase riser to seawater.
	1000	Slip and cut drilling line.
	1730	Pulled riser and BOP.
	2000	Made up 20" & 30" cutting assembly. RIH.
	2230	Cut 20" and 30" casing at 223m.
	2400	Engaged cur & pull tool to 18-3/4" WH. Recovered 20", 30" casing and PGB. Max. pull 30 t.
16.12.87	0100	Recovered cut-off 20&30" casing and PGB.
	0530	Made up and ran TGB running tool with T-sub, chicksan and nozzle. Washed and rotated down approximately 2 m. Was not able to locate TGB.
	0900	Pulled TGB running tool. Jumped ROV and cut guide and TV lines. Moved rig to 34/7-11
	1030	Made up cutting assembly. RIH.
	1100	Position rig and stabbed into wellhead with cutting assembly.
	1400	Cut 20&30" casing at 223m.
	1430	Attempted to pull casing. Max. overpull 140 tonnes Failed.
	1530	Continued to cut casing.
	1600	Attempted to pull casing. Max. overpull 150 ton. Failed
	1630	POOH with cutting assembly.
	1900	Prepared and ran into wellhead with severing charg Fired at 223m. POOH.
	2230	RIH with retrieving assembly.
	2300	Engaged spear and pulled 20/30" casing and PGB.
	2400	Performed final survey with ROV. No sign of TGB.
17.12.87	0700	Anchorhandling. 0155 hrs anchor no. 6 on bolster. 0157 hrs anchor no. 2 on bolster. 0412 hrs anchor no. 7 on bolster. 0655 hrs anchor no.5 on bolster.
	1345	Anchorhandling. 0740 hrs anchor no.3 on bolster 0800 hrs anchor no.1 on bolster. 1018 hrs anchor no. 8 on bolster. 1345 hrs anchor no. 4 on bolster.

No	Size	Make	Type	Ser.no.	Jets 32 inch	Depth out	Drld depth	Hrs	m/HR	WOB tons	RPM	PUMP l/m	PUMP bar	Dull.cond. T	B	G	Other	Bitactivity	Rem
1	26	HTC	OSC3AJ	089WR	24-24-24	332.0	116.0	13.5	8.6	0/15	50/80	4400	140	2	3	I		DRILLING	*
2	17-1/2	HTC	X3A	727BR	24-24-24	332.0	9.0	1.0	9.0	0/0	0/0	0	0	1	1	I		DRLG CMT	*
2 RR	17-1/2	HTC	X3A	727BR	24-24-24	861.0	529.0	24.0	22.1	8/12	100/115	4100	207	2	3	I		DRILLING	*
3	26	TRISTA	KWB	3918	6X16	861.0	529.0	24.5	21.6	0/10	100/110	4100	207	5	8	I		U REAMING	
1 RR	26	HTC	OSC3AJ	089WR	24-24-24	861.0	.0	.0	.0	0/0	0/0	0	0					CIRC	*

SAGA PETROLEUM A.S

6.1.1 BIT RECORD PART 2
Remarks
Well no: 34/7-11

No	Size	Make	Type	Ser.no.	Remarks
1	26	HTC	OSC3AJ	089WR	Run with 36" Smith GTA (20-20-20).
2	17-1/2	HTC	X3A	727BR	Drilled out 30" shoe.
2 RR	17-1/2	HTC	X3A	727BR	Drilled 17 1/2" pilot hole.
1 RR	26	HTC	OSC3AJ	089WR	Check trip prior to 20" casing job.

No	Size	Make	Type	Ser.no.	Jets 32 inch	Depth out	Drld depth	Hrs	m/HR	WOB tons	RPM	PUMP 1/m	PUMP bar	Dull.cond. T	B	G	Other	Bitactivity	Rem
1 RR	26	HTC	OSC3AJ	089WR	24-24-24	332.0	116.0	12.5	9.3	0/15	50/80	4400	140	2	4	I		DRILLING	*
2	17-1/2	HTC	X3A	581AR	28-24-24	852.0	529.0	21.0	25.2	8/15	110/130	4300	200	2	3	I		DRILLING	*
3	26	HTC	OTCGJ/	581AR	20-20-24	852.0	520.0	24.0	22.1	5/9	110/110	3993	213	2	3	I		U REAMING	*
4	17-1/2	SMITH	SDGH	XE4962	24-24-28	1425.0	573.0	33.5	17.2	20/40	100/120	4300	227	6	6	1/4		DRILLING	*
5	17-1/2	SMITH	SDGH	XE2999	24-24-28	1865.0	440.0	22.5	19.6	14/20	110/130	3070	234	3	4	1/4		DRILLING	
6	12-1/4	REED	HP11J	BR5218	18-18-18	2169.0	304.0	30.5	10.0	7/20	120/120	2050	227	3	4	1/16		DRILLING	*
7	12-1/4	CHRIST	RC476	118751		2196.5	27.5	7.5	3.7	5/15	90/130	1290	176	0			C2	CORING	
7 RR	12-1/4	CHRIST	RC476	118751		2214.0	17.5	5.5	3.2	5/15	90/130	1290	176	1			C3	CORING	
8	12-1/4	CHRIST	SC225	150197		2216.0	2.0	.5	4.0	5/15	90/130	1290	145				0%	CORING	*
8 RR	12-1/4	CHRIST	SC225	150197		2228.0	12.0	7.0	1.8	5/15	90/130	1290	145				20%	CORING	
9	12-1/4	CHRIST	SC226	1450930		2242.0	14.0	4.5	3.2	5/10	100/100	1290	147				5%	CORING	
9 RR	12-1/4	CHRIST	SC226	1450930		2262.0	20.0	5.0	4.0	5/10	100/100	1290	147				10%	CORING	
9 RR	12-1/4	CHRIST	SC226	1450930		2290.0	28.0	5.5	5.1	10/15	90/100	1290	144				15%	CORING	
7 RR	12-1/4	CHRIST	RC476	118751		2305.5	15.5	5.5	2.9	10/15	90/100	1290	144	2			C3	CORING	
9 RR	12-1/4	CHRIST	SC226	1450930		2333.0	27.5	7.5	3.7	10/15	90/150	1290	155				40%	CORING	
10	12-1/4	CHRIST	SC226	114176		2360.5	27.5	14.0	2.0	10/15	90/150	1290	155				5%	CORING	
11	12-1/4	REED	HP12	AAG895	18-18-18	2480.0	119.5	20.0	6.0	20/25	110/130	2000	221	3	6	I		DRILLING	*
12	12-1/4	LYNG	S122	001	13-13-13-13	2492.0	12.0	5.5	2.2	25/30	80/120	1840	235	1		I		DRILLING	
13	12-1/4	HTC	ATM22	PN012	15-15-15	2605.0	113.0	34.0	3.4	20/25	60/100	1980	221	8	8	I		DRILLING	
14	12-1/4	REED	HP12	AA1996	18-18-18	2609.0	4.0	4.5	.9	20/25	60/100	1980	221	5	4	I		DRILLING	
15	12-1/4	SMITH	FVH	XE2792	18-18-18	2622.0	13.0	8.0	1.7	10/12	120/120	1980	221	2	2	1/8		DRILLING	
16	12-1/4	REED	HP51	BR5134	18-18-18	2655.0	33.0	14.0	2.4	18/18	80/100	1840	234	2	3	1/8		DRILLING	
12RR	12-1/4	LYNG	S122	001	13-13-13-13	2703.0	48.0	17.0	2.9	14/18	70/160	1940	220	3	1	I	40%	DRILLING	
17	12-1/4	SMITH	FVH	XC6456	16-16-16	2744.0	41.0	8.5	4.9	13/30	70/90	1840	220	6	4	1/8		DRILLING	
18	12-1/4	REED	HP51	BR5135	16-16-16	2784.0	40.0	12.0	3.4	13/30	70/90	1840	220	1	1	I		DRILLING	
19	12-1/4	REED	HP12	AAF192	14-14-14	2245.0	41.0	2.5	16.4	0/0	0/0	1928	234	1	1	I		DRLG CMT	

SAGA PETROLEUM A.S

6.1.1 BIT RECORD PART 2
Remarks
Well no: 34/7-12

No	Size	Make	Type	Ser.no.	Remarks
1 RR	26	HTC	OSC3AJ	089WR	Run with 36" Smith GTA (20-20-20). Rerun from well 34/7-11.
2	17-1/2	HTC	X3A	581AR	Drilled also out 30" shoe in 1.5 hrs.
3	26	HTC	OTCGJ/	581AR	Run with 17 1/2" pilot bit,(2RR).
4	17-1/2	SMITH	SDGH	XE4962	Drilled 20" casing shoe track from 822 to 838 m.
6	12-1/4	REED	HP11J	BR5218	Drilled 13 3/8" shoetrack from 1824 to 1851 m.
8	12-1/4	CHRIST	SC225	150197	Not able to continue coring after changing of washpipe.
11	12-1/4	REED	HP12	AAG895	POOH for logging.

Saga Petroleum a.s.

6.1.2. Bottom Hole Assemblies

Well no: 34/7-11

BIT SIZE	DEPTH INTERVAL (m)	DESCRIPTION	COMMENTS
26"/36"	216 - 332	26" Bit/36" Holeopener/Bit Sub w/Float/9 1/2" Monel w/Totco/2 x 9 1/2" DC/XO/12 x 8"DC/XO/HWDP's	Spud assembly
17 1/2"/26"	332 - 332	17 1/2" Bit/26" Underreamer/Bit Sub/9 1/2" Monel w/Totco/2 x 9 1/2" DC/XO/15 x 8" DC/XO/15 x HWDP	Drilled cmt. and 30" shoe
17 1/2"	332 - 861	17 1/2" Bit/Bit Sub w/Float/XO/9 1/2" MWD/XO/Stab/8" Monel/8" DC/Stab/11 x 8" DC/7 3/4" Jar/3 x 8" DC/XO/HWDP/Dart Sub/14 x HWDP	Drilling 17 1/2" pilot hole
17 1/2"/26"	332 - 861	17 1/2" Bit/26" Underreamer/Bit Sub w/Float/9 1/2" Monel/2 x 9 1/2" DC/XO/Stab/11 x 8"DC/7 3/4" Jar/3 x 8" DC/XO/HWDP/Dart Sub/14 x HWDP	Open hole to 26"

Industritrykk 31725

Saga Petroleum a.s.

6.1.2. Bottom Hole Assemblies

Well no: 34/7-12

BIT SIZE	DEPTH INTERVAL (m)	DESCRIPTION	COMMENTS
26"/36"	216 - 332	26" Bit/36" HO/Bit Sub w/Float/9 1/2" Monel w/Totco/2 x 9 1/2" DC/XO/ 12 x 8" DC/XO/HWDP	
17 1/2"	332 - 852	17 1/2" Bit/NB Stab w/Float/9 1/2" MWD/XO/Stab/8" Monel/Stab/12 x 8" DC/ 7 3/4" Jar/3 x 8" DC/XO/HWDP/Dart Sub/14 x HWDP	Pilot hole
17 1/2"/26"	332 - 852	17 1/2" Bit/26" UR/Bit Sub/Monel/2 x 9 1/2" DC/XO/12 x 8" DC/Jar/3 x 8" DC/XO/HWDP/Dart Sub/14 x HWDP	Opened hole to 26"
17 1/2"	852 - 1425	17 1/2" Bit/NB Stab w/Float/MWD/XO/Stab/Monel/DC/Stab/14 x 8" DC/Jar/ 3 x 8"DC/XO/1 x HWDP/Dart Sub/14 x HWDP	
17 1/2"	1425 - 1865	17 1/2" Bit/NB Stab/XO/Sub/MWD/XO/Stab/8" Monel/1 x 8" DC/Stab/14 x 8" DC/Jar/3 x 8" DC/XO/1 x HWDP/Dart Sub/14 x HWDP	
12 1/4"	1865 - 2169	12 1/4" Bit/NB/Stab/Sub/8 1/4" MWD/Stab/8" Monel/1 x 8" DC/Stab/20 x 8" DC/7 3/4" Jar/3 x 8" DC/XO/1 x HWDP/Dart Sub/14 x HWDP	

Saga Petroleum a.s.

6.1.2. Bottom Hole Assemblies

Well no: 34/7-12

BIT SIZE	DEPTH INTERVAL (m)	DESCRIPTION	COMMENTS
12 1/4"	2169 - 2196.5	12 1/4" Corehead/90' Corebarrel/2 x 8" DC/Stab/12 x 8" DC/Jar/3 x 8" DC/ XO/HWDP/Dart Sub/14 x HWDP	Core no 1
12 1/4"	2196.5 - 2214	----------||----------	Core no 2
12 1/4"	2214 - 2216	----------||----------	Core no 3
12 1/4"	2216 - 2228	----------||----------	Core no 4
12 1/4"	2228 - 2242	----------||----------	Core no 5
12 1/4"	2242 - 2262	----------||----------	Core no 6
12 1/4"	2262 - 2289.5	----------||----------	Core no 7
12 1/4"	2289.5 - 2305.5	----------||----------	Core no 8
12 1/4"	2305.5 - 2333	----------||----------	Core no 9
12 1/4"	2333 - 2360.5	----------||----------	Core no 10

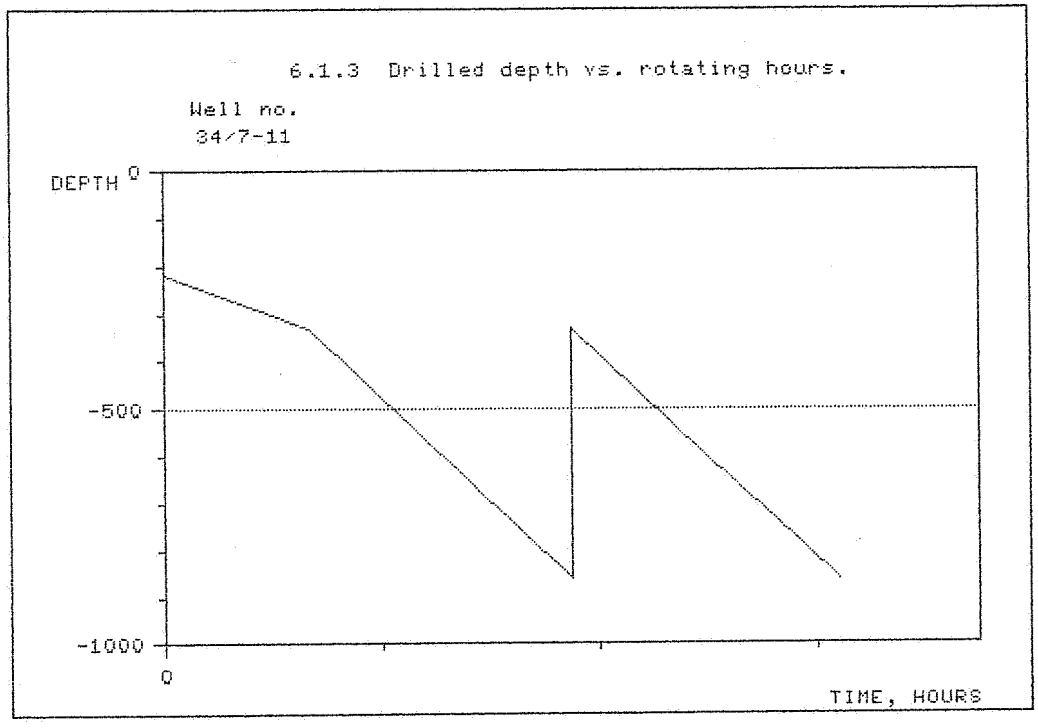
Industritrykk 31725

Saga Petroleum a.s.

6.1.2. Bottom Hole Assemblies

Well no: 34/7-12

BIT SIZE	DEPTH INTERVAL (m)	DESCRIPTION	COMMENTS
12 1/4"	2360.5 - 2480	12 1/4" Bit/NB Stab w/Float/MWD Sub/MWD/Stab w/TR/Monel/1 x 8" DC/Stab/ 20 x 8" DC/Jar/3 x 8" DC/XO/HWDP/Dart Sub/14 x HWDP	
12 1/4"	2480 - 2492	----------||----------	
12 1/4"	2492 - 2605	----------||----------	
12 1/4"	2605 - 2609	12 1/4" Bit/Junk Sub/NB Stab w/Float/8" MWD/Stab/8" Monel/8" DC/Stab/ 20 x 8" DC/7 3/4" Jar/3 x 8" DC/XO/HWDP/Dart Sub/14 x HWDP	
12 1/4"	2609 - 2622	12 1/4" Bit/NB Stab w/Float/8" MWD/Stab/8" Monel/21 x 8" DC/7 3/4" Jar/ 3 x 8" DC/XO/HWDP/Dart Sub/14 x HWDP	
12 1/4"	2622 - 2655	----------||----------	
12 1/4"	2655 - 2703	----------||----------	
12 1/4"	2703 - 2744	----------||----------	
12 1/4"	2744 - 2784	----------||----------	
8 1/2"	2204 - 2245	8 1/2" Bit/9 5/8" Csg. scraper/XO/18 x 6 1/2" DC/1 x HWDP/Dart Sub/ 14 x HWDP	Cleaned out cmt. inside 9 5/8" csg.

