

WELL COMPLETION REPORT

EAST MEREENIE NO. 6.

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

November, 1982. 10/8

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1. SUMMARY

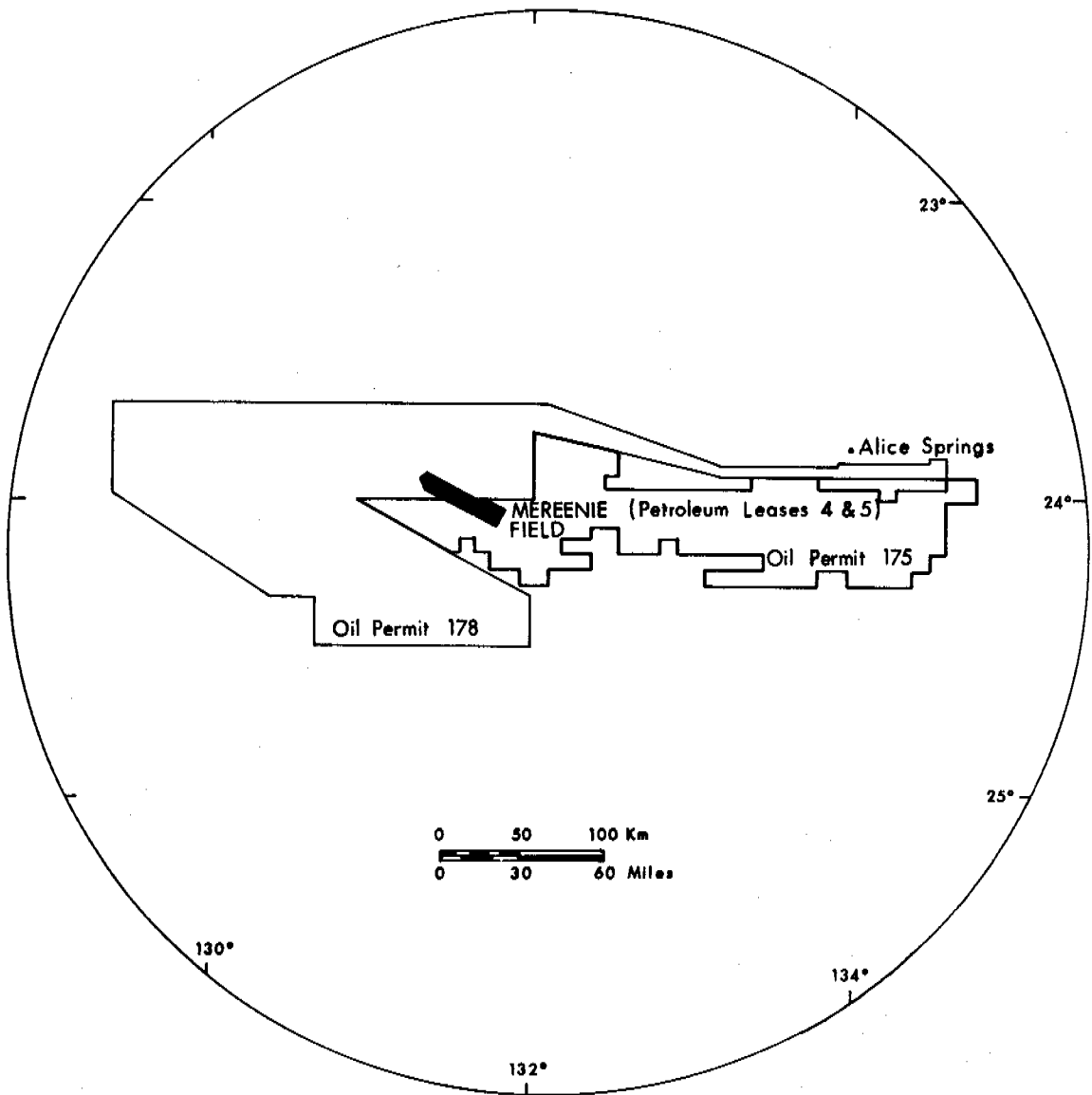
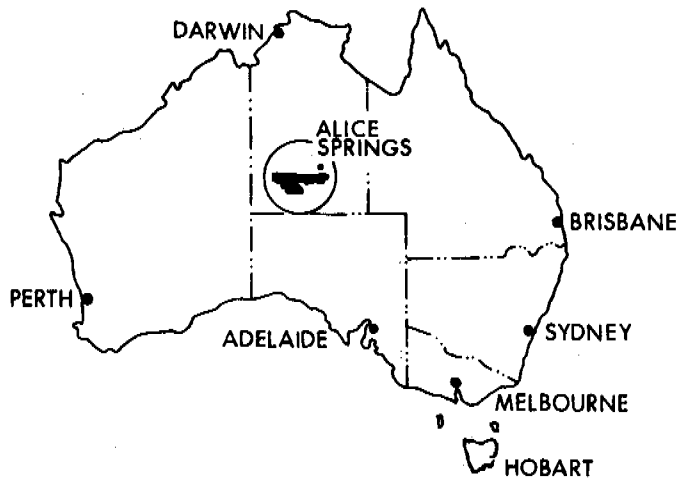
1. SUMMARY:

East Mereenie No.6 was the second of a 20 well programme to delineate and develop the Mereenie oilfield. It was drilled primarily to test the oil production potential of the Pacoota Sandstone (P1 unit) on the southeasterly plunge of the Mereenie Anticline five miles southeast of East Mereenie No.2.

