

**Company :** Santos  
**Well :** WM-19  
**Field :** Mereenie

**Date :** 01-Dec-2013  
**Time :** 10:30



GAMMA-RAY

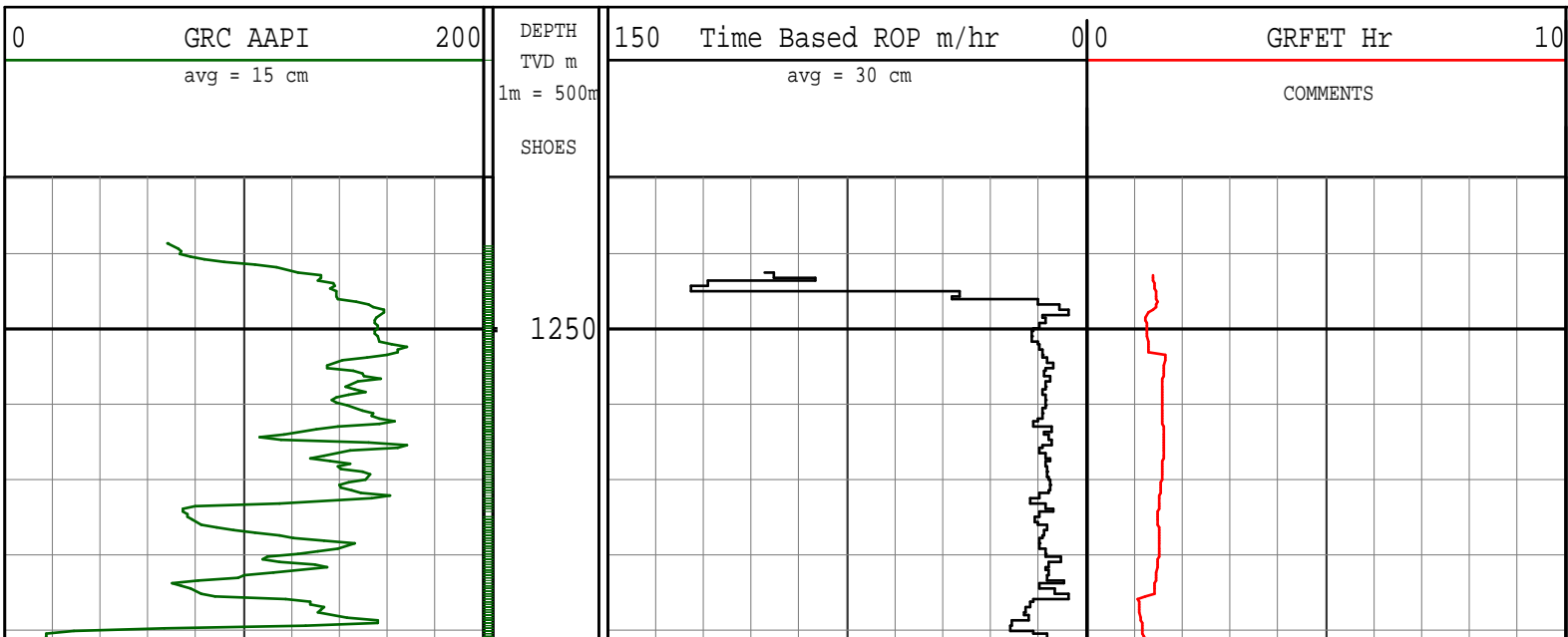
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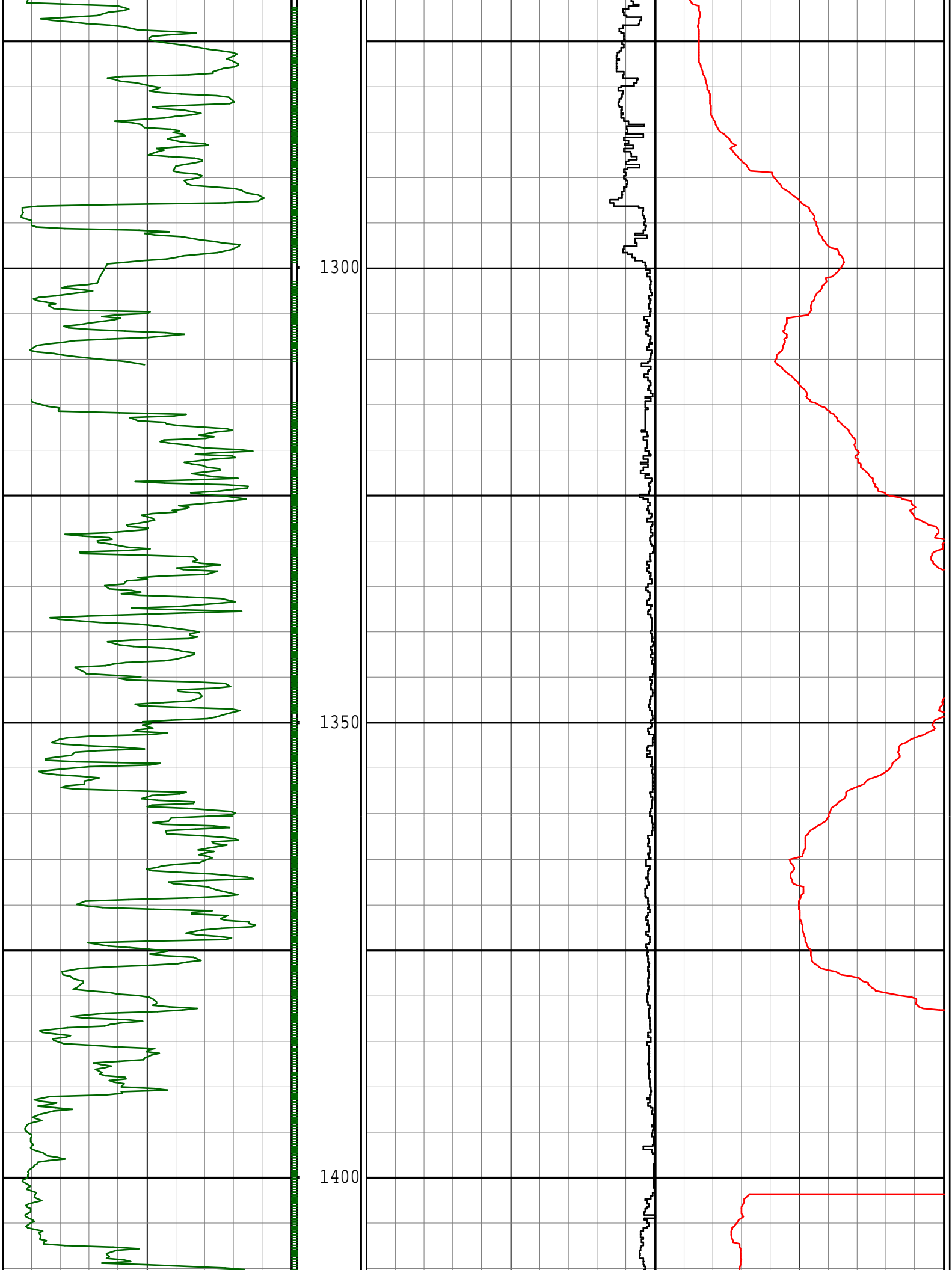
1 : 500  
METERS TVD

