

SECTION 1 - ENGINEERING DATA1.1 Engineering Summary

McManus-1 is located in Northern Territory Exploration Permit 24 (EP24) approximately 50km to the north east of Daly Waters (Figure 1). The hole was drilled as an exploration well to test fracture porosity in the updip flank of a large syncline, immediately south of a large thrust anticlinal structure identified from the 1989 Nutwood Downs seismic survey. The well was drilled by Pacific Oil & Gas Pty. Ltd., as sole permit holder and operator using Rockdril Contractors Pty. Ltd.'s Rig 20, a Longyear 600.

Access to the location was via the boundary fenceline between Maryfield and Kalala stations and a one kilometre access along seismic line 109. Drill site preparation involved clearing a drilling pad over an area of approximately 150m x 150m. Drilling and potable water was pumped from a bore drilled on the site.

Well site supervision was provided by Ian Ledlie and Griff Weste.

Drilling operations commenced at McManus-1 at 1600 hrs on September 28th, 1989 with Rockdril Rig 20 reaming an 8 1/4 inch hole to 86 metres. The well had previously been precollared by Gorey and Cole as a 12 1/4 inch hole to 84 metres, which was then cased with ten inch PVC conductor to 64.5 metres. Then the hole was drilled to 131 metres using an 8 1/4 inch hammer and seven inch casing was set at 128.4 metres. Drilling continued past the seven inch casing shoe with a six inch hammer to 272m, at which depth it was decided to run five inch casing. (A strong water flow was reported at 227 metres). The five inch casing was set at 270.8m at 0900hrs on October 1. The BOP stack was nipped up and tested to 1000 psi prior to cement being drilled out with a 4 1/4 inch rotary bit.

The CHD 101 core assembly was made up and the hole drilled to 275.0 metres. A Formation Integrity Test was conducted and the formation found to leak off at 410 psi (equivalent mud weight 17.1ppg). The hole was then fully cored to a depth of 1319.95m where a DST was run. The formation did not flow and was presumed to be tight. The well was then fully cored to a total depth of 1617.25m. The hole was circulated and wireline logs, including a velocity survey, were run.

Following evaluation of wireline logs and other drilling data it was decided to abandon the hole with the setting of cement plugs over the following intervals: 1136-1370 metres, 302 - 242 metres and from 45 metres to surface. The abandonment was completed and the rig released at 1900 hrs on November 18, 1989. A chronological log of drilling activities is included as Appendix 1.

