3.3 FMT Pressures

One FMT-run (Run 3B) was performed in the well, in 8 1/2" hole. It confirmed the presence of hydrocarbons, as seen on the electrical logs. Pressure measurements at thirty different depths were performed. 16 of the measurements were good to very good, while 10 were tight, supercharged or 'no seal'-points.
Calculation of pressure gradients in the oil and water zone was performed using only the good pressure point. This gave an oil gradient of 7.41 kPa/m (0.755 g/cc) and a water gradient of 10.49 kPa/m (1.069 g/cc).
All pressure measurements are summarized on the next page and a graphical presentation with the gradient interpretation is presented in Figure 3.3.

One segregated sample was taken at 3363.8 m MDRKB. The 2 3/4 gallon chamber contained 3.5 litres of oil, 3.5 l of mud filtrate and 0.22 m^3 gas. No CO_2 or H_2S was detected from this sample chamber. The 1 gallon chamber was sent ashore for PVT analysis.

STATOIL

FMT PRESSURE DATA WELL 34/10-36

Crystal (HP) Gauge

Run no.	Depth MDRKB m	Depth TVDRKB m	Hydr. pres. kPa	Form. pres. kPa	Comments
1	3362.7	3357.7	51530.0	45398.0	Good
2	3364.0	3358.4	51536.0	45401.0	Very good
3	3365.5	3359.9	51540.0	45412.0	Good
4	3367.5	3361.9	51561.0	0.0	Tight
5	3372.0	3366.4	51655.0	45465.0	Good
6	3374.9	3369.3	51685.0	45526.0	Supercharge
7	3374.5	3368.9	51644.0	45479.0	Good
8	3363.2	3357.7	51453.0	45401.0	Good
9	3368.0	3362.4	51560.0	45437.0	Good
10	3385.0	3379.4	51917.0	46020.0	Supercharge
11	3385.5	3379.9	51840.0	45554.0	Good
12	3389.0	3383.4	51880.0	45596.0	Moderate
13	3390.7	3385.1	51908.0	45688.0	Supercharge
14	3395.0	3389.4	51980.0	45665.0	Moderate
15	3409.5	3403.9	52280.0	45857.0	Poor/superch
16	3415.0	3409.3	52325.0	45865.0	Moderate
17	3417.0	3411.4	52348.0	45880.0	Good
18	3418.0	3412.3	52310.0	45890.0	Good
19	3451.0	3445.2	52995.0	0.0	Tight
20	3457.8	3452.0	53085.0	46326.0	Moderate
21	3464.5	3458.7	53145.0	46522.0	Moderate?
22	3474.0	3468.2	53286.0	46480.0	Moderate
23	3478.0	3472.2	53315.0	46480.0	Poor/mod
24	3511.5	3505.7	53945.0	47000.0	Poor
25	3516.5	3510.7	53977.0	47222.0	Poor
26	3518.5	3512.7	53960.0	0.0	Tight

27	3533.0	3527.2	54230.0	48380.0	Supercharge
28	3363.6	3358.0	0.0	No seal	
29	3363.8	3358.2	51584.0	45396.0	Segr.sample v.good
30	3131.5	3120.9	0.0	No seal	

3.4 Well testing

One drill stem test was performed in the Tarbert Formation. The well was perforated in the interval 3371.2 - 3376.2 m MDRKB, and after a 10 hours clean-up flow the well was shut in at the PCT-valve for a 12 hours pressure build-up. After the first build-up period, the well was opened again for a 24 hours main flow period through a 36/64" (14.3 mm) choke , and finally shut in for a main build-up period of 36 hours.

After the main build-up several attemts of opening the PCT-valve failed, so the well was killed by shearing SHORT and circulating out, before unsetting packer and bullheading.

The main test results were:

Oil rate:	836 Sm^3 /d
Gas rate:	161490 Sm^3 /d
Gas-oil-ratio:	193 Sm^3 /Sm^3
Water rate:	7 Sm^3 /d
Choke size:	36/64 " (14.3 mm)
Well Head Pressure:	16500 kPa
Density oil:	0.869 g/cm^3
Density gas:	0.695 relative air
CO_2:	2 %
H_2S:	3.5 ppm
Cl^- in water:	19500 ppm
Reservoir. temp:	126.1 °C

STATOIL

4.10 Drilling Fluid Summary

Comments: The following is an extract from the mud reports.

Total amounts of bulk and chemicals and subsequent cost are subject to revision at a later date.

SUMMARY OF EVENTS

SUMMARY OF EVENTS
WELL NO: 34/10-36
36" HOLE SECTION

Details		
	30" casing set at:	220,0 m
	36" hole drilled from:	159,0 m
	36" hole drilled to:	226,5 m
	Total section cost:	246 476,90 NOK
	Cost pr meter:	3 651,51 NOK

Comments:

Spud mud and 1,18 SG Bentonite/seawater mud were made before drilling commenced. 65 cubic meters of 1,70 SG Bentonite/seawater kill mud were also mixed.

A 9 7/8" bit and BHA was made up and seabottom tagged at 159 meters RKB. 9 7/8" pilot hole was drilled from 159 to 315 meters utilizing seawater and hivis Bentonite pills. The hole was then drilled from 315 to 350 meters with 1,18 SG Bentonite/seawater mud and CMC/seawater mud to check out possible anomalies. Indications of shallow gas was recorded, but the well was static when checked first with 1,10 SG mud, and again with seawater.