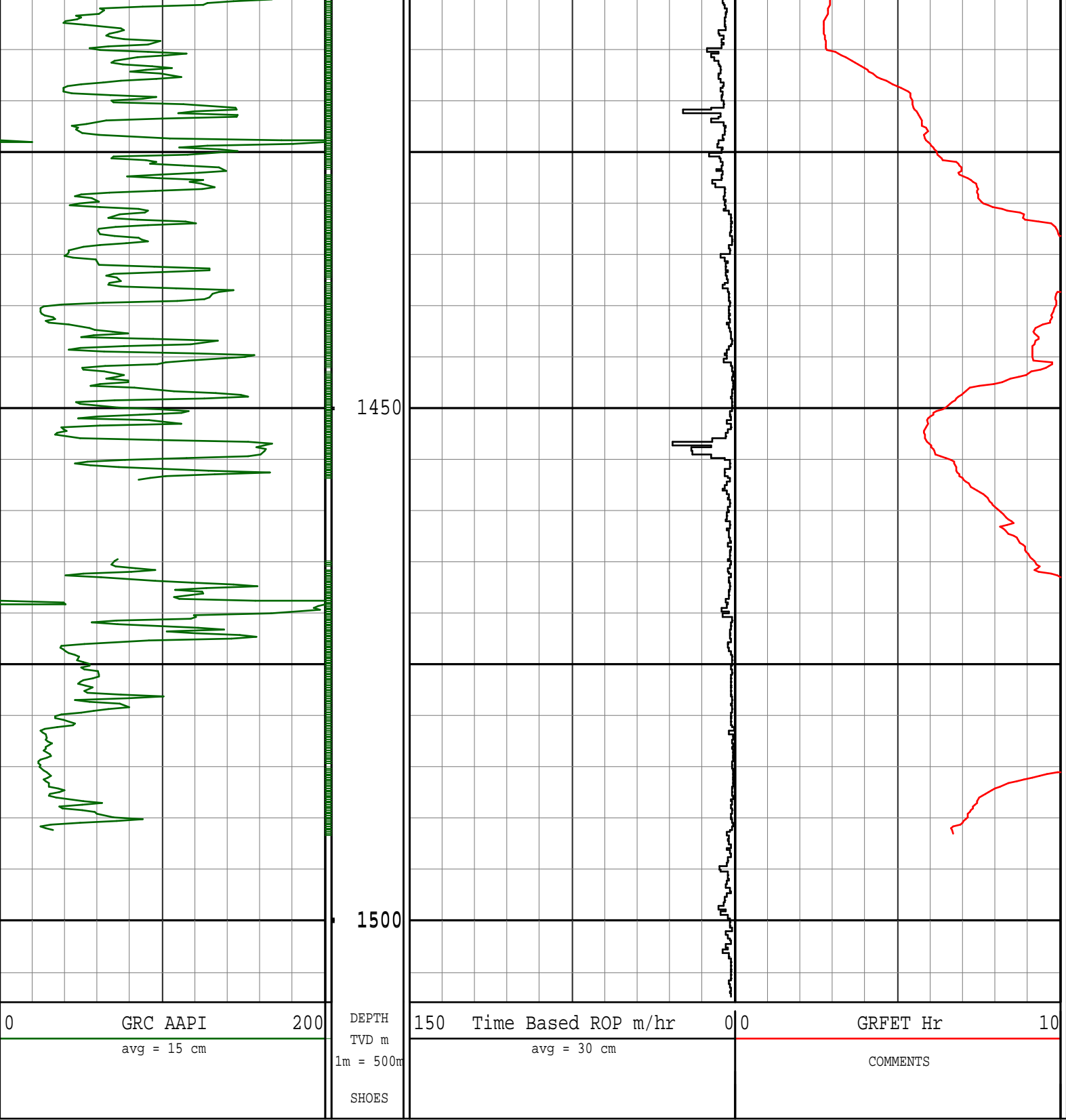
COMPANY : Santos WELL : WM-19 FIELD : Mereenie COUNTY : STATE : NT COUNTRY : AUSTRALIA API No.:				COMPANY : Santos WELL : WM-19 FIELD : Mereenie COUNTY : STATE : NT COUNTRY : AUSTRALIA API WELL No.:				OTHER SERVICES DIRECTIONAL TEMPERATURE			
DEPTH REF. : ROTARY TABLE ELEVATION : 5.15 m (ROTARY TABLE - GROUND LEVEL) ALTITUDE : 731.34 m (MEAN SEA LEVEL - SEA BED )											
BOREHOLE RECORD				DEVIATION RECORD							
HOLE SIZE in	FROM m	TO m	INCLINATION deg	FROM m	TO m						
12 1/4	0	525	0-5	510	1511						
8 3/4	525	1248									
8 1/2	1248	1511									
CASING RECORD											
CASING SIZE in	FROM m	TO m									
9625	0	520									
			DRILLING Co. : ENSIGN RIG : ENSIGN 918 LWD UNIT No. : 004 DISTRICT : ROMA SPUD DATE : 01-AUG-13 LWD START DATE : 20-NOV-13 DEPTH : 519 m LWD END DATE : 01-DEC-13 DEPTH : 1511 m TOTAL DEPTH : 1511 m								

