



4056 TANANGER  
TELF. OFFICE : (04) 69 66 77  
TELF. WAREHOUSE : (04) 69 64 65 - 69 66 26  
TELEX: 33 173 Milin N  
BANKGIRO: 5343.05.17496

A GENERAL REPRESENTATIVE FOR MILCHEM INT. LTD.

WELL SUMMARY

34 / 10 - 12

OPERATOR: DEN NORSKE STATS OLJESELSKAP A/S  
POST BOX 10, CCB  
5363 AGOTNES

DRILLING CONTRACTOR: ROSS DRILLING COMPANY A/S  
C/O NORSEA, POST BOX 138  
4001 STAVANGER

DRILLING RIG: NEPTUNO NORDRAUG

PROJECT MANAGER: TRULS C. BRINCH, STATOIL BERGEN

OPERATORS REPRESENTATIVE: MR. DYKE, NORDRAUG  
MR. ROBERTSON, NORDRAUG

CONTRACTORS REPRESENTATIVE: MR. LERPOLD, NORDRAUG  
MR. HAUGEN, NORDRAUG  
MR. SELDAL, NORDRAUG

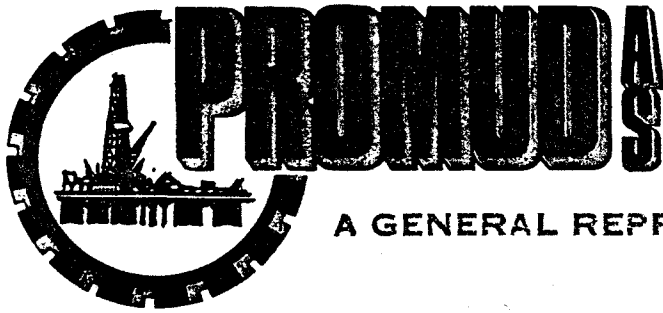
DRILLING MUD SERVICE: PROMUD A/S  
C/O AKER NORSCO BASE  
4056 TANANGER

RIG MUD ENGINEERS: PHIL DALE, SENIOR ENGINEER  
DAVE ATKIN, SENIOR ENGINEER  
SVERRE SØRBØ, MUD ENGINEER  
RANVEIG SIVERTSEN, MUD ENGINEER

PROJECT MUD ENGINEER: R D TATE, PROMUD A/S  
C/O AKER NORSCO BASE  
4056 TANANGER

RECAP COMPLETED BY: DAVE ATKIN  
SVERRE SØRBO  
R D TATE

DATE: DECEMBER 5, 1981



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34/10-12 SUMMARY

34/10-12 was spudded on 16 July 1981 in 161 m of water (RKB). Seawater was used for drilling with high viscosity prehydrated Gel pills being pumped at each connection to clean the hole. 30" casing was run and cemented at 223 m on 18 July.

Next day the 30" casing shoe was drilled out and a 12 1/4" pilot hole drilled to 850 m using Gel mud. Because of the presence of trip gas mud weight was increased to 1.11. After logging the hole was displaced with 1.25 mud, circulated and then displaced back to 1.11 mud. After opening the hole to 26" to 765 m, it was displaced with 1.40 mud from 450 m to 765 m and 215 bbls high viscosity mud spotted from 400 m to 500 m.

Two cement plugs were set and the top plug dressed to 305 m. The rest of the hole was displaced with 1.40 mud and the riser with seawater before being pulled. 20" casing was run and cemented to 298 m with returns to the seabed.

After drilling out cement and shoe a 17 1/2" pilot hole was drilled to 865 m and then under reamed to 22". A re-run of the under reamer was needed, because of tight hole. Mud weight was raised to 1.15 and YP reduced to 17 before running a 16" liner from 198 m to 865 m.

On 4 August 20" casing and 16" liner were pressure tested. Both leaked and cement was squeezed from 170 m to 205 m.

The mud was changed over to a Gel Lignosulphonate system before drilling a 14 3/4" pilot hole to 1560 m. Mud weight was increased to 1.20 before under reaming to 17 1/2" down from 865 m. At 1350 m fluid loss was reduced to 4 ccs and under reaming continued to 1560 m. A second run with the under reamer was necessary before running and cementing 13 3/8 casing to 1545 m.



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page 2.

On 16 August mud weight was increased to 1.40 and 13 3/8" casing cement and shoe drilled. After a leak-off test a 12 1/4" hole was drilled to 1639 m with no problems. Mud weight was reduced to 1.36 using the centrifuge and drilling continued to 1860 m. At this depth as background gas increased mud weight was increased to 1.50. At 1950 m mud weight was raised again to 1.60 and after logging 9 5/8" casing was run and cemented to 1934 m.

Prior to drilling out 9 5/8" casing the system was treated to reduce solids and improve properties. Mud weight was raised from 1.60 to 1.65 after testing the formation at 1953 m.

A core was cut from 2037 m to 2042 m and at 2255 m a salt water flow was encountered. After treating the mud to restore properties, drilling continued to 2311 m where mud weight was raised to 1.70 and later to 1.74. Properties were maintained until TD at 2800 m was reached on 7 September. After logging the well was plugged on 11 September 1981.