The drilling continued from 350 to 425 meters using seawater and hivis pills. Another possible shallow gas zone from 425 to 465 meters was drilled with 1,18 SG mud, and finally the 9 7/8" pilot hole was drilled from 465 to 859 meters using seawater and hivis pills. The hole was displaced to 1,18 SG Bentonite/seawater mud before pulling out.

A 26" bit and 36" hole opener assembly was then run in hole. The pilot hole was opened to 36" from 159 to 226,5 meters utilizing seawater and hivis pills. At TD, 15 cubic meters of hivis mud was pumped and chased out with seawater prior to displacing the hole to hivis mud.

A wipertrip was made. When back on bottom, the hivis mud was displaced out with seawater. Then the hole was displaced to 1,18 SG mud prior to pulling out.

When running the 30" casing, it was not possible to pass 185 meters, possibly due to boulders. The casing was retrieved, and a 26" bit and tandem 36" hole opener was made up and run in hole. The hole was reamed, tight spots at 183 and 191 meters were worked. At TD, 15 cubic meters hivis pill was pumped and chased out with seawater.

Another wipertrip was made. Again, another 15 cubic meters hivis pill was pumped and chased around with seawater prior to displacing the hole to 1,18 SG mud and pulling out.

The 30" casing was then run, set and cemented at 220 meters.

VOLUME DISTRIBUTION.

Volume built:	1039 m^3
Dumped (returns to seabed):	756 m^3
Transferred to next section:	283 m^3

SUMMARY OF EVENTS
WELL NO: 34/10-36
26" HOLE SECTION

Details		
	20" casing set at:	1056,0 m
	26" hole drilled from:	226,5 m
	26" hole drilled to:	1070,0 m
	Total section cost:	353 290,50 NOK
	Cost pr meter:	418,84 NOK

Comments:

Spud mud and 1,18 SG Bentonite/seawater mud were prepared before drilling started. Kill mud from the previous section was used to weight up to 1,18 SG.

A 17 1/2" bit and 26" hole opener was made up and run in hole. Cement was tagged at 215 meters. The hole was opened to 26" to 1071 meters using seawater and hivis pills every 15 meters drilled. At TD, a 20 m^3 hivis pill was pumped and chased out with seawater prior to displacing to 1,18 SG Bentonite/seawater mud and pulling out.

A running tool was then made up to wash the wellhead area.

When returning in the hole with 26" bit and 26" hole opener, tight spots were reamed. At bottom the hole was displaced to 1,18 SG CMC EHV/seawater mud. When pulling out of the hole, there were tight spots, the hole was reamed and the bit was unable to pass 725 meters. When going back in, the hole was again reamed from 600 meters. At bottom, the hole was displaced to 1,18 SG CMC EHV/seawater mud. There were again some tight spots when pulling out of the hole.

The 20" casing was run and cemented in place without problems.

VOLUME DISRIBUTION.

Transferred from previous section:	283 m^3
Volume built:	1245 m^3
Dumped (returns to seabed):	1445 m^3
Transferred to next section:	83 m^3

Recommendations:

Since the hole had regions with swelling clays it might be that the Bentonite mud left in the hole before the wiper trip could enhance swelling. The second time the hole was filled, CMC EHV/seawater mud was used. It could possibly have been better to use CMC EHV/seawater mud for all hole fillings. This mud type will give less swelling of clays.

SUMMARY OF EVENTS
WELL NO: 34/10-36
17 1/2" HOLE SECTION

Details		
	13 3/8" casing set at:	2100,0 m
	17 1/2" hole drilled from:	1070,0 m
	17 1/2" hole drilled to:	2115,0 m
	Total section cost:	780 278,30 NOK
	Cost pr meter:	746,68 NOK

Comments:

1. GENERAL.

The cement, shoe, rathole and 3m new formation were drilled with seawater, and then sweeped with a 20 m^3 hivis pill followed by seawater, before displacement to the 1,25 SG GYP/PAC mud. A leak off test gave EQMW=1,60 SG.

The hole was drilled to 1171m while increasing the mud weight to 1,30 SG. A trip was then made to change the MWD. The hole was tight when pulling out and was reamed down from 1125m when going back in.

The hole was then drilled to 1918m with penetration rate varying between 5 and 30 meters per hour. When pulling out to change bit, the hole was tight and the string was pumped out from 1800m. After washing and reaming with the new bit from the shoe to 1919m, the drilling continued to the interval TD at 2115m. The hole was circulated clean and a wiper trip to the shoe indicated many tight spots, the hole had to be backreamed from 1653m. The hole was washed and reamed from 1640m to TD on tripping back in, and once again circulated clean prior to pulling out of the hole. A tight spot with 25 tons overpull was experienced between 2050m and 2006m, the rest of the hole was in good shape.

One log was run, the tool stopped 25m from bottom. A conditioning trip was made and the hole washed and reamed from 1987m to TD. The hole was again circulated clean, and the pipe tripped out, the hole was in good condition. The 13 3/8" casing was run and cemented without any problems.

2. MUD HISTORY.

Before starting drilling, 300 m^3 of GYP/PAC mud were mixed. The mud was sheared for about 2 hours, giving an 80 BAR pressure drop, and weighted up to 1,25 SG. Initial concentrations of chemicals were:

Ancocide	1,0 liter/m^3.
Lime	0,1 kg/m^3
Celpol SL	11,0 kg/m^3
Celpol REG	1,5 kg/m^3
Gypsum	12,0 kg/m^3

The mud properties were adjusted and maintained by continuous dumping of old mud and additions of premixes. Typical concentrations in the premixes were:

Ancocide	1,0liter/m^3
Celpol SL	15,0 kg/m^3
Gypsum	15,0 kg/m^3

The rheology was run on the low side with typical YP values around 4,5 Pa in the active pit and 5-5,5 Pa out of the hole. The 10 minute gels were between 1 and 1,5 Pa during the entire section. However, the low gels caused no problems. No fill was found after trips. The choke and kill lines was flushed on each shift to minimize chances for barite settling.

