PHILLIPS PETROLEUM

66

PHILLIPS PETROLEUM COMPANY NORWAY

WELL 1/9-6

DRILLING PROGRAM

PROCEDURE NO. 148/80

September 7, 1981

PHILLIPS PETROLEUM COMPANY NORWAY
PROCEDURE APPROVAL AND DISTRIBUTION SUMMARY

PROCEDURE NUMBER: 148/81 DATED: Sept. 7, 1981

PROCEDURE TO: DRILL AND FULLY INVESTIGATE EXPLORATION WELL 1/9-6 USING SEDCO 703

INITIAL [X] REVISION [ ] REVISION NO. ______ DATE ______

PREPARED BY: A. R. Lyons/B. Sandstad DATE: 10.09.81

CHECKED BY: A. C. Sewell /J. W. Konst DATE: 11/9/81

APPROVED FOR NRG ENGINEERING: R. E. Pratt DATE: 11/9/81

APPROVED TO TRANSMIT TO NPD: M. H. McConnell DATE: 15/9/81

NPD APPROVAL RECEIVED FROM: Ølberg/Nybraaten DATE: 26.2.82

APPROVAL RECEIVED VIA: [ ] TELEPHONE [X] TELEX [ ] LETTER

TELEX/LETTER REFERENCE NO. 147 S82

PPCoN APPROVAL FOR DISTRIBUTION AND FIELD EXECUTION: M. H. McConnell DATE: 27/2/82

COMMENTS: (Special Meetings, Confirmations, Dates, etc.)

DISTRIBUTION LIST	COPIES
Petroleum Directorate, Attn: T. Ølberg	2
Operations Manager — J.E. Jennings	1
Drlg & Prod Manager — M.H. McConnell	1
Offshore Manager — Tananger	1
Offshore Manager — 2/4 H	1
Engineering Manager — J.C. Mihm (R) G.A. Kilpatrick	1
Chief Drlg & Prod Engr. — R.E. Pratt	1
Senior Drlg & Prod Supt. — 2/4 H	1
Drilling Supt — DN Cordry (r) Drlg Supv. Sedco 703 Platform	5 (2*)
Prod Supt (r) Prod Supv Platform	2
Offshore Drilling Supt — Hotel	1
Sr. Wireline Supv. — 2/4-C	1
Onshore Prod Supt. — L.L. Frantz	1 (1*)
Chief Offshore Engr. — Tananger	1 (1*)
Chief Offshore Engr — 2/4 H (r) OPE	2
Drilling Engr. Supervisor — J.W. Konst (r). (r) A. C. Sewell	1 (1*)
Chief Reservoir Engineer — J.F. Griggs (r) A.T. Markman	1
Manager of Geology — S.L. Miles	1
Well Records (r) Drlg. Engr. Tech. — Tananger	Original
Well File (Central File No.) 04-835-1/9-6	1

* Preliminary copies — To be distributed prior to NPD approval.

EXPLORATORY WELL 1/9-6

Table of Contents

RIG MOVE AND POSITIONING

The rig "Sedco 703" will move from Hod field to the location of the existing well head of 1/9-4, N 56°29'3.76" E 02°56'0.29". Well 1/9-6 will be spudded from this position.

It is planned to install one marker-buoy close to the location to help guide the rig into the correct heading to determine the exact location.

CONTRACTORS EXPECTED TO BE USED FOR DRILLING - 1/9-6

Drilling Contractor	Sedco 4056 Tananger	American
Logging Services	Schlumberger P.O. Box 129 4051 Sola	French
Mud Services	*	
Mud Logging	Analysts Farburn Industrial Estate Burnside Road, Dyce Aberdeenshire AB2 0HG	British
Well Testing	Flopetrol Box 56 4033 Forus	French
Casing Crew	Stavanger Casing P.O. Box 5019 N-4001 Stavanger	Norwegian
Cementing Services	Halliburton P.O. Box 67 4056 Tananger	American
Coring	*	
Monel Collars, Well Surveying	Eastman Whipstock Aker Norsco Base 4056 Tananger	American
Helicopters	Helicopter Service 4033 Forus Bristow Helicopter Ltd. Aberdeen Airport, Dyce Aberdeenshire 8B2 0ES	Norwegian
Stand-by boat	Tonjer Misje Company Ltd. 5000 Bergen	Norwegian
Downhole Testing	Halliburton P.O. Box 67 4056 Tananger	American

* Will be issued at a later date.

1/9 - 6

DRILLING PROGRAM SUMMARY

B/33B

PHILLIPS PETROLEUM COMPANY — NORWAY
DRILLING PROGRAM

PROCEDURE No. 148/81
FILE 1/9 - 6
DATE September 7, 1981

NAME EXPLORATORY | AFE 6234 | WELL No. 1/9-6 | FIELD GAMMA STRUCTURE
UNTRY NORWAY | PROVINCE NORTH SEA | AREA BLOCK 1/9

TION N56°29'40.10" E02°55'16.20" (BHL)

CTIVE : DRILL AND FULLY INVESTIGATE DEVELOPMENT WELL 1/9-6 USING SEDCO 703

THOD OF DRILLING: ROTARY SEMISUBMERSIBLE SEDCO 703
TOTAL DEPTH: 11900'TVD
ELEV: RKB-CD

APPROXIMATE DEPTHS OF GEOLOGICAL MARKERS
RKB-MSL: 82'(25m) WATER DEPTH: 248'(75.6m)

MARKER	DEPTH RKB-TVD	SUBSEA DEPTH TVD
Paleocene	9909'(3020m)	9827'(2995m)
Danian	10614'(3235m)	10532'(3210m)
Maastrichtian	10975'(3345m)	10893'(3320m)
TOTAL DEPTH	11900 '(3625m)	11812'(3600m)

1: ISF/BHC/GR Run in 17 1/2" hole, prior to reaming to 26", to base of 30" csg. Continue GR to seafloor.
2: ISF/BHC/GR From 13 3/8" casing point to base of 20" casing. FDC/GR
3: ISF/BHC/GR From 9 5/8" casing point to base of 13 3/8" csg. FDC/GR
HDT, CST (optional) CBL in 13 3/8" casing.
4: ISF/BHC/GR/SP From total depth to base of 9 5/8" casing. DLL/MSFL and FDC/CNL/NGS From total depth to 100' above top of the Danian limestone.
HDT from total depth to base of 9 5/8" casing. RFT run optional VELOCITY SURVEY. CBL/VDL/CCL in 9 5/8" casing to 200' above TOC CST, WSS
5: CBL/VDL/CNL/CCL (inside 7" with CBL/VDL from TD to 200' above TOC CNL to 200' above Paleocene marker

DRILLING CUTTING SAMPLES FREQUENCY	INTERVAL	DRILLING TIME FREQUENCY	INTERVAL
See attached sampling program page 7		5' GEOLOGRAPH	Subsea - TD

SPECIAL SURVEYS & TESTS

e shot Directional Surveys to be run each 300' below the 20" g shoe. A gyro survey is to be run after setting 13 3/8", " casings and 7" liner. Initial and weekly BOP test performed r PPCoN procedures. Performed actual leak-off tests at 20", 3/8" and 9 5/8" casing shoes.

REMARKS

ROGRAM XIMATE INTERVAL	MUD TYPE	MUD WT (PPG)	VISC (SEC)	PLASTIC VISC	YIELD PT	WTR LOSS	Ca ++	SOLIDS %	HT/HP FC	OTHER REQUIREMENTS
0-1500'	Seawater	8.5	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.	
-4500'	Seawtr/Native mud	9.0-11.5	32-45	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.	
-9400'	Drispac/Soltex/SW	12.5-16.0	50-60	20-35	18-25	-	L500	-	-	
-11900'	Drispac/Soltex/SW	14.0-15.0	45-55	20-30	18-25	4-6	L500	-	6-4/32	

MARKS
to Mud Program in Drilling Program (Page 13)

G	SETTING DEPTH(1)(2)	HOLE SIZE	CASING SIZE(3)(4)	CEMENT (SX) (5)	TYPE CEMENT(6)	LANDING PT. DESCRIPTION, etc.
IVE PIPE	530'TVD	36"	30", 1 1/2" wall	900	Class G	Subsea wellhead
NDUCTOR	1500'TVD	26"	20", 133 lb/ft K-55	2400	" "	" "
CE	4500'TVD	17 1/2"	13 3/8", 72lb/ft N-80	2900	" "	" "
MEDIATE	9400'TVD	12 1/4"	9 5/8" 53.5 lb/ft N-80, C-95	2500	" "	" "
ODUCTION LINER	11900'TVD	8 1/2"	7", 35 lb/ft N-80	500	" "	" "

KS
(1) All casing strings will be set without reciprocation and with a minimum of 50' rat hole except for 7" liner.
(2) The 9 5/8" setting depth may be revised if the pore pressure is found to decrease at a shallower depth than anticipated. (Refer to pore pressure prediction)
(3) Refer to detailed casing program and schematic in drilling prospectus.
(4) After each casing string has been set and cement plug bumped, Pressure test casing as follows: 1000 psi for 20" casing 2500 psi for 13 3/8" casing, 4500 psi for 9 5/8" casing and 4500 psi for 7" Liner.
(5) Cement volumes for 13 3/8", 9 5/8" and 7" liner should be adjusted to 20% excess volume after reviewing the caliper log.
(6) Refer to detailed cementing program in drilling program for information on mix water and additives.
(7) Refer to procedure for testing pack-offs on p. A-28 in drilling program.

~~STION/TESTING PROGRAM~~
ydrocarbon accumulations are present, Drill Stem Tests will be requested. A separate test program will be provided at that time.

AL REMARKS

This well will be drilled adjacent to the 1/9-4 well as shown on page A-30.

RED BY ARL
R YONS/K. DONNESEN
ILLING ENGINEER

APPROVED
D.N. CORDRY
DRILLING SUPERINTENDENT

APPROVED
M.H. McCONNELL
DRILLING AND PRODUCTION MANAGER

1/9 - 6

GEOLOGICAL PROGNOSIS
AND
EVALUATION PROGRAM

Purpose of test

Well 1/9-6 is an appraisal well on the north-west flank of the Gamma structure. The purpose is to get more information about the size, reservoir quality and fluid properties of the hydrocarbon accumulations in the Ekofisk- and Tor Formations. Total depth will be 150 m into the Hod Formation, and is estimated to approx. 3970 m measured depth.

Drilling hazards

Swelling clays are expected in certain intervals from 400 m down to top Danian. Drilling rate should be controlled to avoid mud rings and sticking problems.

Based on bright spots on the seismic and experience from well 1/9-4, gas problems may occur in the following intervals (measured depths).

1100 - 1400 m (especially at 1300 m)
1650 - 1850 m
2300 - 2500 m

A possible lost circulation zone could occur around 3000 m.

Navigation

The navigation of the rig to location will be made using Pulse/8 navigation system.

Since this well will be spudded very close to well 1/9-4, the final approach will be made as for a re-entry.

1/9-6 STRATIGRAPHIC PROGNOSIS

UNIT	DEPTH TO TOP UNIT(m) (Ref. KB = 25 m) TVD	MEASURED	LITHOLOGY
Quaternary	100	100	clay/silt/sand
Pliocene	480	480	clay/silt/minor sand
Upper Miocene	790	799	clay/silty
Middle Miocene	1035	1075	claystone
Lower Miocene	1745 +-10	1833	claystone
Oligocene	1910 +-10	2071	claystone - shale
Eocene	2815 +-30	3100	shale - claystone
Paleocene	3015 +-40	3328	shale-claystone/sand
Danian Marl	3210 +-50	3535	marl
Danian chalk	3235 +-50	3565	chalk/limestone
Maastrichtian	3345 +-50	3680	chalk/limestone
Campanian	3455 +-50	3790	chalk/limestone
TD	3625	3970	

The above structural depths have been derived from seismic line ST 404-410 and the structural cross section which goes through the prognosed well and well 1/9-4. The seismic velocity draw down in the gas zone is the main factor of uncertainty, which is shown in the table.

WELL 1/9-6 LOGGING PROGRAM

MEASURED DEPTH (m)	CASING	LOGS TO BE RUN
	SEA FLOOR	
0	30"	GR
	20"	ISF/SONIC/GR/SP
1000		ISF/SONIC/GR/SP FDC/GR
	13 3/8"	
2000		ISF/SONIC/GR/SP FDC/GR CBL(in 13 3/8" casing) HDT(optional) CST(optional)
3000	9 5/8"	
4000		ISF/SONIC/GR/SP FDC/CNL/GR HDT CBL (in 9 5/8" casing) CBL/VDL (in 7" liner) CST, WSS DLL/MSFL* VDL open hole*

* run if shows

Geological well logging and sampling procedures

A mud logging contractor will be employed to log the well for hydrocarbon shows, collect samples, prepare sample log and conduct other services throughout drilling operations.

Samples will be collected at 10 meter intervals down to 3000 m measured depth. Thereafter 3 m intervals (or less) will be collected. The sample interval can be changed at the discretion of the well site geologist.

At each sample point there will be collected 4 sets of washed and dried samples and 4 sets of unwashed samples-(½ kg). One composite sample of unwashed cuttings for petrochemical studies will be canned at 30 m intervals throughout the whole well.

One set of washed and dried samples will be retained on the rig until the well is finished. The remaining samples will be sent to GECO, Stavanger periodically during drilling. Storage, washing and distribution will be handled by GECO as per instructions from Statoil.

Coring Program

If hole conditions and other factors are favorable, a minimum of one core will be cut as soon as the Danian chalk (Ekofisk Fm.) has been reached. Additional cores will be requested if significant hydrocarbon shows are encountered. This will be at the discretion of the well site geologist and subject to review by the Phillips Operations Geologist. The plan is to core all hydrocarbon intervals in Ekofisk "porous" zone and Tor Fm.

All cores will be sent to GECO, Stavanger for analysis, distribution, and storage.

Testing Program

If hydrocarbon accumulations are present, Drill Stem Tests will be requested, and a separate testing program will then be forwarded.

Communication Procedures

Confidentiality:

All data are considered confidential and will be released to third parties only by decision of Statoil.

Delivery to partners:

A daily report will be telexed by Phillips to Statoil, partners and to NPD.

All other wellsite data, including field prints of logs, will be sent periodically by post or messenger.

A final well report will be prepared in cooperation between Statoil and Phillips, and will be sent to partners and NPD no later than six months after completion of the well.

Attachment:

Seismic line ST 404-410
Well prognosis sheet
Structural cross section through 1/9-4 and 1/9-6

