

PCGC : Pressure Case Gamma
PCDC: Pressure Case Directional



1 : 600 / 1 : 240

Country		: USA		<div>Company : Noble Energy</div> <div>Rig : H&P 315</div> <div>Well : Crow Creek State AC36-77-1HN</div> <div>Field : Wattenberg</div> <div>Country : USA</div> <div>API Number : 05-123-37133</div>			
Field		: Wattenberg					
Location		: Lat: 40° 31' 24.89" North Long: 104° 23' 16.08" West					
Well		: Crow Creek State AC36-77-1HN					
Company		: Noble Energy					
Rig		: H&P 315		<div>Other Services</div> <div>Directional Drilling</div>			
LOCATION							
Latitude : 40° 31' 24.89" North Longitude : 104° 23' 16.08" West		UTM Easting = 3,309,186.442 ft UTM Northing = 1,435,520.049 ft					
Permanent Datum : Ground Level		Elevation : 4789.00 ft		Elev.		KB N/A	
Log Measured From : Drill Floor		24.00 ft Above Permanent Datum				DF 4813.00 ft GL 4789.00 ft WD N/A	
Drilling Measured From : Drill Floor		MD LOG					
Depth Logged : 646.00 ft To 11,155.00 ft		Unit No. : 11610113		Job No. :CA-XX-0900775411			
Date Logged : 06-Oct-13 To 14-Oct-13							
Total Depth MD : 11,155.00 ft TVD : 6,735.93 ft		Plot Type : Final					
Spud Date : 06-Oct-13		Plot Date : 14-Oct-13					
Run No.	Borehole Record (MD)			Borehole Record (MD)			
	Size	From	To	Run No.	Size	From	To
2	8.750 in	646.00 ft	6,036.00 ft				
3	8.750 in	6,036.00 ft	6,382.00 ft				
4	8.750 in	6,382.00 ft	7,042.00 ft				
5	6.125 in	7,042.00 ft	11,155.00 ft				
				</			

WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	08-Oct-13	09-Oct-13	10-Oct-13	13-Oct-13	
Rig Bit Number	2	3	4	5	
Bit Size (in)	8.750	8.750	8.750	6.125	
Tool Nominal OD (in)	6.750	6.750	6.750	4.750	
Log Start Depth (MD, ft)	646.00	6,036.00	6,382.00	7,042.00	
Log End Depth (MD, ft)	6,036.00	6,382.00	7,042.00	11,155.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	07-Oct-13 14:55	08-Oct-13 23:30	09-Oct-13 14:55	11-Oct-13 15:50	
Drill/Wipe End Date and Time	08-Oct-13 12:15	09-Oct-13 04:30	10-Oct-13 04:30	13-Oct-13 11:00	
Min Inc (deg) @ Depth (MD, ft)	0.22 @ 4,112.00	7.60 @ 6,154.00	22.15 @ 6,391.00	85.03 @ 8,175.00	
Max Inc (deg) @ Depth (MD, ft)	11.11 @ 3,068.00	17.29 @ 6,344.00	83.47 @ 6,988.00	93.24 @ 9,125.00	
Bit TFA(in2) / Bit Type	0.75 / PDC	.75 / PDC	0.75 / PDC	0.75 / PDC	
Flow Rate (gpm)	566.49	595.00	550.00	280.46	
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Fluid Type	Native/Spud Mud	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	
Density (ppg) / Viscosity (spqt)	9.00 / 33.00	9.55 / 33.00	10.40 / 39.00	9.43 / 33.00	
Filtrate CL (ppm)	1,500.00	1,500.00	2,000.00	2,200.00	
pH / Fluid Loss (mptm)	8.60 / 16	8.60 / 10	8.40 / 9	8.40 / 7	
PV (cP) / YP (lbf2)	4 / 4.00	4 / 4.00	10 / 12.00	9 / 5.00	
% Solids / % Sand	3.7 / .9	5.7 / 0.90	7.7 / .2	6.7 / 0.20	
% Oil / Oil:Water Ratio	N/A / N/A	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	N/A @ N/A	
Rmf @ Measured Temp (degF)	N/A @ N/A	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	N/A @ N/A	
Max Tool Temp (deg F) @ 100 ft	151.15 / ROM	151.17 / ROM	105.50 / ROM	213.11 / ROM	