# TOTAL MUD MATERIALS USED FOR WELL

COMPANY STATOIL WELL NO. 34/10-12 PAGE        of       

Quantity	Material	Unit Weight	Unit Cost	Total Cost	%
1,102.70	Bulk Barite	MT	\$ 120.00	\$ 132,324.00	
97.20	Bulk Bentonite	MT	305.00	39,646.00	
30	Milgel	50 kg	19.50	585.00	
182	Wyoming Bentonite	50 kg	17.23	3,135.86	
996	Unical	25 kg	18.10	18,027.60	
591	Ligcon	25 kg	17.43	10,301.13	
540	Caustic Soda	25 kg	11.54	6,231.60	
11	Soda Ash	50 kg	18.90	207.90	
77	Sodium Bicarbonate	50 kg	19.25	1,482.25	
39	Drispac Regular	50 lb	195.18	7,612.02	
56	Drispac Superlo	50 lb	204.81	11,469.36	
10	LD - 8 Defoamer	5 gal	169.04	1,690.40	
211	Permalose	50 lb	50.32	10,617.52	
2	Mud detergent	55 gal	385.00	770.00	
50	Mil Mica Fine	50 lb	17.08	854.00	
60	Mil Mica Medium	50 lb	17.08	1,024.80	
40	Nut Plug Fine	50 lb	17.97	718.80	
100	Nut Plug Medium	50 lb	17.97	1,797.00	

	TOTAL COST FOR WELL	\$ <u>238,495.24</u>
DEPTH AT T.D. <u>2800 mtrs.</u> FT	mtrs. AVERAGE COST per FOOT for WELL	\$ <u>85.18</u>
58 days.	AVERAGE COST per DAY	\$ <u>4,111.99</u>



# CASING INTERVAL

COMPANY STATOIL Well No. 34/10-12 Page 1 of 6

Casing Size 30 " from 163m to 223m (Bit Size) 36 " hole from 163m to 225m Footage

**Material Consumption for Interval:**

Bentonite Bulk	19	MT	\$ 305.00	\$ 5795.00
Wyoming Bentonite	2	50 kg	17.23	34.46
Milgel	30	50 kg	19.50	585.00
Caustic Soda	12	25 kg	11.54	138.48
Soda Ash	6	50 kg	18.90	113.40

Material Cost for Interval \$ 6666.34 Average Cost per <sup>mtrs.</sup> Foot \$ 29.63

Number of Days 2 Average Cost per Day \$ 3333.17

**Comments:**

34/10-12 was spudded on 16 July 1981 in 138m of water. 640 bbls of high viscosity spud mud had been mixed and this was used to sweep the hole clean on connections, drilling otherwise being with seawater. Next day surface volume was increased to 1250 bbls by adding drill water and bulk gel to the original mix. At 225m a 100 bbl slug was pumped and a short trip made. Only 1m of fill was found after the trip, and the hole was displaced with 400 bbls of mud. 30" casing was then run and cemented to 223 m. Total mud made 1250 bbls. Used 700 bbls.



# COMPLETION INTERVAL

COMPANY STATOIL Well No. 34/10-12 Page 2 of 6

Casing Size 20 " from 163m to 298m (Bit Size) 12 1/4 " hole from 225m to 765m later plugged back to 306m

**Material Consumption for Interval:**

Product	Units	Size	Cost/Unit	Total Cost
BULK BARITE	160	MT	\$ 120.00	\$ 19,200.00
BULK BENTONITE	35	MT	305.00	10,675.00
CAUSTIC SODA	124	25 KG	11.54	1,430.96
SODIUM BICARBONATE	10	50 KG	19.25	192.50
SODA ASH	5	50 KG	18.90	94.50
UNICAL	24	25 KG	18.10	434.40
DRISPAC R	2	50 LB	195.18	390.36

Material Cost for Interval \$ 32,417.72 Average Cost per meter \$ 60.03

Number of Days 9 Average Cost per Day \$ 3,601.97

**Comments**

After drilling out cement and 30" casing shoe at 223m, a 12 1/4" pilot hole was drilled to 850m using spud mud. 1,000 units of trip gas was observed after the wiper trip and the mud weight was increased to 1.11 sg. Another wiper trip proved the hole to be in logging condition. POOH and ran logs. After logging and displacement, the hole was opened to 26" to a depth of 765m. Due to new orders, RIH open ended and displaced hole with 1.40 sg mud to 450m. POOH to 500m, displace with 1.11 sg mud.

REMARKS 20" section continue

Two cement plugs were set and the top plug dressed to 305m. The hole was displaced with 1.40 sg mud and POOH. The riser displaced and pulled. RIH and dressed cement plug to 306m, with 1.40 sg mud. Returns to seabed. The 20" casing was run to 298m, circulated with 1.40 sg mud then cemented on July 26, 1981.



# CASING INTERVAL

COMPANY STATOIL Well No. 34/10-12 Page 3 of 6

Casing Size 16" Liner " from 198m ' to 865m ' (Bit Size) 17 1/2+22"UR " hole from 298m ' to 865m reaming) (under-

**Material Consumption for Interval:**

Bulk Barite	120	MT	\$ 120.00	\$ 14,400.00
Bulk Bentonite	13	MT	305.00	3,965.00
Wyoming Bentonite	180	50 kg	17.23	3,101.40
Caustic Soda	123	25 kg	11.54	1,419.42
Unical	52	25 kg	18.10	941.20
Drispac Regular	2	50 lb	195.18	390.36
Sodium Bicarbonate	1	50 kg	19.25	19.25

Material Cost for Interval \$ 24,236.63 mtrs. (under- Average Cost per Foot \$ 42.60 reaming)

Number of Days 8 Average Cost per Day \$ 3,029.58

**Comments:**

On 28 July cement and the 20" casing shoe were drilled out and after drilling 1m of formation a leak off test equivalent to 1.3 was done. A 17 1/2" hole was drilled to 865m. All solids control equipment being run on this section. A 22" under reamer was used to open the hole to 865m and a caliper log run. This showed the hole was tight so another run with the under reamer was necessary. After raising the mud weight to 1.15 the 16" liner was set from 198m to 865m overlapping 20" casing by 100m The liner was cemented. After circulating 250 bbls cement contaminated mud was dumped.





