



EWR Electromagnetic Wave Resistivity  
DGR Dual Gamma Ray

Country		: Australia																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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## WELL INFORMATION

MWD Run Number	200	300	400		
Date run completed	14-May-05	16-May-05	19-May-05		
Rig Bit Number	3	4	5		
Bit Size (mm)	311	311	311		
Tool Nominal OD (mm)	203	203	203		
Log Start Depth (MD, m)	742.0	1,304.0	1,761.0		
Log End Depth (MD, m)	1,304.0	1,761.0	1,825.0		
Drill or Wipe	Drilling	Drilling	Drilling		
Drill/Wipe Start Date and Time	13-May-05 05:18	15-May-05 05:44	18-May-05 22:00		
Drill/Wipe End Date and Time	14-May-05 14:30	16-May-05 00:09	19-May-05 01:48		
Min Inc (deg) @ Depth (MD, m)	0.53 @ 842.32	4.15 @ 1,616.98	4.28 @ 1,805.20		
Max Inc (deg) @ Depth (MD, m)	4.61 @ 1,284.20	4.65 @ 1,300.98	4.46 @ 1,760.80		
Bit TFA(in2) / Bit Type	0.92 / HC MX-03DX	1.10 / Smith MA89PX	1.10 / Smith MA89PX		
Flow Rate (gpm)	980	887	820		
Max AV (mpm) / CV (mpm) @ MWD	86.8 / 135.0	82.0 / 157.2	74.5 / 79.8		
Fluid Type	KCl/Polymer	KCl/Polymer	KCl/Polymer		
Density (sg) / Viscosity (spqt)	1.2 / 54	1.2 / 54	1.3 / 70		
Filtrate CL (ppm)	27,000	38,500	40,000		
pH / Fluid Loss (mptm)	8.2 / 4.2	9.0 / 4.0	9.0 / 3.6		
PV (cp) / YP (lhf2)	17 / 29	21 / 37	23 / 17		
% Solids / % Sand	10 / 1	11.6 / 0.5	13 / 0.4		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A		
Rm @ Measured Temp (degC)	0.16 @ 25.3	0.12 @ 22.8	0.14 @ 17.8		
Rmf @ Measured Temp (degC)	0.13 @ 25.6	0.10 @ 23.3	0.09 @ 17.8		
Rmc @ Measured Temp (degC)	0.29 @ 24.4	0.19 @ 23.3	0.36 @ 17.8		
Max Tool Temp (degC) / Source	61.0 / EWR	67.7 / EWR-P4	65.0 / HCIM		
Rm @ Max Tool Temp (degC)	0.09 @ 61.0	0.06 @ 67.7	0.06 @ 65.0		
Lead MWD Engineer	A. Rule	A. Rule	A. Rule		
Customer Representative	R. King	R. King	C. Wise		

## SENSOR INFORMATION

**Downhole Processor Information**

Tool Type	HCIM	HCIM	HCIM		
Software Version	68.18	68.18	68.18		
Sub Serial Number	198838	198838	198838		
Insert Serial Number	163155	163155	110349		
Logging String Serial Number	DM90072522	DM90072522	DM90072523		
Date and Time Initialized	12-May-05 19:10	14-May-05 21:17	18-May-05 16:42		
Date and Time Read	14-May-05 20:39	16-May-05 19:22	19-May-05 10:09		

**Directional Sensor Information**

Tool Type	DM	DM	DM		
Distance From Bit (m)	19.18	19.22	19.10		
Software Version	3.15	3.15	3.15		
Sub Serial Number	1	1	128402		
Sonde Serial Number	87896	87896	10581139		
Sensor ID Number	N/A	N/A	N/A		
Survey String Serial Number	N/A	N/A	N/A		
Toolface Offset (deg)	0	0	0		

**Gamma Ray Sensor Information**

Tool Type	DGR	DGR	DGR		
Distance From Bit (m)	10.31	10.35	10.34		
Recorded Sample Period (sec)	12	12	12		
Software Version	N/A	N/A	N/A		
Sub Serial Number	059984	059984	10603326		
Insert/Sonde Serial Number	151078	151078	084171		

**Resistivity Sensor Information**

Tool Type	EWR-P4	EWR-P4	EWR-P4		
Distance From Bit (m)	12.65	12.69	12.67		
Recorded Sample Period (sec)	14	14	14		
Software Version	1.38	1.38	1.38		
Sub Serial Number	96506	96506	122988		
Receiver Insert Serial Number	45162	45162	123048		
Transmitter Insert Serial Number	123860	123860	78411		
Receiver Orientation	Down	Down	Down		

