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16.5.1975

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[redacted]

Norsk Hydro a.s

DRILLING PROGRAM

Well: 30/7- 1

Rig: Polyglomar Driller

C O N T E N T S

E 4 - Well specification

E 4.1 - General data of well
E 4.2 - Spudding of well
E 4.3 - 36" hole
E 4.4 - 26" hole
E 4.5 - 17½" hole
E 4.6 - 12 1/4 " hole
E 4.7 - 8½" hole

E 5 - Geological specifications

E 5.1 - Sampling plan
E 5.2 - Coring plan
E 5.3 - Electric logging plan
E 5.4 - Mud logging

E 6 - Deviation control

E 7 - Formation testing (DST)

E 8 - Abandonment of well

APPENDIX

Appendix 1 - Casing Calculations
" 2 - Cement Calculations
" 3 - Drilling Mud Specifications
" 4 - Formation Testing (DST)

DRAWING FOLDER

Content:
- Geological prognosis
- Drilling program
- Mooring Line Pattern
- Seismic profile 550.306
- Seismic " 550.402
- Cla Horizon Isocron Map
- C1 " " "
- C2 " " "

SECTION A: INTRODUCTION

This drilling plan is presented to coordinate the planning and supervision of well 30/7-1 of licence 040. It is to be considered as a general drilling guide for supervisory personnel. Modifications and adjustments of the drilling plan may be necessary from time to time, but all changes in the program shall immediately be reported to the Norsk Hydro Operation Manager in charge.

All possible precautions shall be taken to control the possibility of shallow high pressure gas and the possibility of over-pressured lower zones. All blowout prevention practices and training drills are to be performed regardless of the time involved.

Responsible operator: Norsk Hydro a.s
Bygdøy allé 2
Oslo 2
Norway

Teleph.: (02) 56 41 80
Telex : 18350 hydro n

Operating base : Coast Center Base (CCB)
Ågotnes

Teleph.: (05) 21 66 80
Telex : 19911, att.Hydro

SECTION B: GENERAL INFORMATION

B 1 - AUTHORITY

The Drilling Contractors Captain is responsible for the vessel and marine operations in accordance with the regulations of the Norwegian Maritime Directorate and the Rig Superintendant is responsible for all drilling operations on the rig. They have authority in all matters of rig operations, performance and safety and are in charge of the Drilling Contractors personnel. All third party personnel will also act under the instructions of the Rig Superintendent.

The Norsk Hydro Drilling Engineer (Company Supervisor) is responsible to see that the drilling program is performed in a safe and workman-like manner. He will inform the Rig Superintendent of any changes in the drilling program.

Should it become necessary for Company to take over the drilling operation as set forth in the drilling contract, the Company Supervisor then will assume responsibility for all operations.

B 2 - SECURITY

General

All information concerning this drilling operation is confidential. Nothing is to be reported to outsiders without clearance through Company headquarter in Oslo, unless the Company Supervisor is instructed otherwise.

Personnel of all service companies shall be instructed by their supervisors not to reveal any details of the drilling operation unless otherwise instructed by Company.

Electric Logs

Only authorised personnel are permitted to see these logs. The Company Geologist and Drilling Engineer are responsible for their security and deposition.

Ditch Sample and Cores

The Company Geologist is responsible for their security, storage and deposition.

Formation Log

Only authorised personnel are permitted to see the mud logs. The Company Geologist and Drilling Engineer are responsible for their security and deposition.

B 3 - MEASUREMENTS

Note: All reported units of measurement shall be compatible with the units recorded on the rig.

The following general rules will be in force:

1. Maritime time shall be used for all operations.

2. Hole depths shall be recorded from rotary kelly bushing (RKB).

3. All linear measurements shall be in the metric system (m).

4. Diameters of hole, bits, drilling tools, casings, packers, etc. shall be reported in inches (in.).

5. All casing and tubing will be measured on the rig with thread protectors removed.

6. All mud weights will be reported as specific gravity (sp.gr.).

7. Liquid volume will be reported in barrels (BBL).

8. Cement volume will be reported in cubic feet (cu ft).

9. Pressure will be reported in pounds per square inch (psi).

10. Indicator weight will be reported in pounds (lbs).

SECTION C: DRILLING RIG INFORMATION

C 1 - RIG CONTRACTOR

Rasmussen Global Marine Ltd.

Headquarter:

c/o Einar Rasmussen
Markensgt. 13 (P.O. Box 37)
N-4601 Kristiansand S

Teleph.: (042) 21 490
Telex : 11843 (Poly N)

Operation Office:

c/o Global Marine Ltd.
Coast Center Base
5363 Ågotnes

Teleph.: (05/ 21 66 80
Telex : 19911, att.Global Marine

C 2 - GENERAL RIG DATA

Type:	Aker H-3
Name:	Polyglomar Driller
Registration Country:	Norway
Calling Code:	LFKR
Displacement:	19008 LT (drilling) 12529 LT (underway)

Mooring:	8 point chain system for 600 ft water depth Anchors: 8 - 30 000 lbs Chain : 8 - 3 inch dia - 3 000 ft
Power:	Propulsive power: 6800 HP Electric power : 4x1500 kW (AC)
Speed:	9 knots (estimated)
Drilling Draft:	Rig draft - 21.3 m RKB - MSL - 24 m
Air gap:	15.2 m at drilling draft.