Approved: 28. jun 1981

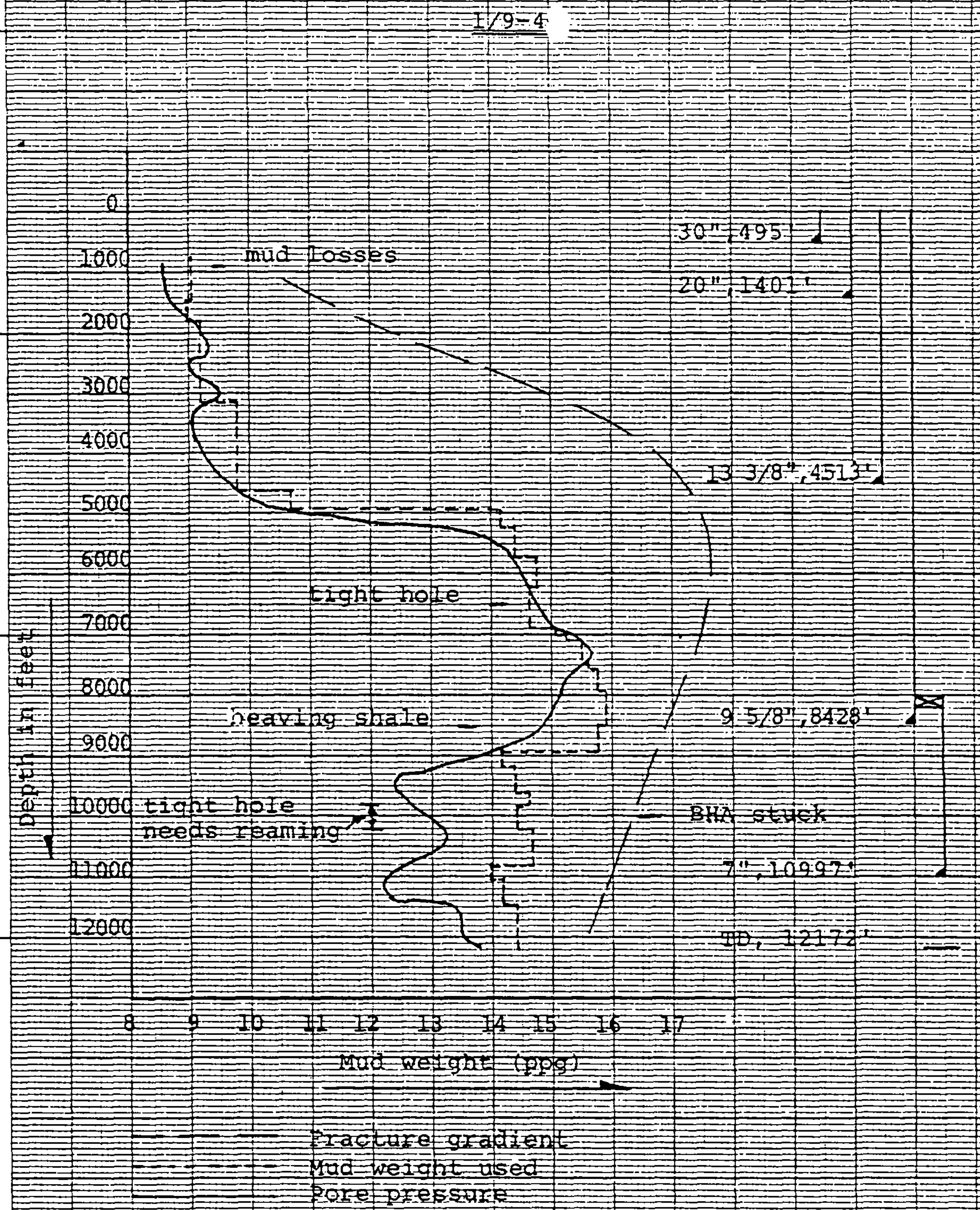
Svein G Larsen

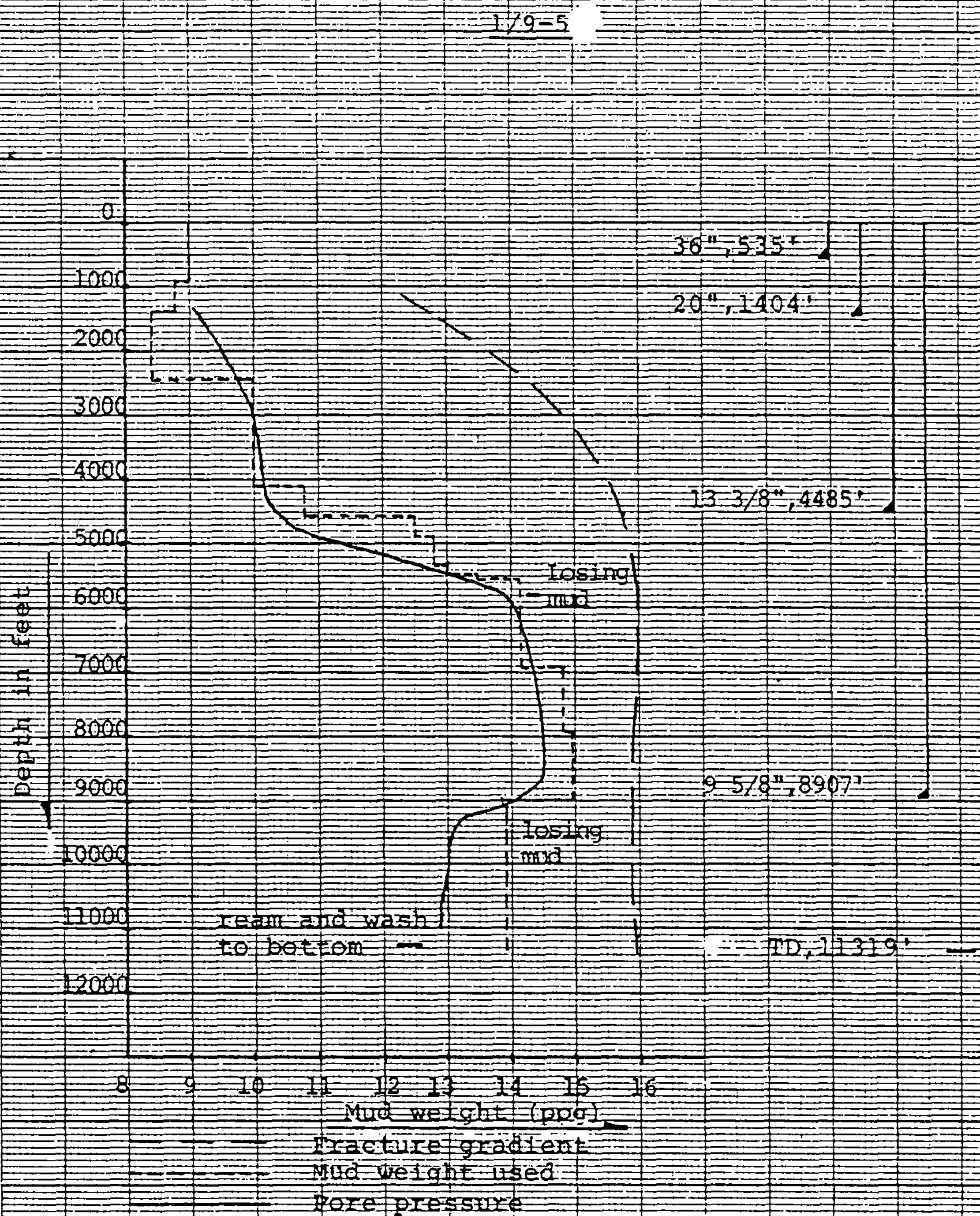
Manager Field Evaluation /Statoil

1/9 - 6

DRILLING PROGRAM DETAILS

OFFSET WELL DATA


1/9-4
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
Depth in feet
mud losses
tight hole
heaving shale
tight hole
needs reaming
30", 495'
20", 1401'
13 3/8", 4513'
9 5/8", 8428'
BHA stuck
7", 10997'
TD, 12172'
8
9
10
11
12
13
14
15
16
17
Mud weight (ppg)
Fracture gradient
Mud weight used
Pore pressure

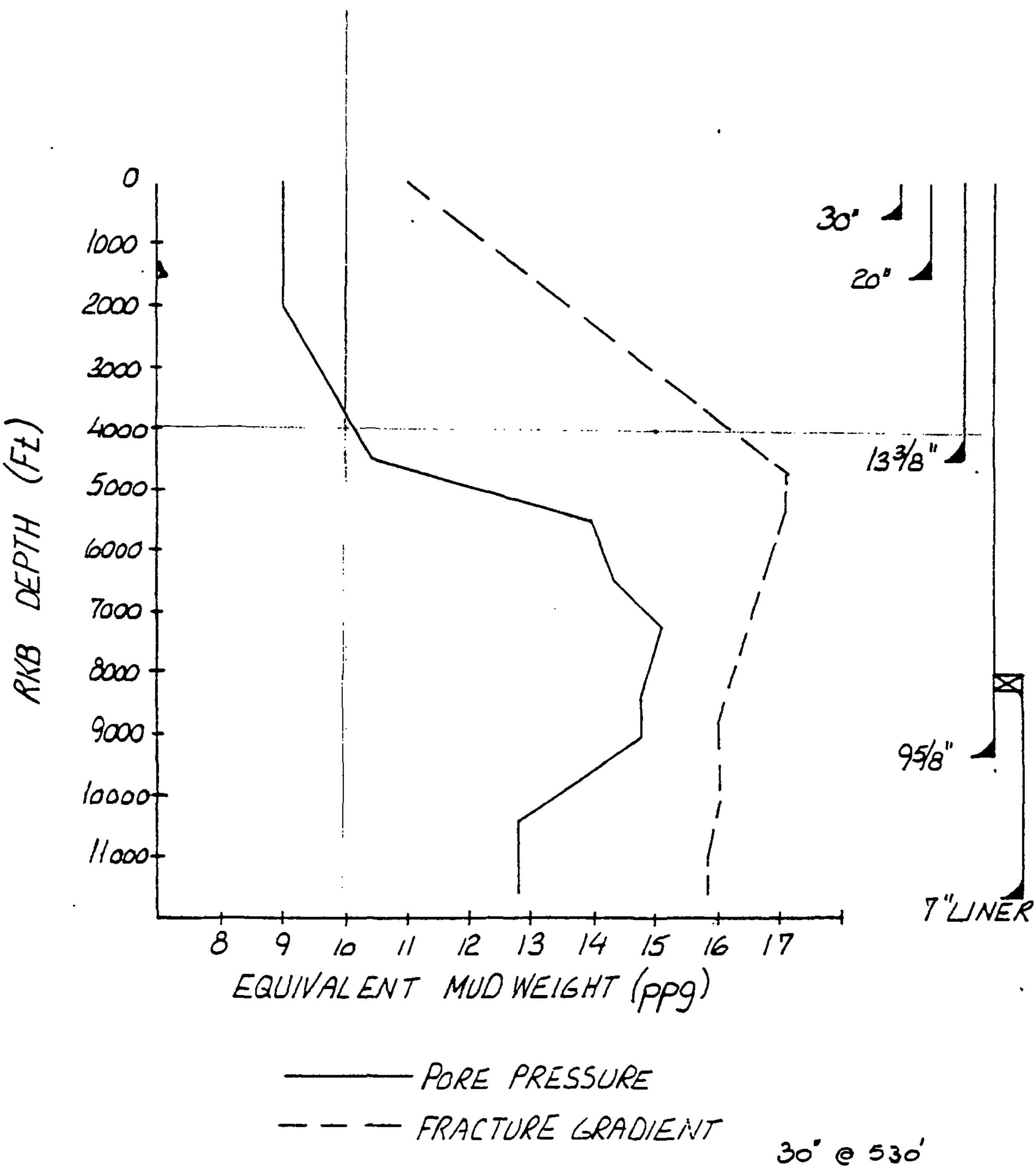


1/9-5
36", 535'
20", 1404'
13 3/8", 4485'
9 5/8", 8907'
TD, 11319'
losing mud
losing mud
ream and wash to bottom
Depth in feet
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
8
9
10
11
12
13
14
15
16
Mud weight (ppg)
Fracture gradient
Mud weight used
Pore pressure

1/9 - 6

PRESSURE AND FRACTURE GRADIENT PROGNOSIS

1/9-6 PORE PRESSURE AND FRACTURE GRADIENT PREDICTION



30" @ 530'
20" @ 1500'
13 3/8" @ 4500'
9 5/8" @ 9400'
7" @ 11900'

ABNORMAL PRESSURE DETECTION

The mud logging unit will be utilized below the 20" casing.

The following parameters related to abnormal pressure detection will be monitored and recorded.

On a depth scale:

1. Drillability
2. ROP
3. "d" exponent
4. Pore pressure

On a time scale:

1. Rotary torque
2. Mud temperature in
3. Mud temperature out
4. Logged differential temperature
5. Mud flow in
6. Mud flow out
7. Mud weight in
8. Mud weight out
9. Pit volume
10. Pit volume total change
11. Mud gas

Close attention is to be paid to the following indications of possible increase in pore pressure of the section being drilled.

a) Increase in gas level of the drilling mud while drilling or after a connection or trip.
b) Increased torque or drag.
c) Change in temperature of the drilling mud returns.
d) Change in mud chlorides.
e) Appearance of large shale cavings over the shaker, indicating hole sloughing.

Any one of the above indicators does not necessarily mean the pore pressure has increased and the well is being drilled underbalanced.

1/9 - 6

DRILLING MUD PROGRAM

PHILLIPS PETROLEUM COMPANY NORWAY

EXPLORATION WELL

DRILLING MUD PROGRAM

Well: Ekofisk 1/9-6

Location: N56°29'42" E02°55'19"

Rig: Sedco 703

36" (91.4 cm) Hole to ±500' (152 M) RKB - 30" (76.2 cm) Casing

The 36" hole will be drilled with sea water with returns to the sea floor. Pump 15-20 barrels of viscous mud on each connection while drilling to keep the hole cleaned of cuttings.

Prepare the thick spud mud as follows:

Materials	Properties
Sea Water	Weight - 8.5 ppg
Prehydrated Bentonite and/or Attapulgite flocculated with Lime:	Viscosity - 100 sec/qt.
Prior to pumping	Filtrate - no control

After drilling to T.D., displace the entire hole with viscous mud for running 30" casing.

26" (66.0 cm) Hole to ±1500' (459 m) - 20" (50.80 cm) Casing

The 17½" Pilot hole will be drilled with seawater/native solids system with returns to the active system. If additional viscosity is required for hole cleaning, add Attapulgite and/or Prehydrated bentonite flocculated with lime as required to increase the Rheological properties to assure sufficient hole cleaning.

The 17½" Pilot hole will be opened to 26" with returns to the sea floor. Drill ahead with seawater flushing the hole with 20 to 50 bbl high viscosity spud mud pills on each connection. Prior to running 20" casing, displace the hole to High viscosity spud mud prepared as suggested in the 36" section. It is recommended the hole be displaced with 1½ times the Hole volume.

13 3/8" (33.97cm) Casing at ± 4500' (1372 m) TVD - 17½" (44.45cm) Hole

Drill the cement, float and shoe with sea water with returns to the sea. After drilling 10 feet of new hole, flush the hole with sea water and perform the required leak-off test.

Drill the 17½" hole with a sea water / native mud maintained to the following properties:

Materials	Properties
Sea Water	Weight - 9.0 - 11.5 ppg (1.03 - 1.38 sp gr)
Prehydrated bentonite and lime	Viscosity - 32 - 45 sec/qt (33-48 sec/l)
	Fluid Loss - No control

Maintain viscosity as necessary to keep the hole clean with native solids, prehydrated bentonite and lime. If additional slugs are required, prepare each with prehydrated bentonite, adding lime just prior to pumping.

Make water additions and run the mud cleaners as required to control weight, viscosity and solids properties.

If tight hole or other problems develop, the system may be mudded up with 2 ppb Drispac for better shale inhibition. Add 0.5 ppb caustic soda to the system before the Drispac to prevent precipitating out the polymer along with MgOH.

When adding Drispac to a fluid high in drill solids it is important to first dilute with water by at least 20% in order to be able to add the desired quantity of Drispac to the system without creating excessive viscosity.

Maintain mud density in the desired range with native solids. Increase density with barite only if weights greater than 10.5 ppg are required to control pressures. Pay very close attention to hole conditions for determining exact mud weights.

On well 1/9-4 the fluid density was increased to 10.5 ppg at approximately 4000', and well 1/9-5 the fluid density was increased to 11.5 ppg to log and run casing. Also pore pressure predictions indicate that it may be necessary to increase the fluid density to approx. 10.5-11.0 ppg some time during the final 1000' of 17½" hole drilled.

If it is necessary to control rheology with chemical, small amounts of Desco should be used for this purpose.

Note: The mud in all sections of the hole should be pretreated with ½ ppb sodium bicarbonate prior to drilling any cement.

9 5/8" (24.45cm) Casing at ± 9400', (2865 M) TVD - 12" (30.48cm) Hole

Drill the 12" (30.48cm) hole with Drispac/sea water mud built and maintained to the properties outlined below.

Properties	
Weight	12.5 - 16.0 ppg (1.50 - 1.92 sp.gr.)
Viscosity	50 to 60 sec/qt (53 to 63 sec/l)
Yield Point	18 - 25 lb/100 sq. ft. at 150°F (9 to 12 cp at 65.5°C)
Plastic Viscosity	20 - 35 cp at 150°F (20 - 35 mP at 65.5°C)

Properties

Water Loss	5 to 6 cc/30 min.
pH	9.5 - 10.0
Calcium	Less than 500 ppm (500 mg/l)
Pf	0.3 - 1.0 cc
Drispac	2 ppb (5.7 kg/m^3)
Soltex	Optional
CEC	20 - 25 ppb (57 - 71 kg/m^3)

On the exploration well 1/9-4 the 13 3/8" casing was drilled out with a mud weight of 14.2 ppg and gradually increased to 15.8 ppg by a depth of 7600'. Very few problems were encountered in the 12" phase of this well; in comparison, 1/9-5 started from under the 13 3/8" shoe with a fluid density of 12.5 ppg, and some tight hole was experienced that was not corrected until the fluid density was increased to 15.8 ppg. Pore pressure predictions indicate a pressure of 15.1 ppg at a depth of approximately 7200'.

Dump all the mud from the 17½" hole and in cleaned pits build a seawater/Drispac mud weighed to at least 14.2 ppg (1.70 sp.gr.). When preparing a fresh Drispac mud, be sure the caustic soda is added to the seawater before the Drispac to prevent precipitating Drispac out along with MgOH. Circulate until the mud weight is a constant 14.2 ppg throughout the hole and perform the leak-off test using 14.2 ppg mud. While drilling, maintain the Drispac concentration at approximately 2 ppb (5.7 kg/m^3) in this section by regular additions for inhibition of tertiary shales. Check protection with montmorillonite pellets in the whole mud.

In general, the mud should be weighted up while drilling to 15.0 ppg (1.80 sp. gr.) by 6756' (2057 m) and 15.8 ppg (1.89 sp. gr.) by 7400' (2255 m). However, let hole conditions dictate the exact mud weight to use.

Control rheology with one pound (0.5 kg) Desco to 4 pounds (1.8 kg) Lignosulfonate. Water additions will be needed for maintenance. In the event that excessive torque, drag or sloughing shale develop add 4 ppb (11.4 kg/m^3) of Soltex.

To control solids use the smallest mesh screens possible on all shakers and mud cleaners and still handle the full circulating volume. Run this equipment at all times.

At all times control pump rate to keep annular velocity below critical velocity. Flow properties must be in good shape for a low ECD. This is particularly important when circulating the small annulus prior to cementing casing. Fine mica and nut plug should be added to the mud if lost circulating occurs.

The outlined fill-up procedure must be adhered to on all trips.

<u>7" (17.78 cm) Casing to TD. ± 11,900'(3627 M) TVD 8½" (21.59cm) Hole</u>

Drill the 8½" (21.59 cm) hole with the existing mud conditioned and maintained as follows:

Weight	14.0 - 15.0 ppg
Viscosity	45 to 55 sec/qt (48 to 58 sec/1)
Plastic Viscosity	20 to 30 cp at 150°F (20 to 30 mP at 65.5°C)
Yield Point	18 to 25 lb/100 sq. ft. at 150°F (9 to 15 cp at 65.5°C)
CEC	20 to 25 ppb (57 to 71 kg/m^3)
Pf	0.5 - 1.0 cc
pH	10.0 ±
API Water Loss	4 to 6 cc/30 min.
Calcium	Less than 500 ppm (500 mg/1)
HTHP Filter Cake	6 to 4/32" (4.8 to 3.2 mm)
HTHP Fluid Loss	<20 cc (2-3 times API WL) at 500 psi and 250°F (121°C)
Drispac	2 ppb (5.7 kg/m^3)

Drill out of the 9 5/8" casing with a fluid density of 14.2 ppg (1.70 sp.gr.) and adjust the weight as hole conditions dictate. Well 1/9-4 was drilled with a density of 14.2 ppg, but the 1/9-5 location required a mud weight of 14.7 ppg to drill the 8½" hole phase. Monitor the connection gas and trip gas and adjust the fluid density up or down to obtain a optimum mud weight.

