



1:240 / 1:600

WELL INFORMATION					
MWD Run Number	100	200	300		
Date run completed	15-Nov-12	16-Nov-12	19-Nov-12		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.750		
Log Start Depth (MD, ft)	742.00	5,954.00	7,082.00		
Log End Depth (MD, ft)	5,954.00	7,082.00	11,082.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	12-Nov-12 14:07	12-Nov-12 15:30	17-Nov-12 18:30		
Drill/Wipe End Date and Time	12-Nov-12 14:07	12-Nov-12 15:30	19-Nov-12 03:31		
Min Inc (deg) @ Depth (MD, ft)	.19 @ 5,531.00	1.31 @ 5,958.00	86.34 @ 7,119.00		
Max Inc (deg) @ Depth (MD, ft)	12.28 @ 3,158.00	81.58 @ 7,026.00	92.19 @ 10,439.00		
Bit TFA(in2) / Bit Type	.75 / PDC	.86 / PDC	.46 / PDC		
Flow Rate (gpm)	576.40	479.47	282.92		
Max AV (fpm) / CV (fpm) @ MWD	435.0 / 435.0	458.4 / 312.6	479.8 / 565.0		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	9.05 / 29.00	10.50 / 42.00	9.33 / 30.00		
Filtrate CL (ppm)	2,000.00	2,350.00	2,500.00		
pH / Fluid Loss (mptm)	9.00 / 29	9.50 / 8	9.50 / 11		
PV (cP) / YP (Ihf2)	1 / 4.00	14 / 14.00	4 / 4.00		
% Solids / % Sand	4.00 / 0.10	9.70 / 0.30	5.50 / 0.30		
% 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	445.00 / PDM	454.00 / PDM	399.10 / PDM		

Max Tool Temp (degF) / Source	145.90 / PCM	154.30 / PCM	226.10 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Adam Sampson	Adam Sampson	Adam Sampson		
Customer Representative	Mike Pino	Roger Foster	Jim Turner		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.76	5.76		
Sub Serial Number	11341322	11341322	11730098		
Insert Serial Number	11400829	11227512	11400829		
Date and Time Initialized	13-Nov-12 18:23	14-Nov-12 17:57	16-Nov-12 22:33		
Date and Time Read	15-Nov-12 02:38	16-Nov-12 10:39	19-Nov-12 13:19		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	56.00	56.00	63.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11341322	11341322	11730098		
Sonde Serial Number	11478107	11297623	114778107		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	41.50	325.20	110.40		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	48.49	48.40	65.66		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11341322	11341322	11730098		
Insert/Sonde Serial Number	11681026	11680983	11681026		

REMARKS

1. All depths are calibrated to driller's pipe tally and are measured depth from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham Plastic" model for oil and synthetic based fluids.
4. All data presented is recorded data unless otherwise specified.
5. The following smoothing parameters have been applied to the data:
PGRC (Gamma CG):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
Gap Fill: 3.0 ft

ROPA (Average Rate Of Penetration):
Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft
Gap Fill: 3.0 ft
6. Insite Version 7.4.1

WARRANTY

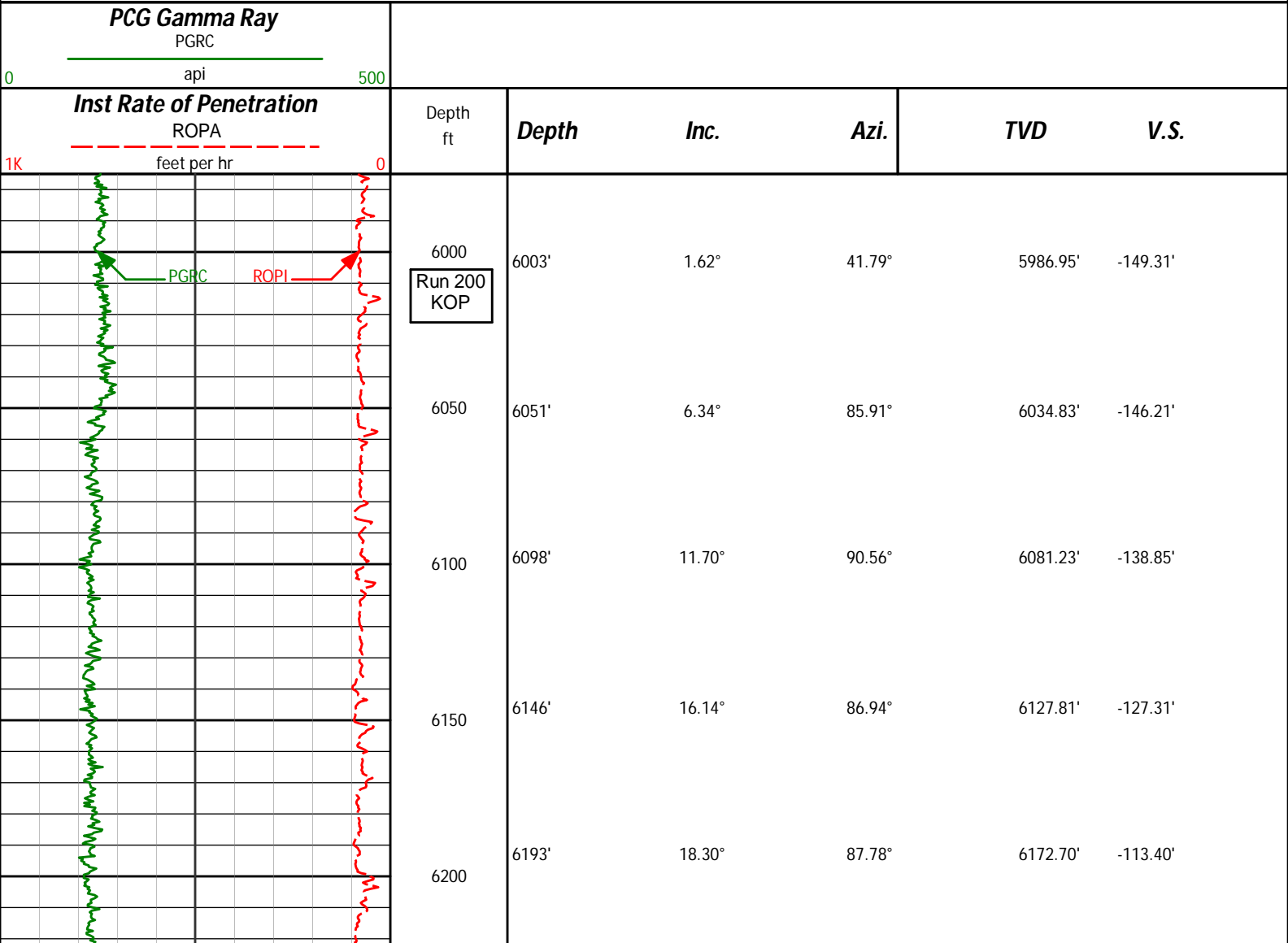
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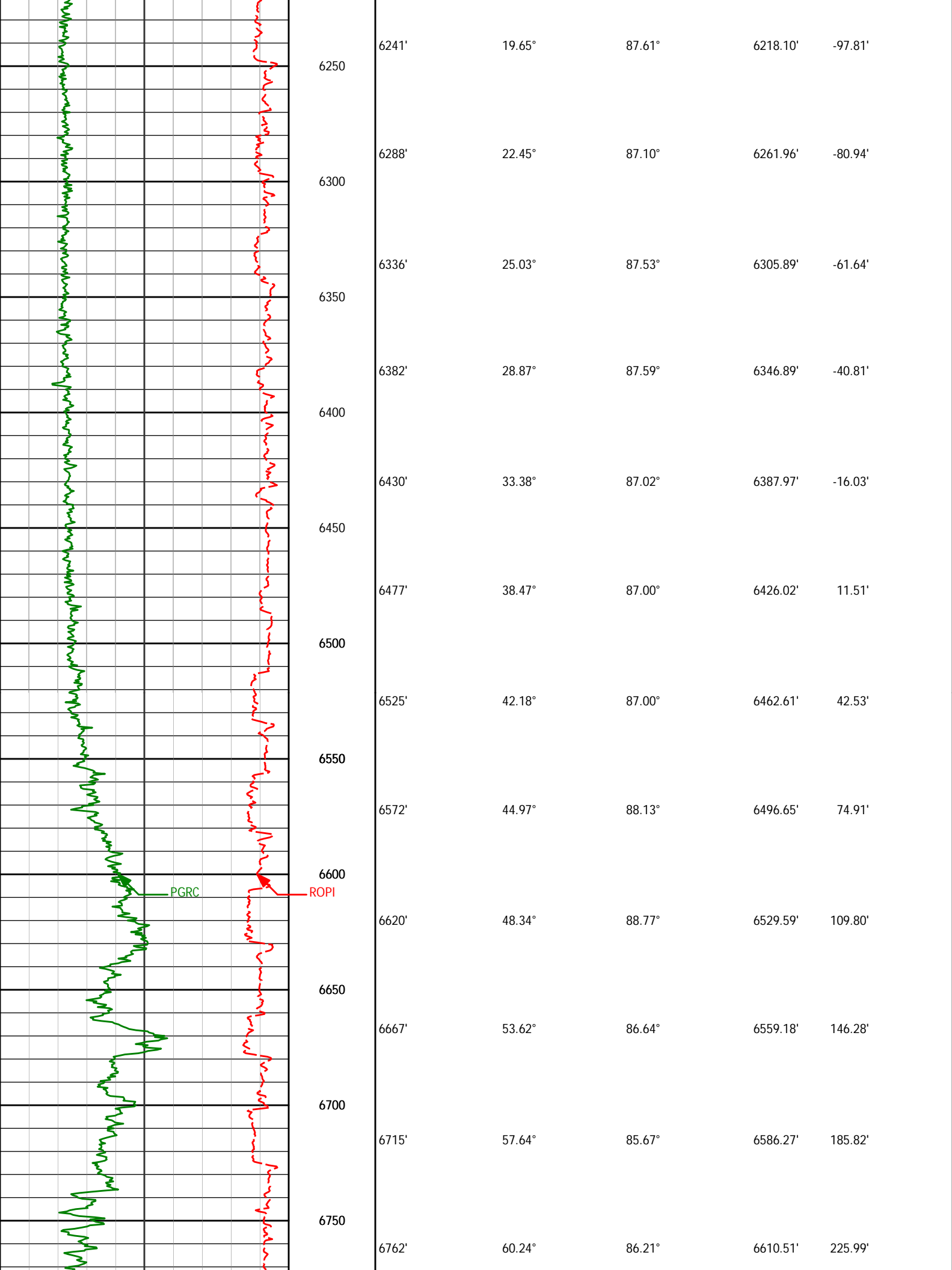
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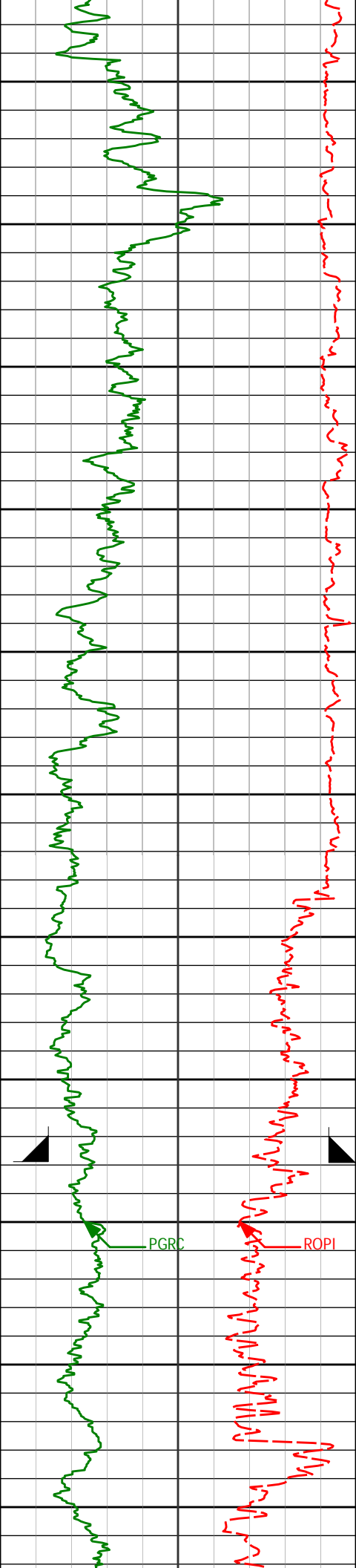
Sperry Drilling Services