C 3 - DRILLING EQUIPMENT

Drawworks:	Continental Emsco C-3 type 11.
Rotary Table:	Continental Emsco T 4950 49½" opening.
Mud Pumps:	2 Continental Emsco FA 1600 7½"x12" triplex 1600 HP
Derrick:	Pyramid 160' with 40'x40' base of Global Marine design.
Motion Compensator:	Western Gear 20'stroke.
Riser:	Regan FC-3, 22"x21"x50' joints with integral 3 1/8 kill and choke lines.
Riser Tensioners:	Western Gear 6 - 80 000 lb units.

C 4 - DRILL PIPE AND DRILL COLLARS

Amount		Size	Grade	Wt/foot	Range	Tool Joint Connection
9	DC	10"	4145H	243	2	NC 70
24	DC	8"	4145H	150	2	NC 56
36	DC	6½"	4145H	92	2	NC 46
15	DC	4 3/4"	4145H	46.8	2	NC 35
1000'	HWDP	5"		50	2	NC 50 x 6½" OD TJ
12000'	DP	5"	E	19.5	2	NC 50 x 6½" OD TJ
5000'	DP	5"	G	19.5	2	NC 50 x 6½" OD TJ
10000'	DP	3½"	E	13.3	2	NC 38 x 4 3/4" OD TJ
7000'	DP	3½"	95	13.3	2	NC 38 x 4 3/4" OD TJ

C 5 - SERVICE CONTRACTORS

Mud Logging:	The Analysts "Total Concept" Well logging services.
Mud:	Milchem Engineering services.
Logging:	Schlumberger Offshore Services. Exclusive - and nonexclusive service.
Testing:	OTIS - Production test equipment Halliburton - BHA and testing services.
Cementing:	Halliburton.
Diving:	Oceaneering Norway A/S.
Supply:	Bugge Supply Ships one anchor handler - 7200 BHP.
	Viking Supply Ships one anchor handler - 7200 BHP.
Stand-by:	One boat in accordance with Oil Directorate spec.
Transport:	Helikopter Service A/S

SECTION D: PRESSURE CONTROL

D 1 - BLOWOUT PREVENTERS

One single 18 3/4" 10 000 psi WP BOP stack with Koomey Controls Model S3K.

For details see BOP and Pressure Control Manual, Section A.

D 2 - WELL PRESSURE CONTROL PROGRAM

D 2.1 Pressure Detection

A well pressure detection program shall commence when drilling out of the 30" casing. The Analysts "Total Concept" well logging services shall be in a continuous operation from this point on.

For further details see BOP and Pressure Control Manual, Section B.

D 2.2 Formation Pressure Test

Formation pressure tests shall be carried out in accordance with the drilling program and will be performed as specified in the BOP and Pressure Control Manual, Section C.

D 2.3 Well Control

All inflow of formation fluids into the well bore shall immediately be acted upon by using one of the procedures as described in the BOP & Pressure Control Manual, Section D. However, strict adherence to procedures in the BOP & Pressure Control Manual does not relieve the responsible personnel from using sound judgement in well control practices. All specified well control training drills shall be carried out.

SECTION E: DRILLING PROGRAM

E 1 - LOCATION

Block 30/7
Production licence No. 040
Preliminary coordinates: Latitude: 60° 29' 28" N
Longitude: 02° 01' 34" E

Rig position to be within a 100 m radius of theoretical location, which is the crossing of seismic lines 550 306 and 550 402.
Expected water depth 104 m.

The drilling rig will have a heading of 290° as shown on the Mooring Line Pattern drawing.

E 2 - GEOLOGICAL PROGNOSIS

This well is programmed to penetrate the formations down to the top of Cretaceous, which is at a depth of 2500 m MSL.

The primary objective is a sand development of Paleocene age. At this level the seismic records show anomalies similar to those seen in the Frigg area, suggesting the presence of gas, (see section WG8, drawing attachment). A large closed structure is present at this level, (see C 1 isochron map, drawing attachment).

Sands in the lower Eocene may present a secondary target, but closure at this level is limited both vertically and horizontally (see Cla map), and no anomalies suggesting the presence of gas are to be seen on the seismic.

No reservoir potential is expected in the upper Cretaceous at this level.

Predicted depths are as follows:

Horizon	Depth sub-sea (m)	RKB (m)
Sea bed	104	128
Top Oligocene	700	724
Top Eocene	1100	1124
Cla seismic marker	~~1720~~ 1627	~~1744~~ 1650
Cl " "	~~1900~~ 1890	~~1924~~ 1913
Base Paleocene Sand	~~2050~~ 2040	~~2074~~ 2063
Top Cretaceous	2450	2474

For further details, see attached Geological Prognosis Sheet.

