3. TRYKKGRADIENTER

3.1 Sammenstilt trykkplott

3.1.1 Overlagringstrykk

Overlagringsgradienten er basert på tetthetslogg.

3.1.2 Poretrykk

Brønn 34/10-33C er et sidesteg til brønn 34/10-33B, og ble boret ut fra 34/10-33B ved 3272 m MD BD (loggers dyp) som tilsvarer 3216.5 m SVD MHN, d.v.s. under toppen av reservoaret.

Poretrykket fra FMT tilsvarer ca. 1.42 g/cm^3 ved "kick off" punktet (1.43 g/cm^3 i toppen av reservoaret).

3.1.3 Oppsprekkingstrykk

Oppsprekkingstrykket er fra "minifrac" tester i 34/10-33 og fra "Leak Off Tests" i området.

Et sammenstilt trykkplott er vedlagt i Fig. 3.1.

3.2 Resultater fra FMT (Formation Multi Tester)

Det ble foretatt to kjøringer med FMT (kjøring nr. 1A og 1B) med Atlas Wireline Services. Under kjøring nr. 1B ble det også gjort prøvetaking (3641 m MD BD). 2 3/4 gallon kammer ble åpnet på riggen, mens 1 gallon kammer (nr. ST015) ble sendt til analyse på land. Resultater av en analyse gjort i slam-laboratoriet på riggen ga følgende:

Formasjonsvann:

pH :	Ingen alkanitet - pH mindre enn 7.5
Cl^-:	25000 ppm
Retort ana.:	solids - 4 %
Total hardhet:	1400
Calsium:	ca. 800 - 1000 (vanskelig å se titrasjon)

Filtrat:

pH:	Ingen alkanitet tilstede
Cl^-:	4500
	vann - 13 %
	olje - 83 %

I kammeret var det ca. 50% vann og 50 % filtrat.

FMT-dataene er listet i Tabell 3.1.
Gass-olje kontakten (Fig. 3.2) er estimert til 3240 ± 5 m SVD MHN i Ness formasjonen. Olje-vann kontakten i Rannoch/Etive er estimert til 3460 ± 20 m SVD MHN.

Kjøring nr.:	Målt dyp (m MD BD)	Vert. dyp (m SVD MHN)	Form. trykk (bar)	Hydr.st.trykk (bar)	Kommentarer
1A	3291.0				Ikke forsegling
	3290.5				"
	3291.5	3231.5	450.19	497.18	God perm.
	3297.0				Ikke forsegling
	3297.5	3236.2	450.32	497.53	God perm.
	3305.0				Ikke forsegling
	3304.5				"
	3305.5				"
	3330.0	3261.3		501.95	Tett formasjon
	3330.5				Ikke forsegling
	3349.0				"
	3349.5	3276.0	452.51	503.74	God perm.
	3352.5				Ikke forsegling
	3353.0				"
	3373.0				"
	3372.5				"
	3399.3				"
	3409.0	3319.9	455.32	510.95	God perm.
	3424.0	3330.5	455.71	512.55	"
	3449.0	3348.1	457.34	515.50	"
	3455.0				Ikke forsegling
	3455.5				"
	3486.0				"
	3486.5				"
	3485.5				"
	3504.0				"
	3505.0				"
	3507.5	3388.9	459.96	521.31	God perm.
1B	3281.5	3223.7	450.08	498.51	God perm.
	3291.5	3231.5	450.28	499.66	"
	3305.0	3241.7	450.51	501.24	"
	3330.0	3261.3		504.70	Tett fornmasjon
	3330.5	3261.6		504.63	"
	3349.5	3276.1	452.67	506.74	God perm.
	3373.0	3293.6	(454.78)	509.71	Supercharged
	3399.3	3313.0		512.11	Ikke forsegling
	3455.5	3352.6	457.61	518.91	God perm.
	3486.0	3374.0	459.04	522.24	"
	3512.5	3392.4	460.38	525.23	"
	3541.5	3412.5	461.99	528.33	"
	3555.0	3422.0	463.27	529.61	Middels perm.
	3564.0	3428.3	463.81	530.43	"
	3580.0	3439.4	464.75	531.98	Lav perm.
	3596.0	3450.6	465.30	533.59	God perm.
	3609.0	3459.0	465.91	534.78	"
	3614.2	3463.4	466.18	535.29	"
	3631.0	3475.3	(473.5)	537.07	Supercharged
	3641.0	3482.4	468.77	537.91	Middels perm.
	3658.5	3494.9	470.01	539.83	"
	3630.5	3474.9	473.75 *	535.52	Lav perm.
	3517.0	3395.5	460.46 *	521.02	God perm.
	3512.5	3392.4	460.26 *	520.43	"
	3501.0	3384.4	459.78 *	519.24	Lav perm.
	3641.0	3482.4	468.74		Prøvetaking