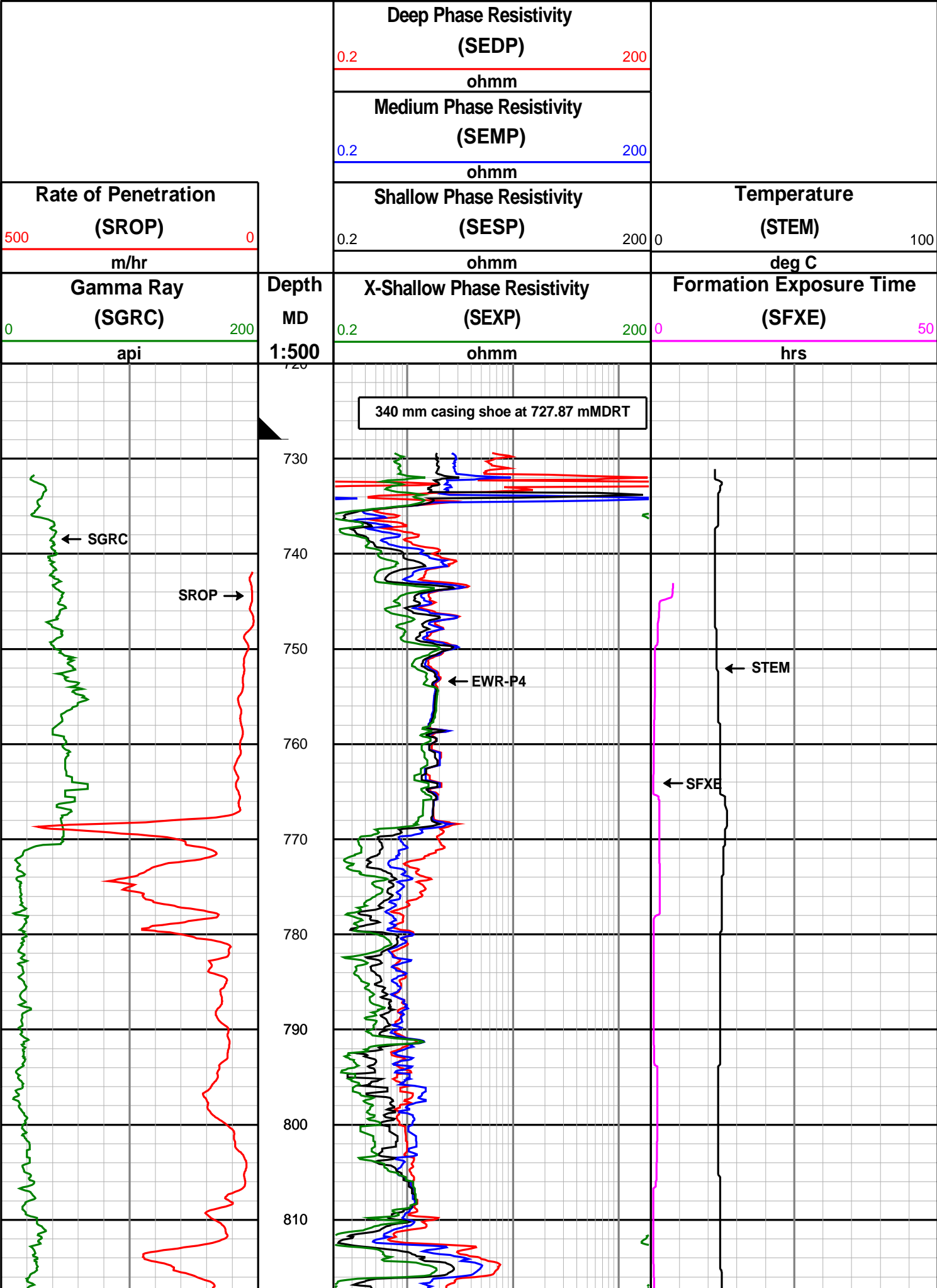
**REMARKS**

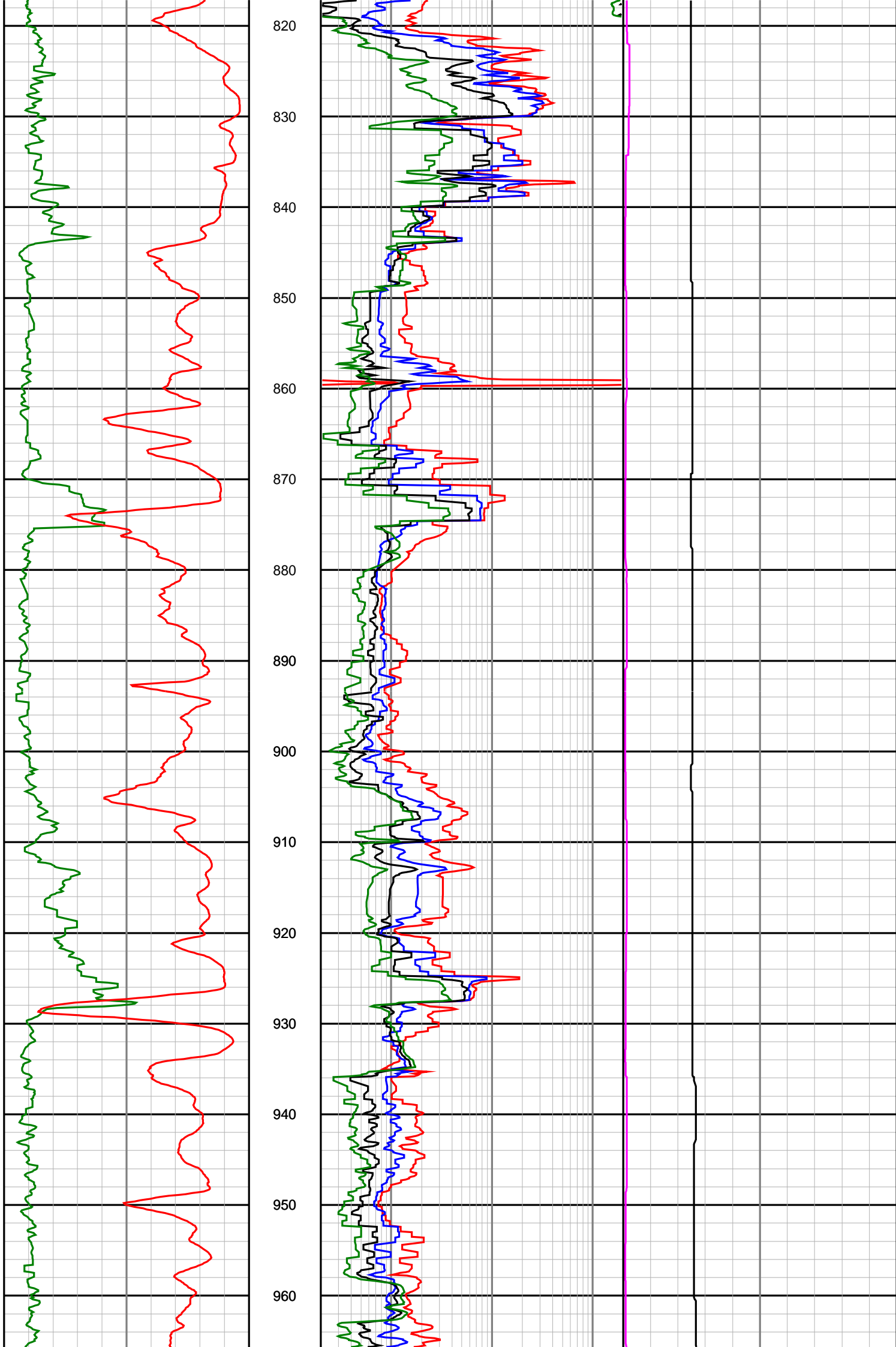
1. All depths are bit depths and referenced to the drillers pipe tally
2. AV/CV is calculated at the MWD collar using the Powere Law for water based muds and the Bingham's Plastic Law for oil based muds.
3. Curve mnemonics are:  
SGRC - Smoothed Gamma Ray Combined, api  
SEXP - Smoothed Extra Shallow Phase Resistivity, Ohm-m  
SESP - Smoothed Shallow Phase Resistivity, Ohm-m  
SEMP - Smoothed Medium Phase Resistivity, Ohm-m  
SEDP - Smoothed Deep Phase Resistivity, Ohm-m  
SROP - Smoothed Rate of Penetration, m/hr  
STEM - Smoothed Medium Phase Resistivity Temperature, deg C  
SFXE - Smoothed Formation Exposure Time, hr
4. Interval 1761.0-1794.0 mMDRT was logged after coring.
5. EMS Surveys were adjusted by Santos Ltd to correct for magnetic interference.

