

PCGC : Pressure Case Gamma
PCDC: Pressure Case Directional



1 : 600 / 1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	03-Aug-13	04-Aug-13	08-Aug-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)	650.00	6,162.00	7,157.00		
Log End Depth (MD, ft)	6,162.00	7,157.00	10,337.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	02-Aug-13 02:05	03-Aug-13 05:15	05-Aug-13 07:30		
Drill/Wipe End Date and Time	02-Aug-13 19:45	03-Aug-13 21:00	06-Aug-13 16:30		
Min Inc (deg) @ Depth (MD, ft)	.22 @ 715.00	7.90 @ 6,251.00	84.88 @ 7,191.00		
Max Inc (deg) @ Depth (MD, ft)	16.88 @ 3,641.00	78.95 @ 7,103.00	93.35 @ 8,647.00		
Bit TFA(in2) / Bit Type	.75 / PDC	.75 / PDC	.55 / PDC		
Flow Rate (gpm)	595.12	600.00	285.49		
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	9.00 / 30.00	10.50 / 36.00	9.15 / 33.00		
Filtrate CL (ppm)	1,700.00	1,400.00	1,500.00		
pH / Fluid Loss (mptm)	9.40 / 0	9.20 / 8	8.90 / 6		
PV (cP) / YP (lbf2)	4 / 3.00	10 / 10.00	6 / 6.00		
% Solids / % Sand	4.1 / 0.25	11.2 / 0.25	4.7 / 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	122.00 / 100 ft	175.00 / 100 ft	200.00 / 100 ft		

Max Tool Temp (degF) / Source	162.80 / PCM	175.21 / PCM	230.30 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Paul Kock	Henry Schmeidler	Henry Schmeidler		
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	11382329	11382329	11675620		
Insert Serial Number	11400994	11400994	11680796		
Date and Time Initialized	01-Aug-13 15:12	01-Aug-13 15:12	04-Aug-13 15:28		
Date and Time Read	04-Aug-13 02:39	04-Aug-13 02:45	07-Aug-13 16:45		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	54.13	52.37	59.79		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11382329	11382329	11675620		
Sonde Serial Number	11297515	11297515	10993462		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	295.13	64.44	247.83		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.13	47.37	54.81		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11382329	11382329	11675620		
Insert/Sonde Serial Number	11681023	11681023	11681024		

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 7.4.2
6. End of Run 200. Gap between build and lateral sections is due to Gamma sensor measure point to bit distance during the build run. Last Gamma datapoint is at 7111 ft MD. Gamma cannot be measured accurately within cased hole, and collection resumes after drilling through cement at 7158 ft MD.

WARRANTY

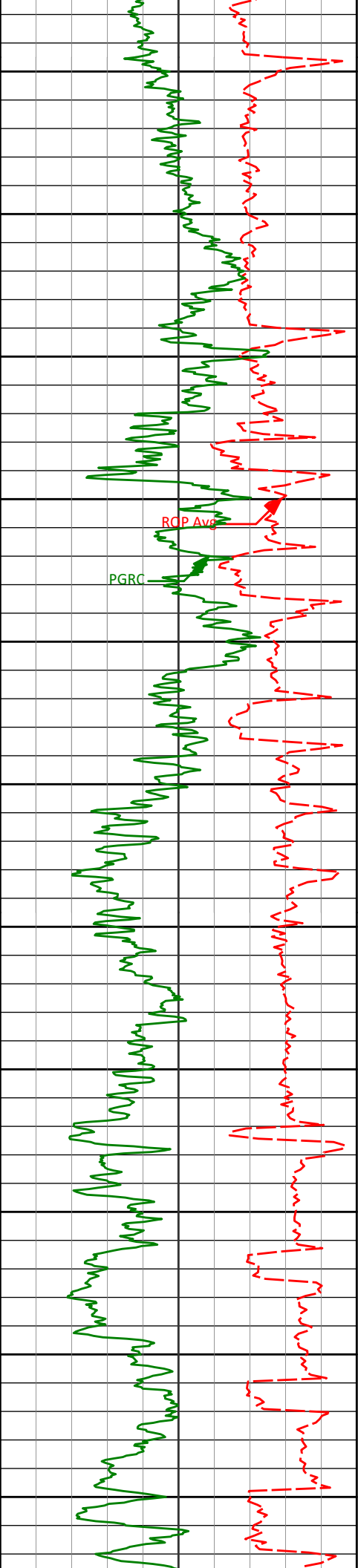
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HALLIBURTON
Sperry Drilling Services

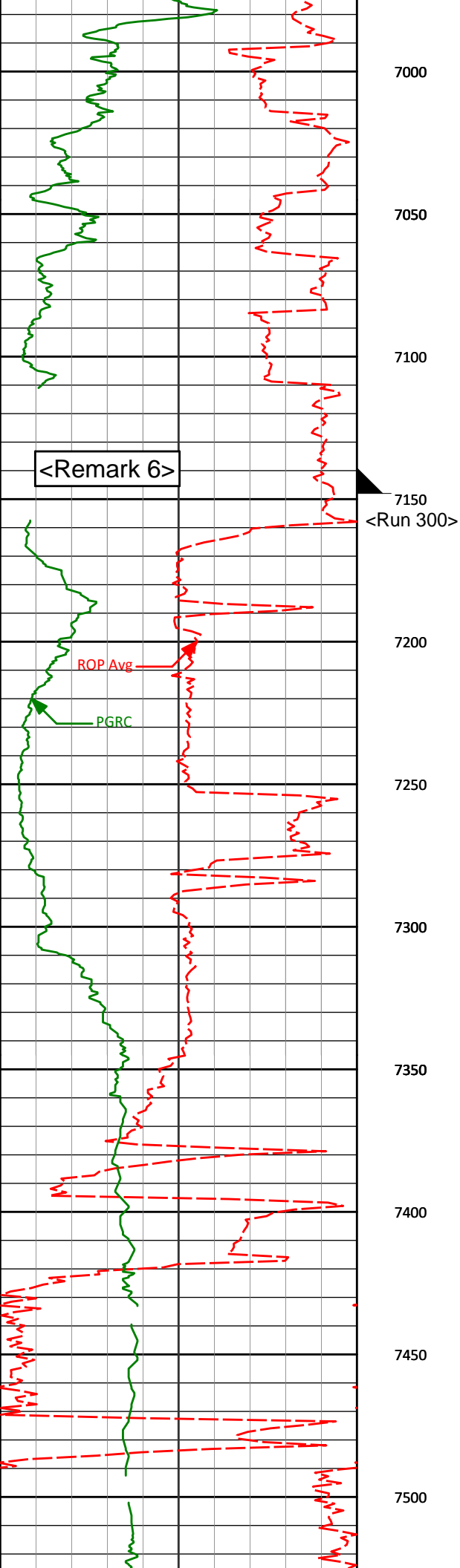
MD Main Log 1:600

Noble Energy, Inc
Lonewolf B02-65HC
H&P 315
T5N R64W

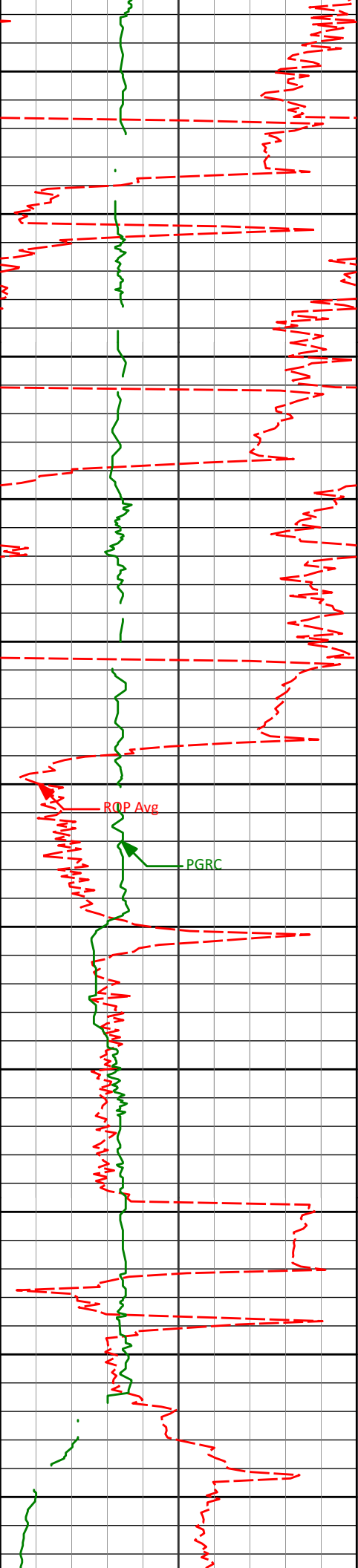




6450	6441'	22.65°	83.85°	6374.75'	258.41'
6500	6488'	26.96°	83.32°	6417.40'	278.11'
6550	6536'	32.30°	86.32°	6459.12'	301.80'
6600	6583'	35.67°	88.43°	6498.09'	327.96'
6650	6631'	38.00°	89.39°	6536.50'	356.53'
6700	6677'	41.28°	89.65°	6571.92'	385.64'
6750	6725'	45.63°	90.42°	6606.75'	418.35'
6800	6772'	50.97°	90.47°	6638.01'	453.07'
6850	6820'	56.48°	90.91°	6666.40'	491.33'
6900	6867'	61.13°	90.06°	6690.74'	531.12'
6950	6915'	65.80°	90.69°	6712.18'	573.62'
	6962'	69.19°	91.32°	6730.17'	616.53'



<7" casing set at 7150' MD>				
All Gamma below is real time only				
7010'	72.51°	91.23°	6745.91'	661.31'
7057'	75.94°	89.95°	6758.69'	706.06'
7103'	78.95°	89.71°	6768.68'	750.56'
7191'	84.88°	88.84°	6781.06'	837.00'
7318'	87.91°	89.55°	6789.05'	962.81'
7413'	89.41°	88.71°	6791.27'	1057.10'
7508'	91.17°	88.33°	6790.79'	1151.53'



7550

7600

7650

7700

7750

7800

7850

7900

7950

8000

8050

7603'

89.85°

88.03°

6789.95'

1246.02'

7697'