3. SOLIDS CONTROL.

The shakers were run with the finest possible screens. The screens had very short lifetime. A total of 25 screens, size 60 and 80 mesh, were used on the first 400m drilled.

The first 300m of formation contained a large fraction of sand. The sand content in the mud was up to 4 % at maximum. The mud cleaner was run with 200 mesh screens and the centrifuge was also run for about 30 hours to reduce the content of fine sand and silt. The cuttings was good most of the section, but in the last part they became more soft and sticky.

4. VOLUME DISTRIBUTION.

Volume built:	1032 m^3
Transferred from previous section:	83 m^3
Dumped:	312 m^3
Lost on surface:	257 m^3
Left behind casing:	70 m^3
Transferred to next section:	476 m^3

Recommendations:

In order to reduce the screen consumption the following is recommended:

-Shaker screens must be changed according to instructions with the mud pumps off. Care must be taken to get the underscreens on top of the inner support and that there are no wrinkles. To ensure this, the upper screen must be withdrawn halfway when mounting the underscreen.

-The 60 and 80 mesh screens should be produced to tolerate more wear. As of now they last only a small fraction of time compared to the 40 mesh screens.

SUMMARY OF EVENTS
WELL NO: 34/10-36
12 1/4" HOLE SECTION

Details		
9 5/8" casing set at:	2994,0	m
12 1/4" hole drilled from:	2115,0	m
12 1/4" hole drilled to:	3010,0	m
Total section cost:	650 996,60	NOK
Cost pr meter:	727,37	NOK

Comments:

1. GENERAL.

The cement, casing shoe, rathole and 3m new formation was drilled and the mud weight increased to 1,35 SG, before a LOT was performed giving 2,10 SG EMW. Another 3m was drilled and a second LOT was performed to 1,76 SG EMW.

The hole was then drilled to 2350m, where the string was pumped out of the hole to pick up a mud motor. The mud weight was increased to 1,40 SG before the drilling/steering continued due to indications of increasing pore pressure and 5m fill. At 2426m, a bit change became necessary, the trip out of and into the hole was good.

The drilling continued to 2661m, but the inability of the BHA to drop angle when required necessitated a further trip out of the hole to change BHA.

A few tight spots were reamed and the hole washed down from 2626m to 2661m, no fill was found on bottom. The drilling continued to 2825m when a bit change became necessary. Some indications of increasing pore pressure were noticed, so the mud weight was increased to 1,45 SG before pulling out of the hole.

When running back in, the hole was washed down from 2627m to 2087m, then reamed and logged to 2825m, no fill was seen on bottom. At 2841m, the mud weight was increased to 1,50 SG while circulating the hole. The hole was drilled to the TD of this section at 3010m without problems.

When pulling out for a wiper trip to the casing shoe, the BHA was lost. After fishing the BHA, and logging was completed, a wiper trip was made to TD. Reaming/backreaming was needed at the lower part of the hole, and the mudweight was increased to 1,54 SG before the casing job. The casing was set and cemented without any problems, and with full mud returns.

2. MUD HISTORY.

Prior to and when drilling the cement, the mud was treated with Sodium Bicarbonate to control the pH. When drilling continued, the mud properties were maintained with additions of premix as in the previous section. The premix contained approximately 15 kg Celpol, 15 kg Gypsym and 1 liter Ancocide per cubic meter. The dilution rates varied between about 5 cubic meters per hour at the start of the section to about 3 cubic meters per hour in the lower part of the section, when penetration rates were about 10 meters per hour.

This gave a very stable mud with very little changes in the day to day mud properties. Close attention was paid to any evidence of bacterial growth by using Panatest dipslides on a daily basis. Initially very little growth was seen, but after a few days a low to moderate (10^3-10^5 organisms per ml) infection was observed. The active mud system was immediately treated with Ancocide, and daily additions of +/-150 liters kept the bacteria' concentration within acceptable limits so that the mud properties were not affected.

The mud rheology remained stable with the yield point around +/- 5 Pa until higher mud weights became necessary. The increased solids content led to increasing the yield point to +/- 7 Pa. However, the mud properties were kept within the programmed specifications.

3. SOLIDS CONTROL.

The GM 2000 H shakers were, in general, functioning very good, although the consumption of screens at the beginning of this well were high. This is probably due to the fact that the screens were put on as mud were run through the shakers. The tension on the screens were also initially set to high. It is also noticed that screens above 60 mesh tended to brake more frequently, which could mean that they have a too weak construction.

At the beginning of the section, the shakers were set with 40 mesh top screens and 60 mesh bottom screens. The bottom screens were soon changed to 80 mesh and later to 100 mesh, while the top screens were changed to 60 mesh at the bottom of the section.

The sentrifuge was run periodically for barite recovery as the dilution rate was increased.

4. VOLUME DISTRIBUTION.

Volume built:	789 m^3
Transferred from previous section:	476 m^3
Lost on surface:	346 m^3
Dumped:	627 m^3
Left behind 9 5/8" csg:	60 m^3
Transferred to next section:	232 m^3

Recommendations:

It is recommended to:
- change the screens on the GANN shakers during connections only.
- use the right tension on the shaker screens when put on.