Max Tool Temp (degF) / Source	151.47 / PCM	151.47 / PCM	165.58 / PCM	218.14 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Lead MWD Engineer	Henry Schmeidler	Henry Schmeidler	Henry Schmeidler	Henry Schmeidler	
Customer Representative	Martin Suarez	Martin Suarez	Steve Record	Steve Record	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.84	5.84	5.84	5.84	
Sub Serial Number	11404299	11404299	11404299	12134682	
Insert Serial Number	11680895	11680895	12001055	11680895	
Date and Time Initialized	06-Oct-13 22:56	01-Jan-70 00:00	09-Oct-13 05:50	11-Oct-13 04:26	
Date and Time Read	09-Oct-13 11:12	09-Oct-13 11:00	10-Oct-13 12:39	14-Oct-13 01:33	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	55.44	52.04	51.86	59.59	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11404299	11404299	11404299	12134682	
Sonde Serial Number	11638477	11638477	12177609	11638477	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	54.83	323.25	249.93	87.92	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	50.44	47.04	46.86	55.61	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11404299	11404299	11404299	12134682	
Insert/Sonde Serial Number	11292594	11292594	11293274	11292594	

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

WARRANTY

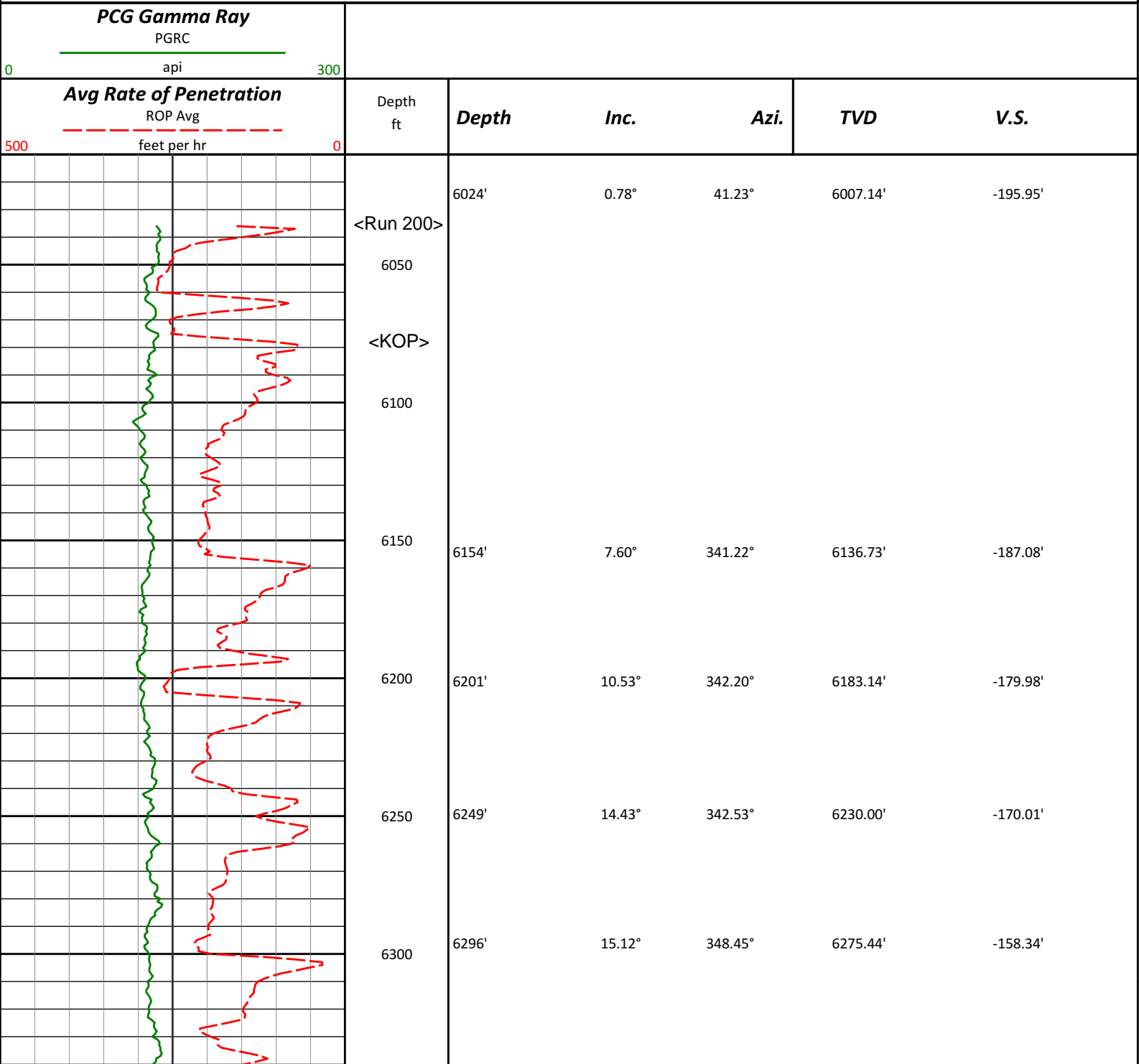
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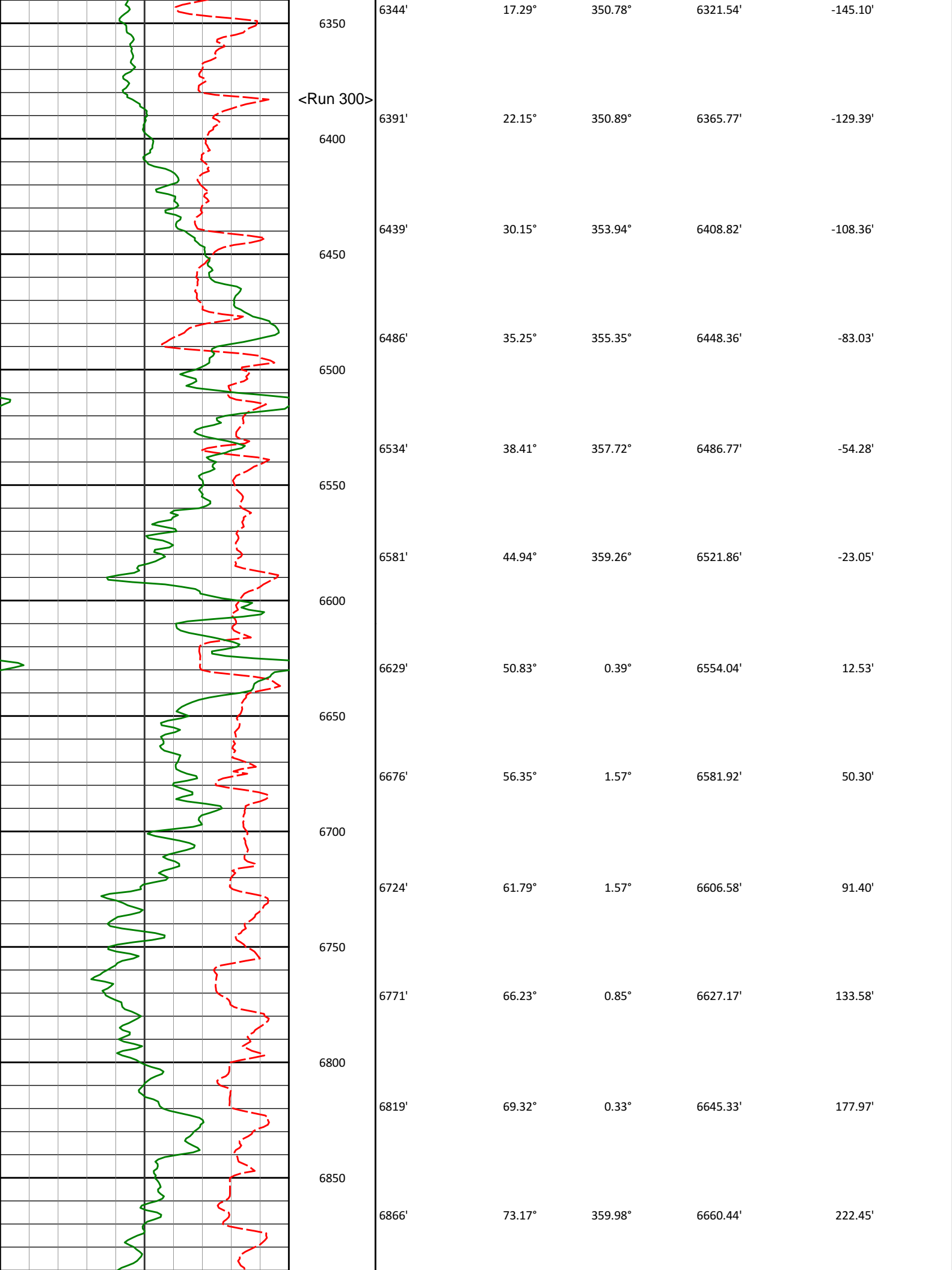
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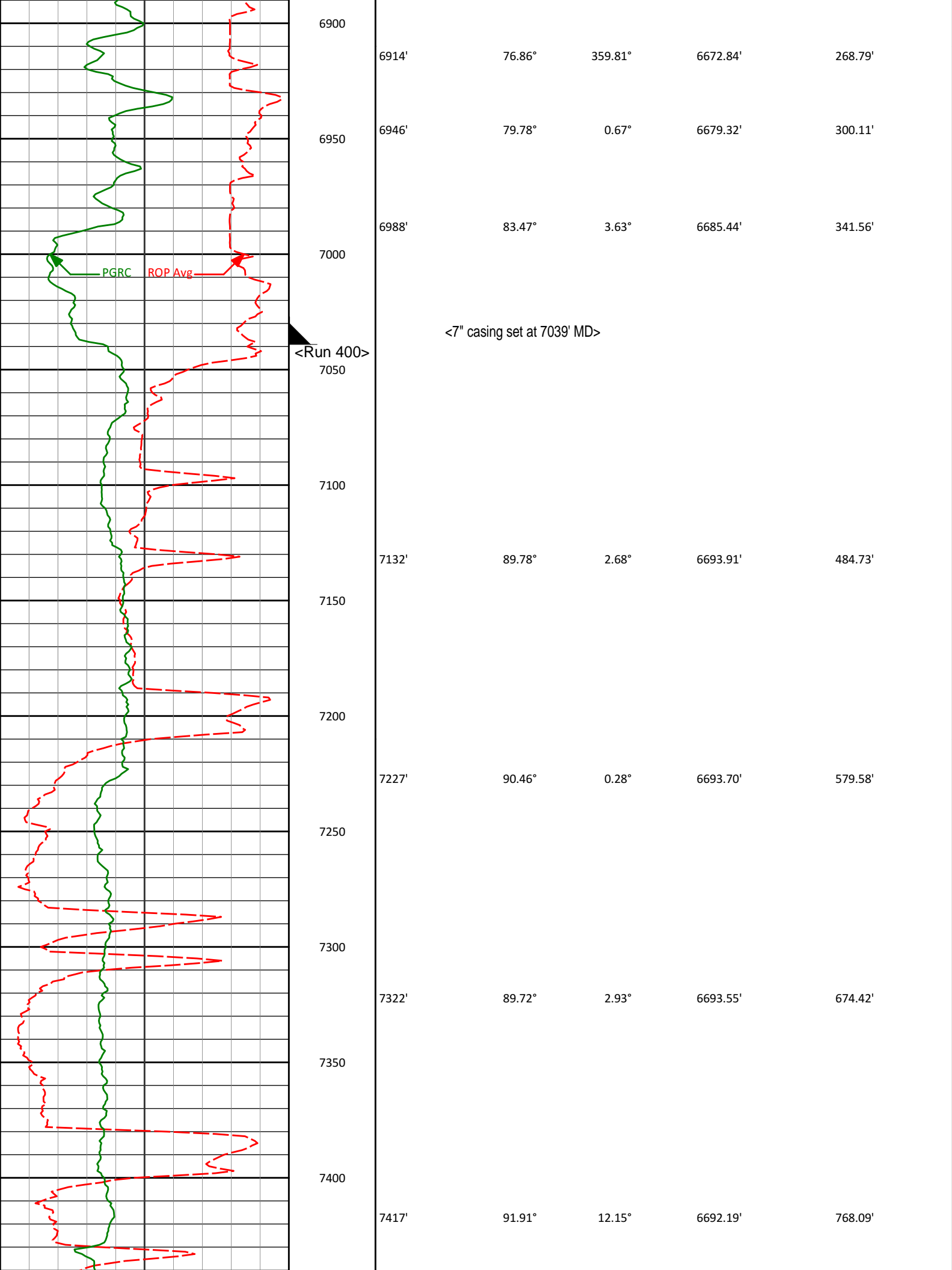
HALLIBURTON
Sperry Drilling Services

