

**PCGC : Pressure Case Gamma**  
**PCDC: Pressure Case Directional**



**1 : 600 / 1 : 240**

Company : Noble Energy									
Rig : H&P 315									
Well : Seyler B10-63-1HN									
Field : Wattenberg									
Country : USA									
API Number : 05-123-37698									
LOCATION					Other Services				
Latitude : 40° 24' 35.53" North					Directional Drilling				
Longitude : 104° 32' 40.52" West									
UTM Easting = 3,266,048.003 ft									
UTM Northing = 1,393,589.059 ft									
Permanent Datum : Ground Level					Elev. KB N/A				
Log Measured From : Drill Floor					DF 4607.00 ft				
Drilling Measured From : Drill Floor					GL 4583.00 ft				
MD LOG					WD N/A				
Depth Logged : 624.00 ft To 10,642.00 ft					Unit No. : 11610113				
Date Logged : 13-Dec-13 To 21-Dec-13					Job No. : CA-XX-0900916997				
Total Depth MD : 10,642.00 ft TVD : 6,578.57 ft					Plot Type : Final				
Spud Date : 13-Dec-13					Plot Date : 22-Dec-13				
Borehole Record (MD)									
Run No.		Size		From		To		Run No.	
2		8.750 in		624.00 ft		5,930.00 ft			
3		8.750 in		5,930.00 ft		6,933.00 ft			
4		6.125 in		6,933.00 ft		10,642.00 ft			
Casing Record (MD)									
		Size		Weight		From		To	
		7.000 in		26.00 lbpf		SURFACE		6,929.00 ft	

## WELL INFORMATION

<b>MWD Run Number</b>	100	200	300		
<b>Date run completed</b>	17-Dec-13	18-Dec-13	21-Dec-13		
<b>Rig Bit Number</b>	2	3	4		
<b>Bit Size (in)</b>	8.750	8.750	6.125		
<b>Tool Nominal OD (in)</b>	6.750	6.750	4.750		
<b>Log Start Depth (MD, ft)</b>	624.00	5,930.00	6,933.00		
<b>Log End Depth (MD, ft)</b>	5,930.00	6,933.00	10,642.00		
<b>Drill or Wipe</b>	Drill	Drill	Drill		
<b>Drill/Wipe Start Date and Time</b>	15-Dec-13 13:00	17-Dec-13 18:30	20-Dec-13 03:30		
<b>Drill/Wipe End Date and Time</b>	17-Dec-13 04:20	18-Dec-13 12:10	21-Dec-13 11:55		
<b>Min Inc (deg) @ Depth (MD, ft)</b>	0.16 @ 1,085.00	10.83 @ 6,005.00	87.17 @ 6,955.00		
<b>Max Inc (deg) @ Depth (MD, ft)</b>	10.71 @ 2,690.00	82.33 @ 6,879.00	93.18 @ 8,834.00		
<b>Bit TFA(in2) / Bit Type</b>	0.78 / PDC	0.94 / PDC	0.65 / PDC		
<b>Flow Rate (gpm)</b>	589.98	531.90	295.00		
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	N/A / N/A	N/A / N/A	N/A / N/A		
<b>Fluid Type</b>	Polymer	Polymer	Polymer		
<b>Density (ppg) / Viscosity (spqt)</b>	9.25 / 35.00	10.90 / 38.00	9.65 / 35.00		
<b>Filtrate CL (ppm)</b>	600.00	1,000.00	1,000.00		
<b>pH / Fluid Loss (mptm)</b>	8.40 / 10	9.40 / 9	9.20 / 8		
<b>PV (cP) / YP (lbf2)</b>	9 / 7.00	10 / 9.00	9 / 11.00		
<b>% Solids / % Sand</b>	4.7 / 0.75	12.1 / 1.00	6.7 / 0.50		
<b>% Oil / Oil:Water Ratio</b>	N/A / N/A	N/A / N/A	N/A / N/A		
<b>Rm @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Rmc @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Max Tool Temp (in) / Tool C</b>	112.12 / PDM	122.22 / PDM	201.42 / PDM		

Max Tool Temp (degF) / Source	149.10 / PCM	163.20 / PCM	231.40 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Henry Schmeidler	Henry Schmeidler	Henry Schmeidler		
Customer Representative	Steve Record	Steve Record	Martin Suarez		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11404263	11404263	11670105		
Insert Serial Number	11400878	11400878	11145600		
Date and Time Initialized	14-Dec-13 12:05	14-Dec-13 12:05	19-Dec-13 07:52		
Date and Time Read	18-Dec-13 22:33	18-Dec-13 22:47	21-Dec-13 22:52		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	54.41	51.98	63.20		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404263	11404263	11670105		
Sonde Serial Number	11833264	11833264	11145699		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	278.83	35.68	162.00		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.41	46.98	58.22		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404263	11404263	11670105		
Insert/Sonde Serial Number	11680921	11680921	12037414		

## 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. Gap in ROP from 6776-6780 is due to surface data issues.
7. Gap in Gamma from 9579-9599 is due to pulser flat line while drilling.

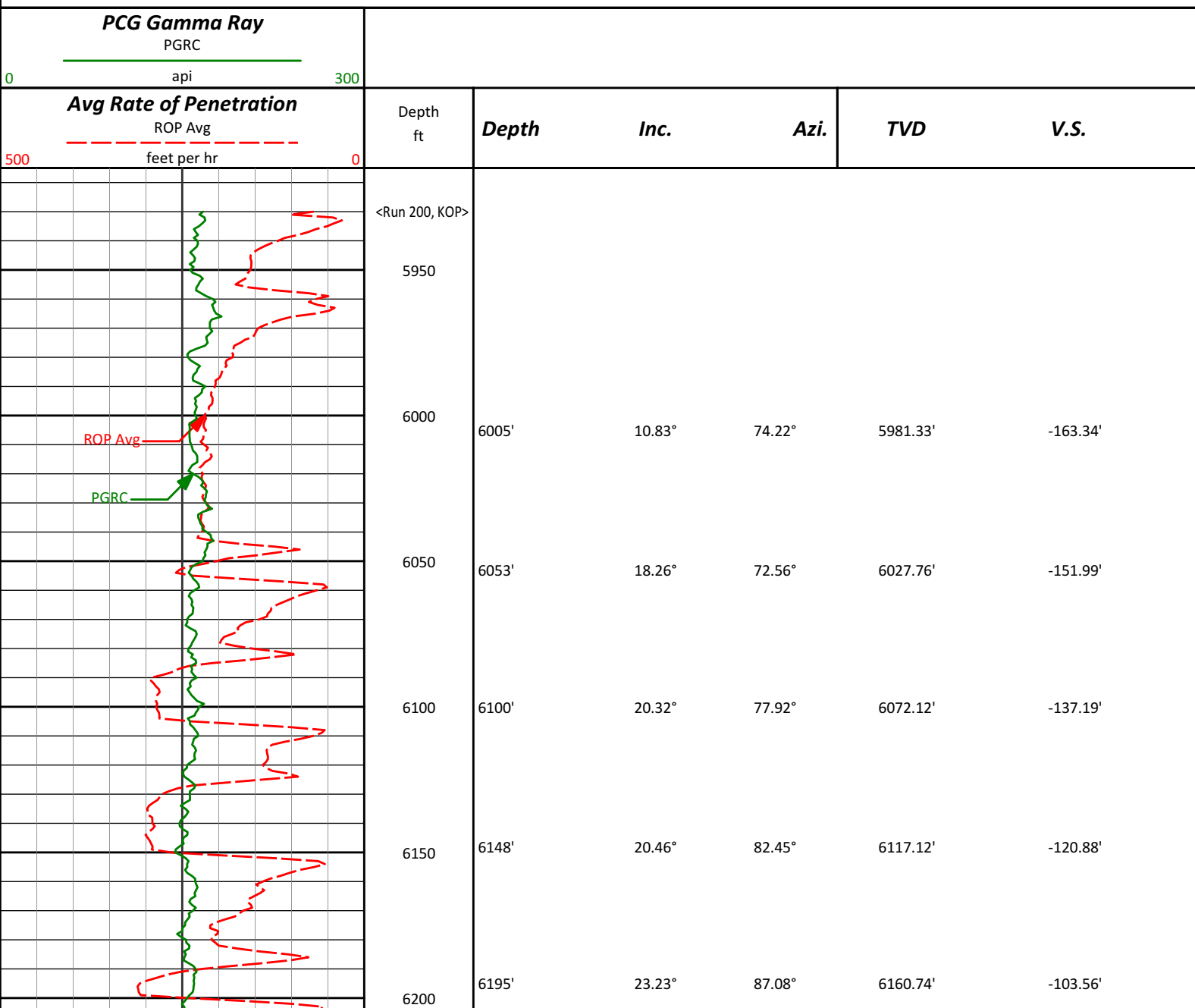
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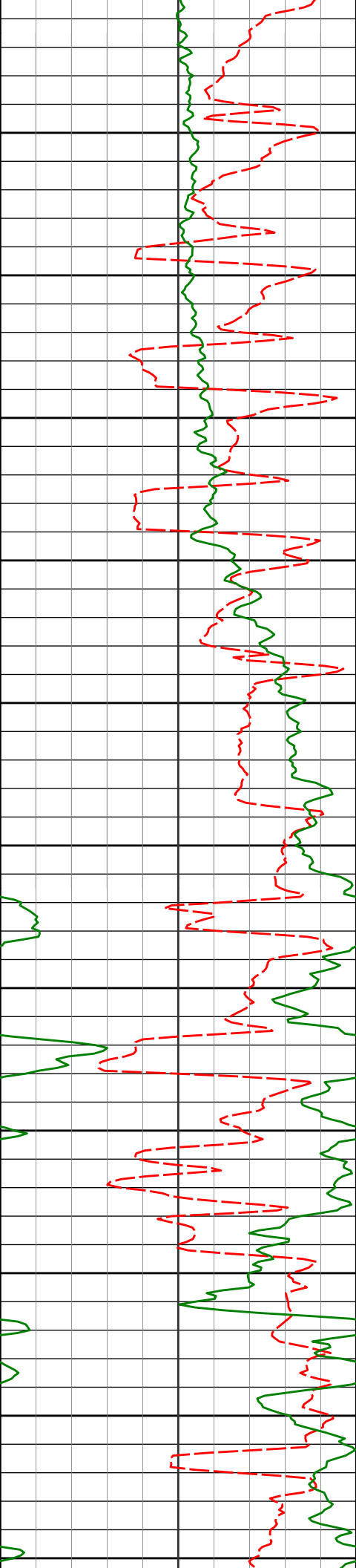
# HALLIBURTON

