DRILLING FLUID SUMMARY

Well: 7/11 - 1X

Field: Cod

Rig: Ocean Viking

Date: 25 February 1968
15 June 1968

Prepared by R. F. Wally

1 | 3 | 4 | 5 1968 **PRESSURE vs. DEPTH PLOT**

29 10 20 30 9 19 29 9 19 29

Well: 7/11-1X
Loc.: Cod
KB Elev.:
Spud: Completed:
Casing:

30"@45c'
-Lost Cir. 20"@1500'
-Tight Hole 13⅜"@6512
-High Vis.
9⅝"@10,24
-Conv. to Sat. Salt
TD@13,034

9.0
9.4
11.5
11.8
12.5
13.0
12.5
13.0

Est. Overburden Pressure Gradient (∇ 1.0 psi/ft)
Normal Formation Pressure Gradient (∇ .43 psi/ft)

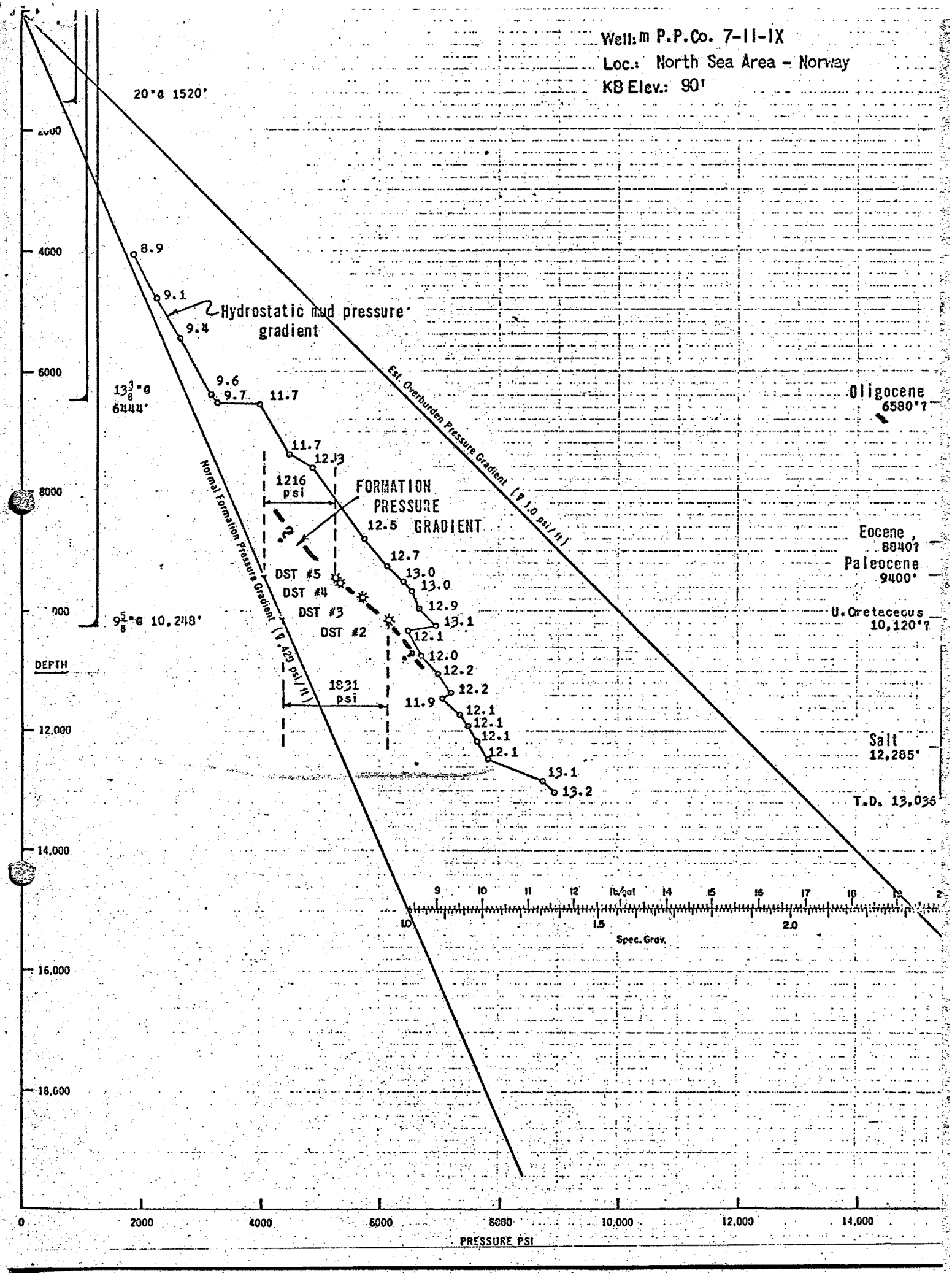
DEPTH FT.
2000
4000
6000
8000
10.000
12.000
14.000
16.000
18.000

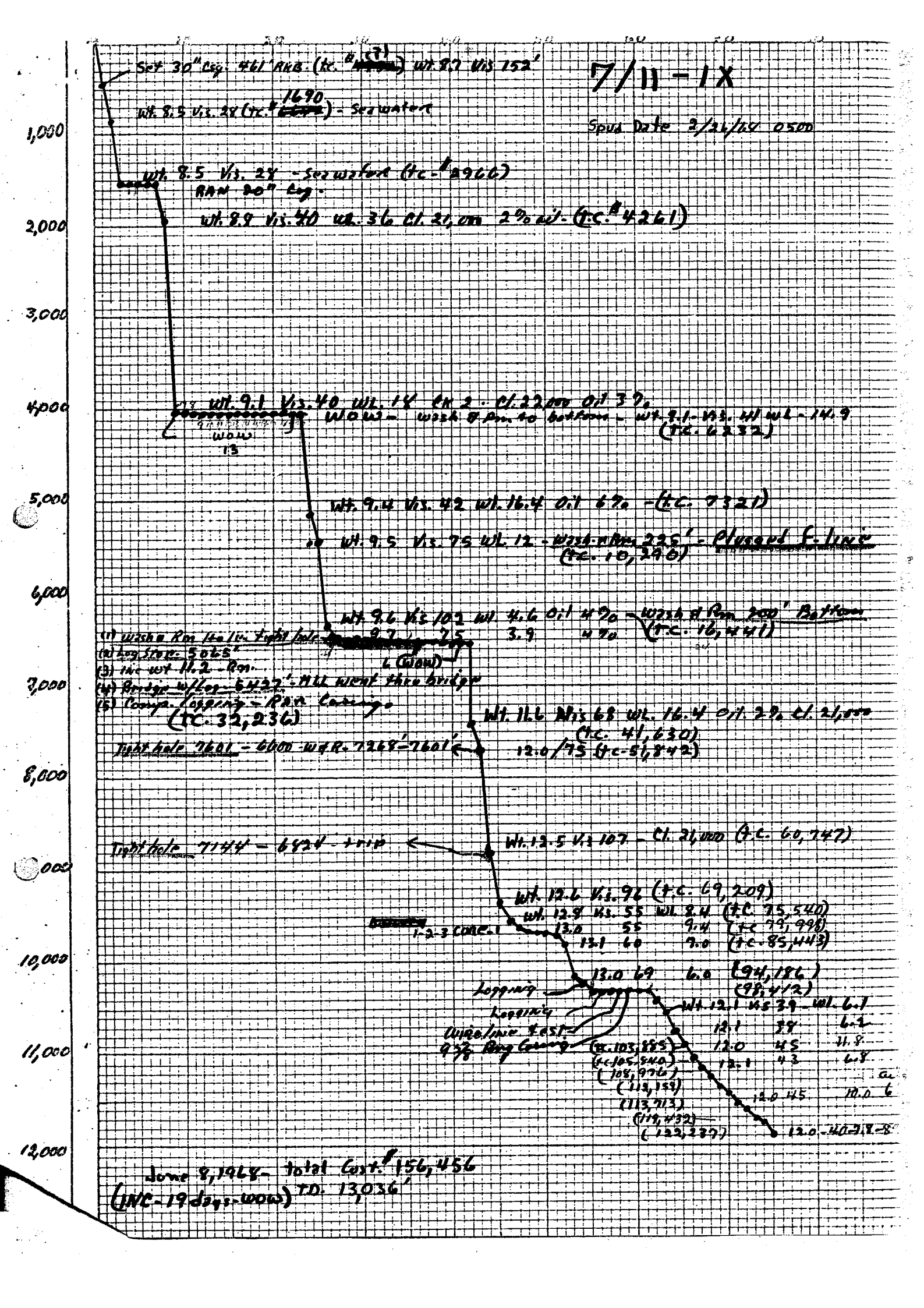
Lb/Gal.
9 10 11 12 13 14 15 16 17 18 19 20
10 15 Spec. Grav. 20