MD Main Log 1:600

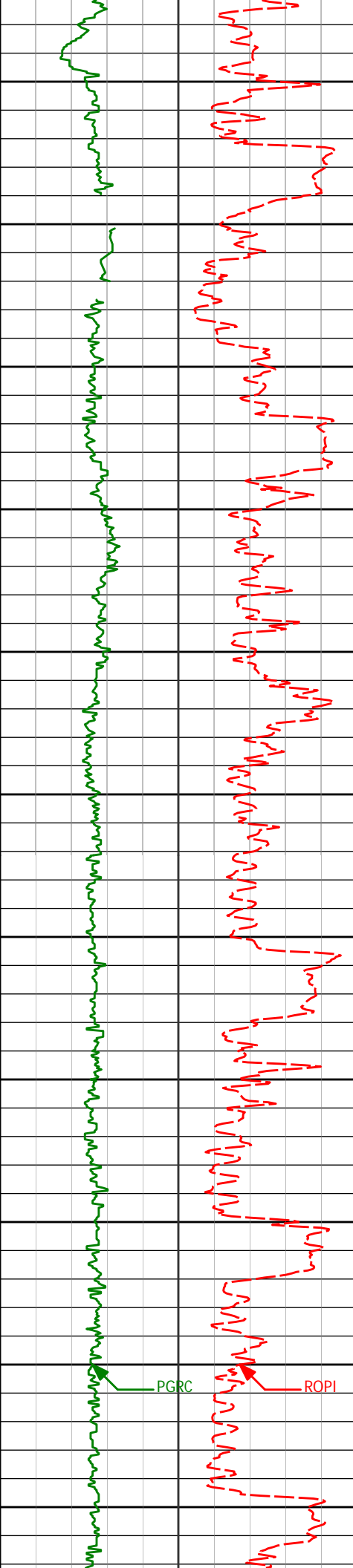
Noble
Wells Ranch AE08-63-1HN
HP 321
T6N R62W







6800	6810'	62.84°	87.65°	6633.39'	268.14'
6850	6857'	66.91°	89.62°	6653.34'	310.68'
6900	6905'	71.62°	90.05°	6670.33'	355.55'
6950	6952'	75.34°	89.12°	6683.69'	400.60'
7000	7000'	78.63°	88.10°	6694.50'	447.36'
	7026'	81.58°	87.21°	6698.97'	472.95'
7050					
7100	7119'	86.34°	88.14°	6708.75'	565.36'
7150					
	CASING SHOE @ 7077'				
7200	7214'	87.53°	87.31°	6713.83'	660.16'
7250					
7300	7309'	87.28°	87.18°	6718.13'	754.99'



7350

7400

7450

7500

7550

7600

7650

7700

7750

7800

7850

7404'

87.75°

87.84°

6722.25'

849.83'

7499'

89.14°

88.19°

6724.83'

944.76'

7594'

91.70°

88.94°

6724.13'

1039.73'

7689'

90.37°

88.00°

6722.42'

1134.69'

7784'

90.62°

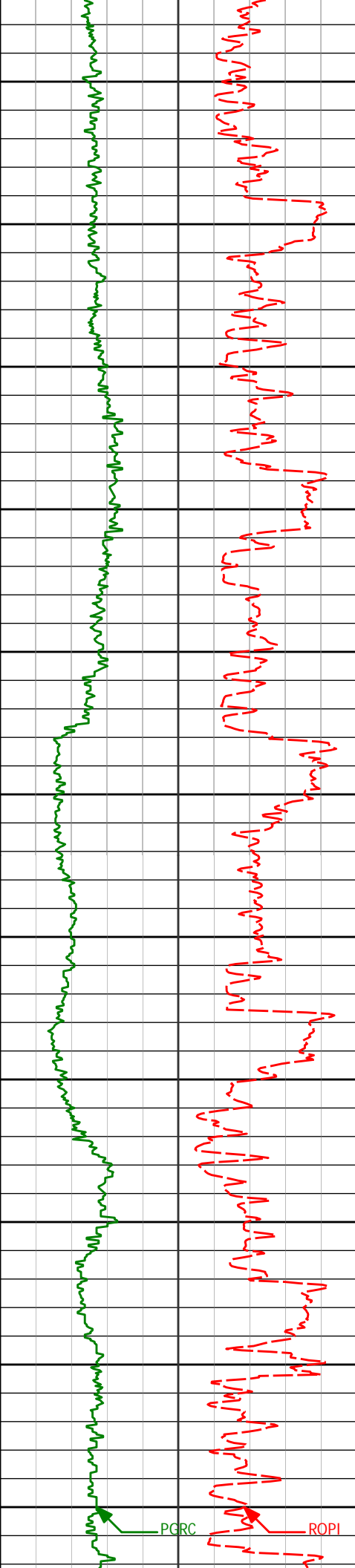
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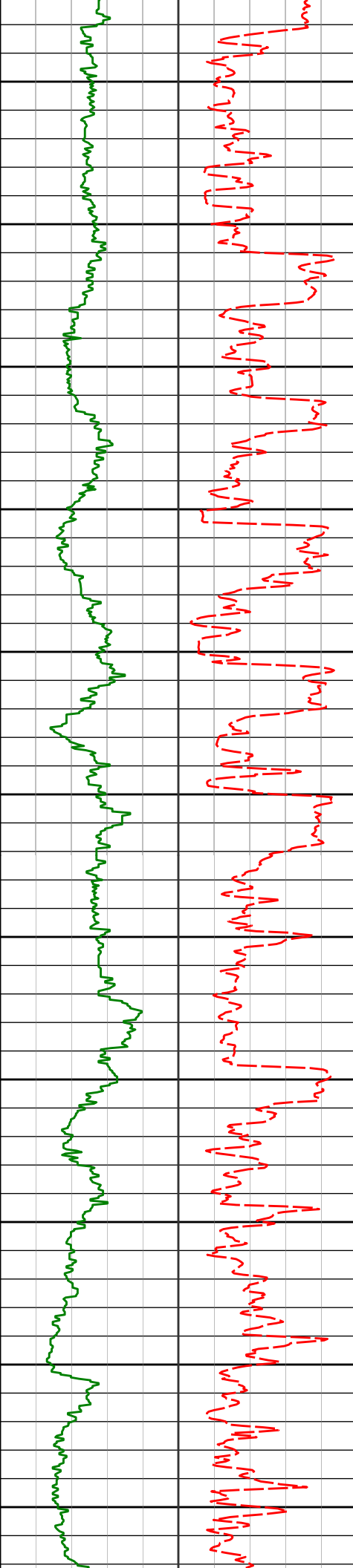
1229.67'

PGRC

ROPI



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7950				
7973'	91.42°	87.55°	6721.20'	1418.53'
8000				
8050				
8068'	90.52°	88.22°	6719.59'	1513.47'
8100				
8150				
8163'	90.89°	88.73°	6718.41'	1608.44'
8200				
8250				
8258'	91.42°	90.07°	6716.49'	1703.42'
8300				
8350				
8353'	90.46°	89.08°	6714.93'	1798.41'
8400				



8450

8448'

91.85°

93.26°

6713.01'

1893.33'

8500

8550

8543'

91.61°

92.30°

6710.15'

1988.14'

8600

8650

8637'

89.85°

90.76°

6708.96'

2082.07'

8700

8750

8732'

87.56°

88.47°

6711.11'

2177.04'

8800

8850

8827'

88.55°

86.63°

6714.33'

2271.91'

8900

8950

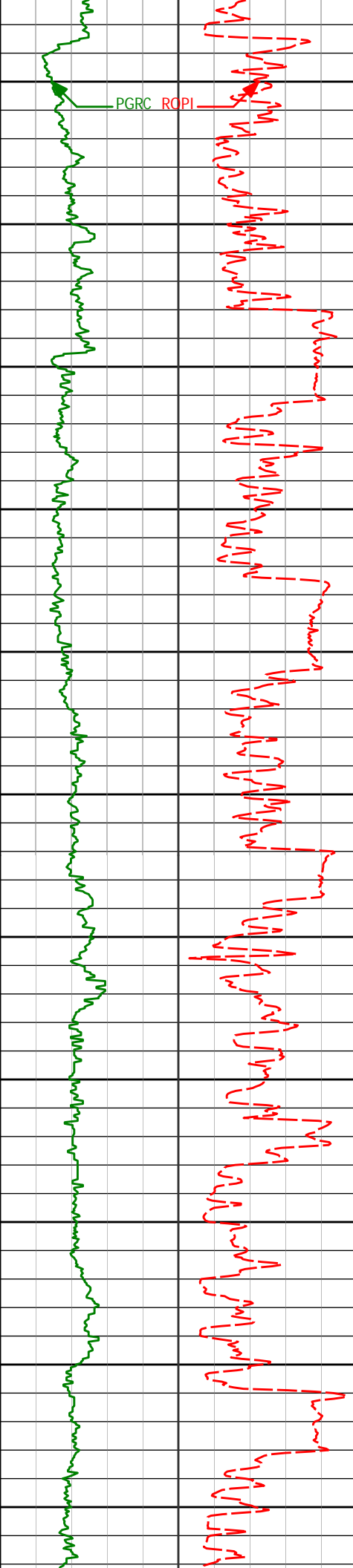
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86.31°

6716.08'

2365.75'



9000

9016'

91.54°

85.59°

6715.36'

2460.55'

9050

9100

9111'

90.96°

87.02°

6713.29'

2555.37'

9150

9200

9205'

89.75°

89.40°

6712.71'

2649.33'

9250

9300

9300'

88.70°

88.97°

6713.99'

2744.31'

9350

9400

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9450

9490'