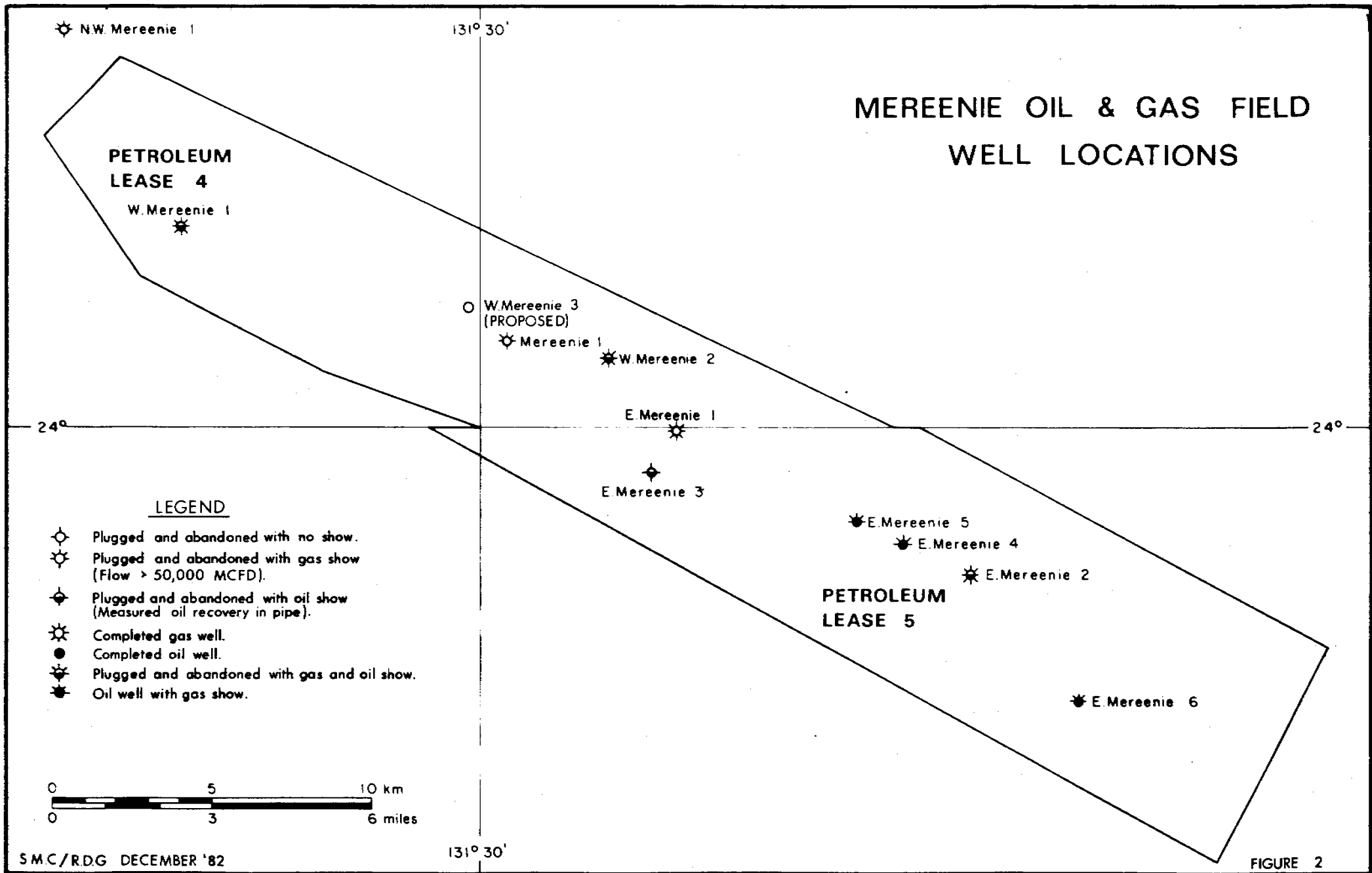
The well was spudded on the 17th March, 1982 (1130 hrs.) using the OIME Mereenie Rig 1 and reached a total depth of 5147 feet in the Pacoota Sandstone (P2 unit) on 2nd May, 1982 (2015 hrs.).

Six cores were cut and three drill stem tests carried out over intervals in the P1 unit of the Pacoota Sandstone. Drill stem test No.1, over the interval 4815 to 4903 feet, produced 320 BOPD. This crude is of a type different to that encountered in previous wells. Drill stem test No.2 proved the interval 4903 to 5020 feet to be impermeable whereas drill stem test No.3, over the interval 5000 to 5147 feet, resulted in a recovery of water cut mud. Mainly on the basis of this latter test the oil/water contact in the P1 has been placed at 5100 feet (2817 feet sub MSL).

At total depth 5-1/2" production casing was set at 5147 feet and, after running 2-3/8" tubing to 4790 feet, the 5-1/2" casing was perforated over selected intervals between 4808 to 4888 feet in the upper part of the P1 unit. The well was completed as an oil producer, and the rig was released on the 7th May, 1982 (1200 hrs.).



LOCATION MAP



0372

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.6

Operator: Oilmin N.L.

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

Petroleum title: Petroleum Lease No.5

District: Alice Springs,
Northern Territory.

Location: Latitude: 24° 04'21" S
Longitude: 131° 40'58" E

Elevation: Ground level: +2263 feet MSL.
Kelly bushing: +2283 feet MSL
(datum for all measurements).

Total depth: 5147 feet (driller)
5146.5 feet (logger)