## Sperry Drilling Services

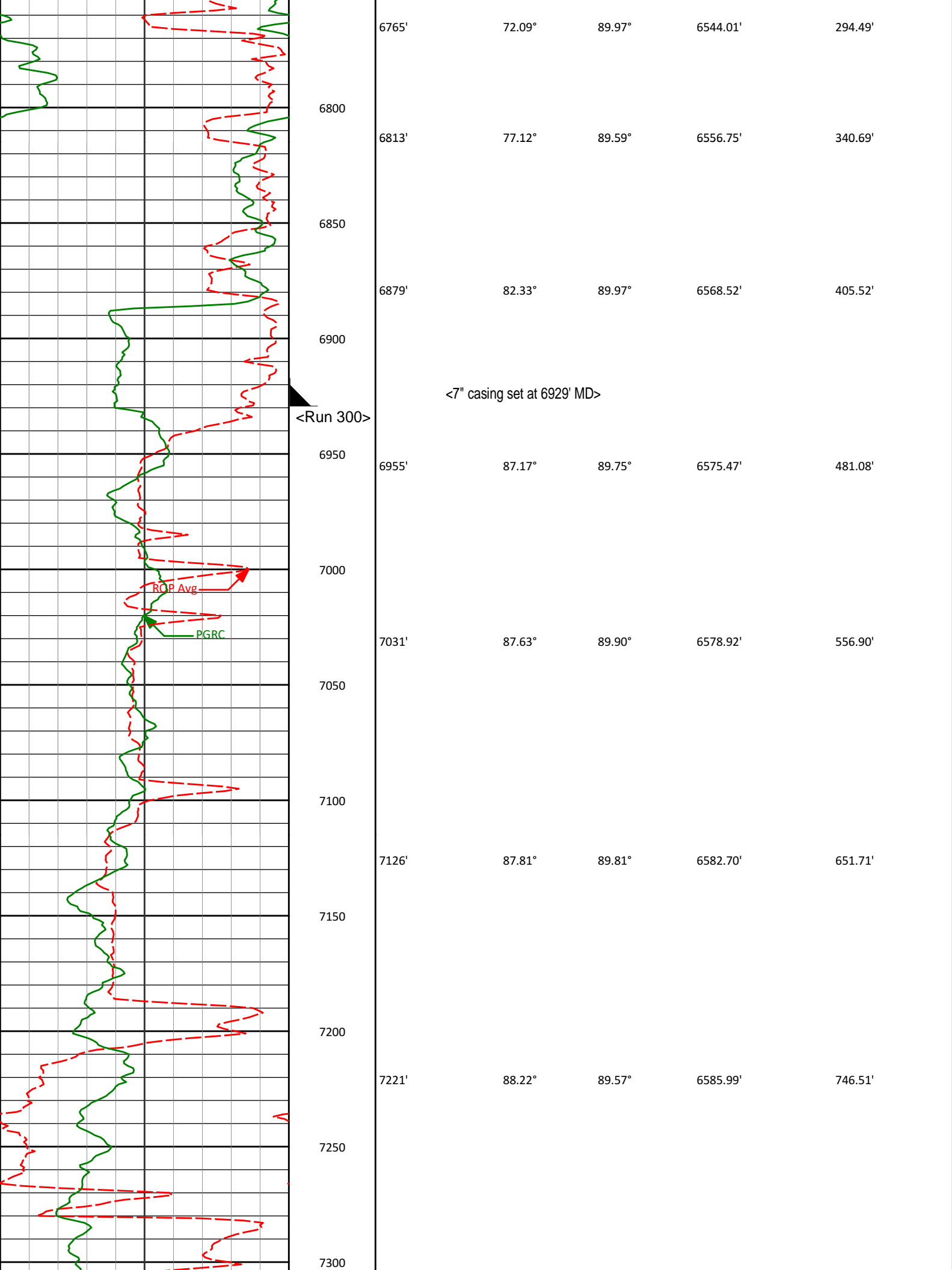
### MD Main Log 1:600

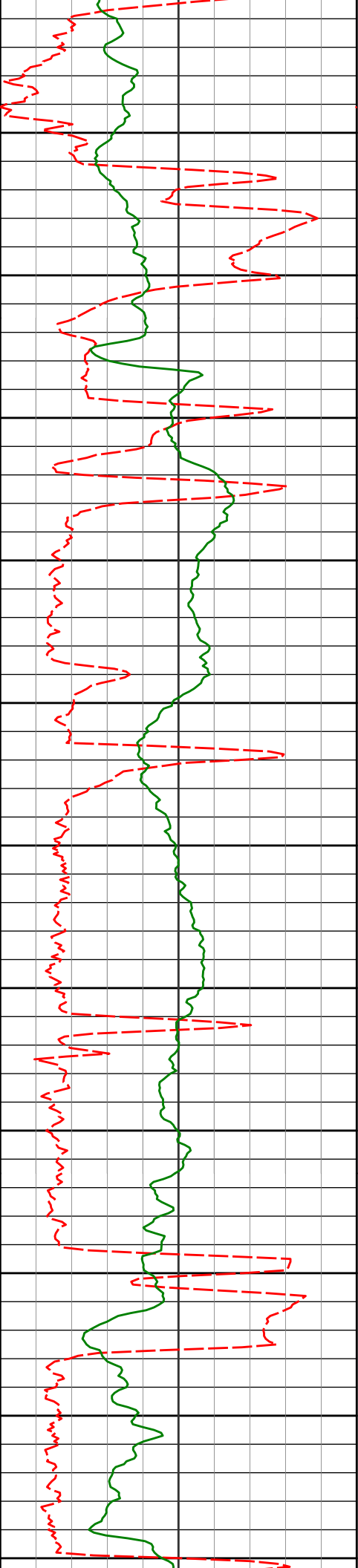
Noble Energy, Inc  
Seyler B10-63-1HN  
H&P 315  
T5N R64W





6250	6243'	27.30°	89.58°	6204.14'	-83.14'
6300	6290'	31.04°	90.97°	6245.17'	-60.26'
6350	6338'	33.44°	90.71°	6285.77'	-34.67'
6400	6385'	35.63°	89.36°	6324.49'	-8.06'
6450	6433'	38.83°	88.71°	6362.70'	20.91'
6500	6480'	45.75°	89.34°	6397.45'	52.45'
6550	6528'	52.33°	90.79°	6428.90'	88.64'
6600	6575'	56.40°	92.84°	6456.28'	126.82'
6650	6623'	57.99°	93.96°	6482.29'	167.16'
6700	6670'	61.27°	90.77°	6506.05'	207.69'
6750	6718'	66.21°	88.78°	6527.29'	250.66'





7316'

89.17°

89.25°

6588.16'

841.32'

7350

7410'

91.11°

88.90°

6587.94'

935.13'

7450

7505'

91.66°

88.79°

6585.64'

1029.88'

7550

7600'

91.73°

89.06°

6582.83'

1124.62'

7650

7695'

91.60°

88.72°

6580.07'

1219.36'

7750

7790'

90.22°

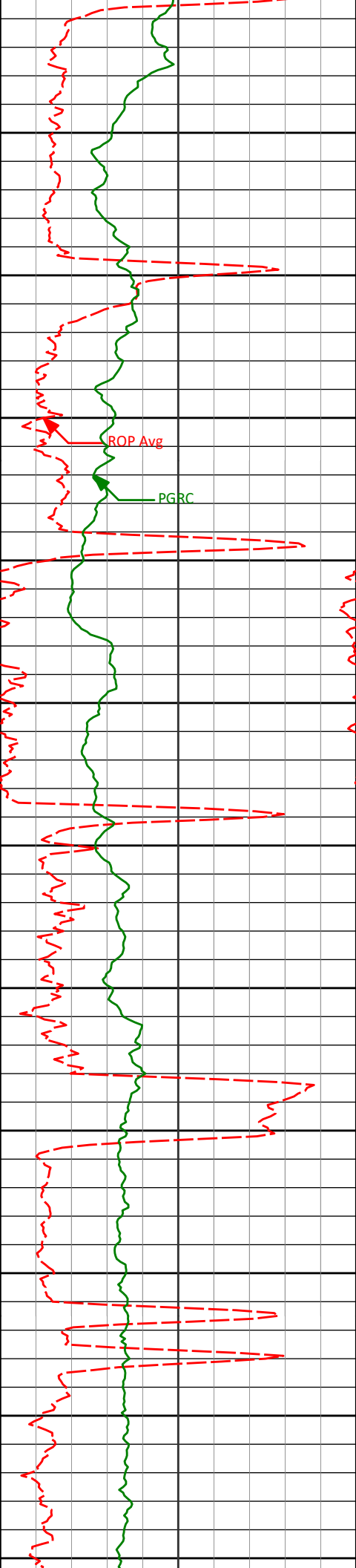
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6578.56'

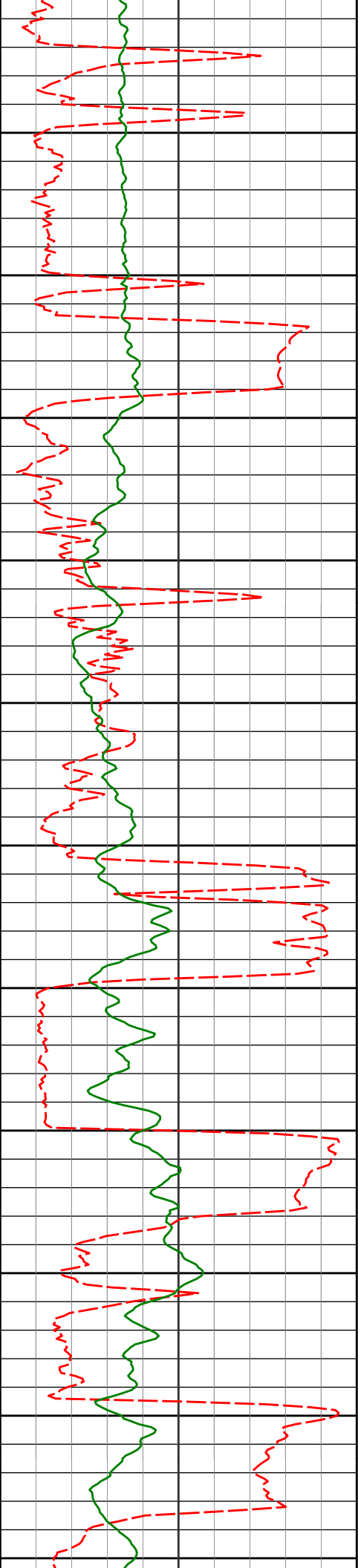
1314.21'

7800

7850



7885'	89.94°	90.59°	6578.44'	1409.14'
7900				
7950				
7980'	89.94°	90.79°	6578.54'	1504.07'
8000				
8050				
8075'	89.51°	91.00°	6579.00'	1599.02'
8100				
8150				
8170'	89.20°	91.46°	6580.07'	1693.98'
8200				
8250				
8264'	90.03°	89.83°	6580.70'	1787.91'
8300				
8350				
8359'	90.25°	89.23°	6580.47'	1882.76'
8400				



