

DRILLING PROGRAM

MOBIL EXPLORATION NORWAY INC.

BLOCK 33/9-2

STATENS OLJEDIREKTORAT	
005511 * 30 JUL 74	
Location Coordinates:	
Indoles oil	Subs- beh.
Go. 43- 117.	nett

Ny loc
 (N. Lat. 61° 19' 03" N
 E. Long. 01° 54' 17" E)

KBE:

Shotpoint 340, Line MNG 20
86' (estimated)

Water Depth:

474' (approximately)

Proposed Total Depth:

10,200'

Anticipated Starting Date:

15. August, 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.

2790
8060

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

<u>Hole Size</u>	<u>Casing Size</u>	<u>Depth RTE</u>	<u>Length ft.</u>	<u>Weight lbs/ft.</u>	<u>Grade</u>	<u>Joint Type</u>
36	30	± 560- 720	160	1 ½" wall	-	Squnch
26	20	± 560-1560	1000	94	K-55	VETCO 'L'
xx 17 ½	13 3/8	± 560-3060	2500	68	N-80	Buttress
12 1/4	9 5/8	± 560-6060	5500	40	N-80	8 rd. LTC
8 ½	7 xxx	5850-8550	2700	29	N-80	X-Line

xx Drill 12 1/4" hole below 20" casing shoe. If hole problems are not encountered drill ahead to ± 6000 feet and set 9 5/8" casing. If hole problems are encountered, drill 17 ½" hole to ± 3060 feet and set 13 3/8" casing, only if necessary.

xxx 7" lines set for evaluation purpose only, after plugging back from TD to ± 8550 feet.

ALL CASING TO BE CHECKED BY INDEPENDENT INSPECTION SERVICE.

Mud Program

<u>Depth Interval</u>	<u>Hole Size</u>	<u>Mud Type</u>	<u>Weight</u>	<u>Funnel Vis/Sec</u>	<u>APY Fluid Loss, cc.</u>
560 - 720	36"	Sea Water. Spot gel mud before running pipe			
720 - 1560	26"	Sea Water. Spot gel mud before running casing			
1560 - 6060	12 1/4"	Sea Water Gel-FCL CMC	10-11	40-50	15 at 5 000+
6060- 10200	8 1/2"	Sea Water Gel-FCL CMC	10-13.5++	40-50	3-5

+ Water loss figure apply to condition of mud immediately before running 9 5/8" 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 control 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', 50', and 100' sea bed penetration and a 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 \pm 5 feet above sea bed. Cement with 400 sacks Class "G", followed by 500 sacks Class "G" 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 (1000 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 BOP's. All crews 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 1000 sacks 8 per cent gel Class "G" cement, followed by 1000 sacks neat Class "G".
6. Nipple-up 18 3/4" API 10,000 BOP stack and 21" riser. Test rams and wing valves to 7,500 psi. Test all surface manifold valves to 10,000 psi. All tests to be made with water.

*Has mud
diverter?
21" Netw.
mud hole
mud 77 1/2"
undercom
til 20"*

7. Drill out 20" float and shoe with 12 1/4" bit and 5 feet of formation. Test formation to 12.0 ppg mud equivalent or establish formation bleed-off pressure, whichever is the less.

Note: See alternate 1, if hole problems encountered.

8. Drill 12 1/4" hole to 6,080 feet. Log as directed by geologist. Conduct weekly pressure test of BOPs as in 6 above using test plug. Conduct frequent pit drills, and "hang-off" drills. "Hang-off" drills to be conducted without closing Hydril.
9. Condition hole for 9 5/8" casing; position blade stabilizer immediately above bit during conditioning trip or trips. Run 9 5/8" casing on 9 5/8" x 18 3/4" API 10,000 Hanger. Cement 9 5/8" to 1,500 feet above shoe joint with 550 sacks neat Class "G" cement. Activate Hanger seals and test.
10. Test BOPs as in 6, above. Conduct weekly pressure tests thereafter.
11. Drill out with 8 1/2" bit, make 5 feet of hole. Pressure test formation to 14.0 ppg mud equivalent, or formation bleed-off, whichever is the less.
12. Drill to approximately 10,200 feet (minimum penetration of Triassic) with 8 1/2" bit. Conduct frequent pit drills and "hang-off" drills. Check drilling breaks for flow. Log as directed by geologist.
13. Plug back open hole to \pm 8500 feet with neat Class "G" cement as required.
14. Condition hole and run 7" casing liner on 9 5/8" x 7" liner hanger with tie back sleeve. Cement full length of liner with 375 sacks Class "G" cement + 0,3% HR. 4 + 0,5% CFR-2. Re-test BOPs as in 6, above.
15. Test 9 5/8" casing to 4,000 psi. Drill out cement in 9 5/8" casing and 7" liner.
16. Test as directed by Management.

