



HALLIBURTON
Sperry Drilling Services

LWD End of Well Report
for
Santos Ltd

Casino - 5

Rig: Ocean Patriot
Field: Casino
Country: Australia
Job No: AU -FE -0003530537
Date: 16th June 2005

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General Information

Company:	Santos Ltd	
Rig:	Ocean Patriot	
Well:	Casino-5	
Field:	Casino	
Country:	Australia	
API Number:		
Sperry-Sun Job Number:	AU-FE-0003530537	
Job start date:	16-Jun-05	
Job end date:	28-Jun-05	
North reference:	Grid	
Declination:	10.897	deg
Dip angle:	-69.993	deg
Total magnetic field:	60893	nT
Date of magnetic data:	17-Jun-05	
Wellhead coordinates N:	38 deg. 47 min 43.680 sec South	
Wellhead coordinates E:	142 deg. 44 min 44.600 sec East	
Vertical section direction:	Closure	deg
MWD Engineers:	A.Rule	J.Nicolson
	B.Cooper	
Company Representatives:	R.Buitenhuis	C.Wise
	R.King	
Company Geologist:	J.Pitman	
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-5, located in the Bass Strait, offshore Victoria.

914mm (36") Open Hole Section

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

445mm (17½") Open Hole Section

An Electronic Multishot (EMS) was dropped at section TD - 665.0 mMDRT.

311mm (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, Position Module (PM), Dual Gamma Ray (DGR), Electromagnetic Wave Resistivity (EWR) and Drillstring Dynamics Sensor (DDS) to monitor downhole vibration.

The section was drilled in three bit runs to 1730.0 mMDRT.

216mm (8½") Open Hole Section

The section was drilled in one bit run through the reservoir. The hole was logged with a LWD tool that incorporated a positive pulser, DGR, EWR, Directional Module (DM) and Pressure While Drilling (PWD).

The well was drilled to a total depth of 1806.0 mMDRT.



Summary of MMDruns

[illegible]



Bitrun Summary

Run Time Data		Drilling Data		Mud Data				
MWD Run :	0200	Start Depth :	665.00 m	Mud Type :	KCl / Polymer			
Rig Bit No:	3	End Depth :	1160.00 m	Weight / Visc :	1.22 sg / 55.00 spqt			
Hole Size :	311.00 mm	Footage :	495.00 m	Chlorides :	42000 ppm			
Run Start :	22-Jun-05 05:41	Avg. Flow Rate :	990 gpm	PV / YP :	15.00 cp / 26.00 lhf2			
Run End :	23-Jun-05 21:25	Avg. RPM :	121 rpm	Solids/Sand :	9 % / 1 %			
BRT Hrs :	39.73	Avg. WOB :	15.90 klb	%Oil / O:W :	0 % / N/A			
Circ. Hrs :	32.13	Avg. ROP :	24.90 m/hr	pH/Fluid Loss:	9.00 pH / 4.80 mptm			
Oper. Hrs :	39.73	Avg. SPP :	1865 psig	Max. Temp. :	49.40 degC			
MWD Schematics		BHA Schematics						
<div><div>(5)</div><div>(4)</div><div>(3)</div><div>(2)</div><div>(1)</div><div><div>5. Mk8 Positive Pulser SN : 8189</div><div>4. PM SN : 134019 16.13 m From Bit</div><div>3. HCIM SN : 91232</div><div>2. DGR & DDS SN : 132474 12.75 m From Bit</div><div>1. EWR-P4 SN : 144719 9.72 m From Bit</div></div></div>		<div><div>(11)</div><div>(10)</div><div>(9)</div><div>(8)</div><div>(7)</div><div>(6)</div><div>(5)</div><div>(4)</div><div>(3)</div><div>(2)</div><div>(1)</div><div><div>11. HWDP</div><div>10. Cross Over Sub</div><div>09. Drill Collar</div><div>08. Drilling Jars</div><div>07. Drill Collar</div><div>06. NM Pony Collar</div><div>05. MWD</div><div>04. Integral Blade Stabilizer</div><div>03. Drill Collar</div><div>02. Integral Blade Stabilizer</div><div>01. Smith GS04BDV CPS</div></div></div>		<div>Length (m)</div>	<div>O.D. (mm)</div>	<div>I.D. (mm)</div>		
				138.37	203.000	76.000		
				1.09	203.000	75.000		
				17.90	202.000	76.000		
				9.20	203.000	76.000		
				88.99	200.000	73.000		
				2.93	206.000	68.000		
				13.16	203.000	76.000		
				2.08	203.000	75.000		
				3.04	203.000	71.000		
				2.11	203.000	76.000		
				0.33	311.000	76.000		
Comments				MWD Performance				
High vibration, tool stopped pulsing at 952.0 mMDRT (see Service Interrupt Report). Drilled to planned bit trip depth at 1170mMDRT. Recorded data recovered at surface.				Tool OD / Type :	203.00 mm / P4M			
				MWD Real-time%:	55.00 %			
				MWD Recorded%:	97.00 %			
				Min. Inc. :	0.56 deg / 712.41 m			
				Max. Inc. :	5.74 deg / 1067.61 m			
				Final Az. :	243.64 deg			
				Max Op. Press. :	2010 psig			