Control the filtrate with Drispac and/or Lignite and prehydrated Wyoming Bentonite blended into the mud to help control the HPHT fluid characteristics. <u>Pilot tests should be</u> run to determine the best treatment for HTPH properties. The HPHP filter cake must be 6/32" (4.8 mm) or less to prevent differential sticking in the porosity of the Danian and Cretaceous and the HTHP fluid loss less than 20.0 cc. Normally it should fall within the range of 2-3 times the API water loss.

A Howco pressurized mud balance should be used throughout the 8½" (21.59 cm) section to ensure accurate mud weight determination.

Always control mud properties within the optimum ranges to minimize excessive circulating pressures. Pay particularly close attention for indications of lost circulation and differential sticking.

Maintain an excess of finemica in the mud while drilling the Danian and Cretaceous. This can be monitored by having a small amount of mica coming over the shaker at all times. Add six sacks of fine Nut Plug each tour while drilling, or as necessary to control losses.

For rheology control, use lignosulfonate and Desco in a 2:1 pound ratio. Lignite may be used for additional rheology and HTHP fluid loss control if high bottom hole temperatures exist.

Use the smallest screen mesh possible on all shale shakers and mud cleaners and still handle the full volume of mud.

Run the mud cleaners at all times to control solids.

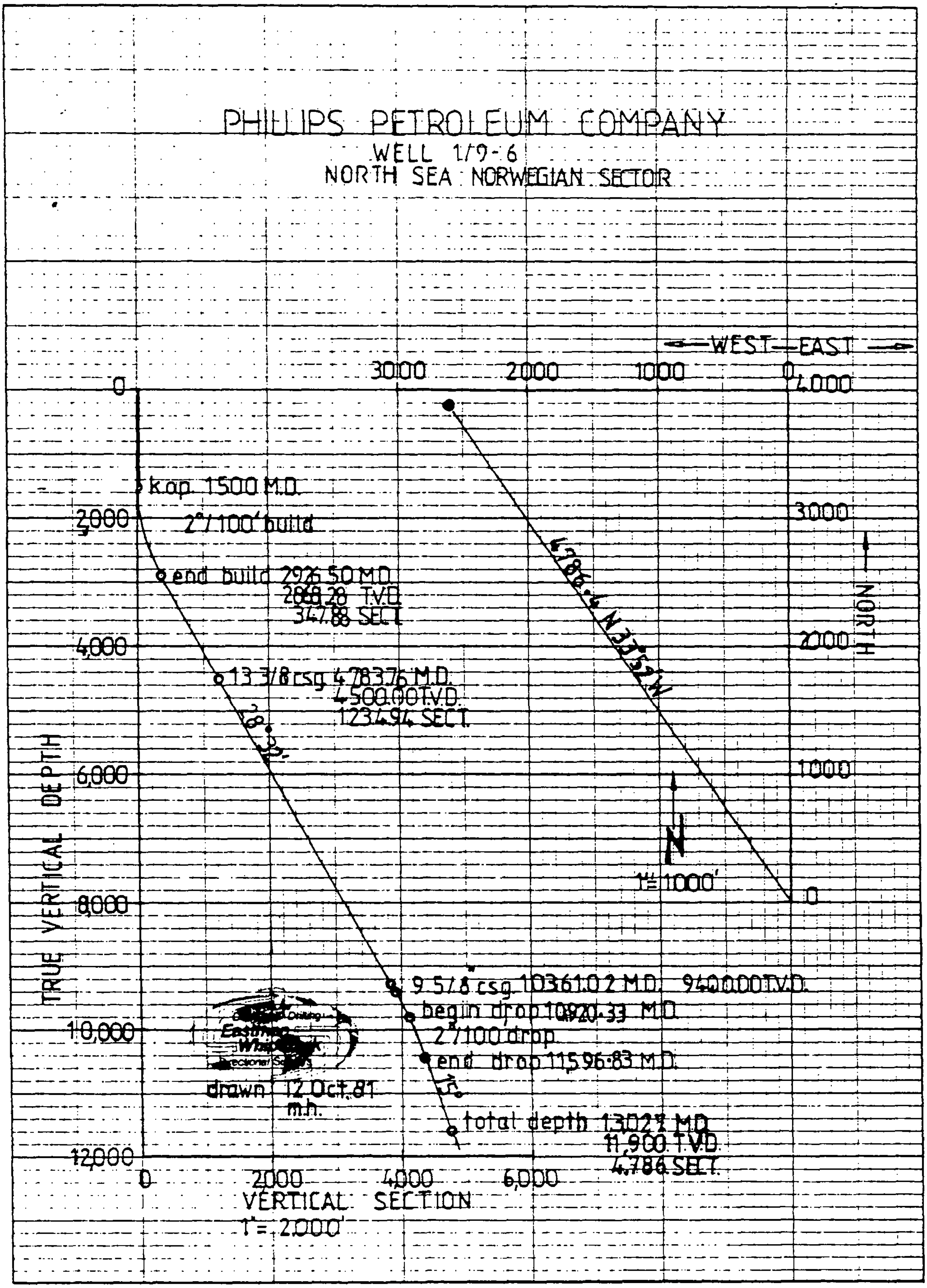
Run the centrifuge as necessary to assist in solids.

The outlined fill-up procedure must be adhered to on all trips.

On the final conditioning trip prior to running 7" casing, the entire active mud system is to be treated with ½ ppb Surflo B-21 and ½ ppb Baroid Coat 45 while circulating. They are a biocide and H_2S scavenger, respectively.

1/9 - 6

DIRECTIONAL PLAN


PHILLIPS PETROLEUM COMPANY
WELL 1/9-6
NORTH SEA NORWEGIAN SECTOR
WEST EAST
3000 2000 1000 0
4000
3000
2000
1000
0
NORTH
4786.4 N 33°52 W
N
1" = 1000'
kop 1500 M.D.
2°/100' build
end build 2926.50 M.D.
2868.28 T.V.D.
347.88 SECT.
13 3/8 csg 4783.76 M.D.
4500.00 T.V.D.
1234.94 SECT.
28°30'
9 5/8 csg 10361.02 M.D. 9400.00 T.V.D.
begin drop 10820.33 M.D.
2°/100 drop
end drop 11596.83 M.D.
15°
total depth 13027 M.D.
11,900 T.V.D.
4,786 SECT.
drawn 12 Oct. 81
m.h.
TRUE VERTICAL DEPTH
0
2000
4000
6000
8000
10,000
12000
0 2000 4000 6000
VERTICAL SECTION
1" = 2000'

```
**********************************************
**********************************************
**                                          **
**                                          **
**                                          **
**     PHILLIPS PETROLEUM COMPANY, NORWAY.  **
**                                          **
**        PHILLIPS EXPLORATION 1/9          **
**                                          **
**     1/9 , NORTH SEA, NORWEGIAN SECTOR.   **
**                                          **
**                                          **
**                                          **
**********************************************
**********************************************
```

DIRECTIONAL PLAN SUBMITTED BY :- EASTMAN WHIPSTOCK (U.K.) LTD., ABERDEEN.

SLOT NAME :- 6

WELL NAME :- 1/9-6

DATE :- 10-FEB-81

REVISION NO :- 6

PREPARED BY :- L. JOHANSEN.

OUR REF :- P00036.6PH

SURFACE INFORMATION

SLOT COORDS FROM PLATFORM CENTRE :- 0.00N 0.00E

CALCULATION PREMISES

ALL DEPTHS ARE IN FEET AND ARE RKB.
ORIGIN POINT OF LOCAL COORDINATES IS PLATFORM CENTRE.

VERTICAL SECTION IS CALCULATED ON THE PLANE OF N33 52W (326.14 DEG) AND IS REFERENCED FROM PLATFORM CENTRE.

WELL PROFILE SYNOPSIS

	MEASURED DEPTH	TRUE VERT DEPTH	INCLIN. DEG MIN	AZIMUTH DEGREES	BEARING DEG MIN	RECTANGULAR COORDINATES		VERTICAL SECTION
KICK OFF POINT	1500.00	1500.00	0 0	0.00	N 0 0E	0.00N	0.00E	0.00
BUILD - BUILD RATE = 2.00DEG / 100FT.	2926.50	2868.28	28 32	326.14	N33 52W	288.87N	193.85W	347.88
HOLD	4783.75	4500.00	28 32	326.14	N33 52W	1025.45N	688.14W	1234.94
HOLD	10361.02	9400.00	28 32	326.14	N33 52W	3237.37N	2172.47W	3898.75
HOLD	10920.34	9891.40	28 32	326.14	N33 52W	3459.20N	2321.33W	4165.89
DROP - DROP RATE = 2.00DEG / 100FT.	11596.84	10518.21	15 0	326.14	N33 52W	3667.01N	2460.78W	4416.15

	MEASURED DEPTH	TRUE VERT DEPTH	INCLIN. DEG MIN	AZIMUTH DEGREES	BEARING DEG MIN	RECTANGULAR COORDINATES	VERTICAL SECTION
	11596.84	10518.21	15 0	326.14	N33 52W	3667.01N 2460.78W	4416.15
************************** * * HOLD * **************************							
	11696.00	10614.00	15 0	326.14	N33 52W	3688.32N 2475.09W	4441.82
************************** * * HOLD * **************************							
	13027.37	11900.00	15 0	326.14	N33 52W	3974.45N 2667.10W	4786.40

WELL PROFILE

	MEASURED DEPTH	TRUE VERT DEPTH	INCLIN. DEG MIN	AZIMUTH DEGREES	BEARING DEG MIN	RECTANGULAR COORDINATES		VERTICAL SECTION
KICK OFF POINT	1500.00	1500.00	0 0	0.00	N 0 0E	0.00N	0.00E	0.00
	1600.00	1599.98	2 0	326.14	N33 52W	1.45N	0.97W	1.75
	1700.00	1699.84	4 0	326.14	N33 52W	5.79N	3.89W	6.98
	1800.00	1799.45	6 0	326.14	N33 52W	13.03N	8.74W	15.69
	1900.00	1898.70	8 0	326.14	N33 52W	23.15N	15.54W	27.88
	2000.00	1997.47	10 0	326.14	N33 52W	36.14N	24.25W	43.52
	2100.00	2095.62	12 0	326.14	N33 52W	51.98N	34.88W	62.60
	2200.00	2193.06	14 0	326.14	N33 52W	70.66N	47.42W	85.10
	2300.00	2289.64	16 0	326.14	N33 52W	92.15N	61.84W	110.98
	2400.00	2385.27	18 0	326.14	N33 52W	116.43N	78.13W	140.21
	2500.00	2479.82	20 0	326.14	N33 52W	143.46N	96.27W	172.77
	2600.00	2573.17	22 0	326.14	N33 52W	173.22N	116.24W	208.60
	2700.00	2665.21	24 0	326.14	N33 52W	205.66N	138.01W	247.67
	2800.00	2755.84	26 0	326.14	N33 52W	240.75N	161.56W	289.93
	2900.00	2844.94	28 0	326.14	N33 52W	278.45N	186.85W	335.33
END OF BUILD SECTION	2926.50	2868.28	28 32	326.14	N33 52W	288.87N	193.85W	347.88
	3000.00	2932.85	28 32	326.14	N33 52W	318.02N	213.41W	382.98
	3500.00	3372.14	28 32	326.14	N33 52W	516.31N	346.48W	621.79
	4000.00	3811.42	28 32	326.14	N33 52W	714.61N	479.55W	860.60
	4500.00	4250.70	28 32	326.14	N33 52W	912.91N	612.62W	1099.41
HOLD SECTION	4783.75	4500.00	28 32	326.14	N33 52W	1025.45N	688.14W	1234.94
	4800.00	4514.27	28 32	326.14	N33 52W	1031.89N	692.46W	1242.70
	5200.00	4865.70	28 32	326.14	N33 52W	1190.53N	798.92W	1433.75
	5600.00	5217.13	28 32	326.14	N33 52W	1349.17N	905.37W	1624.79
	6000.00	5568.55	28 32	326.14	N33 52W	1507.81N	1011.83W	1815.84
	6400.00	5919.98	28 32	326.14	N33 52W	1666.44N	1118.29W	2006.89
	6800.00	6271.41	28 32	326.14	N33 52W	1825.08N	1224.74W	2197.94
	7200.00	6622.83	28 32	326.14	N33 52W	1983.72N	1331.20W	2388.98
	7600.00	6974.26	28 32	326.14	N33 52W	2142.36N	1437.65W	2580.03
	8000.00	7325.69	28 32	326.14	N33 52W	2301.00N	1544.11W	2771.08

	MEASURED DEPTH	TRUE VERT DEPTH	INCLIN. DEG MIN	AZIMUTH DEGREES	BEARING DEG MIN	RECTANGULAR COORDINATES		VERTICAL SECTION
	8400.00	7677.11	28 32	326.14	N33 52W	2459.64N	1650.57W	2962.13
	8800.00	8028.54	28 32	326.14	N33 52W	2618.28N	1757.02W	3153.17
	9200.00	8379.97	28 32	326.14	N33 52W	2776.92N	1863.48W	3344.22
	9600.00	8731.40	28 32	326.14	N33 52W	2935.55N	1969.94W	3535.27
	10000.00	9082.82	28 32	326.14	N33 52W	3094.19N	2076.39W	3726.32
HOLD SECTION	10361.02	9400.00	28 32	326.14	N33 52W	3237.37N	2172.47W	3898.75
	10400.00	9434.25	28 32	326.14	N33 52W	3252.83N	2182.85W	3917.36
	10500.00	9522.11	28 32	326.14	N33 52W	3292.49N	2209.46W	3965.13
	10600.00	9609.96	28 32	326.14	N33 52W	3332.15N	2236.08W	4012.89
	10700.00	9697.82	28 32	326.14	N33 52W	3371.81N	2262.69W	4060.65
	10800.00	9785.68	28 32	326.14	N33 52W	3411.47N	2289.30W	4108.41
	10900.00	9873.53	28 32	326.14	N33 52W	3451.13N	2315.92W	4156.17
END OF HOLD SECTION	10920.34	9891.40	28 32	326.14	N33 52W	3459.20N	2321.33W	4165.89
	10946.84	9914.74	28 0	326.14	N33 52W	3469.62N	2328.32W	4178.44
	11046.84	10003.84	26 0	326.14	N33 52W	3507.31N	2353.62W	4223.83
	11146.84	10094.46	24 0	326.14	N33 52W	3542.40N	2377.17W	4266.09
	11246.84	10186.51	22 0	326.14	N33 52W	3574.85N	2398.94W	4305.16
	11346.84	10279.86	20 0	326.14	N33 52W	3604.60N	2418.91W	4341.00
	11446.84	10374.41	18 0	326.14	N33 52W	3631.63N	2437.05W	4373.55
	11546.84	10470.03	16 0	326.14	N33 52W	3655.91N	2453.34W	4402.79
DROP SECTION	11596.84	10518.21	15 0	326.14	N33 52W	3667.01N	2460.78W	4416.15
	11600.00	10521.27	15 0	326.14	N33 52W	3667.69N	2461.24W	4416.97
HOLD SECTION	11696.00	10614.00	15 0	326.14	N33 52W	3688.32N	2475.09W	4441.82
	12000.00	10907.64	15 0	326.14	N33 52W	3753.65N	2518.93W	4520.50
	12400.00	11294.01	15 0	326.14	N33 52W	3839.62N	2576.62W	4624.02
	12800.00	11680.38	15 0	326.14	N33 52W	3925.58N	2634.31W	4727.55
END OF HOLD SECTION	13027.37	11900.00	15 0	326.14	N33 52W	3974.45N	2667.10W	4786.40

STATOIL
WELL NO 1/9 - 4. FILE NO.: 780
S.SHOT SURVEY. 18 - JAN - 73.

VERTICAL SECTION CALCULATED IN PLANE OF PROPOSAL
DIRECTION: S 47 DEG. 28 MIN. W

RECORD OF SURVEY

RADIUS OF CURVATURE METHOD

STATOIL — 24 b — COMPUTATION PAGE NO. 1

WELL NO 1/9 - 1, FILE NO.: 780 — TIME 11:21:17 — DATE 28-JAN-81

S.SHOT SURVEY, 18 - JAN - 78.

