

PR 84/5 A

WELL COMPLETION REPORT

EAST MEREENIE NO. 10

Oilmin N.L.,  
27-35 Turbot Street,  
BRISBANE, QLD. 4000

May, 1983.

**NORTHERN TERRITORY  
GEOLOGICAL SURVEY**



PR8415A

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1. SUMMARY

1. SUMMARY:

East Mereenie No.10 is the sixth well of a 20 well appraisal programme to delineate and develop the Mereenie oilfield. It was drilled to test the easterly extent of the "new" oil accumulation discovered in the P1 unit in East Mereenie No.6. The well is located 0.5 miles east-south-east of East Mereenie No.6 and intersected the target horizon, the P1 unit, approximately 130 feet downdip. (Figures 1 & 2)

The well was spudded on the 9th October, 1982, at 2000 hrs., using the OIME SL750 Mereenie Rig 1, and reached a total depth of 5835 feet in the Pacoota Sandstone (P4 unit) on the 30th November, 1982, at 0145 hrs.

The well was drilled with air and air foam to the 10-3/4" casing point at 3148 feet in the top of the Stokes Siltstone. During the drilling of the Mereenie Sandstone below 1577 feet frequent periods of lost circulation were experienced. Water influx from the base of the Parke Siltstone and Mereenie Sandstone was estimated at rates up to 400 bbls/hr. After setting the 10-3/4" casing drilling continued with air and air foam to 4447 feet, the base of the Middle Stairway Sandstone. At this point the hole was displaced with an oil based mud system and drilling continued with this to total depth at 5835 feet in the Pacoota P4 unit.

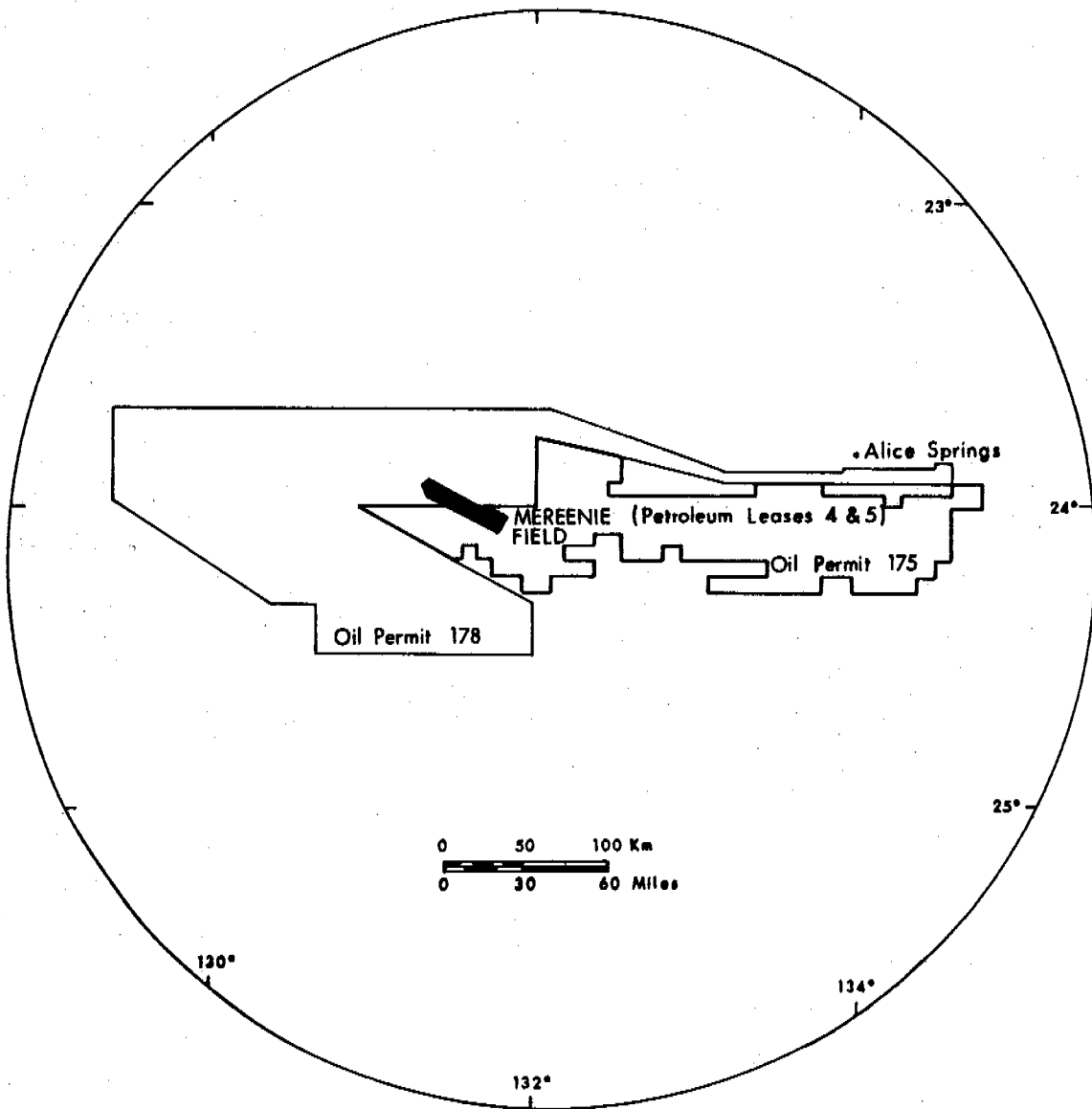
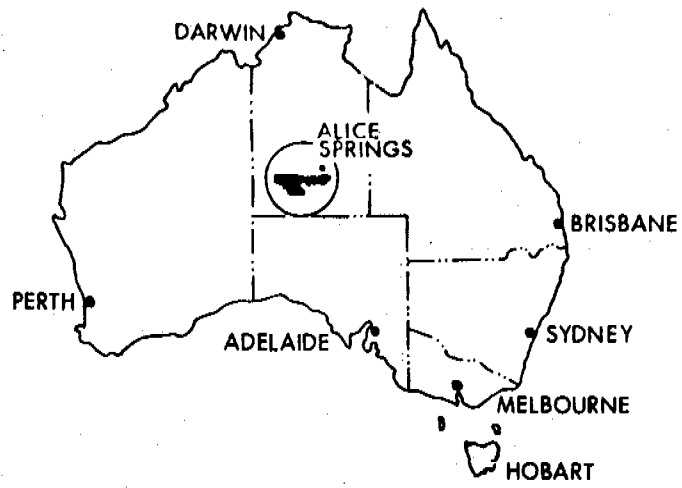
Drill stem test No.1 (4630 to 4714 feet) tested the section at the base of the Lower Stairway Sandstone. The interval produced gas at 3.02 MMcfd and 6.5 bbls. of liquid hydrocarbons was recovered on reverse circulation.

The target horizon was cored (Core No.1) and tested (D.S.T. No.2) and found to be porous and permeable but water saturated. Drill stem test No.3 straddle tested possible reservoir horizons, uphole from the target horizon, at the top of the P1 unit but the formation was very poorly permeable.