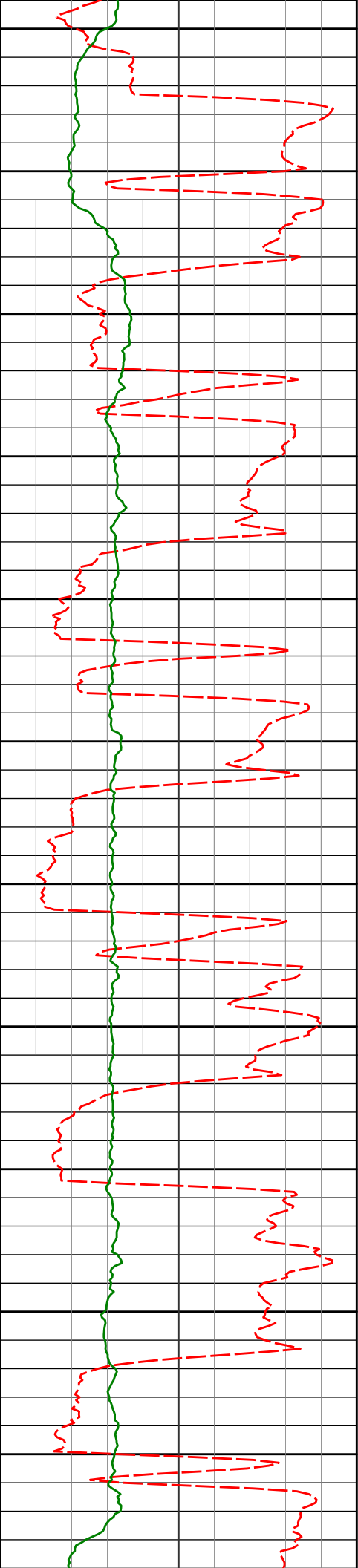
MD Main Log 1:600

Noble Energy, Inc
Crow Creek State AC36-77-1HN
H&P 315
T7N R63W









7450

7500

7550

7600

7650

7700

7750

7800

7850

7900

7950

7511'

