

WELL HISTORY

GENERAL DATA:

Well Name and Number: East Mereenie No. 2

Location: 24°02'47" south
131°38'50" east

Drilling Time in Days to Total Depth: 60 days

Elevation: Ground 2,380' a.s.l. Kelly Bushing 2,369' a.s.l.

DRILLING DATA:

Name and Address of Drilling Contractor:

Oil Drilling and Exploration Limited,
93 York Street,
SYDNEY. N.S.W.

Drilling Plant:

Make: National

Type: T 32

Motors (2): G.M.C. Twin Model 471, 225 h.p.

Mast:

Make: Emsco

Type: Serial 12

Rated Capacity: 416,000 lbs.

Pumps (2):

Make: National

Emsco

Type: C-250

D-300

Size: 7¼" x 15"

7¼" x 14"

Motors: 1 Twin G.M.C. 671

1 Twin G.M.C. 671

1 Twin G.M.C. 471

Air Drilling Equipment:

<u>Unit</u>	<u>Make</u>	<u>Type</u>	<u>Size</u>	<u>Motors</u>
Compressor	Ingersoll-Rand	HHE 3 Stage	1500 c.f.m. 300 p.s.i.	Waukesha 405 h.p.
Booster Compressor	Ingersoll-Rand	HHE 2 Stage	3000 c.f.m. 1500 p.s.i.	Waukesha 405 h.p.
Injection Pump	Aldrich	Triplex HS-3B	1" x 2½"	Wisconsin 30 h.p.

Blow-out Preventor Equipment:

Make:	Schaffer	Hydril	Schaffer
Model:	"B"	G.K.	Rotating
Size:	12" Series 900	12" Series 900	12" Series 900

Blow-out Preventor Equipment (Cont'd.)

Working Pressure 3,000 p.s.i. 3,000 p.s.i. 3,000 p.s.i.

Casing and Cementing Details:

Size:	13 $\frac{3}{8}$ "	9 $\frac{5}{8}$ "	7"
Weight:	48 lbs.	36 lbs.	29 and 26 lbs.
Grade:	H-40	J-55	N80 and J55
Setting Depth:	177'	2,378'	5,072'
Cement Used:	110 sacks	550 sacks	330 (112 lbs. sacks)
Cemented to:	Surface	-	2,500' (Estimate)
Method Used:	Rig Pumps	Rig Pumps	B.J. Cement Unit.

Drilling Fluid:

Air was used for drilling from surface to 4122'. Surface to 446' was air drilled from 446' to 2,387' mist drilling was used. Whilst mist drilling, an injection rate of 8-12 barrels per hour was maintained with a pH of 9.5 to 11 (at end of Blooey line). Additions of foaming agent and lime (or caustic) were made to the fluid system when necessary. From 2,387' to 4,122' air drilling was used. The hole was mudded up at 4,122' in order to commence continuous coring previously requested. Barytes was added when necessary (due to the presence of high pressure, Lower Stairway gas). Hole conditions were good throughout the operation and samples were very satisfactory (samples were particularly good from air drilling; very clean samples were obtained without any lag time). Average mud properties are listed below (for Drilling Interval 4,122' - 5,175').

Weight	:	11.0 lbs./U.S. gls.
Viscosity	:	56 (Marsh)
Water Loss	:	6.7 c.c./30 mins.
pH	:	9.5
Sand Content	:	0.25%

Lost Circulation:

There were no lost circulation problems at East Mereenie No. 2, which compared to East Mereenie No. 1 (546 lost hours) proves the merits of using air as a drilling fluid on Mereenie wells.

Mud Additives Used

The following quantities of mud additives were used in East Mereenie No. 2.

1. Whilst Air Drilling:

Tol-Foam	379½ gls.
Lime	6,730 lbs.
Bi-Chromate	2,770 lbs.
Graphite	100 lbs.
Caustic	2,925 lbs.

2. Whilst Mud Drilling:

Magcogel	39,400 lbs.
Barytes	162,330 lbs.
Caustic	2,385 lbs.
Spersene	1,956 lbs.
XP ₂ -20	700 lbs.
Myrtan	700 lbs.
Tannathin	1,300 lbs.
Driscose	375 lbs.

The total weight of mud material used was 221,771 lbs. (12,525 lbs. used whilst air drilling) and 379½ gallons of Tol-Foam (used whilst air drilling).

Water Supply:

Water was pumped to the rig through a 2" line from a water well over a distance of approximately ¾ mile. The water supply was supplemented during aerated water drilling by the collecting from Mereenie water coming from the blooey line.

Perforation and Shooting Record:

The following zones were perforated through 7" casing using Schlumberger Capsule Jets. Perforations were picked from the microlog.

4412' - 4419'
4404' - 4408'
4379' - 4380'
4372' - 4376'
4360' - 4362'
4344' - 4346'
4332' - 4335'
4191' - 4193'
4182' - 4185'
4160' - 4164'

4/8"
2 1/8" capsule jets.