There were no major problem with the mud system used on this section, and thus the same system is to recommended used in future similar sections.

SUMMARY OF EVENTS
WELL NO: 34/10-36
8 1/2" HOLE SECTION

Details		
	7" liner set at:	2838,0 - 3625,0 m
	8 1/2" hole drilled from:	3010,0 m
	8 1/2" hole drilled to:	3640,0 m
	Total section cost:	995 221,93 NOK
	Cost pr meter:	1 579,72 NOK

Comments:

1. GENERAL.

The cement and 3m of new formation was drilled, using GYP/PAC mud left from the 12 1/4" section. The old mud was then displaced with new 1,47 SG Ancotemp/Bentonite mud. A leak off test giving 1,97 SG EMW was taken before drilling of new formation commenced.

A drilling break occured at 3029m. A core was then cut to 3054m, with an average ROP of 2-3 m/hr. The drilling continued to 3363m, a new drilling break occured at 3359m. Two cores were taken from 3363m to 3417m. When pulling/pumping out with the last core, the hole was found to be a little tight. When tripping back in, the hole was reamed the last stand.

The drilling continued to interval TD of 3640m where the hole was circulated clean. On tripping out of the hole it was necessary to backream from 3490m, and at 3185m the pipe became stuck. The pipe was worked free and pulled to the shoe where the mud weight was increased to 1,52 SG while circulating. The string was reamed back to bottom from 2994m and 20m of fill was found. A 20 m^3 hivis pill was circulated around the hole and large quantities of cuttings (sloughing shales) were seen at the shakers.

Another attempt was made at pulling out of the hole, but it was again necessary to backream, this time from 3350m. At the shoe the hole was circulated clean and the string pulled to surface.

A new BHA was run back in the hole which was reamed from 3025m to TD. Two 20 m^3 hivis pills were circulated around the hole and the string tripped out to run wireline logs; the logging tool could not pass 3270m. The same BHA was run back in the hole and tight spots reamed out; 3,5m of fill were found on bottom. A lovis pill followed by a hivis pill were circulated around the hole and the mud weight increased to 1,56 SG in an attempt to stabilize the shales. But a wiper trip to the shoe and two more hivis pills were required before hole stability was achieved and a trouble free trip out of the hole became possible.

The logging programme resumed, but a wiper trip was needed prior to the last logging run. Another wiper trip which included pumping two more hivis pills was made before running and cementing the 7" liner.

2. MUD HISTORY.

The cement, shoe and rathole was drilled out using the GYP/PAC mud left from the 12 1/4" section. This mud was treated with approximately 1,2 kg/m^3 Sodium Bicarbonate before the cement was drilled. The hole was then displaced to new mud prior to the leak off test.

The new Ancotemp/Bentonite mud consisted of 60 kg/m^3 Bentonite, 9 kg/m^3 Anco Resin and 2 kg/m^3 Ancotemp. After one circulation, the mud was treated with 2 kg/m^3 Celpol LV to improve the API filter loss, and 2 kg/m^3 Ancotemp for thinning purposes. The API and HTHP fluid loss were kept very stable at 3,0-3,6 ml, respectilvely 11-13 ml, with dilution of premixes consisting of Ancotemp, Ancoresin and Celpol LV.

The rheology soon stabilized with an YP around 4,5 Pascals, by dilution rates of 2-3 m^3/hr at the start, decreasing to 1-2 m^3/hr after the first core. The dilution rate was again slightly increased when drilling to TD.

To avoid excessive dilution rates in order to keep the viscosity down, the concentrations of Celpol LV in the premixes were reduced. At the beginning of the section, when the concentrations of Celpol LV was highest, tests showed reduced viscosity and gels after aging the mud for 24 hours at 140 Celsius. In the last part of the section, the aging tests showed higher viscosity and gels, but still well within acceptable limits (YP 6-11 Pa, 10 sec gels 2-4 Pa, 10 min gels 7-12 Pa) . The logging went on without any problems related to mud viscosity and gels.

The continuous use of hivis Bentonite pills to keep the hole clean, did increase the MBT from +/-60 to +/-70 kg/m^3. However, this had little effect on the mud properties. Even the high temperature aging tests showed little changes.

3. SOLIDS CONTROL.

Most of the time the shakers were set with 60 mesh top screens and 100-150 bottom screens. The mudcleaners were run with 150 mesh screens to control low gravity solids.

4. VOLUME DISTRIBUTION.

Volume built:	679 m^3
Transferred from previous section:	232 m^3
Lost on surface:	144 m^3
Dumped:	418 m^3
Transferred to next section:	349 m^3

Recommendations:

No major mud problems were experienced in this section. The same mud system is recommended to be used in future similar sections.

SUMMARY OF EVENTS
WELL NO: 34/10-36
TEST, P & A

Details	Total section cost:	370 379,20 NOK

Comments:

1. GENERAL

The cement to the top of the liner was drilled with the Ancotemp/Bentonite mud left from the 8 1/2" section. A pressure test of the liner lap showed leakage. The following cement squeeze was successful, and the liner lap was cleaned out before the mud weight was reduced to 1,45 SG.

31 m^3 of new test fluid was displaced from the bottom of the hole to approximately 2410m.

Wireline logs were run before the test string was run in.

