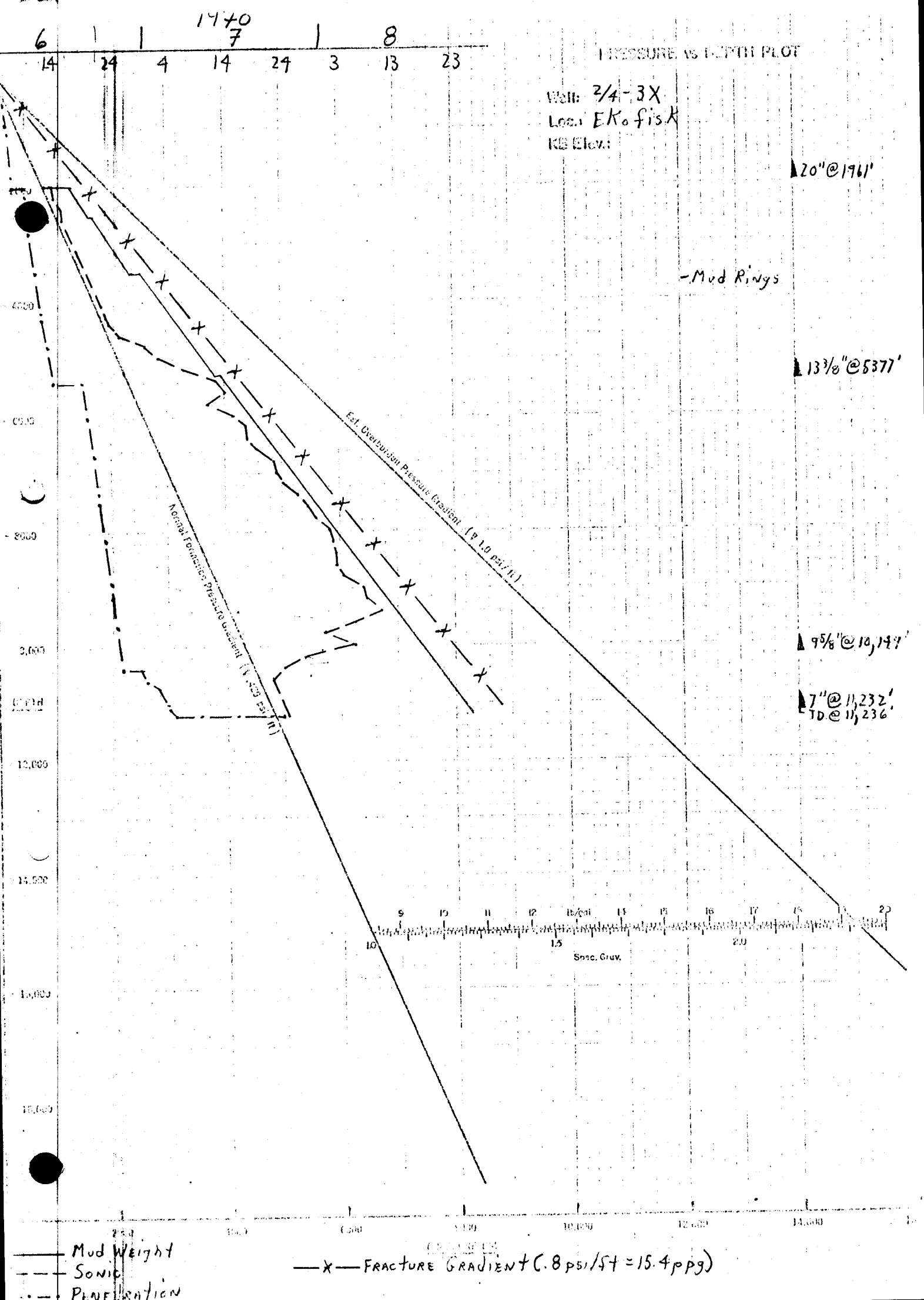




WELL : 4/4-3X
 FIELD : EKOFISK 01 JUNI 1970 - 02 AUG. 1970 - 61 Days

P. R. Co. - NORWAY
 WELL RECAP

1	MUD TYPE		Lignosulfonate	Lignosulfonate	Lignosulfonate		
2	MUD WEIGHT	PPG	12.5-14.3	14.3	14.3-14.4	12.5-14.4	
3	INTERVAL EXAMINED	ft	1961-54cc	54cc-10,150	10,150-11,234	1961-11,234	
4	TOTAL FOOTAGE	ft	3439	4750	1084	9273	
5	HRS DRILLING	hrs	65.5	104	41.5	211	
6	PENETRATION (4÷5)	ft/hr	52.5	45.7	26.1	43.9	
7	MUD COST ^{CURRENT} (1973)	\$	66,793	63,031	16,658	146,682	
8	MUD COST/FT (7÷4)	\$/ft	19.50	13.27	15.37	15.82	
9	HRS. CONDITIONING HOLE	hrs	21.5	3.5	—	25	
10	CONDITIONING COST (9X ^{Rig Cost})	\$	40,850	6,650	—	47,500	
11	CONDITIONING COST/FT (10÷4)	\$/ft	11.88	1.40	—	5.12	
12			15 JUNI 1970	28 JUNI 1970	29 JULI 1970	29 JULI 1970	
13	ROTATING COST (5X RIG COST)	\$	124,450	197,600	78,850	400,900	
14	ROTATING COST/FT (13÷4)	\$/ft	36.19	41.60	72.74	43.23	
15	FISHING HRS	hrs	—	—	—	—	
16	FISHING COST (15X RIG COST)	\$	—	—	—	—	
17	FISHING COST/FT (15÷4)	\$/ft	—	—	—	—	
18	TOTAL COST (7+10+13+16)	\$	232,293	267,281	95,508	595,082	
19	TOTAL COST/FT (18÷4)	\$/ft	67.55	55.27	88.11	64.17	
20	COMMENTS				CORED		

RIG COST \$1900/HR.

17 1/2"

12 1/4"

8 1/2"

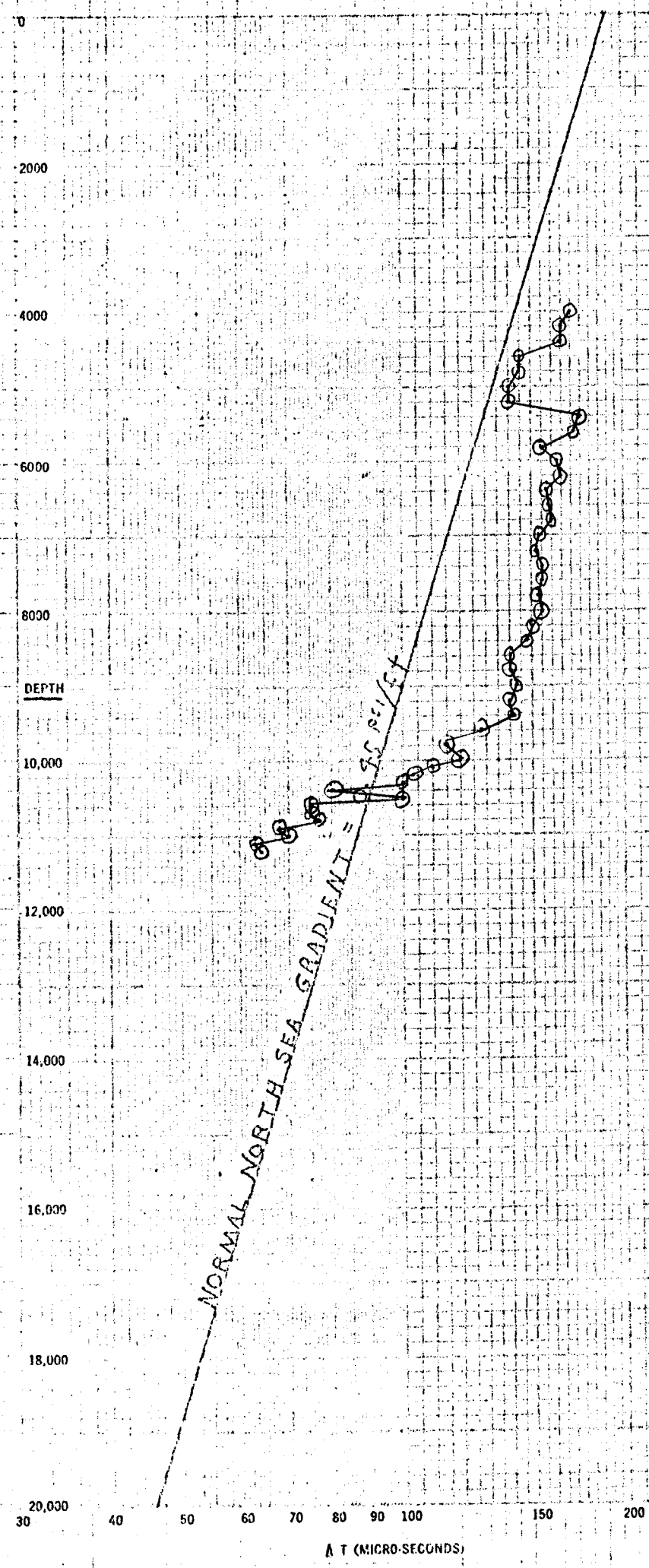
44 Days

WELL: 2/4-3X
 LOCATION: EKOFISK
 KB ELEV:

Data Sheet For Well Log Values
 Shale Δt , Pressure Gradient, and Mud Weight

Depth	Δt	∇P	MW	Depth	Δt	∇P	MW	Depth	Δt	∇P	MW
				2000	170	.485	9.33	7600	155	.717	13.79
				2200	165	.465	8.94	7800	153	.717	13.79
				2400	165	.485	9.33	8000	155	.730	14.04
				2600	145	.450	8.65	8200	150	.717	13.79
				2800	145	.450	8.65	8400	147	.710	13.65
				3000	140	.450	8.65	8600	140	.690	13.27
				3200	140	.450	8.65	8800	140	.695	13.36
				3400	145	.450	8.65	9000	143	.715	13.75
				3600	143	.450	8.65	9200	140	.707	13.60
				3800	142	.450	8.65	9400	141	.717	13.79
				4000	140	.450	8.65	9600	127	.655	12.60
				4200	138	.450	8.65	9800	115	.590	11.35
				4400	135	.450	8.65	10,000	127	.665	12.79
				4600	140	.470	9.04	10,200	103	.530	10.19
				4800	148	.545	10.48	10,400	80	.485	9.33
				5000	150	.570	10.96	10,600	75	.450	8.65
				5200	159	.640	12.31	10,800	78	.450	8.65
				5400	175	.720	13.85	11,000	70	.450	8.65
				5600	173	.725	13.94	11,200	64	.450	8.65
				5800	155	.645	12.40				
				6000	163	.695	13.36				
				6200	165	.710	13.65				
				6400	157	.690	13.27				
				6600	157	.700	13.46				
				6800	160	.715	13.75				
				7000	154	.700	13.46				
				7200	153	.700	13.46				
				7400	155	.715	13.75				

2/4-3X
Eko fish



Geological Unit
Depth (ft)
A T (micro-seconds)

Ekofisk - 3 X.

