



1 : 240

WELL INFORMATION					
MWD Run Number	100	200	300		
Date run completed	06-Feb-13	06-Feb-13	07-Feb-13		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	8.750		
Tool Nominal OD (in)	6.750	6.750	6.750		
Log Start Depth (TVD, ft)	756.00	5,482.51	5,830.14		
Log End Depth (TVD, ft)	5,482.51	5,830.14	6,255.26		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	05-Feb-13 08:45	06-Feb-13 10:15	06-Feb-13 21:20		
Drill/Wipe End Date and Time	06-Feb-13 01:00	06-Feb-13 13:45	07-Feb-13 05:30		
Min Inc (deg) @ Depth (TVD, ft)	.31 @ 1,103.99	.13 @ 5,496.51	19.15 @ 5,776.14		
Max Inc (deg) @ Depth (TVD, ft)	17.06 @ 2,958.66	13.21 @ 5,684.93	80.12 @ 6,248.10		
Bit TFA(in2) / Bit Type	.75 / PDC	.86 / PDC	.86 / PDC		
Flow Rate (gpm)	600.00	587.00	600.00		
Max AV (fpm) / CV (fpm) @ MWD	470.0 / 470.0	356.1 / 356.1	356.1 / 356.1		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.45 / 27.00	9.40 / 34.00	10.00 / 37.00		
Filtrate CL (ppm)	500.00	500.00	500.00		
pH / Fluid Loss (mptm)	8.10 / N/A	9.70 / N/A	9.50 / N/A		
PV (cP) / YP (Ihf2)	1 / 3.00	8 / 8.00	11 / 11.00		
% Solids / % Sand	.4 / .2	7.3 / .3	12.5 / .5		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A		
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Min Tool Temp (deg F) / S	100.00 / PDM	151.47 / PDM	100.00 / PDM		

Max Tool Temp (degF) / Source	133.30 / PCM	151.47 / PCM	162.80 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Robert Ley	Robert Ley	Robert Ley		
Customer Representative	Jeremy Stolz	Jeremy Stolz	Jeremy Stolz		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.76	5.76		
Sub Serial Number	11404279	11404279	11404279		
Insert Serial Number	11680785	11680785	11227556		
Date and Time Initialized	04-Feb-13 15:08	04-Feb-13 15:07	06-Feb-13 17:04		
Date and Time Read	06-Feb-13 18:56	06-Feb-13 18:51	07-Feb-13 10:42		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	58.00	56.00	56.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404279	11404279	11404279		
Sonde Serial Number	11833258	11833258	10835184		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	208.84	323.57	320.36		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	50.45	49.06	49.06		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404279	11404279	11404279		
Insert/Sonde Serial Number	11293277	11293277	11293270		

## REMARKS

1. All depths are true vertical depths and are calibrated to the driller' pipe tally and are measured from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. The Following smoothing parameters have been applied to the data"

PGRC (Gamma Ray):

Interval Resolution: 0.5 feet

Coercion Distance: 0.6 feet

Gap Fill: 3.0 feet

ROPA (Rate of Penetration):