The test was carried out without major problems. After the main build up, the well was reverse circulated with returns over the burner booms, before it was bullheaded and killed.

A retainer was set at 3360m, before injection test/squeezing off perforations. A cement plug was set from 2900m to 2787m, and a bridge plug at 2758m.

2. MUD HISTORY

The mud was treated with 1,8 kg/m^3 Sodium Bicarbonate before the cement to the top of the liner was drilled. During squeezing and the following cement drilling, another 7,6 kg/m^3 of Sodium Bicarbonate was added to lower pH and reduce Calcium content. Increased Calcium content tended to increase the rheology. Premixes of drill water and Ancotemp was added at a rate of 2 - 3 m^3/hr. Ligthin was also added to the active to a consentration of 1,7 kg/m^3. As a result, the YP was soon reduced from 7 Pa to approximate 5 Pa, and gels kept steady at 2/7 Pa (10 sec./10min).

Before the test string was run in, 31 m^3 1,45 SG test fluid was mixed, consisting of: 45 kg/m^3 Bentonite, 9 kg/m^3 Ancotemp and 6 kg/m^3 Thermopol. The fluid had the following properties:

PV = 27 cps
YP = 7 Pa
Gels = 3,5/7 Pa
pH = 9,7

Samples of the test fluid returning from the hole was taken when circulating after the test was completed. Generally, the fluid was in very good condition. The following properties were recorded:

PV = 39 cps
YP = 12 Pa
Gels = 4/12 Pa
pH = 10,5

A standard P & A procedure was carried out. In spite of several cement jobs, the mud showed to be well controlable by addition of premixed thinning chemicals (Ligthin and Ancotemp) and Sodium Bicarbonate.

3. SOLIDS CONTROL

The shakers were run with 60 mesh top screens and 120 mesh bottom screens.

4. VOLUME DISTRIBUTION

Volume built:	194 m^3
Transferred from 8 1/2" section:	349 m^3
Gained from behind 13 3/8" csg:	26 m^3
Lost on surface:	57 m^3
Dumped:	426 m^3
Left in hole:	86 m^3
Final volume:	0 m^3

Recommendations:

No major mud problems were experienced in this section. The same system is recommended for future similar conditions.

MUD VOLUME DISTRIBUTION

Anchor Drilling Fluids											Anchor Drilling Fluids	
					Mud volume distribution summary							
WELL: 34/10-36						***AREA: GULLFAKS SØR***					***RIG: DEEPSEA BERGEN***	
Hole size	**Hole From-to**	**Hole Length**	**Mud/brine Built**	**Volume gained**	**Dumped**	**Lost to Formation**	**Lost on surface equipment**	**Mud left between csg/csg plus left in hole**	**cuttings volume drilled**		**Mud transf. to next section**	**Mud type used for interval**
inch	*m*	*m*	*m3*		*m3*	*m3*	*m3*	*m3*	*m3*		*m3*	
36	159-226,5	67,5	1039		756				44,33		283	BENTONITE/CMC EHV/SEAWATER
26	226,5-1070	843,5	1245		1445				288,90		83	BENTONITE/CMC EHV/SEAWATER
17 1/2	1070-2115	1045	1032		312		257	70	162,18		476	GYPSUM/PAC
12 1/4	2115-3010	895	789		627		346	60	68,02		232	GYPSUM/PAC
8 1/2	3010-3640	630	679		418		144		23,06		349	BENTONITE/ANCOTEMP
TEST, P & A	-	-	194	26	426		57	86			0	BENTONITE/ANCOTEMP
TOTALS												
Start volume:			0	m3			Total mud/Brine left/lost downhole				216	m3
Mud/Brine built:			4978	m3			Total mud/Brine to sea:				4788	m3
Mud/Brine dumped:			3984	m3			Total cuttings volume drilled:				586,49	m3
Mud/Brine lost to formation:			0	m3								
Mud/Brine lost over solids						COMMENTS:	36" SECTION: Returns to seabed.					
control equipment:			804	m3			26" SECTION: Returns to seabed.					
Mud/Brine left between csg/csg							17 1/2" SECTION: 70 m3 left behind casing.					
plus left in hole:			216	m3			12 1/4" SECTION: 60 m3 left behind casing.					
Gained:			26	m3			TEST; P & A: 26 m3 gained from behind 13 3/8" casing.					
Final volume:			0	m3								