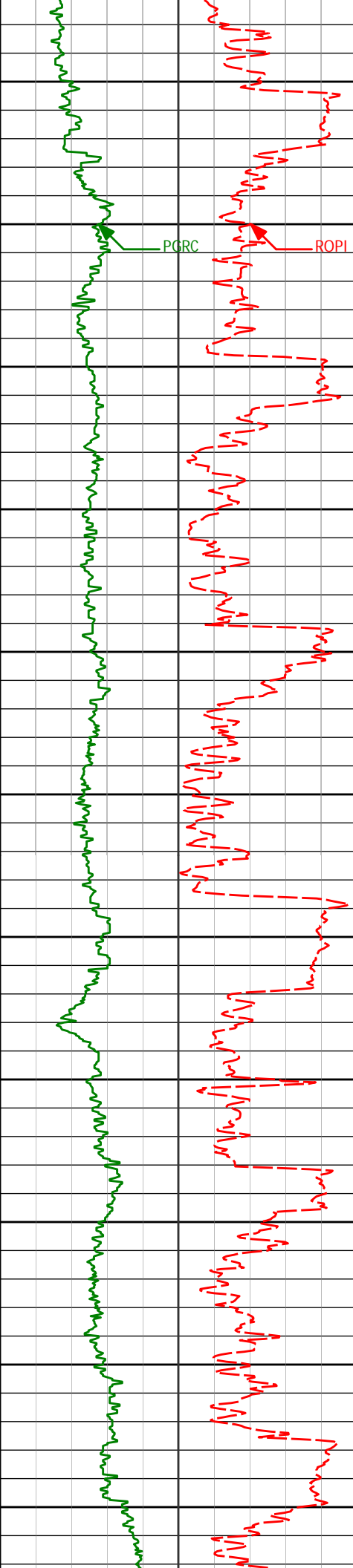
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2934.30'

9500



9550

9584'

89.23°

88.44°

6714.73'

3028.29'

9600

9650

9679'

89.10°

87.94°

6716.11'

3123.25'

9700

9750

9774'

90.80°

87.80°

6716.19'

3218.20'

9800

9850

9869'

87.50°

85.28°

6717.59'

3313.03'

9900

9950

9964'

86.70°

85.41°

6722.40'

3407.65'

10000

10050

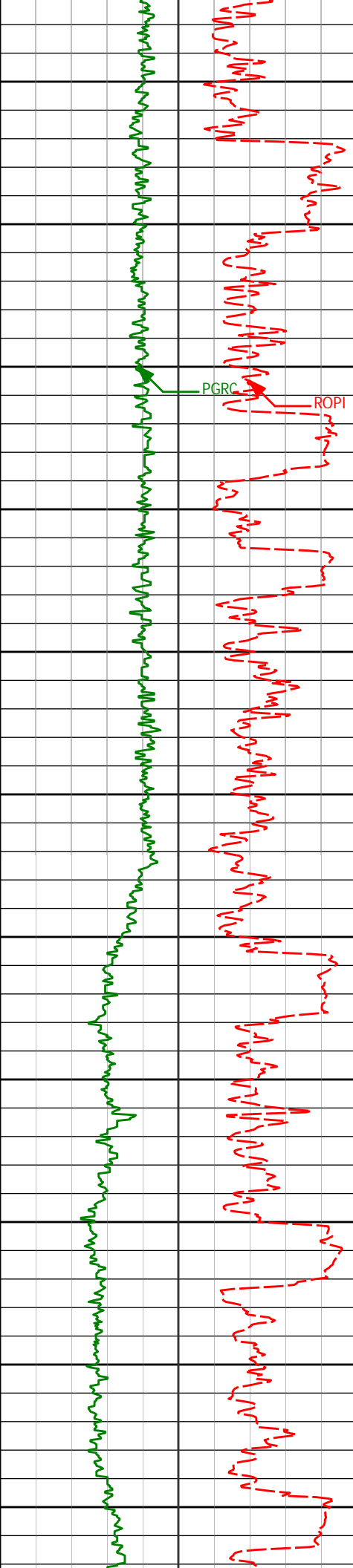
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85.55°

6726.77'

3502.30'



10100

10150

10200

10250

10300

10350

10400

10450

10500

10550

10600

10154'

90.89°

86.58°

6727.67'

3597.10'

10249'

90.62°

87.41°

6726.41'

3691.99'

10344'

91.70°

87.58°

6724.50'

3786.90'

10439'

92.19°

88.53°

6721.27'

3881.81'

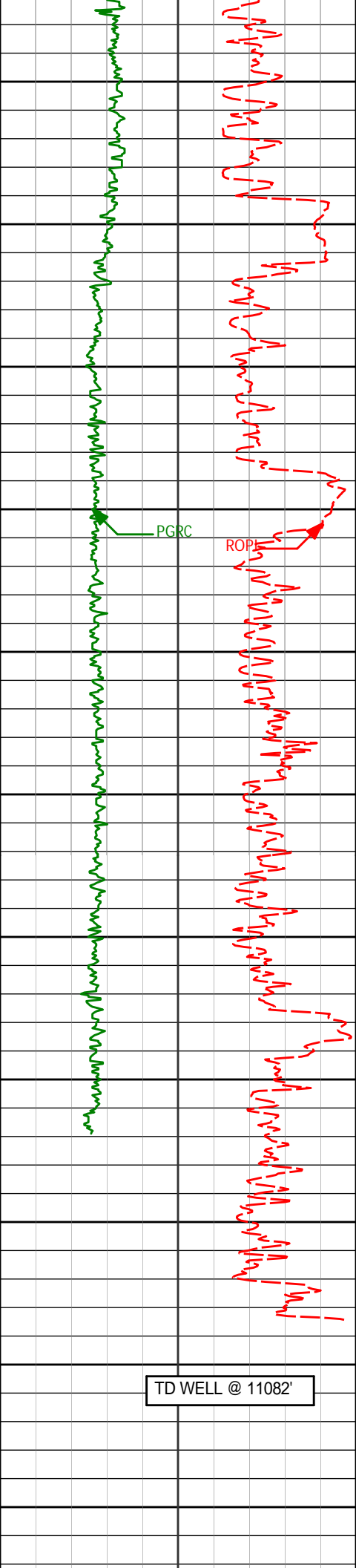
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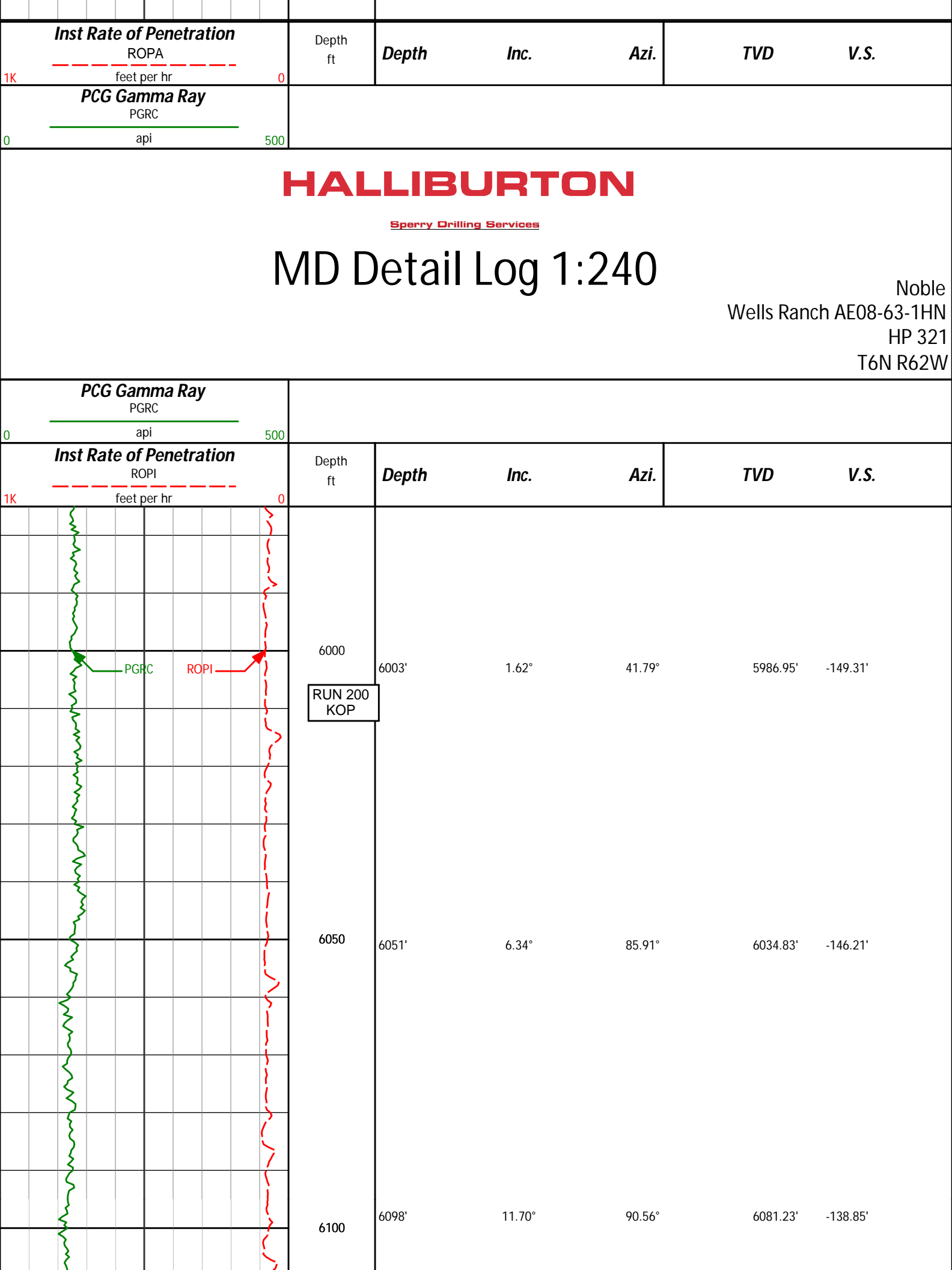
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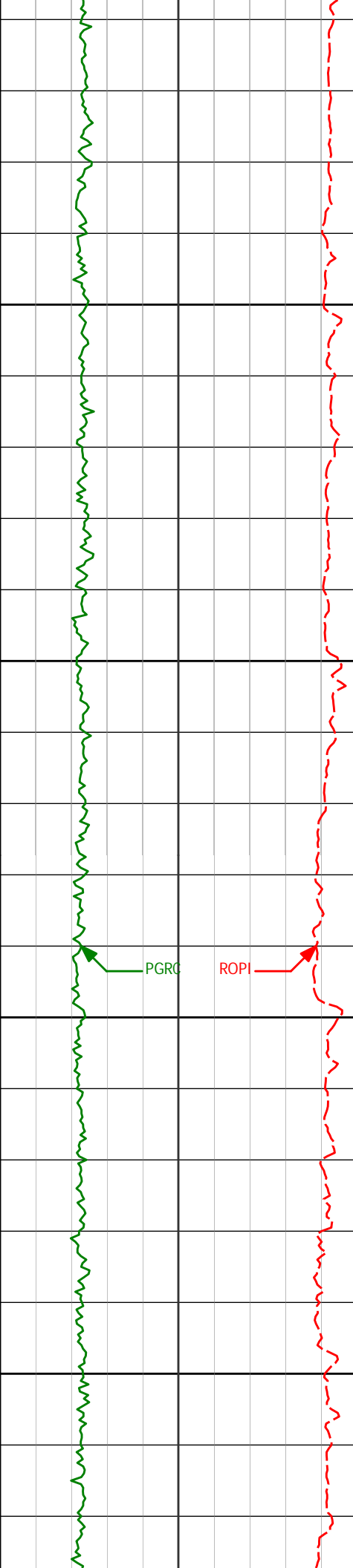
6717.93'