MEASURED DEPTH METERS	DRIFT ANGLE D M	DRIFT DIRECTION D M	COURSE LENGTH METERS	TRUE VERTICAL DEPTH METERS	VERTICAL SECTION METERS	RECTANGULAR COORDINATES METERS		CLOSURE DISTANCE METERS	CLOSURE DIRECTION D M	DOGLEG SEVERITY DEG/30M
0.0	0 0	0 0	0.	0.00	0.00	0.00	0.00	0.00	0 0	0.00
343.0	0 30	S 60 0 W	343.	343.00	1.46	0.75 S	1.30 W	1.50	S 60 0 W	0.04
434.0	0 30	S 63 0 W	91.	433.99	2.23	1.13 S	1.99 W	2.29	S 60 31 W	0.01
1391.0	0 15	S 59 0 W	957.	1390.97	8.33	4.17 S	7.48 W	8.56	S 60 52 W	0.01
1592.0	0 20	S 50 0 E	201.	1591.97	8.98	5.05 S	7.55 W	9.08	S 56 14 W	0.07
1771.0	0 30	S 1 0 W	179.	1770.96	9.37	6.19 S	7.03 W	9.37	S 48 37 W	0.07
2210.0	0 15	N 86 0 W	439.	2209.95	11.94	7.93 S	8.93 W	11.94	S 48 22 W	0.24
2436.0	0 15	S 64 0 W	226.	2435.95	12.77	8.12 S	9.88 W	12.79	S 50 36 W	0.02
2577.0	0 25	S 82 0 W	141.	2576.95	13.51	8.36 S	10.66 W	13.55	S 51 55 W	0.04
2884.0	2 10	N 78 0 W	307.	2883.86	18.41	8.12 S	17.54 W	19.33	S 65 10 W	0.17
2951.0	2 45	S 87 0 W	67.	2950.80	20.37	7.89 S	20.40 W	21.87	S 68 51 W	0.37
2975.0	3 20	S 73 0 W	24.	2974.76	21.44	8.11 S	21.65 W	23.12	S 69 28 W	1.12
3017.0	4 40	S 53 0 W	42.	3016.66	24.25	9.44 S	24.25 W	26.02	S 68 44 W	1.36
3053.0	5 15	S 38 0 W	36.	3052.53	27.35	11.61 S	26.46 W	28.90	S 66 19 W	1.18
3090.0	7 30	S 1 0 W	37.	3089.29	30.91	15.42 S	27.81 W	31.80	S 61 0 W	3.70
3173.0	7 0	S 6 0 W	83.	3171.63	38.45	25.87 S	28.45 W	38.45	S 47 43 W	0.29

FINAL CLOSURE - DIRECTION: S 47 DEGS 43 MINS 14 SECS W
DISTANCE: 38.45 METERS

1/9 - 6

CASING PROGRAM

SELECTION OF CASING SETTING POINTS

30" Casing : Surface casing will be set at approximately 530' RKB-TVD.

20" Casing : The 26" hole will be opened after having safely drilled a 17 1/2" pilot hole with the riser and diverter to 1550' RKB-TVD. The 20" casing will be set at 1500', a depth based on the setting of off set wells.

13 3/8"Casing: The 13 3/8" casing will be set at approximately 4500' RKB-TVD. This will place the casing shoe in the transition zone to abnormal pressure where sufficient fracture gradient can be obtained for drilling with higher mud weights.

9 5/8" Casing: The 9 5/8" casing is programmed as the production string to be set at 9400' RKB-TVD. However, if there is a possiblity of getting differentially stuck or losing circulation because of pore pressure regression, the 9 5/8" casing will be set earlier. An attempt will be made to set this string as deep as possible.

7" Liner : The 7" liner will be set at approximately 11900' RKB-TVD, the proposed T.D. of this well. The 9 5/8" casing will be drifted so that an 8 1/2" hole can be drilled to T.D.

CASING DESIGN CALCULATIONS

20", 133 lbs/ft K-55

1. ___1/9 - 6___ Field

___20___ inch O.D. Casing [X], Tubing [ ]

(1) __20__ O.D. Set at __1500__ ft

(2) __13 3/8 O.D. to be set at __4500__ ft

RH = Amount of hole to be drilled below shoe __3000__ ft

Mud weight outside casing __10.5__ ppg (MGo)

Mud weight inside casing __12__ ppg (MGi)

II. Burst

Burst is not applicable. Maximum SIP is 200 psi.

III. Collapse

A = (MGo) x (0.052) x shoe depth (1)

= __10.5__ x (0.052) x __1500__ = __819__ psi

E = Level to which fluid level will drop = __1500__ ft

OEF = Net collapse pressure without wear allowance

O'E'F" = Net collapse pressure with wear allowance

Wa = Weight of string in air = __133__ lbs/ft x

__1500__ ft = __199,500__ lbs

Wb = Buoyed weight = BF x Wa = __0.85__ x __199,500__

= __169,575__ lbs

(BF determined from Fig. 8-3, PPCo Tubular Design Manual, a function of mud weight)

Percent minimum yield = $\frac{Wb}{Ym \times Ab}$

% Min. Y = __169,575__ ÷ (__55000__ x __38.63__) = __0.08__

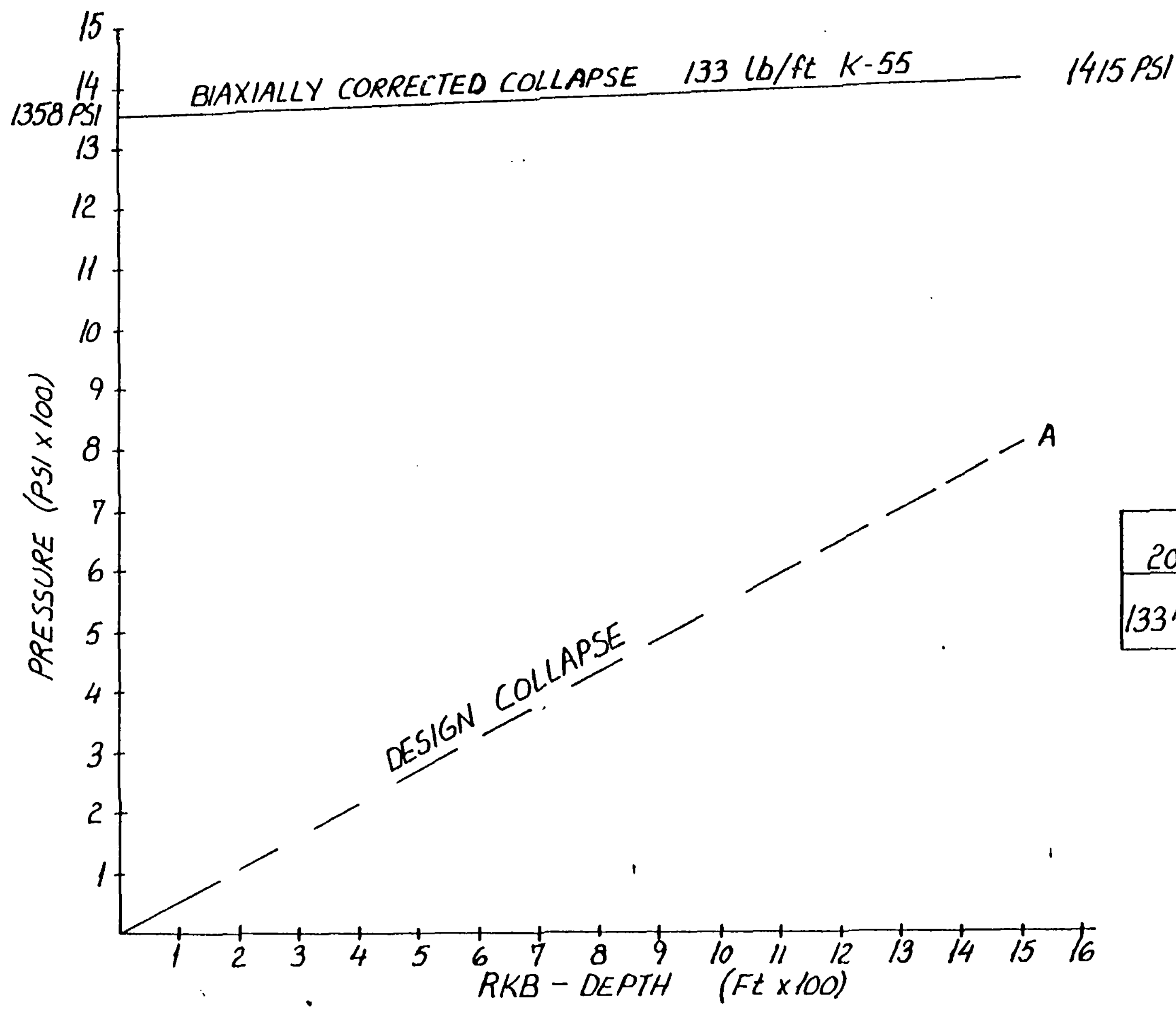
CCF = Collapse correction factor is obtained from Fig. 8-4 of PPCo Tubular Design Manual as a function of % min. Y = __0.99__

G = Biaxial rated collapse = CCF x Allowable collapse Value = __0.96__ x __1415__ = __1358__ psi

1/9-6

20" CASING DESIGN

20"	BURST	COLLAPSE
133 lb/ft K-55	2883 PSI	1415 PSI



CASING DESIGN CALCULATIONS

1. 1/9 - 6 Field

13 3/8 inch O.D. Casing [X] Tubing [ ]

(1) 13 3/8 O.D. set at 4500 ft

(2) 9 5/8 O.D. to be set at 9400 ft

RH = Amount of hole to be drilled below shoe 4900 ft

Mud weight outside casing 12.0 ppg (MGo)

Mud weight inside casing 15.8 ppg (MGi)

II. Burst

A = (MGo) x (o.052) x shoe depth (1)

= 12 x (0.052) x 4500 = 2808 psi

B = (MGi) x (0.052) x depth (2)

= 15.8 x (0.052) x 9400 = 7723 psi

Wear Factor = WF = 50 psi per 1000' of open hole ($\bar{RH}$)

WF = 4900 x 50 /1000 = 245 psi

C = Limited controlled surface pressure with partial blowout = 3000 psi (0.375 x 7723 = 2896 < 3000)

D = BC - OA = 5200 - 2808 = 2392 psi

C' = WF + C = 3245 psi

D' = WF + D = 2637 psi

III. Collapse

E = Level to which fluid level will drop = 2000 ft

OEF Net collapse pressure without wear allowance

O'E'F" = Net collapse pressure with wear allowance

Wa = Weight of string in air = 72 lbs/ft x 4500 ft = 324,000 lbs

Wb = Buoyed weight = BF x Wa 0.82 x 324,000 = 265,680 lbs

(BF determined from Fig. 8-3, PPCo Tubular Design Manual, a function of mud weight)

Percent minimum yield = $\frac{Wb}{Ym \times Ab}$

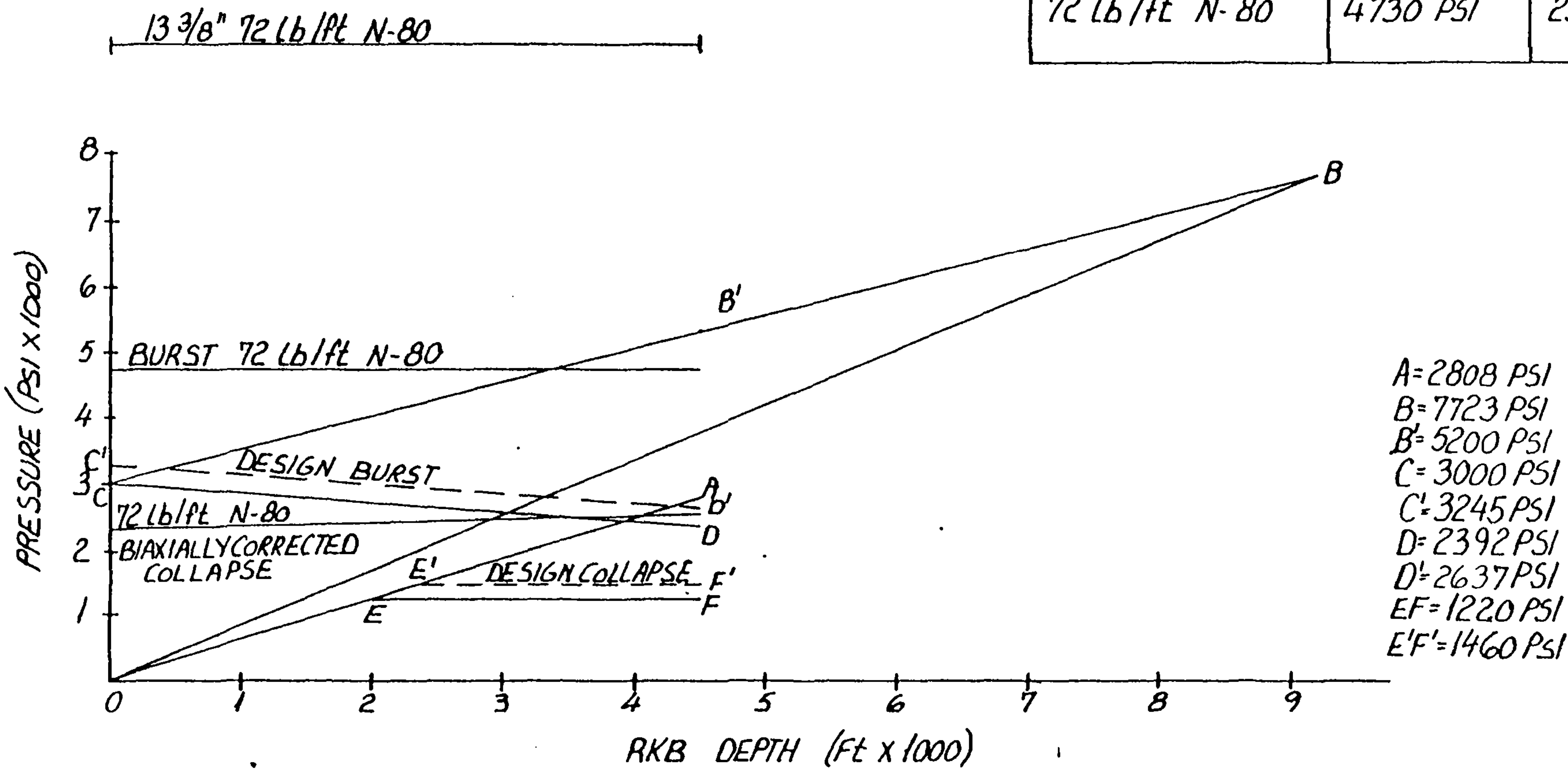
% Min. Y = 265680 ÷ (80000 x 20.77) = 0.159

CCF = Collapse correction factor is obtained from Fig. 8-4 of PPCo Tubular Design Manual as a function of % min. Y = 0.92

G = Biaxial rated collapse = CCF x Allowable collapse Value = 0.92 x 2567 = 2362 psi

1/9 - 6   13 3/8" CASING DESIGN

	BURST	COLLAPSE
72 Lb/ft N-80	4730 PSI	2567 PSI



CASING DESIGN CALCULATIONS 9 5/8", 53.5 lb/ft N-80

C-95

1. 1/9 - 6 Field

9 5/8" inch O.D. Casing ☒ Tubing ☐

(1) 9 5/8" O.D. set at 9400 ft

(2) 7 O.D. to be set at 11900 ft

RH = Amount of hole to be drilled below shoe 2500 ft

Mud weight outside casing 15.8 ppg (MGo)

Mud weight inside casing 14.3 ppg (MGi)

II. Burst

A = (MGo) x (o.052) x shoe depth (1)

= 15.8 x (0.052) x 9400 = 7723 psi

B = (MGi) x (0.052) x depth (2)

= 14.3 x (0.052) x 11900 = 8849 psi

Wear Factor = WF = 50 psi per 1000' of open hole (RH)

WF = 2600 x 50/1000 = 125 psi

C = Design for production use .7 gas gravity

= 6900 psi

D = Net Burst Design = Surface pressure + MG_i - MG_o

C' = WF + C = 7025 psi

D = 7010 + (14.3-15.8)(.052)(9400) = 6277

D' = WF + D = 6402 psi

III. Collapse

Design For Production

Wa = Weight of string in air = 53.5 lbs/ft x

9400 ft = 502900 lbs

Wb = Buoyed weight = BF x Wa 502900 x .75

= 377175 lbs

(BF determined from Fig. 8-3, PPCo Tubular Design Manual, a function of mud weight)

Percent minimum yield = $\frac{Wb}{Ym \times Ab}$

% Min. Y = 377175 ÷ (80000 x 15.55) = .303

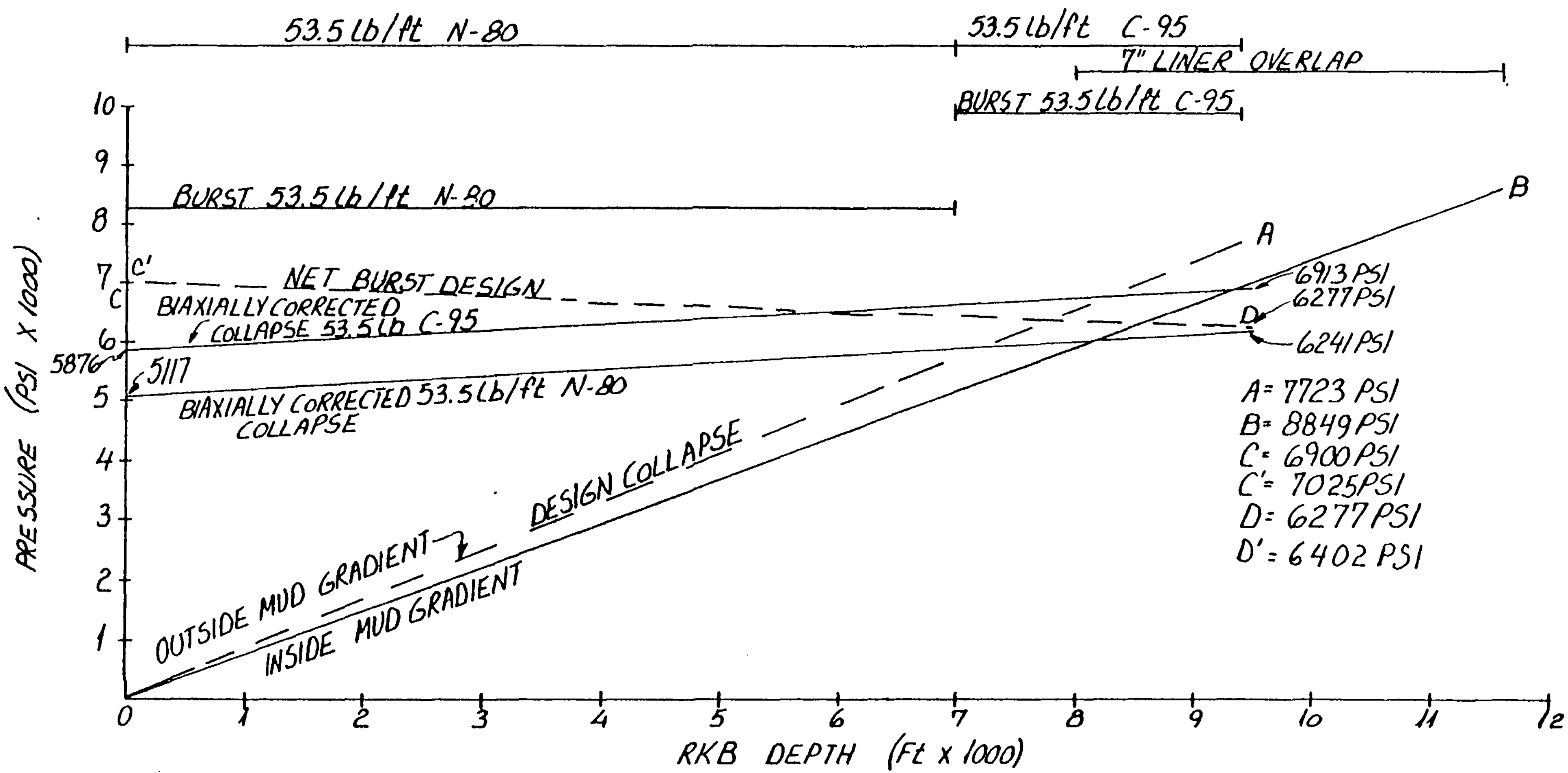
CCF = Collapse correction factor is obtained from Fig. 8-4 of PPCo Tubular Design Manual as a function of % min. Y = .82