89.57°

88.55°

6790.43'

1339.51'

7792'

90.31°

90.55°

6790.53'

1433.74'

7887'

89.78°

89.11°

6790.45'

1527.91'

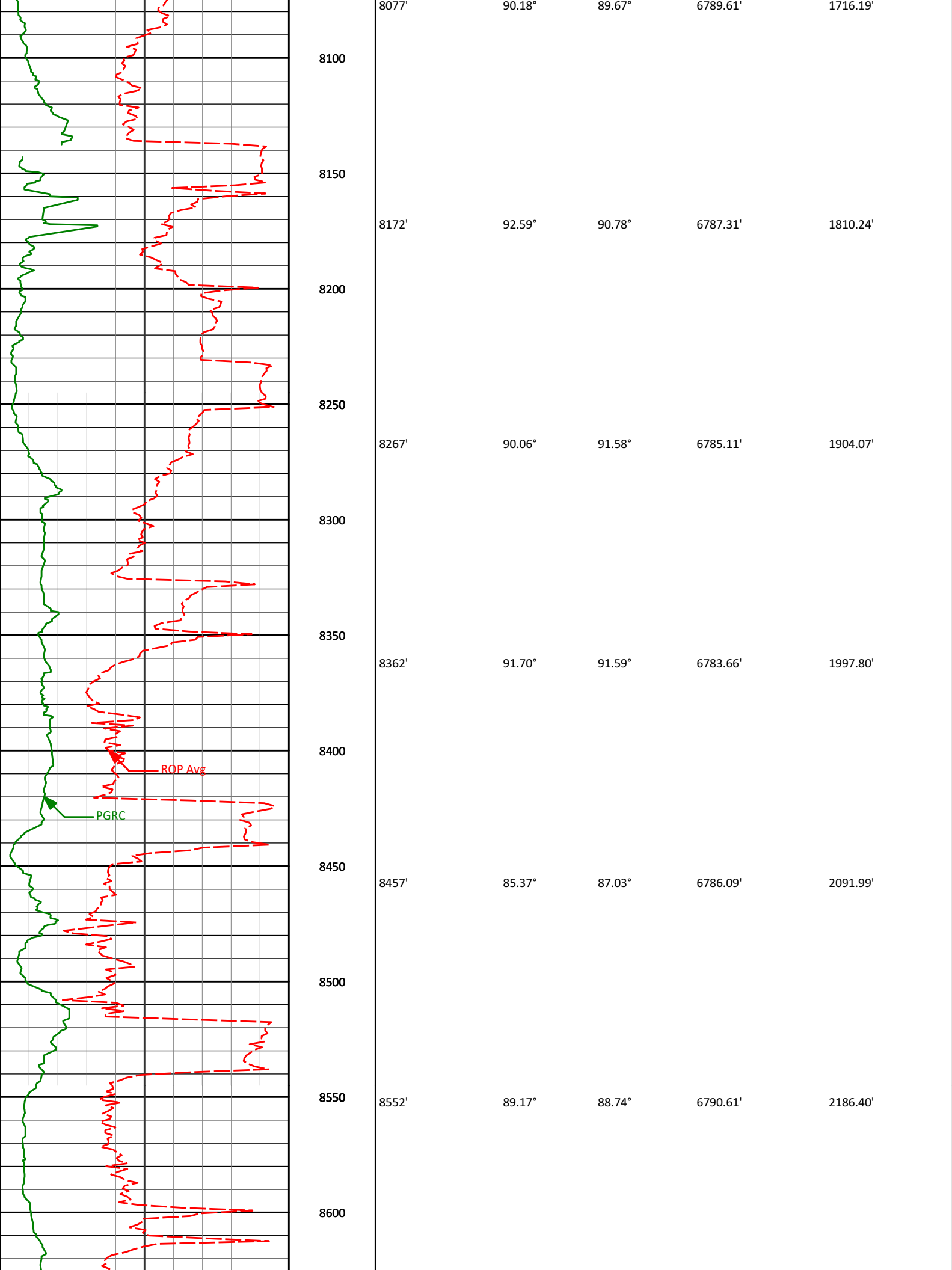
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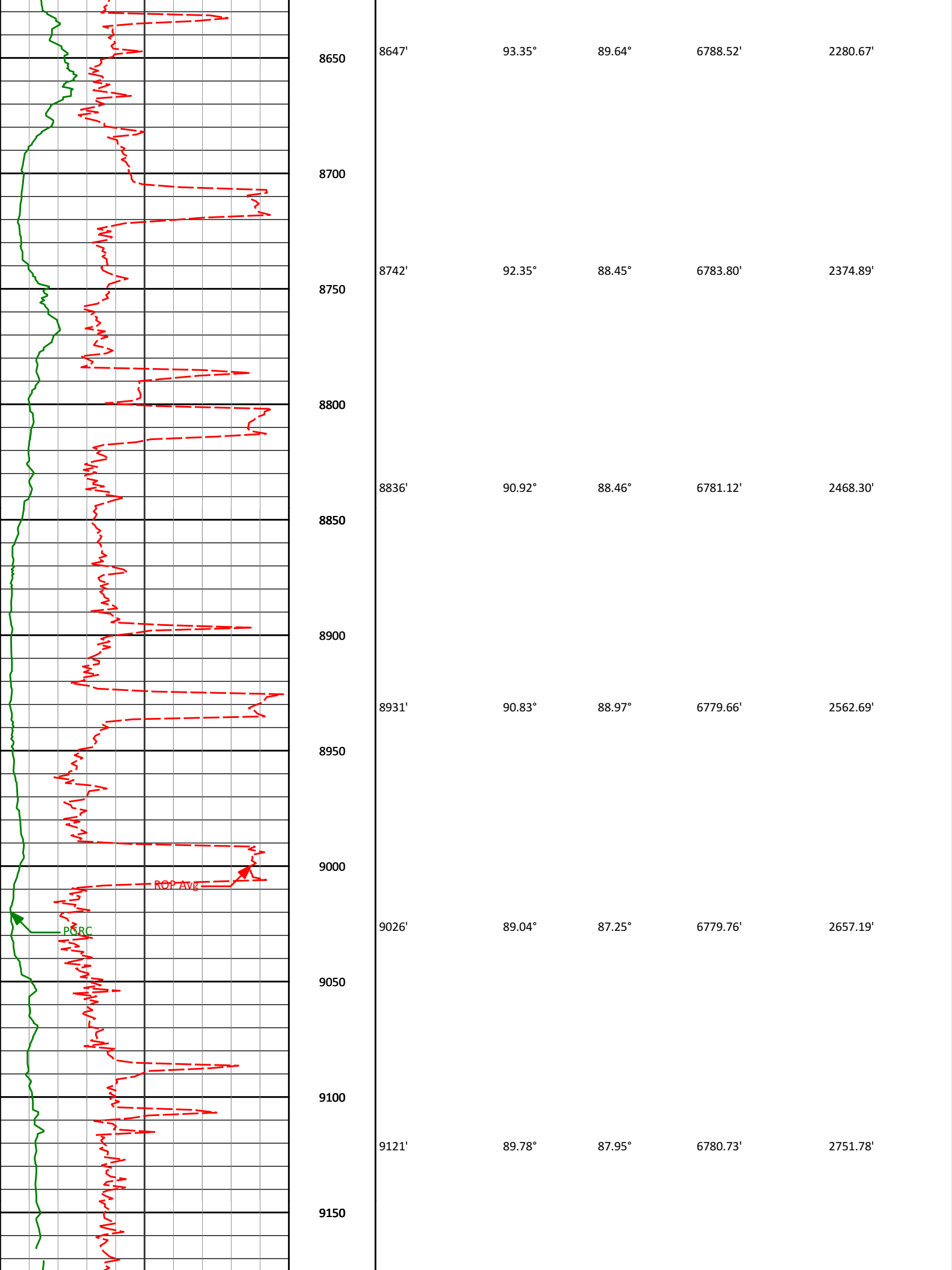
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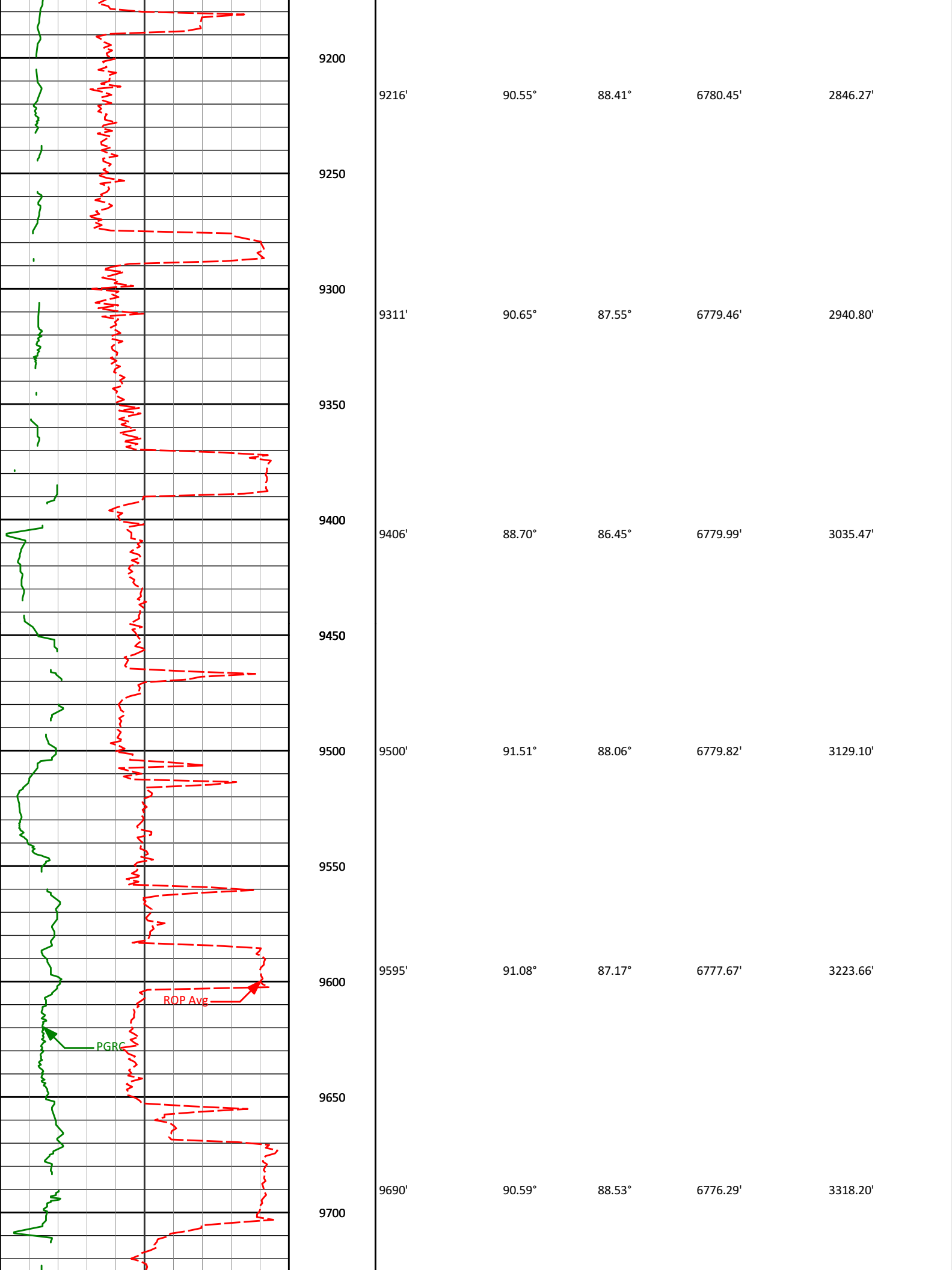
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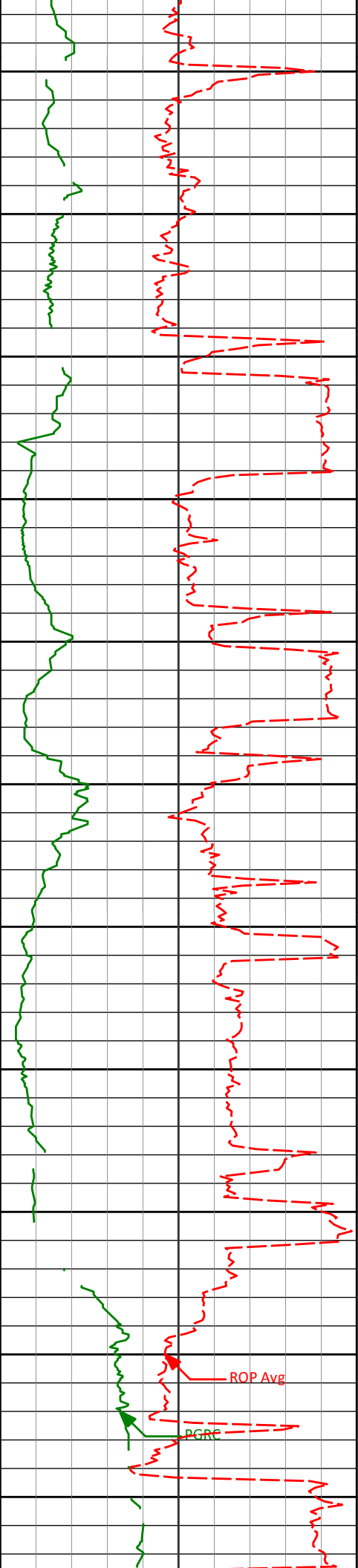
6790.20'

