

PCGK : Pressure Case Gamma
PCDC: Pressure Case Directional



1 : 600 / 1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	29-Oct-13	30-Oct-13	02-Nov-13		
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)	640.00	5,942.00	6,973.00		
Log End Depth (MD, ft)	5,942.00	6,973.00	11,709.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	28-Oct-13 02:00	29-Oct-13 06:15	31-Oct-13 13:20		
Drill/Wipe End Date and Time	28-Oct-13 19:45	29-Oct-13 19:00	02-Nov-13 02:25		
Min Inc (deg) @ Depth (MD, ft)	0.07 @ 996.00	0.38 @ 5,933.00	88.06 @ 7,127.00		
Max Inc (deg) @ Depth (MD, ft)	15.85 @ 3,546.00	83.58 @ 6,919.00	92.29 @ 11,205.00		
Bit TFA(in2) / Bit Type	0.77 / PDC	0.86 / PDC	0.75 / PDC		
Flow Rate (gpm)	583.90	562.06	282.96		
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A		
Fluid Type	Polymer	Polymer	Polymer		
Density (ppg) / Viscosity (spqt)	8.75 / 28.00	10.50 / 36.00	9.33 / 35.00		
Filtrate CL (ppm)	1,300.00	1,200.00	2,000.00		
pH / Fluid Loss (mptm)	9.30 / 0	9.50 / 0	8.90 / 0		
PV (cP) / YP (lbf2)	5 / 3.00	13 / 10.00	10 / 7.00		
% Solids / % Sand	4.1 / 0.15	0.11 / 0.20	5.2 / 0.15		
% 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		
Max Tool Temp (deg F) @ 100 ft	145.00 / DOM	170.07 / DOM	201.40 / DOM		

Max Tool Temp (degF) / Source	145.90 / PCM	170.37 / PCM	231.42 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Paul Kock	Paul Kock	Paul Kock		
Customer Representative	Martin Suarez	Martin Suarez	Martin Suarez		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11404274	11404274	11650065		
Insert Serial Number	11680789	11680789	12001058		
Date and Time Initialized	27-Oct-13 08:21	27-Oct-13 08:21	30-Oct-13 21:12		
Date and Time Read	30-Oct-13 02:41	30-Oct-13 02:47	02-Nov-13 16:53		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	53.99	51.63	60.49		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404274	11404274	11650065		
Sonde Serial Number	11638470	11638470	11638477		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	186.74	183.73	232.67		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	48.99	46.63	55.51		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404274	11404274	11650065		
Insert/Sonde Serial Number	11681100	11681100	11120592		

REMARKS

1. All depths are calibrated to the driller's pipe tally and are measured from the rig 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.
 - ROPA: Average Rate of Penetration is real time data.
 - PGRC: Smooth Pressure Case Gamma Ray Borehole corrected is recorded data.
4. The following smoothing parameters have been applied to the data:
 - All 2" (1:600) logs - 1 ft. interval, 3 ft. coercion distance.
 - All 5" (1:240) logs - .5 ft. interval, .6 ft. coercion distance.
5. INSITE version 8.0.0
6. Gamma presented inside casing from 6926 ft MD to 6973 ft MD.

WARRANTY

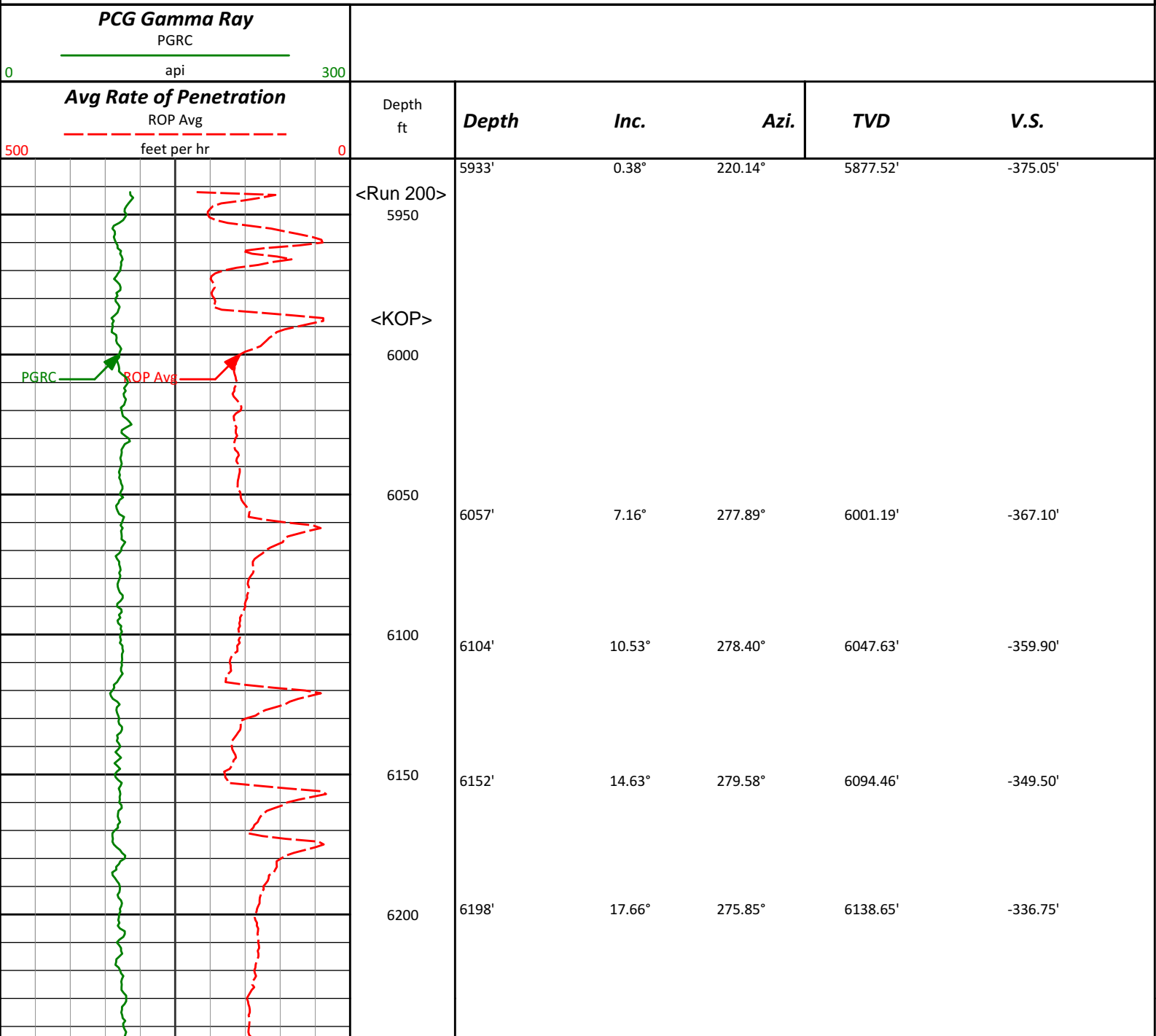
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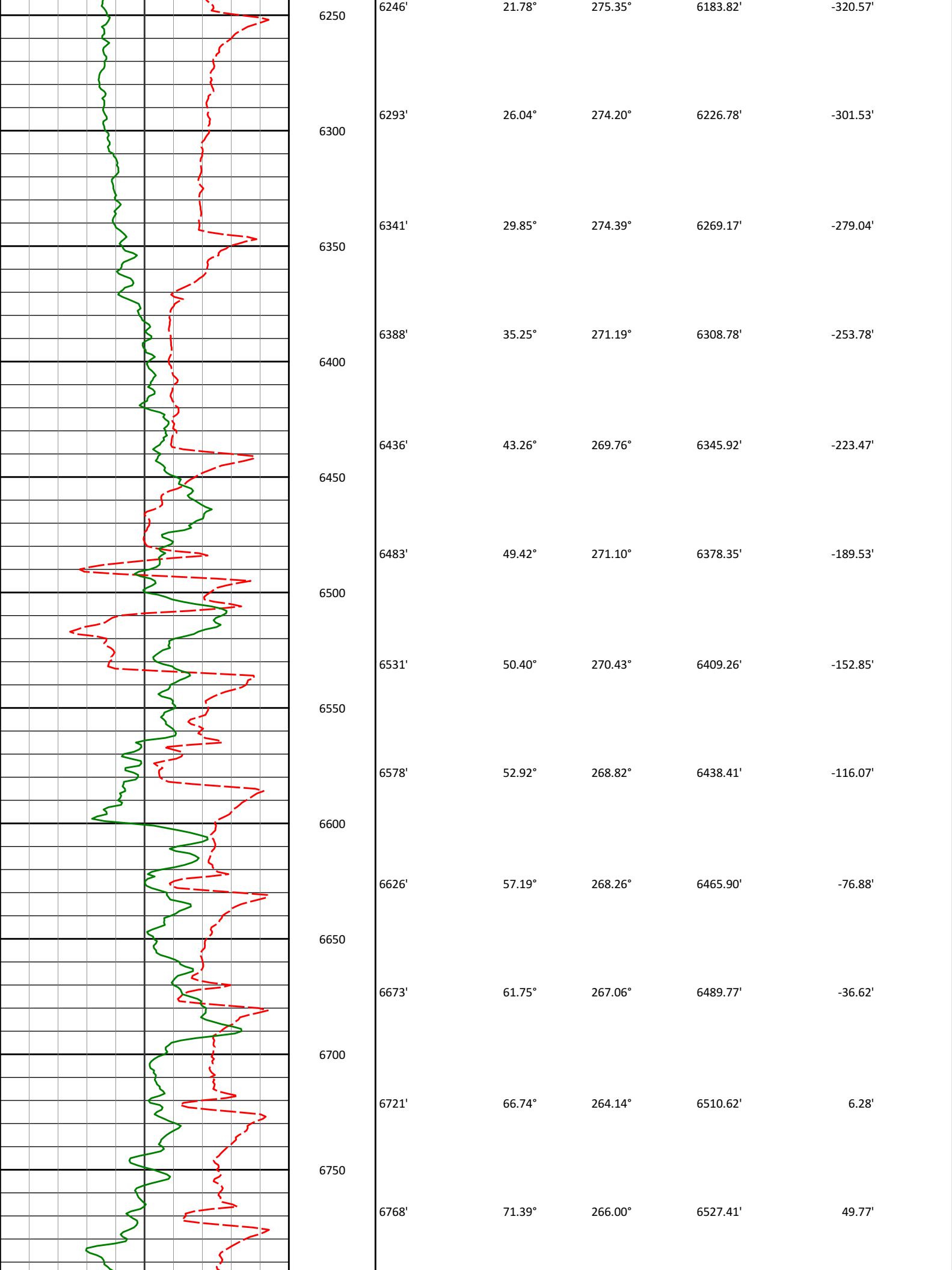
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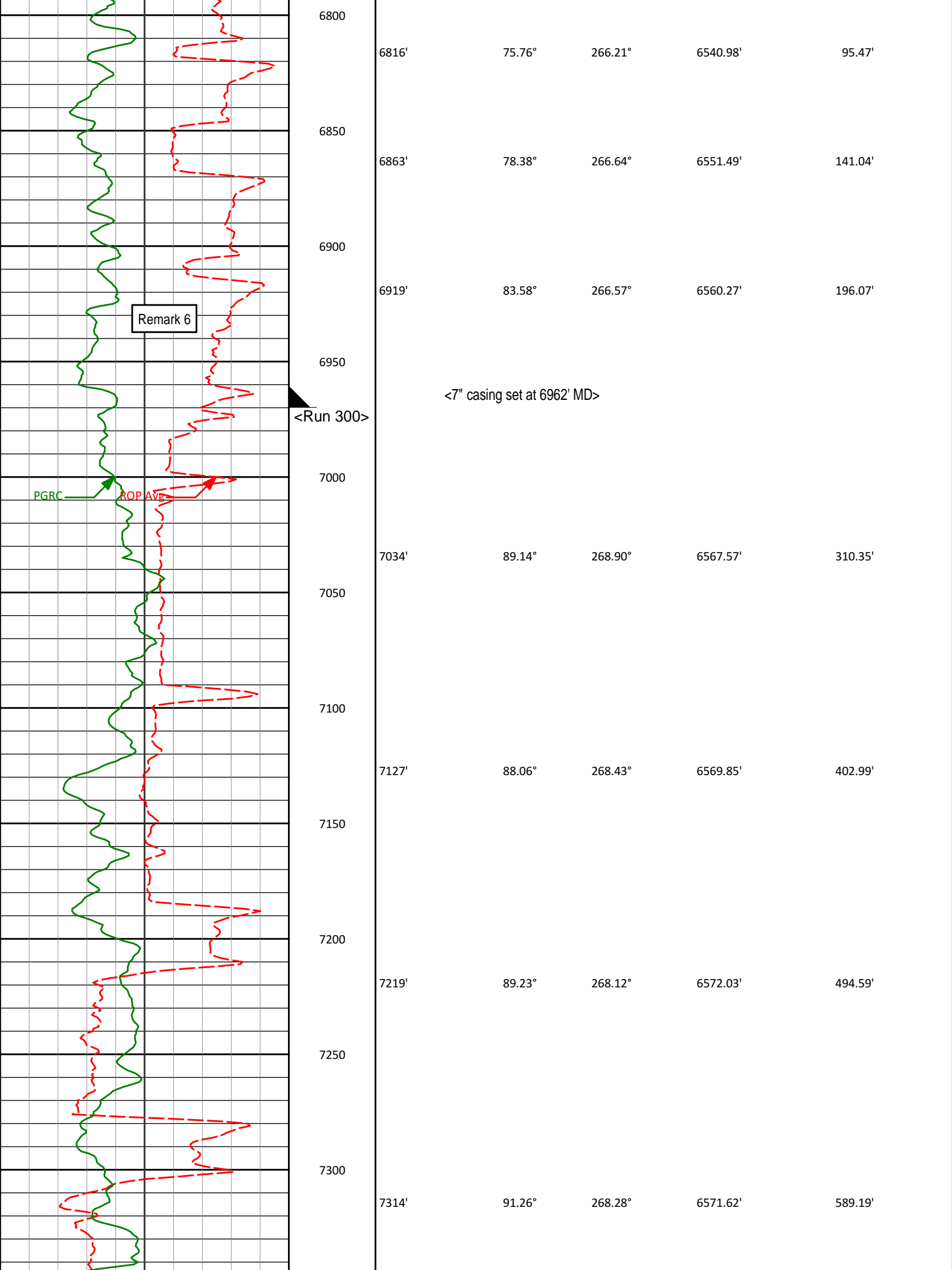
HALLIBURTON
Sperry Drilling Services