Interval Resolution: 0.5 feet

Coercion Distance: 1.2 feet

5. Gamma Data from measured depths of:

5632 feet - 5649 feet

5728 feet - 5746 feet

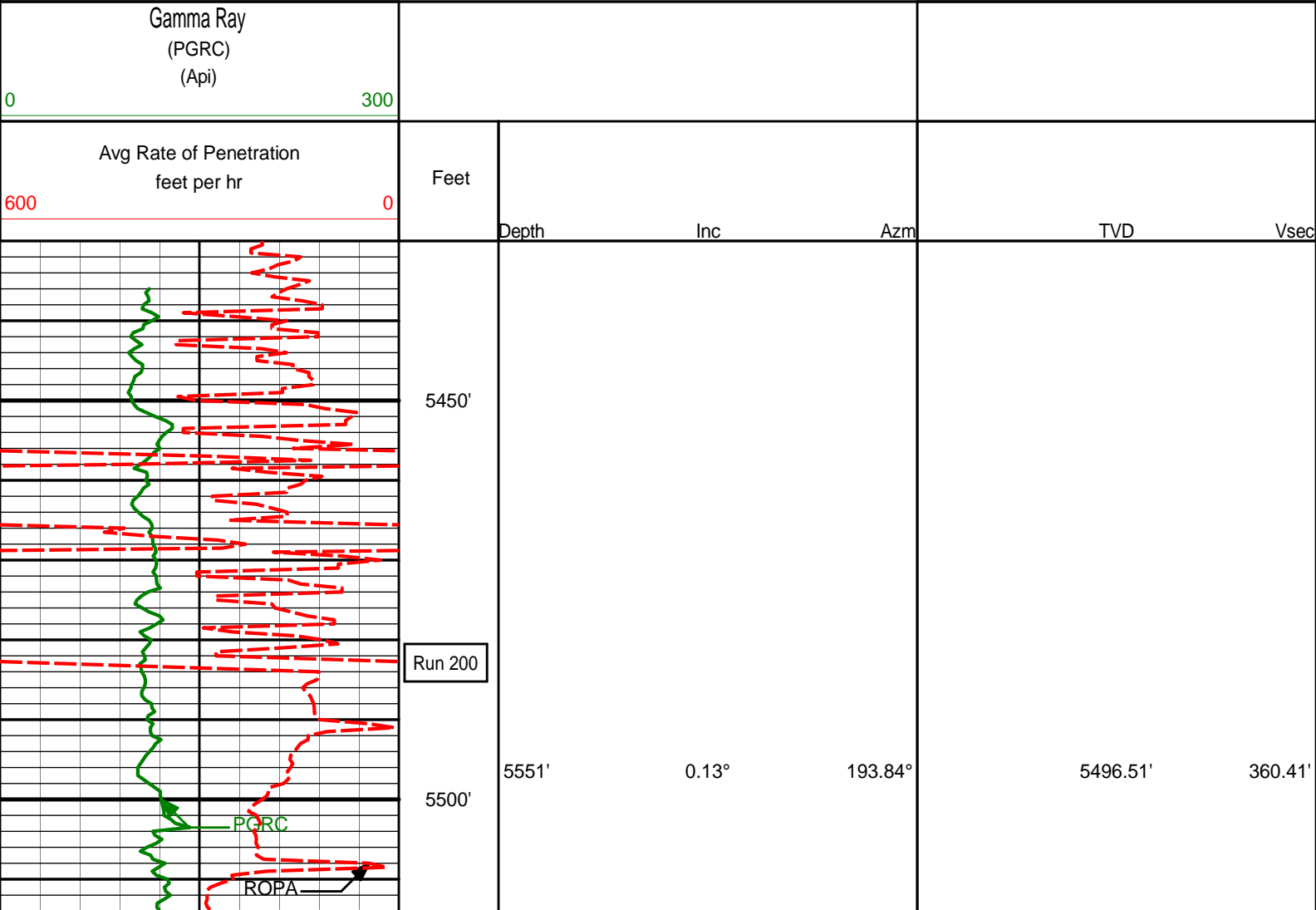
is real time data

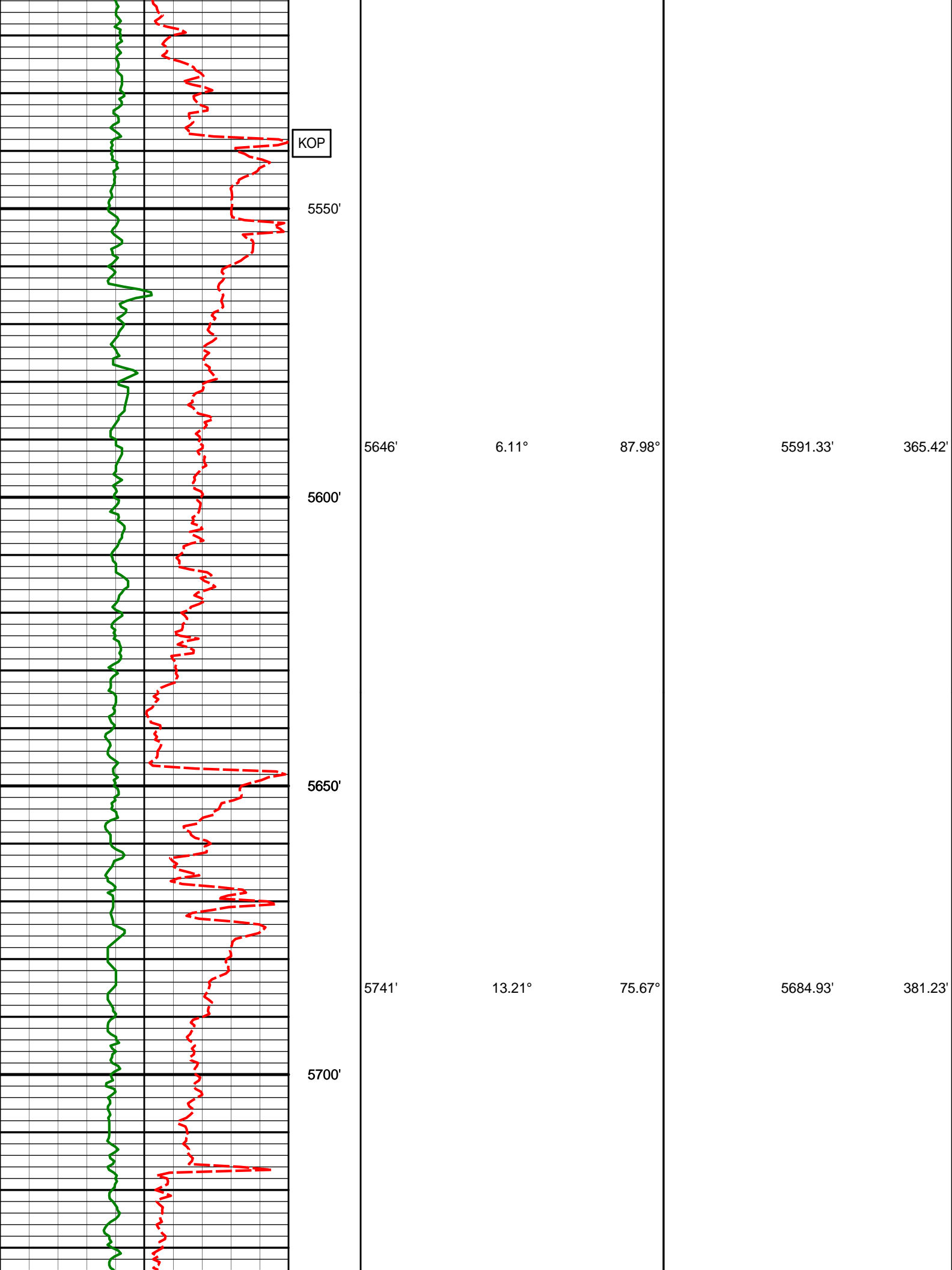
WARRANTY