Block - 2/4

Norway.

Drilling Mud Program.

36" Hole 470' RKB (170 bbls W/O washout.)

Drill the hole with sea water with returns to the sea floor. Pump slugs of thick mud through the hole frequently to clean. After the hole has been drilled, a volume of thick mud equal to twice the volume (300 bbls.) will be pumped into the hole.

Mix the thick mud as follows:

<u>MATERIAL.</u>		<u>PROPERTIES.</u>	
Sea Water.		Viscosity	Thick
Bentonite	10 to 20 PPB	Weight	8.8 PPG
Flosal	3 to 5 PPB	Fluid-loss	No control

Run shearing device on the suction pit when using Flosal and Bentonite.

26" Hole to 2000' RKB (1117 bbls W/O washout.)

Drill the hole with sea water. Pump slugs of thick mud through the hole frequently to clean. After the hole has been drilled, pump a volume of thick mud equal to the hole volume (1117 bbls.). Mix the thick mud as above. Fill the pits with thick mud and mix volume while displacing to have desired volume. Keep the mud thick while pumping into the hole.

17 1/2" Hole to 5500' RKB (650 bbls W/O washout.)

Drill the plug with sea water. Immediately after drilling the plug displace the hole (650 bbls.) with 10.5 ppg. mud previously prepared in the pits as follows:

<u>Material.</u>		<u>Properties.</u>	
Sea Water	-	Weight	10.5 ppg.
Bentonite	- 15 - 20 PPB	Viscosity	38 - 45 sec. 1
Caustic Soda	1/2 - 1 PPB	Fluid Loss	8 - 10 cc/30
Drispac	- 1/2 - 1 PPB	Alkalinity	.5 - 1.0 PF.
Lignosulfonate	6 PPB	Oil	3 - 4%
Desco	- 1 PPB		
Detergent	- 2 PPB		
Barite	- As needed.		
Oil	- 4%		

Drill out below the 20" casing with the prepared mud as above. Control the drilling rate at 60 to 80 feet per hour. As drilling proceeds regulate the mud properties as follows:

Depth	Weight PPG	Viscosity Sec/qt.	Fluid-loss cc. 30/min	Alk	Sol
2000' to 3000'	10.5-11.5	38-40	8-10	.5-1.0	12
3000' to 3500'	11.5-12.5	38-45	8-10	.5-1.0	13
3500' to 4000'	12.5-13.0	38-45	8-10	.5-1.0	20
4000' to 4500'	13.0-13.3	40-45	8-10	.5-1.0	22
4500' to 5000'	13.3-14.0	40-45	8-10	.5-1.0	24
5000' to 5500'	14.0-14.3	40-50	6-8	.5-1.0	26

Below the 20" casing control the flow properties with lignosulfonate and Desco mixed at a 4:1 ratio. Maintain concentration of Detergent at 4-PPB to 4800'. At 4800' add an additional 2 PPB of Detergent and 4 PPB of Soltex. Control the fluidloss with C.M.C. and/or Drispac as required. Should viscosity become a problem use a combination of C.M.C. and starch for fluidloss control.

To minimize the balling problem trips or short trips should be made at approximately 4000' and 4800'. The need for additional trips for hole conditioning will be decided as the hole condition dictates or as the drilling supervisor feels the need.

Cleaning of the riser, by pumping fluid into the kill lines to increase the velocity within the riser, is recommended frequently to eliminate the mud ring problem.

12 1/8" Hole to 10,000' RKB (1482 bbls - W/O washout).

While waiting on cement and nipping up, clean the mud pits. Salvage all surface volume possible and condition the mud in the pits. Pretreat with 1 PPB Sodium Bicarbonate.

Drill the plug with the conditioned mud, treat the cement contaminated mud returns with Bicarbonate of Soda and Water as necessary. Below the 13 3/8" casing maintain the mud as follows:

<u>Properties.</u>		<u>Materials.</u>	
Weight	- 14.3 PPG	Detergent	- 3-4 PPB
Viscosity	40-50 sec/qt	Soltex	- 4 PPB
Fluidloss	4-6 cc/30 min	Oil	- 3.4 %
Alkalinity	.5-1.0 P.p.f. .5		
Solids	26-28%		
Calcium	800 PPM or less.		

Control the drilling rate 80 to 100 ft/hour to 6500' and make short trips as needed to minimize balling. At 6500' discontinue adding detergent.

Control the flow properties with Lignosulfonate and Desco mix at a 4:1 ratio.

Control the fluid loss with C. M. C. and/or Drispac.

8 1/2" Hole to 11,000' (778 bbls W/O washout.)

Condition the mud as above and drill out below the 9 5/8" casing with the same type mud and maintain as follows:

Properties.

Weight	14.8 PPG	Solids.	- 26 - 27%
Viscosity	40-45 Sec/qt	Oil	- 3 - 4%
Waterloss	4-6 cc/30 min		
Alkalinity	05 - 1.0 P.H.		

C O N F I D E N T I A L

NORWAY - NORTH SEA - EXPLORATION WELL

DRILLING PROSPECTUS

Well : 2/4-3x
Approx. Coordinates : 56° 29' 39" N, 03° 13' 39" E.
Water Depth : 240'

General:

It is planned to drill a 11,000' well in block 2/4 with ODECO's semisubmersible drilling rig "Ocean Viking".

Anticipated Pressure and Troublesome Formations:

Heaving shales and high pressure zones can be expected between 4440 to 9820'.

Washouts are anticipated between 8600 to 9600'.

The high pressured zone encountered at 5400' in well 2/4-1X is anticipated and will be controlled by increasing the mud weight to 14.3 ppg.

Hole and Casing Program:

Hole Size	Casing Size	Description	Torque ft-lbs	Approx. Depth RKB
36"	30"	1"wall 309 lbs/ft	Vetco Squinch jts	470'
26"	20"	133 lbs/ft J-"R"&"L"	Vetco Connectors	2000'
17½"	13 3/8"	68 lbs/ft J-ST&C	5200	±5400'
12 1/4"	9 5/8"	47 lbs/ft N-80 Butt.	-	±10100'
8½"	7"	29 lbs/ft N-80 LT&C	3800	±11000'.

Notes:

1. The 36" hole is to be drilled to a depth that will allow three joints of 30" casing to be set on bottom and still have 10' to 12' of casing above the sea floor. This will provide for better U.T.V. reception and allow for some settling of the 30" casing without the wellhead sinking below the sea floor.
2. In order to minimize hole washout below the 20", set the casing not more than 15 to 20 feet off bottom. This string should be cemented with a float shoe on bottom and a baffle collar one joint above bottom.

3. 13 3/8" and 9 5/8" casing strings should be cemented with the float shoes as close to bottom as feasible.
4. The following is a tabulation of the minimum pumping pressures that could burst the casing strings while cementing:

<u>Casing</u>	<u>Minimum pumping pressure that burst casing</u>
20"	2150
13 3/8"	2800
9 5/8"	5300
7"	6200

Cement Requirements:

A. 30" Casing

Cement with 1070 sacks Dalen Portland cement plus 3% calcium chloride mixed with fresh water to a slurry weight of 15.6 ppg. The 1070 sacks provides for cement back to the surface plus 300% washout in open hole and will fill the bottom 25' of 30" casing. Wait on cement 12 hours before drilling out. Run 90' of drill pipe below the 30" handling tool. A 30" Baker Float Shoe will be run on bottom of the 30" casing.

B. 20" Casing

Cement with 2180 sacks Dalen Portland cement plus 8% Bentonite mixed with fresh water to a slurry weight of 13.1 ppg. Follow with 800 sacks Dalen Portland cement plus 2% calcium chloride mixed with fresh water to a slurry weight of 15.6 ppg. Thickening time for the "gel" cement will be 3 hrs. 50 mins. Thickening time for the common cement will be 1 hr. 30 mins. The above cement volume provides for cement back to the surface plus 100% washout in open hole and 45' of fill in the 20" casing. A 20" Baker float shoe will be run on bottom and baffle collar on the first joint. B-J Services' top and bottom sub sea cementing plugs are to be used. The casing threads of the bottom two joints of casing should be cleaned and made up with Bakerlock.

Drilling may be resumed immediately after running the 20" B.O.P. stack and 24" Marine Riser.

C. 13 3/8" Casing

Cement with 2600 sacks Dalen Portland cement plus 4% Bentonite plus 0.1% Diacel "LWL" mixed to 14.1 ppg slurry weight. Follow with 800 sacks Dalen Portland cement mixed to a 15.6 ppg slurry weight. Use fresh water for all mixing. This cement volume provides for cement back to the sea floor plus 25% washout in open hole.