8450

8454'

89.04°

88.21°

6581.06'

1977.52'

8500

8550

8549'

90.40°

88.50°

6581.52'

2072.24'

8600

8650

8644'

92.10°

88.10°

6579.45'

2166.92'

8700

8750

8739'

92.83°

89.63°

6575.36'

2261.61'

8800

8850

8834'

93.18°

91.27°

6570.38'

2356.40'

8900

8950

8929'

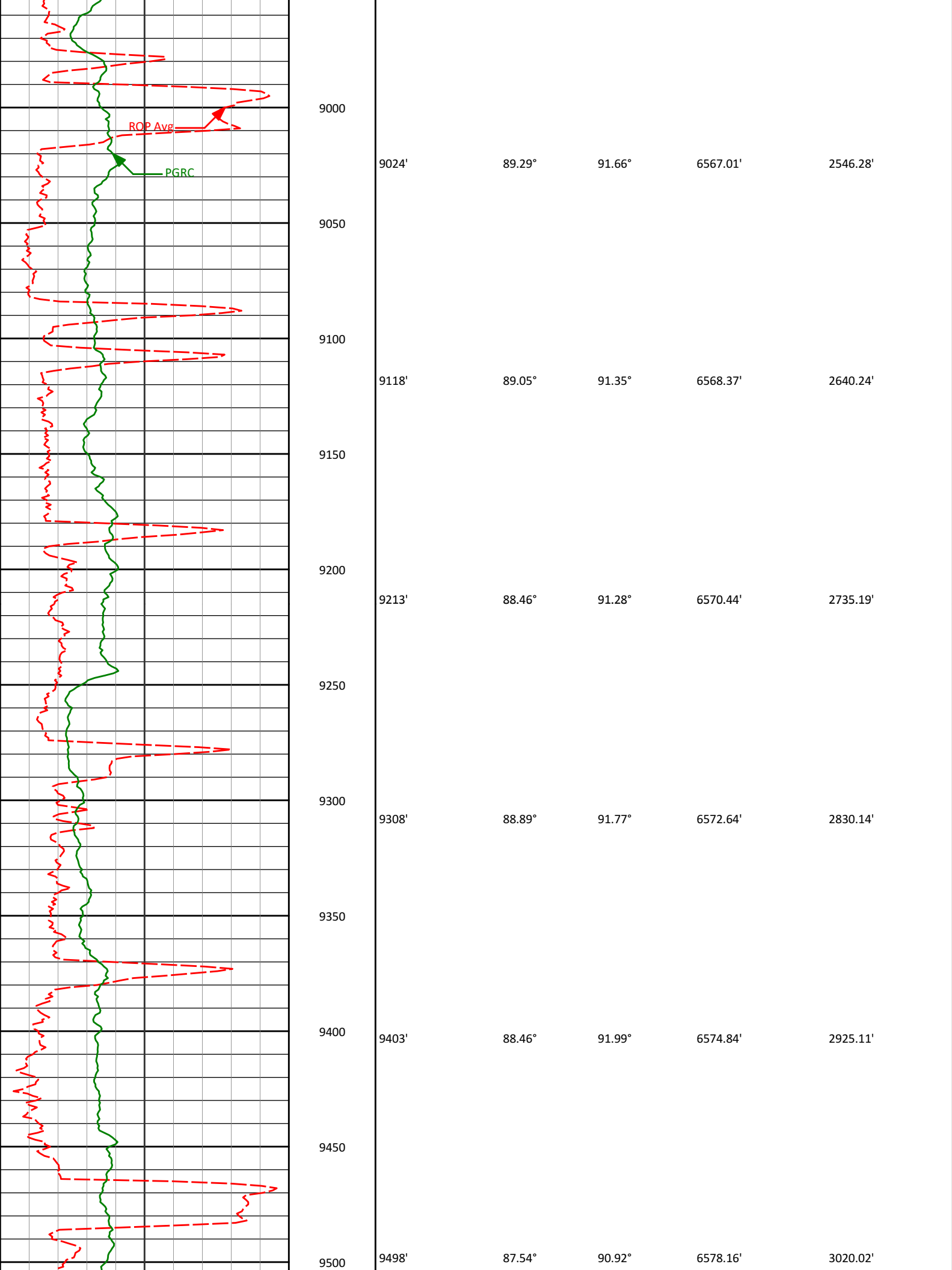
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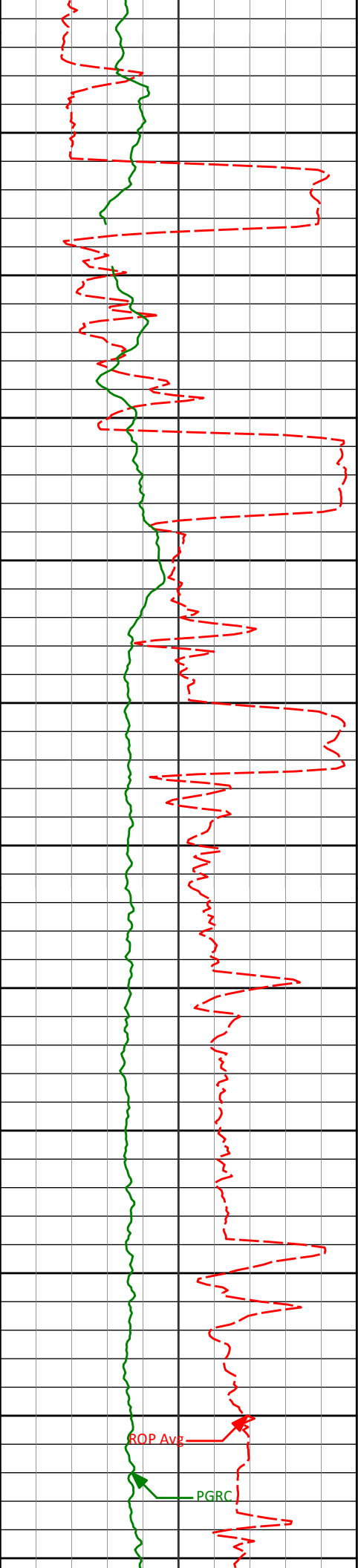
91.28°

6567.09'

2451.30'

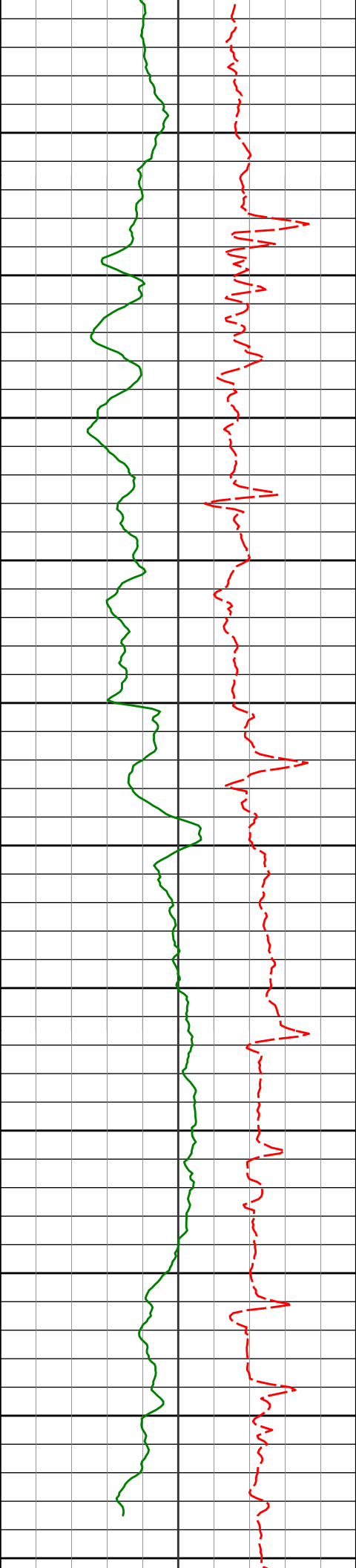






Remark 7

9593'	87.72°	88.58°	6582.09'	3114.80'
9600				
9650				
9688'	88.71°	87.85°	6585.05'	3209.46'
9700				
9750				
9783'	90.22°	88.44°	6585.95'	3304.14'
9800				
9850				
9878'	90.95°	90.12°	6584.98'	3398.96'
9900				
9950				
9973'	89.75°	88.45°	6584.39'	3493.77'
10000				
10050				



10100

10150

10200

10250

10300

10350

10400

10450

10500

10550

10600

10067'

89.60°

88.90°

6584.92'

3587.53'

10162'

89.60°

88.76°

6585.58'

3682.31'

10257'

90.31°

89.72°

6585.66'

3777.13'

10352'

91.17°

90.07°

6584.44'

3872.00'

10447'

90.92°

89.83°

6582.70'

3966.87'

10577'