MUD PROPERTIES SUMMARY

Anchor Drilling Fluids																														Anchor Drilling Fluids
														DRILLING MUDPROPERTIES RECORD																
WELL NO: 34/10-36																														AREA: GULLFAKS SØR
DAY	DATE	DEPTH	HOLE	MW	F.VIS	VG-METER READINGS								AV	PV	YP	GEL	GEL	pH	API	HTHP	Cl-	Pf	Mf	TOT.	Ca++	SOLIDS	OIL	SAND	MBT	EX GYP	HGS	LGS	Bacteria
no.	1992		SIZE			600	300	200	100	60	30	6	3				10sec	10min							H								Test
		mtre	inch	S.G.	s/qt.	rpm	rpm	rpm	rpm	rpm	rpm	rpm	rpm	cpe	cpe	Pa	Pa	Pa		ml	ml	mg/l	ml	ml	mg/l	mg/l	vol%	vol%	vol%	kg/m3	kg/m3	kg/m3	kg/m3	org./ml
1	26-apr	RIG IN TRANSIT																																
2	27-apr	RIG IN TRANSIT																																
3	28-apr	184	9 7/8	1,04	100+																													
4	29-apr	673	9 7/8	1,18	72	34	24	15	9	6	5	3	2	17	10	7	2	2																
5	30-apr	226	36	1,18	50	30	21	18	13	11	9	8	7	15	9	6	7,5	10																
6	1-mai	226,5	36	1,18	80	49	33	28	22	19	16	11	10	24,5	16	8,5	6	8	9,4															
7	2-mai	348	26	1,18	80	49	33	28	22	19	16	11	10	24,5	16	8,5	6	8	9,4															
8	3-mai	843	26	1,18	80	49	33	28	22	19	16	11	10	24,5	16	8,5	6	8	9,4															
9	4-mai	1070	26	1,18	72	47	26	19	10	7	4	2	1	23,5	19	4,5	0,5	1	8,7															
10	5-mai	1070	26	1,18	74	52	33	22	13	9	5	2	1	26	19	7	1	1	8,1															
11	6-mai	1070	26	1,18	74	52	33	22	13	9	5	2	1	26	19	7	1	1	8,1															
12	7-mai	1070	17 1/2	MIXING GYP/PAC MUD																														
13	8-mai	1070	17 1/2	1,25	62	56	34	24	15	9	6	2	2	29	24	5	1	1	8,7	4,2		21000	0	0,6	4600	2600	8	0	0	0	6	265	42	
14	9-mai	1070	17 1/2	1,25	62	58	34	24	15	9	6	2	2	29	24	5	1	1	8,7	4,2		21000	0	0,6	4600	2600	8	0	0	0	6	265	42	
18	10-mai	1171	17 1/2	1,25	60	50	30	23	13	9	6	2	2	25	20	5	1	1,5	8,6	3,7		21000	0	0,5	4500	2700	8	0	0,25	0	6,5	265	42	
16	11-mai	1392	17 1/2	1,30	58	56	33	24	14	9	6	2	2	28	23	5	1	1	8,3	3,7		21000	0	0,4	4400	2560	11,5	0	2,5	20	6,5	250	143	
17	12-mai	1624	17 1/2	1,30	59	60	35	25	14	9	6	2	2	30	25	5	1	1,5	8,2	3,4		21000	0	0,4	4500	2640	11	0	3	30	5,7	271	117	
18	13-mai	1918	17 1/2	1,30	58	65	38	27	16	11	7	3	2	32,5	27	5,5	1	1,5	8,2	3,3		21000	0	0,4	4640	2680	11	0	1,75	60	6	271	117	<1000
19	14-mai	2050	17 1/2	1,30	58	62	35	24	14	10	6	2	1	31	27	4	1	1,5	8,3	3,1		21000	0	0,4	4640	2800	11,5	0	2,5	60	5,6	271	117	<1000
20	15-mai	2115	17 1/2	1,30	58	63	37	27	15	10	6	2	1	31,5	26	5,5	1	1,5	8,4	2,8		21000	0	0,4	4800	2800	11	0	1,5	62	5,5	271	117	<1000
21	16-mai	2115	17 1/2	1,30	63	63	36	25	14	9	5	2	1	31,5	27	4,5	1	1,5	8,4	2,5		21000	0	0,4	4700	2800	11	0	1,5	60	5,5	271	117	<1000
22	17-mai	2115	17 1/2	1,31	72	66	39	28	16	11	6	2	1	33	27	6	1	1,5	8,2	2,6		21000	0	0,4	4800	2800	11	0	1,25	62	5,8	271	117	<1000