G = Biaxial rated collapse = CCF x Allowable collapse

Value = .82 x 6241 = 5117 psi

1/9-6 , 9 5/8" CASING DESIGN

	BURST (P_{MM})	COLLAPSE
53.5 lb/ft N-80	8300 PSI	6241 PSI
53.5 lb/ft C-95	9878 PSI	6913 PSI



7" Liner, 35 lb/ft N-80

CASING DESIGN CALCULATIONS

1. 1/9 - 6 Field

7 inch O.D. Casing [X] Tubing [ ]

(1) 7 O.D. set at 11900 ft

(2) - O.D. to be set at - ft

RH = Amount of hole to be drilled below shoe - ft

Mud weight outside casing 14.3 ppg (MGo)

Mud weight inside casing ________ ppg (MGi)

II. Burst

A = (MGo) x (o.052) x shoe depth (1)

= 14.3 x (0.052) x 11900 = 8849 psi

B = (MGi) x (0.052) x depth (2)

= - x (0.052) x - = - psi

Wear Factor = WF = 100 psi per 1000' of open hole (RH)

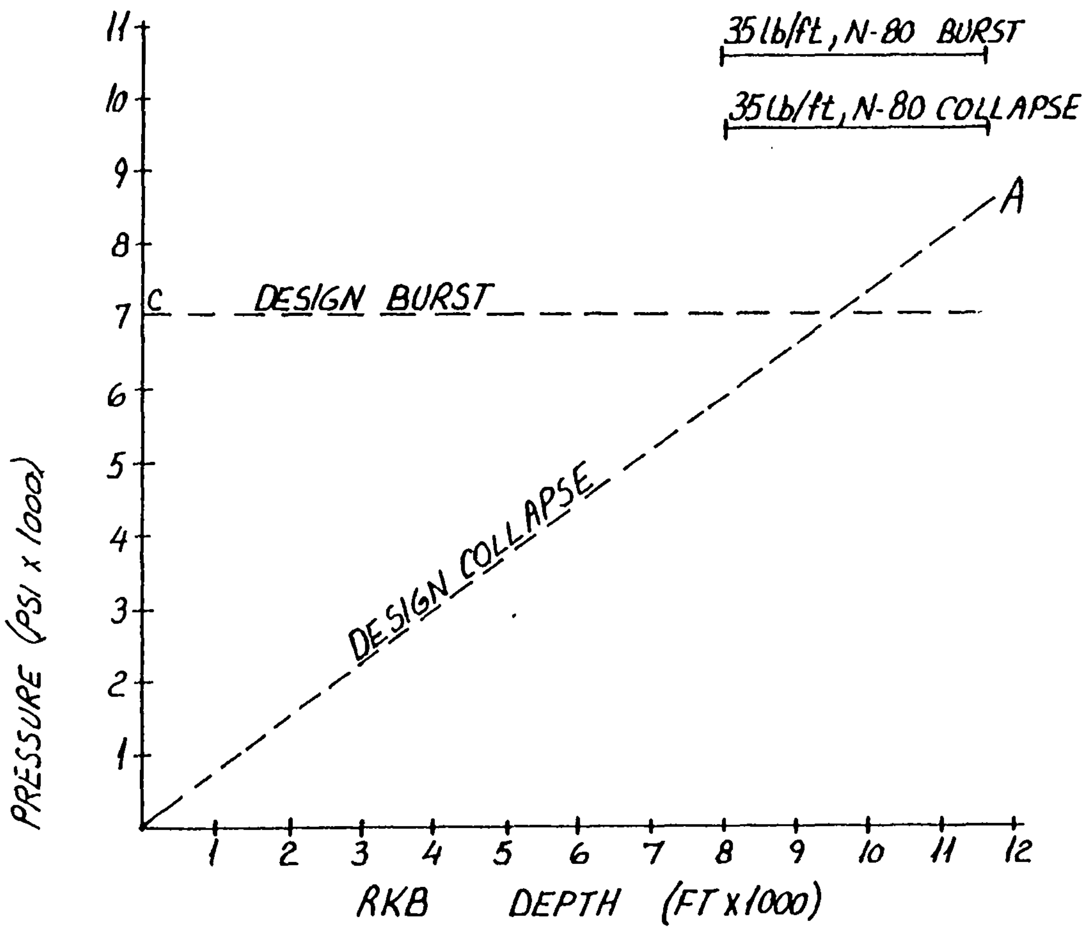
WF = - x 100/1000 = - psi

C = Max surface pressure

= 7010 psi

1/9 6 7" LINER DESIGN

	BURST	COLLAPSE
35#/ft N-80	10580	9605



A = 8849 PSI
C = 7010 PSI

CASING SPECIFICATIONS

SIZE	GRADE	THREADS	WEIGHT	PROPOSED SETTING DEPTH (RKB-TVD)
30"	X-52	Vetco Alt Connectors	460 lb/ft	530'
20"	K-55	Buttress	133 lb/ft	1500'
13 3/8"	N-80	Buttress	72 lb/ft	4500'
9 5/8"	N-80	Buttress	53.5 lb/ft	
	C-95	Buttress	53.5 lb/ft	9400'
7"	N-80	Buttress	35 lb/ft	8000-11900'

CASING ACCESSORIES

1. 30" Casing
   No accessories will be run on this casing. Weatherford/-Lamb float shoe.

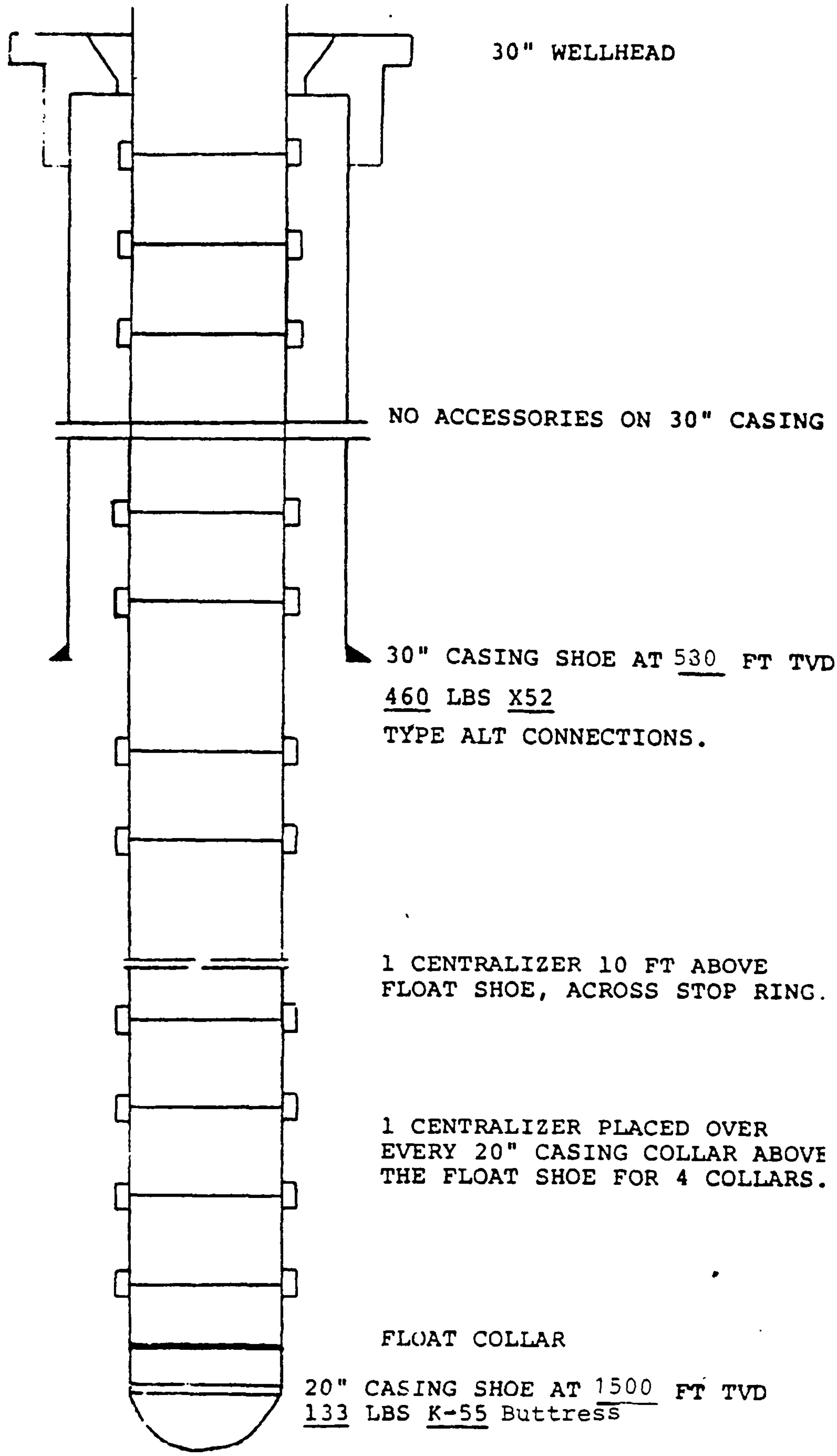
2. 20" Casing
   Run centralizers as follows:
   a) 1 Bow type centralizer 10' above float shoe across stop ring.
   b) 1 Bow type centralizer placed over every 20" casing collar above the float shoe for 4 collars.
   c) Weatherford/Lamb float collar and float shoe.

3. 13 3/8" Casing
   Run centralizers as follows:
   a) Install Bow type centralizers at 5', 45' above float shoe, across stop ring, and 1 per joint thereafter for 6 joints.
   b) Weatherford/Lamb float collar and float shoe.

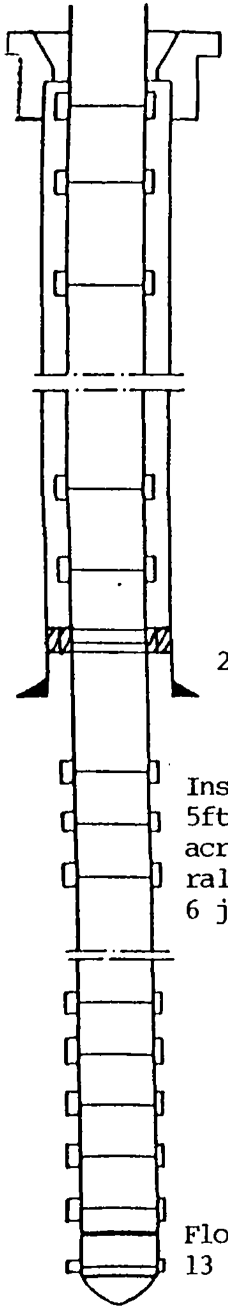
4. 9 5/8" casing
   Run centralizers as follows:
   a) 1 Bow type centralizer 10' above float shoe, across stop ring.
   b) Install 1 Bow type centralizer per joint from 100 ft above to 100 ft below 13 3/8" casing shoe.
   c) Install 1 Bow type centralizer per joint to 1000 ft above T.D.
   d) Weatherford/Lamb float collar and float shoe.

5. 7" Liner
   a) Install 1 Bow type centralizer 10 feet above float shoe, across stop ring.
   b) Install 1 Bow type centralizer per joint between two stop rings.
   c) Weatherford/Lamb float shoe.

20" CASING ACCESSORIES



13 3/8" CASING ACCESSORIES



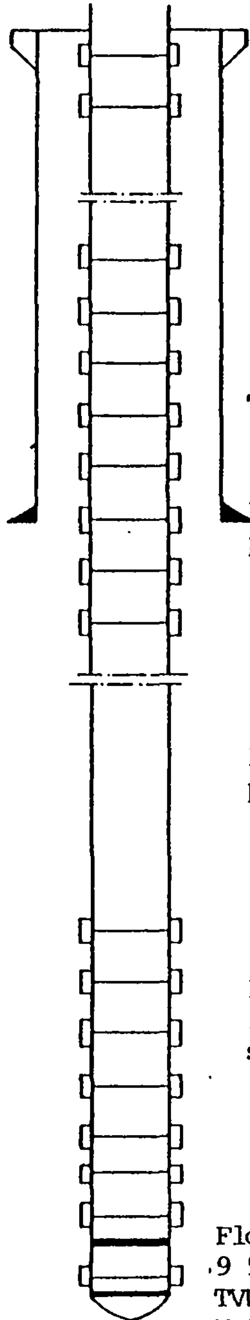
20" casing shoe at 1500ft TVD (1500ft MD) 133 lb/ft, k-55, Buttress

Install Bow type centralizers 5ft and 45ft above float shoe, across stop ring. Install 1 centralizer per joint thereafter for 6 joints.

Float collar

13 3/8" casing shoe at 4500ft TVD (4784ft MD). 72 lb/ft, N-80, Buttress.

9 5/8" CASING ACCESSORIES



13 3/8"casing shoe at 4500ft TVD(4784 ftMD).

Install 1 Bow type centralizer per joint from 100ft above to 100ft below 13 3/8" shoe.

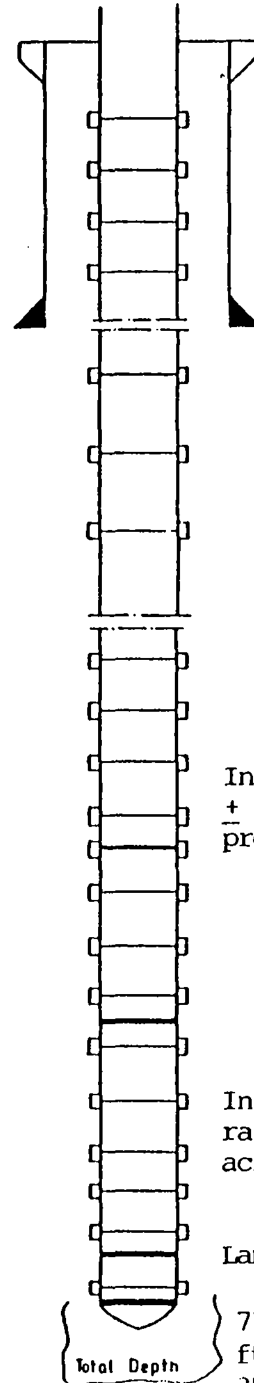
Install 1 Bow type centralizer per joint to 1000ft above T.D.

Install 1 Bow type centralizer 10 ft above float shoe across stop ring.

Float Collar

9 5/8" casing shoe at 9400ft TVD (10361 ft MD). 53.5 lb/ft N-80 and C-95. Use 2800ft of 53.5 lb/ft C-95 at bottom of

7" CASING ACCESSORIES



7" liner overlaps 9 5/8" casing by 1600 ft.

9 5/8" casing shoe at 9400 ft TVD (10361 ft MD).

Install 1 Bow type centralizer per joint between two stop rings.

Install short joints ± 20ft in area of prospective pay zones.

Install 1 bow type centralizer 10ft above shoe, across stop ring.

Landing collar.

7" casing shoe at 11900 ft TVD (13027ft MD) 35 lb/ft N-80, buttress.

1/9 - 6 CEMENT PROGRAM

WELL DATA

CASING SIZE	HOLE SIZE	SHOE DEPTH (RKB-TVD)	STATIC ^oF	CIRCULATING ^oF	SLURRY VOLUME (sacks) LEAD	TAIL
30"	36"	530'	55	55	700	200
20"	26"	1500'	80	71	1900	500
13 3/8"	17 1/2"	4500'	115	96	1900	1000
9 5/8"	12 1/4"	9400'	175	136	1900	600
7"	8 1/2"	11900'	270	220		500

CEMENT SLURRY RECOMMENDATION

30" casing	The 30" is to be cemented with 700 sacks of class G cement + 0.5 gps Econolite mixed with 7.3 gps seawater at 14.0 ppg (lead). This slurry is to be followed by 200 sacks class G cement + 0.8 gps calium chloride mixed with 4.27 gps seawater at 15.8 ppg (tail). The volume is based on 200% excess of annular open hole, with cement to the top of the casing.
20" casing	The 20" casing is to be cemented with 1900 sacks class G cement + 0.5 gps Econolite mixed with 10.45 gps seawater at 13.0 ppg (lead), followed by 500 sacks class G cement mixed with 5.0 gps seawater at 15.8 ppg (tail). The volume is based on 200% excess of annular open hole, with cement to the casing hanger.
13 3/8" casing	The 13 3/8 casing is to be cemented with 1900 sacks class G cement + 0.3 gps Econolite mixed with 9.09 gps fresh water at 13.5 ppg (lead). This is to be followed by 1000 sacks class G cement + 0.15 gps CFR-2L mixed with 4.82 gps fresh water at 16.0 ppg (tail). The cement volume is based on 50% excess of the annular open hole and the top of cement should be 600 feet below the casing hanger.
9 5/8" casing	The 9 5/8" casing is to be cemented with 1900 sacks class G cement 1.0 gps HLX-C248 mixed with 5.66 gps fresh water at 14.7 ppg (lead). This slurry is to be followed by 600 sacks class G cement + 0.22 gps CFR-2L + 0.6 gps HLX-C248 mixed with 4.16 gps fresh water at 16.0 ppg (tail). This is based on a cement volume of 50% excess of the annular open hole volume with 1000 feet of tail at bottom at 100% excess. The top of cement should be at least 1000 feet above the 13 3/8" casing shoe.