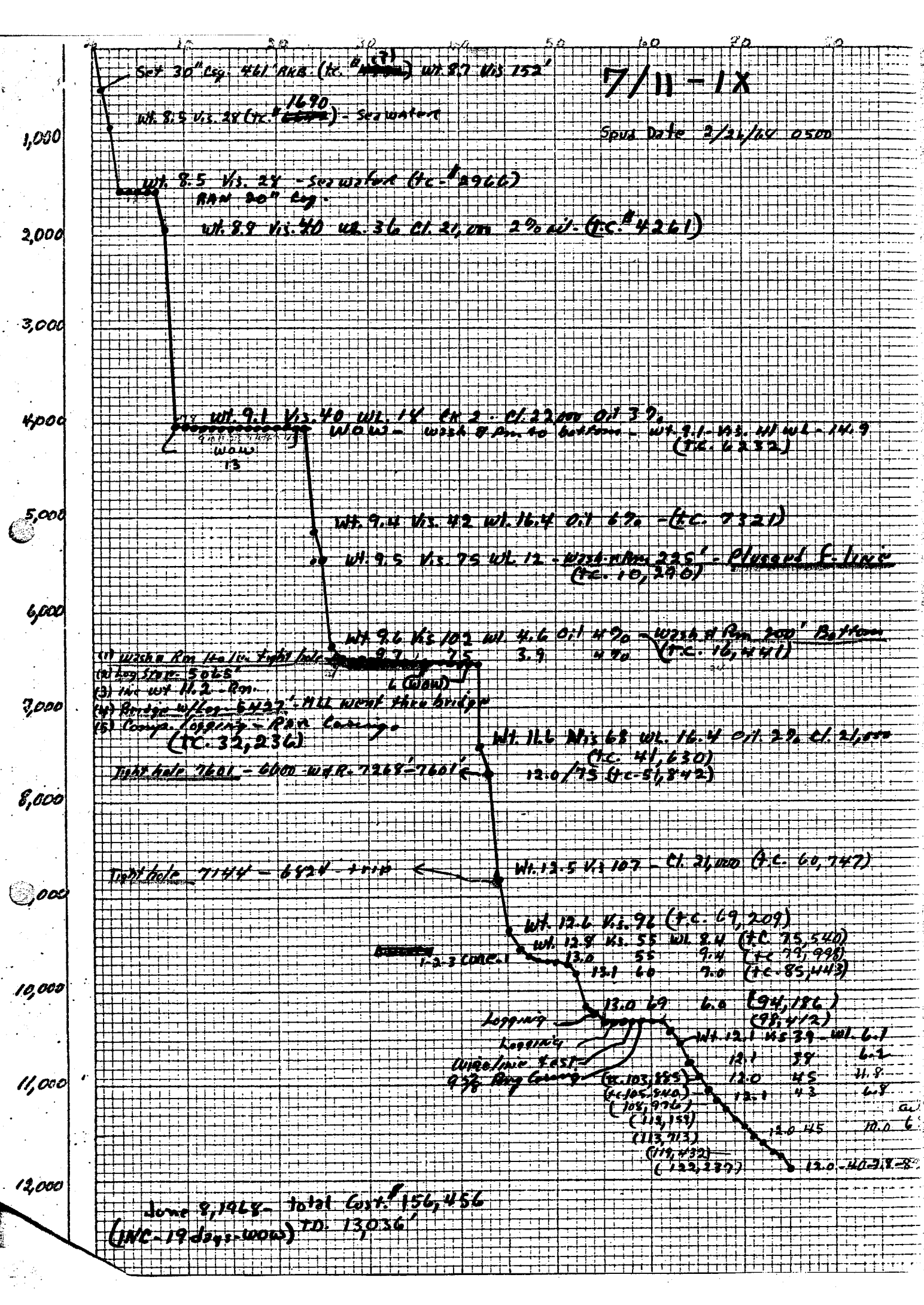
Mud Weight
Sonic
Penetration

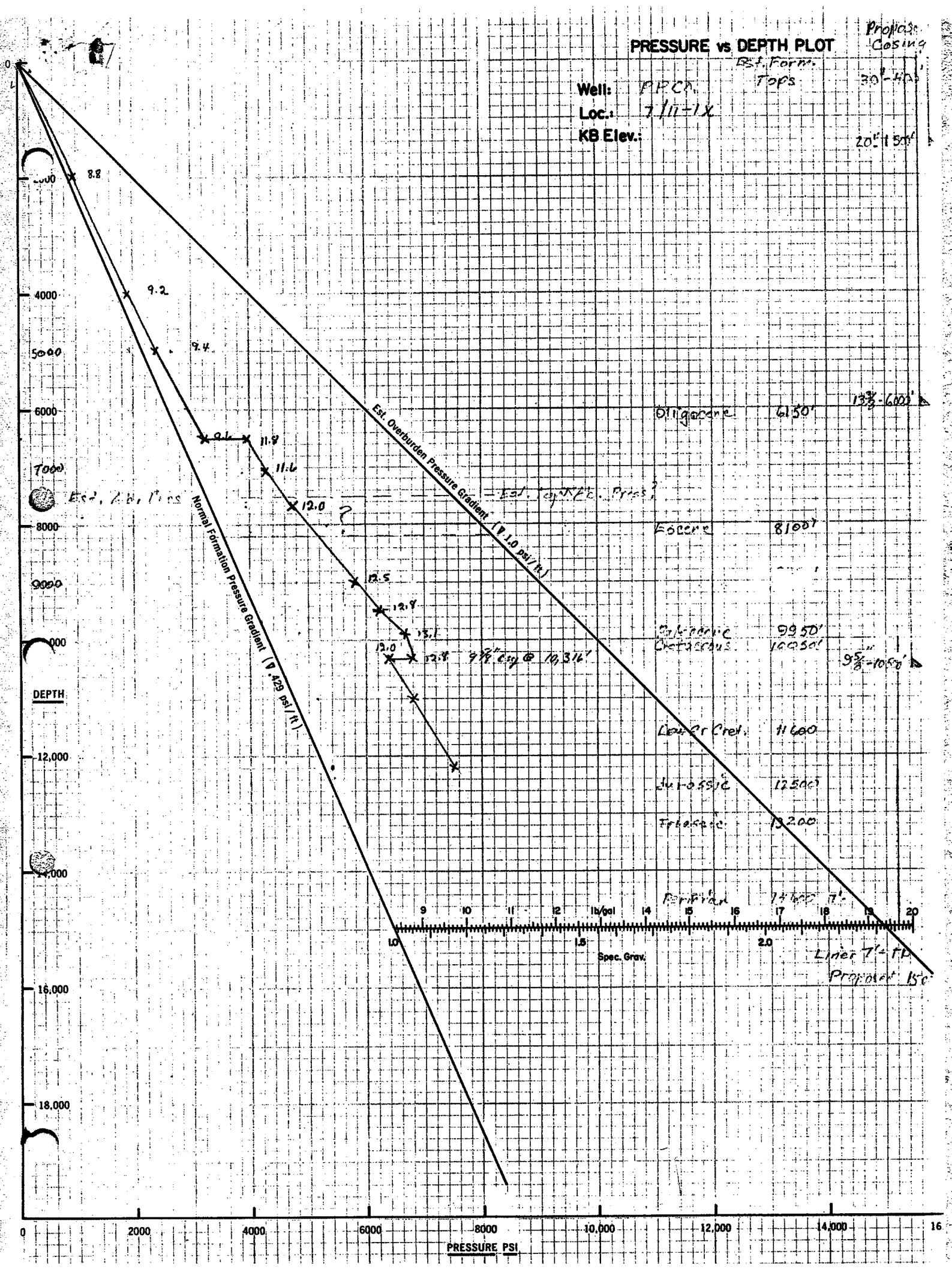
0 2000 4000 6000 8000 10.000 12.000 14.000

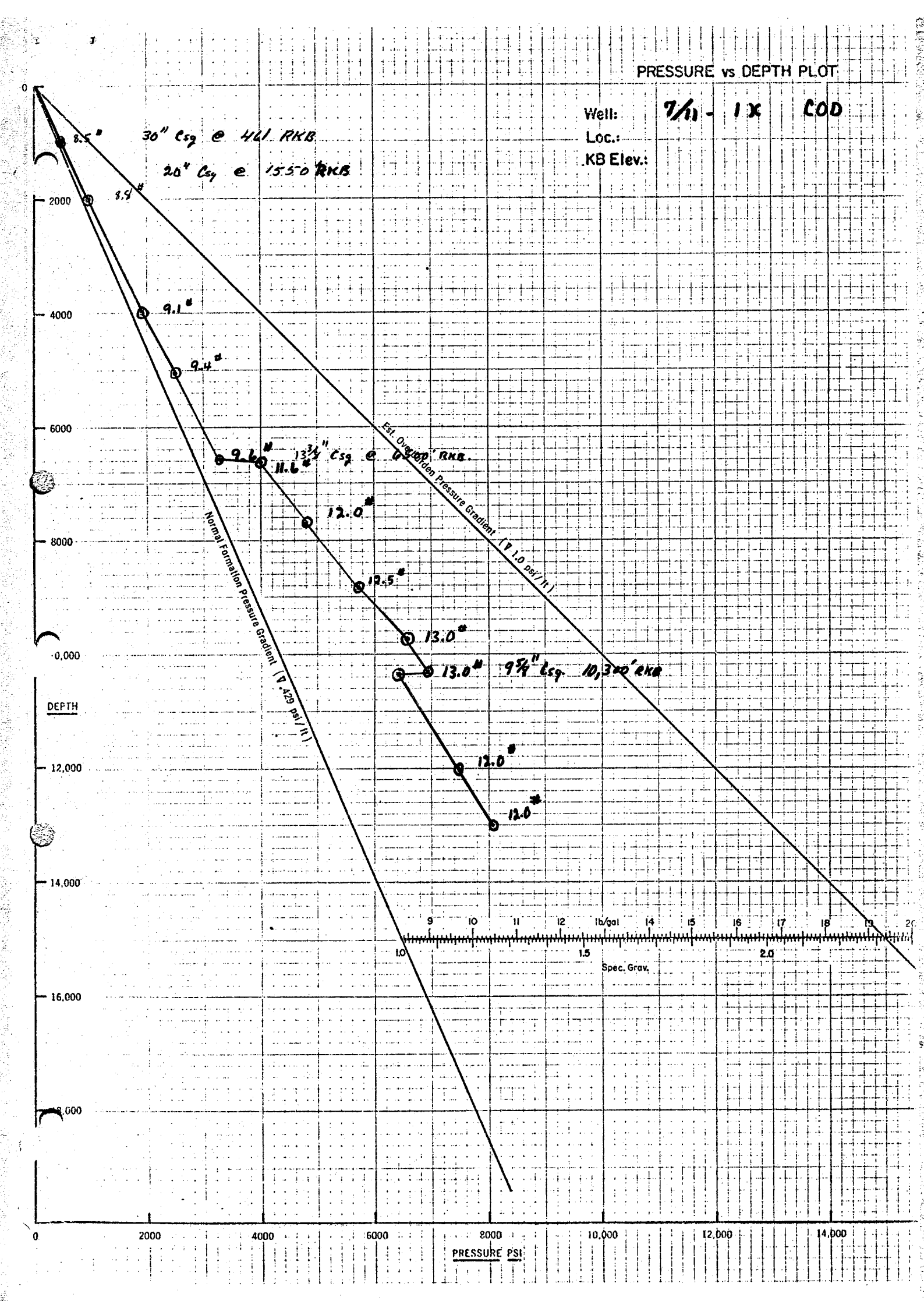
PRESSURE PSI


Well: m P.P.Co. 7-11-IX
Loc.: North Sea Area - Norway
KB Elev.: 90'
20"@ 1520'
13⅜"@ 6444'
9⅝"@ 10,248'
8.9
9.1
9.4
Hydrostatic mud pressure gradient
9.6
9.7
11.7
11.7
12.3
1216 psi
FORMATION PRESSURE 12.5 GRADIENT
12.7
13.0
13.0
12.9
13.1
12.1
12.0
12.2
12.2
11.9
12.1
12.1
12.1
12.1
13.1
13.2
DST #5
DST #4
DST #3
DST #2
1831 psi
Est. Overburden Pressure Gradient (@ 1.0 psi/ft)
Normal Formation Pressure Gradient (@ .429 psi/ft)
Oligocene 6580'?
Eocene 8840?
Paleocene 9400'
U. Cretaceous 10,120'?
Salt 12,285'
T.D. 13,036
DEPTH
PRESSURE PSI
lb/gal
Spec. Grav.