3975.74'



10628'	91.54°	88.88°	6715.10'	4070.69'
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10700				
10723'	88.98°	87.79°	6714.66'	4165.65'
10750				
10800				
10818'	90.65°	89.37°	6714.97'	4260.63'
10850				
10900				
10913'	89.85°	88.37°	6714.56'	4355.62'
10950				
11000				
11008'	90.99°	87.91°	6713.87'	4450.58'
11019'	91.39°	87.27°	6713.64'	4461.57'
11050				
11082'	91.39°	87.27°	6712.11'	4524.50'
11100				
11150				





6150

6200

6250

6300

6146'

16.14°

86.94°

6127.81'

-127.31'

6193'

18.30°

87.78°

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-113.40'

6241'

19.65°

87.61°

6218.10'

-97.81'

6288'

22.45°

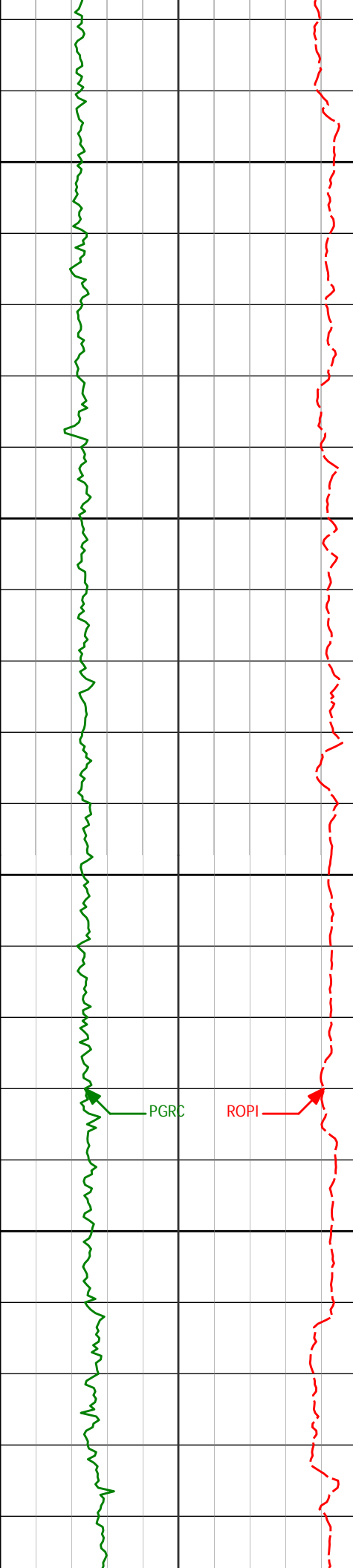
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-80.94'

PGRC

ROPI



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6400

6450

6500

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25.03°

87.53°

6305.89'

-61.64'

6382'

28.87°

87.59°

6346.89'

-40.81'

6430'

33.38°

87.02°

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-16.03'

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87.00°

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6525'

42.18°

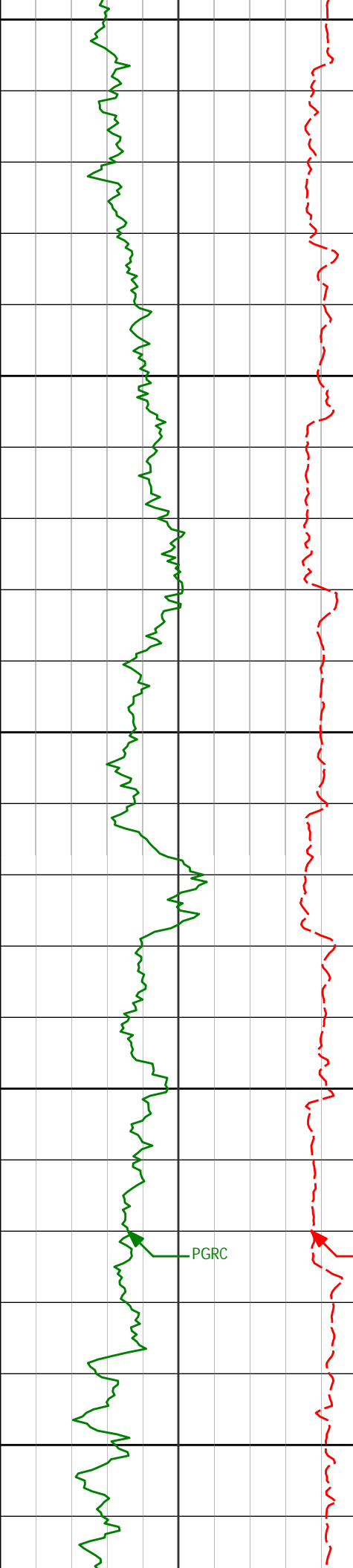
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42.53'

PGRC

ROPI



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88.13°

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74.91'

6600

6620'

48.34°

88.77°

6529.59'

109.80'

6650

6667'

53.62°

86.64°

6559.18'

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6715'

57.64°

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6586.27'

185.82'

PGRC

ROPI

6750

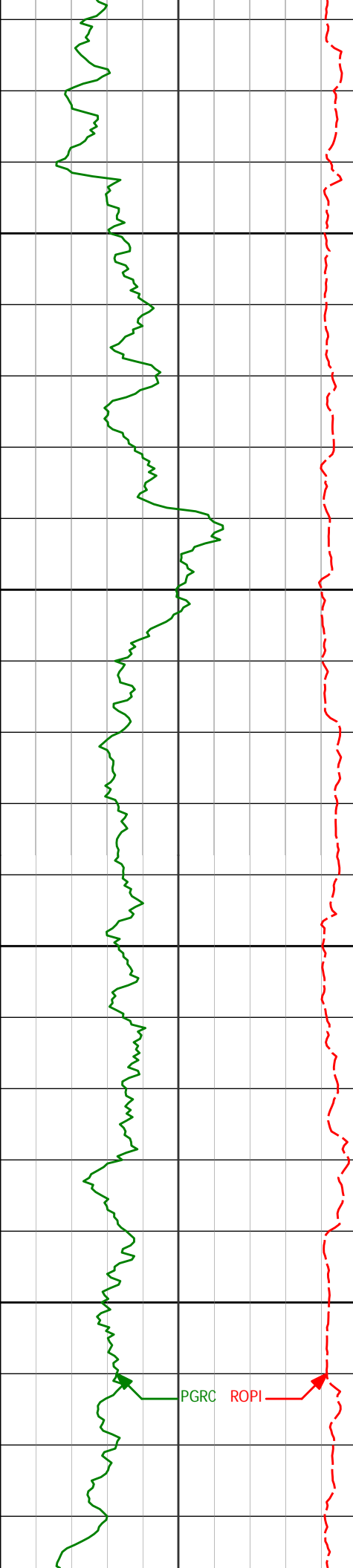
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225.99'



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268.14'

6850

6857'

66.91°

89.62°

6653.34'

310.68'

6900

6905'

71.62°

90.05°

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355.55'

6950

6952'

75.34°

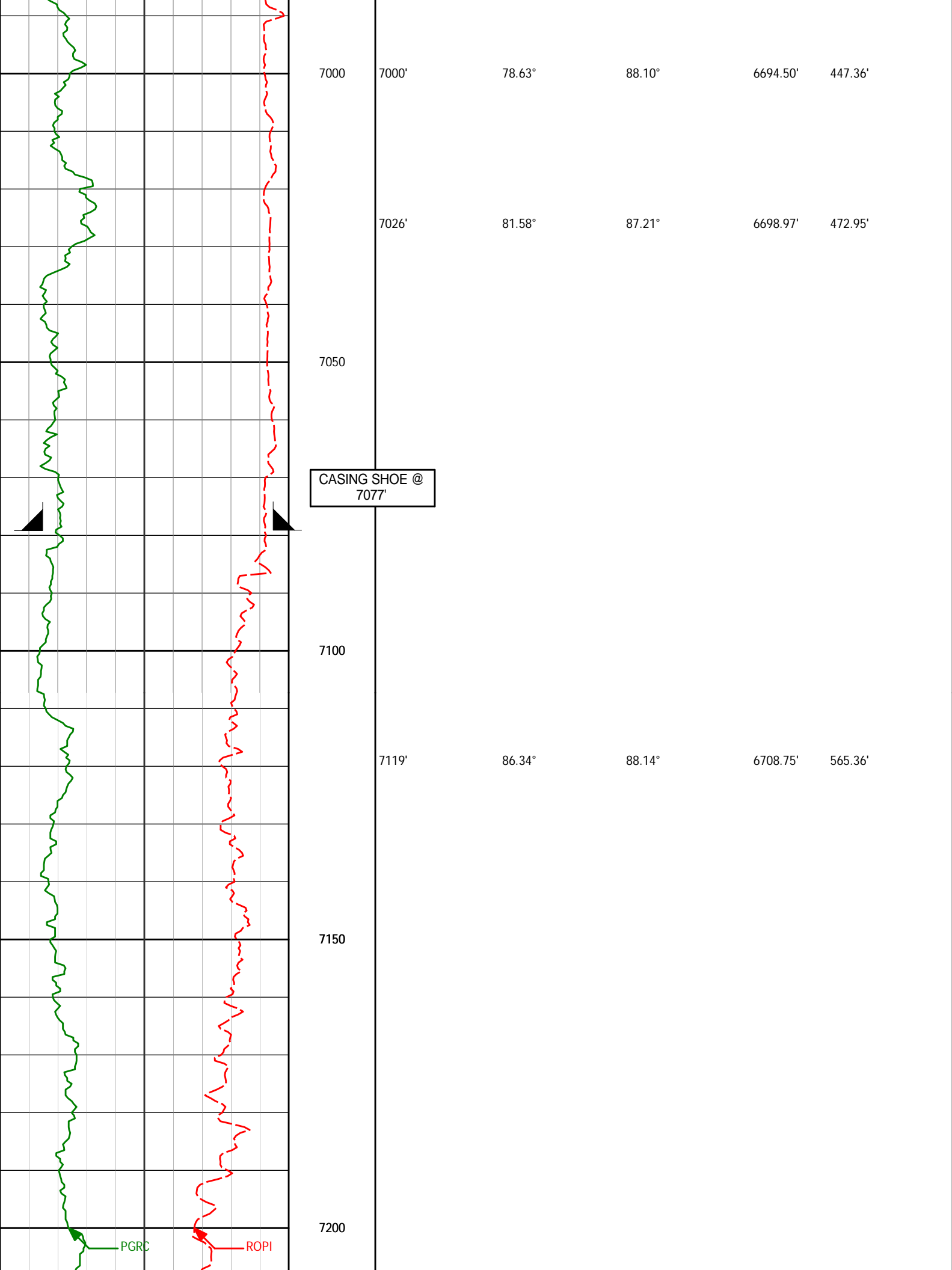
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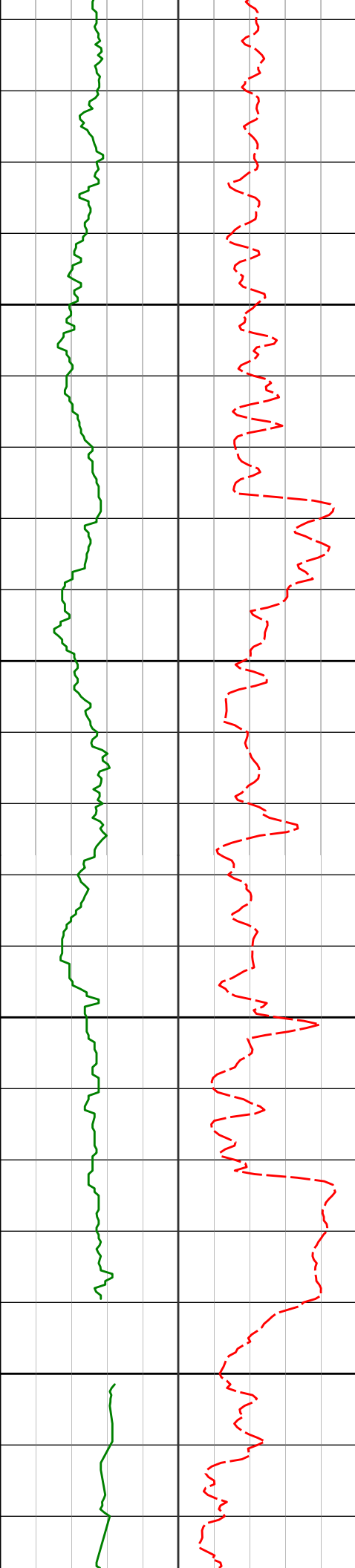
6683.69'