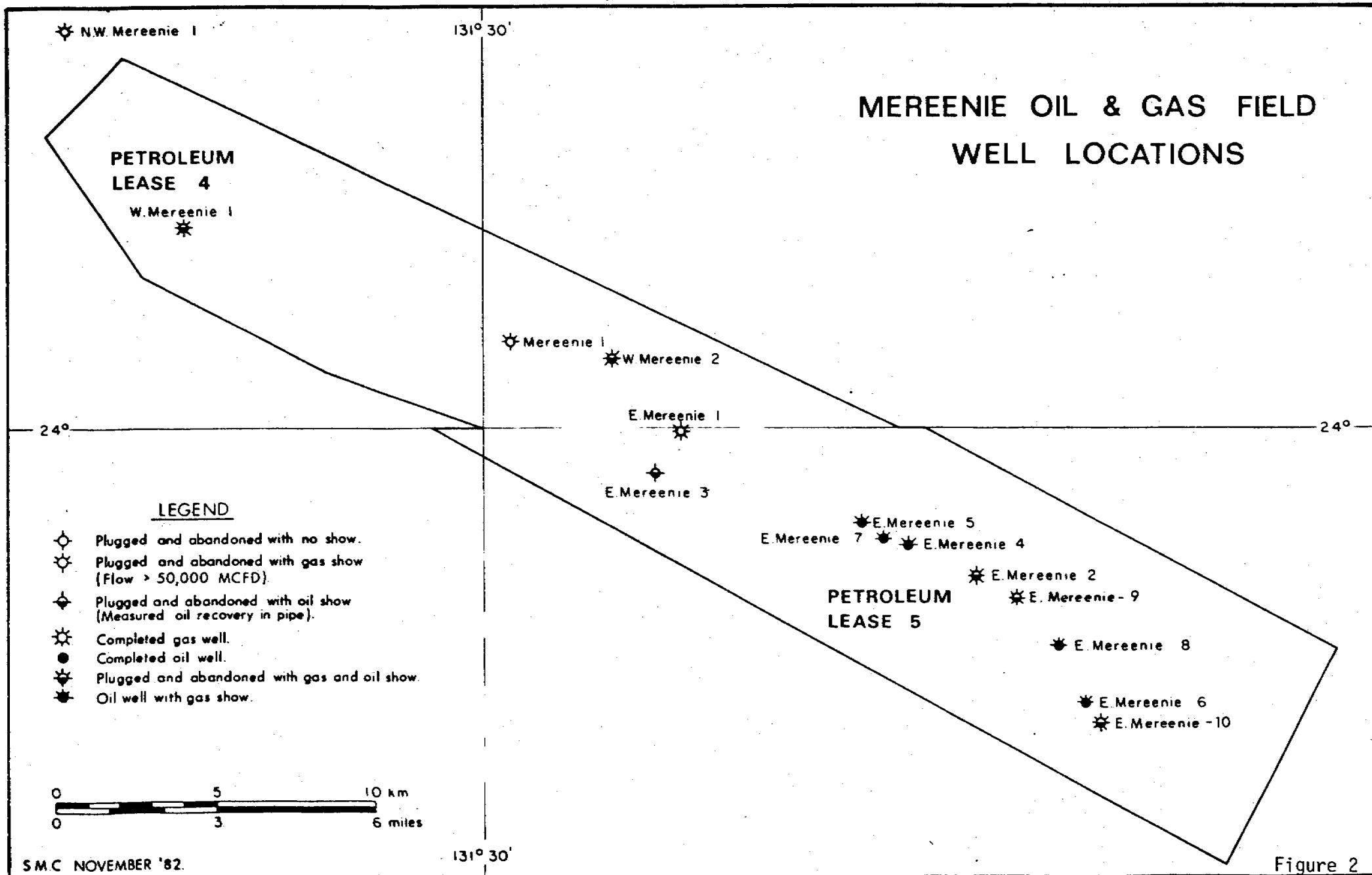
Drilling continued through the P2. Core No.2 was cut in the middle P3 unit and the well was terminated in the top of the P4. Porous and permeable reservoirs exist in the P3 unit but they are water bearing. A potential reservoir horizon exists in the P4, however, in this well, it is poorly permeable and water saturated.

Neither the gas/oil nor oil/water contact were detected, however, electric log data and comparison with adjacent wells indicate the probable oil/water contact is at 4971 feet (-2680 feet MSL).

The 5-1/2" casing was run to 5050 feet, 146 feet into the top of the Pacoota P1 unit, and perforated over the Lower Stairway Sandstone interval (4618 to 4682 feet).



LOCATION MAP



Production tubing (2-3/8") was landed at 4577 feet and the well completed as a gas and liquid hydrocarbon producer from the Lower Stairway Sandstone.



2. WELL HISTORY

2. WELL HISTORY:

Details of depth, time and main operations are shown on the time/depth curve (Figure 3).

2.1 General Data.

Well name and number: East Mereenie No.10

Operator: Oilmin N.L.

Beneficial interest holders: Magellan Petroleum Australia Ltd.  
Canso Resources Limited  
Oilmin N.L.  
Trasoil N.L.  
Petromin N.L.  
Flinders Petroleum N.L.  
Moonie Oil Proprietary Ltd.

Petroleum title: Petroleum Lease No.5

District: Alice Springs N.T.

Location: Latitude: 24° 04'39.3"S  
Longitude: 131° 41'15.7"E

Elevation: Ground level: +2271 feet MSL  
Kelly bushing: +2291 feet MSL  
(datum for all measurements).

Total depth: 5835 feet (Driller)  
5833 feet (Logger)

Spudded: 9th October, 1982 (2000 hrs.)