# CASING INTERVAL

COMPANY STATOIL Well No. 34/10-12 Page 4 of 6

Casing Size 13 3/8 " from 163m to 1545m (Bit Size) 14 3/4-17 1/2 HO " hole from 865m to 1560m Footage

**Material Consumption for Interval:**

Material	Quantity	Unit	Price	Total Cost
Bulk Barite	163.4	MT	\$ 120.00	\$ 19,608.00
Bulk Bentonite	30.2	MT	305.00	9,211.00
Unical	378.0	25 kg	18.10	6,841.80
Ligcon	170.0	25 kg	17.43	2,963.10
Caustic Soda	142.0	25 kg	11.54	1,638.68
Sodium Bicarbonate	21.0	50 kg	19.25	404.25
Drispac Regular	33.0	50 lb	195.18	6,440.94
Drispac Superlo	34.0	50 lb	204.81	6,963.54
Nut Plug Medium	14.0	50 lb	17.97	251.58
LD - 8 Defoamer	7.0	5 gal	169.04	1,183.28
Permalose	166.0	50 lb	50.32	8,353.12

Material Cost for Interval \$ 63,859.29 Average Cost per <sup>mtrs.</sup> Foot \$ 93.91

Number of Days 13 Average Cost per Day \$ 4,912.25

**Comments:**

After drilling out cement inside 16" liner from 183 to 198 m, the 20" casing and 16" liner were tested. Both leaked to a cement plug was set from 170m to 205m. The system was changed from a spud gel to a gel Lignosulfonate system. After drilling out the shoe a formation test showed 1.56 equivalent. A 14 3/4" hole was drilled to 1560m. All solids control equipment was used and dilutions made with seawater. Pumped to clean the bit. A 17 1/2" under reamer was run from 865m, and mud weight increased to 1.22. Kill mud weight ( 300 bbls ) was increased to 1.30. At 1350m fluid loss was reduced from 8 ccs to 4 ccs in three circulations using Drispac Superlo and Unical. After this a premix of prehydrated gel, Unical and Ligcon was made up and bled in to give a fully dispersed system. 13 3/8" was set at 1545m and cemented.



# CASING INTERVAL

COMPANY STATOIL Well No. 34/10-12 Page 5 of 6

Casing Size 9 5/8 " from 163m to 1934m (Bit Size) 12 1/4 " hole from 1545m to 1950m

**Material Consumption for Interval:**

Material	Quantity	Unit	Price	Total Cost
Bulk Barite	288.2	MT	\$ 120.00	\$ 34,584.00
Unical	155	25 kg	18.10	2,805.50
Ligcon	88	25 kg	17.43	1,533.84
Gaustic Soda	57	25 kg	11.54	657.78
Permalose	39	50 lb	50.32	1,962.48
Drispac Superlo	4	50 lb	204.81	819.24
Sodium Bicarbonate	8	50 kg	19.25	154.00
Nut Plug Fine	20	50 lb	17.97	359.40
Nut Plug Medium	36	50 lb	17.97	646.92
Mud detergent	2	55 gal	385.00	770.00
LD - 8 Defoamer	2	5 gal	169.04	338.08

Material Cost for Interval \$ 44,631.24 mtrs. Average Cost per Foot \$ 114.77

Number of Days 9 Average Cost per Day \$ 4,960.76

**Comments:**

On 16 August before drilling out cement mud weight was raised to 1.40 and pre-treated with 1 pound per barrel or Sodium Bicarbonate. The weight of 300 bbls. of 1.30 kill mud was also raised to 1.50.

Cement and shoe were drilled with no problems from cement contamination. After drilling 2m of formation, a leak off test to equivalent weight 1.74 performed. Between 1600m and 1618m bit balling problems occurred, three 25 barrel pills with 1 drum each of mud detergent.

At 1634m and 1638m two further Nut Plug slugs were pumped to ameliorate bit balling.

At 1639m mud weight was reduced to 1.36 over two circulations using the centrifuge. Barite discharge was salvaged and put into slug pit. Drilling continued to 1860m where as background gas increased mud weight was raised to 1.43 and later to 1.50. At 1950m prior to logging mud weight was brought up to 1.60. The hole was logged successfully on 23 August and 9 5/8" casing run and cemented at 1934m the next day.



# COMPLETION INTERVAL

COMPANY STATOIL Well No. 34/ 10-12 Page 6 of 6

Casing Size \_\_\_\_\_ Meters (Bit Size) \_\_\_\_\_ Meters  
 Open Hole " from \_\_\_\_\_ to \_\_\_\_\_ 8 1/2 " hole from 1950m to 2800m

**Material Consumption for Interval:**

Product	Units	Size	Cost/Unit	Total Cost
Bulk Barite	371.1	MT	\$ 120.00	\$ 44,532.00
Unical	378	25 kg	18.10	7,004.70
Ligcon	333	25 kg	17.34	5,804.19
Caustic Soda	82	25 kg	11.54	946.28
Sodium Bicarbonate	37	50 kg	19.25	712.25
Drispac R	2	50 lb	195.18	390.36
Drispac SL	18	50 lb	204.81	3,686.58
Permalose	6	50 lb	50.32	301.92
LD-8	1	5 gal	169.04	169.04
Nutplug F	20	50 lb	17.97	359.40
Nutplug M	50	50 lb	17.97	398.50
Milmica F	50	50 lb	17.08	854.00
Milmica M	60	50 lb	17.08	1,024.80

Material Cost for Interval \$ 66,684.02 Average Cost per meter \$ 77.00

Number of Days 17 Average Cost per Day \$ 3,922.58

**Comments**

See attached page.

8½" hole section remarks.