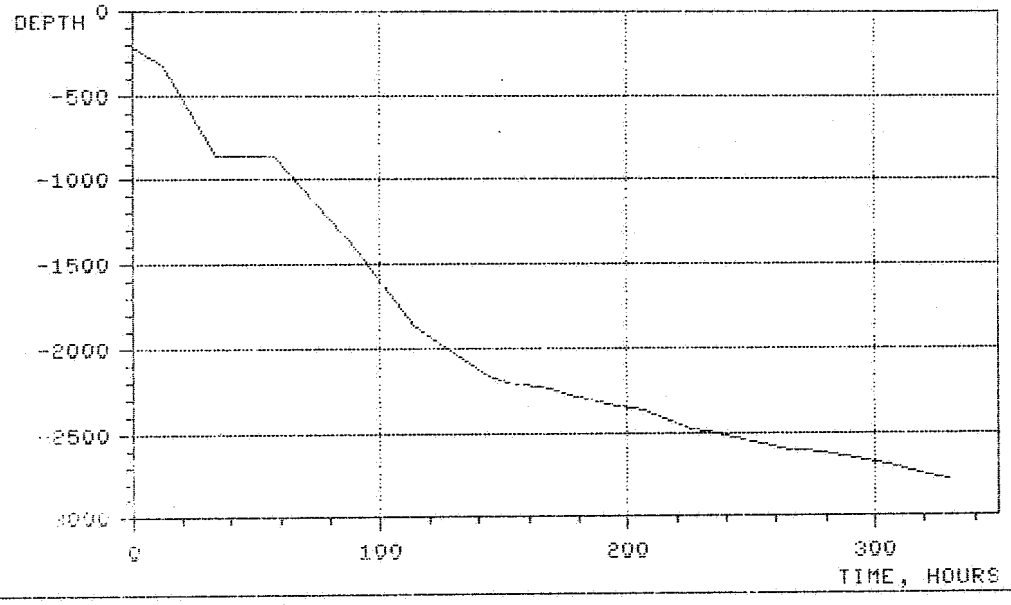


Saga Petroleum a.s.

DATE 14.4.88	AUTH. SBj
DRAW. BY SBj	APPR. PTK
REF. 6.1.3	34/7-11

6.1.3 Drilled depth vs. rotating hours.

Well no.
34/7-12



Saga Petroleum a.s.

DATE	7.4.88	AUTH.	SBj
DRAW. BY	SBj	APPR.	PTK
REF.	6.1.3		34/7-12

SAGA PETROLEUM A.S.

6.2.1 MUD PROPERTIES, DAILY REPORT

Well no: 34/7-11

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf / Mf	Ca++ mg/l	Cl- mg/l	KCL ppb	Sand %	Solids %	Mudtype
870929		.0	1.03											SPUD MUD
870930		.0	1.03											SPUD MUD
871002	36	248.0	1.03											SPUD MUD
871003	36	332.0	1.05											SPUD MUD
871004	26	332.0	1.12											SPUD MUD
871005	17-1/2	664.0	1.13	5	26	23/28	9.0	0.1/0.0		11000		0.1	7.0	SPUD MUD
871006	26	861.0	1.14	6	28	23/29	8.7	0.1/0.0		12500				SPUD MUD
871007	26	861.0	1.16	5	25	21/26	8.0			13000		0.5	9.0	SPUD MUD
871008	26	861.0	1.20	5	21	17/25	9.4			13000		0.5	9.0	SPUD MUD
871009	26	861.0	1.03											SPUD MUD
871010	26	861.0	1.07	19	20	3/14	8.2	0.5/0.1		40000	28	0.1	3.5	KCL MUD
871011	PB	216.0	1.07	22	22	2/3	8.1	0.2/0.3	200	75000	33	0.5	11.5	KCL MUD

SAGA PETROLEUM A.S.

6.2.1 MUD PROPERTIES, DAILY REPORT

Well no: 34/7-12

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf / Mf	Ca++ mg/l	Cl- mg/l	KCL ppb	Sand %	Solids %	Mudtype
871011	36	225.0	1.05											SPUD MUD
871012	36	332.0	1.05											SPUD MUD
871013	17-1/2	379.0	1.13	5	25	21/23	8.6	0.2/0.3		9500		0.3	7.0	SPUD MUD
871014	17-1/2	852.0	1.15	6	28	22/26	9.0	0.2/0.3		12500		0.3	9.5	SPUD MUD
871015	26	852.0	1.17	5	28	23/27	9.0	0.2/0.3		13000		0.3	10.5	SPUD MUD
871016	26	852.0	1.20	6	26	23/26	9.0	0.2/0.3		13000			11.5	SPUD MUD
871017	26	852.0	1.20	6	26	23/26	9.0	0.2/0.3		13000			11.5	SPUD MUD
871018	26	852.0	1.05	22	18	2/2	8.5						2.0	KCL MUD
871019	17-1/2	852.0	1.05	20	21	4/4	8.5		120	50000	35		8.0	KCL MUD
871020	17-1/2	852.0	1.05	20	21	4/4	8.5		120	50000	35		5.0	KCL MUD
871021	17-1/2	870.0	1.09	18	18	2/2	8.0		120	49000	29		6.0	KCL MUD
871022	17-1/2	1334.0	1.17	22	22	2/3	8.1	0.2/0.3	200	75000	33	0.5	11.5	KCL MUD
871023	17-1/2	1544.0	1.25	25	25	3/5	8.2	0.0/0.1	240	68000	33	1.0	13.0	KCL MUD
871024	17-1/2	1865.0	1.58	34	25	4/5	8.4	0.0/0.1	360	60000	33	1.5	24.0	KCL MUD
871025	17-1/2	1865.0	1.58	35	26	8/10	8.4	0.1/0.4	400	60000	31	1.5	24.0	KCL MUD
871026	17-1/2	1865.0	1.58	35	24	6/10	8.3	0.1/0.3	400	60000	31	1.5	24.0	KCL MUD
871027	12-1/4	1870.0	1.58	32	22	5/8	8.9	0.2/0.3	240	60000	31	1.0	24.0	KCL MUD
871028	12-1/4	2106.0	1.72	32	18	6/8	9.0	0.2/0.4	40	57000	31	1.0	26.0	KCL MUD
871029	12-1/4	2183.0	1.72	27	13	8/25	9.6	0.2/0.8	240	60000	32	1.0	27.0	KCL MUD
871030	12-1/4	2214.0	1.72	31	15	5/14	10.8	0.2/0.6	120	61000	34	1.0	27.0	KCL MUD
871031	12-1/4	2234.0	1.72	29	11	2/5	10.9	0.3/1.0	160	56000	36	1.0	27.0	KCL MUD
871101	12-1/4	2276.0	1.72	30	10	2/8	10.9	0.3/1.1	200	56000	34	1.0	27.0	KCL MUD
871102	12-1/4	2314.0	1.72	30	13	2/10	10.9	0.3/1.1	200	58000	32	0.5	26.0	KCL MUD
871103	12-1/4	2357.0	1.72	30	11	2/10	10.8	0.3/1.1	200	59000	31	0.5	26.0	KCL MUD
871104	12-1/4	2364.0	1.72	28	11	2/9	10.4	0.3/1.0	280	58000	31	0.5	27.0	KCL MUD
871105	12-1/4	2480.0	1.72	27	13	3/20	9.8	0.3/0.9	240	58000	28	0.5	27.0	KCL MUD
871106	12-1/4	2480.0	1.72	28	10	2/9	9.6	0.3/0.9	280	60000	28	0.5	27.5	KCL MUD
871107	12-1/4	2480.0	1.70	28	11	2/10	9.6	0.3/0.9	280	60000	28	0.5	27.5	KCL MUD
871108	12-1/4	2510.0	1.72	25	12	3/18	9.6	0.2/0.8	280	60000	28	0.1	28.0	KCL MUD
871109	12-1/4	2595.0	1.72	26	13	3/22	9.3	0.2/0.7	320	61500	30	0.1	29.0	KCL MUD
871110	12-1/4	2609.0	1.72	22	11	2/13	9.3	0.2/0.7	360	57500	23		26.5	KCL MUD

SAGA PETROLEUM A.S.

6.2.1 MUD PROPERTIES, DAILY REPORT

Well no: 34/7-12

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf / Mf	Ca++ mg/l	Cl- mg/l	KCL ppb	Sand %	Solids %	Mudtype
871111	12-1/4	2622.0	1.72	23	11	2/8	9.6	0.2/0.7	360	57000	25		26.0	KCL MUD
871112	12-1/4	2655.0	1.72	25	11	3/9	9.4	0.2/0.9	280	57000	25	0.1	26.5	KCL MUD
871113	12-1/4	2705.0	1.72	25	13	3/17	9.3	0.2/0.9	240	56500	23		26.5	KCL MUD
871114	12-1/4	2778.0	1.72	28	13	3/21	9.7	0.2/1.1	220	52000	21	0.3	27.0	KCL MUD
871115	12-1/4	2784.0	1.72	28	14	3/24	9.5	0.2/1.0	200	51000	20	0.3	27.0	KCL MUD
871116	12-1/4	2784.0	1.72	28	14	3/24	9.4	0.2/0.9	200	51000	20	0.1	27.0	KCL MUD
871117	12-1/4	2784.0	1.72	26	13	3/21	9.2	0.2/0.9	200	50500	20	0.1	27.0	KCL MUD
871118	12-1/4	2784.0	1.72	26	13	3/21	9.2	0.2/0.9	200	50500	20		27.0	KCL MUD
871119	PB	2381.0	1.72	31	22	5/31	11.5	0.5/1.8	320	40000		0.1	27.0	GEL MUD
871120	PB	2330.0	1.72	29	11	3/30	11.5	0.5/1.5	320	42000			27.0	GEL MUD
871121	PB	2330.0	1.72	30	15	4/25	11.8	0.5/1.5	240	42000			27.0	GEL MUD
871122	PB	2330.0	1.72	30	15	4/25	11.5	0.2/1.5	240	42000			27.0	GEL MUD
871124	PB	2330.0	1.72	30	15	4/25	11.8	0.5/1.5	240	42000		0.1	27.0	GEL MUD
871129	PB	2267.0	1.72	28	13	3/18	11.8	0.5/1.5	240	42000			27.0	GEL MUD
871206	PB	2267.0	1.72	25	14	3/22	12.5	0.7/1.7	320	39000			27.0	GEL MUD
871207	PB	2224.0	1.72	24	14	3/24	12.5	0.7/1.7	340	39000		0.1	27.0	GEL MUD
871213	PB	2120.0	1.72	24	14	3/24	12.2	0.6/1.5	320	37000		0.1	27.0	GEL MUD
871214	PB	2120.0	1.72	24	14	3/24	12.2	0.6/1.5	320	37000		0.1	27.0	GEL MUD

SAGA PETROLEUM A.S.

6.2.2 MUD MATERIALS USED

Well no: 34/7-11

Materials	Unit	36 in hole	26 in hole	17-1/2 hole	12-1/4 hole	8-1/2 hole	Total
BARITE	M/T	0	123	0	0	0	123
CAUSTIC SODA	25 KG	4	7	0	0	0	11
Antisol FL 30	25 kg	0	22	0	0	0	22
LIME	40 KG	4	10	0	0	0	14
SODA ASH	50 KG	4	7	0	0	0	11
BENTONITE	M/T	15	53	0	0	0	68
ANTISOL FL 30	25 KG	0	68	0	0	0	68
KCL - BRINE	BBL	0	600	0	0	0	600

SAGA PETROLEUM A.S.

6.2.2 MUD MATERIALS USED

Well no: 34/7-12

Materials	Unit	36 in hole	26 in hole	17-1/2 hole	12-1/4 hole	8-1/2 hole	Total
SAPP	50 KG	0	0	18	3	0	21
BARITE	M/T	0	67	356	758	0	1181
BICARBONATE	50 KG	0	0	8	16	0	24
CAUSTIC SODA	25 KG	6	8	1	52	0	67
Antisol FL 30	25 kg	0	0	103	161	0	264
Magconol	25 l	0	0	4	2	0	6
Resinex	50 lb	0	0	0	120	0	120
Oilex	GALLO	0	0	0	20	0	20
Sodium Sulpha	50 kg	0	0	0	2	0	2
LIME	40 KG	2	7	0	42	0	51
KOH -POTASS.	50KG	0	0	36	32	0	68
SODA ASH	50 KG	4	0	7	0	0	11
BENTONITE	M/T	28	21	0	3	0	52
BENTONITE	50 KG	0	0	33	0	0	33
ANTISOL FL 10	25 KG	0	0	0	3	0	3
ANTISOL FL 30	25 KG	0	0	195	70	0	265
BORREWELL C	25KG	0	0	0	244	0	244
MAGCO 101 INH	55 GA	0	0	0	15	0	15
XC-POLYMER	25 KG	0	0	2	10	0	12
KCL - SXS	50 KG	0	0	921	1072	0	1993
KCL - BRINE	BBL	0	0	1830	0	0	1830
XP-20	50 LB	0	0	0	265	0	265

Saga Petroleum a.s.

6.3. Casing Data

Well no: 34/7-11

SIZE inches	DATE RUN	GRADE	NO OF JOINTS	TOTAL LENGTH m	WEIGHT kg/m (lbs/ft)	COUPLINGS	SHOE DEPTH m-RKB	FLOAT COLL DEPTH m-RKB	CENTRALIZERS type	CENTRALIZERS depth m	REMARKS
30"	3.10.87	B	9	111.6	459.87 (309)	ST-2	327	-			
20"	9.10.87	X56	53	630.71	197.94 (133)	RL-4S	845.01	831.45	Pos.	318.56 306.76	Held 18 3/4" wellhead 1 m above 30" housing while displacing cement.
									Bow.	842.01 838.76 813.75 801.80 789.84 777.89 765.78	Attempt to land 18 3/4" wellhead after 3700 strokes. No success. 18 3/4" wellhead 0.6 m too high.

Saga Petroleum a.s.

6.3. Casing Data

Well no: 34/7-12

SIZE inches	DATE RUN	GRADE	NO OF JOINTS	TOTAL LENGTH m	WEIGHT kg/m (lbs/ft)	COUPLINGS	SHOE DEPTH m-RKB	FLOAT COLL DEPTH m-RKB	CENTRALIZERS type	CENTRALIZERS depth m	REMARKS
30"	12.10.87	B	9	112	459.87 (309)	ST-2	327	-	-	-	
20"	18.10.87	X-56	50	621.51	197.94 (133)	LS	837.51	824.03	Bow:	835 823 810 797 785 772.5 760	
									Pos:	314 301	
13 3/8"	27.10.87	N-80	139	1635.27	107.15 (72)	Buttress	1851.27	1826	Pos:	820	
									Bow:	1848 1835 1823 1811 1799 1787 1775	

Saga Petroleum a.s.

6.3. Casing Data

Well no: 34/7-12

SIZE inches	DATE RUN	GRADE	NO OF JOINTS	TOTAL LENGTH m	WEIGHT kg/m (lbs/ft)	COUPLINGS	SHOE DEPTH m-RKB	FLOAT COLL DEPTH m-RKB	CENTRALIZERS type	CENTRALIZERS depth m	REMARKS
9 5/8"	21.11.87	N-80	178	2149.96	69.98 (47)	Buttress	2366	2330.3	Pos:	1845	
										1832	
									Bow:	2360	
										2348	
										2336	
										2324	
										2312	
										2300	
										2288	
										2276	
										2265	
										2252	
										2239	
										2226	
										2213	
										2201	
										2188	

Industritrykk 31725

Saga Petroleum a.s.

6.4. Cement Data

Well no: 34/7-11

DATE	JOB DESCRIPTION	SHOE DEPTH m-RKB	CEMENT TYPE	SLURRY WEIGHT SG	SLURRY VOLUME USED m³	ADDITIVES L/100kg CEMENT	MIX WATER L/100 kg CEMENT	LOSSES m³	REMARKS
3.10.87	30" csg.	327	G	L:1.58 T:1.92	51.5 16	A-3L:4.0 A-7L:3.55	SW:93.65 SW:41.1	-	
9.10.87	20" csg.	845.01	G	LI:1.56	16	A-3L:3.55 R-15L:0.53	SW:92.31	-	
				LII: 1.63	200	EMSAC:25.18 D19:1.4 % D31LN:2	SW:67.96	-	
				T:1.92	16	Neat	SW:44	-	

Industritrykk 31725

Saga Petroleum a.s.

