

PL 5, NT
EAST MEREENIE NO. 29
WELL COMPLETION REPORT
VOLUME 1 of 2

Distribution:

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SUMMARY

East Merenie 29 (EM 29) is the thirty seventh well to be drilled in the Merenie oil and gas field, Amadeus Basin, Northern Territory (Figs 1 & 2). The well is situated 786 m west northwest of East Merenie 14 on the northeastern flank of the Merenie Anticline, within Petroleum Lease 5, Northern Territory. Seismic Line M83-20 is located 300 metres to the west (Figure 5). There is an absence of seismic data in the targetted area where rugged topography precluded recording.

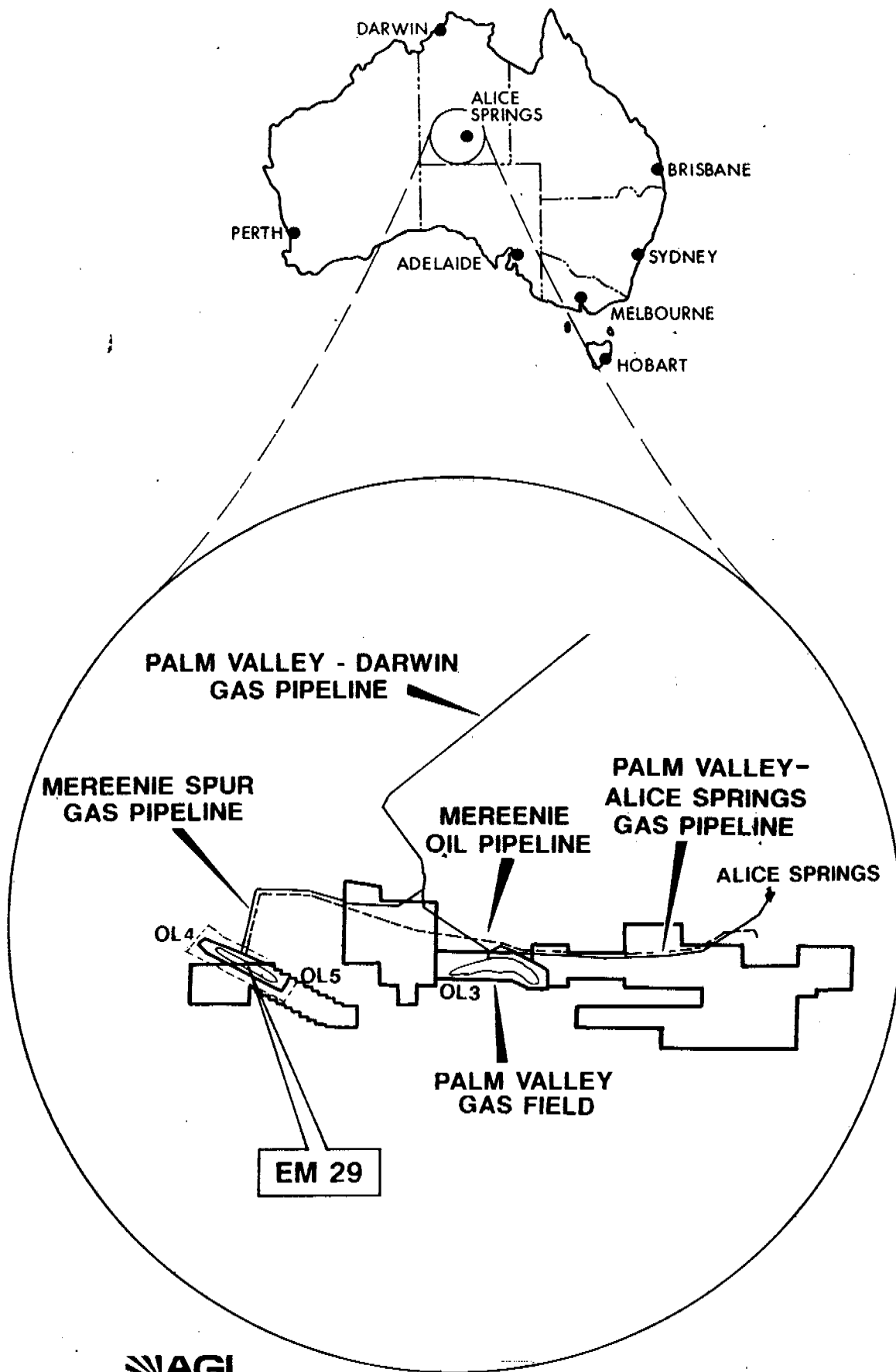
East Merenie 29 was drilled as an oil development well with the main objective being the Ordovician Pacoota P3-120/130 reservoir which is productive in East Merenie 14. The well's secondary objective was to provide information on both the Stairway Sandstone and Pacoota P1 reservoirs.

