DRILLING PROGRAM
MOBIL EXPLORATION NORWAY INC.
BLOCK 33/12-2

Location Coordinates:		N. Lat. 61° 13' 34" N
		E. Long. 01° 51' 24" E
		Shotpoint 160, Line MNG 30
KBE:		85' (estimated)
Water Depth:		475' (approximately)
Proposed Total Depth:		15,000'
Anticipated Starting Date:		June, 1974
Contractors:		
Rig:		"Norskald"
Electric Logging:		Schlumberger
Cementing & DST Service		Ad Hoc
Mud Logging:		Exploration Logging Ltd.
Mud Service:		IMCO
Marine Service:		Grieg Offshore Marine
		M/V "Ibis 1" and M/V "Ibis 2"
Location Service:		Decca
Well Testing:		Otis
Diving Service:		Comex
Sub-sea System:		Cameron
Helicopter:		Helicopter Service A/S
Blow Out Preventers:	18 3/4":	4 Cameron Rams, API 10,000
		2 Hydril, API 5,000
	Diverter:	Vetco 21"
	Manifolds:	Kill, API 10,000
		Choke, API 10,000 above Chokes, API 5,000 below.

Confidential Information

All Mobil and Contractor personnel are cautioned that any information about the activities and results of this operation are confidential and are not to be discussed with other parties. Release of data will be made only with the formal approval of the Mobil Exploration Norway Inc. Management and Petroleum Directorate.

Responsibility

The man immediately responsible for all operations on the rig, in accordance with this program and the drilling contract, will be the Mobil designated Drilling Supervisor, who will be aboard and in charge at all times. He will be advised by a Well Site Geologist and report to the Drilling Superintendent. The Superintendent will report to the Mobil Production Manager. Any change in this program will be approved by the Manager.

Well Objectives

As noted in the geological prognosis.

DRILLING AND CASING PROGRAM

Hole Size	Casing Size	Depth, RTE	Length, Ft.	Weight, Lbs/Ft.	Grade	Joint
36"	30"	± 560- 720	160	$1\frac{1}{2}$" Wall	--	Squnch
26"	20"	± 560-1560	1000	94	K-55	Buttres
$17\frac{1}{2}$"	13 3/8"	± 560-2560	2000	72+	N-80	Buttres
	13 3/8"	2560-5000	2440	68	N-80	Buttres
$12\frac{1}{2}$"	9 5/8" ++	± 560-2560	2000	47	N-80	Buttres
	9 5/8"	2560-6800	4240	43.5	N-80	Buttres
	9 5/8"	6800-9200	2400	47	N-80	Buttres
$8\frac{1}{2}$"	7"+++	9000-15000	6000	29	N-80	X-Line

\+ 13 3/8", 72 Lb/ft. Casing to be rabbited before running.

++ Casing strings not designed for collapse. Care will be taken during testing not to let drawdown pressures approach casing collapse ratings.

+++ 7" Liner if and as required.

++++ All casing to be checked by Independent Inspection Service before being run.

Mud Program

Depth Interval	Hole Size	Mud Type	Weight	Funnel Vis/Sec	APT Fluid Loss, cc.
560- 720	36"	Sea Water Spot gel mud before running pipe			
720- 1.560	26"	Sea Water spot gel mud before running casing			
1540- 5.000	$17\frac{1}{2}$"	Sea Water Gel-FCL CMC	10-11	40-50	15 at 5.000+
5000- 9.200	12 1/4"	Sea Water Gel-FCL CMC	10-13.5++	40-50	3-5
9200-15.000	$8\frac{1}{2}$"	Sea Water Gel-FCL CMC	13.5-?	40-50	3-5

\+ . Water loss figure apply to condition of mud immediately before running 13 3/8" casing and may be lowered if hole conditions warrant. Mud weight may be lowered if no gas shows are encountered.

++ Mud to be 13.5 PPG below 7.500 Ft., .

Hole Deviation

The hole will be kept as straight as practical through the use of stabilizers. No deviation problems are anticipated. Deviation checks will be made at each bit change or at 500 ft. intervals, whichever is less. Additional or fewer surveys may be made at the discretion of the Drilling Supervisor.
Dog leg severity should be limited to 1° per 100 ft.

Well Control Procedure

The Drilling Supervisor will be responsible for well controll procedures. Mobil's Blow-Out Prevention Rig Guide for Floating Rigs will be followed.

Oil Spill Pollution Control

The Drilling Supervisor is responsible for Oil Spill Pollution Control procedures and drills aboard the rig. The primary control measure for small oil spills will be the use of dispersants. Mobil's Manual on Oil Spill Control and API publication No. 4024, Systems Study of Oil Spill Clean-Up Procedures, will be used as guides and expert advice will be immediately solicited in case of a disaster situation.