6.4. Cement Data

Well no: 34/7-12

DATE	JOB DESCRIPTION	SHOE DEPTH m-RKB	CEMENT TYPE	SLURRY WEIGHT SG	SLURRY VOLUME USED m³	ADDITIVES L/100kg CEMENT	MIX WATER L/100 kg CEMENT	LOSSES m³	REMARKS
12.10.87	30" csg.	327	G	L:1.58 T:1.92	52.33 16.04	A-3L:4.0 A-7L:3.55	SW:93.65 SW:41.1		Lost returns halfway through the lead slurry. Reduced pumprate and succeeded to regain partial returns.
18.10.87	20" csg.	837.51	G	LI: 1.56 LII: 1.63 T:1.92	21.59 134.07 16.14	A-3L:3.55 R-15L:0.53 EMSAC:25.18 D19:1.4 % D31LN:2.5 R-12L:0.36 Neat	SW:92.31 SW:67.81 SW:44	- - -	EMSAC was used in lead II due to shallow gas.
27.10.87	13 3/8"csg.	1851.27	G	L:1.60 T:1.90	81.95 16	Bent:1.7 % D31LN:1.78 D31LN:0.89 R-12L:0.4	FW:81.81 FW:43.09	- -	
18.11.87	Balanced cmt. plug	-	G	1.90	11.9	R-12L:1.07	FW:43.24	-	Set balanced cementplug from 2780-2580 m.
18.11.87	Balanced cmt. plug	-	G	1.90	18.1	R-12L:1.07	FW:43.24	-	Set balanced cementplug from 2570-2370 m.
21.11.87	9 5/8"csg.	2366	G	T:1.90	29.56	D19:0.5 % D31LN:1.33 R-12L:0.27	FW:41.96	-	

Industritrykk 31725

Saga Petroleum a.s.

6.4. Cement Data

Well no: 34/7-12

DATE	JOB DESCRIPTION	SHOE DEPTH m-RKB	CEMENT TYPE	SLURRY WEIGHT SG	SLURRY VOLUME USED m^3	ADDITIVES L/100kg CEMENT	MIX WATER L/100 kg CEMENT	LOSSES m^3	REMARKS
28.11.87	Plug/ squeeze	-	G	1.90	2.7	D-19LN:1.5 R-12L:0.75	FW:42.05	-	Set a balanced cementplug from 2235-2164 m. Pull up 3 stds and reverse out drillpipe. Close MPR and squeeze 2.3 m^3 using hesitation squeeze method.
28.11.87	Squeeze	-	G	1.90	4.7	D-19LN:1.5 R-12L:0.75	FW:42.05	-	Displace cement to retainer at 2267 m and squeeze 4 m^3 through perforations, and rest on top of retainer. Reverse out drillpipe.
7.12.87	Squeeze	-	G	1.90	4.7	D-19LN:1.5 R-12L:0.75	FW:42.05	-	Displace cement to retainer at 2224 m. Squeeze 3.2 m^3 through perforations and rest on top of retainer.
13.12.87	Squeeze	-	G	1.90	6.4	D-19LN:1.5 R-12L:0.75	FW:42.05	-	Displace cement to retainer at 2195 m. Squeeze 3.2 m^3 through perforations and dump rest on top of retainer.
15.12.87	Balanced cmt. plug	-	G	1.92	20	A-7L:1.78	SW:42.48	-	Set a balanced cementplug from 460-260 m.

SAGA PETROLEUM A.S.

6.5 DEVIATION DATA

Well no: 34/7-11

MD meter	TVD meter	INCLIN. deg.	AZIMUT deg.	DOGLEG deg/30m	+N,-S meter	+E,-W meter
230.0	230.0	1.00	240.0	.00	.00	.00
241.0	241.0	.75	135.0	3.81	-.14	-.02
270.0	270.0	1.00	200.0	1.00	-.55	-.07
297.0	297.0	.00	151.0	1.11	-.78	-.09
324.0	324.0	.00	102.0	.00	-.78	-.09
380.0	380.0	.40	4	.21	-.89	-.04
428.0	428.0	.40	298.1	.26	-.95	-.08
466.0	466.0	.40	254.2	.24	-.92	-.18
513.0	513.0	.40	271.7	.08	-.96	-.50
563.0	563.0	.20	94.2	.36	-.79	-.50
619.0	619.0	.30	304.8	.26	-.67	-.45
659.0	659.0	.10	86.5	.29	-.60	-.43
707.0	707.0	.40	35.0	.22	-.50	-.26
754.0	754.0	.50	27.0	.08	-.19	-.07
802.0	802.0	.20	52.7	.21	-.04	.12
856.0	856.0	.40	58.3	.11	.20	.35

SAGA PETROLEUM A.S. 6.5 DEVIATION DATA

Well no: 34/7-12

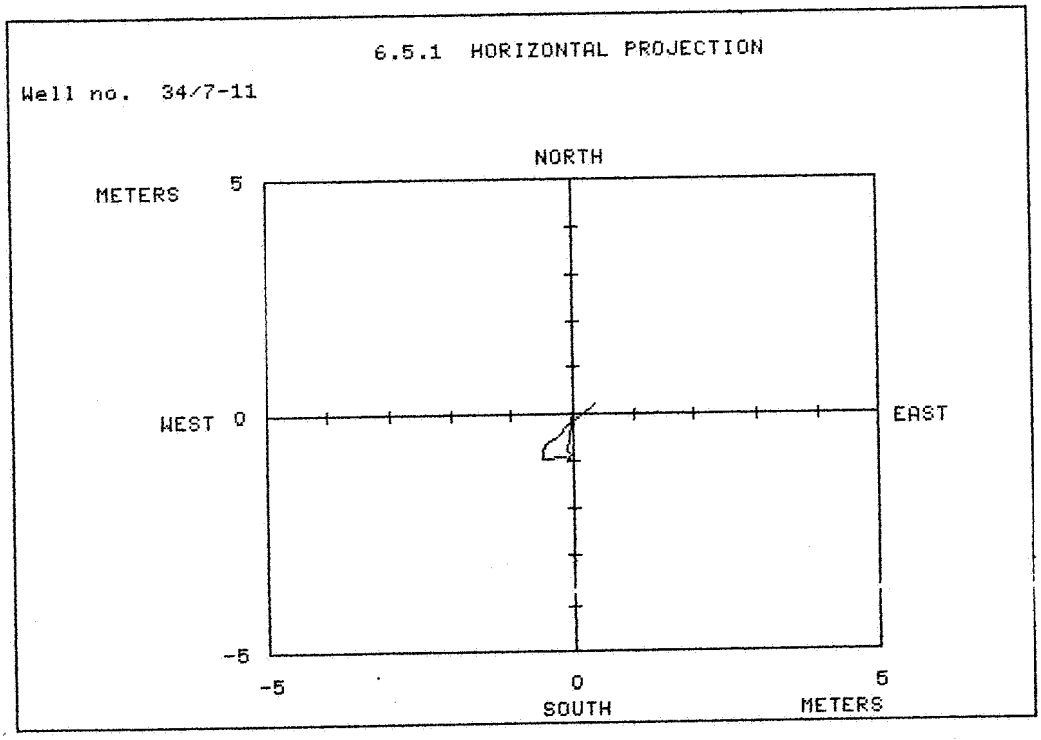
MD meter	TVD meter	INCLIN. deg.	AZIMUT deg.	DOGLEG deg/30m	+N,-S meter	+E,-W meter
223.0	223.0	.75	33.0	.00	.00	.00
232.0	232.0	.75	75.0	1.79	-.07	-.09
279.0	279.0	.50	105.0	.26	-.07	.60
332.0	332.0	.25	95.0	.15	-.01	.94
371.0	371.0	.60	71.0	.30	-.03	1.23
417.0	417.0	.80	73.5	.13	.14	1.76
464.0	464.0	1.00	57.3	.21	.45	2.43
515.0	515.0	.90	59.0	.06	.90	3.15
573.0	573.0	.70	51.7	.12	1.36	3.82
621.0	621.0	.80	43.7	.09	1.78	4.28
703.0	703.0	.40	45.3	.15	2.39	4.88
800.0	800.0	.30	92.8	.09	2.19	5.42
844.0	844.0	.40	86.5	.07	2.19	5.69
895.0	895.0	.30	360.0	.29	2.25	5.75
942.0	942.0	.40	34.4	.15	2.28	5.76
991.0	991.0	.50	32.0	.06	2.60	5.97
1039.0	1039.0	.40	65.0	.17	2.85	6.25
1086.0	1086.0	.50	64.0	.06	3.01	6.58
1134.0	1134.0	.70	50.0	.15	3.28	7.00
1183.0	1183.0	.90	61.9	.16	3.66	7.57
1241.0	1240.9	1.20	72.4	.18	4.08	8.54
1287.0	1286.9	1.40	87.9	.26	4.25	9.57
1335.0	1334.9	1.60	93.5	.15	4.27	10.82
1384.0	1383.9	1.60	94.2	.01	4.18	12.19
1418.0	1417.9	1.80	98.1	.20	4.07	13.19
1433.0	1432.9	1.90	98.8	.21	4.00	13.67
1479.0	1478.8	2.20	46.7	1.19	3.53	15.19
1527.0	1526.8	2.40	98.1	1.25	2.96	16.96
1576.0	1575.8	2.50	103.7	.16	2.57	19.02
1622.0	1621.7	2.80	102.3	.20	2.09	21.09
1669.0	1668.6	3.00	105.8	.17	1.51	23.40
1718.0	1717.6	3.20	105.4	.12	.80	25.95
1765.0	1764.5	3.30	106.5	.08	-.07	28.51
1810.0	1809.4	3.70	106.9	.27	-.72	31.14
1846.0	1845.3	4.00	107.9	.26	-1.44	33.45
1869.0	1868.3	4.10	105.4	.26	-1.91	35.01
1898.0	1897.2	4.00	107.2	.17	-2.48	36.97
1927.0	1926.1	4.20	107.9	.21	-3.11	38.95
1953.0	1952.1	4.30	108.2	.12	-3.71	40.78
1982.0	1981.0	4.20	108.3	.10	-4.38	42.82
2011.0	2009.9	4.40	109.0	.21	-5.08	44.88
2040.0	2038.8	4.40	109.7	.06	-5.81	46.98
2068.0	2066.7	4.70	109.0	.33	-6.55	49.08
2098.0	2096.6	4.90	109.0	.20	-7.37	51.45
2126.0	2124.5	5.10	108.6	.22	-8.15	53.76
2357.0	2354.6	5.10	106.5	.02	-14.34	73.34
2384.0	2381.5	5.00	105.8	.13	-15.01	75.62
2414.0	2411.4	4.90	105.8	.10	-15.71	78.11
2441.0	2438.3	5.10	104.7	.25	-16.33	80.38
2472.0	2469.2	5.10	104.7	.00	-17.03	83.05

SAGA PETROLEUM A.S.

6.5 DEVIATION DATA

Well no: 34/7-12

MD meter	TVD meter	INCLIN. deg.	AZIMUT deg.	DOGLEG deg/30m	+N,-S meter	+E,-W meter
2482.0	2479.1	5.10	104.7	.00	-17.25	83.91
2510.0	2507.0	5.10	104.4	.03	-17.88	86.32
2538.0	2534.9	5.20	103.3	.15	-18.48	88.76
2558.0	2554.8	5.40	100.2	.52	-18.86	90.57
2577.0	2573.7	5.30	99.7	.17	-19.16	92.31
2598.0	2594.6	4.90	97.4	.64	-19.44	94.16
2612.0	2608.6	5.00	97.4	.21	-19.60	95.35
2631.0	2627.5	4.90	96.7	.18	-19.80	96.98
2659.0	2655.4	4.50	98.4	.45	-20.10	99.26
2679.0	2675.4	4.40	96.0	.32	-20.29	100.80
2709.0	2705.3	4.00	96.7	.40	-20.54	102.98
2728.0	2724.2	4.00	93.5	.35	-20.65	104.30
2756.0	2752.2	3.90	93.8	.11	-20.78	106.22
2775.0	2771.1	3.70	98.8	.61	-20.91	107.47

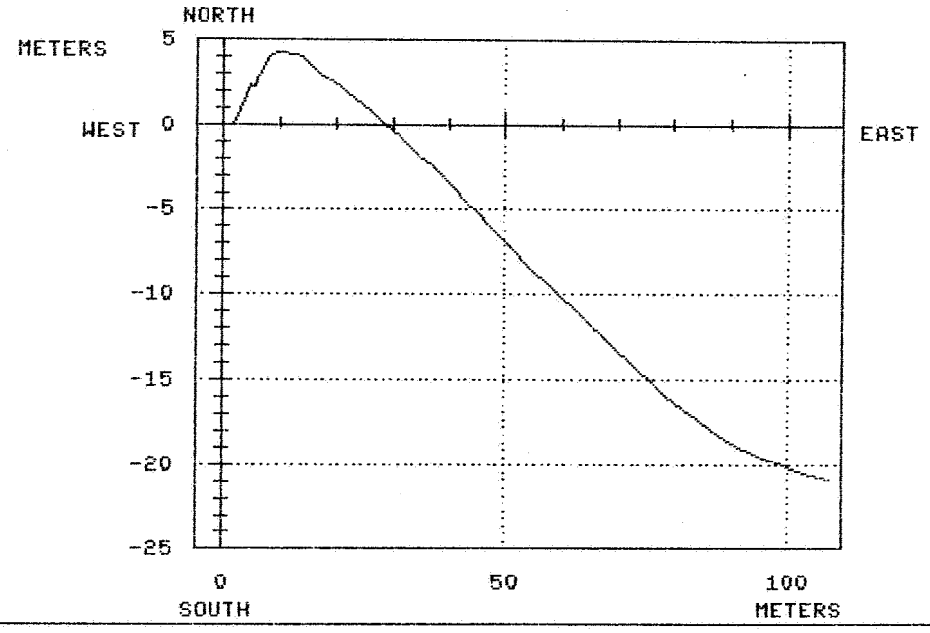


Saga Petroleum a.s.

DATE 14.4.88	AUTH. SBj
DRAW. BY SBj	APPR. PTK
REF. 6.5.1	34/7-11

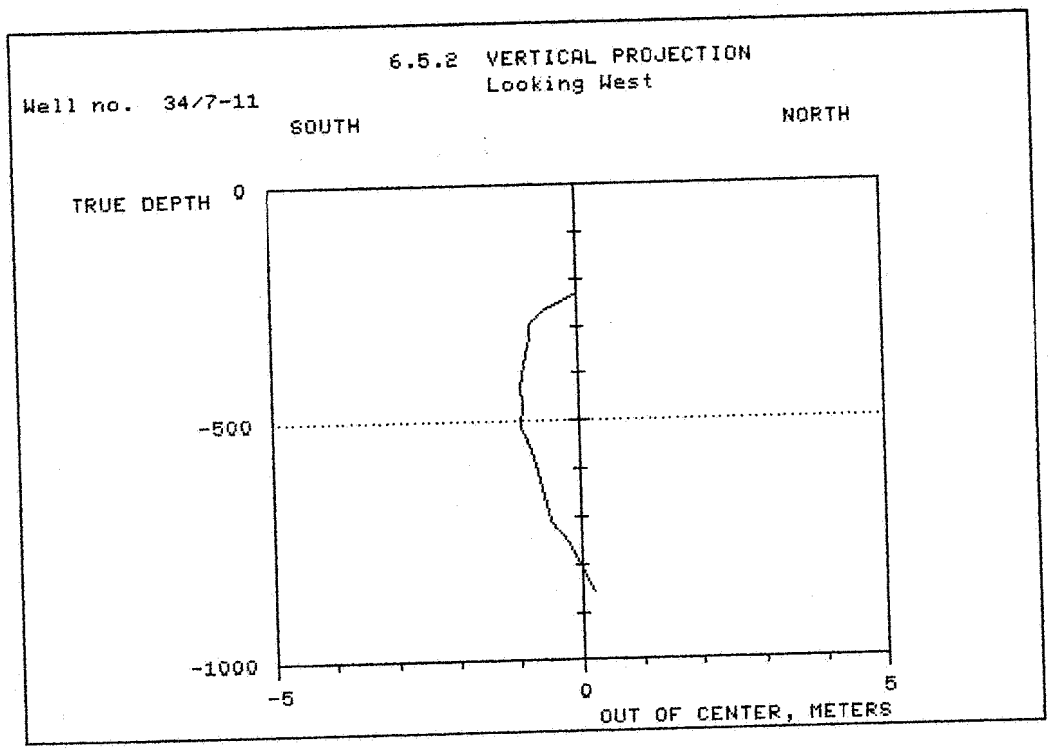
6.5.1 HORIZONTAL PROJECTION

Well no. 34/7-12



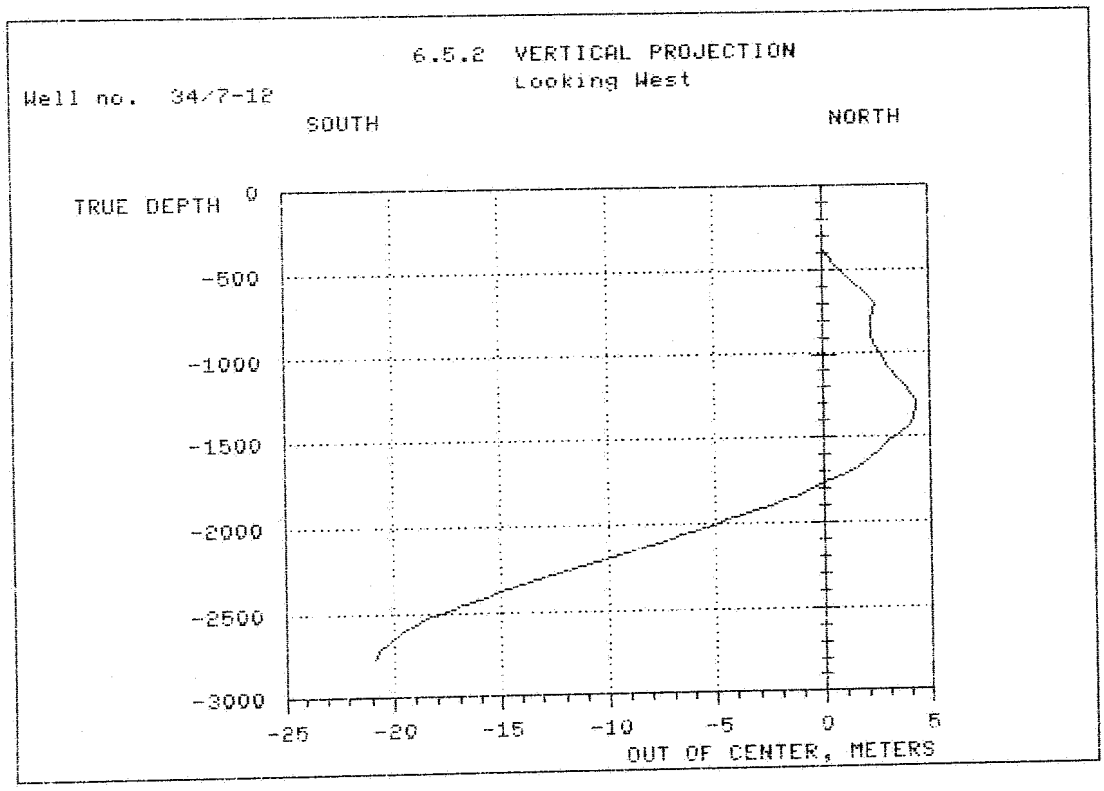
Saga Petroleum a.s.