91.20°

8.44°

6689.64'

860.01'

7606'

89.91°

1.27°

6688.72'

954.33'

7701'

89.88°

1.67°

6688.90'

1049.19'

7796'

89.97°

3.13°

6689.03'

1143.95'

7891'

89.32°

2.01°

6689.61'

1238.69'

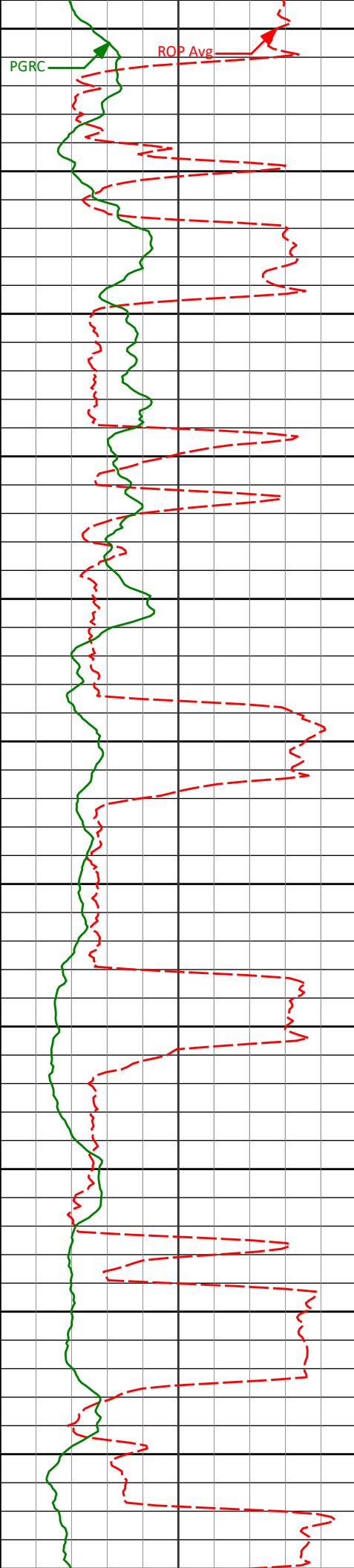
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87.72°

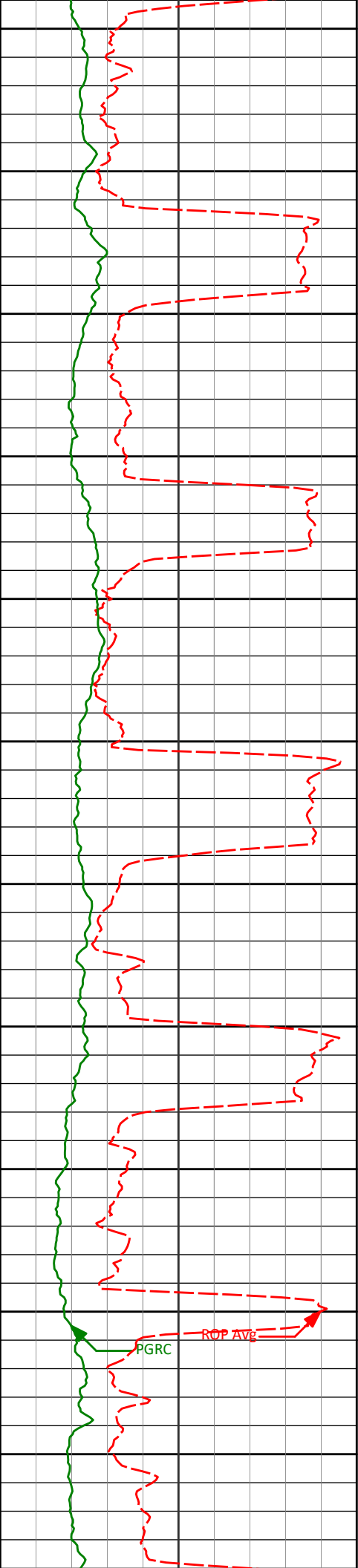
0.15°

6692.07'