Thickening time for the "gel" cement is 3 to 4 hrs. Thickening time for the common cement is 3 hrs.

Run three centralizers with one 7½' above the shoe, one on top

of the second joint, and one on top of the fourth joint.

A. Baker Model "G" differential fill shoe will be run on bottom and a Baker Model "G" differential fill collar on top of the first joint. B-J Services' top and bottom sub sea cementing plugs are to be used.

Mill connections of the bottom two joints should be tack-welded on the racks and Bakerlock used on the field connection.

Drilling may be resumed as soon as the 13 5/8" B.O.P. stack and 16 Marine Riser are in place.

D. 9 5/8" Casing

Prior to cementing 9 5/8" casing, pump 20 bbls of B-J mud sweep ahead of the cement slurry.

Cement with 1480 sacks class "B" cement plus 4% Bentonite plus 0.3% Diacel "LWL" mixed with fresh water to 14.1 ppg. Follow with 800 sacks class "B" cement plus 0.1% Diacel "LWL" mixed with fresh water to 15.6 ppg. This cement volume provides for cement back to the sea floor. Thickening time for "gel" cement is 2 hrs. 10 mins. Thickening time for common cement is 2 hrs. 35 mins.

A Baker Model "G" differential float shoe will be run on bottom and a Model "G" differential float collar on top of the first joint. Three centralizers will be run, one 7½' above the shoe, one at the top of the second joint and one at the top of the fourth joint. The bottom two joints and the float equipment connections should be made up with Bakerlock. Wait on cement 8 hrs. before drilling out.

E. 7" Casing

Cement with 170 sacks class "B" cement plus 0.3% Diacel "LWL" plus 1.0% Diacel "A" mixed with fresh water to slurry weight of 15.6 ppg. This volume of cement provides for a 1000 ft. column of cement with a 25% excess to allow for washouts and to tie back into the 9 5/8" casing string. Thickening time for this cement is 2 hrs. 50 mins.

A Baker Model "G" differential float shoe will be run on bottom and Model "G" fill up collar on top of the first joint.

Bakerlock should be used on the bottom two joints and float equipment. No welding is to be done on this string of casing.

Wellhead and B.O.P. Procedure:

A National Supply Underwater Wellhead System - Payne Control System, Hydril and Shaffer blowout preventors will be used for drilling this well. The procedure for handling and running this equipment is basically as covered in the National Supply Manual.

In addition to the initial subsea 5000 psi B.O.P. test, the preventors are to be tested to 2500 psi the first trip out of the hole after 12:01 a.m. each Tuesday.

Mud Logging:

The Geoservice mud logging unit is to be in service when the well is spudded. A geologist will be on board to furnish information to the mud logger as to frequency, number, and kind of samples to be collected.

Drill Stem Testing:

There will be no open hole drill stem testing.

Hole Deviation Surveys:

An instrument to measure hole deviation is available on the rig. Surveys should be made every trip out of the hole. Intermediate surveys are to be made only if deviation is a problem. Surveys below 8000' are not required unless there is reason to believe a serious hole deviation problem is occurring that will have to be corrected. The final hole deviation and direction can be taken from the dipmeter log.

Logging Program:

See Geological Prognosis.

Coring Program:

See Geological Prognosis.

Lost Circulation Procedure:

Diaseal M

Diaseal M is never added to the drilling mud nor is it slurried as a pill in drilling mud. It is always mixed with water either fresh, salty or salt saturated. It is always pumped down as a separate pill but is preceded and followed by drilling mud. The amount to be used varies from 25 to 200 barrels depending upon the amount of open hole and experience in the area. Some operators are twice the open hole volume as a guide.

Conventional lost circulation material such as nut hulls or fibers can be added to the slurry. Successful jobs have been done with and without the addition of these conventional lost circulation materials. 10 lb/bbl of fibrous material such as Baroid's Fiber-tex (Magcobar's Magco-Fiber) or 20 lb/bbl of medium nut hulls such as Baroid's Wall Nut (Magcobar's Tuf-Plug) are recommended.

The general procedure for using Diaseal "M" when circulation is lost is as follows:

1. Pull off bottom or just above the loss zone.
Put the kelly back on and continue to work the pipe.
2. Mix the slurry as conditions dictate. If pill is to be mixed in suction pit, run necessary amount of water into pit with guns on pit. As water fills suction pit, begin opening sacks of Diaseal "M" and mix contents with water by maximum agitation from guns. As slurry becomes viscous, begin addition of lost circulation material.
- 2a. If Diaseal "M" slurry is already mixed and being held in readiness in standby pit, agitate vigorously, add lost circulation material if it has not already been added. Slurry is ready for use when thoroughly mixed and agitated.
3. When mixing is complete, pump the mixture in the hole and displace the slurry from the pipe with mud.
4. Pull up in the surface pipe and fill the hole with mud through the fill-up line.
5. If the hole does not fill with one foot of mud out of pits, mix another pit of Diaseal "M" slurry and repeat procedure.
6. If the hole does fill, proceed as follows:
 - a) For depths less than 7000 feet, close the pipe rams, pump slowly through the fill-up line at 0-300 psi and squeeze, and hold available pressure for 10 mins.
 - b) For depths more than 7000 or when a squeeze pressure cannot be established, wait two hours, then if the hole will stand full, go to bottom and drill.

Diaseal "M" slurries can be put in place through the bit nozzles. In the Texas Panhandle mud losses have been sealed by pulling off bottom, pumping down a pre-mixed Diaseal "M" slurry of 25 to 50 barrels followed by mud. This restores circulation and drilling is continued.

Mud Program:

36" Hole 470' RKB (170 bbls W/O washout.)

Drill the hole with sea water with returns to the sea floor. Pump slugs of thick mud through the hole frequently to clean. After the hole has been drilled, a volume of thick mud equal to twice the ~~hole~~ volume (300 bbls.) will be pumped unto the hole.

Mix the thick mud as follows:

Material.

Properties.

Sea Water

Viscosity

Thick

Attapulgate clay

15 to 10 PPB

Bentonite

5 to 10 PPB

Weight

8.8 PPG

Flosal

3 to 5 PPB

Fluid-loss

No control

Run shearing device on the suction pit when using Flosal and Bentonite.

26" Hole to 2000' RKB (1117 bbls W/O washout.)

Drill the hole with sea water. Pump slugs of thick mud through the hole frequently to clean. After the hole has been drilled, pump a volume of thick mud equal to the hole volume (1117 bbl.). Mix the thick mud as above. Fill the pits with thick mud and mix volume while displacing to have desired volume. Keep the mud thick while pumping into the hole.

17½" Hole to 5500' RKB (1650 bbls W/O washout.)

Drill the plug with sea water. Immediately after drilling the plug displace the hole (650 bbls.) with 12.5 ppg. mud previously prepared in the pits as follows:

Material.

Properties.

Sea Water	-	Weight	12.5 ppg increase
Bentonite	- 15 - 20 PPB		14.0 ppg at 3500'
Caustic Soda	- ½ - 1 PPB	Viscosity	38 - 45 sec. 2 qt.
Teck. Grade CMC	- ½ - 1 PPB	Fluid Loss	8 - 10 cc/30 min
Lignosulfonate	- 6 PPB	Alkalinity	.5 ← 2.5 PF
Desco	- 1 PPB	Oil	3 - 4%
Detergent	- 2 PPB		
Barite	- As needed.		
Oil	- 4%		

Drill out below the 20" casing with the prepared mud as above. Control the drilling rate as required to maintain the desired mud properties. As drilling proceeds regulate the mud properties as follows:

Depth	Weight PPG	Viscosity Sec/qt.	Fluid-loss cc. 30/min	Alk	% Solids
2000' to 3000'	12.5 - 13.0	38-40	8-10	.5-1.0	20-22
3000' to 3500'	13.0 - 14.0	38-45	8-10	.5-1.0	24-26
3500' to 4000'	14.0 - 14.3	38-45	8-10	.5-1.0	26-28
4000' to 5500'	14.3	40-45	6- 8	.5-1.0	26-28

Below the 20" casing control the flow properties with Lignosulfonate and Desco mixed at a 4:1 ratio. Maintain concentration of Detergent at 2 PPB to 4800'. At 4800' add an additional 2 PPB of Detergent and 4 PPB of Soltex. Control the fluidloss with C.M.C.

To minimize the balling problem trips or short trips should be made at approximately 4000' and 4800'. The need for additional trips for hole conditioning will be decided as the hole condition dictates or as the drilling supervisor feels the need.

Cleaning of the riser, by pumping fluid into the kill lines to increase the velocity within the riser, is recommended frequently to eliminate the mud ring problem.

12 1/4" Hole to 10,000' RKB (1482 bbls - W/O washout.)

While waiting on cement and nipping up, clean the mud pits. Salvage

all surface volume possible and condition the mud in the pits.
Pretreat with 1 PPB Sodium Bicarbonate.

Drill the plug with the conditioned mud, treat the cement contaminated mud returns with Bicarbonate of Soda and Water as necessary. Below the 13 3/8" casing maintain the mud as follows:

Properties.

Weight	14.3 PPG
Viscosity	40-50 sec/qt
Fluid loss	4- 6 cc/30 min
Alkalinity	.5-1.0 P.f.
Solids	26-28%
Calcium	800 PPM or less.

Materials.

Detergent	-	3-4 PPB
Soltex	-	4 PPB
Oil	-	3-4 %

Control the drilling rate as required to maintain mud properties to 6500' and make short trips as needed to minimize balling. At 6500' discontinue adding detergent.

Control the flow properties with Lignosulfonate and Desco mixed at a 4:1 ratio.

Control the fluid loss with C.M.C.

8 1/2" Hole to 11,000' (778 bbls W/O washout.)