RUN DATA											
RUN NUMBER		3	4								
START DATE		25-NOV-13	28-NOV-13								
START TIME		01:30	14:15								
END DATE		28-NOV-13	01-DEC-13								
END TIME		08:00	09:10								
DEPTH IN	m	1248	1404								
DEPTH OUT	m	1404	1511								
LOG TOP	m	1245	1388								
LOG BOTTOM	m	1388	1495								
HOLE SIZE	in	8 1/2	8 1/2								
MUD DATA @	m	1400	1511								
MUD TYPE		WBM	KCL								
DENSITY	lb/gal	9.00	8.90								
VISCOSITY	s/qt	33	31								
pH		9.0	8.8								
FLUID LOSS	cm3/30	9.5	10.0								
SALINITY		55000	54000								
Rm ohmm	@ deg C	@	@								
Rmf ohmm	@ deg C	@	@								

REMARKS
*** FIELD PRINT ONLY ***
SANTOS LTD.
PATHFINDER - A SCHLUMBERGER COMPANY: JOB NO. 13AUS0136
ALL DATA IS REALTIME UNLESS STATED OTHERWISE.
ALL REFERENCES TO LOG TOP, LOG BOTTOM OR LOGGING TOOL DEPTH REFER TO GAMMA-RAY SENSOR UNLESS STATED OTHERWISE. SENSOR OFFSETS FOR THE LOGGING TOOLS ARE SHOWN IN THE BHA REPORT ON THE LOG TRAILER.
ALL ANNOTATIONS IN THE DEPTH TRACK ARE REFERENCED TO BIT DEPTH.
RUN #3: 6 3/4" XEM / GAMMA-RAY LOGGING RUN.
RUN #4: 6 3/4" XEM / GAMMA-RAY LOGGING RUN.
REMARK #1: GAMMA-RAY HAS NOT BEEN ENVIRONMENTALLY CORRECTED FOR BOREHOLE.
REMARK #2: GAMMA-RAY UNAVAILABLE FROM 1313-1317m MD (1309-1314m TVD)
REMARK #3: GAMMA-RAY UNAVAILABLE FROM 1460-1468m MD (1457-1465m TVD)
NOTICE - All interpretations are opinions based on inferences from electrical or other measurements and we do not guarantee the accuracy or correctness of any interpretations. We shall not, except in the case of gross or willful negligence on our part, be liable or responsible for loss, costs, damages or expenses incurred or sustained by anyone as a result of any interpretations made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.
PATHFINDER - A Schlumberger Company
Version No : RX5 V6.05 Release 20Sep2013
Plot Time : 01-Dec-2013 10:29







Survey Report											
Vertical Section Plane: 0.00°						Total Correction: 5.12° East to Grid					
Calculation Method: Minimum Curvature						Survey Reference: Rotary Table					
North Aligned to: Grid North						Well: WM-19					
WELL: WM 19											
Measured Depth (m)	Inclination (deg)	Azimuth (deg)	TVD (m)	Course Length (m)	Vertical Section (m)	Rect Co-ord North (m)	Rect Co-ord East (m)	Closure Distance (m)	Closure Direction (deg)	Dog-leg Severity (dg/30m)	Temp (deg C)
TIED IN TO EXTERNAL SURVEYS AT 510m MD											
510.00	0.30	322.29	509.98		-1.19	1.19 S	3.27 E	3.48	110.00		
THE FOLLOWING ARE PATHFINDER MWD SURVEYS											
549.70	1.01	84.62	549.68	39.70	-1.07	1.07 S	3.55 E	3.71	106.83	0.90	29.50