DATE 7.4.88	AUTH. SBj
DRAW. BY SBj	APPR. PTK
REF. 6.5.1	34/7-12



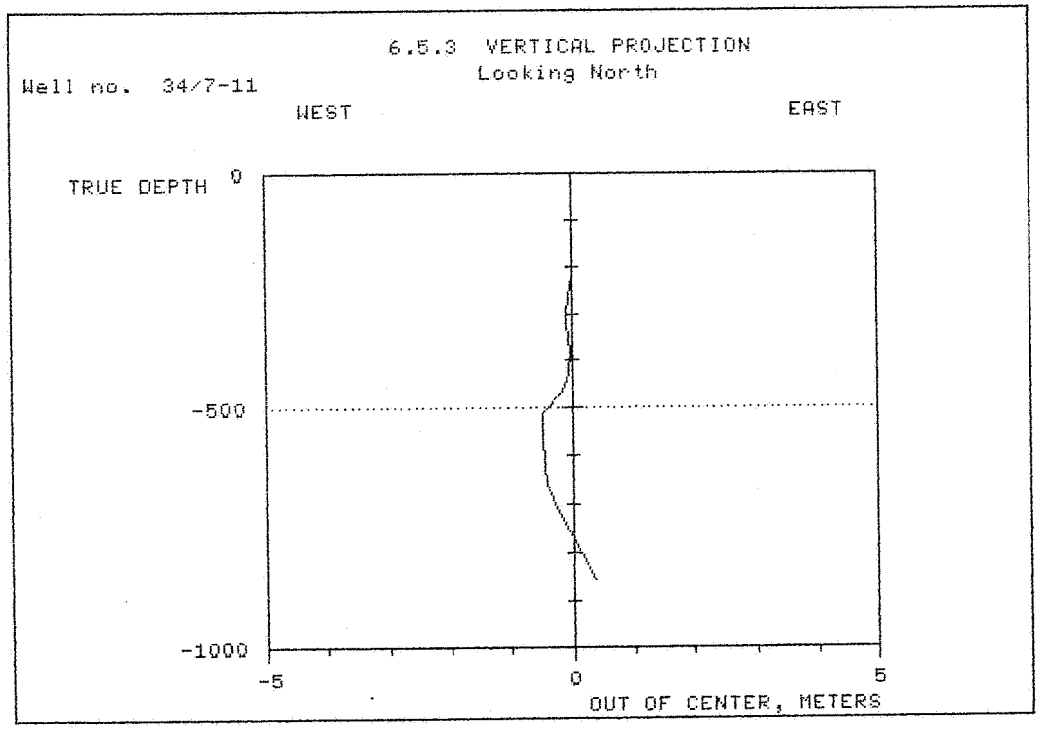
Saga Petroleum a.s.

DATE 14.4.88	AUTH. SBj
DRAW. BY SBj	APPR. PTK
REF. 6.5.2	34/7-11



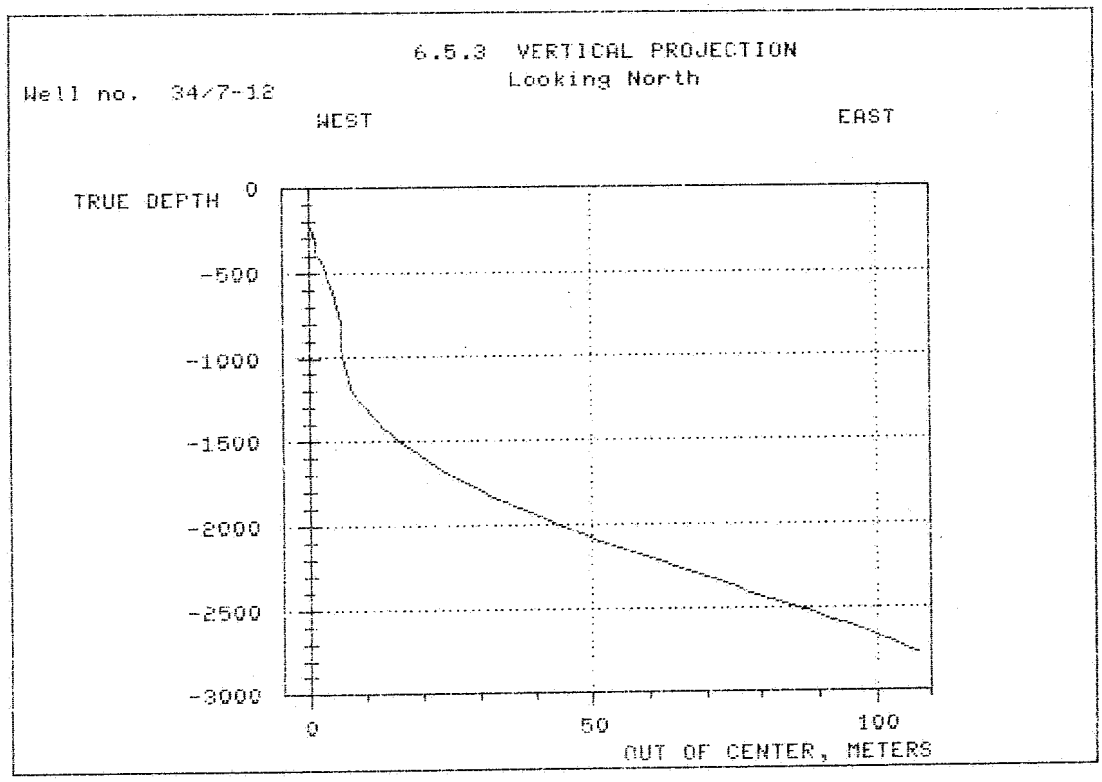
Saga Petroleum a.s.

DATE 7.4.88	AUTH. SBj
DRAW. BY SBj	APPR. PTK
REF. 6,5,2 34/7-12	



Saga Petroleum a.s.

DATE	14.4.88	AUTH.	SBj
DRAW. BY	SBj	APPR.	PTK
REF.	6.5.3		34/7-11



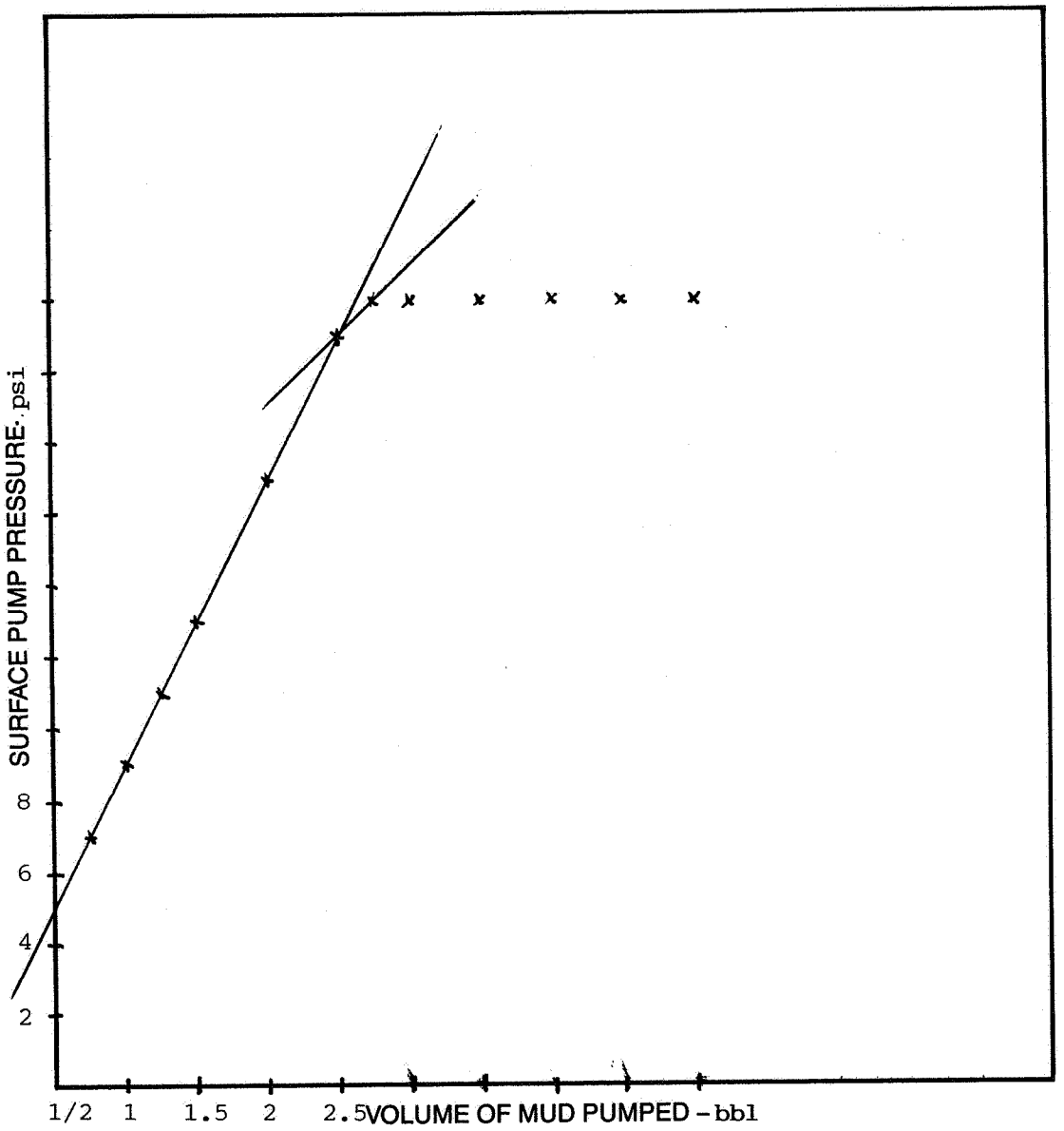
Saga Petroleum a.s.

DATE 7.4.88	AUTH. SBj
DRAW. BY SBj	APPR. PTK
REF. 6.5.3 34/7-12	

Saga Petroleum a.s.

6.6. Formation Leak off Test Data

Well no: 34/7-11



WELL	DATE
34/7-11	5.10.87

CSG. SIZE	VOLUME PUMPED
30"	3.5 bbl
CSG. SHOE DEPTH 327 m	VOLUME RECOVERED –
WATER DEPTH 190 m	FORMATION TYPE Claystone
HOLE SIZE 26"	LEAK OFF PRESSURE 21 psi
HOLE DEPTH 337 m	SHUT-IN PRESSURE 22 psi
MUD WEIGHT 1.12 SG	SHUT-IN TIME –
PUMP RATE 0.25 bbl/min	

EQV. MUD WEIGHT AT CSG. SHOE: 1.17 SG

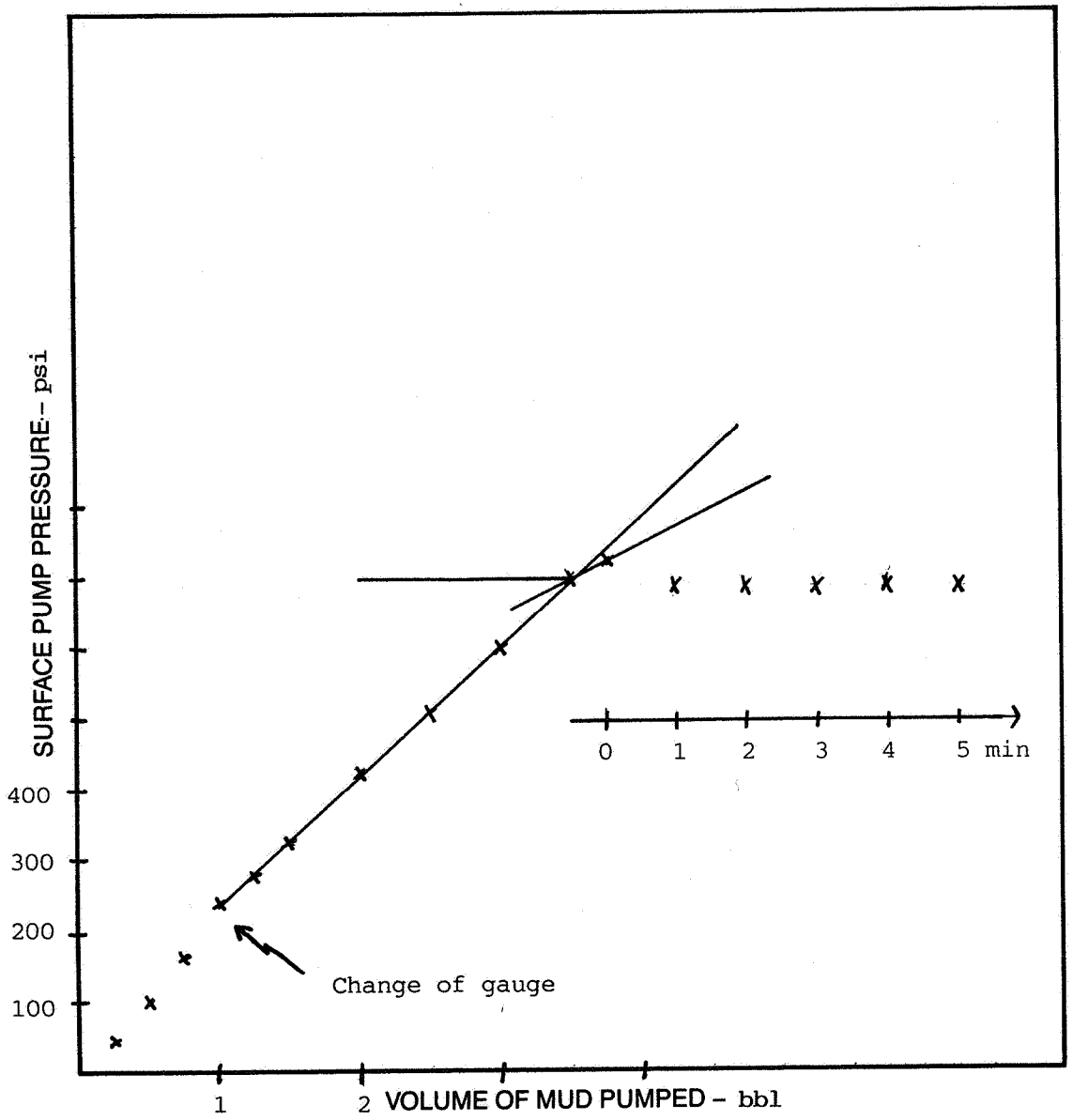
bbl	PRESSURE	bbl	PRESSURE
0.75	7	2.25	19
1.0	9	2.50	21
1.25	11	2.75	22
1.50	13	3.0	22
1.75	15	3.25	22
2.0	17	3.50	22

Industritrykk 31726

Saga Petroleum a.s.