Before drilling the 9 5/8" float collar, the entire mud system treated according to the results of the pilot test suggested in the recommended drilling fluids program. The following treatment was added to lower solids content and to improve mud properties:  
Seawater 15% by volume.

Unical 5 pounds per barrel.

Ligcon 2.5 pounds per barrel.

Caustic .75 pounds per barrel.

Fluid weight maintained at 1.60 sg.

Bicarb 1 pound per barrel added while drilling cement.

After drilling the 9 5/8" casing shoe and 3m of new formation to 1953m, a leak off test equivalent to 1.94 sg was completed. Drilling continued to 1954m where the fluid weight was increased to 1.65 sg as per Statoil orders. A core was then cut from 2037m to 2042m.

At 2255m, a salt water flow was encountered while tripping into the hole. 192 barrels of salt water was introduced into the mud system and the chlorides increased from 12,000 ppm to 17,500 ppm. However, as the solids had been maintained at a low concentration, the adverse affects to the mud system were minimal.

The fluid weight was increased to 1.70 sg at 2311m as per Statoil orders after running an RFT log. The fluid weight was increased to 1.74 sg as per Statoil orders when drilling resumed..

280 barrels of reserve mud was pretreated with lost circulation material (as per Statoil orders) in case lost returns was encountered.

No drilling problems were encountered to TD at 2800m. Drilling fluid was maintained as per Statoil specifications. This well was TD'ed on September 7, 1981. The mud engineers released on September 11, 1981. No further information was received after that date.



# DRILLING MUD RECAP

MILCHEM INCORPORATED / P. O. BOX 22111 / HOUSTON, TEXAS 77027

Contractor ROSS DRILLING OPERATOR STATOIL LEGAL DESCRIPTION \_\_\_\_\_  
 Rig No. NORDRAUG Well Name Tanager/Bergen. And No. 34/10-12 Field Block 34 COUNTY North Sea STATE Norway

Milchem Well No. \_\_\_\_\_ Milchem Warehouse Tanager/Bergen. Spud Date 16/7/81 No. Drilling Days To T.D. 58 DATE T.D. REACHED 7/9/81 TOTAL DEPTH 2800 TOTAL COST \$ 238,495.24

CASING PROGRAM		BITS		TYPE MUD SYSTEM		SOLIDS CONTROL EQUIPMENT		ADDITIONAL INFORMATION	
Depth (ft)	Size (in)	No.	Size (in)	Type	Depth Interval	Type	Depth Interval (ft)	Pump Specifications	Other
223m	30			Spud Gel seawater	138-223m	Mud cleaner	from 865m	National 12-P-160	63/4 x 12
298m	20			" "	163-765	Centrifuge	" "	U.P. and U.C. 5" 9 1/2 + 8" DC's.	
865m	16			Dispersed ligno	298-TD	Desilter	" "		
1545m	13 3/8					Desander			
						Shakers x 3			

DATE (19 81)	TIME	DEPTH (ft)	WT (ppg)		FUNNEL VISCOSITY (sec/g)		PLASTIC VISCOSITY		YIELD POINT (lb/100ft <sup>2</sup> )	GELS (lb/100ft <sup>2</sup> )	pH	FILTRATE (ml/30 min)			Cake (32g/in)	Alkalinity			Chloride (ppm)	Calcium (ppm)	Sand (% by Vol.)	Solids (% by Vol.)	Oil (% by Vol.)	Water (% by Vol.)	Methy. Blue (me/ml mud)	Circ Volume (bbl)	REMARKS
			API	OF	CP	OF	API	HT-10				OF	P <sub>m</sub>	P <sub>t</sub>		M <sub>f</sub>											
16/7	0100	0	1.05	104							9.7	NC							200	20							Made up spud gel. 610bbls
17/7	0100	197	1.05	85							9.7	NC							180	20							Spudded 12.00 16/7/81.
18/7	0100	225	1.04	50							9.7	NC							200	20							Ran & cemented 50" csg. at 223m
19/7	0200	280	1.04	45		10		40	20/40	10	NC			0.9	02/0.3	5500			200	TR	4		96				Displ. w/ mud. Drlg. 12 1/4"
20/7	0100	850	1.06	40		7		18	20/30	10	NC			0.9	03/0.5	11200			320	TR	4		96				Drilling hole.
21/7	0100	850	1.11+	41		7		25	11/14	9.5	NC			0.46	02/0.4	9800			200	TR	8		97	27.5			Logging.
22/7	0100	400	1.11	40		7		19	8/12	9.6	NC			0.6	02/0.4	12200			320	TR	10		90	23.5			Opening hole to 26".
23/7	0100	656	1.11+	40		8		23	8/23	9.0	NC			0.6	02/0.5	12800			300	TR	10		90	25			Reaming.
24/7	0100	765	1.11+	40		5		36	10/13	9.2	NC			0.40	012/0.27	15500			240	TR	9		91	25			Reaming. Displ. w/ 1.40 mud
25/7	0100	306	1.11+	43		5		38	11/11	11.1	NC			5.2	182/2.0	16500			720	TR	9		91	20			Set & dressed CM. Phys. Val.
26/7	0100	306	1.11+	38		5		22	9/11	11.1	NC			4.8	131/1.85	16200			680	TR	9		91	20			Ran & cmts 20" csg./CM. Cont
27/7	0100	306	1.11	38		5		24	6/8	11.2	NC			4.3	0.87/1.0	11000			320	TR	8		92	20			Landed stack.
28/7	0100	328	1.11	41		6		39	9/13	11.2	NC			6.4	165/1.80	14000			680	TR	7		93	20			Drid. CM. Leak off to 1.3sg
29/7	0130	691	1.11+	43		5		40	8/10	10.2	NC			7.2	0.45/0.62	16500			400	TR	10		90	20			Drid. 17 1/2" hole. Opening
30/7	0130	323	1.11	43		4		42	12/14	10.3	NC			2.25	0.28/0.35	18500			700	TR	9		91	20			Drid. 17 1/2" hole. to 22"
31/7	0300	846	1.11	41		4		30	12/15	9.4	NC			0.650	1.025	20000			800	TR	5		95	20			Reaming 22" hole. FCVI.
1/8	0300	465	1.15	41		5		31	12/14	9.1	NC			0.550	1.025	19000			800	TR	6		94	20			Raised MW to 1.15. Reaming
2/8	0300	865	1.15	41		7		31	9/12	9.0	NC			0.55	0.1/0.25	19500			880	TR	7		93	20			Re-reaming 22" hole. FCVI.
3/8	0300	865	1.15	40		9		17	8/12	9.6	NC			0.42	0.18/0.2	20000			720	TR	9		91	20			Ran and cmt. 16" liner.
4/8	0300	865	1.15	40		10		15	3/4	10.8	NC			6.5	1/1.5	17000			480	TR	6		94	20			Switched to ligno. CM cont