Well Evaluation Program

Sample Logging

A mud logging unit will be aboard the rig. Exploration Logging (U.K.) Ltd. personnel will record normal mud log information and collect cutting samples as directed by the well site geologist.

Coring

Coring will be limited to the evaluation of significant reservoir/oil shows. Sidewall cores may be taken.

Testing

A detailed testing program will be prepared when the well reaches proposed depth.

Electric Logging

As noted in geological program.

Operational Sequence

1. The rig will be towed to location and the anchors run. All anchors will be run out 3,000 feet or more. The rig will be positioned with a heading of 315° true. After anchors out, moorings will be tested to 400,000 lbs. After satisfactory mooring test, approximately 200,000 lbs tension will be held on all moorings.

2. Run 26" bit on 36" hole opener to sea bed, drill 36" hole with sea water to 160 feet, sea bed penetration. Wipe hole, spot viscous mud in hole, POH. Bit weight while drilling 36" hole should be kept to minimum. Totcos should be taken after 20' sea bed penetration, after 50', after 100' penetration and at total depth. (160 feet penetration).

3. Run 30" conductor with permanent guide base and 30" housing and stab into hole. Leave bottom of guide base ± 5 feet above sea bed. Cement with 500 sax Class "B", followed by 500 sax Class "B" with 2 per cent Calcium Chloride. Regan Level Indicator will be installed on camera side of guide structure. Level Indicator to be checked before and after cementing.

4. Run 26" bit, drill out 30" shoe, drill ahead with sea water to 1,580 feet-RTE (1,000 feet sea bed penetration). Slug hole with gel while drilling if necessary Spot gel mud in hole before pulling out to run 20". No welding or open flares of any kind will be permitted while operating with open hole unprotected by BOPS, also crew will be on alert to move rig off location on short notice should shallow gas be encountered.

5. Run 20" casing on 18 3/4", API 10,000, housing, latch into 30" housing, cement with 1,000 sax 8 per cent gel Class "B" cement, followed by 1,000 sax neat Class "B".

6. Nipple-up 18 3/4" API 10,000 BOP stack and 21" riser. Test rams and wing valves to 7,500 psi, and Hydril to 2,000 psi. Test choke and kill lines above wing valves to 7,500 psi. Test all surface manifold valves to 10,000 psi. All tests to be made with water.

7. Drill out 20" float and shoe, and 5 feet of formation. Test formation to 12.0 ppg mud equivalent or establish formation bleed-off pressure, whichever is the less.

8. Drill 17 ½" hole to 5,000 feet. Log as directed by geologist. Conduct weekly pressure test of BOPs as in 6 above. Conduct frequent pit drills, and "hang-off" drills. "Hang-off" drills to be conducted without closing Hydril. Log as directed by geologist.

9. Condition hole for 13 3/8" casing; position blade stabilizer immediately above bit during conditioning trip or trips. Run 13 3/8" casing on 13 5/8" x 18 3/4" API 10,000 Hanger. Cement 13 3/8" to 1.500 feet above shoe joint with 1,400 sax neat Class "B" cement. Activate Hanger seals and test.

10. Test BOPs as in 6, above. Conduct weekly pressure tests thereafter.

11. Drill out with 12 1/4" bit, make 5 feet of hole. Pressure test formation to 15.0 ppg mud equivalent, or formation bleed-off, whichever is the less.

12. Drill to about 9,200 feet (150 feet penetration of Triassic) with 12 1/4" bit. Conduct frequent pit drills and "hang-off" drills. Check drilling breaks for flow. Log as directed by geologist.

13. Condition hole and run 9 5/8" casing on 9 5/8" x 18 3/4" hanger. Cement to bring neat cement about 1,000 feet above Jurassic with 400 sacks 6 % gel cement lead-in slurry. Activate seals and test same. Re-test BOPs.

14. Test 9 5/8" casing to 3,000 psi. Drill 5 feet of new hole, test formation to 14.5 ppg mud equivalent or formation bleed-off, whichever is the less.

15. Drill 8 ½" hole to total depth of 15,000 feet. Check all drilling breaks for flow. Log as directed by geologist. Run 7" liner if prospects in 8 ½" hole merit testing.