6.6. Formation Leak off Test Data

Well no: 34/7-12



WELL	DATE
34/7-12	21.10.87

CSG. SIZE	VOLUME PUMPED
20"	3.75 bbl
CSG. SHOE DEPTH	VOLUME RECOVERED
838 m	3.50 bbl
WATER DEPTH	FORMATION TYPE
191 m	Claystone
HOLE SIZE	LEAK OFF PRESSURE
17 1/2"	700 psi
HOLE DEPTH	SHUT-IN PRESSURE
856 m	690 psi
MUD WEIGHT	SHUT-IN TIME
1.08 SG	5 min
PUMP RATE	
0.25 BPM	

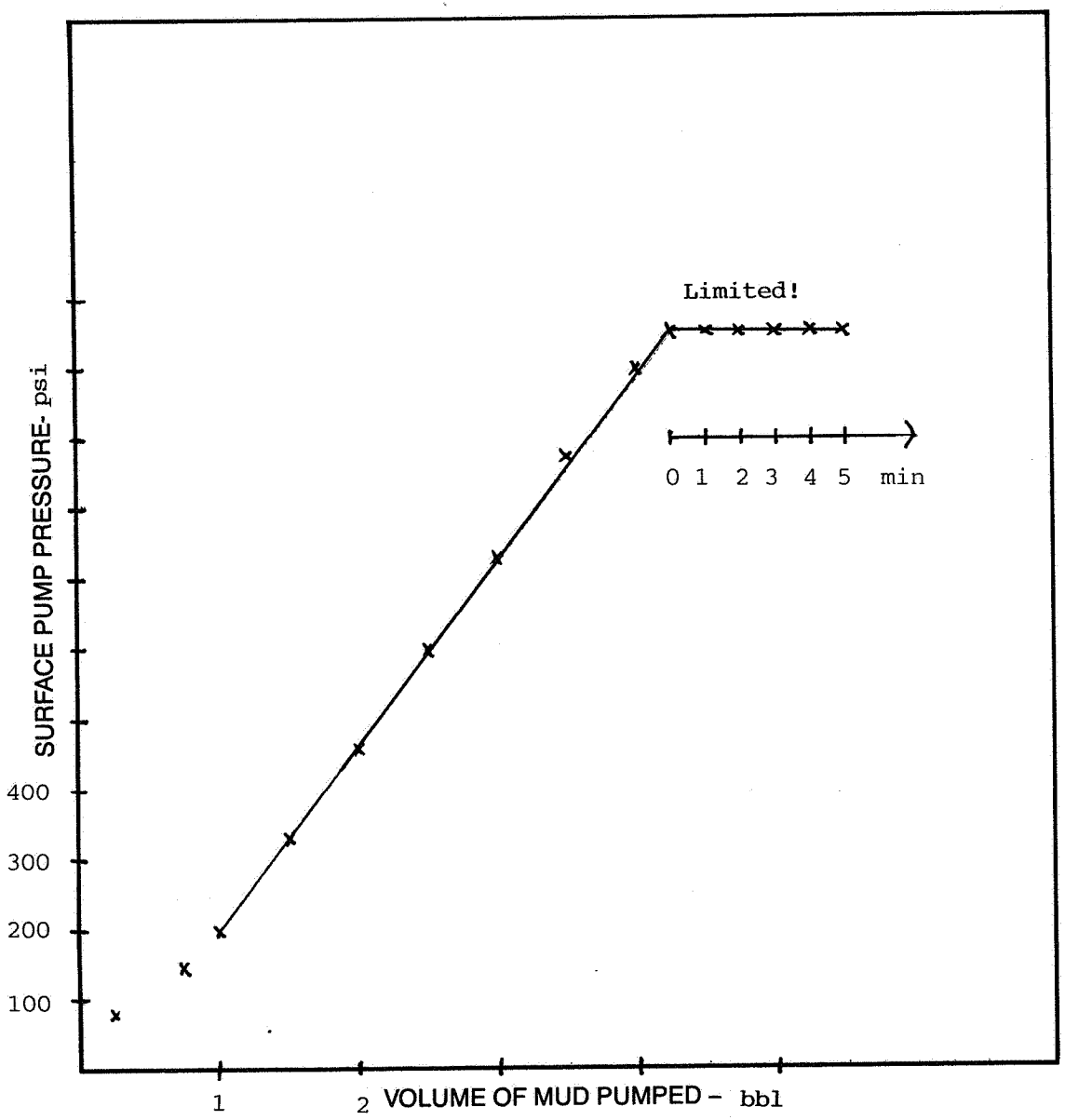
EQV. MUD WEIGHT AT CSG. SHOE: 1.66 SG

bbl	PRESSURE	bbl	PRESSURE
0.25	45	2.00	425
0.50	100	2.50	510
0.75	165	3.00	600
1.00	240	3.50	700
1.25	280	3.75	725
1.50	325		

Saga Petroleum a.s.

6.6. Formation Leak off Test Data

Well no: 34/7-12



WELL	DATE
34/7-12	28.10.87

CSG. SIZE 13 3/8"	VOLUME PUMPED 4.25 bbl
CSG. SHOE DEPTH 1851 m	VOLUME RECOVERED 3.75 bbl
WATER DEPTH 191 m	FORMATION TYPE Claystone
HOLE SIZE 12 1/4"	LEAK OFF PRESSURE 1053 psi
HOLE DEPTH 1944 m	SHUT-IN PRESSURE 1055 psi
MUD WEIGHT 1.60 SG	SHUT-IN TIME 5 min
PUMP RATE 0.5 BPM	

EQV. MUD WEIGHT AT CSG. SHOE: 2.00 SG

bbl	PRESSURE	bbl	PRESSURE
0.25	70	3.00	730
0.75	150	3.50	875
1.00	200	4.00	1000
1.50	330	4.25	1053
2.00	460		
2.50	600		

Industritrykk 31726

SAGA PETROLEUM A.S. 6.7. RIG TIME DISTRIBUTION

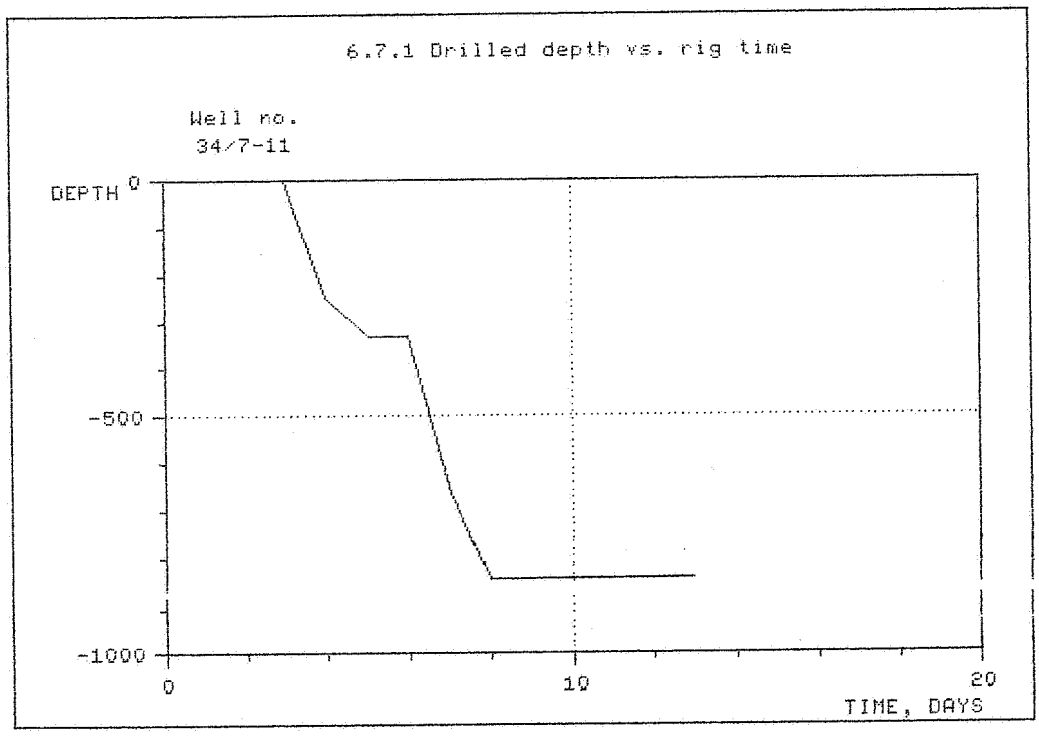
Well no: 34/7-11

Mainoperation	Suboperation	Hours		% of total rig time	
MOVING	ANCHOR	22.5		8.1	
MOVING	TRANSIT	41.0		14.7	
Sum :			63.5		22.8
DRILLING	BOP ACTIVITIES	5.0		1.8	
DRILLING	BOP/WELLHEAD EQ	39.5		14.2	
DRILLING	CASING	35.5		12.7	
DRILLING	CIRC/COND	8.0		2.9	
DRILLING	DRILL	38.5		13.8	
DRILLING	HOLE OPEN	24.5		8.8	
DRILLING	OTHER	1.0		0.4	
DRILLING	PRESS DETECTION	10.5		3.8	
DRILLING	SURVEY	2.5		0.9	
DRILLING	TRIP	29.0		10.4	
Sum :			194.0		69.7
INTERRUPTION	FISH	6.5		2.3	
INTERRUPTION	MAINTAIN/REP	1.0		0.4	
Sum :			7.5		2.7
PLUG & ABANDON	CEMENT PLUG	2.5		0.9	
PLUG & ABANDON	EQUIP RECOVERY	9.5		3.4	
PLUG & ABANDON	OTHER	1.5		0.5	
Sum :			13.5		4.8
Total rig time :		278.5		100.0	

SAGA PETROLEUM A.S. 6.7. RIG TIME DISTRIBUTION

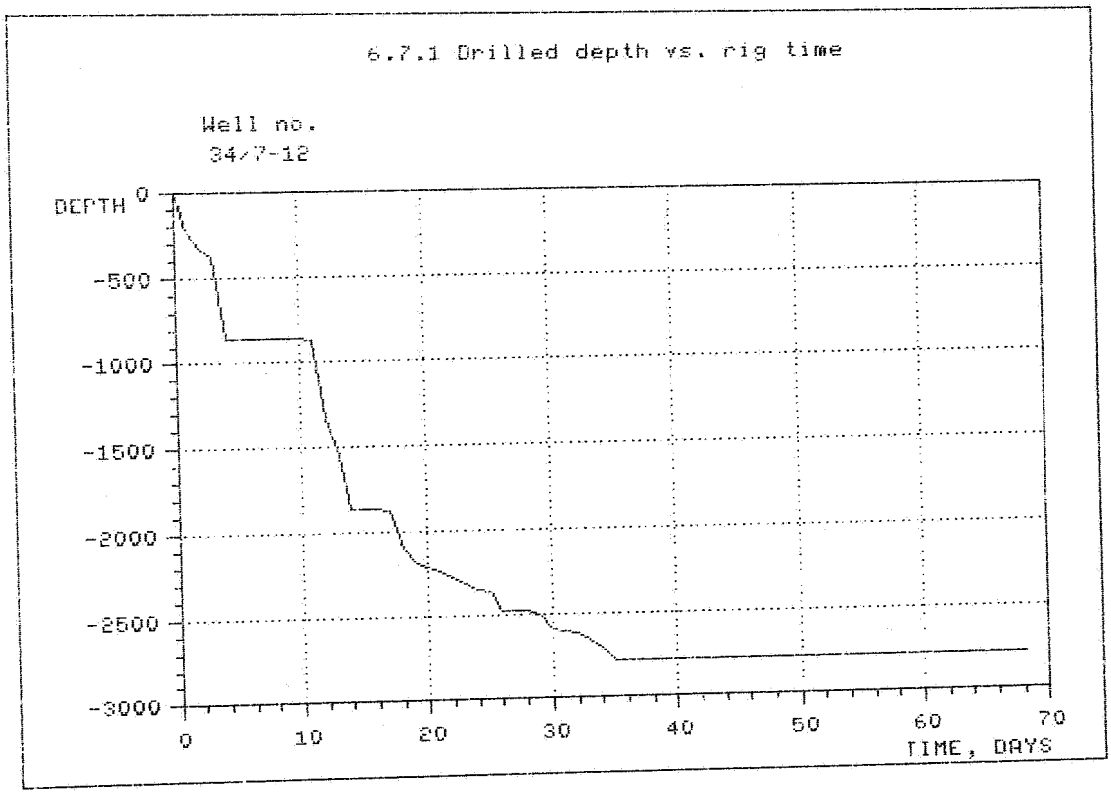
Well no: 34/7-12

Mainoperation	Suboperation	Hours		% of total rig time	
MOVING	ANCHOR	13.8		0.9	
MOVING	POSITION	1.0		0.1	
Sum :			14.8		0.9
DRILLING	BOP ACTIVITIES	26.5		1.6	
DRILLING	BOP/WELLHEAD EQ	52.0		3.2	
DRILLING	CASING	109.0		6.8	
DRILLING	CIRC/COND	12.5		0.8	
DRILLING	DRILL	242.5		15.1	
DRILLING	PRESS DETECTION	6.0		0.4	
DRILLING	REAM	9.0		0.6	
DRILLING	SURVEY	2.0		0.1	
DRILLING	TRIP	114.0		7.1	
DRILLING	UNDERREAM	19.0		1.2	
Sum :			592.5		36.8
FORMATION EVAL	CIRC SAMPLES	2.0		0.1	
FORMATION EVAL	CIRC/COND	16.5		1.0	
FORMATION EVAL	CORE	77.0		4.8	
FORMATION EVAL	DST	428.0		26.6	
FORMATION EVAL	LOG	130.0		8.1	
FORMATION EVAL	TRIP	147.0		9.1	
Sum :			800.5		49.7
INTERRUPTION	FISH	30.0		1.9	
INTERRUPTION	MAINTAIN	1.0		0.1	
INTERRUPTION	MAINTAIN/REP	21.0		1.3	
INTERRUPTION	SUBSEA EQ/F	12.0		0.7	
INTERRUPTION	SUBSURFACE EQ/F	6.0		0.4	
INTERRUPTION	SURFACE EQ/F	6.5		0.4	
INTERRUPTION	WAIT	49.5		3.1	
INTERRUPTION	WELL CONTROL	0.5		0.0	
Sum :			126.5		7.9
PLUG & ABANDON	CEMENT PLUG	6.5		0.4	
PLUG & ABANDON	CIRC/COND	2.0		0.1	
PLUG & ABANDON	CUT	12.0		0.7	
PLUG & ABANDON	EQUIP RECOVERY	17.5		1.1	
PLUG & ABANDON	OTHER	1.5		0.1	
PLUG & ABANDON	TRIP	36.5		2.3	
Sum :			76.0		4.7
Total rig time :		1610.3		100.0	



Saga Petroleum a.s.

DATE	14.4.88	AUTH.	SBj
DRAW. BY	SBj	APPR.	PTK
REF.	6.7.1 34/7-11		



Saga Petroleum a.s.