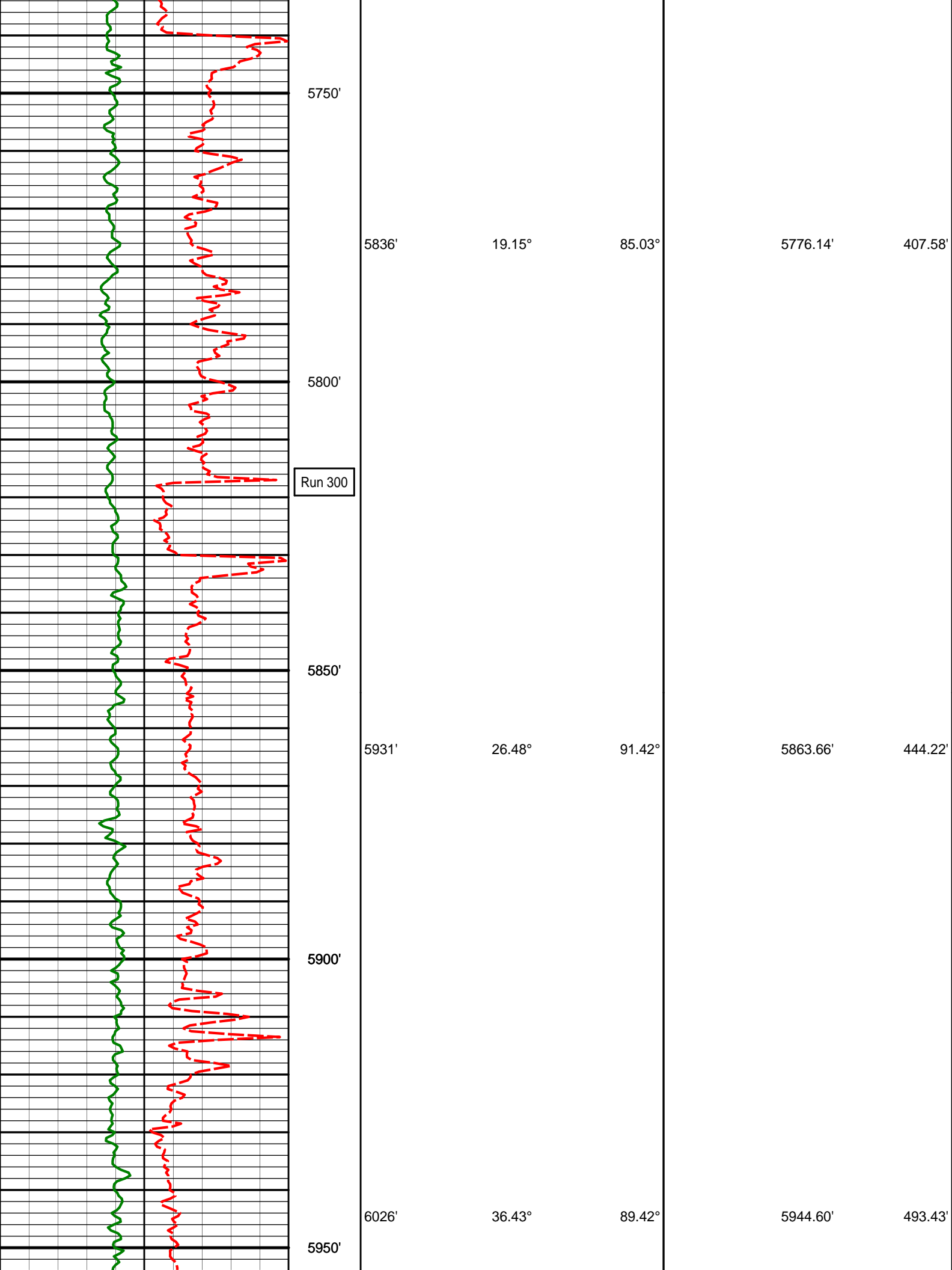
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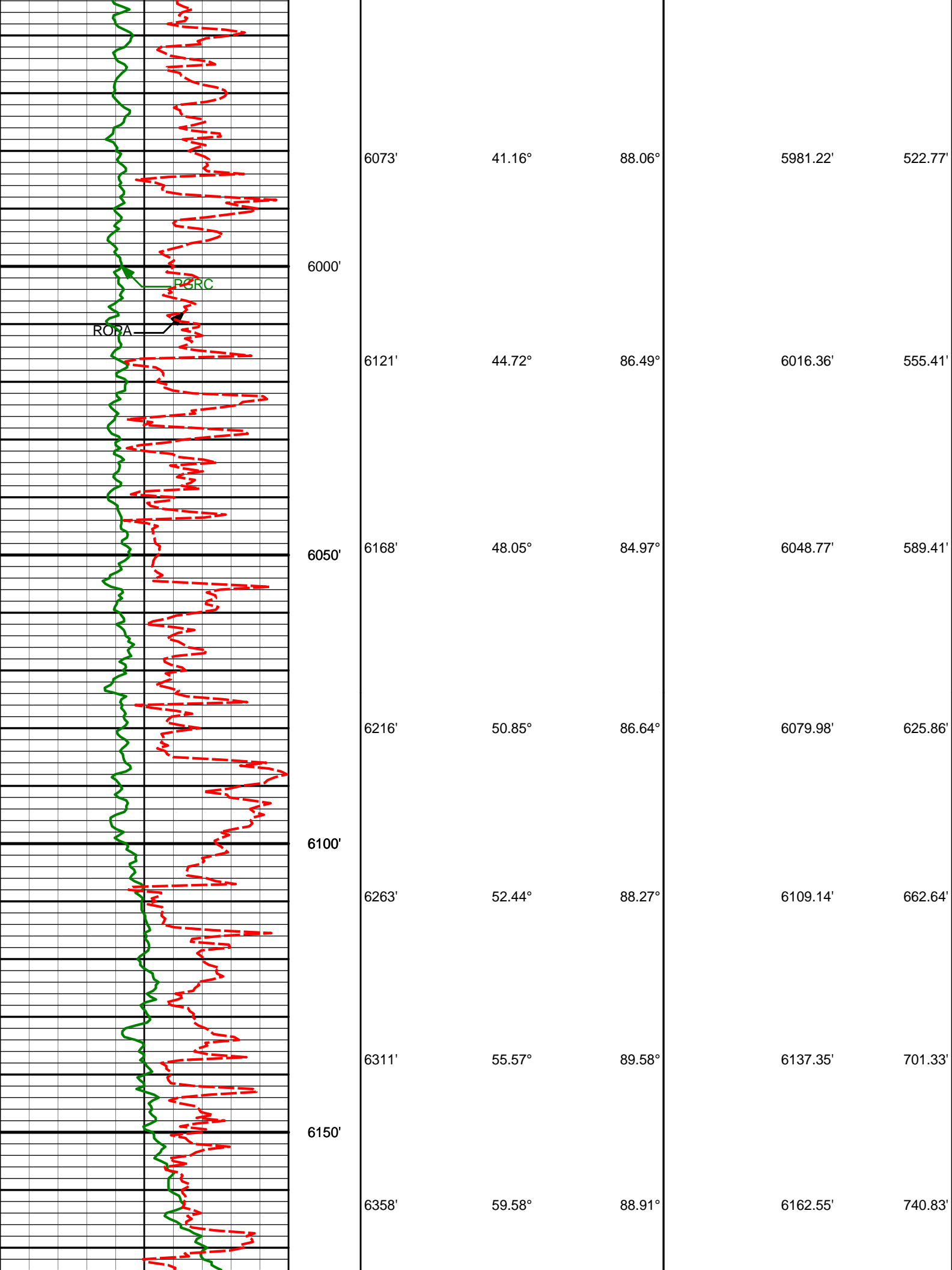