Tabell 3.1 FMT-data fra 34/10-33C

IV 10. DRILLING FLUID

SUMMARY

STATOIL

34/10-33-C & T-1

DETAILED DISCUSSION BY INTERVALS

WELL 34/10-33-C

The well 34/10-33 B was abandoned and an EZSV set at 3280 metres. This well, 34/10-33 C, was a side-track through the 9 5/8" casing from a Packstock tool set at 3279 metres. It was drilled to a TD of 3752 metres, and logged. Then a 7" liner was set at 3751 metres.

All operations were carried out using INTERDRILL NT oil based invert mud. The initial volume of mud was salvaged from the well 34/10-33 B and its properties were maintained to the same specifications. These were:

Plastic Viscosity... 33 - 38 cp.
Yield Point..... 18 - 20 lb/100 sqft
Filtration HTHP)..... 1 ml.
Oil/Water ratio 90/10
Stability..... 1700 volts
Activity..... 0.8 - 0.85

The only major difference in mud properties used, from those used in 33/10-33 B, was that the mud weight was maintained at 1.55 s.g. throughout the section. This appeared sufficient as no mud related problems were encountered in the section, and as there was no repetition of the hole instabilty problem from before.

DETAILED DISCUSSION BY INTERVALS

WINDOW MILLING SECTION

A packstock tool and starter mill assembly was run in the hole, the packstock oriented, and set at 3279 metres. Milling of the window commenced from 3272 metres, and the mud weight was reduced from 1.62 s.g. to 1.55 s.g by bleeding in base oil.

After an abnormal pressure drop was observed, the string was pulled wet looking for a washout. Nothing was found and a new milling assembly was run, but as no progress could be made, this assembly was pulled and replaced with an assembly consisting of window and water-melon mills. This was used until 3274 metres, where due to the slow progress, it was replaced with another window mill assembly. This was used to cut the rest of the window to 3280 metres. Finally a taper mill was run to ream and clean the window, before commencing to drill.

During this operation mud properties were maintained and finely tuned. Due to the number of slugs pumped, about 12 m3 of base oil/unweighted mud had to be added to the circulating system to maintain weight at 1.55 sg.

STATOIL

34/10-33-C & T-1

DETAILED DISCUSSION BY INTERVALS

8 1/2" SECTION HOLE

The section was drilled using a down hole motor and was logged continuously using a MWD tool. After drilling formation to 3285 metres, an F.I.T. was performed to 1.70 s.g. equivalent mud density. The TD of the section and of the well was 3752 metres. To achieve this required trips at 3342 metres, 3367 metres, 3430 metres, and 3581 metres.

The hole gave no drilling problems and only minor conditioning of the mud was necessary. Treatments of Gilsonite were added to keep the fluid loss under 1.5 mls. The mud weight was maintained at 1.55 s.g. throughout the section. A wiper trip was necessary during logging. However; the 7" liner, which was run directly after the logging was finished, was run, landed at 3751 metres and cemented without problems of any sort.

STATOIL

34/10-33-C & T-1

DETAILED DISCUSSION BY INTERVALS

COMPLETION SECTION

The Interdrill NT oil based mud system was displaced to a Bentonite/FCL system. To separate the two systems a weighted TRUVIS and base oil spacer was used. The Bentonite/FCL system returned early, with over 25 m3 of severely contaminated interface having to be dumped (into the cuttings bags for disposal). After the water base system had been circulated and checked, the system was found to contain from 6% to 8% oil; indicating an intake of 8% to 9% of OBM. The oil content of the system finally stablized at nine percent. Because of this oil intake, the system had to be reconditioned with extra additions of lignosulfonate.