7/11 - 1X
Spud Date 2/21/64 0500
Set 30" Csg. 461' RKB (tc. 461')
Wt. 8.7 Vis 152'
Wt. 8.5 Vis. 28 (tc. 1690') - Seawater
Wt. 8.5 Vis. 28 - Seawater (tc - 2966)
RAN 20" Csg.
Wt. 8.9 Vis. 40 wl. 36 Cl. 21,000 2% oil - (tc. 4261)
Wt. 9.1 Vis. 40 wl. 14 Ch 2 · Cl. 22,000 Oil 3%
WOW
13
WOW - Wash @ Rm. 40 bottom - Wt. 9.1 - Vis. 41 WL - 14.9
(tc. 6232)
Wt. 9.4 Vis. 42 wl. 16.4 Oil 6% - (tc. 7321)
Wt. 9.5 Vis. 75 WL. 12 - Wash @ Rm. 225' - Plugged F. line
(tc. 10,290)
Wt. 9.6 Vis 102 wl 4.6 Oil 4% - Wash @ Rm. 200' Bottom
9.7 75 3.9 4%
(tc. 16,441)
(1) Washed Rm 16a to Tight hole
(2) Log Strap: 5065'
(3) Inc wt 11.2 - Rm.
(4) Bridge w/log - 6427' - All went thru bridge
(5) Comm. Logging - Ran Casing
(tc. 32,236)
4 (WOW)
Wt. 11.6 Vis 68 WL. 16.4 Oil 2% Cl. 21,000
(tc. 41,630)
12.0/75 (tc-51,842)
Tight hole 7601 - 6600 - W&R 7268'-7601'
Tight hole 7144' - 6824' - trip
Wt. 12.5 Vis 107 - Cl. 21,000 (tc. 60,747)
Wt. 12.6 Vis. 92 (tc. 69,209)
Wt. 12.9 Vis. 55 WL 8.4 (tc 75,540)
1-2-3 conc.
13.0 55 9.4 (tc 79,998)
13.1 60 9.0 (tc-85,443)
13.0 69 6.0 (94,186)
(98,412)
Logging
Logging
Wire line test -
9 5/8 Csg Comm
Wt. 12.1 Vis 39 - WL 6.1
12.1 38 6.2
12.0 45 11.8
12.1 43 6.8
(tc. 103,885)
(tc. 105,540)
(108,976)
(112,159)
12.0 45 10.0 6
(113,713)
(119,432)
(122,237)
12.0 - 40 - 9.8 - 8
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
11,000
12,000
June 8, 1964 - Total Cost $156,456
(INC - 19 days - WOW) T.D. 13,036'


7/11 - 1X
Spud Date 2/24/64 0500
Set 30" Csg. 461' AKB (tc. # 1690) wt. 8.7 Vis 152'
wt. 8.5 Vis. 28 (tc. # 1690) - Seawater
wt. 8.5 Vis. 28 - Seawater (tc - # 2966)
RAN 20" Csg.
wt. 8.9 Vis. 40 wl. 36 Cl. 21,000 2% oil - (tc. # 4261)
wt. 9.1 Vis. 40 wl. 18 ch 2 · cl. 22,000 oil 3%
WOW - Wash & Ream to bottom - wt. 9.1 - Vis. 41 wl - 14.9
(tc. 6232)
WOW
13
wt. 9.4 Vis. 42 wl. 16.4 oil 6% - (tc. 7321)
wt. 9.5 Vis. 75 wl. 12 - Wash & Ream 225' - Plugged F. line
(tc. 10,290)
wt 9.6 Vis 102 wl. 4.6 oil 4% - Wash & Ream 200' Bottom
3.9 4%
(tc. 16,441)
(1) Wash & Ream 1to/1o. Tight hole
(2) Log Strap: 5065'
(3) Inc wt 11.2 - Ream
(4) Bridge w/Log - 6427' - Will work thru bridge
(5) Comp. Logging - Ream Casing.
(tc. 32,236)
WOW
Tight hole 7601 - 6600 - W&R 7268-7601'
wt. 11.6 Vis 68 wl. 16.4 oil 2% Cl. 21,000
(tc. 41,630)
12.0/75 (tc-5,842)
Tight hole 7144' - 6424' - trip
Wt. 12.5 Vis 107 - Cl. 21,000 (tc. 60,747)
wt. 12.6 Vis. 96 (tc. 69,209)
wt. 12.8 Vis. 55 wl. 8.4 (tc 75,540)
13.0 55 9.4 (tc 79,998)
13.1 60 9.0 (tc-85,443)
1-2-3 conc.
13.0 69 6.0 (94,186)
(98,412)
Logging
Logging
Wire line test -
9 7/8 Ring Casing
wt. 12.1 Vis 39 wl. 6.1
12.1 39 6.1
12.0 45 11.8
12.1 43 6.8
12.0 45 10.0 6
12.0 - 40 - 7.8 - 8
(tc. 103,885)
(tc. 105,540)
(108,976)
(113,159)
(113,713)
(119,432)
(122,287)
done 8,1968 - Total Cost: # 156,456
(WC - 19 days - WOW) TD. 13036'
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
11,000
12,000


PRESSURE vs DEPTH PLOT
Well:
Loc.:
KB Elev.:
Est. Form. Tops
Proposed Casing
30"-400'
20"-1500'
13⅜"-6000'
9⅝"-10,500'
7"-TD
Liner
Oligocene 6150'
Eocene 8100'
Cretaceous 9950'
Lower Cret. 11,600
Jurassic 12,500'
Triassic 13,200'
Permian 14,600'
9⅞" Csg @ 10,316'
Est. Overburden Pressure Gradient (@ 1.0 psi/ft)
Normal Formation Pressure Gradient (@ .429 psi/ft)
Est. Top Abn. Press.
8.8
9.2
9.4
9.6
11.9
11.6
12.0
12.5
12.9
13.1
12.0
12.8
DEPTH
PRESSURE PSI
lb/gal
Spec. Grav.


PRESSURE vs DEPTH PLOT
Well: 7/11 - 1X COD
Loc.:
KB Elev.:
30" Csg @ 461 RKB
20" Csg @ 1550 RKB
8.5#
8.4#
9.1#
9.4#
9.6#
11.6#
12.0#
12.5#
13.0#
13.0#
12.0#
12.0#
13 3/4" Csg @ 9200' RKB.
9 5/8" Csg. 10,300' RKB
Est. Overburden Pressure Gradient (∇ 1.0 psi/ft)
Normal Formation Pressure Gradient (∇ .429 psi/ft)
DEPTH
0
2000
4000
6000
8000
10,000
12,000
14,000
16,000
18,000
9
10
11
12
lb/gal
14
15
16
17
18
19
1.0
1.5
2.0
Spec. Grav.
0
2000
4000
6000
8000
10,000
12,000
14,000
PRESSURE PSI

WELL : 7/11-1X
Field : Cod 25 FEB. 1969 - 15 JUNI 1969 - 110 Days

P.P. Co. - NORWAY

WELL RECAP

1	MUD TYPE		SEA WATER Starch / Drispac	SEA WATER Lignosulfonate	Sat. Salt Drispac		
2	MUD WEIGHT	PPG	1500' - 6512'	6512' - 10,248'	10,248 - 13,034	1500 - 13,034	
3	INTERVAL EXAMINED	ft	8.8 - 9.7	11.5 - 13.1	11.9 - 12.2	8.8 - 13.1	
4	TOTAL FOOTAGE	ft	5012	8748	2786	11,534	
5	HRS DRILLING	hrs	53	125.5	299.5	478	
6	PENETRATION (4÷5)	ft/hr	94.6	69.7	9.3	24.1	
7	MUD COST CURRENT (1973)	$	37,746	61,738	38,002	137,486	
8	MUD COST/FT (7÷4)	$/ft	7.53	7.06	13.64	11.92	
9	HRS. CONDITIONING HOLE	hrs	25	—	—	25	
10	CONDITIONING COST (2X Rig Cost)	$	47,500	—	—	47,500	
11	CONDITIONING COST/FT (10÷4)	$/ft	9.48	—	—	4.12	
12			28 MARS 1969	28 APR. 1969	25 MAI 1969	25 MAI 1969	
13	ROTATING COST (5X RIG COST)	$	100,700	238,450	569,050	908,200	
14	ROTATING COST/FT (13÷4)	$/ft	20.09	27.26	209.25	78.74	
15	FISHING HRS	hrs	—	—	—	—	
16	FISHING COST (15X RIG COST)	$	—	—	—	—	
17	FISHING COST/FT (15÷4)	$/ft	—	—	—	—	
18	TOTAL COST (7+10+13+16)	$	185,946	300,188	607,052	1,093,186	
19	TOTAL COST/FT (18÷4)	$/ft	37.10	34.31	217.89	94.78	
20	COMMENTS			Cored			
	RIG COST = $1900/HR.		17½"	12¼"	8½"	90 Days	

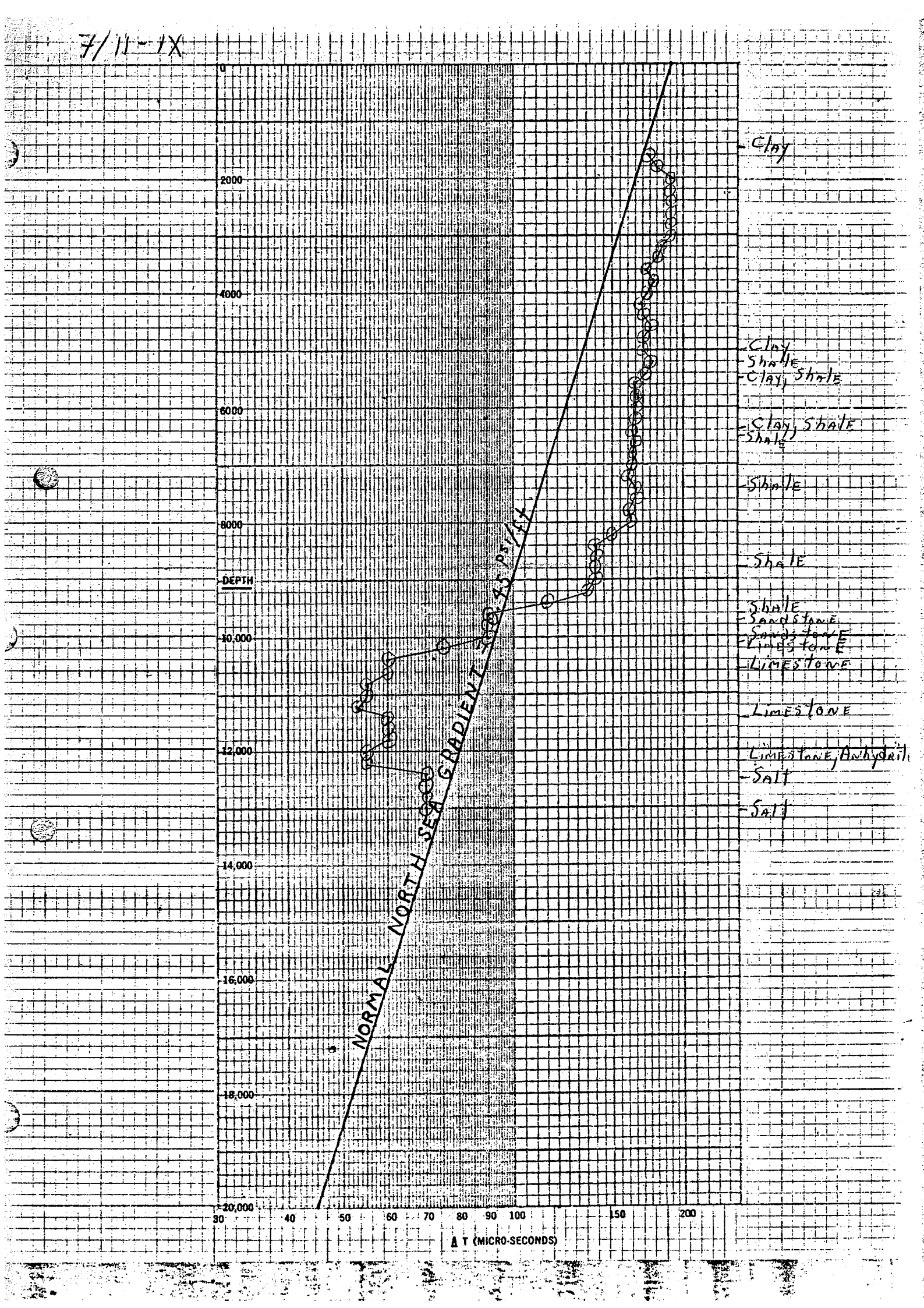
WELL: 7/11-1X
LOCATION: COD
KB ELEV:

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
1600	173	.470	9.04	7200	160	.725	13.94	12,800	70	.450	8.65
1800	180	.545	10.48	7400	165	.747	14.36	13,000	70	.450	8.65
2000	190	.625	12.02	7600	165	.750	14.42				
2200	190	.635	12.21	7800	160	.740	14.23				
2400	190	.650	12.50	8000	162	.753	14.48				
2600	190	.665	12.79	8200	150	.717	13.79				
2800	190	.680	13.08	8400	140	.680	13.08				
3000	190	.690	13.27	8600	140	.690	13.27				
3200	183	.660	12.69	8800	140	.695	13.36				
3400	180	.650	12.50	9000	140	.705	13.56				
3600	172	.625	12.02	9200	135	.685	13.17				
3800	177	.660	12.69	9400	115	.580	11.15				
4000	172	.645	12.40	9600	90	.450	8.65				
4200	168	.635	12.21	9800	90	.450	8.65				
4400	170	.650	12.50	10,000	90	.450	8.65				
4600	175	.695	13.36	10,200	75	.450	8.65				
4800	170	.680	13.08	10,400	60	.450	8.65				
5000	170	.690	13.27	10,600	60	.450	8.65				
5200	175	.717	13.79	10,800	55	.450	8.65				
5400	172	.710	13.65	11,000	55	.450	8.65				
5600	165	.695	13.36	11,200	53	.450	8.65				
5800	165	.700	13.46	11,400	60	.450	8.65				
6000	165	.705	13.56	11,600	60	.450	8.65				
6200	164	.707	13.60	11,800	60	.450	8.65				
6400	163	.715	13.75	12,000	55	.450	8.65				
6600	165	.727	13.98	12,200	55	.450	8.65				
6800	163	.725	13.94	12,400	70	.450	8.65				
7000	163	.730	14.09	12,600	70	.450	8.65				

7/11-1X


0
2000
4000
6000
8000
DEPTH
10,000
12,000
14,000
16,000
18,000
20,000
30
40
50
60
70
80
90
100
150
200
Δ T (MICRO-SECONDS)
NORMAL NORTH SEA GRADIENT
Clay
Clay
Shale
Clay, Shale
Clay, Shale
Shale
Shale
Shale
Sandstone
Sandstone
Limestone
Limestone
Limestone, Anhydrite
Salt
Salt

PHILLIPS PETROLEUM COMPANY
UTENLANDSK AKSJESELSKAP
P.O.BOX 72 - STAVANGER, NORWAY - PHONE 41 340, 41 391 - CABLE: PHILLSTAV

ATC/CJS
SO-049-68

Stavanger, February 19, 1968

Mr. T.J. Jobin,
OSLO OFFICE

E/NOR/D&P/Well-7/11-1X

Enclosed herewith please find our revised Mud Program for Well 7/11-1X Norway. This Mud Program supersedes that which is attached to the Drilling Prospectus previously submitted.

Original Signed by
A. T. CRUMP

A.T. CRUMP

cc: H.H. Hoikkila
T.L. Sandridge,
S.S. Warner,
H.M. Barrett,
F.J. Shell,
O.K. Bodine,
L.H. Hoelscher.

WELL 7/11-1X NORWAY

MUD PROGRAM

36" Hole - (465' RKB)

Hole Volume - 250 bbls
Density - 8.8 ppg
Viscosity -+150 sec
Filtration - No control

This section of the well should be drilled with sea water and with returns to the sea floor. Slugs of high viscosity mud must be pumped into the hole if hole filling becomes a problem. When drilling is completed and prior to running casing, a high viscosity sea water mud equal to twice the hole volume will be pumped into the hole.

The viscous mud should be prepared as follows:

a) Sea water

b) 15 - 26 ppb Zeogel

c) 3 - 4 ppb Flosal

d) Small amount of lime (to provide increased Geletion)

26" Hole - (1500' RKB)

Hole Volume - 810 bbls
Density - 8.8 ppg
Viscosity -+150 sec
Filtration - No control

The drilling and use of mud in this section of hole will be identical to the 36" section. The amount of mud to spot prior to running casing will be determined by maximum pit volume. This volume should be 900 to 1000 bbls.

17½" Hole - (6500' RKB)

Hole Volume - 2000 bbls
Density - 9.0 - 9.5 ppg
Viscosity - 40 - 45 sec
Filtration - Less than 15 cc
pH - 7.0

Tests of formation samples circulated from Well 16/11-1X show that the Tertiary shales are insensitive to a saturated sodium chloride solution and diesel oil. The tests also show that the shales are only slightly affected by sea water. The use of a saturated salt mud in the 17½" hole would present a major logistics problem; thus, the compromise to a sea water-diesel oil mud has been made.

The mud should be prepared as follows:

a) Sea water

b) 4% Diesel oil

Suggest MAINTAINING 4-5 #/bbl Soltex

c) 5 lbs Soltex per barrel diesel oil. The Soltex is added to assist in emulsifying the diesel oil. The Soltex and diesel oil should be mixed prior to adding the mixture to the mud system.

d) 5 to 10 ppb bentonite. The bentonite may not be required after drilling commences since analysis of the Tertiary Shales shows them to contain a high percentage of montmorillonite (bentonite).

e) Add sufficient Drispac and starch in a 1:4 ratio to control filtration loss to less than 15 cc. When the static bottom hole temperature reaches 250 °F, substitute tech grade CMC for starch in the same 1:4 ratio. This ratio should be varied to obtain the desired viscosity control. (Drispac gives much higher viscosity than CMC.)

f) DMS may prove to be necessary to stabilize the filtration properties by desorbtion of Drispac from clay solids.

g) Desco may be used as required for thinning.

h) Provide additional cutting carrying capacity, as required, by the addition of 1-5 ppb Flosal.

i) Before cementing and drilling cement the system should be treated with 1 lb/bbl sodium sulfate.

In the event shale sloughing becomes a severe problem, the mud density should be increased to 13.5 ppg. If this does not solve the problem, the 13.5 ppg mud system is to be coverted to a saturated sodium chloride mud.

12 1/4" Hole - (± 10500')

Hole Volume - 1600 bbls
Density - 10.0 - 10.5 ppg
Viscosity - 40 - 45 sec
Filtration - ±10 cc
pH - 7.0

The 12 1/4" hole should be drilled with the same mud system as above in drilling the 17½" hole. Anticipated hole problems should be similiar to the 17½" hole except a greater probability exists of encountering high pressure zones that will require increased mud densities.

8½" Hole - (± 15000' RKB)

Hole Volume - 1200 bbls
Density - 10.0 - 10.5 ppg
Viscosity - 40 - 45 sec
Filtration - ±10 cc
pH - 7.0

The 8½" hole should be drilled initially with the same type mud used to drill the 17½" and 12 1/4" holes. As soon as salt is encountered the mud is to be converted to a salt saturated system having the following properties:

Density - 10.8 - 11.0 ppg
Viscosity - 38 - 42 sec
Filtration - ±10 cc
pH - 7.0

Before adding Drispac and starch/CMC to reduce the water loss, the calcium ion should be reduced to about 400 ppm using sodium sulfate.

After the system has been saturated with sodium chloride and the calcium ion has been treated to 400 ppm, add sufficient magnesium sulfate to saturate the fluid phase. Solubility charts for magnesium sulfate in a saturated sodium chloride - sodium sulfate solution are not available. Therefore, the mud engineers must run pilot tests to determine the quantity of magnesium sulfate required. The following theoretically calculated solubility table is presented for the mud engineers information only, and is not to be used for anything other than a guide:

Temperature:	Solubility:
	$MgSO_4 \cdot 7H_2O$
°C	lb/bbl sat. salt water
0	207
10	214
20	225
30	228
40	232
50	255
60	278
70	301
80	326
90	349
100	398

When magnesium sulfate is used, care should be taken to keep the pH below 9 and to keep a high concentration of sodium sulfate. If the pH begins to increase in spite of the mud chemistry, treat with lignite. DO NOT USE CAUSTICIZED LIGNITE. CC-16 - 4 3 -

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

NORWAY - NORTH SEA - EXPLORATION WELL
DRILLING PROSPECTUS

Well No: 7/11-1X
Location: 57° 04' N, 02° 26' E
Water Depth: Approximately 250'

General:

Current plans are to drill a 15,000 foot exploratory well in block 7/11 using ODECO's semi-submersible drilling rig "Ocean Viking".

AFE NW - ($ 2,123,167 gross; $ 784,723 net) has been assigned to this project.

Anticipated Formation Pressures and Geology:

The general geology of Well 7/11-1X is as shown in attachment No. 1. The well will be different from well 16/11-1X in that salt is not anticipated before a depth of ± 11,000' is reached.

thin salt below 12500 + 13200 Maj. salt 14600

Extremely high pressure formations are not anticipated in this well, however, seismic data indicate abnormal pressures could be encountered at the following depths:

a. 3500' - 3700' (Questionable)
b. 5200' - 5400' (Questionable)
c. 6250' - 6450' (Questionable)
d. 7200' - 7700' (Probable)
e. 9700' - 9900' (Highly questionable)
f. 10700' - 10900' (Highly questionable)

As a general statement, the geology of Well 7/11-1X between 0 - 11,000' will be similar to the formations encountered between 0 - 6,000' in well 16/11-1X. Thus, considerable problems with heaving shales should be anticipated. An increased mud density may be required to control these shales.

