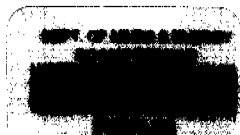


**WEST MEREENIE 9
WELL COMPLETION REPORT**

**COMPILED FOR
SANTOS LIMITED**

**Prepared By:
R. LOWMAN
(Consultant)
February, 1994**

PR94/27

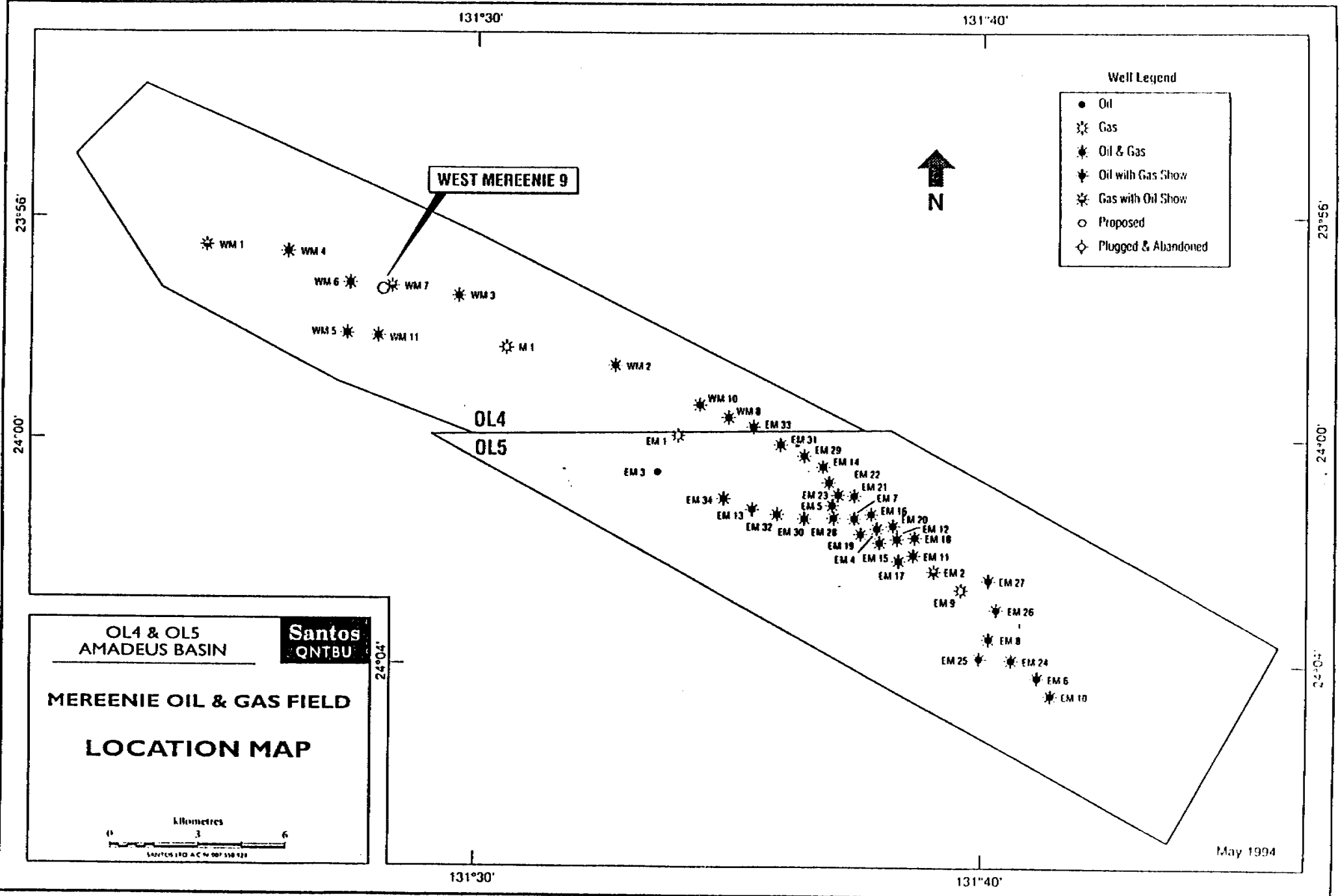


WEST MEREENIE 9

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LOCATION MAP



WELL CARD

WELL: WEST MEREENIE 9		WELL CATEGORY OIL DEVELOPMENT		SPUD: 13/07/94 TD REACHED: 06/08/94	
				RIG RELEASED: 08/08/94 CMPLT:	
				RIG: MEREENIE RIG 1	
LAT: 23° 57' 31.90" S		LONG: 131° 28' 09.00" E		STATUS: COMPLETED OIL WELL	
SEISMIC STATION: 110m West of SP 2174, Line M83-12				REMARKS: COMPLETED AS AN OIL	
ELEVATION GND: 770.8 M		KB 776.9 M		PRODUCER FROM PACOOTA P3-120/130 SAND	
BLOCK/LICENCE: MEREENIE BLOCK, OL 4					
TD 1544		M (Logr Ext) 1544		M (Drlr)	
PBTD		M (Logr)		M (Drlr)	
TYPE STRUCTURE: NW FLANK, MEREENIE ANTICLINE		CASING SIZE 10 3/4"		SHOE DEPTH 634m L, 634.6m D	
TYPE COMPLETION: SINGLE OIL				40.5 LB/FT	
ZONE(S): PACOOTA SST (P3-120/130 SAND)		5 1/2"		1542.9m D	
				MIXED	

AGE	FORMATION OR ZONE TOPS	DEPTH (M)		TST (M)	HIGH (H)
		LOGGERS (Measured)	SUBSEA (TVD)	(True Strat Thickness)	LOW (L)
LATE SILURIAN TO MIDDLE DEVONIAN	MEREENIE SANDSTONE	6.1	+770.8	453.6	-
LATE ORDOVICIAN	CARMICHAEL SANDSTONE	459.3	+317.7	90.4	14.8m H
MIDDLE TO LATE ORDOVICIAN	UPPER STOKES SILTSTONE	550.7	+226.4	256.9	19.5m H
MIDDLE ORDOVICIAN	LOWER STOKES SILTSTONE	810.0	-32.7	84.3	17.4m H
MIDDLE ORDOVICIAN	UPPER STAIRWAY SANDSTONE	894.9	-117.4	54.7	8.7m H
MIDDLE ORDOVICIAN	MIDDLE STAIRWAY SANDSTONE	950.0	-172.4	129.9	10.7m H
MIDDLE ORDOVICIAN	LOWER STAIRWAY SANDSTONE	1080.5	-302.5	74.1	10.6m H
EARLY ORDOVICIAN	HORN VALLEY SILTSTONE	1154.8	-376.4	82.4	10.7m H
EARLY ORDOVICIAN	PACOOTA SANDSTONE				
EARLY ORDOVICIAN	P1 UNIT	1237.4	-458.5	104.5	7.6m H
EARLY ORDOVICIAN	P2 UNIT	1343.0	-564.0	67.2	4.1m H
EARLY ORDOVICIAN	P3 UNIT	1411.0	-632.0	80.9	1.1m H
EARLY ORDOVICIAN	TOP P3 - 120/130 SAND	1444.0	-664.9	-	1.4m H
EARLY ORDOVICIAN	BASE P3 - 120/130 SAND	1456.4	-677.3	-	2.2m L
EARLY ORDOVICIAN	P4 UNIT	1492.7	-713.6	+50.9	0.5m H
	TOTAL DEPTH (LOGR EXTRAP)	1544.0	-764.8		

LOG INTERPRETATION (Interval Averages)						PERFORATIONS (6 shots/ft)				
INTERVAL(m)	Ø %	SW %	INTERVAL(m)	Ø %	SW %	FORMATION		INTERVAL		
PACOOTA SST						PACOOTA SST (P3-120/130 SAND)		1444m - 1457 m		
P1-280 SAND										
1320-1324(3.5)	4.3	25.9								
P3-120/130 SAND						CORES				
1444-1456.8(8.4)	9.7	35.1				FORM	NO.	INTERVAL	CUT	REC
LOWER P3						PACOOTA	1	1444m- 1447.5m (L)	3.5m	2.87m
1472-1486(4.6)	7.2	51.3				P3-120/130		1444m- 1447.5m (D)		(82%)
						PACOOTA	2	1447.5m-1461.5m (L)	14m	13.9m
						P3-120/130		1447.5m-1461.5m (D)		(99%)

LOG	RUN	INTERVAL	BHT/TIME	LOG	RUN	INTERVAL	BHT/TIME
FMS-GR-	1	1190m - 880m	110°F/4 Hrs 12 Min	LDL-CNL-	2	1543m - 875m	134°F/13 Hrs 27 Min
AMS-CAL				PEF-NGS-			
				CAL			
DLL-CAL-SP	1	1539m - 634m	127°F/6 Hrs 32 Min	(*High resolution LDL-CNL-PEF-NGS pass from 1543m-1200m)			
MSFL		1523m - 870m					
AS w/WFT		1531m - 1200m		FMS-GR-	3	1543m - 1175m	136°F/18 Hrs 30 Min
GR		1516m - 17m		AMS-CAL			

FORMATION TESTS (OPEN HOLE)

NO.	INTERVAL (m)	FORMATION	FLOW (mins)	SHUT IN (mins)	BOTTOM GAUGE IP/FP (psia)	SIP	MAX SURF PRESS (psia)	FLUID TO SURF (mins)	TC/BC	REMARKS
1	1327m L 1327m D	PACOOKA P1 (P1-280 SAND)	153	122	-	1346	713	GTS	1/2" -	GTS @ 4.02 MMCFD.
2	1444m L 1444m D	PACOOKA SST (P1-280 thru P3-90 sands)	65	115	-	1222	509	GTS	1/2" -	GTS @ 2.91 MMCFD.

SUMMARY:

WEST MEREENIE 9, A MEREENIE FIELD (QNTBU) OIL DEVELOPMENT WELL, IS LOCATED 257 M SOUTHWEST OF MEREENIE 7, ON THE NORTHWESTERN FLANK OF THE MEREENIE ANTICLINE. THE WEST MEREENIE 9 SURFACE LOCATION IS 110 M WEST OF SP 2174, LINE M83-12. THE MEREENIE FIELD IS LOCATED WITHIN OIL LEASE NO. 4 OF THE NORTHERN TERRITORY. THE PRIMARY OBJECTIVE OF WEST MEREENIE 9 WAS TO INTERSECT THE TOP OF THE PACOOKA SANDSTONE P3 - 120/130 RESERVOIR AT A TRUE VERTICAL DEPTH OF -666.3 M SUBSEA, 17.1 M BELOW THE FIELD GAS - OIL CONTACT.

STRATIGRAPHY INTERSECTED WAS AS PROGNOSIS, WITH ALL FORMATION TOPS BEING INTERSECTED HIGH TO PROGNOSIS DUE TO GREATER THAN ANTICIPATED FORMATION (BEDDING) DIP. AS A RESULT, THE HORIZONTAL DISTANCE TO TARGET TVD (-666.3 M) WAS REVISED FROM 200 M TO A PREFERRED DISTANCE OF 62 M IN THE UPDIP (SSW) DIRECTION. FINAL WELL RESULTS INDICATE THAT THE TOP P3 - 120/130 SAND WAS INTERSECTED AT -664.9 M TVD, 64.4 M SOUTHWEST OF THE SURFACE LOCATION ON AN AZIMUTH OF 193°. TARGET INTERSECTION WAS ONLY 1.4 M HIGH TO PROGNOSIS AND WELL WITHIN TARGET PARAMETERS.

INTERMEDIATE ELECTRIC LOGGING IN WEST MEREENIE 9 CONSISTED OF AN FMS4 - GR - AMS RUN FROM 35 M INTO THE HORN VALLEY SILTSTONE TO 880 M. THIS RUN WAS DESIGNED FOR FINAL TARGET DISTANCE REVISION. ELECTRIC LOGGING AT TOTAL DEPTH OF 1544 M (DRLR AND LGR) CONSISTED OF THE FOLLOWING: RUN 1: DLL-MSFL-AS-GR-SP-CAL; RUN 2: LDL-CNL-PEF-NGS-CAL; RUN 3: FMS4-GR-AMS-CAL. ARRAY SONIC WAS RECORDED WITH WAVEFORM TAPING, WITH A HIGH RESOLUTION LDL-CNL-PEF-NGS PASS FROM 1543 M - 1200 M.

TWO PRE-LOGGING OPEN HOLE FLOW TESTS PRIOR TO MUDDING UP AND INTERSECTION OF THE P3 - 120/130 SAND WERE RUN IN WEST MEREENIE 9. OPEN HOLE TEST 1 AT 1327 M (LGR AND DRLR) TESTED THE PACOOKA P1 - 280 SAND, FLOWING GAS AT 4.02 MMCFD. OPEN HOLE TEST 2 AT 1444 M (LGR AND DRLR) TESTED THE PACOOKA P1 - 280 THROUGH P3 - 90 SANDS INCLUSIVE, RESULTING IN A GAS FLOW RATE OF 2.91 MMCFD. GAS PRODUCTION IN WEST MEREENIE 9 ABOVE THE P3 - 120/130 SAND IS INTERPRETED TO BE EXCLUSIVELY FROM THE P1 - 280 SAND.

TWO FIBRE GLASS SLEEVE CORES WERE CUT IN WEST MEREENIE 9, SPANNING THE PACOOKA P3 - 120/130 SAND. CORE 1 WAS CUT FROM ONLY 1444 M TO 1447.5 M (LGR AND DRLR) DUE TO CORE SHOE FAILURE. CORE 2 WAS CUT FROM 1447.5 M TO 1461.5 M (LGR AND DRLR). A TOTAL OF 17.5 M OF CORE WAS CUT, WITH 16.75 M RECOVERED.

PRELIMINARY LOG ANALYSIS, COMBINED WITH CORE ANALYSIS AND OPEN HOLE TEST RESULTS, INDICATES THE FOLLOWING NET PAY WITHIN WEST MEREENIE 9: PACOOKA P1-280 SAND (3.5M NET GAS PAY, AVERAGE POROSITY 4.3%, AVERAGE SW 25.9%); PACOOKA P3-120/130 SAND (8.4M NET OIL PAY, AVERAGE POROSITY 9.7%, AVERAGE SW 35.1%); LOWER P3 SAND (4.6M NET PAY, AVERAGE POROSITY 7.2%, AVERAGE SW 51.3%).

WEST MEREENIE 9 IS CASED AND COMPLETED AS AN OIL PRODUCER FROM THE PACOOKA SANDSTONE P3 - 120/130 RESERVOIR.

AUTHOR: R. LOWMAN

DATE: FEBRUARY, 1994

WELL HISTORY

1. **GENERAL DATA**

Well Name:	West Mereenie 9	
Well Classification:	Oil Development	
Interest Holders:	SANTOS Group	65.0000%
	Magellan Petroleum	35.0000%
Participating Interests:	SANTOS Group	65.0000%
	Magellan Petroleum	35.0000%
Operator:	SANTOS Limited	
Block:	Mereenie Block, Northern Territory	
Licence:	Oil Lease 4 (OL 4)	
Surveyed Location:	Latitude: 23° 57' 31.90" South (ANS) Longitude: 131° 28' 09.00" East (ANS)	
Surveyed Elevation:	Ground Level: 770.8 M Kelly Bushing: 776.9 M	
Seismic Location:	110 Metres West of Shot Point 2174, Line M83-12	
Total Depth:	Driller: 1544 M	
	Logger: 1544 M (Extrapolated)	
Completion:	Surface Casing: 53 joints of 10 3/4" 40.5#/ft H40 ST&C casing set at 634 M (L), 634.58 M (D).	
	Production Casing: Mixed string of 5 1/2" casing run as follows:	
	24 joints of 17#/ft L80 LT&C casing AND 104 joints of 14#/ft J55 ST&C casing set at 1542.86 M (D).	
	PBTD: 1592.2 M	
Status:	Single Completion Oil Well.	

2. DRILLING DATA

Date Drilling Commenced: 0900 hours, 13th July, 1994

Date Drilling Completed: 0410 hours, 6th August, 1994

Date Rig Released: 1800 hours, 8th August, 1994

Contractor: Oil Drilling and Exploration Pty. Ltd. (OD&E)
8th Level
9 Bligh Street
Sydney NSW 2000

Rig: Mereenie Joint Ventures Rig 1 (under lease to OD&E)

Rig Specifications: (Refer to Appendix X)

3. DRILLING SUMMARY

(a) Drilling Summary (All Depths Driller's KB)

West Mereenie 9 was spudded at 0900 hours on the 13th of July, 1994.

Tables I and II summarise the major drilling operations in this hole. More comprehensive summaries are appended to this report (Appendix VIII: Drilling Summary; Appendix IX: Completion Summary).

TABLE I: CASING, HOLE, AND CEMENT DETAILS

BIT SIZE	DEPTH	CSG SIZE	CSG DEPTH	JNTS	CSG TYPE	CEMENT
17 1/2"	30 M	15"	30 M	3	Conductor Pipe	-
13 9/16"	331 M	-	-	-	-	-
13 1/2"	636 M	10 3/4"	634.58 M	53	40.5 #/ft H40 ST&C	290 sx Class 'A' + 56 sx Class 'A' top up
9 7/8"	1193M	-	-	-	-	-
8 1/2"	1544 M	5 1/2"	1542.86 M	128	Mixed String	700 sx Class 'G'

TABLE II: SUMMARY OF MUD SYSTEMS

MUD TYPE	INTERVAL
Air	Surface - 30 M
Air/Mist/Foam	30 M - 1193 M
Water/2% Brine	1193 M - 1306 M
Air/Mist/Foam	1306 M - 1444 M
5% Nacl/EZ MUD/Polymer	1444 M - 1544 M

(b) Lost Time

Lost time at West Mereenie 9 is attributed to the following:

- 1) Repair oil leaks in drawworks at 1090 metres (1.0 hours).
- 2) Repairs to kelly spinner at 1338 metres (0.5 hours).
- 3) Repairs to Oiltools injection pump at 1365 metres and 1384 metres (total 1.0 hours).

(c) Water Supply

Make up water (Rw 9.15 @ 75° F) was trucked from the Mereenie Bore located approximately 6 km west of the wellsite.

(d) Mudlogging

The Mereenie Rig 1 mudlogging unit was manned by a crew from Colin Higgins and Associates. Samples were collected, washed and described at 10 metre intervals from 40 metres to 880 metres, and then at 3 metre intervals from 880 metres to total depth at 1544 metres. All samples were checked for oil shows using ultraviolet fluorescence. Gas levels were monitored from 40 metres to TD using a hot-wire total gas detector and FID gas chromatograph. Other parameters monitored included rate of penetration, mud pit levels, and mud pump strokes (when required). A mudlog was prepared at a scale of 1:500 and is included in Enclosure II. An ASCII format of ROP and gas data was generated at the wellsite to be used in preparation of the final composite log.

(e) Testing

The following table summarises open hole test's conducted.

OHT	INTERVAL	TYPE	TESTING CO	RESULTS
1	1327 M (D) 1327 M (L)	Open Hole Test	Nil - thru rig manifold	GTS @ 4.02 MMCFD.
2	1444 M (D) 1444 M (L)	Open Hole Test	Nil - thru rig manifold	GTS @ 2.91 MMCFD.

(f) Coring

The following table summarises full hole cores cut in West Mereenie 9.

CORE NO.	FORMATION	INTERVAL	TYPE	CUT (m)	REC. (m)
1	Pacoota Sandstone (P3-120/130 Sand)	1444m - 1447.5m (D) 1444m - 1447.5m (L)	Fibre Glass Sleeve	3.5m	2.87m (82%)
2	Pacoota Sandstone (P3-120/130 Sand)	1447.5m - 1461.5m (D) 1447.5m - 1461.5m (L)	Fibre Glass Sleeve	14m	13.88m (99%)

g) Electric Logging

One run of electric logs was performed at total depth, as detailed below:

TYPE OF LOG	RUN/SUITE	INTERVAL	BHT/TIME
FMS- GR- AMS- CAL-	1/1	1190m - 880m 1181m - 880m 1190m - 880m 1178m - 880m	110°F/4 hrs 12 min
DLL- MSFL- GR- AS w/WFT- SP- AMS- CAL	1/2	1539m - 634m 1523m - 870m 1516m - 17m 1531m - 1200m 1509m - 634m 1510m - 634m 1531m - 634m	127°F/6 hrs 32 min
LDL- CNL- PEF- NGS- AMS- CAL HLDL - HCNL	2/2	1543m - 875m 1543m - 875m 1543m - 875m 1534m - 875m 1528m - 875m 1543m - 875m 1543m - 1200m	134°F/13 hrs 27 min
FMS- GR- AMS- CAL	3/2	1543m - 1175m 1535m - 1175m 1532m - 1200m 1543m - 1175m	136°F/18 hrs 30 min

(h) Geothermal Gradient

An extrapolated bottom hole temperature of 141°F at 1544 metres is calculated. This gives a geothermal gradient of 1.38°F/30m. Data used for calculations is as follows:

127°F at 1510 metres after 6 hrs 32 min from the DLL-MSFL-AS-GR-SP-AMS-CAL final logging run.

134°F at 1528 metres after 13 hours 27 min from the LDL-CNL-PEF-NGS-AMS-CAL final logging run.

136°F at 1532 metres after 18 hrs 30 min from the FMS-GR-AMS-CAL final logging run.

Additional temperature data available but not used in calculating the BHT/geothermal gradient is as follows:

110°F at 1190 metres after 4 hours 12 min from the FMS-GR-AMS-CAL intermediate logging run.

(i) Hole Deviation

Deviation survey results are summarised in Appendix VIII (Drilling Summary) and on the Composite Log (Enclosure I).

(j) Velocity Survey

No velocity survey was run in West Mereenie 9.

(k) Completion Summary

West Mereenie 9 was cased and suspended in early August 1994. 5 1/2" casing was run to 1542.86 metres (D) and cemented with 700 sacks Class 'G' cement. After fracture treatment West Mereenie 9 was completed in mid September 1994 as a single oil producer from the Pacoota P3-120/130 sand. 2 3/8" tubing was run to 1432.17m, and the interval 1444m-1457m perforated. Oil production has gradually increased from an average of 25 BOPD to 45 BOPD at the end of January 1995, with associated minor water production.

GEOLOGY

1. **PRE-DRILLING SUMMARY**

West Mereenie 9, a QNTBU (Queensland and Northern Territory Business Unit) Oil Development well, will be the forty-sixth well to be drilled in the Mereenie Oil and Gas Field in the Amadeus Basin, Northern Territory. The proposed well is located at SP 2174, Line M83-12, 257 metres southwest of West Mereenie 7 on the northwestern flank of the Mereenie Anticline. The Mereenie Oil and Gas Field is located within Oil Lease No. 4.

The primary objective of West Mereenie 9 was the Pacoota Sandstone (P3 Unit, 120/130 sand) for oil production. Secondary objectives of the well were the Lower Stairway Sandstone and Pacoota Sandstone P1 Unit for economic gas accumulations.

2. **DRILLING RATIONALE (after Well Proposal)**

West Mereenie 9 was designed to target the top of the Pacoota P3-120/130 reservoir (net sand) at a true vertical depth (TVD) of -666.3 metres (subsea), 17.1 metres below the field gas-oil contact of -649.2 metres (subsea).

The base of the P3-120/130 sand was prognosed at -675.1 metres (subsea), 25 metres above the well intersection in West Mereenie 7 and 44.2 metres above the field oil-water contact of -719.3 metres (subsea). This proposed target intersection was 11.6 metres higher than the elevation of the P3-120/130 sand in West Mereenie 4, which is interpreted to be in a transition zone (top of transition zone for Mereenie Field at -679.7 metres subsea). If intersected on prognosis, the base of the P3-120/130 sand in West Mereenie 9 was expected to be 4.6 metres above the interpreted top of the field transition zone, with minimal water production anticipated.

West Mereenie 9 spudded in the Mereenie Sandstone and deviated updip to intersect the top of the target P3-120/130 sand at a prognosed true vertical depth of -666.3 metres (subsea). Proposed total depth was 1562 metres, 45 metres into the Pacoota P4 unit. Although the horizontal distance to the target was prognosed as 200 metres, this distance was only approximate and subject to revision after intersection of the Stokes Siltstone. A further revision of the target depth was to be made after the intermediate logging run, covering the top of the Horn Valley Siltstone.

Where possible, both the Lower Stairway Sandstone and the P1 unit of the Pacoota Sandstone were to be air drilled, to allow for the monitoring of open hole gas flow rates from these units.

West Mereenie 9 had an anticipated high probability of success, as it was targeting the best reservoir in the Mereenie Field (the Pacoota P3-120/130) in a structurally favourable position.

3. **RESULTS OF DRILLING**

(a) **Stratigraphy**

West Mereenie 9 was spudded in the Mereenie Sandstone and reached a total measured depth of 1544 metres in the upper Pacoota Sandstone P4 unit. The following table lists the formations intersected in West Mereenie 9, together with subsea elevations and thicknesses. All depths are Logger's Depths.

TABLE III: WEST MEREENIE 9 STRATIGRAPHY

AGE	FORMATION	DEPTH (MD)		SUBSEA (TVD)		THICKNESS (TST)	
		Metres	Feet	Metres	Feet	Metres	Feet
L. Silurian-M. Devonian	Mereenie Sandstone	6.1	20.0	+770.8	+2548.9	453.6	1488.2
Late Ordovician	Carmichael Sandstone	459.3	1506.9	+317.7	+1042.4	90.4	296.6
Middle to Late Ordovician	Upper Stokes Siltstone	550.7	1806.7	+226.4	+742.7	256.9	842.8
Middle Ordovician	Lower Stokes Siltstone	810.0	2657.4	-32.7	-107.2	84.3	276.6
Middle Ordovician	Upper Stairway Sandstone	894.9	2936.0	-117.4	-385.2	54.7	179.5
Middle Ordovician	Middle Stairway Sandstone	950.0	3116.8	-172.4	-565.6	129.9	426.2
Middle Ordovician	Lower Stairway Sandstone	1080.5	3544.9	-302.5	-992.4	74.1	243.1
Early Ordovician	Horn Valley Siltstone	1154.8	3788.7	-376.4	-1235.0	82.4	270.3
Early Ordovician	Pacoota Sandstone						
Early Ordovician	P1 Unit	1237.4	4059.7	-458.5	-1504.3	104.5	342.8
Early Ordovician	P2 Unit	1343.0	4406.1	-564.0	-1850.3	67.2	220.5
Early Ordovician	P3 Unit	1411.0	4629.2	-632.0	-2073.4	80.9	265.4
Early Ordovician	Top P3-120/130 Sand	1444.0	4737.5	-664.9	-2181.6	-	-
Early Ordovician	Base P3-120/130 Sand	1456.8	4779.5	-677.3	-2222.1	-	-
Early Ordovician	P4 Unit	1492.7	4897.3	-713.6	-2341.2	+50.9	+167.0
	TOTAL DEPTH (Logger Extrapolated)	1544.0	5065.6	-764.8	-2509.3		
MD:	Measured Depth						
TVD:	True Vertical Depth						
TST:	True Stratigraphic Thickness						

Cuttings samples were collected, washed, and described at 10 metre intervals from 40 metres to 880 metres, and thereafter at 3 metre intervals from 880 metres to 1544 metres (Total Measured Depth - Logger Extrapolated).

The stratigraphic sequence penetrated by West Mereenie 9 was very similar to that encountered by other wells in the field. It consists of aeolian, fluvial, lacustrine, and shallow to moderately deep marine sediments comprising sandstones, siltstones, and minor carbonates of Late Silurian to Early Ordovician age (Figure 2). For detailed lithological descriptions refer to Appendix I.

(b) Stratigraphic Prognosis (Logger's Depths)

West Mereenie 9 is located 110 metres west of Shot Point 2174, Line M83-12. Well control was provided primarily by West Mereenie 7, located 257 metres to the northeast.

All formation tops were intersected high to prognosis (the base of the P3-120/130 sand was intersected 2.6 metres low to prognosis). West Mereenie 9 was deviated in order to intersect the top of the Pacoota P3-120/130 oil reservoir at an elevation of -666.3 metres (subsea). The actual intersection was at -664.9 metres, 1.4 metres high to the proposed target depth.

Actual versus prognosed formation tops and thicknesses for West Mereenie 9 are tabled below:

**TABLE IV: ACTUAL VERSUS PROGNOSED DEPTHS AND THICKNESSES
WEST MEREENIE 9**

FORMATION	DEPTHS PROGNOSED (m)			DEPTHS ACTUAL (m)			DEPTH DIFF (m)	THICKNESSES PROGNOSED (m)		THICKNESSES ACTUAL (m)	
	MD	TVD	SS	MD	TVD	SS	SS	MEAS	TST	MEAS	TST
Mereenie Sandstone	6.1	6.1	+770.8	6.1	6.1	+770.8	-	467.9	459.9	453.2	453.6
Carmichael Sandstone	474.0	474.0	+302.9	459.3	459.2	+317.7	14.8 H	96.0	95.0	91.4	90.4
Upper Stokes Siltstone	570.0	570.0	+206.9	550.7	550.5	+226.4	19.5 H	260.0	259.0	259.3	256.9
Lower Stokes Siltstone	830.0	827.0	-50.1	810.0	809.6	-32.7	17.4 H	79.0	78.0	84.9	84.3
Upper Stairway Sandstone	909.0	903.0	-126.1	894.9	894.3	-117.4	8.7 H	59.0	58.0	55.1	54.7
Middle Stairway Sandstone	968.0	960.0	-183.1	950.0	949.3	-172.4	10.7 H	135.0	133.0	130.5	129.9
Lower Stairway Sandstone	1103.0	1090.0	-313.1	1080.5	1079.4	-302.5	10.6 H	77.0	76.0	74.3	74.1
Horn Valley Siltstone	1180.0	1164.0	-387.1	1154.8	1153.3	-376.4	10.7 H	82.0	81.0	82.6	82.4
Pacoota Sandstone											
P1 Unit	1262.0	1243.0	-466.1	1237.4	1235.4	-458.5	7.6 H	105.0	104.0	105.6	104.5
P2 Unit	1367.0	1345.0	-568.1	1343.0	1340.9	-564.0	4.1 H	68.0	67.0	68.0	67.2
P3 Unit	1435.0	1410.0	-633.1	1411.0	1408.9	-632.0	1.1 H	34.0	33.0	33.0	32.6
Top P3-120/130 Sand	1469.0	1443.2	-666.3	1444.0	1441.8	-664.9	1.4 H	9.0	8.0	12.4	12.3
Base P3-120/130 Sand	1478.0	1452.0	-675.1	1456.4	1454.2	-677.3	2.2 L	39.0	38.0	36.3	36.0
P4 Unit	1517.0	1491.0	-714.1	1492.7	1490.5	-713.6	0.5 H	+45.0	+44.0	+51.3	50.9
TOTAL DEPTH: (Logger Extrapolated)	1562.0	1519.0	-742.1	1544.0	1541.7	-764.8					
MD: Measured Depth (relative to KB) TVD: True Vertical Depth (relative to KB) SS: Subsea (relative to TVD) TST: True Stratigraphic Thickness											

- (c) **Hydrocarbon Summary** (Logger's Depths - all KB depths quoted are Measured Depths, all subsea depths are relative to True Vertical Depth)

Total gas was recorded from 40 metres to total depth (1544 metres) using a hot wire total gas detector. One unit of gas is equal to 100 ppm methane equivalent. Chromatographic analysis was determined using an FID gas chromatograph, and these values are quoted as percentages (C1 - C4). Ditch cuttings were collected at 10 metre intervals from 40 metres to 880 metres, and then at 3 metre intervals from 880 metres to TD. All samples were washed, described, and checked for fluorescence using ultraviolet light.

Surface to top Upper Stairway Sandstone (6.1 metres to 894.5 metres)

Total background gas from the surface to 894.9 metres was too small to be measured. No gas flaring was evident during drilling or after tripping. Sandstones within this interval are interpreted as water saturated.

Upper Stairway Sandstone (894.9 metres to 950.0 metres)

The Upper Stairway Sandstone is comprised predominantly of sandstone with minor interbedded siltstone and rare dolomite. The unit generally has no reservoir potential in the Mereenie Field, with no gas shows recorded in West Mereenie 9. Gas throughout the formation was too small to be measured while air/mist drilling, with no gas flaring recorded. No hydrocarbon fluorescence was observed in the Upper Stairway Sandstone.

Middle Stairway Sandstone (950.0 metres to 1080.5 metres)

The Middle Stairway Sandstone consists predominantly of siltstone with minor thinly interbedded sandstones and rare dolomite. The unit is slightly sandier towards the base. In the Mereenie Field the formation is gas saturated but tight, with no reservoir potential. Except for minor occasional connection gas after surveys (6 units of 100% C1 at 981 metres), no gas shows were recorded in the Middle Stairway Sandstone while air/mist drilling. No gas flaring was evident while drilling or after tripping. No hydrocarbon fluorescence was recorded.

Lower Stairway Sandstone (1080.5 metres to 1154.8 metres)

As in adjacent Mereenie Field wells, the Lower Stairway Sandstone in West Mereenie 9 consists of three distinct lithostratigraphic units: an upper unit consisting predominantly of sandstone with occasional siltstone interbeds (1080.5 metres to approximately 1093 metres), a middle unit consisting predominantly of siltstone with sandstone interbeds (1093 metres to 1129.5 metres), and a lower unit consisting predominantly of sandstone with thinly interbedded siltstone. This lower unit has some reservoir potential in certain areas of the field, and as such the unit was listed as a secondary objective of West Mereenie 9.

In West Mereenie 9 there were no significant gas shows recorded while air/mist drilling through the Lower Stairway Sandstone. Connection gas peaks of 6-8 units were recorded at 1091 and 1134 metres. A small total gas peak of 4 units (90:10) at the base of the formation from 1148 metres to the top of the Horn Valley Siltstone at 1154.8 metres had no associated gas flare. Log evaluation indicates tight sandstones only with no net pay recorded. At West Mereenie 9 the Lower Stairway Sandstone is interpreted to be gas saturated but with no reservoir quality sandstones.

Horn Valley Siltstone (1154.8 metres to 1237.4 metres)

The Horn Valley Siltstone is a euxinic siltstone unit with thin interbeds of fossiliferous limestone and trace sandstone. The unit in the Mereenie Field has no reservoir potential. Only minor total gas peaks of up to 4 units were recorded where the formation was air/mist drilled (1154.8 metres to 1193 metres), with no associated gas flaring.

From 1193 metres (intermediate logging point) it was necessary to run in the hole with the dynadrill, in order to decrease hole angle to achieve target parameters in the Pacoota Sandstone P3 unit. As such, the remainder of the Horn Valley Siltstone was drilled with a water/2% brine solution. Total gas peaks of up to 200 units were recorded, but these are associated with connection/survey gas. As mentioned above, the Horn Valley Siltstone has no reservoir potential in the Mereenie Field.

Pacoota Sandstone (1237.4 metres to 1544 metres total depth)

No vegetation existed during the Ordovician period, with a hot and dry climate prevalent. The Pacoota Sandstone was deposited in a transgressive series of marine to shoreline environments on the southwestern margin of a shallow epicontinental sea (after Havord, 1988). It is the primary reservoir formation for the Mereenie Field and has been divided into four lithostratigraphic units, designated P1 through P4. Three of these units and 51.2 metres (measured thickness) of the fourth were intersected in West Mereenie 9. These units and associated hydrocarbon shows are described below.

P1 Unit (1237.4 metres to 1343.0 metres)

The P1 unit consists of interbedded sandstones and siltstones deposited in a shallow marine to intertidal sand bar sequence. Clean sands were deposited as high energy sand shoals and bars. The unit lies within the gas zone in West Mereenie 9, and this along with proven reservoir quality (the P1-280 sand) necessitated listing the P1 unit as a secondary objective of the well.

Drilling with water/2% brine continued to 1306 metres. Background total gas from 1237.4 metres to 1306 metres was 8 units, decreasing with depth to 1 unit. Total gas peaks of 166/8 units (80:14:6) and 85/5 units (55:20:11:14) were associated with tight fining upwards sandstones at 1250 and 1266 metres, however both peaks were influenced by connection/survey gas. Minor hydrocarbon fluorescence (20% decreasing to 10% with depth moderately bright to rare bright solid white yellow) was also recorded from 1263 to 1267 metres. However, log evaluation indicates tight sandstones only within this interval, with no net pay recorded.

At 1306 metres, the dynadrill was pulled out of the hole, and the remainder of the P1 unit air/mist drilled. From 1306 metres to 1320 metres, total background gas was a steady 1 unit (100% C1), with the only total gas peaks recorded associated with trip and connection gas. No gas flaring was evident. At 1320 metres there was an increase in total gas, rising to a maximum of 3521 units (64:15:11:10) as the P1-280 sand was penetrated. Concurrent with this gas increase was intermittent gas flaring at the end of the blooie line, followed immediately by a strong continuous gas flare at 1321 metres. An open hole test (OHT 1) was conducted at 1327 metres, at the base of the P1-280, resulting in a measured gas flow rate of 4.02 MMCFD. Log evaluation indicates 4 metres of gross sand within the P1-280 sand (1320 metres to 1324 metres), with the gas flow coming from a 3.5 metre net interval (1320 metres to 1323.5 metres). Possible fracturing within this interval is interpreted as causing the high flow rate of 4.02 MMCFD, as primary porosity from log evaluation is only 4.3% (water saturation 25.9%). No hydrocarbon fluorescence is associated with the interval 1306 metres to 1327 metres.

Air/mist drilling continued from 1327 metres to the base of the P1 unit at 1343 metres, with a steady strong gas flare and no additional significant further gas influxes recorded. Total gas values of up to 3687 units (67:12:10:11) were recorded. No hydrocarbon fluorescence was recorded. Log evaluation indicates tight sandstones only within this interval (interpreted gas saturated), with no net pay recorded.

P2 Unit (1343.0 metres to 1411.0 metres)

The P2 unit is a shallow to moderately deep marine unit consisting of predominantly thinly interbedded siltstone and sandstone, with occasional episodes of better sand development (in the mid and basal sections of the unit). It is characterised by a lower glauconitic interval, in West Mereenie 9 from approximately 1384 metres to the base of the unit. The P2 unit in general has no sands of reservoir quality.

Air/mist drilling continued throughout the P2 unit, with a continuous steady strong gas flare. Gas values of up to 4228 units (64:14:12:10) were recorded in the interval, but with no further gas influxes interpreted. No hydrocarbon fluorescence was recorded in the P2 unit. Log evaluation indicates tight reservoir sands only, interpreted gas saturated. No net pay is associated with the sands of the P2 unit.

P3 Unit (1411 metres to 1492.7 metres)

The P3 unit consists of sandstone with generally thinly interbedded siltstone, deposited in a predominantly fluvial environment. The main oil producing reservoir in the Mereenie Field is the P3-120/130 sand. In certain areas of the Mereenie Field some of the basal P3 sands are also of reservoir quality.

Air/mist drilling continued down to 1444 metres, where Core 1 was programmed to be cut in the P3-120/130 sand. Gas values of up to 4250 units (65:14:11:10) were recorded, with no associated hydrocarbon fluorescence. The gas flare at the end of the blooie line was still strong and steady. Prior to mudding up and cutting Core 1, a final open hole test was performed (OHT 2), resulting in a final gas flow rate of 2.91 MMCFD. This was less than was recorded earlier from the P1-280 sand, which was still open to the borehole. This result indicates no further influx of gas, with all production interpreted to be coming from the P1-280 sand. The reduction in flow rate may be due to depletion of a fractured reservoir.

The well was mudded up to a 5% NaCl/EZ MUD/Polymer mud system, and coring commenced in the P3-120/130 sand. Originally, 18.3 metres (60') of core was programmed to be continuously cut. However, due to mechanical problems, the core was cut in two separate lengths. Core 1 was cut from 1444 metres to 1447.5 metres, where core shoe failure necessitated pulling out of the hole. 3.5 metres of core was cut, with 2.87 metres (82%) recovered. Gas over the interval was 4 increasing with depth to 30 units (63:23:14). Core 2 was cut from 1447.5 metres to 1461.5 metres. 14 metres of core was cut, with 13.88 metres (99%) recovered. A gas peak of 124/6 units (53:21:15:11) was recorded from 1449 metres to 1454 metres, decreasing to 60 units at the base of the Core 2 interval. A total of 17.5 metres of core was cut, with 16.74 metres recovered.

Log evaluation indicates that the P3-120/130 Sand (gross interval 1444 metres to 1456.4 metres) contains 8.4 metres of (untested) net oil pay, with an average porosity of 9.7% and an average Sw (water saturation) of 35.1%. Oil shows within the cored interval ranged from trace at the top of Core 1 to good (100%) at 1456.4 metres in Core 2. From 1456.4 metres to 1457.6 metres a siltstone interbed is present, with no oil shows apparent below this point in Core 2 (tight reservoir). Core oil saturations agree well with the visual oil shows recorded, with no residual oil saturations above 1445 metres, and none below the siltstone at 1456.4 metres. Permeabilities within the cored interval were variable, ranging from as low as 0.010 md at 1444.53 metres to 100 md at 1452.4 metres and 1453.3 metres.

The top P3-120/130 sand (-664.9 metres subsea) was intersected 1.4 metres high to prognosis and well within target parameters. The top of the sand is 15.7 metres (17.1 metres prognosed) below the field GOC (gas-oil contact) of -649.2 metres subsea. The base of the P3-120/130 sand at -677.3 metres subsea is 2.2 metres low to prognosis, 42.0 metres (44.2 metres prognosed) above the field OWC (oil-water contact) of -719.3 metres. Though fluid contacts, resistivity logs, core analysis, and visual oil shows indicate that the P3-120/130 sand is within the oil leg, log resistivities are not as high as anticipated and indicate that the reservoir is near the top of the extensive transitional oil-water zone present in the Mereenie Field (at -679.7 metres subsea).

Below the base of Core 2 (1461.38 metres) to the top of the P4 unit at 1492.7 metres, background gas averaged 10 units. The interval is predominantly sandstone with occasional siltstone interbeds. Hydrocarbon fluorescence noted from 1471 metres to 1489 metres was described as 10 -60% dim to occasionally bright patchy to solid yellow green to yellow white, with a dim yellow crush cut and thick to thin ring residue. Associated with this fluorescence were two gas peaks, from 1471 metres to 1479 metres (267/10 units, 58:20:13:9) and from 1479 metres to 1489 metres (425/10 units, 58:20:14:8). Both peaks were influenced to some degree by connection gas. However, within the gross interval 1472 metres to 1486 metres, log evaluation indicates 4.6 metres of (untested) net oil pay, with an average porosity of 7.2% and an average Sw of 51.3%. The base of this gross interval (1486 metres, -706.9 metres subsea) is 12.4 metres above the field OWC of -719.3 metres subsea.

P4 Unit (1492.7 metres to 1544 metres Total Depth)

The P4 unit is interpreted to be a shallow marine, shoreface to nearshore sand, deposited in a high energy environment. In the Mereenie Field, the P4 unit consists of a massive, dominantly clean quartzose sandstone with minor interbedded siltstone.

51.3 metres (measured thickness) of P4 unit was penetrated in West Mereenie 9, with a lithology of mainly clean, poor porosity quartzose sandstones and trace medium to dark grey siltstones. Background total gas within the unit ranged from 4-10 units (79:14:7), with no significant total gas peaks recorded. No hydrocarbon fluorescence was recorded. Log evaluation indicates generally poor porosity sandstones with no interpreted net pay.

4. SUMMARY

West Mereenie 9, a QNTBU Oil Development Well, was the forty-sixth well drilled in the Mereenie Oil and Gas Field in the Amadeus Basin, Northern Territory (OL 4). The well is located at SP 2174, Line M83-12, 257 metres southwest of West Mereenie 7 on the northwestern flank of the Mereenie Anticline. The primary objective of West Mereenie 9 was the Pacoota Sandstone (P3 Unit, 120/130 sand) for oil production. Secondary objectives of the well were the Lower Stairway Sandstone and Pacoota Sandstone P1 unit for economic gas accumulations.

Santos operated the project on behalf of the Mereenie Joint Venture. Drilling was performed by OD&E leasing Mereenie Rig 1, an OIME SL750. West Mereenie 9 was spudded in the Mereenie Sandstone on the 13th of July 1994 at 0900 hours, reaching a total depth of 1544 metres (Logger and Driller) in the Pacoota Sandstone P4 unit at 0410 hours on the 6th of August 1994.

Intermediate electric logging in West Mereenie 9 consisted of an FMS-GR-AMS run from 35 metres into the Horn Valley Siltstone to 880 metres, in order to revise final target parameters. Logging at total depth consisted of a DLL-MSFL-AS-GR-SP-CAL run, an LDL-CNL-PEF-NGS-CAL run, and a FMS-GR-AMS-CAL run. Array Sonic was recorded with waveform taping, with a high resolution LDL-CNL-PEF-NGS pass from TD to 1200 metres. Two open hole flow tests were performed in West Mereenie 9 (referenced below), in addition to two fibre-glass sleeve cores cut across the Pacoota P3-120/130 reservoir.

The primary target of West Mereenie 9, the Pacoota P3-120/130 oil reservoir, is the best reservoir in the field. Log evaluation and core analysis results indicate a total of 8.4 metres of net oil pay over the interval 1444 metres to 1456.4 metres, with an average porosity of 9.7% and an average water saturation of 35.1%. Permeabilities within the cored interval (1444 metres to 1461.5 metres) were at some depths as high as 100 md.

West Mereenie 9 was deviated in order to intersect the top of the P3-120/130 reservoir at a true vertical depth (TVD) of -666.3 metres subsea, 17.1 metres below the field gas-oil contact of -649.2 metres subsea. The actual intersection was 1.4 metres above this target, at -664.9 metres subsea and well within the target window. Final survey results put the intersection of the top P3-120/130 sand 64.4 metres (62 metres preferred distance) southwest of the surface location, on an azimuth of 193° (and in the updip direction as preferred). The base of the P3-120/130 reservoir was prognosed at -675.1 metres subsea, 25 metres above the well intersection in West Mereenie 7, 44.2 metres higher than the field oil-water contact of -719.3 metres subsea, and 11.6 metres above the well intersection in West Mereenie 4, which is interpreted to be in a transitional zone. The top of the transitional oil-water zone in the Mereenie Field is interpreted at -679.7 metres subsea. The actual intersection of the base of the P3-120/130 reservoir in West Mereenie 9 was at -677.3 metres subsea, 2.2 metres low to prognosis (indicating a thicker than prognosed P3-120/130 sand) and 2.4 metres above the top of the interpreted transitional zone. Lower than anticipated log resistivities tend to confirm close proximity to the top of the transitional oil-water zone. After completion and fracture stimulation, West Mereenie 9 flowed an average of 25 BOPD with minor water production.

Log evaluation also indicates 4.6 metres of (untested) net oil pay within the gross interval 1472 metres to 1486 metres, within the lower Pacoota P3 unit (average porosity 7.2%, average water saturation 51.3%). Associated with this net pay were significant gas shows and hydrocarbon fluorescence (10-60%). The top of this gross interval (1472 metres, -692.9 metres subsea) is 13.2 metres below the top of the transitional oil-water zone at -679.7 metres subsea, with the base of the interval (1486 metres, -706.9 metres subsea) 12.4 metres above the field OWC of -719.3 metres subsea.

Regarding the secondary objectives of the well, the Lower Stairway Sandstone in West Mereenie 9 is interpreted as gas saturated but tight, with no interpreted net pay. No gas flaring was noted while air drilling the formation. However, an open hole flow test of the lower Pacoota P1-280 reservoir flowed gas at 4.05 MMCFD from 3.5 metres of interpreted net pay (gross interval 1320 metres to 1324 metres). Possible fracturing within the P1-280 sand is interpreted as causing the high flow rate, as primary porosity from log evaluation is only 4.3%. No further productive gas zones are interpreted in West Mereenie 9, verified by a second open hole flow test spanning the P1-280 sand to directly above the P3-120/130 oil reservoir. A gas flow rate of only 2.91 MMCFD was achieved, indicating no further influx of gas and possible depletion of the fractured P1-280 reservoir.

Remaining zones/formations in the well are interpreted as tight/water saturated, with no significant shows recorded. Minor hydrocarbon fluorescence from 1250 metres to 1266 metres (20% decreasing with depth to 10%) in the upper Pacoota P1 unit is interpreted as residual oil in a tight reservoir section, with no net pay interpreted from log evaluation.

The main features/results of West Mereenie 9 are summarised as follows:

1. Formation tops were intersected much higher than prognosed, indicating that the well is located more in a flank position rather than in a saddle. As a result, the extent of the saddle between West and East Mereenie is now in question.
2. Log and core data clearly show that P3-120/130 reservoir quality and thickness are very good by Mereenie standards and significantly better than prognosed.
3. The fracture treatment of the P3-120/130 reservoir was conducted as programmed. However, the unusual stress regime and interpreted fracture path have led to an ineffective treatment (refer to Appendix IX). Several theories related to stress regimes have been advanced to explain this behaviour, with a detailed study required to confirm a hypothesis.
4. Oil production has gradually increased from an average of 25 BOPD to 45 BOPD (end of January 1995). Minor water production encountered was anticipated due to the close proximity of the P3-120/130 reservoir to the top of the interpreted field oil-water transitional zone (refer to Appendix IX).
5. Further evaluation is at present underway to determine if any further remedial action can be taken in West Mereenie 9.

After logging, 5 1/2" production casing was run and cemented to TD. The well was completed using a 2 3/8" tubing conveyed perforating gun at 6 shots per foot. The perforated interval is 1444m-1457m, encompassing the P3-120/130 sand.

Mereenie Rig 1 was released at 1800 hours on the 8th of August 1994, 26 days and 18 hours after spudding West Mereenie 9.

5. REFERENCES

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