Condition the mud as above and drill out below the 9 5/8" casing with the same type mud and maintain as follows:

Properties.

Weight	14.3 PPG	Solids	26 - 27%
Viscosity	40-45 Sec/qt	Oil	4 - 4%
Water loss	4- 6 cc/30 min		
Alkalinity	05-1.0 P.f.		

Attached is a list of the chemical and trade name of drilling mud additives used in our operations.

General:

A Daily drilling report from 0600 to 0600 hrs is to be called to the Stavanger Office at 08:30 a.m. daily unless advised otherwise. All information reported over the radio should be in code.

Attached are "Casing Setting Report" and "Cementing Report" forms that are to be filled out when casing is set.

Attached also is a plot of torque in AMPS versus a torque readings in ft-lbs for rotary table RPM ranging from 40 to 250 RPM.

A drillpipe float may not be used after the first 17 1/2" bit run.

A.T. CRUMP

BAZ/GJ

5/13/70

Cost of Material--\$	_____
Tax-----\$	_____
Drayage-----\$	_____
Total Mud Cost--\$	_____
Cost/foot-----\$	_____
Oil Cost & Dray.\$	_____ Cost/Ft.w/Cil

* ROT. HRS. VS. TOTAL HRS. _____ MAKE-UP WATER: Cl _____ ppm; TH _____ Ca+Mg, ppm; ALK- Pr _____ Mr _____, Bicarb _____ ppm Carb _____ ppm SO₄ _____ ppm

[illegible]

DATE	DEPTH	MUD	PROPERTIES				FILTRATE ANALYSIS										DAILY MATERIALS ADDED				COST	
			WEIGHT PPM	FLUID LOSS	PLUG LOSS	GELS	CL PPM	TH PPM	Ca + Mg	Fe	Mn	Na	OIL, % Vol.	SOLIDS % Vol.	SAND % Vol.	LCM #/bbl.	DAILY	CUMULATIVE				
	Feet		AV cps	Y.P.	0 to 10 min.	10 min.	10 min.	10 min.	10 min.	10 min.	10 min.	10 min.	10 min.	10 min.	10 min.	10 min.	10 min.					
7-1	10,245	14.3 41	21 9		3.9 2 9.0	21,000	330	.4				3	25	.25			Logging					
7-2	10,265	14.3 41	21 22		3.9 2 9.0	21,000	320	.4				3	25	.25			Running 2 1/2" tubing	2,261	130,023			
7-3	10,420	14.3 42	20 6		3.7 2 9.5	21,000	280	.5				3	24	.25			Logging	64	130,087			
7-4	10,580	14.3 41	25 11		3.6 2 9.3	21,000	240	.25				3	25	.3			Logging	1,225	131,312			
7-5	10,650	14.3 42	29 12		4.2 2 9.4	21,000	200	.3				3	26	.25			Logging	718	132,030			
7-6	10,820	14.3 40	31 9		3.8 2 9.3	21,000	240	.35				2	26	.25			Logging	1,062	133,092			
7-7	10,910	14.3 40	31 9		3.6 2 9.2	21,000	240	.3				3	26	.25			Logging	1,588	134,680			
7-8	11,235	14.3 43	31 11		3.4 2 9.4	21,000	240	.4				3	26	.25			Logging	370	135,041			
7-9	11,236	14.3 44	31 11		3.4 2 9.4	21,000	240	.4				3	26	.25			Logging		135,041			
7-10	11,255	14.3 41	21 10		3.4 2 9.2	21,500	280	.4				3	26	.25			Logging	330	135,371			
7-11	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing	137	135,508			
7-12	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-13	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-14	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-15	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-16	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-17	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-18	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-19	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-20	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-21	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-22	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-23	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-24	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-25	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-26	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-27	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-28	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-29	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			
7-30	11,255	14.3 41	23 10		3.4 2 9.3	21,500	280	.4				3	26	.25			Running 2 1/2" tubing		135,508			

[illegible]



BAROID DIVISION
NATIONAL LEAD COMPANY

File
2/4-31 Complete

DRILLING MUD RECORD

16.1 of 6

DATE SEPT 1, 1971

STOCKPOINT STAVANGER

COMPANY PHILLIPS PETROLEUM COMPANY STATE NORWAY CASING PROGRAM: 20 inch at 1961 ft.
WELL 2/4-3X RE-ENTRY + COMPLETION COUNTY NORTH SEA 13 3/8 inch at 5377 ft.
CONTRACTOR ODECO LOCATION EKOEFISK 9 7/8 inch at 10,149 ft.
BAROID ENGINEER WITT - RAWALT SEC - TWP - RNG - TOTAL DEPTH 11,236 (10,527) P33.

DATE	DEPTH	WEIGHT	VISCOSITY	FILTRATION		SAND	SALT		pH	VISCOSITY			GELS		FILTRATE ANALYSIS				RETORT ANALYSIS			REMARKS AND TREATMENT
				cc	Coke 32ml		NaCl ppm	Cl ppm		cp	Pv	Yp	In	10min	Cl ppm	Ca ppm	SO ₄ ppm	Alk Pf	Oil %	Water %	Solids %	
1-71	-	13.5	43	10.2	2	TR	-	21,000	9.8	-	22	10	1	5	-	100	-	.45	TR	80	20	MOVED ON LOCATION
5-15-71	-	14.3	46	12.0	2	TR	-	21,500	9.8	-	29	18	1	8	-	120	-	.45	TR	79	21	COND. PIT MUD - RAN BOP STACK
5-16-71	1400	14.4	48	9.0	4	3/4	-	20,000	11.9	-	29	13	5	14	-	200	-	3.3	-	75	25	WIN + TAGGED CEMENT @ 961' -
5-16-71	4917	14.3	43	9.3	4	-	-	20,000	12.0	-	26	8	3	10	-	200	-	3.7	-	-	-	DRILLED CEMENT TO 1521', WITH TC
5-16-71	5076	14.4	47	8.5	3	-	-	20,000	11.8	-	28	9	3	15	-	200	-	3.4	-	76	24	4780' + DRILLED CEMENT TO 5076'
																						DRILLED BRIDGE PLUG @ 5076'. CIRC + CONDITION MUD. OLD MUD INTERVAL 1521' - 4780' VERY FLUID BUT SCURD. MIXED 100 BBLs VOLUME.
5-17-71	4898	14.3	48	9.6	4	3/4	-	20,000	11.7	-	27	7	2	8	-	200	-	2.0	-	76	24	WTH TO TOP OF 4" LINER (4898')
5-17-71	9898	14.3	44	9.1	4	-	-	20,000	11.9	-	28	2	2	5	-	120	-	1.6	1	77	22	CIRC + COND MUD. MADE SCRAPER RUN.
																						TRIP FOR 6" BIT. OLD MUD INTERVAL 5076' - 9898' FLUID, SOURCED, MUD DENSITY LIGHT (12.0 PPG). UNDER BRIDGE PLUG MUD BECOMING HEAVIER TO REACH 16.0 PPG OFF BOTTOM (9898')
5-18-71	9957	14.4	44	9.0	4	3/4	-	20,000	11.7	-	27	6	2	11	-	120	-	1.6	-	78	22	W.E.H. + DRILLED ON JUNK @ TOP OF LINER
5-18-71	10,520	14.3	44	9.0	4	-	-	20,000	11.7	-	27	6	2	10	-	80	-	1.8	TR	78	22	DRILLED BRIDGE PLUG @ 9952'
																						DRILLED CEMENT FROM 9954' TO 10,400'. NASHED DOWN TO 10,520'. CIRC + CONDITION MUD OPEN-ENDED. 24 HOUR STATIC AGE @ 275°F. ON THIS MUD - SHEAR 30 LB/100 FT ² .
5-19-71	10,520	14.4	51	7.6	3	1/2	-	20,000	11.5	-	36	15	5	18	-	80	-	1.4	1	75	24	CIRC + COND MUD FOR PACKER FLUID
5-20-71	10,520	14.4	55	7.6	3	1/2	-	20,000	11.5	-	37	17	5	18	-	80	-	1.4	1	75	24	PERFORATED, W.E.H. + REVERSED CIRC.
5-21-71	10,520	14.4	55	7.6	2	TR	-	20,000	11.5	-	34	16	5	15	-	100	-	1.0	1	75	24	RUNNING 4 1/2" TUBING
5-22-71	10,520	14.4	55	8.5	2	TR	-	20,000	11.5	-	34	16	5	15	-	100	-	1.0	1	75	24	LANDED 4 1/2" TUBING
5-23-71	10,520	14.3	55	8.5	2	TR	-	20,000	11.5	-	34	16	5	15	-	100	-	1.0	1	75	24	RUNNING BAKER WIRE-LINE TOOLS
5-24-71	10,520	14.3	55	8.5	2	TR	-	20,000	11.5	-	34	16	5	15	-	100	-	1.0	1	75	24	W.O.W. - FISHING FOR WIRE-LINE TOOLS.
5-25-71	10,520	14.3	48	8.8	2	TR	-	20,000	11.3	-	30	14	2	12	-	100	-	1.0	1	75	24	PULL RISER TO RETRIEVE FING PLUG. RUN RBT TOOL + LEAVE FISH @ 9500'.
5-26-71	10,520	14.3	47	8.9	2	TR	-	20,000	11.3	-	28	14	2	12	-	100	-	1.1	TR	76	24	RECOVER FISH WITH WIRELINE - CIRC + CONDITION MUD TO NEW SPECIFICATIONS.
5-27-71	10,520	14.3	46	8.9	3	TR	-	20,000	12.0	-	29	7	2	8	-	100	-	1.4	TR	76	24	RETRIEVE BOP STACK TO RUN X-MAS TREE.
5-28-71	10,520	14.3	44	8.9	3	TR	-	20,000	11.8	-	28	5	2	6	-	160	-	1.4	TR	76	24	RIGGING UP X-MAS TREE TO LAND
5-29-71	10,520	14.0	42	10.5	4	TR	-	20,000	11.4	-	24	2	0	5	-	200	-	1.0	TR	76	24	ATTEMPTING TO LAND X-MAS TREE
5-30-71	10,520	14.0	42	10.5	4	TR	-	20,000	11.4	-	24	2	0	5	-	200	-	1.0	TR	76	24	WAITING ON WEATHER
5-31-71	10,520	14.0	42	10.5	4	TR	-	20,000	11.4	-	24	2	0	5	-	200	-	1.0	TR	76	24	RETRIEVE X-MAS TREE + REDRESS
6-1-71	10,520	14.0	42	10.5	4	TR	-	20,000	11.4	-	24	2	0	5	-	200	-	1.0	TR	76	24	LANDED X-MAS TREE
6-2-71	10,520	14.0	42	10.5	4	TR	-	20,000	11.4	-	24	2	0	5	-	200	-	1.0	TR	76	24	RIG UP TO PULL FING VALVE - CIRC + COND MUD DENS. IN PITS FROM MAY 29 TO JUNE 2 LOW DUE TO WATER INFLUX FROM RIG ACTIVITIES - NONE USED IN WELL