# DRILLING MUD RECAP

MILCHEM INCORPORATED / P. O. BOX 22111 / HOUSTON, TEXAS 77027

Contractor ROSS DRILLING OPERATOR STATOIL LEGAL DESCRIPTION \_\_\_\_\_

Rig No. NORDRAUG Well Name Tananger/Bergen And No. 34/10-12 Field 34 COUNTY North Sea STATE Norway

Milchem Well No. \_\_\_\_\_ Milchem Warehouse Tananger/Bergen Spud Date 16/7/81 No. Drilling Days To T.D. 58 DATE T.D. REACHED 7/9/81 TOTAL DEPTH 2800 TOTAL COST \$ 238,495.24

CASING PROGRAM		BITS		TYPE MUD SYSTEM		SOLIDS CONTROL EQUIPMENT		ADDITIONAL INFORMATION			
Depth (ft)	Size (in)	No.	Size (in)	Type	Depth Interval (ft)	Type	Depth Interval (ft)				
223m	30"			Spud Gel		Mud cleaner	from 865 m	Pump Specifications _____			
298m	20"			Gel - Lignosulphonate		Centrifuge	to 1950 mtr.	D.P. and D.C. _____			
865m	16"					Desilter	All used.	Other _____			
1545m	13 3/8"					Dosander					
						Shakers x 3					

DATE (19 )	TIME	DEPTH (ft)	WT (ppg)	FUNNEL VISCOSITY (sec/gal)		PLASTIC VISCOSITY		YIELD POINT (lb/100ft <sup>2</sup> )	GELS (lb/100ft <sup>2</sup> )	pH	FILTRATE (ml/30 min)			Alkalinity		Chloride (ppm)	Calcium (ppm)	Sand (% by Vol.)	Solids (% by Vol.)	Oil (% by Vol.)	Water (% by Vol.)	Methy. Blue (mg/ml mud)	Circ. Volume (bbl)	REMARKS
				API	OF	CP	OF				API	HT-HP	OF	Cake (32nd in)	P <sub>m</sub>									
5/8	0300	865	1.15	41	9	50	12	2/5	11	9	2	8	1/1.5	15500	600	TR	5	95	20			1141	Drig. cmt.	
6/8	0300	1110	1.15	41	9	50	13	5/7	11	8.2	2	9.5	0.9/1.4	14500	560	TR	7	93	22.5			1264	Drig. ahead.	
7/8	0130	1360	1.16	41	9	50	14	4/6	10.7	8.2	2	7.0	0.9/1.7	14000	660	TR	8	92	22.5			1456	Drig. ahead.	
8/8	0100	1560	1.16	44	8	50	11	4/13	10.6	8.2	2	4.6	0.6/1.4	13200	800	TR	10	90	25.0			1575	Drig. ahead.	
9/8	0100	986	1.16	43	8	50	13	4/14	10.6	8.2	2	3.5	0.4/0.7	14000	480	TR	9	91	27.3			1204	Underreaming.	
10/8	0100	1352	1.22	44	10	50	12	4/14	10.7	8.0	2	3.8	0.3/0.8	14200	420	TR	10	90	25.5			1528	Reaming.	
11/8	0100	1435	1.22	45	10	50	9	3/7	10.7	3.8	1	3.6	0.5/1.1	13800	320	TR	10	90	27.5			1650	Reaming. lowered W.L.	
12/8	0100	1560	1.22	44	10	50	8	2/6	10.7	3.8	1	3.2	0.5/1.4	12500	200	TR	9	91	28			1783	Reamed. Caliper log.	
13/8	0100	1560	1.22	43	8	50	9	3/6	10.8	3.9	1	3.5	0.6/1.6	11300	160	TR	8	92	30			1753	Re-reaming.	
14/8	0100	1560	1.22	44	10	50	9	3/7	10.7	4.0	1	2.8	0.5/1.7	10000	160	TR	9	91	30			1609	Re-reaming.	
15/8	0100	1560	1.25	44	13	50	9	3/8	10.6	4.1	1	2.8	0.5/1.8	10000	160	TR	10	90	30			1803	Reamed. Wtd.up. Ran B 38csg	
16/8	0100	1560	1.40	46	14	50	10	3/10	10.8	4.3	1	3.0	0.6/1.8	10000	160	TR	13	87	30			1537	Rncsg.Circ.Cmtd.Wtdactive	
17/8	0100	1561	1.40	45	14	50	10	3/8	10.8	4.0	1	3.2	0.6/1.8	8600	200	TR	14	86	30			1335	Drld. cmt.&lm forml.	
18/8	0100	1581	1.40	45	13	50	10	4/10	10.8	4.0	1	2.8	0.5/1.3	8500	220	TR	15	85	30			1327	Drld. junk. Leak off.	
19/8	0100	1618	1.40	45	14	50	10	3/8	10.8	4.0	1	3.0	0.6/1.7	8000	200	TR	13	87	29			1255	Drld. ahead.	
20/8	2400	1639	1.36	44	12	50	9	2/8	10.8	4.0	1	2.8	0.6/1.4	7900	220	TR	12	88	30			1370	Drld. ahead. Reduced wt to 1.30	
21/8	0130	1795	1.36	45	12	50	11	3/10	10.6	4.0	1	2.4	0.5/1.9	9500	200	TR	12	88	24			1320	" "	
22/8	0230	1950	1.60	45	17	50	12	3/13	10.1	4.3	1	2.0	0.4/1.3	11500	180	TR	22	78	25			1377	Drld. Raised wt to 1.60	
23/8	0200	1950	1.60	45	17	50	12	3/13	10.5	4.3	1	2.5	0.5/1.7	11000	160	TR	23	77	25			1347	Cond. for logging. Logged	
24/8	0230	1950	1.60	48	17	50	11	3/11	9.7	4.6	1	2.1	0.4/1.6	11500	280	TR	22	78	25			1225	Ran 9 5/8" csg.	