The prime objective of this well is the lower section of the Upper Cretaceous. Considerable interest in formations above the

Upper Cretaceous is shown regarding possible sand development in the thick shale sections that were present in well 16/11-1X.

Due caution should be observed drilling the thick shale sections against abnormal pressure kicks, differential sticking and/or lost circulation. Therefore, no increase in the mud density should be made unless necessary.

Below the Upper Cretaceous a massive salt section is anticipated. Approximately 500' of this salt will be penetrated before the objective depth is reached. Even though considerable difficulties were experienced in ths salt section of well 16/11-1X which required high mud densities, the top 500 feet of salt in this section is to be drilled with a natural density for salt saturated mud.

Hole and Casing Program:

Hole Size	Casing Size	Description	Torque Ft-lbs	Approx. Depth RKB
36" (1)	30"	1" wall 309 lb/ft	(Welded)	465
26"	20"	133 lb J ST&C		1500
17 1/2"	13 3/8"	68 lb J ST&C	5200	6500
12 1/4"	9 5/8"	47 lb N Butt.	11000 to 12000	± 10500 (2)
8 1/2"	7" (liner)	29 lb J LT&C	3800	± 15000

1. The 36" hole is to be drilled to a depth that will allow three joints of 30" casing to set on bottom and still have 10' to 15' 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. 9 5/8" casing will be set in the Upper Cretaceous which is estimated to be at a depth between 10,200' and 11,000'.

Cement Requirements:

A. 30" casing: Cement with 750 sxs (71,200 lb) Dalen Portland cement plus 3% Calcium chloride (2130 lbs). The calcium chloride can be blended with the cement by adding the 2130 lbs to 93 bbls of fresh water and using the mixture for cement mixing water. The cement slurry should be mixed to 15.6 ppg and will have more than one hour thickening time. Wait on cement 12 hours before drilling out. At that time, the cement should have a compressive strength of approximately 1000 psi.

The 750 sxs of cement will provide for cement back to the surface plus 200% wash out in open hole and will fill the bottom 45' of 30" casing. Run 90' of drill pipe below the 20" autolock cement. A 30" Baker Float Shoe will be run on the bottom of the 30" casing.

EXPLORATION RECORD

Lease Field 7, Block 11 - Norway Offshore Well 7/11-1X

Formation Name	Top	Base	Remarks
Recent			
Pleistocene			
Upper Pliocene	1674 (-1584)	1824	
Plio. correl. horiz.	1824 (-1734)	2017	
Lower Pliocene	2017 (-1927)	2209	
Upper Miocene	2209 (-2119)	2396	
Middle Miocene	2396 (-2306)	5030	
Lower Miocene			
Burdigalian	5030 (-4940)	5594	
Aquitanian	5594 (-5504)	6460	
Oligocene	6460 (-6370)	8748	
?U.(?) - M. Eocene	8748 (-8658)	9215	
?L.Eoc. - ?Paleoc.	9215 (-9125)	9427	
Paleocene	9427 (-9337)	9466	
Up. Sand Member	9466 (-9376)	9528	
Shale Member	9528 (-9438)	9554	
Middle Sand Member	9554 (-9464)	9809	
Lower Sand Member B	9809 (-9719)	9976	
Lower Sand Member A	9976 (-9886)	10078	
Danian	10078 (-9968)	10388	
Upper Cretaceous	10388 (-10298)	?11480	
Lower Cretaceous	?11480 (-11390)	-	
Jurassic	-	-	
Triassic	-	-	
Permian	12280 (-12190)	-	
Total Depth	13036 (-12946)		

Form 883 3-53

CONFIDENTIAL

NOR/D&P-Well 7/11-1x
Nov. 22, 1967.

PHILLIPS 7/11-1x, COD PROSPECT
GEOLOGIC WELL PROGNOSIS

LOCATION: Field 7, Block 11, Production License 018; 57°04' N., 02°26' E. Near SP 1238, Line NJV 5704.

PROPOSED T.D.: 15,000' (4575m) WATER DEPTH (MSL): - 251'(77m)

RKB (MSL): +90' (27m) SEA FLOOR (RKB): 341'(104m)

EXPECTED GEOLOGIC SECTION

xx. SEISMIC REFLECTORS
(x. estim. thickness objective zone)

FORMATION	ESTIM DEPTH RKB FT(M)	ACTUAL TOP	EXPECTED LITHOLOGY (x. objective)
Rec.-Pleist.			sands, gravel
Pliocene			clays, thin sands
Miocene			" " "
Oligocene (x.150')	?6150		(x) sandstone, clays
Eocene	?8100 (2470)		clays, thin sands
Paleocene (x.100')	9950 (3035)		shale (x) sandstone
U. Cret.	10050 (3065)		shale
- - -	10350 (3157)		chalky limestone
(x. 100')	10700 (3264)		(x) basal permeable zone
xx GREEN	11100 (3386)		TOP CHALK
- - -	11100 (3386)		chalk
xxYELLOW	11600 (3538)		BASE CHALK
L. Cret.	11600 (3538)		marl, clay
- - - (x. 100')	?12000 (3660)		(x) sandstone, shale
U. Juras	?12500 (3813)		marl, clay
M. Juras			evap (?), clay, oolitic ls
L. Juras (x. 250')	?12950 (3950)		clay sh (x) sandstone
U. Trias	?13200 (4026)		clay, salts
M. Trias			ls, marl
L. Trias (x. 300')	?14000 (4270)		clay (x) sandstone (Bunter?)
Perm-Trias	?14300 (4362)		clay transition
xx. VERMILION	14600 (4453)		Zechstein anhyd, salt
Total depth	15000 (4575)		

CASING PROGRAM

SIZE	APPROX. DEPTH RKB FT. (m)	ESTIM FORMATION SET IN
30"	470 (143)	Recent
20"	1500 (458)	Pleist.-Pliocene
13 3/8"	6000 (1829)	Oligocene
9 5/8"	10500 (3355)	U.Cret. chalk
7"	15000 (4575), if required	Permian

LOGGING PROGRAM

RUN	HOLE SIZE	APPROX INTERVAL	TOOLS
-	36"	341-470' RKB (104-143m)	-
-	26"	470-1500' RKB (143-458m)	(Gamma Ray, Run 1, to subsea).
1	17½"	1500-6000' RKB (458-1829m)	Induction Electric Microlog/Microlat-Caliper BHC Sonic/Gamma If needed to evaluate shows: Cont. Dipmeter BHC Formation Density Epithermal Neutron Sidewall Core Equipment
2	12 1/4"	6000-10500' RKB (1829-3203m)	Same as Run 1. ± Formation Tester
3	8½"	10500-15000' RKB (3203-4575m) Two runs may be required in this interval.	Same as Run 2 if no salt in Jurassic and Triassic; otherwise: Laterolog/Microlat-Caliper BHC Sonic/Gamma-Caliper Cont. Dipmeter. Geophone survey at T.D. If needed: BHC Formation Density Epithermal Neutron. Sidewall Core Equipment Formation Tester.

CORING PROGRAM

Coring should be primarily confined to evaluation of oil and gas shows. Full-barrel recovery should be attempted. Sidewall core equipment can be run to recover supplementary lithologic data or lithology previously missed. Anticipated coring depths are:

9950' RKB	Paleocene sandstone
10700' RKB	U. Cretaceous limestone (chalk)
? 12000' RKB	L. Cretaceous sandstone
? 12950' RKB	L. Jurassic sandstone
? 14000' RKB	L. Triassic sandstone (Bunter?)

TESTING PROGRAM

No conventional drillstem tests will be run in open hole. Use of the Schlumberger Formation Tester can be considered in the event of shows and favourable log analysis results.

POTENTIAL TROUBLE ZONES

LOST CIRCULATION

1500 - 10350'	Tertiary sandstones
10700 - 10900'	U. Cretaceous chalk or limestone.

HIGH PRESSURE (based on velocity inversions)

3300 - 3800'	TERTIARY
5150 - 5300	
6300 - 6500'	
7100 - 7450'	
9600 - 9750'	
? 10550 -10800'	UPPER CRETACEOUS

SALT SECTION

±12700'	Jurassic, thin bedded
±13200'	Triassic, thin bedded or massive
±14600'	Permian, massive

SAMPLE DISTRIBUTION

DRILL CUTTINGS.

WASHED: 10 sets (including chips from cored intervals)

2 - Phillips (rig & shorebase)

1 - AGIP S.p.A., Mr. O. D'Agostino, Box 4174, Milan

1 - Laboratories ERAP, Grande Rue, 78-Chambourcy, France.

UNWASHED: 4 SETS +

1 - Phillips (shorebase)
1 - Laboratories ERAP, as above
1 - paleontologic services (to be determined)
+ 1 - pre-Tertiary only, to Labofina, as above.

CORES

6"± cuts(of sandstone):

Core Laboratories, Mr. Frank Buckle, 22 Leather-market St., London S.E. 1, England.

Laboratories ERAP, (sandstone, and dark shale lithologies)

Longitudinal Slices

½ - Phillips (shore base)
½ - N.G.U., as above

SIDEWALL CORES:

Core Laboratories, (sandstone)

Paleontologic services. (Shale lithology recoveries, if from the pre-Tertiary, should be cut for palynologic determinations).

FLUIDS

DST RECOVERIES.

Lab. ERAP: Water - 1 liter in plastic container.
Oil - 1 liter in non-plastic container.

Phillips: To be arranged by D&P.

FIT RECOVERIES

Phillips.