7" Liner

The 7" liner is to be cemented with 500 sacks class G cement + 0.29 gps CFR-2L + 0.9 gps HLX-C248 mixed with 3.78 gps fresh water at 16.0 ppg. The cement colume is based 50% excess of the annular open hole volume and the top of cement should be at the liner hanger 300 feet above the 9 5/8" casing shoe.

Phillips Well 1/9-6

30" Casing

Lead Slurry	Norcem Class 'G' Cement
	0.5 gps Econolite
	7,81 gps Seawater
Density:	14.0 ppg
Yield:	1.59 cu.ft./sk.
Thickening time:	6 hrs. +
Free Water:	0.9 %
Fluid Loss:	1000 + cc/30 min.
Compressive Strength:	Set NO STRENGTH at 55 deg F at 8 hrs.
	600 psi at 55 deg F at 24 hrs.

Fann:	600	300	200	100
	96	79	72	64

n' = 0.23 k' = 0.20924

Turbulent Flow:	197 BMP
Plug Flow:	28.7 BMP

Tail Slurry	Norcem 'G' Cement
	0.80 gps Calcium Chloride
	4.27 gps Sea Water
Density:	15.8 ppg
Yield:	1.15 cu.ft./sk.
Thickening Time:	4 hrs +
Free Water:	Nil

Phillips Well 1/9-6
30" Casing contd.

Fluid Loss:	1000 + cc/ 30 min.
Compressive Strength:	200 psi at 55 deg F at 8 hrs.
	1400 psi at 55 deg F at 24 hrs.

Fann:

600	300	200	100
290	201	166	146

n' = 0.387   k' = 0.20031

Turbulent Flow: 291.54 BMP

Phillips Well 1/9-6

20" Casing

<u>Lead Slurry</u>

	Norcem Class 'G' Cement		
	0.5	gps	Econolite
	10.45	gps	Sea Water

Density: 13.0 ppg.

Yield: 1.94 cu.ft./sk.

Thickening Time: 5 hr. +

Free Water: 1.2 %

Fluid Loss: 1000 + cc/ 30 min.

Compressive Strength: 500 psi at 80 deg F in 16 hrs.
810 psi at 80 deg F in 24 hrs.

Fann:	600	300	200	100
	65	57	45	39

n' = 0.30 k' = 0.08833

Turbulent Flow: 107 BPM

Plug Flow 14 BPM

<u>Tail Slurry</u>

Norcem 'G' Cement

5.0 gps Sea Water

Density: 15.8 ppg

Yield: 1.14 cu.ft./sk.

Thickening Time: 4 hrs. 30 min.

Free Water: 1 %

Phillips Well 1/9-6
20" Casing Contd.

Fluid Loss:	1000 + cc/ 30 min.
Compressive Strength:	300 psi at 80 deg F at 8 hrs.
	2500 psi at 80 deg F at 24 hrs.

Fann:	600	300	200	100
	165	108	80	59

n' = 0.581 k' = 0.03061

PV = 57 YP = 108

Turbulent Flow: 111.91 BMP

Phillips Well 1/9-6
13. 3/8" Casing

Lead Slurry	Norcem "G" Cement
	0.3 gps Econolite
	9.09 gps Fresh Water
Density:	13.5 ppg.
Yield:	1.73 cu.ft./sk.
Thickening Time:	3 hrs. 53 min.
Free Water:	0.8 %
Fluid Loss:	1000 + cc/ 30 min.
Compressive Strength:	550 psi at 110 deg F at 12 hrs.
	1175 psi at 110 deg F at 24 hrs.

Fann:	600	300	200	100
	49	36	31	27

n' = 0.33 k' = 0.04947

Turbulent Flow:	38 BMP
Plug Flow:	4.8 BMP
Tail Slurry	Norcem 'G' Cement
	0.15 gps CFR-2L
	4.82 gps Fresh Water
Density:	16.0 ppg
Yield:	1.14 cu.ft./sk.
Thickening Time:	3 hrs. 19 min.

Phillips WEell 1/9-6
13 3/8" Casing contd.

Free Water:	1.1 %
Fluid Loss:	1000 + cc/ 30 min
Compressive Strength:	625 psi at 110 deg F at 8 hrs.
	1100 psi at llo deg F at 12 hrs.
	2150 psi at llo deg F at 24 hrs.

Fann:	600	300	200	100
	48	24	15	8

n' = 1.006   k' = 0.00047

Turbulent Flow: 8.35 BPD
Plug Flow: 0.04 BMP

Phillips Well 1/9-6
9 5/8" Casing

<u>Lead Slurry</u>

Lead Slurry	Norcem 'G'		
	1.0	gps	HLX-C248
	5.66	gps	Fresh Water

Density:	14.7 ppg.
Yield:	1.36 cu.ft./sk.
Thickening Time:	4 hrs. 4 min.
Free Water:	2.0 %
Fluid Loss:	164 cc/ 30 min.
Compressive Strength:	1975 psi at 175 deg F at 16 hrs.

Fann:	600	300	200	100
	50	27	20	13

n' = 0.75   k' = 0.0028

Turbulent Flow:	11.3 BMP
Plug Flow:	0.07 BMP

Tail Slurry	Norcem 'G' Cement		
	0.22	gps	CFR-2L
	0.6	gps	HLX-C248
	4.16	gps	Fresh Water

Phillips Well 1/9-6
9 5/8" Casing contd.

Density:	16.0 ppg
Yield:	1.14 cu.ft./sk.
Thickening Time:	4 hrs. 10 min.
Free Water:	0.52 %
Fluid Loss:	140 cc/ 30 min.
Compressive Strength:	500 psi at 175 deg F at 8 hrs.
	4700 psi at 175 deg F at 24 hrs.

Fann:	600	300	200	100
	50	30	19	9

n' = 0.964   k' = 0.00071

PV = 20   YP = 30

Gel:	10 sec. - 2	10 min. - 2
Turbulent Flow:	8.91 BMP	
Friction Pressure:	0.47 psi/1000 ft. at 5 BMP	

Phillips Well 1/9-6

<u>7" Liner slurry</u>	Norcem 'G'
	0.29 gps. CFR-2L
	0.9 gps. HLX-C 248
	3.78 gps. Fresh Water
Density	16.0 ppg.
Yield	1.14 cu.ft./sk.
Thickening Time	3 hrs. 39 min.
Free Water	0.5 %
Fluid Loss	14 cc/ 30 min.
Compressive Strength	2500 psi at 255 deg F at 8 hrs.
	5000 psi at 255 deg F at 24 hrs.

Fann	600	300	200	100
	66	33	21	11

n' = 1.004 k' = 0.00066

PV = 33 YP = 33

Gel	10 sec. - 1 10 min. - 2
Turbulent Flow	6.124 BPM
Friction Pressure	16.30 psi/ 1000 ft. at 5 BPM

ATTACHMENT I

DRILLING OPERATIONAL GUIDELINES

TABLE OF CONTENTS

PHILLIPS ORGANIZATION CHART FOR EXPLORATORY WELLS:

DRILLING & PRODUCTION MANAGER

M.H. McConnell (Home phone 665616)

DRILLING SUPERINTENDENT

D.N. Cordry (Home phone 557249)

OFFSHORE DRILLING SUPERINTENDENT

C.L. Ppool

D. Sharp

RESERVOIR	GEOLOGY	DRILLING ENGINEERING
J.F. Griggs (665368)	S.L. Miles (598209)	J.W. Konst (556586)
	R.D. Zang (559443)	A.C. Sewell (696017)
		J.E. Stevens (097)66284
		E.B. Hodcroft (535928)

Statoil Organization Chart for Exploratory Wells

Reservoir	Geology	Drilling
P. Lindberg (560183)	A. Haye	I. Johnsen (576125)
	S.G. Larsen (560678)	B. Frøyland (521919)
	E. Lie (097-43889)	Ø. Håland (576765)
		T. Baker (523737)

ADMINISTRATIVE DETAILS

Reporting:

The "Phillips Daily Drilling Report" will be faxed to the Phillips base at Tananger each morning before 0600 hrs. This report covers activities from the previous 0500 to 0500 on the day of the report. While the Phillips report covers the daily activities, the IADC report is still the offical log of the well.

Drilling notes

D.N. Cordry will be in charge of Drilling Operations and located at the Phillips base in Tananger. The offshore drlg. supt. is responsible for implementing this drilling prospectus at the well site.

Helicopter transportation will be from Forus heliport and Aberdeen to the Sedco 703.

Cargo and Transportation manifest, to and from the rig, and in keeping with Phillips Petroleum Company Norway requirements, are to be fully completed.

WELL CONTROL PROGRAM

1. GENERAL

The Phillips Drilling Supervisors are responsible for the overall drilling operations. One of the primary considerations is to insure that full control of the drilling fluids is maintained at all times. They are authorized to take what action they deem necessary to carry out this responsibility.

Certain drills and procedures have been instituted and standardized to insure that a well control program is carried out by the rig crews. These procedures are not meant to relieve the Drilling Supervisor of his overall responsiblity, but are meant to assist him.

(1) Any time the mud is being circulated, and open hole is exposed, the mud weight and viscosity will be checked and recorded at least every 15 minutes in the pump room and the shale shaker. The "Daily Mud Weight Record" is to be filled out and given to the Phillips Supervisor each day.

(2) Suitable floor safety valves threaded, or with proper subs, to fit both drill pipe and drill collars are to be in an accessible place on the rig floor at all times when not in use. If possible, these valves should be of a "full opening" design for the pipe on which they will be used. The outside diameter of these valves must be such that they can be run in the hole, if necessary, without danger of hanging in BOP's, existing, or open hole.

NOTE: Use the Hydril or T.I.W. type safety valve first. The Gray inside BOP will NOT be installed unless it is so ordered by Phillips Drilling Supervisor.

(3) At all times, be aware of how much surface mud volume is on hand. Check the Pit Level Recorder for accuracy each tour.

(4) The Phillips Drilling Supervisor is to be on the rig floor at the following times:

a) At the start of each trip and until 15 stands have been pulled, and it is determined that hole fill-up is correct and no hole swabbing occurs.

b) During all flow check while tripping.

c) Whenever a core is being pulled.

d) Whenever the hole could be swabbing.

(5) A circulating pressure VS pump rate graph should be made at the start of each section of hole (see attached paper by Dick Angel). Maximum pump rate should be half the normal circulating rate. The pressure required to circulate at the half rate should be measured each tour. If this pressure does not fall on plotted line a full test should be run and new graph plotted.

(6) Either the constant drill pipe pressure method or the Dick Angel variable circulation rate method will be used in controlling a kick. The drilling contractor will have a kick control procedure to follow.

During the drilling acitivities PPCoN plans to provide two drilling supervisors on the rig. During critical operations throughout these periods, a drilling engineer will also be on location.

2. KICK CONTROL EXERCISE

The Kick Control exercise is designed to provide necessary circulating information in the event a "Kick" occurs. Additionally, the kick control drill is to be construed mandatory in order that the drill crews have basic well kill knowledge.

The Kick Control Exercise is to be performed by the driller each 12 hour tour, when major changes occur in mud properties (i.e., mud weight increased more than 2 ppg), or if the PPCoN Drilling Supervisor feels that new information is warranted.

Kick Control circulation rate is to be performed at one-half (½) the drilling strokes per minute (SPM). An additional, kick control rate at any random value is optional but not mandatory.

For example, if drilling has been performed at 100 SPM then the new Kick Control Exercise is to be performed at 50 SPM. As an option, if desired, the Drilling Supervisor can request Kick Control information at 25 SPM. Regardless of results, the drilling personnel should select an optimum time to perform the kick control drill. Accepted practice is that the driller coming on tour performs a new Kick Control Exercise at the first opportunity.

Critical points in addition to the Tourly Kick Control times are:

(1) Below each casing shoe prior to or after performing leak-off test.
and/or

(2) Just before drilling into the pay zone.
and/or

(3) When major changes have been made in the mud properties.

The Kick Control Exercise is to be reported to the IADC and Phillips Daily reports. The data is to contain SPM, GPM and standpipe pressure (psi).

3. <u>WELL KILL PROCEDURE</u>

Well kicks will be handled as instructed in the well control training program. The following points have been covered in this training program, but are again emphasized in this prospectus.

While Drilling

(1) During normal drilling operations, keep all choke line valves to the adjustable choke and mud gas separator in the open position, with the exception of the inside valves on kill and choke line.

(2) If the well commences flowing and the decision is made to shut the well in, raise the kelly cock above the rotary table, shut down the pump, open the choke line and close the hydril. Shut the well in slowly using the adjustable choke, while observing the annulus pressure. This procedure for shutting in the well is particularly important when drilling below the 20" casing shoe.

(3) If the well flows before setting 20" casing, close diverter bag. Check that one of the diverter lines is open. Pump the pre-mixed mud into the hole. If this does not control flow, pump in sea water at a high rate with additional mud as it can be mixed.

(4) If the well flows when drilling 17½" hole below 20" surface casing, exercise extreme caution when shutting the well in. In no event should the following surface pressures be exceeded:

MUD WEIGHT	MAXIMUM ALLOWABLE SURFACE PRESSURE
Sea water	200 psi
10.0	130 psi
12.0	25 psi

If the well cannot be shut in without exceeding these pressures, allow well to flow through choke line, diverting the flow out the flare line. Higher surface pressures could break down the formation at the 20" casing shoe and possibly channel to the seabed around the well.

(5) Well kicks will be circulated out, as outlined in the well killing worksheet, adjusting the choke to maintain constant bottom hole pressure.

4. WELL KILL DRILL

The Well Kill Drill is designed to train and evaluate rig crews in the practice of controlling a "kick". Additionally, the Drill will provide the opportunity to verify the working condition of chokes, valves, and gauges. The drill will give realistic training to the drilling personnel using actual equipment under a simulated well control situation.

A. PROCEDURE

1. The Drill shall be performed prior to drilling out float equipment in each casing 20" and 13 3/8".

2. Establish circulation pressure at a reduced rate and record.

3. Close the blow out preventer on the drill string and record shut-in drill pipe pressure. (This will be zero, but for the purpose of this drill, is will be assumed to be 300 psi or a pre-determined figure.)

4. Establish circulation at a reduced pump rate through the chokes. Hold sufficient back pressure so that the drill pipe pressure is equal to the reduced circulation pressure plus the 300 psi "kick", plus a 100 psi safety margin. Example: The drill pipe pressure is 400 psi at 30 strokes per minute. To control the 300 psi "kick" with a 100 psi safety margin, the chokes are adjusted so that the circulating drill pipe pressure would be 800 psi at 30 strokes per minute.
   (400 psi + 300 psi + 100 psi = 800 psi)

5. Calculate the density of the new mud weight required to contain the BHP plus the 100 psi safety margin.

6. Calculate time for new mud volume to reach the bit and the drill pipe pressure required at that time to maintain BHP plus the 100 psi safety margin.

7. The timing and response of the equipment as well as the reaction of the drill crew should be noted by the supervisors. Record the results and observations on both the IADC and Phillips Daily Drilling Reports. Choke, kill valves and lines are to be filled with water or high viscosity anticorrosion fluid for drilling operations when the well kill drill is complete.

5. <u>INCREASED PIT LEVEL TEST DRILL</u>
(Reference Standard Offshore Practice D-378)

This drill is designed to insure that the rig crews take prompt and correct action when a kick occurs. The test procedure and proper action will be discussed with the Contractor's supervisors at the beginning of each well.

The actual test or drill should be initiated without warning the drilling crew. This should be done twice a week for each crew as long as it does not interfere with critical operations. An ideal time for the drill is when drilling cement out of the casing.

The test procedure is as follows:
(1) Raise the Pit Level Float indicating an increase in surface mud volume.
(2) Observe the reaction of the driller and drilling crew to this "kick".
(3) Discuss with the driller and tool pusher.
(4) Record on Daily IADC Report and PPCo Daily Drilling Report.

The Contract Toolpusher and Phillips Drilling Supervisor are to be on the floor when the pit level increase drill is initiated. Both supervisors are to discuss the drill in detail before and after so that the results will be beneficial to all personnel.

6. FORMATION LEAK-OFF TEST

The Formation Leak-off Test is to be run below 20" 13 3/8", 9 5/8" casing shoes. The Leak-off Test is designed to ascertain the equivalent mud density at which the formation will lose drilling fluid. The Leak-off test is not designed to fracture the formation or cement bond at the casing shoe. Every effort should be made to prevent breakdown.

PROCEDURE

General: Leak-off Test should be conducted utilizing the Platform Cementing unit. New or calibrated low pressure gauges are to be used. Use the lowest pressure gauges available in order to achieve high accuracy of the test (i.e., 0-1000 psi for 20" shoe, 0-3000 psi for 13 3/8" shoe.)

(1) Upon drilling out float shoe, clean out rathole and drill 10 feet new hole. Circulate bottoms up and ascertain lithology (i.e., shale, sand, limestone, etc.).