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

Alternate 1:

If hole problems are encountered during the drilling of the 12 1/4" hole, ream out float and shoe with 17 1/2" bit and drill to \pm 3080 feet. Condition hole for 13 3/8" casing. Log as directed by geologist. Run 13 3/8" casing on 13 3/8" x 18 3/4" API 10,000 hanger. Cement to 1500 feet above shoe joint with 1400 sacks neat class "G" cement.

CASING CEMENT CALCULATIONS

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

	<u>Bbls/ft</u>	<u>Cu. Ft/ft.</u>
30" x 36" annular volume	0.38467	2.15988
30" x 1½" wall casing volume	0.7082	3.9761
30" x 1" wall casing volume	0.7616	4.2761
 <u>Cement Data</u>	 Neat	 Class "G"
<u>Using freshwater</u>	<u>Class "G"</u>	<u>+ 2 % CaCl₂</u>
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	4:30+	1:30+
Compressive strength psi, 8 hrs. & 60° F	NS	375
12 hrs. & 60° F	75	695

Casing cemented full length to seabed

Annular volume = 0.38467 x 160 = 61.55 bbls

20' plug in shoe joint = 0.7616 x 20 = 15.23 bbls

Total volume 76.78 bbls

76.78 bbls x 5.62 ft³/bbl ÷ 1.18 ft³/sk = 365.68 sacks.

Excess of 150 % = 914 sacks.

Use

400 sacks neat Class "G", tailed in with 500 sacks Class "G" + 2 % calcium chloride.

Displacement = 140 x 0.7082 = 99.15 bbls + D.P. volume.

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

	<u>Bbls/ft</u>	<u>Cu. Ft/ft.</u>
20" x 26" annular volume	0.2681	1.5053
20" x 94 ppg casing volume	0.3552	1.9947
 <u>Cement Data</u>	 Neat	 Class "G"
<u>Using fresh water</u>	<u>Class "G"</u>	<u>+ 8 % Gel</u>
Gallons water per sack	5.2	10.4
Slurry weight, ppg	15.6	13.1

	Neat Class "G"	Class "G" + 8 % Gel
Yield, cu. ft. per sack	1.18	1.92
Thickening time, hr:min	4:30+	4:00+
Compressive strength, psi, 12 hrs. & 60°F	75	
24 hrs. & 60°F	495	45

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 ft³/bbl) + 80 % excess = 3071.2 cu.ft.

Use

(Lead) 1000 sacks 8 % gel cement = 1920 cu.ft.

(tail in) 1000 sacks neat "G" 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 17 1/2" hole (no allowance for washout)

	<u>Bbls/ft.</u>	<u>Cu.ft/ft.</u>
13 3/8" x 17 1/2" annular volume	0.1237	0.6946
13 3/8" x 68 ppf casing volume	0.1497	0.8406

Cement Data

Using fresh water

	Neat Class "G"	Class "G" + 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	1:30	4:00+
Compressive strength, psi, 12 hrs. & 100°F	1150	
24 hrs. & 100°F	2300	375

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

$(200.52 \text{ bbls.} \times 5.62 \text{ ft}^3/\text{bbl}) + 50 \% \text{ excess} = 1690.38 \text{ cu.ft.}$

Use

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

Displacement = $2900 \times 0.1497 = 434.13 \text{ bbls} + \text{D.P. volume}$

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

	<u>Bbls/ft.</u>	<u>Cu. ft/ft.</u>
9 5/8" x 12 1/4" annular volume	0.0558	0.3132
9 5/8" x 40 ppf casing volume	0.0758	0.4257

