

6.3 Mud report

For detailed mud properties, refer to table B-5.

36" hole section, 30" casing

The 36" hole was drilled to 215 m, using sea water and periodically spotting high viscosity pills. Before running the casing the hole was displaced with spud mud. The 30" casing had to be washed down the last 35 m.

Mud materials used in this section were bentonite, caustic soda, soda ash and lime.

26" hole section, 20" casing

The 21" riser was run prior to drilling a 17 1/2" pilot hole to 1012 m. The pilot hole was drilled using sea water and periodically flushing with high viscosity pills. High mud losses to the formation was encountered (15-50 m³/hr), as due to the too short hydration time for the viscous mud, gel was completely lost in the return mud. To relieve this problem, salt gel (attapulgate) was added to the mud.

Occasionally the mud cleaning equipment became overloaded, which resulted in a recirculation of sand. The hole was displaced with 45 m³ high viscosity mud prior to logging.

The 17 1/2" pilot was opened to 26" using an underreamer. After having circulated the hole clean the hole was displaced with 48 m³ "lost circulation mud" + 36 m³ high viscosity mud, before the riser was pulled and a wiper trip with a 26" bit was made. A tight spot was encountered from 970-974 m. The hole was displaced with high viscosity mud prior to running the 20" casing, which stood up at 970 m. Circulation was initiated, but still the casing would not pass 970 m. Prior to cementing the casing at 962 m (revised setting depth due to stand-up) 177 m³ sea water was pumped around.

Mud materials used in this hole section: Bentonite, caustic soda, soda ash, lime, attapulгите, Nut Plug C, Nut Plug F and Mica C.

17 1/2" hole section, 13 3/8" casing

The 17 1/2" hole section was drilled to a total depth of 2648 m, using a gypsum/lignosulfonate mud type. The mud weight down to 1829 m varied from 1.08 - 1.13 r.d, where it was raised to 1.26 r.d due to tight hole problems. After having drilled to T.D, the mud weight was increased to 1.35 r.d. and prior to running the casing further increased to 1.40 r.d. Throughout the drilling of this section overpull and tight spots were frequently encountered. The caliper log subsequently run showed washed-out hole throughout most of the section.

Some of the hole problems experienced are believed to have originated from the following reasons.

- too high pH for the mud type used.
- frequent pump break-down.

The 13 3/8" casing was run and landed without any problems.

Mud materials used in this hole section: Barite, bentonite, caustic soda, soda ash, gypsum, CMC-LV, CMC Extra H-V, CMC-HV, Drispac reg, and Magconol.

12 1/4" hole section, 9 5/8" casing

The 12 1/4" hole was drilled to a total depth of 3741 m using a bentonite/lignosulfonate/lignite mud type. The mud weight was increased gradually to control pore pressure, ending up with 1.76 r.d. before running the casing. Apart from tight hole problems experienced immediately below the 13 3/8" casing shoe and at TD prior to and after logging, no major hole or mud problems were encountered when drilling this section. The casing could, hence, be successfully run and landed.

Mud materials used in this hole section: Barite, bentonite caustic soda, soda ash, lime, spercene, XP-20, Resinex, CMC-LV, CMC-Extra HV, aluminium stearate.

Magconol, and Magcolube.

8 3/8" hole section

The 8 3/8" hole was drilled to a total depth of 4287 m, where the drill string became stuck. A fish was left in the hole from 4058 m to T.D. A bentonite/lignosulfonate/lignite mud type was used when drilling this section. The mud weight was increased to 1.96 r.d. prior to drilling out the 9 5/8" casing shoe, and increased gradually to control the pore pressure, having a 2.03 r.d. mud at the time the drill string became stuck.

The following major hole and mud problems were encountered when drilling this section:

- Fill on bottom after trips.
- Gas was swabbed in at 4126 m.
- Stuck pipe (jarred free) at 4140 m when pulling out of the hole from 4170 m.
- Stuck pipe at 4287 m, a fish was left in the hole.
- High mud losses due to dilution.

Mud materials used in this hole section: Barite, bentonite caustic soda, soda ash, lime, spercene, XP-20, Resinex, aluminium stearate, Magconol, CMC-Extra HV, Pipe lax, fine nut plug, and Corrosion 101 A.