ER-1907-4



BAROID DIVISION NATIONAL LEAD COMPANY

DRILLING MUD RECORD

G. 2 OF 6

DATE SEPT. 1, 1971

STOCKPOINT STAVANGER

COMPANY PHILLIPS PETROLEUM COMPANY STATE NORWAY CASING PROGRAM: 20 inch at 1961 ft.
WELL 2/4-3X RE-ENTRY + COMPLETION COUNTY NORTH SEA 13 3/8 inch at 5377 ft.
CONTRACTOR ODECO LOCATION EROLFISK 9 7/8 inch at 10,149 ft.
BAROID ENGINEER WITT - RAWALT SEC - TWP - RNG - TOTAL DEPTH 11,236 (10,527) ft.
7 " " 11,232 "

DATE	DEPTH	WEIGHT	VISCOSITY	FILTRATION		SAND	SALT		pH	VISCOSITY			GELS		FILTRATE ANALYSIS				RETORT ANALYSIS			REMARKS AND TREATMENT
				cc	Cake 32nd		NaCl ppm	Cl ppm		cp	Pv	Yp	In	10min	Cl ppm	Ca ppm	SO ₄ ppm	Alk Pf	Oil %	Water %	Solids %	
3-71	10,530	14.4	50	10.5	2	TR	-	20,000	11.4	-	30	14	2	12	-	200	-	1.0	TK	76	24	ATTEMPT TO JAR LOOSE FWG PLUG. SPOT 7 BBLs SPOT FREE + DIESEL.
4-71	10,530	14.4	52	9.8	2	TR	-	20,000	11.3	-	32	15	2	12	-	200	-	.8	TK	76	24	JAR ON FWG PLUG - REVERSE CIRC
5-71	10,530	14.4	52	9.8	2	TR	-	20,000	11.3	-	32	15	2	12	-	200	-	.8	TR	76	24	JAR ON FWG PLUG W/ 2 3/8" TUBING. + JARS. NO RESULTS - WAITING ON TOOLS
6-71	10,520	14.4	52	10.0	2	TR	-	20,000	11.4	-	30	14	2	12	-	200	-	1.0	TR	76	24	SET BAKER PLUG AT 340' PULLING RISER AND X-MAS TREE.
7-71	10,530	14.4	51	9.8	2	TR	-	20,000	11.3	-	30	14	2	12	-	200	-	1.0	TK	76	24	RUN BOP STACK + RISER
8-71	10,520	14.4	52	9.8	2	TR	-	20,000	11.4	-	29	14	2	12	-	200	-	.9	TK	76	24	PULL TUBING TO RETRIEVE F.W.G. PLUG
9-71	10,530	14.4	52	10.2	2	TR	-	20,000	11.4	-	29	14	2	12	-	200	-	.9	TK	76	24	CIRC + COND. MUD - LANDED 4 1/2" TUBING
10-71	10,530	14.5	47	10.2	3	TR	-	20,000	11.4	-	30	7	2	10	-	200	-	.9	TR	76	24	PREPARING TO LAND X-MAS TREE
11-71	10,530	14.5	47	10.2	3	TR	-	20,000	11.4	-	30	7	2	10	-	200	-	.9	TK	76	24	LANDED X-MAS TREE, SENTRY LINE DID NOT HOLD PRESSURE - PULL X-MAS TREE
12-71	10,530	14.4	52	10.2	3	TR	-	20,000	11.4	-	30	17	12	20	-	200	-	.9	TK	76	24	RAN BOP STACK + RISER - PULLED ONE STD TUBING + REPAIR SENTRY LINE
13-71	10,520	14.4	52	10.2	3	TR	-	20,000	11.5	-	27	13	5	15	-	200	-	.9	TK	76	24	PULL RISER + BOP STACK
14-71	10,520	14.3	50	9.0	3	TR	-	20,000	11.7	-	30	12	6	14	-	200	-	1.0	TK	76	24	COULD NOT LAND X-MAS TREE - RAN BACK BOP STACK + RISER
15-71	10,520	14.4	50	9.2	3	TR	-	19,500	11.4	-	29	17	5	15	-	200	-	.8	TK	76	24	CIRC + COND. MUD FOR THREE HOURS. Pull BOP STACK + RISER
16-71	10,520	14.4	50	9.0	3	TR	-	19,000	11.4	-	30	13	5	12	-	200	-	.8	TK	76	24	RUN + LANDED X-MAS TREE
17-71	10,520	14.4	50	9.0	2	TR	-	19,000	11.4	-	30	13	5	12	-	200	-	.9	TK	76	24	DISPLACE TUBING W/ 20 BBLs X-C Polymer + WATER - FLOW WELL
18-71	10,520	14.4	50	9.0	2	TR	-	19,000	11.4	-	30	13	5	12	-	200	-	.8	TK	76	24	W.O.W. TO DIVE. TESTED TUBING + FOUND LEAK IN TUBING TO ANNULUS
19-71	10,530	14.3	50	8.8	2	TR	-	20,000	11.6	-	30	13	4	12	-	200	-	.8	TK	76	24	HIT BRIDGE IN TUBING AT 2760.
20-71	10,530	14.4	50	8.8	2	TR	-	20,000	11.6	-	30	13	4	12	-	200	-	1.0	TK	76	24	Pull 5" RISER + THEN RAN BOP + LATCH. RIG UP TO RUN BAKER WIRELINE TOOLS. MIX 200 BBLs NEW Volume mud. RIG UP WIRELINE BOP + BAIL FROM 2775' TO 3730'
21-71	10,530	14.3	4	9.8	2	TR	-	20,000	11.6	-	29	13	4	12	-	200	-	1.0	TK	76	24	STILL BAILING W/ WIRE TO 4040'



BAROID DIVISION NATIONAL LEAD COMPANY

DRILLING MUD RECORD

Pg. 3 of 6

DATE Sept 1 1971

STOCKPOINT STAVANGER

COMPANY PHILLIPS PETROLEUM COMPANY

STATE NORWAY

CASING PROGRAM: 26 inch at 1951 ft.

WELL 2/4-3X RE-ENTRY & COMPLETION

COUNTY NORTH SEA

13 3/4 inch at 5277 ft.

CONTRACTOR NAFCO

LOCATION FROESK

9 3/4 inch at 16174 ft.

BAROID ENGINEER WITT - RAWALT

SEC TWP RNG

TOTAL DEPTH 11,232 ft.

DATE	DEPTH feet	WEIGHT lb/gal	VISCOSITY Sec	FILTRATION		SAND %	SALT		pH	VISCOSITY			GELS		FILTRATE ANALYSIS				RETORT ANALYSIS			REMARKS AND TREATMENT
				cc	cake 32nd		NaCl ppm	Cl ppm		cp	Pv	Yp	in	10 min	Cl ppm	Ca ppm	SO ₄ ppm	Alk Pf	Oil %	Water %	Solids %	
22-71	10,520	14.4	50	9.8	2	TR	-	20,000	11.6	-	31	16	3	12	-	200	-	1.0	TR	76	24	WORKING WIRELINE RIGGED. PULLED
6-23-71	10,530	14.3	50	9.8	2	TR	-	20,000	11.6	-	31	15	3	12	-	200	-	1.0	TR	76	24	5" RISER & SET CORROSION CAP
7-6-71	10,530	14.3	50	10	2	TR	-	20,000	10.0	-	30	15	2	10	-	200	-	.35	TR	76	24	TEMPORARY ABANDONED 2/4-3X
7-7-71	10,530	14.3	49	12	2	TR	-	20,000	9.5	-	30	14	2	10	-	200	-	.3	TR	76	24	RIG MOVED TO 2/4-2X
7-8-71	10,530	14.3	49	12	2	TR	-	20,000	9.5	-	30	14	2	10	-	200	-	.3	-	76	24	RIG MOVED BACK ON 2/4-3X.
7-9-71	10,530	14.3	49	12	3	TR	-	20,000	9.5	-	30	14	2	10	-	200	-	.3	-	76	24	WELDED CORROSION CAP.
7-10-71	10,530	20.1	70	21.9	10	TR	-	15,000	11.7	-	80	23	10	25	-	80	-	1.3	-	57	43	DROPPED BOP STACK WHILE
7-11-71	10,520	20.0	65	21.9	10	TR	-	15,000	11.7	-	80	16	5	25	-	80	-	1.3	-	57	43	ATTEMPTING TO RUN SAME -
7-12-71	10,530	20.0	65	21.9	10	TR	-	15,000	11.7	-	80	16	5	25	-	80	-	1.3	-	57	43	RETRIEVED BOP STACK & STARTED
13-71	10,530	20.0	65	21.9	10	TR	-	15,000	11.7	-	80	16	5	25	-	80	-	1.3	-	57	43	REPAIRS.
7-14-71	10,530	20.0	65	21.9	5	TR	-	16,000	11.7	-	80	16	5	25	-	80	-	1.3	-	57	43	REPAIRING BOP STACK
7-15-71	10,530	18.0	55	17.5	4	TR	-	19,000	10.6	-	45	15	5	18	-	400	-	.45	-	64	36	" " " & TEST SAME
																						CONV. RESERVE MUD TO ENTER
																						4 1/2" THRU & CLEAN OUT SAME.
																						REPAIRED BOP STACK & ATTEMPTING
																						TO RETRIEVE DAMAGED X-HANS TUB.
																						RETRIEVED DAMAGED X-HANS TUB.
																						PREPARING TO RUN BOP STACK.
																						RAN BOP STACK & 5" RISER
																						RETRIEVED PLUG @ 347'. COULD NOT
																						RETRIEVE PLUG @ 548'. WITH 4 1/2"
																						& WASHED TO PLUG (SETTLED)
																						PARITE OVER SHAKER.
																						ATTEMPTED TO PULL PLUG @ 548'
																						WITH 2 1/2" DP & RIG @ TOP OF
																						PLUG. MUD RETURNS OUT FROM 14.4
																						TO 10.1 PPG. CIRC. & DISPLACED
																						W/20 PPG MUD. PULLED OUT W/ MUD
																						& RAN 5" RISER.
																						STAGED IN HOSE DISPLACING WITH
																						HEAVY MUD @ 815, 2000 & 3000.
																						POOH & NOW