Date 24/8 Milchem Technical Representative Atkin/Dale/Sørbo/Lea District Norway Region \_\_\_\_\_ PAGE 2 OF 3

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# DRILLING MUD RECAP

MILCHEM INCORPORATED / P. O. BOX 22111 / HOUSTON, TEXAS 77027

Contractor ROSS DRILLING OPERATOR STATOIL LEGAL DESCRIPTION \_\_\_\_\_

Rig No. NORDRAUG Well Name Tananger/Bergen And No. 34/10-12 Field 34 COUNTY North Sea STATE Norway

Milchem Warehouse Tananger/Bergen Spud Date 16/7/81 No. Drilling Days To T.D. 58 DATE T.D. REACHED 7 sept 81 TOTAL DEPTH 2800m TOTAL COST \$ 238,495.24

CASING PROGRAM		BITS		TYPE MUD SYSTEM		SOLIDS CONTROL EQUIPMENT		ADDITIONAL INFORMATION	
Depth (ft)	Size (in)	No.	Size (in)	Type	Depth Interval (ft)	Type	Depth Interval (ft)	Pump Specifications	
223m	30			Spud Gel	865	Mud cleaner	1934-2800	National 12-P-160	6 3/4 x 12
298m	20			Gel - Ligno.	865-TD	Centifuge		D.P. and D.C.	6 1/2
865m	16							Other	
1545m	13 3/8								
1934m	9 5/8								

DATE (1981)	TIME	DEPTH (ft)	WT (ppg)	FUNNEL VISCOSITY (sec/g)		PLASTIC VISCOSITY		YIELD POINT (lb/100ft <sup>2</sup> )	GELS (lb/100ft <sup>2</sup> )	pH	FILTRATE (ml/30 min)			Coke (32nd in)	Alkalinity			Chloride (ppm)	Calcium (ppm)	Sand (% by Vol.)	Solids (% by Vol.)	Oil (% by Vol.)	Water (% by Vol.)	Methy. Blue (mg/ml mud)	Circ. Volume (bbl)	REMARKS
				API	OF	CP	OF				API	HT-HP	OF		P <sub>m</sub>	P <sub>f</sub> / M <sub>r</sub>										
25/8	0200	1934	1.60	48	17	50	11	3/11	9.8	4.7	14.7	250	1	2.0	0.4/1.5	11500	240	TR	23	77	25	1125	Cmtd. 9 5/8" csg.			
26/8	0200	1954	1.65	48	16	50	10	2/12	10.6	3.8	13.8	250	1	3.6	0.65/1.8	11500	280	TR	23	77	25	993	Drl. cmt. & shoe & new form.			
27/8	0230	2041	1.65	47	15	50	9	2/10	10.2	3.3	13.6	250	1	2.7	0.55/2.5	12500	160	TR	21	79	22.5	985	Leak off. Drl. ahead.			
28/8	0230	2185	1.65	49	16	50	11	2/10	10.4	3.6	14.4	250	1	2.7	0.5/2.5	12500	240	TR	23	77	22.5	994	Corod.			
29/8	0300	2264	1.65	49	16	50	9	3/8	10	3.2	14.3	250	1	2.3	0.5/2.75	14500	160	TR	22	78	22.5	1149	Trip. Kick-salt water flow			
30/8	0200	2312	1.70	49	17	50	9	2/7	10.4	3.2	13.1	250	1	3.1	0.75/2.9	14500	120	TR	22	78	22.5	1211	Drl. 2255-2311. Raise w			
31/8	0200	2390	1.74	48	16	50	9	4/8	9.6	3.8	14.1	250	1	1.7	0.4/2.1	15000	280	TR	24	76	22.5	1101	Drlg. Raised MW to 1.7 to 474			
1/9	0200	2472	1.74	52	18	50	10	3/10	10.1	3.5	13.9	250	1	2.15	0.5/2.5	15000	220	TR	25	75	22.5	1073	Drlg to 2472. RCD to change			
2/9	0200	2546	1.74	50	17	50	15	2/12	10.4	3.7	14.1	250	1	2.0	0.55/2.6	16500	240	TR	26	74	22.5	1050	Drlg to 2546. " bit.			
3/9	0200	2630	1.74	48	15	50	12	2/9	10.2	3.4	13.8	250	1	2.0	0.5/2.4	16500	240	TR	26	74	22.5	1164	Change bit. Drlg ahead.			
4/9	0200	2687	1.74	50	15	50	13	2/8	9.9	3.1	13.2	250	1	1.9	0.4/2.3	16000	280	TR	26	74	22.5	1194	" "			
5/9	0100	2748	1.74	47	15	50	10	2/8	11.1	2.7	12.8	250	1	2.2	0.4/1.9	16200	220	TR	25	75	22	1266	Drilling.			
6/8	0030	2793	1.74	48	14	50	9	2/8	11.1	2.5	12.8	250	1	2.2	0.4/1.9	15800	200	TR	26	74	22	1277	Drilling.			
7/8	2400	2800	1.74	48	14	50	10	2/7	10	2.5	12.9	250	1	2.0	0.5/1.9	16100	200	TR	26	74	22	1212	TD 2800m. Logging.			
8/8	2400	2800	1.74	47	14	50	10	2/7	10	2.4	12.9	250	1	2.0	0.4/1.9	16000	200	TR	26	74	22	1162	Plugging well.			
9/8	2400	1800PBT1	1.74	47	15	50	9	2/10	10.5	3.8	14.8	250	1	2.6	0.7/1.8	16100	300	TR	23	77	21	840	Plugging well.			
10/8	2200	1365PBT1	1.74	49	16	50	11	3/10	10.8	4.0	14.8	250	1	2.9	0.9/2.4	16000	280	TR	23	77	21	948	Plugging well.			
11/8	2400	750PBT1	1.74	48	16	50	11	3/14	10.7	4.0	14.9	250	1	2.9	0.9/2.4	16000	200	TR	23	77	21	874	Plugging well. Engr off rig			