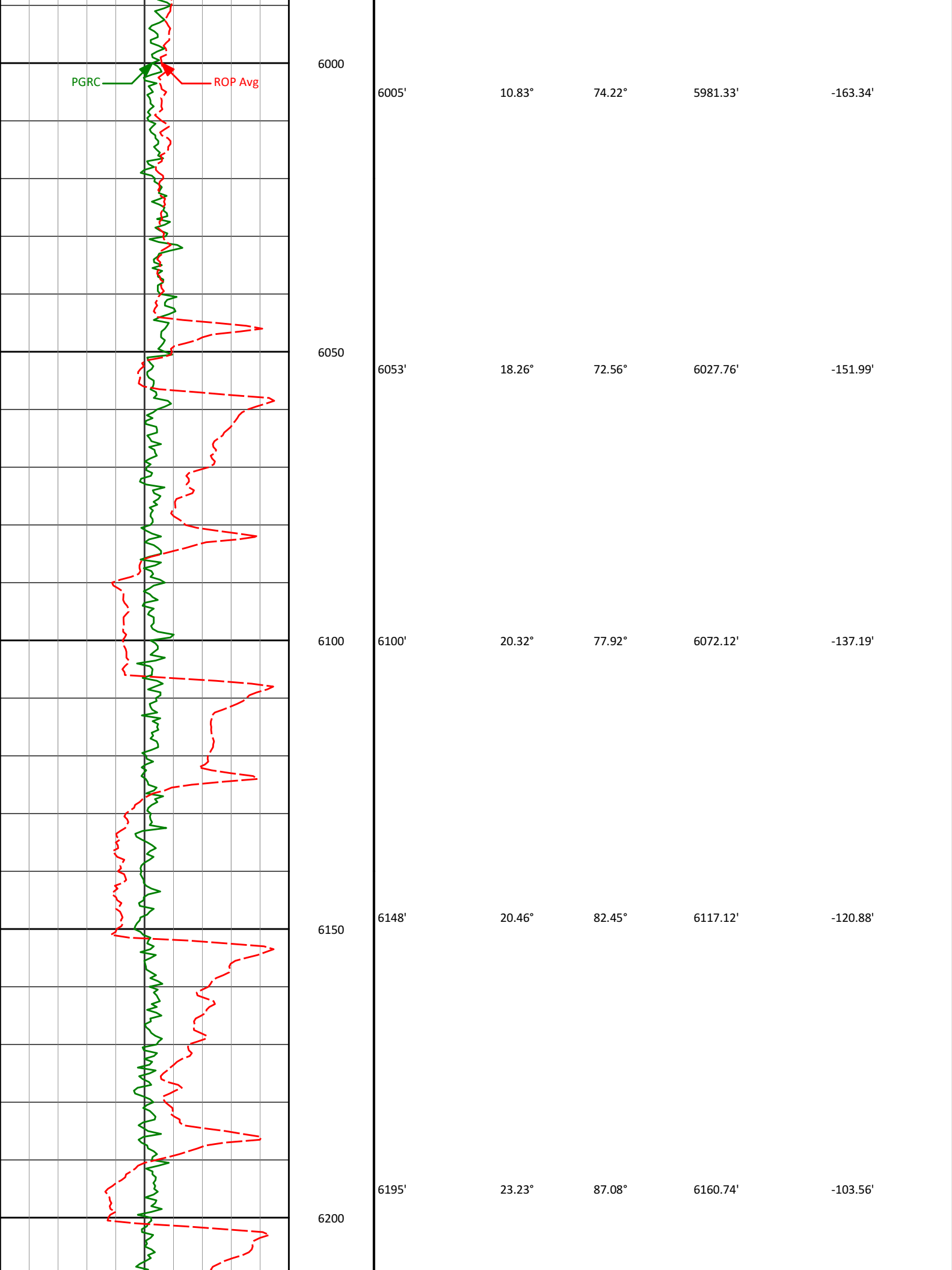
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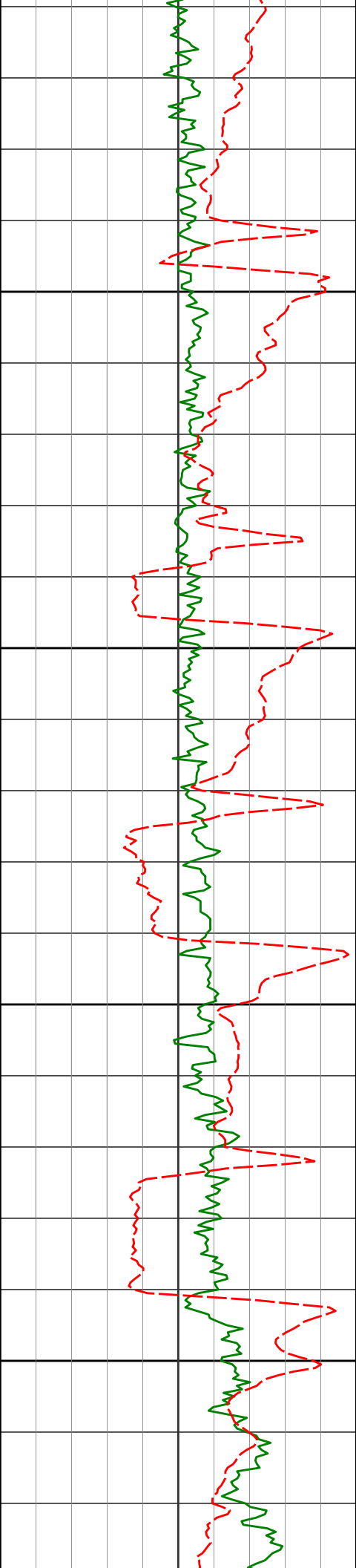
89.69°

6580.11'

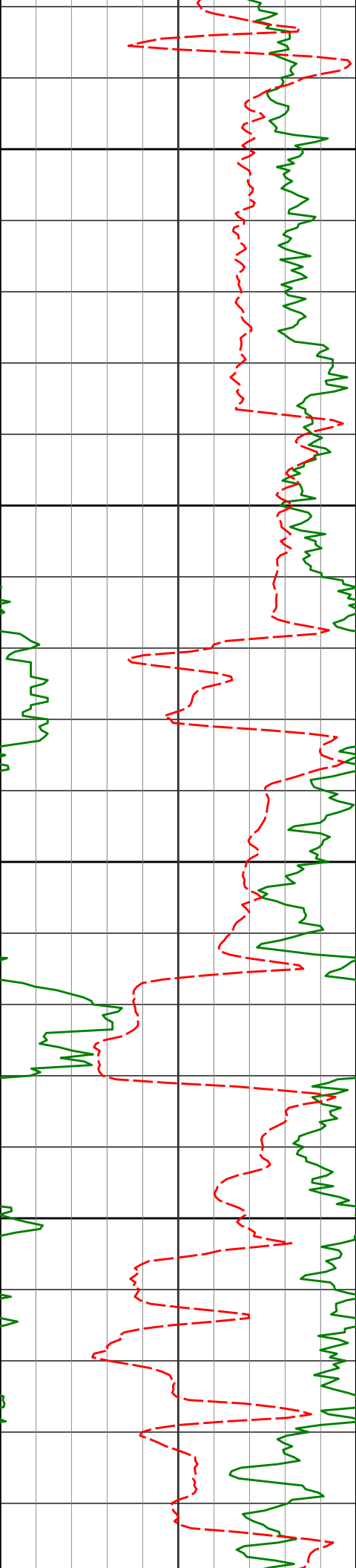
4096.67'







6243'	27.30°	89.58°	6204.14'	-83.14'
6250				
6290'	31.04°	90.97°	6245.17'	-60.26'
6300				
6338'	33.44°	90.71°	6285.77'	-34.67'
6350				
6385'	35.63°	89.36°	6324.49'	-8.06'
6400				



6450

6500

6550

6600

6433'

38.83°

88.71°

6362.70'

20.91'

6480'

45.75°

89.34°

6397.45'

52.45'

6528'

52.33°

90.79°

6428.90'

88.64'

6575'

56.40°

92.84°

6456.28'

126.82'

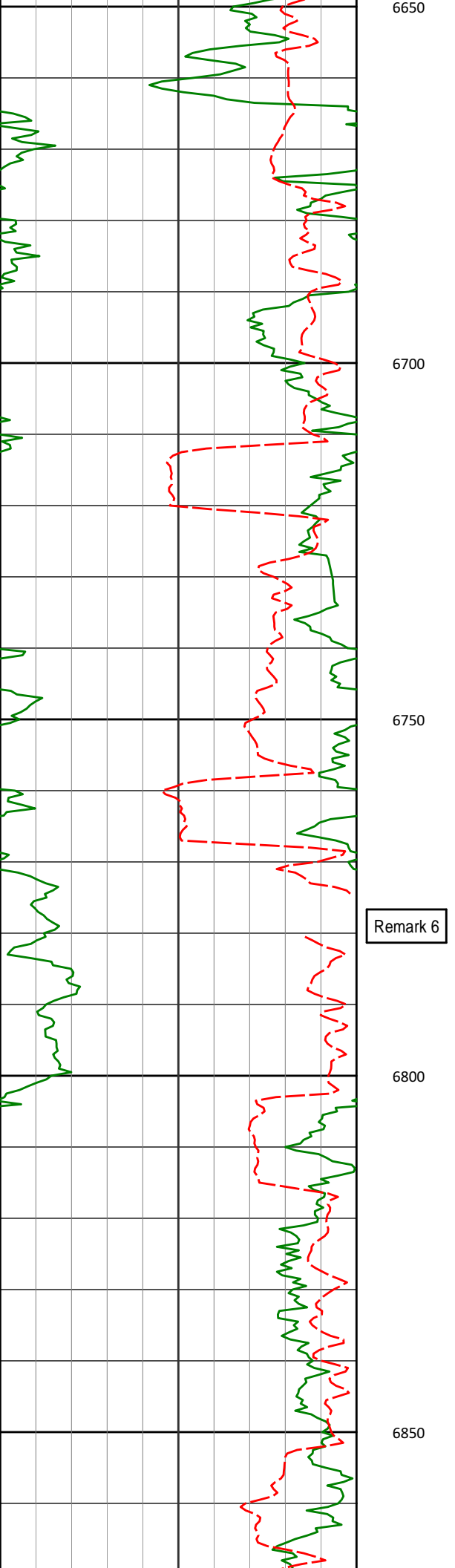
6623'

57.99°

93.96°

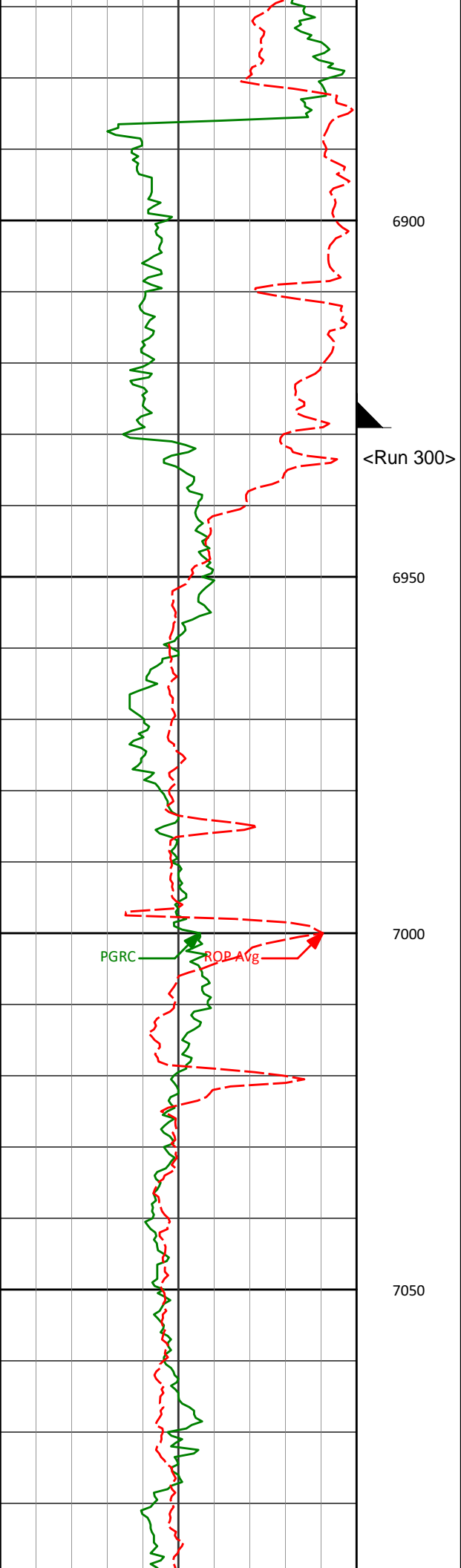
6482.29'