660.30	3.52	71.75	660.18	110.60	0.08	0.08 N	7.75 E	7.75	89.41	0.69	29.50
696.90	4.09	70.52	696.70	36.60	0.87	0.87 N	10.05 E	10.09	85.07	0.47	29.50
733.10	4.39	69.42	732.80	36.20	1.78	1.78 N	12.56 E	12.69	81.91	0.26	29.50
771.00	4.92	67.61	770.58	37.90	2.91	2.91 N	15.42 E	15.70	79.30	0.43	31.40
835.30	5.10	70.21	834.63	64.30	4.93	4.93 N	20.66 E	21.24	76.58	0.14	31.40
873.00	5.19	70.82	872.18	37.70	6.06	6.06 N	23.85 E	24.61	75.75	0.08	31.40
913.50	4.92	71.61	912.52	40.50	7.21	7.21 N	27.23 E	28.16	75.17	0.21	31.40
970.40	4.79	75.31	969.22	56.90	8.58	8.58 N	31.84 E	32.98	74.92	0.18	31.40
1008.10	4.61	77.33	1006.79	37.70	9.31	9.31 N	34.84 E	36.06	75.04	0.19	33.40
1049.40	4.31	76.14	1047.97	41.30	10.05	10.05 N	37.97 E	39.27	75.18	0.23	33.40
1087.30	4.00	75.13	1085.77	37.90	10.73	10.73 N	40.63 E	42.02	75.21	0.25	33.40
1251.90	5.01	79.83	1249.86	164.60	13.47	13.47 N	53.25 E	54.93	75.80	0.20	41.00
1290.10	5.32	79.30	1287.90	38.20	14.09	14.09 N	56.63 E	58.36	76.02	0.25	46.80
1330.80	5.49	78.91	1328.42	40.70	14.82	14.82 N	60.40 E	62.19	76.21	0.13	50.60
1369.10	5.58	78.03	1366.54	38.30	15.56	15.56 N	64.02 E	65.88	76.34	0.10	54.40
1409.30	5.41	79.74	1406.56	40.20	16.30	16.30 N	67.79 E	69.73	76.48	0.18	52.50
1447.00	5.58	79.61	1444.08	37.70	16.95	16.95 N	71.34 E	73.33	76.64	0.14	52.50
1485.90	5.71	81.55	1482.80	38.90	17.57	17.57 N	75.12 E	77.15	76.83	0.18	62.10
1491.50	5.71	81.24	1488.37	5.60	17.66	17.66 N	75.67 E	77.70	76.87	0.17	64.00
PROJECTION TO BIT @ 1511.0m											
1511.00	5.71	81.24	1507.77	19.50	17.95	17.95 N	77.59 E	79.64	76.97	0.00	

BOTTOM HOLE ASSEMBLY RECORD							
3		m	4		m		
PDC BIT	0.23		PDC BIT	0.23			
DOG SUB	0.17		DOG SUB	0.40			
G2 MUD MOTOR	9.50		G2 MUD MOTOR	9.44			
FLOAT SUB	0.90		FLOAT SUB	0.90			
HI TOOL	1.19		HI TOOL	1.19			
NMDC PONY	3.47		NMDC PONY	3.48			
NMDC MWD	9.23		NMDC MWD	9.23			
GAP SUB	1.13		GAP SUB	1.13			
IB STAB	1.80		IB STAB	1.80			
NMDC	9.11		NMDC	9.11			
FILTER SUB	1.02		FILTER SUB	1.02			
X/OVER SUB	0.73		X/OVER SUB	0.73			
=====			=====				
TOTAL BHA LENGTH	38.48		TOTAL BHA LENGTH	38.43			
SENSOR OFFSETS:			SENSOR OFFSETS:				
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DIRECTIONAL	17.62		DIRECTIONAL	17.57			
GAMMA-RAY	16.23		GAMMA-RAY	16.18			



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GAMMA-RAY

1 : 500  
METERS TVD