Plugging Back and Squeeze Jobs:

No Plugging Back or Squeeze Jobs were carried out on East Mereenie No. 2.

Fishing Operations:

There were no fishing operations at East Mereenie No. 2.

Ditch Cuttings:

Ditch cuttings were collected at 10' intervals from surface to 3100', at 5' intervals from 3100' to 3150', at 10' intervals from 3150' to 4130' and at 5' intervals from 4130' to total depth. Three cuts of samples were made, one for Northern Territory Administration, Alice Springs; one for Magellan Petroleum (N.T.) Pty. Ltd., and one for Exoil (N.T.) Pty. Ltd.

Coring:

The coring programme called for continuous coring through the Pacoota Sandstone. Core No. 1 and 2 were cut using a Hughes "J" type barrel and Hughes Hand Formation Core Heads. Cores Nos. 3 to 20 were cut using a D. & S. 53' x 6 7/8" O.D. barrel and using Christensen 8 11/16" and 7 13/16" Diamond Core Heads. Core Nos. 21 to 24 were cut using a

Christensen 7 $\frac{13}{16}$ " Diamond Core Heads. A total of 24 cores were cut and 2 conventional core heads and 6 diamond core heads were run. 457 hours or approximately 30% of total time was spent on coring operations (including trips and opening hole). One foot core samples were bagged in plastic containers or tins, boxed and sent to Core Laboratories in Brisbane and Bureau of Mineral Resources in Canberra for analysis. The remainder of the cores were boxed and sent to Alice Springs.

Core No.	Interval	Amount		% Recovered
		Cored	Recovered	
1	4155' - 4158'	3'	2'5"	81
2	4158' - 4160'	2'	1'	50
3	4160' - 4182'	22'	22'	100
4	4182' - 4223'	41'	40'1"	98
5	4223' - 4267'	44'	44'	100
6	4267' - 4309'	42'	38'2"	91
7	4309' - 4352'	43'	43'	100
8	4352' - 4386'	34'	31'11"	94
9	4386' - 4391'	5'	5'	100
10	4391' - 4395'	4'	no recovery	-
11	4395' - 4400'	5'	no recovery	-
12	4400' - 4441'	41'	2'	5
13	4441' - 4462'	21'	17'4"	82
14	4462' - 4492'	30'	30'	100
15	4492' - 4508'	16'	13'	81
16	4508' - 4517'	9'	8'3"	91
17	4517' - 4537'	20'	15'10"	78
18	4539' - 4541'	2'	2'	100
19	4541' - 4565'	24'	15'	63
20	4646' - 4659'	13'	12'5"	95
21	4747' - 4777'	30'	30'	100
22	4804' - 4806'	2'	2'	100
23	4806' - 4836'	30'	29'7"	99
24	4955' - 4965'	10'	10'	100

at
Benside *
Core Library

Total footage cored: 493 feet

Total footage recovered: 415 feet

Percentage recovered: 84%

All cores were cut in Pacoota Sandstone.

Footage cored represents 48% of Pacoota Sandstone penetrated.

Electrical and Other Logs:

One logging run was made by Schlumberger.

<u>Run No.</u>	<u>Type</u>	<u>Depth</u>	
		<u>From</u>	<u>To</u>
1	Microlog-Caliper	2,380'	4,995'
1	Gamma-Ray	Surface	4,992'
1	Sonic	2,380'	4,990'
1	Induction-Electric	2,380'	5,041'

Logs were run on scales of 2" = 100 feet and 5" = 100 feet. See Appendix 'D' for detailed interpretation. In addition, a velocity survey was run by United Geophysical at the following depths in open hole:- 2390', 3,000', 4,000', 4,850' and in casing at 2,300'.

Drilling Time and Gas Log:

One-foot drilling times were recorded on a Geolograph.

Mud-logging was done by the Exoil wellsite geologist using a Core Laboratories gas detector manned continuously while drilling and coring. Five-foot drilling times and gas detector readings are shown on the Composite Log.

Figure 2 shows the time versus depth graph.

Formation Testing:

Four open hole tests were carried out on East Mereenie No. 2. A continuous open hole evaluation was possible on the air drilled portion of the hole. The Lower Stairway gas flows were approximately the same as previously flowed on drill stem tests in the other Mereenie

wells. Formation damage could not be responsible for low flows in this well.

Open hole measurements were taken with pitot tube and manometer. All tests are over the interval surface to depth stated. The results of these tests appear in the following table:-

<u>Depth</u>	<u>Flow</u>
3,832'	310 m.c.f.g.p.d.
3,939'	196 m.c.f.g.p.d.
4,035'	139 m.c.f.g.p.d.
4,122'	139 m.c.f.g.p.d.

The above table shows flow rates on the Lower Stairway gas zone. In the Upper Stairway, gas was flaring on connections below 3,220' (gas too small to measure). In the Lower Stairway gas was flaring continuously below 3,813'.