BAROID DIVISION NATIONAL LEAD COMPANY

DRILLING MUD RECORD

16. 4 OF 6

DATE Sept 1, 1971

STOCKPOINT SEAWARD

COMPANY

PHILLIPS PETROLEUM COMPANY

STATE

NORWAY

CASING PROGRAM:

20 inch at 1111 ft.

WELL

214-3X RE-ENTRY & COMPLETION

COUNTY

NORTH SEA

CONTRACTOR

DAECO

LOCATION

EROLFISK

BAROID ENGINEER

WITT - RAWALT

SEC

TWP

RNG

TOTAL DEPTH

11,231' 11.252' 11.275' 11.275'

DATE	DEPTH	WEIGHT	VISCOSITY	FILTRATION		SAND	SALT		pH	VISCOSITY			GELS		FILTRATE ANALYSIS				RETORT ANALYSIS			REMARKS AND TREATMENT
				cc	Cake 30nd		NaCl ppm	Cl ppm		cp	Pv	Yp	in	10min	Cl ppm	Ca ppm	SO ₄ ppm	Alk Pf	Oil %	Water %	Solids %	
7-16-71	10,530	20.0	70	16.0	4	TR	-	15,500	9.8	-	70	30	5	25	-	400	-	.3	TR	61	39	WOW
7-17-71	10,530	20.0	78	12.0	5	TR	-	17,500	10.2	-	80	28	5	25	-	200	-	.6	TR	58	42	WOW. WITH TO 2571' & CIRC. WITH
7-18-71	10,530	20.0	70	14.0	5	TR	-	17,000	9.8	-	66	22	5	22	-	200	-	.5	TR	58	42	TO 3500' & WASHED TO 4300'
7-19-71	10,530	18.0	60	15.0	5	TR	-	17,000	10.0	-	40	15	5	20	-	200	-	.5	TR	37	63	WASHED FROM 4300' TO 5078'
7-20-71	10,530	16.7	56	12.0	4	TR	-	15,000	10.5	-	34	15	5	20	-	200	-	.75	1	33	66	(REV. CIRC.)
7-21-71	10,530	17.5	52	10.0	3	TR	-	14,500	10.8	-	40	16	3	15	-	200	-	.8	2	35	63	WASHED FROM 5078' TO 7223'
7-22-71	10,530	16.3	51	16.4	3	1	-	12,000	9.2	-	27	13	2	8	-	200	-	.4	2	29	69	(REV. CIRC.) LOWERING DENSITY.
																						WASHED FROM 7223' TO 8835'
																						W/BRIDGE @ 8729'. MUD GAS
																						CUT TO 13.1 PPG @ 8729'.
																						@ 8835' REV. CIRC. GAS CUT MUD
																						OFF BOTTOM. INCREASING DENSITY
																						WITH TO 9410' HITTING BRIDGE.
																						HAD CIRC (REV) @ 8828' & 9117'
																						W/GAS CUT MUD OFF BOTTOM.
																						WORKED THRU BRIDGE @ 9440'. VARIED
																						GAS CUT RETURNS & LARGER CUTTINGS
																						OVER SHAKER. WITH TO 9551'
																						HITTING BRIDGE & PLUGGING DP.
7-23-71	10,530	16.3	51	11.0	3	1.5	-	12,000	10.0	-	29	11	2	10	-	200	-	.7	2	29	69	POUCH & CLEANED DP. WITH HITTING
																						BRIDGE @ 9645'. CIRC. GAS CUT MUD.
																						WASHED TO 8903'. BOTTOMH DIP
																						GAS CUT.
7-24-71	10,530	15.5	52	10.5	3	-	-	12,000	10.6	-	30	22	14	14	-	200	-	.7	2	28	70	WASHED TO 9810' w/BRIDGES @
																						9105', 9225', 9560'. VARIED GAS
																						GAS CUT RETURNS. HIT BRIDGE @
																						9310'. BURGER OVER SHAKER @ 9510'
7-25-71	10,530	15.6	53	10.5	3	1.5	-	12,000	10.0	-	32	24	10	21	-	200	-	.5	2	28	70	COULD NOT DRILL OUT BRIDGE @ 9510'.
																						AT & CIRC. GAS CUT MUD OFF BOTTOM.
																						DRUG ON BRIDGE @ 9310'.
7-26-71	10,530	15.5	55	7.5	3	1	-	14,000	10.0	-	27	16	2	10	-	320	-	.8	2	27	71	COND. MUD TO RUN WIRE-LINE TOOLS.
																						COULD NOT DRILL THRU BRIDGE @ 9510'



BAROID DIVISION
NATIONAL LEAD COMPANY

DRILLING MUD RECORD

Pg. 5 of 6

DATE Sept 1, 1971

STOCKPOINT STALINGER

COMPANY

Petroleum Company

STATE Norway

CASING PROGRAM:

20 inch at 1151 ft

WELL

2/4-3x Re-entry & Completion

COUNTY

NORTH SEA

13 3/4 inch at 5377 ft

CONTRACTOR

Carco

LOCATION

English

9 3/4 inch at 10,101 ft

BAROID ENGINEER

Witt - Rawalt

SEC

TWP

RNG

TOTAL DEPTH 11,711 ft

DATE	DEPTH	WEIGHT	VISCOSITY	FILTRATION	SAND	SALT	pH	VISCOSITY	GELS	FILTRATE ANALYSIS				RETORT ANALYSIS				REMARKS AND TREATMENT				
	feet	lb/gal	Sec	cc	Cake 32nd	%	NaCl ppm	Cl ppm		cp	Pv	Yp	in	10min	Cl ppm	Co ppm	SO ₄ ppm		Alk Pf	Oil %	Water %	Solids %
7-27-71	10,530	15.5	54	9.0	3	1	-	14,000	10.2	-	28	17	2	10	-	320	-	.8	2	71	27	TWO RUNS OF WIRE-LINE TOOLS STUCK @ 9525' & 9130' RESPECTIVELY WITH W/O.P. TO 9810' & CIRC. & COND. MUD. MUD GAS CUT OFF BOTTOM
7-28-71	10,530	15.6	44	9.0	3	3.5	-	14,000	10.2	-	28	17	2	10	-	320	-	.8	2	72	26	RAN WIRE-LINE TOOLS. COULD NOT OPEN OTIS SS. RECOVERED LINTSUD MUD, & IRON WITH SAND PUMP. RAN IMPRESSION BLOCK. LAYED DOWN B.P.
7-29-71	10,530	16.0	50	12.0	3	1	-	17,000	11.0	-	38	17	5	18	-	300	-	.8	2	68	30	RAN RE-ENTRY TOOL & LATCH ON TO 4 1/2" TUBING. CIRC. & COND. MUD INCREASING DENSITY TO 16.0 PPG
7-30-71	10,530	16.0	50	12.4	3	1	-	17,000	11.0	-	37	17	5	18	-	300	-	.8	2	68	30	GAS STILL COMING IN. RAISE WT. TO 16.3. RETRIEVE 8585' OF TUBING
7-31-71	10,530	16.3	50	12.5	3	1/2	-	17,500	10.5	-	34	17	4	17	-	300	-	.6	2	67	31	RAN OVERSHOT ON 5" DRILL PIPE TO 3580 W/ NO RECOVERY. TRIP TO CHANGE OVERSHOT.
8-1-71	10,530	16.3	50	12.6	3	1/4	-	18,000	10.6	-	34	17	4	18	-	300	-	.65	2	67	31	NO RECOVERY. WENT IN HOLE W/ IMPRESSION BLOCK. TRIP FOR OVERSHOT
8-2-71	10,530	16.3	50	12.6	3	1/4	-	18,000	10.8	-	34	17	4	18	-	300	-	.7	2	67	31	LATCHED ON TO OVERSHOT & PULLED OUT OF HOLE. FISH RIGGED W/ GAS & LUDMUD OIL
8-3-71	10,530	16.3	50	12.8	3	1/4	-	18,000	10.8	-	34	17	4	20	-	300	-	.75	2	67	31	TRIP IN HOLE W/ 8 1/2" BIT TO 8585. MUD GAS CUT TO 10.3 PPG. WASH DOWN TO 9120. REDUCE WEIGHT TO 15.5.
8-4-71	10,530	15.5	48	12.6	3	1/4	-	18,000	10.8	-	30	16	4	18	-	300	-	.80	2	70	28	TRIP IN HOLE WITH OVERSHOT. CATCH ONTO FISH (ONE JOINT OF TUBING) & TRIP OUT OF HOLE. CUT WT TO 14.3
8-5-71	10,530	14.4	47	13.4	2	1/4	-	18,000	11.0	-	26	16	5	20	-	300	-	.9	1	76	23	WENT IN HOLE WITH MILLING TOOL - MILLING ON PACKER @ 9818. COULD NOT RETRIEVE PACKER AFTER MILLING IN SAME.