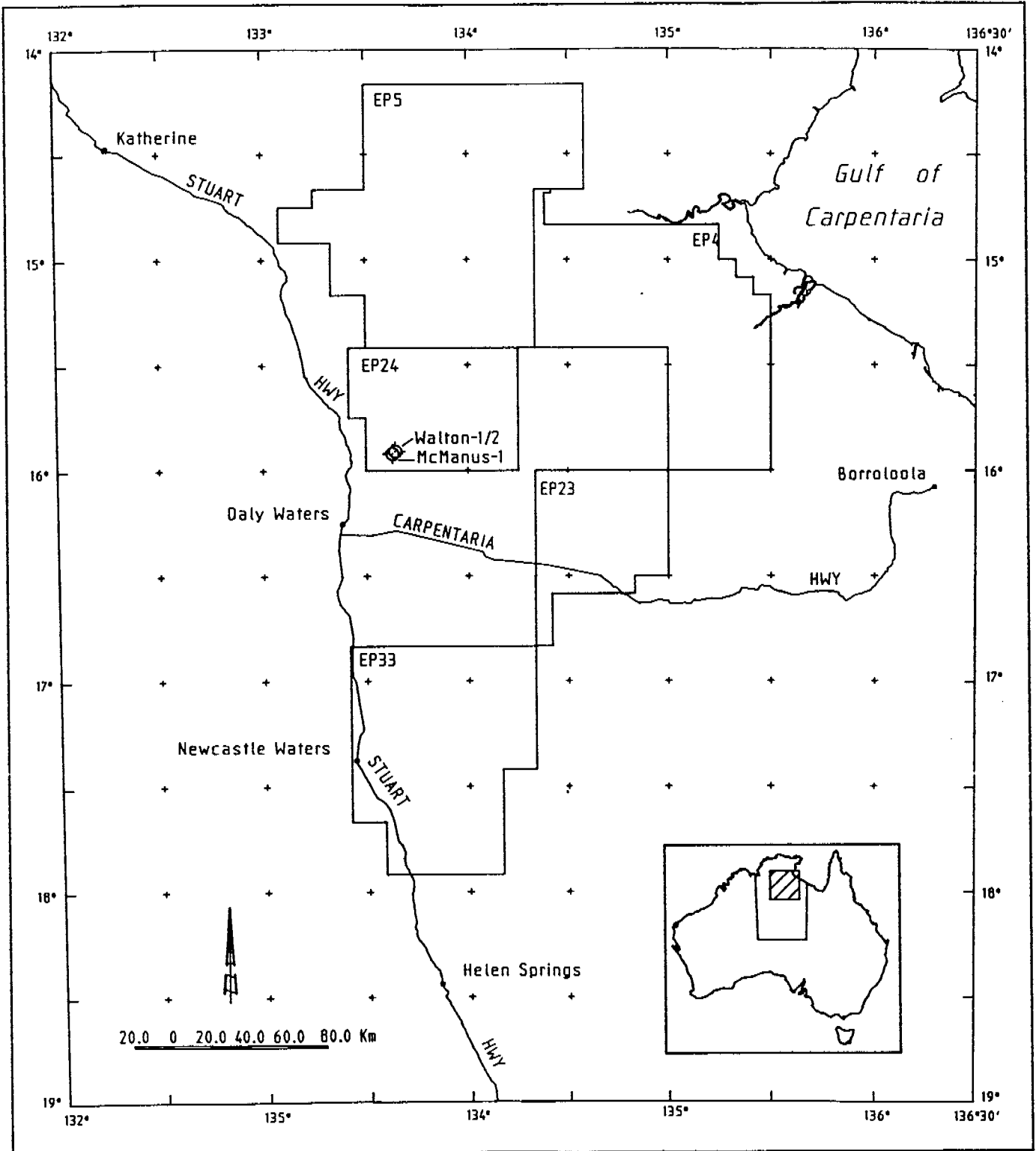


Figure 1. Location map for Walton-1 & 2 and McManus-1

1.2 General Data

Well Name: McManus-1

Well Type: Exploration Well

Operator: Pacific Oil & Gas Pty Limited

Licence Holders: Pacific Oil & Gas Pty Limited 100%

Petroleum Title: EP 24, Northern Territory

Location: McManus-1
 Latitude: 15. 55' 14.44" South
 Longitude: 133 37' 46.53" East
 Maryfield: 1:100,000 sheet
 AMG : 353306.9E, 8239350.9N
 Zone 53

Elevation: Ground Level: 189.53m
 Drilling Floor: 192.93m

Total Depth: 1617.25 m (Driller)
 1617.40m (Logger)

Commencement Date: 28th September 1989

Total Depth Reached: 0815hrs, 13th November, 1989

Rig Released: 1900 hours ,18th November, 1989

Drilled by: Rockdril Contractors Pty. Ltd.

Drilling Rig: Rig 20, Longyear 600

Hole Size: 12 $\frac{1}{2}$ inch to 84.0m
 8 $\frac{1}{2}$ inch to 131.0m
 6 inch to 272.0m
 4 $\frac{1}{3}$ inch to 1617.25m

Wireline Logs: Spontaneous Potential
 Dual Focussed Resistivity
 Gamma Ray, Caliper
 Density
 Dipmeter (tool failed)
 Multichannel Sonic
 Run from 1617m to 220m

Velocity Survey: A 23 level velocity survey was conducted by
 Velocity Data.