167.16'



6650				
6670'	61.27°	90.77°	6506.05'	207.69'
6700				
6718'	66.21°	88.78°	6527.29'	250.66'
6750				
6765'	72.09°	89.97°	6544.01'	294.49'
Remark 6				
6800				
6813'	77.12°	89.59°	6556.75'	340.69'
6850				





6879'

82.33°

89.97°

6568.52'

405.52'

6900

<7" casing set at 6929' MD>

<Run 300>

6950

6955'

87.17°

89.75°

6575.47'

481.08'

7000

PGRC

ROP Avg

7031'

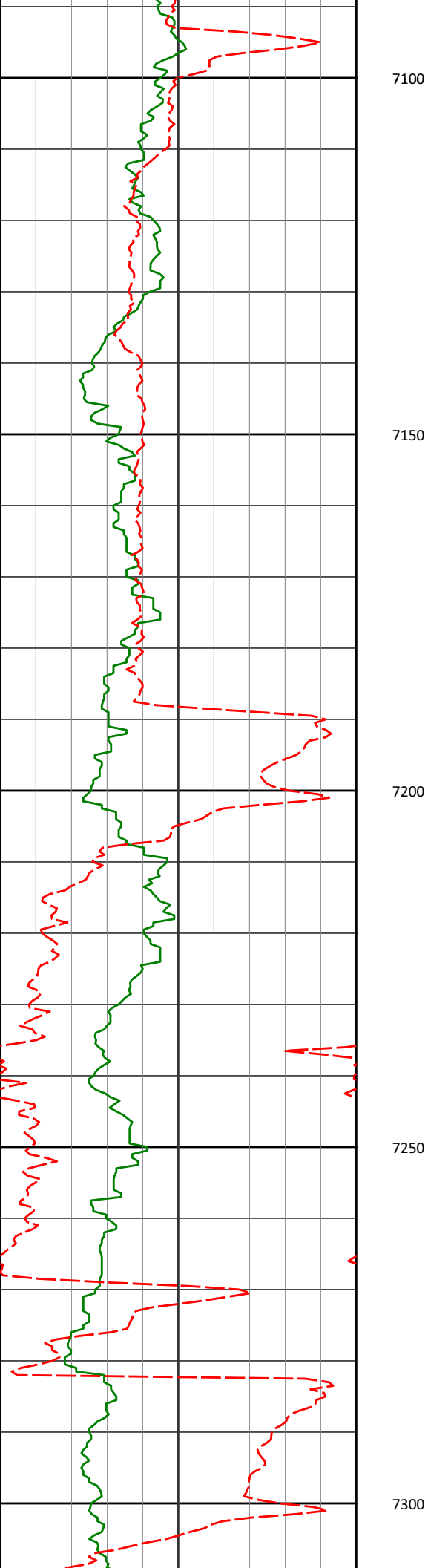
87.63°

89.90°

6578.92'

556.90'

7050



7126'

87.81°

89.81°

6582.70'

651.71'

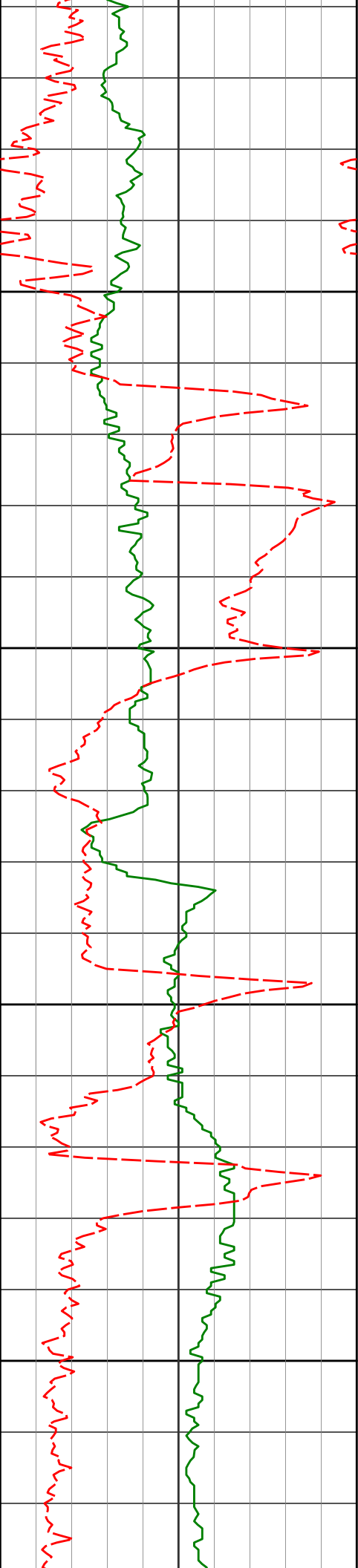
7221'

88.22°

89.57°

6585.99'

746.51'



7316'

89.17°

89.25°

6588.16'

841.32'

7350

7400

7410'

91.11°

88.90°

6587.94'

935.13'

7450

7500

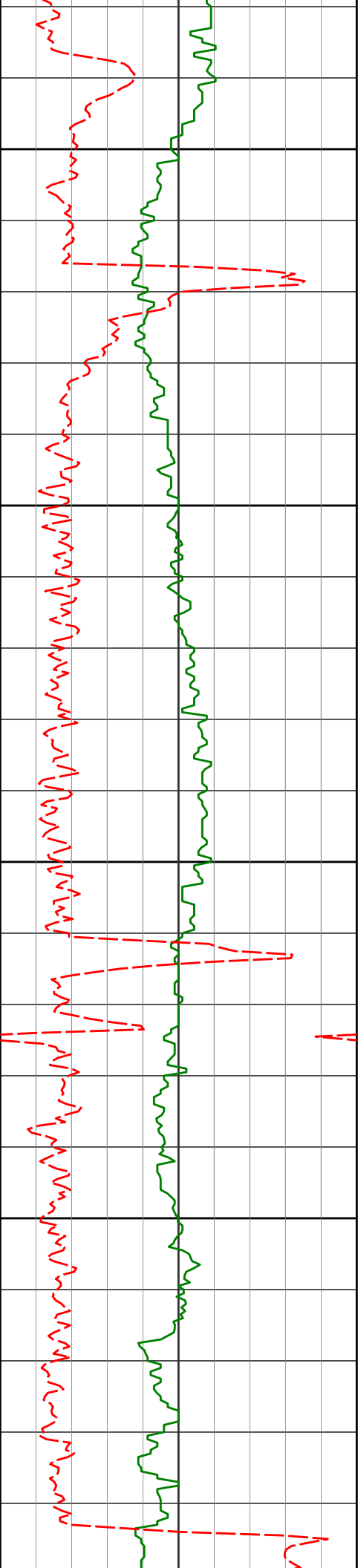
7505'

91.66°

88.79°

6585.64'

1029.88'



7550

7600

7650

7700

7600'

7695'

91.73°

91.60°

89.06°

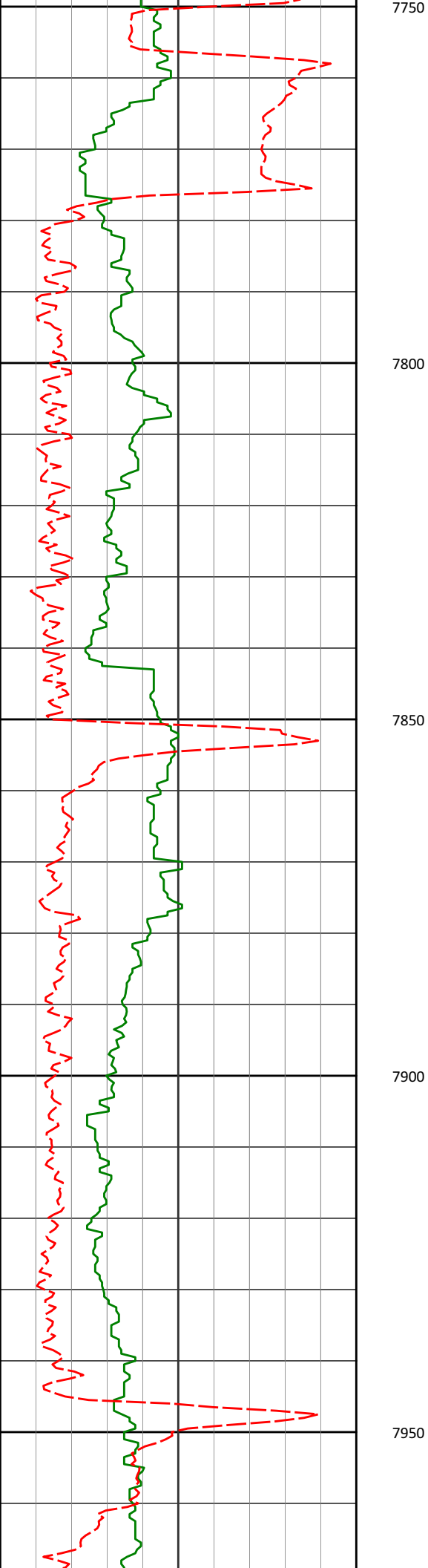
88.72°

6582.83'

6580.07'

1124.62'

1219.36'



7790'

90.22°

90.56°

6578.56'

1314.21'

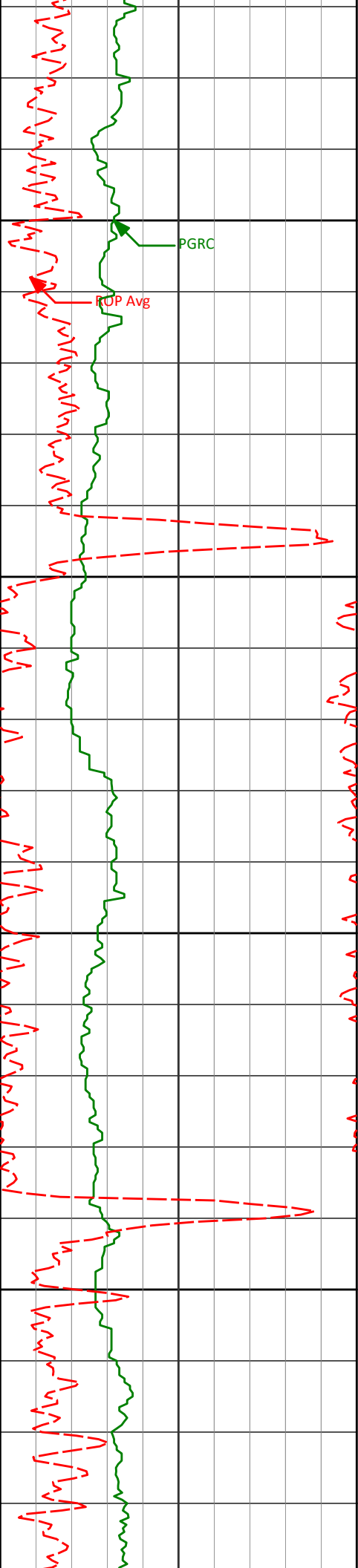
7885'