A pressure test of the liner lap failed and it was necessary perform a sqeeze job. This resulted in having to drill over 300 metres of cement out of the 9 5/8" casing. As a consequence the Bentonite/FCL system was converted into essentially a low Lime mud system (the Pm reaching as high as 15). After the system had been treated with FCL, to disperse and condition it, completion procedures were continued.

However; now because of the oil and lime in the system, the mud started to react quite badly to the high down hole temperature (120 degrees celcius), and high pump pressures were needed to break circulation.

It was decided to replace the system with a fresh Bentonite/FCL mud. When the new system had displaced the old and had been treated to obtain the desired temperature stability, the drill string was pulled out of the hole and testing procedures were commenced.

STATOIL

34/10-33-C & T-1

DETAILED DISCUSSION BY INTERVALS

WELL 34/10-T-1

TESTING SECTION

A production packer was set at 3220 metres and the testing string assembly was run and stung into it. After overcoming various problems in achieving a satisfactory pressure test, the testing programme was started.

The well was flowed for several days and the various problems with the equipment were located and fixed. Then, once everything was operating satisfactorily, the mud engineer was released for the period of the production test.

At the end of the test, the mud engineer was recalled to the rig. The production test string was pulled from the packer and the well circulated with no problems. Finally the well was temporarily plugged back by setting a cement plug from 3000 to 2900 m.

STATOIL

34/10-33-C & T-1

CONCLUSIONS AND RECOMMENDATIONS

WELL 34/10-33-C

MILLING SECTION

Operations for this section were carried out using the INTERDRILL NT mud system. There were no mud related problems and the Packstock tool was positioned and set with ease. In similar circumastances, the use of this system during these types of procedures can be recommended.

8 1/2" HOLE SECTION

This section was drilled using the INTERDRILL NT mud system. Drilling rates were rapid and no mud or hole problems occurred. The 7" Liner was run and set without any trouble.

Required mud treatments were small. They mainly consisted of the building and treating of the new volume required to fill the hole, and to replace the volume that was lost through adhesion to removed cuttings and solids.

During this sidetrack the mud weight was maintained at 1.55 s.g. and there was no repetition of the hole instability experienced while drilling 34/10-33-B. From this it would appear that the formation stability is fairly sensitive to mud weight. Thus in the drilling of future wells, the mud weight used through this depth interval should be maintained in the range of 1.55 s.g.

The use of the INTERDRILL NT system in future drilling projects for this interval is recommended.

COMPLETION SECTION

The INTERDRILL NT mud was displaced by a Bentonite/FCL mud, using a loe YP weighted oil based mud spacer. The separation was poor and 25 m3 of contaminated interface had to be dumped (about 50/50 for each system). In addition, there was some oil contamination of the whole Bentonite/FCL system.

What appears to have happened is that the Oil based spacer did not reach turbulent flow as planned during displacement, and as a result channeling of the oil mud was not avoided.

STATOIL

34/10-33-C & T-1

CONCLUSIONS AND RECOMMENDATIONS

In future we recommend the use of a high viscosity IDFREE spacer, with a YP of +/- 45 lbs/100 ft2. It should also be considered to follow the Idfree spacer with a portion of waterbased mud without lignosulphonate. This to avoid the problem of lignosulphonate emulsifying the oil as it enters the waterbased mud.

The system was eventually replaced by a fresh Bentonite/FCL mud. This was because after squeezing the liner and drilling out the cement, the mud system had effectively been converted to a Low Lime mud.

A characteristic of this type of mud is that, when hole temperatures are over 120 C, they can develop excessive Gel Strengths when static for long periods of time. On a circulation after a perforation run, the pump pressure required to break circulation was high. This seemed to indicate that these types of Gels were begining to form. Thus, since the programme was projecting that the mud would have to remain static in the hole for over a month, it was decided to change out to a fresh uncontaminated Bentonite/FCL mud.