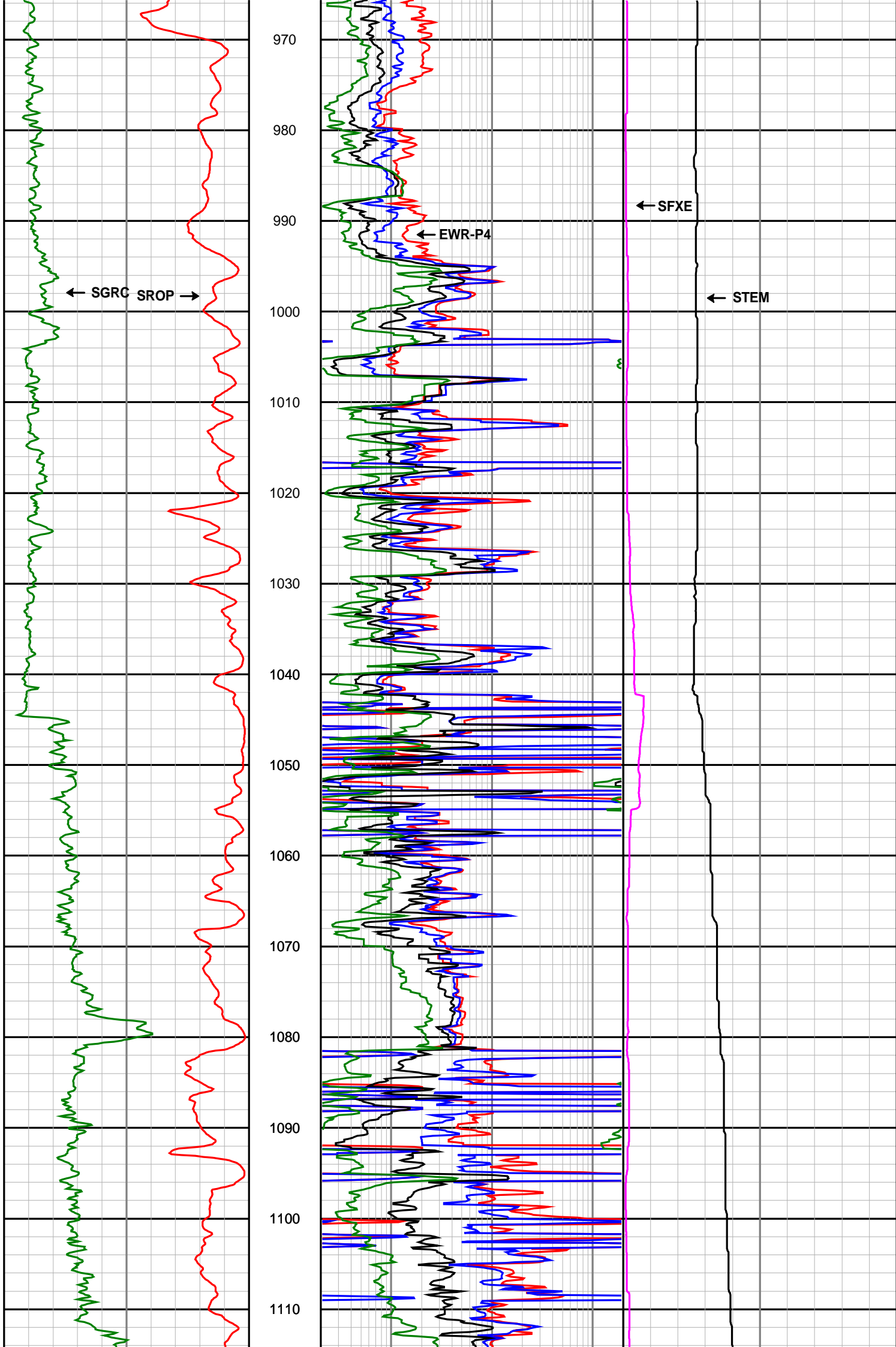
**WARRANTY**

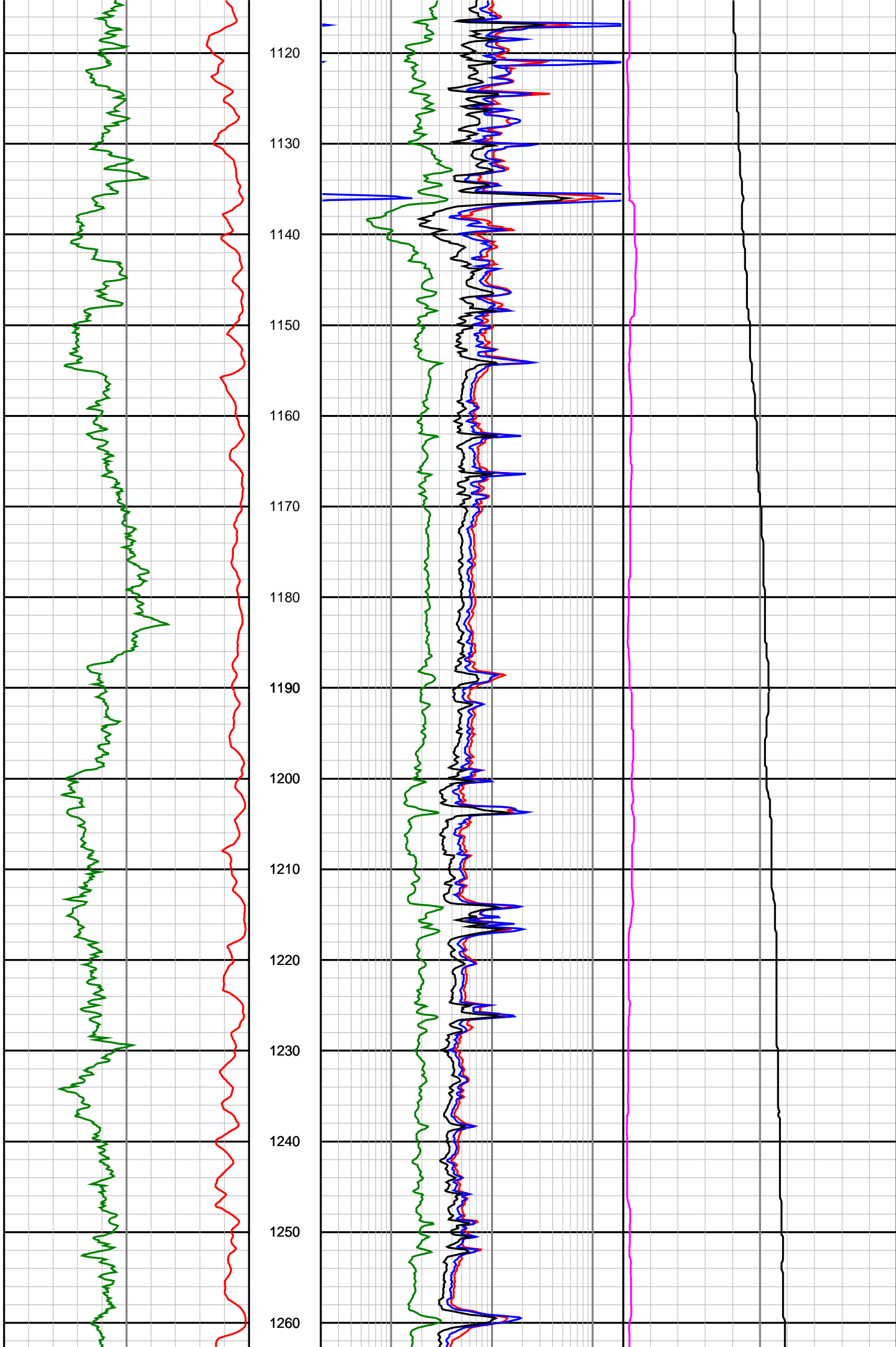
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