1.3 Drilling Rig

ROCKDRIL RIG 20 - RIG AND EQUIPMENT DESCRIPTION

DRILLING RIG: Longyear 600

Depth Capacity: CHD 134 1,747 m (Rod Rating 1956m)
 CHD 101 2,180 m (Rod Rating 3050m)
 CHD 76 3,428 m (Rod Rating 2750m)

Power Unit: Caterpillar 3306-T 210 Hp @ 2,000 RPM
 620 lb. Ft. @ 1,400 RPM

Transmission: To Powerhead and Hoist Hydr/Mech (Funk) 4 speed
 Ratios: 6.27-1 (Blocked out on hoist)
 3.12-1
 1.75-1
 1.00-1

Bit Speeds: Based on 2000 Engine RPM @ 3,000 psi Pump
 Pressure: 1st - 130 RPM
 2nd - 260 RPM
 3rd - 466 RPM
 4th - 822 RPM

Powerhead: Pump & Drive Motor - Sunstrand 23 lb.
 Powerhead Ratio - 2.081:1
 Overall Ratio - 1st 13.09:1
 2nd 6.51:1
 3rd 3.65:1
 4th 2.087:1

Lubrication: Positive Lube Pump

Torque @ 4,500 psi - 1st 4,219 ft. Ib
 2nd 2,099 Ft. Ib
 3rd 1,179 Ft. Ib
 4th 673 Ft. Ib

Spindle I.D. 4-3/16" (106mm)
 Retraction 14" (355.6mm)

Max. casing size with head retracted - 12 "
 (304.8mm).

Feed System: Feed Length - 11 ft (3.35m)
 Cylinder Size - 5" Bore x 2-1/2" Piston Rod
 Lift Capacity - 73,625 lbs (33,396 kgs) @ 2500 PSI
 Thrust - 7,856 lbs (3,422 kgs) @ 200 PSI
 Hydraulic Pump -2 stage Compensator 2500 PSI
 and 200 PSI (Delavan)

Chuck: Hydraulic 3 - Jaw tungsten Inserts, Subs required to convert to top drive of Kelly from approximately 1200m 101 size hole.

Main Hoist: Type: Hydr/Gear
 Drum Diam: 9-1/2" (241.3mm) - Grooved
 Drum Length: 20-5/8" (523.87mm)
 Flange Diam: 18-1/4" (463.55mm)
 Drum Capacity: 730' x 5/8" Cable (223m x 16mm)
 Hydr. Pump: Sunstrand f23
 Hydr. Motor: Sunstrand f23 2-speed

	<u>Low</u>	<u>High</u>
1st	N/A	N/A
2nd	0-118ft/m (136m/m)	0-177ft/m (54m/m)
3rd	0-211ft/m (64.3m/m)	0-316ft/m (96m/m)
4th	0-370ft/m (113m/m)	0-555ft/m (169m/m)

Hoisting Capacity:

	<u>Single</u>	<u>4 Pt. Line</u>
1st	N/A	N/A
2nd	5,000 lbs (6804 kgs)	60,000 lbs (27,216 kgs)
3rd	9,750 lbs (4422 kgs)	39,000 lbs (17,690 kgs)
4th	5,500 lbs (2495 kgs)	22,000 lbs (9,979 kgs)

Brake: Size - 18" x 14" (457 mm x 101 mm)
 Area - 226 sq. ins. (1458 cm²)
 Brakes used for holding loads only
 Power up and down through hydraulics

Wireline Hoist: Type: Hydraulic-Chain drive from Main Hoist Motor
 Drum Diam: 5-1/2" (140mm)
 Drum Length: 17-1/8" (435mm)
 Flange Diam: 30" (726mm)
 Drum Capacity: 6486 ft. x 5/16" Cable (1996 m x 8 mm) at 75% of Spool Level Wind
 Bare Drum Speed: 0-1000 F.P.M. (305 m/m)
 Control: Power up and down through hydraulics with free wheel.