Bitrun Summary

Run Time Data		Drilling Data		Mud Data			
MWD Run :	0300	Start Depth :	1160.00 m	Mud Type :	KCl / Polymer		
Rig Bit No:	4	End Depth :	1392.00 m	Weight / Visc :	1.22 sg /	49.00	spqt
Hole Size :	311.00 mm	Footage :	232.00 m	Chlorides :	45000 ppm		
Run Start :	24-Jun-05 04:44	Avg. Flow Rate :	988 gpm	PV / YP :	11.00 cp /	26.00	lhf2
Run End :	25-Jun-05 09:27	Avg. RPM :	146. rpm	Solids/Sand :	10 % /	0.5	%
BRT Hrs :	28.72	Avg. WOB :	9.50 klb	%Oil / O:W:	0 % /	N/A	
Circ. Hrs :	19.14	Avg. ROP :	15.50 m/hr	pH/Fluid Loss:	8.40 pH /	5.00	mptm
Oper. Hrs :	28.72	Avg. SPP :	2956 psig	Max. Temp. :	68.00 degC		
MWD Schematics		BHA Schematics					
 <p>(5)</p> <p>(4)</p> <p>(3)</p> <p>(2)</p> <p>(1)</p> <p>5. Mk8 Positive Pulser SN : 8298</p> <p>4. PM SN : 143272 16.26 m From Bit</p> <p>3. HCIM SN : 161828</p> <p>2. EWR-P4 SN : 205859 11.27 m From Bit</p> <p>1. DGR SN : 10505500 8.97 m From Bit</p>		<p>Component</p> <p>Length O.D. I.D.</p> <p>(m) (mm) (mm)</p>					
		 <p>(11)</p> <p>(10)</p> <p>(9)</p> <p>(8)</p> <p>(7)</p> <p>(6)</p> <p>(5)</p> <p>(4)</p> <p>(3)</p> <p>(2)</p> <p>(1)</p> <p>11. HWDP 138.37 203.000 76.000</p> <p>10. Cross Over Sub 1.09 203.000 75.000</p> <p>09. Drill Collar 17.90 202.000 76.000</p> <p>08. Drilling Jars 9.20 203.000 76.000</p> <p>07. Drill Collar 62.27 200.000 73.000</p> <p>06. NM Pony Collar 2.93 206.000 68.000</p> <p>05. MWD 12.90 203.000 76.000</p> <p>04. Integral Blade Stabilizer 2.08 203.000 75.000</p> <p>03. Drill Collar 3.04 203.000 71.000</p> <p>02. Integral Blade Stabilizer 2.11 203.000 76.000</p> <p>01. Smith MA89PX 0.52 311.000 76.000</p>					
Comments				MWD Performance			
Drilled to 1392.0 mMDRT. Pulled out to change the bit.				Tool OD / Type :	203.00 mm /	P4M	
				MWD Real-time%:	99.00 %		
				MWD Recorded%:	100.00 %		
				Min. Inc. :	3.06 deg /	1006.82 m	
				Max. Inc. :	5.74 deg /	1067.61 m	
				Final Az. :	252.31 deg		
				Max Op. Press. :	2410 psig		