LOGS & REPORTS

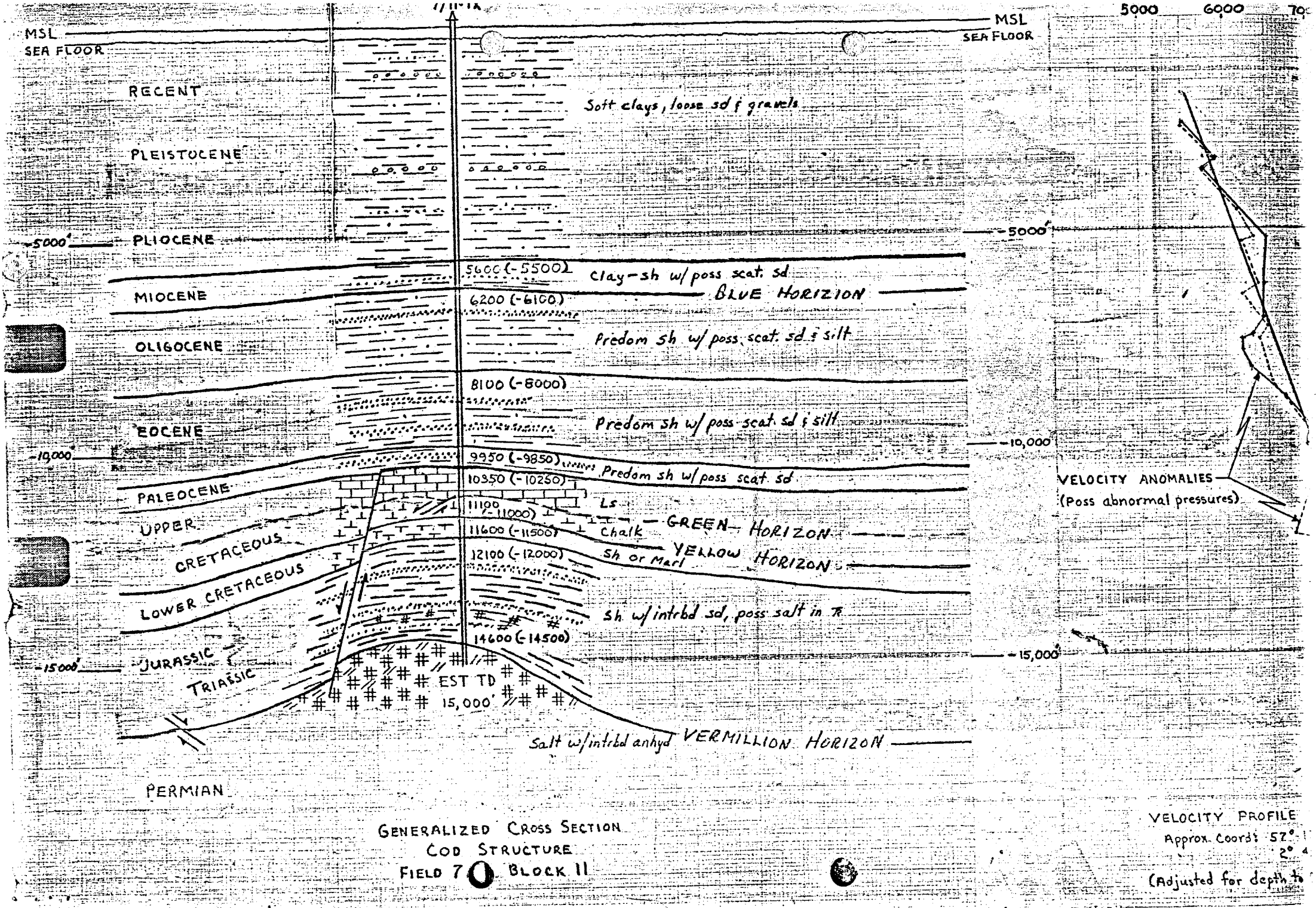
DST Charts & Summary : 9 sets (from Stavanger)
Schlumberger Logs : 10 prints, 1 transparency, (from Stavanger)
Weekly Geologic summary : 1 original (from Oslo)

DISTRIBUTION CHECKLIST

	PHILLIPS				ELF NORGE			AGIP	FINA	Core Lab	NGU M/I	Pal Ser
	Oslo	Rig/ Stav	Lon	Bv	Oslo	Stav	Paris					
Unwashed		1					1		1			1
Washed (+core chips)		4 2+ trade					1	1	1		1	
Cores		(½l.)					(6")			(6")	(½l)	
SWCs										(✓)		(✓)
DST charts	1	1	1	1	1		1	1	1		1	
Schlum prints	1	1	1	1	1	1	1	1	1		1	
" transparency							1					
+ Weekly geol. summ.	1		1	1	1	1	1	1	1			
+ Geos. mudlog	1		1	1	1	1	1	1	1		1	
+ Lith log	1		1	1	1		1					
Test fluids		(✓)					(✓)					

\+ Distributed from Oslo.

CC: Stavanger Office (4)
Oslo Office (4)
London (3)
Petrofina
Agip
Elf Norge A/S.
Geoservices.



GENERALIZED CROSS SECTION
COD STRUCTURE
FIELD 7 BLOCK 11

VELOCITY PROFILE
Approx. Coord: 57°
2°
(Adjusted for depth)

D+P/wells 7/11-1X

BAROID DIVISION
NATIONAL LEAD COMPANY

DRILLING MUD RECORD

COMPANY Phillips Pet. Co. STATE Norway CASING PROGRAM: 30" @ 450'
WELL 7-11-1X COUNTY 7-11 20" inch at 1500 ft.
CONTRACTOR ODECO LOCATION North Sea 13 5/8 inch at 6512 ft.
DATE 1 July 1969 9 5/8 inch at 10247 ft.
STOCKPOINT Stavanger BAROID ENGINEER Devlin & Stelzer SEC TWP RNG TOTAL DEPTH 13034 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	10 min	Cl ppm	Ca ppm	SO_4 ppm	Alk Pf	Oil %	Water %	Solids %	
26 Feb	461	8.6	150																			- Drilling 36" hole
27 Feb	533	8.8	172																			- Drilling 26" hole.
28 Feb	1430	8.8	152	"																		- Drilling 26" hole. Spotting slugs.
29 Feb	1510	8.8	164	"																		- Spotted 1100 bbls. for desing.
5 Mar.	1950	8.8	40	36.0	4	.75			7.2		6	20	8	12	21000	400		N.1	2	92	6	- Drilling
14 Mar	4032	8.9	40	14.4	3	.25			7.0		12	9	6	12	21500	410		"	1	93	6	- W.O.W.; Build volume
20 Mar.	4032	9.1	42	14.8	3	.50			7.0		10	15	8	15	22000	420		"	4	89	7	- Mud Smoke. Wash + ream
" "		9.6	52	21.0	4	.75			7.0		12	10	14	20	21000	450		"	2			1500'-4000'; 14 heavy
" "	4800	10.0	43	17.0	3	.75			7.0		11	15	10	14	22000	450		"	3	85	12	- Drilling
21 Mar.	5450	9.4	41	16.2	3	.75			7.3		15	15	7	8	21000	450		"	7	84	9	- Drilling; Work on pumps
" "	5450	9.5	75	12.0	3	.75			7.0		20	35	18	25	22000	440		"	4	85	11	- Trip for bumper sub.
22 Mar.	5450	9.5	58	10.4	3	.75			7.0		13	17	7	8	21000	440		"	3	87	10	- Reaming tight hole
23 Mar.	6400	9.6	100	4.6	2	.75			7.0		22	36	9	30	22000	320		"	4	85	11	- Drilling
24 Mar.	6512	9.7	75	3.9	2	.75			7.0		20	26	7	20	22000	360		"	4	86	10	- Reaming tight hole
25 Mar.	6512	9.7	62	4.6	2	1.0			7.0		16	22	9	16	22000	360		"	4	86	10	- Increasing density to log
26 Mar.	6512	11.2	65	9.6	2	1.0			7.0		19	20	12	21	22000	340		"	3	81	16	- Logging + adding density
28 Mar.	6512	11.7	65	10.4	2	1.0			7.0		23	29	14	25	22000	320		"	3	80	17	- Increasing density, running csg.
1 April	6512	11.6	64	16.0	3	1.0			7.5		25	32	12	28	22000	640		"	2	81	17	- Drilling out of 13 3/8 csg.
9 April	7400	11.6	65	16.4	3	.75			7.0		30	40	20	31	21000	660		"	2	81	17	- Drilling & weighting up difficulty
10 April	7720	11.8	75	10.0	3	1.0			7.5		23	29	13	22	21000	560		"	1	83	16	controlling viscosity
11 April	8200	12.5	107	11.6	3	1.0			7.5		35	49	20	27	21000	520		"	1	81	18	- Drilling
12 April	9300	12.5	96	7.6	2	1.0			7.5		28	37	24	31	21000	380		"	2	80	18	- Drilling
13 April	9500	12.8	55	8.4	2	1.0			7.5		20	17	15	27	21000	480		"	2	81	19	- Drilling
14 April	9600	13.0	55	9.4	2	1.0			7.5		25	30	20	27	21000	480		"	2	81	19	- Coring
15 April	9660	13.0	53	9.6	2	1.25			7.5		20	26	19	27	21000	400		"	2	78	20	- Coring
16 April	9688	13.0	52	9.0	2	1.25			7.5		23	27	18	26	21000	400		"	2	78	20	- Reaming
17 April	9700	13.0	57	10.2	3	1.25			7.0		25	27	22	29	22000	420		"	2	77	21	- Coring
18 April	9940	13.1	60	7.0	2	1.25			7.5		25	25	18	26	22000	420		"	2	77	21	- Drilling. ME. blue + 25 ppb.
19 April	10000	12.9	68	6.0	2	2.0			7.5		25	35	23	32	22000	400		"	2	77	21	teatonite
20 April	10170	13.0	69	6.0	2	2.0			7.5		25	25	25	35	22000	420		"	2	77	21	- Drilling
21 April	10280	13.1	68	6.0	2	2.0			7.3		25	35	19	25	22000	440		"	2	77	21	- Drilling
22 April	10300	13.0	61	6.1	2	2.0			7.2		24	31	15	22	22000	420		"	2	77	21	- Logging + running 9 5/8 casing

BAROID DIVISION
NATIONAL LEAD COMPANY

DRILLING MUD RECORD

COMPANY _____ STATE _____ CASING PROGRAM: _____ inch at _____ ft.

WELL _____ COUNTY _____ _____ inch at _____ ft.