Mast: Crown Block Rating 121000 lbs. (54886 kgs) inc. 1.64
Factor of safety
Hook Load Rating: 60000 lbs (27216 kgs) with 4 part
line
Method of Raising: Hyd. Cyl. (2)
Rod Stacking Cap: 30 & 40 ft. stands
Guy Lines Required: 4
Mast Length: 58.4" (17.78 m)
Weight Indicator: Indicator gauge to 60000 lbs with
4 part line.

Mounting: Trailer mounted with four levelling jacks

Mud Pump: 5 x 6 G.D. Pump rated 150 G.P.M. @ 310 PSI
Powered by Sunstrand f21 Pump & Motor with Gear
Reducer

7-1/2 x 10 G.D. Pump Rated 487 G.P.M. @ 255 PSI (211
G.P.M. @ 574 PSI - Powered by 4-71 G.M. Diesel.

Fluid Pumps: 2 x 535 Bean Pumps Powered by Sunstrand
f21 Pump Driving 2 sunstrand f20 in series with bypass

Max. Flow - 1 pump 35 G.P.M.
Max. Flow - 2 pumps 70 G.P.M.

Specifications of Associated Equipment

Substructure: Rig raising sub-base - 7m long 2.5m width x 2.0m high

Derrick Floor: 3.5 m long width x 2.0 m high
Swivel: Longyear Type LD max. safe static
working load 28 tons. Max safe
working load when rotating 15 tons at
200/300 RPM.

Weight
Indicator: Martin-Decker Model WS8-11

Mud System:

a. Mud system consisting of the following items:

Settling Tank

Overall dimensions 4.8m long 2.00m wide 0.90m high
Mounted on oilfield type skid 6m long
Capacity 8,600 litres (2,275 gals-54 BBLs)

Equipped with:

Geosource shale shaker capacity 300/500 GPM size 4' x 5' dual screen driven by an hydraulic motor 10HP

Pickup pump fe centrifugal 500 GPM hydraulic motor

Desilter 200 GPM model Economaster S2-E4

Mud agitator type axial flow impell 45 degree flat blade turbine, driven by a hydraulic low speed 60 RPM high torque motor.

Pump type Mission 3 x 4 x 13 centrifugal belt driven from engine.

Prime mover W/Power takeoff type Lister HR4 52 HP 1800 RPM

Hydraulic System: Gear pump tandem type suitable to operate pick-up, shale shaker, 2 mud agitators, centrifugal pump 2 x 2-1/2 x 12 (No. 1 Agitator and 2 Centrifugal pumps are fitted on the other tank)

Mud gun

Degasser

- b. Mixing/storage tank-two compartments
Overall Dimensions 4.8m long 2.00 wide 1.20 high mounted on oilfield type skid 6m long capacity 11,500 litres (3,042 gals - 72.4 BBLs)

Equipped with:

Centrifugal pump-Kelly-Lewis 2 x 2-1/2 x 13 driven by a hydraulic motor 18 HP

2 mud agitator W/impeller 26" hydraulic driven

2 mud gun

- c. Cementing/Killing unit mounted skid 6m long 22m wide w/two tanks around 1,000 gals. capacity each

Prime mover Lister diesel engine mel H46 103 Hp

Power take-off twin disc dry type

Gear box flexible coupling

Oilwell pump model D-323 type Triplex max. bore x stroke 2-1/2" x 3" rated HP 60 rated press. 4,000 PSI rated RPM 500

Agitators 6 HP capacity 60RPM hydraulic driven one on each tank

Centrifugal pump type Kelly-Lewis K-70 2" x 2-1/2 x 9"
Hydraulic driven

Hydraulic system including tandem gear pump driven from front of engine.