East Merenie 29 was drilled by AGL Petroleum acting as operator for the Merenie Joint Venture. The well spudded in the Park Siltstone on the 16 January 1990 at 0500 hrs and reached a total depth of 5021 feet in the Pacoota P4 unit on the 20 February 1990 at 2230 hrs. The well was directionally drilled from the basal Merenie Sandstone in order to penetrate the targetted P3-120/130 reservoir at an optimum position above the oil/water contact. Maximum deviation was 23 degrees in the Upper Stokes Silstone, dropping to 9.3 degrees at total depth. The top of the P3-120/130 sand was intersected at 4800 ft MD (4675.5 ft TVD), or 2292.5 ft subsea. A gas detector was operational from the middle of the Merenie Sandstone to total depth, at which wireline logs were run.

Hydrocarbon shows were observed in the Pacoota Sandstone P1, P2 & P3 units. Only minor gas shows were recorded while drilling through the Upper, Middle and Lower Stairway Sandstone. Log analysis indicates a net pay of 29.5 ft within the P3-120/130 using a 9% porosity cut-off.

No conventional or sidewall cores were cut in the well. An open hole test however, was conducted at 4214 ft, just below the P1-80 sand, recovering 881,000 cubic feet gas/day through a 1/2" choke. One drill stem test was run over the interval 4140-4422 ft, spanning most of the P1 unit interval. This recovered 582,000 cubic feet gas/day through a 1/2" choke.

After logging, 5-1/2" production casing was run and cemented from TD to the 8-5/8" casing shoe at 3939 ft. The well was then perforated using tubing conveyed guns over the intervals 4800 to 4844 ft KB (P3-120/130 sand) and 4860-4867 ft KB (P3-150 sand). The rig was subsequently released at 2100 hrs on 23 February 1990.