Bitrun Summary

Run Time Data		Drilling Data		Mud Data			
MWD Run :	0400	Start Depth :	1392.00 m	Mud Type :	KCl / Polymer		
Rig Bit No:	5	End Depth :	1730.00 m	Weight / Visc :	1.22 sg /	49.00	spqt
Hole Size :	311.00 mm	Footage :	338.00 m	Chlorides :	46000 ppm		
Run Start :	25-Jun-05 09:51	Avg. Flow Rate :	940 gpm	PV / YP :	14.00 cp /	36.00	lhf2
Run End :	26-Jun-05 16:39	Avg. RPM :	162 rpm	Solids/Sand :	10 % /	0.5	%
BRT Hrs :	30.79	Avg. WOB :	11.60 klb	%Oil / O:W :	0 % /	N/A	
Circ. Hrs :	15.18	Avg. ROP :	46.30 m/hr	pH/Fluid Loss:	7.90 pH /	4.50	mptm
Oper. Hrs :	30.79	Avg. SPP :	3204 psig	Max. Temp. :	71.00 degC		
MWD Schematics		BHA Schematics					
 <p>(5)</p> <p>(4)</p> <p>(3)</p> <p>(2)</p> <p>(1)</p> <p>5. Mk8 Positive Pulser SN : 8298</p> <p>4. PM SN : 143272 16.06 m From Bit</p> <p>3. HCIM SN : 161828</p> <p>2. EWR-P4 SN : 205859 11.07 m From Bit</p> <p>1. DGR SN : 10505500 8.77 m From Bit</p>		<p>Component</p> <p>Length O.D. I.D.</p> <p>(m) (mm) (mm)</p>					
		 <p>(11)</p> <p>(10)</p> <p>(9)</p> <p>(8)</p> <p>(7)</p> <p>(6)</p> <p>(5)</p> <p>(4)</p> <p>(3)</p> <p>(2)</p> <p>(1)</p> <p>11. HWDP 138.37 203.000 76.000</p> <p>10. Cross Over Sub 1.09 203.000 75.000</p> <p>09. Drill Collar 17.90 202.000 76.000</p> <p>08. Drilling Jars 9.20 203.000 76.000</p> <p>07. Drill Collar 62.27 200.000 73.000</p> <p>06. Drill Collar 2.93 206.000 68.000</p> <p>05. MWD 12.90 203.000 76.000</p> <p>04. Integral Blade Stabilizer 2.08 203.000 75.000</p> <p>03. Drill Collar 3.04 203.000 71.000</p> <p>02. Integral Blade Stabilizer 2.11 203.000 76.000</p> <p>01. Hycalog DSX104HGWA5 (PDC) 0.32 311.000 75.000</p>					
Comments				MWD Performance			
Drilled 311mm (12¼") hole to section TD at 1730.0 mMDRT.				Tool OD / Type :	203.00 mm /	P4M	
				MWD Real-time%:	99.00 %		
				MWD Recorded%:	100.00 %		
				Min. Inc. :	5.17 deg /	1377.53 m	
				Max. Inc. :	6.37 deg /	1693.36 m	
				Final Az. :	251.82 deg		
				Max Op. Press. :	2993 psig		