400.60'

PGRC

ROPI





7214'

87.53°

87.31°

6713.83'

660.16'

7250

7300

7309'

87.28°

87.18°

6718.13'

754.99'

7350

7400

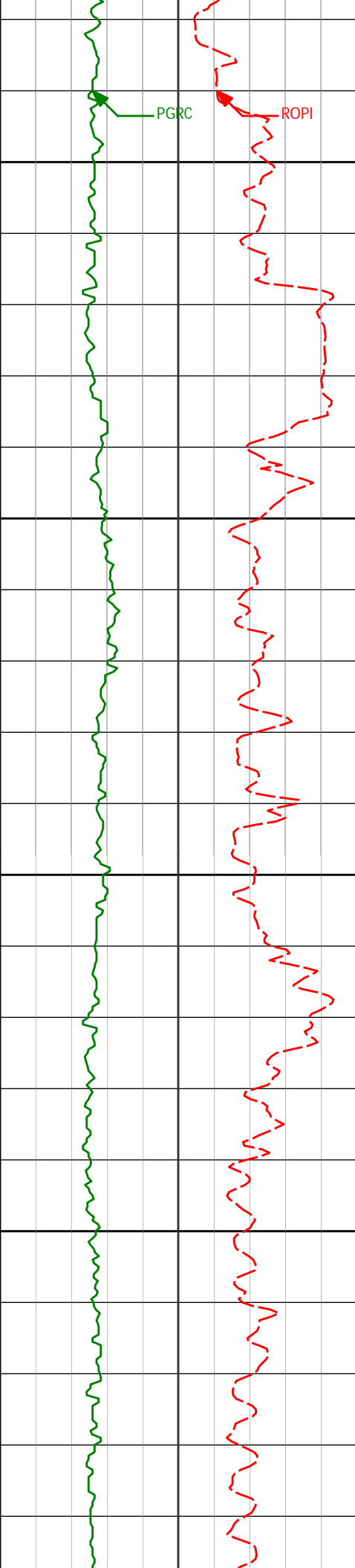
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7450

7500

7550

7600

7499'

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88.19°

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944.76'

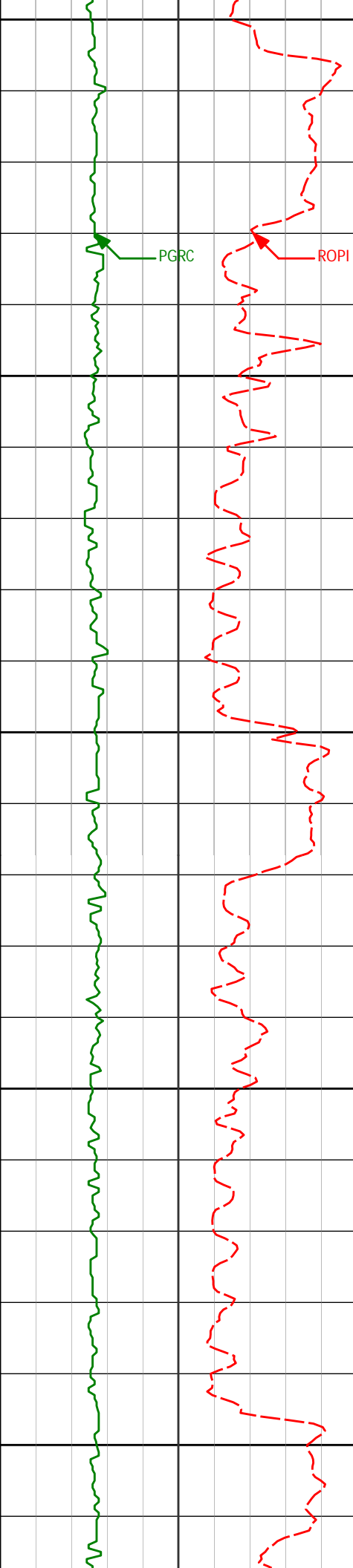
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88.94°

6724.13'

1039.73'



7650

7689'

90.37°

88.00°

6722.42'

1134.69'

7700

7750

7784'

90.62°

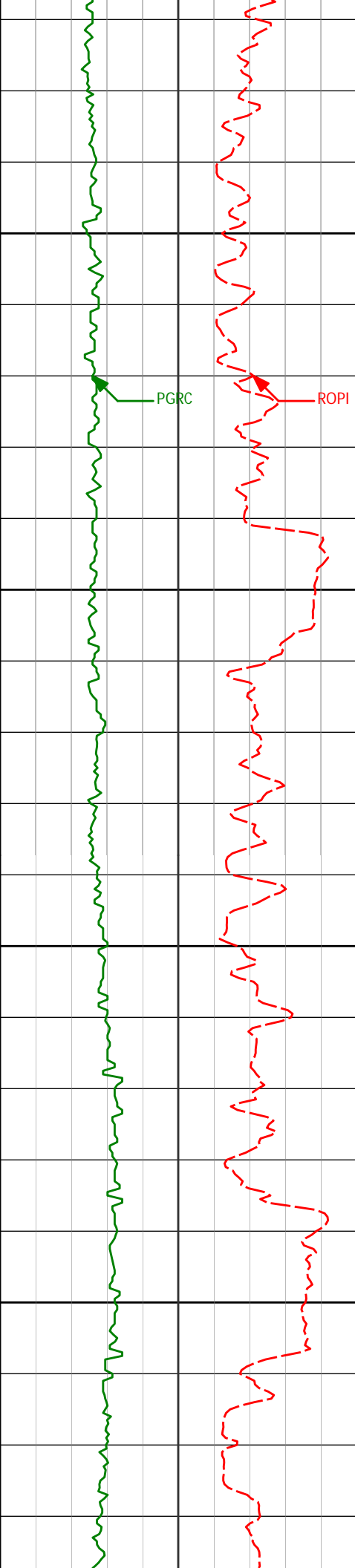
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1229.67'

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7850



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86.94°

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7950

7973'

91.42°

87.55°

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1418.53'

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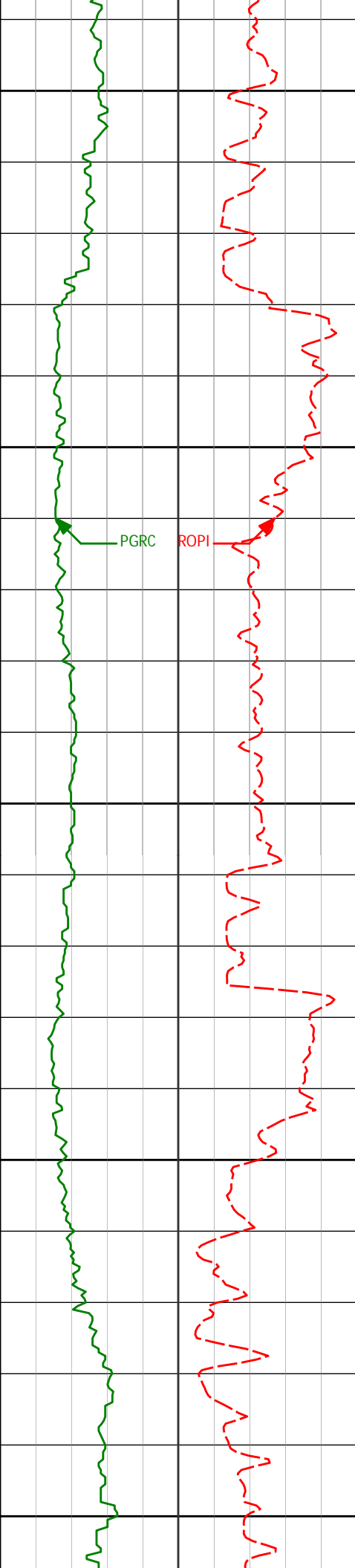
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88.22°

6719.59'

1513.47'



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8150

8200

8250

8300

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88.73°

6718.41'

1608.44'

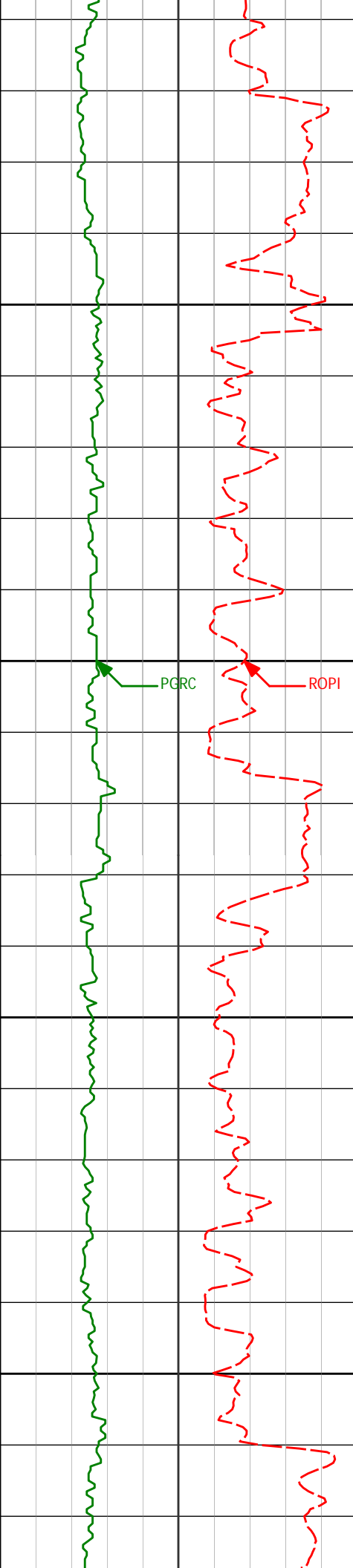
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8450