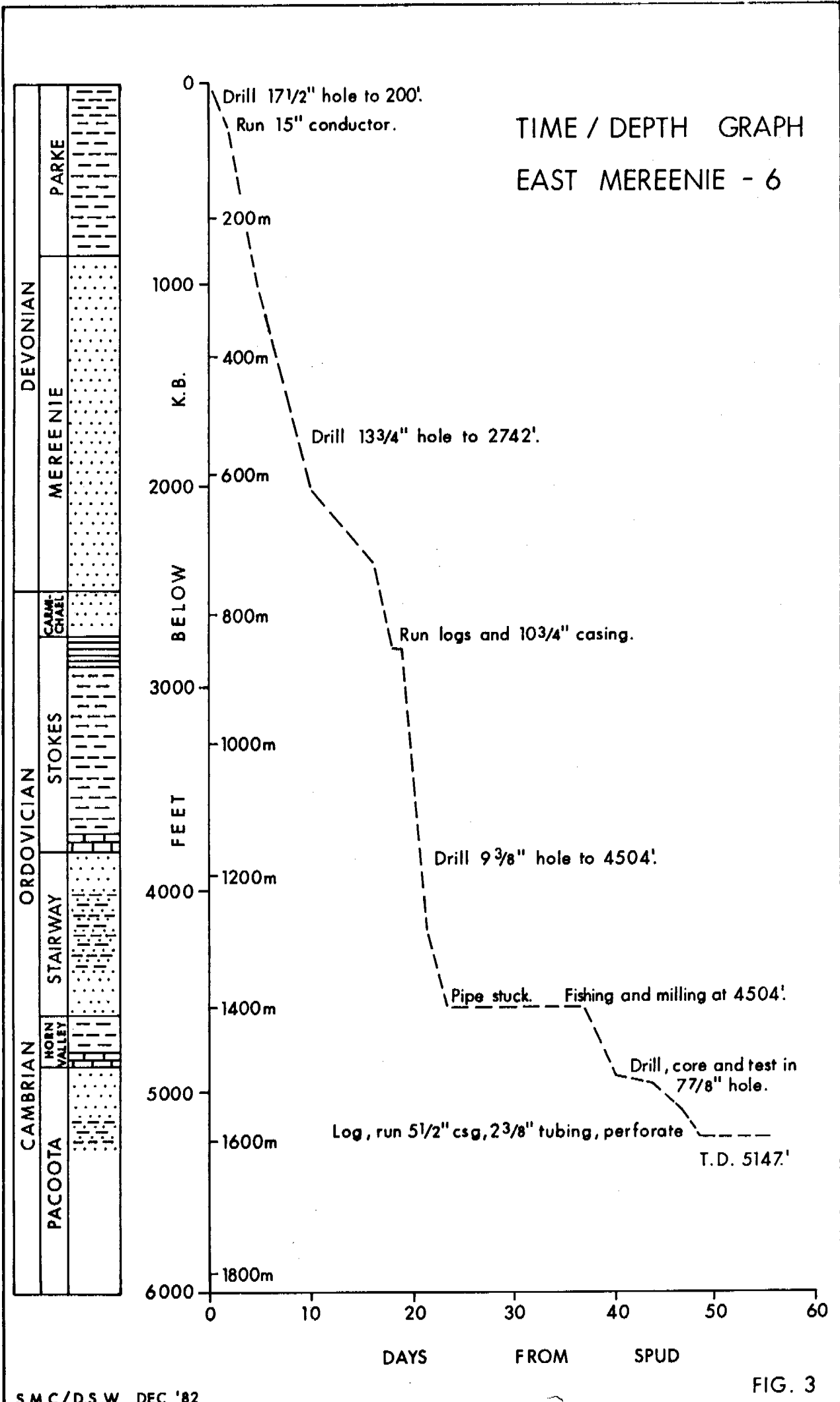
Spudded: 17th March, 1982 (1130 hrs.)

Rig released: 7th May, 1982 (1200 hrs.)

Well status: Cased for oil production from the Pacoota Sandstone (P1 unit).

Perforations over selected intervals between 4808 and 4888 feet.

Geological formation tops: Parke Siltstone Surface
Mereenie Sandstone 847'
Carmichael Sandstone 2485'
Stokes Siltstone 2732'
Stairway Sandstone 3769'
Horn Valley Siltstone 4556'
Pacoota Sandstone 4766'
Total depth 5147'



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.6..

FIELD: ...Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.
1982		
Mar. 17	120	Complete rig-up. Drill rat hole. Make up 17½" bit. Spud 1130 hrs. Drilled 17½" hole to 120 feet.
Mar. 18	200	Drilled 17½" hole to 200 ft. Run and cemented 15" conductor pipe at 200 feet.
Mar. 19	392	Install rotating BOP. Air drilled 13-3/4" hole to 392 feet.
Mar. 20	707	Air drilled 13-3/4" hole to 707 feet.
Mar. 21	932	Mist drilled 13-3/4" hole to 932 ft. Well making estimated 150 barrels water per hour.
Mar. 22	1180	Mist drilled 13-3/4" hole to 1180 ft.
Mar. 23	1415	Mist drilled 13-3/4" hole to 1415 ft.
Mar. 24	1555	Mist drilled 13-3/4" hole to 1555 ft.
Mar. 25	1757	Mist drilled 13-3/4" hole to 1757 ft.
Mar. 26	1924	Mist drilled 13-3/4" hole to 1924 ft.
Mar. 27	2034	Mist drilled 13-3/4" hole to 2034 ft. Well making estimated 250 barrels water per hour.
Mar. 28	2116	Mist drilled 13-3/4" hole to 2116 ft.
Mar. 29	2198	Mist drilled 13-3/4" hole to 2198 ft.
Mar. 30	2287	Mist drilled 13-3/4" hole to 2287 ft.
Mar. 31	2384	Mist drilled 13-3/4" hole to 2384 ft.
Apr. 1	2443	Mist drilled 13-3/4" hole to 2443 ft.
Apr. 2	2635	Mist drilled 13-3/4" hole to 2635 ft.
Apr. 3	2742	Mist drilled 13-3/4" hole to 2742 ft. Gearhart ran Sonic Gamma Ray Caliper Log. Ran 70 joints of 10-3/4", 40.5 lbs/ft., H40 ST&C casing

WELL: ... East Mereenie No.6.