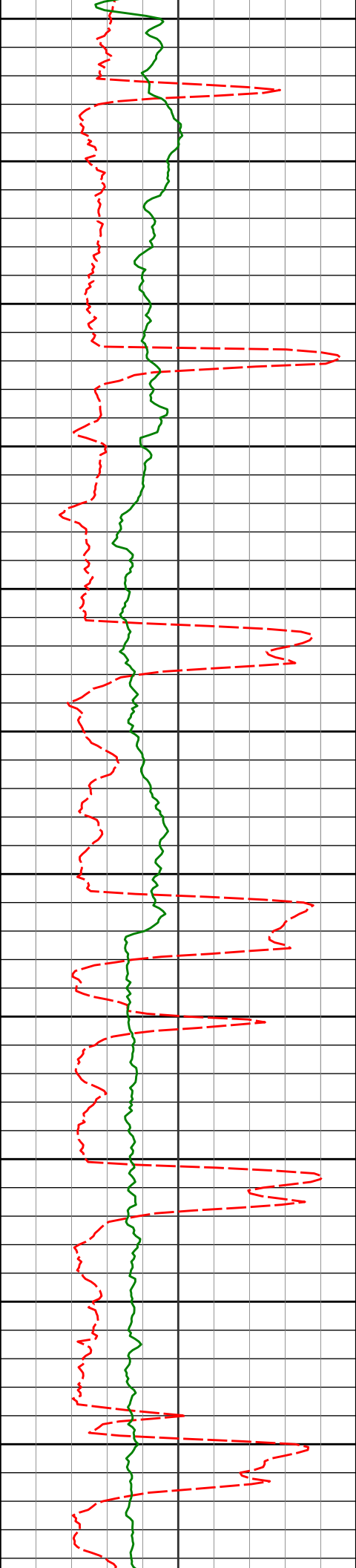
MD Main Log 1:600

Noble Energy, Inc
Cockroft B15-69-1HNM
H&P 315
T5N R64W









7350

7400

7450

7500

7550

7600

7650

7700

7750

7800

7850

7409'

91.32°

268.85°

6569.48'

683.82'

7504'

91.76°

268.95°

6566.92'

778.48'

7599'

90.99°

268.55°

6564.65'

873.13'

7693'

90.00°

268.02°

6563.84'

966.75'

7788'

89.88°

268.82°

6563.94'

1061.38'

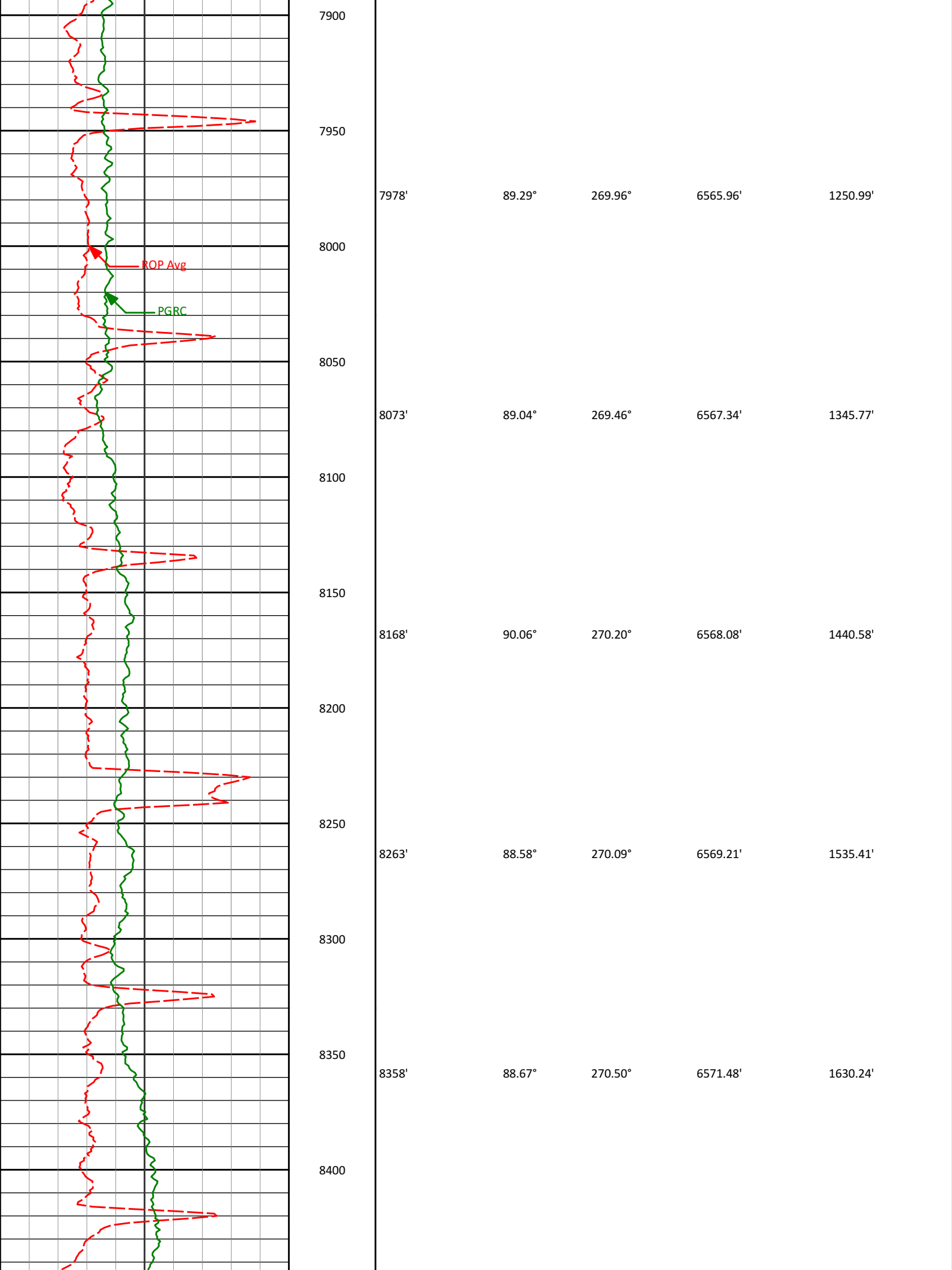
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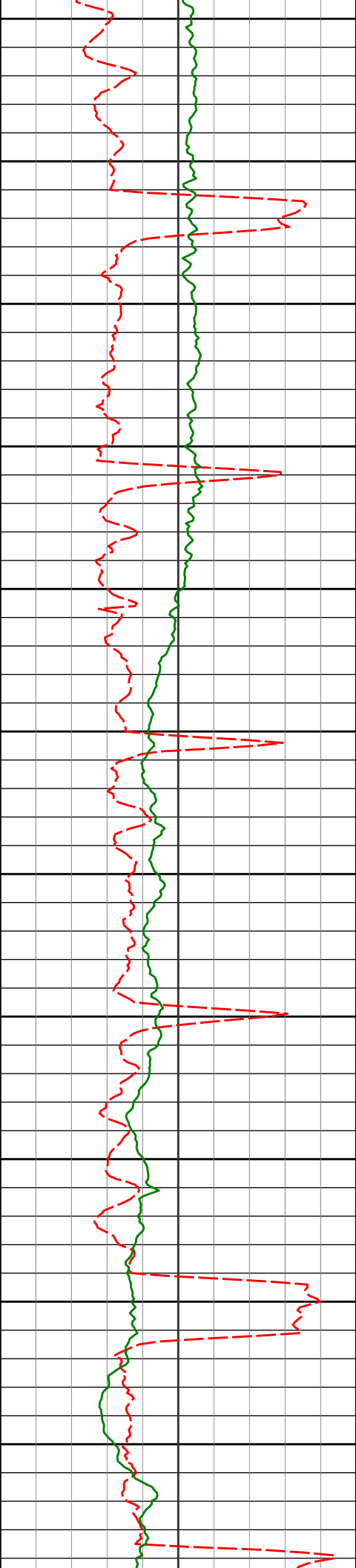
89.20°

270.29°

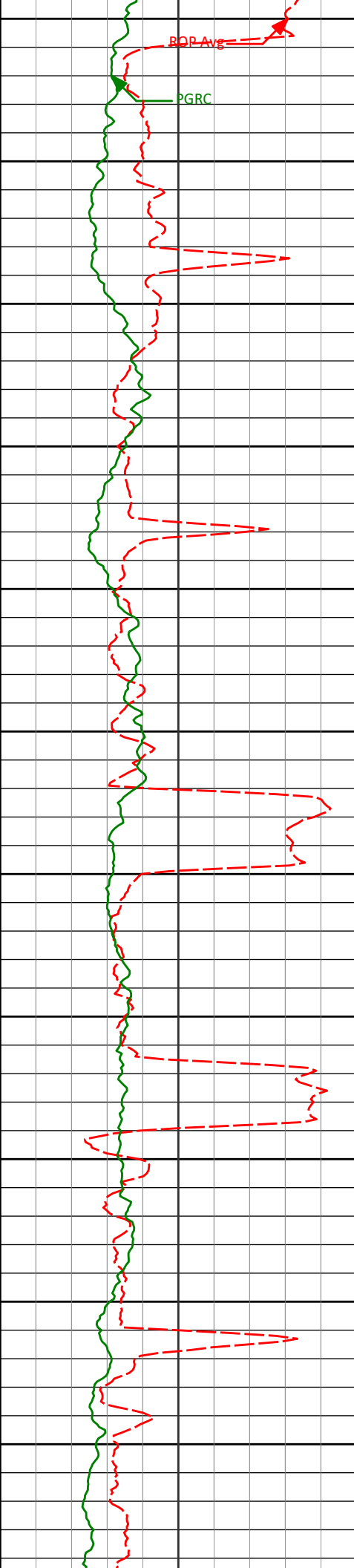
6564.71'

1156.16'





8450	8453'	88.61°	270.37°	6573.73'	1725.08'
8500					
8550	8548'	90.22°	270.55°	6574.71'	1819.94'
8600					
8650	8643'	90.31°	270.39°	6574.27'	1914.82'
8700					
8750	8737'	90.96°	270.28°	6573.23'	2008.67'
8800					
8850	8832'	91.76°	270.00°	6570.98'	2103.48'
8900					
8950	8927'	91.60°	269.74°	6568.20'	2198.26'



9000

9022'

90.25°

269.53°

6566.66'

2293.03'

9050

9100

9117'

90.49°

268.74°

6566.05'

2387.76'

9150

9200

9212'

91.45°

269.05°

6564.44'

2482.45'

9250

9300

9307'

90.65°

269.02°

6562.71'

2577.15'

9350

9400

9402'

89.69°

269.32°

6562.42'

2671.88'