DATE	10.5.88	AUTH.	SBj
DRAW. BY	SBj	APPR.	PTK
REF.	6.7.1		34/7-12

SAGA PETROLEUM A.S. 6.7.2. DAILY RIG TIME DISTRIBUTION

Page 1 of 2 Well no: 34/7-11

Dato	Mainoperation	Suboperation	Hours	
29.09.87	MOVING	TRANSIT	3.5	
	Sum :			3.5
30.09.87	MOVING	TRANSIT	24.0	
	Sum :			24.0
01.10.87	MOVING	ANCHOR	10.5	
	MOVING	TRANSIT	13.5	
	Sum :			24.0
02.10.87	DRILLING	BOP/WELLHEAD EQ	3.0	
	DRILLING	DRILL	5.5	
	DRILLING	SURVEY	1.0	
	DRILLING	TRIP	2.5	
	MOVING	ANCHOR	12.0	
	Sum :			24.0
03.10.87	DRILLING	CASING	9.5	
	DRILLING	CIRC/COND	1.5	
	DRILLING	DRILL	8.0	
	DRILLING	SURVEY	1.5	
	DRILLING	TRIP	3.0	
	INTERRUPTION	MAINTAIN/REP	0.5	
	Sum :			24.0
04.10.87	DRILLING	BOP ACTIVITIES	0.5	
	DRILLING	BOP/WELLHEAD EQ	11.5	
	DRILLING	CASING	8.5	
	DRILLING	TRIP	3.5	
	Sum :			24.0
05.10.87	DRILLING	BOP ACTIVITIES	1.5	
	DRILLING	CIRC/COND	0.5	
	DRILLING	DRILL	16.5	
	DRILLING	TRIP	5.5	
	Sum :			24.0
06.10.87	DRILLING	CIRC/COND	3.0	
	DRILLING	DRILL	8.5	
	DRILLING	HOLE OPEN	7.0	
	DRILLING	PRESS DETECTION	0.5	
	DRILLING	TRIP	5.0	
	Sum :			24.0
07.10.87	DRILLING	CIRC/COND	3.0	
	DRILLING	HOLE OPEN	17.5	
	DRILLING	PRESS DETECTION	1.0	
	DRILLING	TRIP	2.0	
	INTERRUPTION	MAINTAIN/REP	0.5	
	Sum :			24.0
08.10.87	DRILLING	BOP/WELLHEAD EQ	7.0	
	DRILLING	CASING	2.0	
	DRILLING	PRESS DETECTION	9.0	
	DRILLING	TRIP	6.0	
	Sum :			24.0
09.10.87	DRILLING	BOP/WELLHEAD EQ	7.0	
	DRILLING	CASING	15.5	
	DRILLING	TRIP	1.5	
	Sum :			24.0

SAGA PETROLEUM A.S. 6.7.2. DAILY RIG TIME DISTRIBUTION

Page 2 of 2 Well no: 34/7-11

Dato	Mainoperation	Suboperation	Hours	
10.10.87	DRILLING	BOP ACTIVITIES	3.0	
	DRILLING	BOP/WELLHEAD EQ	11.0	
	DRILLING	OTHER	1.0	
	INTERRUPTION	FISH	6.5	
	PLUG & ABANDON	CEMENT PLUG	1.0	
	PLUG & ABANDON	OTHER	1.5	
	Sum :			24.0
11.10.87	PLUG & ABANDON	CEMENT PLUG	1.5	
	PLUG & ABANDON	EQUIP RECOVERY	9.5	
	Sum :			11.0

SAGA PETROLEUM A.S. 6.7.2. DAILY RIG TIME DISTRIBUTION

Page 1 of 6 Well no: 34/7-12

Dato	Mainoperation	Suboperation	Hours	
11.10.87	DRILLING	BOP/WELLHEAD EQ	7.5	
	DRILLING	DRILL	1.0	
	DRILLING	SURVEY	0.5	
	DRILLING	TRIP	2.5	
	MOVING	POSITION	1.0	
	Sum :			12.5
12.10.87	DRILLING	CASING	9.0	
	DRILLING	CIRC/COND	1.0	
	DRILLING	DRILL	11.0	
	DRILLING	SURVEY	1.5	
	DRILLING	TRIP	1.5	
	Sum :			24.0
13.10.87	DRILLING	BOP/WELLHEAD EQ	7.5	
	DRILLING	CASING	9.5	
	DRILLING	DRILL	3.0	
	DRILLING	TRIP	4.0	
	Sum :			24.0
14.10.87	DRILLING	CIRC/COND	1.5	
	DRILLING	DRILL	18.0	
	DRILLING	TRIP	4.0	
	INTERRUPTION	MAINTAIN/REP	0.5	
	Sum :			24.0
15.10.87	DRILLING	TRIP	3.0	
	DRILLING	UNDERREAM	18.0	
	INTERRUPTION	MAINTAIN/REP	3.0	
	Sum :			24.0
16.10.87	DRILLING	BOP/WELLHEAD EQ	6.0	
	DRILLING	CASING	6.0	
	DRILLING	CIRC/COND	3.0	
	DRILLING	PRESS DETECTION	1.5	
	DRILLING	TRIP	6.5	
	DRILLING	UNDERREAM	1.0	
	Sum :			24.0
17.10.87	DRILLING	CASING	11.0	
	INTERRUPTION	WAIT	13.0	
	Sum :			24.0
18.10.87	DRILLING	BOP/WELLHEAD EQ	10.0	
	DRILLING	CASING	7.0	
	INTERRUPTION	MAINTAIN/REP	0.5	
	INTERRUPTION	SUBSEA EQ/F	1.5	
	INTERRUPTION	WAIT	5.0	
	Sum :			24.0
19.10.87	INTERRUPTION	WAIT	24.0	
	Sum :			24.0
20.10.87	DRILLING	TRIP	7.5	
	INTERRUPTION	SUBSEA EQ/F	9.0	
	INTERRUPTION	WAIT	7.5	
	Sum :			24.0

SAGA PETROLEUM A.S. 6.7.2. DAILY RIG TIME DISTRIBUTION

Page 2 of 6 Well no: 34/7-12

Dato	Mainoperation	Suboperation	Hours	
21.10.87	DRILLING	BOP ACTIVITIES	3.0	
	DRILLING	BOP/WELLHEAD EQ	11.0	
	DRILLING	CASING	2.0	
	DRILLING	DRILL	2.5	
	DRILLING	PRESS DETECTION	1.5	
	DRILLING	TRIP	2.5	
	INTERRUPTION	SUBSEA EQ/F	1.5	
	Sum :			24.0
22.10.87	DRILLING	CIRC/COND	0.5	
	DRILLING	DRILL	21.0	
	DRILLING	REAM	0.5	
	DRILLING	TRIP	1.0	
	INTERRUPTION	MAINTAIN/REP	1.0	
	Sum :			24.0
23.10.87	DRILLING	BOP ACTIVITIES	0.5	
	DRILLING	DRILL	15.5	
	DRILLING	REAM	2.5	
	DRILLING	TRIP	5.5	
	Sum :			24.0
24.10.87	DRILLING	DRILL	17.0	
	FORMATION EVAL	CIRC/COND	3.5	
	FORMATION EVAL	TRIP	3.0	
	INTERRUPTION	MAINTAIN/REP	0.5	
	Sum :			24.0
25.10.87	DRILLING	CASING	1.0	
	DRILLING	TRIP	3.0	
	FORMATION EVAL	CIRC/COND	2.5	
	FORMATION EVAL	LOG	12.5	
	FORMATION EVAL	TRIP	4.0	
	INTERRUPTION	MAINTAIN/REP	1.0	
	Sum :			24.0
26.10.87	DRILLING	BOP/WELLHEAD EQ	1.5	
	DRILLING	CASING	17.0	
	DRILLING	CIRC/COND	2.5	
	DRILLING	TRIP	3.0	
	Sum :			24.0
27.10.87	DRILLING	BOP ACTIVITIES	2.5	
	DRILLING	BOP/WELLHEAD EQ	1.0	
	DRILLING	CASING	14.5	
	DRILLING	DRILL	1.5	
	DRILLING	TRIP	4.5	
	Sum :			24.0
28.10.87	DRILLING	BOP ACTIVITIES	2.5	
	DRILLING	DRILL	21.5	
	Sum :			24.0
29.10.87	DRILLING	DRILL	7.5	
	DRILLING	PRESS DETECTION	3.0	
	DRILLING	TRIP	2.5	
	FORMATION EVAL	CORE	4.5	
	FORMATION EVAL	TRIP	5.0	
	INTERRUPTION	MAINTAIN/REP	0.5	
	INTERRUPTION	SURFACE EQ/F	1.0	
	Sum :			24.0

SAGA PETROLEUM A.S. 6.7.2. DAILY RIG TIME DISTRIBUTION

Page 3 of 6 Well no: 34/7-12

Dato	Mainoperation	Suboperation	Hours	
30.10.87	FORMATION EVAL	CORE	11.0	
	FORMATION EVAL	TRIP	12.5	
	INTERRUPTION	SURFACE EQ/F	0.5	
	Sum :			24.0
31.10.87	FORMATION EVAL	CORE	11.5	
	FORMATION EVAL	TRIP	10.5	
	INTERRUPTION	MAINTAIN/REP	1.0	
	INTERRUPTION	SURFACE EQ/F	1.0	
	Sum :			24.0
01.11.87	FORMATION EVAL	CORE	14.5	
	FORMATION EVAL	TRIP	9.5	
	Sum :			24.0
02.11.87	FORMATION EVAL	CIRC/COND	1.0	
	FORMATION EVAL	CORE	13.5	
	FORMATION EVAL	TRIP	9.0	
	INTERRUPTION	MAINTAIN/REP	0.5	
	Sum :			24.0
03.11.87	FORMATION EVAL	CIRC/COND	0.5	
	FORMATION EVAL	CORE	18.5	
	FORMATION EVAL	TRIP	4.5	
	INTERRUPTION	MAINTAIN/REP	0.5	
	Sum :			24.0
04.11.87	DRILLING	BOP ACTIVITIES	6.5	
	DRILLING	DRILL	0.5	
	DRILLING	REAM	1.0	
	DRILLING	TRIP	3.5	
	FORMATION EVAL	CORE	3.5	
	FORMATION EVAL	TRIP	2.5	
	INTERRUPTION	MAINTAIN/REP	6.5	
	Sum :			24.0
05.11.87	DRILLING	DRILL	19.5	
	FORMATION EVAL	CIRC SAMPLES	2.0	
	FORMATION EVAL	CIRC/COND	1.5	
	FORMATION EVAL	TRIP	1.0	
	Sum :			24.0
06.11.87	FORMATION EVAL	CIRC/COND	2.0	
	FORMATION EVAL	LOG	16.0	
	FORMATION EVAL	TRIP	6.0	
	Sum :			24.0
07.11.87	DRILLING	TRIP	2.0	
	FORMATION EVAL	LOG	22.0	
	Sum :			24.0
08.11.87	DRILLING	DRILL	10.5	
	DRILLING	REAM	4.5	
	DRILLING	TRIP	8.5	
	INTERRUPTION	SURFACE EQ/F	0.5	
	Sum :			24.0
09.11.87	DRILLING	DRILL	24.0	
	Sum :			24.0
10.11.87	DRILLING	CIRC/COND	1.0	
	DRILLING	DRILL	9.5	
	DRILLING	TRIP	10.5	
	INTERRUPTION	MAINTAIN/REP	0.5	
	INTERRUPTION	SURFACE EQ/F	2.5	
	Sum :			24.0

SAGA PETROLEUM A.S. 6.7.2. DAILY RIG TIME DISTRIBUTION

 Well no: 34/7-12

Dato	Mainoperation	Suboperation	Hours	
11.11.87	DRILLING	BOP ACTIVITIES	5.5	
	DRILLING	CIRC/COND	0.5	
	DRILLING	DRILL	8.0	
	DRILLING	TRIP	8.5	
	INTERRUPTION	MAINTAIN/REP	1.0	
	INTERRUPTION	SURFACE EQ/F	0.5	
	Sum :			24.0
12.11.87	DRILLING	CIRC/COND	0.5	
	DRILLING	DRILL	13.5	
	DRILLING	TRIP	9.5	
	INTERRUPTION	WELL CONTROL	0.5	
	Sum :			24.0
13.11.87	DRILLING	DRILL	18.0	
	DRILLING	TRIP	6.0	
	Sum :			24.0
14.11.87	DRILLING	DRILL	17.5	
	DRILLING	REAM	0.5	
	DRILLING	TRIP	5.5	
	INTERRUPTION	MAINTAIN/REP	0.5	
	Sum :			24.0
15.11.87	DRILLING	CIRC/COND	2.0	
	DRILLING	DRILL	2.0	
	DRILLING	TRIP	3.0	
	FORMATION EVAL	LOG	17.0	
	Sum :			24.0
16.11.87	FORMATION EVAL	LOG	2.5	
	INTERRUPTION	FISH	21.5	
	Sum :			24.0
17.11.87	FORMATION EVAL	CIRC/COND	3.0	
	FORMATION EVAL	LOG	10.5	
	FORMATION EVAL	TRIP	5.0	
	INTERRUPTION	FISH	4.5	
	INTERRUPTION	MAINTAIN/REP	1.0	
	Sum :			24.0
18.11.87	FORMATION EVAL	LOG	24.0	
	Sum :			24.0
19.11.87	DRILLING	CASING	5.0	
	FORMATION EVAL	LOG	10.0	
	PLUG & ABANDON	CEMENT PLUG	4.5	
	PLUG & ABANDON	CIRC/COND	1.0	
	PLUG & ABANDON	TRIP	3.5	
	Sum :			24.0
20.11.87	DRILLING	BOP/WELLHEAD EQ	2.0	
	DRILLING	CASING	18.5	
	DRILLING	TRIP	2.5	
	INTERRUPTION	MAINTAIN/REP	1.0	
	Sum :			24.0
21.11.87	DRILLING	BOP ACTIVITIES	2.5	
	DRILLING	BOP/WELLHEAD EQ	1.0	
	DRILLING	CASING	3.5	
	DRILLING	TRIP	3.5	
	FORMATION EVAL	TRIP	13.5	
	Sum :			24.0

SAGA PETROLEUM A.S. 6.7.2. DAILY RIG TIME DISTRIBUTION

Page 5 of 6 Well no: 34/7-12

Dato	Mainoperation	Suboperation	Hours	
22.11.87	DRILLING	CASING	5.0	
	FORMATION EVAL	CIRC/COND	1.5	
	FORMATION EVAL	TRIP	11.5	
	INTERRUPTION	SUBSURFACE EQ/F	6.0	
	Sum :			24.0
23.11.87	FORMATION EVAL	DST	11.0	
	FORMATION EVAL	TRIP	13.0	
	Sum :			24.0
24.11.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
25.11.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
26.11.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
27.11.87	FORMATION EVAL	DST	22.5	
	INTERRUPTION	MAINTAIN	1.0	
	INTERRUPTION	SURFACE EQ/F	0.5	
	Sum :			24.0
28.11.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
29.11.87	DRILLING	BOP/WELLHEAD EQ	4.5	
	FORMATION EVAL	DST	17.0	
	FORMATION EVAL	TRIP	2.0	
	INTERRUPTION	MAINTAIN/REP	0.5	
	Sum :			24.0
30.11.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
01.12.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
02.12.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
03.12.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
04.12.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
05.12.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
06.12.87	FORMATION EVAL	DST	6.5	
	FORMATION EVAL	LOG	5.0	
	FORMATION EVAL	TRIP	12.5	
	Sum :			24.0
07.12.87	DRILLING	BOP ACTIVITIES	3.5	
	FORMATION EVAL	DST	10.0	
	FORMATION EVAL	LOG	8.5	
	FORMATION EVAL	TRIP	2.0	
	Sum :			24.0
08.12.87	FORMATION EVAL	DST	22.0	
	FORMATION EVAL	LOG	2.0	
	Sum :			24.0
09.12.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
10.12.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
11.12.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0

SAGA PETROLEUM A.S. 6.7.2. DAILY RIG TIME DISTRIBUTION

Page 6 of 6 Well no: 34/7-12

Dato	Mainoperation	Suboperation	Hours	
12.12.87	FORMATION EVAL	DST	24.0	
	Sum :			24.0
13.12.87	FORMATION EVAL	CIRC/COND	1.0	
	FORMATION EVAL	DST	3.0	
	FORMATION EVAL	TRIP	20.0	
	Sum :			24.0
14.12.87	INTERRUPTION	FISH	4.0	
	PLUG & ABANDON	CUT	2.5	
	PLUG & ABANDON	EQUIP RECOVERY	3.5	
	PLUG & ABANDON	TRIP	14.0	
	Sum :			24.0
15.12.87	INTERRUPTION	MAINTAIN/REP	1.0	
	PLUG & ABANDON	CEMENT PLUG	2.0	
	PLUG & ABANDON	CIRC/COND	1.0	
	PLUG & ABANDON	CUT	3.0	
	PLUG & ABANDON	EQUIP RECOVERY	11.5	
	PLUG & ABANDON	TRIP	5.5	
	Sum :			24.0
16.12.87	PLUG & ABANDON	CUT	6.5	
	PLUG & ABANDON	EQUIP RECOVERY	2.5	
	PLUG & ABANDON	OTHER	1.5	
	PLUG & ABANDON	TRIP	13.5	
	Sum :			24.0
17.12.87	MOVING	ANCHOR	13.8	
	Sum :			13.8

7. OPERATIONAL DATA

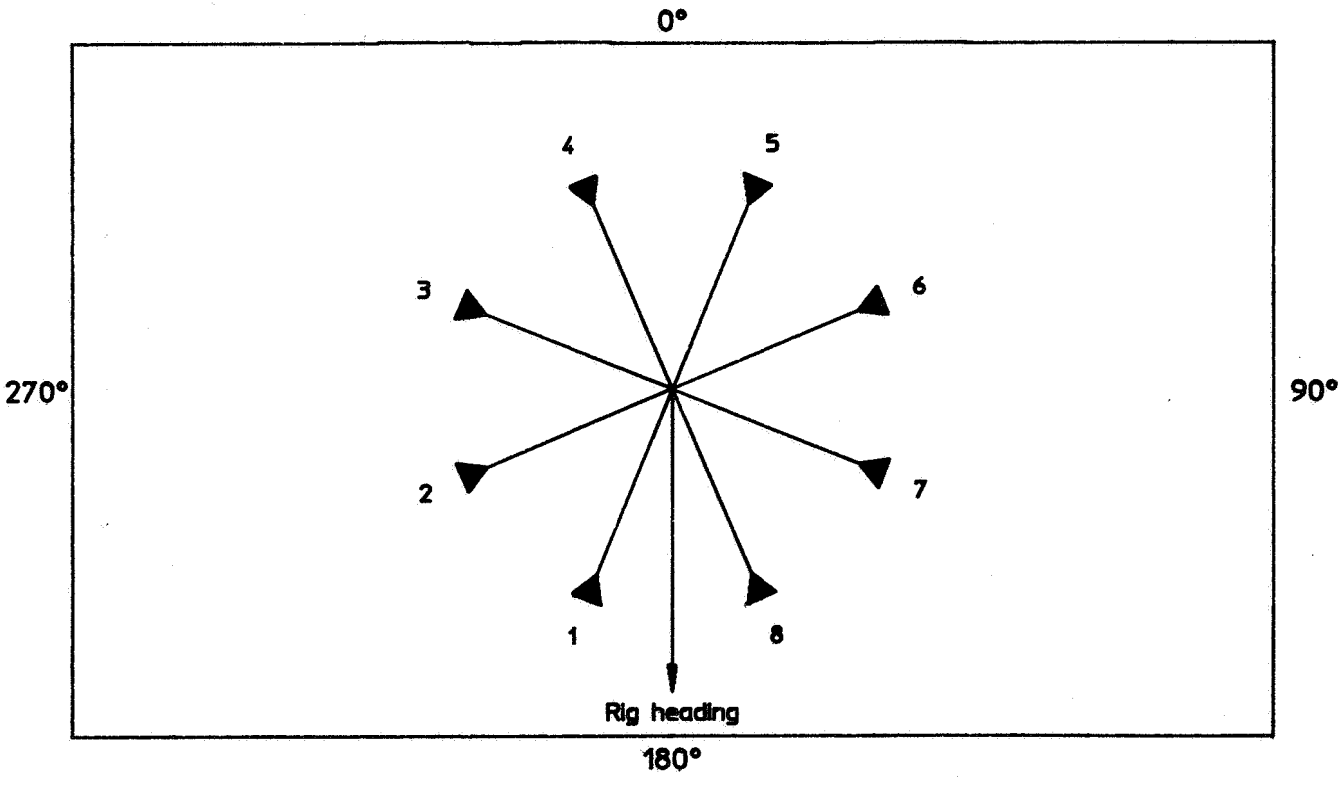
If not otherwise mentioned, all depths in this chapter refer to m RKB (Rotary Kelly Bushing).