FIELD: Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.
<u>10-3/4" casing details</u>		
	2742.00	T.D. of 13-3/4" hole
	7.00	Off bottom
	2735.00	Hanging depth
	3.50	Guide shoe and float collar
	2714.00	70 joints of 10-3/4" casing
	17.50	
	17.50	Landing joint
	0.00	K.B.
Apr. 4	2742	Cemented 10-3/4" casing with 450 sacks of construction cement in a 15.4 lbs/gal. slurry. Displaced with 265 bbls water and bumped plug with 800 psi. Checked float. Holding OK. W.O.C. Landed casing. Installed BOPs. Pressure test BOPs, casing and choke manifold to 1000 psi. Tests OK.
Apr. 5	3412	Drilled out plug, cement and shoe. Air drilled 9-7/8" hole to 3412 ft.
Apr. 6	4118	Air drilled 9-7/8" hole to 4118 ft.
Apr. 7	4280	Air drilled 9-7/8" hole to 4280 ft. R.I.H. with reamer.
Apr. 8	4504	Reamed under gauge hole from 3890-4280 ft. Drilled 9-7/8" hole from 4280 ft. to 4504 ft. Stuck pipe at 4504 ft.
Apr. 9	4504	Work stuck pipe, run free point indicator work pipe.
Apr. 10	4504	Work stuck pipe.
Apr. 11	4504	Attempt back off 4172 feet, 2785 feet, 2785 feet and 2723 feet. All unsuccessful. Back off at 2597 ft. Run-in hole with washpipe. Washed over fish.
Apr. 12	4504	Washed over fish to 2921 ft. Circulated hole clean. R.I.H. with fishing string. Recover fish except for bit and bit sub. Top of fish at 4498 ft.

WELL: East Mereenie No.6

FIELD: Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.
Apr. 13	4504	Fished unsuccessfully for bit and bit sub.
Apr. 14	4504	Fished unsuccessfully. Ran 75 sacks cement plug on top of fish. P.O.H.
Apr. 15	4504	W.O.C.
Apr. 16	4504	W.O.C. Drilled out cement from 4472-4504 ft. Drilling on fish.
Apr. 17	4504	Attempted to drill past fish. Unsuccessful.
Apr. 18	4504	Spotted 130 sack plug of construction cement on top of fish. W.O.C.
Apr. 19	4504	W.O.C.
Apr. 20	4506	Drill out cement from 4400 ft. to 4504 ft. Try to drill round fish. Tripped and ran-in with mill. Milled 4504 to 4506 ft.
Apr. 21	4508	Milled 4506 to 4508 ft. Tripped. Ran-in with bit and junk sub.
Apr. 22	4561	Mud drilled 4508 to 4561 ft.
Apr. 23	4740	Drilled 7-7/8" hole to 4740 ft.
Apr. 24	4845	Drilled 7-7/8" hole to 4845 ft.
Apr. 25	4863	Run Magnet and Junk sub. Cored 4845 to 4863 ft.
Apr. 26	4874	Cored to 4866 ft. Recovered 3 ft. 10½ ins. core. Reamed rat hole. Drilled to 4869 ft. Cored to 4874 ft.
Apr. 27	4903	Reamed rat hole. Drilled to 4903 ft. Ran-in hole for test. Made open hole formation test (D.S.T. No.1) over interval 4815 to 4903 ft. (88 ft.). Opened tool for 12 mins. Weak blow increasing to strong. Gas to surface after 9 mins. Shut-in tool for 30 mins. Opened-up for final flow. Mud, gas and oil to surface after 17 mins. Clean oil to surface after 24 mins. from reopening tool. Measured flow rate into tank 320 BOPD. Flowing pressure at manifold 110-120 psig. Gravity of oil 48°

WELL: ... East Mereenie No.6

FIELD: Mereenie.....

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.														
Apr. 27 (contd.)		API at 56°F. Duration of final flow period 234 mins. Final shutin 245 mins. <u>Field Chart Readings from D.S.T. No.1</u> <table border="1"> <thead> <tr> <th>IHP</th> <th>IFP</th> <th>ISIP</th> <th>FFP</th> <th>FSIP</th> <th>FHP</th> <th>BHT</th> </tr> </thead> <tbody> <tr> <td>2268</td> <td>162</td> <td>1836</td> <td>811</td> <td>1836</td> <td>2214</td> <td>140°F</td> </tr> </tbody> </table>	IHP	IFP	ISIP	FFP	FSIP	FHP	BHT	2268	162	1836	811	1836	2214	140°F
IHP	IFP	ISIP	FFP	FSIP	FHP	BHT										
2268	162	1836	811	1836	2214	140°F										
Apr. 28	4957	Completed D.S.T. No.1. Drilled 7-7/8" hole from 4903 to 4957 ft.														
Apr. 29	4999	Cored 4957-4966 ft. Recovered 7½ feet. Drilled to 4999 feet.														
Apr. 30	5031	Made open hole formation test (D.S.T. No.2) over interval 4903 to 5020 ft. (117 ft.). Very weak initial blow which died. Interval tight. Initial flow period 10 mins. Initial shutin period 30 mins. Final flow period 29 mins. Final shutin period 30 mins. Flowing and shutin pressures - zero. Drilled 7-7/8" hole to 5031 ft.														
May 1	5057	Drilled 7-7/8" hole to 5040 ft. Cored to 5051 ft. (recovered 8 ft.). Cored to 5057 ft. (recovered 4-3/4 feet).														
May 2	5147	Reamed 504 to 5057 ft. Drilled 7-7/8" hole to 5147 ft.														
May 3	5147	Ran Gearhart Sonic Gamma Ray Caliper, Neutron Density and Induction Logs. Ran open hole formation test (D.S.T. No.3) over interval 5000-5147 ft. (147 ft.). Very light blow on opening tool. Closed-in after 12 mins. flow for 48 mins. ISI. Final flow of 90 mins., flow gradually diminishing to zero. Closed-in for 90 mins. FSI. <u>Halliburton Chart Readings D.S.T. No.3</u> <table border="1"> <thead> <tr> <th>IHP</th> <th>IFP</th> <th>ISIP</th> <th>FFP</th> <th>FSIP</th> <th>FHP</th> <th>BHT</th> </tr> </thead> <tbody> <tr> <td>2453</td> <td>129</td> <td>1960</td> <td>228</td> <td>1925</td> <td>2443</td> <td>138°F</td> </tr> </tbody> </table> Recovery from test was 400 ft. slightly water cut mud.	IHP	IFP	ISIP	FFP	FSIP	FHP	BHT	2453	129	1960	228	1925	2443	138°F
IHP	IFP	ISIP	FFP	FSIP	FHP	BHT										
2453	129	1960	228	1925	2443	138°F										

