PETROFINA EXPLORATION AUSTRALIA S. A.

ARCHER - 1

FINAL WELL REPORT

GEOLOGICAL WELL PROGNOSIS

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ARCHER - 1

FINAL WELL REPORT

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May 1990

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1. INTRODUCTION

The Archer Prospect lies within the Archer Wrench Zone, the northern bounding fault system of the Omeo Terrace in the VIC/P20 Permit, approximately 100km from the Victorian coast. The nearest producing oilfield is the Kingfish field, 22km to the northwest. The Anemone-1/1A well lies 2km to the northeast, immediately basinward of the Omeo Terrace. The nearest well on the Omeo Terrace is Moray-1, 25km to the southwest.

Since the drilling of Angler-1 and Anemone-1/1A, and the completion of a comprehensive seismostratigraphic study, additional horizons (seismic sequence boundaries) have been tied in, and an updated depth conversion applied.

The proposed well location is on in-line GF88B-80 at CDP 580 (X = 613,829 and Y = 5,708,073). Water depth at this location is 164m. The well will be designed to penetrate 150m below the top of Campanian "2" Sandstone to a predicted total depth of 3950mss. Provision will be made, however, to continue drilling to a maximum of 200m below the top of the UK1 Sandstone, with a predicted total depth of 4360mss, in the event that favourable results are obtained in the higher reservoirs.

Primary reservoir targets are within the UK2 unit at prognosed depths of 3629mss and 3800mss. Secondary targets are deltaic sandstones within the UK3 and UK3.1 sequences, and the top UK1 sandstones.

The principal exploration risks are lateral sealing along faults bounding the prospect.

GENERAL DATA SUMMARY

Well Name:	Archer-1
State:	Victoria, Australia
Basin:	Gippsland
Licence:	VIC/P20
Co-ordinates:	Seismic Line GF88B-80 CDP 580
- geographic:	Lat 38°46'08" S
	Long 148°18'36" E
- UTM:	613,829 E
	5,708,073 N
Water Depth:	164m
Operator:	Petrofina Exploration Australia 30%
Partners:	OPIC 30%
	JGL 30%
	Bridge 10%

Primary Objectives

(i) **Intra UK2 (Campanian "1" Sandstone)**

Depth:	3629 mss
Lithology:	Upper shoreface sandstones
Trap:	Anticline with fault-dependent closure and partial 4-way dip closure

(ii) **Intra UK2 (Campanian "2" Sandstone)**

Depth:	3800 mss
Lithology:	Upper shoreface sandstones
Trap:	Anticline with fault-dependent closure and partial 4-way dip closure

Secondary Objectives

(i) **Top UK3.1 Sandstone (Campanian)**

Depth:	3425 mss
Lithology:	Deltaic sandstones
Trap:	Anticline with fault-dependent closure and partial 4-way dip closure

(ii) **Intra UK3.1 Sandstone "A" (Campanian)**

Depth:	3540 mss
Lithology:	Deltaic sandstones
Trap:	Anticline with fault-dependent closure and partial 4-way dip closure

(iii) **Intra UK3.1 Sandstone "B" (Campanian)**

Depth:	3590 mss
Lithology:	Deltaic sandstones
Trap:	Anticline with fault-dependent closure and partial 4-way dip closure

(iv) **UK1 Sandstone (Santonian Sandstones)**

Depth:	4160 mss
Lithology:	Upper shoreface sandstones
Trap:	Entirely fault-dependent downside structural closure

2. GEOLOGY

2.1 Regional Setting

The Archer Prospect is located in the southwest of the Gippsland Basin in the central part of Permit VIC/P20, some 100 kms from the Victorian coast.

The evolution of the Gippsland Basin was controlled by four major tectonic phases. The first is characterised by rifting in late Jurassic/early Cretaceous time (ending 95 Ma, Cenomanian), and is associated with the separation of the Australian and Antarctic plates. The deposition of the Strzelecki Group, which includes abundant volcanic units, took place during this time. The rift phase was succeeded by a rift-drift phase (ending 80 Ma, Campanian) which gave rise to the deposition of the oldest prospective sequences in the Latrobe Group, mainly the UK1 and UK2 units.

The 80 Ma event was followed by a major marine transgression across the basin, giving rise to clear angular unconformities on the basin margin. It marked the onset of a complex tectonic regime, including wrenching and inversion, linked to the opening of the Tasman Sea. The Tasman Basin tectonic phase ended at 50 Ma (Eocene). During this phase, second order tectonic events caused a series of major erosional transgressions followed by depositional regressive sequences. These regressive sequences include the UK3, UK4, UK5 and base Tertiary units of the Latrobe Group. Sedimentation took place in widely varying environments ranging from non-marine upper coastal plain near the Basin margin, to offshore marine in the Central Deep. This has been yielded a complex assemblage of sedimentary facies with variable reservoir, seal and source potential.

The final phase in the Basin development was a period of widespread thermal sag with deposition of the deep marine Seaspray Group.

2.2 Structure

The Archer Prospect is defined by the 3-D seismic survey acquired in 1988. Depth maps at top UK1, Base UK3 and top UK3.1 and a seismic line are shown on Figures 1 and 2. The Prospect comprises stacked reservoirs in a faulted anticline with both 4-way dip and fault closure.

2.2.1 Structure at Top UK1 (Top Santonian)

At the level of the Top UK1 sequence boundary, the Archer Prospect comprises a downside, entirely fault-dependent structural closure dipping to the northeast against the southern bounding fault. Vertical relief at this level is approximately 100m.

2.2.2 Structure at Base UK3 (Early Campanian) and UK3.1 (Intra UK3 Event)

The Base UK3 angular unconformity is a major seismic sequence (megasequence) boundary throughout the Basin, corresponding to the onset of Tasman Basin tectonism at approximately 80 Ma. Within the Archer Prospect, this level and the underlying UK3.1 horizon are strongly flexed into downside domal closures. These are mainly fault-dependent against both northern and southern bounding faults, with total vertical closures of up to 150m for Base UK3 and 75m for UK3.1. At least 25m of closure at both levels is fault independent.

2.3 Objectives

Reservoir predictions for the Archer Prospect are based on facies extrapolation from Anemone-1/1A, 1750m to the northeast.

The primary objectives are the Campanian "1" and "2" sandstones encountered in the UK2 interval at Anemone-1/1A. These reservoirs are interpreted as shallow marine sandstones deposited predominantly in a lower shoreface environment. Both sandstones

are expected to be preserved at Archer, but to be better developed owing to the more proximal position of Archer, possibly occurring as upper shoreface sandstones at the proposed well location. The reservoir potential of these two sandstones was confirmed at Anemone-1/1A where both were found to be hydrocarbon bearing. Minimum reservoir thicknesses of 100m are anticipated for each of the primary objectives.

Secondary objectives include units UK3 and UK3.1 deltaic to shallow marine sandstones and lower UK2 (Santonian) sandstones equivalent to those discovered at Anemone-1/1A.

In contrast to the units UK1 and UK2, depositional environments probably differ markedly between Anemone-1 and Archer in unit UK3, as the deltaic and shallow marine facies at Anemone-1/1A are expected to pass proximally into deltaic facies interfingered with coastal plain sequences. The two excellent sandstones in the intervals 3840-3855m and 3880-3913m in Anemone-1/1A (Intra UK3.1 "A" and "B" sandstones) and the sandy interval at Top UK3.1 have been extrapolated into the Archer Prospect. These are considered as secondary targets owing to the higher risk related to vertical seal integrity in that interval.

The UK1 reservoir is regarded as a secondary target owing to the high risk related to lateral sealing by the fault. If results from shallower reservoirs suggest that the fault does not seal, this objective will not be drilled.

Reservoir parameters have been taken from the log evaluation at Anemone-1/1A and corrected for the shallower depth at Archer. These are presented in Table 1.

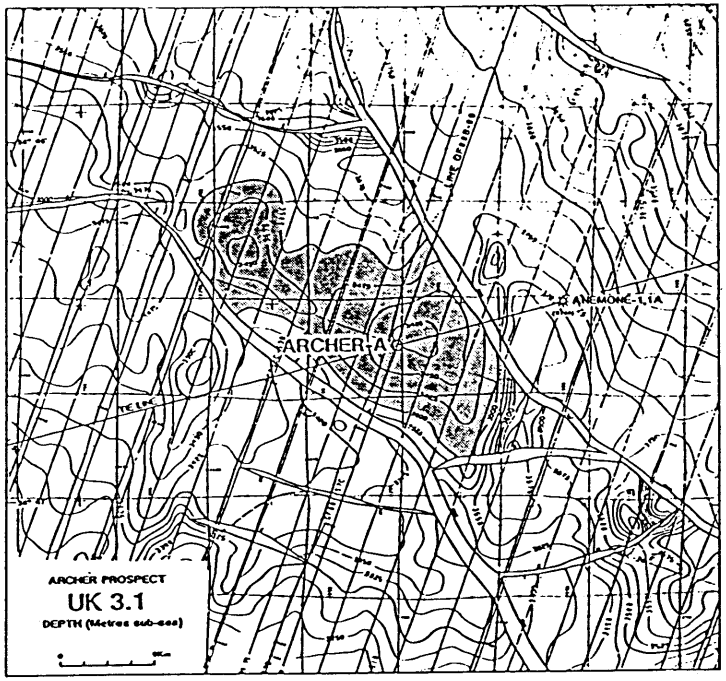
The other intra-Latrobe Group sediments from Palaeocene down to top UK3 are expected to have been deposited in coastal plain and near shore environments. These have low hydrocarbon entrapment potential owing to poor seal development as demonstrated in other VIC/P20 wells.

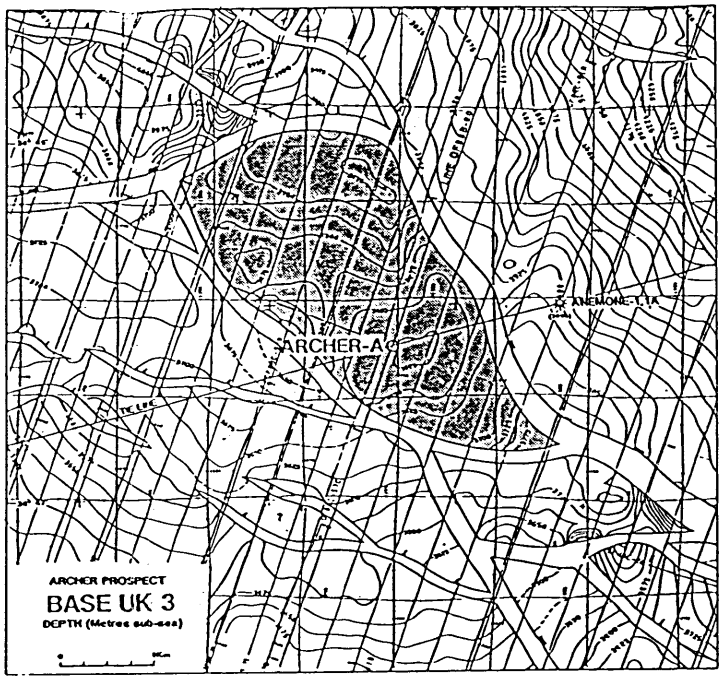
2.4 Hydrocarbon Sources and Migration

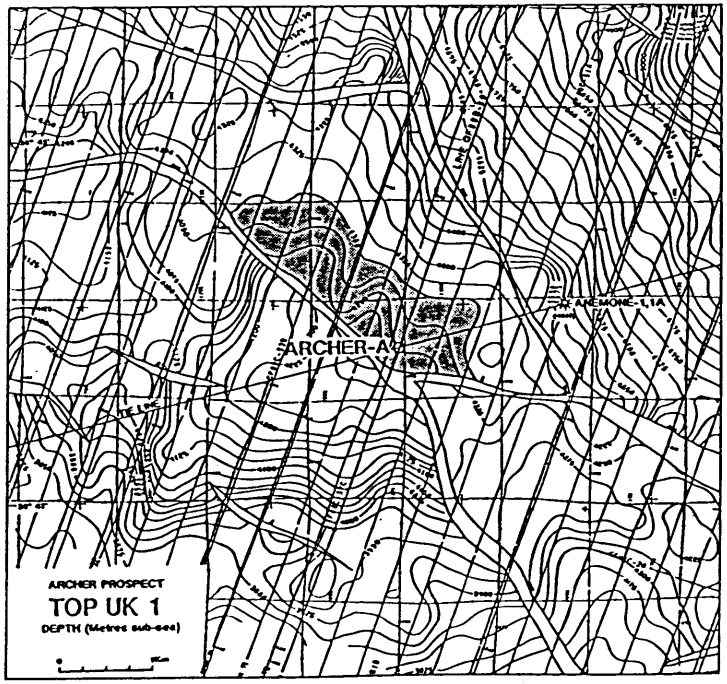
The latest regional maps for the UK3 and deeper horizons show two migration pathways into the Omeo Terrace. One is from the northwest, from the same kitchen that sourced the Kingfish field. This northwest drainage area has fewer faults to impede migration into the Archer Prospect and is a confirmed oil-prone area. The other is from the synclinal deep to the northeast between Anemone-1/1A and Angler-1. Hydrocarbon source characteristics for this latter area will be similar to those of the hydrocarbons discovered in Angler-1 and Anemone-1/1A. However, the shallow depths of the intra UK2 reservoirs at Archer should ensure that entrapped hydrocarbons from this source area are below the Dew Point pressure of the condensates at Angler-1 and Anemone-1/1A, equivalent to a subsea depth of ±3880m, resulting in the presence of liquid hydrocarbons in these reservoirs. The deeper UK1 objective, if sourced essentially from the northeast rather than from the Kingfish source, would probably contain gas-condensate.

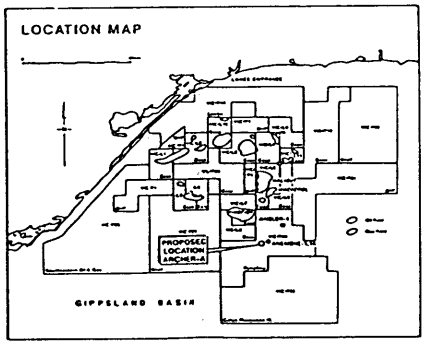
2.5 Seal

The primary reservoir objectives in the UK2 and the secondary objective in the UK1 intervals are characterised by sharp transgressive unconformities at their tops, and are overlain by offshore marine shales. These are laterally extensive and make excellent seals. Pro-delta and lower delta front shales are expected to occur within the UK3 and UK3.1 intervals, but are not expected to be well developed. This adversely affects the effectiveness of vertical seals within these intervals. However, a greater risk at Archer is possible leakage across faults, since all major sandstones predicted at Archer are likely to be located opposite sandstones at or near their tops. Clay smearing along fault planes must therefore be invoked to act as a barrier to permeability across the fault.









LOCATION : LINE GF88B-80 CDP 530

UTM X = 613829
Y = 5708073

LAT. 38° 46'08" S
LONG. 148° 18'36" E

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VIC/P20

ARCHER-A
PROSPECT MONTAGE

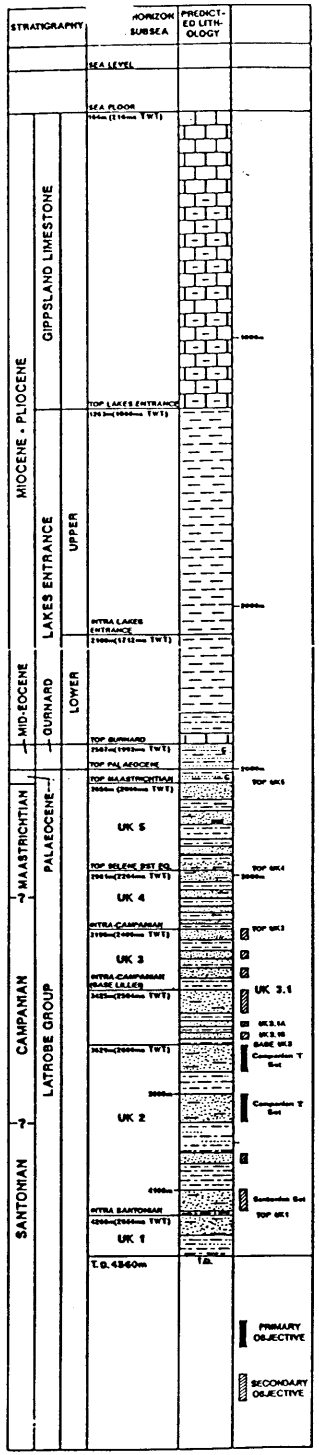

FIGURE 1

ESTIMATED TOTAL COST

	CUMUL COST	AFE COST
TANGIBLES		
20X WELLHEAD AND ACCESSORIES	$91,726	$117,000
20X CASING, LINERS & ACCESSORIES	$676,437	$345,500
20X TUBING & DOWNHOLE PROD. EQUIPMENT	$0	$0
TOTAL TANG.	$768,164	$462,500
INTANGIBLES		
101 MOB & DEMOB RIG	$166,287	$166,286
102 RIG CONTRACT	$2,477,919	$2,126,498
103 CEMENTING SERVICES	$69,943	$51,870
104 DIRECTIONAL DRILLING	$162,080	$218,400
105 LOCATION SURVEY & PREPARATION	$30,000	$125,000
106 DIVING AND SUBSEA SERVICES	$175,956	$151,200
107 CATERING	$18,012	$14,700
108 CASING RUNNING	$17,680	$60,000
109 RENTAL EQUIPMENT	$59,357	$96,600
110 MUD ENGINEERING SERVICES	$22,031	$18,900
112 WELLHEAD RUNNING/RECOVERY	$47,909	$0
113 TURBO DRILLING	$26,933	$80,000
114 WELL CONTROL INSURANCE	$0	$0
209 DRILL BITS	$184,289	$146,250
210 CORE HEADS	$0	$32,500
211 MUD PRODUCTS	$190,526	$147,000
212 COMPLETION PRODUCTS	$0	$0
214 CEMENT & ADDITIVES	$104,448	$120,000
217 FUEL	$311,039	$252,000
218 LUBRICANTS	$0	$21,000
219 WATER	$0	$2,100
21X MISCELLANEOUS CONSUMMABLES	$58,560	$4,200
301 ELECTRICAL LOGGING	$971,136	$510,000
302 MUD LOGGING	$90,818	$105,000
303 CORING	$9,056	$20,000
30X MISCELLANEOUS GEOLOGICAL ANALYSIS	$0	$148,000
401 SURFACE TESTING EQUIPMENT	$40,366	$76,440
402 DST EQUIPMENT	$21,501	$20,800
40X MISC. TESTING SERVICES & ANALYSIS	$0	$0
501 LOCAL AIR TRANSPORT	$277,539	$262,500
502 SUPPLY & STAND-BY BOATS	$814,177	$857,000
504 TELECOMMUNICATIONS	$15,976	$10,500
505 LIFTING & MOVING EQUIPMENT	$21,766	$42,000
5XX MISCELLANEOUS LOGISTICS	$36,107	$266,160
X20 SUPERVISION OPERATOR	$79,200	$29,400
X21 SUPERVISION CONTRACTED	$74,250	$88,830
TOTAL INTANG.	$6,574,860	$6,271,134
CONTINGENCY 10%		$673,363
**** GRAND TOTAL ****	$7,343,024	$7,406,997

DRILLING PROGRAMME

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DRILLING PROGRAMME APPROVED BY:

Drilling Manager

Exploration Manager

General Manager

R H GORDIER

1 WELL OBJECTIVES

Well Archer-1 is located on a faulted anticline with a component of 4-way dip closure. The primary objectives will be the upper shoreface Campanian sandstones "1" and "2" defined in Anemone-1/1A with prognosed depths at 3629mss and 3800mss respectively. Secondary objectives include other deltaic stream mouth bar Campanian sandstones between 3425m and 3950m subsea (T.D.). Good vertical seals for the primary objectives are expected to be provided by offshore marine shales. Thin pro-delta shales are expected to seal secondary objectives. However, a major risk at Archer is possible leakage across faults.

The predicted hydrocarbon type is oil from the Campanian paludal sequence northwest of the prospect (Kingfish Kitchen). However some chance of gas/condensate exists, if the objectives are charged from the Campanian marine source in the synclinal deep between Anemone-1/1A and Angler-1.

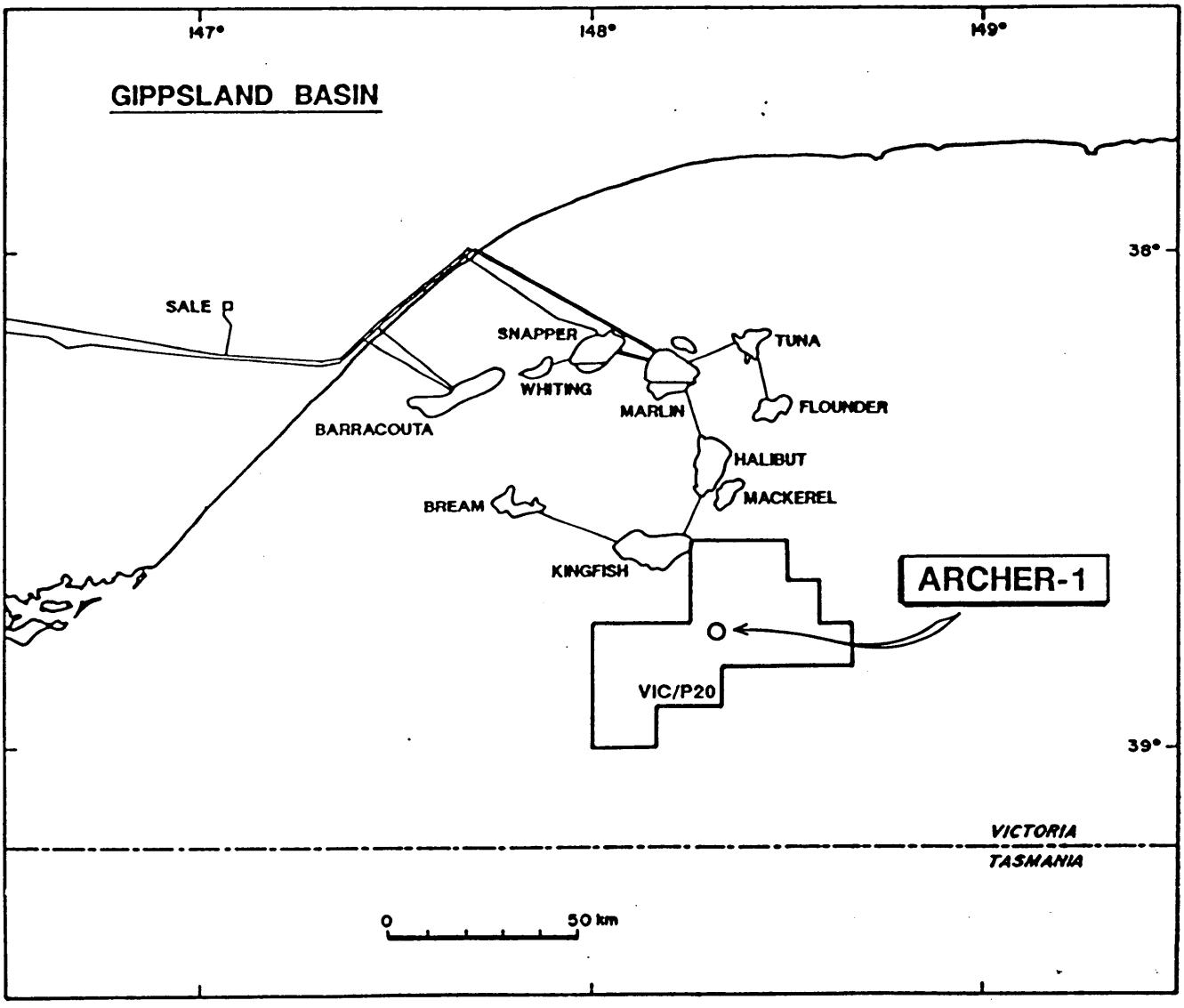
LICENCEES

Petrofina Exploration Australia S.A.	30%
Japex Gippsland Limited	30%
Overseas Petroleum and Investment Corporation	30%
Bridge Oil Limited	10%

Petrofina Expl. Aust. S.A. VIC/P20

2 LOCATION ARCHER-A

WELL NAME	: ARCHER-1	LAT./LONG.	: 38° 46' 08"S 148° 18' 36"E
WELL CLASS	: EXPLORATION	UTM	: 613,829 E 5,708,073 N
AREA	: BASS STRAIT	SEISMIC LINE	: GF88B-80
LICENCE No	: VIC/P20	CDP	: 580
DRILLING UNIT	: ZAPATA ARCTIC	K.B. ELEVATION	: 27m
RIG TYPE	: SEMI SUBMERSIBLE	WATER DEPTH	: 164m
RIG HEADING	: 290°	TOTAL DEPTH & FORMATION	: 3980m RKB CAMPANIAN
DRILLING CONTRACTOR	: ZAPATA OFFSHORE COMPANY		



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3 WELL SUMMARY ARCHER-1

DEPTH RKB	STRATIGRAPHY	PREDICTED LITHOLOGY	PREDICTED LITHOLOGY DESCRIPTION	CORES	HOLE SIZE	CASING SPECIFICATION	PRESSURE CONTROL	MUD SYSTEM	DIRECTIONAL SURVEY	LOGGING	DRILLING HAZARDS
191m	MIOCENE - PLIOCENE / GIPPSLAND LIMESTONE		SEAFLOOR		36"	30" @ 250m 1"/1.5" W.T. VETCO ST-2	N/A	Seawater with high vis pills	Totco every 20-30m		
500			CALCARENITE light grey, soft sticky fossiliferous, marly matrix, occ carbonaceous, occ glauconitic		26"	20" @ 493m 94ppf X-56 VETCO RL-4S	N/A	Seawater/gel/ native possible polymer additions	Totco every 80-90m MWD every 80-90m		
1000			MARL light grey, soft plastic, sticky glauconitic		17 1/2"		Diverter (2000 psi) Annular (5000 psi) Annular (10,000 psi) 2 x Double Rams (15,000 psi)			LSS/DLT/GR/CAL	
1290m	MIOCENE - PLIOCENE / LAKES ENTRANCE / UPPER		SILTSTONE light-medium grey, soft-moderately hard, grades to claystone and marl			13-3/8" @ 1230m 68ppf N80 Buttress					
1500								3-5% KCl/EZ Mud	MWD every 80-90m to top of target. Every 150m thereafter		Possible reactive shale/ tight hole on trips
2000			CLAYSTONE light-dark grey, soft-moderately firm, silty calcareous								
2127m	MID-EOCENE / GURNARD / LOWER		SILTSTONE light-dark grey, moderately hard calcareous pyritic, glaunconitic, loc sandy CLAYSTONE light grey, soft-moderately hard, carbonaceous SILTSTONE light grey, carbonaceous								
2500			SILTSTONE medium-dark grey, moderately hard, glauconitic sandy		12 1/4"						
2534m											
2627m	MAAST. ? / PALAEOCENE / UK5		SANDSTONE clear, loose, medium-coarse feldspathic silty-shaley in part								
2683m			SANDSTONE clear-very light grey, medium-coarse carbonaceous, shaley in parts								
3000											
3008m											
3217m	CAMPANIAN / LATROBE GROUP / UK4 / UK3		SANDSTONE white-lgiht grey, firm-moderately hard, medium-coarse				Diverter (2000 psi) Annular (5000 psi) Annular (10,000 psi) 2 x Double Rams (15,000 psi)			LSS/DLT/MSFL/GR LDT/CNL/GR SHDT/NGT (FMS) (RFT) VSP CST (CBL/VDL/CCL/GR) (CBL/CET/CCL/GR)	Possible high drilling torque
3452m	UK3.1										
3500											
3656m	UK2		SILTSTONE/SHALE dark grey, moderately hard, carbonaceous COAL black, vitreous, hard								Possible abrasive formation resulting in undergauge bit
3827m											
T.D. 3980m	?		SANDSTONE white-light grey, firm-moderately hard, medium-coarse, carbonaceous, locally shaley			9-5/8" @ 3980m 47ppf N80 Buttress					
4000											
4500											

PRIMARY OBJECTIVE

SECONDARY OBJECTIVE

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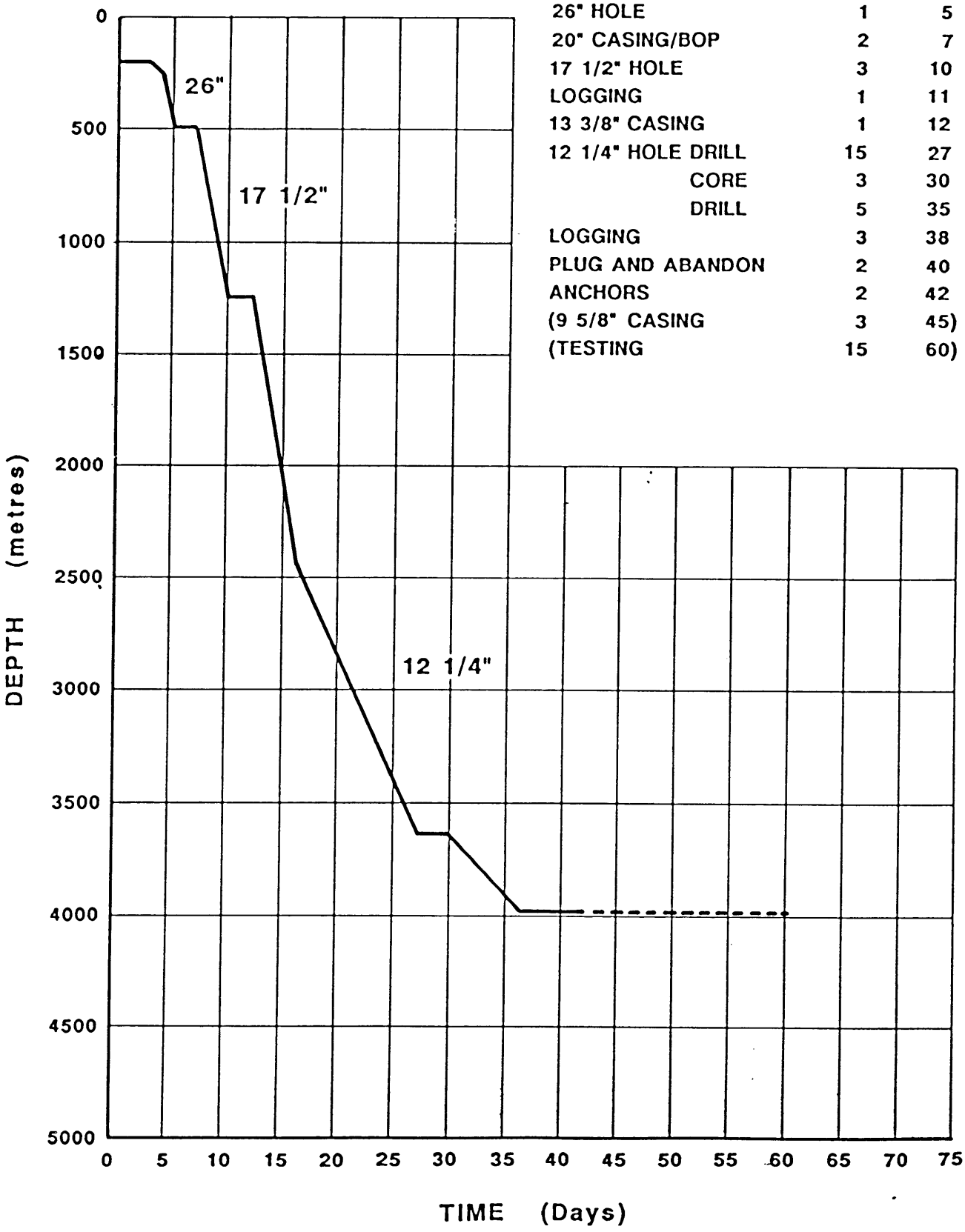
4. DRILLING/TIME CURVE ARCHER-A

TIME BREAKDOWN

ACTIVITY	DAYS	CUMUL.
LOCATE/ANCHORS	3	3
36" HOLE/30" CASING	1	4
26" HOLE	1	5
20" CASING/BOP	2	7
17 1/2" HOLE	3	10
LOGGING	1	11
13 3/8" CASING	1	12
12 1/4" HOLE DRILL	15	27
CORE	3	30
DRILL	5	35
LOGGING	3	38
PLUG AND ABANDON	2	40
ANCHORS	2	42
(9 5/8" CASING	3	45)
(TESTING	15	60)



5 DRILLING PROCEDURES

1. Position rig over well location.
2. Dependent upon weather, make up 30" casing. Land in permanent guide base, hang off.
3. Drill 36" hole to 260mkb with seawater and high viscosity slugs.
4. Run 30" casing, ensuring low pressure wellhead housing lands 2m above mudline.
5. Cement 30" casing to mudline, using inside string.
6. Drill 26" hole to 500mkb with 17-1/2" bit and 26" hole opener or 26" bit, using seawater and high viscosity slugs.
7. Run 20" casing and high pressure housing.
8. Cement 20" casing to mudline.
9. Nipple up BOP stack, tensioners, slip joint and diverter package.
10. Test BOPs, 20" casing and function test diverter.
11. Drill out 20" shoe and drill 3-5m of new formation. Test formation to 1.50SG equivalent. Drill 17-1/2" hole to 1235mkb with seawater and high viscosity slugs initially, allowing system to "mud up" by retaining all viscous slugs in system. Some dilution later in the section may be necessary.
12. Run open hole electric wireline logs.
13. Run and cement 13 3/8" casing. Cement to 100m below 20" shoe. Set pack-off.
14. Test BOPs and casing.
15. Drill out float collar and shoe plus 3-5m new formation.
16. Test formation to 1.80SG equivalent or leak-off if less.
17. Change mud to 3-5% KCL/EZ mud system.
18. Drill 12-1/4" hole to 3980mkb. Core as required by geologist.
19. Run open hole electric wireline logs.
20. Should hydrocarbons be discovered a 9-5/8" casing will be set at TD. A detailed programme for setting the casing and testing will be issued at that time.
21. A programme for abandonment or suspension of the well will be issued as appropriate.