DAILY MUD PROPERTIES

TABLE B-5

WELL: NORSK HYDRO 30/7-8

DATE	DEPTH	SP.GR. WT.	VIS SEC.	CORR. 115°F		GELS		PH BLACK STRIP	FLUID LOSS		CL CACL NACL MG/L	ALKALINITY			CA PPM	RETORT			BBL CEC
				PV	YP	0	10		100PSI API	500PSI 300°F HP HP		PF	PM	MF		% OIL	% SOL	% WATER	
17/11	ON LOCATION		RIG UP																
18		1.04	150																
19	155	1.04	150																
20	215	1.04	120																
21	215	1.04	70																
22	356	1.05	55																
23	528	1.04	100 ⁺			TO FLUSH HOLE ONLY - DRILLING WITH SEAWATER.													
24	728	1.04	80																
25	895	1.05	80																
26	1012	1.05	80																
27	398	1.05	80			REAM WITH HOLE OPENER													
28	855	1.05	80																
29	1012	1.04	27			FLUSH WITH HAVIS MUD													
30	1012	1.04	27																
01/12						CMT GSG.													
02																			
03						SEAWATER IN HOLE													
04																			
05																			
06	1015	1.04	44	9	10	11	21	12	NC	-	16000	0.7	1	0.75	0	0	3	97	
07	1015	1.04	48	11	13	9	19	12	NC	-	16000	0.6	1.2	0.65	400	0	2	88	
08	1017	1.08	43	9	4	6	9	11.5	39	-	16000	0.2	1	0.25	1400	0	7	93	
09	1238	1.1	40	6	5	4	9	12.2	13.8	-	17000	0.2	0.8	0.3	2000	1	7	92	
10	1482	1.12	49	6	6	7	10	10.5	13.8	-	17000	0.2	0.8	0.3	2000	1	7	92	
11	1572	1.12	49	6	7	9	12	12	14.8	-	17000	0.3	1	0.5	1600	1	8	91	
12	1821	1.13	43	5	6	6	9	11	14.8	-	22000	0.2	1	0.25	1600	1	10	89	
13	1828	1.26	45	10	5	7	11	11	10.4	-	23000	0.1	0.4	0.4	1800	1	14	95	
14	1917	1.26	43	6	7	9	13	11.5	14	-	2200	0.1	1	0.3	1200	1	14	95	

DATE SPUD:

DATE T.D.:

DAILY MUD PROPERTIES

TABLE B-5

WELL: NORSK HYDRO 30/7-8

DATE	DEPTH	SP. GR. WT.	VIS SEC.	CORR. 115°F		GELS		PH BLACK STRIP	FLUID LOSS		CL CACL NACL MG/L	ALKALINITY			CA PPM	RETORT			BBL CEC
				PV	YP	0	10		100PSI API	500PSI 300°F HP HP		PF	PM	MF		% OIL	% SOL	% WATER	
15/12	1980	1.26	49	14	4	2	8	10.5	6.4	-	22000	0.1	0.9	0.3	2000	1	14	85	
16	2067	1.26	50	14	8	9	22	10.3	7.4	-	21000	0.15	1.0	0.35	1800	-	12	88	
17	2138	1.26	46	11	6	5	22	10.9	9.0	-	20000	0.3	1.4	0.5	1800	-	13	87	
18	2231	1.26	47	13	9	8	20	10.1	9.2	-	18000	0.2	1.1	0.4	1800	-	13	87	
19	2310	1.26	46	12	6	5	20	10.6	7.4	-	20000	0.2	1.0	0.5	1800	-	13	87	
20	2343	1.26	48	12	9	7	28	10.8	8.6	-	20000	0.2	1.2	0.5	1600	-	12	88	
21	2421	1.26	43	12	5	3	18	11.0	10.6	-	22000	0.3	1.4	0.5	1200	-	13	87	
22	2443	1.26	43	12	6	4	19	10.7	8.2	-	21000	0.2	1.1	0.4	1400	-	13	87	
23	2479	1.26	43	11	5	2	19	11.0	8.4	-	21000	0.3	1.9	0.6	1300	-	13	87	
24	2593	1.26	47	14	7	5	26	10.7	10.8	-	19000	0.3	2.1	0.6	1000	-	13	87	
25	2596	1.26	45	14	8	5	24	10.7	9.6	-	20000	0.3	2.0	0.6	1000	-	13	87	
26	2648	1.35	43	15	5	4	21	10.6	9.8	-	20000	0.2	1.5	0.4	1000	-	15	85	
27	2648	1.35	43	15	5	4	21	10.6	9.8	-	20000	0.2	1.5	0.4	1000	-	15	85	
28	2648	1.35	43	15	5	5	22	10.6	9.8	-	20000	0.2	1.5	0.4	1000	-	15	85	
29	2648	1.35	47	15	5	4	21	10.5	8	-	20000	0.1	1.3	0.4	1000	-	15	85	
30	2648	1.4	48	16	5	3	18	10.5	8.6	-	21000	0.2	1.3	0.5	1000	-	17	83	
31	2648	1.4	56	16	5	3	18	10.1	7	-	21000	0.1	1	0.5	1000	-	17	83	
1/1	2648	1.4	60	16	5	3	18	10.1	7	-	21000	0.1	1	0.5	1000	-	17	83	
2	2648	1.4	52	13	7	3	18	10.1	8.2	-	20000	0.2	1.1	0.5	1000	-	17	83	
3	2648	1.4	55	16	8	4	19	10	7	-	20000	0.1	1	0.5	1000	-	16	84	
4	2648	1.4	53	16	8	4	19	10	7.2	-	20000	0.1	1	0.5	1000	-	16	84	
5	2640	1.4	50	12	10	7	10	11.7	25	-	21000	1.2	8	1.7	800	-	17	83	
6	2654	1.51	48	13	10	8	12	11.8	25	-	20000	1.3	10	1.9	1100	-	19	81	
7	2702	1.56	49	9	7	5	11	11.5	19	-	22000	1.1	8	1.8	1200	-	24	74	
8	2734	1.56	49	10	10	8	11	11.5	17	-	20000	0.8	8	1.7	1100	-	24	74	
9	2774	1.56	49	10	7	6	12	11.0	15	-	20000	0.6	6	1.1	680	-	25	75	
10	2851	1.56	50	14	8	7	12	10.4	13	21	21000	0.4	6	1.3	660	-	27	73	
11	2927	1.56	46	13	6	4	12	10.8	12	21	21000	0.4	4	1.4	400	-	29	71	