9450

9500

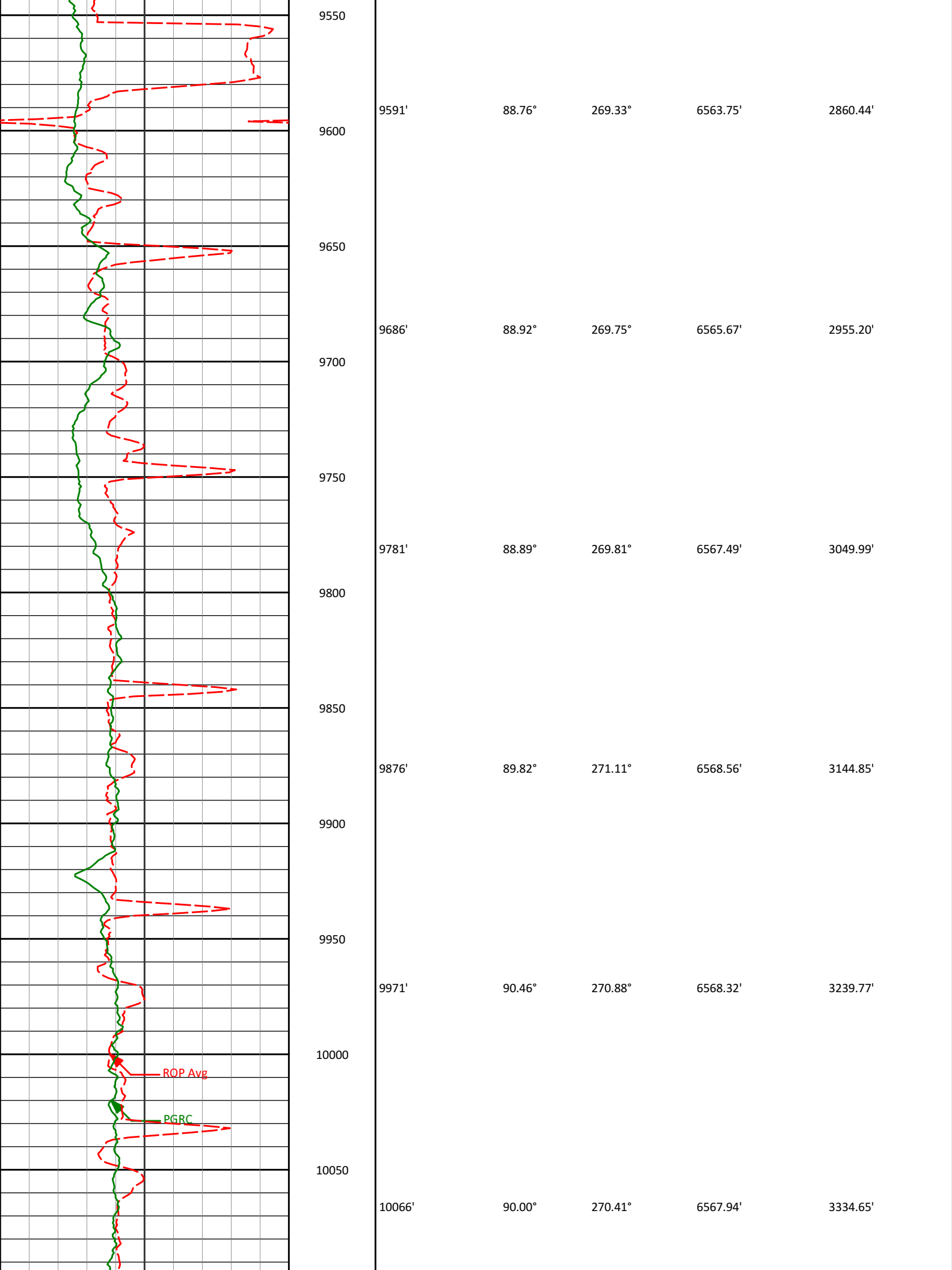
9496'

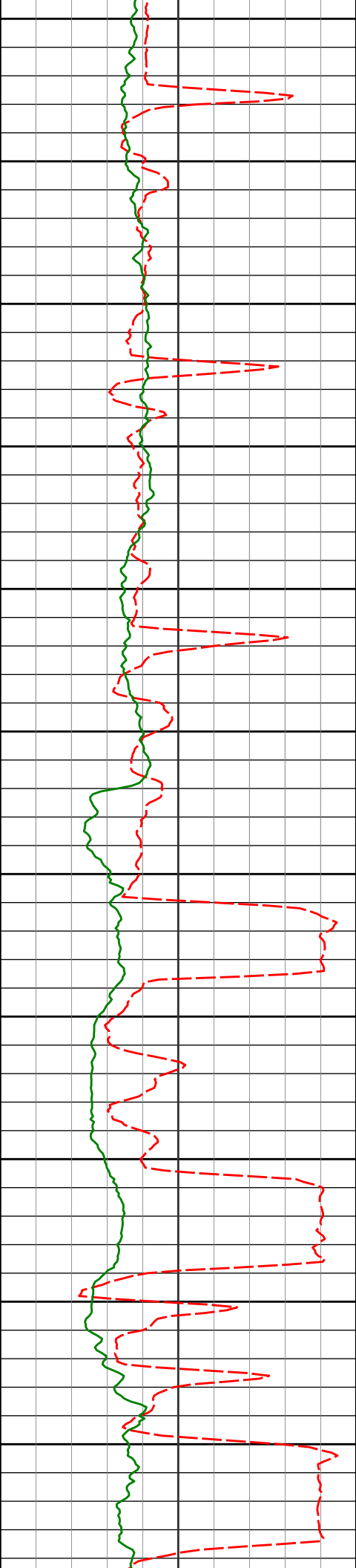
89.97°

269.85°

6562.70'

2765.67'





10100

10150

10200

10250

10300

10350

10400

10450

10500

10550

10600

10161'

89.81°

269.98°

6568.09'

3429.50'

10255'

90.40°

270.48°

6567.92'

3523.35'

10350'

91.36°

272.34°

6566.46'

3618.27'

10445'

91.45°

272.69°

6564.13'

3713.23'

10540'

90.68°

270.40°

6562.37'

3808.15'

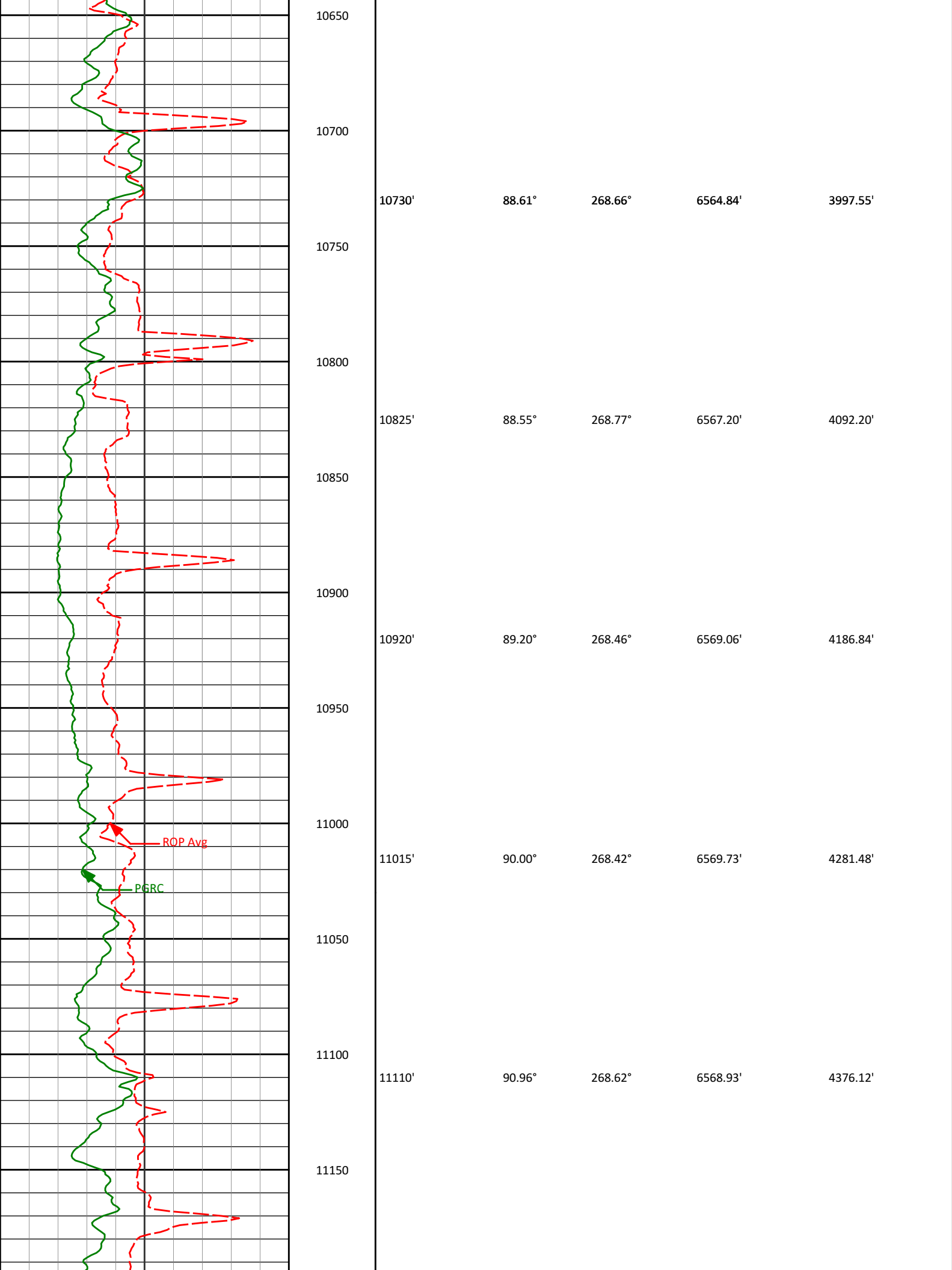
10635'

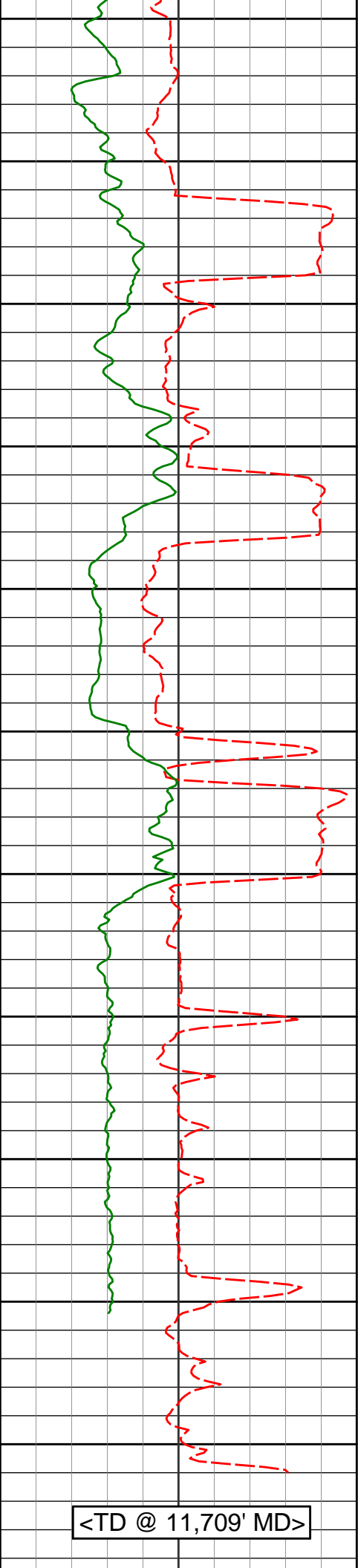
88.86°

268.54°

6562.75'

3902.92'



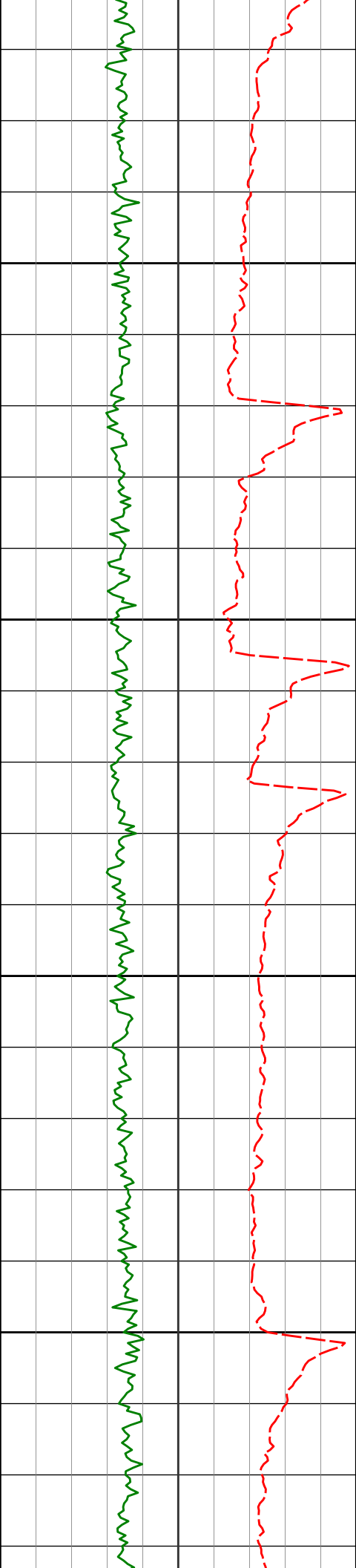


11200	11205'	92.29°	268.70°	6566.25'	4470.75'
11250					
11300	11300'	91.39°	268.81°	6563.20'	4565.38'
11350					
11400	11394'	91.02°	267.88°	6561.23'	4658.99'
11450					
11500	11489'	90.25°	268.47°	6560.18'	4753.58'
11550					
11600	11584'	89.97°	268.53°	6560.00'	4848.22'
11650	11647'	89.20°	269.16°	6560.46'	4911.02'
11700					