Directional Survey Data

Measured Depth (metres)	Inclination (degrees)	Direction (degrees)	Vertical Depth (metres)	Latitude (metres)	Departure (metres)	Vertical Section (metres)	Dogleg (deg/30m)
89.70	0.00	0.00	89.70	0.00 N	0.00 E	0.00	TIE-IN
153.32	0.87	155.19	153.32	0.44 S	0.20 E	-0.44	0.41
180.77	0.73	150.88	180.76	0.78 S	0.38 E	-0.78	0.17
236.21	1.06	149.10	236.20	1.53 S	0.81 E	-1.53	0.18
263.92	1.31	159.82	263.90	2.05 S	1.05 E	-2.05	0.36
292.77	1.22	161.34	292.75	2.65 S	1.26 E	-2.65	0.10
321.46	1.16	161.70	321.43	3.21 S	1.45 E	-3.21	0.06
350.14	1.12	162.94	350.10	3.76 S	1.63 E	-3.76	0.05
378.70	1.03	165.33	378.66	4.27 S	1.77 E	-4.27	0.11
407.39	0.99	169.70	407.34	4.76 S	1.88 E	-4.76	0.09
436.08	0.89	162.06	436.03	5.22 S	2.00 E	-5.22	0.17
464.75	0.86	161.47	464.70	5.64 S	2.13 E	-5.64	0.03
493.60	0.87	164.24	493.54	6.05 S	2.26 E	-6.05	0.04
522.35	0.23	169.75	522.29	6.32 S	2.33 E	-6.32	0.67
551.14	0.52	129.89	551.08	6.46 S	2.44 E	-6.46	0.39
579.90	0.54	127.68	579.84	6.63 S	2.65 E	-6.63	0.03
608.62	0.51	119.52	608.56	6.77 S	2.87 E	-6.77	0.08
636.96	0.54	120.09	636.90	6.90 S	3.09 E	-6.90	0.03
652.27	0.52	118.09	652.21	6.97 S	3.22 E	-6.97	0.05
712.41	0.56	146.86	712.34	7.34 S	3.62 E	-7.34	0.13
741.29	1.28	173.83	741.22	7.78 S	3.73 E	-7.78	0.85
800.77	1.61	179.35	800.68	9.27 S	3.81 E	-9.27	0.18
858.08	1.58	236.40	857.97	10.51 S	3.16 E	-10.51	0.80
915.48	4.81	243.64	915.31	11.91 S	0.93 E	-11.91	0.01
891.65	3.06	238.12	891.51	11.24 S	2.01 E	-11.24	1.33
1006.82	3.06	237.46	1006.52	14.52 S	3.19 W	-14.52	0.01
1067.61	5.74	249.44	1067.13	16.46 S	7.41 W	-16.46	1.39
1150.27	5.53	253.03	1149.39	19.08 S	15.08 W	-19.08	0.15
1178.55	5.52	254.47	1177.54	19.84 S	17.70 W	-19.84	0.15
1207.09	5.50	252.55	1205.94	20.61 S	20.33 W	-20.61	0.20
1294.00	5.38	250.68	1292.46	23.21 S	28.15 W	-23.21	0.07
1322.59	5.29	252.03	1320.93	24.06 S	30.67 W	-24.06	0.16
1351.22	5.31	252.31	1349.44	24.87 S	33.19 W	-24.87	0.03
1377.53	5.17	251.91	1375.64	25.61 S	35.47 W	-25.61	0.16
1406.19	5.23	251.21	1404.18	26.43 S	37.94 W	-26.43	0.09
1434.97	5.43	251.49	1432.83	27.29 S	40.47 W	-27.29	0.21
1463.79	5.42	253.43	1461.52	28.11 S	43.07 W	-28.11	0.19
1492.55	5.42	251.34	1490.16	28.93 S	45.66 W	-28.93	0.21
1521.49	5.55	253.59	1518.96	29.76 S	48.29 W	-29.76	0.26
1550.14	5.55	251.90	1547.48	30.58 S	50.94 W	-30.58	0.17

Directional Survey Data

Measured Depth (metres)	Inclination (degrees)	Direction (degrees)	Vertical Depth (metres)	Latitude (metres)	Departure (metres)	Vertical Section (metres)	Dogleg (deg/30m)
1607.59	5.88	251.40	1604.64	32.39 S	56.37 W	-32.39	0.17
1636.21	5.89	252.97	1633.11	33.28 S	59.16 W	-33.28	0.17
1664.65	6.20	254.05	1661.39	34.13 S	62.03 W	-34.13	0.35
1693.36	6.37	251.89	1689.93	35.05 S	65.04 W	-35.05	0.30
1712.40	6.06	251.82	1708.86	35.70 S	67.00 W	-35.70	0.48
1734.43	6.14	252.76	1730.77	36.41 S	69.23 W	-36.41	0.17
1763.18	5.90	251.71	1759.36	37.33 S	72.10 W	-37.33	0.28
1783.40	5.66	250.49	1779.47	37.99 S	74.03 W	-37.99	0.40
1806.00	5.66	250.49	1801.96	38.73 S	76.13 W	-38.73	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 CLOSURE OF 243.15 DEGREES (GRID)

A TOTAL CORRECTION OF 11.99 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.

HORIZONTAL DISPLACEMENT(CLOSURE) AT 1820.00 METRES

IS 86.78 METRES ALONG 243.15 DEGREES (GRID)

RT to LAT = 21.5 m.

Final survey projected to TD

Service Interrupt Report

MWD run number :	0200	Time/Date of Failure :	25-Jun-05 03:31
Rig Bit Number :	3	Depth at time of Failure :	952.00 m
MWD Run start time/date :	22-Jun-05 05:41	Lost Rig Hours :	4.00
MWD Run end time/date :	23-Jun-05 21:25		

Rig Activity

Drilling 311mm (12¼") hole.

Description of Failure

Tool stopped pulsing.

Action Taken

Toggled tool and adjusted flowrates in an attempt to re-establish detection.

Operation Impact

Drilled to planned bit trip depth with no surveys and FE data. Recorded FE data was recovered at surface.

Reason for Failure

High Vibration recorded by DDS. CIM hanger and hard connect failed insulation test on surface. Pulser failed the running rig test.