DATE _____ CONTRACTOR _____ LOCATION _____ _____ inch at _____ ft

STOCKPOINT _____ BAROID ENGINEER _____ SEC _____ TWP _____ RNG _____ TOTAL DEPTH _____ 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	10 min	Cl ppm	Ca ppm	SO_4 ppm	Alk Pf	Oil %	Water %	Solids %	
28 April	10248	12.0	40	11.2	3	1.25			7.5		18	9	3	9	22000	520		N.1	2	82	16	Drilling out of 9 5/8 casing
29 April	10420	12.1	40	7.2	2	.75			7.5		21	5	3	8	22000	380		"	4	80	16	Drilling
30 April	10572	12.1	39	6.4	2	.75			7.5		22	4	3	6	22000	420		"	4	80	16	Drilling
1 May	10745	12.1	38	6.2	2	.75			7.0		20	5	3	9	22000	400		"	4	80	16	Drilling
2 May	10910	12.0	45	9.0	2	.50			7.0		19	16	7	32	57000	380		"	3	81	16	Drilling & salting up.
3 May	11057	12.2	44	11.2	3	.5			7.0		16	14	8	27	89000	380		"	2	83	15	Drilling & salting up
4 May	11193	12.1	43	6.8	2	.5			7.2		21	9	1	7	91000	400		"	2	84	14	Drilling & salting up
5 May	11290	12.0	46	7.4	2	.4			7.2		22	10	1	6	161000	410		"	7	80	13	Drilling & salting up.
		12.1	47	11.2	3	.4			7.1		23	11	2	6	188000	380		"				Addn. Dispac & CMC
6 May	11400	12.1	40	6.2	2	.4			7.1		20	7	0	1	183000	390		"	7	81	12	Drilling
7 May	11460	11.9	39	9.0	2	.5			7.0		19	6	0	1	178000	400		"	6	82	12	Drilling
8 May	11566	12.0	45	10.0	2	.5			7.0		24	12	1	6	185000	380		"	6	81	13	Drilling
9 May	11615	11.9	38	10.8	2	.35			7.1		18	5	0	1	174000	380		"	7	81	12	Drilling
10 May	11724	12.1	41	7.9	2	.5			7.1		22	6	0	1	190000	380		"	7	81	12	Drilling
11 May	11800	12.0	38	8.8	2	.5			7.0		13	4	0	0	181000	390		"	8	82	10	Drilling
12 May	11900	12.1	39	7.8	2	.4			7.0		18	5	0	0	174000	390		"	8	81	11	Drilling
13 May	11940	12.1	44	8.0	2	.5			7.0		19	6	0	1	184000	390		"	8	81	11	Drilling
14 May	11980	12.1	40	9.4	2	.4			7.0		17	4	0	0	188000	380		"	8	82	10	Drilling
15 May	12050	12.0	40	7.5	2	.5			7.0		18	5	0	0	189000	390		"	7	83	10	Drilling
16 May	12190	12.1	41	10.4	2	.35			7.0		19	5	0	0	170000	410		"	6	83	11	Drilling & lost 100 bbls.
17 May	12250	12.0	43	8.1	2	.5			7.2		20	5	0	0	175000	410		"	6	84	10	Drilling & lost 100 bbls.
18 May	12500	12.1	43	6.3	2	.5			7.0		20	6	1	2	177000	560		"	7	79	14	Drilling
19 May	12970	13.1	44	6.8	2	.5			7.0		26	10	3	5	191000	380		"	7	77	16	Drilling & weighting up.
21 May	13037	13.0	46	5.8	2	.25			7.0		20	8	2	6	190000	380		"	6	78	16	Logging at 13037'
			Testing; mud riser + flex joint leaking; losing mud while testing.																			Coming.

BR-1907-4

PRINTED IN U.S.A.

BAROID DIVISION
NATIONAL LEAD COMPANY

COMPANY: $ STATE

WELL COUNTY

CONTRACTOR LOCATION SEC TWP RNG

STOCKPOINT DATE BAROID ENGINEER

CASING PROGRAM: inch at ft.
inch at ft.
inch at ft
TOTAL DEPTH ft.

DATE	DEPTH	WEIGHT	VISCOSITY	FILTRATION		SAND	SALT		pH	VISCOSITY			GELS		FILTRATE ANALYSIS				RETORT ANALYSIS			REMARKS AND TREATMENT
	feet	lb/gal	Sec	cc	Coke 32nd	%	NaCl ppm	Cl ppm		cp	Pv	Yp	in	10 min	Cl ppm	Ca ppm	SO_4 ppm	Alk Pf	Oil %	Water %	Solids %	

MATERIAL	AMOUNT	COST $	MATERIAL	AMOUNT	COST $	MATERIAL	AMOUNT	COST $
Baryte	1424 M1	9419760	Lime (25K)	23	4260			
Bentonite	491 (100#)	17010	Bicarb. soda	40 (50K)	1980			
Flosal	579 (50#)	6405	Soda ash	47 (50K)	2660			
Zeogel	126 (50#)	3492	Actflo-S	31 (55 gl)	6355			
Desco	997 (50#)	31405	Sodium Sulfite	107 (50K)	4190			
Saltex	316 (50#)	6587	Salt	3135 (50K)	6265			
Starch	56.4 (25K)	3936	Bit Lube	21 (55 gl)	2654			
CMC	134 (25#)	1626	Al. Stearate	15 (1 gl)	193			
Drispac	216 (50#)	15329	Emulsifier	199 (25K)	1057			
Diesel Oil	3 (50 gl)	27						
Jel Flake	2 (50#)	19						
Walnut-C	15 (25#)	553						
Walnut-F	32 (25#)	236						
Mica-C	3 (25#)	16						

Drayage	
Extra Tax	
TOTAL COST	193602

13

MUD MATERIALS USED (Total)

DRILLING MUD RECORD

FSS 6F 6-64

PRINTED IN U.S.

FILE NO. D 3

BIT RECORD

SALESMAN

CONTRACTOR ODECO RIG NO. "Ocean-Viking"
COMPANY Phillips Petroleum FIELD COD
LEASE 7/11/1X WELL NO. 1X
STATE North Sea COUNTY Norway
SEC./T'SHIP/RANGE Norwegian Continental Shelf

RIG MAKE Emsco
RIG SIZE A 1500
PUMP NO. 1 D 1350
PUMP NO. 2 D 1350
MUD TYPE Salt

COLLARS: OD X ID X LENGTH
7¾" x 2¾" x 750'
6½" x 2" x 750'
DRILL PIPE 5" 19.5 #
TOOL JOINT 5 X-H

MO. / DAY / YR.
SPUD 2/26/68
UNDER SURFACE ___/___/___
UNDER INTER. ___/___/___
TOTAL DEPTH 5/19/68

T.P.-DRILLERS Redford & D'orsay
WATER SOURCE North sea
FUEL SOURCE Supply Boat (Fina)

RUN NO.	SIZE	MAKE	TYPE	SERIAL NO.	JETS - 32nds Reg. R or RO 1	2	3	DEPTH OUT	FEET	HOURS	FEET PER HOUR	CUM. HOURS	WT. 1000 LBS.	R.P.M.	PUMP PRESS.	PUMP NO 1 Liner	SPM	PUMP NO. 2 Liner	SPM	MUD PROPERTIES Wt.	W.L.	F.V.	P.V.	Y.P.	Ver. Dev.	Dull. Cond. 1/4 1/8 T	B	G		Do
1	17½"	Htco	OSC-3J	46347	16	16	16	461	116	7½	15.5	7½	10	60	1200	7½	65	7½	63		Sea	water				1	1	I	Made 36" Hole	2
R	36"	Sec	PhO	R R	24	24	24	461	116	7½	"	"	"	"	"	"	"	"	"		"	"	"	"	"	1	1	I		
2 R2	26"	Htco	OSC-3	340	24	24	24	1520	1159	23	50.5	30½	30	100	1400	7½	55	7½	57		"	"	"	"	"	1	1	I	Made 26" Hole	2
R #1	17½"	Htco	OSC3J	UK46347	16	16	16	1708	188	4	47	34½	10	300	2000	7½	55	7½	55		F/O	501								
3	17½	Htco	OSC3AJ	40091	16	16	16	4037	2329	15	155.5	49½	50	200	2500	7½	42	7½	41	9	18	45				1	1	I	Suspended w.o.w	3
4	17½	Htco	OSC3J	UK46346	18	18	18	6501	2464	35½	69.5	85	45	160	2000	7½	45	7½	45	9.6	12	77				1	1	I	Fin. 17½ Hole	3
R #1	17½	Htco	OSC-3	UK46347	Fu	11	Open	Ran to condition hole for logging																	15½ Hrs	2	1	I	Cond. 17½" Hole	
5	12¼	Sec.	S47KJ	945551	28	28	28	Drill Cmt (Plug) F/C & shoe & 24" pipe wrench																		4½	Hrs		Broken Teeth	
6	12¼	HTCO	X3	45218	13	13	13	6529	28	½	56	85½	70	125	3000	6¾	62	6¾		11.5	20	66				4	2	I	Drill on Junk	
7	12¼	HTCO	X3	45219	13	13	13	7601	1073	19½	55	105	70	60/150	3000	6¾	62	6¾		11.8	10	66				6	2	OG¼	Drilling formation	
8	12¼	HTCO	X16	50452	14	13	13	8824	1223	22	55.5	127	45/50	60/150	3000	6¾	62	6¾		12.5	12	110				7	4	I	"	"
9	12¼	HTCO	X16	50449	14	14	14	9463	639	16	39.5	143	50/55	140	3000	6¾	41	6¾	40	13	60	84				6	4	I	"	"
10	12¼	Htco	X16	50453	15	15	14	9589	126	4	31.5	147	55	150	3000	6¾	41	6¾	40	13	8.4	55				4	3	I	B.T. Pulled to core	
1	8 7/16	HYC106	P616R	9687	——			9622	33	5	6.6		10/15	75	1200	6¾	39	6¾		13	9.6	56				1	1	I	CORE #1	
1 #1	8 7/16	HYC106	P616R	9687	——			9678	56	10½	5.32		10/20	75	1800	6¾	39	6¾		13	9.6	53				1	1	I	CORE #2	
11	12¼	Sec	M4NGJ	944735	15	14	14	9688	10	½	20	147½	30	120	2700	6¾	62	6¾		13	9.6	53				1	1	I	Reamed 89' 8 7/16"	
1 #1	8 7/16	Hyclog	R616R	9687	——			9734	46	9½	4.85																		Core #3	
12	12¼	Sec	M4NGJ	UK50454	14	14	14	9988	254	9½	26.7	157	60	110	3000	6¾	31	6¾	30	13	6.2	78				6	1	½	Reamed 46' & Drld	
13	12¼	sec	M4NGJ	944759	14	14	14	10087	99	7	14.1	164	60	60	3000	6¾	32	6¾	31	13	7.6	63				6	3	I		
14	12¼	sec	H76J	945657	14	14	14	10223	136	12	11.4	176	65	75	3000	6¾	31	6¾	31	13	7.2	63				7	7	I		
15	12¼	sec	H76J	945659	14	14	14	10316	93	8½	10.9	194½	65	60	3000	6¾	31	6¾	32	13.1	6.2	64				4	4	I	Made 12¼ Hole	
16	8½	sec	S4J	942832	14	14	14	10316	Drld Plugs F/C - Cmt & G/S in 9 5/8" Csg =																	3	3	I	Broken Teeth	
17	8½	sec	M4NJ	947285	11	11	10	10375	59	6	5.89	200½	45	60	3000	6¾	55	6¾		12.1	12	35				6	6	I		

BIT RECORD

SALESMAN:

FILE NO.