E 3 - WELL CONTROL PROGNOSIS

E 3.1 Shallow Gas

Information from wells drilled in this part of the North Sea indicates the possibility of drilling into shallow gas pockets. This expected shallow gas requires the use of a diverter while drilling the 26" and 17½" hole. Ref. Appendix

E 3.2 Abnormal Pressure

Abnormal pressure is not expected in this well to the programmed TD (2650 meters) in the Upper Cretaceous section. Abnormal pressure have not occured in nearby wells and there is no evidence of abnormal pressures in the seismic cross section.

E 3.3 Anticipated Drilling Problems

There are two drilling problems that may be experienced in the well.

These are: the possibility of encountering boulders in the first 100 meters below the sea floor, and the possibility of drilling gumbo in the Upper and Middle Eocene section.

Boulders collect in reworked glacial channels which may be encounted anywhere on the Norwegian Continental Shelf. The hazzard they present is the possibility of knocking cones off the bit or hole opener, or they may fall in on the top of the drilling tools.

Soft, sticky gumbo clay generally is easy to pick out on seismic logs, and though it appears in other areas of block 30/7 it is not seen in the 30/7-1 seismic section. The hazzards presented by drilling gumbo are:

1. Rapid build up of solids in the mud which may block circulation in the annulus and thus break-down of the formation below.

2. Gumbo sticks to the drill collars and forms a wedge above the stabilizers and the bit. This not only impedes the withdrawal of the drill string, but also creates a swabbing condition in the hole Gumbo, if encountered, will be treated in the hole by adding thinning chemicals to the mudstream. Excessive solids will be removed from the mud at the surface by using solids control equipment.

E 4 - WELL SPECIFICATION

E 4.1 General Data of Well

Projected depth 2650 meters, MSL (2674 m RKB)

Distance from RKB to Sea Floor is 128 meters.

E 4.2 Spudding of Well

Prior to spudding the well, the sea-bed will be inspected by divers for adverse conditions, pipelines, cables, debris, etc. The divers will make out an inspection certification.

The exact distance from the sea floor to RKB at drilling draft will be recorded.

A drilling template will be available on the rig ready to run if decided. If the template is run, its position will be checked by using TV and/or divers.

E 4.3 36 in. Hole

Casing Depth

128-163$^{\pm}$ meters RKB.

Drilling Assembly

26" tricone rock bit and 36" hole opener.

Mud

Seawater with returns to sea floor. Use 50 barrel slugs of premixed viscous mud to clean the hole. For drilling mud specifications, see Appendix 3

General Drilling Procedure

Tailor hole depth to casing measurement and overhole for fill. Mud up hole to run casing. Make a check trip.

Casing

3 joints (36$^{\pm}$ meters) 30" OD, 1" wall, 310 lb/ft, grade 2, R3 lap weld casing with Vetco ATD connections. Baker float shoe welded on shoe joint and Cameron conductor housing welded on housing joint. Run casing to place on 5" drill pipe and cement through short drill pipe stinger below running tool. For casing calculations, see Appendix 1.

Cement

1020 sacks Class G cement with 2% calcium chloride mixed with seawater. Average slurry 1.90 sp.gr. (15.8 ppg). This amount of cement allows for an access of 150%. Displace cement in casing to 6 meters above the shoe. Observe returns on sea floor. Wash out in hanger. Recement annulus if no cement returns.

For cement calculations, see Appendix 2.

BOP

Install 22" marine riser with diverter system on 30" casing.

Casing Test

Marine riser stands full of seawater during a 15 minute test.

Shoe Test

Marine riser stands full of seawater after drilling out shoe during a 15 minute test. Spot a cement plug if shoe test fails.

E 4.4 26 in. Hole

Casing Depth

128-311$^{\pm}$ meters RKB.

Drilling Assembly

17½" SMF rock bit and 26" underreamer. Assorted sizes of jet nozzles are furnished.

Mud

Seawater. Use slugs of premixed viscous mud to clean the hole. For drilling mud specifications, see Appendix 3.

General Drilling Procedure

Tailor hole depth to casing measurement and overhole for fill. Mud up hole to run casing. Make a check trip. Circulate out contents of marine riser with seawater and observe for 15 minutes. If level stands full, disconnect riser and observe top of 30" casing for 15 minutes. If O.K. lay riser down.

Casing

15 joints (183^{+} meters) 20" OD, 94 lb/ft, grade X-52, R3, spiral weld casing with Vetco type L connections. Baker float shoe and Cameron housing welded on shoe and housing joints. Run casing to place on drill pipe. Centralizers are available to run as decided. For casing calculations, see Appendix 1.