ER-1907-4

PRINTED IN U.S.A.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

P.P. Co. 2/4-3x Re-entry Completion.

5-14-71	Rig moved on location.	
5-15-71	Cond. 300 BBLS. surface system.	B.W./K.R.
5-16-71 0' to 50'	Drld. 560' cent. plug, 2' cent. bridge, 236' cent. plug, bridge plug. Old mud in hole incorp. into system. Old mud fluid but soured. Lost some mud while GIH between cent. plugs.	
-	Due to unbalanced colm. Mixed 100 BBLS. additional needed volm. Changed bottom DDS screen - 80 mesh.	K.R.
5-17-71 5076' 60 9898'	Circ. & Cond. mud 9898' top of 7" liner. Old mud interval 5076'-9898' soured, density light (12.0 PPG) @ beginning (5076') progressively becoming heavier (16.0 PPG)	
-	top of 7" liner (9898'). Incorp. this mud into system.	K.R.
5-18-71 9898' to 10,530'	Drld. bridge plug & 446' cent. plug in 7" liner. While drlg. this cent. plug & washing to 10,530' PBD, started cond. system for packer fluid.	K.R.
5-19-71 10,530'	Circ. for 8 hrs. making final cond. of packer fluid.	K.R.
5-20-71 10,530'	Perforated, WIH & reverse circ. 2½ hrs. No treatment to mud.	K.R.
5-21-71 10,530'	Running 4½" tubing - 3½" tubing stringer in 7" liner.	K.R.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

5-22-71	Landing 4½" tubing-cond. surface system- Mixed 60 BBLS X-C Polymer.	
10,530'		K.R./B.W.
5-23-71	Running Baker Wire - Line Tools - lost fish in 4½" riser - pulled riser to retrieve fish.	
10,530'		B.W.
5-24-71	Waiting on weather - fishing for wire- line tools.	
10,530'		B.W.
5-25-71	Fish for FWG plug - pull riser to retrieve fish. Run RBI tool. Wire-line broke leaving fish in hole. Started to circulate through tubing.	B.W.
5-26-71	Circ. & cond. mud to new packer fluid specs. as per P.P. Co. orders. Contd. fishing w/wire-line. Recovered fish. Circ. for 3 hrs.	K.R./B.W.
5-27-71	Cont. on the 3 hrs. circ., cond mud to P.P.Co. specs. Landed tubing and started removing BOP stack. Static ageing tests on packer fluid BHT showed slt, settling in 18 hrs.	
5-28-71	To servere settling in 48 hrs.	
		K.R.
5-28-71	Rigging up X-Mas tree to land same.	
10,530'		K.R.
5-29-71	Attempting to land X-Mas tree. Surface packer fluid water cut from displacing riser & pulling same. X-C Polymer mud density	
10,530'	high from gunning same with pumps & lines full of packer fluid. Operator does not want either mud cond. at this time.	K.R.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

5-30-71	WOW - Attempting to land X-Mas tree.	
10,530'		K.R
5-31-71	Retreived X-Mas tree. Redressing same to rerun.	
10,530'		K.R
6-1-71	Ran and laded X-Mas tree - preparing to displace tubing & spot X-C Polymer slurry.	
10,530'		K.R
6-2-71	Attemp to pull FWG plug. Could not. Reverse circ. Jaring on plug with no results.	
10,530'		K.R./B.W.
6-3-71	Attemp to jar loose FWG plug. Spot 7 BBLS of scot free and diesel on plug with no results.	
10,530'		B.W.
6-4-71	Jar on FWG plug. Reverse circ. & condition mud. Wait on tools on boat from Great Yarmouth.	
10,530'		B.W
6-5-71	Picked up 2 3/8" tubing & run in. Washed top of FW6 plug with 3000 psi. Attempt to pull plug with wire-line. Run in hole w/tubing & Bowen oil Jars.No results.Reverse circ.& waiting on tools.	B.
10,530'		
6-6-71	Waiting on Baker tools. Set Baker plug at 340'. Preparing to pull X-Mas tree. Pulling riser & X-Mas tree.	
10,530'		B.W
6-7-71	Run BOP stack and test. Rig and run 16" mud riser. Repair slip joint and displace riser with mud	
10,530'		B.W.
6-8-71	Pulled tubing to retrieve FWG plug. Circ. and condition mud for three hrs. Working on separation sleeve and safety valve.	
10,530'		B.W.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

6-9-71 10,530'	Landed 4½" tubing. Preparing to land X-Mas tree. B.W.+K.R.
6-10-71 10,530'	Preparing to land X-Mas tree. K.R.
6-11-71 10,530'	Landed X-Mas tree. Sentry line did not hold pressure. Pulled X-Mas tree. WOW to run BOP stack. K.R.
6-12-71 10,530'	Ran BOP stack and riser. Displaced riser. Pulled one std. tubing & found break in sentry line. Repairing sentry line. Cond. mud in suction pit prior to displacing riser. K.R.
6-13-71 10,530	Repaired sentry line & landed tubing. Pulled riser and BOP stack. Preparing to run X-Mas tree. K.R.
6-14-71 10,530'	Could not land X-Mas tree. Ran BOP stack & riser. Incorp. 60 BBLS X-C Polymer slurry into surface system while mixing 80 BBLS. additional volume. X-C Polymer slurry had become to contaminated with packer fluid to function as required. Circ. 1½ hrs., attempting wire line ops, but mud volume unbalanced, circ. 1½ hrs. K.R.
6-15-71 10,530	Finished wire line ops. Circ. 3 hrs. Pulled mud riser and BOP stack. K.R.
6-16-71 10,530'	Landed X-Mas tree - mixed 60 BBLS X-C Ploymer mud. K.R./B.W.
6-17-71 10,530'	Displace tubing with 30 BBLS X-C Polymer mud and 132 BBLS water. Run Baker wireline tools. Prepare to flow well. Flow well for 3½ hrs. Annulus hose broken. Well shut in. Waiting on weather. B.W.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

6-18-71	Waiting on weather to dive. Divers down to connect annulus hose and check for leaks.
10,530'	Tested tubing and annulus and found hole in tubing. B.W.
6-19-71	Attempt to set plug in sliding sleeve but hit bridge at 2760'. Set ANP plug at 547'. Pull 5" riser & prepare to pull X-Mas tree. Decide to run back riser. Run & catch same. Mix 200 BBLs new mud vol.
6-20-71	Rig up wireline lubricator. Pull ANP plug at 547'. Rig up wireline bailer and bail from 2775' to 3730'. B.W.
6-21-71	Working bailer from 3730' to 4046'. Tested annulus and tubing. Test showed communication between tubing and annulus. B.W.
6-22-71	Working wireline bailer. Circulate diesel through X-Mas tree valves. Ran ANP and FWG plugs in tubing by wireline. Rig and pull 5" riser & laid down. Rig & run corrosion cap. B.W.
6-23-71	Temporary abandon well 2/4-3x Rig down to move to 2/4-2x Engineers released. B.W.
7-5-71	Engineering services continued. Rig back on 2/4-3x.
7-6-71	Drilled corrosion cap-working on and testing BOP stack. B.W.
7-7-71	Dropped BOP stack while attempting to run same. Retrieved BOP stack and started repairs. B.W./K.R.
7-8-71	Reapiring BOP stack and testing same. K.R.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

7-9-71	Repair and test BOP stack	
10,530'		K.R.
7-10-71	Repaired & tested BOP stack. Attempting to retrieve X-mas tree. Conditioned 125 bbls of 13.6 PPG mud to 20.1 PPG.	
10,530'		K.R.
7-11-71	Retrieved damaged X-mas tree (X-mas tree was damaged when BOP stack fell) Preparing to run BOP stack.	
10,530'		K.R.
7-12-71	Ran BOP stack - rigged up 5" riser. Retrieving two wireline surface plugs.	
10,530'		K.R.
7-13-71	Retrieved first wireline plug at 347'. Could not pull second one at 548'. Went in and washed off top of plug with 2 3/8" drillpipe.	
10,530'		K.R.
7-14-71	When washing off top of plug mud cut from 14.4. to 10.1 PPG. Circ. & displace with 20 PPG mud. Pulled out of hole & retrieved ANP plug at 548'	
10,530'		K.R.
7-15-71	Rig up Bowen BOP on 5" riser & test. Rig up & run 2 3/8" drillpipe to 813' & displace w/20PPG mud. Pick up drillpipe to 3,000 & displace w/20 PPG mud. Trip out of hole & wait on weather B.W.	
10,530'		
7-16-71	Waiting on weather 24 hours. Raised weight in Pit.#1 to 20PPG.	
10,530'		B.W.
7-17-71	Waiting on weather. Pick up 2 3/8" drillpipe & circulate at 2571. Wash down with 2 1/2 millshoe to 4300'.	
10,530'		B.W.
7-18-71	Wash down w/2 3/8" drillpipe from 4301' to 5078' in the 4 1/2" tubing (reverse circulating)	
10,530'		B.W.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