1622.08'









9750

9785'

90.74°

88.83°

6775.19'

3412.60'

9800

9850

9880'

90.25°

90.32°

6774.38'

3506.83'

9900

9950

9975'

87.41°

91.28°

6776.32'

3600.75'

10000

10050

10070'

88.31°

90.84°

6779.86'

3694.57'

10100

10150

10165'

86.95°

91.25°

6783.79'

3788.38'

10200

ROP Avg

PGRC

10250

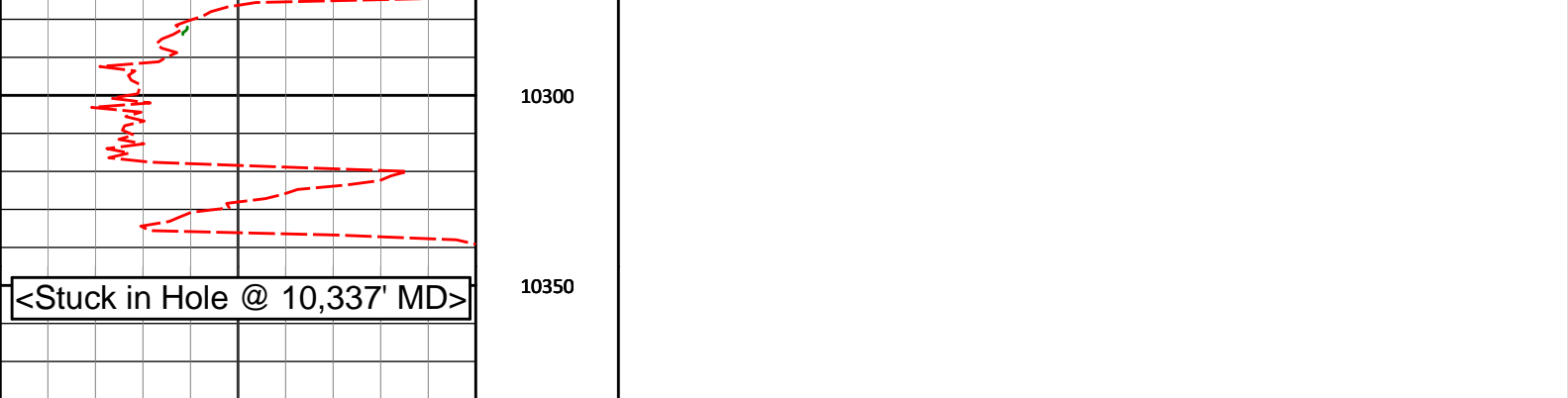
10260'

87.16°

90.48°

6788.68'

3882.19'



Avg Rate of Penetration ROP Avg feet per hr	Depth ft	Depth	Inc.	Azi.	TVD	V.S.
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PCG Gamma Ray PGRC api	
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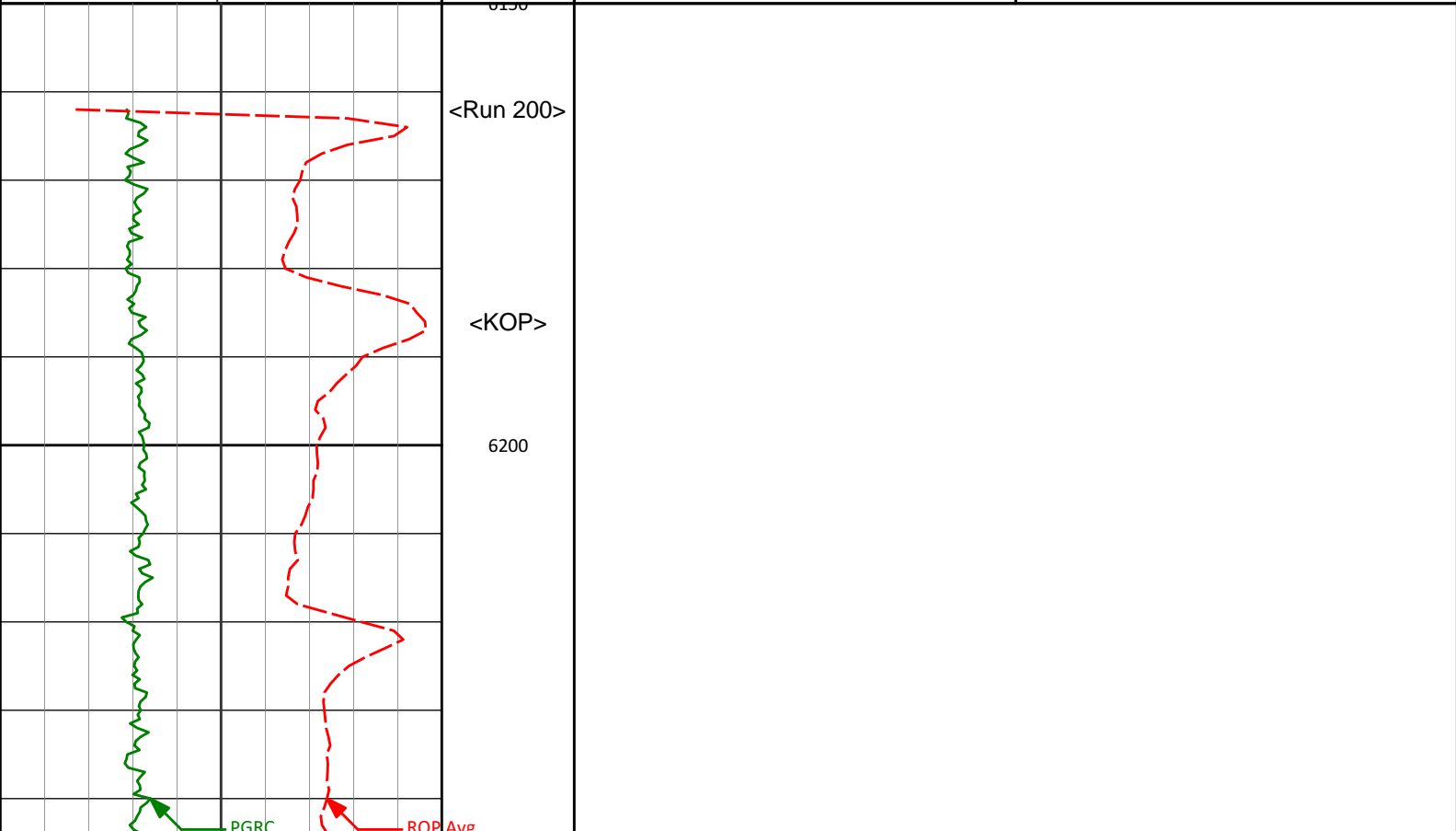
Sperry Drilling Services