Cement

500 sacks Class G cement with 12% bentonite and 0,5% HR-7 mixed with seawater, followed by 1325 sacks Class G cement with 2% calcium chloride mixed with seawater. The second portion of the slurry has an average sp.gr. 1.90 (15.8 ppg.). This amount of cement allows for an excess of 120%. Cement 20" casing using Halliburton SSR cementing plug system. Run a drill pipe pup joint above the SSR adapter. Displace top plug to 10 meters above shoe. Required top of cement at sea floor. Observe returns. Wash off in hanger.
For cementing calculations, see Appendix 2.

BOP

Install BOP stack, marine riser and diverter on 20" casing. The blowout preventers are not to be used while drilling the 17½ hole.

BOP Test

Refer BOP and Pressure Control Manual, section A. Blind ram test will be limitted to 1000 psi. After testing BOP's install wear bushing.

Casing Test

Test for 15 minutes at 1000 psi.

Shoe Test

After drilling out casing shoe, close the Hydril and determine the pressure necessary to pump fluid into formation. Stop the pumping and determine the formation holding pressure. The marine riser is to stand full of salt water for a successful test. Recement the casing shoe if required.

E 4.5 17½ in. HOLE

Casing Depth

128-824 meters RKB.

Drilling Assembly

17½" SMF tricone rock bits. Assorted sizes of jet nozzles are furnished. Stabilize drilling assembly to promote vertical hole. Servco sleeve type stabilizer equipment is furnished.

Mud

Seawater and gel. Use premixed viscous mud to flush hole.
For drilling mud specifications, see Appendix 3.

General Drilling Procedure

Tailor hole depth to casing measurement and overhole for fill. Condition hole to log. Make a check trip. After running logs clean out and condition hole to run casing. Make a check trip. Remove wear bushing.

Casing

Approximately 56 joints (690 meters) 13 3/8" OD, 68 lb/ft, K55, R3, BT casing. Baker model G differential fill up float equipment. Provide two shoe joints and tack weld connections below cement collar. Run casing to place on 5" drill pipe (effective string weight 60.530 kg in 1.04 sp.gr. mud). Centralizers are available to run. For casing calculations, see Appendix 1.

Cement

770 sacks Class G cement plus 4% gel mixed 1.69 sp.gr. (14.1 ppg) with seawater followed by 1000 sacks Class G cement neat mixed 1.90 sp.gr (15.8 ppg) with seawater. This amount allows for an excess of 40%. Cement 13 3/8" casing using Halliburton SSR cementing plug system. Run pup joint above the SSR adapter. Top of cement at sea floor. Wash off in hanger with clean seawater the contents of BOP stack and riser until clean.
For cement calculations, see Appendix 2.

BOP

Same installation as before.

BOP Test

Refer BOP and Pressure Control Manual, Section A. Blind ram test will be limitted to 1000 psi. After testing BOP's install wear bushing.

Casing Test

Test for 15 minutes at 1000 psi. Rubber drill pipe for drilling through 13 3/8" casing.

Shoe Test

After drilling out casing shoe, pressure formation and determine formation fracture pressure and formation holding pressure. A successful test will hold a 1.20 sp.gr. fluid column or greater during a 15 minute test. Braden-head squeeze cement if required.

E 4.6 12 1/4 in. HOLE

Casing Depth

128-1714± meters RKB.

Drilling Assembly

12 1/4" tricone rock bits of various suppliers with assorted sizes of jet nozzles are furnished. Stabilize drilling assembly to promote vertical hole. Servco sleave type stabilizer equipment is furnished.

Mud

Milchem lightly dispersed Unical System. Funnel viscosity 50-80 seconds. API water loss 10-12 cc. 1.08 increasing to 1.20 sp.gr. at casing depth (9.0-10.0 ppg). Maximise the use of solids control equipment in this interval. For drilling mud specifications, see Appendix 3.

General Drilling Procedure

Use a minimum amount of sacked weight material when slugging pipe. Tailor hole depth to casing measurement and overhole for fill. Condition mud and make a check trip before logging. After running logs clean out and condition hole to run casing. Make a check trip. Remove wear bushing.

Casing

Approximately 130 joints 1580 meters of 9 5/8" OD, 43.5 lb/ft, N80, BT casing. Baker model G differential fill up float equipment. Provide two shoe joints and tack weld connections below float collar. Run casing to place on 5" drill pipe (effective string weight 86,800 kg in 1.20 sp.gr. mud). Centralizers are available to run. Do not change out rams as Hydril GL preventers afford ample protection.
For casing calculations, see Appendix 1.

Cement

970 sacks Class G cement plus 4% gel and 0.5% CFR-2 mixed 1.69 sp.gr (14.1 ppg) with fresh water followed by 500 sacks Class G cement plus 0.5% CFR-2 mixed 1.90 sp.gr (15.8 ppg) with fresh water. This amount provides for a cement rise to sea floor plus 40% excess. Cement 9 5/8" casing using Halliburton SSR cementing plug system. Run pup joint above SSR adapter. Wash off in hanger using clean seawater the internals of the BOP stack and the riser until clean.
For cement calculations, see Appendix 2.