23	18-mai	2115	17 1/2	1,33	75	62	35	25	14	9	5	2	1	31	27	4	1	1,5	8	2,7		21000	0	0,4	4800	2800	12	0	1,5	62	5,8	308	121	<1000
24	19-mai	2180	12 1/4	1,35	62	64	37	27	16	11	6	2	1	32	27	5	1	3,5	8,6	3,1	19,6	21000	0	0,4	4000	3000	13	0	1	62	5,8	318	140	100000
25	20-mai	2350	12 1/4	1,35	62	62	37	27	16	11	7	2	1	31	25	6	1	3,5	8,1	3,4	17,6	21000	0	0,4	3800	2800	13	0	1	65	5,8	318	140	100000
26	21-mai	2381	12 1/4	1,40	61	65	38	28	16	11	7	2	2	32,5	27	5,5	1	3	7,9	3,1	18	21000	0	0,5	4300	2900	14	0	0,75	60	6	408	111	<1000
27	22-mai	2426	12 1/4	1,40	66	63	36	26	15	11	7	2	1	31,5	27	4,5	1	2,5	7,7	2,9	17	20500	0	0,4	4280	3160	14	0	1	57	6	408	111	10000
28	23-mai	2574	12 1/4	1,40	63	66	36	29	17	12	7	2	1	33	28	5	1	2,5	7,7	3	17	21000	0	0,5	4120	3040	14,5	0	0,5	57	6	408	111	10000
29	24-mai	2661	12 1/4	1,40	62	66	38	28	16	11	7	2	1	33	28	5	1	2,5	7,9	3	18	21000	0	0,4	4340	3200	14	0	0,5	57	6	408	111	10000
30	25-mai	2746	12 1/4	1,40	62	70	41	30	18	13	8	3	2	35	29	6	1,5	3	7,8	3	17	21000	0	0,4	4400	3100	14	0	0,5	60	6	408	111	10000
31	26-mai	2825	12 1/4	1,45	61	74	43	32	19	14	8	3	2	37	31	6	1	4	7,8	3	15	21000	0	0,4	4580	3040	14,5	0	0,5	56	6	408	111	10000
32	27-mai	2863	12 1/4	1,50	59	76	44	32	19	14	8	3	2	38	32	6	1	6	7,7	3,2	17	21000	0	0,4	4280	2800	19	0	0,5	56	6	461	210	10000
33	28-mai	2952	12 1/4	1,50	56	77	46	32	19	14	8	3	2	38,5	31	7,5	1,5	10	7,6	3,4	18	21000	0	0,5	4240	2720	18	0	0,5	53	6	503	157	10000
34	29-mai	3010	12 1/4	1,50	50	73	43	34	22	16	12	4	3	36,5	30	6,5	1,5	17	7,6	4		21000	0	0,5	4300	2700	19	0	0,5	48	6	461	210	10000
35	30-mai	3010	12 1/4	1,50	52	73	43	34	22	16	12	4	3	36,5	30	6,5	2	14	7,6	3,7		21000	0	0,5	4000	2960	19	0	0,5	47	6	461	210	10000
36	31-mai	3010	12 1/4	1,54	51	62	36	27	16	11	7	2	1	31	26	5	1	6,5	7,6	3,8		21000	0	0,5	4280	2600	19	0	0,5	46	6	461	210	10000
37	1-jun	3010	12 1/4	1,54	51	63	36	27	15	11	7	2	1	31,5	27	4,5	1	6,5	7,6	3,8		21000	0	0,5	4360	2720	19	0	0,5	46	6	461	210	10000
38	2-jun	3010	12 1/4	1,54	52	58	34	25	16	12	8	3	2	29	24	5	1	8,5	7,8	3,9		21000	0	0,5	4360	2720	19	0	0,5	47	6	461	210	10000
39	3-jun	3010	8 1/2	1,54	52	58	34	25	16	12	8	3	2	29	24	5	1	6,5	7,6	3,8		21000	0	0,5	4360	2720	19	0	0,5	46	6	461	210	10000
40	4-jun	3036	8 1/2	1,47	61	64	38	30	20	15	10	4	3	32	26	6	2,5	11	8,7	3,7	14	1400	0	0,6	160	120	16	0	0,75	55		557	72	
41	5-jun	3060	8 1/2	1,47	48	51	30	23	14	10	7	3	2	25,5	21	4,5	2	5,5	8,9	3,6	13	1500	0,1	0,8	160	120	16	0	0,5	57		557	72	
42	6-jun	3329	8 1/2	1,47	54	66	39	30	19	14	9	4	3	33	27	6	2	6,5	8,7	3,5	13	1600	0,1	0,8	120	80	17	0	0,5	60		515	124	
43	7-jun	3363	8 1/2	1,47	45	54	32	25	16	12	8	4	3	27	22	5	2	4,5	8,7	3,5	13	1500	0,1	0,9	160	80	17	0	0,25	57		515	124	