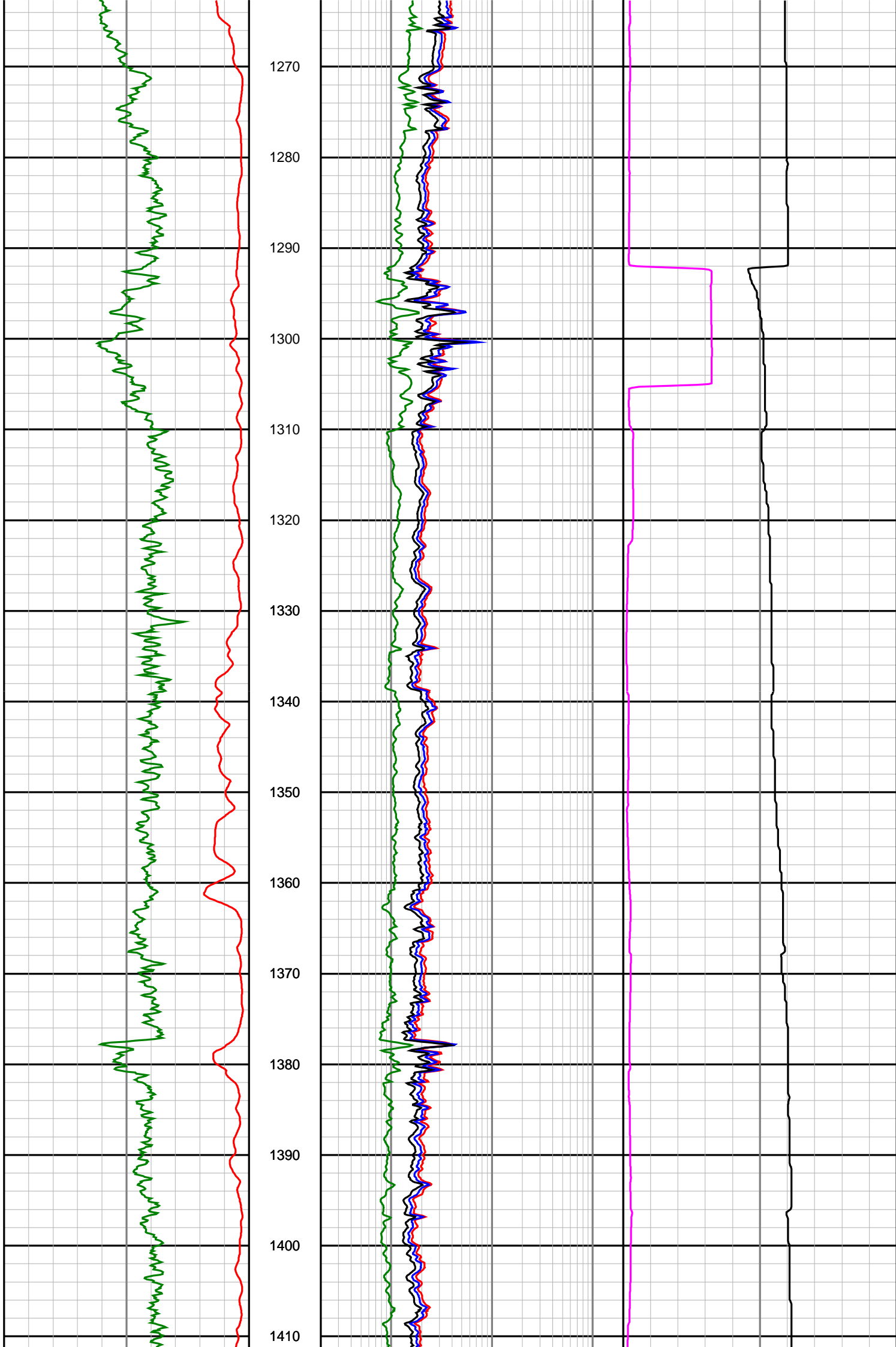
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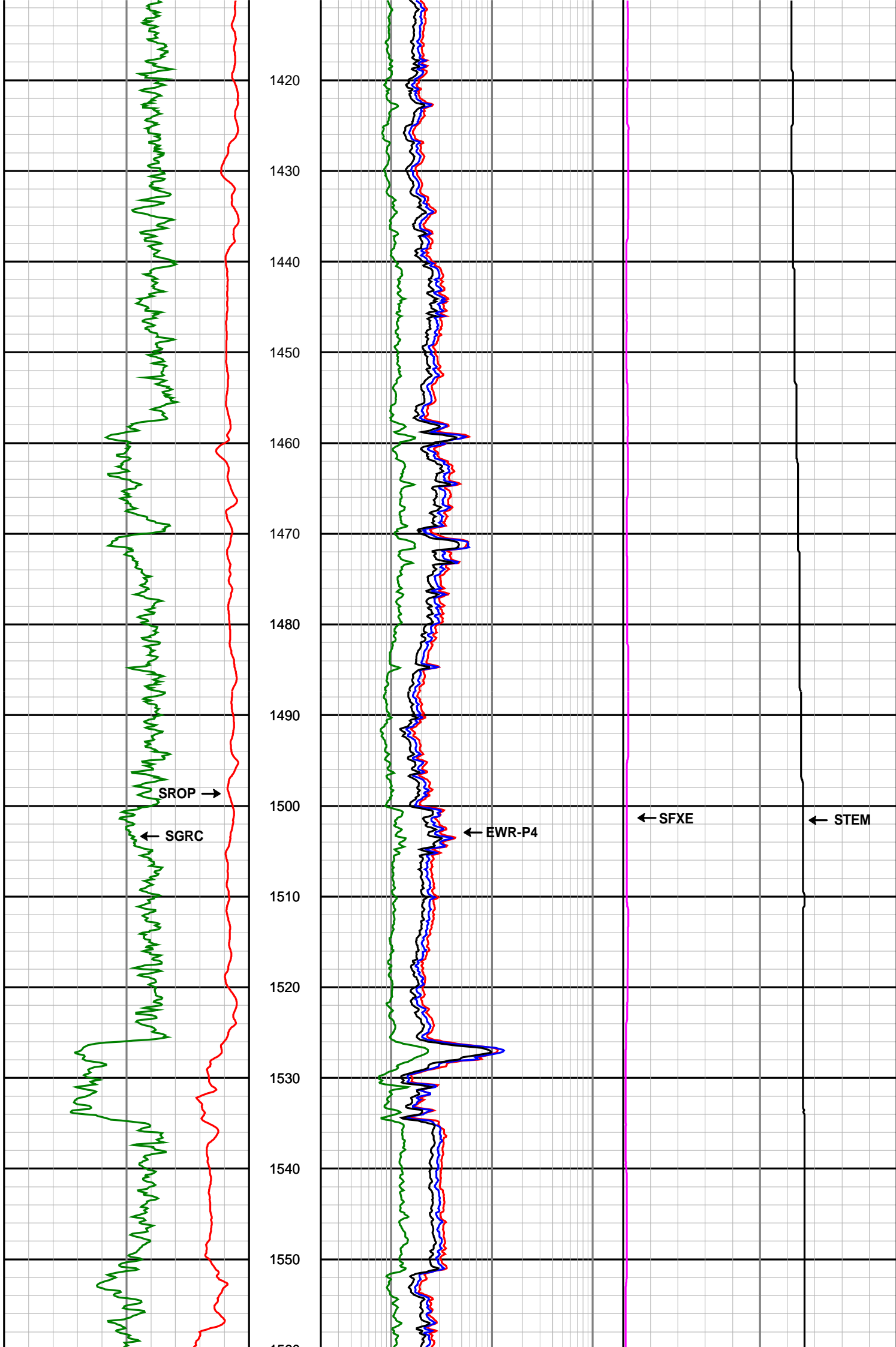