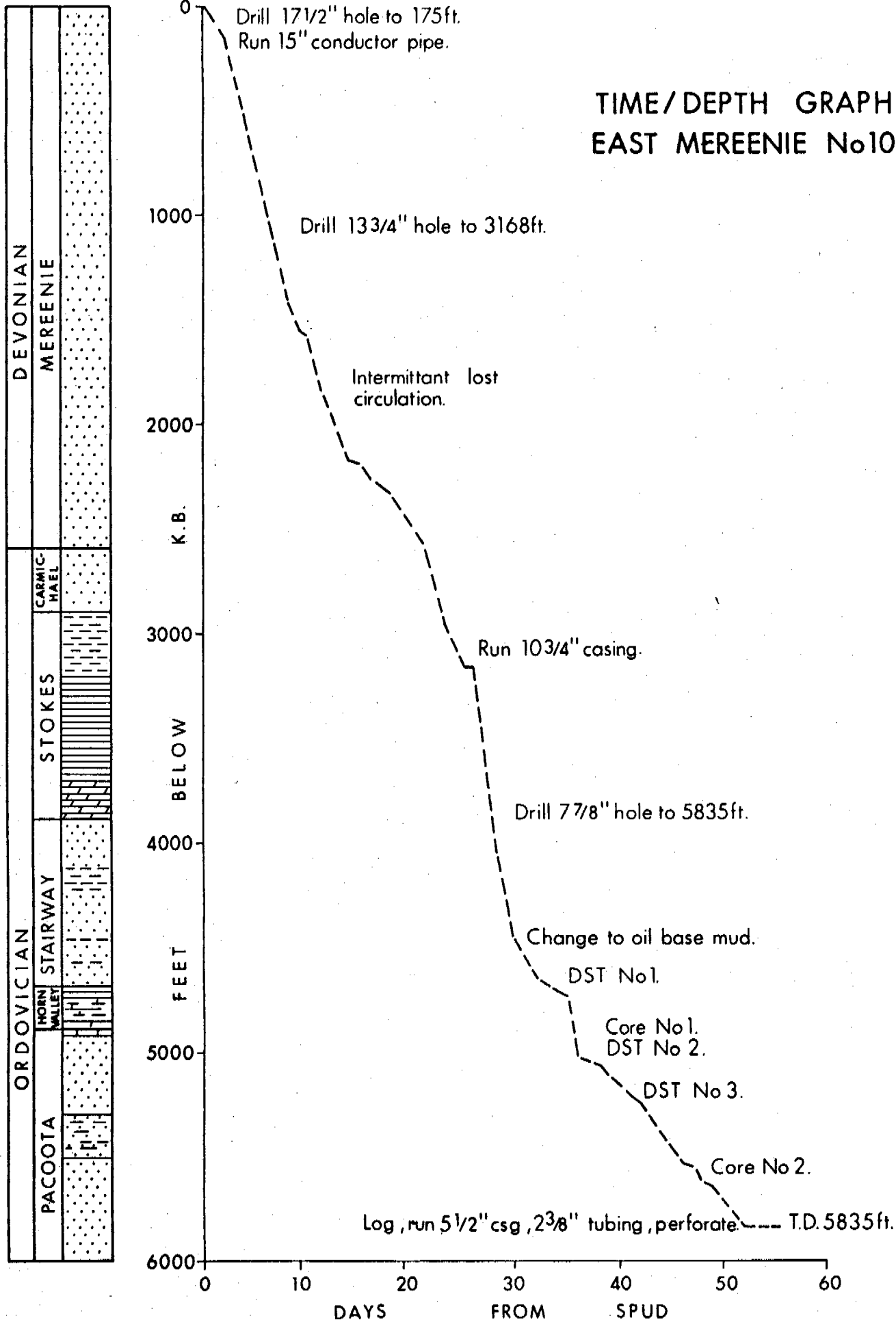
Rig released: 3rd December, 1982 (2230 hrs.)

Well status: Cased for production from the Lower Stairway Sandstone.  
Perforated over the interval 4618 to 4682 feet.

Geological formation tops:

Parke Siltstone	Surface
Mereenie Sandstone	955 ft.
Carmichael Sandstone	2618 ft.
Stokes Siltstone	2856 ft.
Stairway Sandstone	3905 ft.
Horn Valley Siltstone	4694 ft.
Pacoota Sandstone	4904 ft.
Total depth	5835 ft.

# TIME/DEPTH GRAPH EAST MEREENIE No 10



2.2 Rig Data.

Drilling contractor: Mereenie Joint Venture Partners.

Drilling plant: Make: O.I.M.E.  
Type: Model SL-5 (SL-750)  
Rated Capacity: 12,500 ft. with 4-1/2" O.D. drill pipe.  
Motors: 3 - Caterpillar D-3408 (compounded) 385 B.H.P. each.

Mast - Make: Parco Model P-131  
Type: Cantilever  
Rated capacity: 550,000 lbs. (10 lines).

Pumps - Make: 2 - Continental Emsco Triplex.  
Type: F-800 - V-belt driven from compound.  
Size: 6-3/4" x 9"

Rotary table - Make: IDECO LR-275 (27-1/2")  
Capacity: 570 tons dead load.

Blowout preventors - Make: Cameron Cameron  
Model: "U" Double Gate "D" Annular  
Size: 13-5/8" 13-5/8"  
Rating (PSI) 5000 5000

Choke manifold - Make: McEvoy  
Size & type: 3" - 5000 PSI W.P. choke and kill with one positive and one adjustable choke and Cameron 3" - 5000 H.C.R. flanged valve.

Mud tanks - Size & Capacity: 3 tank system - returns, settling and suction - Total capacity: 777 barrels.

Shale shaker - Make: Brandt.  
Type: Single dual screen

Mud mixers - Make: 4-Brandt heavy duty.  
Type: 32" blade - electrically driven.



2.3 Drilling Data.

2.3.1 Drilling Record.

WELL: ..East.Mereenie.No.10. FIELD: ...Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.
9/10/82	51	Completed rig-up Mereenie O.I.M.E. SL-750 Rig No.1 Drill rat hole. Spudded 17-1/2" bit at 2000 hrs. Drilled 17-1/2" hole to 51 ft. Air drilling.
10/10/82	84	Drilled 17-1/2" hole to 84 ft.
11/10/82	198	Drilled 17-1/2" hole to 175 ft. Ran and cemented 15" conductor pipe with 100 sacks "A" cement and 2% CaCl <sub>2</sub> .  Connected and nipped-up blooey line. Drilled mouse hole. Continued drilling with 13-3/4" hole to 198 feet.
12/10/82	469	Drilled 13-3/4" hole to 469 ft. Survey at 381 ft. = 0°. Well making 400 bbls/hr.
13/10/82	689	Drilled 13-3/4" hole to 689 ft. Survey at 680' = 1/8°.
14/10/82	898	Drilled 13-3/4" hole to 898 ft. Well making approx. 400 bbls/hr.
15/10/82	1140	Drilled 13-3/4" hole to 1140 ft. Air booster connected. Survey at 980' = 1°.
16/10/82	1327	Drilled 13-3/4" hole to 1327 ft. Survey at 1293' = 1°.
17/10/82	1504	Drilled 13-3/4" hole to 1504 ft. Well making approximately 400 bbl/hr.
18/10/82	1578	Drilled 13-3/4" hole to 1578 ft. Survey at 1578' = 1/2°. Drilled into lost circulation zone - no returns from 1577 ft.
19/10/82	1737	Drilled 13-3/4" hole to 1737 ft. Blind - no returns to 1673 ft. Returns only from 1673 to 1737 ft.

WELL: East Mereenie No.10.