CONTRACTOR "ODECO" RIG NO "Ocean Viking"
COMPANY Phillips Petroleum FIELD COD
LEASE 7 11 1X WELL NO. 1X
STATE North sea COUNTY Norway
SEC./T'SHIP/RANGE Continental Shelf

RIG MAKE Emsco
RIG SIZE A 1500
PUMP NO. 1 D-1350
PUMP NO. 2 D-1350
MUD TYPE Salt

COLLARS: OD X ID X LENGTH
7 3/4" x 2 3/4" x 750'
6 1/2" x 2" x 750'
DRILL PIPE 19.5# - 5"
TOOL JOINT 5-XH

	MO. / DAY / YR.
SPUD	2 / 26 / 68
UNDER SURFACE	/ /
UNDER INTER.	/ /
TOTAL DEPTH	5 / 19 / 68

T.P.-DRILLERS
Redford - Dorsey
WATER SOURCE North Sea
FUEL SOURCE Fina

RUN NO.	SIZE	MAKE	TYPE	SERIAL NO.	JETS - 32nds Reg. R or RO 1	2	3	DEPTH OUT	FEET	HOURS	FEET PER HOUR	CUM. HOURS	WT. 1000 LBS.	R.P.M.	PUMP PRESS.	PUMP NO 1 Liner	PUMP NO 1 SPM	PUMP NO. 2 Liner	PUMP NO. 2 SPM	MUD PROPERTIES Wt.	W.L.	F.V.	P.V.	Y.P.	Ver. Dev.	Dull. Cond. 1/4 1/8 T	B	G		Date
18	8 1/2	Sec	H7wJ	805240	11	11	10	10445	70	8 1/2	8.25	209	50	55	3000	6 3/4	43	6 3/4		12.2	6	36				6	8	I	Broken Teeth	
19	8 1/2	HTCO	X-V	45272	11	11	11	10578	133	10	13.3	219	50	55	3000	6 3/4	43	6 3/4		12.1	6	38				2	2	I	Broken Teeth	
20	8 1/2	HTCO	X-V	45271	11	11	11	10795	217	15 1/2	14	234.5	50	55	3000	6 3/4	42	6 3/4		12.3	6	37				5	8	I	Broken Teeth	
21	8 1/2	HTCO	X-V	60629	11	11	11	10920	125	12 1/2	10	247	50	60	3000	6 3/4	43	6 3/4		12	9	47				5	7	I	Broken Teeth	
22	8 1/2	HTCO	X-V	60630	11	11	11	11057	137	12	11.4	259	55	70	3000	6 3/4	42	6 3/4		12	9.2	38				5	7	I	Broken Teeth	5/18/68
23	8 1/2	HTCO	X-C	58372	11	11	11	11181	124	13	9.55	272	55	70	3000	6 3/4	42	6 3/4		12	6	48			2°	5	6	I	Broken Teeth	
24	8 1/2	HTCO	X-V	58246	11	11	11	11254	73	11 1/2	6.35	283 1/2	55	70	3000	6 3/4	44	6 3/4		12	6	43				5	3	I	Broken Teeth	
25	8 1/2	Sec	M4NGJ	801134	10	10	12	11339	85	10 1/2	8.1	294	55	70	3000	6 3/4	44	6 3/4		12	6	53			5°	7	7	I	B.T. & Cones split	
26	8 1/2	HTCO	X-C	58374	11	11	11	11400	61	11 1/2	5.3	305 1/2	55	70	3000	6 3/4		6 3/4	41	12.1	11	49				3	6	I	Broken Teeth	
27	8 1/2	Sec	M4NJ	947284	11	11	11	11468	68	11 1/2	5.9	317	50	60	3000	6 3/4	41	6 3/4		11.9	8.4	39			4.5°	5	4	I	Broken Teeth	
28	8 1/2	Sec	S6J	945045	10	10	10	11566	98	12	8.2	329	30/42	35/60	3000	6 3/4	39	6 3/4		12.2	9.4	65				3	5	I	Broken Teeth	
29	8 1/2	Sec	S4GJ	945418	10	10	10	11615	49	9 1/2	5.15	338 1/2	39/42	35/70	3000	6 3/4	42	6 3/4		12	8	46				7	4	I	Broken Teeth	
30	8 1/2	HTCO	X-V	UK45273	10	10	10	11700	85	10	8.5	348 1/2	58	75	3000	6 3/4	42	6 3/4		12	7.6	44				4	7	I	Broken Teeth	
31	8 1/2	HTCO	X-V	UK45274	10	10	10	11750	50	8 1/2	5.9	357	58	40/70	3000	6 3/4		6 3/4	42	12.1	7.8	40				6	4	I	Broken Teeth	
32	8 1/2	HTCO	X-55R	XM-696	10	10	10	11922	172	37	4.64	394	55	35	2500	6 3/4	37	6 3/4		12	8	39				1	1	I	Broken inserts	
33	8 1/2	HTCO	X-55R	XM695	11	11	11	12036	114	22	5.18	416	55	38	2600	6 3/4	38	6 3/4		12	8	41				8	8	I	B/O Locked	
34	8 1/2	Sec	M4LGJ	945849	11	11	11	12063	27	5 1/2	4.91	421 1/2	50	50	3000	6 3/4	38	6 3/4		12	8	41				6	3	I		
35	8 7/16	Hycog	PC7IR	8486	Diamond			12165	102	20 1/2	4.96	442	20	150	1700	6 3/4	48	6 3/4		11.9	8	38				1	X	I		
36	8 1/2	HTCO	XC	58625	11	11	11	12232	67	10	6.7	452	50	50	3000	6 3/4	48	6 3/4		11.9	8	41				3	3	I		
37	8 1/2	Sec	W7GJ	945634	11	11	11	12277	45	8 1/2	5.3	460 1/2	50	50	3000	6 3/4	43	6 3/4		12	8	42				7	4	I		
RR 35	8 7/16	Hycog	PC7IR	8486	Diamond			12638	361	21 1/2	16.81	482	20	150	1900	6 3/4	45	6 3/4		12.2	6.6	40				6	X	I		
38	8 1/2	Sec	M4LGJ	945789	11	11	11	13000	362	8 1/2	42.60	490 1/2	50	60	3000	6 3/4	43	6 3/4		12	7	45				1	2	I	Salt	5/19/68
																													Finished Hole	

PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74003

October 17, 1968

Re: PPCo. 7/11/1X
North Sea Area
Norway

Mr. W. W. Dunn
Brussels, Belgium

Attached, for your information and file, is copy of report dated October 9, 1968, prepared by J. B. Marr concerning the reservoir and accumulation continuity and/or discontinuity within the captioned well as determined by pressure data from the well.

L. M. Rickards

LMR:lh
Attach.

cc - Messrs. T. J. Jobin (w/attach.)
Ralph L. Young (w/attach.

October 9, 1968

PPCo. 7/11/1X, North Sea Area, Norway reservoir and accumulation continuity and/or discontinuity within the well as determined by pressure data from the well.

Mr. O. D. Thomas
International Dept.

Attn: Mr. L. M. Rickards (2)
Mr. R. L. Young

OBJECTIVE

Our objective is to identify continuity or discontinuity between the hydrocarbon accumulations tested in the 7/11/1X and define the hydrocarbon-water contacts if possible. It is also our objective to identify and evaluate any abnormal formation pressures encountered.

CONCLUSIONS

1. Three separate hydrocarbon accumulations on an abnormal formation pressure gradient were tested in the subject well (see attached graph).

   The first accumulation was tested by DST #4, perforations -9445' to -9587' datum, and DST #5, perforations -9350' to -9365' datum. Although accumulation continuity may exist between these two intervals there is now a datum pressure difference from the original p_f of DST #4 of about 48 psi. The second accumulation, perforations -9680' to -9710' datum, is separated from the first accumulation by a datum pressure difference of approximately 343 psi. The third and lowest accumulation, perforations -10,085' to -10,108' datum, is separated from the second accumulation by a datum-pressure difference of approximately 449 psi.

2. Abnormally high formation pressures were measured in the subject well. They range from 5326 psi at 9564' depth, ∇p_f = .558 psi/ft. to 6177 psi @ 10,178' depth, ∇p_f = .607 psi/ft. Normal formation pressure is exceeded by approximately 1216 psi to 1831 psi respectively. See attached P-D plot. The top of the abnormally pressured section is not discernible from these data.

3. Reservoir pressure depletion is indicated to have occurred in the top pay zone during DSTs #4 and #5. The formation pressure in this zone declined from an ISIP of 5326 psi to a FSIP of 5244 psi during DST #4, and declined from 5266 psi (ISIP) to 5192 (FSIP) during DST #5. It is possible that the 5266 psi ISIP from DST #5 was influenced by the pressure depletion indicated in the zone tested by DST #4. There is still a 34 psi datum pressure discrepancy which must be explained before accumulation continuity between these two tests is clearly established.

4. The bottom, most abnormally pressured pay zone, exhibited extremely low permeability. On DST #2 the initial reservoir pressure of this zone was 6177 psi. The final unextrapolated SIP after 7 hours and 20 minutes was only 3013 psi, further suggesting a limited type reservoir. During this test gas volume rate decreased from 1.21 MCFG to 60 MCFGPD. Surface flow pressures declined from 94 psi to 60 psi.

RECOMMENDATIONS

It is recommended that these high quality pressure data from the 7/11/1X be used to help identify accumulation and/or reservoir continuity between the 7/11/1X and the presently testing 7/11/2X.

DISCUSSION AND DATA

The attached pressure-elevation graph was constructed from all useable formation pressure and fluid data presently available from the 7/11/1X well. Non-static formation pressures obtained from DST pressure build-up data were machine extrapolated to static condition. The sub-surface gas gradient of .097 psi/ft. is based on the gas gravity of .704 reported from DST #4.

No water pressure data are available from this well so no attempt could be made to determine gas-water contact elevation.

The general overall quality of the recorded DST data from the 7/11/1X is very good for purposes of pressure-depth elevation. Most of the recorded initial shut-in pressures were static or near static. Some discrepancies were, however, noted on several of the test charts, such as gauge stylus sticking or 'stairstepping' and gauge stylus failing to zero on the pressure baseline.

Accuracy of the formation pressure data obtained from wire line tests Nos. 4 and 5 in the 7/11/1X well are questionable. The recorded IHP's on these tests are 3.9% and 8.55%, respectively, too high when compared to the IHP's calculated from the mud weight reported during the tests. On WLT #4 the SIP build-up was insufficient for reliable extrapolation, requiring a 325 psi (5.7%) extrapolation to the static condition. Formation permeability calculated from this test is less than 0.1 md. WLT #5, which was run within the interval tested by DST #4, recorded a static formation pressure of 5700 psi @ -9528'. This is approximately 370 psi higher than the static reservoir pressure adjusted to the same datum recorded by DST #4. When reduced by the indicated mud check error of 8.55%, the formation pressure recorded by WLT #5 is about 120 psi less than that recorded by DST #4. Corrected in this manner, WLT #5 more closely approximates what is indicated to be the true static reservoir pressure of the tested interval.

J B Marr

J. B. Marr
254 FPB, Ext. 7292

JBM:bk
Attachms.
cc w/attachms. H. M. Barrett - O. K. Bodine
A. Haig - SPG Files

PRESSURE – DATUM GRAPH

DATE:

P.P. Co. 7-11-IX
North Sea Area - Norway
Elev. (K.B.) 90'