7-19-71	Wash down inside 4½" tubing with 2 3/8" drill-pipe from 5078' to 7223'. Lowering mud weight from 20PPG to 14.3PPG by 10,500' (reverse circulating)	B.W.
10,530'		
7-20-71	Wash down reverse circulate to 8835'. Hit bridge at 8729'. Mud gas cut from 15.8 to 13.1 PPG after going through bridge.	B.W.
10,530		
7-21-71	@ 8835' reversing circ., increasing mud density, checking for flows. Circ. gas cut mud off bottom after each circ. pause. Eventually built mud density to 17.5 PPG. POH.	B.W./K.R.
10,530'		
7-22-71	WIH to 9410' hitting bridge & plugging bit. (had rev. circ. @ 8828 & 9117 with gas cut mud off bottom each time) circ. conv. worked through bridge to 9440' (10hrs.) consistent varied gas cut	
	returns of 13.6 ~ 14.8 from 16.3 PPG. Large cuttings over shaker (1" dia.) WIH to 9551' & hit bridge plugging tubing. Started POOH. Decreasing mud density at intervals as depth K.R.	
10,530'		
7-23-71	POOH w/plugged DP—WIH hitting bridge @ 8645', circ. gas cut mud from 16.3 PPG. to 15.6 PPG. Cleaned out bridge and washed to 8903', circ. bottoms up, mud gas cut from 16.3 PPG to 14. PPG.	K.R.
10,530'		
7-24-71	Washed & circ. to 9470' w/bridges @ 9105 & 9225'. Circ. gas cut mud 9470' from 16.3 PPG to 14. PPG. Washed & circ. to 9810' w/bridges 9560'. Circ. & tried to work through bridge @ 9810.	K.R.
10,530'		
	Cuttings and rubber over shaker 9810'	
7-25-71	Could not penetrate bridge @ 9810'. POOH F/NB. WIH to 9810' circ. & cond. mud. Mud cut to 14.5 from 15.6 PPG. off bottom. Attempted to drill out bridge 9810'. Could not.	K.R.
10,530'		
7-26-71	Circ. & cond. mud for wire-line operations. Wire line gauge tool stopped 9525' - 1st run " " sinker bar " 9130' - 2nd run	
10,530'	Attempting to reach 9633' sliding sleeve.	K.R.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

7-27-71	WIH to 4500' & broke circ. WIH to 9805' & circ. gas/air cut mud. From 15.5 to 14.8 PPG. WIH to 9810' & circ. & cond. mud. POOH to run wire line. Installed new 50 & 80 mesh DDS screens.K.R.
10,530'	
7-28-71	Run wireline tool to open sliding sleeve. Sleeve would not open. Run sand pump & recovered limestone pebbles, rubber & iron. Ran impression block. Went in hole with 2 3/8" drillpipe & came out laying down. K.R./B.W.
10,530'	
7-29-71	Pull & lay down 5" riser. Run & latch 16" riser. Wash out tubing hanger w/12 1/4" bit. Run retrieving tool & circ. for four hours. Raise mud weight to 16PPG. B.W.
10,530'	
7-30-71	Gas still coming in at 16 PPG. Reverse circ. through tubing. Condition mud & raise weight to 16.3 PPG. Pulled 8585' of tubing out of hole (RKB). B.W.
10,530'	
7-31-71	Picked up 5" drillpipe & circ & condition mud at 8580'. Worked overshot & pulled out of hole with no recovery. Changed overshot & going back in hole. B.W.
10,530'	
8-1-71	Run in hole with fishing spear & circ. at 8580'. Pulled out of hole with no recovery. Went in hole with impression block & took impression. Circ. 1/2 hr. Trip out of hole to get overshot. B.W.
10,530'	
8-2-71	Latched on to fish with overshot & pulled 40'. Circ. two hours & pulled out of hole. Fish filled with gas cut mud & oil. Laid down fish & overshot. Rigged up to trip back in hole with 8 1/2" bit
10,530'	
8-3-71	Trip in hole to 8585'. Circ. with mud gas cut to 10.3 PPG. Wash down to 9720'. Circ. & condition mud & gradually cutting mud weight back to 15.5 PPG. Tag top of fish at 9788'. Trip out of hole for overshot. B.W.
10,530'	
8-4-71	Latch on to fish (one joint of tubing). Trip out of hole with fish & overshot. Trip in hole w/870' of 2 3/8" DP & Rest 5" DP. Circ. & wash down from 9800 to 10,498. Slowly cut mud weight to 14.0
10,530'	
8-5-71	RT-Milled on packer @ 9818'. POOH attempting to retrieve packer. Did not retrieve packer.
10,530'	B.W./K.R.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

8-6-71	WIH w/bit & dressed packer @ 8930'. (packer was pulled up hole before losing on last trip). POOH & picked up spear. Latched on to spear @ 8987' & POOH.	K.R.
10,530'		
8-7-71	Partial recovery of 28' of packer. TIH to 9898' to recover rest of packer. Did not recover. TIH w/junk basket.	
10,530'		K.R.
8-8-71	POOH w/junk basket. Picked up milling tool & milled on packer @ 9898'. POOH & ran spear. POOH w/partial recovery of packer.	K.R.
10,530'		
8-9-71	WIH to 10,480' & attempted to latch rest of packer assembly (had fallen into 7" liner). No recovery. WIH w/6" bit to 10,480' & circ. & cond. mud.	K.R.
10,530'		
8-10-71	POOH (junk basket full of iron) & rigged up schlun. Ran CBL, collar locator, wire-line junk basket. Attempted to run bridge plug (mis-fire, could not set) TIH & circ. & cond. mud. POOH.	K.R.
10,530'		
8-11-71	Rig up Schumberger & set bridge plug @ 9982'. Test casing to 2100 PSI. Displace mud riser w/ water and pull same. Rig up & pull BOP stack. Test BOP stack and install 5" rams.	K.R./B.W.
10,530'		
8-12-71	Run and latch BOP stack. Run & latch up 16" mud riser. Test kill & choke lines, BOP conn., and 5" rams to 5000 PSI. Trip in hole w/6" bit & drill bridge plug @ 9982', Circ. & cond. mud. B.W.	
10,530'		
8-13-71	Circ. and condition mud for two hours. Rig up and run 5" liner from 9745' to 10,470'. Cemented with 180 sx class E. cement. Displace cement, reverse circulated and set pack off. Pulled out.	B.W.
10,530'		
8-14-71	Trip in hole. Rotate and clean casing 9600'-9745'. Trip to pick up 6" bit. Wash down from 9745' - 9764' circ. one hour. Trip to pick up 4 1/8" bit.	
10,470'	Went in hole to 10,444' and bit was plugged.	
	Pull to 9724' and circ.	B.W.

BAROID (U.K.) LIMITED

ENGINEER ACTIVITY & REMARKS

8-15-71	Finish trip in hole. Tag bottom at 10,468'. Circ. & condition mud for 4½ hours. Rig up Schlumberger & run junk basket to 10,463'. Rig up & made three perforating runs.	B.W.
10,470'		
8-16-71	Finish trip in hole - reverse circulate for three hours. Trip out of hole & pull bore protector. Set and test spacer pack off bushing to 5000 PSI. Run Schlumberger junk basket.	
	Set production packer at 9700'. Rig up & running production string.	
10,470'		B.W.
8-17-71	Running 4½" tubing string. Pulled 124 joints to check pressure sentry device. Running back in hole with production string without sentry system.	B.W.
10,470'		
8-18-71	WTH w/tubing, circ., attempted to land 4½" tubing.	
10,470'		B.W./K.R.
8-19-71	Could not land tubing. Circ. while waiting on new tubing hanger. Landed tubing. Ran 5" riser.	
10,470'		K.R.
8-20-71	Carried out wire-line & testing operations on 4½" & annulus. Set wire-line plugs, pulled BOP stack, ran X-mas tree. Mixed 60 BBLs. viscous X-c polymer slurry.	K.R.
10,470'		
8-21-71	Pulled wire-line plugs, displaced tubing with 25 BBLs. viscous slurry & followed with H ₂ O. Opened & flowed well. Installed new 30 mesh DDS screen, now 30 x 50.	K.R.
10,470'		
8-22-71	Flowing well.	
10,470'		K.R.
8-23-71	Flowed well. Shut in. Acidized well.	
10,470'		K.R.

BIT RECORD

PM 483

SECURITY OPERATIONS
OILFIELD PRODUCTS DIVISION Dresser Industries, Inc.
P. O. BOX 6504 HOUSTON, TEXAS 77005 (713) 784-6011

SALESMAN: _____ Page _____ of _____

CONTRACTOR <u>ODECO</u>	RIG NO. <u>O.V.</u>	RIG MAKE _____	COLLARS: OD X ID X LENGTH	MO. / DAY / YR.	T.P.-DRILLERS
COMPANY <u>Phillips</u>	FIELD <u>EKOFISK</u>	RIG SIZE _____	_____ x _____ x _____	SPUD _____ / _____ / _____	
LEASE <u>2/4</u>	WELL NO. <u>3X</u>	PUMP NO. 1 _____	_____ x _____ x _____	UNDER SURFACE _____ / _____ / _____	
STATE <u>Norway</u>	COUNTY <u>Offshore</u>	PUMP NO. 2 _____	DRILL PIPE _____	UNDER INTER. _____ / _____ / _____	WATER SOURCE _____
SEC./T'SHIP/RANGE _____		MUD TYPE _____	TOOL JOINT _____	TOTAL DEPTH _____ / _____ / _____	FUEL SOURCE _____

RUN NO.	SIZE	MAKE	TYPE	SERIAL NO.	JETS - 32nds Rep. R or RO			DEPTH OUT	FEET	HOURS	FEET PER HOUR	CUM. HOURS	WT. 1000 LBS.	R.P.M.	PUMP PRESS	PUMP NO. 1		PUMP NO. 2		MUD PROPERTIES								Ver. Dev.	Dull. Cond. 1/4 1/8				Date																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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*DENOTE BY (N)-NO. (L)-LIGHT (M)-MEDIUM (H)-HEAVY ROUNDING OF GAGE

SUBJECT TO PROVISIONS ON REVERSE SIDE

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