FIELD: ...Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.
20/10/82	1895	Drilled 13-3/4" hole to 1895 ft. blind. Survey at 1853' = 1/2°.
21/10/82	2012	Drilled 13-3/4" hole to 2012 ft. Blind to 1960 ft. Returns 1960 to 2012 ft.
22/10/82	2111	Drilled 13-3/4" hole to 2111 ft. blind. Survey at 2030' = 3/4°. Ream from 1965 to 2052 ft.
23/10/82	2195	Drilled 13-3/4" hole to 2195 ft. Drill to 2180 ft. blind.
24/10/82	2235	Drilled 13-3/4" hole to 2235 ft. No returns 2210 to 2240 ft.
25/10/82	2279	Drilled 13-3/4" hole to 2279 ft. Survey at 2270 = 1/2°. Repair on air booster. Drilling blind except 2240 to 2270 ft.
26/10/82	2313	Drilled 13-3/4" hole to 2313 ft. Drilling blind. Ream 1450 to 2291 ft. undergauge.
27/10/82	2385	Drilled 13-3/4" hole to 2385 ft. Returns from 2370 to 2385 ft.
28/10/82	2473	Drilled 13-3/4" hole to 2473 ft. No returns 2430 to 2465 ft. Injector changed in air booster.
29/10/82	2541	Drilled 13-3/4" hole to 2541 ft. Survey 2541' = 1/2°.
30/10/82	2675	Drilled 13-3/4" hole to 2675 ft. Ream 2460 to 2541 ft. undergauge.
31/10/82	2873	Drilled 13-3/4" hole to 2873 ft. Survey at 2833' = 1/2°.
1/11/82	3032	Drilled 13-3/4" hole to 3032 ft. Lost circulation 2895 to 3032 ft.
2/11/82	3168	Drilled 13-3/4" hole to 3168 ft. blind. Returns only from 3035 to 3065 ft. Survey 3148' = 1-1/2°. Ream 2950 to 3085 ft. undergauge hole.
3/11/82	3168	Ran 10-3/4" casing - 81 joints 40.5#, R.3 H40 to 3163 ft. Cemented with 300 sacks Class "A" construction cement at 15.4 slurry with 3% HR-4 Howco Retarder. Displaced with 308 bbls water. Plug-down at 1330 hrs. Nipple-up BOPs.

WELL: ..East Mereenie No.10..

FIELD: .....Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.
4/11/82	3171	Nipple-up BOP, pressure test blind rams, HCR valve and choke manifold valves, also choke line, pipe rams, Hydril all to 1000 psi. Cement top tagged at 3110 feet. Drill out plug. Circulate, clean out hole and commence drilling.  Drilled 7-7/8" hole to 3171 feet.
5/11/82	3985	Drilled 7-7/8" hole to 3985 ft. Survey at 3828' = 2-1/2°. Survey at 3521' = 2-1/2°.
6/11/82	4431	Drilled 7-7/8" hole to 4431 ft. Survey at 4121' = 2-1/2°. Ream 4024 to 4050 ft. undergauge hole.
7/11/82	4543	Drilled 7-7/8" hole to 4543 ft. Survey at 4447' = 2-1/2°. Changed over from air drilling to oil based mud drilling. Oil based mud composed of 320 bbls of old mud (with high water content), 200 bbls of crude oil with 4 drums EZMUL, 40 x 25 kg sacks of lime and 240 x 25 kg rocks of CaCl <sub>2</sub> to increase salinity of water to 300,000 ppm. Mud weight at 8.9 ppg. Oil/water ratio 67/33. Total circulating volume = 477 bbls (357 in hole and 120 in pits).
8/11/82	4652	Drilled 7-7/8" hole to 4652 ft. Ream 4530 to 4580 ft. undergauge hole.
9/11/82	4714	Drilled 7-7/8" hole to 4714 feet. Survey at 4691 feet = 6-1/4°.
10/11/82	4729	Drilled 7-7/8" hole to 4729 ft. Made open hole formation test D.S.T. No.1 over Lower Stairway Sandstone interval 4630 to 4714 ft. Opened tool for 10 mins. with immediate strong blow to surface with gas to surface after 4 mins. Shut-in tool for 34 mins. Open tool for 90 mins. Gas and condensate to surface. Final shut-in period 131 mins. Stabilized gas pressure at 67 psi through 1-1/4" orifice in flow prover at 19°C. Calculated gas flow of 3.02 MMcfd. Liquid hydrocarbons recovered from drill pipe estimated at 6.5 bbls/90 mins. or 100 bbls/day. Top liquid hydrocarbons sample in drill pipe 55.6 API at 60°F.



Well: East Mereenie No. 10.....

Field: Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.							
<u>FIELD CHART READINGS D.S.T. NO. 1</u>									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><u>IHP</u></th> <th style="text-align: center;"><u>IFP</u></th> <th style="text-align: center;"><u>ISIP</u></th> <th style="text-align: center;"><u>FFP</u></th> <th style="text-align: center;"><u>FSIP</u></th> <th style="text-align: center;"><u>FHP</u></th> <th style="text-align: center;"><u>BHT °F</u></th> </tr> </thead> </table>			<u>IHP</u>	<u>IFP</u>	<u>ISIP</u>	<u>FFP</u>	<u>FSIP</u>	<u>FHP</u>	<u>BHT °F</u>
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="text-align: center;">2211</td> <td style="text-align: center;">491</td> <td style="text-align: center;">2108</td> <td style="text-align: center;">699</td> <td style="text-align: center;">2108</td> <td style="text-align: center;">2229</td> <td style="text-align: center;">130</td> </tr> </tbody> </table>			2211	491	2108	699	2108	2229	130
2211	491	2108	699	2108	2229	130			
11/11/82	4855	Drilled 7-7/8" hole to 4855 ft. Survey at 4810' = 5°.							
12/11/82	4920	Drilled 7-7/8" hole to 4920 ft. BOP drill held on trip. Reset crown stopper. Function BOP rams. Nipple-down circulating head and blooey line and nipple-up flow nipple and flow line. Survey 4905' = 4-1/2°.							
13/11/82	4996	Drilled 7-7/8" hole to 4983 ft. worked junk sub, trip run-in with core barrel, cut Core No. 1 from 4983 to 4996 ft.							
14/11/82	5005	Continued to cut core to 5005 ft. Core recovered 22' = 100%. Made open hole formation test over Pacoota (P1) Sandstone target. D.S.T. No. 2 interval 4966 to 5005 ft. Opened tool for 5 mins immediate bubble increasing in strength. Shut-in tool for 30 mins, reopened tool for 90 mins. Weak bubble gradually increasing then weakened to zero. No gas to surface, no flow to surface. Recovery 11.7 bbls of drilling mud and water. Collected 300 mls water from between DCIP and hydrospring which when tested gave approx. 30,000 ppm chloride or 55,000 ppm NaCl.							
<u>FIELD CHART READINGS D.S.T. NO. 2</u>									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><u>IHP</u></th> <th style="text-align: center;"><u>IFP</u></th> <th style="text-align: center;"><u>ISIP</u></th> <th style="text-align: center;"><u>FFP</u></th> <th style="text-align: center;"><u>FSIP</u></th> <th style="text-align: center;"><u>FHP</u></th> <th style="text-align: center;"><u>BHT °F</u></th> </tr> </thead> </table>			<u>IHP</u>	<u>IFP</u>	<u>ISIP</u>	<u>FFP</u>	<u>FSIP</u>	<u>FHP</u>	<u>BHT °F</u>
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="text-align: center;">2564</td> <td style="text-align: center;">105</td> <td style="text-align: center;">1803</td> <td style="text-align: center;">140</td> <td style="text-align: center;">180</td> <td style="text-align: center;">2564</td> <td style="text-align: center;">-</td> </tr> </tbody> </table>			2564	105	1803	140	180	2564	-
2564	105	1803	140	180	2564	-			
15/11/82	5058	Drilled 7-7/8" hole to 5058 ft. Ream 4983 to 5005 ft from 7-27/32" core diameter to 7-7/8".							