When a freshly prepared Bentonite mud is displaced into the hole such as this and is first exposed to high temperatures, the viscosity and gel strengths increase. This is because the increased temperature acts to cause the the Bentonite to continue to yield.

The system can be stabelized to temperature by the additions of a thinners such as lignosulphonates. Since over-treatment can result in too low a final viscosity, it is necessary that the system be circulated and treated for at least 2 to 3 circulations. This allows the Bentonite to yield fully at the working temperature and ensures that all the Bentonite particles are coated with lignosulphonate.

STATOIL

34/10-33-C & T-1

CONCLUSIONS AND RECOMMENDATIONS

WELL 33/10-T-1

TESTING

The well was flowed for the required period. Some remedial work was done with out problems. At the end of the test, the well was killed and the test string was retrieved without trouble, before the well was plugged and suspended.

The Bentonite/FCL mud performed satisfactorily and economically. Its use should be considered under similar conditions in the future.

DRILLING FLUID PROPERTIES RECORD

WELL NAME: 34/10-33 C

AREA: GULLFAKS SOER

OIL BASED MUD

RIG: DEEP SEA BERGEN

CONTRACTOR: O.D.C.C.

STATOIL

FLUID SYSTEM: INTERDRILL N.T.

IDF MUD ENGINEERS: ROBINSON

DATE	DEPTH M	WEIGHT S.G.	TEMP	FV	AV	PV	YP	GELS 10s	GELS 10m	HTHP @250	CAKE	Es	WATER %	OIL %	SOLID %	SALT %	OIL/H2O RATIO		BAR w/v	BAR %	LGS w/v	LGS %	ALK	XS LIME	WPS	Aw	REMARKS
11/07/89	3279	1.56	33	61	39.0	30	18	17	37	1.4	1	1550	7	69	24	0.29	91	9	781.9	18.6	133.9	5.1	2.6	11.2	128.5	0.88	RUN P'STOCK. MILLING
12/07/89	3279	1.56	32	80	37.5	29	17	17	38	1.4	1	1600	7	70	24	0.28	91	9	785.4	18.7	132.2	5.1	2.8	12.0	130.7	0.88	MILLING
13/07/89	3279	1.56	28	105	38.5	30	17	17	37	1.4	1	1540	7	70	24	0.30	91	9	784.3	18.6	132.1	5.1	2.8	12.0	142.3	0.86	MILLING
14/07/89	3281	1.565	43	83	38.5	30	17	17	40	1.4	1	1600	7	70	24	0.34	91	9	796.1	18.9	123.7	4.7	2.5	10.7	157.6	0.84	CUT WINDOW AND REAM
15/07/89	3342	1.55	61	61	44.0	34	20	20	48	1.2	1	1660	7	70	24	0.39	91	9	755.3	17.9	147.9	5.7	2.5	10.7	173.0	0.82	DRILL. FIT. DRILL
16/07/89	3382	1.55	44	76	42.5	33	19	21	51	1.2	1	1620	7	70	24	0.39	91	9	755.3	17.9	147.9	5.7	2.5	10.7	173.0	0.82	DRILL/TRIP/DRILL
17/07/89	3430	1.57	36	95	44.0	34	20	17	45	1.4	1	1640	6	69	25	0.36	92	8	764.7	18.2	168.8	6.5	2.3	9.9	174.9	0.81	DRILL/TRIP/DRILL
18/07/89	3581	1.55	30	87	45.0	35	20	20	50	1.0	1	1780	6	70	24	0.36	92	8	759.1	18.0	146.2	5.6	2.4	10.3	174.9	0.81	DRILL/TRIP/DRILL
19/07/89	3730	1.55	45	73	45.5	35	21	21	52	1.0	1	1830	6	71	24	0.35	93	7	762.6	18.1	144.4	5.5	3.0	12.9	181.8	0.80	DRILL/TRIP/DRILL
20/07/89	3752	1.55	45	87	48.0	38	20	21	53	1.0	1	1800	6	70	25	0.35	93	7	739.1	17.6	172.0	6.6	3.2	13.7	181.8	0.80	TRIP7DRILL/CIRC
21/07/89	3752	1.55	19	119	47.5	37	21	21	47	1.2	1	1780	5	70	25	0.35	93	7	718.6	17.1	197.5	7.6	3.2	13.7	199.9	0.77	LOG/WIPER TRIP/LOG
22/07/89	3752	1.55	19	121	47.5	37	21	21	48	1.2	1	1800	5	70	25	0.35	93	7	718.6	17.1	197.5	7.6	3.1	13.3	199.9	0.77	LOGGING
23/07/89	3752	1.55	19	119	47.5	38	19	21	47	1.2	1	1800	5	70	25	0.35	93	7	718.6	17.1	197.5	7.6	3.1	13.3	199.9	0.77	RUN & CMT LINER
24/07/89	3752	1.57	48	119	61.0	47	28	26	57	1.6	1	1650	10	66	24	0.27	87	13	792.9	18.8	127.7	4.9	2.0	8.6	87.5	0.93	DRILL CEMENT
25/07/89	3752	1.57	49	130	61.5	46	31	27	62	1.8	1	1640	11	64	25	0.31	85	15	738.7	17.5	186.4	7.1	2.4	10.3	90.9	0.92	DISP & B'LOAD OBM