Cameron gate valve 2" 3,000 PSI

Cameron pressure gauge 3,000 PSI

Shear relief valve 3,000 PSI

Wellhead Equipment:

No.1 BOP Hydril 6"-3000 PSI W.P. Type GK bottom flanged
6"-3000 PSI bore size 7-1/6"

No.1 BOP Shaffer 6" x 3,000 PSI W.P. Type B double unit top
and bottom studded bore size 7-1/16"

No.1 Breda National Wellhead 5000 PSI to suit 7", 5", 4"
casing plus all accessories

No.1 Drilling spacer spool 3000 PSI W.P. bottom and top
flanged 6"-3000 PSI two outlets-1st flanged 2"-3000 PSI, 2nd
3"-3000 PSI bore size 7-1/6"

No.2 National valve 2"-3000 PSI W.P. flanged for kill line

No.1 National valve 3"-3000 PSI W.P. flanged for choke line

No.1 National valve flo-tork model 3"-3000 PSI W.P.
W./Hydraulic actuator

No.1 Cameron check valve type R2"-3000 PSI W.P.

No.1 National choke manifold assy. 3"x2-1/2" 3000 PSI W.P.

No.1 Kill line 2"-3000 PSI W.P.

No.1 Choke line 3"-3000 PSI W.P.

No.1 Hydril automatic pump accumulator unit type HP-17-K80

No.1 Shaffer hydraulic control panel pedestal type for BOP
remote control

No.1 Shaffer auxiliary control panel

No.1 Bourne upper kelly cock 3000 PSI W.P.

No.1 TIW Lower kelly cock 3000 PSI W.P.

No.2 Gray Inside BOP (float valve) 3000 PSI W.P.

No.1 Guiberson type G tubing preventor 1,500 PSI W.P.

No.1 Guiberson Wireline oil savers type H W/hydraulic pump
3000 PSI W.P.

No.1 Guiberson Type C releasing attachment

Set stabbing valves for different thread connections-flare
line

Tubular Equipment and Fishing Tools:

CHD 101 Longyear rods O.D. 3.701" I.D. 3.268 (Midbody) I.D.
3.091 joint depth rating 10,000 ft. (3,050m)

Set of cross-over subs

Core barrels for CHD 101mm

Gotco overshot O.D. 5-7/8" w/spiral to catch from 2-3/8" to
4-7/8

Taper and bell taps for all tubing sizes

Surface and Casing Equipment:

Longyear automatic pre-torque and break-out tool rod size CHD
76 through CHD 101
Casing size E through N
Max. torque (breakout) 2,8000 lb/ft
Max. torque (make-up) 2,4000 lb/ft
Rod clamp weight capacity 4,000 lb

Baash-Ross hinged casing spider w/different bushing

Baash-Ross casing slips 6-5/8"

Handling tools for 4", 5" and 7" casing

Set of circulating head for different sizes of casing

Set of lifting plugs for all tubing

Auxiliary Equipment:

Explosion proof lighting system

A.C. electric generator KVA60

A.C. electric generator KVA35

Water storage tank 2,000 gallons

Fuel storage tank 500 gallons

Workshop barrack

Motorpump type mono

Centrifugal pumps (2") - Petrol driven

Transportation and Lifting Means:

1 6 x 6 Mack truck fitted with hydraulic crane

2 Toyota Land-cruiser pick-up 4WD

Miscellaneous:

Radio-wireless set SSB radio fitted with appropriate flying doctor frequency

Set of mats for setting rig

Set of extinguishers

Drill collars and stabilizers to suit hole specifications.

1.4 Hole Sizes and Depths

McManus-1: Drilling commenced with the air drilling of a 12 1/4" precollar hole to 86.0m by Gorey and Cole. Rockdril Rig 20 set over the precollar and air drilled with an 8 1/2" hammer to 131.0m. Hammer drilling of 6" hole continued to 272.0m. The remainder of the hole was fully cored with CHD 101 with a 110.5mm near-bit reamer shell.