Well: ..East.Mereenie.No.10.....

Field: ..Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.														
16/11/82	5080	<p>Drilled 7-7/8" hole to 5080 ft. Made open hole straddle test. D.S.T. No.3 interval 4900 to 4925 ft. over limestone interval at the top of the Pacoota (P1) Sandstone for possible permeable zone. Opened tool for 10 mins. - no bubble observed, closed in 32 mins., reopened 60 mins., no bubble, gas or liquids to surface. Closed in 60 mins. Mud sample collected between DCIP and hydrospring when tested equated to oil based mud in use.</p> <p style="text-align: center;"><u>FIELD CHART READINGS D.S.T. NO.3</u></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><u>IHP</u></th> <th style="text-align: center;"><u>IFP</u></th> <th style="text-align: center;"><u>ISIP</u></th> <th style="text-align: center;"><u>FFP</u></th> <th style="text-align: center;"><u>FSIP</u></th> <th style="text-align: center;"><u>FHP</u></th> <th style="text-align: center;"><u>BHT</u> °F</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2486</td> <td style="text-align: center;">3</td> <td style="text-align: center;">3</td> <td style="text-align: center;">3</td> <td style="text-align: center;">3</td> <td style="text-align: center;">2451</td> <td style="text-align: center;">136</td> </tr> </tbody> </table>	<u>IHP</u>	<u>IFP</u>	<u>ISIP</u>	<u>FFP</u>	<u>FSIP</u>	<u>FHP</u>	<u>BHT</u> °F	2486	3	3	3	3	2451	136
<u>IHP</u>	<u>IFP</u>	<u>ISIP</u>	<u>FFP</u>	<u>FSIP</u>	<u>FHP</u>	<u>BHT</u> °F										
2486	3	3	3	3	2451	136										
17/11/82	5153	Drilled 7-7/8" hole to 5153 feet. Survey at 5095' = 2-1/2°.														
18/11/82	5191	Drilled 7-7/8" hole to 5191 feet. Ream 5114 to 5164 feet.														
19/11/82	5253	Drilled 7-7/8" hole to 5253 feet.														
20/11/82	5306	Drilled 7-7/8" hole to 5306 feet.														
21/11/82	5382	Drilled 7-7/8" hole to 5382 feet. Oil/water 84:16.														
22/11/82	5447	Drilled 7-7/8" hole to 5447 feet.														
23/11/82	5501	Oil/water ratio 84:16. Drill 7-7/8" hole to 5501 feet.														
24/11/82	5583	Drill 7-7/8" hole to 5583 feet. Mud weight 9.4 ppg, viscosity 46.														
25/11/82	5601	Drill 7-7/8" hole to 5585 feet. Run survey - 3-3/4°. Cut Core No.2 to 5601 feet. Mud weight 9.4 ppg, viscosity 43.														
26/11/82	5630	Cut Core No.2 to 5616 feet. P.O.H. core recovery 100% (31 ft.). Ream rat hole. Drill 7-7/8" hole to 5630 feet. Mud weight 9.3 ppg, viscosity 44 secs.														

Well: ..East Mereenie No.10.....

Field: ..Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.
27/11/82	5690	Drill 7-7/8" hole to 5690 feet.
28/11/82	5750	Drill 7-7/8" hole to 5703 feet. Drill 7-7/8" hole to 5750 feet.
29/11/82	5830	Drill 7-7/8" hole to 5830 feet.
30/11/82	5835	Drill 7-7/8" hole to 5835 feet. Strap out. Log with Gearhart. Lay down drill pipe.
1/12/82	5835	Run 128 joints of 5-1/2", J55 14 lb./ ft. buttress thread casing with shoe at 5050 feet and float collar at 5009 feet.  Cement casing with 300 sacks of Class A cement treated with 0.75% Halad 22A and 0.5% CFR2 in a 15.2 ppg slurry dis- placed with 122 bbls. of mud. Bumped plug with 950 psi. Plug held OK.
2/12/82		Tag cement plug at 5005 feet. Run Gearhart cement bond log and casing collar locator log.
3/12/82		Perforate interval 4618 to 4682 feet with Gearhart casing gun, 2 shots per foot.  Run Guiberson Model VI unipacker on 144 joints of 2-3/8", J55, 4.7 lbs./ft. EUE tubing. Hanging weight in 9.4 ppg mud is 37,000 lbs. Tubing set in tension at 4577 feet with 50,000 lb. total strain. Nippled up wellhead.
		Rig released 2230 hrs.

2.3.2 Hole Sizes and Depths.

17-1/2" to 175 feet

13-3/4" to 3168 feet

7-7/8" to 5835 feet

2.3.3 Casing and Cementing Details.

15" casing:	Weight:	1/4" wall
	Grade:	not specified
	Shoe depth:	170 feet
	Cement used:	100 sacks

10-3/4" casing:	Weight:	40.5 lbs/ft.
	Grade:	J55
	Shoe depth:	3163 feet
	Cement used:	300 sacks

5-1/2" casing:	Weight:	14 lbs/ft.
	Grade:	J55
	Shoe depth:	5050 feet
	Cement used:	300 sacks.



### 2.3.5 Drilling Fluid

The 17-1/2" hole was drilled with air and air foam to 175 feet at which depth 15" casing was run.

The 13-3/4" hole was drilled with air foam from the 15" casing shoe to the 10-3/4" casing point at 3148 feet. Major water influx occurred from 400 ft in the Parke Siltstone. From 1578 feet to 3148 feet drilling continued with frequent periods of lost circulation.

The 7-7/8" hole was drilled from the 10-3/4" casing shoe to 4447 feet with air foam. At this point the hole was displaced with an oil based mud system and this system was used to drill the 7-7/8" hole to total depth at 5835 feet.

The daily drilling fluid properties are listed in Table 1.







2.3.6 Formation Sampling.

(i) Ditch cuttings -

Samples were taken at intervals of 30 feet from below the 15" casing shoe at 170 feet to 4460 feet in the Middle Stairway Sandstone. From this depth samples were taken at intervals of 10 feet to total depth at 5835 feet. When drilling with mud two splits of the sample were bagged and untreated and three splits then made of the washed and dried samples. Where air or mist drilling provided only cuttings powder this was split five ways. The samples were distributed as follows :-

Oilmin:	1 set washed and dried	} mud drilling
	1 set untreated	
	2 sets of powder - air/mist drilling	
Magellan:	1 set washed and dried - mud drilling	
	1 set powder - air/mist drilling	
NT. Dept. of Mines:	1 set washed and dried	} mud drilling
	1 set untreated	
	2 sets of powder - air/mist drilling	

Sample descriptions are given in Appendix 1.