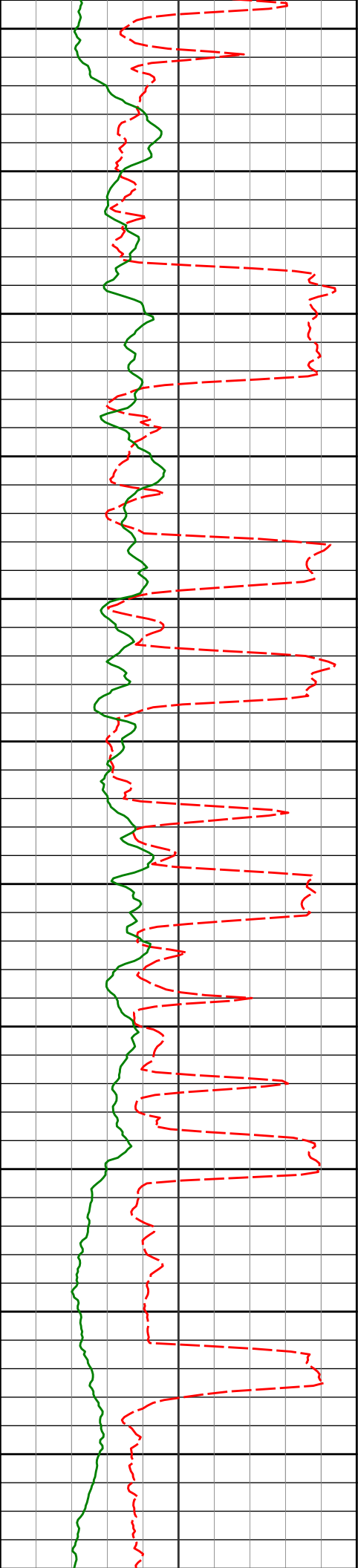
1333.55'



8000				
8050				
8081'	86.20°	355.68°	6697.11'	1428.38'
8100				
8150				
8175'	85.03°	353.84°	6704.30'	1521.92'
8200				
8250				
8270'	86.57°	353.75°	6711.25'	1616.36'
8300				
8350				
8365'	88.52°	354.88°	6715.31'	1711.03'
8400				
8450				
8460'	90.83°	354.09°	6715.85'	1805.80'
8500				



8550	8555'	92.22°	354.67°	6713.32'	1900.54'
8600					
8650	8650'	91.26°	356.90°	6710.43'	1995.39'
8700					
8750	8745'	88.37°	356.35°	6710.74'	2090.34'
8800					
8850	8840'	89.01°	358.96°	6712.91'	2185.30'
8900					
8950	8935'	89.54°	1.23°	6714.11'	2280.24'
9000					
9030'	91.39°	2.21°	6713.35'	2375.07'	
9050					



9100

9125'

93.24°

2.29°

6709.51'

2469.77'

9150

9200

9220'

91.94°

2.18°

6705.21'

2564.45'

9250

9300

9314'

89.01°

0.88°

6704.43'

2658.29'

9350

9400

9410'

87.84°

2.20°

6707.06'

2754.10'

9450

9500

9505'

88.09°

2.13°

6710.44'

2848.83'