WELL: East Mereenie No.6

FIELD: Mereenie

Date	E.T.D. (ft.)	Details of Operations, Descriptions and Results.
May 4	5147	Ran Gearhart Dual Laterolog, Velocity Survey and Selective formation tester.
May 5	5147	Laid down drill pipe and collars. Ran 127 joints 5½" J55, 14 lbs/ft. ST&C casing with shoe at 5147 feet and float collar at 5104 feet. Mixed and pumped 400 sacks of construction cement treated with 0.3% weight HR4 (retarder) and 0.75% weight Halad 22 (Fluid loss reducer) in a 15.2 lbs/gal slurry. Displaced with 125 barrels mud. Bumped plug with 1150 psig. Checked float holding OK. Landed casing W.O.C.
May 6	5147	Picked-up 2-3/8" tubing and ran casing scraper to top of cement at 5103 ft. Displaced mud from casing with inhibited water. P.O.H. Ran Cement Bond Log, casing collar locator Gamma Ray Log.
May 7	5147	Gearhart set wireline packer at 4786 feet. Ran-in with stinger and tubing. Landed tubing in tubing hanger and installed Christmas Tree. Tubing shoe at 4790 feet. Tested Christmas Tree, tubing and annulus to 1000 psig for 15 mins. OK. Rig released at noon, 7th May, 1982.

2.3.2 Hole Sizes and Depth.

17-1/2" to 200 feet

13-3/4" to 2742 feet

9-7/8" to 4504 feet

7-7/8" to 5147 feet (total depth)

2.3.3 Casing and Cementing Details.

15" casing: Weight: not specified

Grade: not specified

Shoe depth: 200 feet

Cement used: 50 sacks

10-3/4" casing: Weight: 40.5 lb/ft.

Grade: H40

Shoe depth: 2735 feet

Cement used: 450 sacks of Class A cement in a 15.4 ppg slurry.

5-1/2" casing: Weight: 14.0 lb/ft.

Grade: J55

Shoe depth: 5147 feet

Cement used: 400 sacks.

Construction cement treated with 0.3% by weight HR4 and 0.75% by weight Halad 22 in a 15.2 ppg slurry.

2.3.4 BIT AND DEVIATION RECORD

WELL EAST MEREENIE NO. 6 SPUD DATE 17/3/82 COMP. DATE 7/5/82
 FIELD MEREENIE CONTRACTOR OILMIN. N.L. RIG No. 1
 LOCATION 24° 04' 21" S TYPE UNIT OIME - 750
 131° 40' 58" E DRILL PIPE DESCRIPTION
 ELEVATIONS GROUND 2263' GL
 CASING HEAD
 T.D. 5147' T.V.D. TUBING HEAD
 DEVIATION (B.H.L.) ROTARY DRIVE BUSHING 2283' KB

DATE IN	DEPTH OUT ft	BIT RECORD							WEIGHT 000lb	R.P.M.	DEPTH & DEVIATION	
		BIT No	SIZE	MAKE	TYPE	JET SIZE	FEET	HOURS			VERTICAL <input type="checkbox"/>	DIRECTIONAL <input type="checkbox"/>
17/3/82	19'	1	17½	HTC	OSC	OPEN	200	17-3/4	10	40	170	0°
19	200'	2	13-3/4	SEC	H7UG	"	503	33½	35	60		
21	1529'	3	"	SMITH	Q9JS	"	707	79½	40	55/60	1418	1½°
24	1986'	4	"	"	"	"	457	59-3/4	40	55/60	1956	1½°
27	2127'	5	"	"	"	"	141	37½	30/40	55/60		
29	2287'	6	"	"	"	"	160	83-3/4	40	60	2241	1½°
30	2439'	7	"	"	"	"	152	34½	40	60		
1/4/82	2742'	8	"	"	"	"	303	83-3/4	40	60		
4	4280'	9	9-7/8	HTC	J22	"	1538	45½	35	60	4214	3/4°
7	4504'	10	"	"	J33	"	224	11½	4	50		
12	4504'	RR9	"	"	J22	"	-	14	3	50		
16	4505'	11	7-7/8	"	"	14	1	2	3	45	4452	2½°
17	4505'	12	"	"	"	"	34	4½	5	50		
18	4504'	13	"	"	J55R	"	-					
19	4404'	RR10	9-7/8	"	J33	16	REAMING	4238'	TC	4400		
20	4504'	RR13	7-7/8	"	J55R	OPEN	105	2½	10/15	80		
20	4504'	14	8-3/4	REED	HGJ	"	104	2¼	°/15	75		
21	4504'	15	7-7/8	"	C2G	"	-					
21	4509'	16	"	"	"	"	1	2				
22	4561'	RR16	"	"	"	OPEN	53	10¼	20/30	70		
22	4845'	17	"	HTC	J22	"	284	21	8/10	50	4826	2°
25	4851'	18	"	HTC	J22	14	6	3/4	20	70		
25	4851'	C1	7-27/32									
			x 3½	CHRIS	C20		-	5½	15	70		
26	4866'	C2	"	"	"		15	9	5	75		
26	4869'	RR18	7-7/8	HTC	J22	14	3	1/2	15/20	70		
26	4874'	C3	7-27/32									
			x 3½	CHRIS	C20		5	3½	15/20	60		
27	4957'	19	7-7/8	HTC	J77	14	54	8¼	30	65		
29	4966'	RRC3	7-27/32									
			x 3½	CHRIS	C23		9	5½	15/20	65/70		
29	5020'	RR19	7-7/8	HTC	J77	14	54	8	30	70		
29	5040'	20	"	"	"	"	20	2-3/4	30	60		
29	5051'	RRC3	7-27/32									
			x 3½	CHRIS	C23		11	5¼	18/20	70		
29	5057'	RRC1	"	"	C20		6	3-3/4	18	70		
2/5/82	5147'	RR20	7-7/8	HTC	J77	14	90	13	30/35	70	5145'	1½°
											TD = 5147'	

2.3.5 Drilling Fluids.

The 17-1/2" hole was drilled with air to 200 feet, where 15" casing was run and cemented.