Notes:

1. The 13-3/8" casing will be set in the marl at the base of the Gippsland Limestone.

2. If problems are encountered while drilling 12-1/4" hole, a contingency exists to set 9-5/8" casing at 3400mkb, above the primary objective, drill 8-1/2" hole to TD (3980mkb) and set a 7" liner if hydrocarbons are found and testing is required.

ARCHER DRILLING PROCEDURES

AMENDMENT #1 - 13 MARCH 1990

As provided for in the Archer-1 Drilling Programme, and in view of the current borehole situation, including the hydrocarbon indications, an intermediate 9-5/8" casing will be set above the primary objective prior to drilling 8-1/2" hole to TD (3980mkb). Therefore, amendments from point 17 onwards have been made to the original Drilling Procedures document:

17. Drill 12-1/4" hole to 3445mkb.

18. Run open hole electric wireline logs: LLD-LLS-GR-AS-MSFL; LDT-CNL-GR; NGT-FMS; RFT.

19. Run 5" open-ended drill pipe and set a balanced cement plug from HUD to 3350m. Use 1.90SG class "G" cement slurry.

20. Wait on cement. While waiting, confirm the wellhead situation.

21. Run 12-1/4" bit and tag TOC. Dress off to 3375m.

22. Run 9-5/8" 47 lb/ft casing to ±3367m. Run ±600m of P110 grade on bottom and ±1000m below wellhead, run N80 grade between both P110 sections.

23. Cement 9-5/8" casing as per original programme, reduce lead slurry volume to have TOC 100m above top Gurnard formation. Halliburton to advise cement recipe.

24. Run 8-1/2" bit, drill out to 10m below 9-5/8" casing shoe.

25. Perform a leak-off test to 1.60SG equivalent or leak-off if less.

26. Drill 8-1/2" hole to TD (3980m) with seawater/gel/polymer mud system. Take regular surveys to check verticality. Core as required.

27. Run open hole electric wireline logs as per initial programme (TD logging).

28. Should hydrocarbons be discovered and testing be required a 7" liner will be set at TD. A detailed programme for setting the liner and testing will be issued at that time.

29. A programme for abandonment or suspension of the well will be issued as appropriate.

DRILLING MANAGER

EXPLORATION MANAGER

GENERAL MANAGER

6 MUD PROGRAMME

WEIGHT	VISCOSITY	PV/YP	GELS	FLUID LOSS	SOLIDS	PH	SALINITY
HOLE SIZE: 36"/26"			INTERVAL: 191-500 mkb			MUD TYPE: Seawater w/pills	
1.05 SG	100 + Sec/qt	20-25/ 40-50	-	-	-	10.5-11.5	22,000

NOTES/TREATMENT:

This section will be drilled with seawater. High viscosity pills will be pumped on connections and a fresh water viscous pill weighted to 1.15 SG will be left in the hole prior to running both the 30" and 20" casing strings. The viscous pills will be of a pre-hydrated flocculated Bentonite type. The API Bentonite concentration will be in the range of 27.5 - 30.0 ppb.

HOLE SIZE: 17-1/2"			INTERVAL: 500-1235 mkb			MUD TYPE: SW/Gel/Native	
1.05 SG	40+	-/12+	-	-	-	9.5+	22,000

NOTES/TREATMENT:

This section will be drilled with seawater. High viscosity pills will be pumped and retained in returns allowing the system to build to a seawater/gel/native system. The lack of fluid loss control should facilitate higher ROPs and the gel/native additions satisfactorily clean the hole. Dilution and solids control equipment may be necessary to control mud weight. Problems of bit balling in Gippsland marls will be treated with detergent additions.

HOLE SIZE: 12-1/4"			INTERVAL: 1235-3980mkb			MUD TYPE: 3-5% KCl/EZ mud	
1.1-1.15	40-45	-/16-20	3/5	4 - 5 12 - 16 HTHP *	min	8.5-9.0	Max 30,000

NOTES/TREATMENT:

After drilling out the shoe, the hole will be displaced to a 3-5% KCL/EZ mud system. Chemical properties for the system should be - pH less than 9.5, chlorides less than 30,000 mg/l and calcium less than 200 mg/l. Pac-R and XCD will be added to maintain high YP - this will provide good hole cleaning properties and also achieve laminar flow and reduce possible hole erosion. Treatment with lime may be necessary due to contamination with carbonates. Addition of Dextrid and Pac-L may be required for filtration control. At the end of the section, where high temperatures are expected, BARANEX can be used to maintain a thin filtercake. The mud will be treated with BARACIDE to prevent any bacterial degradation.

* In Latrobe formations

7 CASING PROGRAMME

INTERVAL m	WEIGHT ppf	GRADE	JOINT TYPE	BURST (Safety Factor)	COLLAPSE (Safety Factor)	TENSION (Safety Factor)
HOLE SIZE 36" DEPTH 257			CASING SIZE 30"		PREVIOUS SHOE DEPTH	-
191-201	460	B	ST-2	-	-	-
201-247	310	B	ST-2	-	-	-
HOLE SIZE 26" DEPTH 500			CASING SIZE 20"		PREVIOUS SHOE DEPTH	250m
191-491	94	X-56	RL-4S	2100psi (3.00)	520psi (1.38)	1,080,000lb (11.5)
HOLE SIZE 17-1/2" DEPTH 1235			CASING SIZE 13-3/8"		PREVIOUS SHOE DEPTH	493m
191-1230	68	N-80	Buttress	5020psi (1.38)	2260psi (1.21)	1,556,000lb (6.7)
HOLE SIZE 12-1/4" DEPTH 3980			CASING SIZE 9-5/8"		PREVIOUS SHOE DEPTH	1230m
192-3100	47	N-80	Buttress	6870psi (1.01)	4750psi (1.09)	1,086,000lb (1.86)

DESIGN ASSUMPTIONS

Collapse:
20" Annulus full of 1.90 gr/cc cement, seawater in casing.
13-3/8" Annulus full of 1.20 gr/cc cement, mud level drop to 65% evacuation. inside.
9-5/8" Annulus full of 1.20 gr/cc mud, pipe empty to 65% evacuation.
Burst:
20" Pressure on gas column that would fracture the shoe, annulus full of 1.20 gr/cc mud.
13-3/8" Pressure on gas column that would fracture the shoe, annulus full of 1.20 gr/cc mud.
9-5/8" Pipe full of gas
Tension: All strings zero buoyancy factor.

8 CEMENT PROGRAMMES

CASING SIZE: 30"

SLURRY DESCRIPTION Approx 55 MT Class 'G' cement + 1% $CaCl_2$ BWOC + 4.98 gals/SK seawater + defoamer as required

DESIRED TOP Mud Line	**EXCESS** 250%			
SLURRY VOL. m^3	42			
SLURRY YIELD m^3/T	0.76			
SLURRY DENSITY-S.G.	1.90			
THICKENING TIME-HRS MIN.	as per Lab test			
COMPRESSIVE STRENGTH-PSI/24 HRS	± 1500			
RUNNING AND CEMENTING INSTRUCTIONS				

SHOE, COLLARS(S) AND JOINT STRENGTHENING
30" Float Shoe welded to pipe

MECHANICAL AIDS
None

FLUSH, DISPLACEMENT RATE, PLUGS, RECIPROCATION, etc
None

PRESSURE TESTING AND LANDING 30" Housing to be set 2m above seabed. Check level indicator before and after cementing. After backing out running tool, jet inside of housing.

CASING SIZE: 20"

SLURRY DESCRIPTION Approx 120 MT Class 'G' cement + 5.0 gals/SK seawater + defoamer as required

DESIRED TOP Mud Line	**EXCESS** 100%			
SLURRY VOL. m^3	91			
SLURRY YIELD m^3/T	0.76			
SLURRY DENSITY-S.G.	1.90			
THICKENING TIME-HRS MIN.	as per Lab test			
COMPRESSIVE STRENGTH-PSI/24 HRS	± 1500			
RUNNING AND CEMENTING INSTRUCTIONS				

SHOE, COLLARS(S) AND JOINT STRENGTHENING Float Collar and Shoe welded into 1st joint of casing. Thread lock 1st coupling above Float Collar.

MECHANICAL AIDS One centraliser inside 30" shoe, one in middle of first 2 joints 2m above 20"

FLUSH, DISPLACEMENT RATE, PLUGS, RECIPROCATION, etc
None

PRESSURE TESTING AND LANDING Land in 30" housing, check for engagement with over-pull 50% above string weight. Pressure test to 300 psi.

8 CEMENT PROGRAMMES

CASING SIZE: 13-3/8"

SLURRY DESCRIPTION Approx 82 MT Class 'G' cement. Lead Slurry: 61 MT Class 'G' + aquagel + seawater + defoamer. Tail Slurry: 21 MT Class 'G' + seawater.

DESIRED TOP 100m below 20" shoe	EXCESS 60% in open hole or caliper with no excess			
SLURRY VOL. m^3	71.5	16		
SLURRY YIELD m^3/T	1.17	0.76		
SLURRY DENSITY-S.G.	1.60	1.90		
THICKENING TIME-HRS MIN.	as per Lab test	as per Lab test		
COMPRESSIVE STRENGTH-PSI/24 HRS	± 450	1 1800		

RUNNING AND CEMENTING INSTRUCTIONS

SHOE, COLLARS(S) AND JOINT STRENGTHENING Float Shoe and Float Collar to be 1 joint apart. Threadlock all connections up to and including 1st coupling above Float Collar. Use Halliburton PDC drillable shoe & Superseal Type II float collar.

MECHANICAL AIDS

Centralisers to be run on 1st 5 joints and 2 inside 20" casing

FLUSH, DISPLACEMENT RATE, PLUGS, RECIPROCATION, etc

- 50 bbl seawater
- Use Halliburton non rotating plug

PRESSURE TESTING AND LANDING

Bump plug and pressure test to 1750 psi

CASING SIZE: 9-5/8"

SLURRY DESCRIPTION Approx 58 MT Class 'G' cement. Lead Slurry: 37MT Class 'G' + freshwater + liquid extender or gel + retarder + defoamer. Tail Slurry: 21 MT Class 'G' + dispersant + defoamer + retarder + freshwater

DESIRED TOP 2400m (above Top Gurnard)	EXCESS 40% in open hole or caliper with no excess			
SLURRY VOL. m^3	49	16		
SLURRY YIELD m^3/T	1.31	0.76		
SLURRY DENSITY-S.G.	1.50	1.90		
THICKENING TIME-HRS MIN.	as per Lab test	as per Lab test		
COMPRESSIVE STRENGTH-PSI/24 HRS	± 500	± 2000		

RUNNING AND CEMENTING INSTRUCTIONS

SHOE, COLLARS(S) AND JOINT STRENGTHENING Float Shoe and Float Collar to be 1 joint apart. Threadlock all connections up to and including 1st coupling above Float Collar.

MECHANICAL AIDS

Centralisers to be run on 1st 10 joints + 2 inside 13-3/8" casing

FLUSH, DISPLACEMENT RATE, PLUGS, RECIPROCATION, etc

50 bbl Flocheck 21

PRESSURE TESTING AND LANDING Bump plug and pressure test to 3000 psi

9 WELLHEAD PROGRAMME

Wellhead and BOP Programme

Wellhead to consist of an 18 3/4" 10,000 pso H2S Service Vetco SG-5 system. One complete "back-up" set of equipment to be on location, inclusive of emergency pack-off. Wellhead system to be for 30", 20", 13 3/8", 9 5/8" casing design with possibility of tying back 7" or hanging tubing.

Blowout Preventor Stack will consist of:

Main Stack:
* one 18 3/4" 10M Hydril GX annular
* two 18 3/4" 15M Hydril dual extended rams
* one 18 3/4" 15M Vetco H4 connector
* six 3 1/16" 15M Cameron failsafe type 'F' kill-choke valves

Upper Assembly:
* one 21 1/4" 5M Oil States flex joint
* one 21 1/4" 5M N.L. Shaffer annular
* one 18 3/4" 10M CIW Collet connector

The diverter will have 2,000 psi W.P. capability with remote control. The choke manifold will be 15M W.P. and have two 20M Swaco ultra chokes, and two 15M adjustable manual chokes.

TESTING

Surface: Test for lower, middle, upper and shear rams, inner and outer kill valves, and iner an outer, upper and lower choke valves.
High pressure 10,000psi 10mins
Low pressure 250psi 10mins
Test for lower annular preventer
High pressure 5,000psi 10mins
Low pressure 250psi 10mins
Test for upper annular preventer
High pressure 2,500psi 10mins
Low pressure 250psi 10mins
Test for choke kill manifold
High pressure 10,000psi 10mins
Low pressure 250psi 10 mins
Test for cement manifold
High pressure 10,000psi 10mins
Low pressure 250psi 10mins
Test for standpipe manifold
High pressure 5,000psi 10mins
Low pressure 250psi 10mins
Test for Kelly cocks
High pressure 10,000psi 10mins
Low pressure 250psi 10mins

Subsea: When testing equipment subsea the high pressure tests are to be:
- After 20" and 13-3/8" casing = 5000psi for rams and choke/kill valves, 3500psi for lower annular, 2500psi for upper annular.
- After 9-5/8" casing = 7000psi for rams and choke/kill valves, 3500psi for lower annular, 2500psi for upper annular.

The BOPs will be tested once a week and each time casing has been run. Results will be recorded on the IADC Report.

10 DEPARTURE LIMITS

1. The surface position of the borehole is to be located within a radius of 20m of the given well location.

   Latitude: 38°46'08"S
   Longitude: 148°18'36"E

2. The well is to be drilled using standard exploration drilling practices to keep within the normal constraints of a vertical well.

Surveying

36" interval	Totco surveys to be taken every 20-30m
26" interval	Totco surveys to be taken every 80-90m
17 1/2" interval	MWD surveys to be taken every 80-90m
12 1/4" interval	MWD surveys to be taken every 80-90m
8 1/2" interval	MWD surveys to be taken every 80-90m to top target, every 150m thereafter

Totco or Single Shot surveys to be taken every round trip. More frequent surveys to be run if necessary.

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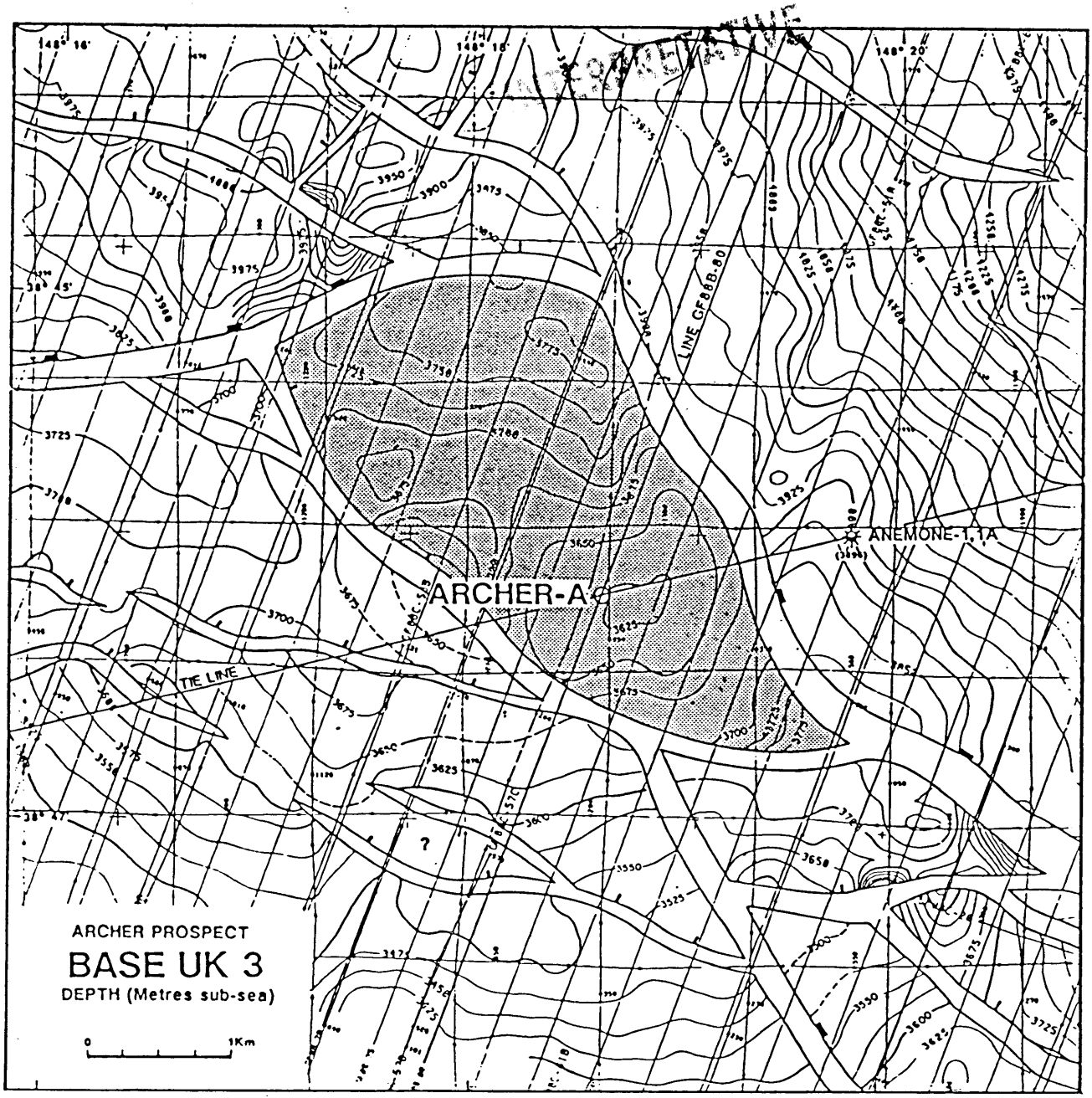
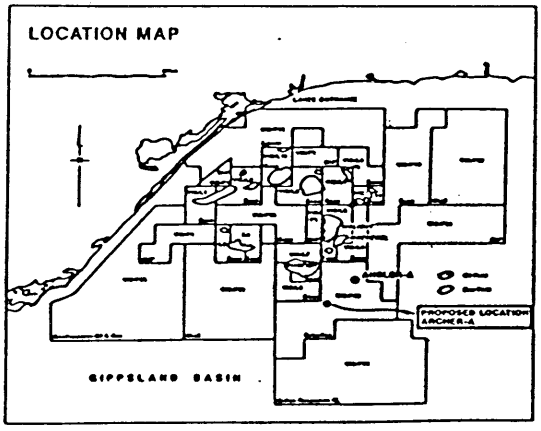
11a. LOCATION SCHEMATIC ARCHER-A





LOCATION : LINE GF88B-80 CDP 580
UTM 613829 E
: 5708073 N
LAT. 38° 46' 08" S
LON. 148° 18' 36 " E

PETROFINA EXPLORATION AUSTRALIA S.A.

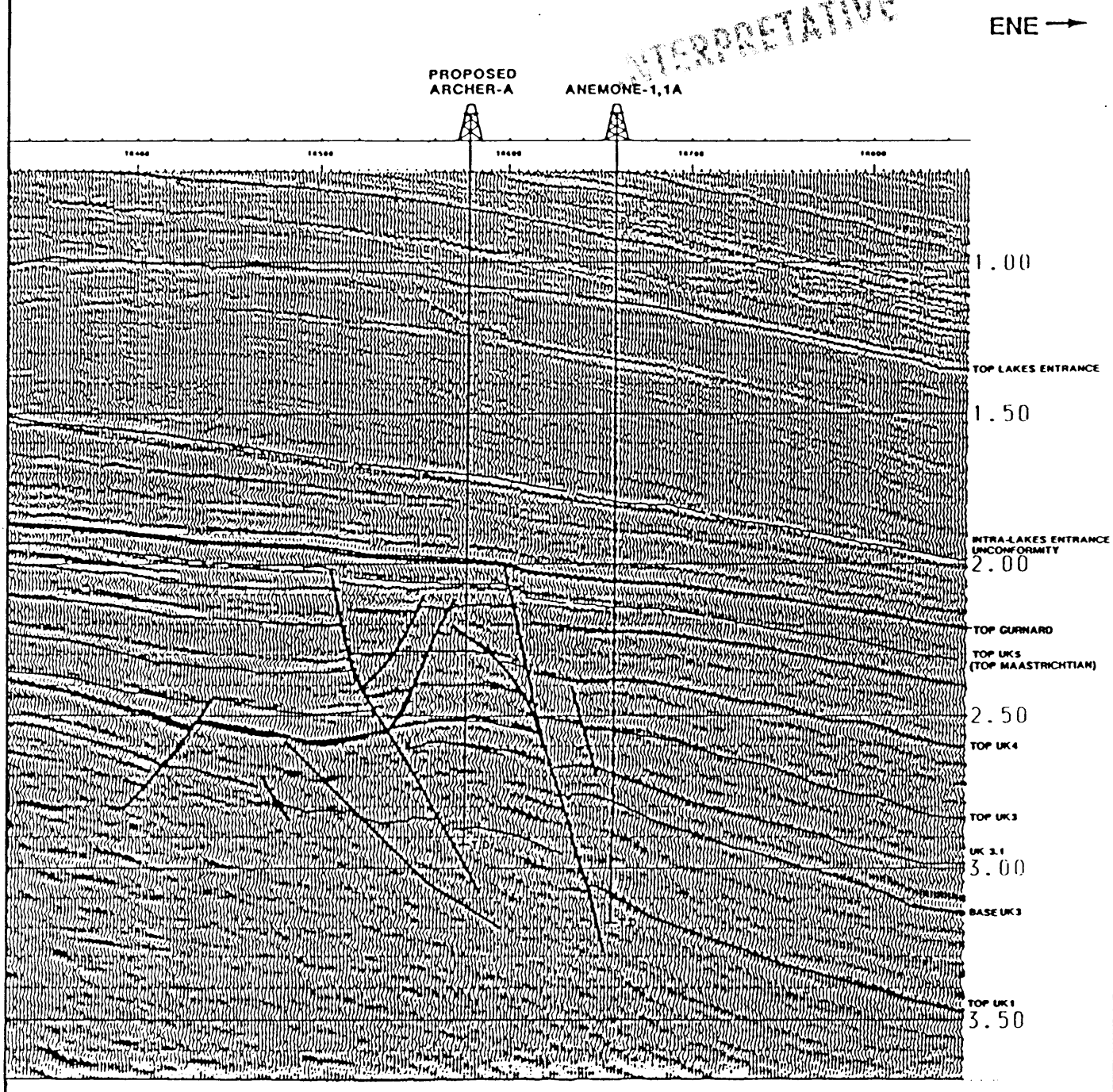
VIC/P20

ARCHER PROSPECT

Petrofina Expl. Aust. S.A. VIC/P20

11b. SEISMIC SECTION ARCHER-A

ARCHER - ANEMONE TIE LINE



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12a GEOLOGICAL PROGNOSIS
Definitions

PROSPECT DESCRIPTION

Anticline with fault dependent closure and partial 4-way dip closure.

OBJECTIVE HORIZONS

Campanian and Santonian sandstone reservoirs.

Primary Objectives:
i) Upper UK 2 Sandstone (Campanian '1' SST) - 3656mkb
ii) Intra UK 2 Sandstone (Campanian '2' SST) - 3828mkb

Secondary Objectives:
i) Top UK 3.1 Sandstone (Upper Campanian) - 3452mkb
ii) Intra UK 3.1A Sandstone (Lower Campanian) - 3567mkb
iii) Intra UK 3.1B Sandstone (Lower Campanian) - 3617mkb

SUCCESSION DERIVATIONS

Depths have been calculated for seismic markers at CDP580 on line GF88B-80 using velocity formulae from nearby wells.

TOTAL DEPTH

Well will be designed to penetrate 150m below the top of Campanian "2" Sandstone to a predicted total depth of 3980mkb.

GEOPRESSURES/DRILLING HAZARDS

A. Hard calcarenite at the base of the Gippsland limestone caused serious vibrations within the drill string, leading to washouts and twist-offs in both Selene 1 and Hermes 1.

Petrofina Expl. Aust. S.A. VIC/P20

12b GEOLOGICAL PROGNOSIS
Geophysical Data

ARCHER-A

SYSTEM	FORMATION		DEPTH (m) RKB (SS)	THICKNESS (m)	TWT (secs)	SEISMIC MARKER	NOTES
			27(0)				
			191(164)		216		
TERTIARY	GIPPSLAND LIMESTONE			1099		INTERPRETATIVE	CALCARENITE MARL
			1290(1263)		1080	TOP LAKES ENTRANCE	
	LAKES ENTRANCE	UPPER		1244			SILTSTONE CLAYSTONE
		LOWER	2127(2100)		1712	INTRA LAKES ENTRANCE	SILTSTONE
	GURNARD		2534(2507)		1992	TOP GURNARD	
						TOP PALAEOCENE	SILTSTONE
? MAAST.	LATROBE GROUP	PAL.	2683(2656)	149	2060	TOP MAASTRICHTIAN	SANDSTONE
		UK5		325		TOP UK4 EQ. TO TOP SELENE SST	SANDSTONE SHALE
		UK4	3008(2981)	209	2284		SANDSTONE COAL SILTSTONE
		UK3	3217(3190)	235	2400	TOP UK3 (INTRA CAMPANIAN)	SANDSTONE SILTSTONE
		UK3.1	3452(3425)	204	2504	TOP UK3.1(INTRA CAMPANIAN) (BASE T. LILLIEI)	SANDSTONE
CAMPANIAN			3656(3629)		2600	TOP UK2 (INTRA CAMPANIAN)	SILTSTONE SANDSTONE
?			T.D. EXPECTED AT 3980m				

G540

13 GEOLOGICAL CORING/SAMPLING PROGRAMME

CORING

Primary Objective:

Coring will be dependant on shows and subject to operational conditions.

Secondary Objectives:

Coring is dependant on shows and subject to operational conditions.

SIDEWALL CORES

Sidewall cores will be shot mainly in shales for palaeontological, palynological and geochemical control. Further cores may be taken at the discretion of the wellsite geologist for lithological control in reservoir zones.

CUTTING SAMPLES

Two sets of unwashed samples and eight sets of washed and dried samples will be collected at the following intervals:

493 - 2450m : 10m intervals
2450m - TD : 5m intervals

Two unwashed canned samples will be collected for geochemistry aggregated over 10m intervals from 2450m - TD.

Sampling rate can be varied at the discretion of the wellsite geologist.

A canned sample of mud from the flow line will be taken prior to cutting any core.

DISTRIBUTION

Washed & Dried Cuttings		Unwashed Cuttings		Canned Cuttings	
Rig	1	Pexaus	2	Geochem Contractor	1
Pexaus	2			Labofina Brussels	1
Partners	3				
DITR	1				
BMR	1				

14 WIRELINE LOGGING PROGRAMME

HOLE SIZE	APPROXIMATE INTERVAL (SS)	LOGS
17 1/2"	500 - 1230	LSS/DLT/GR/CAL
12 1/4"	1230 - 3980	LSS/DLT/GR/MSFL/CAL CST VSP
	2500 - 3980 (T.D.)	LDT/CNL/GR SHDT/NGT (FMS) (RFT)

Notes:

1. Brackets denote to be run should hydrocarbons be encountered or as required at discretion of wellsite geologist.
2. First gamma ray to be continued to seabed.
3. All logs to be recorded on 1:200 and 1:500 metric scales and digitally on magnetic tape.
4. MSFL to be recorded only in front of reservoir.
5. All changes to the above programme will be subject to approval from Technical Manager, Melbourne.

15 MUD LOGGING

MUD-LOGGING

The following lists outline the basic functions to be executed by the Mud-Logging Unit.

Monitoring

Lag Time	H_2S
Depth	CO_2
Lag Depth	Hours on Bit
ROP	Bit RPM
Total Gas	Hook Load
Normalised Total Gas	W.O.B.
C1-C5	Torque
Pump Strokes	Pump Pressure
PVT	Mud Flow in/out
All Pits Individually	Mud Temp in/our
Trip Tank	U.V. Light

Computed

Hydraulics and pressure losses in the system
Swab and surge pressures
Advanced 'd' exponent analysis (corrected)
Bit cost/foot
Pore pressure analysis
Fracture gradient analysis
Over-burden gradient
Kick kill calculations

16 DST GENERAL GUIDELINES

1. TEST OBJECTIVES

The objectives of any test in this well are to:

1.1 Determine the type and mobility of any reservoir fluids.
1.2 Determine basic productivity characteristics.
1.3 Measure pressure/temperature effects over time, checking for any apparent depletion effects.
1.4 Obtain PVT samples.

2. RESERVOIR DATA

The primary target of the well is the Campanian "1" and "2" Sandstones of the Latrobe Formation. The prognosed top is 3656mkb. Additional secondary objectives are other Latrobe Group Sandstones between 3452m and 4200m subsea.

Est. BHP at 3656mkb:	5470 psi (normally pressured)
Est. BHT at 3656mkb:	95°C
Likely reservoir fluid:	Gas/Oil
Reservoir type:	Sandstone

3. TESTING PHILOSOPHY

The well contains several zones of interest that are potentially hydrocarbon bearing and may require testing. The actual test intervals will be determined from wireline logs at a later date.

Testing will be carried out using cased hole testing techniques. Testing will be conducted in a 9-5/8" casing using a Schlumberger full bore PCT test system.

Should logs indicate the test interval to be potentially a high producer or of low permeability, the MUST tool will be utilised to give real time pressure/temperature values at surface throughout the test.

Cycling of test tool functions is conducted using annulus or tubing pressure. . Setting and freeing the packer is the only time string movement required throughout the test.

4. PERFORATING

The well will be perforated under-balanced hence tubing conveyed perforating guns will be run at the base of the test string. The firing of the guns will be mechanically initiated by a drop bar which can be optionally run on slick line.

16 DST GENERAL GUIDELINES

No overpressuring is expected, so prior to perforating, the test string contents will be displaced with diesel to obtain the desired under-balanced conditions upon perforating.

5. TEST EQUIPMENT

All downhole, sub-surface and surface equipment, to be supplied by Schlumberger, will be suitable for H_2S service and will be required to be rated to 10,000 psi where used for high pressure flow. Should wet gas be encountered, a heater to prevent hydrate formation will be available. All equipment will be pressure and function tested prior to its despatch to the rig and again upon its arrival on the rig.

6. PRESSURE/TEMPERATURE GAUGES

Surface readout of the downhole pressure and temperature data will be provided by the MUST tool. The MUST actuator/pressure gauge assembly will be run on Schlumberger's electric wireline. A 10,000 psi TPT electronic gauge will be used to transmit the data.

The primary downhole recording gauges will be four 10,000 psi SSDP gauges.

7. SAMPLING

Samples will be taken at surface and bottomhole sampling will be conducted and the equipment necessary, supplied by Schlumberger and run on their wireline cable.