Saga Petroleum a.s.

Anchor Pattern

Anchor no :	1	2	3	4	5	6	7	8
Compass direction :	202	247	292	337	022	067	112	157
Length of chain out (m) :	1095	1112	1412	1395	1445	1420	1430	1425
Max. initial tension (MT) :	160	160	160	160	160	160	160	160

Remarks :



DATE 10.05.88	AUTH. SBJ.
DRAW.BY APH	APPR. PTK
REF. 7.2 34/7-11	

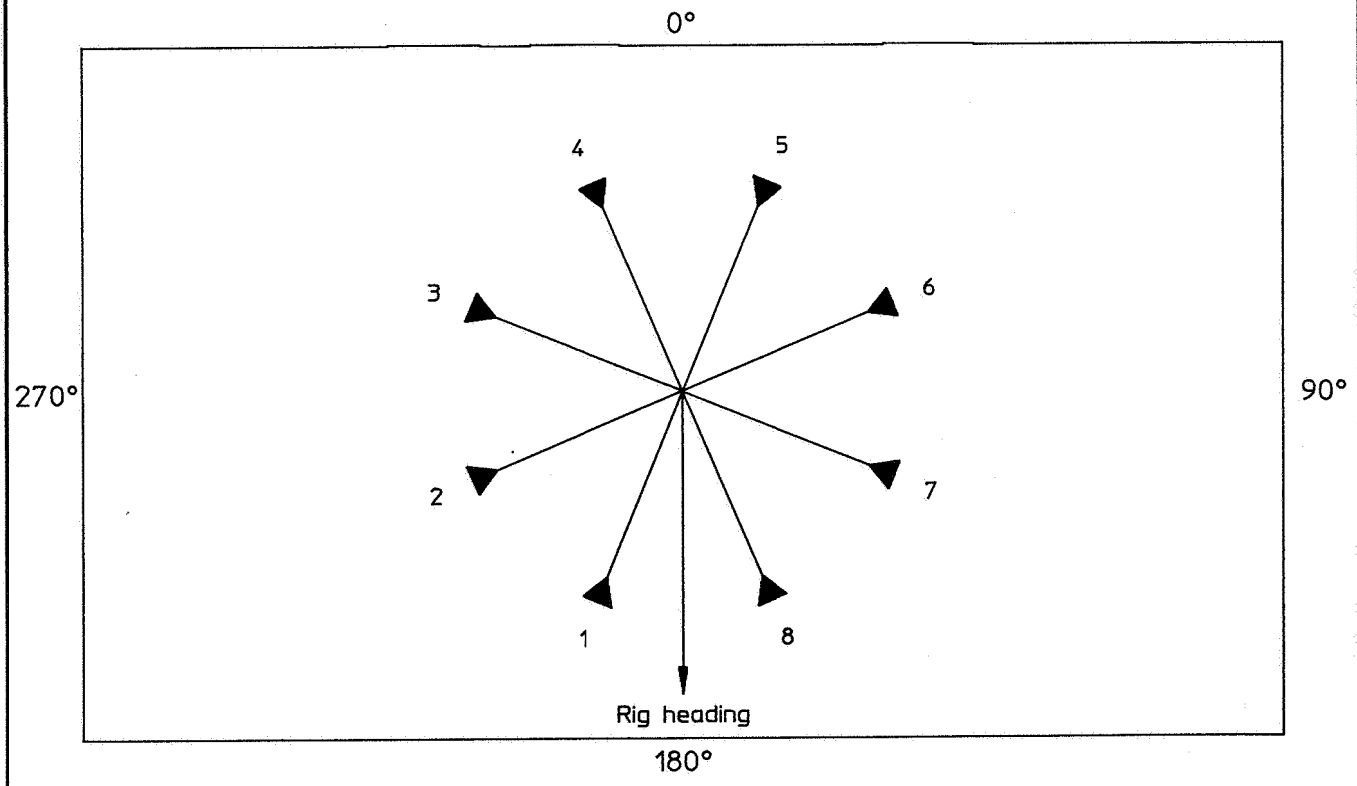
Fig. 7.1

Saga Petroleum a.s.

Anchor Pattern

Anchor no :	1	2	3	4	5	6	7	8
Compass direction :	202	247	292	337	022	067	112	157
Length of chain out (m) :	1095	1112	1412	1395	1445	1420	1430	1425
Max. initial tension (MT) :	160	160	160	160	160	160	160	160

Remarks :



DATE 10.05.88	AUTH. SBj.
DRAW.BY APH	APPR. PTK
REF. 7.2 34/7-12	

Fig. 7.1

Saga Petroleum a.s.

Helicopter and Charter Flights

Well no: 34/7-11

NO OF FLIGHT		FLIGHT ROUTE	PASSENGERS		DESCRIPTION OF CARGO	REMARKS
			OUT	IN		
3	SCHEDULED HELICOPTER FLIGHTS	BGO-TS-BGO	31	35	Oil Ewuipment and	Mail
	SCHEDULED CHARTER FLIGHTS					
3	Extra Helicopter Fl.	- "" -	15	11		

Industritrykk 31725

Saga Petroleum a.s.

Helicopter and Charter Flights
Well no: 34/7-12

NO OF FLIGHT		FLIGHT ROUTE	PASSENGERS		DESCRIPTION OF CARGO	REMARKS
			OUT	IN		
32	SCHEDULED HELICOPTER FLIGHTS	BGO-TS	423	426	Oil Equipment, Mai	
0	SCHEDULED CHARTER FLIGHTS					
9	Extra Helicopter Fl.	BGO-TS	60	58	Oil Equipm. Mail	(1490 kilos)

Industritrykk 31725

Fig. 7.2

Saga Petroleum a.s.

Occupational Accidents. Incident/Profession
Arbeidsulykker. Skadehendelse/Yrke

Well no: 34/7-11

Incident / Skadehendelse \ Profession / Yrke	Administration – Administrasjon	Roughneck – Boredekksarbeider	Driller – Borer	Electrician – Elektriker	Catering – Forpleining	Roustabout – Hjelpearbeider	Electronic technician – Instrumenttekniker	Crane operator – Kranfører	Derrikman – Tårnmann	Painter Maler Sandblaster worker – Sandblåser	Mechanic/ Mekaniker/Motormann/ Repairer – Reparatør	Operator – Operatør	Plumber – Rørlegger	Service technichan – Serviceteknikker	Scaffolding worker – Stillasbygger	Welder – Sveiser	Unspecified – Uspesifisert	Total – Totalt	%	Year – år
Contact with machinery in motion Kontakt med maskindel i bevegelse																				
Fire, explosion, etc. Brann, eksplosjon e.l.																				
Fall to same level Fall til samme nivå																				
False step Tråkk på ujevnheter, feiltråkk																				
Falling objects Fallende gjenstander																				
Contact with stationary objects Kontakt med gjenstander i ro																				
Accident of handling mobile units Håndteringsulykker																				
Chemicals Kontakt med kjemiske forbindelser																				
Body overload Overbelastning av kroppsdeler																				
Splinter, spurt Splinter, sprut																				
Electricity Elektrisk strøm																				
Extreme temperatures Ekstreme tempraturer																				
Occupational disease Yrkessykdommer																				
Man overboard Mann overbord																				
Other Annet																				
Total Totalt																		0		

Industritrykk 31725

Fig. 7.3

Saga Petroleum a.s.

Occupational Accidents. Incid./injur. part of the body
Arbeidsulykker. Skadehendelse/skadet legemsdel
Well no: 34/7-11

Injured part of the body / Skadet legemsdel — Incident / Skadehendelse	Eye – Øye	Back – Rygg	Toe/foot – Tå/fot	Hip/leg – Hofte/bein	Abdomen/chest – Mage/bryst	Arm/shoulder – Arm/skulder	Head – Hode	Tooth – Tann	Hand/finger – Hånd/finger	Other – Annet	Total – Totalt	%	Year – År
Contact with machinery in motion Kontakt med maskindel i bevegelse													
Fire, explosion, etc. Brann, eksplosjon e.l.													
Fall to lower level Fall til lavere nivå													
Fall to the same level Fall til samme nivå													
False step Tråkk på ujevnheter, feiltråkk													
Falling objects Fallende gjenstander													
Contact with stationary objects Kontakt med gjenstander i ro													
Accident of handling mobile units Håndteringsulykker													
Chemicals Kontakt med kjemiske forbindelser													
Bodity overload Overbelastning av kroppsdeler													
Splinter, spurt Splinter, sprut													
Electricity Elektrisk strøm													
Extreme tempratures Ekstreme temperaturer													
Occupational disease Yrkessykdommer													
Man overboard Mann overbord													
Other Annet													
Total Totalt											0		

Industritrykk 31725

Fig. 7.3

Saga Petroleum a.s.

Occupational Accidents. Incid./extern. influence
Arbeidsulykker. Skadehendelse/ytre faktor

Well no: 34/7-11

External influence / Ytre faktor — Incident / Skadehendelse	Chemical, physical, biological influence Kjemisk, fysisk, biologisk faktor	Cooling, pressure, wormth, ventilation Kjøling, trykk, varme, ventilasjon	Material, goods, packing Materiale, gods, emballasje	Electric equipment Elektrisk utrustning	Other machine Annen maskin	Drilling tools Boretenger	Handcraft tool, machines, instruments Håndverktøy, maskiner, instrumenter	Movable/fixed arrangements of the constr. Løs/fast innretning på bygning, konstruksjon	Lifting-/transport equipment Løfte-/transport anordning	Other Annet	Total Totalt	%	Year År
Contact with machinery in motion Kontakt med maskindel i bevegelse													
Fire, explosion, etc. Brann, eksplosjon e.l.													
Fall to lower level Fall til lavere nivå													
Fall to same level Fall til samme nivå													
False step Tråkk på ujevnheter, feiltråkk													
Falling objects Fallende gjenstander													
Contact with stationary objects Kontakt med gjenstander i ro													
Accident of handling mobile units Håndteringsulykker													
Chemicals Kontakt med kjemiske forbindelser													
Bodity overload Overbelastning av kroppsdeler													
Splinter, spurt Splinter, sprut													
Electricity Elektrisk strøm													
Extreme tempratures Ekstreme temperaturer													
Occupational disease Yrkessykdommer													
Man overboard Mann overbord													
Other Annet													
Total Totalt											0		

Industritrykk 31725

Fig. 7.3

Saga Petroleum a.s.

Occupational Accidents. Incident/Profession
Arbeidsulykker. Skadehendelse/Yrke

Well no: 34/7-12

Incident / Skadehendelse \ Profession / Yrke	Administration – Administrasjon	Roughneck – Boredekksarbeider	Driller – Borer	Electrician – Elektriker	Catering – Forpleining	Roustabout – Hjelpearbeider	Electronic technician – Instrumenttekniker	Crane operator – Kranfører	Derrikman – Tårnmann	Painter Maler Sandblaster worker – Sandblåser	Mechanic/ Mekaniker/Motormann/ Repairer – Reparatør	Operator – Operatør	Plumber – Rørlegger	Service technichan – Servicetekniker	Scaffolding worker – Stillasbygger	Welder – Sveiser	Unspecified – Uspesifisert	Total – Totalt	%	Year – år
Contact with machinery in motion Kontakt med maskindel i bevegelse																				
Fire, explosion, etc. Brann, eksplosjon e.l.																				
Fall to same level Fall til samme nivå																				
False step Tråkk på ujevnheter, feiltråkk																				
Falling objects Fallende gjenstander		1																1		
Contact with stationary objects Kontakt med gjenstander i ro																				
Accident of handling mobile units Håndteringsulykker																				
Chemicals Kontakt med kjemiske forbindelser																				
Body overload Overbelastning av kroppsdeler																				
Splinter, spurt Splinter, sprut																				
Electricity Elektrisk strøm																				
Extreme temperatures Ekstreme tempraturer																				
Occupational disease Yrkessykdommer																				
Man overboard Mann overbord																				
Other Annet																				
Total Totalt		1																1		

industritrykk 31725

Fig. 7.3

Saga Petroleum a.s.

Occupational Accidents. Incid./injur. part of the body
Arbeidsulykker. Skadehendelse/skadet legemsdel
Well no: 34/7-12

Injured part of the body / Skadet legemsdel — Incident / Skadehendelse	Eye – Øye	Back – Rygg	Toe/foot – Tå/fot	Hip/leg – Hofte/bein	Abdomen/chest – Mage/bryst	Arm/shoulder – Arm/skulder	Head – Hode	Tooth – Tann	Hand/finger – Hånd/finger	Other – Annet	Total – Totalt	%	Year – År
Contact with machinery in motion Kontakt med maskindel i bevegelse													
Fire, explosion, etc. Brann, eksplosjon e.l.													
Fall to lower level Fall til lavere nivå													
Fall to the same level Fall til samme nivå													
False step Tråkk på ujevnheter, feiltråkk													
Falling objects Fallende gjenstander						1					1		
Contact with stationary objects Kontakt med gjenstander i ro													
Accident of handling mobile units Håndteringsulykker													
Chemicals Kontakt med kjemiske forbindelser													
Bodity overload Overbelastning av kroppsdeler													
Splinter, spurt Splinter, sprut													
Electricity Elektrisk strøm													
Extreme tempratures Ekstreme temperaturer													
Occupational disease Yrkessykdommer													
Man overboard Mann overbord													
Other Annet													
Total Totalt						1					1		

Industritrykk 31725

Fig. 7.3

Saga Petroleum a.s.