This space is for your convenience when using the Supplementary Data form in conjunction with the "form holder."  
DO NOT DETACH ALONG PERFORATED LINE UNTIL THE DATA IS COMPLETE.



MILCHEM INCORPORATED / P. O. BOX 28111 / HOUSTON, TEXAS 77027

## SUPPLEMENTARY DATA

OPERATOR STATOIL LEGAL DESCRIPTION 34/10-12 Milchem Well No. \_\_\_\_\_

Well Name And No. 34/10-12 COUNTY North Sea STATE Norway

DATE	DEPTH	INFORMATION
16/7	0	Mixing spud mud.
17/7	197	Drilling 36" hole - returns to sea bed.
18/7	225	Drilled 36" hole. Ran & cemented 30" casing.
19/7	290	Drilled cement 220-225m ran riser. Displ w/ 1.04 mud. Drilling 12 1/4" hole.
20/7	850	Drilling 12 1/4" hole.
21/7	850	POOH from 850m. RIH. No fill. Circ. gas. Mud cut. Incr. wt. to 1.10. Wiper trip. Circ. Raised wt. to 1.11+. Wiper trip. RIH. No fill. Circ. POOH. Logged. RIH w/ 12 1/4" bit.
22/7	400	Displ. hole w/ 1.25 sg mud. Circ. Displ. back to 1.11 mud. POOH. RIH w/ 17 1/2" bit & 26" H.O.
23/7	656	Reamed 378-548. Surveted. POOH. RIH. Reamed.
24/7	765	Reamed to 765. POOH to redress H.O. New orders. RIH open ended to 765. Displ hole w/ 1.40 sg. Mud to 450m. POOH to 500m. Displ w/ 1.11 sg. mud. Mixed & pumped 215 bbl H <sub>2</sub> O via 1.11 sg mud 500-400m. POOH to 450m.
25/7	306	Set two cmt. plugs. Circ. B/U after each plug. RIH w/ 17 1/2" bit & 26" IR. Dressed cmt. to 306m. Displ. circ. w/ 245 bbl 1.40 sg mud. POOH to 163m. Displ. riser w/seawater. Prep. to pull riser. B/U
26/7	306	Pulled riser. Reamed cmt. 305-306m. Circ. B/U w/ 1.40 sq mud - returns to seafloor. Ran 20" csg. Circ. csg. w/ 1.40 sq. mud - returns to seafloor. Cmt. csg. Displ. cmt w/ 1.11 sg mud. Prep to run stack.
27/7	306	Landed stack tested - no good. Repairing choke line.
28/7	328	Finished repairs. Tested BOP's. RIH. Drl. cmt. 266m-306m. Leak off to 1.3 sg. Drl. cmt. plug.
29/7	691	Drilling 17 1/2" hole.
30/7	323	Drl. 17 1/2" hole to 865m. Circ. hole clean. Wiper trip to 20" shoe. Tight hole 810-770m. 2m fill on btm. Circ. hole clean. POOH. RIH w/bit & 22" under reamer. Reamed cmt. & form.
31/7	846	Reaming 22" hole from 410 m. Filled all reserve pits w/ mud.
1/8	456	Reaming 22" hole from 296 again after Neg. Log results. Raised MW to 1.15.
2/8	865	Re-reaming 22" hole to TD. Circ. hole clean. POOH for logging.
3/8	865	Logged w/ schl. Ran & cmt. 16" liner. Lowered yield point fill 17. Dumped 250 bbls cmt. cont. mud.
4/8	865	Tested BOP. Drlg. hard cmt. 183-198. Tested 20" & 16" csg. Both leaked. Set cmt. plug 170-205m. Switched to
5/8	865	WOC. RIH to Liner top. No cmt. POOH. Test stack ok. Drlg soft cmt. 205-223m. Start Drlg. plug. Ign. mud. Trtd. for cmt. cont.