PETROLEUM LEASES 4 & 5

MEREENIE FIELD

EM 29

LOCALITY MAP

AUTHOR: T. O'SULLIVAN

DATE: DECEMBER, 1989

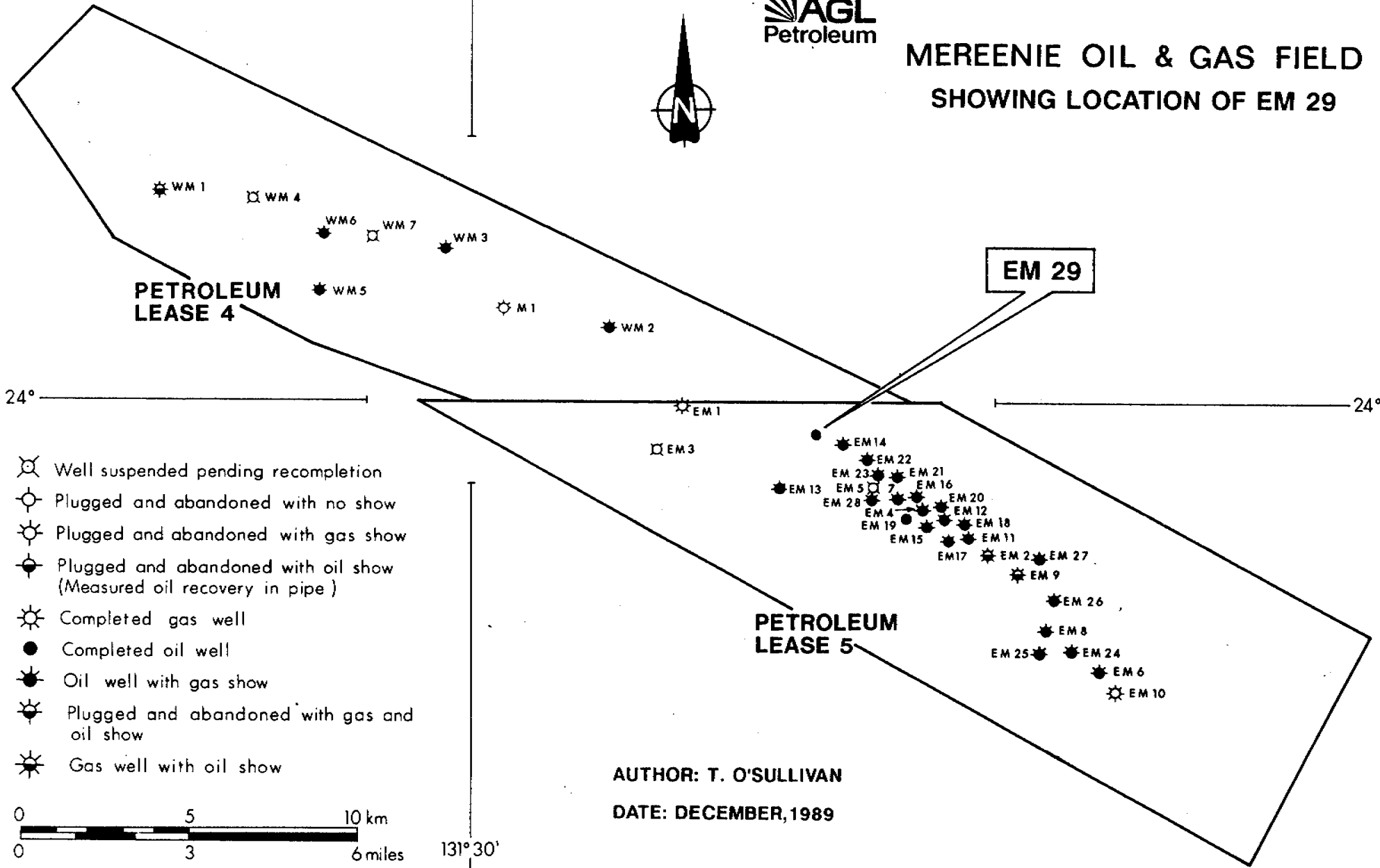
FIGURE 1












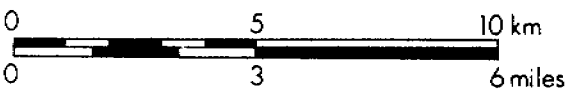
MEREENIE OIL & GAS FIELD SHOWING LOCATION OF EM 29



131° 30'



-  Well suspended pending recompletion
-  Plugged and abandoned with no show
-  Plugged and abandoned with gas show
-  Plugged and abandoned with oil show (Measured oil recovery in pipe)
-  Completed gas well
-  Completed oil well
-  Oil well with gas show
-  Plugged and abandoned with gas and oil show
-  Gas well with oil show



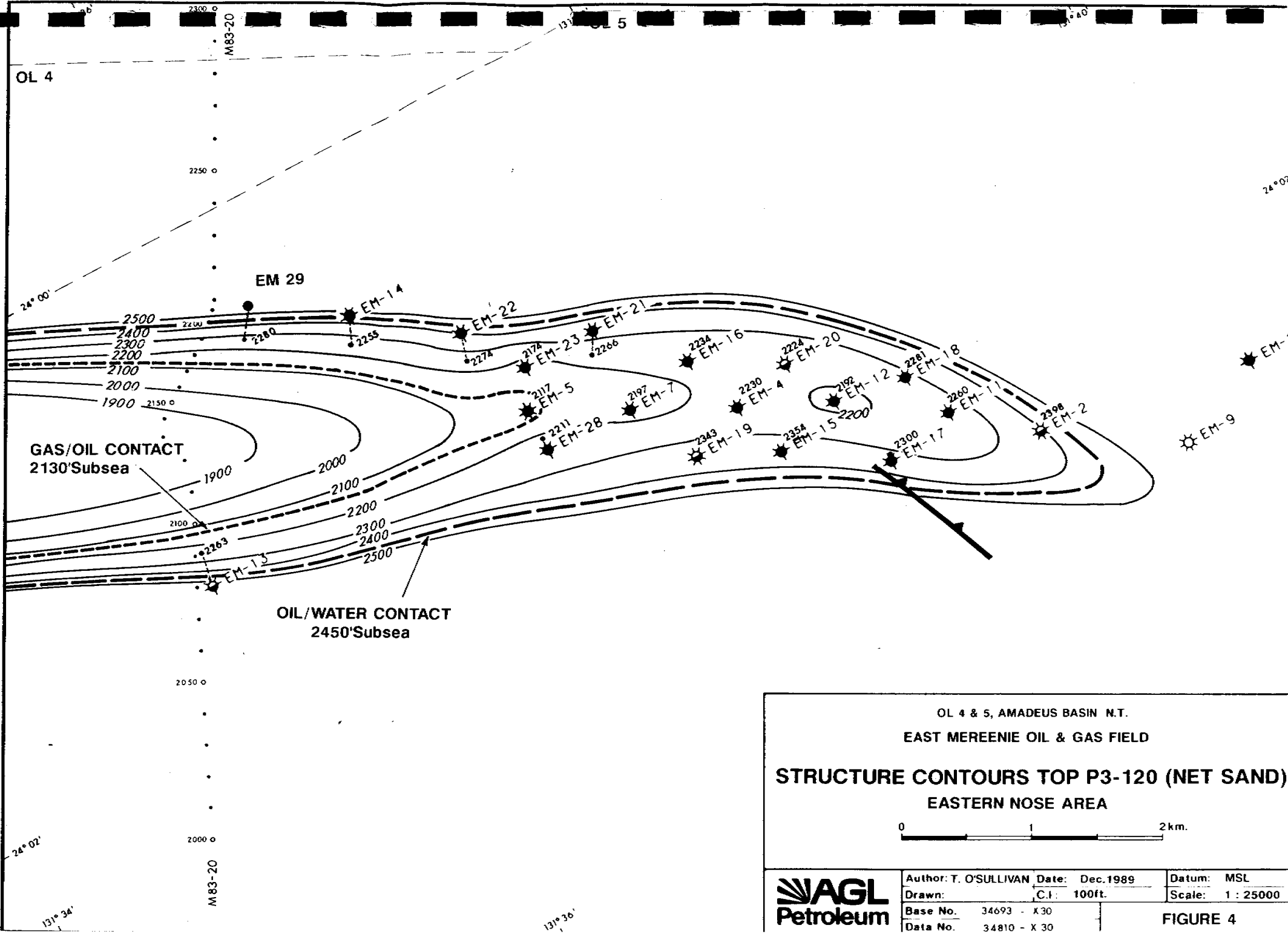
AUTHOR: T. O'SULLIVAN
DATE: DECEMBER, 1989