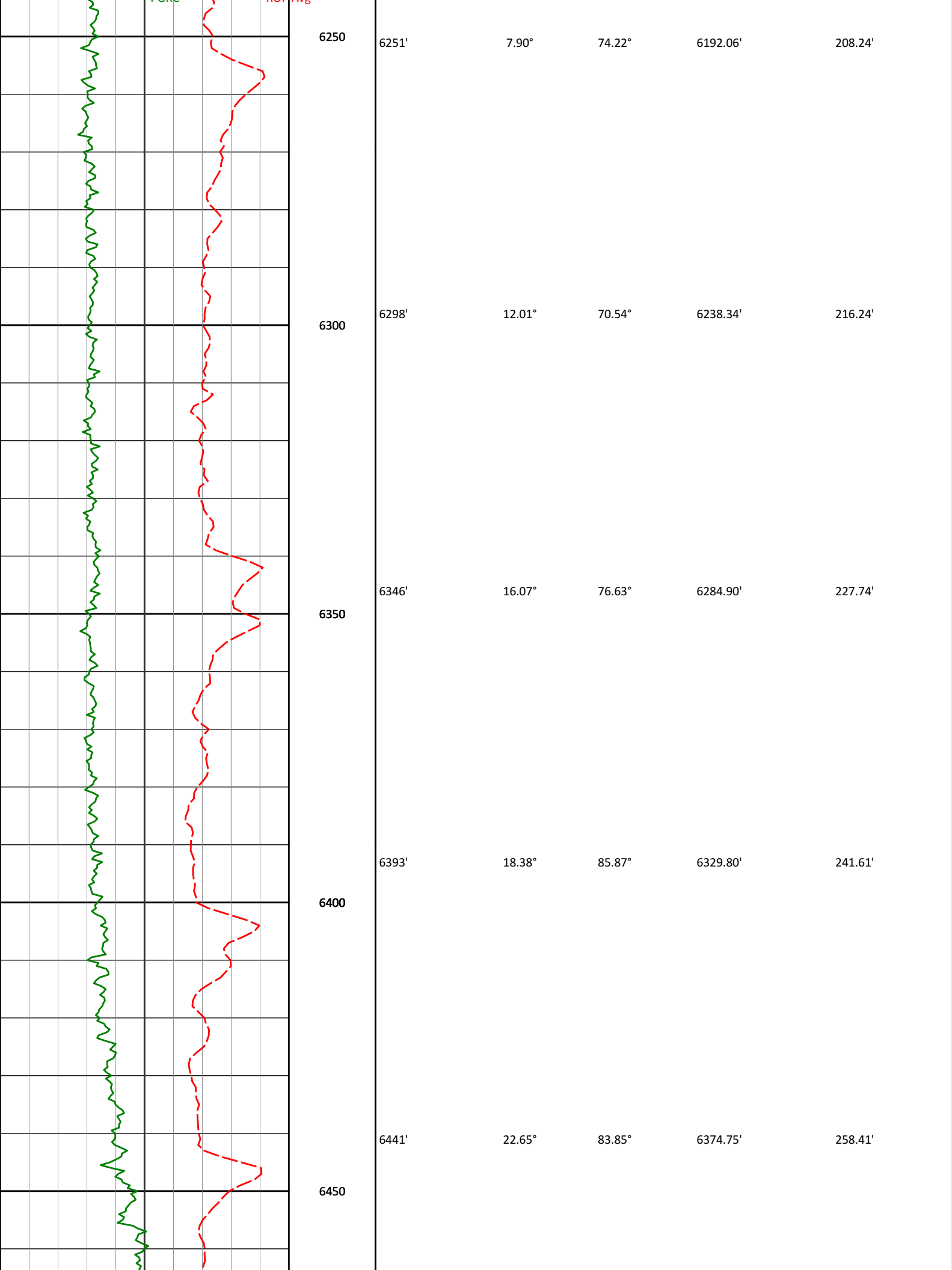
MD Detail Log 1:240

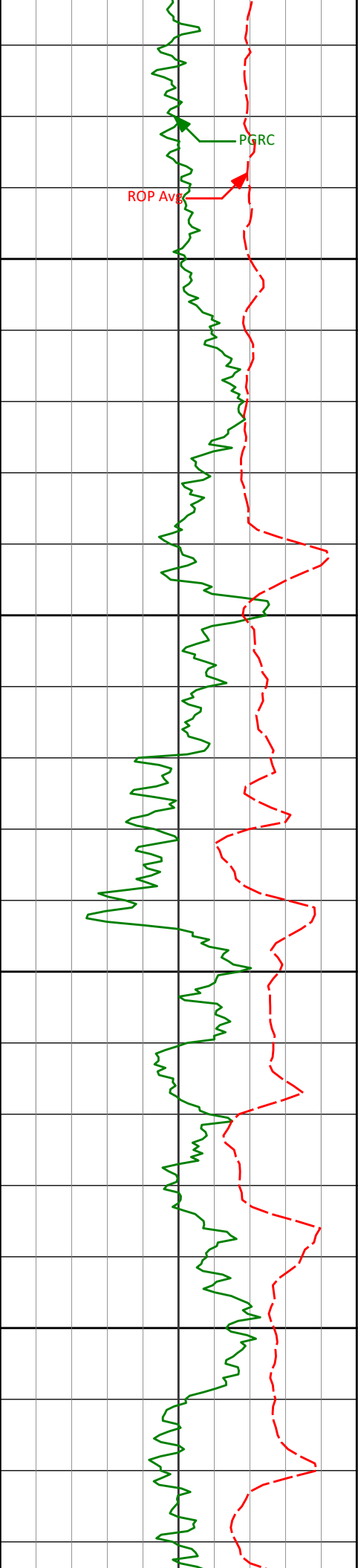
Noble Energy, Inc
Lonewolf B02-65HC
H&P 315
T5N R64W

PCG Gamma Ray PGRC api	
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Avg Rate of Penetration ROP Avg feet per hr	Depth ft	Depth	Inc.	Azi.	TVD	V.S.
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6500

6550

6600

6650

6488'

26.96°

83.32°

6417.40'

278.11'

6536'

32.30°

86.32°

6459.12'

301.80'

6583'

35.67°

88.43°

6498.09'

327.96'

6631'

38.00°

89.39°

6536.50'

356.53'

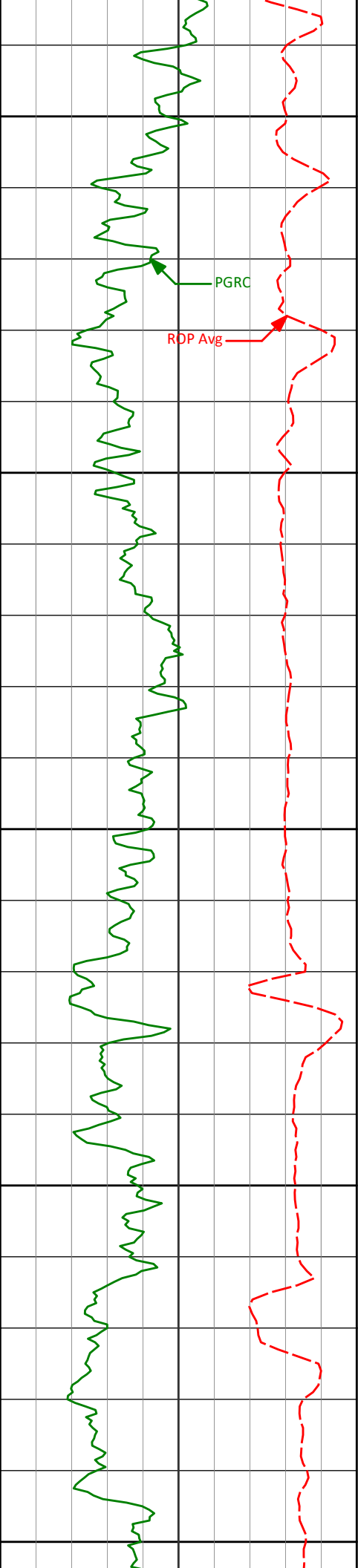
6677'

41.28°

89.65°

6571.92'

385.64'



6700

6725'

45.63°

90.42°

6606.75'

418.35'

6750

6772'

50.97°

90.47°

6638.01'

453.07'

6800

6820'

56.48°

90.91°

6666.40'

491.33'

6850

6867'

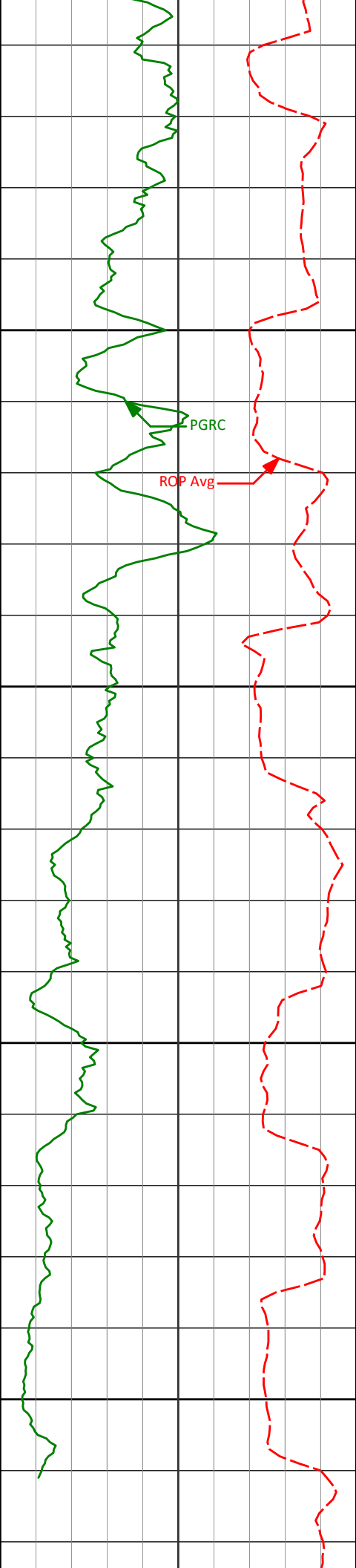
61.13°

90.06°

6690.74'

531.12'

6900



6950

7000

7050

7100

6915'

65.80°

90.69°

6712.18'

573.62'

6962'

69.19°

91.32°

6730.17'