<TD @ 11,709' MD>

HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

Noble Energy, Inc
Cockroft B15-69-1HNM
H&P 315
T5N R64W



6100

6104'	10.53°	278.40°	6047.63'	-359.90'
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6150

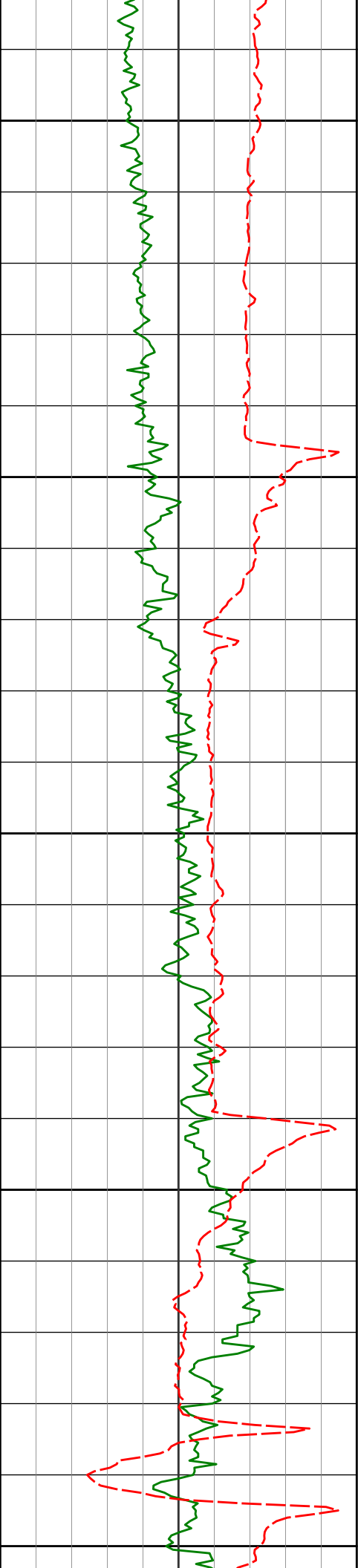
6152'	14.63°	279.58°	6094.46'	-349.50'
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6200

6198'	17.66°	275.85°	6138.65'	-336.75'
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6250

6246'	21.78°	275.35°	6183.82'	-320.57'
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6300

6350

6400

6450

6500

6293'

26.04°

274.20°

6226.78'

-301.53'

6341'

29.85°

274.39°

6269.17'

-279.04'

6388'

35.25°

271.19°

6308.78'

-253.78'

6436'

43.26°

269.76°

6345.92'

-223.47'

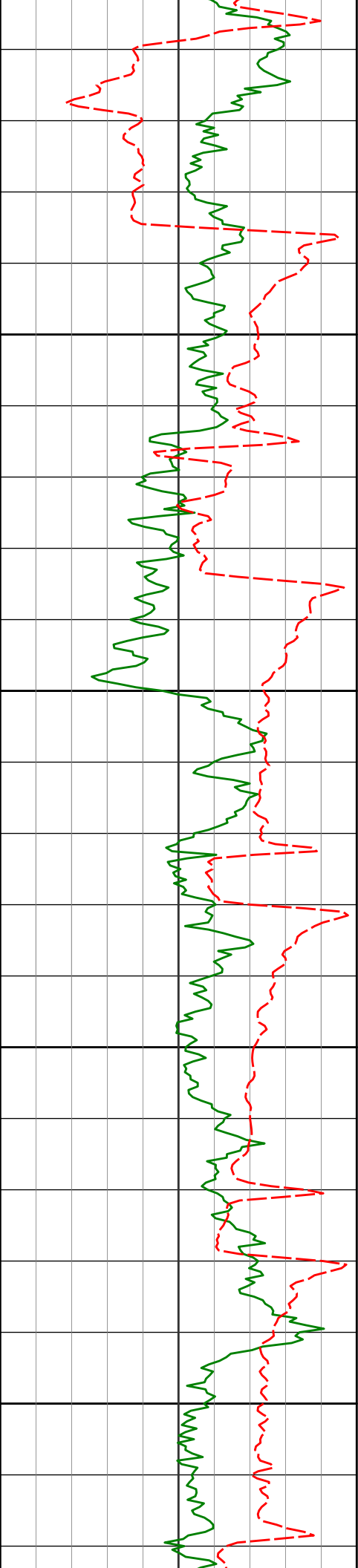
6483'

49.42°

271.10°

6378.35'

-189.53'



6531'

50.40°

270.43°

6409.26'

-152.85'

6550

6578'

52.92°

268.82°

6438.41'

-116.07'

6600

6626'

57.19°

268.26°

6465.90'

-76.88'

6650

6673'

61.75°

267.06°

6489.77'

-36.62'

6700

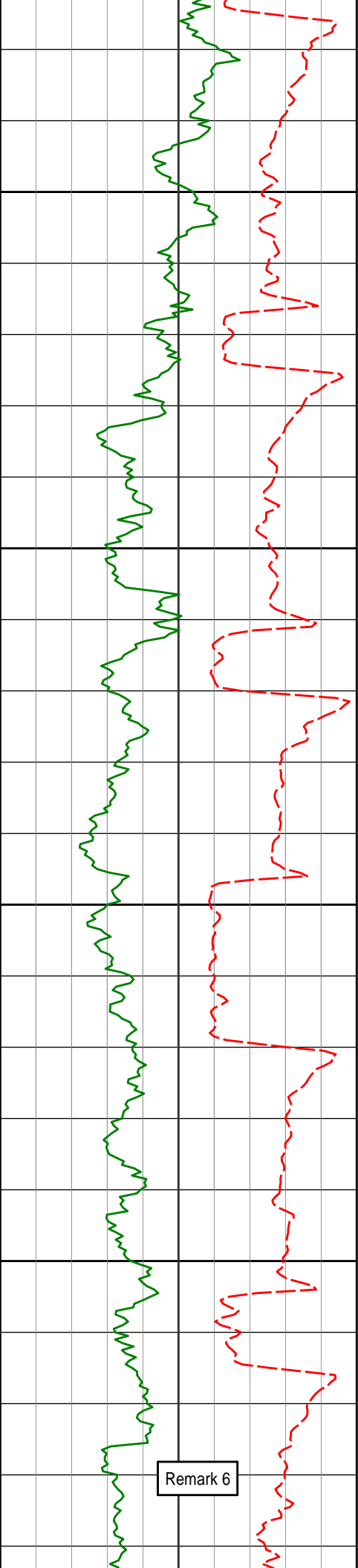
6721'

66.74°

264.14°

6510.62'

6.28'



6750

6768'	71.39°	266.00°	6527.41'	49.77'
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6800

6816'	75.76°	266.21°	6540.98'	95.47'
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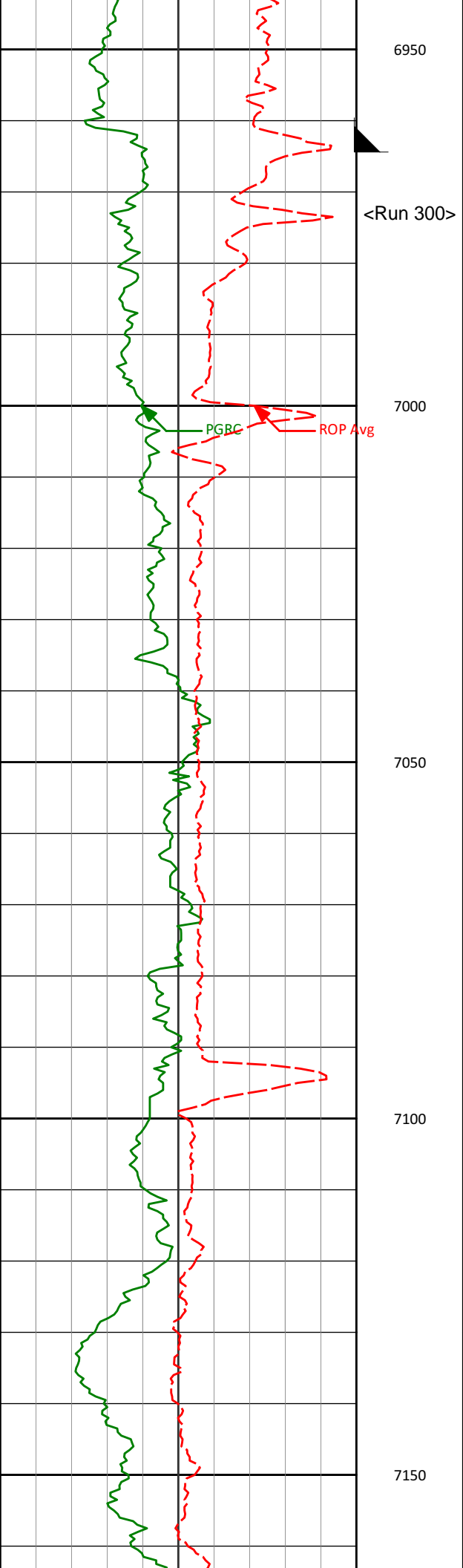
6850

6863'	78.38°	266.64°	6551.49'	141.04'
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6900

6919'	83.58°	266.57°	6560.27'	196.07'
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Remark 6



<7" casing set at 6962' MD>

<Run 300>

PGBC

ROP Avg

7034'

89.14°

268.90°

6567.57'

310.35'

7050

7100

7127'

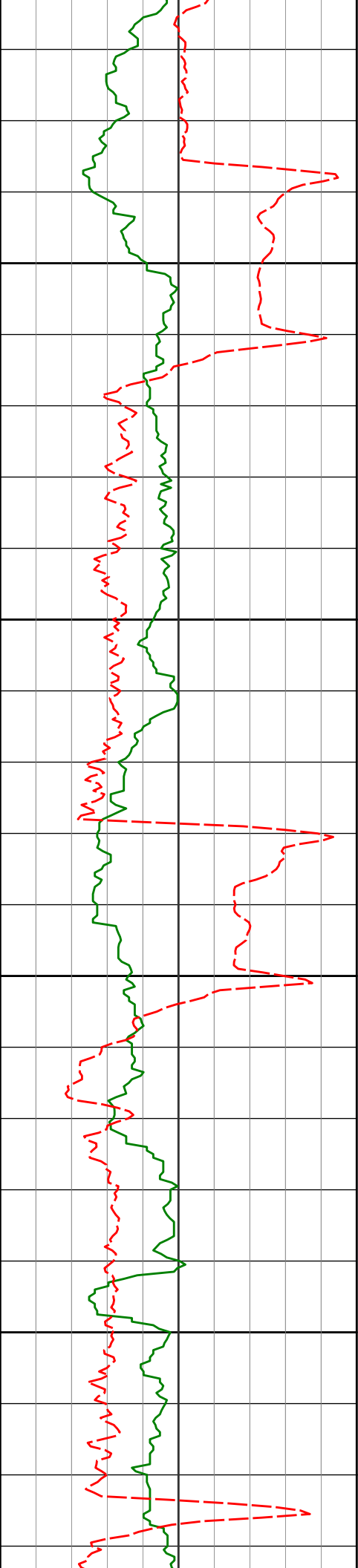
88.06°

268.43°

6569.85'

402.99'

7150



7200

7219'

89.23°

268.12°

6572.03'

494.59'

7250

7300

7314'

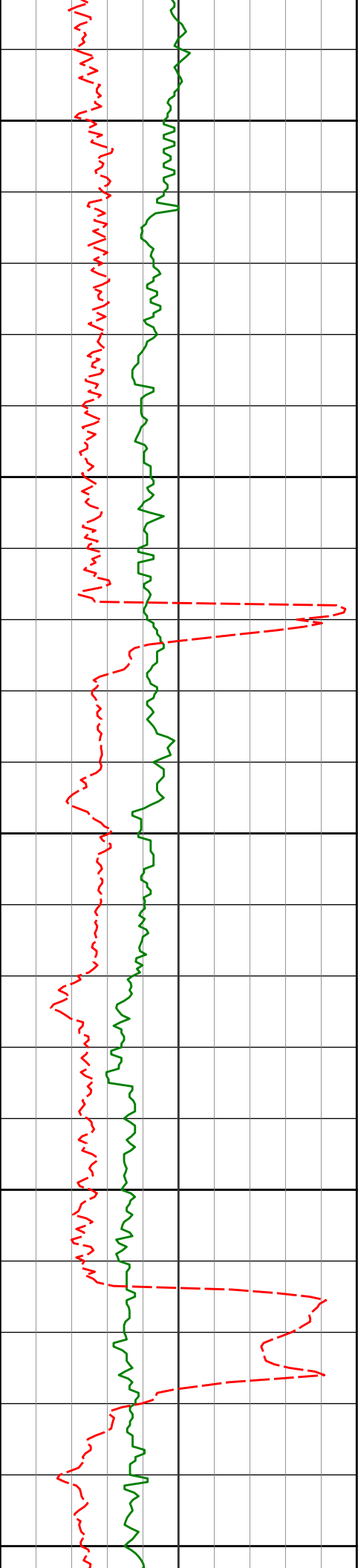
91.26°

268.28°

6571.62'