8448'

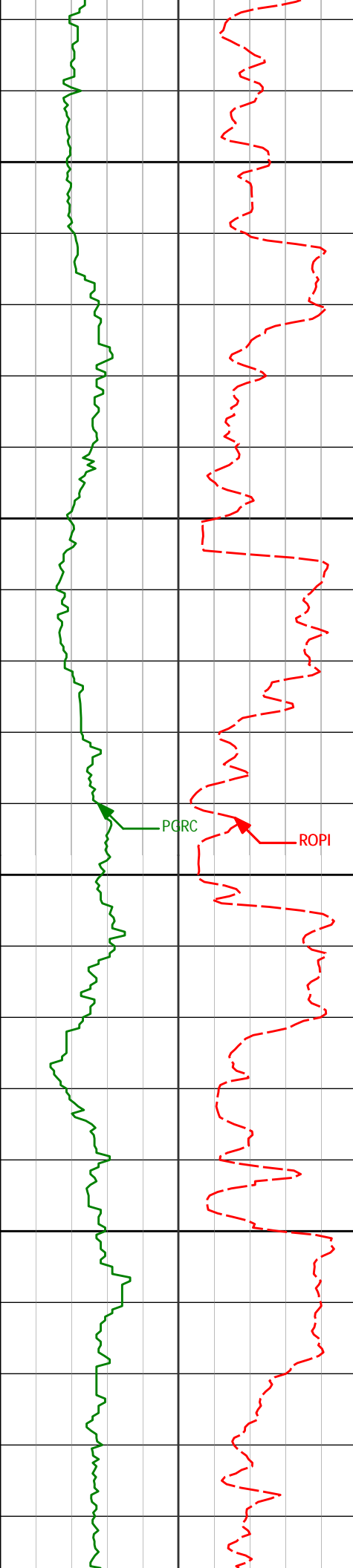
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1893.33'

8500



8550

8600

8650

8700

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1988.14'

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2082.07'

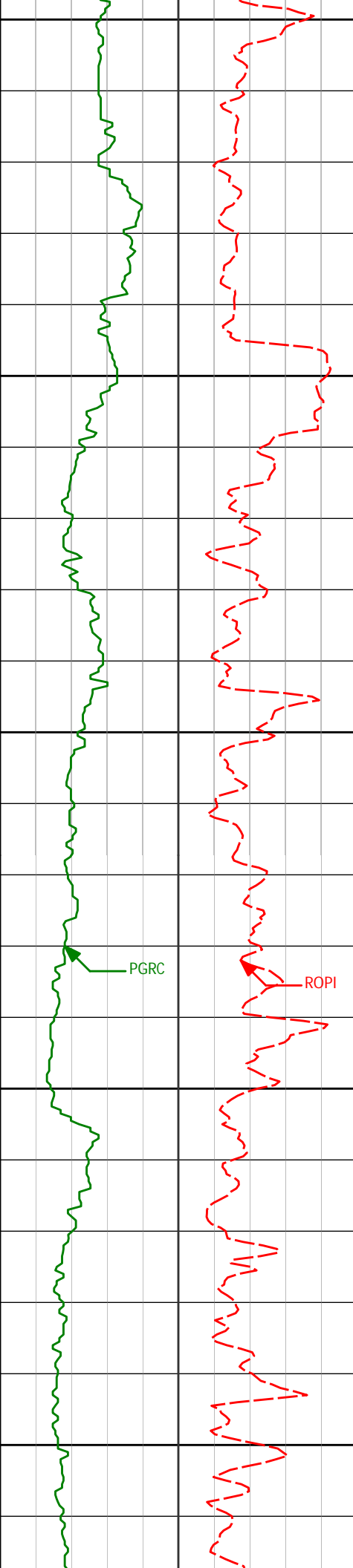
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6711.11'

2177.04'



8750

8800

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8900

8950

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86.63°

6714.33'

2271.91'

PGRC

ROPI

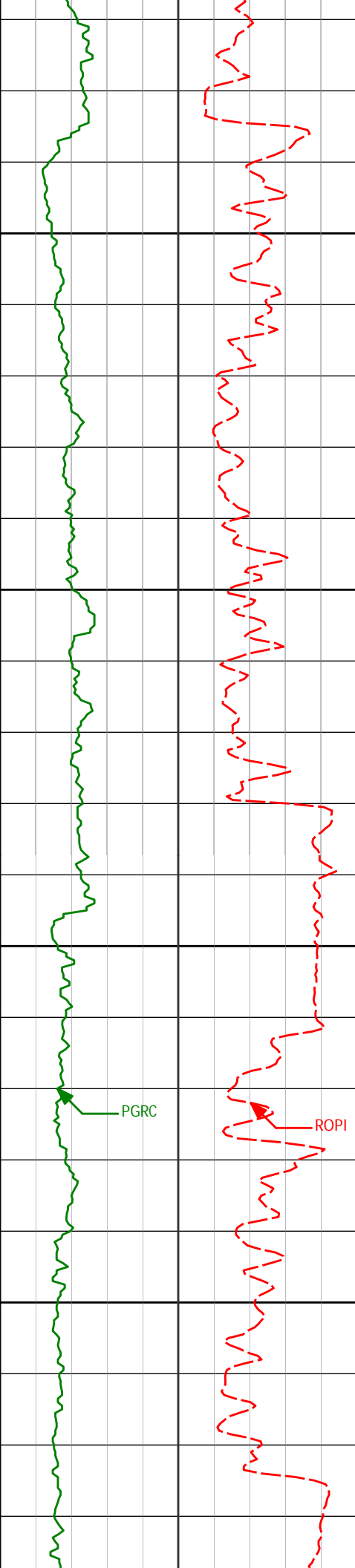
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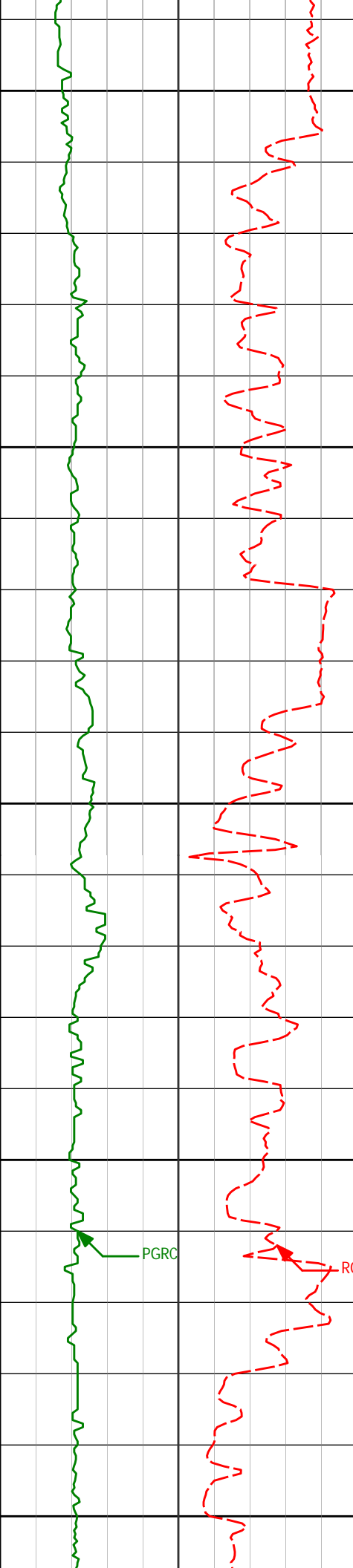
9111'

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87.02°

6713.29'

2555.37'



9200

9205'

89.75°

89.40°

6712.71'

2649.33'

9250

9300

9300'

88.70°

88.97°

6713.99'

2744.31'

9350

9400

9395'

90.43°

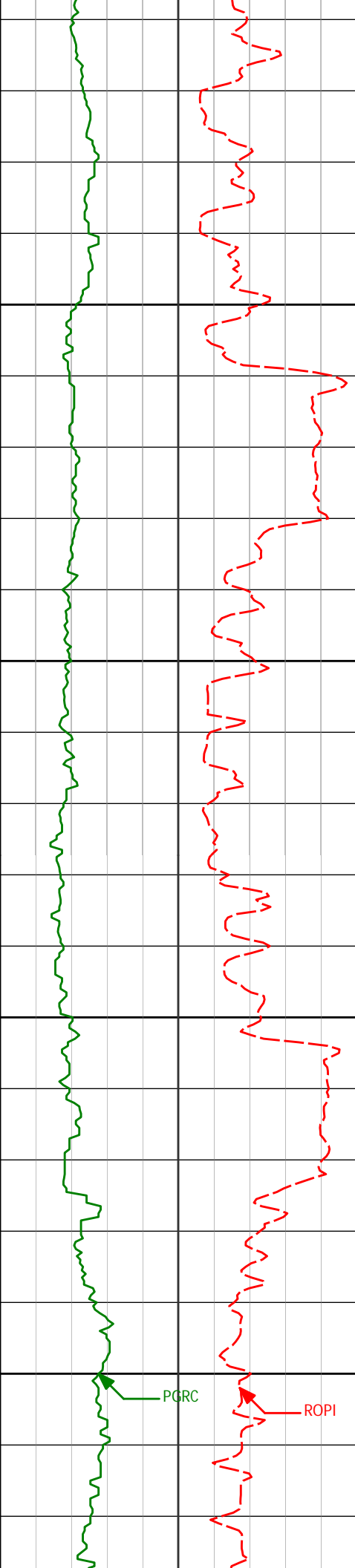
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2839.30'

PGRC

ROPI



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89.15°

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9500

9550

9584'

89.23°

88.44°

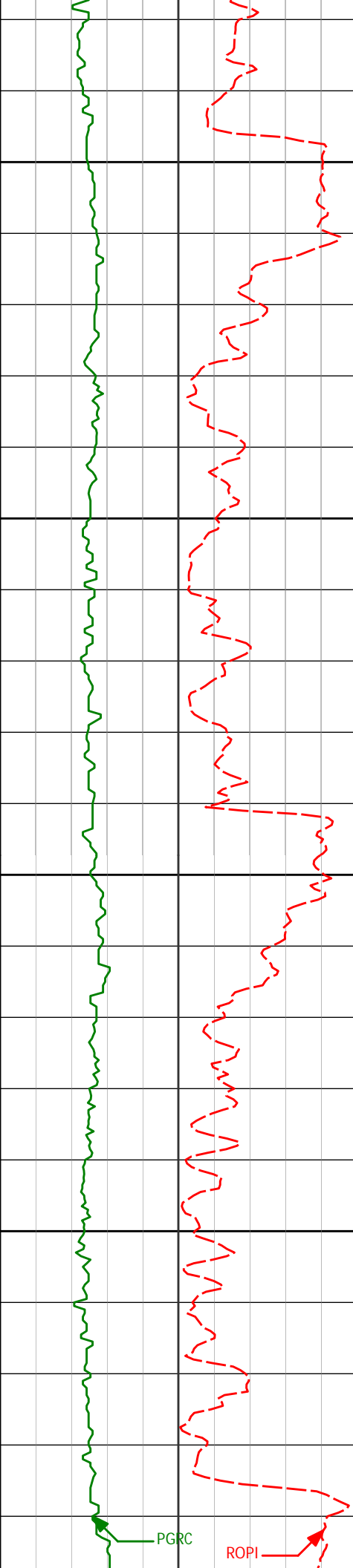
6714.73'