BOP

Same installation as before.

BOP Test

See BOP and Pressure Control Manual, Section A. Blind ram test will be limitted to 2200 psi. After testing BOP's install wear bushing.

Casing Test

Test for 15 minutes at 2200 psi. Use one casing protector per stand while drilling through 9 5/8" casing.

Shoe Test

After drilling out the casing shoe, pressure the formation and determine the formation fracture pressure and the formation holding pressure. A successful test will hold a 1.26 sp.gr. column or greater during a 15 minute test. Squeeze cement using a Halliburton RTTS tool if required.

E 4.7 8½ in. HOLE

Casing Depth

128-2674$^{\pm}$ meters RKB. Casing depth in shale about 200 meters below chalk in Upper Cretaceous.

Drilling Assembly

8½" tricone bits of various makes and assorted sizes of jet nozzles are furnished.

Mud

Milchem Unical-Ligeon system. Funnel viscosity 45-50 seconds, API water loss 4-6 cc, 1.20-1.26 sp.gr. (10-10.5 ppg).
For drilling mud specifications, see Appendix 3.

General Drilling Procedure

Use a minimum amount of sacked weight material when slugging pipe. Condition hole and make a check trip before logging. After logs, clean out and condition hole to run casing. Make a check trip. Lay down drill string.

Casing

Approximately 208 joints, 2540 m, 7" OD, 29 lb/ft, N-80, R3, BT casing. Baker model G differential fill float equipment. Provide two shoe joints and tack weld connections below cement collar. Run casing to place on 5" drill pipe (effective string weight 91,890 kg in 1.26 sp.gr. mud). Centralizers are available to run. Do not change out rams as Hydril GL preventers afford ample protection.
For casing calculations, see Appendix 1.

Cement

570 sacks Class G cement plus 0.5% CFR-2 and 0.2% HR7 mixed with fresh water to average slurry weight of 1.90 sp.gr. (15.8 ppg). This amount provides for a cement rise 150 m into the 9 5/8" casing plus 20% excess. Cement 7" casing using Halliburton SSR cementing plug system. Run pup joint above SSR adapter. Wash off in hanger using clean seawater the internals of the BOP stack and the riser until clean.
For cement calculations, see Appendix 2.

BOP Test

After cementing 7" casing change out to 3½" rams. If stack is pulled, stump test BOP's before rerunning. Test BOP's in accordance with the BOP Manual, Section A. Blind ram test will be limitted to 4200 psi. After testing BOP's install a wear bushing.

Casing Test

RIH with 6" bit picking up 4 3/4" drill collars and 3½" drill pipe. Clean out to plug on cement collar. Check measurements. Condition mud. Test casing with 4200 psi for 15 minutes. Scrape casing using Baker size 14 Roto-Vert casing scraper dressed with size 14B blocks before running a cement bond log. Block squeeze cement as required.

E 5 - GEOLOGICAL SPECIFICATIONS

E 5.1 Sampling Plan

The frequency of sampling is one each single ($9^{\pm}$ meter interval) from the 30" casing shoe to the 13 3/8" casing depth and three each single ($3^{\pm}$ meter interval) below the 13 3/8" casing to total depth. The Norwegian Petroleum Directorate will be supplied with set of wet and dry samples. Samples will be clearly marked and identified.

In order to obtain the best possible representative bit samples the following guidelines are given:

1. Do not drill faster than the samples can be taken.

2. Circulate the samples of a drilling break after a potential cap rock has been penetrated if recommended by the Company Geologist.

3. Circulate bottoms up before pulling a bit.

4. Circulate after all occurances which could effect proper evaluation below that depth, i.e. spotting oil, lost circulation regained, high trip gas, etc.

E 5.2 Coring Plan

Coring will be done using a Christensen 6 1/4" by 3" by 60 ft Marine Corebarrel, and 8 11/32" by 3" ID type MC - 22 Christensen core bits. This equipment is to be on the rig at all times.

Cores will be taken whenever a significant oil or gas show occurs as requested by the Company Geologist. The Norwegian Petroleum Directorate will be supplied with 1/4 of all recovered cores, packaged and identified. Accompaning the core will be copies of the core description and the core analysis.

E 5.3 Electrical Logging Plan

All electrical logs to be recorded on 1:200 and 1:500 scales.

The following logging runs are programmed.

Run No. 1

Logging program from the 13 3/8" casing depth to the 20" casing shoe:

IES
BHC-GR-CAL
GR log to continue to sea floor.

Run No. 2

Logging program from the 9 5/8" casing depth to the 13 3/8" casing shoe:

IES

BHC-GR-CAL

CNL-FDC

Run No. 3

Logging program from the 7" casing depth to the 9 5/8" casing shoe:

IES

BHC-GR-CAL

HDT

CNL-FDC

ML-MLL (Prox)

DLL - Prox

Other electrical wireline services (FIT, CST and DSC) to be run as required.