89.94°

90.59°

6578.44'

1409.14'



7980'

89.94°

90.79°

6578.54'

1504.07'

8000

8050

8100

8150

8170'

89.20°

91.46°

6580.07'

1693.98'

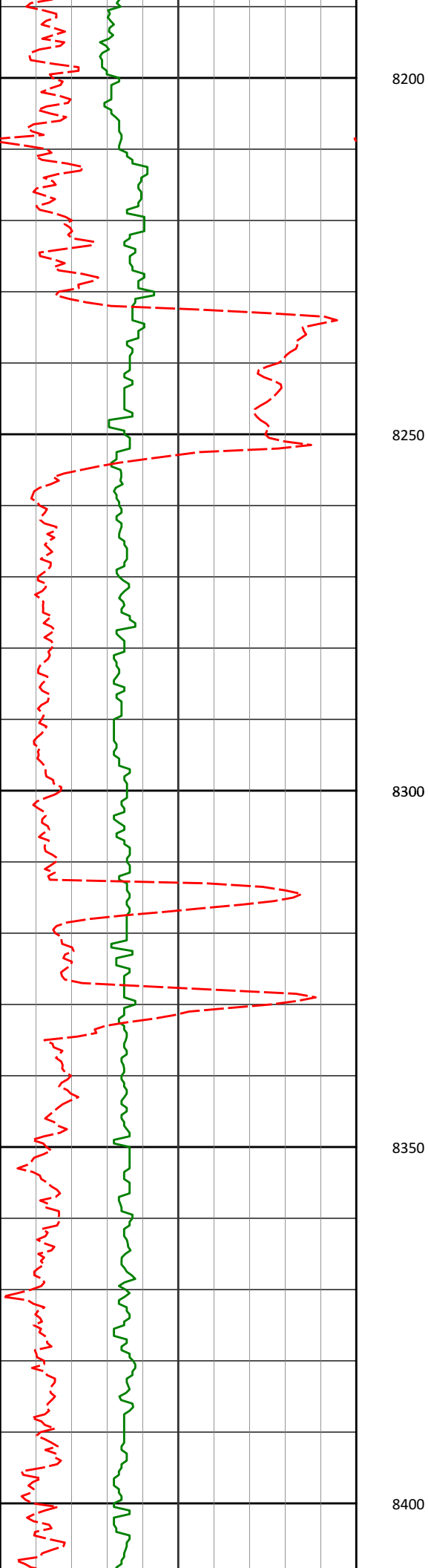
8075'

89.51°

91.00°

6579.00'

1599.02'



8264'

90.03°

89.83°

6580.70'

1787.91'

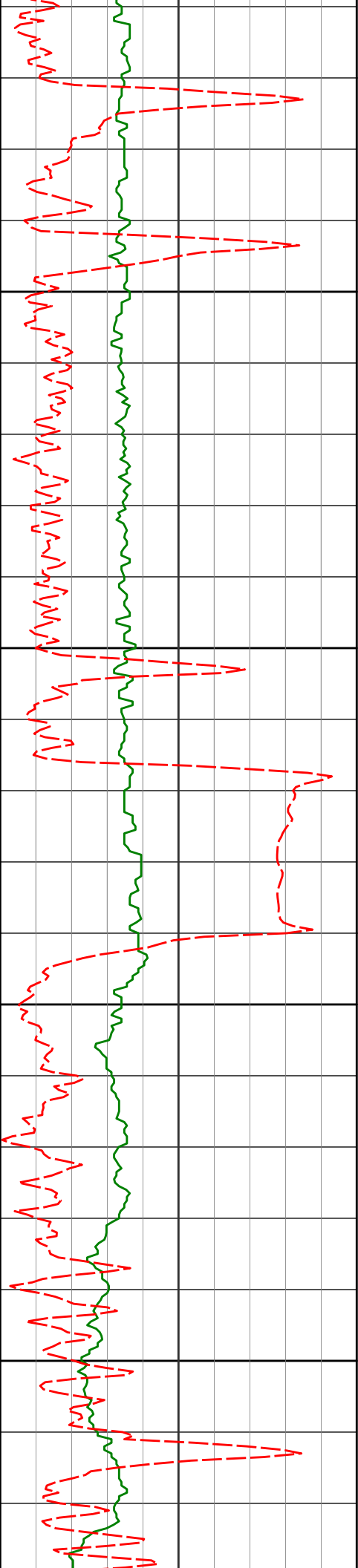
8359'

90.25°

89.23°

6580.47'

1882.76'



8450

8454'

89.04°

88.21°

6581.06'

1977.52'

8500

8550

8549'

90.40°

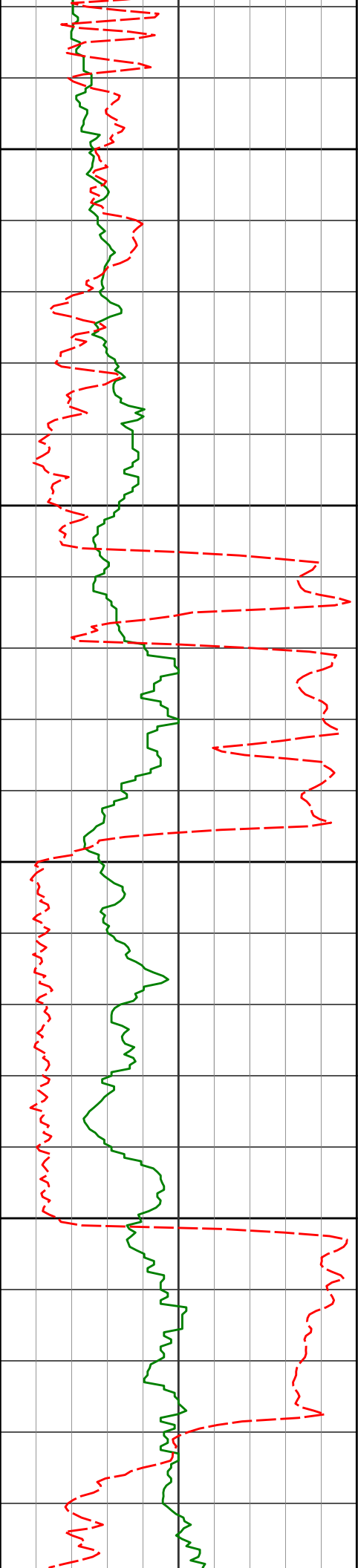
88.50°

6581.52'

2072.24'

8600





8644'

92.10°

88.10°

6579.45'

2166.92'

8650

8700

8739'

92.83°

89.63°

6575.36'

2261.61'

8750

8800

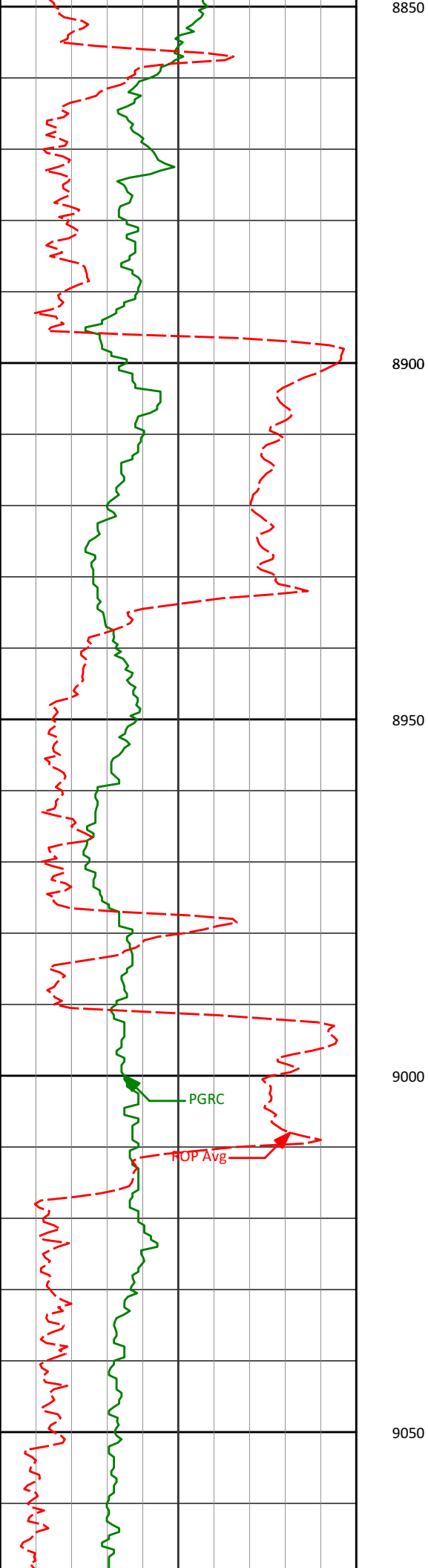
8834'

93.18°

91.27°

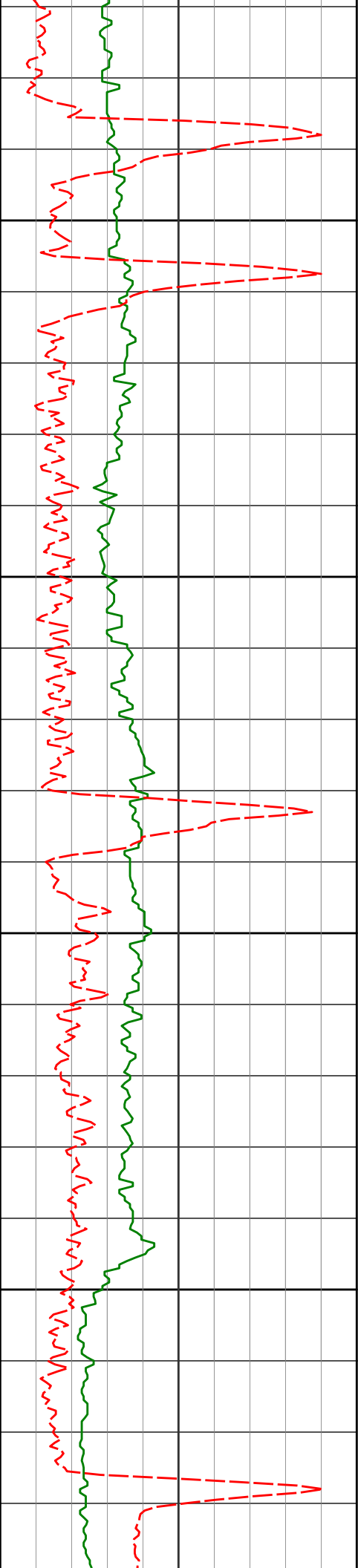
6570.38'