17 DATA DISTRIBUTION

ITEM	COMPILED/ DESPATCHED	PEXAUS	PSA BRUSSELS	PFE S'PORE	JAPEX	OPIC	BRIDGE	DITR/ BMR	COMMENTS
TELEX OR FAX									
Daily Drilling/Geological Report	Rig	1	-	-	-	-	-	-	
Daily Operations Report	Pexaus+	-	1	1	1	1	1	2	+ Petrofina Exp. Aust
Weekly Drilling/Geological Report	Pexaus	-	1	1	1	1	1	2	
Sidewall/Core Description	Rig/Pexaus	-	1	1	1	1	1	2	
Provisional Log Interpretation	Rig/Pexaus	-	1	1	1	1	1	2	
WIRELINE LOGS									
Field Prints	Pexaus	-	-	1	1	1	1	2	
Field Sepias	Rig	1	-	-	-	-	-	-	
Field Fax/Telemetry	Rig	1	-	1*	1*	1*	1*	-	*Only when rapid decisions required
Final Prints	Pexaus	-	-	-	1	1	1	2	
Final Sepias	Pexaus	-	-	-	1	1	1	2	
Edit Tapes	Pexaus	-	-	-	1	1	1	1	
Petrofina Interpretation Print	Pexaus	-	1	1	1	1	1	2	
Petrofina Interpretation Sepia	Pexaus	-	1	-	1	1	1	-	
OTHER LOGS									
Mud Logs (Weekly) Print	Rig/Pexaus	-	-	1	1	1	1	2	
Mud Logs (Weekly) Sepia	Rig	1	-	-	-	-	-	-	
Final Mud Log Print	Pexaus	-	-	-	1	1	1	2	
Final Mug Log Sepia	Pexaus	-	-	-	1	1	1	2	
Petrofina Lithology Print	Rig/Pexaus	-	-	-	1	1	1	2	
Petrofina Lithology Sepia	Rig/Pexaus	-	-	-	1	1	1	2	
Composite Log Print	Pexaus	-	1	1	1	1	1	2	
Composite Log Sepia	Pexaus	-	1	-	1	1	1	2	
FINAL REPORTS									
Geological Completion Report	Pexaus	-	1	1	1	1	1	2	
Drilling Completion Report	Pexaus	-	1	1	1	1	1	2	
CONTRACTOR FINAL REPORTS									
Core Analysis	Pexaus	-	-	-	1	1	1	2	
Biostratigraphy	Pexaus	-	-	-	1	1	1	2	
Velocity Survey	Pexaus	-	-	-	1	1	1	2	
Test Data	Pexaus	-	-	-	1	1	1	2	
Fluid Analysis	Pexaus	-	-	-	1	1	1	2	
Geochemistry	Pexaus	-	1	-	1	1	1	2	
SAMPLES									
Washed and Dried	Rig	3+*	-	-	1	1	1	2	+One set to be kept on rig until end of well
Unwashed	Rig	2*	-	-	-	-	-	-	
Canned Geochemical	Rig	2*	-	-	-	-	-	-	
Swc	Rig	1*	-	-	-	-	-	-	
Core	Rig	1*	-	-	-	-	-	1/4+1/4	*For distrib. to specialist contractors

ABANDONMENT PROGRAMME

PETROFINA EXPLORATION AUSTRALIA S.A.

ARCHER - 1

ABANDONMENT PROGRAMME

WELL NAME:	ARCHER-1
LOCATION:	Offshore Bass Strait - Vic P/20 Permit
	Co-ordinates: Latitude 38°46'07.01"S Longitude 148°18'36.09"E
RIG:	Zapata Arctic Semisubmersible KBE = 28m
WATER DEPTH:	167m
FORMATION:	Latrobe Group Sandstones
TYPE OF JOB:	Cement Plug, Abandonment and Wellhead Recovery

1. **Well Summary**

   Please refer to well diagram

2. **Objective**

   Abandon Archer-1 and recover wellhead according to Submerged Lands Act Schedule.

ARCHER-1

ABANDONMENT PROGRAMME

1. Complete Schlumberger logging.

2. RIH with open-ended drill pipe to TD (4050m) and circulate hole clean.

3. Set balanced cement plug #1 from 4050m to 3600m; pump 10bbl water ahead, 110bbl cement slurry (recipe to be advised by Halliburton), 4bbl water and displacement.

4. Pull back to 3600m and reverse circulate 200% of drill pipe volume.

5. Set balanced cement plug #2 from 3600m to 3300m; pump 10bbl water ahead, 100bbl cement slurry (recipe to be advised by Halliburton), 4bbl water and displacement.

6. Pull back 20 stands and reverse circulate drill pipe volume.

7. While waiting on cement (check surface samples), circulate well to inhibited mud (corrosion inhibitor and bactericide) and lay down excess pipe.

8. RIH and tag plug with 10,0001b (top of cement to be above 3337m).

9. Close annular and pressure test to 1000psi for 15 minutes.

10. POOH, laying down excess drill pipe.

11. RIH with cutting assembly and cut 9-5/8" casing at 1200m.

12. RIH with spear. Rig up Weatherford and recover 9-5/8" casing.

13. RIH with open-ended drill pipe to 1300m and set balanced plug #3 from 1300m to 1000m. Pump 10bbl water ahead, 100bbl cement slurry (recipe to be advised by Halliburton), 1.5bbl water and displacement.

14. Pull back 20 stands and reverse circulate drill pipe volume.

15. WOC then RIH and tag plug with 10,0001b (top of cement to be above 1170m).

16. Close annular and pressure test to 1000psi for 15 minutes.

17. POOH laying down excess drill pipe.

18. RIH with cutting assembly and cut 13-3/8" casing at $\pm$260m.

19. RIH with spear. Rig up Weatherford and recover 13-3/8" casing.

20. RIH with open-ended drill pipe to 350m and set balanced plug #4 from 350m to 220m. Pump 40bbl water ahead, 90bbl cement slurry (recipe to be advised by Halliburton), 2bbl water and displacement.

21. Pull back to 220m and reverse circulate 200% of drill pipe volume.

22. POOH and WOC.

23. RIH and tag plug with 10,000lb (top of cement to be above 240m).

23. POOH laying down excess drill pipe. Displace riser to seawater.

24. Unlatch BOP and pull BOP stack.

25. RIH, cut and pull assembly dressed with metal muncher blades. Cut 20" and 30" at ±205m. (Adjust depth of cut to stay away from collars and connectors).

26. POOH and lay down PGB, wellhead and 30"/20" casings.

27. Make final seabed survey with ROV and fill in Certificate of Seabed Clearance.

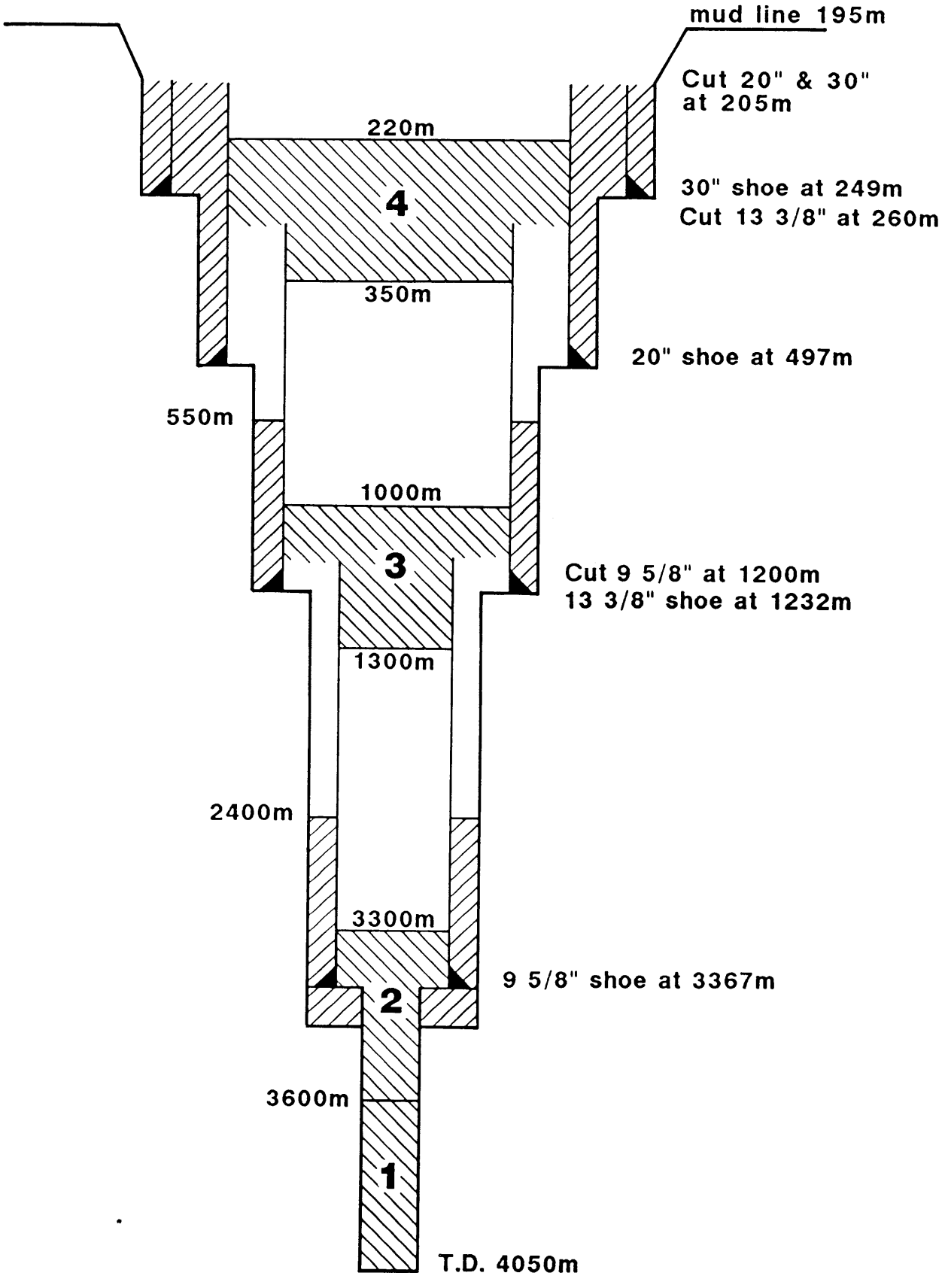
28. De-ballast rig and pull anchors.

Note: Slurry volumes for each plug to be recalculated on the rig using actual well data, and caliper for open-hole plugs.

ARCHER-1

ABANDONMENT PROGRAM

(DEPTH RKB)



EN 039

B.DeV. FEB. 1990

DRILLING UNIT

Description of Drilling Unit - ZAPATA ARCTIC, including Pressure Control Equipment

EXHIBIT "C"

DESCRIPTION OF MOBILE DRILLING UNIT

ZAPATA ARCTIC
ZAPATA SS-4000

DRILLING UNIT, DRILLING EQUIPMENT, MATERIALS, SUPPLIES AND SERVICES

PART I
DRILLING UNIT TO BE FURNISHED BY CONTRACTOR

A. FLOATING DRILLING VESSEL

1. Type Zapata SS-4000 Class Semi-submersible. Self propelled twin-hulled seabarge catamaran with six stabilizing columns and elevated water tight working platform.

2. Major Dimensions

(a)	Length lower hulls:	380.6'
(b)	Overall width:	236.2'
(c)	Each lower hull width:	44.3'
(d)	Separation between lower hulls:	147.6'
(e)	Lower hull depth:	26.2'
(f)	Number of stabilizing columns:	6
(g)	Height of stabilizing columns:	95.8'
(h)	Diameter of stabilizing columns:	4 @ 32.8' 2 @ 28.9'
(i)	Height to low steel:	122.0'
(j)	Height to upper deck at center line:	137.1'
(k)	Depth of upper hull at center line:	15.1'
(l)	Upper deck width:	203.4'
(m)	Upper deck length:	257.2'
(n)	Diameter of struts and braces:	6.1' to 8.8'
(o)	Drilling draft:	77.0'
(p)	Drilling displacement:	36,340 short tons
(q)	Drilling draft wave clearance:	45.0'
(r)	Drilling draft clearance wave:	75.0'
(s)	Severe storm draft (drilling survival):	61.0'
(t)	Severe storm displacement:	33,610 short tons
(u)	Severe storm wave clearance:	61.0'
(v)	Severe storm clearance wave:	119.0'
(w)	Severe storm displacement:	33,100 short tons

3. Variable Load and Storage Capacities

Variable Load Capacities:

Drilling mode:	4,470 short tons
Transit mode:	3,165 short tons
Drilling survival:	3,640 short tons

The variable deck load is that semi-permanent weight that the Drilling Unit can transport and store in either the transit or operating conditions. The variable deck load consists of bulk tanks, sack stores, tubulars, supplies, riser, BOP, liquid mud, vertical tensions of riser tensioners, guideline tensioners and hookload; the drilling and the associated equipment not originally installed on the rig. The variable deck load does not include liquids in lower hull, mooring weight in transit or mooring tension while drilling.

Storage Capacities:

Upper Hull Capacities:

Bulk Mud and Cement w/P-tanks at 1,800 Cu. ft. and 3 pre-cementing tanks at 1,000 Cu. ft.:	17,400 Cu. ft.
Sack Materials (gross):	4,000 sacks
Liquid Mud in 4 tanks	2,688 bbls.
Slug tank:	58 bbls.
Liquid mud in 4 process tanks:	272 bbls.
Pipe rack:	Forward: 3,766 sq. ft. Aft: 4,734.4 sq. ft. Total: 8,500.4 sq. ft.
Riser rack:	3,766 sq. ft.
Potable water:	1,230 bbls.

Lower Hull Capacities:

Fuel Oil:	15,069 bbls.
Drill Water:	12,510 bbls.

4. Propulsion System

Two 10' diameter propellers with Kort nozzles (one each hull), each driven by four (4) 850 hp electric motors. Total propulsion power: 6,800 hp

5. Propulsion Characteristics

Transit draft:	24.3'
Lower hull depth:	26.2'
Lower hull freeboard:	2.0'
Displacement:	22,744 short tons

Approximate propulsion speed data: Trial speed on calm and deep open sea under Beaufort Scale of 3 or less on the draft 7.4 meters: avg. 10 kts.

6. Minimum Operating Water Depth 150'

7. Maximum Severe Environment Operating Water Depth 2,000'

8. Classification and Certification

American Bureau of Shipping (ABS) column stabilized drilling unit, Maltese Cross A-1, Circle M, Maltese Cross AMS, for unrestricted ocean service.

Ice Class IC strengtening for pontoons, propulsion and steering gear

9. Country of Registration U.S.A.

B. VESSEL MOORING SYSTEM

The Zapata SS-4000 mooring system is a twelve-point system consisting of the following:

Anchors:	12 - 44,000 lb. Stevfix
Chain:	12 - 2,250' lengths 2-3/4" stud link ABS-certified anchor chain
Mooring Wire Lines:	12 - (5,500') 3" wire rope
Buoys:	12 - Pendant line buoys, steel construction with separate compartments
Winch-Windlass:	4 - Skaggit Model ETW-300/44 double drum, double wildcat mooring winch/anchor windlass, powered by 710 hp D.C. motor with band brake, dynamic brake, level wind footage and tension indicators.
	4 - Skaggit Model ETW-300/44 single drum, single wildcat mooring winch/anchor windlass, powered by 710 hp D.C. motor with band brake, dynamic brake, level wind footage and tension indicators.
Controls:	Control station at each corner of drilling unit with windlasses

Fairleads:	12 - column mounted, UCWF3/44 wire rope chain fairleaders (2-3/4" chain, 3" wire)
Pendant Lines & Reels:	12 - 2,200' pendant lines w/4 power-driven, double drum storage reels

C. HELIPORT

Octagonal shape, 89'10" across, each side 35' long, designed to ABS and U.K. rules for Sikorsky S-61 and Boeing Chinook helicopters, with NewMar helicopter refueling system and Billy Pugh helicopter safety net.

D. LIVING QUARTERS

100-man capacity on two decks with galley, mess, company representative's office, contractor representative's office, maintenance office, recreation rooms, change rooms, hospital, wheel house, radio room and barge control center.

E. COMMUNICATIONS EQUIPMENT

1. Radio Telegraph Station

1 - Marine Telegraphy Console including main and reserve transmitters and receiver, auto alarm, auto keyer, chronometer, etc., meeting SOLAS requirements.

2. Emergency Radios

1 - ITT MacKay 403A lifeboat transceiver complete with antennas

1 - EPIRB ACR incorporated RLB12 (or equal)

4 - MRT55C RCA VHF FM emergency communication radios in lifeboats

3. Automatic Direction Finder (ADF)

Simrad/Taiyo model TDC 328HATS with antennas

4. VHF/FM Radio Telephones

2 - Sailor RT 144AC, complete with dual watch for bridge unit and remotes for Toolpusher and Ballast Controller (1 - radio room; 1 bridge)

5. Maritime Radiotelephone Station

R.F. Harris SSB, 125W w/1000W linear amplifier, antenna coupler and antenna

6. Backup Maritime Radiotelephone Station (SSB)

Marconi CHI505, SSB with automatic antenna coupler and with distress tone generator and battery power

7. Aeromobile Equipment

King KY196 with speaker and microphone (covering all 720 aircraft channels)

SS-1000 southern Avionics Radio Beacon 100W helicopter homing beacon with PC1000 antenna coupler, MR7 automatic monitor/alarm receiver, and heli-pad antenna

8. VHF/FM Walkie Talkies

6 - VHF FM portable radios, intrinsically safe, standard type, complete with battery charger(s), case(s) and accessories

9. Radio Telex (error correcting

Phillips model STB750 channelized ARQ system complete with teletype and selective call

10. Radar

1 - JRC model JMA860, 60KW true motion, 10CM band wave length with antenna

1 - JRC model JMA8507, 50KW relative motion, 3CM band wave length with antenna

11. LORAN "C"

Navidyne ESZ7000

12. Satellite Navigation

Transtar Satellite Navigator/Omega Navigator

13. Gyroscopes

2 - Sperry Marine MK 37D gyro with switchover

14. Autopilots

Sperry Marine dual autopilot

15. Depth Sounder

Furuno F851S complete with depth alarm and recorder, with ED202 digital depth indicator

16. T.V. Monitoring System

Cameras to monitor pump rooms, propulsion rooms, drill floor, and cellar deck with monitors in ballast control room, company representative's office and toolpusher's office

17. Satellite Communications System

JRC model JUE35A Inmarsat terminal for transmitting voice and fax via satellite. Facsimile unit JRC model JAX-820

F. FIRE FIGHTING AND SAFETY EQUIPMENT

4 - Whittaker enclosed survival capsules, 50-man capacity each; winterized

4 - 25-man ocean equipped inflatable life rafts, USCG approved

125 - life jackets

9 - life buoys with lines, lights and/or smoke signals

63 - portable fire extinguishers

12 - semi-portable fire extinguishers

1 - fixed CO2 system for paint locker

3 - fixed Halon systems for engine/generator rooms, boiler room, and emergency generator room

3-berth hospital with complete medicine chest and examination facilities

1 - 150 gal. foam fire extinguishing system for heliport

1 - water deluge system for drill floor and production test areas

1 - dry chemical unit, 2,500 lb. capacity for heliport

1 - sprinkler system for quarters

110 - survival suits

ALL EQUIPMENT WILL SATISFY SOLAS REQUIREMENTS

G. VESSEL POSITION INDICATOR

1 - Honeywell RS902 digital acoustic vessel position indicator system with riser angle sensor and dual hydrophones

3 - Regan Bullseye with mounting brackets to attach to BOP stack and riser

H. POWER SYSTEM

1. Engines and Alternators

4 - EMD 16E8 diesel engines, rated ABS continuous, 1950 bhp at 900 RPM, each skid mounted unit includes 1 EMD model A20, AC alternator, ABS rated and certified for 1,400KW, 2,000 KVA, for SCR system application

2. SCR System

Ross-Hill power system with 6 SCR modules, 2 auxiliary control and reversing sub modules, 1 dynamic braking section, 1 mud pump console, 2 propulsion consoles, 4 winch control and alternator control systems

3. Emergency Generator Unit

Caterpillar Model D399TA turbocharged diesel electric set with 86CKW, marine AC generator

I. AIR COMPRESSORS

3 - Quincy model QSI490 w/125 hp motors, each rated 494 CFM at 125 Psi with air dryer

2 - Bulk air compressors, Quincy model D75AS with 100 hp motor rated at 956 total SCFM at Psig with air dryers

1 - emergency air compressor, Quincy model D350 with Lister ST2A diesel engine rated at 34.5 SCFM at 200 Psig

2 - high pressure air compressors - Price booster type with 75 hp motor rated at 125 SCFM each at 2,500 Psig, with air dryer

J. WATER DISTILLATION UNIT

2 - Koomey model W-10 reverse osmosis watermakers, 3,500 gal./day each

K. SEWAGE TREATMENT PLANT

1 - Omnipure model 12M812-27 (3,600 gal./day)

L. VESSEL PUMPS

3 - seawater service pumps with 150 hp motors; 340 short tons/hr.
2 - drill water pumps with 120 hp motors, 120 short tons/hr.
2 - drill water pumps with 30 hp motors; 27 short tons/hr.
4 - ballast water pumps with 100 hp motors; 600 short tons/hr.
2 - ballast stripping pumps with 15 hp motors; 55 short tons/hr.

2 - fire and bilge pumps with 120 hp motors; 130 short tons/hr.
2 - potable water pumps with 10 hp motors
4 - fuel transfer pumps with 10 hp motors
2 - bilge pumps with 60 hp motors; 130 short tons/hr.

M. CRANES

2 - National model OS-435 with 120' boom rated at 60 short tons at 30' radius

1 - National model OS-215 with 120' boom rated at 43 short tons at 30' radius

All cranes fitted with Markload X1-B load, radius capacity system

N. WELDING MACHINES

2 - 400 amp rectifier type DC welders

O. STEAM GENERATOR SYSTEM

Howell complete steam generating system skid mounted, capable of furnishing 20 million BTU/hr. using #2 fuel oil and fresh water makeup with:

14 - fixed heaters

8 - portable heaters

2 - stand on, fixed heaters rated for 700,000 BTU/hr. indoor duty or 1,200,000 BTU/hr. outdoor duty

5 - de-icing units

P. TRASH COMPACTOR

1 - ITS trash compactor, Scavenger electric model

Q. POLLUTION CONTROL SYSTEM

2 - column collecting tanks, 115 bbl. capacity each
2 - oily water transfer pumps with 2 hp motors, 11 short tons/hr.
1 - oily water separator rated at 5.5 short tons/hour

R. SUPPLY VESSEL MOORING

Samson "Bird's Nest" type mooring system with 12" circular nylon surge lines

S. PRODUCTION TEST FACILITIES

Port and starboard piping runs (including utilities) for Company-supplied PT package

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DESCRIPTION OF MOBILE DRILLING UNIT

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ZAPATA SS-4000

DRILLING UNIT, DRILLING EQUIPMENT,
MATERIALS, SUPPLIES AND SERVICES

PART II
DRILLING EQUIPMENT TO BE FURNISHED BY CONTRACTOR

A. DRILLING MACHINERY

1. Drawworks

3000 hp Continental Emsco C-3 type II electric drawworks with sand reel capacity of 23,100' of 9/16" wire line, Dretech model 15050 eddy current brake, GBH spinning cathead with air controls, GBH breakout cathead, Koomey Crown Block saver

Drawworks powered w/three ESE79 DC electric motors rated 710 hp continuous, 920 hp intermittent

2. Derrick

Branham Ind. dynamic bolted derrick, 1,300,000 lb. hook load capacity, 160' x 40' x 40' with 20,0000' of 5" drill pipe racking capacity

3. Substructure

40' x 40' height from main deck to drill floor, 28', 600,000 lb. set back capacity, 1,300,000 lb. rotary table support capacity

4. Mud Pumps

2 - Continental Emsco triplex single acting piston slush pumps, each powered with ESE79DC electric motors rated at 710 hp continuous, 920 hp intermittent

2 - 6 x 8R, 100 hp 1750 RPM Mission Magnum I charging pumps, PD55 pulsation dampeners on suchtions; dressed with 6-1/2" pump liners

5. Mud Mixing Pumps

3 - Mission Magnum I centrifugal pumps, 6 x 8R w/100 hp 1750 RPM electric motor

6. Crown Block

1 - 750 ton with 11 60" diameter sheaves for 1-1/2" line

7. Traveling Block

1 - 750 capacity with 8 60" sheaves for 1-1/2" line

8. Hook

1 - BJ 5750 Dynaplex, 750 ton capacity

9. Swivel

1 - Continental Emsco LB650, 650 ton capacity

10. Rotary Hoses

2 - 3-1/2" x 75', 5,000 PSI WP, 10,000 PSI test

11. Drilling Line

1 - 1-1/2", 6 x 19 IWRC XIPS

12. Ton Mile Intergrator

1 - Totco Ton Mile recorder system for installation on drawworks.

13. Rotary Table and Drive Unit

Continental Emsco 49-1/2" rotary table with 2-speed transmission, driven by 1 ESE-79DC electric motor rated 710 hp continuous, 920 hp intermittent

14. Kelly Spinner

1 - International A6C heavy duty power sub., left and right rotation with 6-5/8" API reg. left hand pin box sub

15. Standpipe Manifold

1 - Demco dual standpipe manifold, 5", 5,000 Psi WP, 7,500 Psi test

16. Mud Saver

1 - Okeh mud saver bucket

17. Master and Kelly Bushings

1 - Varco type MPCH hinged combination pin drive unit consisting of:

Varco type MPCH hinged master casing bushing complete for use in 49-1/2" rotary table with split extended API bowls: 1 set API No. 1,

1 set API No. 2, 2 sets API No. 3; lifting sling and bit breaker adapter.

1 - Varco type 27 HDP roller kelly bushing

18. Elevator Links

1 set - Byron Jackson 4-3/4" x 144", 750 ton capacity
1 set - Byron Jackson 2-3/4" x 132", 350 ton capacity
1 set - Byron Jackson 3-1/2" x 144", 500 ton capacity

19. Choke Manifold

3-1/16", 15,000 Psi WP with 2 20,000 Psi Swaco ultra chokes and 2 Cameron 15,000 Psi adjustable manual chokes

20. Mud Gas Separator and Possum Belly Trip Tank

Swaco mud gas separator unitized with possum belly tank, 50 bbl. capacity

21. Rathole

1 - rathole assembly for Range-3 kelly

22. Mousehole

1 - mousehole assembly for Range-2 pipe

23. Drop-In Valves

2 - Hydril #12 drop-in back pressure valves with seating subs for 4-1/2" and 5" X-hole connections

24. Float Valve

1 - Gray inside BOP 6-1/2" o.d. with 4-1/2" i.f. connections

25. Circulating Test Sub

3 - 5" X-hole tool joint to Weco 1502 union

26. Wire Line Wiper

1 - BJ or equal for 9/16" sandline

27. Wire Line Measuring Unit

1 - Mathey surveyor B2 power driven measuring reel assembly with 25,000' 0.092" diameter measuring line

28. Air Hoists

9 - Joy AF-112 (3-rig floor; 4-cellar deck; 2-end of dragways)

6 - Joy JHA-100 on cellar deck for guideline and podline tensioners

2 - Joy AF-112 air hoists for retrieving towing bridles

1 - Joy AW-80 for monkey board

29. Drilling Functions Recorder

Totco 6-pen drilling recorder unit located on drill floor

30. Electronic Mud System

Totco E5 electronic mud totalizer mud system for 4 pits and 1 trip tank

31. Survey Equipment

Totco No. 6 double recorded 0-8°, 0-16°, 0-7° (Hotwell), and 0-14° (Hotwell), double chart with sinker bar retrieving assembly

B. DRILL STRING

1. Drill Pipe

10,800' 5" o.d., 19.5 lb./ft., Grade E, R-2, drill pipe with 6-3/8" o.d. x 3-3/4" i.d. flash weld tool joints with 5" x-hole connections, 18° taper on boxes with plastic internal coating and fine particle hardbanding on box end only

8,000' 5" o.d., 19.5 lb./ft., Grade G-105, R-2, drill pipe with 6-1/2" o.d. x 3-1/2" i.d. flash weld tool joints with x-hole connections, 18° taper on boxes, non-hardfaced with internal plastic coating

66 jts. Drilco "Heavy-Wate" 5" o.d. drill pipe w/6-1/2" o.d. x 3-1/8" i.d. flash weld tool joints

2. Pup Joints

2 - 7' pup joints, Grade G-105 5" x-hole box and pin, 6-1/2" o.d. 18° shoulder, 3-1/4" i.d.

2 - 10' pup joints, Grade G-105 x-hole box and pin, 6-1/2" o.d., 18° shoulder, 3-1/4" i.d.

2 - 15' pup joints, Grade G-105 5" x-hole box and pin, 6-1/2" o.d., 18° shoulder, 3-1/4" i.d.

3. Subs

Necessary crossover subs for use with Contractor's drill string

4. Drill Collars

6 - 9-1/2" o.d. x 3" i.d. x 31' drill collars w/ 7-5/8" API regular box up and pin down, zip grooved (Drilco), spiral cut

40 jts. 8" o.d. x 2-13/16" i.d. x 31' drill collars w/6-5/8" API regular box up and pin down, spiral cut, zip grooved (Drilco)

45 - 6-1/2" o.d. x 2-1/4" i.d. x 31' drill collars w/4-1/2" API x-hole box up and pin down, spiral cut, zip grooved (Drilco)

5. Kelly

2 - 5-1/4" hexagon kellys x 54' overall, 51' working space, 3" bore, 7-3/4" o.d. top upset with 6-3/8" o.d. lower upset with 5" "extra hole" pin down, pressed steel thread protectors (Drilco)

6. Kelly Valves

2 - OMSCO 6-5/8" upper Kelly valve complete with wrench, 6-5/8" API reg. left hand box and pin connections, 15,000 Psi test (H2S trim)

2 - OMSCO lower kelly valves, 7-1/2" o.d. 3" i.d., complete with wrench, x-hole box and pin connections, 15,000 Psi test (H2S trim)

7. Bumper Subs

2 - 8" Baash-Ross 6-SI
2 - 6-1/2" Baash-Ross 6-SI

C. DRILL STRING HANDLING TOOLS

2 - Byron Jackson GG 5" air operated drill pipe elevator

1 - Byron Jackson MGG 3-1/2" 250-ton manual drill pipe elevator

1 set - drill pipe and casing tongs, Byron Jackson Type F with lug jaws, 2-7/8" through 5-3/4"

1 set - rotary tongs, Byron Jackson Type SDD complete with lug jaws 4" through 15"

1 - Byron Jackson GG350-ton manual elevator for 5" drill pipe

1 set - rotary tongs, Byron Jackson Type DB complete with lug jaws for 3-1/2" through 14-3/8"

1 set - rotary tongs, Byron Jackson Type B with extended heads for 13-3/8" through 24" casing

1 set - maritime hydraulics pneumatic power slips remotely operated for 5" o.d. drill pipe

2 - Varco 5" type SDXL rotary slip complete with 5" inserts for 5" o.d. drill pipe

1 - Varco 3-1/2" type SDML rotary slip complete with inserts for 3-1/2"

2 - Varco type DCS-L multi-segment drill collar slips complete with circular buttons for 8" collars

2 - Varco type DCS-L multi-segment drill collar slips complete with circular buttons for 9-1/2" drill collars

2 - Varco type DCS-R multi-segment drill collar slips complete with circular buttons for 5-1/2" - 7" drill collars

3 - Varco type MPR multi-segment safety clamp complete with case and wrench for range 6-1/2" - 10-1/2" o.d.