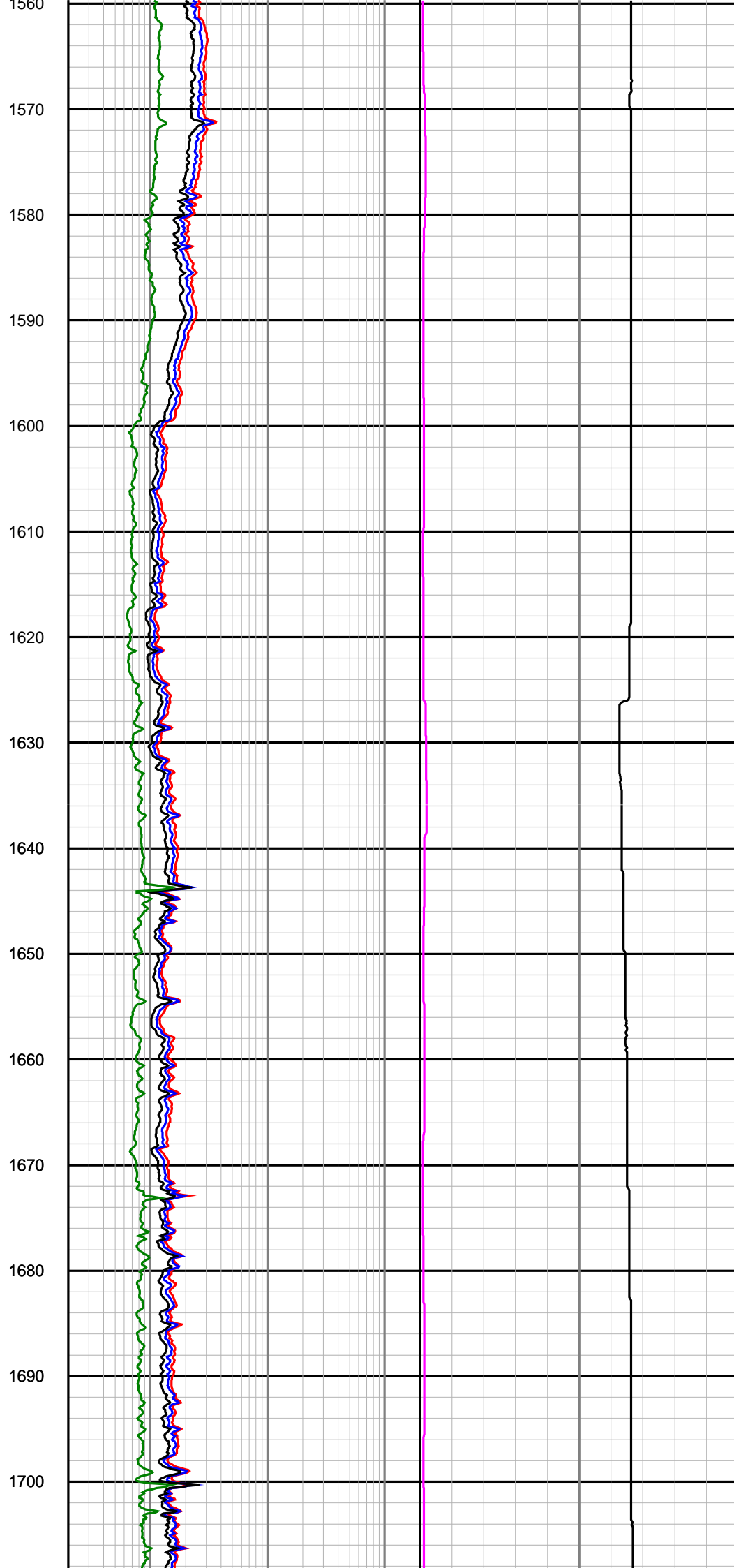
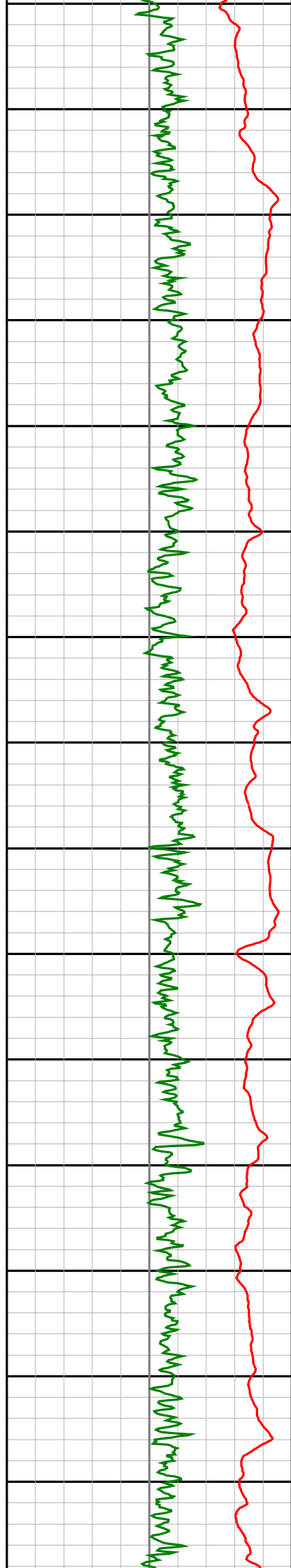