2356.40'



8929'	90.80°	91.28°	6567.09'	2451.30'
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9024'	89.29°	91.66°	6567.01'	2546.28'
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9100

9118'

89.05°

91.35°

6568.37'

2640.24'

9150

9200

9213'

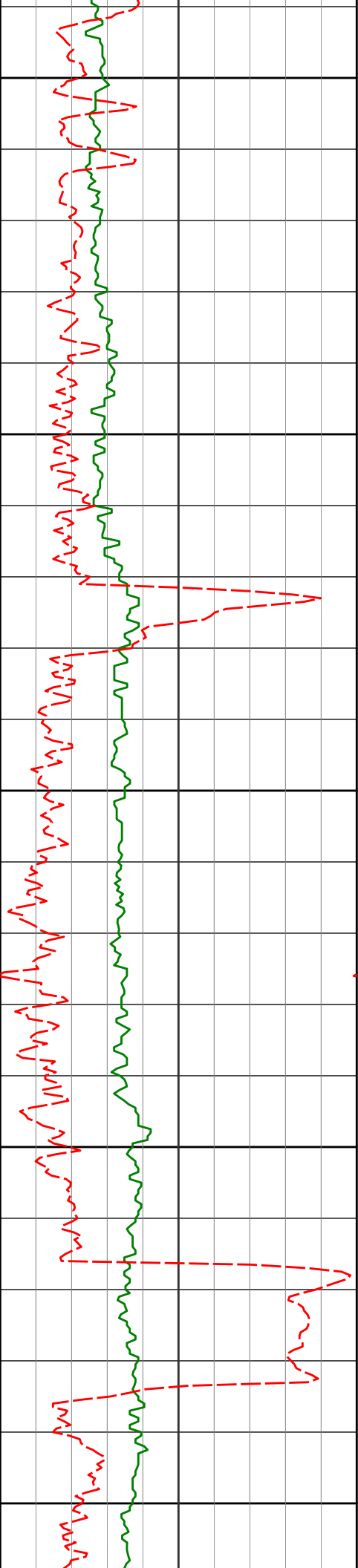
88.46°

91.28°

6570.44'

2735.19'

9250



9300

9308'

88.89°

91.77°

6572.64'

2830.14'

9350

9400

9403'

88.46°

91.99°

6574.84'

2925.11'

9450

9500

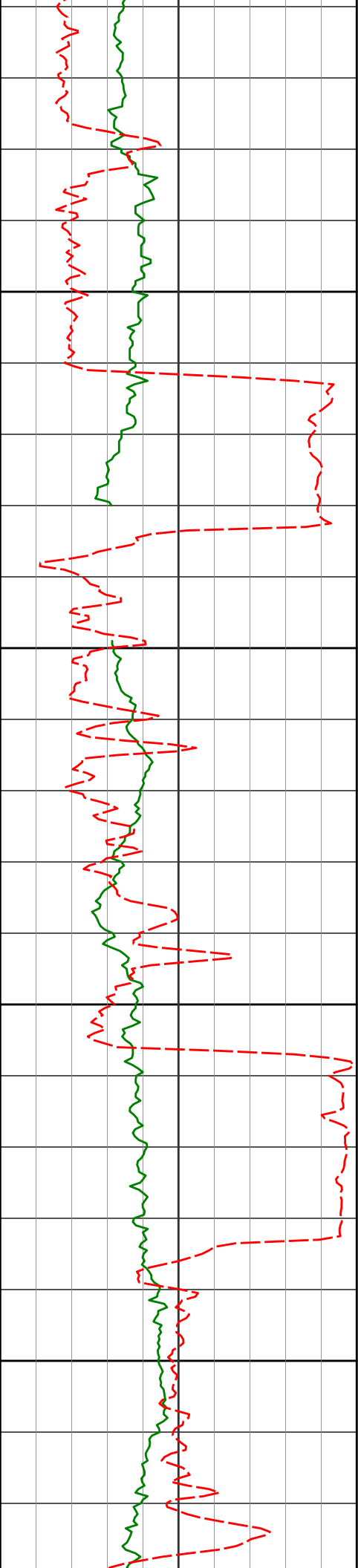
9498'

87.54°

90.92°

6578.16'

3020.02'



9550

Remark 7

9593'

87.72°

88.58°

6582.09'

3114.80'

9600

9650

9688'

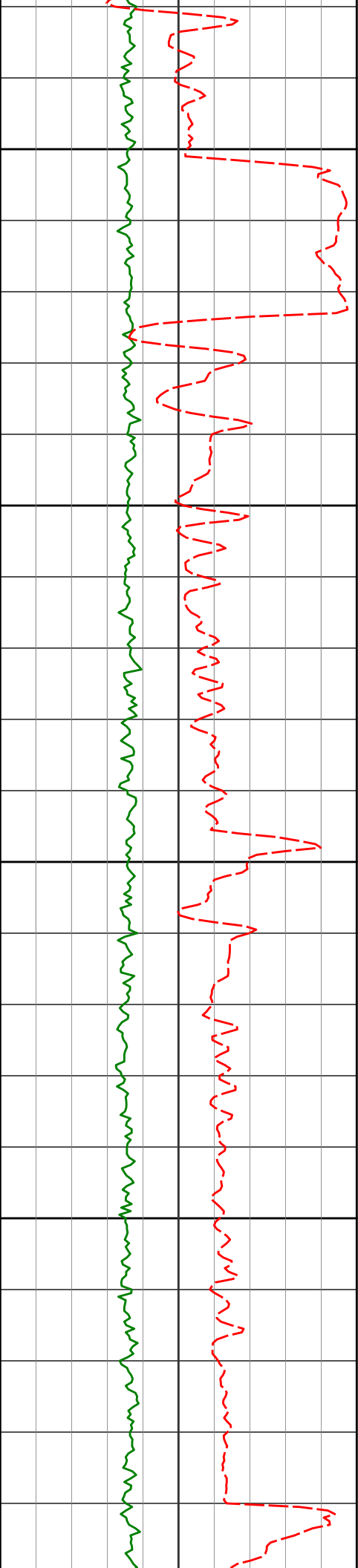
88.71°

87.85°

6585.05'

3209.46'

9700



9750

9783'

90.22°

88.44°

6585.95'

3304.14'

9800

9850

9878'

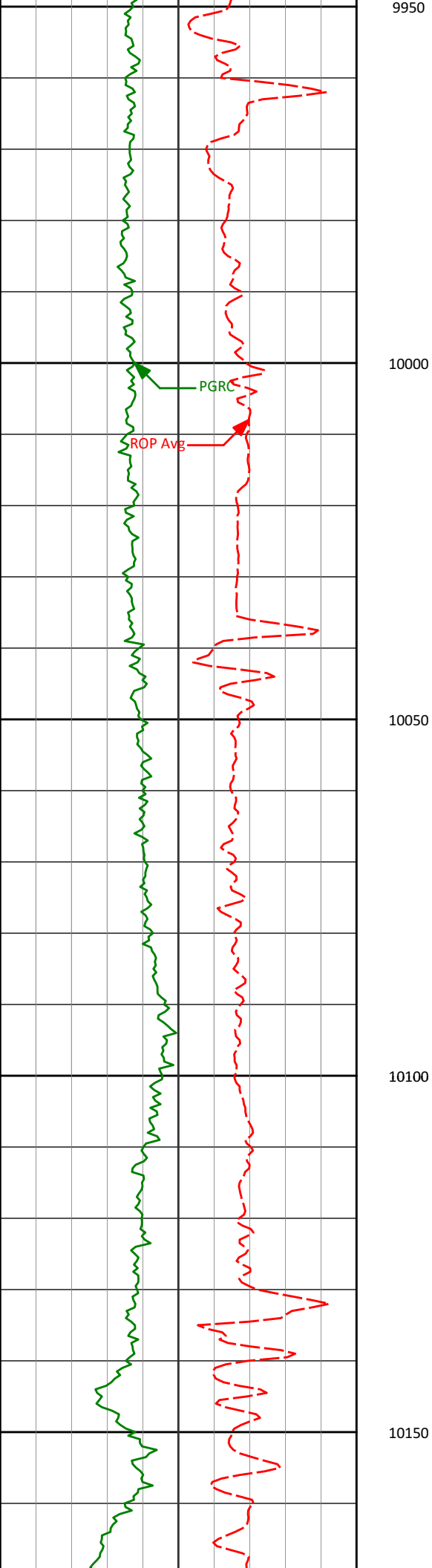
90.95°

90.12°

6584.98'

3398.96'

9900



9973'

89.75°

88.45°

6584.39'

3493.77'

10000

10050

10067'

89.60°

88.90°

6584.92'

3587.53'

10100

10150

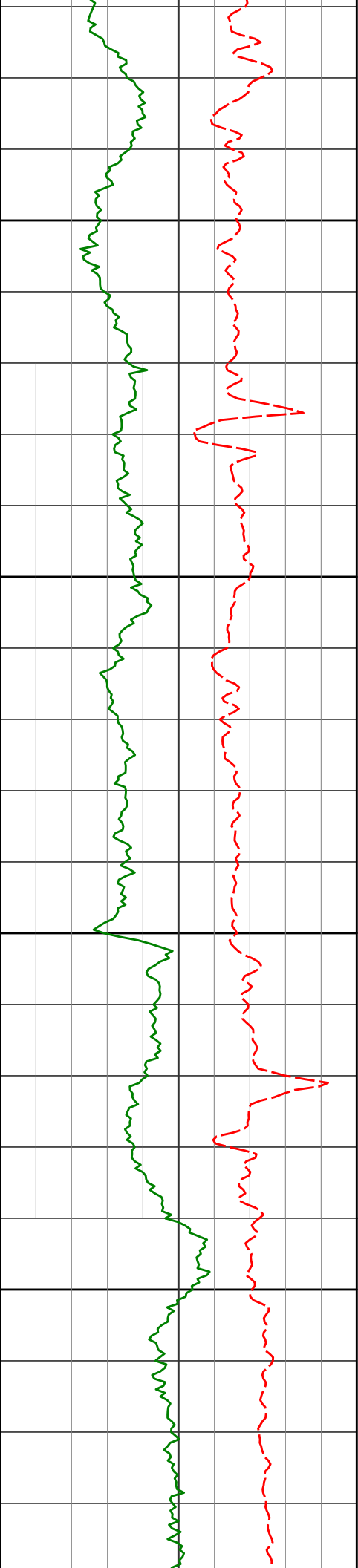
10162'