589.19'

7350



7400

7409'	91.32°	268.85°	6569.48'	683.82'
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7450

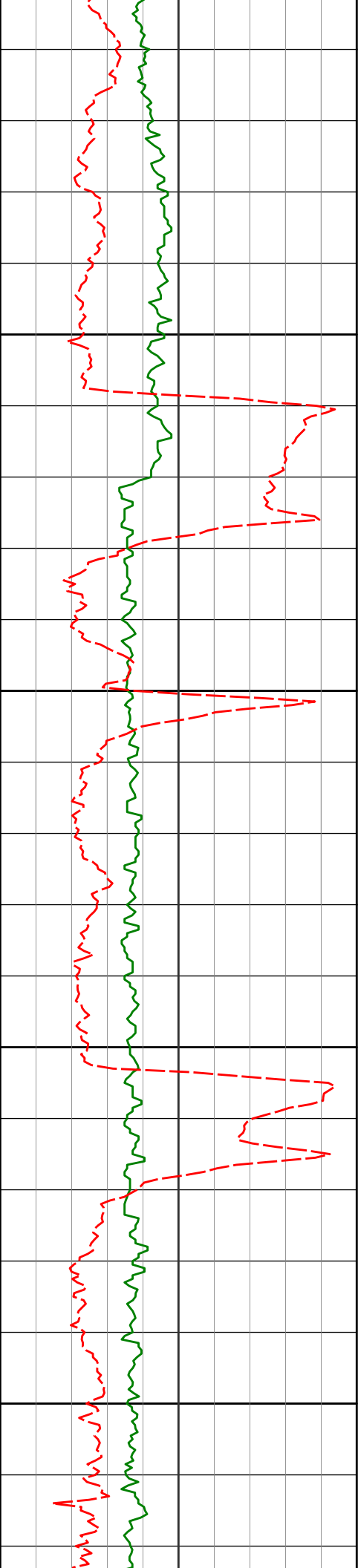
7500

7504'	91.76°	268.95°	6566.92'	778.48'
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7550

7600

7599'	90.99°	268.55°	6564.65'	873.13'
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7650

7693'

90.00°

268.02°

6563.84'

966.75'

7700

7750

7788'

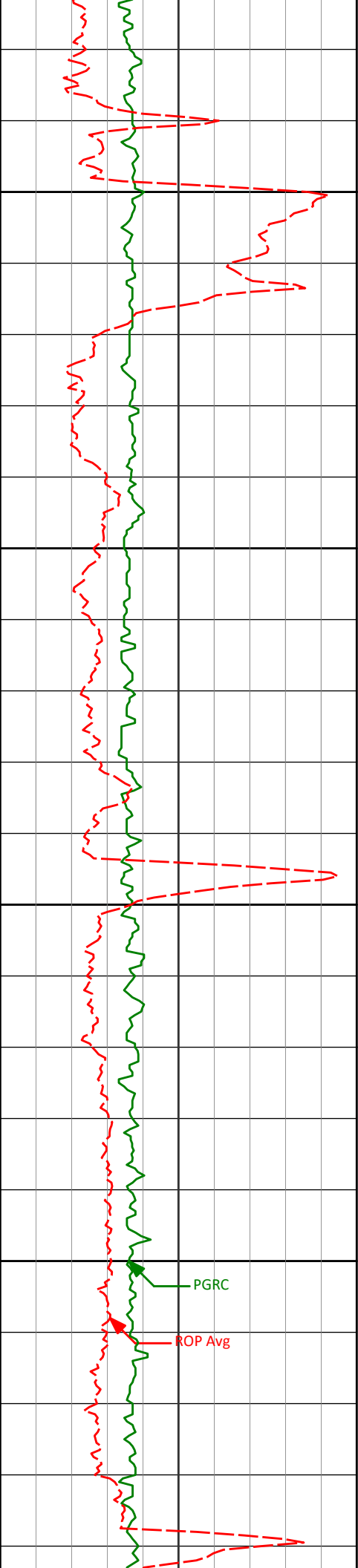
89.88°

268.82°

6563.94'

1061.38'

7800



7850

7883'

89.20°

270.29°

6564.71'

1156.16'

7900

7950

7978'

89.29°

269.96°

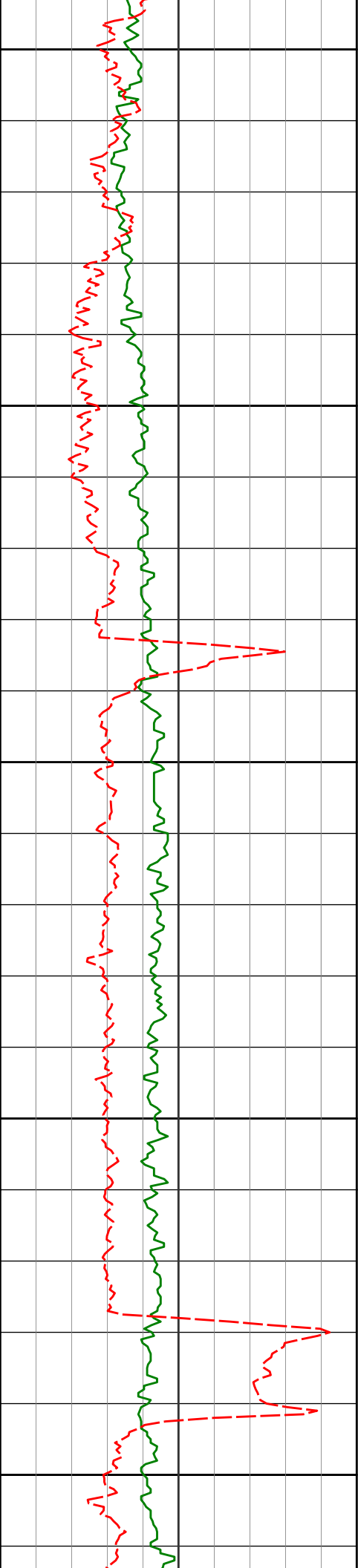
6565.96'

1250.99'

8000

PGRC

ROP Avg



8050

8073'

89.04°

269.46°

6567.34'

1345.77'

8100

8150

8168'

90.06°

270.20°

6568.08'

1440.58'

8200

8250

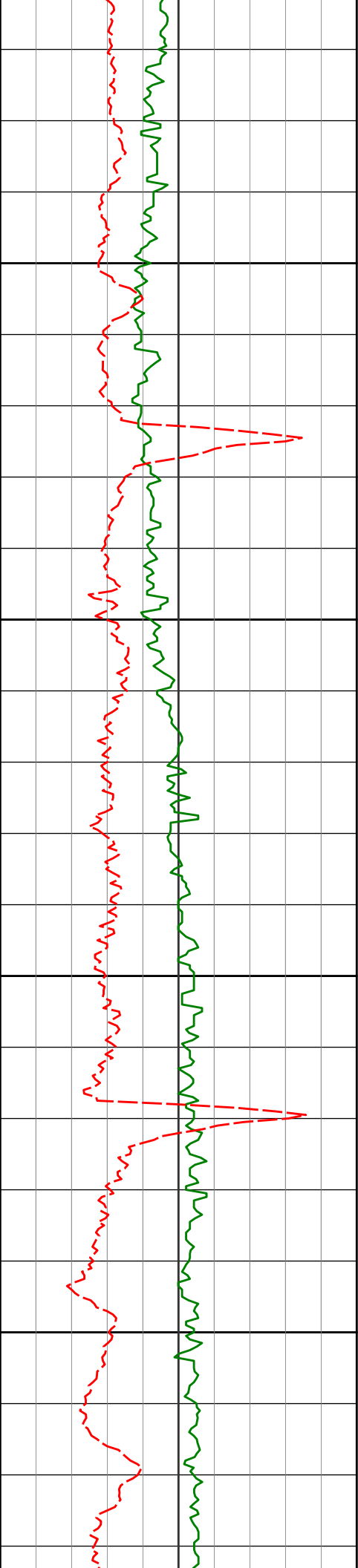
8263'

89.58°

270.00°

6569.31'

1535.41'



8300

8350

8400

8450

8358'

88.67°

270.50°

6571.48'

1630.24'

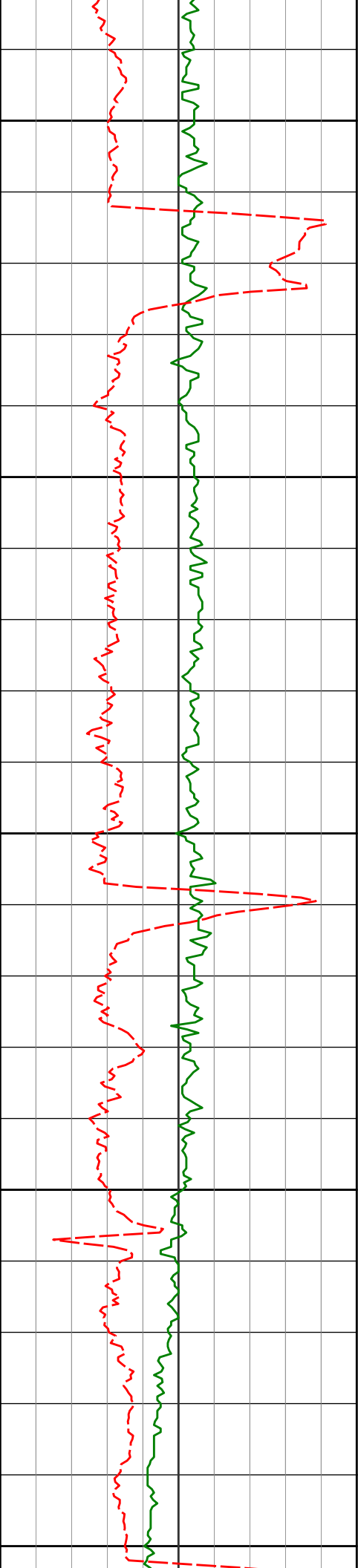
8453'

88.61°

270.37°

6573.73'

1725.08'



8500

8550

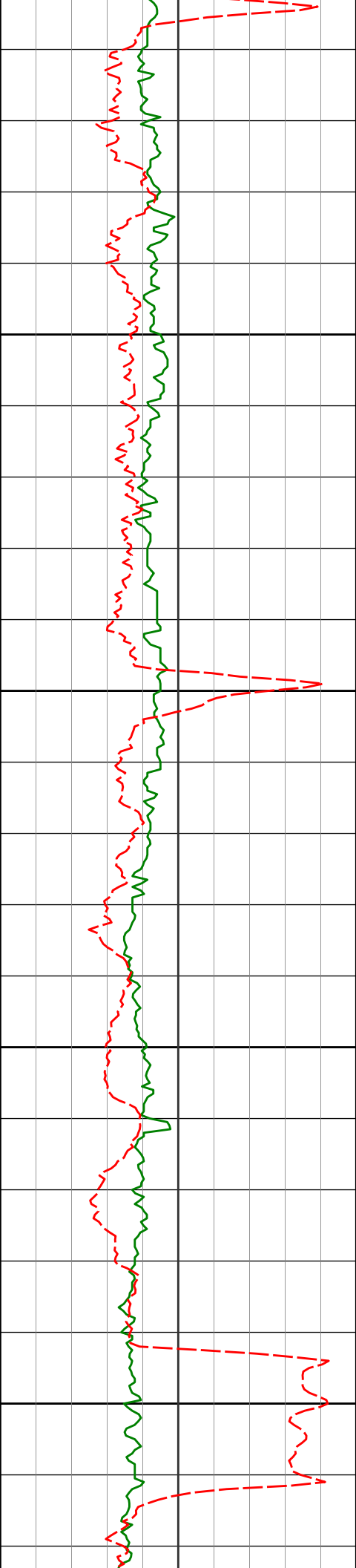
8600

8650

8700

8548'	90.22°	270.55°	6574.71'	1819.94'
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8643'	90.31°	270.39°	6574.27'	1914.82'
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8737'

90.96°

270.28°

6573.23'

2008.67'

8750

8800

8832'