(ii) Coring -

A total of 53.5 feet of core was cut in two coring runs with 100% total recovery -

Core	Interval (driller) (ft.)	Interval (corrected) (ft.)	Rec. (ft.)	Rec. (%)	Bit Type
1	4983-5005	4987-5009	22	100	Chris MC201
2	5585-5616.5	same	31.5	100	Chris MC201

Full descriptions of the cores are included in Appendix 2.

(iii) Sidewall sampling -

No sidewall samples were taken.

2.3.7 Logging and Surveys.

(i) Electric logging -

The following logs were run using a Gearhart DDL logging unit.

2.3.6 Formation Sampling.

(i) Ditch cuttings -

Samples were taken at intervals of 30 feet from below the 15" casing shoe at 170 feet to 4460 feet in the Middle Stairway Sandstone. From this depth samples were taken at intervals of 10 feet to total depth at 5835 feet. When drilling with mud two splits of the sample were bagged and untreated and three splits then made of the washed and dried samples. Where air or mist drilling provided only cuttings powder this was split five ways. The samples were distributed as follows :-

Oilmin:	1 set washed and dried	} mud drilling
	1 set untreated	
	2 sets of powder - air/mist drilling	
Magellan:	1 set washed and dried - mud drilling	
	1 set powder - air/mist drilling	
NT. Dept. of Mines:	1 set washed and dried	} mud drilling
	1 set untreated	
	2 sets of powder - air/mist drilling	

Sample descriptions are given in Appendix 1.

(ii) Coring -

A total of 53.5 feet of core was cut in two coring runs with 100% total recovery -

Core	Interval (driller) (ft.)	Interval (corrected) (ft.)	Rec. (ft.)	Rec. (%)	Bit Type
1	4983-5005	4987-5009	22	100	Chris MC201
2	5585-5616.5	same	31.5	100	Chris MC201

Full descriptions of the cores are included in Appendix 2.

(iii) Sidewall sampling -

No sidewall samples were taken.

2.3.7 Logging and Surveys.

(i) Electric logging -

The following logs were run using a Gearhart DDL logging unit.

<u>Log</u>	<u>Run</u>	<u>Interval</u> (ft.)	<u>Date</u>
CDL-CAL	1	4400-5832	30/11/82
GR	1	0-5832	30/11/82
DIL-GR-CAL	1	4400-5832	30/11/82

Prints of all wireline logs are included as Enclosure 3.

(ii) Velocity survey -

No velocity survey was run.

(iii) Penetration rate and gas logs -

The penetration rate was recorded continuously from spud to total depth. The mud gas was monitored continuously on a conventional hotwire detector during the mud drilling phase.

A mud log showing penetration rate, gas, lithological and other pertinent data was prepared at the wellsite on a daily basis and is included as Enclosure 2.

A composite log is also included as Enclosure 1.

(iv) Deviation surveys -

Deviation surveys are shown in 2.3.4 (Bit and Deviation Records).

(v) Temperature surveys -

Temperature surveys were not done, however, the following temperatures were recorded -

136°F at 5835 feet (Gearhart)

130°F at 4714 feet (Halliburton)

136°F at 4925 feet (Halliburton)

2.3.8 Formation Testing.

Drill stem testing -

D.S.T. No.1	Interval:	4629.7 to 4714 feet
	Method:	Conventional dual bottom hole.
	Tester:	Halliburton
	Results:	Gas flowed at 3.02 MMcfd. Recovered 6.5 bbl (440 ft.) of liquid hydrocarbons in drill string.
D.S.T. No.2	Interval:	4965.9 to 5005 feet
	Method:	Conventional dual bottom hole.
	Tester:	Halliburton
	Results:	Recovered 300 ml of saline water (255,000 ppm total salts) from between DCIP and hydrospring.
D.S.T. No.3	Interval:	4900.31 to 4925.45 feet
	Method:	Straddle
	Tester:	Halliburton
	Results:	Recovered oil cut mud from between DCIP and hydrospring.

Full details of these tests are included in Appendix 4.

Details of fluid samples collected while testing are available in Appendix 5.

2.3.9 Well Completion Data.

128 joints of 5-1/2", J55, 140 lbs/ft. casing was run with the shoe at 5050 feet and the float collar at 5009 feet. The casing was perforated by Gearhart with a 4" casing gun over the interval 4618 feet to 4682 feet (Lower Stairway Sandstone) with two shots per foot. After perforating the 5-1/2" casing a Guiberson Model VI Unipacker was run on 144 joints of 2-3/8", J55, 4.7 lbs/ft. EUE tubing. The completion assembly was set in tension at 4577 feet with 50,000 lbs. total strain.

A 2000 psi working pressure McEvoy Christmas Tree was installed and the well shut-in with 9.4 ppg oil based mud in the hole.

3. GEOLOGY

3. GEOLOGY:

3.1 Previous Work.

East Mereenie No.10 is the sixth appraisal well of the new drilling programme started in January, 1982. Previous drilling of the Mereenie Anticline had established an oil and gas accumulation in the Pacoota Sandstone with the best reservoir potential located in the Pacoota P1 and Pacoota P3 units. Small amounts of high pressure gas had been experienced in the Stairway Sandstone, however, the reservoirs had poor permeability.

East Mereenie No.6 discovered a new oil pool in the Pacoota P1 unit. Further drilling to the west and updip from this well (East Mereenie Nos. 8 and 9) showed that the oil accumulation extended updip to a gas/oil contact at -2130 feet MSL.

Well data also showed that, in the eastern end of the field, the amount of permeable reservoir in the Pacoota P1 unit was limited to one sandstone horizon, towards the top of the unit, averaging 5 feet in thickness.

Data from East Mereenie No.9 showed that the good reservoir potential of the P3 sandstone extended eastwards to that point and also that the P3 oil/water contact was above -2630 feet MSL.

3.2 Stratigraphy.

East Mereenie No.10 was spudded in the Parke Siltstone and at total depth, 5835 feet, was 86 feet into the Pacoota Sandstone P4 unit. For a list of formation tops and thicknesses see Table 2.

A detailed description of the lithology is appended (Appendices 1 and 2) and is graphically shown and briefly described on the Composite Well Log and Mud Log (Enclosures 1 and 2).

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TABLE 2.