2 - Byron Jackson, type TA-150 center latch elevators (1 ea.) for handling 6-1/2" and 8" o.d. zip groove drill collars

1 - Byron Jackson type SLX-150 side door elevators for handling 9-1/2" o.d. zip grooved drill collars

1 - Byron Jackson type TA-150 air operated elevator for 6-1/2" o.d. zip grooved drill collars

8 - 1' subs for 6" drill collars

6 - lift subs for 8" drill collars

3 - lift subs for 9-1/2" drill collars

1 - Byron Jackson type TA-150 air operated elevator for 8" o.d. zip groove drill collars

1 - Byron Jackson type TA-75 air operated elevator for 9-1/2" o.d. zip groove drill collars

1 each - bit breaker for the following sizes: 24"-26"; 17-1/2"; 8-1/2"; and 12-1/4"

1 - dolly drill collar adapter with 1-3/4" x 36" links (80 ton)

1 - drill pipe spinner: Klampon or similar

Drilco Type I EZY Torque hydraulic cathead

D. CASING TOOLS

3 - Byron Jackson 500-ton 20" air/manual operated elevator/spiders for 13-5/8" through 20" casing

3 - Byron Jackson 1000-ton 14" air/manual operated elevator/spiders for 5-1/2" through 13-3/8" casing

1 - Lamb model 16,000 power casing tongs for sizes 5-1/2", 7", 9-5/8" and 13-3/8" o.d. casing

1 - Lamb model 20,000 power casing tong with jaw sets for 20" and 13-3/8" casing

1 - type CB split bushing for 30" casing

1 - type CB split bushing fpr 20" casing

1 - Varco CMSXL casing slip for 30" casing

1 - Varco type CMSXL multi-segment casing slip complete with circular buttons for 20" o.d. casing

1 - insert bowl No. 1 (split) for use in type MPCH bushing to handle 13-3/8" and 11-3/4" o.d. casing

1 - Varco type CMSXL multi-segment casing slip complete with circular buttons for 13-3/8" o.d. casing

1 - insert bowl No. 2 (split) for use in type MPCH bushing to handle 10-3/4" and 9-5/8" o.d. casing

1 - Varco 7" type CMSXL multi-segment casing slip complete with 7" inserts for 7" o.d. casing

1 - Varco CMSXL multi-segment casing slip complete with circular buttons for 9-5/8" o.d. casing

1 each - Byron Jackson type "SJ" single joint elevator for the following casing sizes: 20"; 13-3/8"; 9-5/8" and 7"

2 - Byron Jackson swivel suspension assemblies

1 each - Byron Jackson type SLX-150 side door casing elevators for the following casing sizes: 20"; 13-3/8", 9-5/8" and 7"

E. FISHING TOOLS

1 - Bowen 11-1/4" o.d. series 150 releasing and circulating overshot complete with parts to engage and pack off 9-1/2" o.d. and 8" o.d. drill collars with 6-5/8" API regular box connections

1 - Bowen 8-1/8" o.d. series 150 releasing and circulating overshot complete with parts to engage and pack off 6-1/2" o.d. drill collars and 5" o.d. drill pipe, with 5" x-hole box connection

1 - Bowen 5-5/8" o.d. series 150 releasing and circulating overshot complete with parts to engage and pack off 4-3/4" o.d. drill collars and 3-1/2" o.d. drill pipe with 3-1/2" i.f. connection

1 - Bowen rotary taper tap complete with wickers tapered from 2-1/4" o.d. to 4-3/4" o.d. with 5" x-hole box connection

1 - 4-3/4" o.d. Bowen rotary taper tap with wickers tapered from 2-1/2" o.d. to 1" o.d. to catch 1-1/4" i.d. through 2-1/4" i.d. with 3-1/2" i.f. box connection

1 - 4-3/4" o.d. Bowen type "Z" oil jar with 3-1/2" i.f. connections

1 - 4-3/4" o.d. x 20" stroke Bowen fishing bumper sub with 3-1/2" i.f. connections

1 - 6-1/2" o.d. Bowen type "Z" oil jar with 5" x-hole connections

1 - 8" o.d. Bowen type "Z" oil jar with 6-5/8" API regular connections

1 - Bowen junk sub for 7-1/2" to 8-1/2" hole with 4-1/2" API regular connections

1 - Bowen junk sub for 11-1/2" to 13" hole with 6-5/8" API regular connections

1 - Bowen junk sub for 5-1/8" to 5-7/8" hole with 3-1/2" API regular connections

1 - 8-1/4" Bowen flat bottomed junk mill with 4-1/2" API regular pin connections

1 - 11" o.d. standard reverse circulation Bowen junk basket No. 2690, complete with magnet insert and 6-5/8" API regular box connections

1 - 7-7/8" o.d. standard reverse circulation Bowen junk basket No. 2567, complete with magnet insert and 5" X hole box connection

1 - 8" o.d. Bowen safety joint No. 7925 3-1/2" bore, with 6-5/8" API regular tool joint box up pin down

1 - 6-3/4" o.d. Bowen safety joint No. 8280 3-3/4" bore, with 5" x-hole tool joint box up and pin down

1 - 4-3/4" o.d. Bowen safety joint No. 7870 2-11/16" bore, with 3-1/2" i.f. connections

1 - 12" Bowen flat bottomed junk mill with 6-5/8" API regular pin connection

1 - 11-1/2" Impression Block with 6-5/8" API regular pin connection

1 - 8" Impression Block with 4-1/2" API regular pin connection

1 - 5" o.d. Bowen K and G fishing magnet for operation in 5-7/8" hole with 2-7/8" API regular connection

Washpipe and Accessories:

600' 43.5 lb/ft., R-2, N-80 washpipe w/9-5/8" x-line connections complete with lift plugs and rotary shoes

600' 29.7 lb/ft., R-2, N-80 washpipe w/7-5/8" TSWP connections complete with lift plugs and rotary shoes

F. MUD AND CEMENT SYSTEMS

1. Mud System

4 - pressure tanks, 1800 cu. ft. USCG coded for 65 Psi
4 - high and low level indicators, 1 for each storage tank
4 - remote weight indicators (K-M weighing system)
2 - surge tanks, 160 cu. ft. 8' diameter

2. Cement System

4 - pressure tanks, 1800 cu. ft. USCG coded for 65 Psi
4 - high and low level indicators, 1 for each storage tank
4 - remote weight indicators (K-M weighing system)
3 - precementing tanks, 1000 cu. ft., 13' diameter, USCG coded for 65 Psi with remote weight indicator (K-M weighing system and high and low level indicators)
3 - remote weight indicators (K-M weighing system)

3. Shale Shaker

1 - Thule 120' triple shale shaker including 3 200 VSM hydraulic units

4. Degasser

1 - Swaco vacuum type with 6 x 8 R pump driven by 100 hp explosion proof motor

5. Desander

1 - Swaco 312 w/ 3 x 12" cones with 6 x 8 R pump driven by 100 hp explosion proof motor, 1500 GPM capacity

6. Desilter/Mud Cleaner

1 - Swaco 8T4 desilter w/ 16 x 4" cones w/ 6 x 8 R pump driven by 100 hp explosion proof motor, 1200 GPM capacity mounted over a Thule VSM-200 hydraulically driven variable speed screen unit

7. Centrifuge

1 - Swaco 414 centrifuge with CLN mono feed pump, variable speed, maximum feed rate of 100 GPM

8. Mud Mixer and Agitators

4 - "Lightnin" model 76-Q-25 heavy duty mud agitators, each powered with a 25 hp electric motor
4 - "Lightnin" model 71-Q-5 heavy duty mud agitators, each powered by a 5 hp electric motor
1 - "Lightnin" model 71-Q-3 heavy duty mud agitator, powered by a 3 hp electric motor

9. Cementing Unit

1 - Halliburton unit with Twin HT400 pumps, diesel driven
1 - electric motor driven hydraulic pump unit

Unit includes:
Hopper and screen, water hose, by-pass hose, sack cutter table, cement vat with screen and tool and utility box
1 - Halliburton recirculating mixer with 80 cu. ft. surge tank

G. SUBSEA CONTROL SYSTEM

Koomey closed loop control system with 2 2,500' capacity hose reels, each complete with 2,250' of hose, master control panel, hydraulic control panel, electric remote control panel, test panel, complete retrievable subsea control pods, electrically driven pumps (3 x 40 hp) and 1,176 gallon 3,000 Psi WP surface accumulator unit

H. RISER TENSIONING SYSTEM

8 - Western Gear riser tensioners, 80,000 lbs. each, 1-3/4" wire line (50' travel), 9 air pressure vessels plus 3 standby vessels and control panel
1 - Totco ton cycle indicator

I. GUIDE LINE AND POD LINE TENSIONING SYSTEM

6 each - Western Gear guide line tensioners, 16,000 lbs. each, 4 for guide lines, 2 for BOP pod lines

J. SUBSEA EQUIPMENT

1. 18-3/4", 15,000 Psi BOP Stack

2 - Vetco H-4 heavy duty 18-3/4" 15,000 Psi WP wellhead connector with studded hub

1 - Hydril 18-3/4", 15,000 Psi WP extended dual ram blowout preventer H2S trimmed. Studded top connection with CS-18 ring groove. Fitted with 4 3-1/16" CIW hubbed outlets with BX-154 stainless steel lined ring grooves. Flanged bottom connection with CX-18 ring groove. Dressed with shear rams and 5" pipe rams

1 - Hydril 18-3/4", 15,000 Psi WP extended dual ram blowout preventer H2S trimmed. Studded top connection with CX-18 ring groove. Flanged bottom connection CX-18 ring groove. Fitted with 4 3-1/16" CIW hubbed outlets with BX-154 stainless steel lined ring grooves. Dressed with 2 sets 5" pipe rams, and can also be dressed with 1 set 3-1/2" - 5" variable rams or 1 set of 3-1/2" pipe rams

1 - Hydril 18-3/4", 10,000 Psi annular preventer. H2S trimmed with 18-3/4" x 10,000 Psi studded top and BX-164 ring groove. 18-3/4" x 15,000 Psi flanged bottom with CS-18 ring groove

3 - Cameron type "F" gate valves, 3-1/16"" 15,000 lb. WP with "DF" actuator, 90° block target, clamp hub ends, stainless steel lined ring grooves, stainless steel bonnet groove, super trim

3 - Cameron type "F" gate valves, 3-1/8" bore with "DF" actuator, 3-1/8", 15,000 WP CIW clamp hub ends, stainless steel lined ring grooves, super trim

1 - guide frame for 18-3/4", 15,000 lb. WP BOP stack with 4 posts on 6' radius, with sleeve for attaching Regan connector. Interfaces for Normar carrier

1 - receiver plate assembly with hangoff beams, and preps for control pods

2. 18-3/4", 15,000 Psi Lower Riser Package

1 - collet connector, hydraulic 18-3/4", 10,000 lb. WP with CIW clamp hub top, with BX-164 ring groove, "AX" gasket bottom and manual override with stanless steel lined ring grooves, with secondary release

1 - N.L. Shaffer 21-1/4", 5,000 Psi WP annular BOP. 18-3/4" x 10,000 Psi WP clamp hub on bottom and 21-1/4" x 5,000 Psi WP studded top with stanless steel lined ring grooves, super trim

2 - Oil States flex joint type with 21-1/4" x 5,000 Psi WP flanged bottom x 21" FD-8 pin top with 3" 15,000 Psi WP, BX-154 clamp hub choke and kill line elbows and super trim with stainless steel lined ring grooves and 2 elbows for rigid conduit line

1 - stab plate fixed to fit 18-3/4" 10,000 Psi WP collet connector with 3" 15,000 Psi WP choke and kill line collet connectors

2 - Copper State BOP flex hose 3" i.d. 15,000 Psi WP with CIW #6 clamp hub one end and API flange other end, stainless steel lined BX-154 ring grooves, super trim approximately 20'

3. 21" Riser System (Regan)

40 - riser, 21" x 1/2" wall X-65 pipe "FD-8" riser connection ends pin up x box down w/3" i.d. 15,000 Psi WP choke and kill lines w/2 x 2-5/16" i.d., 3,000 Psi WP hydraulic supply line for control system. 50', super trim

36 sets - syntatic foam buoyancy material for 21" riser; 2,000' pressure. Buoyance of approximately 96% riser steel weight in water (Emerson & Cumming)

2 - 20' riser pup joint; as above

1 - 10' riser pup joint; as above

1 - 15' riser pup joint; as above

2 - telescoping joint "FD-8" pin up x box down with 45' stroke, 21" x 21" wall X-65 pipe w/3" i.d., 15,000 Psi WP choke and kill lines and 2 x 2-15/16" i.d. 3,000 Psi hydraulic supply line.

4. Accessories

2 - choke/kill hoses, 3" i.d., 15,000 Psi WP w/clamp hubs each end; super trim; 55'

2 - BOP hydraulic supply hose, 2" i.d., 3,000 Psi with WECO connections, 55'

1 - Vetco H4 test stump for 18-3/4", 15,000 Psi BOP stack

1 - Collet test stump, 18-3/4" x 15,000 Psi for lower marine riser package

1 set - running and handling tools for 21" riser

1 - riser running spider, hydraulic operated to fit 49-1/2" rotary

Vetco tools for SG-5 wellhead system:

1 - packoff retrieving, reinstallation tool w/4-1/2" i.f. box

1 - 9-5/8" full bore casing direct drive running tool

1 - multi-purpose 18-3/4" SG-5 plug type test tool for isolating seal assembly and testing all BOP components in one run

1 - wellhead housing casing hanger universal plug type test tool

1 - 18-3/4" wear bushing and seat protector running and retrieving tool

1 - running tool, temporary guide base

1 - 30" housing running tool

1 - 18-3/4" wellhead housing running tool

1 - 18-3/4" SG-5 type T casing hanger and universal direct drive running tool

1 - utility guide frame (Reynolds)

1 - Cameron 18-3/4" weight set test tool

5. Diverter System (Regan)

1 - support housing type KFDS, nominal 24" with 14" flowline and 4" fillup line connections

1 - diverter assembly type KFDS, nominal 24" with 10" insert to pack off on drill pipe. Includes 30° included angle ball joint with 21" type FD-8 box down

1 - diverter handling tool type HT-2 with 5" x-hole connection box up

1 - hydraulic riser support ring type SDL-2 with padeyes for 8 riser tensioner lines

1 - Koomey test pump model S30RX with chart recorder for high pressure testing of BOP and related equipment

1 - Koomey test pump model S20RX with chart recorder for high pressure testing of riser and choke manifold

6. Subsea TV System

1 - hydro subsea TV model W-1215 with: 1 monitor, rig floor; 1 monitor, toolpusher's office, with air winch model HA155B

K. SPECIAL EQUIPMENT

1. Forklift

1 - diesel forklift, 4000 lb. capacity

2. Emergency Towing Bridle

2 x 3", 110' lengths 6 x 37 galvanized IPS, IWRC wire rope w/2 x 3" x 38.5' lengths of ORQ chain

3. Hose Reel

1 - hose reel assembly for running 30" pin connector, 2,250' of 6 x 3/16" i.d. hoses

4. Motion Compensator System

N.L. Shaffer model 18/600, 18' stroke capacity, 600,000 lb. compensating; 1,500,000 lb. locked; 1,000,000 lbs. fully extended

5. Automated Pipe Racking

Byron Jackson 3-arm electro hydraulic vertical racking system consisting of:

1 - upper horizontal hydraulic power arm and carriage assembly with shear pivot head

1 - middle horizontal hydraulic power arm and carriage assembly with heavy duty stand lift cylinder for lifting 1 stand of 9-1/2" drill collars

1 - lower horizontal hydraulic power arm and carriage assembly

1 - hydraulic power unit for pipe handling system (Hydradyne hydraulic)

1 - remotely operated pneumatic racking board for 224 stands of 5" drill pipe and 14 stands of 9" drill collars

1 - enclosed and heated derrickman console for operation of upper racking area and finger boards

1 - enclosed and heated assistant drillers console for operation of lower and intermediate racking arms

6. BOP Handling Equipment

1 - Normar rail-mounted BOP handling dolly designed to move and test BOPs as one unit (200 metric ton capacity)

2 - overhead BOP handling cranes (50 short ton capacity each)

7. 30" Hydraulic Latch (Vetco)

1 - Vetco hydraulic latch complete with 2-arm guide frame and storage skid with interface to spare oil states 2-1/4" flex joint

8. Emergency Escape Line

1 - derrick escape device, M&R Rig Company model No. 9

9. Cement Standpipe

1 - 15,000 Psi cement standpipe with hose 10,000 Psi maximum WP

10. Hydraulic Roughneck

1 - with tilt for mousehole connection, type MH 1168, Maritime hydraulics

WELL LOCATION SURVEY

SITE SURVEY

342NL/P10
HY7990

REPORT ON SITE SURVEY
AT ARCHER "A" LOCATION
BASS STRAIT

Prepared for: PETROFINA EXPLORATION AUST. S.A.
LEVEL 2
476 ST KILDA ROAD
MELBOURNE VIC 3000

Prepared by: ASSOCIATED SURVEYS INTERNATIONAL PTY. LTD.
18 PROWSE STREET
WEST PERTH WA 6005

Date: JANUARY, 1989

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APPENDIX Extension of Survey

2.0 SCOPE OF WORK

The site survey was carried out over a location defined in the following terms:

An area of 2000 metres square, centred on Latitude 38°46'8.4"S, 148°18'36"E (Easting 613806m, Northing 5708028m).

The grid consisted of 11 lines at 100 metre spacing run in an East-West direction, with an additional line run at 50 metres either side of the centre line, and five lines at 500 metre spacing run in a North-South direction.

NOTE: Official Well Location is Now (9 February 1990):

Latitude: 38°46'08"S (5 708 073m N)
Longitude: 148°18'36"E (613 829m E)

The offset is: 50m dist
027° brg

3.0 SUMMARY AND CONCLUSIONS

3.1 Summary

After award of the Contract to Associated Surveys International (ASI), the vessel "M.T. Wongara", together with all personel, berthed at Port Welshpool, in Victoria at 0930 hours on December 3rd, 1988 to begin mobilising the equipment required for the survey.

During the following two days, the side-scan sonar winch and all bottom sampling equipment were installed on board the vessel. As the Syledis positioning and computer processing equipment had been calibrated and installed for a previous survey, this equipment was already on the vessel. The shore stations for the Syledis were moved to suitable locations on the Bass Strait Oil Platforms during this period.

The Petrofina Representative joined the vessel on December 4th, 1988 and with all equipment operational, the vessel sailed from Port Welshpool on the high tide at 0830 hours on December 5th, 1988.

Although the vessel arrived on site at 2330 hours on December 5th, 1988, strong South Westerly winds and heavy seas precluded any survey operations being undertaken. After steaming in the area for almost 24 hours, with no improvement in the weather, the Petrofina Representative Mr M.D. Bouveret, decided to return to the vessel's home port, Eden N.S.W. to await a suitable "weather window" to allow the survey to proceed. The vessel arrived in Eden at 1030 hours on December 7th, 1988.

With an improvement in the weather, the vessel sailed from Eden at 1308 hours on December 9th, 1988. Upon arrival at the site at 0230 hours on December 10th, 1988 the survey was immediately commenced, and continued uninterrupted until rough weather again made the acquisition of suitable results impossible. The vessel remained in the area until 0800 hours the following day, when with the weather further worsening, the Petrofina Representative gave instructions to proceed to a safe anchorage, Refuge Cove, to again await an improvement. Arriving at Refuge Cove at 0830 hours on December 12th, 1988 the vessel remained there until 2140 hours, when the weather had improved sufficiently to proceed back towards the site.

The remainder of the survey at the Archer site was undertaken without further incident between the hours of 0830 - 2357 on December 13th, 1988. On completion of the survey, the vessel proceeded towards the "Angler 1" location.

3.2 Conclusions

The area slopes fairly evenly from North-West to South-East, with a depth of approximately 165 metres at the "Archer A" location.

Over a 2km square surrounding the location, the seabed is essentially smooth and free of any obstacles and hazards for the approach of the rig.

4.0 PERSONNEL AND EQUIPMENT

4.1 Personnel

The following personnel were utilised on this contract:

M. Gale	Senior Hydrographic Surveyor/Party Chief
A. Terrill	Geophysicist
M. Strawhorn	Electronics Technician
B. Hassett	Hydrographic Surveyor
J. Vigurs	Geophysicist/Processor

4.2 Equipment

The following equipment was utilised on this contract:

Syledis Positioning System
QUBIT TRAC IVB Navigation Computer and Data Logger
Elac LAZ721 Echo Sounder
EG&G SMS960 Seafloor Mapping System/Side Scan Sonar
EG&G Model 272 Safe-T-Link Side Scan Towfish
EG&G Boomer Sub-Bottom Profiling System
Grab Sampler
Drop Corer

SURVEY VESSEL EQUIPMENT LAYOUT

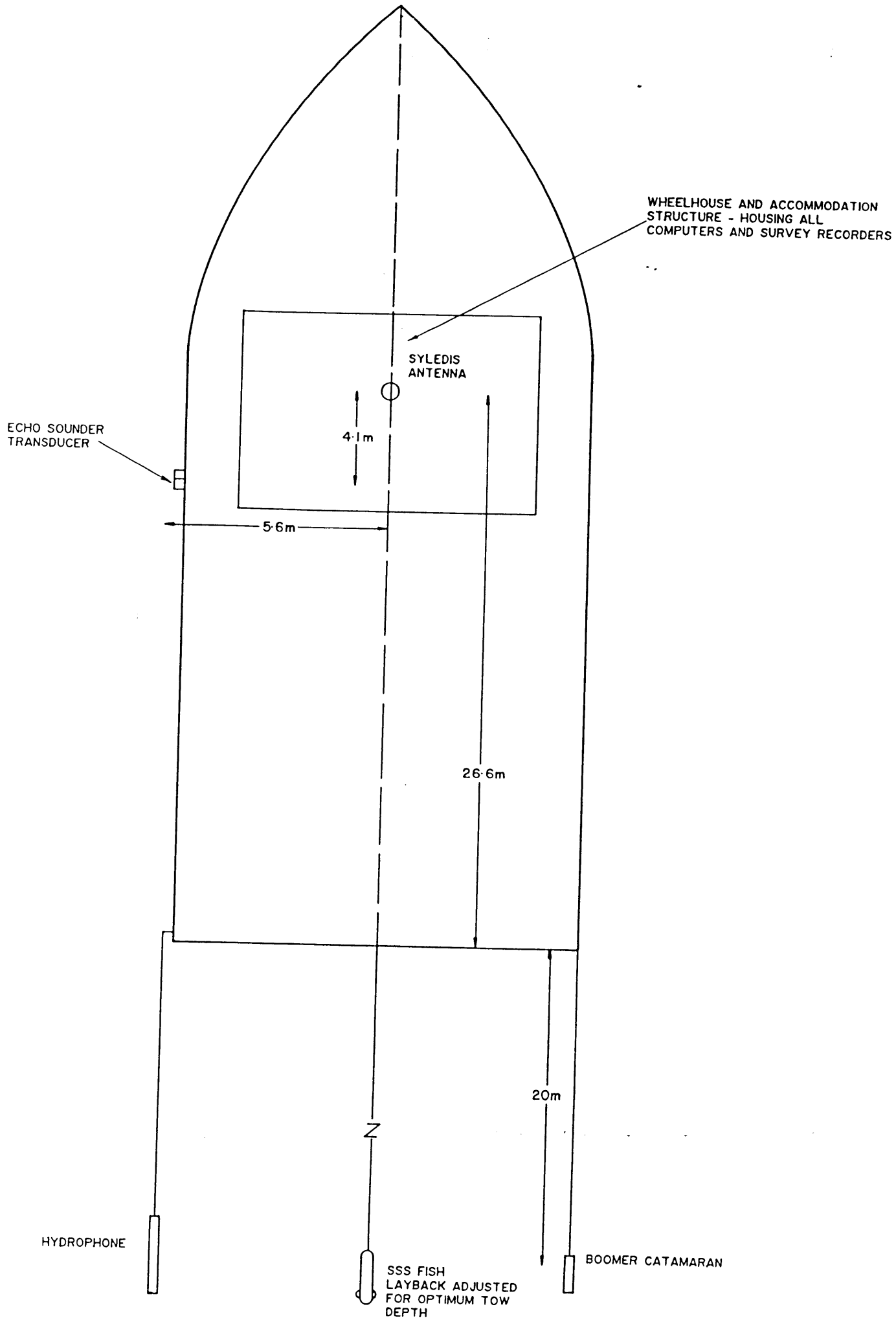

FIG. 1

5.0 SURVEY METHODS AND PROCEDURES

5.1 Navigation Positioning and Calibration

5.1.1 Navigation Positioning

The Electronic Positioning System was the Sercel Syledis microwave system. Three shore stations, set up on points of known co-ordinates ashore, were used for ranging to give vessel position.

A QUBIT TRAC IVB system based on the HP9930 computer was used for navigation control. The system reads the Syledis ranges via a QUBIT 2781 intelligent interface, and by the method of Least Squares adjustment, converts these ranges into a position on the AMG co-ordinate system. This allows real time logging on magnetic disc and paper printer and position to be displayed on a VDU screen.

The facility of a Rainbow 8 card in the interface meant that the vessel could be conned along a pre-determined survey line by using a screen graphics display showing the required line and a cursor representing the vessel position. This remote monitor was mounted beside the helm.

5.1.2 Calibration

The Syledis was calibrated over a baseline of known length at Seaspray in Victoria. The length of this baseline was 3605.3 metres. The remote beacons, each colour coded with its own cable and antenna, were set up at the Western end of the baseline, and the mobile units, again colour coded with cables and antennae, were set up at the Eastern end. A series of twenty range readings was observed from each mobile/remote comination, and delay values established for later inclusion in the TRAC IVB software.

5.2 Echo Sounder

The sounder used on the project was an Elac LAZ721 echo sounder with transducer mounted on a bracket over the Port side of the vessel. A 50 KHz transducer was used for this survey. The depth trace printed on paper was annotated by "fix" marks with details of time, date, run number and fix number. An Actif digitiser was interfaced to the sounder to produce digital depth data.

5.2.1 Sounder Calibration

Calibration of the sounder was carried out at commencement and again at completion of sounding. A calibrated bar check was lowered to fixed distances below the sea surface. The scale of the sounder and the digitiser were set to zero and compensated for velocity of sound on both the sounder and the digitiser. Depths were checked at 4 metres and then at 2 metre increments down to the maximum survey depth.

5.3 Side Scan Sonar

This survey technique involves the transmission of high frequency bursts of acoustic energy in progressive sweeps across the seabed, and the detection of the reflected signals. The relative intensities of the reflected signals correlate to variations in seafloor topography and to changes in texture and composition of seabed materials. By processing and printing signals from successive sweeps across an advancing paper chart, it is possible to create a facsimile two dimensional record of the seabed features.

For this survey an EG&G SMS960 Seafloor Mapping System was used incorporating an EG&G SMS960 Recorder and EG&G Model 272T 100 KHz Towfish.

The towfish, which carries two transducers to acoustically sweep the seabed on either side of the vessel's track, was towed astern. The length of the tow cable was adjusted in order to maintain, if possible, a towfish height above seabed of 8 to 10 metres.

The SMS960 Recorder processes the reflected signals detected by the transducers, and prints the facsimile records. The recorder corrects for slant range and vessel speed to produce true-to-scale records of seafloor features.

Vessel speed was manually input during this survey using information supplied by the navigation computer via the video display.

The SMS960 recorder was interfaced to the navigation system in order that records could be automatically annotated with navigation 'fix' information noting fix number, time, date, line number and operating parameters.

For this survey, the system was operated to record data from 100 metres range either side of the vessel track, and the corrected records were produced at 1:1000 scale.

5.4 Sub-bottom profiling

The sub-bottom profiling technique involves use of a surface towed seismic source to produce seismic energy (compressional sound waves). This energy is directed downwards to the seabed to obtain reflections from sub-seabed geological or geotechnical interfaces between materials with different densities and within which the velocity of sound differs.

The technique is best suited to survey environments which have horizontal or low angled geotechnical interfaces such as sedimentary layers to reflect the signal vertically.

The seismic signals reflected from the seabed and below are detected by a surface towed hydrophone streamer and converted to electric signals.

These signals are processed and printed on successive sweeps of a dry paper facsimile recorder to produce a continuous seismic profile of the seabed sub-bottom. Typically, such profiles show horizontal or sub-horizontal traces called 'reflectors' which are facsimiles of the reflecting interfaces, or sedimentary layers, in two dimensions along the line of profile.

The geometry of each reflector on the seismic profile reproduces the geometry of the corresponding reflecting horizon, and reflector intensity varies as follows:

- Moderate to strong reflectors correspond to marked contrast in material density and seismic velocity. The strongest of these reflectors should indicate significant interface between material types such as the water/sediment interface between loose sediment and dense sediment or rock.

- Weak to moderate reflectors correspond to much less significant contrasts which could represent quite subtle changes in material texture and density.

- Reflectors so weak as to be untraceable suggest very insignificant material variations.

- 'Clean' records indicate negligible reflections and thus indicate uniform, sub-bottom materials.

Lateral changes in material types, or steeply sloping horizons scatter the seismic signal, thereby producing irregular or chaotic reflectors on the seismic profiles. Inhomogeneities such as cemented zones in otherwise uncemented sediments, or weak zones in otherwise hard rock, likewise cause seismic scattering.

Seismic profile interpretation is often hindered by the presence of multiples. The most significant of these occurs when the seabed is re-reflected from the sea surface to the seabed and back. The multiple is printed on the profile at double the displacement on the time scale of the original seabed reflector. When profiling is carried out in shallow water, the seabed multiple overprints and can mask the true sub-bottom reflectors.

The sub-bottom profiling system on this survey used a boomer sound source.

This source comprises a flat boomer plate attached to a surface towed catamaran. The discharge of a high energy electric current through a flat coil within this plate causes a metallic disc to pulse and to transmit a short duration burst of seismic energy downward into the seabed.

The high energy electric current was supplied to the boomer by a capacitor discharge type energy source. This unit was operated at maximum power of 175 joules.

A Benthos 12 element single channel hydrophone streamer was used for this survey.

With the boomer source towed 20 metres astern of the vessel's Port quarter, the streamer was towed 20 metres astern of the Starboard quarter from an outrigger pole to keep it away from the vessel's wake.

The seismic energy detected by the hydrophone streamer was processed as follows prior to recording:

- Filtered, between 500 Hz Lo-cut and 1500 Hz Hi-cut by a Band Pass Filter incorporated in the receiver unit. This process removes unwanted noise from the data.

- Time varied gain amplified, to enhance deeper data, using a TVG Amplifier incorporated in the receiver.

The processed signals were printed to produce facsimile seismic profile records using an EPC 1600 9" dry paper recorder. This was operated at a sweep speed which presents 80 milliseconds of record (approximately equivalent to 65 metres in depth scale) across 9 inches of paper.

The EPC recorder incorporates an extremely accurate internal clock and is used to supply the time break or trigger to the boomer energy source. This was 'fired' at 0.25 second intervals.

The EPC recorder was interfaced to the navigation computer so that fix marks could be automatically printed on the records. The fix numbers and other information on time and date, line number and operating parameters were manually anotated on the paper records.

5.5 Base Station Data

The survey was carried out using the following co-ordinates for the base stations. The co-ordinates are based on AGD66 on the Australian Map Grid Zone 55, Central Meridian 147°E:

i) Kingfish B (offset)
Easting 603367.7
Northing 5727056.1
Antenna Height 28.8m 9AHD)

ii) Snapper (offset)
Easting 589696.8
Northing 5771950.9
Antenna Height 32.6m (AHD)

iii) Flounder (offset)
Easting 625723.3
Northing 5758491.2
Antenna Height 33.6m (AHD)

6.0 SURVEY RESULTS

6.1 Bathymetry

The bathymetric data has been reduced to Chart Datum at Rabbit Island (Port No. 6061 in the Australian National Tide Tables) by applying height and time differences to the Devonport (Mersey River) tides.

Checks on the soundings at line intersections reveal an accuracy of soundings of +/- 1 metre.

The survey revealed a fairly evenly sloping seabed, with depths varying from 97 metres in the North-West corner of the area, to 260 metres in the South East corner. The contours run fairly consistently in a SSW-NNE direction, with no noticeable variations to this pattern. The depth at the location is approximately 165 metres.

6.2 Seabed Features

The seafloor topography throughout the surveyed area is very steep and this necessitated constant adjustments to the height of the sonar fish which caused some degradation of the sonar records. The record quality was fairly good, but in the absence of direct evidence from a core sample, the interpretation of the seafloor sediments is based on seabed reflectivity alone and is therefore tentative.

Sonar records generally indicate a seafloor of moderate reflectivity and it is considered that the majority of the area is covered by a veneer of coarse shelly sand. In some areas the records have a mottled texture, possibly caused by greater concentrations of coarse material having been re-worked by bottom currents. The central area shows slightly higher reflectivity and has been interpreted as sandy gravel. However, the boundary is not always well defined and is thought to be gradational. Within this coarser central area, are narrow ribbons of megarippled sand, 30 - 40 metres wide and about 500 metres long. These ribbons trend approximately East/West and the crests of the megaripples trend approximately North/South, suggesting the prevailing bottom current has a general East/West direction. Average heights of megaripples in these areas are estimated to be not more than one metre. A large area of megarippled sand is present to the north of the site. Megaripples have a similar North/South trend but crests are more sinuous possibly indicating variable bottom current directions.

Both drop core and grab samples were attempted but were unsuccessful. This may be due to the local sea state or may possibly indicate a hard seafloor in the central region. Other than the general steep slope in the centre, particularly to the Northwest of location where the average gradient is 1:10, there are no obstructions seen from the sonar records which may affect the location of a semi submersible platform.

6.3 Shallow Geology

Boomer records were generally of good quality with penetration occasionally down to 80 metres. However, the general depth of the seafloor and the high relief present in the area necessitated a scale of 500ms to be set on the recorder. This has resulted in some loss of the fine bedding detail which may have been observed at a larger scale.

It is evident from boomer records that there are a number of flat lying erosion surfaces present in the area occasionally seen to depths of about 50 metres. None of the surfaces are present across the entire site and the mapped surface is the most persistent. This horizon is virtually horizontal, but the thickness of the overylying sediments shows a general increase towards the northwest of the site. In the Southeast corner the horizon has been eroded. Little information is observed below the mapped horizon but within the overlying sediments, thinly bedded, impersistent reflectors can be seen. Bedding is often cut by channelling and an area of cross bedding, outlined on the chart, indicates a palaeo river channel flowed towards the east. The impersistence of the reflectors, together with the presence of channelling and cross bedding, suggests these sediments were deposited in a fluvio-deltaic environment.

To the Northeast of the site a strong reflector is present at a depth of between 60 and 80 metres. It is not laterally extensive and is only seen out of the area. However, these sediments appear to have been faulted with a downthrow to the east of about 10 metres.

Channel infill is represented by a series of thinly bedded horizontal reflectors, possibly sands, silts and clays. Elsewhere sediments are thought to consist mainly of fine to coarse sands and gravels with occasional thin beds of silts and muds.

Whilst there is no direct evidence of slope instablility observable from boomer records, the general steepness of the slope, particularly to the Northwest of location, may make this a possibility. Other than that there do not appear to be any hazards, from boomer records, which may affect the installation of a semi-submersible platform.