The 13-3/4" hole was drilled with air to approximately 1000 feet where water influx necessitated the addition of a foaming agent. Drilling continued with air mist to 2742 feet, the 10-3/4" casing depth.

9-7/8" hole was drilled from the 10-3/4" casing shoe at 2735 feet to 4504 feet where pipe was stuck. After fishing and milling operations the hole was displaced with KCl polymer mud and 7-7/8" hole was drilled from 4504 feet to total depth at 5147 feet.

(iv) Fluid samples -

- (1) A water sample from the Mereenie Sandstone aquifer was collected as requested by the Northern Territory Department of Mines and Energy and sent to their offices in Alice Springs. No results are available.
- (2) An oil sample from D.S.T. No.1 was sent to Amdel and Hematite Laboratories. The results of these tests are included in Appendix 6, Fluid Analyses. A brief description of the oil from the Amdel report is -

Colour:	light brown
S.G.:	0.782 at 15.6°C
A.P.I.:	49.45 at 15.6°C
Viscosity:	2.115 Centistokes at 37.8°C.

- (3) A water sample was taken from the Gearhart Selective Formation Tester (SFT) at 4849.5 feet.

This was analysed onsite for K⁺ concentration and a portion was sent to Amdel for a full water analysis. Both tests confirmed the water was mud filtrate. Full results are available in Appendix 6, Fluid Analyses.

- (4) The filtrate from a sample of water cut mud from D.S.T. No.3 (5000 to 5147 feet) was tested at the wellsite and showed a chloride ion concentration of 48,000 ppm.

2.3.7 Logging and Surveys.

- (i) Electric logs were run using a Gearhart DDL logging unit -

<u>Log</u>	<u>Run</u>	<u>Interval</u> (ft.)	<u>Date</u>
BCS-GR-Ca1	1	427 - 4726.5	3/4/82
BCS-GR-Ca1	2	2735 - 5113	3/5/82
CDL-CNS-GR-Ca1	1	4400 - 5144	3/5/82
DDL-MSFL-GR-Ca1	1	2735 - 5140	3/5/82
Computer processed interpretation (Laserlog)		4400 - 5102	3/5/82
CBL-VDL-GR	1	0 - 5098	2/5/82

Prints of all wireline logs are included as Enclosure 3.

- (ii) Velocity survey -

A velocity shoot was run on 4th May, 1982, by Velocity Data Pty. Ltd. Details are given in Appendix 5.

- (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 gas detector during the mud drilling phase.

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

- (iv) Deviation surveys -

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

- (v) Temperature surveys -

Temperature surveys were not run, however, the following temperatures were recorded :-

- 127°F at 5144 feet (Gearhart)
- 140°F at 4898 feet (Halliburton)
- 138°F at 5143 feet (Halliburton)

2.3.8 Formation Testing.

(i) Drill stem testing -

D.S.T.1	Interval:	4815 to 4903 feet
	Method:	Conventional dual bottom hole.
	Tester:	Halliburton
	Results:	Gas to surface 9 mins. Oil to surface 120 mins. Rec. 33 bbls 48 API straw yellow oil in stock tank. Flow estimated at 320 BOPD.
D.S.T.2	Interval:	4903 to 5020 feet
	Method:	Conventional dual bottom hole.
	Tester:	Halliburton
	Results:	No gas to surface. No fluid recovery.
D.S.T.3	Interval:	5000 to 5147 feet
	Method:	Conventional dual bottom hole.
	Tester:	Halliburton
	Results:	No gas to surface. Rec. 400 feet of slightly water cut mud.

Full details of these tests are included in Appendix 4.

(ii) Formation interval testing -

The formation interval tester was used to try to sample fluid from the prospective reservoir intervals between 4750 feet and 4870 feet in the P1 unit. Only one test, at 4849.5 feet, was successful in retrieving any fluid, however, only one quarter of a gallon out of a possible five gallons was obtained and formation pressure was not retained in the sample cylinder. No true formation fluids were recovered.

2.3.9 Well Completion Data.

(i) Perforations -

Perforations were made over the following intervals in 5-1/2" casing :-

<u>Interval</u> (feet)	<u>No. of Shots</u>
4808 - 4816	16
4877 - 4888	22
4845 - 4853	16

All intervals were perforated with two shots per foot using a 7-11/16" Magnum Formed Live Jet tubing gun on the 21st and 22nd May, 1982.

(ii) Tubing -

2-3/8" production tubing was run to 4790 feet.

3. GEOLOGY

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3.1 Previous Work.

The previous work in this area has been summarised in the East Mereenie No.5 Well Report. Data from East Mereenie No.5 confirmed the existence of the gas and oil accumulation in the Pacoota Sandstone and the gas/oil contact at -2130 feet MSL. The oil/water contact could not be confirmed and therefore the previously accepted oil/water contact at -2450 feet MSL was regarded as the best estimate.

3.2 Stratigraphy (see Table 1)

Parke Siltstone (Pertnajara Group)

Depth: Surface
Thickness: 827+ feet
Age: Devonian
Lithology:

The Parke Siltstone is dominantly argillaceous and silty with minor horizons of sandstone and limestone. The shaley siltstones are chocolate brown, sometimes purple and/or green and commonly micaceous and calcareous.

Mereenie Sandstone.

Depth: 847 to 2485 feet
Thickness: 1638 feet
Age: Upper Silurian to Middle Devonian.
Lithology:

847 to 1760 feet (Mereenie Sandstone)

The sandstones are clear, white, tan to brown and quartzose. Grain size is very fine to fine, with occasional medium grained beds. The sandstones are thickly bedded (>10 feet) units of poorly sorted, subangular to subrounded quartz aggregates, with occasional thin beds of red and brown shales.

1760 to 1970 feet (Mereenie Sandstone)

The unit consists of thinly interbedded red and occasional brown quartzose sandstones and shales.