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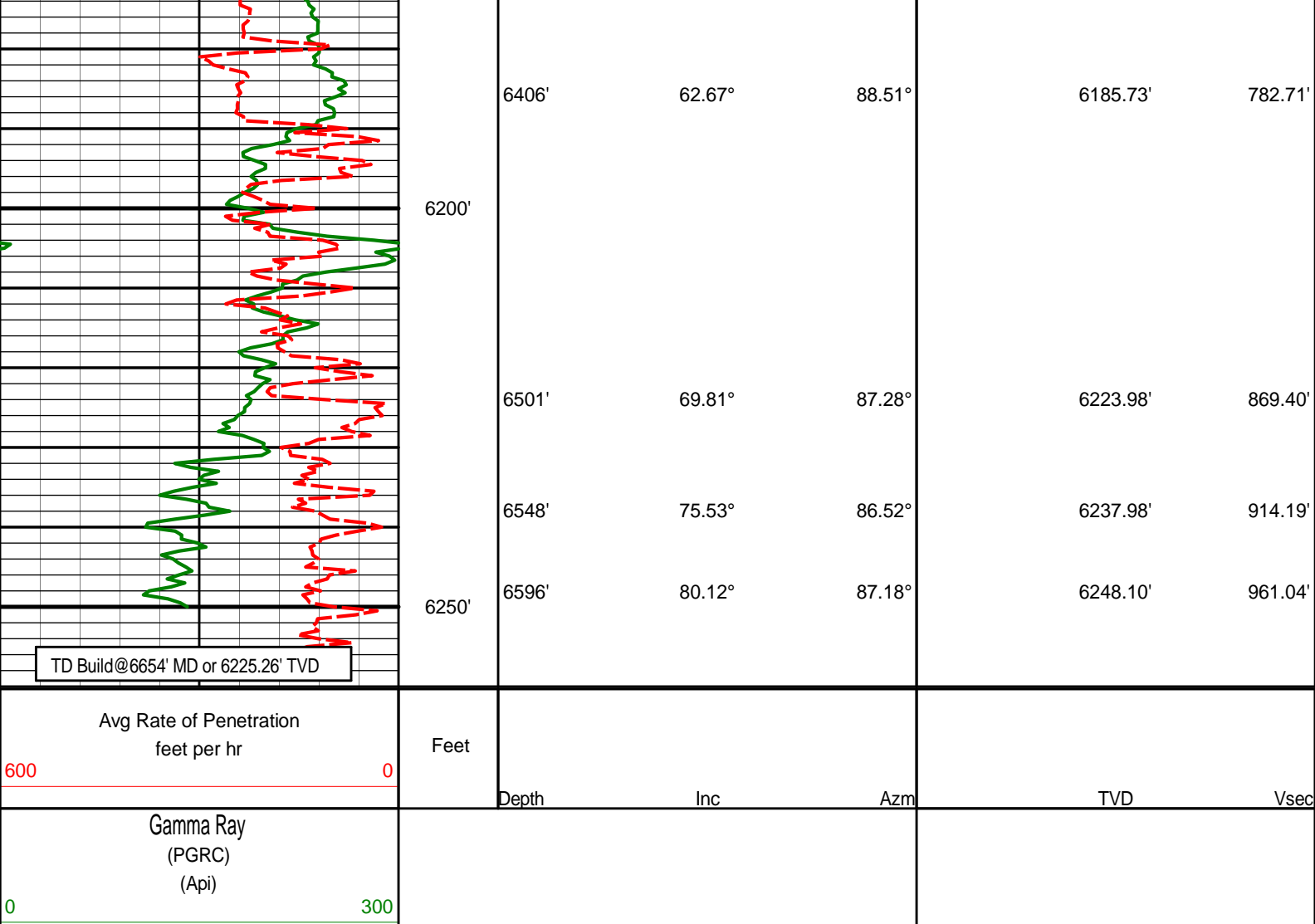
TVD Detail Log 1:240