616.53'

7010'

72.51°

91.23°

6745.91'

661.31'

7057'

75.94°

89.95°

6758.69'

706.06'

7103'

78.95°

89.71°

6768.68'

750.56'

<Remark 6>

7150

<7" casing set at 7150' MD>

All Gamma below is real time only

<Run 300>

7191'

84.88°

88.84°

6781.06'

837.00'

7200

PGRC

ROP Avg

7250

7300

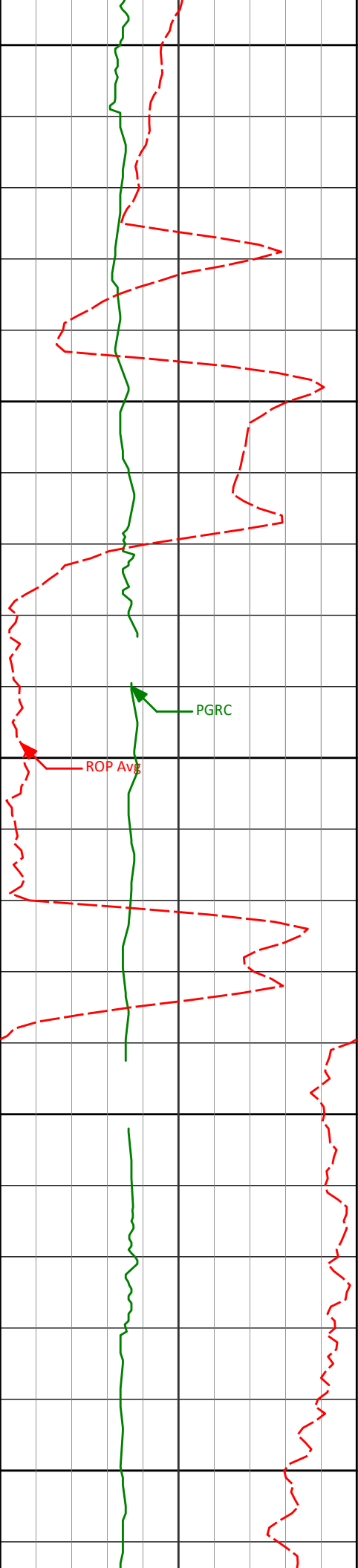
7318'

87.91°

89.55°

6789.05'

962.81'



7350

7400

7450

7500

7550

7413'

89.41°

88.71°

6791.27'

1057.10'

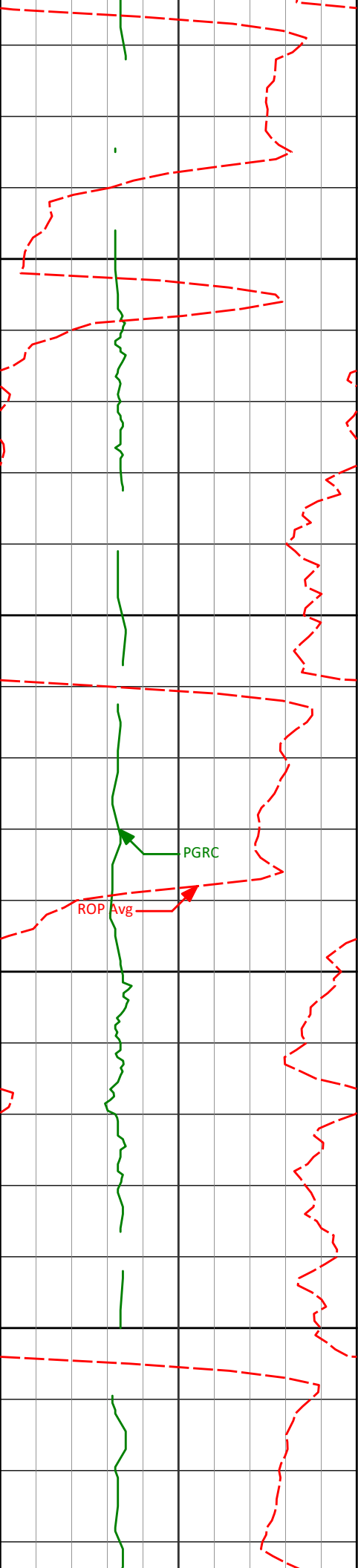
7508'

91.17°

88.33°

6790.79'

1151.53'



7600

7603'

89.85°

88.03°

6789.95'

1246.02'

7650

7700

7697'

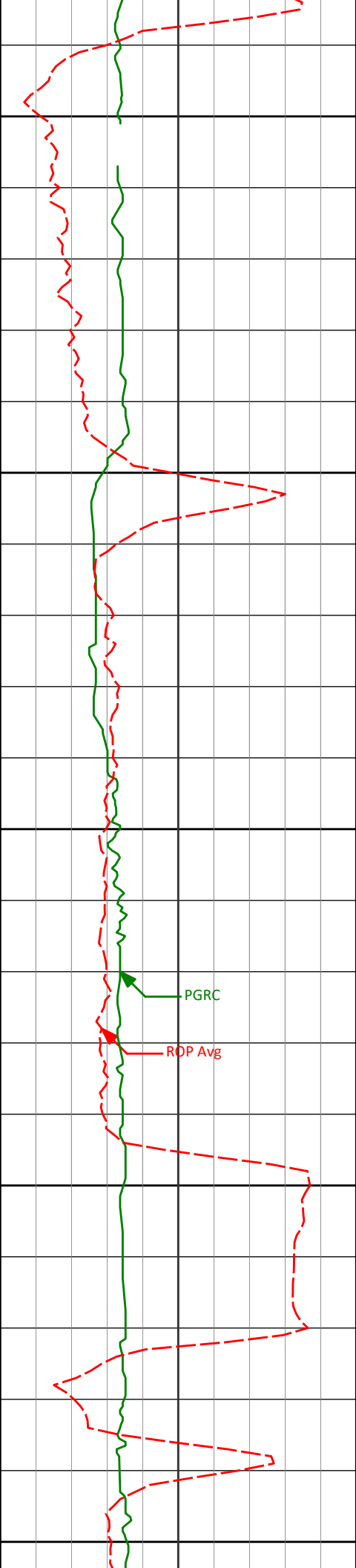
89.57°

88.55°

6790.43'

1339.51'

7750



7800

7850

7900

7950

8000

7792'

90.31°

90.55°

6790.53'

1433.74'

7887'

89.78°

89.11°

6790.45'

1527.91'

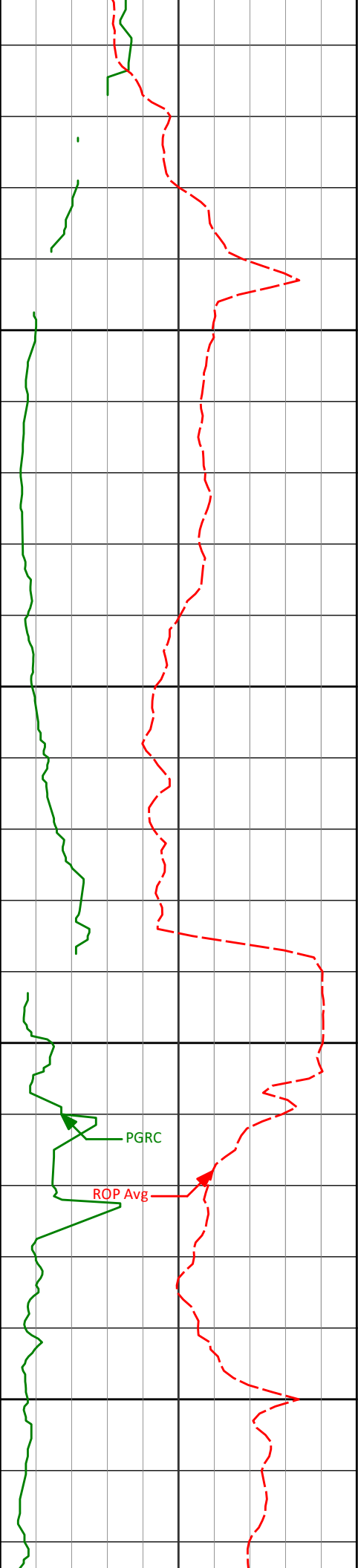
7982'

90.52°

90.56°

6790.20'

1622.08'



8050

8077'

90.18°

89.67°

6789.61'

1716.19'

8100

8150

PGRC

ROP Avg

8172'

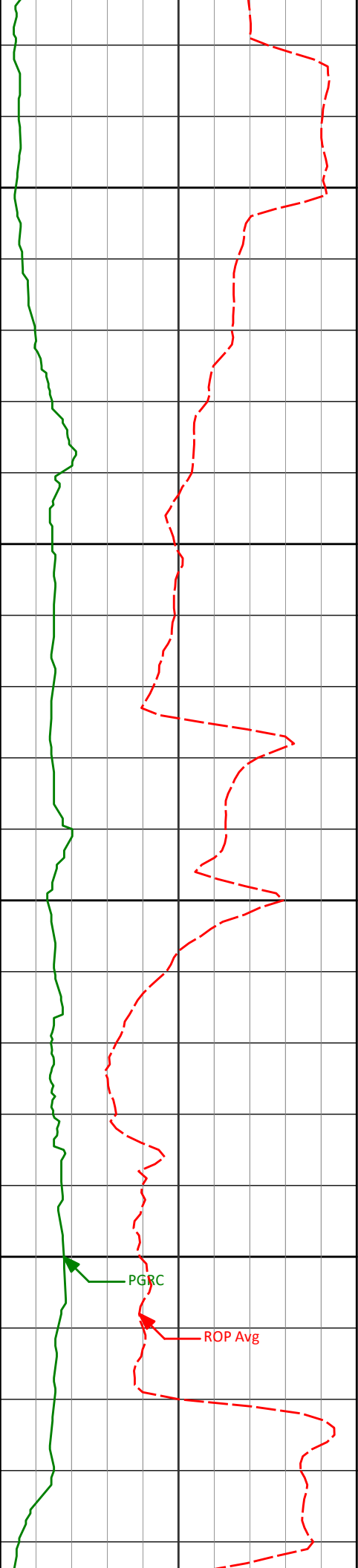
92.59°

90.78°

6787.31'