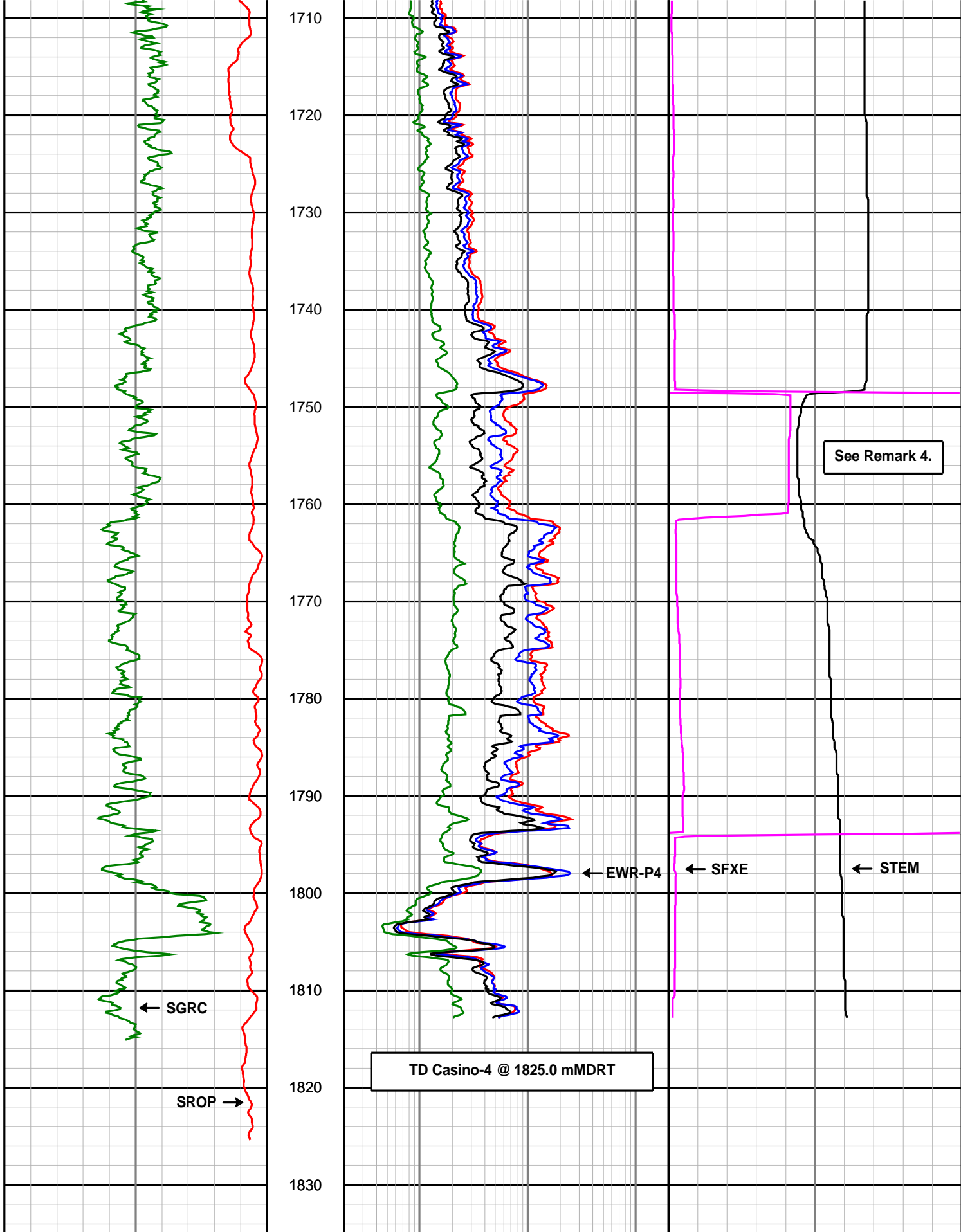












<b>Gamma Ray (SGRC)</b>	<b>Depth MD</b>	<b>X-Shallow Phase Resistivity (SEXP)</b>	<b>Formation Exposure Time (SFXE)</b>
0200	1:500	0.2200	050
api		ohmm	hrs
<b>Rate of Penetration (SROP)</b>		<b>Shallow Phase Resistivity (SESP)</b>	<b>Temperature (STEM)</b>
5000		0.2200	0100
m/hr		ohmm	deg C
		<b>Medium Phase Resistivity</b>	

0.2	(SEMP)	200
	ohmm	
	Deep Phase Resistivity	
0.2	(SEDP)	200
	ohmm	



**HALLIBURTON**

## DIRECTIONAL SURVEY REPORT

Santos Ltd  
Casino-4  
Casino  
Victoria  
Australia

AU-FE-0003530535

RT to LAT = 22.0m. EMS Surveys to 734.4 mMDRT.