2.0 SCOPE OF WORK

The site survey was carried out over a location defined in the following terms:

An area of 2200 metres radius, centred on Latitude 38°45'52.24"S, 148°19'49.22"E (Easting 615580m, Northing 5708499m). An additional adjacent area to the west encompassing the Archer site had been previously surveyed. As this area partially overlapped the Anemone site, it was not resurveyed.

The grid consisted of 11 lines at 100 metre spacing run in an East-West direction, with an additional 16 lines run at 200 metres in an East West direction, and seven lines at 500 metre spacings run in a North-South direction. Four extra north-south direction lines at 200 metre spacings were run west of the Archer site.

See the following diagram for site layout.

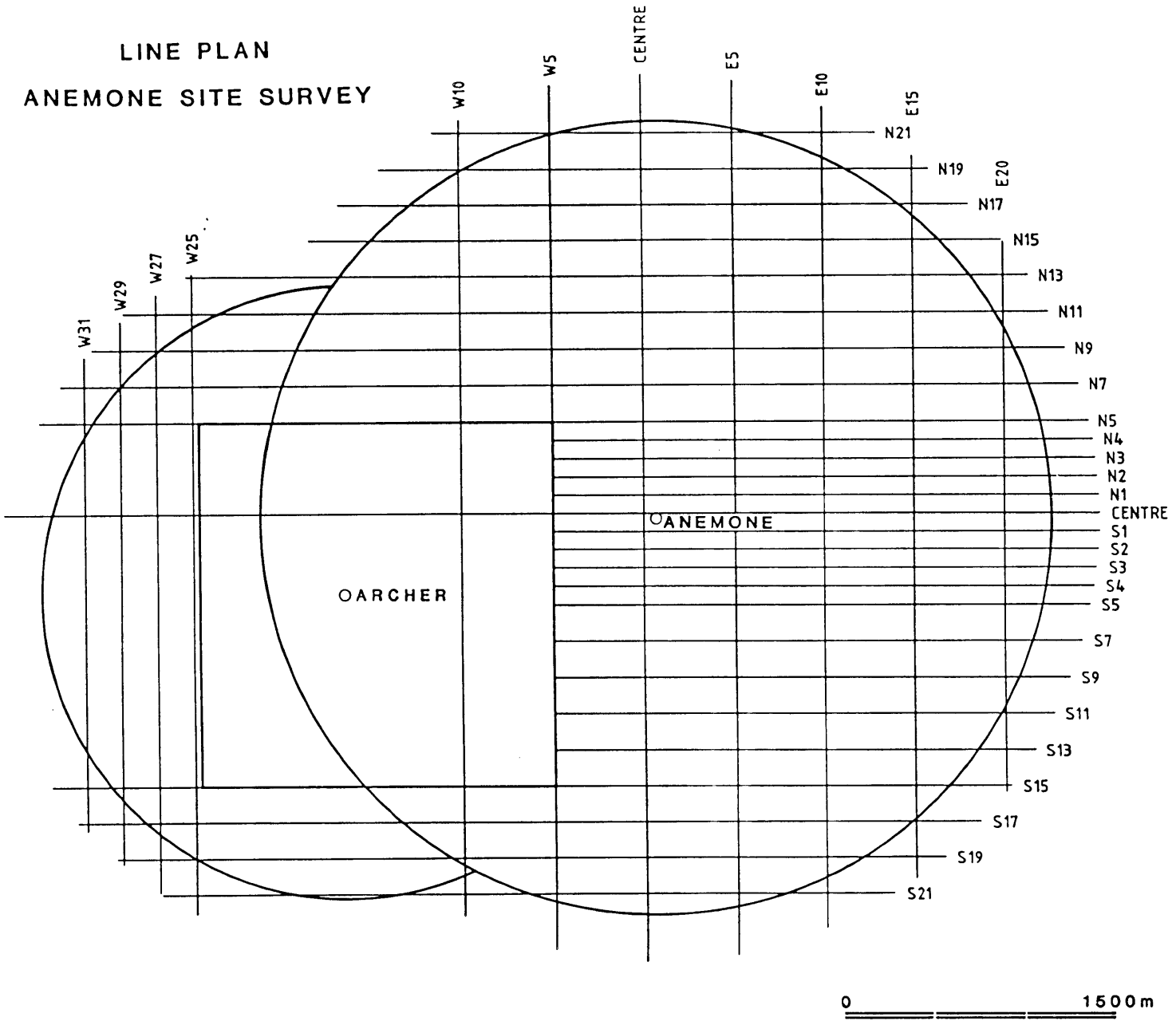
LINE PLAN
ANEMONE SITE SURVEY
W31
W29
W27
W25
W10
W5
CENTRE
E5
E10
E15
E20
N21
N19
N17
N15
N13
N11
N9
N7
N5
N4
N3
N2
N1
CENTRE
S1
S2
S3
S4
S5
S7
S9
S11
S13
S15
S17
S19
S21
ANEMONE
ARCHER
0
1500m

FIG. 1

RIG POSITIONING

ASSOCIATED SURVEYS INTERNATIONAL

ref. M210NT

PETROFINA EXPLORATION AUST SA
REPORT ON THE POSITIONING OF
THE SEMI-SUBMERSIBLE RIG
'ZAPATA ARCTIC'
AT ARCHER A SITE

Prepared for: PETROFINA EXPLORATION AUST SA
LEVEL 2
476 ST KILDA ROAD
MELBOURNE VIC 3000

Prepared by: ASSOCIATED SURVEYS INTERNATIONAL PTY LTD
18 PROWSE STREET
WEST PERTH WA

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ANNEXES

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ANNEX A TO SECTION 7	FINAL POSITION PRINTOUT

1.0 INTRODUCTION

Associated Surveys International Pty Ltd (ASI) was contracted by Petrofina Exploration Aust SA to position the semi-submersible drilling rig "Zapata Arctic" on location at Archer A site in Bass Strait, and to assist with the placing of anchors for the rig.

These operations were carried out between February 14 and 21 1990, using Syledis radio positioning system with Minitrac Navigation and the final position confirmed by G.P.S. Satellite positioning.

The personnel involved were:

M. Gale	Party Chief
J. Veitch	Electronics Engineer
T. Barnsley	G.P.S. Surveyor/Chain Manager

2.0 SUMMARY OF FINAL RESULTS

Australian National Spheroid (AGD66)

At Spudding in:		
Drill Stem Position	613 828.5E	5 708 067.5N
Target Position	613 829.0E	5 708 073.0N
Difference (T-O)	0.5m	5.5m

Latitude	38°46'07.0938" South
Longitude	148°18'36.9212" East
Heading	282 degrees

A differential G.P.S./Syledis comparison, obtained an hour after spudding in, confirmed the above position.

3.0 SEQUENCE OF EVENTS

14/2/90	M. Gale and equipment fly to Melbourne
15/2/90	All personnel arrive in Sale. Conduct preliminary Syledis calibration. Test GPS equipment.
16/2/90	Carry out in-situ Syledis calibration at Lakes Entrance.
17/2/90	M. Gale, J. Veitch drive to Welshpool, fly to "Zapata Arctic" with equipment. Set up on rig. Recovering anchors.
18/2/90	Recovering anchors. Conduct comparison between GPS and Syledis.
19/2/90	Recover all remaining anchors. Move to Archer Site. Commence running anchors.
20/2/90	Running anchors. Carry out GPS/Syledis comparison. Commence de-ballasting.
21/2/90	Complete de-ballasting. Move to final position and pre-tension anchors. Take final Syledis position at spud-in. Take comparison G.P.S./Syledis reading for confirmation of position. Demobilise all personnel and equipment.

4.0 DESCRIPTION OF EQUIPMENT

4.1 Radio Positioning System

The navigation system used for this project was Syledis, which operates in the 420-450MHz frequency band. This system has been used continuously by Associated Surveys since 1981 and has been found to be the best system available for this type of contract.

It can operate with up to four mobiles, each mobile interrogating up to three beacons simultaneously. Each beacon operates on a "slot", which is a time shared window, determined by the synchronization pulse from the master unit. The system was used in the normal 20 watt output mode.

The onboard mobile unit interrogates each beacon in the range/range mode with a coded signal, which is detected and returned to the mobile in the timed "slot" allocated to each beacon. The mobile calculates, from the time it takes for a single pulse within the code to be returned, the range in metres to the beacon it has interrogated.

4.2 Real Time Navigation and Data Logging Minitrac

The Minitrac system is based on a Hewlett Packard 85 desk top computer and the Qubit 2781 intelligent interface unit. Minitrac is a basic real time navigation and data logging system capable of being interfaced to a number of positioning systems.

The operator can enter selected positions as setpoints, to which the system will calculate the range and bearing, providing both a digital and graphical display. Offset positions can also be tracked and the ranges and bearings given relative to the offset.

Output data to the CRT includes time, reference position, offset position, raw ranges, quality of fix, bearing and distance to a setpoint and runline information. All of which can also be output to the inbuilt printer.

4.3 G.P.S. Satellite Positioning Equipment

ASI supplied two Ashtech L-XII receivers for this contract. One receiver was installed on the "Zapata Arctic" with the shore based receiver being installed in the ASI Sale office and the antennae located on a point with known co-ordinates.

Once the "Zapata Arctic" was anchored on location G.P.S. readings were taken, both on the rig and on shore, and values compared to determine an accurate positional check against Syledis. Further post processing was undertaken in Perth for final reporting.

5.0 SUMMARY OF SYLEDIS CALIBRATION

The Syledis system was calibrated over a short baseline of known length at Seaspray in Victoria. From this calibration the delays inherent in the system were established. Since the antenna and cable were already installed onboard the "Zapata Arctic" it could not be calibrated using this antenna and cable. A second antenna and cable was used for an insitu calibration at Lakes Entrance.

This insitu calibration confirmed the values of the delays each portion of the equipment contributed to the whole system, and a theoretical delay value was computed for the system as installed on the "Zapata Arctic", using the previously installed antenna and cable.

For the in-situ calibration the complete system including Minitrac was set up with the antenna on the coordinated mark. The theoretical delays were input into the software and various combinations of the beacons established were interrogated.

The resulting fixes showed good residuals for the beacons interrogated, confirming the values used for the delays.

.0 NAVIGATION AND POSITIONING

6.1 Spheroid, Projection and Grid

The rig was positioned on the Australian National Spheroid (AGD66) using the Transverse Mercator Projection in Australian Map grid (AMG) zone 55.

All heights are referenced to the Australian Height Datum (AHD) which is Mean Sea Level (MSL).

G.P.S. readings were relative to the WGS84 spheroid and were converted from the differential information to the AGD66.

The parameters for the rig positioning were:

Australian National Spheroid (AGD66):

Semi major axis	6378160.000m
Eccentricity	0.006694541855

Universal Transverse Mercator Projection:

AMG Zone 55,	Central Meridian	147°0'00"
Origin	False Easting	500 000 metres
	False Northing	10 000 000 metres
	Scale Factor	0.9996000

Based on Johnston Origin, Australian National Spheroid.

6.2 Coordinated Station

(Appendix "B" to report of survey - Station Summaries)

Carrajung

A second order trig mark on Mount Carrajung. The antenna was mounted on the Esso tower.

Geographic Coordinates	Latitude	38°22'25.09" South
	Longitude	246°40'33.33" East
A.M.G. Coordinates	Easting	471 619.9 East
	Northing	5 752 663.5 North
Elevation centre antenna		619.7 m
Antenna pointing		090 true

Flounder

A G.P.S. coordinated mark on the helideck of the Flounder Platform. The antenna was mounted in position 'A' on the rail below the helideck on the south side of the platform.

Geographic Coordinates	Latitude	38°18'46.30" South
	Longitude	148°01'26.90" East
A.M.G. Coordinates	Easting	589 678.78 East
	Northing	5 771 950.85 North
Elevation centre antenna		29.6 m
Antenna pointing		170 true

Barracouta

A G.P.S. coordinated mark on the helideck of Barracouta platform. The Antenna was mounted at the top of the radio mast.

Geographic Coordinates	Latitude	38°17'53.359" South
	Longitude	147°40'28.791" East
A.M.G. Coordinates	Easting	558 993.63 East
	Northing	5 760 873.19 North
Elevation centre antenna		47.64 m
Antenna pointing		130 true

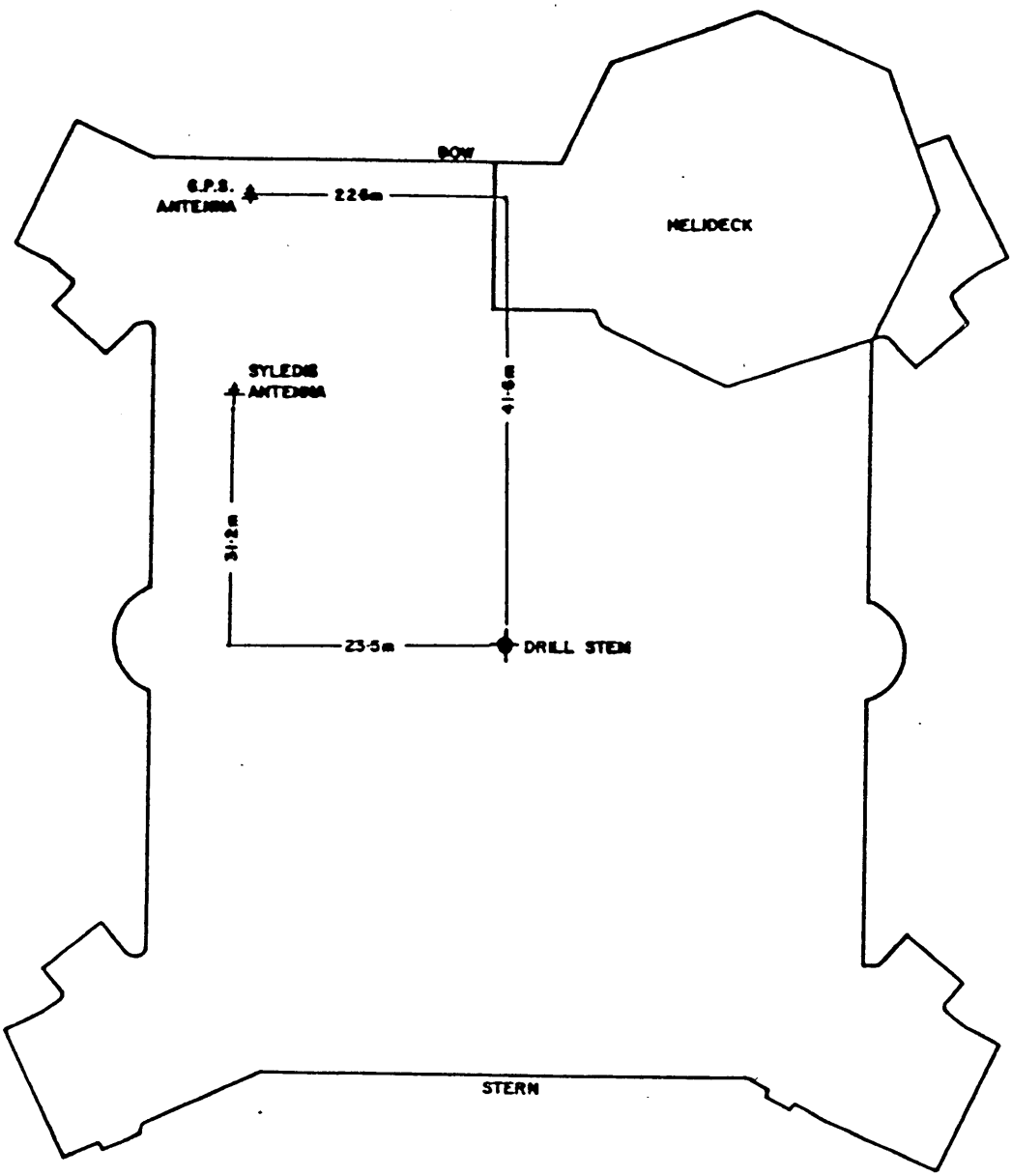
Snapper

A G.P.S. coordinated mark on the helideck of Snapper platform. The antenna was mounted on the rail two decks below on the south west corner of the platform.

Geographic Coordinates	Latitude	38°11'44.68" South
	Longitude	148°01'26.90" East
A.M.G. Coordinates	Easting	589 678.78 East
	Northing	5 771 950.85 North
Elevation centre antenna		29.6 m
Antenna pointing		170 true

ANNEX A TO SECTION 6

VESSEL OFFSETS



ORIENTATION	
SURVEYED	M. F. G.
DRAWN	T. M.

ZAPATA ARCTIC

ANTENNA OFFSETS

DATE	MARCH 89
SCALE	N.T.S.
DATUM	
REF.	HY 8089
PLAN No.	REV.

7.0 CONDUCT OF THE SURVEY

7.1 Layout of Anchors

An anchor pattern for the vessel was provided by the Captain. To assist with the laying of anchors, setpoints were made up so that the range and bearing to the anchor was the same as for the radar position, from which the anchor handling vessels were conned into position.

Offsets to each of the four corners of the rig from which the anchors were deployed were measured off the vessels drawings. With the known final heading and position of the vessel, the coordinates of each point was calculated. From each point the range and bearing of each of the anchor positions off the manoeuvring board was taken and the final position coordinates calculated.

The first anchor, number 7, was dropped as the vessel moved into position, the port stern anchor point being tracked as an offset.

The remaining anchors were run with the setpoint entered and no offset input until all anchors were placed in position.

(Annex A to section 6; Vessel Offsets)

7.2 Positioning the Rig

For the final positioning of the rig, 2D ranges were observed to each of the four shore stations, meaned and the resultant ranges were used to calculate the position.

The offset position to the drill tower was input into the computer and the gyro entered as the heading changed. By working the anchors the drill tower was brought to within 5 metres of the required position.

(See Annex B to section 6; Checks on comparison, G.P.S. - Syledis)

The rig was pre-tensioned after ballasting down and the final position checked, this was 8.2 m from the well position and was accepted as the final position for spudding in.

After the well was spudded, the G.P.S. position was monitored and two hours of readings recorded for later post processing, as well as twenty readings being hand recorded and the differential position established being compared with a concurrent Syledis position. (See annex B to section 6; Checks on comparison, GPS - Syledis).

ANNEX B TO SECTION 6

```
==============================
 MINITRAC OFFLINE MANUAL CALC
==============================

SYSTEM SET UP
-------------
ID    EASTINGS   NORTHINGS   HEIGHT
---------------------------------

 1   471691.90 5752663.50   619.70
 2   625736.29 5758478.40    33 60
 3   558993.63 5760873.19    47.60
 4   589678.78 5771950.85    29 60

HEIGHT OF TRANSMITTER 47.4

PROPOG CONSTANT 1

          MINI TRAC
          *********

STN     E: 471691.9 N: 5752663.5
STN 2   E: 625736.3 N: 5758478.4
STN 3   E: 558993.6 N: 5760873.2
STN 4   E: 589678.8 N: 5771950.9

DEFINED OFFSETS
       X:  23.5 Y: -31.2

WAY POINT ARCHER SET:-
     E: 613829.0 N: 5708073.0

FIX:   1
=======          SYLEDIS                GPS

Mast Posn:     613793.6 East
               5708054.2 North
                    2.4 Rmse
Offset Posn:   613829.0 East          613827.4 E      dE: -1.6
               5708070.7 North        5708072.4 N     dN +1.7
                  282.0 Gyro

Offset to Waypoint: ARCHER
Brg: 358.7     Dist:     2 3

      Ranges       C-Os
      ------       ----
   148992.2         1.3
    51828.2         2.5
    76133.3          .9
    58318.0        -3.7
-------------------------
```

ASI
SENIOR SURVEYOR

ANNEX A TO SECTION 7

FINAL POSITION PRINTOUT

TIME 1100 DATE 21 FEB 90

MINITRAC OFFLINE MANUAL CALC

SYSTEM SET UP

ID	EASTINGS	NORTHINGS	HEIGHT
1	471691.90	5752663.50	619.70
2	625736.29	5758478.40	33.60
3	558993.63	5760873.19	47.60
4	589678.78	5771950.85	29.60

HEIGHT OF TRANSMITTER 47.4

PROPOG CONSTANT 1

MINI TRAC
****

STN 1 E: 471691.9 N: 5752663.5
STN 2 E: 625736.3 N: 5758478.4
STN 3 E: 558993.6 N: 5760873.2
STN 4 E: 589678.8 N: 5771950.9

DEFINED OFFSETS
X: 23.5 Y: -31.2

WAY POINT ARCHER SET:-
E: 613829.0 N: 5708073.0

FIX: 1

LATITUDE	-38 46 07.0938
LONGITUDE	148 18 36.9212
EASTINGS	613828.500
NORTHINGS	5708067.500
GRID CONV	0 49 13.945
CENT MERID	147

Mast Posn: 613793.1 East
5708051.0 North
4.3 Rmse

Offset Posn: 613828.5 East
5708067.5 North
282.0 Gyro

Offset to Waypoint: ARCHER
Brg: 4.9 Dist: 5.5

Ranges	C-Os
148992.5	1.5
51829.8	4.2
76133.3	2.8
68324.0	-6.9

OPERATIONS

SUMMARY OF ACTIVITIES

SUMMARY OF ACTIVITIES

DATE	REPORT No.	DEPTH m	MUD WEIGHT (S.G.)	ACTIVITY
19.02.90	1	-	-	Rig arrived on Archer "A" location from Ayu-1 at 1530hrs, 19 February 1990. Unable to position rig due to strong current. Ran anchors.
20.02.90	2	-	-	Continued to run anchors. Pulled rig into position. Completed anchoring. Ballasted down to drilling draft. Made up 30" casing and landed in PGB.
21.02.90	3	255	1.04	Ballasted rig, pre-tensioned anchors. Made up 26" Bit No. 1RR, 36" hole opener and BHA No. 1. Spudded well at 1000 hrs. Drilled 36" hole from 195m (seabed) to 255m. Displaced hole to mud. Made wiper trip - no fill. POH. Ran and cemented 30" casing with shoe at 249m. WOC.
22.02.90	4	510	1.20	WOC. Made up 26" Bit No. 1RR and BHA No. 2. RIH and tagged TOC at 246m. Drilled out cement. Drilled 26" hole to 510m. Made wiper trip - no fill. Displaced open hole to hi-vis mud. POH. Ran 20" casing.
23.02.90	5	510	-	Ran and cemented 20" casing with shoe at 497m. Ran BOPs and riser.
24.02.90	6	608	1.06	Tested BOPs and surface equipment. Made up 17-1/2" Bit No. 2 and BHA No. 3. Tagged cement at 484m. Drilled out cement. Drilled formation to 513m. Performed FIT to EMW: 1.6 SG. Drilled 17-1/2" hole to 608m.
25.02.90	7	1200	1.13	Drilled 17-1/2" hole to 1200m.
26.02.90	8	1247	1.15	Drilled 17-1/2" hole to 1247m. Made wiper trip to 20" shoe - 1m fill. POH. Ran Log #1 DLL/AS/GR/CAL/SP. Ran 13-3/8" casing.
27.02.90	9	1250	1.15	Ran and cemented 13-3/8" casing with shoe 1232m. Tested BOPs. Made up 12-1/4" bit No. 3 and BHA No. 4. Tagged cement at 1219m.

				Drilled out cement and drilled formation to 1250m.
28.02.90	10	1932	1.06	Performed FIT to EMW: 1.8 SG. Drilled 12-1/4" hole 1448m. Made wiper trip to 13-3/8" shoe - no fill. Drilled 12-1/4" hole to 1932m.
01.03.90	11	2531	1.08	Drilled 12-1/4" hole to 2502m. Made wiper trip to shoe - 33m fill. Drilled 12-1/4" hole to 2531m.
02.03.90	12	2612	1.08	Drilled 12-1/4" hole to 2550m. POH. RIH with 12-1/4" Bit No. 4 and BHA No. 5. Drilled 12-1/4" hole to 2612m.
03.03.90	13	2691	1.09	Drilled 12-1/4" hole to 2691m. POH. RIH with 12-1/4" Bit No. 5 and BHA No. 6.
04.03.90	14	2947	1.10	RIH. Drilled 12-1/4" hole to 2947m.
05.03.90	15	3209	1.11	Drilled 12-1/4" hole to 3209m.
06.03.90	16	3311	1.11	Drilled 12-1/4" hole to 3311m. POH - hole tight, maximum overpull 140kips. RIH with fluted hanger to check wellhead space out.
07.03.90	17	3353	1.12	Tested BOPs. RIH with 12-1/4" Bit No. 4RR and BHA No. 7. Reamed to 2660-2919m, 3248m-TD. Drilled 12-1/4" hole to 3353m.
08.03.90	18	3445	1.10	Drilled 12-1/4" hole to 3445m. Circulated bottoms up, made wiper trip to casing shoe - maximum overpull 40 kips. When running back to bottom, pipe stuck at 3412m. Jars failed after 1/2 hour. Regained circulation after 3 hours. Worked pipe.
09.03.90	19	3445	1.09	Pumped EZ-spot and reduced hydrostatic while working pipe. Ran free point indicator - pipe stuck at 3364m. Backed off at 3361m. POH with string.
10.03.90	20	3445	1.06	Made up fishing BHA No. 8. Engaged fish, reduced mud weight and jarred fish free. POH.
11.03.90	21	3445	1.09	M/U and RIH with 12-1/4" Bit No. 5RR and BHA No. 9. Made wiper

				trip. Reamed and washed from 3365m-TD. Ran Log #1: DLL/MSFL/GR/SP/CAL/AS.
12.03.90	22	3445	1.08+	Ran Log #2: LDL/CNL/NGT and Log #3: GR/SHDT/FMS. Made wiper trip to 3445m with 12-1/4" Bit No. 5RR and BHA No. 9
13.03.90	23	3445	1.08+	Ran Log #4: RFT (2 runs).
14.03.90	24	3445	1.08+	Continued Log #4: RFT run #2. RIH with open ended drillpipe to 3445m. Set cement plug from 3445-3345m. POH. M/U and RIH with 12-1/4" Bit No. 5RR and BHA No. 10.
15.03.90	25	3445	1.09	Tagged TOC at 3343m. Dressed off cement plug to 3377m. POH. Rigged up to run 9-5/8" casing. Made up 9-5/8" casing shoe joint and intermediate joint, dropped down hole. Made up 9-5/8" casing spear.
16.03.90	26	3445	1.09	RIH with casing spear and recovered fish. Rigged up and ran 9-5/8" casing.
17.03.90	27	3445	1.09+	Ran and cemented 9-5/8" casing with shoe at 3367m. POH with running string and tested BOP.
18.03.90	28	3445	-	Continued testing BOPs. Laid down 12-1/4" BHA. P/U and RIH with 8-1/2" Bit No. 6 and BHA No. 11 to 3340m. Drilled out cement to 3377m. Performed FIT to EMW: 1.6 SG. Drilled out cement plug to 3435m.
19.03.90	29	3468	1.06	Drilled cement plug to 3445m. POH. P/U and RIH with 8-1/2" Bit No. 7 and BHA No. 12. Drilled 8-1/2" hole to 3468m.
20.03.90	30	3599	1.05	Drilled 8-1/2" hole to 3599m.
21.03.90	31	3651	1.06+	Drilled 8-1/2" hole to 3612m. POH. RIH with 8-1/2" Bit No. 8 and BHA No. 13. Drilled 8-1/2" hole to 3651m.
22.03.90	32	3781	1.06+	Drilled 8-1/2" hole to 3781m.
23.03.90	33	3810	1.06+	Drilled 8-1/2" hole to 3810m. POH. Tested BOPs. Made up 8-1/2" Bit No. 9 and BHA No. 14.

24.03.90	34	3888	1.06	RIH to 3775m, reamed to 3810m. Drilled 8-1/2" hole to 3888m.
25.03.90	35	3965	1.07	Drilled 8-1/2" hole to 3937m. Circulated for samples. Made 15 stands wiper trip. Drilled 8-1/2" hole to 3965m.
26.03.90	36	3999	1.08	Drilled 8-1/2" hole to 3999m. POH (hole tight). P/U and RIH with 8-1/2" Bit No. 10 and BHA No. 15 to 3964m. Reamed to 3999m.
27.03.90	37	4050	1.06+	Drilled 8-1/2" hole to 4050m (TD). Circulated bottoms up. Made wiper trip to shoe. POH.
28.03.90	38	4050	1.06+	Ran Log #1: DLL/AS/MSFL/CAL/GR. Ran Log #2: LDL/CNL/NGS. Ran Log #3: SHDT. Ran Log #4: RFT#1.
29.03.90	39	4050	1.06+	Ran Log #4: RFT#1, Log #5: RFT#2.
30.03.90	40	4050	1.07+	Continued RFT #2. Made wiper trip with 8-1/2" Bit No. 10RR. Ran Log #6: RFT#3, Log #7: RFT#4.
31.03.90	41	4050	1.07+	Ran Log #8: RFT#5, Log #9: VSP, Log #10: CST. RIH with openended drillpipe.
01.04.90	42	4050	1.08	RIH to 4050m. Set balanced plug #1A: 4050-3800m, #1B: 3800-3550m, #1C: 3550-3300m. WOC. Tagged TOC at 3265m. Tested plug to 3500psi. POH and layed down excess drillpipe.
02.04.90	43	4050	1.08	L/D excess drillpipe. Retrieved 9-5/8" pack-off. Made up casing cutting equipment and RIH. Cut and retrieved 9-5/8" casing at 1212m. RIH with open-ended drillpipe to 1300m.
03.04.90	44	4050	-	Set balanced cement plug #2: 1300-1000m. Tagged TOC with 10kips at 1040m. Tested plug to 1000psi. POH. RIH with casing cutting equipment, cut and retrieved 13-3/8" casing at 263m. RIH with open-ended drillpipe. Set balanced plug #3: 350-220m. Tagged TOC with 10kips at 262m.
04.04.90	45	4050	-	Set balanced plug #3A: 260-220m.

				Displaced riser to seawater. Pulled riser and BOP stack. Tagged TOC with 10kips at 224m. M/U casing cutting equipment assembly for cutting 20" and 30" casing.
05.04.90	46	4050	-	Cut and retrieved 20" casing at 200.5m. Cut 30" casing at 200.5m. Unable to work 30" casing free. Recut 30" casing at 199.8m.
06.04.90	47	4050	-	Unable to work 30" casing free. Cut 30" casing at 200.2m.
07.04.90	48	4050	-	Continued cutting casing at 200.2m. Unable to work 30" casing free. Cut 30" casing at 199.5m. Attempted to work 30" casing free.
08.04.90	49	4050	-	Ran explosive charges to 199m, set off charge and freed casing. POH with PGB and 30" casing. Pulled anchors.
09.04.90	50	4050	-	Continued pulling anchors. Rig released at 1100 hrs.

DISCUSSION AND RECOMMENDATION

ARCHER - 1

DISCUSSION AND RECOMMENDATIONS

A. Bit Performance in 12-1/4" / 8-1/2" Hole Sections

B. Stuck Pipe in 12-1/4" Hole

C. Fishing for Two Joints of 9-5/8" Casing

D. Abandonment Problems

E. Deviation

A. BIT PERFORMANCE IN 12-1/4" / 8-1/2" HOLE SECTIONS

Discussion

12-1/4" Section

The 12-1/4" section was drilled through Lakes Entrance, Gurnard and Latrobe Group from 1247m to 3445m, a total of 2198m in 137 hours with three bits.

The PDM was picked up and tested and the 13-3/8" float collar/float shoe were drilled out with 12-1/4" B9M+ PDC bit (Bit No. 3). After drilling out cement a limited F.I.T. was performed to 1.8 EMW. Bit #3 drilled to 2550m (a total of 1303m in Lakes Entrance) in 42.5 hours, averaging 30.7m/hr. The bit was pulled 8m short from reaching Gurnard Formation due to significant drop in ROP. It was 40% worn and 1/16 undergauged. The change in lithology with formation becoming more silty appeared to be the reason for the ROP drop. Due to the fact that the failure of PDM was also suspected, the PDM was laid down.

The 12-1/4" TD295 PDC (Bit No. 4) drilled through Gurnard and Top Latrobe from 2550m to 2691m (a total of 141m) in 26.0 hours, averaging 5.4m/hr. The bit was pulled due to slow ROP. Surface inspection revealed that the bit was severely balled up with face of the bit and 9 out of 10 junk slots packed off. It was only 10% worn. Since the MWD tool stopped working at 2563m it was laid out and the back up MWD tool was picked up.

Subsequently 12-1/4" MATJ-22 insert bit #5 was RIH and it drilled from 2691m to 3311m, a total of 620m in 53.0 hours averaging 11.7m/hr. The bit was pulled out due to drop in ROP in 6.3.1/8 condition. When pulling out, the hole was tight from 3311-2728m with maximum overpull of 140k. This required wiping of each stand in this interval.

The 12-1/4" TD295 PDC bit (re-run) was used to drill Latrobe from 3311m to 3445m, a total of 134m in 15.5 hours averaging 8.6m/hr. While drilling from 3353 to 3355m the ROP dropped significantly and balling of the bit was suspected. A 20bbl caustic soda pill was mixed and circulated, allowing bit to soak for 15 min. The drilling continued until 3445m.