91.76°

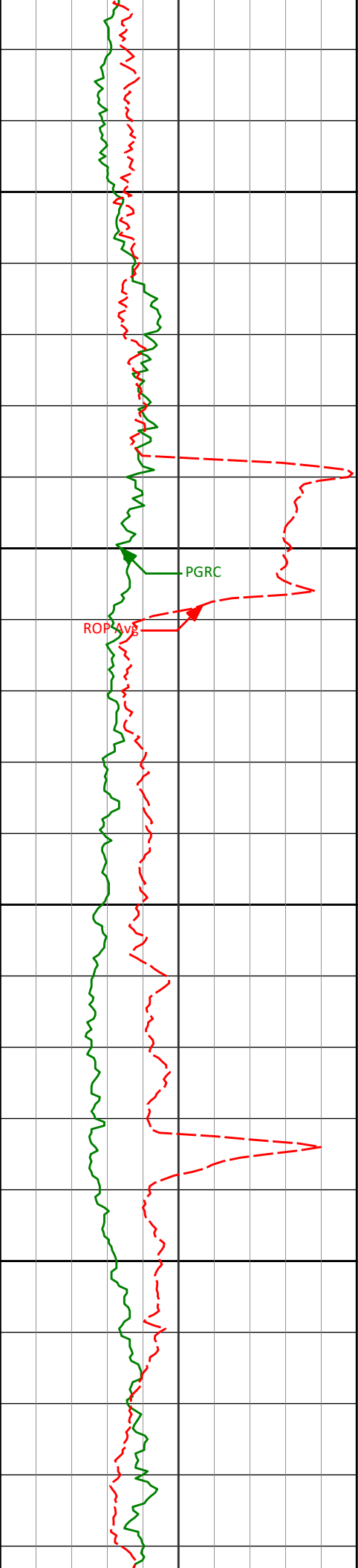
270.00°

6570.98'

2103.48'

8850

8900



8950

9000

9050

9100

8927'

91.60°

269.74°

6568.20'

2198.26'

9022'

90.25°

269.53°

6566.66'

2293.03'

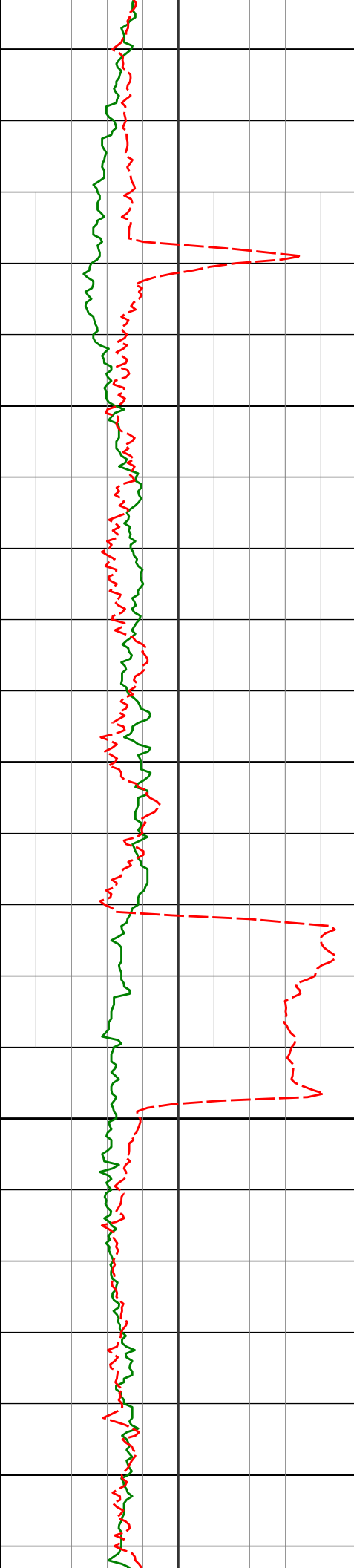
9117'

90.49°

268.74°

6566.05'

2387.76'



9150

9200

9250

9300

9350

9212'

 91.45°

269.05°

6564.44'

2482.45'

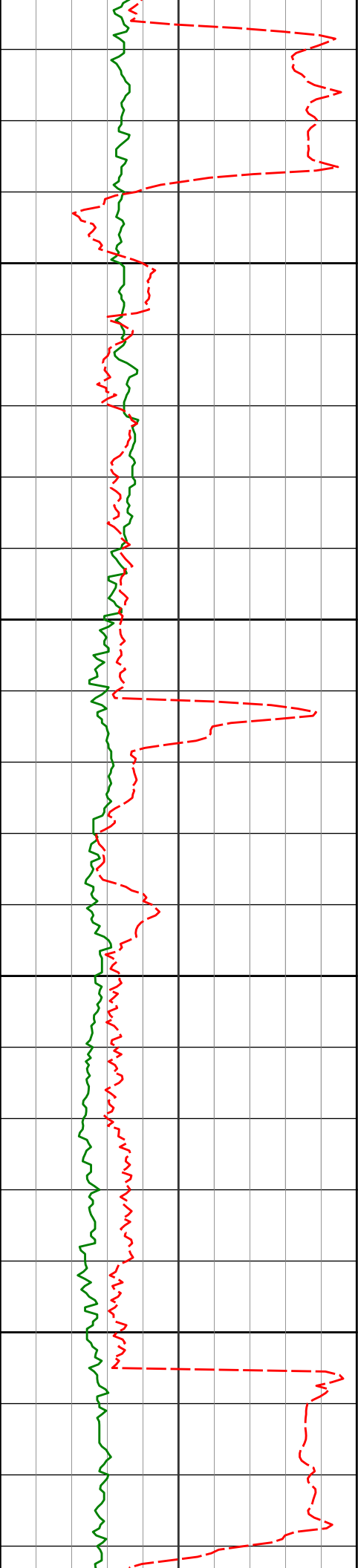
9307'

 90.65°

269.02°

6562.71'

2577.15'



9400

9402'

89.69°

269.32°

6562.42'

2671.88'

9450

9500

9496'

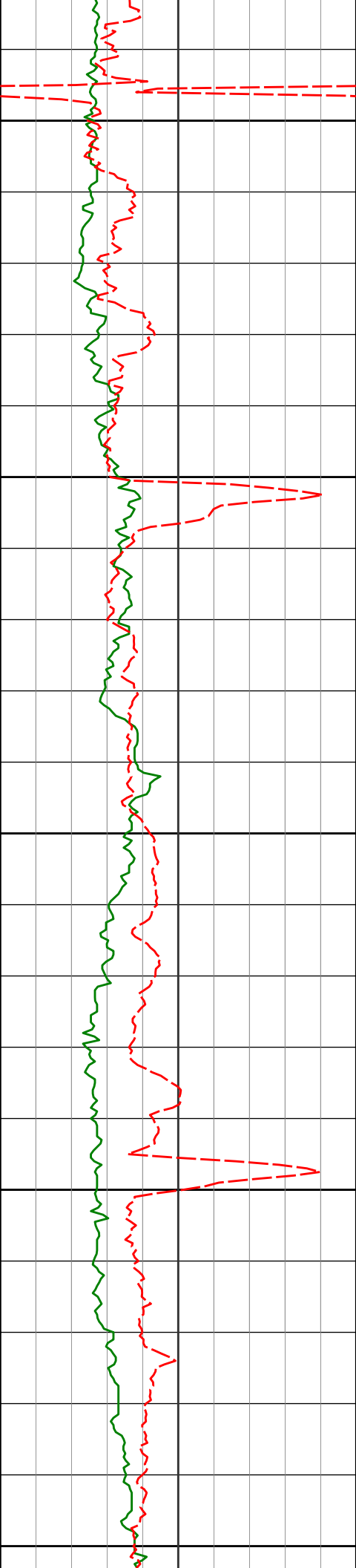
89.97°

269.85°

6562.70'

2765.67'

9550



9600

9650

9700

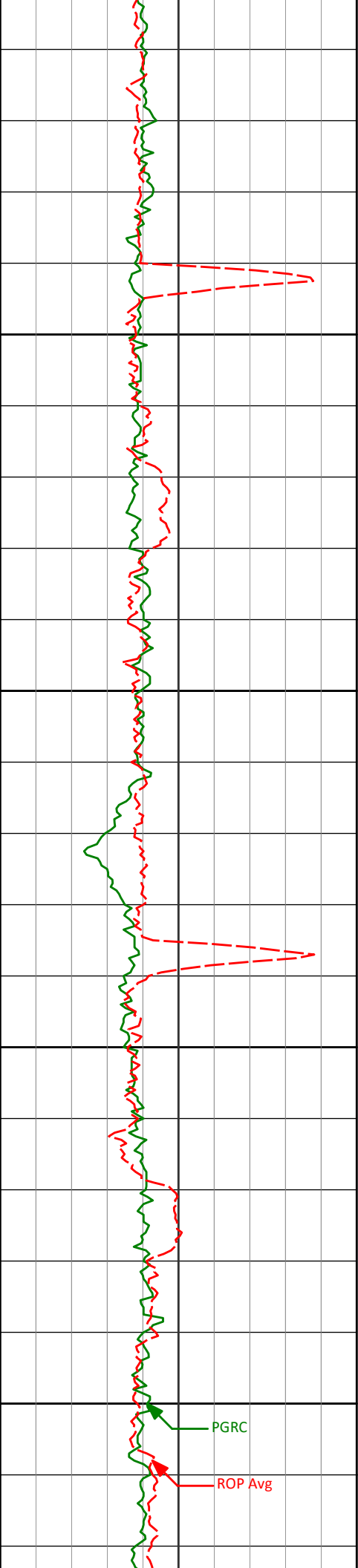
9750

9800

9591'	88.76°	269.33°	6563.75'	2860.44'
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9686'	88.92°	269.75°	6565.67'	2955.20'
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9781'	88.89°	269.81°	6567.49'	3049.99'
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9850

9876'

89.82°

271.11°

6568.56'

3144.85'

9900

9950

9971'

90.46°

270.88°

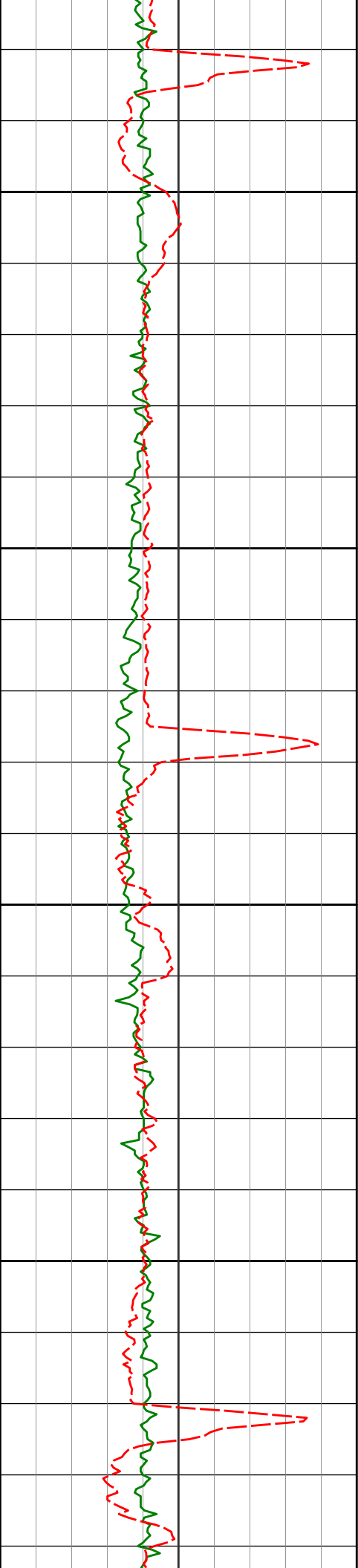
6568.32'

3239.77'

10000

PGRC

ROP Avg



10050

10066'

90.00°

270.41°

6567.94'

3334.65'

10100

10150

10161'

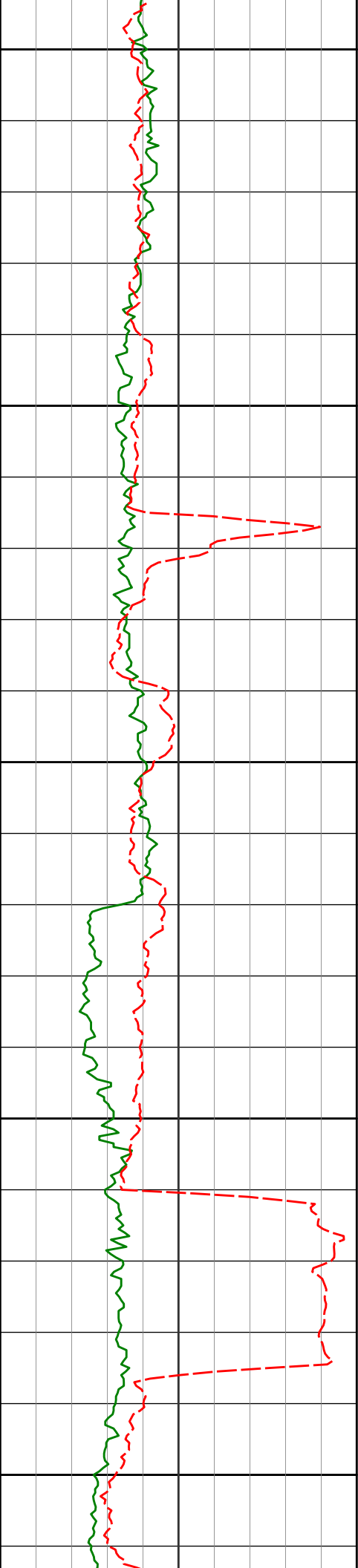
89.81°

269.98°

6568.09'