9550

9600

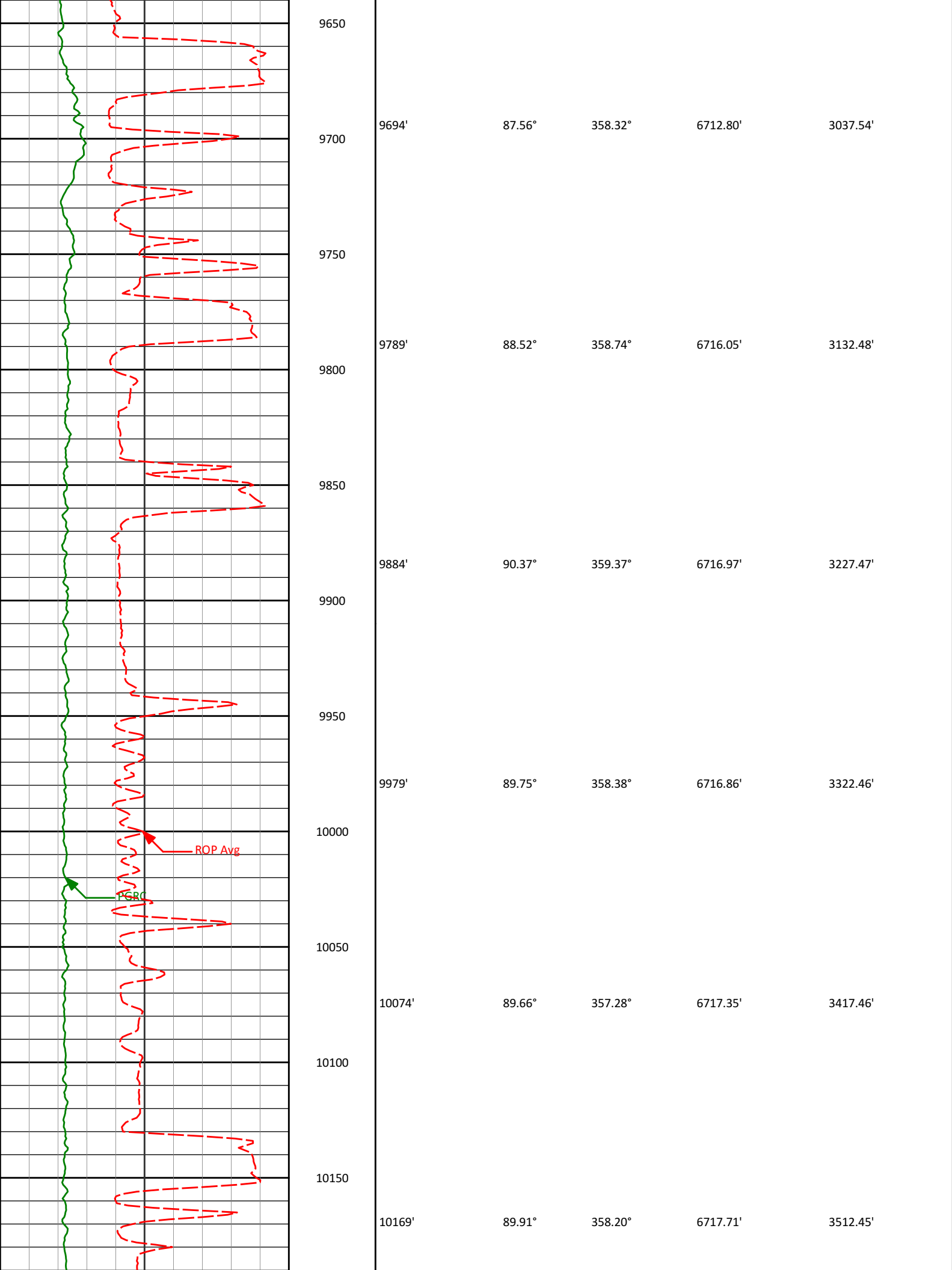
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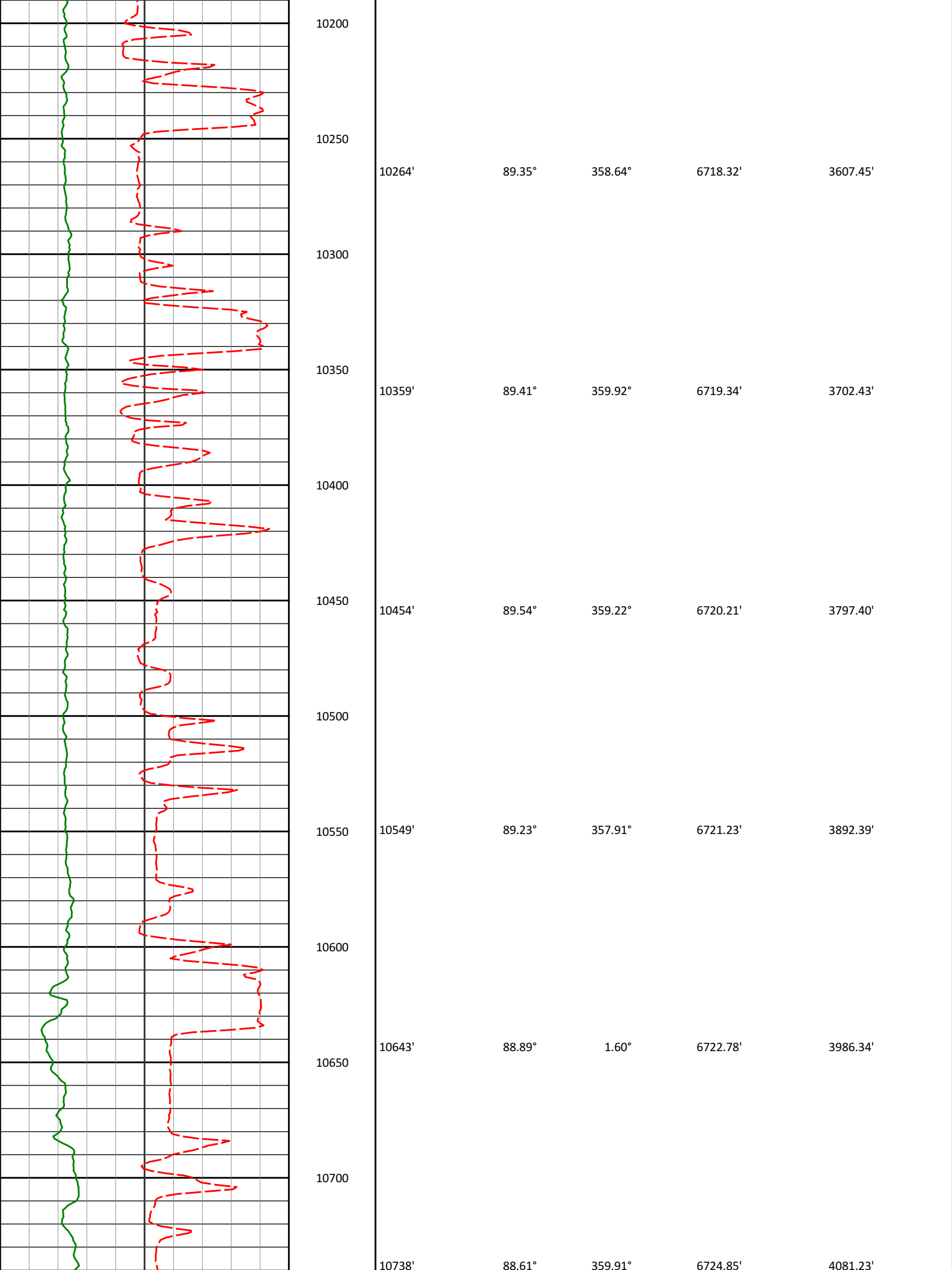
90.74°