3028.29'

9600

PGRC

ROPI



9650

9679'

89.10°

87.94°

6716.11'

3123.25'

9700

9750

9774'

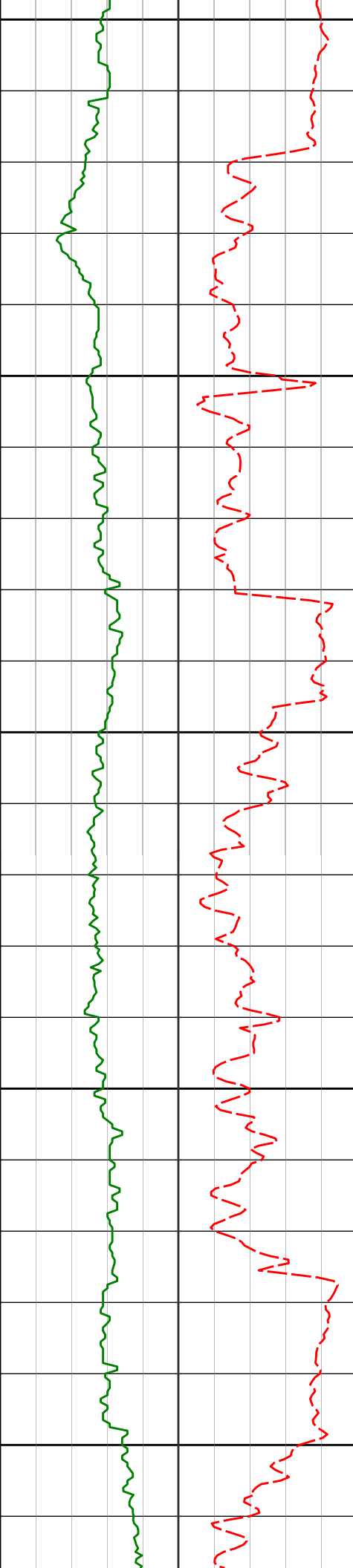
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87.80°

6716.19'

3218.20'

9800



9850

9869'

87.50°

85.28°

6717.59'

3313.03'

9900

9950

9964'

86.70°

85.41°

6722.40'

3407.65'

10000

10050

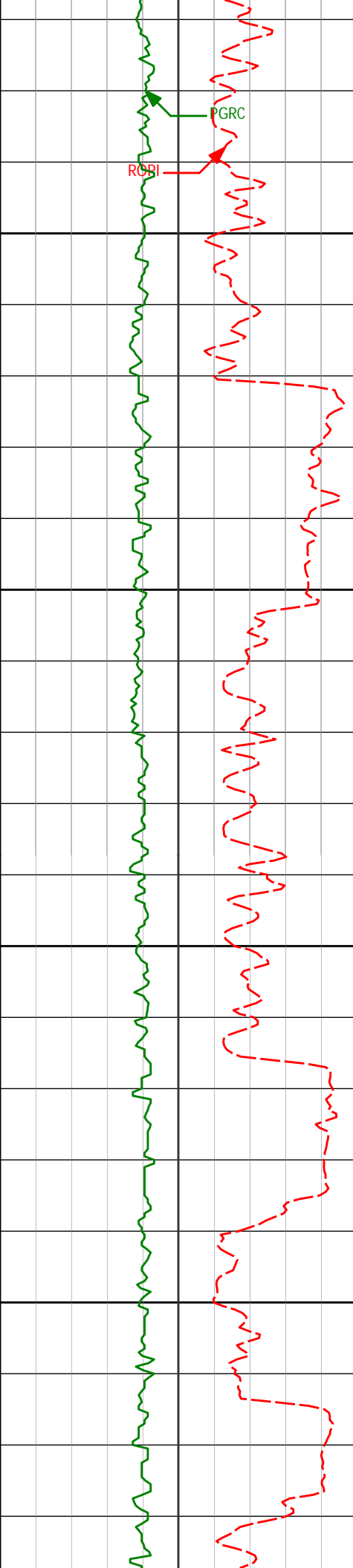
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85.55°

6726.77'

3502.30'



10100

10150

10200

10250

10154'

90.89°

86.58°

6727.67'

3597.10'

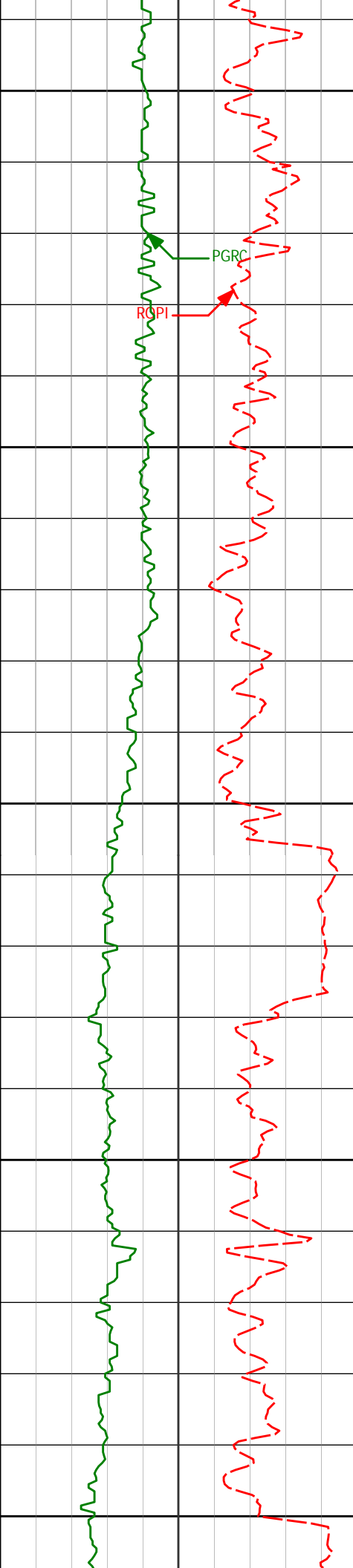
10249'

90.62°

87.41°

6726.41'

3691.99'



10300

10350

10400

10450

10500

10344'

91.70°

87.58°

6724.50'

3786.90'

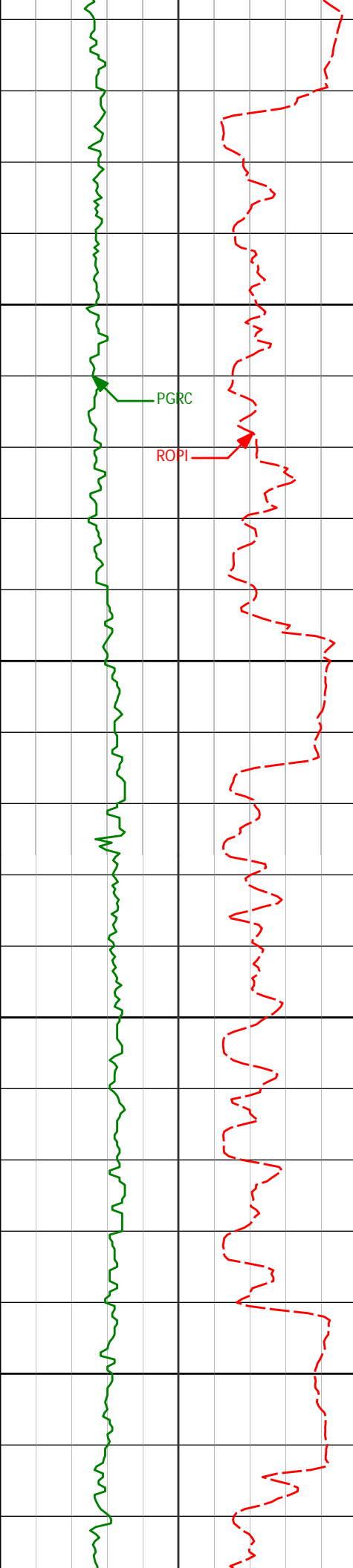
10439'

92.19°

88.53°

6721.27'

3881.81'



10533'	91.88°	88.69°	6717.93'	3975.74'
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10550

PGRC

ROPI

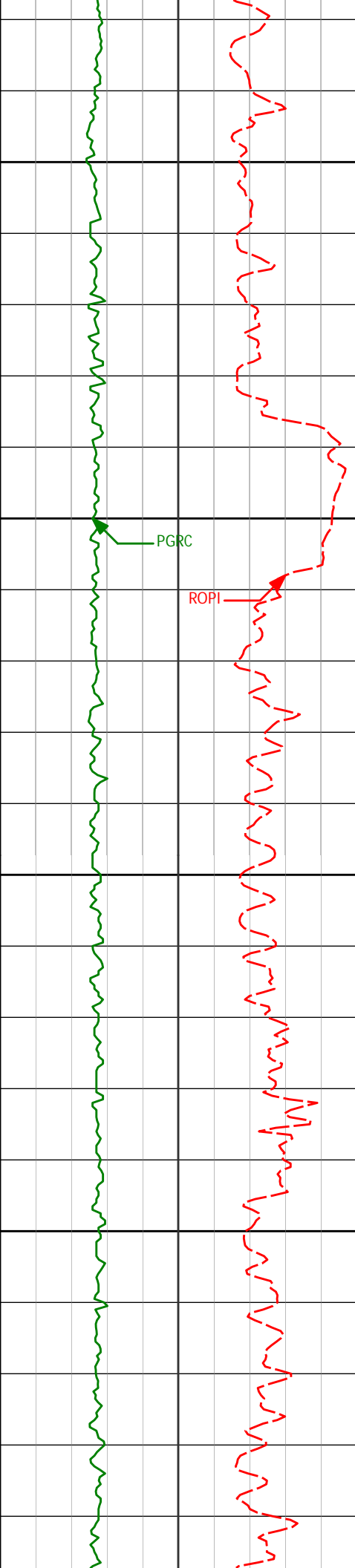
10600

10628'	91.54°	88.88°	6715.10'	4070.69'
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10650

10700

10723'	88.98°	87.79°	6714.66'	4165.65'
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10750

10800

10850

10900

10818'

90.65°

89.37°

6714.97'

4260.63'

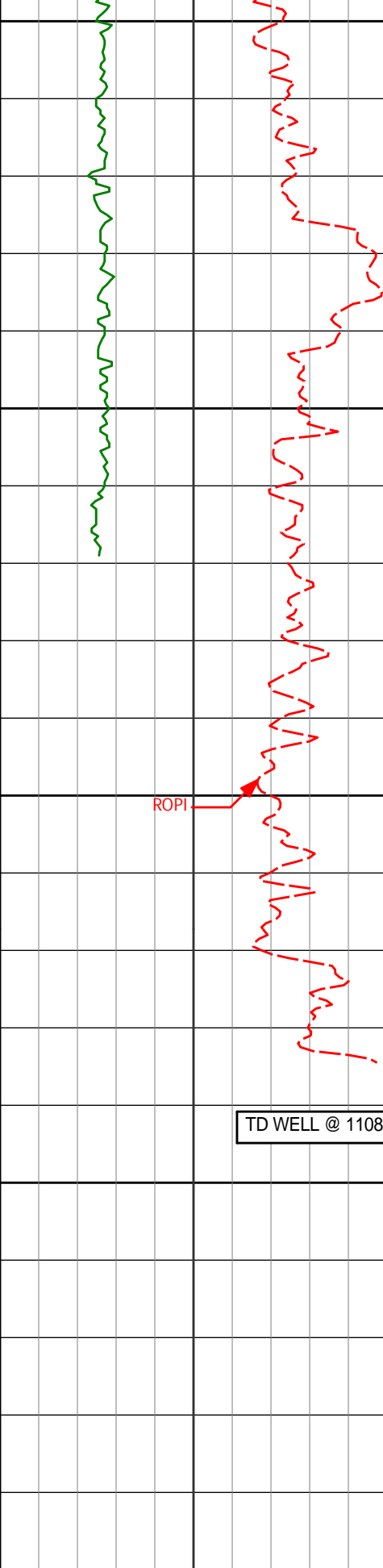
10913'