3429.50'

10200



10250

10255'

90.40°

270.48°

6567.92'

3523.35'

10300

10350

10350'

91.36°

272.34°

6566.46'

3618.27'

10400

10450

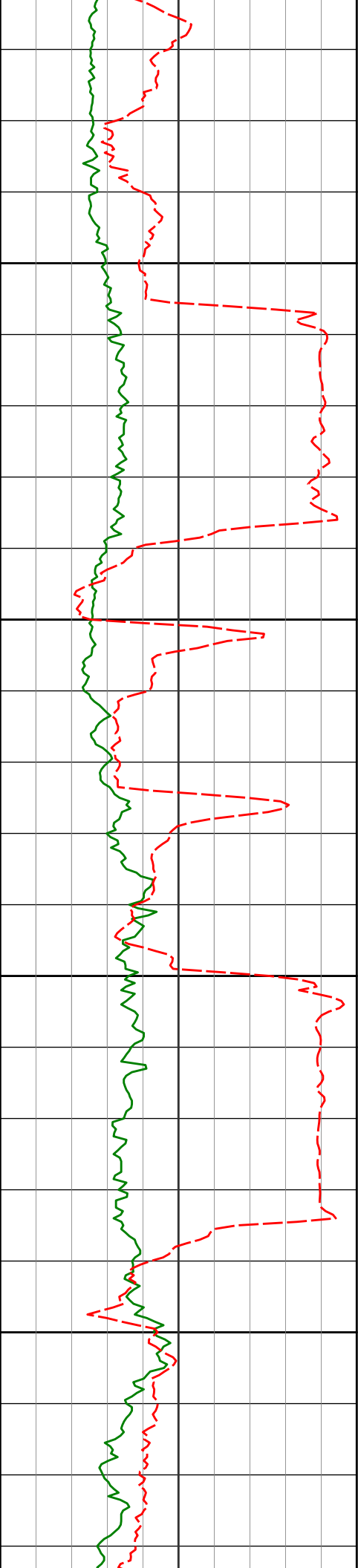
10445'

91.45°

272.69°

6564.13'

3713.23'



10500

10540'

90.68°

270.40°

6562.37'

3808.15'

10550

10600

10635'

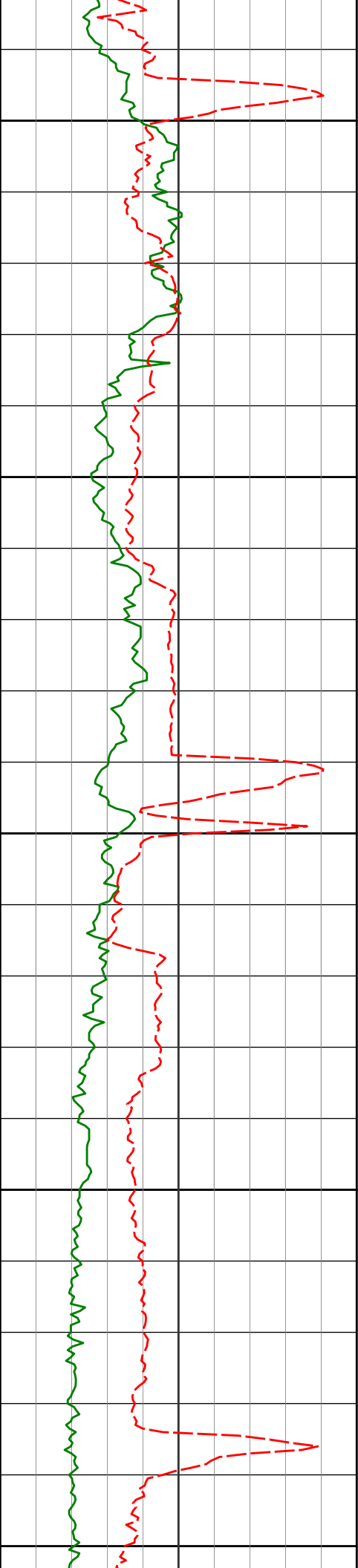
88.86°

268.54°

6562.75'

3902.92'

10650



10700

10730'

88.61°

268.66°

6564.84'

3997.55'

10750

10800

10825'

88.55°

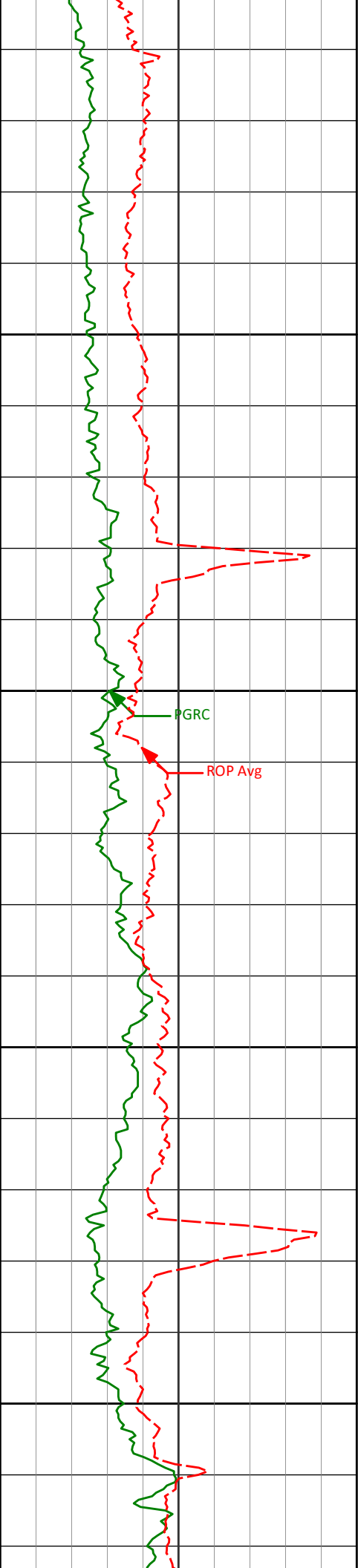
268.77°

6567.20'

4092.20'

10850

10900



10950

11000

11050

11100

10920'

89.20°

268.46°

6569.06'

4186.84'

11015'

90.00°

268.42°

6569.73'

4281.48'

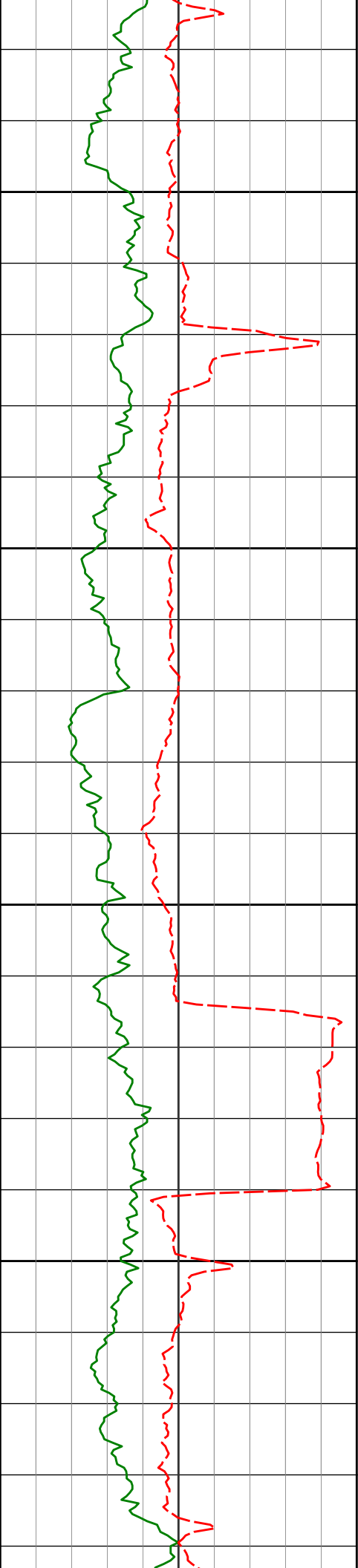
11110'

90.96°

268.62°

6568.93'

4376.12'



11150

11200

11250

11300

11205'

92.29°

268.70°

6566.25'

4470.75'

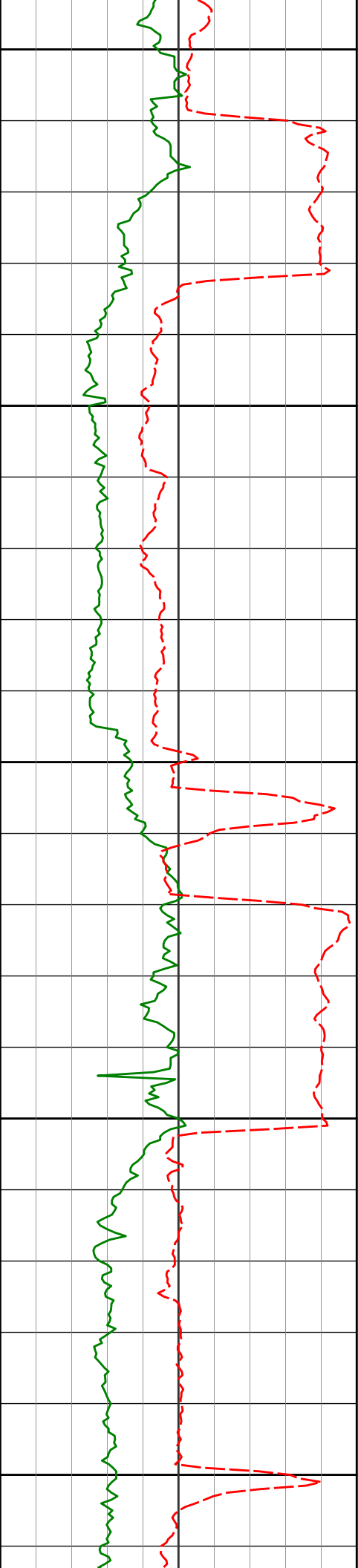
11300'

91.39°

268.81°

6563.20'

4565.38'



11350

11400

11450

11500

11550

11394'

91.02°

267.88°

6561.23'

4658.99'

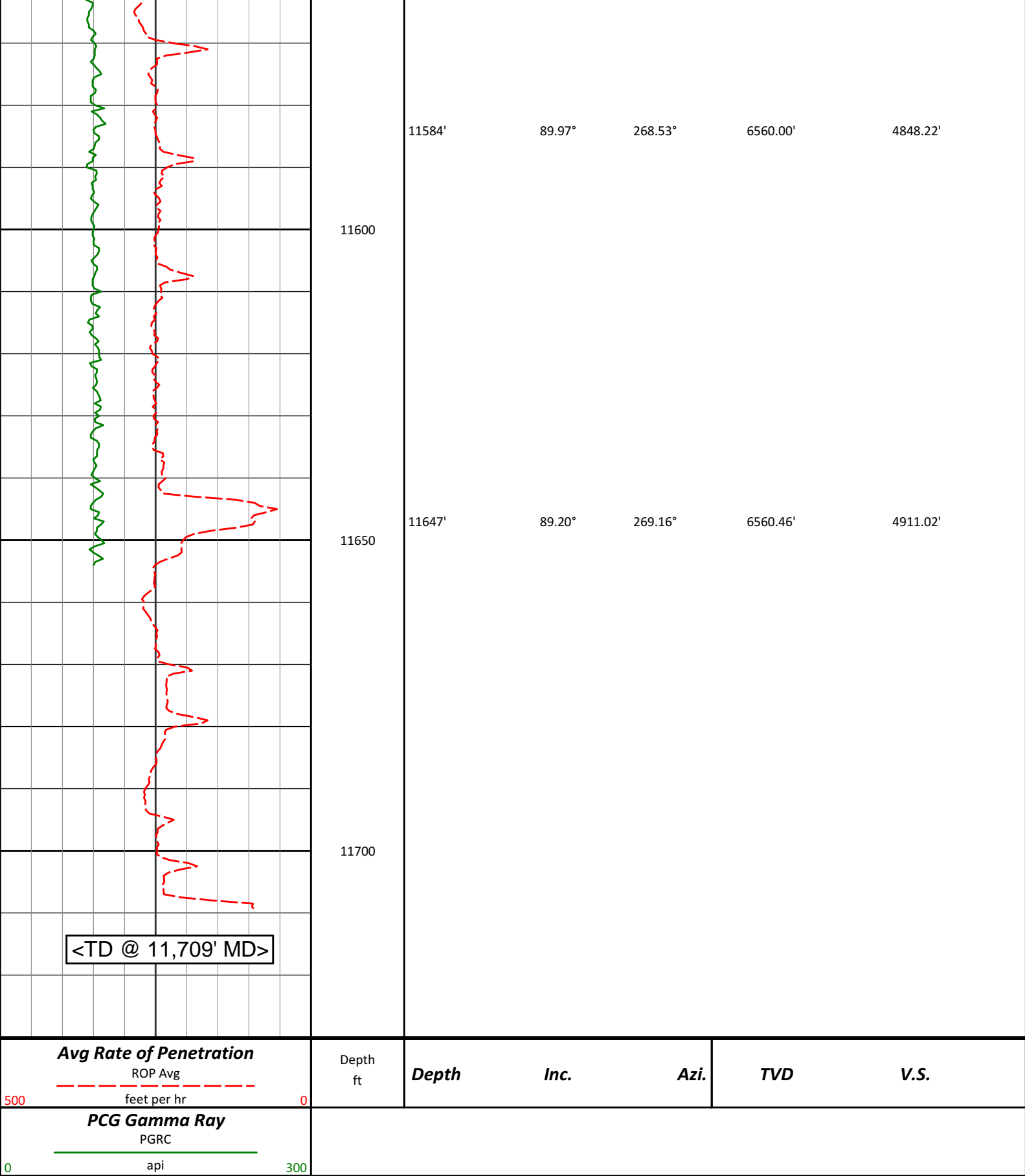
11489'