Measured Depth (metres)	Inclination (degrees)	Direction (degrees)	Vertical Depth (metres)	Latitude (metres)	Departure (metres)	Vertical Section (metres)	Dogleg (deg/30m)
137.400	0.00	0.00	137.400	0.000 N	0.000 E	0.000	TIE-IN
155.270	0.85	0.00	155.269	0.133 N	0.000 E	0.133	1.43
183.080	1.00	0.00	183.076	0.582 N	0.000 E	0.582	0.16
210.810	1.06	0.00	210.801	1.080 N	0.000 E	1.080	0.06
238.200	0.99	0.00	238.187	1.570 N	0.000 E	1.570	0.08
265.670	0.64	0.00	265.654	1.961 N	0.000 E	1.961	0.38
294.940	0.63	0.00	294.922	2.285 N	0.000 E	2.285	0.01
323.720	0.81	0.00	323.700	2.647 N	0.000 E	2.647	0.19
352.060	0.45	0.00	352.038	2.958 N	0.000 E	2.958	0.38
381.120	0.39	0.00	381.097	3.171 N	0.000 E	3.171	0.06
410.010	0.74	0.00	409.986	3.456 N	0.000 E	3.456	0.36
438.380	0.53	0.00	438.354	3.771 N	0.000 E	3.771	0.22
466.930	0.61	0.00	466.903	4.055 N	0.000 E	4.055	0.08
496.110	0.63	0.00	496.081	4.370 N	0.000 E	4.370	0.02
524.800	0.45	0.00	524.770	4.641 N	0.000 E	4.641	0.19
553.280	0.34	0.00	553.249	4.837 N	0.000 E	4.837	0.12
581.980	0.46	0.00	581.948	5.038 N	0.000 E	5.038	0.13
610.680	0.25	0.00	610.648	5.215 N	0.000 E	5.215	0.22
639.310	0.09	0.00	639.278	5.300 N	0.000 E	5.300	0.17
668.160	0.40	0.00	668.127	5.424 N	0.000 E	5.424	0.32
696.880	0.31	0.00	696.847	5.602 N	0.000 E	5.602	0.09
725.800	0.27	0.00	725.766	5.748 N	0.000 E	5.748	0.04
734.400	0.26	0.00	734.366	5.788 N	0.000 E	5.788	0.03
813.650	1.10	353.23	813.610	6.722 N	0.090 W	6.722	0.32
842.320	0.53	18.03	842.277	7.121 N	0.081 W	7.121	0.69
870.890	0.83	88.47	870.846	7.252 N	0.167 E	7.252	0.86
899.570	1.86	98.30	899.517	7.190 N	0.835 E	7.190	1.10
956.720	2.07	127.80	956.635	6.423 N	2.569 E	6.423	0.54
1014.200	2.43	162.77	1014.073	4.623 N	3.750 E	4.623	0.73
1100.390	3.68	204.01	1100.149	0.350 N	3.165 E	0.350	0.85
1129.190	4.46	205.68	1128.876	1.504 S	2.304 E	-1.504	0.82
1158.130	4.53	204.02	1157.727	3.562 S	1.351 E	-3.562	0.16
1187.370	4.39	203.45	1186.878	5.645 S	0.435 E	-5.645	0.15
1216.000	4.44	203.57	1215.423	7.667 S	0.445 W	-7.667	0.05
1244.280	4.48	206.57	1243.618	9.658 S	1.377 W	-9.658	0.25
1284.200	4.61	205.06	1283.412	12.506 S	2.754 W	-12.506	0.13
1300.980	4.65	203.38	1300.137	13.741 S	3.309 W	-13.741	0.25
1329.900	4.59	205.24	1328.963	15.863 S	4.267 W	-15.863	0.17
1416.800	4.27	202.81	1415.604	21.990 S	7.004 W	-21.990	0.13
1445.220	4.21	202.25	1443.946	23.932 S	7.810 W	-23.932	0.07
1472.150	4.21	200.09	1470.803	25.776 S	8.524 W	-25.776	0.18
1530.610	4.18	198.76	1529.106	29.811 S	9.948 W	-29.811	0.05
1588.180	4.19	198.08	1586.523	33.799 S	11.275 W	-33.799	0.03
1616.980	4.15	199.72	1615.246	35.780 S	11.953 W	-35.780	0.13
1645.860	4.17	198.78	1644.050	37.758 S	12.644 W	-37.758	0.07

## Casino-4

Measured Depth (metres)	Inclination (degrees)	Direction (degrees)	Vertical Depth (metres)	Latitude (metres)	Departure (metres)	Vertical Section (metres)	Dogleg (deg/30m)
1674.590	4.18	197.38	1672.704	39.745 S	13.293 W	-39.745	0.11
1732.100	4.45	198.68	1730.051	43.859 S	14.634 W	-43.859	0.15
1760.800	4.46	201.16	1758.664	45.954 S	15.393 W	-45.954	0.20
1805.200	4.28	201.27	1802.935	49.107 S	16.617 W	-49.107	0.12
1825.000	4.28	201.27	1822.680	50.484 S	17.153 W	-50.484	0.00

### 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 1825.000 METRES  
IS 53.319 METRES ALONG 198.77 DEGREES (GRID)

## MWD RUN 200 - BHA

## MWD RUN 200 - MWD

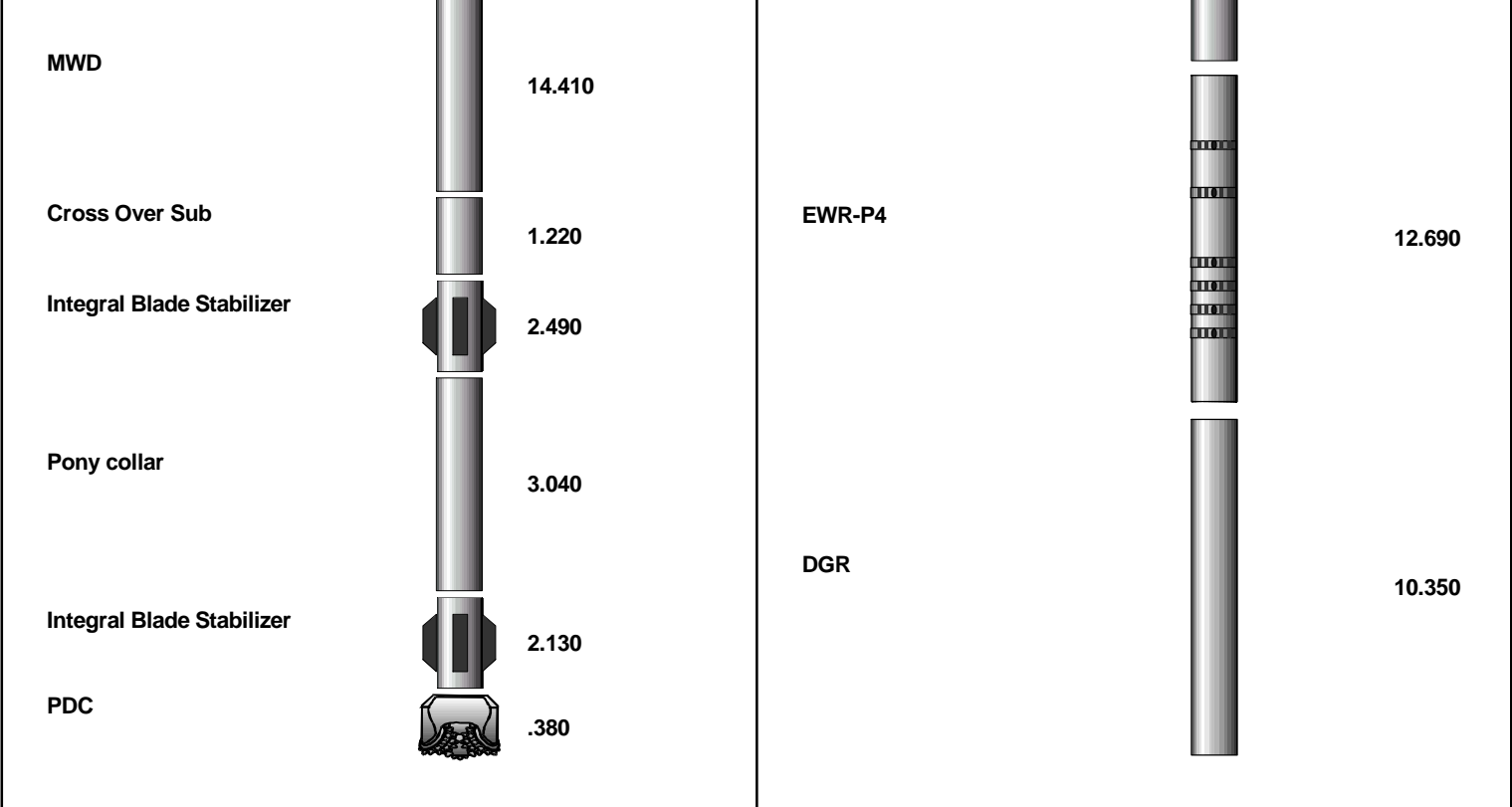
	Component Length (m)		Sensor Measure Point Distance To Bit (m)
HWDP	138.060	DM	19.180
Drill Collar	27.810		
Cross Over Sub	1.090	HCIM	
Drilling Jars	9.670		
Drill Collar	88.330	PWD	15.170
NMDC	2.930		