1810.24'

8200



8250

8267'

90.06°

91.58°

6785.11'

1904.07'

8300

8350

8362'

91.70°

91.59°

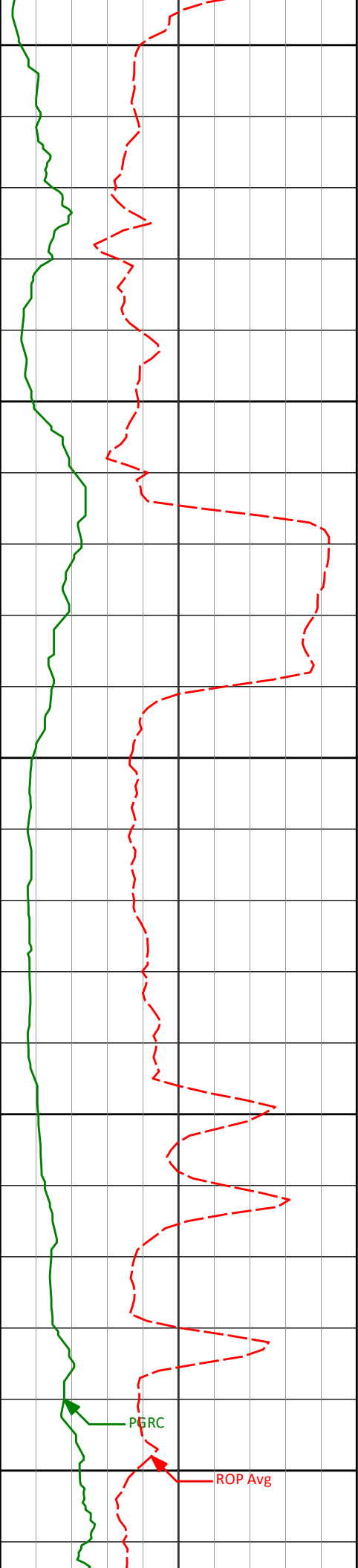
6783.66'

1997.80'

8400

PGRC

ROP Avg



8450

8457' 85.37° 87.03° 6786.09' 2091.99'

8500

8550

8552' 89.17° 88.74° 6790.61' 2186.40'

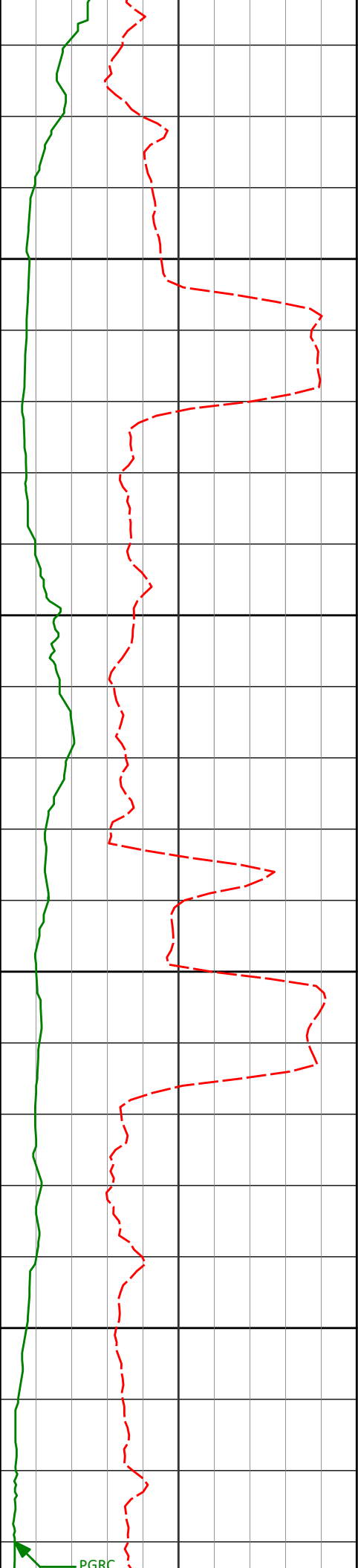
8600

8650

8647' 93.35° 89.64° 6788.52' 2280.67'

PGRC

ROP Avg



8700

8750

8800

8850

8742'

92.35°

88.45°

6783.80'

2374.89'

8836'

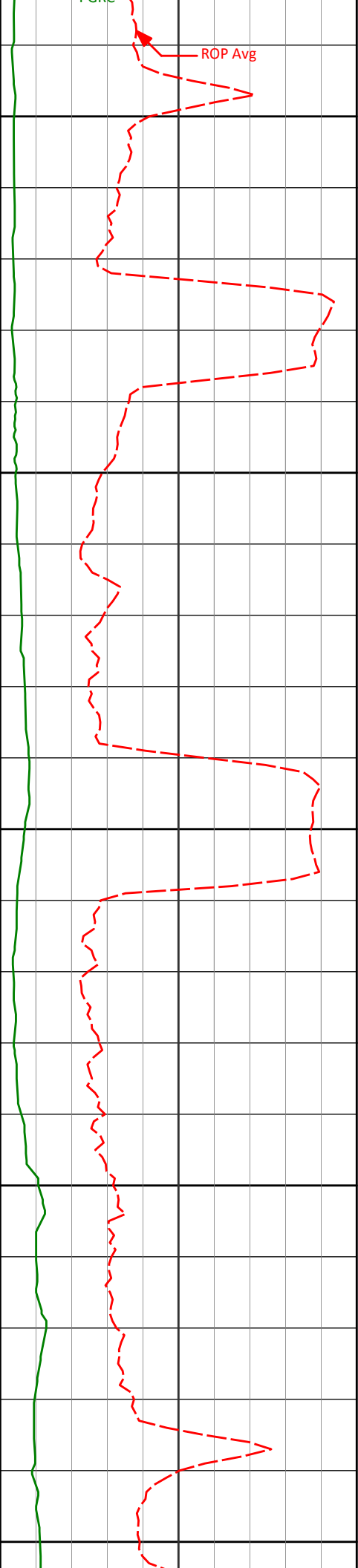
90.92°

88.46°

6781.12'

2468.30'

PGRC



8900

8950

9000

9050

9100

8931'

90.83°

88.97°

6779.66'

2562.69'

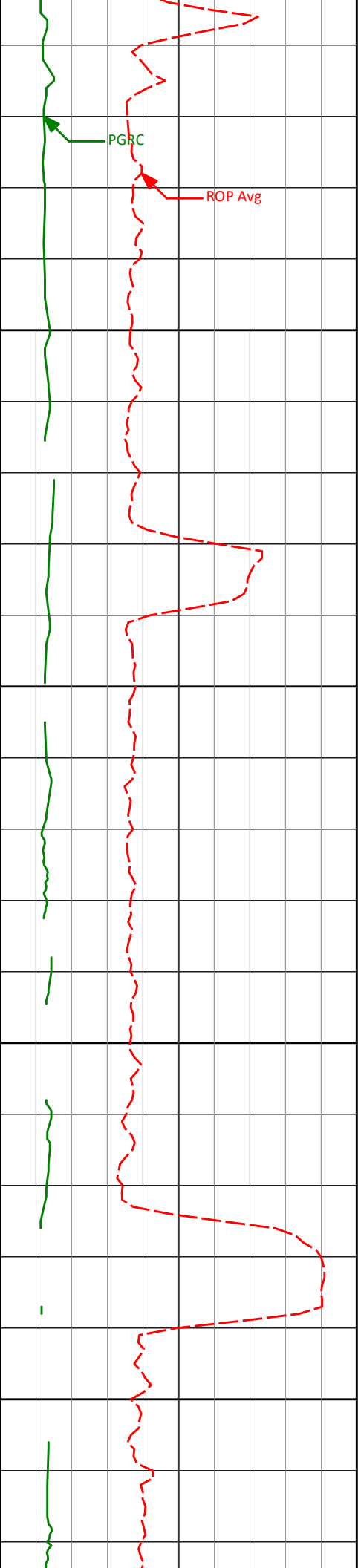
9026'

89.04°

87.25°

6779.76'

2657.19'



9150

9200

9250

9300

9121'

89.78°

87.95°

6780.73'

2751.78'

9216'

90.55°

88.41°

6780.45'

2846.27'

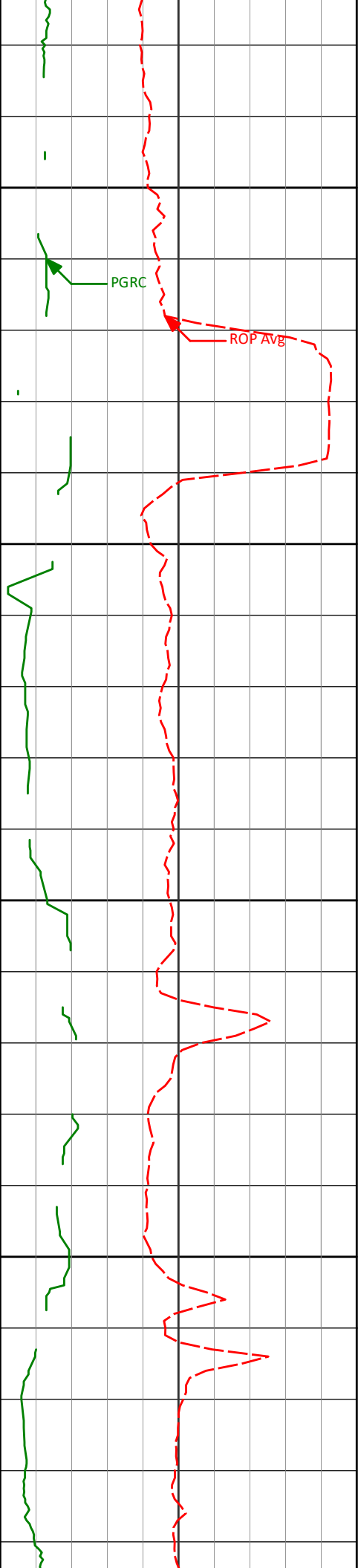
9311'

90.65°

87.55°

6779.46'

2940.80'



9350

9400

9450

9500

9406'

88.70°

86.45°

6779.99'

3035.47'