90.25°

268.47°

6560.18'

4753.58'



HALLIBURTON

Wattenberg Weld Colorado USA CA-XX-0900775413							
Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
306.00	1.30	287.01	305.97	1.02 N	3.32 W	3.37	0.42
605.00	0.30	172.31	604.95	1.23 N	6.46 W	6.52	0.49
720.00	0.13	120.97	719.95	0.87 N	6.31 W	6.35	0.21
812.00	0.31	162.50	811.95	0.58 N	6.15 W	6.17	0.25
904.00	0.20	193.01	903.95	0.19 N	6.11 W	6.11	0.19
996.00	0.07	188.68	995.95	0.02 S	6.15 W	6.14	0.14
1088.00	0.19	243.09	1087.95	0.15 S	6.30 W	6.28	0.18
1179.00	0.17	167.86	1178.95	0.35 S	6.41 W	6.38	0.25
1272.00	0.10	267.47	1271.95	0.49 S	6.46 W	6.42	0.23
1365.00	0.22	235.26	1364.95	0.60 S	6.69 W	6.64	0.16
1458.00	0.33	212.49	1457.94	0.93 S	6.98 W	6.91	0.17
1553.00	0.17	174.70	1552.94	1.31 S	7.11 W	7.02	0.23
1648.00	0.18	288.39	1647.94	1.40 S	7.24 W	7.14	0.31
1743.00	0.47	286.29	1742.94	1.25 S	7.76 W	7.67	0.31
1838.00	0.64	229.42	1837.94	1.48 S	8.53 W	8.43	0.58
1932.00	0.68	170.30	1931.93	2.37 S	8.84 W	8.68	0.69
2027.00	1.69	79.28	2026.92	2.67 S	7.36 W	7.19	1.93
2122.00	3.45	54.43	2121.82	0.74 S	3.66 W	3.61	2.15
2217.00	5.23	53.37	2216.54	3.51 N	2.14 E	-1.93	1.87
2312.00	7.83	58.32	2310.92	9.49 N	11.13 E	-10.54	2.80
2407.00	9.54	55.47	2404.83	17.35 N	23.12 E	-22.04	1.86
2502.00	10.70	50.97	2498.35	27.37 N	36.46 E	-34.75	1.47
2597.00	12.20	53.72	2591.46	38.87 N	51.41 E	-48.98	1.69
2692.00	13.54	47.32	2684.07	52.34 N	67.68 E	-64.41	2.05
2787.00	13.42	51.12	2776.46	66.80 N	84.44 E	-80.26	0.94
2881.00	14.12	44.76	2867.76	81.79 N	101.00 E	-95.90	1.77
2976.00	14.63	43.53	2959.79	98.71 N	117.42 E	-111.27	0.62
3071.00	14.41	48.13	3051.76	115.30 N	134.48 E	-127.30	1.23
3166.00	14.69	50.70	3143.71	130.81 N	152.60 E	-144.45	0.74
3261.00	15.47	45.66	3235.44	147.30 N	170.99 E	-161.81	1.61
3356.00	12.25	47.59	3327.67	162.95 N	187.49 E	-177.35	3.43
3451.00	13.62	48.45	3420.25	177.17 N	203.31 E	-192.28	1.46
3546.00	15.85	46.21	3512.13	193.57 N	221.04 E	-209.00	2.43
3641.00	14.66	43.44	3603.78	211.28 N	238.68 E	-225.53	1.47
3736.00	13.47	39.39	3695.93	228.56 N	253.97 E	-239.76	1.63
3830.00	12.69	40.92	3787.49	244.82 N	267.68 E	-252.47	0.91
3925.00	11.32	40.66	3880.41	259.78 N	280.59 E	-264.45	1.45
4020.00	10.87	52.05	3973.65	272.36 N	293.73 E	-276.81	2.35
4115.00	11.57	53.07	4066.83	283.59 N	308.41 E	-290.78	0.77
4210.00	9.15	53.93	4160.27	293.76 N	322.13 E	-303.87	2.56
4305.00	10.45	52.87	4253.89	303.41 N	335.10 E	-316.24	1.39
4400.00	9.72	50.78	4347.42	313.68 N	348.18 E	-328.68	0.86
4495.00	7.64	51.08	4441.33	322.72 N	359.31 E	-339.24	2.19
4590.00	6.97	48.47	4535.55	330.50 N	368.54 E	-347.98	0.79
4685.00	4.47	47.11	4630.07	336.85 N	375.56 E	-354.61	2.63
4779.00	4.15	68.38	4723.81	340.59 N	381.41 E	-360.22	1.72
4874.00	1.51	83.71	4818.69	342.00 N	385.85 E	-364.57	2.86
5159.00	0.94	35.52	5103.63	344.32 N	390.95 E	-369.52	0.40
5443.00	1.48	27.00	5387.57	349.50 N	393.98 E	-372.23	0.20
5728.00	0.47	79.30	5672.53	353.00 N	396.79 E	-374.83	0.44
5886.00	0.36	212.56	5830.52	352.70 N	397.16 E	-375.21	0.48
5933.00	0.38	220.14	5877.52	352.46 N	396.98 E	-375.05	0.11
6057.00	7.16	277.89	6001.19	353.21 N	389.06 E	-367.10	5.62
6104.00	10.53	278.40	6047.63	354.24 N	381.91 E	-359.90	7.17
6152.00	14.63	279.58	6094.46	355.89 N	371.59 E	-349.50	8.56
6198.00	17.66	275.85	6138.65	357.57 N	358.92 E	-336.75	6.97
6246.00	21.78	275.35	6183.82	359.15 N	342.80 E	-320.57	8.58
6293.00	26.04	274.20	6226.78	360.71 N	323.82 E	-301.53	9.11
6341.00	29.85	274.39	6269.17	362.40 N	301.40 E	-279.04	7.94
6388.00	35.25	271.19	6308.78	363.58 N	276.16 E	-253.78	12.06
6436.00	43.26	269.76	6345.92	363.80 N	245.81 E	-223.47	16.79
6483.00	49.42	271.10	6378.35	364.07 N	211.82 E	-189.53	13.26
6531.00	50.40	270.43	6409.26	364.56 N	175.11 E	-152.85	2.31

6578.00	52.92	268.82	6438.41	364.31 N	138.25 E	-116.07	5.99
6626.00	57.19	268.26	6465.90	363.30 N	98.92 E	-76.88	8.95
6673.00	61.75	267.06	6489.77	361.64 N	58.48 E	-36.62	9.95
6721.00	66.74	265.82	6510.62	358.95 N	15.35 E	6.28	10.65
6768.00	71.39	265.69	6527.41	355.70 N	28.41 W	49.77	9.90
6816.00	75.76	267.58	6540.98	353.00 N	74.36 W	95.47	9.86
6863.00	78.38	267.74	6551.49	351.13 N	120.13 W	141.04	5.58
6919.00	83.58	267.94	6560.27	349.05 N	175.38 W	196.07	9.29
7034.00	89.14	268.90	6567.57	345.89 N	290.06 W	310.35	4.90
7127.00	88.06	268.43	6569.85	343.73 N	383.00 W	402.99	1.27
7219.00	89.23	268.12	6572.03	340.97 N	474.93 W	494.59	1.32
7314.00	91.26	268.28	6571.62	337.99 N	569.88 W	589.19	2.15
7409.00	91.32	268.85	6569.48	335.61 N	664.83 W	683.82	0.60
7504.00	91.76	268.95	6566.92	333.79 N	759.77 W	778.48	0.47
7599.00	90.99	268.55	6564.65	331.71 N	854.72 W	873.13	0.91
7693.00	90.00	268.02	6563.84	328.90 N	948.68 W	966.75	1.19
7788.00	89.88	268.82	6563.94	326.28 N	1043.64 W	1061.38	0.85
7883.00	89.20	270.29	6564.71	325.54 N	1138.63 W	1156.16	1.71
7978.00	89.29	269.96	6565.96	325.74 N	1233.62 W	1250.99	0.36
8073.00	89.04	269.46	6567.34	325.26 N	1328.61 W	1345.77	0.59
8168.00	90.06	270.20	6568.08	324.98 N	1423.60 W	1440.58	1.32
8263.00	88.58	270.09	6569.21	325.22 N	1518.59 W	1535.41	1.56
8358.00	88.67	270.50	6571.48	325.70 N	1613.57 W	1630.24	0.44
8453.00	88.61	270.37	6573.73	326.42 N	1708.54 W	1725.08	0.15
8548.00	90.22	270.55	6574.71	327.18 N	1803.52 W	1819.94	1.70
8643.00	90.31	270.39	6574.27	327.96 N	1898.52 W	1914.82	0.20
8737.00	90.96	270.28	6573.23	328.50 N	1992.51 W	2008.67	0.70
8832.00	91.76	270.00	6570.98	328.74 N	2087.48 W	2103.48	0.90
8927.00	91.60	269.74	6568.20	328.53 N	2182.44 W	2198.26	0.32
9022.00	90.25	269.53	6566.66	327.93 N	2277.43 W	2293.03	1.45
9117.00	90.49	268.74	6566.05	326.49 N	2372.41 W	2387.76	0.87
9212.00	91.45	269.05	6564.44	324.66 N	2467.38 W	2482.45	1.06
9307.00	90.65	269.02	6562.71	323.07 N	2562.35 W	2577.15	0.84
9402.00	89.69	269.32	6562.42	321.70 N	2657.34 W	2671.88	1.05
9496.00	89.97	269.85	6562.70	321.02 N	2751.34 W	2765.67	0.64
9591.00	88.76	269.33	6563.75	320.34 N	2846.33 W	2860.44	1.38
9686.00	88.92	269.75	6565.67	319.58 N	2941.30 W	2955.20	0.47
9781.00	88.89	269.81	6567.49	319.21 N	3036.28 W	3049.99	0.07
9876.00	89.82	271.11	6568.56	319.98 N	3131.27 W	3144.85	1.68
9971.00	90.46	270.88	6568.32	321.63 N	3226.26 W	3239.77	0.72
10066.00	90.00	270.41	6567.94	322.70 N	3321.25 W	3334.65	0.70
10161.00	89.81	269.98	6568.09	323.03 N	3416.25 W	3429.50	0.49
10255.00	90.40	270.48	6567.92	323.41 N	3510.25 W	3523.35	0.82
10350.00	91.36	272.34	6566.46	325.74 N	3605.20 W	3618.27	2.20
10445.00	91.45	272.69	6564.13	329.92 N	3700.08 W	3713.23	0.38
10540.00	90.68	270.40	6562.37	332.48 N	3795.02 W	3808.15	2.55
10635.00	88.86	268.54	6562.75	331.60 N	3890.01 W	3902.92	2.74
10730.00	88.61	268.66	6564.84	329.28 N	3984.96 W	3997.55	0.29
10825.00	88.55	268.77	6567.20	327.15 N	4079.91 W	4092.20	0.14
10920.00	89.20	268.46	6569.06	324.85 N	4174.86 W	4186.84	0.76
11015.00	90.00	268.42	6569.73	322.26 N	4269.82 W	4281.48	0.84
11110.00	90.96	268.62	6568.93	319.81 N	4364.79 W	4376.12	1.03
11205.00	92.29	268.70	6566.25	317.59 N	4459.72 W	4470.75	1.40
11300.00	91.39	268.81	6563.20	315.53 N	4554.65 W	4565.38	0.95
11394.00	91.02	267.88	6561.23	312.82 N	4648.59 W	4658.99	1.07
11489.00	90.25	268.47	6560.18	309.80 N	4743.53 W	4753.58	1.02
11584.00	89.97	268.53	6560.00	307.31 N	4838.50 W	4848.22	0.30
11647.00	89.20	269.16	6560.46	306.04 N	4901.48 W	4911.02	1.58
11709.00	89.20	269.16	6561.33	305.14 N	4963.47 W	4972.84	0.01

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 273.45 DEGREES (GRID)
A TOTAL CORRECTION OF 7.81 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.

HORIZONTAL DISPLACEMENT(CLOSURE) AT 11709.00 FEET
IS 4972.84 FEET ALONG 273.52 DEGREES (GRID)

Surface surveys at 306 ft and 605 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 11647 ft MD to TD at 11709 ft MD.

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