16. Test as directed by Management.

17. Plug and abandon or plug and suspend, as directed by Management.

CASING CEMENT CALCULATIONS

1. 30" conductor in 36" hole (no allowance for washout)

	Bbls/ft	Cu. Ft/ft.
30" x 36" annular volume	0.38467	2.15988
30" x $1\frac{1}{2}$" wall casing volume	0.7082	3.9761
30" x 1 " wall casing volume	0.7616	4.2761

Cement Data Using freshwater	Neat Class "B"	Class "B" + 2% $CaCl_2$
Gallons water per sack	5.2	5.2
Slurry weight, ppg.	15.6	15.6
Yield, cu. ft. per sack	1.18	1.18
Thickening time, hr: min	3:36+	1:30+
Compressive strenght, psi, 8 hrs. & 60° F	20	300
12 hrs. & 60° F	80	555

Casing cemented full length to seabed

Annular volume = 0.38467 x 160 = 61.55 bbls
20' plug in shoe joint= 0.7082 x 20 = 14.16 bbls
Total volume 75.71 bbls

75.71 bbls x 5.62 ft^3/bbl ÷ 1.18 ft^3/sk = 360.58 sacks.
Excess of 200% = 1082 sacks
Use 500 sacks neat Class "B", tailed in with 500 sacks Class "B" + 2% calcium chloride.
Displacement = 140 x 0.7082 = 99.15 bbls + D.P. volume.

2. 20" casing in 26" hole (no allowance for washout)

	Bbls/ft	Cu. Ft/ft.
20" x 26" annular volume	0.2681	1.5053
20" x 94 ppf casing volume	0.3552	1.9947

Cement Data Using fresh water	Neat Class "B"	Class "B" + 8% Gel
Gallons water per sack	5.2	10.4
Slurry weight, ppg	15.6	13.1

	Neat Class "B"	Class "B" + 8% Gel
Yield, cu. ft. per sack	1.18	1.92
Thickening time, hr:min	3:36+	4:00+
Compressive strength, psi, 12 hrs. & 60° F	80	15
24 hrs. & 60° F	615	60

Casing cemented full length to seabed.

Annular volume = 0.2681 x 1000 = 268.1 bbls.
100' plug in casing = 0.3552 x 100 = 35.5 bbls.
Total volume = 303.6 bbls.
(303.6 bbls x 5.62 ft^3/bbl) + 80% excess = 3071.2 cu.ft.

Use

(Lead) 1000 sacks 8% gel cement = 1920 cu. ft.
(tail in) 1000 sacks neat cement = 1180 cu. ft.
Total 3100 cu. ft.

Displacement = 900 x 0.3552 = 319.68 bbls + D.P. volume.

3. 13 3/8" casing in 17½" hole (no allowance for washout)

	Bbls/ft.	Cu.ft/ft.
13 3/8" x 17½" annular volume	0.1237	0.6946
13 3/8" x 72 ppf casing volume	0.1480	0.8314
13 3/8" x 68 ppf casing volume	0.1497	0.8406

Cement Data Using fresh water	Neat Class "B"	Class "B" + 8% gel
Gallons water per sack	5.2	10.4
Slurry weight, ppg	15.6	13.1
Yield, cu. ft. per sack	1.18	1.92
Thickening time, hr:min	2:25	1:50
Compressive strength, psi, 12 hrs. & 120° F	1905	310
24 hrs. & 120° F	3595	610

Casing cemented to 1500' above shoe

Annular volume = 0.1237 x 1500 = 185.55 bbls.
100' plug in casing = 0.1497 x 100 = 14.97 bbls.
Total volume 200.52 bbls.

(200.52 bbls. x 5.62 ft^3/bbl) + 50 % excess = 1690.38 cu. ft.

Use

1400 sacks neat Class "B" cement = 1652 cu. ft.

Displacement = 2340 x 0.1497 + 2000 x 0.1480

= 350.3 + 296.0 = 646.3 bbls + D.P. volume.

4. 9 5/8" casing in 12 1/4" hole (no allowance for washout)

	Bbls/ft.	Cu. ft/ft.
9 5/8" x 13 3/8" annular volume	0.0581	0.3354
9 5/8" x 12 1/4" annular volume	0.0558	0.3132
9 5/8" x 47 ppf casing volume	0.0732	0.4110
9 5/8" x 43.5 ppf casing volume	0.0744	0.4180

Cement Data Using fresh water	Class "G" + 6 % Gel + 0.5 % HR7	Neat Class "G"	HR-4 Retarded Class "G" 0.2 %	0.3 %
Gallons water per sack	8.9	5.2	5.2	5.2
Slurry weight, ppg.	13.6	15.6	15.6	15.6
Yield, cu. ft. per sack	1.67	1.18	1.18	1.18
Thickening time, hr:min	3:00+	1:54	3:09	4:00
Compressive strength, psi,	8 hrs. & 160°F	2185		
	12 hrs. & 160°F	3055		
	24 hrs. & 160°F	5925	5185	5200

Casing to be cemented in such a manner to place cement across any hydrocarbon bearing formations penetrated. Due to the possibility of an extremely long cement column, it may require the use of staging collars in the casing string above the Jurassic section (7600'). A Halliburton DV stage collar should be on board. Decision to employ this collar will be made following log interpretation.