DRILLING FLUID PROPERTIES RECORD

WELL NAME: 34/10-33 C 7.00" HOL

AREA: GULLFAKS SOER

WATER BASED MUD

RIG: DEEP SEA BERGEN

CONTRACTOR: O.D.C.C.

STATOIL

FLUID SYSTEM: BENTONITE/FCL

IDF MUD ENGINEERS: ROBINSON/BULGER

DATE	DEPTH M	WEIGHT S.G.	TEMP	FV	AV	PV	YP	GELS 10s	GELS 10m	FLUID LOSS API	FLUID LOSS HTHP	CAKE	pH	Pf	Mf	Pm	TOT HARD	CL- G/L	OIL %	SOLID %	SAND %	MBT	BAR Kg/M3	BAR % v/v	LGS Kg/M3	LGS % v/v	REMARKS
26/07/89	3752	1.56	40	41	23.5	18	11	7	15	0.0	0.0	0	11.0	0.90	1.25	1.65	880	10.5	8	24	0.0	62.0	511.6	12.2	294.5	11.3	SQEEZE LINER LAP
27/07/89	3752	1.55	54	47	25.5	16	19	12	19	0.0	0.0	0	11.5	0.90	1.25	*****	660	11.0	8	26	0.0	57.0	401.2	9.5	414.7	15.9	DRILL CEMENT
28/07/89	3752	1.55	43	40	20.0	15	10	9	16	0.0	0.0	0	11.5	1.00	1.30	*****	640	11.5	9	25	0.0	57.0	448.8	10.7	358.5	13.8	DRG CMT & TEST LINER
29/07/89	3752	1.55	15	43	20.5	15	11	9	17	0.0	0.0	0	11.5	1.00	1.30	*****	640	11.5	9	25	0.0	57.0	448.8	10.7	358.5	13.8	TEST TIE BACK PACKER
30/07/89	3752	1.55	15	39	16.0	12	8	10	18	0.0	0.0	0	12.0	1.40	1.65	1.50	160	1.8	0	22	0.0	50.0	521.0	12.4	251.0	9.6	PERF. BUILD NEW MUD
31/07/89	3752	1.55	20	40	17.0	12	10	11	20	0.0	0.0	0	12.0	1.60	1.70	1.75	160	2.7	2	22	0.0	50.0	531.7	12.6	243.8	9.4	DISP. W/NEW MUD
01/08/89	3752	1.55	15	40	16.5	12	9	12	20	0.0	0.0	0	12.0	1.60	1.70	1.75	160	2.7	2	22	0.0	50.0	533.4	12.7	239.1	9.2	RUN TEST STRING
02/08/89	3752	1.55	15	40	16.5	12	9	12	20	0.0	0.0	0	12.0	1.60	1.70	1.75	160	2.7	2	22	0.0	50.0	533.4	12.7	239.1	9.2	PRESS. TEST STRING
03/08/89	3752	1.55	15	46	17.5	12	11	15	25	13.0	0.0	0	11.5	2.20	2.40	3.00	160	3.4	2	22	0.0	50.0	533.8	12.7	237.8	9.1	POOH TEST STRING
04/08/89	3752	1.55	15	42	17.0	12	10	12	22	13.0	0.0	0	11.5	2.00	2.20	3.00	160	2.8	1	22	0.0	50.0	528.2	12.5	242.1	9.3	RUN TEST STRING