(2) Circulate and condition mud thoroughly. Be assured mud weight in/out is balanced.

(3) Pick up BHA to just above casing shoe, rig up cement unit to drillpipe from floor standpipe manifold or choke manifold (be sure lines from cement unit to floor are flushed and loaded with drill mud). Close hydril or pipe rams.

(4) With graph paper, ruler and pencil in hand commence pumping down drillpipe slowly (NOTE: 20" and 13 3/8" casings approximately ½ BPM).
Pump down drillpipe continuously and plot gauge pressure every ½ bbl pumped.

For example:

a) Pump ½ bbl, plot pressure.

b) Pump ½ bbl, plot pressure.

c) Pump ½ bbl, plot pressure.

d) etc.

(5) Upon achieving three straight points on the graph paper, draw a straight line through the points (normally the first point is no good as this is the air-in-mud compression effect when pumping starts).

(6) Continue pumping slowly and marking the pressure reading every ½ bbl on your graph paper.

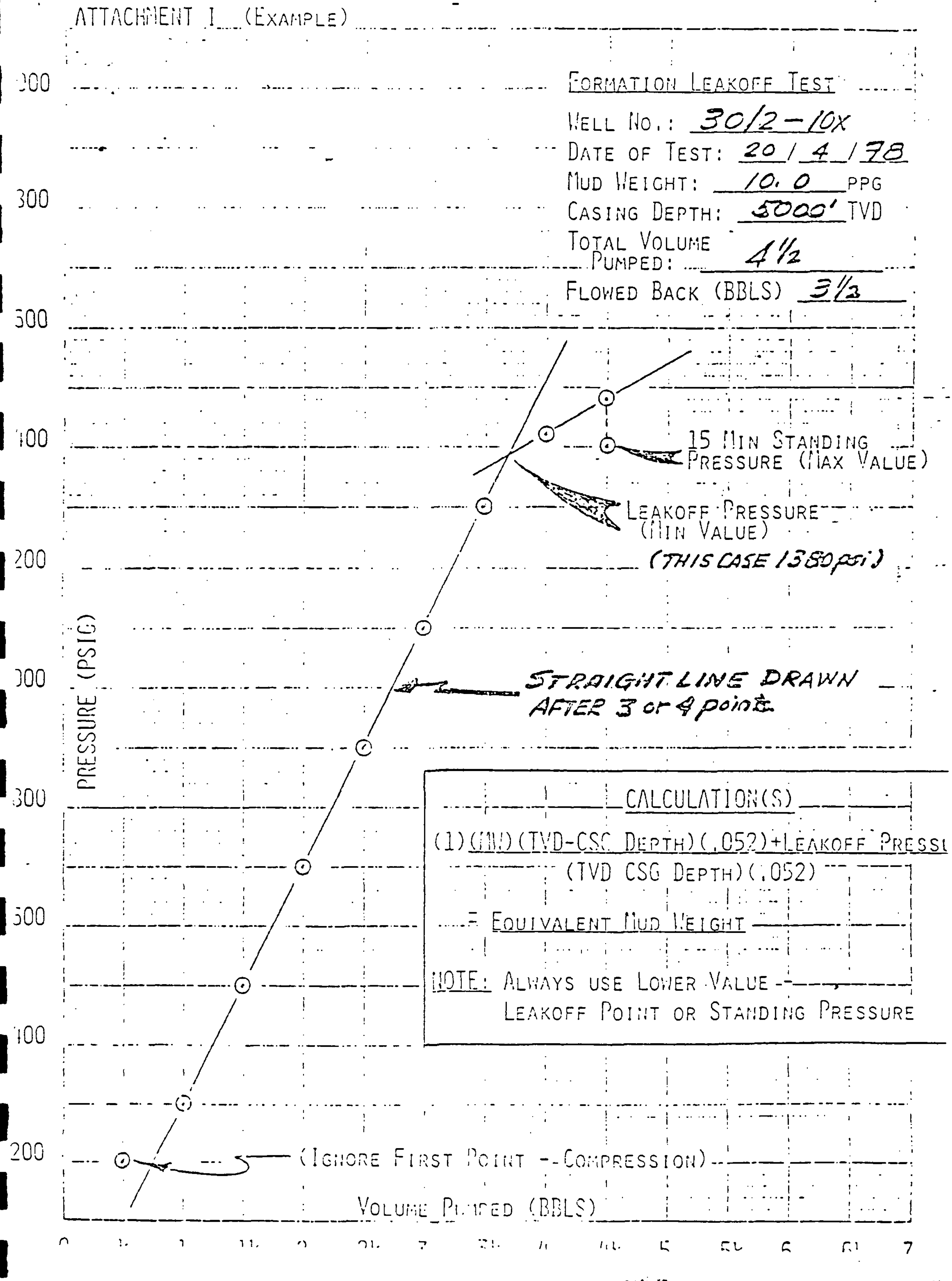
(7) When the formation starts to leak-off, the plotted point will move to the right of the straight line (you drew this line in Step 5).

(8) Take one additional pressure reading and shut down pump. Let pressure drop to a standing pressure (about 15 mins.).

(9) Record total bbls pumped and standing pressure after 15 mins. Open return line to tank and flow back. Record volume of mud flowed back. Record and report on IADC and PPCoN daily reports.

(10) While you are waiting on the pressure to reach Standing Pressure, draw a line through the two points that leaked off. Where the two lines intersect is the leak-off Pressure.

NOTE: Standing Pressure should be about the same value. Attached is a typical leak-off plot with explanations (Attachment 1).


ATTACHMENT I (EXAMPLE)
FORMATION LEAKOFF TEST
WELL NO.: 30/2-10X
DATE OF TEST: 20 / 4 / 78
MUD WEIGHT: 10.0 PPG
CASING DEPTH: 5000' TVD
TOTAL VOLUME PUMPED: 4½
FLOWED BACK (BBLS) 3½
15 MIN STANDING PRESSURE (MAX VALUE)
LEAKOFF PRESSURE (MIN VALUE)
(THIS CASE 1380 psi)
STRAIGHT LINE DRAWN AFTER 3 or 4 points
CALCULATION(S)
(1) (MW)(TVD-CSG DEPTH)(.052)+LEAKOFF PRESS
(TVD CSG DEPTH)(.052)
= EQUIVALENT MUD WEIGHT
NOTE: ALWAYS USE LOWER VALUE -- LEAKOFF POINT OR STANDING PRESSURE
(IGNORE FIRST POINT -- COMPRESSION)
PRESSURE (PSIG)
VOLUME PUMPED (BBLS)
200
300
500
100
200
000
300
500
100
200
7

NOTE: When running leakoffs below 9 5/8" casing shoe , record pressure every 1/4 bbl pumped. Accuracy will be better.

If the first leak-off looks questionable, go ahead and repeat the test to be sure. Some Drilling Supervisors on PPCo's exploration wells run these tests three times to be sure. Accuracy is important. Record and report your results on IADC and PPCoN 0500 daily report and 1500 hr report.

7. DRILLING BREAKS

When a drilling break occurs during the course of drilling operations, response of all parties must be coordinated. A significant increase in the rate of penetration is defined as a drilling break.

For purposes of drilling the Greater Ekofisk North Sea Area, a drilling break is double the normal rate of penetration. The standard practice once a drilling break encountered is:

(1) Immediately notify the Phillips Drilling Supervisor.

(2) Drill no more than 5 feet into break.

(3) Pick up off bottom, shut off pumps and check for flow or loss.

(4) a. If well is flowing, initiate well kill procedures.
b. If well is taking mud, initiate loss circulation procedures.

(5) If the well is static, the Phillips Drilling Supervisor will decide whether to circulate bottoms up or condition hole. Record and report drilling breaks on the IADC and Phillips Daily Report and the results of each break.

8. HOLE FILL-UP PROCEDURE

Improper "Hole Fill-up" practices during trips can result in well kicks and/or hole sloughing. The hole fill-up procedures described herein are to be strictly adhered to on all trips. A hole fill-up monitoring device is to be utilized where possible otherwise isolate a pit if necessary. Hole fill-up volumes and relevant data is to be provided on the Hole Fill-up Data Sheet for each trip. Theoretical fill-up volumes required for the sizes of drillpipe and drill collars normally used are shown below:

(1) 17½", 12 1/4 AND 8½" (ALL TRIPS)

(a) Fill trip tank and run returns from the pump being used to fill the hole to this tank.

(b) Pick up off bottom, stand back kelly. Check hole to see if it is full.

(c) Pull 5 stands and fill hole. Check for flow or loss. Fill every 5 stands to the casing shoe.

NOTE: When making wiper trip, go back in hole, check to be sure you got the equivalent volume of mud back as used on fill-up.

(d) When bit reaches casing shoe, shut down and check for flow or losses irregardless of fill-up results. POOH and fill up every 5 stands. When pulling Hevi-weight drillpipe, fill up every 2 stands.

(e) Upon reaching drill collars, shut down and check for flow, POOH and fill up every stand of drill collars.

(f) When running back in hole and reaching the casing shoe, shut down and check to see if equivalent mud volume returned. Check to see if hole is standing full. When on bottom, check to be sure hole is full and that equivalent mud volume returned to pits. Surging of hole is to be avoided.

(2) GENERAL NOTES

(a) If drillpipe is pulled "wet", the mud is to be returned to the hole. Drain the mud bucket in the Bell nipple. Thus, fill-up volumes will be the same as pulling dry pipe.

(b) The Driller is to submit the Hole Fill-up Sheet to the Phillips Drilling Supervisor as requested or at end of tour. Hole fill-up forms are to be completed on the rig at all times.

(c) In the event swabbing is occurring, due to bit balling, fill up through the drillpipe at the frequency directed above. For severe bit balling more frequent fill-up and circulating as deemed necessary by the PPCoN Drilling Supervisor.

DRILL PIPE	DISPLACEMENT VOLUMES	
	Bbls/ft	Bbls/5 Stands
5" OD 19.5 lb/ft x 4.275" ID	0.0065	2.97
3½" 13.3 lb/ft x 2.764 ID	0.0045	2.09
HEAVY WEIGHT DRILL PIPE	Bbls/ft	Bbls/2 Stands
5" OD x 50 lb/ft x 3" ID	0.0167	3.00
DRILL COLLARS	Bbls/ft	Bbls/Stand
9½" OD x 3" ID, 217 lb/ft	0.0790	7.34
9" OD x 3" ID, 192 lb/ft	0.0699	6.51
8" OD x 2 13/16" ID, 150 lb/ft	0.0545	5.07
6½" OD x 2 13/16" ID, 92 lb/ft	0.0333	3.10

BLOW OUT PREVENTERS

AND WELL HEAD EQUIPMENT

BOP'S RISER AND CONTROL EQUIPMENT

A. BOP STACK, 18 3/4" 10,000 PSI

1. Vetco Riser Adapter 18 3/4" 5000 M.S.P. API 6BX - 163 stainless steel lined flange DN.

2. Vetco 18 3/4" UNI-FLEX joint w/SS lined BX-163 ring groove & 18 3/4" 5000 M.S.P. API 6 BX flange.

3. Rucker - Shaffer Spherical Annular 18 3/4" 10,000 psi WP API 6-BX flange w/stainless steel lined BX-164 ring groove bottom & 18 3/4" 5000 psi WP API 6 BX studded face w/stainless steel lined BX-163 ring groove top.

4. Vetco H-4 connector 18 3/4" 5000 M.S.P. style "E" high angle release w/ 18 3/4" 10,000 M.S.P. clamo hub.

5. Vetco 18 3/4" 10,000 MSP Marine riser mandrel w/style "K" H-4 pin up & 18 3/4" 6 BX-164 flange down.

6. Rucker -Shaffer 18 3/4" - 10,000 psi WP DBL LWS BOP STD'D TOP, FLG'D BTM & (4) 3 1/16" 10,000 psi STD'D OTLTS, & 14" Poslock.

7. Rucker - Shaffer 18 3/4" - 10,000 psi WP LWS DBL BOP STD'D TOP & BTM w/(4) 3 1/16 " 10,000 psi STD'D OTLTS & 14" Poslock.

8. Vetco H-4 connector w/18 3/4" - 10,000 psi API 6-BX flange & BX - 164 ring groove up w/extended length neck.

B. 703 STACK - CHOKE AND KILL VALVES

The stack is fitted with McEvoy type EDU valves in the following arrangement:

Lower Kill Valves

McEvoy gate valve. 3-1/16" 10,000 lbs BX-154 ring groove, no. 5 clamp. Model EDU CROSS. (Inner kill)

McEvoy gate valve 3 1/16" 10,000 lbs BX-154 ring groove, no. 5 clamp. Model EDU STRAIGHT. (Outer kill)

Upper kill valves

McEvoy gate valve 3-1/16" 10,000 lbs BX-154 ring groove, no. 5 clamp. Model EDU ANGLE. (Inner kill valve).

McEvoy gate valve. 3-1/16" 10,000 lbs BX-154 ring groove, no. 5 clamp. Model EDU STRAIGHT. (Outer kill).

(Lower) Choke Valves

McEvoy gate valve 3-1/16" 10,000 lbs BX-154 ring groove, no. 5 clamp. Model EDU ANGLE (Inner choke).

McEvoy gate valve, 3 1/16" 10,000 lbs BX-154 ring groove, no. 5 clamp. Model EDU STRAIGHT. (Outer choke).

C. GUIDE LINE TENSIONER - 16,000 lbs. - 40 Ft. Travel

Length retracted	224 IN
Length extended	344 IN
Weight	3800 lbs.
Cylinder bore	7 IN
Cylinder stroke	120 IN
Maximum Operational Air Pressure	1900 PSI
Maximum Tension (Single Line)	16,000 lbs.
Maximum Wire Line Travel	40 FT.
Line Speed	Over 300 FPM
Oil Volume (normal contained in reservoir and cylinder during operation)	11 U. S. GAL
Air-Oil Reservoir Pressure (operational)	15 to 70 PSI
Relief Valve Setting (Air-Oil Reservoir)	95 PSI - normal
Relief Valve Setting (Ari-Oil Reservoir)	120 PSI -maximum

SHEAVES

OD	28 IN
Tread diameter	25 3/4 IN
Bearing Type	Tapered Roller
Wire Rope Groove	3/4 IN DIA

OIL TYPE - AIR-OIL RESERVOIR

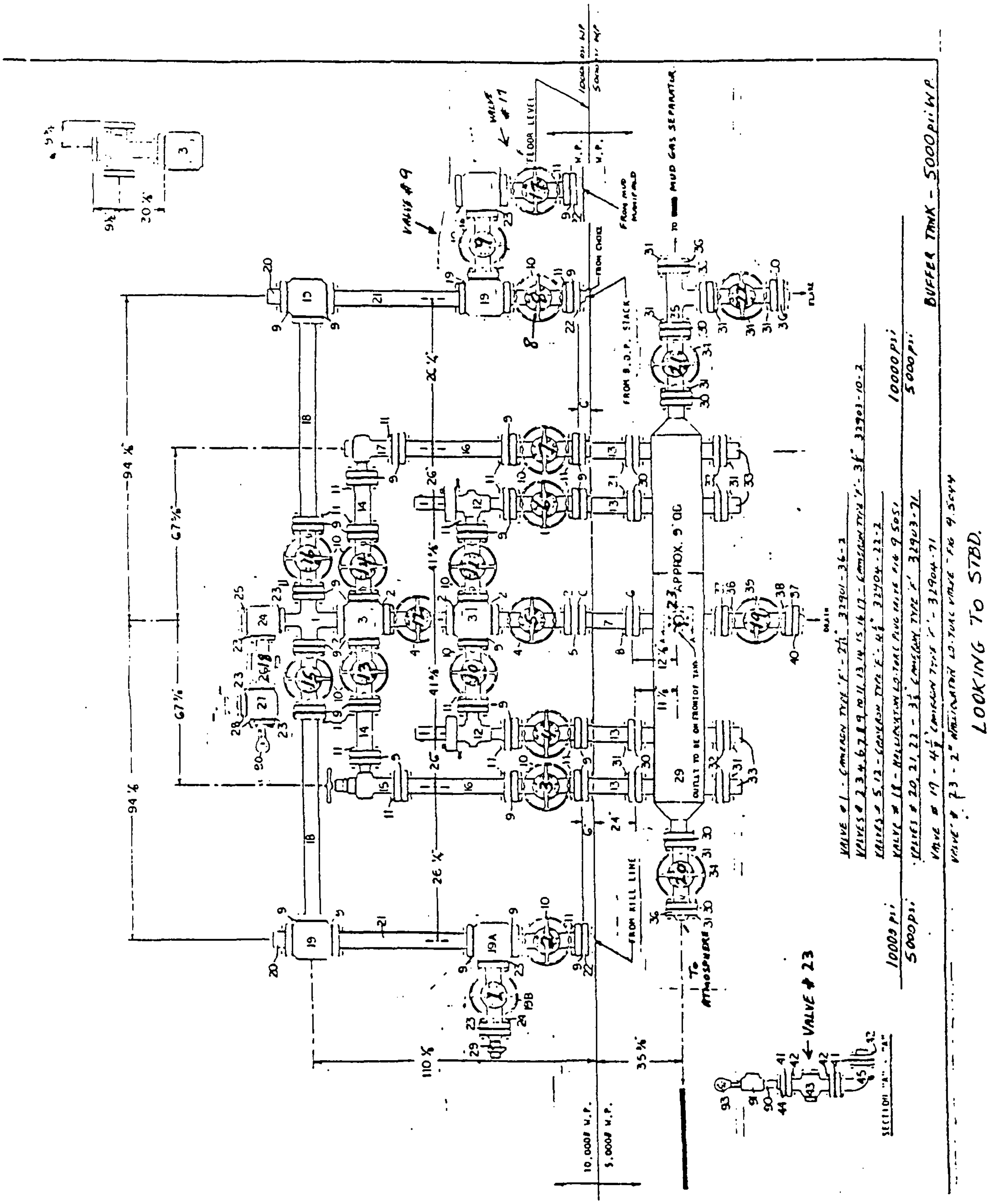
Standard	Pydraul 29E LT
for 20° - 140° Operation	Monsanto Company

For lower temperature operation, or for other fluids, consult Rucker for substitute fluid.