E 5.4 Mud Logging

The Analyst mud logging services will be in operation continuously from the time the circulation is established, after setting of the 30" casing, and until the total depth is reached.

A specification of the Analysts' services has been listed in the BOP and Pressure Control Manual, Section B.

E 6 - DEVIATION CONTROL

The hole is to be drilled as a vertical hole by positioning stabilizers in the lower hole drilling assembly and applying bit weight in a manner as to minimise declivity.

Surveys will be taken using a Totco drift indicator dropped prior to pulling a dull bit in the vicinity of the following depths:

Hole size		Survey Depths
17½"	When Drilling out 20" Casing	318 meters RKB
		400 "
		550 "
		700 "
	13 3/8" Casing Depth	830 "
12 1/4"		1000 "
		1150 "
		1300 "
		1450 "
		1600 "
	9 5/8" Casing Depth	1720 "
8½"		1900 "
		2150 "
		2300 "
		2450 "
		2600 "
	at total Depth	2650 "

Should, however, doglegs develop, or hole angle increase, more surveys will be taken as decided. Also if a bit has made as much as 60 meters before becoming dull a survey should be taken.

E 7 - FORMATION TESTING (DST)

Depending on the results from the interpretation of the electrical logs, the mud log, the cores, etc. given formations may be tested. In such case, casing will be run and the test will be conducted in cemented casing.

The testing procedure is presented in Appendix 4.

In case of testing a separate program will be issued when information from the penetrated formations is available.

E 8 - ABANDONMENT OF WELL

The well may be capped for later reentry. A description for temporary abandonment of the well will be issued later. Final abandonment program will be issued before expiration of the temporary abandonment.

APPENDIX 1

Casing Calculation

Well 30/7-1

The casing program has been specified in the enclosed table.

Burst-collapse and tension properties have been tabulated from API Casing specifications.

Each casing string is of the same weight and grade and collapse safety factors are therefore calculated based on the mud weights only. Tension safety factors have been modified to account for the bouancy effect of the specified muds.

CASING DESIGN SUMMARY

Hole		Mud	Casing									
Size	Interval -ft.(RKB)	sp.gr.	Size	Setting depth-ft (sea flor)	Wt lbs/ft	Grade	Effective load, lbs	Burst PSI	Collapse		Tension	
									PSI	Design factor	Load lbs x 1000	Design factor
36"	420-560	1,04	30"	115	310	2	30.409	-	-	-		high
26"	535-1046	1,04	20"	600	94	X 52	48.109	1530	507	1,7	1479	high
17½"	1020-2730	1,04	13 3/8"	2283	68	K 55	132.423	3450	1950	1,7	1069	8,1
12 1/4"	2703-5650	1,20	9 5/8"	5203	43,5	N 80	191.665	6330	3810	1,4	1005	5,2
8½"	5624-8800	1,26	7"	8353	29	N 80	203,358	8160	7020	1,5	746	3,7

Note: Hole interval and casing setting depths are approximate and are listed in feet

APPENDIX 2

Cement Calculations

Well 30/7-1

CEMENT CALCULATIONS
(Well 30/7-1)

1. 30" CASING

Hole Interval:	128 m to 171 m	= 43 m (141 ft)
Casing Interval:	128 m to 163 m	= 35 m (115 ft)
Hole Gage		= 36 in
Top Cement		= to surface
Excess in open hole		= 150%

Slurry Volume:

36" by 30":	2.16 cu ft x 115 ft x 2.5	= 621 cu ft
36" rathole:	7.07 cu ft x 26 ft x 2,5	= 460 " "
In 30" Csg.:	4.28 cu ft x 20	= 86 " "
	Total	= 1167 cu ft

Cement: 1020 sacks Class G + 2% $CaCl_2$ = 1173 cu ft

Slurry Weight	15,8 ppg
Slurry Volume	1,15 cu ft/sack
Water Ratio	5,0 gal/sack
Mixing Water	Sea Water

2. 20" CASING

Hole Interval	163 m to 319 m	= 156 m (512 ft)
Casing Interval	128 m to 311 m	= 183 m (600 ft)
Hole Gage		= 26 in
Top Cement		= to surface
Excess in open hole		= 150%

Slurry Volume:

30" by 20"csg:	2.09 cu ft x 115	= 240 cu ft
26" by 20":	1.50 cu ft x 512 x 2.5	= 1927 " "
26" rathole:	3.69 cu ft x 24 x 2.5	= 240 " "
In 20" Csg:	1.99 cu ft x 20	= 40 " "
	Total	= 2447 cu ft

Cement: 500 sacks Class G + 12%Gel + 5%HR7 = 1095 cu ft

Slurry Weight	12.5 ppg
Slurry Volume	2.19 cu ft/sack
Water Ratio	12.8 gal/sack

Tail in: 2128 sacks Class G + 2% $CaCl_2$ = 2447 cu ft

Slurry Weight	15.8 ppg
Slurry Volume	1.15 cu ft/sack
Water Ratio	5.0 gal/sack
Mixing Water	Sea Water