34785-Z1
FIGURE 2

STRATIGRAPHY OF THE MEREENIE FIELD

AGE	ENVIRONS	GROUP	STRATIGRAPHY	LITHOLOGY	TECTONIC EVENT	HYDROCARBON OCCURENCES	
PERMIAN	CONTINENTAL	PERTN-JARA	SURFICIAL SEDIMENTS		ALICE SPRINGS OROGENY		
DEVONIAN	LACUSTRINE		PARKE SILTSTONE				PERTNJARA MOVEMENT
	M	AEOLIAN	MEREENIE SANDSTONE	A			
	E		B				
SILURIAN	L	SHALLOW MARINE	MEREENIE SANDSTONE	C	RODINGAN MOVEMENT		
	L		D				
ORDOVICIAN	ESTUARINE	LARAPINTA	CARMICHAEL SANDSTONE		RODINGAN MOVEMENT	SMALL GAS FLOWS SMALL GAS FLOWS MINOR GAS PRODUCTION OIL & GAS PRODUCTION OIL & GAS PRODUCTION GAS FLOWS & OIL RECOVERY	
	SHALLOW MARINE		STOKES FORMATION	UPPER			
				LOWER			
	INTERTIDAL		STAIRWAY SANDSTONE	UPPER			
				MIDDLE			
			LOWER				
	EUXINE		HORN VALLEY SILTSTONE				
	INTERTIDAL		PACOOKA SANDSTONE	P1			
P2							
P3							
P4							
CAMBRIAN	L	PERTAOORRTA	GOYDER FORMATION		PETERMANN RANGES OROGENY		
	M		CLELAND SANDSTONE				
	E						
PROT.	L	SHALLOW MARINE EVAPORITIC	BITTER SPRINGS FORMATION		SOUTHS RANGE MOVEMENT AREYONGA MOVEMENT		