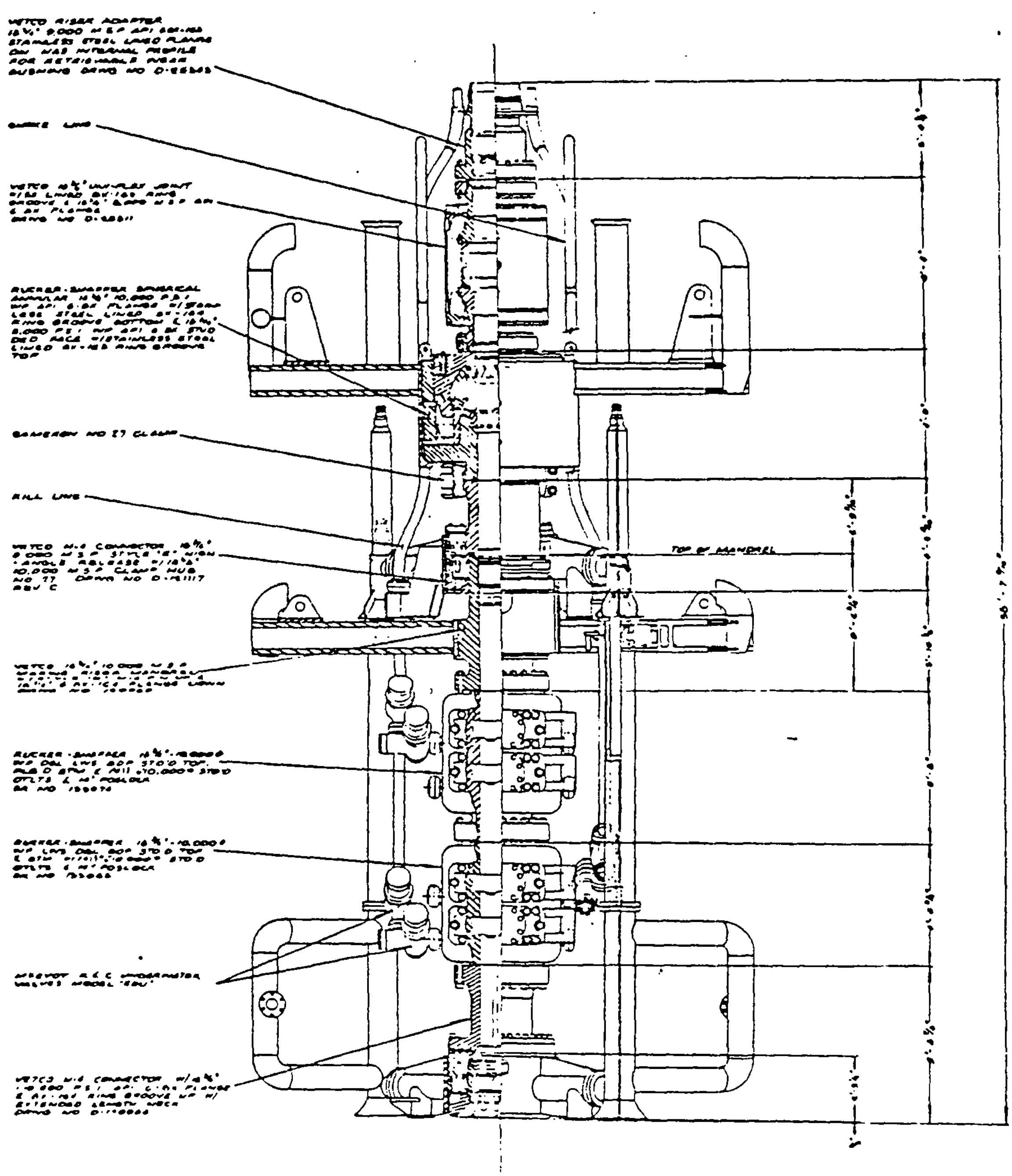
AIR PRESSURE VESSEL

Maximum Operational Pressure	2400 PSI
Standard Volume (Contained)	275 U.S. GAL or 140 U.S. GAL or 70 U.S. GAL

CAMERON 10,000 PSI CHOKE MANIFOLD.



18 3/4" 10,000 PSI STACK



BLOWOUT PREVENTER AND WELLHEAD PROGRAM

Wellhead: Cameron subsea wellhead with H-4 top preparation.

While drilling the 17½" pilot the 30" Pin connector, ball joint, 20" riser, telescopic joint and diverter will be used.

While drilling 17½", 12 1/4" and 8 1/2" holes, the 18 3/4" BOP stack will be used.

Testing of Blowout Preventer and Accessory Equipment:

I General

All tests will be witnessed by the Phillips Drilling Supervisor who will also sign the test report. Check and record volumes of hydraulic fluid and time needed for each function.

II Initial Installation Tests

A. Before running BOP stack test blind/shear rams, pipe rams and valves to full working pressure and annular preventers to 75% of working pressure as outlined in the testing procedure. All lines and equipment used in the test are to be washed and filled with water before each test.

B. Immediately after installation test pipe rams and valves to full working pressure and annular preventers to 75% of working pressure as outlined in the testing procedure. All lines and equipment are to be washed and filled with water before test. Run function test on one pod and full pressure test on the other pod, leaving system on this last pod after test.

III Subsequent Tests

A. Pressure test BOP equipment to the maximum calculated pressure the casing will be subjected to (these pressures are given in the test procedure) before drilling out of set casing and weekly on the first trip out of the hole after 00:01 a.m. each Tuesday. Use the same procedure as before.

B. A blowout preventer equipment function test is to be conducted during each trip out of the hole. Each station, remote and main controls, is to be tested. The function tests include blind/shear rams (make sure the hole is free of any pipe....).

C. After any repairs or on reinstallation after pulling, test BOP equipment to full working pressure for any item replaced or repaired and to maximum calculated pressure the casing will be subjected to for remainder of equipment. Do not exceed 75% of annular preventer working pressure.

D. Prior to starting well test program test blind/ shear rams, pipe rams and valves to the maximum calculated pressure the casing will be subjected to and annular preventer to 75% of working pressure.

A BOP pressure test work sheet is attached. This form should be used when testing BOP.

At time of installation of BOP stack all valves in the choke manifold should be tested to full working pressure against the closed gate.

IV <u>Special Mention to Safety Precautions</u>

A. One pump unit operator is to be stationed at the high pressure pump at all times during test. The operator is to stay in continuous contact with the rig floor. The "Phillips" supervisor or the Drilling Contractor Supervisor are the only persons to go into the test area to inspect for leaks when the equipment is pressurized. Rig crews are to stay clear of the area until the supervisor has contacted the pump operator and has made certain that all pressure has been released. The rig crews may then go into work area to repair leaks or carry out other work as directed.

B. All lines, swings, and connections that are used in the testing of the blowout preventers are to be adequately secured in place.

C. Pressure is to be released only through the pressure release lines that are vented back into reservoir, on the pump unit. The lines are clamped down as well as being fixed with swivels to direct the flow into the reservoir(s).

TEST PROCEDURE FOR 18 3/4 BOP STACK AND ACCESSORY EQUIPMENT

GENERAL

The maximum working pressure of all this equipment is 10000 PSI except for bag type preventers derrick standpipe and rotary hoses: 5000 PSI.

The required test pressures will be while drilling:

17½	3000 psi on all equipments rated at 10000 psi
	3000 psi on bag pipe preventers....
12 1/4	7000 psi
	3500 psi
8 1/2	7000 psi
	3500 psi

All pressure tests are to be held 15 minutes.
After each test if mud has or may have entered the choke or kill line, wash these lines with water or any kind of viscous fluid with anticorrosion additives but avoid leaving solids in suspension in lines. They may settle on the valves.

CHOKE MANIFOLD TEST

Open all valves on choke and kill lines. Pump in a few bbls of water. Close and test each valve independently. The tests of the testing unit, the lines, choke manifold, choke and kill lines should be over by the time the test tool is seated in the wellhead.

BOP TESTS

NO.1

Close the middle pipe ram. Fill up pipe w/water to detect any leak at test plug. Test at required pressure down kill line. Release pressure at pump unit. Open rams.

NO.2

Test of the lower pipe rams to be the same as test No.1

NO.3

Close upper spherical preventers. Close inside choke line valves. Test at required pressure pumping down kill line. Release pressure at pump unit. Open upper sphercical preventer.

NO.5

Close upper pipe rams. Close inside choke line valves. Test inside choke valves and upper pipe rams with the required pressure through the kill lines. Release pressure at the pump.

NO.6

Leave upper pipe rams closed. Open inside choke line valves. Close outside choke line valves. Test outside choke valves to required pressure through the kill lines. Release pressure at the pump. Open upper pipe rams. Retrieve test string leaving test plug in place.

NO.7

Close blind shear rams. Open lower outside choke line valve. Close outer kill line valve. Test valves and blind shear rams to required pressure through lower choke line. Release pressure at the pump.

NO.8

Leave blind shear rams closed. Close upper inside choke line valve. Open upper outside chokeline valve. Close inside kill line valve. Open outside kill line valve. Test to required pressure through lower choke line. Release pressure at the pump. Retrieve test plug.

NO.9

Test drillpipe safety valves to required pressure. Wash through kelly and stand pipe with water.

NO.10

Test kelly cock below swivel to required pressure. Release pressure at pump unit.

COMMENTS

Record test on IADC Report and BOP check list. Pump high viscosity and anticorrosion fluid in kill and choke lines. When this fluid is at the bottom of the lines, close all valves and leave in this state.

BOP TEST

18 3/4" 10,000 PSI WP STACK

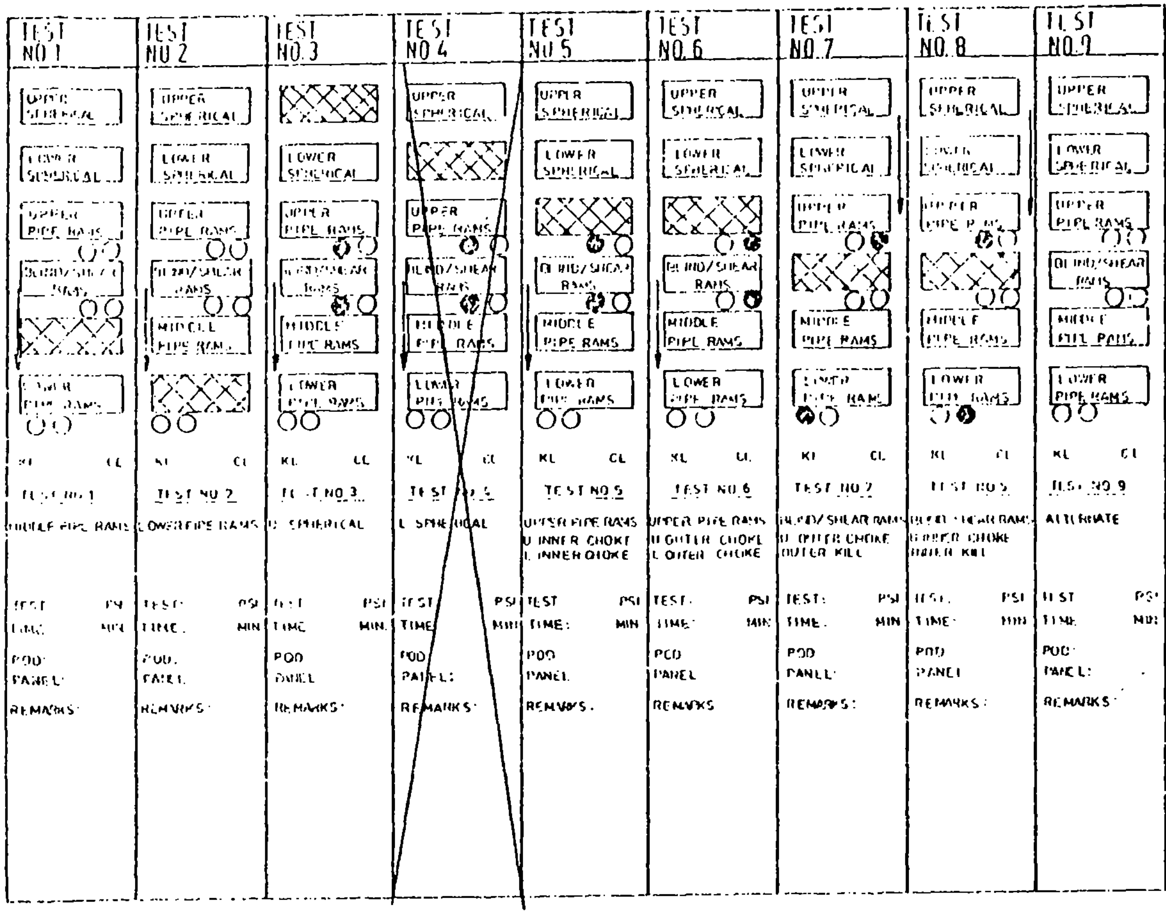
OPERATOR: ______________________

WELL ______________ WATER DEPTH ______________

LAST CASING: SIZE ______ GRADE ______
WEIGHT ______ DEPTH ______
BURST ______ COLLAPSE ______

DATE OF TEST: ______________

DATE OF LAST TEST: ______________



NOTE:

A. PRIOR TO TEST NO 1 FLUSH KILL AND CHOKE LINES WITH CLEAR WATER, THEN CLOSE UPPER KILL LINE AND PRESSURE UP TO APPROX 300PSI ON KILL LINE. OPEN VALVE AND OBSERVE PRESSURE DROP. THIS IS TO INSURE THAT ALL VALVES ARE IN CORRECT POSITION.

B. PRIOR TO STEP 7 THE UPPER OUTER CHOKE AND LOWER OUTER CHOKE VALVE SHOULD BE CLOSED. PRESSURE UP CHOKE LINE TO APPROX 300 PSI THEN OPEN THE LOWER INNER CHOKE VALVE AND OBSERVE PRESSURE DROP.

C. PANELS TO BE DENOTED: DRILLING PANEL - D
MINI PANEL IN OFFICE - M
ACCUMULATOR UNIT - A

D. AT COMPLETION OF TEST PUMP HIGH VISC ---- ANTI CORROSION FLUID IN KILL AND CHOKE LINES

SURFACE EQUIPMENT TEST

UPPER KELLY COCK ______________
LOWER KELLY COCK ______________
DRILL PIPE SAFETY VALVE ______________

CHOKE MANIFOLD PRESSURE CHECK:

1. CIRCULATED CLEAR FRESH WATER THROUGH MANIFOLD [ ] YES [ ] NO
2. PRESSURE TESTED EACH MANIFOLD GATE VALVE: [ ] YES [ ] NO
3. PRESSURE TESTED EACH MANIFOLD PLUG VALVE [ ] YES [ ] NO
4. SIZE OF POSITIVE CHOKE BEANS INSTALLED: ______________
5. LAST DATE PRESSURE GAUGE CALIBRATED: ______________
6. FUNCTION OPERATED REMOTE ADJUSTABLE CHOKE [ ] YES [ ] NO
7. REMOTE GAUGES OPERABLE [ ] YES [ ] NO DATE LAST CALIBRATION? ______
8. PRESSURE RATING OF BUFFER TANK? ____ psi

IMPORTANT:
TEST ANNULAR TO ___ % OF WORKING PRESSURE (WP: 5000 psi)

SYMBOLS:

- ● CLOSED FAILSAFE VALVE
- ○ OPEN FAILSAFE VALVE
- KL - KILL LINE
- ▨ CLOSED RAM/ANNULAR
- ☐ OPEN RAM/ANNULAR
- CL - CHOKE

SIGNATURE CONTRACTORS REPRESENTATIVE ______________

SIGNATURE PHILLIPS REPRESENTATIVE ______________

PROCEDURE FOR TESTING PACK-OFFS

1. Run and cement casing as per drilling program.

2. Calculate volumes to test seal assembly to initial (V_1) and final (V_2) test pressure using the following equation. Also calculate the volume necessary to pressure up against top of cement to initial pressure (V_3).

$$V = V_i C_p P$$

V_i = Initial volume, which is the volume of line from pump to choke or kill line, plus volume of choke or kill line, plus volume of fluid inside stack which is being compressed. Volume in barrels.

C_p = Compressibility of fluid:
For water = 0.000003
For mud = 0.0000025

P = Pressure in psi:

Initial pressure:	1000 psi - 13 3/8" 3000 psi - 9 5/8"
Final Pressure:	Same as test pressure of BOP stack while drilling out respective casing.

3. Close lower pipe rams and pressure up to initial pressure while carefully noting the volume of fluid used. This is to check the calculated volume (V_1). Bleed off pressure and open rams.

4. Without pack-off set, pump up to initial pressure but do not exceed calculated volume (V_3). This is to verify the annulus is not sealed close to the pack-off. Bleed off pressure.

5. Set pack-off. Pick up approximately 1 foot and circulate to clear any debris in area of stack.

6. Run back in and test pack-off to initial pressure. Volume should be close to calculated volume (V_1). If not, pack-off is not set!

7. Until pack-off holds initial pressure, do not continue with higher pressure.

8. After getting initial test, test pack-off to final pressure, increasing pressure in 500 psi steps. Take careful notice of volumes pumped. They should be close to those calculated, but <u>in no case pump more than volume necessary to get initial pressure down to top of cement (V_3)</u>.