3. 13 3/8" CASING

Hole Interval	311 m to 832 m =	521 m (1709 ft)
Casing Interval	128 m to 824 m =	696 m (2283 ft)
Hole Gage		17½ in.
Top Cement		to surface
Excess in open hole		40%

Slurry Volume:

20" by 13 3/8" Csg:	1.02 cu ft x 600 ft	= 612 cu ft
17½" by 13 3/8":	0.69 cu ft x1683 x 1.4	= 1626 " "
17½" rathole:	1.67 cu ft x 26 x 1.4	= 61 " "
In 13 3/8" Csg:	0.87 cu ft x 80 ft	= 70 " "
	Total	= 2369 cu ft

Cement: 792 sacks Class G + 4% Gel = 1219 cu ft

Slurry Weight	14.1 ppg
Slurry Volume	1.54 cu ft/sack
Water Ratio	8.0 gal/sack

Tail in: 1000 sacks Class G Neat = 1150 cu ft

Slurry Weight	15.8 ppg
Slurry Volume	1.15 cu ft/sack
Water Ratio	5.0 gal/sack

Mixing Water: Sea Water

4. 9 5/8" CASING

Hole Interval	824 m to 1722 m	= 898 m (2945 ft)
Casing Interval	128 m to 1714 m	= 1586 m (5203 ft)
Hole Gage		12 1/4 in.
Top Cement		to surface
Excess in open hole		40%

Slurry Volume:

13 3/8" by 9 5/8" Csg:	0.34 cu ft x 2283	= 776 cu ft
12 1/4" by 9 5/8" :	0.31 cu ft x 2920x1.4	= 1267 " "
12 1/4" Rat Hole:	0.82 cy ft x 26 x 1.4	= 30 " "
In 9 5/8" Csg:	0.42 cu ft x 80	= 34
	Total	= 2107 cu ft

Cement: 995 sacks Class G + 4% Gel + 0.5% CFR-2 = 1532 cu ft

Slurry Weight	14.1 ppg
Slurry Volume	1.54 cu ft/sack
Water Ratio	8.0 gal/sack

Tail In: 500 sacks Class G + 0.5% CFR-2 = 575 cu ft

Slurry Weight	15.8 ppg
Slurry Volume	1.15 cu ft/sack
Water Ratio	5.0 gal/sack

Mixing Water: Fresh Water

5. 7" CASING

Hole Interval	1714 m to 2682 m	= 968 m (3176 ft)
Casing Interval	128 m to 2674 m	= 2546 m (8353 ft)
Hole Gage		8½ in.
Top Cement	150 m (500 ft) above 9 5/8" casing shoe	
Excess in open hole		20%

Slurry Volum:

9 5/8" by 7" Csg:	0.15 cu ft/ft x 500	= 75 cu ft
8½" by 7":	0.13 cu ft/ft x3150x1.20	= 491 " "
8½" Rat Hole:	0.39 cu ft/ft x 26 x1.20	= 12 " "
In 7" Csg:	0.21 cu ft/ft x 80	= 17 " "
	Total	= 595 cu ft

Cement: 518 sacks Class G + 0.5 CFR-2 + 0.2% HR7 = 595 cu ft

Slurry Weight	15.8 ppg
Slurry Volume	1.15 cu ft/sack
Water Ratio	5.0 gal/sack

Mixing Water: Fresh Water

Note: Cement blends are to be lab. tested.

Actual Volume may be adjusted by caliper log.

APPENDIX 3

DRILLING MUD SPECIFICATIONS

WELL 30/7 - 1

1. Mud Conditioning Equipment

The Polyglomar Driller has the following mud conditioning equipment:

Shale Shaker: Hutchinson Hays "Rumba" model 102
Desander: Demco model 86
Desilter: Demco model 412 H
Mud Agitators: "Lightnin" mud mixers
Mud Gas Separator: Global Marine Design
Degasser: Welco model 5200
Mud Mixing Pumps: IR - MIR - 150 centrifugal
Automatic Mud System: Halliburton (used for maintaining desired weight)

2. Mud Materials and Services.

The mud material and treating chemicals are supplied by Milchem International who will also provide the mud engineering services. A Mud Engineer will be aboard during all drilling and completion operations. It is his function to periodically test the mud properties, to advise the treatment for the mud, to assist in mixing and treating the mud, and to keep a daily record of mud additives and costs.

Tests of the physical and chemical properties of the mud are performed about every six hours on a routine basis and may be performed more often if critical situations arise. The mud property tests are conducted in accordance with the API recommended procedure. In addition to testing the mud properties, the Mud Engineer also records the following on the Drilling Mud Report form:

- Time of sampling
- Hole depth and rig operation at the time of sampling
- Place where sample was taken and temperature of mud
- Hole volume, pit volume and total system volume

- Drilling assembly, mud flow velocity and pressure
- Mud conditioning equipment being used

Seawater base chrome lignosulfonate (Unical) mud will be used in the lower sections of the hole. The following tabulation sets forth the planned mud properties to be in effect during the intervals drilled.