MWD		14.410	EWR-P4		12.650
Cross Over Sub		1.220			
Integral Blade Stabilizer		2.490			
Pony collar		3.040			
Integral Blade Stabilizer		2.130			
Tricone		.340	DGR		10.310

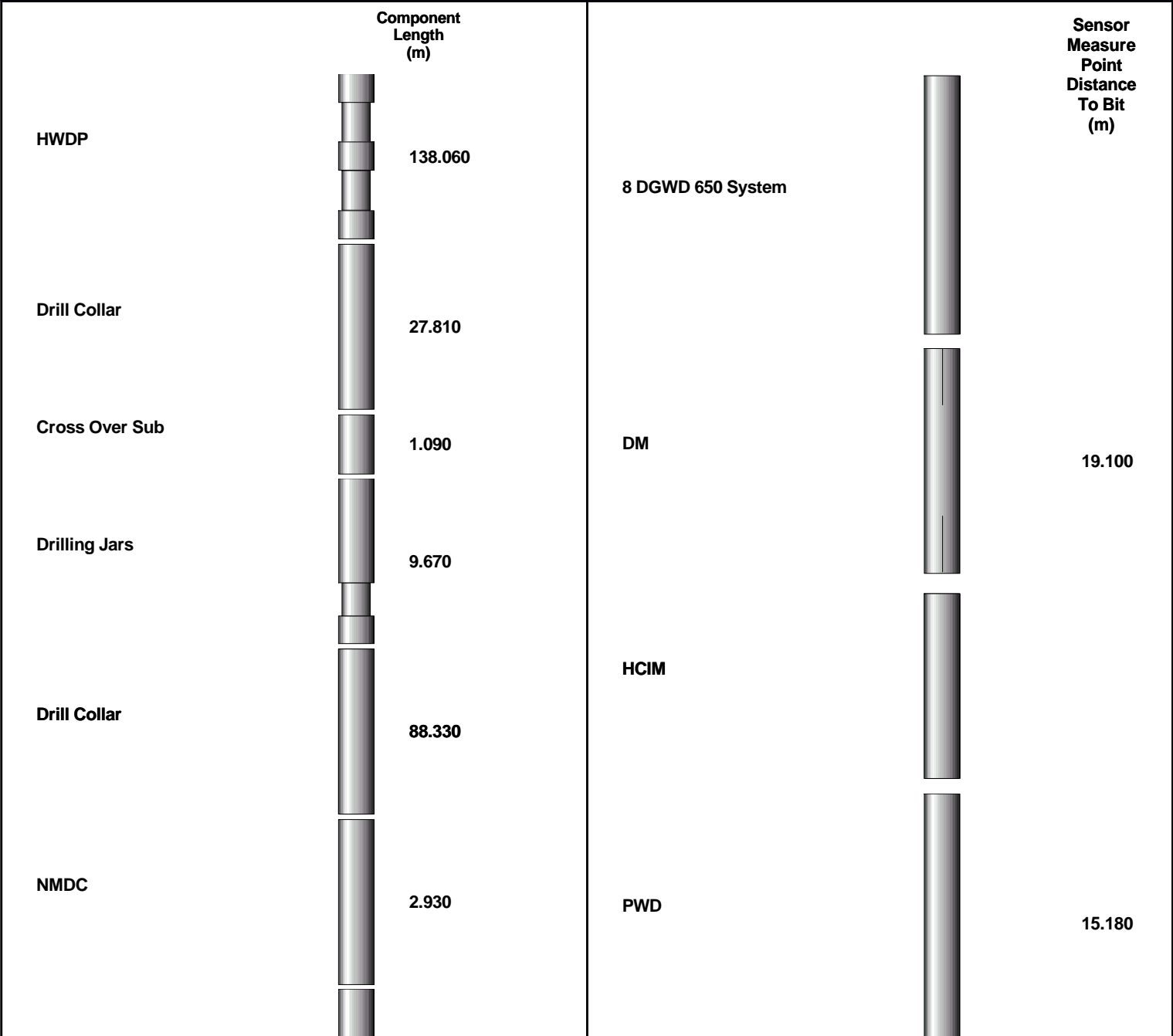
MWD RUN 300 - BHA









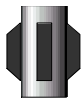



MWD RUN 300 - MWD

	Component Length (m)		Sensor Measure Point Distance To Bit (m)
HWDP	138.060	8 DGWD 650 System	
Drill Collar	27.810		
Cross Over Sub	1.090	DM	19.220
Drilling Jars	9.670		
Drill Collar	88.330	HCIM	
NMDC	2.930	PWD	15.210



MWD RUN 400 - BHA	MWD RUN 400 - MWD
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MWD		14.250	EWR-P4		12.670
Cross Over Sub		1.220			
Integral Blade Stabilizer		2.490			
Pony collar		3.040			
Integral Blade Stabilizer		2.130			
PDC		.380	DGR		10.340