Milchem Technical Representative Atkin/Sivertsen/Dale/Sørbo District Norway Page 1 of 3





## SUPPLEMENTARY DATA

MILCHEM INCORPORATED / P. O. BOX 22111 / HOUSTON, TEXAS 77022

OPERATOR STATOIL LEGAL DESCRIPTION 34/10-12 Milchem Well No. \_\_\_\_\_

Well Name And No. 34/10-12 COUNTY North Sea STATE Norway

DATE	DEPTH	INFORMATION
6/8	1110	Drld. out shoe. Circ. BU. Leak off test EQV 1.56 sg. Changed bit- Drlg. ahead. Mixed 300bbls Gel. 1 shake w/screen
7/8	1360	Drld. to 1244m. POOH. RIH w/ new bit. Hole tight at 1150m. Reamed to 1180m. RIH to btm. Drilling.
8/8	1560	Drld. to 1560m w/ wiper trips at 1433m, 1515m, 1560m. Pumped 20 bbl slugs w/ 13lb/bbl Nutplug at 1515m & 1560m.
9/8	986	POOH to shoe, RIH, tight at 1485m. Reamed 1483m-1500m. Circ. hole clean. POOH. Logged. RIH w/ under reamer. Reamed from 865m.
10/8	1352	Reamed to 1352m. POOH. RIH. Reamed tight. Spots to 1352 m.
11/8	1435	Reamed to 1413m. Circ. POOH. RIH. Reamed.
12/8	1560	Reamed to 1560m. POOH. RAN caliper log. Break down DP
13/8	1560	Re-reamed to 1135m. POOH.
14/8	1560	Re-reamed 1135-1475m.
15/8	1560	Reamed to 1560m. Circ. hole clean. Weighted up to 1.25. POOH. RAN caliper log. Ran 13 9/8 casing.
16/8	1560	Ran csg. to 1544m. Circ. cmtd. Tested BOP's. Weighted active to 1.40.
17/8	1561	RIH tagged cmt. 1515m. Circ. & raised wt. to 1.40. Drld. F.C. & shoe and 1m formn. to 1561m.
18/8	1581	RIH. Worked junk basket at 1561m. POOH w/ junk. RIH. Drilled to 1562m. Leak off 1.74equiv. Drld to 1581m.
19/8	1621	Drld. ahead. Pumped 3x25 bbl pills Nutplug/Unical, last two w/ 1 dr. MD each to De-ball bit.
20/8	1639	Drld. to 1639m. POOH to change bit. Pumped 25 bbl Nutplug slugs at 1634&1638m. Reduced wt. to 1.36.
21/8	1795	POOH. RIH w/ new bit. Drilled ahead.
22/8	1950	Drld to 1860m. Gas 225 units. Circ. & raised wt to 1.43 then 1.50. Drld. & raised wt to 1.55 at 1950m. Raised wt. to 1.60.
23/8	1950	Finished raising wt. to 1.60. Wiper trip. Circ. & cond. for logging. Logged.
24/8	1950	Finished logging. RIH. Circ. & cond. mud. Ran 9 5/8" casing. Circ. casing.
25/8	1934	Cmtd. 9 5/8" csg. Tested BOP's. RIH w/ 8 1/2" bit & new BHA.
26/8	1954	RIH. Drld. CMT. & FC 1903-1927. TIH w/ new bit. Drld. cmt. shoe 1927-1950m. Drld. 8 1/2 hole to 1953 m.
27/8	2041	Circ. B/U. Leak off 1.94 equiv. Circ. & weighted to 1.65. Drld. to 2037m. Circ. & cond for coring. Wiper trip. RIH w/ corebit & barrel.
28/8	2185	RIH w/ core barrel. Circ. B/U. Cut core No. 1. POOH. RIH w/bit No. 19. Reamed & washed 2037-2043m. Drld.

Milchem Technical Representative Atkin/Dale/Sørbo/Lea District Norway Page 2 of 3  
 150-30-1771









Drilling Fluids Division

# DAILY DRILLING MUD ADDITIONS

MILCHEM INCORPORATED / P. O. BOX 22111 / HOUSTON, TEXAS 77027

Contractor ROSS DRILLING OPERATOR STATOIL LEGAL DESCRIPTION \_\_\_\_\_

Rig No. NORDRAUG Well Name And No. 34/10-12 Field 34 COUNTY North Sea STATE Norway

Milchem Well No. \_\_\_\_\_ Milchem Warehouse Tananger/Bergen. Spud Date 16/7/81 No. Drilling Days To T.D. 58 DATE T.D. REACHED 7/9/81 TOTAL DEPTH 2800 TOTAL COST \$ 238,495.24

DATE (1981)	DEPTH (m)	Barite		Caustic Soda		Unical		Dispac S.L.		Permalose		Nutplug Fine		Nutplug Medium		Mica Fine		Mica Medium		Ligcon		Sodium Bicarbonate																DAILY COST	CUMULATIVE COST
		Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost	Unit	Cost				
31/8/81	2390	50		57		2		6		20		50		50		60		34																				11,472.56	213,945.82
1/9	2472	20		16		1												12																				3,103.57	217,049.39
2/9	2546	15	13	15		4												20																			3,389.36	220,438.75	
3/9	2630	21	10	38														38																			3,985.54	224,424.29	
4/9	2687	13	6	44														44																			3,192.56	227,616.85	
5/9	2748		12	27														21																			993.21	228,610.06	
6/9	2793	12.8	4																																		1,582.16	230,192.22	
7/9	2800	12.8																																			1,536.00	231,728.22	
8/9	2800	No	materials used.																																			231,728.22	
9/9	2800	26																10																			3,312.50	235,040.72	
10/9	1365	25.9																7																			3,242.75	238,283.47	
11/9		1.6																																			192.00	238,495.24	