Drill Stem Tests

Ten drill stem tests were carried out. All measurements for gas flows were made by pitot tube and manometer, except for D.S.T. No. 1 and 4, where a critical flow prover was used.

<u>No.</u>	<u>Interval</u>	<u>Recovery</u>	<u>Remarks</u>
1:	4,145'-4,182'	270' slight condensate and gas cut drilling mud.	Stabilised flow of 3.1 MM.c.f.d. flowed condensate at 5.4 bbls./million; test shows thin sands to be porous and permeable.
2:	4,185'-4,267'	4 gallons drilling mud.	Flow 88 m.c.f.d. Interval tight.
3:	4,267'-4,309'	8 gallons drilling mud.	Flow 44 m.c.f.d. Interval tight.
4:	4,349'-4,386'	1,172' slight	Stabilised flow of gas and condensate 1.3 Mm.c.f.d. Interval cut drilling mud. porous and permeable from thin sands. High mud recovery due to drill collar washing out.

<u>No.</u>	<u>Interval</u>	<u>Recovery</u>	<u>Remarks</u>
5:	4,386'-4,441'	Nil	Test misrun.
6:	4,437'-4,492'	4" free oil 20' oil cut mud.	No gas to surface. Interval tight.
7:	4,520'-4,646'	3' free oil 95' oil cut mud.	No gas to surface. Interval tight.
8:	4,740'-4,804'	180' free oil 1,430' oil and salt water cut drilling mud. 90' salt water.	Flow 139 m.c.f.d., gas interval some porosity. Slight permeability.
9:	4,646'-4,804'	525' gas and oil cut mud. 3,135' gas and oil cut salt water.	Gas T.S.T.M. No shut-ins taken. Flow 8+ HM - approximate flow 150 barrels/day.
10:	4,910'-4,965'	30' drilling mud.	No gas to surface. Interval tight.

Chokes were not used (either at surface or bottom hole). However, a $\frac{5}{8}$ " wash pipe in the Johnston Initial Shut-in Tool acts as an effective choke. All pressures were recorded with Johnston Type T-1 pressure recorders. A total of 101 $\frac{1}{2}$ hours or approximately 7% of total time was spent on Drill Stem Tests.

Deviation Surveys:

Deviation surveys were run before trips and recovered from drill pipe or on a wire line when air drilling. Readings are listed below:-

250'	1°	1460'	1°	2120'	1 $\frac{1}{2}$ °	4350'	2 $\frac{3}{4}$ °
400'	$\frac{3}{4}$ °	1550'	1°	2210'	1 $\frac{3}{4}$ °	4386'	2 $\frac{1}{2}$ °
620'	$\frac{3}{4}$ °	1650'	$\frac{7}{8}$ °	2300'	1 $\frac{3}{4}$ °	4508'	2 $\frac{3}{4}$ °
825'	1°	1775'	1°	2380'	2 $\frac{1}{4}$ °	4539'	2 $\frac{3}{4}$ °
1100'	1 $\frac{3}{4}$ °	1850'	$\frac{3}{4}$ °	2614'	2°	4645'	2 $\frac{1}{2}$ °
1280'	1 $\frac{1}{4}$ °	2000'	1 $\frac{1}{4}$ °	2975'	2°	4682'	2 $\frac{1}{4}$ °

Deviation Surveys (Cont'd.)

4804' 2°
 4950' 2¼°
 4985' 2¼°
 5074' 2½°

Temperature Surveys:

No temperature surveys were run.

Drilling Observations:

A total of 1,533½ hours were required to drill East Mereenie No. 2. Total rotating hours on bottom (excluding coring) was 515 hours or approximately 34% of total time. A total of 29 bits drilled 4,682' of hole. The bits were used as follows:-

<u>Fluid</u>	<u>No. of Bits</u>	<u>Footage Drilled</u>	<u>Hours Required</u>	<u>Average Penetration Rate</u>	<u>Ft./Bit</u>
Air	18*	4,122'	299	14 ft./hr.	229
Mud	12*	560'	216	2.5 ft./hr.	47

* Bit No. 18 drilled 183' in six hours (air) and 33' in 13¼ hours (mud).

Average penetration rate for the hole (excluding coring) was 9 ft./hr., or 161 ft./bit. 20 conventional and 9 button bits were used in drilling operations.

Air drilling operations required 22 days to drill 4,122'. 38 days were required to core and drill the remaining 1,053' of hole.

Breakdown of Drilling Operations:

	<u>Footage</u>	<u>Hours Required</u>	<u>Ft./Hr.</u>	<u>No. of Bits Used</u>	<u>Footage/Bit</u>
Surface Hole	181	17½	9.5	1	181
Air drilling 12¼" hole	247	14	17.6	1	247
Mist drilling 12¼" hole	1,959	204½	9.5	12	163
Air drilling 8¼" hole	1,735	63	27.5	4	434
Mud drilling 8¼" hole	560	216	2.5	12	47