TABLE 1

EAST MEREENIE NO.6 STRATIGRAPHIC TABLE

AGE	FORMATION	DEPTH (feet)		THICKNESS (ft.)
		KB (ft.)	MSL (ft.)	
DEVONIAN	PARKE SILTSTONE	Surface	+2263	827+
	MEREENIE SANDSTONE	847	+1436	1638
UPPER SILURIAN				
UPPER ORDOVICIAN	CARMICHAEL SANDSTONE	2485	-202	247
MIDDLE ORDOVICIAN	STOKES SILTSTONE	2732	-449	1037
	Upper Stokes Siltstone	2732	-449	763
	Lower Stokes Siltstone	3495	-1212	274
	STAIRWAY SANDSTONE	3769	-1486	787
	Upper Stairway Sandstone	3769	-1486	191
	Middle Stairway Sandstone	3960	-1677	385
	Lower Stairway Sandstone	4345	-2062	211
LOWER ORDOVICIAN	HORN VALLEY SILTSTONE	4556	-2273	210
	PACOOTA SANDSTONE	4766	-2483	381
	P1 unit	4766	-2483	344
	P2 unit	5110	-2827	37+
	P3 unit	NP		
	P4 unit	NP		
UPPER CAMBRIAN	GOYDER FORMATION	NP		
	TOTAL DEPTH	5147	-2864	

1970 to 2340 feet (Mereenie Sandstone)

Massive, homogeneous units of clear, white and occasional tan to light brown, quartzose sandstone form the major part of this unit. The sandstone is generally poorly sorted and very fine to fine grained with sub-angular to subrounded quartz grains. Very minor grey-green and red-brown shales and siltstones are encountered in this unit.

2340 to 2485 feet (Mereenie Sandstone)

The basal Mereenie Sandstone unit consists of interbedded clear, white and brown, quartzose sandstones, green-grey and brown shales and dark brown, green-grey siltstones. The sandstones are mostly white to reddish-brown, very fine to fine grained and poorly sorted. The siltstones and shales are soft to moderately hard and are occasionally calcareous and dolomitic.

Carmichael Sandstone (Larapinta Group)

Depth: 2485 to 2732 feet

Thickness: 247 feet

Age: Upper Ordovician

Lithology:

This formation consists of thinly interbedded white, brown and tan quartzose sandstones, red-brown, micaceous siltstones and grey-green and brown shales. Shales and siltstones become more common with increasing depth.

Stokes Siltstone (Larapinta Group)

Depth: 2732 to 3769 feet

Thickness: 1037 feet

Age: Middle Ordovician

Lithology:

2732 to 3495 feet (Upper Stokes Siltstone)

Interbedded brown shales, green siliceous shales and brown-green mottled shales grade upwards into interbedded brown shale and brown micaceous siltstone above 3050 feet. Thin beds are slightly calcareous. Above 2900 feet is thinly bedded and fine grained sandstone comprises approximately 20% of the section.

3495 to 3769 feet (Lower Stokes Siltstone)

The Lower Stokes Siltstone is dominantly argillaceous and strongly dolomitic. Bedding is generally thin with sandy dolomites and dolomitic shales alternating rapidly and grading into each other. The dolomites are grey, occasionally white and commonly sandy. The base of this unit is abruptly marked by the first sand of the Stairway Sandstone

Stairway Sandstone (Larapinta Group)

Depth: 3769 to 4556 feet

Thickness: 787 feet

Age: Middle Ordovician

Lithology:

3769 to 3960 feet (Upper Stairway Sandstone)

The top of the Upper Stairway Sandstone is marked by a sandstone and an abrupt change from the overlying argillaceous dolomites and shales. The unit is dominantly arenaceous with common thin shale horizons. The quartzose, fine to coarse grained sandstones have abundant siliceous cement, rare mica and occasional pyrite as accessory minerals. Sand grains are generally rounded and moderately sorted. The shales are multicoloured (black, red-brown, green-grey) and slightly micaceous. A transition zone exists between this unit and the more argillaceous Middle Stairway Sandstone.

3960 to 4345 feet (Middle Stairway Sandstone)

This unit is dominantly argillaceous but is commonly silty with frequent thin arenaceous laminae. Bedding is generally thin with rapid variations in lithology throughout. The shales are dark grey and black, micromicaceous, subfissile and sometimes siliceous. They grade into quartzose sandstones and micaceous siltstones. The sandstones are invariably fine grained. Minor amounts of carbonaceous material are present. The base of this unit is transitional with the Lower Stairway Sandstone.

4345 to 4556 feet (Lower Stairway Sandstone)

The oldest lithostratigraphic unit of the Stairway Sandstone is dominantly quartzose sandstone and relatively homogeneous. Minor laminae and occasional beds of siltstone are distributed uniformly throughout the section. The sandstones are quartzose, slightly calcareous and very siliceous. Sorting is generally poor with large rounded grains often set in a matrix of fine

grained subangular detrital quartz and siliceous cement. Most of the grains have pitted and frosted surfaces. The siltstones are generally grey-brown and micaceous. From the electric logs the basal part of this unit is seen to be transitional with the Horn Valley Siltstone, although the change in lithology as indicated by the cuttings, is abrupt.

Horn Valley Siltstone (Larapinta Group)

Depth: 4556 to 4766 feet

Thickness: 210 feet

Age: Lower Ordovician

Lithology:

Interbedded siltstones and shales in approximately equal proportions are the dominant lithologies. Minor lithologies include limestone and sandstone. The siltstones and shales are micaceous, slightly calcareous and occasionally dolomitic. The sandstones are fine grained and quartzose with an abundance of silica cement. The limestones are arenaceous and dolomitic in part. Bedding is generally very thin.