Anchor Drilling Fluids

DRILLING MUDPROPERTIES RECORD

Anchor Drilling Fluids

WELL NO: 34/10-36

AREA: GULLFAKS SØR

DAY	DATE	DEPTH	HOLE	MW	F.VIS	VG-METER READINGS								AV	PV	YP	GEL	GEL	pH	API	HTHP	Cl-	Pf	Mf	TOT.	Ca++	SOLIDS	OIL	SAND	MBT	EX GYP	HGS	LGS	Bacteria
no.	1992		SIZE			600	300	200	100	60	30	6	3				10sec	10min							H									Test
		mtre	inch	S.G.	s/qt.	rpm	rpm	rpm	rpm	rpm	rpm	rpm	rpm	cpe	cpe	Pa	Pa	Pa		ml	ml	mg/l	ml	ml	mg/l	mg/l	vol%	vol%	vol%	kg/m3	kg/m3	kg/m3	kg/m3	org./ml
44	8-jun	3390	8 1/2	1,47	48	56	33	25	16	12	8	3	2	28	23	5	2	4,5	8,5	3,6	13	1800	0,1	0,9	200	140	17	0	0,5	57		515	124	
45	9-jun	3417	8 1/2	1,47	46	51	30	23	14	10	7	3	2	25,5	21	4,5	1,5	4,5	8,6	3,7	13	1800	0,1	0,9	240	120	17	0	0,5	57		515	124	
46	10-jun	3556	8 1/2	1,47	45	51	30	22	14	10	7	4	3	25,5	21	4,5	1,5	4	8,6	3,6	12	1800	0,1	1	240	120	17,5	0	0,5	59		500	145	
47	11-jun	3640	8 1/2	1,47	47	54	32	24	15	11	7	3	2	27	22	5	2	4	8,6	3,2	12	1800	0	1	200	120	17,5	0	0,5	57		500	145	
48	12-jun	3640	8 1/2	1,52	52	63	37	28	18	15	9	4	3	31,5	26	5,5	2	4	8,6	3,1	12	1900	0	1	240	180	20	0	0,5	60		524	194	
49	13-jun	3640	8 1/2	1,52	52	68	40	31	20	15	10	5	4	34	28	6	2,5	4,5	8,8	3,2	12	1900	0,1	1,1	240	160	19,5	0	0,5	68		545	168	
50	14-jun	3640	8 1/2	1,56	50	68	40	31	19	14	9	4	3	34	28	6	2,5	4,5	8,5	3	11	1900	0,1	1	240	160	20,5	0	0,5	69		612	150	
51	15-jun	3640	8 1/2	1,56	64	76	45	35	22	16	11	5	4	38	31	7	2,5	4,5	8,4	3	11	1900	0	1,4	280	180	20,5	0	0,5	66		612	150	
52	16-jun	3640	8 1/2	1,56	58	56	33	24	15	11	8	4	3	28	23	5	2	4	8,8	3,1	12	1900	0,1	1,5	240	160	20,5	0	0,5	65		612	150	
53	17-jun	3640	8 1/2	1,56	59	71	41	30	19	15	10	5	4	35,5	30	5,5	2	4	8,5	3	11	1900	0,1	1,4	240	160	20,5	0	0,5	66		612	150	
54	18-jun	3640	8 1/2	1,56	51	75	44	33	21	16	11	5	4	37,5	31	6,5	2,5	5	8,8	2,9	11	1900	0,1	1,4	240	160	20,5	0	0,5	68		612	150	
55	19-jun	3640	8 1/2	1,56	60	60	34	27	16	11	8	4	3	30	26	4	2	4	8,6	3	11	1900	0,1	1,4	240	160	20,5	0	0,5	67		612	153	
56	20-jun	3640	TEST	1,56	61	68	39	27	18	13	9	4	3	34	29	5	3	4,5	8,9	3	11	1800	0,1	1,6	260	180	20,5	0	0,5	68		612	150	
57	21-jun	3640	TEST	1,56	55	59	34	26	17	13	9	5	4	29,5	25	4,5	2,5	7	10,6	3	11	1900	0,4	2	220	160	20,5	0	0,5	66		618	150	
58	22-jun	3640	TEST	1,56	52	65	38	28	17	13	9	4	3	32,5	27	5,5	2,5	4	11,9	3,9	15	1900	1,2	3	140	120	20,5	0	0,5	63		612	150	
59	23-jun	3640	TEST	1,56	50	60	35	27	17	13	9	4	3	30	25	5	2,5	9	12,3	4,6	15	1900	2,1	4,6	140	120	20,5	0	0,5	63		612	150	
60	24-jun	3460	TEST	1,45	57	57	35	26	16	12	9	4	3	28,5	22	6,5	2	10	12,3	4,6	15	1700	2	4,2	180	160	18	0	0,4	56		424	203	
61	25-jun	3460	TEST	1,45	65	70	42	32	20	15	10	5	4	35	28	7	2	9	12,2	4,7	16	1700	1,5	2,7	120	120	17	0	0,25	58		466	151	
62	26-jun	3460	TEST	1,45	64	67	40	29	18	14	9	3	2	33,5	27	6,5	2	8	12,2	4,7	16	1700	1	2	120	120	17	0	0,25	58		466	151	
63	27-jun	3460	TEST	1,45	64	64	38	28	17	13	9	4	3	32	26	6	2	7,5	12,2	4,7	16	1800	1	2	110	110	17	0		58		466	151	
64	28-jun	3640	TEST	1,45	64	63	37	27	17	13	9	4	3	31,5	26	5,5	2	7,5	12,2	4,7	16	1800	0,9	1,9	100	100	17	0		58		466	151	
65	29-jun	3640	TEST	1,45	70	63	37	27	17	13	9	4	3	31,5	26	5,5	2	7	12,2	4,6	16	1800	0,9	1,9	100	100	17	0		58		466	151	
66	30-jun	3640	TEST	1,45	73	60	35	26	16	12	8	3	2	30	25	5	2	7	12,2	4,7	16	1800	0,9	1,9	100	100	17	0		58		466	151	
67	1-jul	3640	TEST	1,45	76	60	35	26	16	12	8	3	2	30	25	5	2	7	12,2	4,8	16	1800	0,9	1,9	100	100	17	0		58		466	151	
68	2-jul	3640	TEST	1,45	57	61	36	26	17	13	8	3	2	30,5	25	5,5	2	7	11,7	4,9	16	1900	0,5	1,6	100	100	17	0	0,5	57		466	151	
69	3-jul		P & A	1,45	55	60	35	26	16	12	8	3	2	30	25	5	2	7	11,7	4,9	16	1900	0,5	1,6	100	100	17	0	0,5	57		466	151	
70	4-jul		P & A	1,45	54	64	38	28	17	13	8	3	2	32	26	6	2	8	12,1	5	16	1900	0,8	1,8	150	150	17	0	0,5	57		466	151	
71	5-jul		P & A	1,45	58	66	39	30	19	15	10	4	3	33	27	6	2	8	12,5			1900	0,8	1,7	160	160	17			57		466	151	
72	8-jul		P & A	1,45	57	74	44	35	22	17	12	6	5	37	30	7	2,5	15	12,6	5,4		1900	1,7	3,3	240	240	17			57		466	151	
73	9-jul		P & A	1,45	51	48	28	20	12	9	6	3	2	24	20	4	2	4	12	5,3		2100	0,7	1,6	200	200	17			57		466	151	
74	10-jul		P & A	1,45	62	61	37	29	19	15	10	5	4	30,5	24	6,5	2	16	12	4,7		4800	0,7	1,5	400	400	17			55		466	151	
75	11-jul		P & A	1,45	63	73	45	36	24	19	13	7	6	36,5	28	8,5	4	18	12,2	5,6		4900	0,8	1,8	400	400	17			55		466	151	
76	12-jul		P & A	1,45	62	56	34	28	19	16	12	7	6	28	22	6	5	22	12,1	5,3		4800	0,5	1,5	400	400	17			55		466	151	
77	13-jul		P & A	END WELL																														