89.60°

88.76°

6585.58'

3682.31'



10200

10250

10300

10350

10257'

90.31°

89.72°

6585.66'

3777.13'

10352'

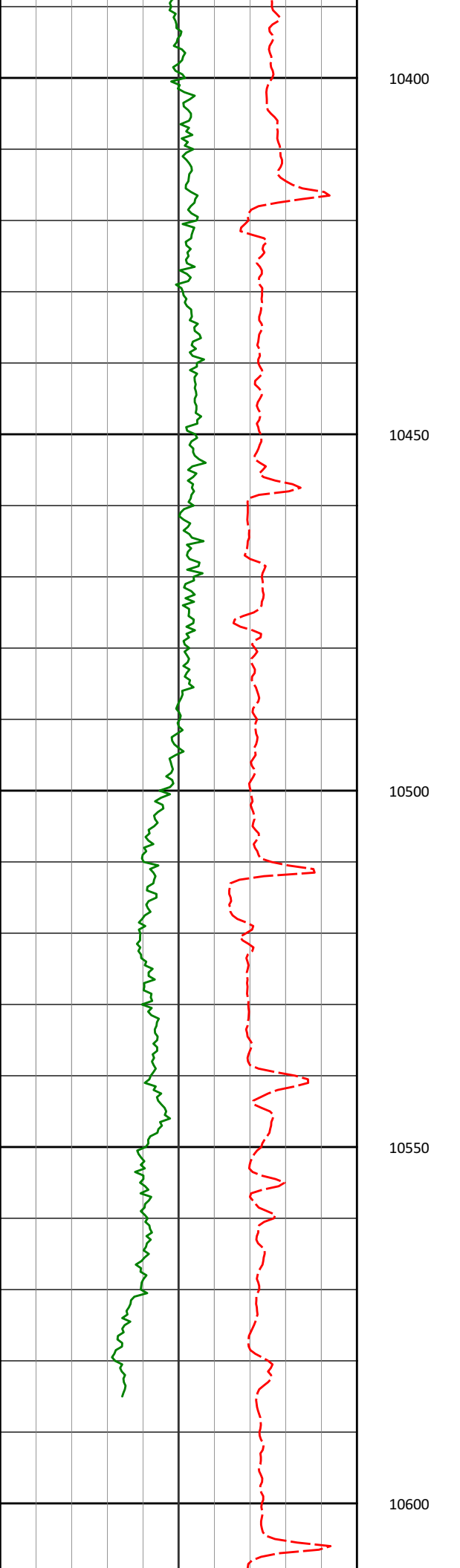
91.17°

90.07°

6584.44'

3872.00'





10447'

90.92°

89.83°

6582.70'

3966.87'

10577'

91.36°

89.69°

6580.11'

4096.67'



2690.00	10.71	211.88	2675.50	112.85 S	140.26 W	-134.67	0.33
2785.00	9.73	212.07	2768.99	127.15 S	149.19 W	-142.89	1.04
2880.00	9.47	210.03	2862.66	140.72 S	157.36 W	-150.40	0.45
2974.00	8.72	211.04	2955.48	153.53 S	164.91 W	-157.33	0.82
3069.00	8.81	209.52	3049.37	166.02 S	172.21 W	-164.01	0.26
3164.00	8.82	214.14	3143.25	178.38 S	179.87 W	-171.08	0.75
3259.00	7.44	215.01	3237.29	189.44 S	187.49 W	-178.15	1.46
3353.00	5.08	216.93	3330.73	197.74 S	193.48 W	-183.73	2.52
3448.00	3.35	207.86	3425.47	203.56 S	197.30 W	-187.27	1.94
3543.00	2.04	214.42	3520.36	207.41 S	199.55 W	-189.33	1.42
3638.00	0.85	207.19	3615.33	209.43 S	200.83 W	-190.51	1.26
3923.00	0.22	78.87	3900.32	211.21 S	201.27 W	-190.86	0.35
4207.00	1.19	67.40	4184.29	209.98 S	198.02 W	-187.68	0.34
4492.00	1.37	66.26	4469.22	207.47 S	192.17 W	-181.96	0.07
4776.00	0.82	144.48	4753.18	207.74 S	187.88 W	-177.66	0.51
5061.00	0.73	167.66	5038.16	211.16 S	186.31 W	-175.93	0.11
5346.00	1.03	135.55	5323.13	214.76 S	184.13 W	-173.58	0.20
5631.00	0.73	242.57	5608.11	217.43 S	183.94 W	-173.26	0.50
5874.00	0.42	201.96	5851.09	218.96 S	185.64 W	-174.89	0.20
6005.00	10.83	74.22	5981.33	216.05 S	173.94 W	-163.34	8.47
6053.00	18.26	72.56	6027.76	212.56 S	162.41 W	-151.99	15.50
6100.00	20.32	77.92	6072.12	208.65 S	147.41 W	-137.19	5.77
6148.00	20.46	82.45	6117.12	205.80 S	130.94 W	-120.88	3.30
6195.00	23.23	87.08	6160.74	204.25 S	113.53 W	-103.56	6.94
6243.00	27.30	89.58	6204.14	203.69 S	93.06 W	-83.14	8.77
6290.00	31.04	90.97	6245.17	203.81 S	70.15 W	-60.26	8.08
6338.00	33.44	90.71	6285.77	204.18 S	44.55 W	-34.67	5.00
6385.00	35.63	89.36	6324.49	204.19 S	17.91 W	-8.06	4.94
6433.00	38.83	88.71	6362.70	203.69 S	11.12 E	20.91	6.71
6480.00	45.75	89.34	6397.45	203.17 S	42.72 E	52.45	14.75
6528.00	52.33	90.79	6428.90	203.23 S	78.94 E	88.64	13.89
6575.00	56.40	92.84	6456.28	204.46 S	117.11 E	126.82	9.36
6623.00	57.99	93.96	6482.29	206.86 S	157.38 E	167.16	3.85
6670.00	61.27	90.77	6506.05	208.51 S	197.88 E	207.69	9.10
6718.00	66.21	88.78	6527.29	208.33 S	240.91 E	250.66	10.95
6765.00	72.09	89.97	6544.01	207.86 S	284.81 E	294.49	12.73
6813.00	77.12	89.59	6556.75	207.68 S	331.07 E	340.69	10.51
6879.00	82.33	89.97	6568.52	207.43 S	395.99 E	405.52	7.91
6955.00	87.17	89.75	6575.47	207.25 S	471.65 E	481.08	6.37
7031.00	87.63	89.90	6578.92	207.01 S	547.57 E	556.90	0.64
7126.00	87.81	89.81	6582.70	206.77 S	642.49 E	651.71	0.21
7221.00	88.22	89.57	6585.99	206.26 S	737.44 E	746.51	0.49
7316.00	89.17	89.25	6588.16	205.29 S	832.41 E	841.32	1.06
7410.00	91.11	88.90	6587.94	203.77 S	926.39 E	935.13	2.10
7505.00	91.66	88.79	6585.64	201.85 S	1021.34 E	1029.88	0.59
7600.00	91.73	89.06	6582.83	200.08 S	1116.28 E	1124.62	0.29
7695.00	91.60	88.72	6580.07	198.24 S	1211.22 E	1219.36	0.38
7790.00	90.22	90.56	6578.56	197.65 S	1306.20 E	1314.21	2.43
7885.00	89.94	90.59	6578.44	198.60 S	1401.20 E	1409.14	0.29
7980.00	89.94	90.79	6578.54	199.74 S	1496.19 E	1504.07	0.21
8075.00	89.51	91.00	6579.00	201.22 S	1591.18 E	1599.02	0.50
8170.00	89.20	91.46	6580.07	203.26 S	1686.15 E	1693.98	0.59
8264.00	90.03	89.83	6580.70	204.32 S	1780.14 E	1787.91	1.95
8359.00	90.25	89.23	6580.47	203.54 S	1875.13 E	1882.76	0.68
8454.00	89.04	88.21	6581.06	201.42 S	1970.11 E	1977.52	1.66
8549.00	90.40	88.50	6581.52	198.69 S	2065.06 E	2072.24	1.46
8644.00	92.10	88.10	6579.45	195.88 S	2160.00 E	2166.92	1.83
8739.00	92.83	89.63	6575.36	194.00 S	2254.89 E	2261.61	1.78
8834.00	93.18	91.27	6570.38	194.74 S	2349.75 E	2356.40	1.76
8929.00	90.80	91.28	6567.09	196.85 S	2444.66 E	2451.30	2.50
9024.00	89.29	91.66	6567.01	199.29 S	2539.63 E	2546.28	1.64
9118.00	89.05	91.35	6568.37	201.76 S	2633.58 E	2640.24	0.42
9213.00	88.46	91.28	6570.44	203.94 S	2728.54 E	2735.19	0.62
9308.00	88.89	91.77	6572.64	206.47 S	2823.48 E	2830.14	0.68
9403.00	88.46	91.99	6574.84	209.58 S	2918.40 E	2925.11	0.51
9498.00	87.54	90.92	6578.16	211.99 S	3013.31 E	3020.02	1.48
9593.00	87.72	88.58	6582.09	211.58 S	3108.22 E	3114.80	2.47
9688.00	88.71	87.85	6585.05	208.62 S	3203.13 E	3209.46	1.29
9783.00	90.22	88.44	6585.95	205.55 S	3298.07 E	3304.14	1.71
9878.00	90.95	90.12	6584.98	204.35 S	3393.05 E	3398.96	1.93
9973.00	89.75	88.45	6584.39	203.17 S	3488.04 E	3493.77	2.16

10067.00	89.60	88.90	6584.92	201.00 S	3582.01 E	3587.53	0.51
10162.00	89.60	88.76	6585.58	199.07 S	3676.99 E	3682.31	0.15
10257.00	90.31	89.72	6585.66	197.81 S	3771.98 E	3777.13	1.25
10352.00	91.17	90.07	6584.44	197.64 S	3866.97 E	3872.00	0.98
10447.00	90.92	89.83	6582.70	197.56 S	3961.95 E	3966.87	0.36

10577.00	91.36	89.69	6580.11	197.03 S	4091.93 E	4096.67	0.35
10642.00	91.36	89.69	6578.57	196.68 S	4156.91 E	4161.56	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 92.76 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.83 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10642.00 FEET  
IS 4161.56 FEET ALONG 92.71 DEGREES (GRID)**

Surface surveys at 304 ft and 582 ft have had azimuths corrected to grid north, but they were not taken by Halliburton.

Last survey is a projection from 10577 ft MD to TD at 10642 ft MD.