8-1/2" Section

The 8-1/2" hole was drilled in Latrobe from 3445m to 4050m, a total of 605m in 139 hours with five bits. After drilling out cement with 8-1/2" Bit #6, ATJ-1, the limited FIT was performed to 1.6 SG EMW. An 8-1/2" PDC bit #7, Longyear DP-17, was run in the hole and it drilled until 3612m, a total of 167m in 38.5 hours at an average ROP of 4.3m/hr. It was POH 100% worn and ringed out. The lithology was mainly sandstone with some siltstone stringers. It is suspected that the poor performance of DP-17 bit was caused by faulty design with excessive number of cutters and not enough matrix to hold them. Subsequently three insert bits were used to drill to TD with ROPs ranging from 5.6-3.9m/hr. It should be noted that due to deviation problems the recommended W.O.B. could not be applied while drilling with these insert bits on a pendulum type assembly.

Recommendations

- **In view of the very good performances of the 12-1/4" and 8-1/2" insert rock bits in the Latrobe it is recommended that the use of insert rock bits against PDC bits should be considered in this section. Bit records from the offset wells should be available to Rig Supervisor to help him establish optimum drilling parameters.**

- **Due to poor performance of several Longyear PDC bits in the area, it is recommended that future purchases from this manufacturer should be avoided.**

B. STUCK PIPE IN 12-1/4" HOLE

Discussion

The 12-1/4" hole was drilled to 3445m and it was circulated for 2-1/2 hours until clean returns. The wiper trip was made to 13-3/8" casing shoe. While POH the maximum overpull was 40 kips in the 2725m to 2697m interval. While running back to bottom to continue drilling the pipe became stuck at 3412m. After jarring for 1/2 hour the Tri-State Bowen jars failed. Circulation was established and a 50bbl "Torque-Ease" pill was pumped. The string was worked with maximum overpull of 180 kips. The hydrostatic pressure was reduced by displacing hole to 1.02 SG mud and the choke line was displaced to seawater. The second 50bbl "Torque-Ease" pill was pumped and placed around DCs. Schlumberger's free point indicator showed pipe free at 3364m. The string was backed off at 3361m in the DC section. The fishing assembly with new set of jars was RIH, the fish was engaged and became free after approximately 2 hours of jarring. There is no doubt that the failure of the Tri-State drilling jars resulted in this expensive fishing job.

It should be noted that later another set of Tri-State Bowen jars had to be laid out because it developed a leak while drilling 8-1/2" hole section.

Recommendation

Due to several Tri-State equipment failures (see Section D also) it is recommended that an alternative equipment supplier should be considered.

C. FISHING FOR TWO JOINTS OF 9-5/8" CASING

Discussion

The 1000 ton air operated elevators and spider were rigged up and function tested for running 9-5/8" casing. The shoe and intermediate joints were made up and whilst running in, they were dropped in the hole. The Bowen fishing spear assembly was made up and fish was recovered in one attempt. The PDC drillable shoe was damaged by the impact. The 1000 ton elevators are equipped with the positive lock mechanism and the reason for two joints of casing being dropped is that Weatherford operator did not close/lock the elevators properly. It was also found that the 9-5/8" elevator guides were not installed.

Recommendations

- **It is recommended that casing should be initially run using side-door elevators and hand slips/dog collar until the string weight permits safe use of air operated elevators (see Petrofina Drilling Manual, Chapter 10, Clause 7).**

- **Proper size elevator guides have to be installed before each casing string is run.**

D. ABANDONMENT PROBLEMS

Discussion

A special Tri-State spear/cutter configuration was used to cut 20"/30" casing. It would allow the casing to be cut and pulled in the same run. In order to do that, the marine spear was locked in 20" casing and tension of approximately 20 kips was applied to cutting assembly against spear's thrust bearing. While cutting at 200.5m the 18-3/4" wellhead lock-ring released and the 18-3/4" wellhead and 20" casing stub were POH. The 20" casing stub was cut off at surface and the 18-3/4" wellhead was re-landed in the 30" housing. Over the next three days several unsuccessful attempts were made to cut and pull 30" casing/PGB (maximum overpull of 520 kips). The 18-3/4" wellhead lockring released several times, most probably due to a combination of tension and vibrations. The cutting depths were changed and five sets of cutters were replaced (including two sets of Metal Munchers). Marine spears as well as 18-3/4" wellhead running tool with and without jars were unsuccessfully used. In one instance the piston inside the marine cutter was washed out, preventing cutters from expanding; approximately eight hours of rig time were lost due to this. Subsequently the 18-3/4" wellhead was recovered. A special cutting assembly was made up and 30" casing cut at 199.5m. The attempt to pull 30" housing and PGB with 30" casing running tool and jars was once again unsuccessful. The rig was deballasted to tow draft and 30" casing was cut at 199m with explosives. The 30" casing and PGB were recovered on guide-wires.

Recommendations

- **Grease up 30" low pressure housing to prevent bond creation after 30" casing cementation.**

- **Carefully select lengths of 18-3/4" high pressure wellhead housing and 30" low pressure housing to allow maximum "cutting window" between ST-2 and ALT-2 squnch joints. The "cutting window" was only 0.86m in the case of Archer-1.**

- **In cases where "standard" cutting assembly is used (cut and pull in two runs), the proper centralization of the cutting assembly in 20" casing is necessary. Ensure that proper stabilizers are onboard.**

- **Due to recent problems with Tri-State fishing/cutting/drilling equipment (Ayu-1 - parted marine swivel; Archer-1 - washed-out piston inside marine cutter, two drilling jar failures), it is recommended that every piece of fishing/cutting/bottomhole**

assembly, provided by any contractor, should be accompanied by an inspection certificate no older than 14 days.

E. DEVIATION

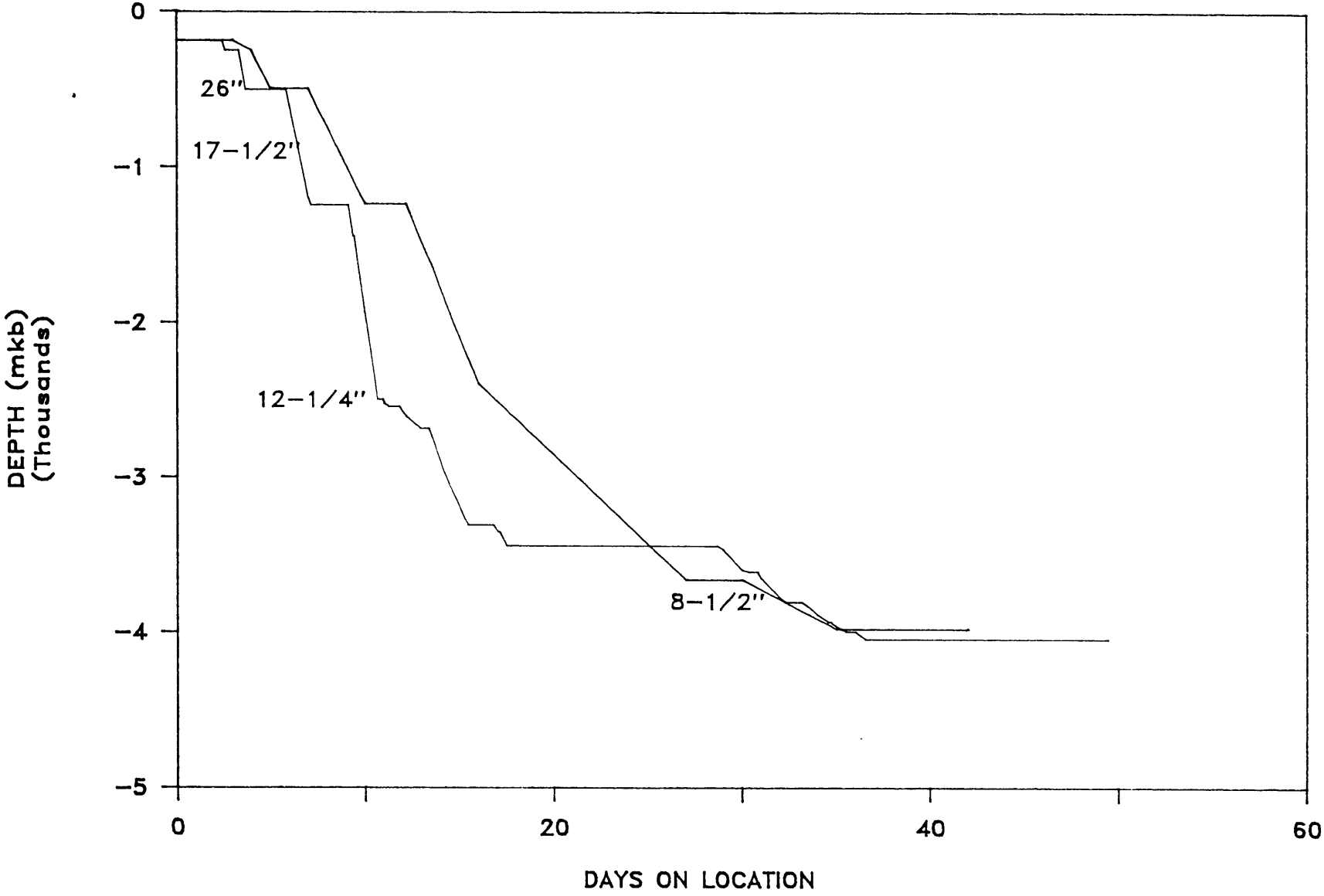
Discussion

The deviation started to build up rapidly from 1.4° at 3267m to a maximum of 7.6° at 3772m. The maximum dog leg severity was 1.7°/30m in the 3839-3857m interval. In the early stages of deviation build up, a pendulum or packed BHA were considered. The use of a pendulum BHA would result in a drastic decrease of the ROP due to necessary WOB decrease. The packed BHA would require moving of the MWD tool further up the drilling string and this was rejected by the Exploration Department. Since the target limit was given by the Exploration Department as a 100m radius at 4000m, drilling proceeded until reaching a depth of 3810m. At this depth, with an angle of 7.6°, the pendulum assembly was run and deviation was brought under control.

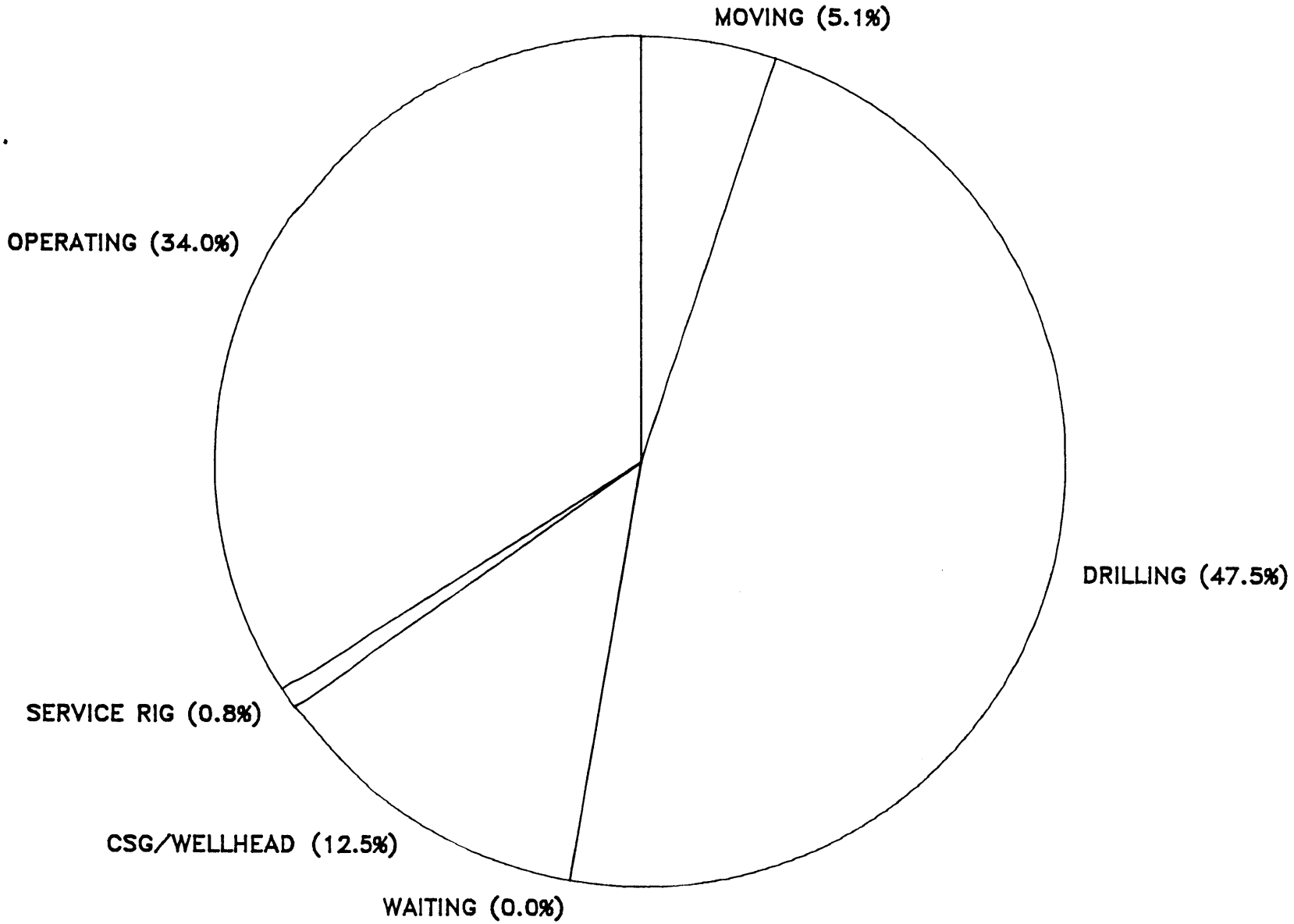
DEPTH VS DAYS CURVE

ARCHER – 1

PENETRATION GRAPH



TIME BREAKDOWN


MOVING (5.1%)
OPERATING (34.0%)
DRILLING (47.5%)
SERVICE RIG (0.8%)
CSG/WELLHEAD (12.5%)
WAITING (0.0%)

TIME BREAKDOWN

IADC CODE	OPERATION	HOURS
1	MOVING	60.5
2	DRILLING	320.5
3	REAMING	14.0
4	CORING	0.0
5	CIRCULATE/CONDITION MUD	41.0
6	TRIPPING	167.5
7	LUBE RIG	0.0
8	REPAIR RIG	0.5
9	SLIP & CUT LINE	9.0
10	DEVIATION	0.5
11	LOGGING	127.0
12	CASING	52.0
13	WAIT ON CEMENT	5.5
14	WELLHEAD / BOP	34.0
15	TEST BOP	25.0
16	DRILL STEM TEST	0.0
17	PLUG & ABANDON	200.0
18	SQUEEZE	0.0
19	FISHING	44.5
20	DIRECTIONAL WORK	0.0
21	CEMENTING	11.5
22	DRILL CEMENT	18.5
23	LEAK OFF CEMENT	2.0
24	WAIT ON WEATHER	0.0
25	WAIT ON DAYLIGHT	0.0
26	WAIT ON OPERATOR	0.0
27	WAIT ON CONTRACTOR	0.0
28		0.0
29	WAIT ON MISCELLANEOUS	0.0
30	PICK UP / LAY DOWN STRING	15.5
31	ROV OPERATIONS	0.0
32	SAFETY	0.5
33	KILLING OPERATIONS	0.0
34	STUCK PIPE	25.5
	TOTAL	1175.0

EXPLANATION OF TIME BREAKDOWN

1. **MOVING**

   - Moving and Anchoring

2. **DRILLING**

   - Drilling
   - Reaming
   - Coring
   - Circulating and Conditioning Mud
   - Tripping
   - Picking Up and Laying Down string

3. **CASING AND WELLHEAD**

   - Run Casing
   - Cement
   - Wait on Cement
   - Run BOP
   - Test BOP
   - Drill out Cement

4. **OPERATING**

   - Deviation Survey
   - Electrical Logging
   - DST
   - Squeeze Cement
   - Fishing
   - Directional Work
   - Leak Off Test
   - ROV Operations
   - Safety Drill
   - Plug and Abandon

5. **WAITING**

   - Weather
   - Daylight
   - Equipment/Operator
   - Contractor
   - Miscellaneous

6. **SERVICE RIG**

   - Lubricate Rig
   - Repair Rig
   - Slip and Cut Line

CONTRACTOR SUMMARY

ARCHER - 1

CONTRACTOR SUMMARY

Drilling	Zapata Off-Shore Company
Mud Engineering & Products	Baroid
Mud Logging	Geoservices
Electrical Logging	Schlumberger
MWD	Teleco
Downhole Motors	Eastman Christensen
Casing & Tubing Crew	Weatherford
Rental Tools	Tri-State
	Tasman Oil Tools
	Petrodrill
	Austoil
	Smith International
Cementing	Halliburton
Wellhead	Vetco Gray
Wellhead Retrieval	Tri-State
	Techmaster
R.O.V.	SubSea International
Helicopters	Bristow Helicopters
Supply Boats	Australian Offshore Services
Positioning	Associated Surveys
Site Survey	Associated Surveys
Telecommunications	Utek
Weather Forecasting	Oceanroutes
Transport and Handling	Peter Stoitse Transport
Local Labour (Base)	Gippsland Offshore Services

DRILLING DATA

BIT RECORD

ARCHER#1 - BIT RECORD

BIT NR	DIAM in	MAKE	TYPE	SER No	NOZZLES	OUT m	FOOTAG m	DRILL HRS	ROP m/hr	ACTUAL ROT.HRS	ACTUAL ROP	WOB Klb	RPM	GPM	PRESS PSI	DEVI deg	SG gr/cc	M VIS	LITHOLOGY	CONDITION	
1RR	26	REED	Y11	K26711	3x8,4x12	255	60	4.0	15.0			0-5	40-80	700		-	1.04	100	SAND (SPUD)	1.1.I	
	36	SMITH	H.O.	AHO1011	3x9																
1RR	26	REED	Y11	K26711	3x8,4x12	510	255	10.0	25.5			0-15	80-90	700	3100	1.0	1.20	100	SAND/CLAY	2.2.I	
2	17-1/2	HTC	CX3A	914WK	4x16	1247	737	31.5	23.4	20.0	36.9	5-25	80-160	940-970	2722-3100	0.5	1.15	42	MARL/CALCAR	1.5.I	2 seal failures
3	12-1/4	HTC	B9M+	122CAA5813	5x16,12	2550	1303	42.5	30.7	24.1	54.1	10-25	480-500	770-780	2450-2700	0.9	1.08	41	CLYST/MARL/SLST	40%	ring - 1/16" UG
4	12-1/4	DBS	TD295	72900169	5x13	2691	141	26.0	5.4	19.7	7.2	20-45	100-200	725-800	2950-3100	0.9	1.09	42	SLST/SST	10%	
5	12-1/4	HTC	MATJ-22	S88EG	3x15	3311	620	53.0	11.7	41.5	14.9	40-50	90-110	670-690	3100-3300	1.8	1.11	44	SST/SLST/COAL	6.3.1/8	broken inserts
4RR	12-1/4	DBS	TD295	72900169	3x14,2x13	3445	134	15.5	8.6	12.0	11.2	20-25	120	680	2640-2780	1.7	1.10	46	SST/SLST	40%	
5RR	12-1/4	HTC	ATJ-M22	S88EG	OPEN	WIPER TRIP						15	90	510	800		1.09	47			
5RR	12-1/4	HTC	ATJ-M22	S88EG	OPEN	DRESS OFF CEMENT											1.09	49			
6	8-1/2	HTC	ATJ1	E51EC	3x16	DRILL OUT CEMENT											1.06	46		3.2.I	
7	8-1/2	LONGYEAR	DP17	4750101	2x11,2x12	3612	167	38.5	4.3	28.9	5.8	10-35	65-120	375-500	2120-2450	4.6	1.06	49	SST/SLST	100%	ringed out
8	8-1/2	HTC	MATJ-22	K96EF	3x12	3810	198	35.5	5.6	28.2	7.0	25-32	80-90	375	2190	7.6	1.06	53	SST/SLST/COAL	4.3.1/16	
9	8-1/2	HTC	MATJ-22	TO9EG	3x12	3999	189	52.0	3.6	44.2	4.3	25-35	80-110	375	2200	4.7	1.08	51	SST/SLST/COAL	3.3.1/32	
10	8-1/2	SECURITY	S84F	400215	2x13,1x11	4050	51	13.0	3.9	10.6	4.8	30-35	90	375	2180	4.3	1.06	47	SLTS/SST	1.1.I	

BHA RECORD

ARCHER#1-BHA REPORT

B.H.A. No	Date	Description	Length (m)	Hrs	REMARKS
1	21/02/90	BIT 1RR, H.O., BIT SUB, 2*9-1/2" DC, X/O, 7*8" DC, X/O	90.87	4.0	DRILL 36" HOLE
2	22/02/90	BIT 1RR, BIT SUB, 9-1/2" DC, STAB, 9-1/2" DC, X/O, 10*8" DC, X/O	118.73	10.0	DRILL 26" HOLE
3	24/02/90	BIT 2, BIT SUB, 2*9-1/2" DC, X/O, STAB, X/O, MWD, STAB, MONEL, 7*8" DC, JARS, 3*8" DC, X/O, 15 HWDP	286.14	31.5	DRILL 17-1/2" HOLE
4	27/02/90	BIT 3, 9-1/2" MACH2 PDM, X/O, STAB, X/O, MWD, STAB, MONEL, 7*8" DC, JARS, 3*8" DC, X/O, 15 HWDP	280.77	42.5	DRILL 12-1/4" (PDC+PDM)
5	02/03/90	BIT 4, BOROX REAMER, MWD, STAB, SHOCK SUB, STAB, MONEL, 9*8" DC, JARS, 3*8" DC, X/O, 15 HWDP,DART SUB	294.74	26.0	DRILL 12-1/4" HOLE (PDC
	03/03/90	BIT 5, BOROX REAMER, MWD, STAB, SHOCK SUB, STAB, MONEL, 12*8" DC, JARS, 3*8" DC, X/O, 15 HWDP,DART SUB	322.69	53.0	DRILL 12-1/4" HOLE
7	07/03/90	BIT 4RR, BOROX REAMER, MWD, STAB, SHOCK SUB,STAB, MONEL, 9*8" DC, JARS, 3*8" DC, X/O, 15 HWDP,DART SUB	294.89	15.5	DRILL 12-1/4" HOLE (PDC
8	10/03/90	11-1/4" OVERSHOT, JARS, 6*8" DC, JAR ACCEL, X/O, 15 HWDP, DART SUB	211.11		FISH STUCK PIPE IN 12 1/4" HOLE
9	11/03/90	BIT 5RR, BIT SUB, 8" DC, STAB, 3*8" DC, JARS, 2*8" DC, X/O, 15 HWDP,DART SUB	209.20		WIPER TRIP IN 12 1/4" HOLE
10	14/03/90	BIT 5RR, BIT SUB, 8" DC, STAB, 3*8" DC, JARS, 8" DC, X/O, 15 HWDP,DART SUB	199.68		DRESS OFF CEMENT PLUG IN 12 1/4" HOLE
11	18/03/90	BIT 6, JUNK SUB, BIT SUB, 15*6-1/2" DC, X/O, JARS, X/O, 2*6-1/2" DC, X/O, 15 HWDP,DART SUB	311.54		DRILL OUT CEMENT
12	19/03/90	BIT 7, BOROX REAMER, X/O, X/O, MWD, 8-3/8" STAB, X/O, X/O, SHOCK SUB, X/O, X/O, 8-1/4" STAB, MONEL, X/O, 15*6-1/2" DC, X/O, JARS, X/O, 2*6-1/2" DC, X/O, 15 HWDP,DART SUB	343.51	38.5	DRILL 8-1/2" HOLE (PDC)
13	21/03/90	BIT 8, JUNK SUB, BOROX REAMER, X/O, X/O, MWD,STAB, MONEL, STAB, X/O, 17*6-1/2" DC, X/O, HWDP, JARS, 14 HWDP,DART SUB	337.58	35.5	DRILL 8-1/2" HOLE
	23/03/90	BIT 9, X/O, X/O, X/O, MWD, MONEL, X/O, STAB, 6-1/2" DC, STAB, 16*6-1/2" DC, X/O, HWDP, JARS, 14 HWDP ,DART SUB	335.93	52	DRILL 8-1/2" HOLE
15	26/03/90	BIT 10, X/O, X/O, X/O, MWD, MONEL, X/O, STAB, 6-1/2" DC, STAB, 16*6-1/2" DC, X/O, HWDP, JARS, 14 HWDP ,DART SUB	335.93	13	DRILL 8-1/2" HOLE

DIRECTIONAL DATA

TELECO DIRECTIONAL SURVEY LISTING

Company..... PETROFINA INTERNATIONAL — Page 2 of 4

Well..... ARCHER #1 — Teleco Job ID.: TAU 145

Survey Calc. Method..... Minimum Curvature — Grid Correction: 0

Vert. Sect. Calc. Method..... Vertical well: Closure calculated at each survey station. — Mag. Decl. Corr.: 12.8

Proposed Azimuth..... N.A. — Grid Decl. Corr.: 12.8

M.DPTH meters	CRS LEN meters	INCLINATION degrees	AZIMUTH degrees	T.V.D. meters	CLOSURE meters	NORTH/SOUTH meters	EAST/WEST meters	DOGLEG SEV. deg/30m
			INITIAL TIE-IN COORDINATES					
0.0		0.000	0.000	0.00	0.00	0.00	0.00	
494.0	494.0	0.800	191.300	493.98	3.45	-3.38	-0.68	0.049
503.0	9.0	1.100	255.200	502.98	3.55	-3.47	-0.77	3.457
513.0	10.0	1.200	256.600	512.98	3.64	-3.51	-0.97	0.312
521.0	8.0	1.100	263.700	520.98	3.72	-3.54	-1.12	0.652
533.0	12.0	1.000	257.700	532.98	3.82	-3.58	-1.34	0.371
600.0	67.0	0.600	248.300	599.97	4.44	-3.83	-2.24	0.188
672.0	72.0	0.400	303.200	671.97	4.75	-3.83	-2.80	0.206
765.0	93.0	0.300	24.800	764.97	4.54	-3.43	-2.97	0.150
844.0	79.0	0.300	281.400	843.97	4.45	-3.21	-3.08	0.179
917.0	73.0	0.400	85.900	916.97	4.36	-3.15	-3.02	0.285
994.0	77.0	0.500	13.200	993.96	3.87	-2.80	-2.67	0.210
1089.0	95.0	0.400	322.900	1088.96	3.50	-2.14	-2.78	0.124
1172.0	83.0	0.500	353.800	1171.96	3.37	-1.54	-2.99	0.093
1215.0	43.0	0.500	200.900	1214.96	3.44	-1.53	-3.08	0.678
1261.0	46.0	0.400	128.100	1260.96	3.53	-1.82	-3.02	0.352
1280.0	19.0	0.400	144.300	1279.96	3.50	-1.91	-2.93	0.178
1307.0	27.0	0.400	125.300	1306.96	3.47	-2.05	-2.80	0.147
1400.0	93.0	0.400	151.300	1399.95	3.46	-2.52	-2.38	0.058
1503.0	103.0	0.800	158.700	1502.95	4.01	-3.50	-1.95	0.118
1570.0	67.0	0.600	152.400	1569.94	4.55	-4.25	-1.61	0.096
1672.0	102.0	0.700	143.200	1671.94	5.32	-5.22	-0.99	0.042
1769.0	97.0	0.700	164.000	1768.93	6.28	-6.27	-0.48	0.078
1863.0	94.0	0.600	146.700	1862.92	7.23	-7.23	-0.05	0.070
1954.0	91.0	0.600	173.800	1953.92	8.11	-8.10	0.27	0.093
2050.0	96.0	0.400	143.900	2049.91	8.89	-8.87	0.52	0.101
2141.0	91.0	0.400	167.100	2143.91	9.49	-9.46	0.78	0.051
2237.0	93.0	0.800	186.500	2236.91	10.45	-10.42	0.78	0.143
2332.0	95.0	0.900	142.500	2331.90	11.73	-11.67	1.16	0.203
2398.0	66.0	0.900	146.400	2397.89	12.64	-12.51	1.76	0.028
2483.0	85.0	0.800	140.400	2482.88	13.76	-13.53	2.51	0.047
2528.0	45.0	0.900	150.300	2527.88	14.37	-14.07	2.89	0.118
2684.0	156.0	0.800	138.700	2683.86	16.50	-15.96	4.21	0.038
2789.0	105.0	1.100	146.400	2788.84	18.13	-17.35	5.26	0.093
2872.0	83.0	1.300	156.600	2871.83	19.83	-18.87	6.07	0.105
2964.0	92.0	1.500	159.400	2963.80	22.07	-20.96	6.91	0.069
3070.0	106.0	1.700	156.900	3069.76	25.02	-23.70	8.01	0.060
3163.0	93.0	1.800	147.400	3162.71	27.82	-26.20	9.34	0.099

NOTICE : THIS IS A FIELD COPY ONLY. CERTIFIED SURVEY RESULTS WILL BE PROVIDED AFTER SUBMISSION TO TELECO OFFICE.

TELECO SONAT

TELECO DIRECTIONAL SURVEY LISTING

Company..... PETROFINA INTERNATIONAL — Page 3 of 4

Well..... ARCHER #1 — Teleco Job ID.: TAU 145

Survey Calc. Method..... Minimum Curvature — Grid Correction: 0

Vert. Sect. Calc. Method..... Vertical well: Closure calculated at each survey station. — Mag. Decl. Corr.: 12.8

Proposed Azimuth..... N.A. — Grid Decl. Corr.: 12.8

M.DPTH meters	CRS LEN meters	INCLINATION degrees	AZIMUTH degrees	T.V.D. meters	CLOSURE meters	NORTH/SOUTH meters	EAST/WEST meters	DOGLEG SEV. deg/30m
3267.0	104.0	1.400	143.200	3266.67	30.63	-28.60	10.98	0.120
3390.0	123.0	1.600	124.200	3389.63	33.52	-30.77	13.30	0.130
3436.0	46.0	1.700	120.700	3435.61	34.62	-31.47	14.42	0.093
3497.0	61.0	2.700	110.500	3496.57	36.42	-32.44	16.54	0.526
3515.0	18.0	2.900	108.100	3514.54	37.06	-32.73	17.37	0.386
3534.0	19.0	3.100	107.700	3533.52	37.78	-33.04	18.32	0.318
3543.0	9.0	3.300	107.700	3542.50	38.14	-33.19	18.80	0.667
3562.0	19.0	3.500	106.000	3561.47	38.97	-33.51	19.88	0.354
3581.0	19.0	4.000	104.200	3580.43	39.86	-33.84	21.08	0.811
3593.0	12.0	4.400	104.600	3592.40	40.50	-34.06	21.93	1.003
3601.0	8.0	4.600	105.300	3600.37	40.97	-34.22	22.54	0.778
3651.0	50.0	5.800	108.400	3650.17	44.56	-35.54	26.87	0.739
3660.0	9.0	6.000	109.500	3659.12	45.33	-35.84	27.74	0.766
3670.0	10.0	6.200	109.800	3669.06	46.22	-36.20	28.74	0.608
3680.0	10.0	6.400	110.900	3679.00	47.17	-36.58	29.77	0.701
3689.0	9.0	6.600	111.200	3687.94	48.05	-36.95	30.72	0.676
3699.0	10.0	6.900	111.600	3697.88	49.09	-37.38	31.82	0.911
3707.0	8.0	6.900	111.600	3705.82	49.94	-37.73	32.71	0.000
3718.0	11.0	7.100	110.900	3716.74	51.13	-38.22	33.96	0.593
3727.0	9.0	7.300	110.500	3725.66	52.13	-38.62	35.01	0.687
3734.0	7.0	7.200	110.200	3732.61	52.91	-38.92	35.84	0.458
3744.0	10.0	7.400	109.800	3742.53	54.04	-39.36	37.04	0.619
3753.0	9.0	7.400	110.200	3751.45	55.08	-39.75	38.13	0.172
3762.0	9.0	7.500	110.500	3760.38	56.13	-40.16	39.22	0.358
3772.0	10.0	7.600	109.500	3770.29	57.32	-40.61	40.45	0.495
3782.0	10.0	7.500	108.400	3780.20	58.50	-41.04	41.70	0.527
3792.0	10.0	7.600	107.700	3790.12	59.68	-41.44	42.95	0.408
3801.0	9.0	7.600	107.400	3799.04	60.75	-41.80	44.08	0.132
3810.0	9.0	7.600	107.400	3807.96	61.82	-42.16	45.22	0.000
3821.0	11.0	7.200	105.600	3818.87	63.09	-42.56	46.58	1.261
3830.0	9.0	6.900	105.300	3827.80	64.08	-42.86	47.64	1.008
3839.0	9.0	6.900	105.600	3836.73	65.05	-43.14	48.68	0.120
3847.0	8.0	6.500	103.900	3844.68	65.88	-43.38	49.58	1.674
3857.0	10.0	6.300	102.800	3854.62	66.87	-43.64	50.67	0.704
3867.0	10.0	6.200	101.700	3864.56	67.83	-43.87	51.73	0.468
3877.0	10.0	6.000	100.700	3874.50	68.76	-44.08	52.78	0.679
3887.0	10.0	5.700	98.600	3884.45	69.64	-44.25	53.78	1.105
3895.0	8.0	5.500	96.500	3892.41	70.31	-44.35	54.55	1.074
3904.0	9.0	5.400	94.400	3901.37	71.02	-44.43	55.40	0.744
3914.0	10.0	5.300	90.500	3911.33	71.77	-44.47	56.34	1.131

NOTICE : THIS IS A FIELD COPY ONLY. CERTIFIED SURVEY RESULTS WILL BE PROVIDED AFTER SUBMISSION TO TELECO OFFICE.