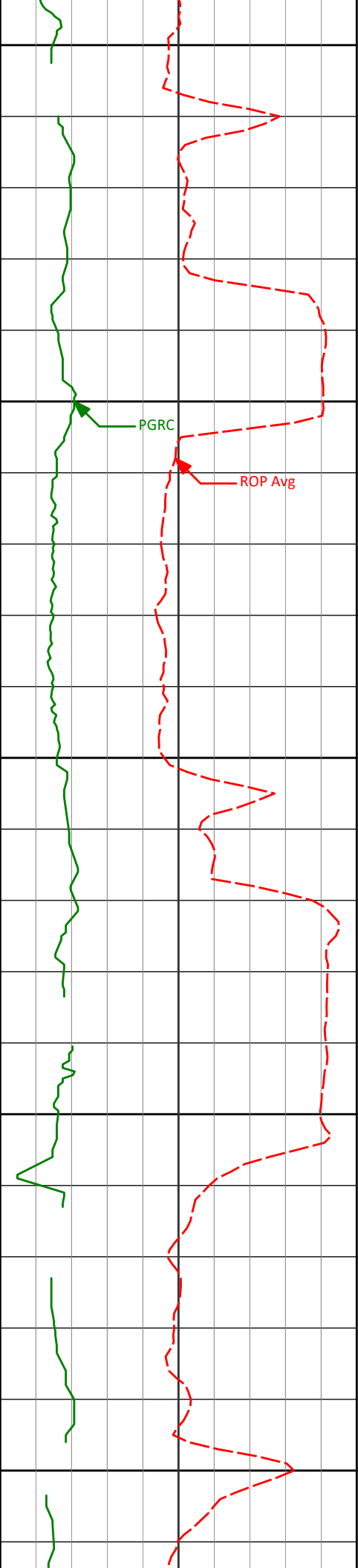
9500'

91.51°

88.06°

6779.82'

3129.10'



9550

9600

9650

9700

9750

9595'

91.08°

87.17°

6777.67'

3223.66'

9690'

90.59°

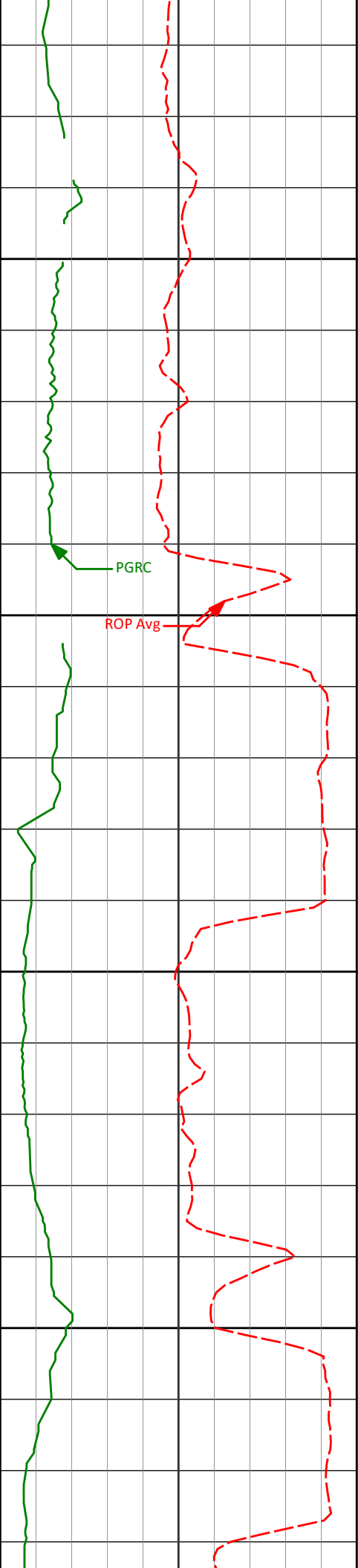
88.53°

6776.29'

3318.20'

PGRC

ROP Avg



9800

9850

9900

9950

9785'

90.74°

88.83°

6775.19'

3412.60'

9880'

90.25°

90.32°

6774.38'

3506.83'

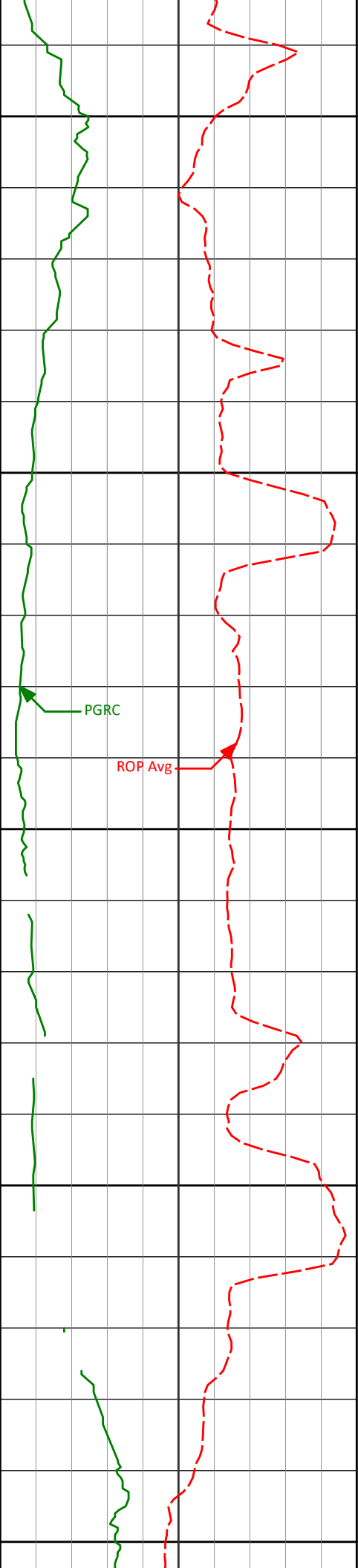
9975'

87.41°

91.28°

6776.32'

3600.75'



10000

10050

10100

10150

10200

10070'

88.31°

90.84°

6779.86'

3694.57'

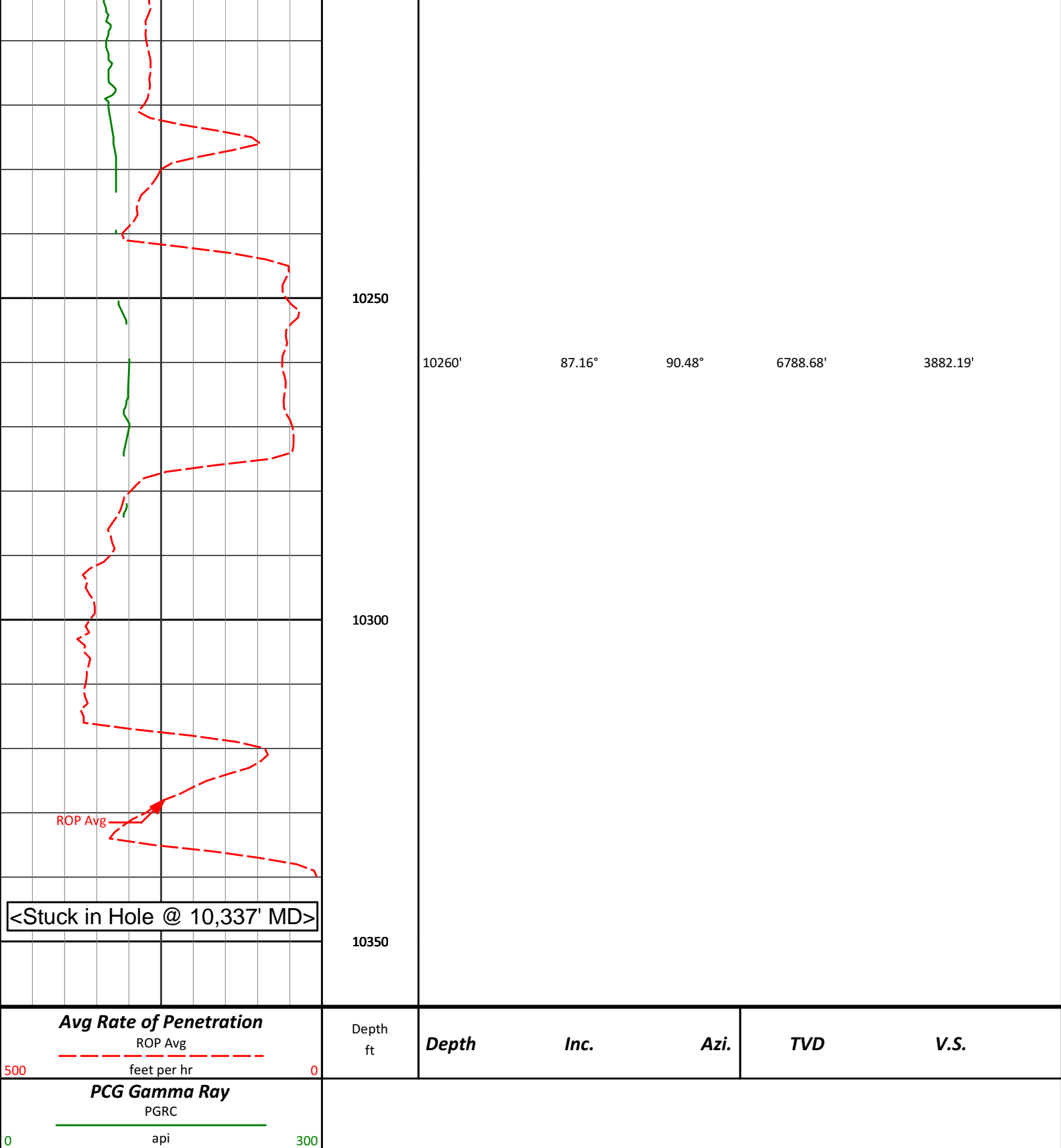
10165'

86.95°

91.25°

6783.79'