DATE SPLD:

DATE T.D.:

DAILY MUD PROPERTIES

TABLE B-5

1981 DATE	METERS DEPTH	SP.GR. WT.	VIS SEC.	CORR. 115°F		GELS		PH BLACK STRIP	FLUID LOSS		CL CACL NACL MG/L	ALKALINITY			CA PPM	RETORT			BBL CEC
				PV	YP	0	10		100PSI API	500PSI 300°F HP HP		PF	PM	MF		% OIL	% SOL	% WATER	
12/1	3031	1.63	50	17	10	11	42	10.2	13.6	38.4	18000	0.4	1.6	0.9	600	-	24	76	27.5
13	3133	1.63	46	17	6	5	27	9.9	9.2	26.8	16000	0.2	0.9	0.8	800	-	23	77	23
14	3189	1.63	48	18	7	5	22	9.5	7.0	23.6	17000	0.2	1.1	0.7	880		23	77	20
15	3205	1.63	46	17	7	5	21	9.6	7.2	23.6	17000	0.2	1.1	0.7	880		23	77	20
16	3205	1.63	55	19	11	6	30	9.4	6.8	22.6	17000	0.2	1.1	0.7	880		23	77	20
17	3294	1.63	47	18	7	6	23	10.8	7.2	23.4	16000	0.3	1.4	1.0	900		23	77	20
18	3349	1.69	45	20	7	5	21	9.0	6.6	17.6	17000	0.1	0.7	0.9	360		25	75	27.5
19	3349	1.69	46	20	7	6	21	9.4	6.6	17.6	17000	0.2	0.9	0.7	800		25	75	27.5
20	3349	1.69	46	20	7	6	21	9.4	6.6	17.6	17000	0.2	0.9	0.7	800		25	75	27.5
21	3349	1.69	46	20	7	6	21	9.4	6.6	17.6	17000	0.2	0.9	0.7	800		25	75	27.5
22	3380	1.69	45	19	5	3	14	10.8	6.4	20.4	20000	0.9	1.9	2.2	200		25	75	22.5
23	3446	1.69	44	20	5	3	16	11.1	6.8	17.6	17000	1.3	1.8	3.2	100		24	76	20
24	3500	1.69	48	21	8	5	25	10.2	6.6	15.5	17000	1.0	1.7	2.8	400		25	75	27.5
25	3535	1.69	48	20	8	8	27	9.6	6.4	17.8	19000	0.6	1.3	2.4	500		25	75	27.5
26	3546	1.69	47	20	9	6	26	10.3	6.8	15.2	18000	0.9	1.2	2.3	400		24	76	25
27	3559	1.69	48	18	10	9	30	11	7	14.8	17000	1.1	1.7	3	300		25	75	25
28	3576	1.69	47	20	7	6	22	10.8	6.8	14.8	17000	1.4	2.5	3.8	400		24	76	25
29	3576	1.69	50	20	7	6	22	10.8	6.8	14.8	17000	1.4	2.5	3.8	400		24	76	25
30	3612	1.69	47	18	8	8	24	11.2	7	12.6	17000	1.8	2.8	4.5	300		24	76	27.5
31	3634	1.69	50	18	8	6	24	10.7	7	14.2	17000	1.7	3.0	4.2	300		24	76	27.5
1/2	3670	1.69	47	16	9	7	23	10.4	7	13.2	17000	1.6	1.6	4.2	300		25	75	22.5
2	3682	1.69	49	16	9	8	23	10.2	7.2	13.4	17000	1.3	1.7	4	300		25	75	22.5
3	3730	1.69	47	16	9	7	24	10.2	7.2	13	17000	1.4	1.6	3.4	200		26	74	22.5
4	3741	1.69	47	14	10	6	22	10.1	7	13	17000	0.7	2	2	200		26	74	22.5
5	3741	1.74	43	16	9	6	18	10	6.8	15	17000	1.1	2	2.8	200		28	72	22.5
6	3741	1.74	43	16	9	6	18	10.1	7.6	15	17000	1	1.8	2.8	200		28	72	22.5
7	3741	1.74	43	15	9	6	20	9.7	8	13.6	18000	0.5	1.1	2	240	0	28	72	20
8	3741	1.76	47	17	9	6	20	10.3	7.6	13	18000	1.2	2.4	3.2	200	TR	29	71	20