DRILLING FLUID PROPERTIES RECORD

WELL NAME: 34/10-33 C 7.00" HOL

AREA: GULLFAKS SOER

WATER BASED MUD

RIG: DEEP SEA BERGEN

CONTRACTOR: O.D.C.C.

STATOIL

FLUID SYSTEM: BENTONITE/FCL

IDF MUD ENGINEERS: VAN LAAR

DATE	DEPTH M	WEIGHT S.G.	TEMP	FV	AV	PV	YP	GELS 10s	GELS 10m	FLUID LOSS API	FLUID LOSS HTHP	CAKE	pH	Pf	Mf	Pm	TOT HARD	CL- G/L	OIL %	SOLID %	SAND %	MBT	BAR Kg/M3	BAR % v/v	LGS Kg/M3	LGS % v/v	REMARKS
05/08/89	3752	1.55	15	42	19.0	13	12	10	18	13.0	0.0	0	12.0	2.20	2.60	3.40	140	3.4	1	22	0.0	50.0	528.6	12.6	240.9	9.2	TEST TEST STRING
06/08/89	3752	1.55	15	42	19.0	13	12	10	18	13.0	0.0	0	12.0	2.20	2.60	3.40	140	3.4	1	22	0.0	50.0	528.6	12.6	240.9	9.2	START TO FLOW WELL
07/08/89	3752	1.55	15	41	18.5	13	11	10	18	13.0	0.0	0	12.0	2.20	2.60	3.40	140	3.4	1	22	0.0	50.0	528.6	12.6	240.9	9.2	SHUT IN. FIX HOSE
08/08/89	3752	1.55	15	38	16.5	12	9	12	19	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	FLOW WELL
09/08/89	3752	1.55	15	38	16.5	12	9	12	19	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
10/08/89	3752	1.55	15	40	16.5	12	9	10	18	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
11/08/89	3752	1.55	15	41	16.5	12	9	10	18	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
12/08/89	3752	1.55	15	41	16.5	12	9	10	18	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
13/08/89	3752	1.55	15	41	16.5	12	9	10	18	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
14/08/89	3752	1.55	15	42	16.5	12	9	10	18	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
15/08/89	3752	1.55	15	42	16.5	12	9	10	18	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
16/08/89	3752	1.55	15	42	16.5	12	9	10	18	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
17/08/89	3752	1.55	15	42	16.5	12	9	10	18	14.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
18/08/89	3752	1.55	15	40	16.5	12	9	10	18	15.0	0.0	0	11.5	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
19/08/89	3752	1.55	20	41	16.5	12	9	10	18	16.0	0.0	0	11.0	2.00	2.40	3.20	160	3.6	1	19	0.0	48.0	655.1	15.6	83.9	3.2	CONTINUE TESTING
20/08/89	3752	1.55	18	42	17.5	13	9	10	18	17.0	0.0	0	11.5	2.00	2.40	3.20	160	5.0	1	19	0.0	43.0	656.1	15.6	81.0	3.1	CONTINUE TESTING
21/08/89	3752	1.56	18	41	18.0	13	10	11	18	18.0	0.0	0	11.5	2.00	2.40	3.20	160	3.0	1	19	0.0	43.0	681.0	16.2	68.8	2.6	ENGINNER RELEASED
31/08/89	3752	1.55	16	40	27.0	18	18	14	21	19.0	0.0	0	10.5	0.32	0.70	0.00	400	3.0	2	19	0.0	43.0	659.9	15.7	81.9	3.1	ENG'R BACK ON RIG
01/09/89	3752	1.55	16	61	54.0	33	42	21	28	26.0	0.0	0	10.5	0.30	0.55	0.00	560	9.5	2	19	0.0	43.0	664.5	15.8	68.8	2.6	WORK ON SURF. EQUIP
02/09/89	3752	1.55	16	41	39.0	33	12	7	21	23.0	0.0	0	10.5	0.30	0.70	0.00	600	10.0	2	19	0.0	43.0	664.9	15.8	67.8	2.6	WORK ON SURF. EQUIP
03/09/89	3752	1.55	16	41	39.5	34	11	8	20	22.0	0.0	0	10.5	0.30	0.75	0.00	600	9.8	2	19	0.0	43.0	664.7	15.8	68.2	2.6	WORK ON SURF. EQUIP
04/09/89	3752	1.55	16	41	39.0	33	12	8	20	22.0	0.0	0	10.5	0.30	0.70	0.00	600	9.8	2	19	0.0	43.0	664.7	15.8	68.2	2.6	WORK ON SURF. EQUIP
05/08/89	3752	1.55	16	42	42.5	36	13	10	22	21.0	0.0	0	10.5	0.32	0.75	0.00	700	10.0	2	19	0.0	42.0	664.9	15.8	67.8	2.6	FLOW WELL
06/09/89	3752	1.55	16	44	46.0	35	22	16	25	21.0	0.0	0	10.5	0.32	0.78	0.00	800	11.0	2	19	0.0	42.0	665.6	15.8	65.7	2.5	FLOW WELL
07/09/89	3752	1.55	16	48	54.0	40	28	18	26	21.0	0.0	0	10.5	0.32	0.78	0.00	800	11.0	2	19	0.0	42.0	665.6	15.8	65.7	2.5	FLOW WELL
08/09/89	3752	1.55	16	75	59.0	41	36	21	30	24.0	0.0	0	10.5	0.30	0.70	0.00	900	11.0	2	19	0.0	42.0	665.6	15.8	65.7	2.5	FLOW WELL
09/09/89	3752	1.55	16	77	58.5	41	35	20	31	22.0	0.0	0	10.5	0.30	0.70	0.00	900	11.0	2	19	0.0	42.0	665.6	15.8	65.7	2.5	FLOW WELL
10/09/89	3752	1.55	16	39	27.0	18	18	14	20	20.0	0.0	0	10.5	0.30	0.60	0.00	640	10.5	2	19	0.0	43.0	665.2	15.8	66.7	2.6	FLOW WELL
11/09/89	3752	1.55	16	39	26.5	17	19	13	20	21.0	0.0	0	10.5	0.30	0.70	0.00	640	11.0	2	19	0.0	43.0	665.6	15.8	65.7	2.5	SHUT IN. END TEST
12/09/89	3752	1.55	16	45	33.0	20	26	20	26	24.0	0.0	0	10.5	0.30	0.60	0.00	640	11.0	2	20	0.0	43.0	623.4	14.8	118.1	4.5	KILL WELL