TELECO OILFIELD SERVICES SONAT

TELECO DIRECTIONAL SURVEY LISTING

Company..... PETROFINA INTERNATIONAL — Page 4 of 4

Well..... ARCHER #1 — Teleco Job ID.: TAU 145

Survey Calc. Method..... Minimum Curvature — Grid Correction: 0

Vert. Sect. Calc. Method..... Vertical well: Closure calculated at each survey station. — Mag. Decl. Corr.: 12.8

Proposed Azimuth..... N.A. — Grid Decl. Corr.: 12.8

M.DPTH	CRS LEN	INCLINATION	AZIMUTH	T.V.D.	CLOSURE	NORTH/SOUTH	EAST/WEST	DOGLEG SEV.
meters	meters	degrees	degrees	meters	meters	meters	meters	deg/30m
3923.0	9.0	5.100	87.300	3920.29	72.41	-44.46	57.15	1.174
3933.0	10.0	5.100	87.000	3930.25	73.08	-44.41	58.04	0.080
3942.0	9.0	5.200	89.400	3939.21	73.71	-44.39	58.85	0.792
3951.0	9.0	5.300	90.100	3948.17	74.37	-44.38	59.67	0.396
3962.0	11.0	5.200	90.100	3959.13	75.18	-44.39	60.68	0.273
3971.0	9.0	4.800	89.800	3968.09	75.81	-44.39	61.46	1.336
3980.0	9.0	4.800	91.200	3977.06	76.43	-44.39	62.21	0.390
3990.0	10.0	4.700	87.700	3987.03	77.10	-44.38	63.04	0.920
4000.0	10.0	4.400	88.400	3997.00	77.73	-44.36	63.83	0.915
4008.0	8.0	4.500	88.000	4004.97	78.23	-44.34	64.45	0.393
4018.0	10.0	4.200	86.400	4014.94	78.84	-44.31	65.21	0.905
4027.0	9.0	4.000	89.100	4023.92	79.37	-44.30	65.86	0.687
4036.0	9.0	4.200	88.400	4032.90	79.90	-44.29	66.50	0.687
4042.0	6.0	4.300	87.300	4038.88	80.26	-44.27	66.94	0.645

NOTICE : THIS IS A FIELD COPY ONLY. CERTIFIED SURVEY RESULTS WILL BE PROVIDED AFTER SUBMISSION TO TELECO OFFICE.

TELECO OILFIELD SERVICES

SONAT

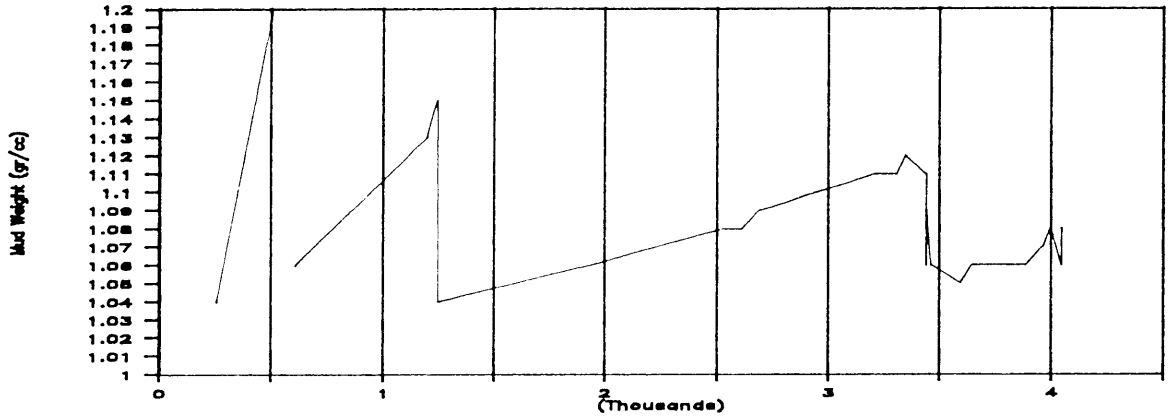
MUD DATA

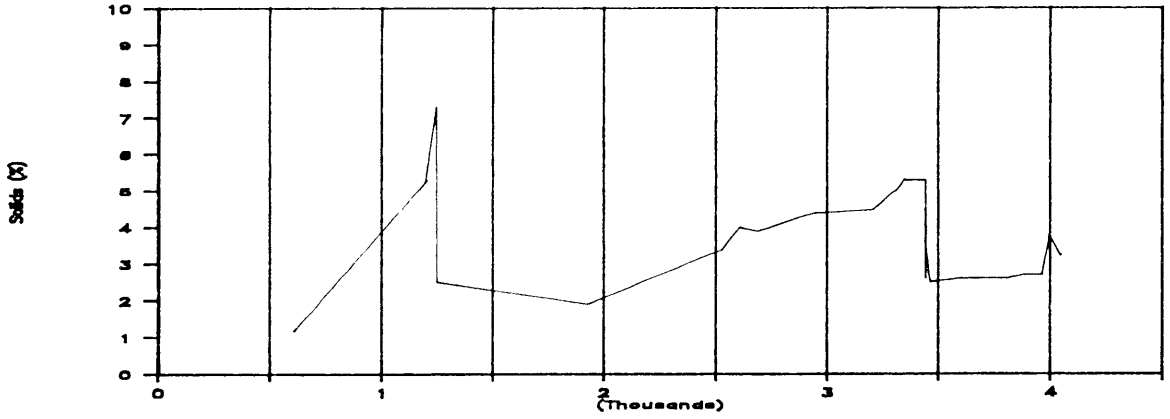
MUD PROPERTIES

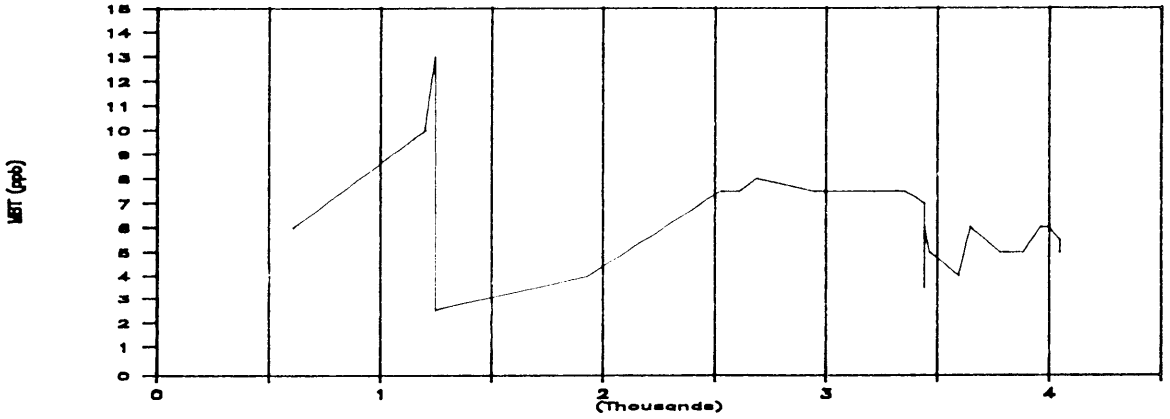
ARCI ı - MUD REPORT

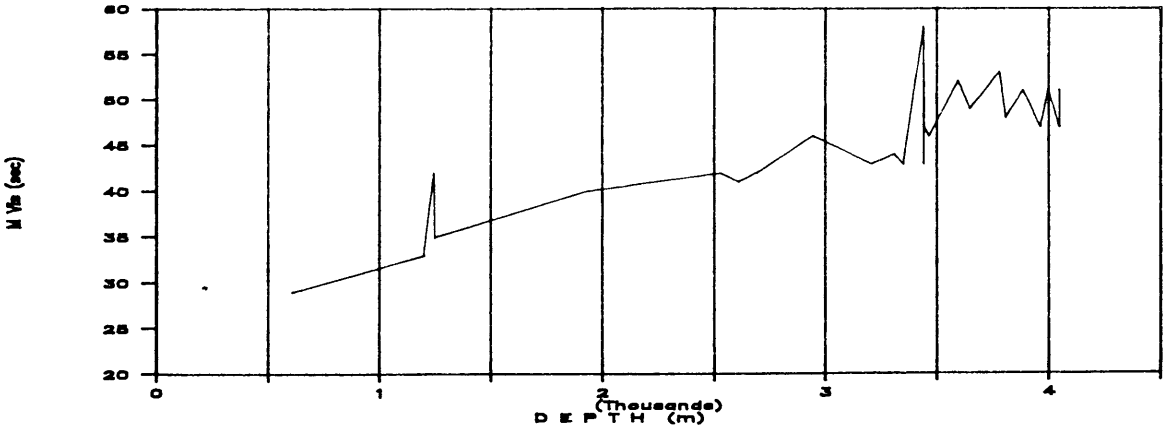
DAY	DEPTH	t°	S.G.	M VIS	PV	YP	GEL 1	GEL 2	FILTRATE (API)	FILTRATE (HTHP)	CAKE	pH	Pf	Mf	CHLOR	Ca	SAND	SOLIDS	WATER	OIL	MBT
0																					
1																					
2																					
3	255		1.04	100																	
4	510		1.20	100																	
5	510																				
6	608		1.06	29	3	5	2	2				10.2	0.07	0.11	19.0	1320	TR	1.20	98.80	0	6.0
7	1200	39.9	1.13	33	5	19	6	6	90.0		8	9.5	0.08	0.14	18.5	400	0.1	5.30	94.70	0	10.0
8	1247	38.3	1.15	42	9	24	12	16	35.5		5	9.3	0.05	0.10	18.0	400	0.1	7.30	92.70	0	13.0
9	1250	25.0	1.04	35	7	8	3	3	19.3		1	9.4	0.08	0.30	25.0	100	0	2.50	97.50	0	2.5
10	1932	26.0	1.06	40	7	12	3	4	8.9		1	8.8	0.08	0.28	25.0	200	TR	1.90	98.10	0	4.0
11	2531	28.2	1.08	42	9	13	3	4	7.5		1	8.8	0.04	0.25	25.0	340	TR	3.40	96.60	0	7.5
12	2612	31.0	1.08	41	7	12	3	3	7.0		1	9.2	0.90	0.40	24.0	240	TR	4.00	96.00	0	7.5
13	2691		1.09	42	9	14	3	3	7.2	19.0	1	9.3	0.11	0.22	26.5	200	TR	3.90	96.10	0	8.0
14	2947	38.0	1.10	46	10	15	3	3	6.6	20.0	1	9.4	0.13	0.25	25.0	220	TR	4.40	95.60	0	7.5
15	3209	37.0	1.11	43	11	14	3	4	6.4	19.6	1	9.4	0.11	0.30	24.5	380	0.2	4.50	95.50	0	7.5
16	3311		1.11	44	12	12	2	3	5.0	21.0	1	9.3	0.08	0.28	23.5	420	0.75	5.00	95.00	0	7.5
17	3353	35.0	1.12	43	12	12	3	3	5.4	23.0	1	8.9	0.05	0.25	23.5	360	TR	5.30	94.70	0	7.5
18	3445		1.11	58	18	20	3	6	4.2	16.0	1	8.6	0.07	0.27	22.0	320	TR	5.30	94.70	TR	7.0
19	3445	35.0	1.09	54	17	19	3	4	4.0	15.0	1	9.8	0.20	0.45	16.5	200	TR	4.90	91.10	4	6.0
20	3445		1.06	43	12	10	2	3	5.2	22.0	1	9.1	0.10	0.35	10.0	180	TR	2.60	97.40	TR	3.5
21	3445		1.09	48	14	14	2	2	4.7	18.5	1	8.8	0.05	0.30	13.0	240	TR	4.00	96.00	TR	5.0
22	3445		1.08	47	14	13	2	2	3.8	16.0	1	8.9	0.05	0.40	13.5	240	TR	3.50	95.50	1	5.0
23	3445		1.08	49	13	11	2	2	4.1	15.5	1	8.9	0.05	0.40	13.5	240	TR	4.00	95.00	1	5.0
24	3445	40.0	1.08	47	13	13	2	2	4.4	15.8	1	8.8	0.05	0.32	13.0	240	TR	4.00	95.50	0.5	5.0
25	3445		1.09	49	15	11	2	2	4.2	16.0	1	8.9	0.09	0.34	13.0	260	TR	4.50	95.50	TR	5.0
26	3445		1.09	52	14	10	2	2	3.9	15.0	1	10.0	0.15	0.32	13.5	240	TR	4.50	95.50	TR	6.0
27	3445		1.09	47	10	10	2	2	3.5	19.5	1	10.8	0.27	0.38	13.5	420	0.5	4.00	96.00	TR	5.5
28	3445		1.09	47	12	10	2	2	3.6	19.0	1	9.6	0.10	0.20	14.0	200	TR	3.50	96.00	0.5	6.0
29	3468	27.8	1.06	46	10	10	2	2	4.4	17.2	1	11.7	0.36	0.53	12.0	400	TR	2.50	97.50	TR	5.0
30	3599	33.3	1.05	52	15	15	2	2	5.4		1	9.7	0.14	0.29	11.0	240	0.1	2.60	97.40	TR	4.0
31	3651	30.0	1.06	49	13	13	2	2	5.3	16.2	1	9.4	0.06	0.19	11.0	280	TR	2.60	97.40	TR	6.0
32	3781	30.6	1.06	53	13	13	2	2	5.4	16.6	1	8.9	0.05	0.25	10.0	280	0.1	2.60	97.40	TR	5.0
33	3810		1.06	48	12	11	2	2	5.1		1	9.4	0.12	0.37	10.0	240	0.1	2.60	97.40	TR	5.0
34	3888	31.1	1.06	51	13	13	2	3	5.3	15.6	1	9.3	0.07	0.21	8.0	280	TR	2.70	97.30	TR	5.0
35	3965	31.1	1.07	47	11	10	2	2	5.4	16.0	1	9.1	0.11	0.35	7.5	300	TR	2.70	97.30	TR	6.0
36	3999	30.0	1.08	51	12	12	2	3	5.1	16.0	1	9.4	0.11	0.30	7.5	320	0.1	3.75	96.25	0	6.0
37	4050	34.4	1.06	47	12	11	2	3	5.3	16.0	1	9.3	0.12	0.30	7.5	280	TR	3.25	96.75	0	5.5
38	4050		1.06	51	12	11	2	3	4.8		1	9.3	0.07	0.24	7.5	280	TR	3.25	96.75	0	5.5
39	4050		1.06	51	12	11	2	3	4.8		1	9.3	0.07	0.24	7.5	280	TR	3.25	96.75	0	5.5
40	4050	28.3	1.07	51	11	11	2	2	4.8	18.0	1	9.3	0.10	0.29	7.0	240	0.1	3.25	96.75	TR	5.0
41	4050		1.07	51	11	11	2	2	4.8	18.0	1	9.3	0.10	0.29	7.0	240	0.1	3.25	96.75	TR	5.0
42	4050		1.08	43								10.1									
43	4050		1.08	44																	

ARCHER — 1

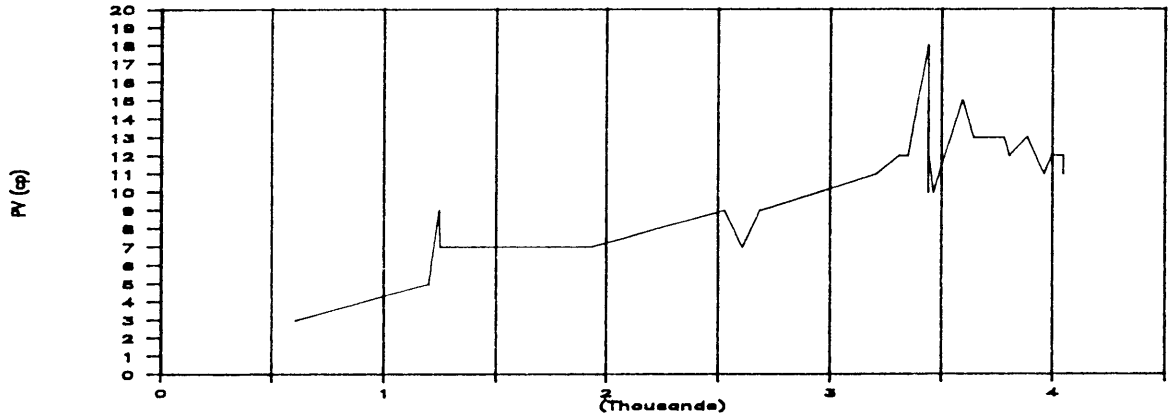

Mud Weight (gr/cc)
1.2
1.19
1.18
1.17
1.16
1.15
1.14
1.13
1.12
1.11
1.1
1.09
1.08
1.07
1.06
1.05
1.04
1.03
1.02
1.01
1
0
1
2
3
4
(Thousands)

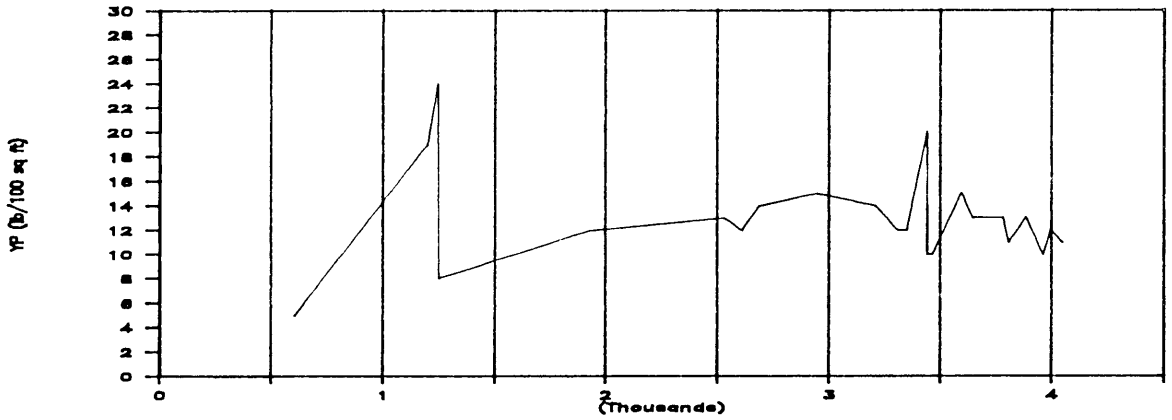

Solids (%)
10
9
8
7
6
5
4
3
2
1
0
0
1
2
3
4
(Thousands)

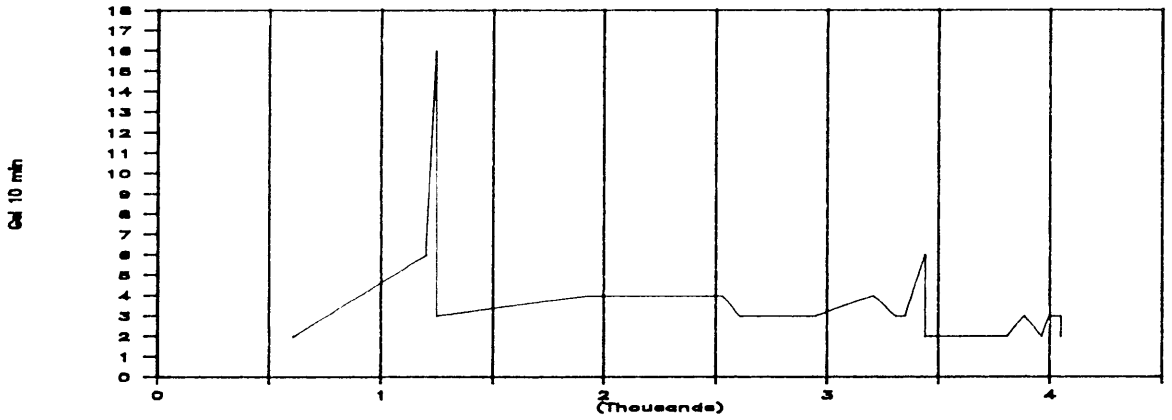

MBT (ppb)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
1
2
3
4
(Thousands)

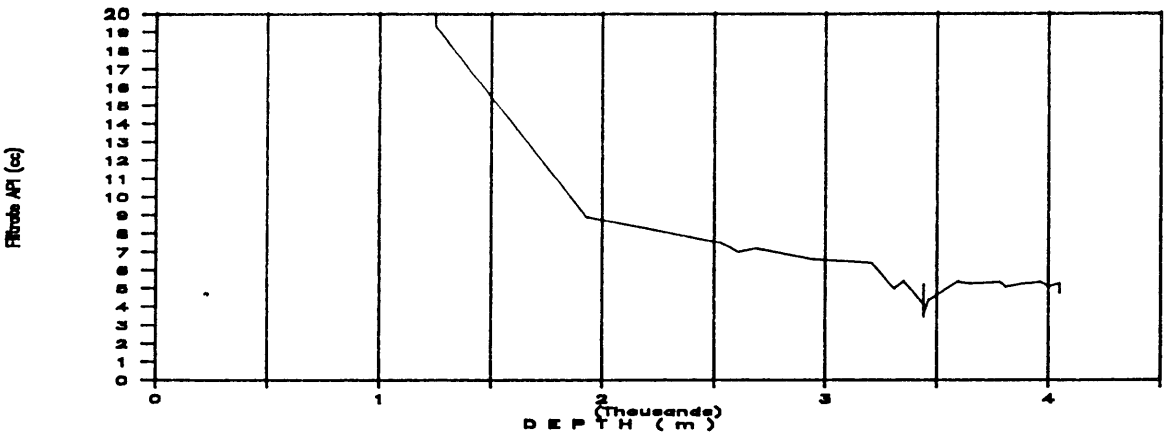

M Vis (sec)
60
55
50
45
40
35
30
25
20
0
1
2
3
4
(Thousands)
D E P T H (m)

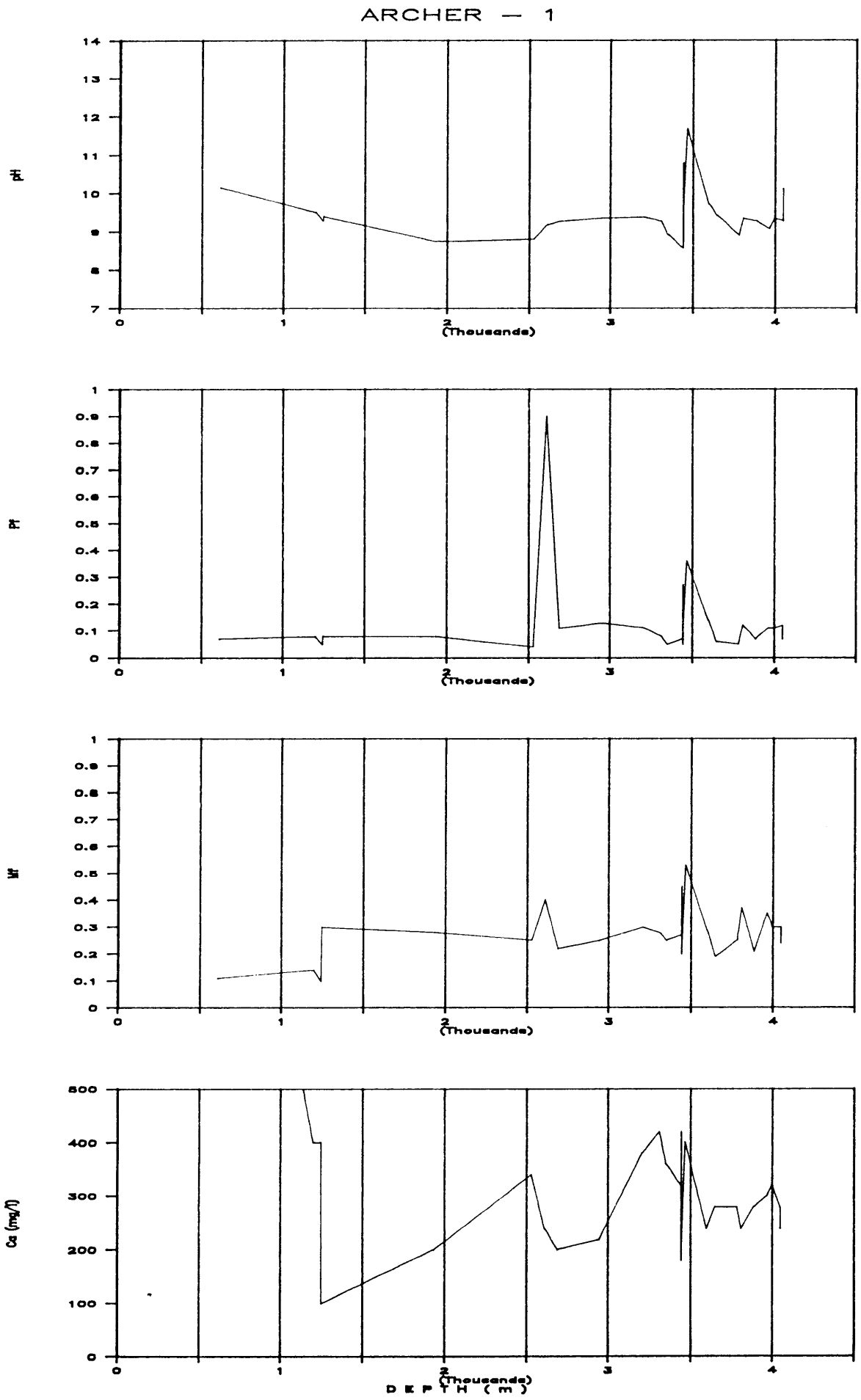
ARCHER — 1


PV (cp)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
1
2
3
4
(Thousands)


YP (lb/100 sq ft)
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
0
1
2
3
4
(Thousands)


Gel 10 min
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
1
2
3
4
(Thousands)


Filtrate API (cc)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
1
2
3
4
(Thousands)
DEPTH (m)


ARCHER — 1
pH
14
13
12
11
10
9
8
7
0
1
2
3
4
(Thousands)
Pf
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
(Thousands)
Mf
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
(Thousands)
Cs (mg/l)
500
400
300
200
100
0
0
1
2
3
4
(Thousands)
DEPTH (m)

MATERIAL RECAP

MATERIAL RECAP

MATERIAL	UNIT	36"		26"		17-1/2"		12-1/4"		8-1/2"		TOTAL
		USED	PPB	USED	PPB	USED	PPB	USED	PPB	USED	PPB	
AQUAGEL	Tonne	8.9	20.19	14.4	16.87	11	8.10	5.2	1.81	3.8	3.39	43.3
BARITE	Tonne			37.9				28.6	10.00	10.15	9.05	76.65
CAUSTIC SODA	25 kg	4	0.23	5	0.15	31	0.57	4	0.03			44
LIME	25 kg	11	0.62	16	0.47			4	0.03			31
DEXTRID	50 lb					37	0.75					37
PAC-R	50 lb							271	2.15	92	1.86	363
EZ-MUD DP	50 lb							114	0.90	34	0.69	148
KCl	25 kg							2123	18.50			2123
KOH	25 kg							98	0.85	42	0.94	140
QB-II	25 kg					11	0.20	5	0.04			16
SODA ASH	25 kg							13	0.11	4	0.09	17
SODIUM BICARB	25 kg							3	0.03	18	0.40	21
XCD POLYMER	25 kg					6	0.11	50	0.44	21	0.47	77
BARANEX	50 lb							143	1.13	185	3.54	328
BARADEFOAM	208 L									1		1
BARAFILM 415	208 L							1		1		2
BARASCAV 777	208 L							10	0.73	8		18
CONDET	208 L											0
CIDE	30 kg							2	0.02	5	0.13	7
TORQ TRIM	208 L											0
EZ-SPOT	208 L							6				6
COST	A$	$3,613		$15,574		$8,752		$116,166		$43,029		$187,134
COST/METER	A$	$60.22		$61.07		$11.88		$52.85		$71.12		$48.54
COST/DAY	A$	$3,613		$15,574		$2,917		$11,617		$4,781		$7,797
METER	M	60		255		737		2198		605		3855
DRILLING DAY		1		1		3		10		9		24

CASING & CEMENT

30"

PETROFINA EXPLORATION AUSTRALIA S.A.

CASING AND CEMENTING REPORT

WELL Archer-1 FIELD Vic/P20 CASING SIZE 30" SET AT 248.34 m

DRILLERS TD 255 m LAST CASING SIZE - SET AT - m

JOINTS RECEIVED 8 OF 30" WEIGHT 310 LB/FT GRADE B LENGTH - m

AMOUNT USED 4 JTS LENGTH 48.02 m No. JTS FAIL RABBIT 0 No. JTS DAMAGED 0

(including Shoe & Float Jts but not Hanger Pup)

TOTAL REJECTED 0 TOTAL BACKLOADED 1

JOINTS RECEIVED 2 OF 30" WEIGHT 460 LB/FT GRADE B LENGTH - m

AMOUNT USED 1 JTS LENGTH 7.52 m No. JTS FAIL RABBIT 0 No. JTS DAMAGED 0

TOTAL REJECTED 0 TOTAL BACKLOADED 1

CASING DATA

No. OF PIECES	SIZE–WT–GRADE–TYPE THREAD	MAKE UP LENGTH	SETTING DEPTH
1	30" 310# (1" WT) - B - ST2	12.89	235.65
	Shoe Joint		
3	30" 310# (1" WT) - B - ST2	35.13	200.52
	Intermediate Joints		
1	30" 460# (1.5" WT) - B - ST2	7.52	193.00
	Housing Joint		
	TOP OF 30" Housing TO RKB	193.00	-

CEMENTING DATA

SLURRY	CALCULATED TOP	CEMENT (SACKS & CLASS)	ADDITIVES (GAL/BBL)	MIX WEIGHT S.G.	YIELD FT³/SK
1	Seabed	1231 sx "G"	1% BWOC Calcium Chloride	15.8	1.15

No. OF PLUGS USED 0 OPEN HOLE EXCESS 250% CIRC. VOL 120 BBL CIRC TIME 15 MINS

MIXING CEMENT 35 MINS DISPLACE TIME 5 MINS DISPLACE VOL 46 BBLS RETURNS? Yes

DISPLACE PUMP PRESS 600 PSI PLUG BUMP PRESS - PSI VOL LOST - BBLS FLOAT HOLD? Yes

SPACERS None

CENTRALISERS USED: 0 SPACING -

REMARKS: After circulating, the cement mixing had to be postponed to unblock the cement bin (dust collector) - approx. 25 mins.

CEMENT COMPANY Halliburton DRILLING SUPERVISOR J. Roy

CEMENTER T. Galbraith DRILLING ENGINEER M. Pyzik DATE 21.2.90

20"

PETROFINA EXPLORATION AUSTRALIA S.A.

CASING AND CEMENTING REPORT

WELL Archer-1 FIELD Vic/P20 CASING SIZE 20" SET AT 497.17 m

DRILLERS TD 510m m LAST CASING SIZE 30" SET AT 248.54 m

JOINTS RECEIVED 30" OF 20" WEIGHT 133 LB/FT GRADE X-56 LENGTH - m

AMOUNT USED 23 JTS LENGTH 272.78 m No. JTS FAIL RABBIT 0 No. JTS DAMAGED 0

(including Shoe & Float Jts but not Hanger Pup)

TOTAL REJECTED 0 TOTAL BACKLOADED 7

+ Two Wellheads & Pups + 1 Wellhead & Pup Joint

JOINTS RECEIVED 4 OF 20" WEIGHT 94 LB/FT GRADE X-56 LENGTH - m

AMOUNT USED 2 JTS LENGTH 24.73 m No. JTS FAIL RABBIT 0 No. JTS DAMAGED 0

TOTAL REJECTED 0 TOTAL BACKLOADED 2

CASING DATA

No. OF PIECES	SIZE–WT–GRADE–TYPE THREAD	MAKE UP LENGTH	SETTING DEPTH
1	20" 94# X-56 RL-4S	12.02	497.17
	Shoe Joint/Float Collar Joint		
23	20" 133# X-56 RL-4S	272.78	484.25
	Intermediate Joints		
1	20" 94# X-56 RL-4S/ALT-2	11.81	211.47
	X/O Joint		
1	Wellhead 20" 94# X-56 ALT-2	7.56	199.66
	TOP OF Wellhead TO RKB		192.10

CEMENTING DATA

SLURRY	CALCULATED TOP	CEMENT (SACKS & CLASS)	ADDITIVES (GAL/BBL)						MIX WEIGHT S.G.	YIELD FT³/SK
1	Surface	2973 sx "G"	Neat						15.8	1.15

No. OF PLUGS USED 0 OPEN HOLE EXCESS 100% CIRC. VOL 420 BBL CIRC TIME 40 MINS

MIXING CEMENT 85 MINS DISPLACE TIME 10 MINS DISPLACE VOL 37 BBLS RETURNS? Yes

DISPLACE PUMP PRESS 600 PSI PLUG BUMP PRESS - PSI VOL LOST - BBLS FLOAT HOLD? Yes

SPACERS None 1/2 bbl return

CENTRALISERS USED: 3 SPACING In the middle of first two joints (2) & inside 30" casing shoe (1)

REMARKS: Good returns throughout the job, cement to surface 26" hole tight on 20" casing from 255-285m up to 100,000# drag through tight spot but no sticking.