3788.38'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

**Noble Energy
Lonestar B02-65HC
Wattenberg
Weld Colorado
USA
CA-XX-0900630165**

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
284.00	0.40	191.65	284.00	0.97 S	0.20 W	-0.33	0.14
618.00	0.20	225.25	617.99	2.52 S	0.85 W	-1.18	0.08
715.00	0.22	337.89	714.99	2.47 S	1.04 W	-1.36	0.36
808.00	0.58	289.73	807.99	2.14 S	1.55 W	-1.82	0.49
901.00	0.38	32.09	900.99	1.72 S	1.82 W	-2.04	0.81
994.00	0.46	11.66	993.99	1.10 S	1.58 W	-1.72	0.18
1087.00	0.43	12.57	1086.98	0.39 S	1.43 W	-1.47	0.03
1179.00	0.48	331.84	1178.98	0.29 N	1.54 W	-1.49	0.35
1273.00	0.33	47.60	1272.98	0.82 N	1.52 W	-1.40	0.54
1366.00	0.49	338.41	1365.98	1.37 N	1.47 W	-1.27	0.52
1459.00	0.34	29.07	1458.97	1.99 N	1.48 W	-1.20	0.41
1554.00	0.87	11.10	1553.97	2.95 N	1.20 W	-0.80	0.58
1649.00	0.56	354.84	1648.96	4.12 N	1.11 W	-0.54	0.39
1743.00	0.43	356.48	1742.96	4.93 N	1.17 W	-0.50	0.13
1838.00	0.34	183.04	1837.96	5.01 N	1.21 W	-0.52	0.81
1933.00	0.76	24.58	1932.96	5.30 N	0.96 W	-0.24	1.15
2028.00	2.80	30.59	2027.90	7.88 N	0.49 E	1.54	2.15
2123.00	4.79	15.56	2122.69	13.70 N	2.73 E	4.55	2.33
2218.00	4.93	10.71	2217.35	21.54 N	4.56 E	7.41	0.46
2313.00	6.87	13.25	2311.84	31.08 N	6.62 E	10.73	2.06
2408.00	9.43	15.08	2405.88	44.13 N	9.95 E	15.78	2.71
2502.00	11.52	12.68	2498.31	60.72 N	14.01 E	22.04	2.27
2597.00	13.18	13.37	2591.11	80.51 N	18.59 E	29.24	1.76
2692.00	14.85	15.09	2683.28	102.80 N	24.27 E	37.86	1.81
2787.00	15.24	12.82	2775.02	126.73 N	30.21 E	46.96	0.75
2882.00	14.34	12.71	2866.87	150.38 N	35.57 E	55.45	0.95
2977.00	15.14	13.91	2958.74	173.90 N	41.14 E	64.13	0.91
3072.00	12.74	13.45	3050.94	196.13 N	46.56 E	72.48	2.53
3167.00	12.76	13.18	3143.60	216.53 N	51.39 E	80.01	0.06
3262.00	14.60	13.97	3235.90	238.37 N	56.67 E	88.18	1.95
3357.00	14.50	14.36	3327.85	261.51 N	62.51 E	97.08	0.14
3452.00	15.73	11.07	3419.56	285.68 N	67.94 E	105.70	1.57
3546.00	14.18	11.40	3510.38	309.47 N	72.66 E	113.57	1.65
3641.00	16.88	12.77	3601.90	334.34 N	78.01 E	122.22	2.87
3736.00	15.55	15.76	3693.12	360.05 N	84.52 E	132.12	1.65
3831.00	14.24	12.93	3784.92	383.69 N	90.59 E	141.32	1.58
3926.00	13.25	12.90	3877.20	405.69 N	95.64 E	149.27	1.04
4021.00	10.99	12.00	3970.08	425.16 N	99.95 E	156.16	2.39
4116.00	9.13	8.34	4063.62	441.47 N	102.93 E	161.30	2.07
4211.00	9.66	12.16	4157.34	456.72 N	105.70 E	166.09	0.86
4306.00	7.66	7.26	4251.26	470.79 N	108.18 E	170.44	2.24
4401.00	9.22	11.66	4345.23	484.52 N	110.52 E	174.60	1.78
4495.00	7.92	11.73	4438.18	498.23 N	113.36 E	179.26	1.37
4590.00	6.09	12.68	4532.46	509.56 N	115.79 E	183.19	1.94
4685.00	5.14	11.93	4627.01	518.63 N	117.78 E	186.38	1.00
4780.00	2.45	27.49	4721.79	524.60 N	119.59 E	188.98	3.01
4875.00	1.58	40.61	4816.73	527.39 N	121.38 E	191.13	1.03
4970.00	1.82	53.72	4911.69	529.28 N	123.45 E	193.43	0.48
5065.00	1.79	179.30	5006.67	528.69 N	124.69 E	194.58	3.37
5160.00	0.75	201.06	5101.65	526.63 N	124.48 E	194.10	1.19
5445.00	0.22	31.48	5386.64	525.38 N	124.11 E	193.56	0.34
5729.00	0.97	27.67	5670.62	527.99 N	125.52 E	195.31	0.26
6013.00	1.17	10.53	5954.57	532.98 N	127.17 E	197.61	0.13
6106.00	1.20	2.75	6047.55	534.88 N	127.39 E	198.08	0.17
6251.00	7.90	74.22	6192.06	539.11 N	137.07 E	208.24	5.25
6298.00	12.01	70.54	6238.34	541.62 N	144.79 E	216.24	8.84
6346.00	16.07	76.63	6284.90	544.82 N	155.97 E	227.74	8.98
6393.00	18.38	85.87	6329.80	546.86 N	169.69 E	241.61	7.60
6441.00	22.65	83.85	6374.75	548.39 N	186.43 E	258.41	9.01
6488.00	26.96	83.32	6417.40	550.60 N	206.02 E	278.11	9.18
6536.00	32.30	86.32	6459.12	552.69 N	229.64 E	301.80	11.54
6583.00	35.67	88.43	6498.09	553.87 N	255.87 E	327.96	7.60
6631.00	38.00	89.39	6536.50	554.41 N	284.64 E	356.53	5.00
6677.00	41.28	89.65	6571.92	554.66 N	313.98 E	385.64	7.16
6725.00	45.63	90.42	6606.75	554.63 N	346.99 E	418.35	9.12
6772.00	50.97	90.47	6638.01	554.35 N	382.07 E	453.07	11.35

6820.00	56.48	90.91	6666.40	553.89 N	420.74 E	491.33	11.50
6867.00	61.13	90.06	6690.74	553.56 N	460.93 E	531.12	10.01
6915.00	65.80	90.69	6712.18	553.27 N	503.86 E	573.62	9.81
6962.00	69.19	91.32	6730.17	552.50 N	547.27 E	616.53	7.32
7010.00	72.51	91.23	6745.91	551.50 N	592.60 E	661.31	6.92
7057.00	75.94	89.95	6758.69	551.03 N	637.82 E	706.06	7.75
7103.00	78.95	89.71	6768.68	551.17 N	682.71 E	750.56	6.56
7191.00	84.88	88.84	6781.06	552.27 N	769.79 E	837.00	6.80
7318.00	87.91	89.55	6789.05	554.05 N	896.51 E	962.81	2.45
7413.00	89.41	88.71	6791.27	555.49 N	991.47 E	1057.10	1.82
7508.00	91.17	88.33	6790.79	557.94 N	1086.43 E	1151.53	1.89
7603.00	89.85	88.03	6789.95	560.95 N	1181.38 E	1246.02	1.43
7697.00	89.57	88.55	6790.43	563.76 N	1275.33 E	1339.51	0.63
7792.00	90.31	90.55	6790.53	564.50 N	1370.33 E	1433.74	2.24
7887.00	89.78	89.11	6790.45	564.78 N	1465.32 E	1527.91	1.61
7982.00	90.52	90.56	6790.20	565.05 N	1560.32 E	1622.08	1.71
8077.00	90.18	89.67	6789.61	564.86 N	1655.32 E	1716.19	1.01
8172.00	92.59	90.78	6787.31	564.49 N	1750.28 E	1810.24	2.79
8267.00	90.06	91.58	6785.11	562.54 N	1845.23 E	1904.07	2.79
8362.00	91.70	91.59	6783.66	559.92 N	1940.17 E	1997.80	1.72
8457.00	85.37	87.03	6786.09	561.06 N	2035.06 E	2091.99	8.20
8552.00	89.17	88.74	6790.61	564.56 N	2129.87 E	2186.40	4.38
8647.00	93.35	89.64	6788.52	565.90 N	2224.82 E	2280.67	4.51
8742.00	92.35	88.45	6783.80	567.48 N	2319.68 E	2374.89	1.64
8836.00	90.92	88.46	6781.12	570.02 N	2413.61 E	2468.30	1.51
8931.00	90.83	88.97	6779.66	572.15 N	2508.57 E	2562.69	0.55
9026.00	89.04	87.25	6779.76	575.28 N	2603.51 E	2657.19	2.61
9121.00	89.78	87.95	6780.73	579.25 N	2698.42 E	2751.78	1.07
9216.00	90.55	88.41	6780.45	582.27 N	2793.37 E	2846.27	0.94
9311.00	90.65	87.55	6779.46	585.62 N	2888.31 E	2940.80	0.91
9406.00	88.70	86.45	6779.99	590.59 N	2983.17 E	3035.47	2.35
9500.00	91.51	88.06	6779.82	595.09 N	3077.05 E	3129.10	3.44
9595.00	91.08	87.17	6777.67	599.04 N	3171.94 E	3223.66	1.04
9690.00	90.59	88.53	6776.29	602.60 N	3266.86 E	3318.20	1.52
9785.00	90.74	88.83	6775.19	604.78 N	3361.83 E	3412.60	0.36
9880.00	90.25	90.32	6774.38	605.48 N	3456.82 E	3506.83	1.65
9975.00	87.41	91.28	6776.32	604.16 N	3551.78 E	3600.75	3.15
10070.00	88.31	90.84	6779.86	602.40 N	3646.70 E	3694.57	1.05
10165.00	86.95	91.25	6783.79	600.67 N	3741.60 E	3788.38	1.50
10260.00	87.16	90.48	6788.68	599.23 N	3836.46 E	3882.19	0.84

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 82.28 DEGREES (GRID)
A TOTAL CORRECTION OF 7.85 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10260.00 FEET
IS 3882.98 FEET ALONG 81.12 DEGREES (GRID)**

Surface surveys at 284 ft and 618 ft have had azimuths corrected to grid north, but were not taken by Halliburton.