DATE SPUD:

DATE T.D.:

DAILY MUD PROPERTIES

TABLE B-5

1981 DATE	METERS DEPTH	SP.GR. WT.	VIS SEC.	CORR. 115°F		GELS		PH BLACK STRIP	FLUID LOSS		CL CACL NACL MG/L	ALKALINITY			CA PPM	RETORT			BBL CEC
				PV	YP	0	10		100PSI API	500PSI 300°F HP HP		PF	PM	MF		% OIL	% SOL	% WATER	
			PASCALS		CASING AND		CEMENTING		RUNNING 15,000 PSI BOP			COST CORRECTION							
9/2	3741	1.76	47	17	9	6	20	10.3	7.6	13	18000	1.2	2.4	3.2	200		29	71	
10	3726		RUNNING		9 - 5/8"			CASING AND											
11	3726		RUNNING		15,000 PSI BOP														
12	3726																		
13	3726		COST CORRECTION																
14	3771	1.96	45	19	5	3	19	10.8	5.8	11.6	19000	1.7	4.7	3.6	400		32	68	22.5
15	3821	1.96	45	21	4	3	16	11.0	3.2	12.8	17000	2.1	5.3	3.9	200		32	68	25
16	3858	1.96	47	25	5	3	23	11.0	3.0	11.2	17000	1.8	4.7	4.5	200		32	68	25
17	3888	1.96	52	26	6	5	28	10.6	2.8	10.6	16000	1.5	3.8	3.3	300		33	67	25
18	3897	1.98	50	24	4	4	20	10.7	2.9	11.0	17000	1.3	2.6	2.6	400		34	66	25
19	3918	1.98	49	22	5	4	22	11.0	2.7	9.2	16000	1.5	3.8	3.2	300		34	66	22.5
20	3962	1.99	52	24	6	5	26	10.6	3.2	10.0	16000	1.1	3.0	2.8	200		34	66	20
21	4020	1.99	55	25	7	6	31	10.1	3.0	11.4	17000	1.0	3.0	2.0	400		34	66	22.5
22	4050	1.99	49	21	7	7	23	10.6	3.0	11.2	17000	1.0	2.3	2.3	400		34	66	20
23	4082	1.99	49	20	8	7	22	11.5	3.8	12.4	17000	1.2	2.5	3.4	320		34	66	20
24	4101	2.01	46	19	6	4	20	10.8	3.8	12.8	17000	0.6	1.8	2.0	360		33	67	20
25	4101	2.01	51	19	6	4	20	10.8	3.8	12.8	17000	0.6	1.8	2.0	360		33	67	20
26	4111	2.01	46	17	5	4	15	11.3	3.8	13.6	17000	0.8	2	2.8	280		35	65	17.5
27	4126	2.01	47	18	5	2	13	10.6	3.8	13	16000	0.7	1.6	2	320		34	66	20
28	4126	2.03	48	19	4	2	12	11.6	3.6	11.6	15000	1	2	3	320	1	35	64	20
1/3	4126	2.03	47	21	4	3	15	10.8	4	11.8	16000	0.9	1.4	1.8	320	1	35	64	20
2	4129	2.03	47	21	4	4	15	11.7	3.8	11.8	14000	0.9	1.5	3	320	1	36	63	20
3	4133	2.03	48	20	4	3	15	10.3	2.8	10	16000	0.6	1.8	1.9	280	1	36	63	20
4	4170	2.03	47	21	5	4	15	10.5	3.8	10.8	16000	1	1.9	2	240	2	36	63	20
5	4181	2.03	47	20	4	3	15	11.3	3.8	11.8	16000	0.9	2.1	3.4	400	1	35	64	20
6	4189	2.03	47	20	4	3	15	10.7	2.8	9.8	16000	0.9	1.6	3.1	400	1	35	64	20
7	4189	2.03	47	20	4	3	15	10.7	2.8	9.8	16000	0.9	1.6	3	400	1	35	64	20
8	4189	2.03	48	21	5	4	15	10.6	3.6	9.6	16000	1.1	1.8	2.9	240	1	35	64	20