CEMENT COMPANY Halliburton DRILLING SUPERVISOR J. Roy

CEMENTER T. Galbraith DRILLING ENGINEER M. Pyzik DATE 23.2.90

13-3/8"

PETROFINA EXPLORATION AUSTRALIA S.A.

CASING AND CEMENTING REPORT

WELL Archer-1 FIELD Vic/P20 CASING SIZE 13-3/8" SET AT 1232.4 m

DRILLERS TD 1247 m LAST CASING SIZE 20" SET AT 497.17 m

JOINTS RECEIVED 97 OF 13-3/8" WEIGHT 68 LB/FT GRADE N80 LENGTH - m

AMOUNT USED 87 JTS LENGTH 1036.35 m No. JTS FAIL RABBIT 0 No. JTS DAMAGED 1

(including Shoe & Float Jts but not Hanger Pup)

TOTAL REJECTED 1 TOTAL BACKLOADED 10

JOINTS RECEIVED 2 OF 13-3/8" WEIGHT 68 LB/FT GRADE L80 LENGTH - m

AMOUNT USED 1 JTS LENGTH 2.90 m No. JTS FAIL RABBIT 0 No. JTS DAMAGED 0

TOTAL REJECTED 0 TOTAL BACKLOADED 1

CASING DATA

No. OF PIECES	SIZE–WT–GRADE–TYPE THREAD	MAKE UP LENGTH	SETTING DEPTH
1	Float Shoe Joint	12.25	1232.41
	13-3/8" - 68 PPF - N80 - R3 Buttress		
1	Float Collar Joint	12.00	1220.16
	13-3/8" - 68 PPF - N80 - R3 Buttress		
85	Intermediate Joints	1012.10	1208.16
	13-3/8" - 68 PPF - N80 - R3 Buttress		
1	18-3/4" x 13-3/8" Casing Hanger	2.90	196.06
	13-3/8" - 68 PPF - L80 - R3 Buttress		
	TOP OF 13-3/8" Hanger TO RKB	193.16	193.16

CEMENTING DATA

SLURRY	CALCULATED TOP	CEMENT (SACKS & CLASS)	ADDITIVES (GAL/BBL)						MIX WEIGHT S.G.	YIELD FT³/SK
Lead	550m	787 sxs "G"	2.2%	BWOW	Bentonite				13.3	1.751
Tail	1015m	492 sxs "G"	Neat						15.8	1.150

No. OF PLUGS USED 1 OPEN HOLE EXCESS 0% CIRC. VOL - BBL CIRC TIME 60 MINS

MIXING CEMENT 55 MINS DISPLACE TIME 43 MINS DISPLACE VOL 510 BBLS RETURNS? Yes

DISPLACE PUMP PRESS 700 PSI PLUG BUMP PRESS 1750 PSI VOL LOST 0 BBLS FLOAT HOLD? Yes

SPACERS Pumped 20 bbls of freshwater ahead of lead

CENTRALISERS USED: 3 SPACING Middle of first 3 joints

REMARKS:

CEMENT COMPANY Halliburton DRILLING SUPERVISOR J. Roy

CEMENTER P. Watson DRILLING ENGINEER S. Marinoff DATE 27.2.90

9-5/8"

PETROFINA EXPLORATION AUSTRALIA S.A.

CASING AND CEMENTING REPORT

WELL Archer-1 FIELD Vic/P20 CASING SIZE 9-5/8" SET AT 3367 m

DRILLERS TD 3377 m LAST CASING SIZE 13-3/8" SET AT 1232 m

JOINTS RECEIVED 131 (123 incl.) OF 9-5/8" WEIGHT 47 LB/FT GRADE P110 LENGTH - m

AMOUNT USED 2xX/O JTS LENGTH ____ m No. JTS FAIL RABBIT - No. JTS DAMAGED 2

(including Shoe & Float Jts but not Hanger Pup) TOTAL REJECTED - TOTAL BACKLOADED 8

JOINTS RECEIVED 241 OF 9-5/8" WEIGHT 47 LB/FT GRADE N80 LENGTH - m

AMOUNT USED 147 JTS LENGTH 1731.15 m No. JTS FAIL RABBIT - No. JTS DAMAGED 1

(incl. shoe & float jnts but not hanger pup) TOTAL REJECTED - TOTAL BACKLOADED 94

CASING DATA

No. OF PIECES	SIZE–WT–GRADE–TYPE THREAD	MAKE UP LENGTH	SETTING DEPTH
1	9-5/8" 47# P110 (Vam) Shoe Joint	11.98	3367.00
1	9-5/8" 47# P110 (Vam) Intermediate	12.28	3355.02
1	9-5/8" 47# P110 (Vam) F/Collar Jnt	10.97	3342.74
33	9-5/8" 47# P110 (Vam) Casing Jnts	390.11	3331.77
1	9-5/8" 47# P110 (Vam(P))xBut(B) X/O	5.86	2941.66
147	9-5/8" 47# N80 (But) Casing Jnts	1731.15	2935.80
1	9-5/8" 47# P110 (But(P))xVam(B) X/O	5.88	1204.65
85	9-5/8" 47# P110 Vam Casing Joints	1002.43	1198.77
1	18-3/4"x9-5/8" Casing Hanger & Pup	3.31	196.34
	(9-5/8" 47# P110 Vam)		
	TOP OF Hanger TO RKB		193.03

CEMENTING DATA

SLURRY	CALCULATED TOP	CEMENT (SACKS & CLASS)	ADDITIVES (GAL/BBL)	MIX WEIGHT S.G.	YIELD FT³/SK
Tail	3167	240 sx "G"	Halad 322L - 22gal/10bbl	15.8	1.15
Lead	2458	455 sx "G"	Bentonite 2.5% BWOW	13.0	1.87
			HR-6L 3gal/10bbl		

No. OF PLUGS USED 2 OPEN HOLE EXCESS - CIRC. VOL 400 BBL CIRC TIME 90 MINS

MIXING CEMENT 30 MINS DISPLACE TIME 105 MINS DISPLACE VOL 762 BBLS RETURNS? OK

DISPLACE PUMP PRESS 650 PSI PLUG BUMP PRESS 3000 PSI VOL LOST - BBLS FLOAT HOLD? Yes

SPACERS 10bbl of drill water/40bbl of Flo-Check 21/20bbl of drill water

CENTRALISERS USED: 12 SPACING 10 on first 10 joints and 2 inside the 13-3/8" casing shoe

REMARKS: Lock ring installed on casing hanger

CEMENT COMPANY Halliburton DRILLING SUPERVISOR M. Lanzer

CEMENTER Jeff Kaye DRILLING ENGINEER M. Pyzik DATE 17.03.90

FORMATION DATA

FORMATION LEAK-OFF DATA

ARCHER#1 - FORMATION LEAK-OFF DATA

	DEPTH (mkb)	EMW (gr/cc)	PRESSURE (psi)	LEAK OFF GRADIENT (psi/ft)	REMARK
20" CASING SHOE	497	1.60	1132	0.89	NO LEAK OFF
13-3/8" CASING SHOE	1232	1.80	3158	0.86	NO LEAK OFF
9-5/8" CASING SHOE	3367	1.60	7671	0.71	NO LEAK OFF

RFT DATA

ARCHER-1 RFT DATA

RUN # 1, 2755m to 3452.1m

DEPTH BKB M	FORMATION PRESSURE PSIA	SURFACE GRADIENT PSI/FT	HYDROSTATIC PRESSURE PSIA	HYDROSTATIC GRADIENT PSI/FT	MUD WEIGHT OVERBALANCE PSI	PERMEABILITY	COMMENTS
2755.00	3885.56	0.434	4276.00	0.473	390	GOOD	GOOD TEST
2937.80	4167.40	0.437	4556.70	0.473	389	GOOD	GOOD TEST
3018.00	4289.20	0.437	4680.50	0.473	391	MOD/GOOD	GOOD TEST
3157.20	4475.95	0.436	4881.10	0.471	405	GOOD	GOOD TEST
3245.00	4606.14	0.436	5016.00	0.471	410	GOOD	GOOD TEST
3331.50	4734.80	0.437	5149.30	0.471	415	GOOD	GOOD TEST
3390.00	4833.40	0.438	5236.40	0.471	403	GOOD	GOOD TEST
3390.20							SEGR.SAMPLE 2
3393.00	4836.54	0.438	5240.80	0.471	404	GOOD	GOOD TEST
3396.50	4839.69	0.438	5245.80	0.471	406	GOOD	GOOD TEST
3398.60	4841.33	0.438	5249.00	0.471	408	GOOD	GOOD TEST
3403.50	4847.30	0.438	5256.00	0.471	409	VERY GOOD	SEGR.SAMPLE 1
3404.60			5257.30	0.471		TIGHT	DRY TEST
3405.00	4848.87	0.438	5258.10	0.471	409	MODERATE	GOOD TEST
3406.10	4849.40	0.438	5258.90	0.471	410	MODERATE	GOOD TEST
3407.00	4851.60	0.438	5261.10	0.471	410	MOD-POOR	GOOD TEST
3410.00	4852.80	0.437	5265.80	0.471	413	MODERATE	GOOD TEST
3412.80	4855.70	0.437	5270.00	0.471	414	MODERATE	GOOD TEST
3418.40			5278.60	0.471			SEAL FAILURE
3418.60			5279.00	0.471			DRY TEST
3419.00	4864.90	0.437	5278.80	0.471	414		SUPERCHARGED
3419.20	4864.90	0.437	5279.10	0.471	414		SUPERCHARGED
3422.00	4866.43	0.437	5283.80	0.471	417	GOOD	GOOD TEST
3424.30	4869.74	0.437	5287.30	0.471	418	GOOD	GOOD TEST
3424.50			5287.50	0.471			SEAL FAILURE
3426.00	4872.05	0.437	5289.80	0.471	418	POOR	GOOD TEST

RUN # 2, 3471.5m to 4026.0m

3471.50	4952.90	0.438	5273.50	0.463	321	15.60	GOOD TEST
3481.50	4960.84	0.438	5287.40	0.463	327	24.70	GOOD TEST
3489.00	4966.97	0.437	5300.00	0.463	333	34.00	SEG.SAMPLE 2
3491.00	4968.79	0.437	5301.80	0.463	333	14.80	GOOD TEST
3502.50	4979.30	0.437	5321.60	0.463	342	7.50	GOOD TEST
3506.60	4997.00	0.438	5325.60	0.463	329		SUPERCHARGED
3506.70	4993.30	0.438	5325.60	0.463	332		SUPERCHARGED
3513.50	5009.68	0.438	5337.10	0.463	327	6.00	GOOD TEST
3514.20							SEG.SAMPLE 5
3514.60	5010.40	0.438	5337.70	0.463	327	414.00	GOOD TEST
3526.00	5013.10	0.437	5353.80	0.463	341	24.00	GOOD TEST

3527.00	5014.70	0.437	5355.00	0.463	340	TIGHT	GOOD TEST
3535.30	5026.21	0.437	5370.30	0.463	344	20.20	GOOD TEST
3548.20	5044.80	0.437	5388.90	0.463	344	179.90	GOOD TEST
3554.00	5059.88	0.437	5396.00	0.463	336	7.00	SUPERCHARGED
3563.50	5070.40	0.437	5410.90	0.463	341	154.50	GOOD TEST
3569.80	5078.90	0.437	5419.90	0.463	341	352.00	GOOD TEST
3573.80	5084.60	0.437	5425.60	0.463	341	31.00	GOOD TEST
3578.20	5109.30	0.439	5432.30	0.463	323	90.00	GOOD TEST
3581.00	5111.43	0.438	5435.50	0.463	324	82.00	GOOD TEST
3584.50	5112.56	0.438	5442.00	0.463	329	69.00	GOOD TEST
3588.00	5115.50	0.438	5446.10	0.463	331	2.44	GOOD TEST
3591.50	5117.68	0.438	5452.90	0.463	335	495.00	SEG.SAMPLE 1
3597.40	5124.08	0.438	5461.90	0.463		115.00	GOOD TEST
3599.10	5126.99	0.438	5462.10	0.463	335	38.00	SLTLY SUPER.
3614.20	5141.55	0.437	5488.70	0.463	347	30.00	GOOD TEST
3617.00	5146.75	0.437	5489.20	0.463	342	160.00	GOOD TEST
3630.40	5165.38	0.437	5512.10	0.463	347	25.31	GOOD TEST
3637.50	5175.48	0.437	5520.50	0.463	345	50.00	GOOD TEST
3643.00	5183.72	0.437	5529.10	0.463	345	73.00	GOOD TEST
3650.80	5198.87	0.437	5541.50	0.463	343	7.80	GOOD TEST
3657.50	5210.33	0.438	5550.40	0.463	340	191.00	GOOD TEST
3674.60	5248.11	0.439	5576.00	0.463	328	67.00	GOOD TEST
3681.00	5250.20	0.438	5584.80	0.462	335	125.00	SEG.SAMPLE 3
3683.00	5252.40	0.438	5586.90	0.462	335	0.27	GOOD TEST
3686.00	5253.30	0.438	5594.10	0.463	341	18.70	GOOD TEST
3693.00	5262.90	0.438	5605.20	0.463	342	38.40	GOOD TEST
3700.80	5268.00	0.437	5613.50	0.462	346	52.00	GOOD TEST
3708.00	5297.20	0.439	5627.60	0.463	330	1.10	GOOD TEST
3719.20	5294.10	0.437	5644.50	0.463	350	122.00	GOOD TEST
3726.10	5305.29	0.437	5654.80	0.463	350	257.00	GOOD TEST
3740.50	5349.01	0.439	5676.60	0.463	328	123.00	GOOD TEST
3761.00			5705.10	0.462			TIGHT
3770.50	5381.80	0.438	5722.40	0.463	341	59.00	GOOD TEST
3824.00	5467.12	0.439	5797.50	0.462	330	0.70	GOOD TEST
3829.50	5477.91	0.439	5808.00	0.462	330	0.58	GOOD TEST
3836.70			5816.00	0.462		DRY	DRY
3837.00	5514.60	0.441	5817.20	0.462	303	18.00	GOOD TEST
3845.50	5544.09	0.443	5830.50	0.462	286	75.00	GOOD TEST
3858.80	5559.28	0.442	5848.70	0.462	289	0.76	TIGHT
3865.00	5562.40	0.442	5858.50	0.462	296	0.40	TIGHT
3883.70			5887.20	0.462			SEAL FAILURE
3883.90			5887.30	0.462			SEAL FAILURE
3933.90	5745.10		5963.20	0.462	218	18.00	GOOD TEST
3936.50	5746.70	0.448	5967.00	0.462	220	13.00	GOOD TEST
3945.60	5767.25	0.449	5980.10	0.462	213	1.00	GOOD TEST
3947.40	5768.22	0.449	5984.40	0.462	216	15.50	GOOD TEST
3947.50							SEG.SAMPLE 4
3954.50	5772.00	0.448	5995.10	0.462	223	15.00	GOOD TEST
3958.50	5775.36	0.448	6000.00	0.462	225	25.00	GOOD TEST
3962.00	5776.92	0.448	6006.20	0.462	229	8.80	GOOD TEST
4026.00							TIGHT

RESERVOIR FLUID DATA

ARCHER-1 RFT FLUID RECOVERY

RFT RUN #1

RFT #1	3403.5m	RFT #2	3390.2m
Recovered:	48.5 cu/ft gas	Recovered:	22.9 cu/ft gas
	6.7 litres of oil		5 litres of oil
	oil gravity 52° API @ 14°C		3 litres of filtrate
			oil gravity 50° API @ 16°C

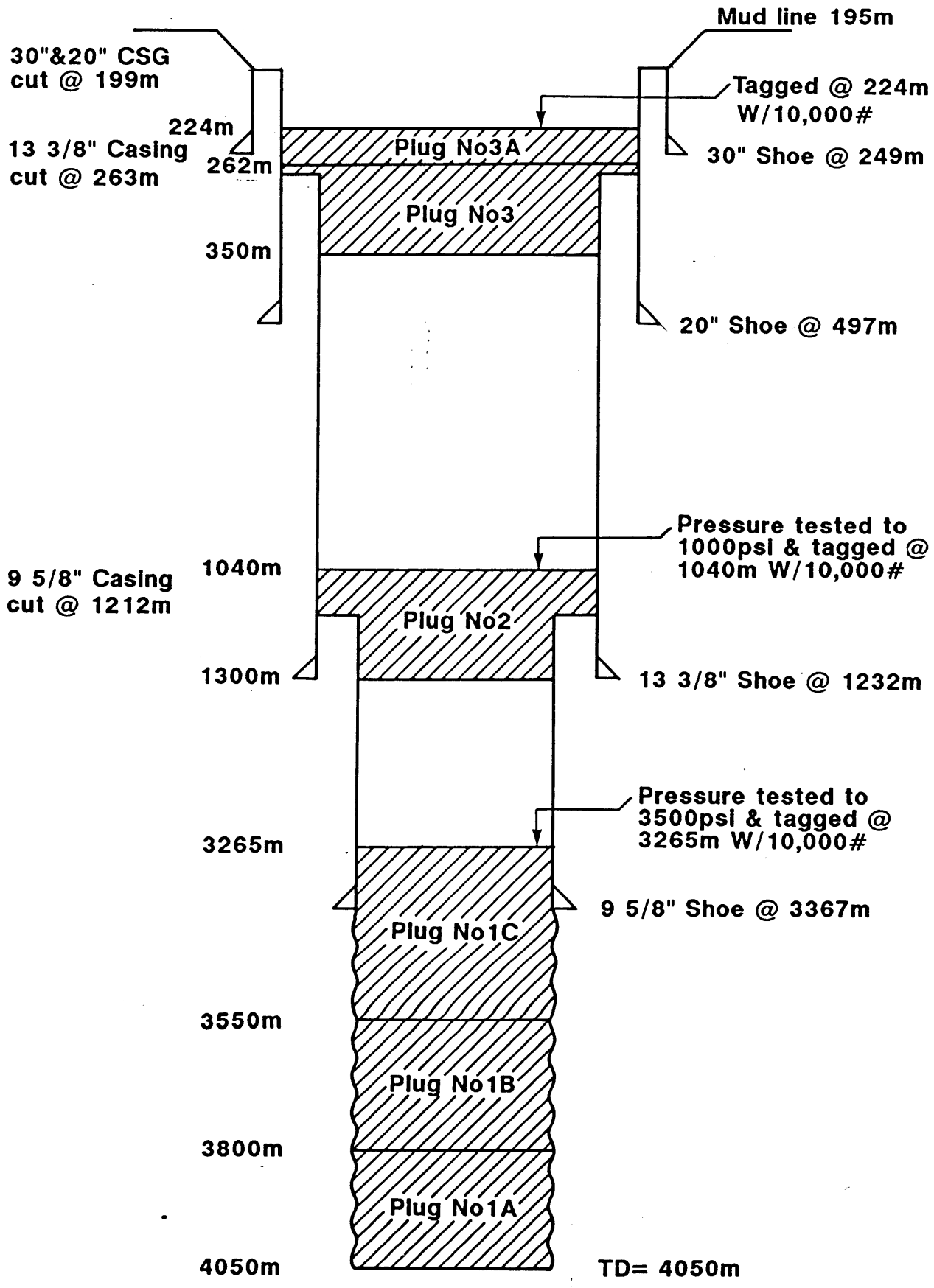
RFT RUN #2

RFT #1	3591.5m	RFT #2	3489.0m
Recovered:	51 cu/ft gas	Recovered:	25.6 cu/ft gas
	2.2 litres of oil/condensate		4 litres of oil/condensate
	3 litres of filtrate		3 litres of filtrate
	oil gravity 52° API @ 17°C		oil gravity 52° API @ 17°C
RFT #3	3681.0m	RFT #4	3947.5m
Recovered:	81.5 cu/ft gas	Recovered:	84.1 cu/ft gas
	1.4 litrs of oil/condensate		0.7 litres of oil/condensate
	0.8 litres of filtrate		1.3 litres of filtrate
	oil gravity 52° API @ 10°C		oil gravity 48° API @ 17°C
RFT #5	3514.2m		
Recovered:	59.1 cu/ft gas		
	3 litres of oil/condensate		
	1.25 litres of filtrate		
	oil gravity 52° API @ 15°C		

ABANDONMENT REPORT

DIAGRAM

ARCHER-1
ABANDONMENT DIAGRAM



EN 041

M.P., May 1990

CERTIFICATE OF

SEABED CLEARANCE

Petrofina Exploration Australia S.A.
Incorporated in Belgium with Limited Liability
Registered in New South Wales

Level 2
476 St Kilda Road
Melbourne Vic. 3004

Telephone: (03) 267 7999
Telex: 154767 PEXAUS
Telefax: (03) 267 7776

CERTIFICATE OF SEABED CLEARANCE

OPERATOR: PETROFINA AUSTRALIA A.S.

RIG: ZAPATA ARCTIC

FIELD: VIC - P/20

LOCATION: BASS STRAIT

DATE: 8TH APRIL 90

THIS IS TO CERTIFY THAT:

A. ALL STRINGS OF CASING HAVE BEEN CUT AT A DEPTH OF Min. 17. FEET BELOW THE SEA BED AND THAT ALL STRUCTURES ABOVE THIS POINT HAVE BEEN RECOVERED WITH THE CASING.

SIGNED .....
O.I.M. Capt. .....

COMPANY ZAPATA.....

B. THE SEABED WITHIN 70 METRES OF THE ABANDONED WELL HAS BEEN SURVEYED VISUALLY AND NO DEBRIS WHICH COULD POSSIBLY CAUSE DAMAGE TO FISHERMEN'S NETS WAS FOUND.

SIGNED .....
R.O.V. SUPT/DIVING SUPV.

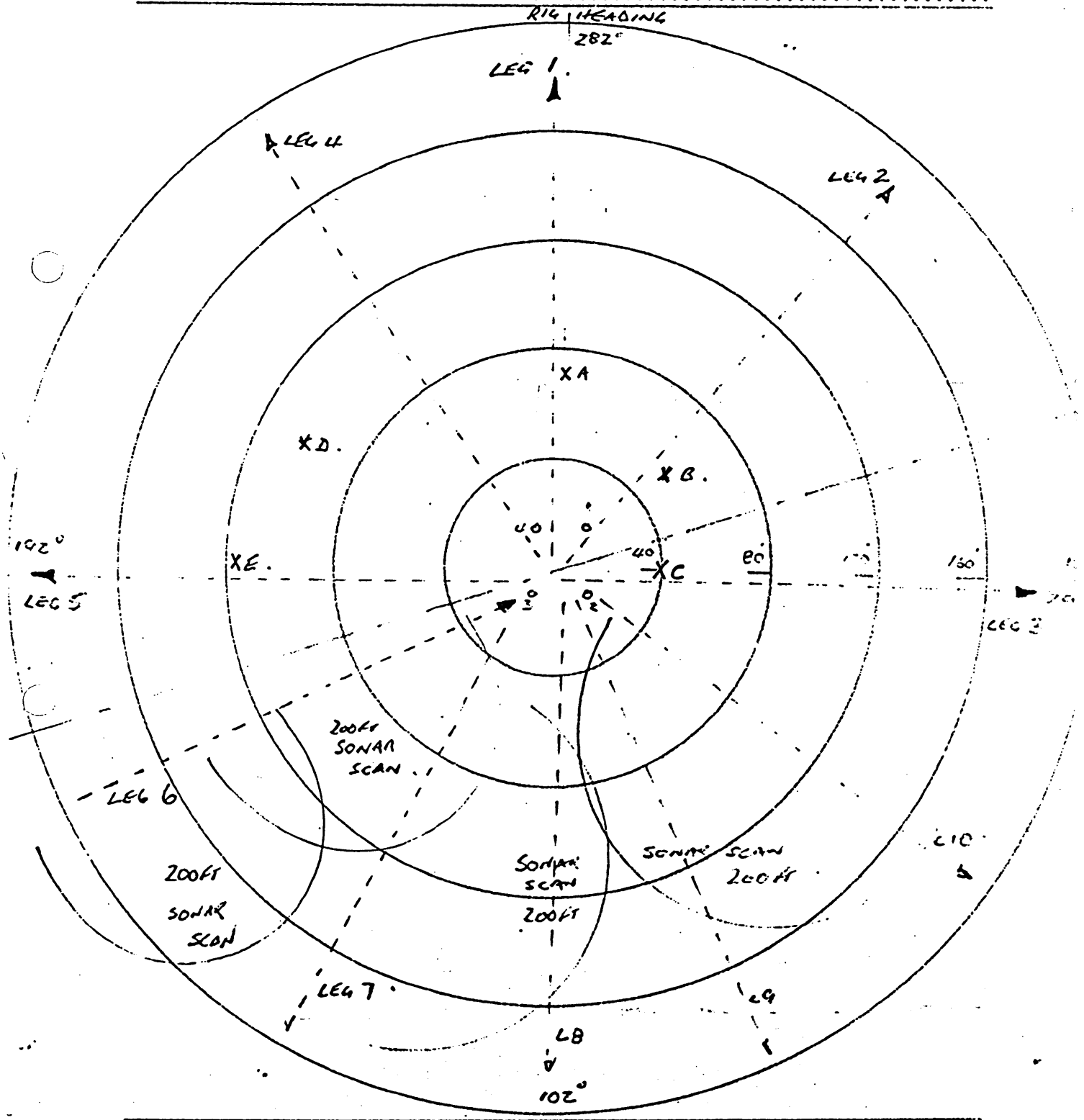
COMPANY SUBSEA INTERNATIONAL

C. THE WELLHEAD EQUIPMENT AND DEBRIS REMOVED FROM THE WELL SITE Archer #1 WILL BE RETURNED TO PETROFINA WAREHOUSE FACILITIES, PORT WELSHPOOL.

SIGNED .....
PETROFINA DRILLING SUPERVISOR

REPORT 1A & B **SUBSEA INTERNATIONAL DEBRIS SURVEY REPORT**

Client	: PETROFINA	Date (START)	: 30-3-90
Location	: ARCHER # 1	Area of Survey	: 200' FROM WELL
Vessel	: ZAPATA ARTIC	Depth	: 535 FEET
Submersible	: SCORPIO 22	Visibility	: VARIABLE
Dive Number	: 31,32,		
Dive Task	: SEABED SURVEY		



Debris: A 24" PIPE
B PAINT CAN
C PIPE 6' x 6" DIA
D FRUIT CAN
E SHIPS LIGHT

SUBSEA REPRESENTATIVE :

CLIENT'S REPRESENTATIVE:

REPORT 1B

	POSITION (DIST & BRGS)	APPX DIMENSIONS (M.)	DESCRIPTION	MEANS OF IDENT.	RE-COVER
A	PIPE 75 FEET 280°	24 INCHS LONG 3 INCH DIAMETER	RECOVERED DIVE 31 3 INCH PIPE.	C	YES
B	50FT. 320°	4 Litre Can.	RECOVERED DIVE 32. PAINT CAN	C	YES
C	40FT. 10°	6" x 4" DIA	PIPE CONCRETE FILLED. HALF BURIED	AC.	NO
D	60FT. 230°	6" x 6"	FRUIT CAN	C	NO
E	100FT 190°	5" x 4"	SHIPS LIGHT FRAME	C	NO
6					
7					
8					
9					
10			(continue on sep. sheet)		

MEANS OF IDENTIFICATION			
A	SONAR SCAN	D	RIG RECORDS
B	DIVING INSPECTION		
C	R.O.V.		

REASONS FOR NOT REMOVING REMAINING DEBRIS:
C. BURIED AND STUCK FIRM ON SEABED UNABLE TO DISLODGE. *

SIGNATORIES

1	2
NAME _____	NAME DAVID BURWOOD.
POSITION _____	POSITION OPERATIONS CONTROLLER
COMPANY _____	COMPANY SUBSEA INTERNATIONAL

GUIDANCE NOTES

1. Survey should extend to at least 70m from the wellhead.
2. The first signatory should be the person responsible for the rig, either the OIM or clients rep. The second signatory should be the person supervising the seabed survey, the sonar operator, the diving superintendant etc.

* ITEM C. HAS BEEN ON SEABED FOR SOME TIME. PROBABLY NOT LOST BY THIS INCIDENT.

EST. WELL COST

ARCHER - ANEMONE TIE LINE

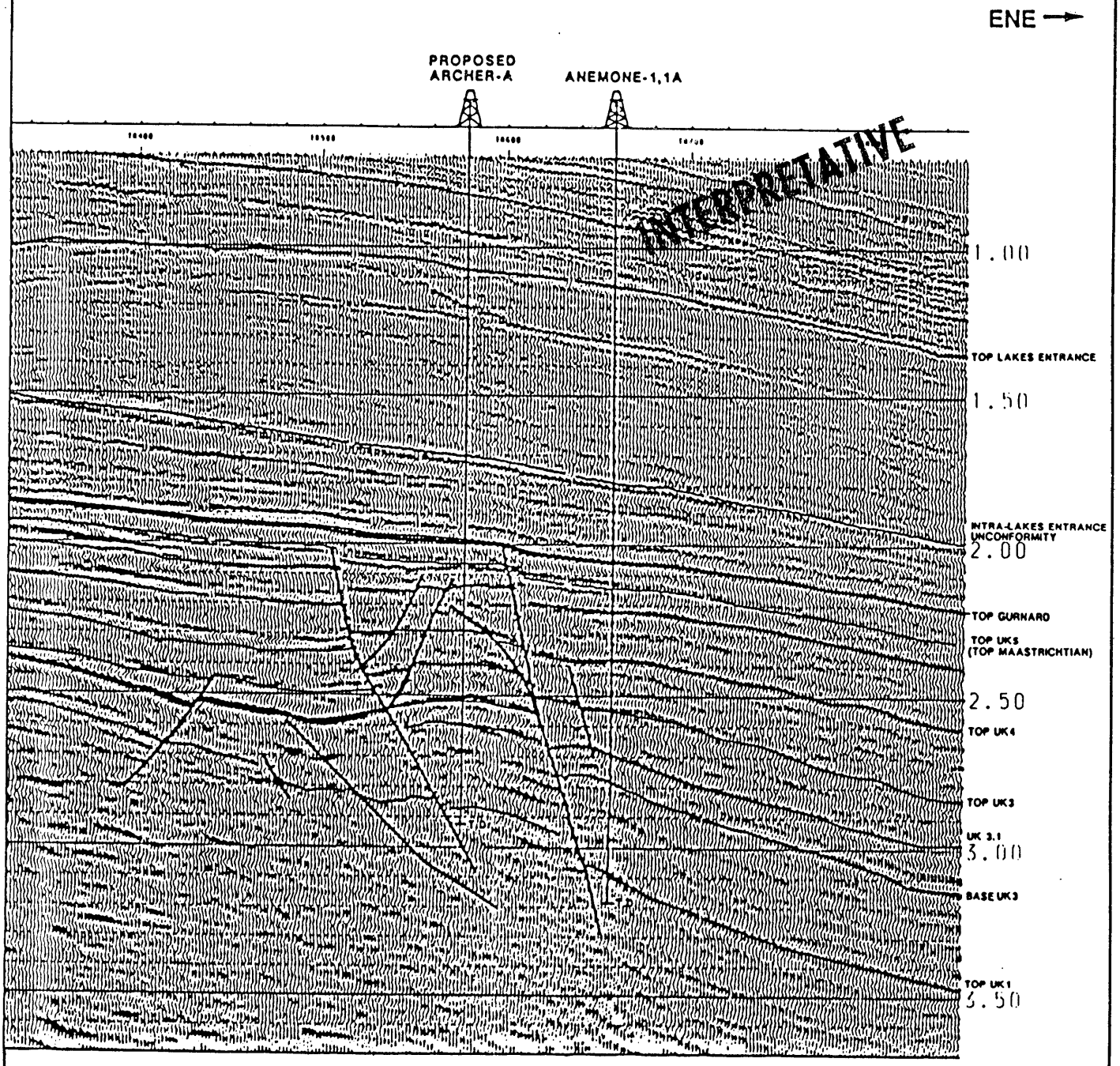


FIGURE 2