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## DIRECTIONAL SURVEY REPORT

Noble Energy  
Rohn LB22-62HN  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0900145807

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
756.00	0.00	0.00	756.00	0.00 N	0.00 E	0.00	TIE-IN
825.00	0.55	98.04	825.00	0.05 S	0.33 E	0.32	0.79
1104.00	0.31	26.91	1103.99	0.44 N	1.98 E	2.02	0.19
1383.00	0.96	41.45	1382.97	2.87 N	3.88 E	4.16	0.24
1476.00	1.76	42.34	1475.95	4.51 N	5.36 E	5.80	0.85
1571.00	3.94	41.91	1570.82	8.01 N	8.51 E	9.31	2.30
1666.00	5.71	37.32	1665.48	14.20 N	13.56 E	14.97	1.90
1761.00	6.90	42.67	1759.91	22.15 N	20.29 E	22.50	1.40
1855.00	8.28	44.26	1853.08	31.15 N	28.84 E	31.94	1.49
1950.00	9.73	37.09	1946.91	42.45 N	38.45 E	42.68	1.93
2045.00	11.55	40.31	2040.28	56.11 N	49.44 E	55.05	2.02
2140.00	12.74	39.43	2133.15	71.45 N	62.25 E	69.39	1.26
2235.00	13.46	38.13	2225.68	88.24 N	75.73 E	84.55	0.82
2330.00	14.82	39.41	2317.80	106.32 N	90.27 E	100.90	1.47
2425.00	16.04	42.79	2409.37	125.34 N	106.90 E	119.44	1.60
2520.00	14.71	41.81	2500.97	143.97 N	123.86 E	138.25	1.43
2615.00	16.25	40.58	2592.52	162.20 N	140.37 E	156.68	1.74