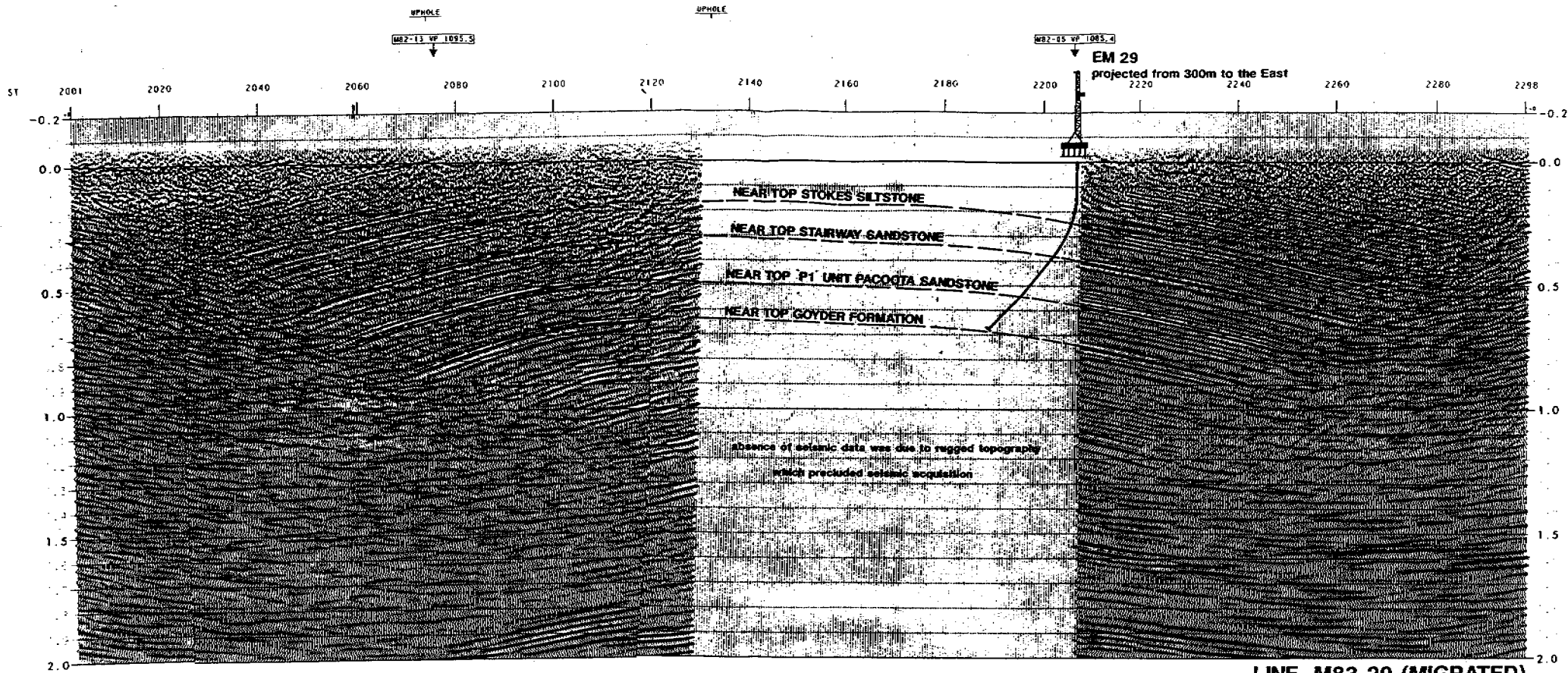
FIGURE 3



OL 4 & 5, AMADEUS BASIN N.T.
 EAST MEREENIE OIL & GAS FIELD
STRUCTURE CONTOURS TOP P3-120 (NET SAND)
 EASTERN NOSE AREA

0 1 2 km.

	Author: T. O'SULLIVAN	Date: Dec. 1989	Datum: MSL
	Drawn: _____	C.I.: 100ft.	Scale: 1 : 25000
	Base No. 34693 - X 30	FIGURE 4	
	Data No. 34810 - X 30		



LINE M83-20 (MIGRATED)

FIGURE 6

TABLE 1

EAST MEREENIE 29 - STRATIGRAPHIC TABLE

AGE	FORMATION	DEPTH (FT)		THICKNESS (FT)
		KB (FT)	MSL (FT)	
DEVONIAN-	PARKE SILTSTONE	Surface	+2363	+51
SILURIAN	MEREENIE SANDSTONE	51	+2312	1707
UPPER ORDOVICIAN	CARMICHAEL SANDSTONE	1758	+ 625	243
	STOKES SILTSTONE			
	Upper Stokes Sandstone	2001	+ 382	799
	Lower Stokes Sandstone	2800	- 417	284
MIDDLE ORDOVICIAN	STAIRWAY SANDSTONE			
	Upper Stairway Sandstone	3084	- 701	160
	Middle Stairway Sandstone	3244	- 861	419
	Lower Stairway Sandstone	3663	- 1280	206
LOWER ORDOVICIAN	HORN VALLEY SILTSTONE	3869	-1486	251
LOWER ORDOVICIAN	PACOOTA SANDSTONE			
	Pacoota P1	4120	-1737	350
TO UPPER CAMBRIAN	Pacoota P2	4470	-2087	220
	Pacoota P3	4690	-2307	110
	Pacoota P3-120	4800	-2417	171
	Pacoota P4	4971	-2588	+50
CAMBRIAN	GOYDER FORMATION	NR	-	-
	TOTAL DEPTH (Drillers Depth)	5021	-2638	

Remarks: Hole deviated from approximately 1352 ft in the basal Mereenie Sandstone. Thickness uncorrected for drift angle and formation dip.

1.0 WELL DATA

WELL NAME AND NUMBER : East Mereenie 29

DESIGNATION/STATUS : Oil producer P3-120/130

PETROLEUM TITLE : Petroleum Lease No. 5,
Northern Territory

DISTRICT : Alice Springs, Northern Territory

LOCATION - Geographical : Latitude : 24°0'32.9"
Longitude: 131°36'0.9"
- AMG : Easting : 764511.9
Northing : 7341850.1
- Seismic : Line 85-N44 is 400 m to south
786 m from East Mereenie 14 at 304
degrees rel to true north.

ELEVATION : Ground Level : 2363 ft
Kelly Bushing: 2383 ft

OPERATOR : AGL Petroleum

BENEFICIAL INTEREST HOLDERS: Moonie Oil NL 21.00%
Transoil NL 9.00%
Petromin NL 7.05%
← International Oil Proprietary 6.25%

Magellan Petroleum NT P/L 20.00%
→ United Oil & Gas Co NT P/L 15.00%

Canso Resources Limited 15.00%
Farmout Drilling NL 6.25%

RIG : OIME SL-750 (Mereenie Rig No. 1)

DATE DRILLING COMMENCED : 0500 hrs, 16 January 1990

DATE TOTAL DEPTH REACHED : 2230 hrs, 20 February 1990

TOTAL DEPTH : 5021 ft

RIG RELEASED : 2100 hrs, 23 February 1990

GEOLOGICAL FORMATION TOPS :	Parke Siltstone	Surface
	Mereenie Sandstone	51 ft
	Carmichael Sandstone	1758 ft
	Stokes Siltstone	2001 ft
	Stairway Sandstone	3084 ft
	Horn Valley Siltstone	3869 ft
	Pacoota Sandstone	4120 ft
	P1-40	4156 ft
	P1-60	4178 ft
	P1-80	4194 ft
	P1-110	4211 ft
	P1-120	4222 ft
	P1-140	4255 ft
	P1-180	4294 ft
	P1-200	4304 ft
	P1-210	4323 ft
	P1-240	4342 ft
	P1-280	4391 ft
	P1-310	4415 ft
	P1-350	4454 ft
	P2	4470 ft
	P3-10	4690 ft
	P3-70	4756 ft
	P3-90	4778 ft
	P3-120	4800 ft
	P3-130	4813 ft
	P3-150	4850 ft
	P3-190	4885 ft
	P3-230	4918 ft
	P3-250	4952 ft
	P4	4971 ft

2.0 SAMPLING, LOGGING AND TESTING

2.1 Ditch Cuttings

Ditch cuttings were collected at 30 ft intervals from 890-4010 ft (near Top Pacoota Sandstone) and thereafter at 10 ft intervals to 5021 ft (TD). All samples were lagged, described and examined for hydrocarbon indications. Three sets of washed samples and two sets of unwashed samples were collected and distributed as follows :

AGL Petroleum : 1 set washed, 1 set unwashed.

Magellan Petroleum : 1 set washed.

NT Department of Mines : 1 set washed, 1 set unwashed.

2.2 Geochemical Sampling

No geochemical canned samples were collected. Samples of mud used to drill the upper, lower and bottom hole sections were collected.

2.3 Mud Logging

A mud logging unit was operational from 800 ft to total depth. Total gas, percentage lithology, rate of penetration, WOB, bit RPM and other pertinent data were monitored and displayed graphically on a mud log (Enclosure 2).

Detailed lithological and hydrocarbon show descriptions were prepared by a wellsite geologist from 800 ft to total depth and these are presented in Appendix 1. The wellsite geologist was also responsible for supervision of mud logging, wireline logging and formation testing. A composite log is included as Enclosure 1.

2.4 Conventional/Sidewall Cores

No conventional or sidewall cores were cut.

2.5 Wireline Logs

Wireline logs were run by Schlumberger Australia over the following intervals :

	<u>LOG</u>	<u>INTERVAL (metres)</u>	
RUN 1:	LDL-CNL-CAL-GR	3938.0 - 2256.0	
	DLL-MSFL-CAL-GR	3924.0 - 2256.0	(GR to surface)
	FMS	3924.0 - 2935.0	
Processed Log:	CYBERDIP	3930.0 - 2950.0	
RUN 2:	LDL-CNL-CAL-GR	5019.0 - 3936.0	
	DLL-MSFL-CAL-GR	5006.0 - 3936.0	
	FMS	5020.0 - 4150.0	
		4200.0 - 3936.0	(SHDT mode)
	RFT	4941.0 - 4206.0	
Processed Logs:	CYBERDIP	5020.0 - 3936.0	
	CYBERLOOK	4970.0 - 4180.0	

Films and prints of the logs were provided at scales of 1:200 & 1:500. A magnetic tape was also provided. Prints of the logs at 1:200 & 1:500 scales are presented in Enclosures 3-12.

2.6 Velocity Survey

No velocity survey was run.

2.7 Deviation Record

The deviation data is presented in Appendix 4.

2.8 Formation Testing

Open Hole Tests:

Gas first started flaring from the blooie line at 4199 ft while air drilling. Drilling continued to 4212 ft (just below P1-80 sand) whereupon an open hole test was conducted with results as follows :

Open Hole: Test Depth	Flow	Orifice Size	Flow Pressure	Temp	Gas Gravity
4112 ft	881,000 cfgd	1/2"	166 psig	105°F	0.77

Drill Stem Tests

One drill stem test was conducted from 4140-4422 ft, spanning most of the Pacoota Sandstone 'P1 unit' interval. A summary of results is given below.

DST 1 (4140 - 4422 ft)

P1-440 through P1-310

Date : 13 February 1990
 Tester : Australian DST
 Formation : Pacoota P1
 Type of Test : Conventional Bottom Hole Dual Packers
 Water Cushion : Nil
 Times : First Flow : 10 minutes
 First Shut-in : 30 minutes
 Second Flow : 180 minutes
 Second Shut-in : 480 minutes
 Pressures : Initial Hydrostatic : 1779.6 psi
 First Flow : 213-192 psi
 Initial Shut-in : 1636 psi
 Second Flow : 210-268 psi
 Second Shut-in : 1640 psi
 Final Hydrostatic :
 Recorder Depth : 4122 ft

Results : Tool opened with immediate moderate blow. Gas flare at blooie line after 7 mins. Tool shut-in after 10 mins. Tool opened with immediate strong blow and gas flare. Flow was measured through 1/2" flow prover at 0.582 MMCFGD after 180 mins. (A maximum flow of 0.999 MMCFGD was recorded through a 1" choke).

Recovery : 500' rathole mud with trace condensate.

Samples : 3 gas, 3 fluid.

Remarks : See Drilling and Completion Record (Appendix 2) for test details.

Repeat Formation Testing

An RFT tool was run for pressure information, however no samples were taken. A summary of results is given below and a detailed RFT log included in Enclosure 4.

Depth of Test (ft)	Formation Pressure (psig)	Remarks
4206.5	-	Tight
4214.0	-	Tight
4226.5	-	Tight
4202	-	Seal Failure
4399	-	Tight
4432	-	Tight
4462	-	Tight
4461	-	Tight
4396	-	Tight
4705	-	Tight
4710	1901.36	After 30 mins. Mod. Tight
4802	1703.05	After 10 mins. Good K
4837.5	1697.17	After 15 mins. Good K
4864	-	Tight
4865	-	Tight
4911	-	Tight
4912	-	Tight
4941	1890.01	After 5 mins. Very Good K

3.0 GEOLOGICAL DATA

3.1 Reasons for Drilling

East Mereenie No 29 is the thirty seventh well to be drilled in the Mereenie oil and gas field and was designed as an oil development well targeting the Ordovician P3-120/130 reservoir of the Pacoota Sandstone. A secondary objective of the well was to provide information on the other prospective Ordovician formations, in particular the Stairway Sandstone and the P1 unit of the Pacoota Sandstone.

The well is located on the north eastern flank of the Mereenie Anticline 786 metres north west of East Mereenie No 14 (EM 14) which tested 666 BOPD and 432 MCFGD from the P3-120/130 sands.

3.2 Stratigraphy

East Mereenie No. 29 spudded in a thin veneer of Parke Siltstone formation of Devonian age, underlain by the Mereenie Sandstone at 51 feet. Total depth was reached at 5021 feet, 131 feet below the top of the Pacoota Sandstone P4 unit (Table 1).

The stratigraphic sequence intersected was very similar to that encountered in other wells in the field and consisted of aeolian fluvial, lacustrine and shallow marine sediments comprising sands, silts, shales and minor carbonate (Figure 3). The sequence ranged in age from late Devonian at the surface to early Ordovician at total depth.

A comparison of formation thicknesses with EM 14 to the east shows that the Mereenie to basal Stokes Siltstone interval has thickened by approximately 140 feet, the Stairway Sandstone has thinned by approximately 42 feet, the Horn Valley Siltstone has thickened by approximately 20 feet, the Pacoota Sandstone P1 & P2 unit thicknesses are almost identical and the P3 unit, although not fully penetrated in EM 14, appears to be similar in thickness.

3.3 Formation Dips

Dipmeter surveys were run at intermediate casing point and at total depth.

The average structural dip of the formation was estimated at 14° in a north northeast direction.

3.4 Petroleum Geology

Gas detection and the logging of ditch cuttings commenced in the middle of the Mereenie Sandstone and continued to total depth, just below the top of the Pacoota Sandstone P4 unit.

Significant gas and hydrocarbon shows were observed in the Pacoota Sandstone P1, P2 and P3 units. Only minor gas shows were recorded while drilling through the Upper, Middle and Lower Stairway Sandstone.

Upper Stairway Sandstone (3084 - 3244 ft)

The Upper Stairway Sandstone is a predominantly arenaceous unit with minor interbedded siltstone and rare thin carbonates. Sandstone porosities derived from wireline logs are tabulated in Appendix 5.

Although porosities up to 13% occur and a total of 34 ft of net sand with $\geq 6\%$ \emptyset is present, there is very poor permeability, as the section was drilled with air without any fluid entry into the borehole. Evidence from other wells in the Mereenie Field indicates that the Upper Stairway lies totally within the gas column at this location.

Middle Stairway Sandstone (3244 - 3663 ft)

The Middle Stairway Sandstone is a dominantly siltstone unit, becoming sandier towards its base.

Porosity development is poor with only three thin zones totalling 8.5 ft exhibiting porosities $\geq 6\%$. No hydrocarbon shows or fluid entry into the wellbore was noted while air drilling this interval, confirming its lack of permeability.

Lower Stairway Sandstone (3663 - 3869 ft)

As in adjacent wells the Lower Stairway Sandstone is comprised of three distinct lithostratigraphic units. The uppermost consists of sandstone with lesser interbedded siltstone, the middle is dominantly siltstone, and the lower is a partly bar shaped sandstone unit which has reservoir potential in certain areas of the field.

Porosities were generally poor throughout the Lower Stairway with only several thin zones totalling 15.5 ft exhibiting $\geq 6\%$ \emptyset , and maximum porosities in the order of 9-10%. The basal (LS 160) sand was dominantly tight with only one thin zone (3865-3867 ft) showing a maximum of 8% porosity.

Only minor gas shows (up to 2 units) were recorded while drilling through the Lower Stairway which lies totally within the gas column. This and the absence of any fluid influx into the well bore while air drilling, again confirms the presence of low permeabilities.

Horn Valley Siltstone (3869-4120 ft)

The Horn Valley Siltstone is a euxinic, dominantly siltstone unit with thin interbeds of limestone and dolomite.

Only minor gas shows (up to 2 units) were recorded through this information which characteristically has no reservoir potential in the Mereenie Field. Although one thin zone (4017-4020 ft) exhibits up to 6% porosity, cuttings and the lack of any fluid flow while air drilling indicates nil or very poor permeability.

Parcoota Sandstone P1 Unit (4120-4470 ft)

The Parcoota Sandstone P1 reservoir unit contains 23 ft of net sand with $\geq 6\%$ \emptyset distributed in a number of thin sands (Appendix 5). A gas flare was first observed at the end of the blooie line while air drilling at 4199 ft, in the middle of the P1-80 sand. Drilling

continued down to 4212 ft, just below the base of the P1-80 sand, whereupon an open hole test was run, recovering 0.881 MMCFGD. The well was then mud drilled to 4422 ft, which is below the top of the P1-310 sand and a DST run over the interval 4140-4422 ft (entire P1 except for basal P1-310 & P3-150 sands). The recovery of 0.582 MMCFGD suggests that little or no additional permeable zones had been encountered.

Wireline logs showed generally poor porosities in all sands tested, although the upper P1-80 sand was severely washed out preventing a reliable porosity measurement. The results of the open hole test indicates however, that the latter sand has both good porosity and permeability.

No cores were cut or further tests run in the P1 unit, though cuttings confirm the generally poor porosity due to silica cementation. Trace to 30% dull green-white fluorescence with no to very slow dull white cut was observed in cuttings from below approximately 4210 ft.

Parcoota Sandstone P2 Unit (4470 - 4690 ft)

The Pacoota Sandstone P2 unit showed characteristically little reservoir potential with only 11 ft of nett sand with $\geq 6\%$ \emptyset and a maximum porosity of 9%. This is consistent with its finer grained lithology, with silts predominating.

Gas units were low averaging 2-3 units and cuttings confirmed the presence of generally tight to poor porosities as most sands were moderately to well silica cemented.

20-30% very dull yellow-white fluorescence with no to very dull white crush cut was observed in sandstone cuttings below 4660 ft (-2140 ft) which is just below the expected gas/oil contact of -2130 ft MSL.

No tests were run or cores cut through the P2 unit which was mud drilled.

Pacoota Sandstone P3 Unit (4690-4970 ft)

The Pacoota Sandstone P3 unit is a dominantly sandstone interval with normally the best reservoir potential in the Mereenie Field.

In EM-29 the unit has a total of 117.5 ft with $\geq 6\%$ \emptyset and porosities of up to 13.5% (See Appendix 5). The most porous zone is the P3-120/130 sand with 29.5 ft of net pay with $> 9\%$ and up to 11% porosity. Although not tested this sand is productive in most east flank Mereenie wells, the closest of which, EM-14, 786 metres to the east, produced 666 BOPD from the same zone.

Significant gas (up to 148 units) and liquid hydrocarbon shows (yellow-white fluorescence and white cut) were observed from the top of the P3 unit down to approximately 4930 ft (-2405.6 ft). Below this depth wireline logs indicate porous sands have high water saturations.