Pacoota Sandstone (Larapinta Group)

Depth: 4766 to 5147 feet

Thickness: 381 feet

Age: Upper Cambrian to Lower Ordovician

Lithology:

4766 to 5110 feet (P1 unit)

The top of the Pacoota Sandstone is marked by a glauconite zone, a thin arenaceous limestone and a corresponding sharp decrease in sonic interval transit time. The unit is overwhelmingly arenaceous but there are few homogeneous sandstone horizons over 5 feet thick. Thin, clean, fine to medium grained, quartzose sandstones are separated by shales and bioturbated sands and shales. The sandstones are generally well cemented with silica but some thin horizons do retain some primary intergranular porosity. Biological activity is abundant with churning, subhorizontal burrowing and shell fragments common throughout the whole section.

Most of the major sandstone beds can be correlated with the nearest well, East Merenie No.2, and thence with most of the wells drilled so far. However, several sands at the top of the P1 unit in East Merenie No.6 are not evident elsewhere and would seem to be developing in an eastwards direction from East Merenie No.2. Lithologies are consistent with the P1 elsewhere in the Merenie Field.

5110 to 5147 feet (P2 unit).

The P2 unit consists of micaceous siltstones and shales in the 37 feet of this unit which was drilled.

3.3 Petroleum Geology.

(i) Previous Data.

The data to date including East Merenie No.5 showed that the Merenie Anticline contains significant hydrocarbons in three separate intervals, the Upper Stairway Sandstone, the Lower Stairway Sandstone and the Pacoota Sandstone.

The Upper Stairway is gas prone with normal reservoir pressures but permeability is poor.

The Lower Stairway Sandstone is gas prone with a high condensate content. Permeability is sporadic but generally poor. Data to date indicates the reservoir is overpressured.

The Pacoota Sandstone contains oil and gas at normal pressures. The main reservoir units are the P1 and P3 with fair to moderate porosity and permeability. Sporadic thin zones in the P2 and P4 contain reserves of hydrocarbons but are generally impermeable.

The gas/oil contact is considered common to all reservoirs and horizontal at approximately -2130 feet MSL whilst the oil/water contact, again common and essentially horizontal, is estimated at -2450 feet MSL. This gives an oil column of 320 feet and a gas column of 1100 feet.

(ii) East Merenie No.6

The following is a summary of the petroleum geology of these prospective zones in East Merenie No.6 -

Upper Stairway Sandstone (3769 to 3960 feet)

The Upper Stairway Sandstone showed little porosity and permeability from either cuttings samples or electric logs. No hydrocarbons were detected.

Lower Stairway Sandstone (4345 to 4556 feet)

Cuttings samples from within the Lower Stairway Sandstone showed poor to moderate porosity and minor brown hydrocarbon stain towards the base

of the unit. The porosity logs are all effected by out of gauge hole in the interval 4470 to 4482 feet, however, the Sonic Log does indicate that the zone between 4468 and 4478 feet has some porosity. At 4504 feet the smell of gas at the surface indicated the presence of hydrocarbons. Notably there was no flame at the end of the blooey line whilst drilling with air. A mud weight of 8.6 ppg was sufficient to balance reservoir pressure indicating the reservoir in this area is very tight and/or normally pressured. No cores were cut nor D.S.Ts. run in this unit.

The unit contains minor amounts of hydrocarbons in a tight reservoir with sporadic pockets of porosity.

Pacoota Sandstone (P1 unit, 4766 to 5110 feet).

As in the previous wells, the P1 shows variable but generally poor porosity and permeability due to diagenetic silica and calcite cementation. Thus grain size had little effect on the porosity and permeability of the sandstones.

One 5 ft. interval of sandstone (4846 to 4851 feet) had significant porosity and permeability. Several other thin zones showed porosity development but had poor permeability. During the drilling of the section from 4814 to 4851 feet hydrocarbons were evident from cuttings and mud gas while oil was also visible in the mud stream. D.S.T. No.1 from 4815 to 4903 feet, flowed oil at rate of 320 BPD. The oil was light straw yellow in colour with a density of 48° API. This crude is of a different colour to that recovered from previous wells in the Mereenie Field.

D.S.Ts. 2 and 3 showed the rest of the Pacoota P1 unit was tight, however, water cut mud was recovered from D.S.T. No.3 (5000 to 5147 feet). Although there was no definite evidence of hydrocarbons in the cuttings hydrocarbons were evident in a shaley section of Core No.6 (5051 to 5056 feet) and a distinctive hydrocarbon odour was evident throughout Cores 5 and 6. Core analysis results from these intervals confirm these observations. Thus it can be concluded that an oil/water contact exists in the base of the P1 unit at approximately 5100 feet (-2817 feet MSL).

In a gross sense the P1 unit shows the same reservoir characteristics as was established by previous wells. However, there are two significant differences. The good reservoir sandstone at 4200 feet in East Mereenie No.4 and 4360 feet in East Mereenie No.2 thins eastwards and becomes practically impermeable in this well. The porous and permeable sand at 4846 feet correlates with a similar interval in East Mereenie No.2 and has now been established as a significant P1 production unit of considerable lateral extent.

Pacoota Sandstone (P2 unit, 5110 to 5147 feet)

This unit showed no evidence of porosity or hydrocarbon content in the section drilled.

3.4 Relevance to Appraisal Programme.

East Mereenie No.6 was drilled to test the eastern extent of the oil and gas accumulation in the Pacoota P1 reservoir unit. The well intersected the P1 unit in the oil column, however, the oil recovered was of a different colour to that recovered elsewhere in the field. Not only is the oil different but it occurred at a level (-2563 feet MSL) 113 feet below that of the previously established oil/water contact (-2450 feet MSL). The gas/oil contact was not intersected in this well and the oil/water contact is tentatively estimated at 5100 feet KB (-2817 feet MSL).

The well also established that the producing sand at 4846 feet correlates with a sand of good reservoir characteristics in East Mereenie No.2 and is therefore a significant and widespread production interval in the eastern end of the field.

The nature of the trapping mechanism of the oil discovered in this well is unknown and further wells are necessary to determine the updip and downdip extent of this oil pool.

The good production sand at 4200 feet in East Mereenie No.4 and 4360 feet in East Mereenie No.2 thins eastwards and is non-productive in East Mereenie No.6.