DRILLING FLUID PROPERTIES RECORD

WELL NAME: 34/10-33 C 7.00" HOLE

AREA: GULLFAKS SOER

WATER BASED MUD

RIG: DEEP SEA BERGEN

CONTRACTOR: O.D.C.C.

STATOIL

FLUID SYSTEM: BENTONITE/FCL

IDF MUD ENGINEERS: VAN LAAR

ATE	DEPTH M	WEIGHT S.G.	TEMP	FV	AV	PV	YP	GELS 10s	GELS 10m	FLUID LOSS API	CAKE HTHP	pH	Pf	Mf	Pm	TOT HARD	CL- G/L	OIL %	SOLID %	SAND %	MBT	BAR Kg/M3	BAR % v/v	LGS Kg/M3	LGS % v/v	REMARKS
/09/89	3752	1.55	16	60	50.0	30	40	22	38	25.0	0.0	0 10.5	0.30	0.60	0.00	640	11.0	2	19	0.0	43.0	665.6	15.8	65.7	2.5	TEST TEST STRING
/09/89	3752	1.55	16	70	52.5	35	35	23	39	27.0	0.0	0 10.5	0.40	0.80	0.00	640	11.0	2	19	0.0	43.0	665.6	15.8	65.7	2.5	START TO FLOW WELL