1.5 Casing and Cementing

McManus-1: 10" PVC conductor set at 64.5m.
 Make:
 No of Joints: 9
 Cement Used: 6 sacks class A cement
 Accesories: Nil
 Remarks: Cemented to surface

7" surface casing set at 128.4m
 Make: Kawasaki
 Weight: 26 lb/ft
 Grade: N80
 No of Joints: 12
 Cement Used: 47 sacks class A cement
 1 sack CFR2
 Accesories: Cement shoe
 Remarks: Cemented to Surface

5" intermediate casing set at 270.8m
 Make: Kawasaki
 Weight: 13 lb/ft
 Grade: K55
 No of Joints: 28
 Cement Used: 36 sacks class A cement
 1 sack CFR2
 Accesories: Cement shoe
 Remarks: No returns were observed at the surface.

1.6 Drilling Mud

McManus-1 was spudded using an air drilling system, with stiff foam where lost circulation was encountered. Air drilling continued to 272 metres using water lifted from the hole, and where necessary water and gel misted with air. The remainder of the hole was drilled with a Drill Floc system (a polyacrilamide mud), with up to 3% KCl added towards the lower part of the hole.

Details of the drilling fluid properties and mud consumed for the hole are given in Appendix 2.

TABLE 1

BIT SUMMARY

McManus-1

Bit No	Make/Type	Serial No	Depth in (m)	Depth out (m)	W.O.B. (kg)	R.P.M.	Pump Pressure (psi)
	Flat-face, hammer 8½"	-	86.0	131.0	2000	20	-
	Varel VM2 roller 5/8"	-	drill out cement (DOC)		-	-	-
	Concave hammer 6"	-	131.0	272.04	2000	30	200
1	Walker McDonald, 4½"	-	DOC		3000	40	150-200
2	Longyear S6, 3.976"	L31345	272.25	274.85	6000	300	400-800
3	Longyear, 4 step, 3.976"	L31705	274.85	422.95	4-8000	250-300	300-1000
4	Longyear, 4, step, 3.976"	L3738	422.95	470.05	4-9000	200-300	500-800
5	Longyear, S6, 3.976"	L31345	470.05	505.25	5-8000	250	500
6	Longyear, S2, 3.976"	L69348	505.25	557.05	3000	300	800-1000
7	Longyear, 4 step, 3.976"	L31705	557.05	846.75	3-6000	250-300	700-1200
8	Longyear, 8 step, 3.976"	L28148	846.75	906.65	5-6000	250	500-1200
9	Longyear, 8 step, 3.976"	L30956	906.65	1071.35	3-6000	250-300	700-1000
10	Longyear, S6, 3.976"	L31346	1071.35	1319.95	3-8000	200-300	700-1200
11	Longyear, S6, 3.976"	L178401	1319.95	1612.0	4-8000	250	1000-1200-1500
12	Longyear, S6, 3.976"	L2902	1612.0	1617.25	4-6000	250	900-1200

1.7 Water Supply

Both drill and potable water were pumped from a water bore which was drilled at the wellsite by Gorey and Cole.

1.8 Bit & Deviation Record

1.8.1 Drilling Bits

Twelve bits were used in the drilling of McManus-1. Details of bit usage are given in Table 1.

1.8.2 Deviation

Deviation Survey details are given in Table 2.

TABLE 2

Deviation Survey Record

McManus-1

Depth (m)	Deviation (°)
164.0	0 3/4
266.0	0 1/4
345.0	1
412.95	2 3/4
430.0	3 1/4
452.0	3 1/4
470.0	3
525.0	3 1/2
575.0	3 1/2
630.0	3 1/2
693.25	3 1/2
789.0	4
945.0	4 1/2
1062.0	4
1178.0	4
1370.0	8
1500.0	4

1.9 Fishing and Related Operations

No fishing operations were conducted in McManus-1.