DATE SPUD:

DATE T.D.:

DAILY MUD PROPERTIES

TABLE B-5

WELL: NORSK HYDRO 30/7-8

1981 DATE	METERS DEPTH	SP.GR. WT.	VIS SEC.	CORR. 115°F		GELS		PH BLACK STRIP	FLUID LOSS		CL CACL NACL MG/L	ALKALINITY			CA PPM	RETORT			BBL CEC
				PV	YP	PASCALS 0 10	100PSI API		500PSI 300°F HP HP	PF		PM	MF	% OIL		% SOL	% WATER		
9/3	4189	2.03	WORK ON	1500	0	PSI	BOPs												
10	4189	2.03																	
11	4189	2.03																	
12	4189	2.03																	
13	4189	2.03																	
14	4189	2.03	43	19	3	2	13	10.5	5.0	11.6	15000	1.0	2.4	2.3	280	1	34	65	17.5
15	4189	2.03	45	19	4	3	17	11.7	7.2	14.8	14000	1.6	4.7	2.6	240	-	35	65	20
16	4189	2.03	47	28	2	4	22	11.6	7.8	17.6	12000	1.6	4.6	2.7	200		35	65	18
17	4212	2.03	51	30	2	2	10	11.1	3.2	13.6	12000	1.0	4.4	2.6	280		35	65	20
18	4233	2.03	53	29	2.5	2	10	11.0	3.2	13.4	11000	1.1	4.4	3.3	320		35	65	20
19	4284	2.03	57	42	3.5	3	24	11.5	4.0	13.6	11000	1.4	3.3	3.3	360		35	65	25
20	4286	2.03	55	35	4.5	4	20	10.5	3.8	13.8	13000	1.0	3.0	3.6	400	1	35	64	20
21	4286	2.03	80	35	4.5	4	20	10.5	3.6	13.6	13000	1.0	3.0	3.6	400	2	34	64	20
22	4286	2.03	73	43	5.5	5	22	10.4	2.8	10.4	13000	0.8	4.0	3.0	440	6	35	59	20
23	4286	2.03	64	44	4	3	10	10.9	3.4	10.4	12500	0.9	2.4	3.9	400	3	35	62	20
24	4286	2.03	62	41	4	2	8	11.1	3.6	9	12500	1.2	3.4	4	400	3	35	62	20
25	4286	2.03	59	40	4	2	8	11.1	3	8.4	12500	1.2	3.6	4	400	3	34	63	20
26	4286	2.03	60	30	4	2	8	11.1	3	8.4	12500	1.3	3.6	4	320	3	34	63	20
27	4286	2.03	59	28	3.5	2	8	10.8	3.2	10.2	12500	1	2.6	3.8	400	3	34	63	20
28	4286	2.03	59	28	3.5	2	8	10.7	3.2	10.2	12500	0.9	2.5	3.8	400	3	34	63	20
29	4286	2.03	60	28	3.5	2	8	10.7	3.2	10.2	12500	0.9	2.5	3.8	400	3	34	63	20
30	4286	2.03	60	30	4.5	2	14	11.1	3.4	11	12000	0.9	2.6	4	320	2	34	64	20
31	4286	2.03	65	28	4	3	16	10.6	3.4	10.6	12000	0.9	2.4	3.8	320	2	34	64	20
1/4	3676	2.03	78	43	9	7	39	11.8	4.8		10500	2.6	9.8	5.8	320	2	34	64	22.5
2	TEMPORARILY PLUGGED AND ABANDONED																		

DATE SPUD:

DATE T.D.: