



**HALLIBURTON**  
**Sperry Drilling Services**

**End of Well Report**  
**for**  
**Santos Ltd**

**Casino-4**

**Rig:** Ocean Patriot  
**Field:** Casino  
**Country:** Australia  
**Job No:** AU-FE -0003530535  
**Date:** 7<sup>th</sup> May 2005

## Table of Contents

1. General Information
2. Operational Overview
3. Summary of MWD Runs
4. Bitrun Summary
5. Directional Survey Data

## General Information

Company:	Santos Ltd	
Rig:	Ocean Patriot	
Well:	Casino-4	
Field:	Casino	
Country:	Australia	
API Number:		
Sperry-Sun Job Number:	AU-FE-0003530535	
Job start date:	07-May-05	
Job end date:	21-May-05	
North reference:	Grid	
Declination:	10.942	deg
Dip angle:	-69.993	deg
Total magnetic field:	60916	nT
Date of magnetic data:	08-May-05	
Wellhead coordinates N:	38 deg. 47 min 13.030 sec South	
Wellhead coordinates E:	142 deg. 41 min 54.490 sec East	
Vertical section direction:	0	deg
MWD Engineers:	A. Rule	J. Nicolson

Company Representatives:	R. King	C. Wise
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Company Geologist:	R. Subramanian
Lease Name:	VIC P-44
Unit Number:	197
State:	Victoria
County:	

## Operational Overview

Sperry Drilling Services, a division of Halliburton, were contracted by Santos Ltd to provide Surveying and Logging While Drilling (LWD) services on the well, Casino-4, located in the Bass Strait, offshore Victoria. The well was drilled as a pilot hole, before drilling the development hole Casino-4DW1.

### 36" Open Hole Section

Sperry tools were not run in the 36" hole section.

### 17½" Open Hole Section:

An Electronic Multishot (EMS) was dropped at the 17½" hole TD of 742.0 mMDRT. Because of the failure of the TOTCO ring the EMS landed inside steel BHA collars and the recorded surveys were affected by magnetic interference.

### 12¼" Open Hole section

The hole section was drilled with a rotary assembly and logging while drilling (LWD) tools to provide realtime and recorded drilling and formation evaluation data. The tools incorporated a positive pulser, Directional Module (DM), Dual Gamma Ray (DGR), Electromagnetic Wave Resistivity (EWR) and Drillstring Dynamics Sensor (DDS) to monitor downhole vibration.



The section was drilled in one coring and three bit runs to 1825.0 mMDRT.

## Summary of MMDruns



[illegible]

113.14	113.14	68.18	0	0
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## Bitrun Summary

Run Time Data		Drilling Data		Mud Data				
MWD Run :	0200	Start Depth :	742.00 m	Mud Type :	KCl/Polymer			
Rig Bit No:	3	End Depth :	1304.00 m	Weight / Visc :	1.23 sg /	53.93	spqt	
Hole Size :	311.00 mm	Footage :	562.00 m	Chlorides :	27000 ppm			
Run Start :	12-May-05 19:08	Avg. Flow Rate :	981 gpm	PV / YP :	17.00 cp /	29.24	lhf2	
Run End :	14-May-05 20:40	Avg. RPM :	101 rpm	Solids/Sand :	10 % /	1 %		
BRT Hrs :	49.54	Avg. WOB :	15.40 klb	%Oil / O:W:	N/A % /	N/A		
Circ. Hrs :	33.41	Avg. ROP :	27.10 m/hr	pH/Fluid Loss:	8.20 pH /	4.20	mptm	
Oper. Hrs :	49.54	Avg. SPP :	3110 psig	Max. Temp. :	61.00 degC			
MWD Schematics		BHA Schematics						
<div><div><div>(6)</div><div></div></div><div><div>(5)</div><div></div></div><div><div>(4)</div><div>6. Mk8 Pulser 1200 System SN: 8530 0.00 m From Bit</div></div><div><div>(3)</div><div>5. DM SN: 87896 19.18 m From Bit</div></div><div><div>(2)</div><div>4. HCIM SN: 163155</div></div><div><div>(1)</div><div>3. PWD SN: 161846 15.17 m From Bit</div></div><div><div></div><div>2. EWR-P4 SN: 45162 12.65 m From Bit</div></div><div><div></div><div>1. DGR SN: 151078 10.31 m From Bit</div></div></div>		<div><div><div>(12)</div><div></div></div><div><div>(11)</div><div></div></div><div><div>(10)</div><div></div></div><div><div>(9)</div><div></div></div><div><div>(8)</div><div>12. 15 x HWDP 138.06 127.000 79.400</div></div><div><div>(7)</div><div>11. 3 x Drill Collar 27.81 171.450 76.200</div></div><div><div>(6)</div><div>10. Cross Over Sub 1.09 203.200 76.200</div></div><div><div>(5)</div><div>09. Drilling Jars 9.67 203.200 76.200</div></div><div><div>(4)</div><div>08. 10 x Drill Collar 88.33 203.200 76.200</div></div><div><div>(3)</div><div>07. NM Pony Collar 2.93 203.200 70.000</div></div><div><div>(2)</div><div>06. MWD 14.41 203.160 70.021</div></div><div><div>(1)</div><div>05. Cross Over Sub 1.22 203.200 70.000</div></div><div><div></div><div>04. Integral Blade Stabilizer 2.49 203.200 70.000</div></div><div><div></div><div>03. Pony collar 3.04 203.200 73.000</div></div><div><div></div><div>02. Integral Blade Stabilizer 2.13 209.500 73.000</div></div><div><div></div><div>01. HC MX-03DX (Tricone) 0.34 311.000 75.000</div></div></div>						
Comments				MWD Performance				
Drilled with rotational assembly to 1304.0 mMDRT. Pulled out to change the bit.				Tool OD / Type :	203.00 mm /	P4M		
				MWD Real-time%:	80.00 %			
				MWD Recorded%:	100.00 %			
				Min. Inc. :	0.53 deg /	842.32 m		
				Max. Inc. :	4.61 deg /	1284.20 m		
				Final Az. :	205.06 deg			
				Max Op. Press. :	2270 psig			

## Bitrun Summary

Run Time Data		Drilling Data		Mud Data				
MWD Run :	0300	Start Depth :	1304.00 m	Mud Type :	KCl/Polymer			
Rig Bit No:	4	End Depth :	1761.00 m	Weight / Visc :	1.24 sg /	53.93	spqt	
Hole Size :	311.00 mm	Footage :	457.00 m	Chlorides :	38500 ppm			
Run Start :	14-May-05 21:15	Avg. Flow Rate :	887 gpm	PV / YP :	21.00 cp /	37.01	lhf2	
Run End :	16-May-05 19:22	Avg. RPM :	142 rpm	Solids/Sand :	11.6 % /	0.5	%	
BRT Hrs :	46.12	Avg. WOB :	14.80 klb	%Oil / O:W:	N/A % /	N/A		
Circ. Hrs :	28.36	Avg. ROP :	32.80 m/hr	pH/Fluid Loss:	9.00 pH /	4.00	mptm	
Oper. Hrs :	46.12	Avg. SPP :	3675 psig	Max. Temp. :	67.70 degC			
MWD Schematics		BHA Schematics						
<div><div><div>(6)</div><div></div></div><div><div>(5)</div><div></div></div><div><div>(4)</div><div>6. Mk8 Pulser 1200 System SN: 8530 0.00 m From Bit</div></div><div><div>(3)</div><div>5. DM SN: 87896 19.22 m From Bit</div></div><div><div>(2)</div><div>4. HCIM SN: 163155</div></div><div><div>(1)</div><div>3. PWD SN: 161846 15.21 m From Bit</div></div><div><div></div><div>2. EWR-P4 SN: 45162 12.69 m From Bit</div></div><div><div></div><div>1. DGR SN: 151078 10.35 m From Bit</div></div></div>		<div><div><div>(12)</div><div></div></div><div><div>(11)</div><div></div></div><div><div>(10)</div><div></div></div><div><div>(9)</div><div></div></div><div><div>(8)</div><div>12. 15 x HWDP 138.06 127.000 79.400</div></div><div><div>(7)</div><div>11. 3 x Drill Collar 27.81 171.450 76.200</div></div><div><div>(6)</div><div>10. Cross Over Sub 1.09 203.200 76.200</div></div><div><div>(5)</div><div>09. Drilling Jars 9.67 203.200 76.200</div></div><div><div>(4)</div><div>08. 10 x Drill Collar 88.33 203.200 76.200</div></div><div><div>(3)</div><div>07. NM Pony Collar 2.93 203.200 70.000</div></div><div><div>(2)</div><div>06. MWD 14.41 203.000 70.000</div></div><div><div>(1)</div><div>05. Cross Over Sub 1.22 203.200 70.000</div></div><div><div></div><div>04. Integral Blade Stabilizer 2.49 203.200 70.000</div></div><div><div></div><div>03. Pony collar 3.04 203.200 73.000</div></div><div><div></div><div>02. Integral Blade Stabilizer 2.13 209.500 73.000</div></div><div><div></div><div>01. Smith MA89PX (PDC) 0.38 311.000 76.200</div></div></div>						
Comments				MWD Performance				
Picked up a PCD bit and drilled to core point. The hole was tight on the trip out and jarring occurred.				Tool OD / Type :	203.00 mm /	P4M		
				MWD Real-time%:	98.00 %			
				MWD Recorded%:	100.00 %			
				Min. Inc. :	4.15 deg /	1616.98 m		
				Max. Inc. :	4.65 deg /	1300.98 m		
				Final Az. :	198.68 deg			
				Max Op. Press. :	3100 psig			

## Bitrun Summary

Run Time Data		Drilling Data		Mud Data				
MWD Run :	0400	Start Depth :	1794.00 m	Mud Type :	KCl/Polymer			
Rig Bit No:	5	End Depth :	1825.00 m	Weight / Visc :	1.30 sg /	70.00	spqt	
Hole Size :	311.00 mm	Footage :	31.00 m	Chlorides :	40000 ppm			
Run Start :	18-May-05 16:40	Avg. Flow Rate :	820 gpm	PV / YP :	23.00 cp /	17.24	lhf2	
Run End :	19-May-05 10:09	Avg. RPM :	90 rpm	Solids/Sand :	13 % /	0.4 %		
BRT Hrs :	17.48	Avg. WOB :	21.10 klb	%Oil / O:W:	N/A % /	N/A		
Circ. Hrs :	6.41	Avg. ROP :	42.70 m/hr	pH/Fluid Loss:	9.00 pH /	3.60	mptm	
Oper. Hrs :	17.48	Avg. SPP :	3666 psig	Max. Temp. :	65.00 degC			
MWD Schematics		BHA Schematics						
<div><div>(6)</div><div></div><div>(5)</div><div>(4)6. Mk8 Positive Pulser SN: 8270 0.00 m From Bit</div><div>(3)5. DM SN: 10581139 19.10 m From Bit</div><div>(2)4. HCIM SN: 110349</div><div>(1)3. PWD SN: 104432 15.18 m From Bit</div><div>2. EWR-P4 SN: 123048 12.67 m From Bit</div><div>1. DGR SN: 084171 10.34 m From Bit</div></div>		<div><div>(12)</div><div></div><div>(11)</div><div>(10)</div><div>(9)</div><div>(8)12. 15 x HWDP138.06127.00079.400</div><div>(7)11. 3 x Drill Collar27.81171.45076.200</div><div>(6)10. Cross Over Sub1.09203.20076.200</div><div>(5)09. Drilling Jars9.67203.20076.200</div><div>(4)08. 10 x Drill Collar88.33203.20076.200</div><div>(3)07. NM Pony DC2.93203.20070.000</div><div>(2)06. MWD14.25203.12070.000</div><div>(1)05. Cross Over Sub1.22203.20070.000</div><div>04. Integral Blade Stabilizer2.49203.20070.000</div><div>03. Pony collar3.04203.20073.000</div><div>02. Integral Blade Stabilizer2.13209.50073.000</div><div>01. Smith MA89PX (PDC)0.38311.00076.200</div></div>						
Comments				MWD Performance				
Drilled additional rathole after coring.				Tool OD / Type :	203.00 mm /	P4M		
				MWD Real-time%:	96.67 %			
				MWD Recorded%:	100.00 %			
				Min. Inc. :	4.28 deg /	1805.20 m		
				Max. Inc. :	4.46 deg /	1760.80 m		
				Final Az. :	201.16 deg			
				Max Op. Press. :	3372 psig			

## Directional Survey Data

Measured Depth (metres)	Inclination (degrees)	Direction (degrees)	Vertical Depth (metres)	Latitude (metres)	Departure (metres)	Vertical Section (metres)	Dogleg (deg/30m)
137.40	0.00	0.00	137.40	0.00 N	0.00 E	0.00	TIE-IN
155.27	0.85	0.00	155.27	0.13 N	0.00 E	0.13	1.43
183.08	1.00	0.00	183.08	0.58 N	0.00 E	0.58	0.16
210.81	1.06	0.00	210.80	1.08 N	0.00 E	1.08	0.06
238.20	0.99	0.00	238.19	1.57 N	0.00 E	1.57	0.08
265.67	0.64	0.00	265.65	1.96 N	0.00 E	1.96	0.38
294.94	0.63	0.00	294.92	2.29 N	0.00 E	2.29	0.01
323.72	0.81	0.00	323.70	2.65 N	0.00 E	2.65	0.19
352.06	0.45	0.00	352.04	2.96 N	0.00 E	2.96	0.38
381.12	0.39	0.00	381.10	3.17 N	0.00 E	3.17	0.06
410.01	0.74	0.00	409.99	3.46 N	0.00 E	3.46	0.36
438.38	0.53	0.00	438.35	3.77 N	0.00 E	3.77	0.22
466.93	0.61	0.00	466.90	4.05 N	0.00 E	4.05	0.08
496.11	0.63	0.00	496.08	4.37 N	0.00 E	4.37	0.02
524.80	0.45	0.00	524.77	4.64 N	0.00 E	4.64	0.19
553.28	0.34	0.00	553.25	4.84 N	0.00 E	4.84	0.12
581.98	0.46	0.00	581.95	5.04 N	0.00 E	5.04	0.13
610.68	0.25	0.00	610.65	5.22 N	0.00 E	5.22	0.22
639.31	0.09	0.00	639.28	5.30 N	0.00 E	5.30	0.17
668.16	0.40	0.00	668.13	5.42 N	0.00 E	5.42	0.32
696.88	0.31	0.00	696.85	5.60 N	0.00 E	5.60	0.09
725.80	0.27	0.00	725.77	5.75 N	0.00 E	5.75	0.04
734.40	0.26	0.00	734.37	5.79 N	0.00 E	5.79	0.03
813.65	1.10	353.23	813.61	6.72 N	0.09 W	6.72	0.32
842.32	0.53	18.03	842.28	7.12 N	0.08 W	7.12	0.69
870.89	0.83	88.47	870.85	7.25 N	0.17 E	7.25	0.86
899.57	1.86	98.30	899.52	7.19 N	0.83 E	7.19	1.10
956.72	2.07	127.80	956.64	6.42 N	2.57 E	6.42	0.54
1014.20	2.43	162.77	1014.07	4.62 N	3.75 E	4.62	0.73
1100.39	3.68	204.01	1100.15	0.35 N	3.16 E	0.35	0.85
1129.19	4.46	205.68	1128.88	1.50 S	2.30 E	-1.50	0.82
1158.13	4.53	204.02	1157.73	3.56 S	1.35 E	-3.56	0.16
1187.37	4.39	203.45	1186.88	5.64 S	0.43 E	-5.64	0.15
1216.00	4.44	203.57	1215.42	7.67 S	0.44 W	-7.67	0.05
1244.28	4.48	206.57	1243.62	9.66 S	1.38 W	-9.66	0.25
1284.20	4.61	205.06	1283.41	12.51 S	2.75 W	-12.51	0.13
1300.98	4.65	203.38	1300.14	13.74 S	3.31 W	-13.74	0.25
1329.90	4.59	205.24	1328.96	15.86 S	4.27 W	-15.86	0.17
1416.80	4.27	202.81	1415.60	21.99 S	7.00 W	-21.99	0.13
1445.22	4.21	202.25	1443.95	23.93 S	7.81 W	-23.93	0.07

## Directional Survey Data

Measured Depth (metres)	Inclination (degrees)	Direction (degrees)	Vertical Depth (metres)	Latitude (metres)	Departure (metres)	Vertical Section (metres)	Dogleg (deg/30m)
1472.15	4.21	200.09	1470.80	25.78 S	8.52 W	-25.78	0.18
1530.61	4.18	198.76	1529.11	29.81 S	9.95 W	-29.81	0.05
1588.18	4.19	198.08	1586.52	33.80 S	11.28 W	-33.80	0.03
1616.98	4.15	199.72	1615.25	35.78 S	11.95 W	-35.78	0.13
1645.86	4.17	198.78	1644.05	37.76 S	12.64 W	-37.76	0.07
1674.59	4.18	197.38	1672.70	39.75 S	13.29 W	-39.75	0.11
1732.10	4.45	198.68	1730.05	43.86 S	14.63 W	-43.86	0.15
1760.80	4.46	201.16	1758.66	45.95 S	15.39 W	-45.95	0.20
1805.20	4.28	201.27	1802.94	49.11 S	16.62 W	-49.11	0.12
1825.00	4.28	201.27	1822.68	50.48 S	17.15 W	-50.48	0.00

## Directional Survey Data

CALCULATION BASED ON Minimum Curvature METHOD

SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT

TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD

VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 0.00 DEGREES (GRID)

A TOTAL CORRECTION OF 12.01 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.

HORIZONTAL DISPLACEMENT(CLOSURE) AT 1830.00 METRES

IS 53.51 METRES ALONG 198.78 DEGREES (GRID)

RT to LAT = 22.0m

Final Survey Projected to TD.

EMS Surveys from surface to 734.4 mMDRT.

EMS Surveys have been adjusted by Santos Ltd  
to correct for magnetic interference.