Cement Data

Using fresh water

	Neat <u>Class "G"</u>	HR-4 Retarded	
		<u>Class "G"</u>	
		<u>0.2 %</u>	<u>0.3 %</u>
Gallons water per sack	5.2	5.2	5.2
Slurry weight, ppg.	15.6	15.6	15.6
Yield, cu.ft. per sack	1.18	1.18	1.18
Thickening time, hr:min	2:35	3:00+	4:00+
Compressive strength, psi, 8 hrs. & 160°F	2525		
	12 hrs. & 160°F	3055	
	24 hrs. & 160°F	5925	5185 5200

Casing cemented to 1500' above shoe

Annular volume = $0.0558 \times 1500 = 83.7 \text{ bbls}$
 100' plug in casing = $0.0758 \times 100 = 7.58 \text{ bbls}$
 Total volume = 91.28 bbls

$(98.2 \text{ bbls} \times 5.62 \text{ ft}^3/\text{bbl}) + 20 \% \text{ excess} = 615.59 \text{ cu.ft.}$

Use

550 sacks neat Class "G" cement = 649 cu.ft.

Displacement = $5400 \times 0.0758 = 409.32 \text{ bbls} + \text{D.P. volume}$

5. 7" casing liner in 8 1/2" hole (no allowance for washout)

	<u>Bbls/ft</u>	<u>Cu.ft/ft.</u>
7" x 8 1/2" annular volume	0.0226	0.1268
7" x 29 ppf casing volume	0.0371	0.2085

Cement Data

Using fresh water

	Neat Class "G"	HR-4 Retarded Class "G"	
		<u>0.2 %</u>	<u>0.3 %</u>
Gallons water per sack	5.2	5.2	5.2
Slurry weight, ppg	15.6	15.6	15.6
Yield, cu.ft. per sack	1.18	1.18	1.18
Thickening time, hr:min	1:48	3:09	4:00
Compressive strength, psi, 8 hrs. and 160°F	2525		
	12 hrs. and 160°F		
	3055		
	24 hrs. and 180°F	4425	3775

Liner cemented full length

Annular volume = 0.0226 x 2700 = 61.02 bbls.
 100' plug in casing = 0.0371 x 100 = 3.71 bbls.
 Total volume = 64.73 bbls.

(64.73 bbls. x 5.62 ft³/bbl) + 20 % excess = 436.54 cu.ft.

Use

375 sacks Class "G" cement + 0.3 % HR-4 + 0.5 % CFR-2 = 442 cu.ft.
 Displacement = 2600 x 0.0226 = 58.76 bbls. + D.P. volume (\pm 5820)