89.85°

88.37°

6714.56'

4355.62'



10950

11000

11050

11100

11150

11008'	90.99°	87.91°	6713.87'	4450.58'
11019'	91.39°	87.27°	6713.64'	4461.57'
11082'	91.39°	87.27°	6712.11'	4524.50'

ROPI

TD WELL @ 11082'

Inst Rate of Penetration ROPI feet per hr		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
1K	0						
PCG Gamma Ray PGRC							



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE08-63-1HN
Weld Colorado
USA
CA-XX-0009919209

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
752.00	0.00	0.00	752.00	0.00 N	0.00 E	0.00	TIE-IN
814.00	0.21	19.60	814.00	0.11 N	0.04 E	0.04	0.33
1090.00	0.55	45.03	1089.99	1.50 N	1.14 E	1.15	0.13
1365.00	0.49	77.39	1364.98	2.69 N	3.21 E	3.22	0.11
1645.00	0.37	97.76	1644.98	2.82 N	5.27 E	5.29	0.07
1928.00	0.25	117.85	1927.97	2.42 N	6.72 E	6.73	0.06
2212.00	0.56	156.49	2211.96	0.86 N	7.81 E	7.81	0.14
2495.00	0.89	187.47	2494.94	2.58 S	8.07 E	8.06	0.18
2590.00	3.92	219.21	2589.85	5.82 S	5.92 E	5.89	3.37
2684.00	6.01	226.73	2683.49	11.69 S	0.31 E	0.23	2.33
2779.00	7.66	228.42	2777.81	19.30 S	8.05 W	-8.18	1.74
2874.00	8.83	237.84	2871.84	27.38 S	18.96 W	-19.14	1.88
2969.00	10.59	243.15	2965.47	35.20 S	32.92 W	-33.15	2.07
3063.00	11.81	247.44	3057.68	42.80 S	49.51 W	-49.79	1.58
3158.00	12.28	246.73	3150.59	50.52 S	67.77 W	-68.11	0.52
3254.00	11.16	247.55	3244.59	58.10 S	85.74 W	-86.12	1.18
3348.00	11.71	246.19	3336.72	65.43 S	102.88 W	-103.31	0.65
3443.00	10.99	245.49	3429.86	73.08 S	119.94 W	-120.42	0.77
3538.00	8.47	234.30	3523.50	80.92 S	133.86 W	-134.40	3.30
3633.00	5.90	210.64	3617.76	89.21 S	142.04 W	-142.63	4.07
3728.00	4.83	213.35	3712.34	96.75 S	146.73 W	-147.36	1.16
3823.00	2.21	220.82	3807.16	101.47 S	150.12 W	-150.79	2.79
3918.00	0.47	214.96	3902.13	103.18 S	151.54 W	-152.22	1.83
4013.00	0.46	192.03	3997.12	103.87 S	151.84 W	-152.53	0.20
4297.00	0.73	205.50	4281.11	106.62 S	152.86 W	-153.56	0.10
4582.00	1.48	197.67	4566.05	111.77 S	154.76 W	-155.50	0.27
4677.00	0.66	139.95	4661.04	113.36 S	154.78 W	-155.53	1.33
4961.00	0.41	89.85	4945.03	114.61 S	152.70 W	-153.46	0.18
5246.00	0.31	265.59	5230.03	114.67 S	152.45 W	-153.21	0.25
5531.00	0.19	201.99	5515.02	115.18 S	153.41 W	-154.17	0.10
5815.00	1.10	48.60	5799.01	113.83 S	151.56 W	-152.31	0.45
5898.00	1.47	38.17	5881.99	112.47 S	150.30 W	-151.05	0.53
5958.00	1.31	42.95	5941.97	111.36 S	149.36 W	-150.09	0.33
6003.00	1.62	41.79	5986.95	110.51 S	148.58 W	-149.31	0.69
6051.00	6.34	85.91	6034.83	109.81 S	145.48 W	-146.21	11.04
6098.00	11.70	90.56	6081.23	109.67 S	138.12 W	-138.85	11.50
6146.00	16.14	86.94	6127.81	109.36 S	126.59 W	-127.31	9.42
6193.00	18.30	87.78	6172.70	108.73 S	112.69 W	-113.40	4.62
6241.00	19.65	87.61	6218.10	108.10 S	97.09 W	-97.81	2.80
6288.00	22.45	87.10	6261.96	107.31 S	80.23 W	-80.94	5.98
6336.00	25.03	87.53	6305.89	106.41 S	60.93 W	-61.64	5.38
6382.00	28.87	87.59	6346.89	105.53 S	40.11 W	-40.81	8.35
6430.00	33.38	87.02	6387.97	104.35 S	15.34 W	-16.03	9.43
6477.00	38.47	87.00	6426.02	102.92 S	12.19 E	11.51	10.83
6525.00	42.18	87.00	6462.61	101.29 S	43.21 E	42.53	7.73
6572.00	44.97	88.13	6496.65	99.93 S	75.57 E	74.91	6.17
6620.00	48.34	88.77	6529.59	98.99 S	110.46 E	109.80	7.09
6667.00	53.62	86.64	6559.18	97.50 S	146.93 E	146.28	11.77
6715.00	57.64	85.67	6586.27	94.84 S	186.45 E	185.82	8.55
6762.00	60.24	86.21	6610.51	91.99 S	226.61 E	225.99	5.60
6810.00	62.84	87.65	6633.39	89.74 S	268.74 E	268.14	6.03
6857.00	66.91	89.62	6653.34	88.74 S	311.27 E	310.68	9.45
6905.00	71.62	90.05	6670.33	88.61 S	356.15 E	355.55	9.85
6952.00	75.34	89.12	6683.69	88.28 S	401.20 E	400.60	8.14
7000.00	78.63	88.10	6694.50	87.14 S	447.94 E	447.36	7.16

7026.00	81.58	87.21	6698.97	86.09 S	473.53 E	472.95	11.84
7119.00	86.34	88.14	6708.75	82.34 S	565.91 E	565.36	5.21
7214.00	87.53	87.31	6713.83	78.58 S	660.70 E	660.16	1.53
7309.00	87.28	87.18	6718.13	74.01 S	755.49 E	754.99	0.30
7404.00	87.75	87.84	6722.25	69.89 S	850.31 E	849.83	0.86
7499.00	89.14	88.19	6724.83	66.61 S	945.22 E	944.76	1.51
7594.00	91.70	88.94	6724.13	64.23 S	1040.18 E	1039.73	2.81
7689.00	90.37	88.00	6722.42	61.70 S	1135.13 E	1134.69	1.71
7784.00	90.62	88.84	6721.60	59.08 S	1230.09 E	1229.67	0.92
7878.00	89.23	86.94	6721.73	55.62 S	1324.02 E	1323.62	2.50
7973.00	91.42	87.55	6721.20	51.06 S	1418.90 E	1418.53	2.39
8068.00	90.52	88.22	6719.59	47.56 S	1513.82 E	1513.47	1.18
8163.00	90.89	88.73	6718.41	45.03 S	1608.78 E	1608.44	0.66
8258.00	91.42	90.07	6716.49	44.04 S	1703.75 E	1703.42	1.51
8353.00	90.46	89.08	6714.93	43.33 S	1798.73 E	1798.41	1.45
8448.00	91.85	93.26	6713.01	45.26 S	1893.67 E	1893.33	4.64
8543.00	91.61	92.30	6710.15	49.87 S	1988.51 E	1988.14	1.04
8637.00	89.85	90.76	6708.96	52.38 S	2082.47 E	2082.07	2.49
8732.00	87.56	88.47	6711.11	51.74 S	2177.43 E	2177.04	3.41
8827.00	88.55	86.63	6714.33	47.68 S	2272.28 E	2271.91	2.19
8921.00	89.32	86.31	6716.08	41.90 S	2366.08 E	2365.75	0.89
9016.00	91.54	85.59	6715.36	35.19 S	2460.84 E	2460.55	2.46
9111.00	90.96	87.02	6713.29	29.06 S	2555.62 E	2555.37	1.62
9205.00	89.75	89.40	6712.71	26.12 S	2649.56 E	2649.33	2.84
9300.00	88.70	88.97	6713.99	24.77 S	2744.54 E	2744.31	1.20
9395.00	90.43	89.28	6714.71	23.32 S	2839.52 E	2839.30	1.85
9490.00	90.15	89.15	6714.22	22.01 S	2934.51 E	2934.30	0.32
9584.00	89.23	88.44	6714.73	20.04 S	3028.49 E	3028.29	1.24
9679.00	89.10	87.94	6716.11	17.04 S	3123.43 E	3123.25	0.54
9774.00	90.80	87.80	6716.19	13.51 S	3218.36 E	3218.20	1.79
9869.00	87.50	85.28	6717.59	7.78 S	3313.16 E	3313.03	4.37
9964.00	86.70	85.41	6722.40	0.09 S	3407.72 E	3407.65	0.86
10059.00	88.02	85.55	6726.77	7.39 N	3502.32 E	3502.30	1.41
10154.00	90.89	86.58	6727.67	13.90 N	3597.08 E	3597.10	3.21
10249.00	90.62	87.41	6726.41	18.87 N	3691.95 E	3691.99	0.92
10344.00	91.70	87.58	6724.50	23.02 N	3786.83 E	3786.90	1.15
10439.00	92.19	88.53	6721.27	26.25 N	3881.72 E	3881.81	1.13
10533.00	91.88	88.69	6717.93	28.52 N	3975.64 E	3975.74	0.38
10628.00	91.54	88.88	6715.10	30.54 N	4070.57 E	4070.69	0.40
10723.00	88.98	87.79	6714.66	33.30 N	4165.52 E	4165.65	2.93
10818.00	90.65	89.37	6714.97	35.66 N	4260.49 E	4260.63	2.41
10913.00	89.85	88.37	6714.56	37.54 N	4355.46 E	4355.62	1.34
11008.00	90.99	87.91	6713.87	40.62 N	4450.41 E	4450.58	1.29
11019.00	91.39	87.27	6713.64	41.08 N	4461.40 E	4461.57	6.93
11082.00	91.39	87.27	6712.11	44.08 N	4524.31 E	4524.50	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 CLOSURE OF 89.44 DEGREES (GRID)
A TOTAL CORRECTION OF 7.77 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11082.00 FEET
IS 4524.52 FEET ALONG 89.44 DEGREES (GRID)**

Final survey projected to TD