2815.00	16.23	39.38	2392.32	183.20 N	140.37 E	158.68	1.74
2710.00	13.99	36.73	2684.23	182.65 N	155.71 E	173.98	2.50
2805.00	14.91	38.39	2776.22	201.44 N	170.17 E	190.32	1.06
2900.00	16.44	40.99	2867.69	221.17 N	186.57 E	208.71	1.76
2995.00	17.06	39.33	2958.66	242.09 N	204.22 E	228.44	0.82
3090.00	16.66	39.78	3049.58	263.33 N	221.76 E	248.11	0.44
3184.00	15.17	44.06	3139.98	282.53 N	238.93 E	267.20	2.02
3279.00	12.66	42.60	3232.18	299.13 N	254.62 E	284.54	2.67
3375.00	9.89	39.71	3326.32	313.21 N	267.01 E	298.34	2.94
3469.00	9.23	50.65	3419.02	324.20 N	278.00 E	310.42	2.05
3564.00	8.62	54.76	3512.87	333.14 N	289.71 E	322.99	0.92
3659.00	7.96	53.17	3606.88	341.19 N	300.79 E	334.86	0.74
3754.00	7.17	48.61	3701.05	349.05 N	310.50 E	345.34	1.04
3849.00	5.91	39.07	3795.44	356.77 N	318.03 E	353.64	1.74
3944.00	4.04	26.23	3890.08	363.57 N	322.59 E	358.88	2.28
4039.00	1.73	13.26	3984.95	367.97 N	324.40 E	361.14	2.51
4133.00	1.72	234.54	4078.93	368.53 N	323.58 E	360.38	3.43
4228.00	2.38	209.63	4173.87	365.98 N	321.44 E	357.99	1.16
4323.00	1.13	189.57	4268.83	363.34 N	320.31 E	356.59	1.45
4418.00	1.60	183.26	4363.80	361.09 N	320.07 E	356.12	0.52
4513.00	1.66	170.15	4458.76	358.41 N	320.23 E	356.00	0.40
4608.00	1.93	184.17	4553.72	355.45 N	320.35 E	355.81	0.54
4703.00	1.51	173.15	4648.67	352.61 N	320.39 E	355.54	0.56
4798.00	1.84	168.52	4743.63	349.87 N	320.84 E	355.71	0.37
4893.00	1.20	159.90	4838.60	347.45 N	321.48 E	356.10	0.71
4988.00	0.98	159.47	4933.58	345.76 N	322.11 E	356.54	0.23
5083.00	1.29	156.28	5028.56	344.02 N	322.82 E	357.07	0.33
5273.00	0.96	141.19	5218.53	340.82 N	324.68 E	358.58	0.23
5479.00	0.50	124.48	5424.51	338.97 N	326.50 E	360.20	0.25
5551.00	0.13	193.84	5496.51	338.72 N	326.74 E	360.41	0.65
5646.00	6.11	87.98	5591.33	338.79 N	331.77 E	365.42	6.47
5741.00	13.21	75.67	5684.93	341.66 N	347.37 E	381.23	7.75
5836.00	19.15	85.03	5776.14	345.70 N	373.44 E	407.58	6.81
5931.00	26.48	91.42	5863.66	346.53 N	410.19 E	444.22	8.13
6026.00	36.43	89.42	5944.60	346.29 N	459.70 E	493.43	10.53
6073.00	41.16	88.06	5981.22	346.96 N	489.13 E	522.77	10.23
6121.00	44.72	86.49	6016.36	348.53 N	521.78 E	555.41	7.75
6168.00	48.05	84.97	6048.77	351.08 N	555.71 E	589.41	7.45
6216.00	50.85	86.64	6079.98	353.73 N	592.08 E	625.86	6.40
6263.00	52.44	88.27	6109.14	355.36 N	628.89 E	662.64	4.35
6311.00	55.57	89.58	6137.35	356.08 N	667.72 E	701.33	6.87
6358.00	59.58	88.91	6162.55	356.61 N	707.38 E	740.83	8.61
6406.00	62.67	88.51	6185.73	357.56 N	749.39 E	782.71	6.48
6501.00	69.81	87.28	6223.98	360.78 N	836.22 E	869.40	7.61
6548.00	75.53	86.52	6237.98	363.21 N	881.00 E	914.19	12.26

**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 83.99 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.45 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6548.00 FEET  
IS 952.93 FEET ALONG 67.60 DEGREES (GRID)**