1.10 Formation Testing

A drill stem test was conducted in McManus-1 over the interval 1071.45 to 1319.95m. The conventional bottom-hole test commenced at 2015hrs on November 2 and was pulled at 0515hrs on the November 3. Approximately 652 metres of drilling mud was recovered from the drillstring above the tool. The tool itself also contained mud without any oil cut. Analysis of the pressure charts indicates a possible leak in the drill string enabling mud to flow from the annulus into the drill string. Full details of the test can be found in Appendix 3.

1.11 Time Distribution

Time spent on the various phases of the drilling operation are given in Appendix 4, and a time-depth curve for McManus-1 is included as Figure 2.

1.12 Well Costs

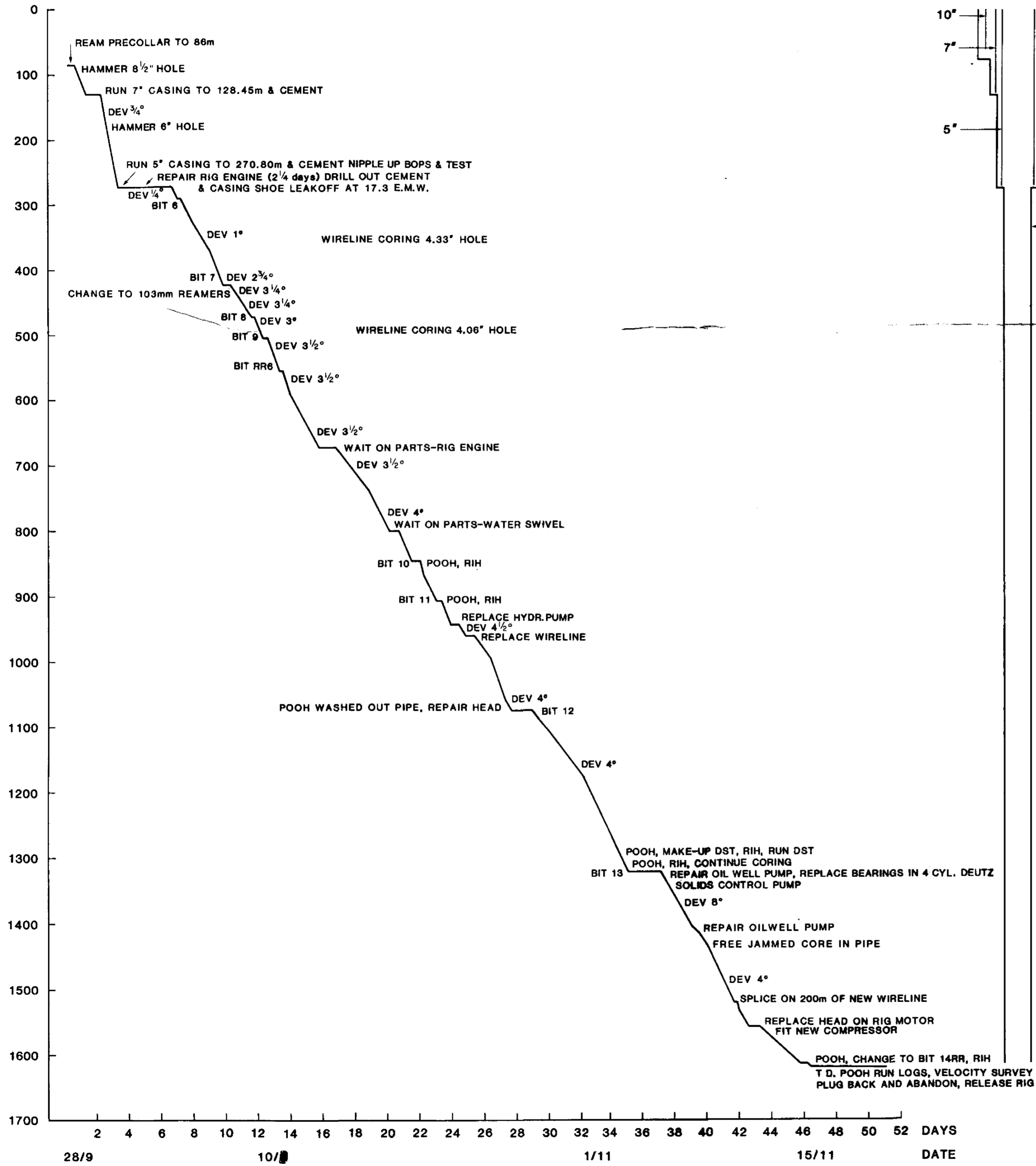
A detailed cost-break down for McManus-1 is given in Table 3.