EAST MEREENIE NO.10 STRATIGRAPHIC TABLE

AGE	FORMATION	DEPTH (feet)		THICKNESS (ft.)
		KB (ft.)	MSL (ft.)	
DEVONIAN	PARKE SILTSTONE	Surface	+2271	935+
	MEREENIE SANDSTONE	955	+1336	1663
UPPER SILURIAN				
UPPER ORDOVICIAN	CARMICHAEL SANDSTONE	2618	- 327	238
MIDDLE ORDOVICIAN	STOKES SILTSTONE	2856	- 565	1049
	Upper Stokes Siltstone	2856	- 565	815
	Lower Stokes Siltstone	3671	-1380	234
	STAIRWAY SANDSTONE	3905	-1614	789
	Upper Stairway Sandstone	3905	-1614	189
	Middle Stairway Sandstone	4094	-1803	389
	Lower Stairway Sandstone	4483	-2192	211
LOWER ORDOVICIAN	HORN VALLEY SILTSTONE	4694	-2403	210
	PACOOKA SANDSTONE	4904	-2613	931+
	P1 unit	4904	-2613	346
	P2 unit	5250	-2959	221
	P3 unit	5471	-3180	278
	P4 unit	5749	-3458	86+
UPPER CAMBRIAN	GOYDER FORMATION		-	-
	TOTAL DEPTH	Drillers Depth 5835 Loggers Depth 5833	-3544 -3542	

Parke Siltstone (Pertnajara Group)

Depth: Surface to 955 feet  
Thickness: 935 feet  
Age: Upper Devonian  
Lithology:

The formation is dominantly brown, partly arenaceous siltstone, with minor fine to medium grained, white sandstones and grey-green calcareous siltstone. Between 540 and 680 feet sandstones comprise up to 40% of the section. Elsewhere they form thin laminae within the dominantly siltstone lithology. Between 400 and 450 feet and 880 and 915 feet calcareous siltstones are common.

Bedding is thin with most units under 5 feet thick. The base of the Parke Siltstone is marked by a distinct drilling break from 15 to 30 ft./hr. coinciding with the top of the first sandstone of the Mereenie Formation.

Mereenie Sandstone.

Depth: 955 to 2618 feet  
Thickness: 1663 feet  
Age: Devonian/Silurian  
Lithology:

During the drilling of the Mereenie Sandstone in this well a lost circulation zone was encountered at 1577 feet. After this depth returns to surface were only intermittent and the samples collected severely contaminated.

When the gamma log for East Merenie No.6 is compared to that of East Merenie No.10 a significant difference is readily apparent. Good correlation occurs to the top of the Mereenie Sandstone at 955 feet and downwards from 2470 feet, but the section between these two correlation points is quite different.

Although the gamma trace is different the thickness of the abovementioned section is almost exactly the same. Furthermore, the drilling rate curves from both wells match. Thus, it is concluded that the stratigraphy of the section has not changed from East Merenie No.6 and that the gamma ray log has been influenced by post-depositional factors.

One difference between the two wells is the presence of one or more lost circulation zones in the Mereenie Sandstone in East Merenie No.10 whereas none are apparent in East Merenie No.6. The difference in the gamma logs may arise from the presence of fractures in East Merenie No.10 in which high gamma material has accumulated from circulating ground water and/or by the drilling process itself.

The stratigraphy of the Mereenie Sandstone is the same as in East Mereenie No.6 and the reader is referred to that report for the appropriate description.

Carmichael Sandstone (Larapinta Group)

Depth: 2618 to 2856 feet  
Thickness: 238 feet  
Age: Upper Ordovician  
Lithology:

This section consists of red-brown to off white, fine to medium grained, subrounded to subangular, silty and micaceous sandstone. The lithologies become more argillaceous towards the base of the formation where minor red-brown siltstones are present.

A similar section is present in East Mereenie No.6.

Stokes Siltstone (Larapinta Group).

Depth: 2856 to 3905 feet  
Thickness: 1049 feet  
Age: Middle Ordovician  
Lithology:

The Stokes Siltstone can be divided into two units. Both units correlate well with similar units in East Mereenie No.6.

2856 to 3671 feet (Upper Stokes Siltstone)

This interval consists of red-brown shales grading to brown siltstones with minor green siliceous shales and green-white dolomitic horizons.

3671 to 3905 feet (Lower Stokes Siltstone).

The overall red colouration of the Upper Stokes Siltstone is replaced by grey-green and the lithology is dominantly green shaley dolomite interbedded with green dolomitic shales.

Stairway Sandstone (Larapinta Group)

Depth: 3905 to 4694 feet  
Thickness: 789 feet  
Age: Middle Ordovician  
Lithology:

The Stairway Sandstone is divided into three litho-stratigraphic units. All these units are unchanged in the surrounding wells.

3905 to 4094 feet (Upper Stairway Sandstone)

The upper 90 feet of this unit consists of interbedded dolomitic siltstones and shales with minor interbeds of fine grained sandstone. The base of the unit consists of a 97 ft. white, fine grained, quartzose sandstone unit with minor siltstone and shale horizons.

4094 to 4483 feet (Middle Stairway Sandstone)

Grey to dark grey, micro micaceous siltstones and fine grained sandstones are the lithologies present in this unit. The sandstones become more abundant towards the base.

4483 to 4694 feet (Lower Stairway Sandstone)

This unit is dominantly arenaceous. An upper and lower section of sandstone is separated by a grey siltstone and minor grey-white sandstone section. The upper sandstone unit is some 70 feet thick and consists of white to grey, fine grained, micaceous, poor porosity, quartzose sandstone with minor horizons of medium to coarse grained sandstone between 4500 to 4510 feet. The lower sandstone unit is 97 feet thick and is dominantly a white, clear, medium to coarse grained quartzose sandstone.

Horn Valley Siltstone (Larapinta Group)

Depth: 4694 to 4904 feet  
Thickness: 210 feet  
Age: Lower Ordovician  
Lithology:

The Horn Valley Siltstone is dominantly argillaceous and consists of interbedded light to dark grey, pyritic and calcareous shales and grey, micaceous and calcareous siltstones. Interbeds of micaceous and argillaceous limestone are common between 4800 to 4870 feet. This is identical to the Horn Valley Siltstone intersected in the surrounding wells.

Pacoota Sandstone (Larapinta Group)

Depth: 4904 to 5835 feet

Thickness: 931+ feet

Age: Lower Ordovician

Lithology:

As in the surrounding wells the Pacoota Sandstone is divided into four units, the P1, P2, P3 and P4.

4904 to 5250 feet (Pacoota P1 unit).

As in the surrounding wells this dominantly arenaceous unit consists of bioturbated and churned mixtures of sandstone and siltstone interbedded with clean, dominantly fine grained, siliceous sandstone.

All the significant sandstone units except one are recognizable in the surrounding wells: East Mereenie Nos, 6, 8 and 9. The exception mentioned above is the sandstone unit between 4950 and 4960 feet in East Mereenie No.6 which does not extend eastwards as far as the East Mereenie No.10 location.

The upper 65 feet of the Pacoota Sandstone is glauconitic and correlates with a similar glauconite zone in other wells drilled so far.

5250 to 5471 feet (Pacoota P2 unit).

Although the P2 unit is more argillaceous than the P1, it is still dominantly arenaceous. The mixed nature of the cuttings and a similar electric log motif to the silty churned sections of the P1 suggest that except for minor sandstone and rare shale horizons, much of the P2 may be churned and bioturbated. The second, or base Pacoota P2, glauconite zone is present in this well in the lowermost 60 feet of the P2 from 5410 to 5472 feet.

5471 to 5749 feet (Pacoota P3 unit).

The P3 unit is dominantly arenaceous with rare thin shale horizons. There are three separate dominantly arenaceous sections which are recognised in the surrounding wells. These sandstone sections are separated by intervals of thinly interbedded, fine and very fine grained sandstones, and minor siltstones and shales.