Depth M (RKB)	Weight sp.gr.	FVis sec.	WL cc	HTWL cc	PV	YP	Type of Mud
287	8.5	-	-	-	-	-	Seawater
830	8.5	-	-	-	-	-	"
1720	1.08-1.20	50-80	10-12	-	10-15	20-30	Light Unical
2650	1.20-1.26	45-55	4-6	10-12	10-15	15-20	Medium Unical

Generally, mud additives will be mixed in fresh drill water and blended into the mudstream.

3. Drilling Mud Materials

For the drilling of 30/7 - 1 the Polyglomar Driller will have on board the following stock of mud materials and chemical additives:

Bulk Baryte	6000	cubic feet (367 metric tons)
Sacked Baryte	500	sacks
Bulk Bentonite	1200	cubic feet (37 metric tons)
Salt Water Gel	600	sacks
Caustic Soda	100	"
Flosal	50	"
Lime	150	"
Unical	250	"
CMC Low Vis	100	"
CMC High Vis	100	"
Lig̃con	100	"
Drispack	10	"
Soltex	50	"
Desco	50	"
Bicarb	25	"
Mill Free	25	"
Quick Seal Fine	30	"
Quick Seal Medium	30	"
Quick Seal Coarse	30	"
Mud Detergent	5	drums

APPENDIX 4

Formation Testing (DST)

Well 30/7-1

1. Introduction

Formation testing is performed to evaluate the productive potential of a well which has penetrated an oil or gas reservoir. The information obtained will be used in later field development planning.

As all formation testing is performed in cased holes there is sufficient time to prepare for the test after it has been decided upon from log analysis. During this time a formal test program will be issued specifying the length of casing to be run, the interval to be perforated, the expected reservoir fluid, the test tools and the bottom hole choke sizes, etc.

2. Formation Test Program

The following written program anticipates the formation test to be performed in 7" casing and requires a clean out string of 3½" drill pipe, 4 3/4" drill collars and scraping tools as well as the 3½" Hydril PH6 test string tubing which is to be used only for testing.

Prior to conducting a formation test a meeting is held to thoroughly discuss the test procedure and assign personnel who will be engaged in the test. It is important that the aspect of safety be discussed and that all unnecessary obstructions be cleared from the drill floor and other testing areas. All necessary precautions against fire will be taken. Also, only personnel necessary for the testing operation will be in the immediate vicinity.

The Drilling Superintendent is in charge of the testing operation. The Company Supervisor is responsible for the planning of the formation test and the collection of data.

The following procedure is offered as a guide. It assumes a typical test of a perforated interval in 7" casing using a retrievable packer and a Hydrospring Retrievable Valve Tester (RVT) with 1/4" bottom hole choke and a subsurface lubricator valve. Production is manifolded to heater, separator, test tank and burner.

1. Check separator and heater and calibrate gauging recorders and meters.

2. Check wireline unit and all wireline tools.

3. Calibrate bottom hole pressure gauges.

4. Check operation of test tools and make up bottom test string assembly.

5. Make up tubing and pressure test each joint.

6. Add oil cushion.

7. Install SSTT and test operation of valves.

8. Run upper test string tubing, space out and land in well head. Check measurements. Wait for daylight.

9. Install control head.

10. Pick up travel length of one bunker sub, close pipe ram lower assembly one foot.

11. Mark reference on tubing at rotary. Observe vessel motion.

12. Open pipe rams and pick up total collapse length of tools. Mark reference on tubing at rotary. Set packer.

13. Lower assembly until upper mark is one foot above reference position. Close rams and lower SSTT to land on rams. Pressure annulus to 500 psi.

    The RVT-tool will open in 3 or 4 minutes. Throughout the test check annulus pressure and if erratic stop test.

14. Open well on 16/64" choke to heater. Time oil cushion to surface. Time gas to surface. Time rathole mud to surface.

15. Flow well to clean up.

16. Close subsurface lubricator valve and bleed off pressure.

17. Install wireline lubricator and wireline pressure recorder.

18. Open subsurface lubricator valve. Check pressure in lubricator.

19. Open SSTT and check pressure in lubricator for 10 minutes.

20. Run pressure gradient survey on 1000 foot stops to given depth in hole in and out.

21. Close subsurface lubricator valve and bleed off pressure.

22. Extract wireline pressure recorder and remove lubricator.

23. Flow well for production test.

24. Repeat steps 16 through 22 and make a draw down test on 16/64 choke. Be sure wireline tools are not flowing up the hole. If so reduce surface choke size.

25. Continue flowing well for production test. Take samples until the end of formation test.

26. Wait for daylight to reverse out, unseat packer and POOH.