Occupational Accidents. Incid./extern. influence
Arbeidsulykker. Skadehendelse/ytre faktor

Well no: 34/7-12

Incident / Skadehendelse \ External influence / Ytre faktor	Chemical, physical, biological influence Kjemisk, fysisk, biologisk faktor	Cooling, pressure, wormth, ventilation Kjøling, trykk, varme, ventilasjon	Material, goods, packing Materiale, gods, emballasje	Electric equipment Elektrisk utrustning	Other machine Annen maskin	Drilling tools Boretenger	Handcraft tool, machines, instruments Håndverktøy, maskiner, instrumenter	Movable/fixed arrangements of the constr. Løs/fast innretning på bygning, konstruksjon	Lifting-/transport equipment Løfte-/transport anordning	Other Annet	Total Totalt	%	Year År
Contact with machinery in motion Kontakt med maskindel i bevegelse													
Fire, explosion, etc. Brann, eksplosjon e.l.													
Fall to lower level Fall til lavere nivå													
Fall to same level Fall til samme nivå													
False step Tråkk på ujevnheter, feiltråkk													
Falling objects Fallende gjenstander						1					1		
Contact with stationary objects Kontakt med gjenstander i ro													
Accident of handling mobile units Håndteringsulykker													
Chemicals Kontakt med kjemiske forbindelser													
Bodity overload Overbelastning av kroppsdeler													
Splinter, spurt Splinter, sprut													
Electricity Elektrisk strøm													
Extreme tempratures Ekstreme temperaturer													
Occupational disease Yrkessykdommer													
Man overboard Mann overbord													
Other Annet													
Total Totalt						1					1		

Industritrykk 31725

Fig. 7.3

	WIND		SEAS		SWELL			RIG MOVEMENT				ANCHOR		RISER	
Date	speed m/s	dir deg	height m	dir deg	height m	dir deg	periode sec	heave m	roll deg	pitch deg	head deg	min	tons max	max	Remarks
870930	8	225	4.0	225							180	0	0	0	
871002	8	180	2.0	180				0.3	0.3	0.3	180	100	110	0	
871003	15	180	3.0	180				0.6	0.7	0.7	180	100	120	0	
871004	20	180	5.0	180				1.0	2.0	2.0	180	100	118	240	
871005	19	180	5.0	180				1.2	2.0	2.0	180	100	110	240	
871006	9	200	3.0	225				1.0	2.0	2.0	180	105	120	175	
871007	10	90	2.5	180				0.8	1.2	1.0	180	100	122	175	
871008	19	180	6.2	180				1.6	2.5	3.0	180	100	120	168	
871009	13	225	2.5	225				0.9	2.8	1.6	180	100	129	0	
871010	8	315	3.4	315				1.7	3.0	2.8	180	100	120	187	
871011	22	25	3.2	0				0.6	3.2	1.8	180	100	125	187	

	WIND		SEAS		SWELL			RIG MOVEMENT				ANCHOR		RISER	
Date	speed m/s	dir deg	height m	dir deg	height m	dir deg	periode sec	heave m	roll deg	pitch deg	head deg	min	tons max	max	Remarks
871011	21	255	3.7	255				0.7	3.0	1.8	180	100	125	0	
871012	5	70	1.8	70				0.5	1.4	1.4	180	100	123	0	
871013	13	125	1.9	125				0.6	0.8	1.4	180	100	122	0	
871014	18	135	2.3	135				0.3	1.8	1.6	180	100	127	150	
871015	21	77	2.1	45				0.3	2.3	1.6	180	100	125	150	
871016	35	200	4.6	180				2.0	3.4	3.0	180	100	132	0	
871017	26	200	4.6	180				1.1	2.6	3.2	180	100	132	0	
871018	34	154	6.0	140				3.1	4.4	3.6	180	100	119	0	
871019	30	155	5.4	155				1.7	3.4	3.8	180	100	116	0	
871020	17	150	3.4	150				1.0	2.6	2.0	180	100	127	0	
871021	22	135	3.7	135				1.1	2.2	2.4	180	100	129	178	
871022	16	170	3.2	170				0.8	2.6	2.8	180	100	126	175	
871023	4	198	1.7	210				0.3	1.4	1.2	180	100	125	194	
871024	21	180	2.4	180				0.2	2.8	1.2	180	100	120	224	
871025	24	180	3.4	180				0.7	2.4	2.2	180	100	116	226	
871026	28	180	6.1	180				1.9	4.8	4.0	180	100	116	226	
871027	19	140	3.8	140				1.1	2.6	2.6	180	100	121	228	
871028	13	230	3.1	230				0.7	2.8	1.4	180	100	119	226	
871029	3	170	1.6	170				0.4	1.6	1.0	180	100	117	228	
871030	17	165	2.3	165				0.5	1.6	1.4	180	100	117	228	
871031	7	220	2.0	220				0.3	2.0	1.2	180	100	117	222	
871101	14	200	1.4	200				0.1	1.6	0.8	180	100	116	220	
871102	6	265	1.6	265				0.4	2.0	0.6	180	100	116	228	
871103	13	254	1.8	254				0.3	1.2	0.8	180	100	114	224	
871104	22	270	1.8	270				0.5	1.6	0.6	180	100	115	221	
871105	8	170	1.4	170				0.5	1.8	2.0	180	100	114	215	
871106	5	292	1.7	290				0.8	1.0	1.0	180	100	118	223	
871107	13	285	2.6	280				0.7	1.6	0.8	180	100	114	223	
871108	10	355	2.6	350				0.6	1.4	1.8	180	100	122	227	
871109	3	113	1.6	100				0.6	1.0	1.0	180	100	111	236	
871110	25	170	7.5	170				1.0	4.0	3.0	180	100	126	236	
871111	15	135	3.4	135				1.3	3.0	2.5	180	100	122	240	

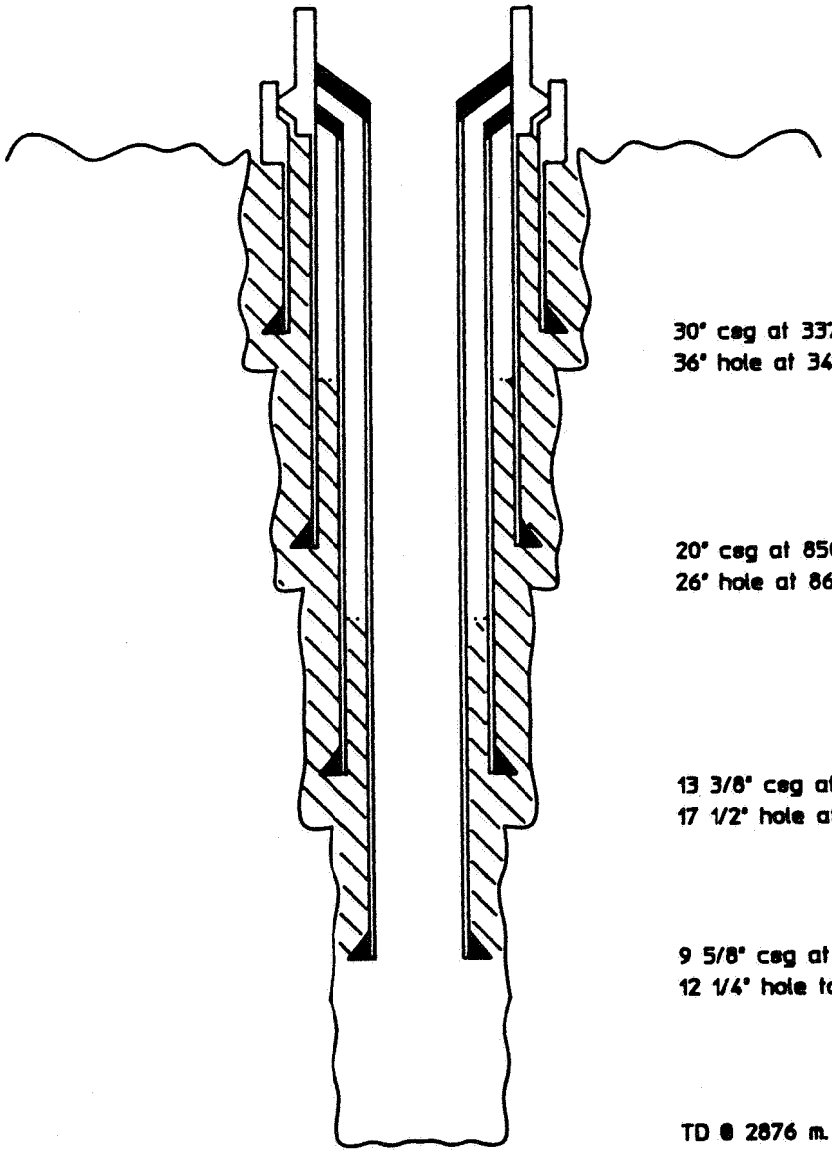
	WIND		SEAS		SWELL			RIG MOVEMENT				ANCHOR		RISER	
Date	speed m/s	dir deg	height m	dir deg	height m	dir deg	periode sec	heave m	roll deg	pitch deg	head deg	min	tons max	max	Remarks
871112	13	135	3.3	135				0.7	2.0	2.0	180	100	123	240	
871113	8	25	3.6	45				1.0	1.2	1.2	180	100	121	240	
871114	8	295	1.7	315				0.6	1.0	1.0	180	100	125	238	
871115	18	135	3.4	135				0.2	1.2	2.0	180	100	124	238	
871116	3	250	2.3	250				0.5	1.0	1.0	180	100	124	241	
871117	4	340	1.7	315				0.8	2.0	2.0	180	100	124	234	
871118	18	208	2.6	208				0.4	2.8	2.0	180	100	126	234	
871119	14	250	4.8	250				1.2	3.6	1.8	180	100	127	235	
871120	11	285	2.8	315				1.7	3.0	1.8	180	100	120	239	
871121	10	295	3.6	295				0.5	3.8	1.4	180	100	120	239	
871122	9	0	2.1	90				0.9	3.6	0.8	180	100	118	240	
871123	10	340	1.7	0				1.7	3.8	2.0	180	100	117	241	
871124	15	360	3.0	360				1.1	2.6	3.2	180	100	116	237	
871125	1	0	2.1	0				0.7	1.2	1.2	180	100	124	236	
871126	12	195	1.2	195				0.4	2.2	0.6	180	100	115	236	
871127	6	200	1.6	240				0.3	1.4	1.0	180	100	118	238	
871128	13	180	1.4	180				0.3	1.8	1.0	180	100	119	237	
871129	13	200	2.2	200				0.8	2.4	1.0	180	100	120	237	
871130	9	345	1.8	320				0.4	1.6	1.2	180	100	120	235	
871201	5	241	1.2	241				0.2	1.2	0.6	180	100	119	0	
871202	5	280	1.5	295				0.7	1.8	1.0	180	100	118	0	
871203	16	220	2.4	220				0.8	1.8	0.8	180	100	116	0	
871204	12	255	2.2	255				0.4	1.8	0.8	180	100	120	0	
871205	16	320	2.8	320				1.2	1.6	1.8	180	100	120	0	
871206	13	330	3.5	330				1.2	2.2	2.8	180	100	119	0	
871207	5	340	2.4	340				0.6	1.8	1.8	180	100	120	0	
871208	12	270	1.8	280				0.7	1.2	1.0	180	100	123	0	
871209	18	310	2.9	310				0.3	2.8	1.0	180	100	120	0	
871210	19	334	5.0	334				2.4	3.2	3.6	180	100	122	0	
871211	7	270	2.8	270				1.1	2.0	1.2	180	100	116	0	
871212	11	238	2.0	238				0.4	1.6	1.2	180	100	120	0	
871213	15	270	2.1	270				0.3	1.3	1.4	180	100	120	0	

	WIND		SEAS		SWELL			RIG MOVEMENT				ANCHOR		RISER	
Date	speed m/s	dir deg	height m	dir deg	height m	dir deg	periode sec	heave m	roll deg	pitch deg	head deg	min	tons max	max	Remarks
871214	20	270	4.5	270				0.9	2.4	1.4	180	100	125	0	
871215	4	45	3.0	40				0.5	1.4	1.4	180	100	125	0	
871216	17	130	5.2	130							180	0	0	0	
871217	15	180		0							180	0	0	0	

8. WELL PROFILES

If not otherwise mentioned, all depths in this chapter refer to m RKB (Rotary Kelly Bushing).

Saga
Petroleum a.s.

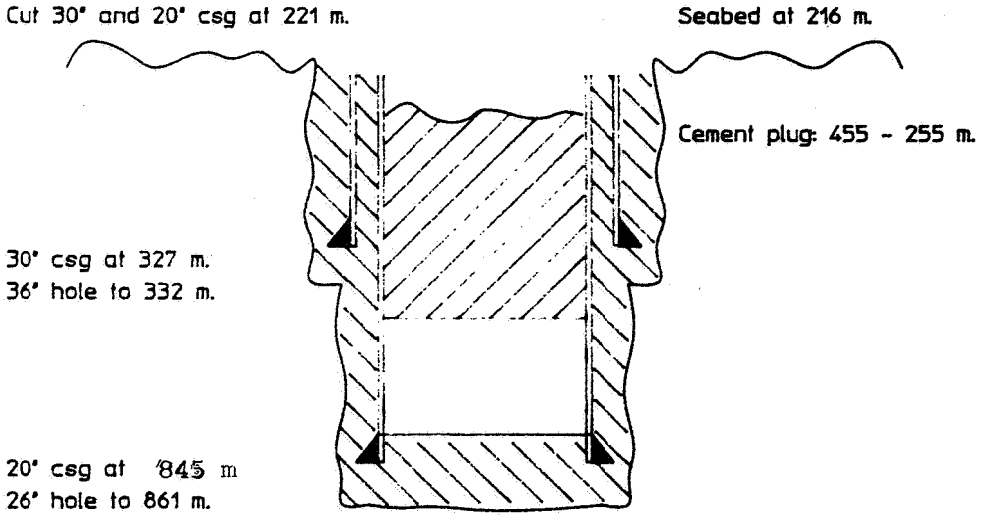


DATE 21.08.87	AUTH. FL
DRAWBY FL	APPR. TSØ
REF. 5.1 34/7-11	

Fig. 8.1

Saga
Petroleum a.s.

Abandonment Profile well 34/7-11



DATE 20.11.87	AUTH. FL
DRAW.BY FL	APPR.
REF. 34/7-11	

Fig. 8.2

Saga Petroleum a.s.

Abandonment Profile well 34/7-12

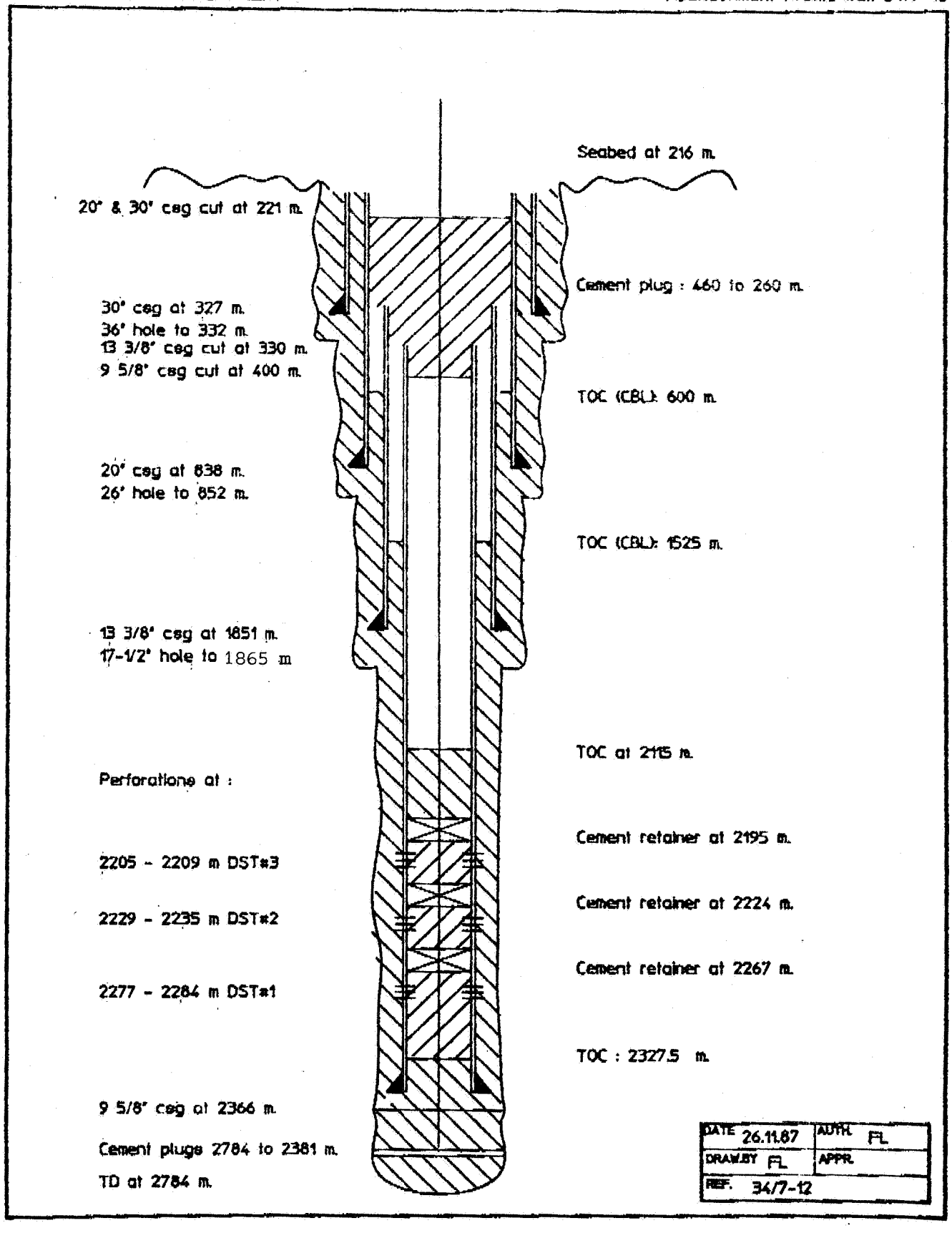


Fig. 8.2