TABLE 3WELL COSTSMcManus-1

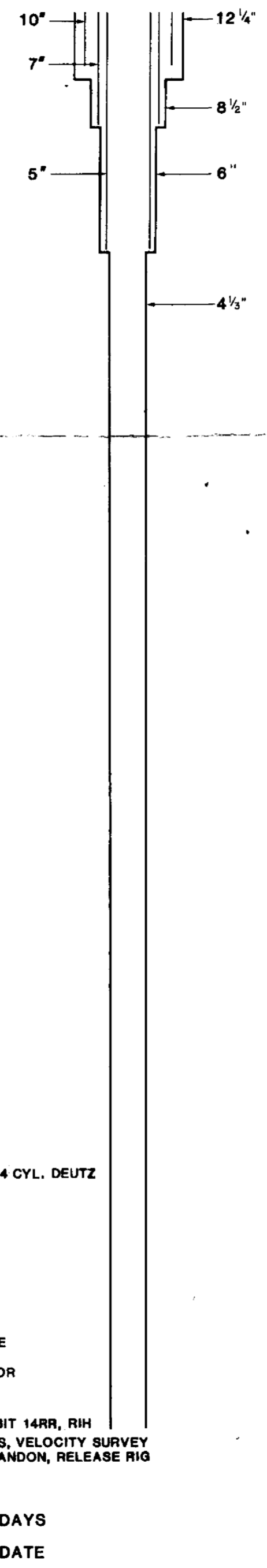
as at 30/06/90

ITEM	TOTALS
Drilling	363,074
Supplies & Communications	16,311
Vehicle Operation	2,523
Travel & Assommocation	31,132
Contractors & Professionals	22,660
Laboratory Analysis	7,322
Salaries, Office Costs & Other Costs	37,137
TOTAL	480,159

McMANUS-1



CASING SIZE HOLE SIZE



STRATI-GRAPHY	FORMATION	DEPTH (m)
	CRET. UNDIFF.	0 - 12
	TINDALL LIMESTONE	100 - 128
	NUTWOOD DOWNS VOLCANICS	200 - 264
	GOX FORMATION	300 - 467
	BUKALARA	467 - 500
	DEAD HC SANDSTONE	500 - 553
	KYALLA MEMBER	600 - 668
	MOROAK MEMBER	700 - 738
	LIVE OIL SHOWS GOOD OIL BLEED VIS POR. 4 %	738 - 800
	MINOR FLUORESCENCE VERY MINOR GAS	800 - 900
	PIN PRICK-OIL BLEEDS/STAINS NO VIS POR	900 - 1000
	UPPER VELKERRI	1000 - 1173
	EXCELLENT GAS SHOWS	1200 - 1300
	MINOR OIL BLEEDS	1300 - 1400
	MIDDLE VELKERRI	1400 - 1550
	LOWER VELKERRI	1550 - 1600
	TD. 1617.25m	1600 - 1700

DRILLING FLOOR

28/9

10/11

1/11

15/11

DATE

Figure 2

<h2>Mc MANUS-1</h2> <h3>TIME DEPTH CURVE</h3>			
REF.		DRAFTING	Kemp Cartographics
SCALE	1:5000	REPORT	303796
AUTHOR	I. Ledlie, K.P.L.	PLAN No	PatNTcw4203
DATE	January, 1990		