The upper sandstone unit from 4592 to 5531 feet is a white, fine to coarse grained, quartzose sandstone with fine siltstone laminae. The majority of the sandstone is tightly cemented with silica.

The medial sandstone unit from 5584 to 5626 feet is dominantly red and white, fine to medium grained, cross-stratified, quartzose sandstone with rare silty, argillaceous and micaceous laminae. One core was cut from 5585 to 5616.6 feet in the middle P3 sandstone section.

In the basal sandstone section from 5688 to 5732 feet the sandstones are finer grained and the section slightly more argillaceous. Fine, sometimes medium grained, quartzose and quartzose argillaceous sandstone are finely interbedded with thin siltstone and shale laminae.

5749 to 5835 feet (Pacoota P4 unit).

Only the top 86 feet of this unit was penetrated. A colour change from red to dominantly white and a grain size change from dominantly fine grained to medium and coarse grained sandstone marks the top of the Pacoota P4 unit. The electric logs and cuttings show that the top 30 feet of the unit is quartzitic with very poor porosity due to silica cementation. This is typical of the P4 unit in surrounding wells. Minor amounts of siderite show as pink spots in the sandstone throughout the section drilled.

### 3.3 Petroleum Geology.

Although good porosity is evident in some sandstones of the Mereenie Formation only those formations below the Stokes Siltstone contain evidence of hydrocarbons. Of these only the Upper and Lower Stairway Sandstone and the Pacoota Sandstone have reservoir potential.

#### Upper Stairway Sandstone (3905 to 4094 feet)

This arenaceous unit has poor porosity and permeability which is consistent with information obtained from previous wells drilled in this area. The only indication of the presence of hydrocarbons was a slight hydrocarbon stain and weak cut between 4010 and 4040 feet. No gas was noticed on connections whilst drilling with air foam.

#### Lower Stairway Sandstone (4483 to 4694 feet)

As in other wells the Lower Stairway Sandstone consists of upper and lower sandstone sections separated by a silty unit.

Neither of the upper two sections showed either reservoir potential or hydrocarbons. As in the Upper Stairway Sandstone the primary porosity of the sandstones has been greatly reduced by silica cementation.

The lower sandstone section is coarser grained and thin zones of porosity are evident from cuttings and the electric logs. The most significant zone is between 4634 to 4639 feet where the density log indicates a maximum porosity of 8%. The interval 4630 to 4714 feet was drill stem tested and produced a gas flow of 3.02 MMcfd and 6-1/2 barrels of liquid hydrocarbons (54.4 API at 15.6°C) were recovered from the drill pipe on reverse circulation. The G.O.R. is high at 32,127 cu. ft./bbl. and drill stem test shut-in pressures indicate that the formation is normally pressured. Thus, the lower sandstone section of the Lower Stairway Sandstone contains gaseous and minor liquid hydrocarbons in at least one thin reservoir horizon at normal formation pressures.

#### Pacoota Sandstone (P1 unit, 4904 to 5250 feet)

The P1 unit was the target horizon in this well. As in the adjacent wells porosity and permeability was poor throughout except for a sandstone horizon in the upper part of the P1 between 4986 to 4993 feet. This sand is recognisable on electric log character and lithology in the nearby wells, East Mereenie No.6, East Mereenie No.8 and East Mereenie No.9 and flowed oil and gas to surface in East Mereenie No.6 and East Mereenie No.8.

The interval was cored in Core No.1 (4983 to 5005 feet), and the core analysis results show the sandstone has an average porosity of 14 to 15% and good permeabilities (maximum 235 millidarcies). Drill stem test No.2 tested the cored interval and recovered 4.7 bbls of mixed water and mud and 300 ml of saltwater on back circulation. Subsequent analysis showed the water to contain 255,000 ppm total salts.

The density log shows two further thin zones of porosity are present at 4950 feet and 4960 feet and have average density log porosities of approximately 8%. Both these sandstones are present in East Mereenie Nos. 6 and 8 where they have similar porosity values but poor permeability. The permeability of the two zones at 4950 feet and 4960 feet is therefore expected to be poor, but it must be noted that the zones were neither cored nor tested. Electric logs indicate that the sandstones are oil bearing.

As the porous and permeable sandstone at 4986 feet contains water and the sandstone at 4960 feet contains oil, the oil/water contact in East Mereenie No.10 is estimated to occur at 4971 feet (-2680 feet MSL), 67 feet below the top of the P1 unit.

Pacoota Sandstone (P2 unit, 5250 to 5472 feet)

There are no significant reservoirs nor hydrocarbon indications in this unit.

Pacoota Sandstone (P3 unit, 5472 to 5749 feet)

The Pacoota P3 unit contains several prospective reservoir intervals readily apparent on the density log. These intervals are -

- |    |                   |                       |     |
|----|-------------------|-----------------------|-----|
| 1. | 5566 to 5570 feet | Average log porosity: | 7%  |
| 2. | 5599 to 5604 feet | Average log porosity: | 10% |
| 3. | 5608 to 5622 feet | Average log porosity: | 10% |
| 4. | 5634 to 5636 feet | Average log porosity: | 10% |
| 5. | 5694 to 5703 feet | Average log porosity: | 11% |
| 6. | 5712 to 5734 feet | Average log porosity: | 11% |

Examination of Core No.2 (5585 to 5616.5 feet) indicated that only traces of hydrocarbons were present in the cored reservoir and that permeability was poor. This was confirmed by core analysis where the measured oil saturation was a maximum of 22% and the permeability a maximum of 7 millidarcies. Electric logs also indicate that this interval and the others listed above are water saturated.

In East Mereenie No.10 the Pacoota P3 has good reservoir potential, however, the unit is water bearing.



### 3.4 Relevance to Appraisal Programme.

East Mereenie No.10 was drilled to test the easterly and downdip extent of the P1 oil pool discovered in East Mereenie No.6 and confirmed in East Mereenie No.8. It was also drilled to obtain information on the oil/water contacts of the P1 and P3 oil pools.

The well intersected the primary target horizon approximately 130 feet downdip from East Mereenie No.6 and the horizon is permeable and water bearing. The oil/water contact is estimated to occur at 4971 feet (-2680 feet MSL), just above the target horizon and 67 feet below the top of the Pacoota P1 unit. Thus the downdip limit of the P1 oil pool has been established. As East Mereenie No.9 fixed the updip limit of this accumulation the oil pool limits are estimated as -

Gas/oil contact:	-2130 feet
Oil/water contact:	-2680 feet
Total oil column:	530 feet

The results of this well have confirmed the reservoir potential of the P3 unit and also confirmed that the P3 unit oil/water contact, estimated at -2450 feet MSL is valid for the eastern end of the field.

The minor shows of oil in Core No.2 taken in the P3 unit most probably represent residual oil.

East Mereenie No.10 is the first well in which significant amounts of liquid hydrocarbons have been recovered from the Lower Stairway Sandstone. Also this is the first time normal formation pressures have been recorded in this interval. The presence of these reservoir parameters at the location of this well is in part due to the structural position of the Stairway Sandstone, the lowest tested at Mereenie to date.