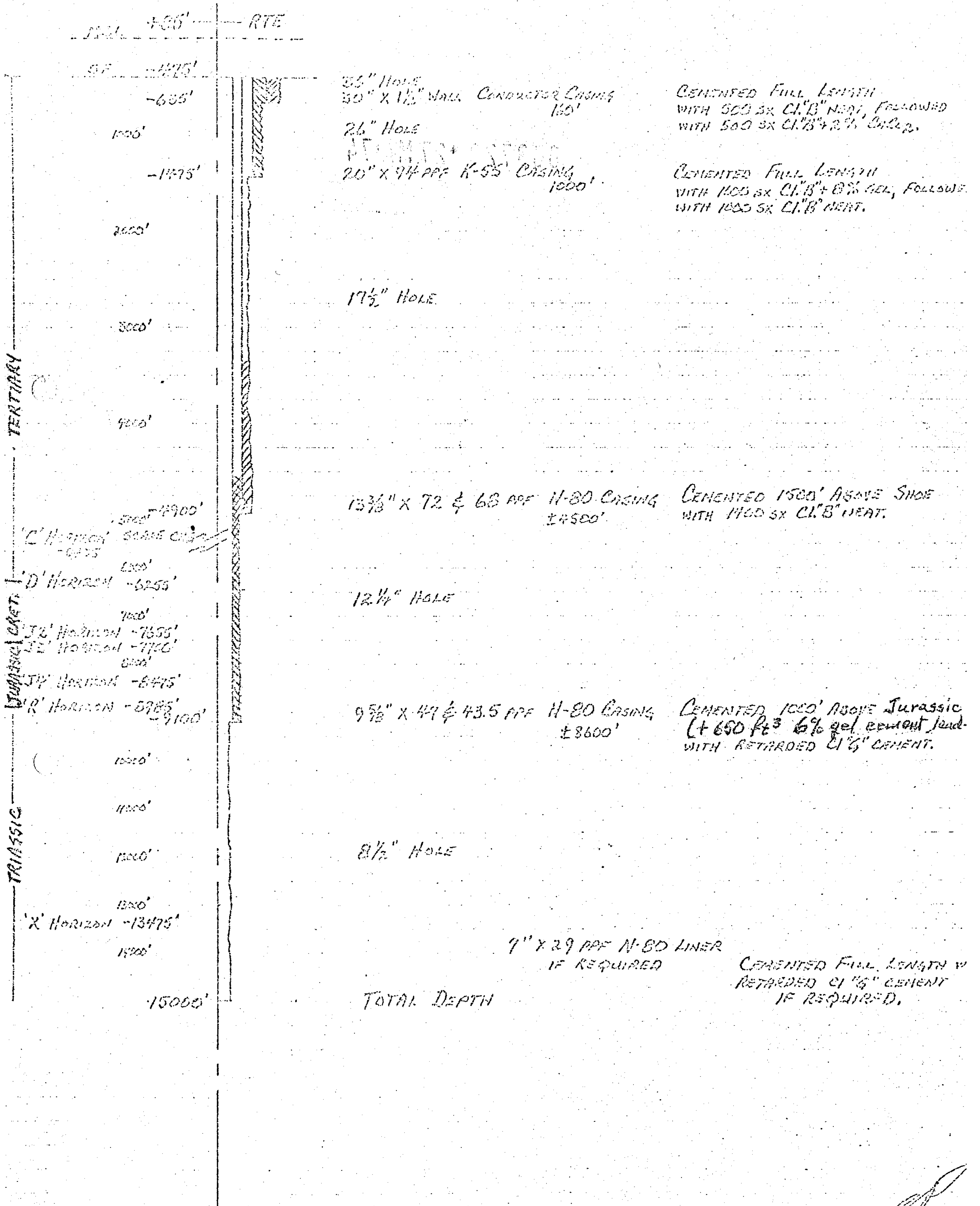
Anticipated cement requirements = 1.500 sacks Class "G".

It is recommended that a 400 sack 6 % gel retarded Class "G" lead in cement be used as a scouring fluid. Displacement rates of 15 BPM should be utilized after cement at casing shoe.

1000 sx CI "G" retarded tail in, - fill up above 6600' (50 % excess included. Lead in slurry should come into 13 3/8" shoe).

[illegible] EXPLORATION NORWAY INC.

WELL Nº 33/12-2



Revised 5-24-7?