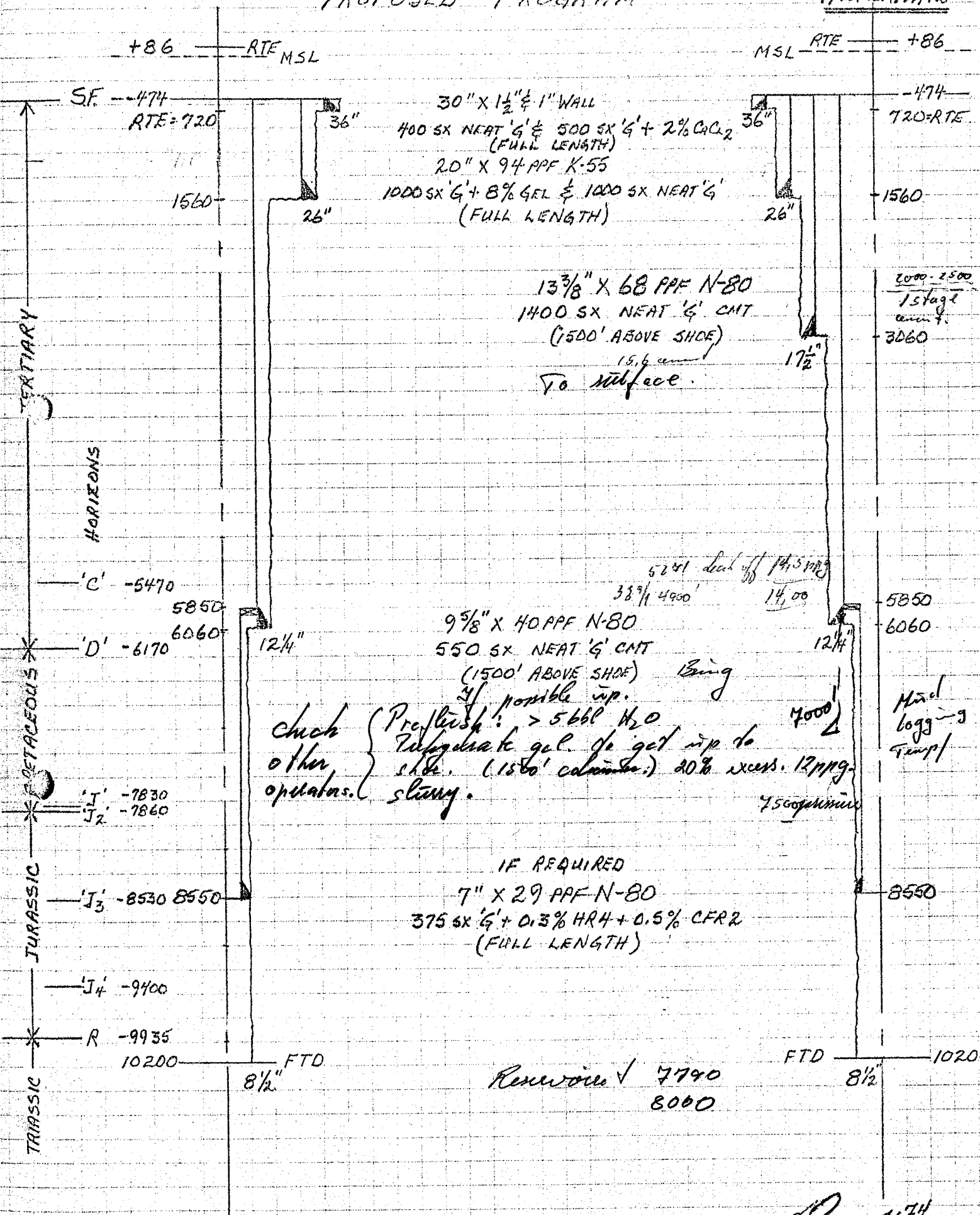
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26.7.74

WELL NO. 33/9-2

PROPOSED PROGRAM

ALTERNATE



TERTIARY

HORIZONS

CRETACEOUS

JURASSIC

TRIASSIC

SF -474
RTE=720

+86 RTE MSL

1560

36"
26"

30" X 1 1/2" X 1" WALL
400 SX NEAT 'G' & 500 SX 'G' + 2% CaCl₂
(FULL LENGTH)
2.0" X 94 PPF K-55
1000 SX 'G' + 8% GEL & 1000 SX NEAT 'G'
(FULL LENGTH)

13 3/8" X 68 PPF N-80
1400 SX NEAT 'G' CMT
(1500' ABOVE SHOE)
15.6 annular
To surface.

36"
26"

-474
720=RTE

MSL RTE +86

1560

2000-2500
1st stage
annular
3260

'C' -5470
5850
'D' -6170
6060

12 1/4"

9 5/8" X 40 PPF N-80
550 SX NEAT 'G' CMT
(1500' ABOVE SHOE)
if possible up.

5251 deal off 14.5 mg
38% 4400 14.00

5850
6060

check { Preflush: > 5660 H₂O
other { Temperature gel. do get up to
operators. slurry. (1500' column) 20% excess. 12 mg
slurry.

'J1' -7830
'J2' -7860

'J3' -8530 8550

IF REQUIRED
7" X 29 PPF N-80
375 SX 'G' + 0.3% HR4 + 0.5% CFR2
(FULL LENGTH)

'J4' -9400

R -9935
10200

8 1/2" FTD

Renovise 7790
8000

8 1/2" FTD 1020

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