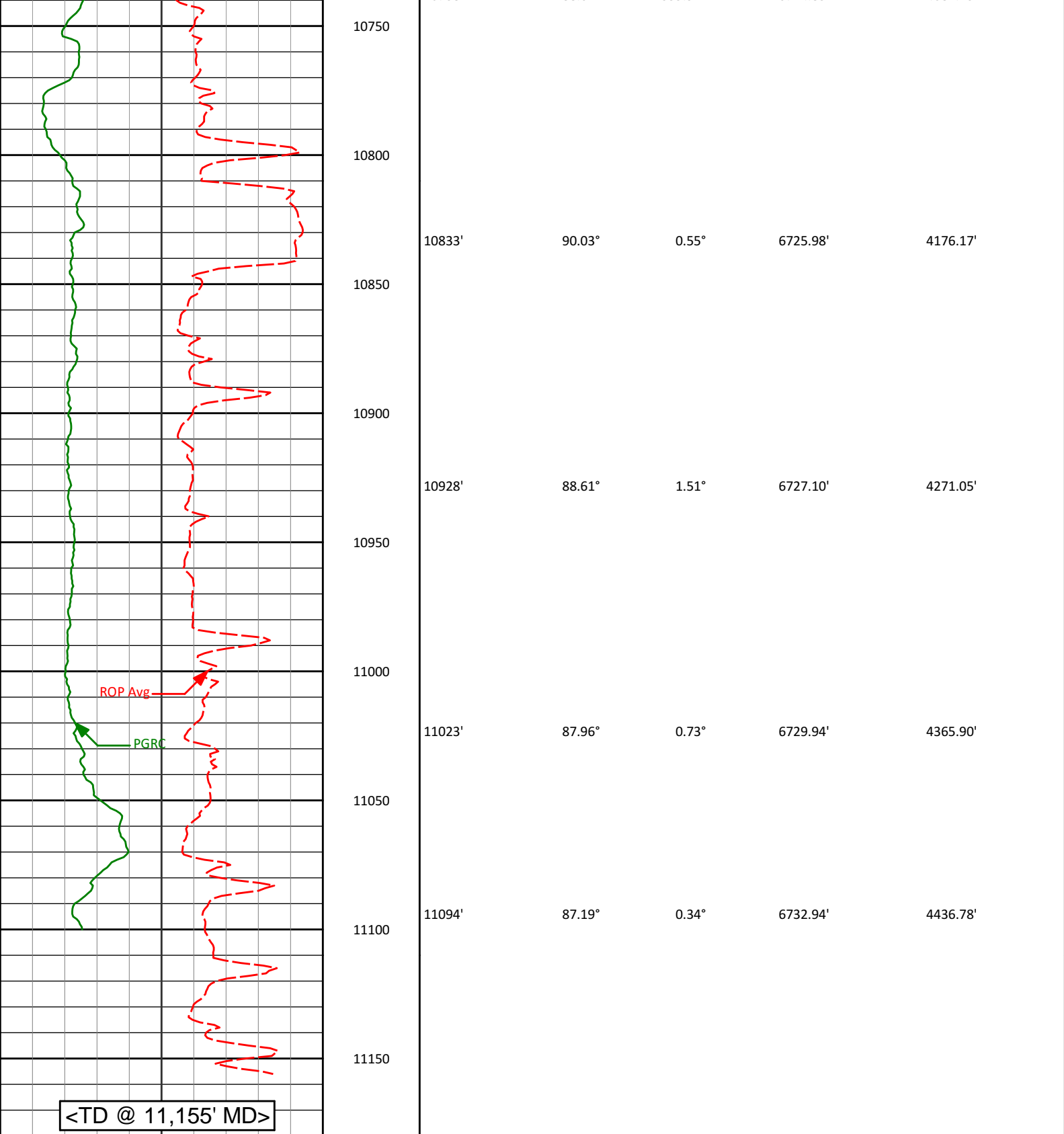
1.96°

6711.41'

2943.62'



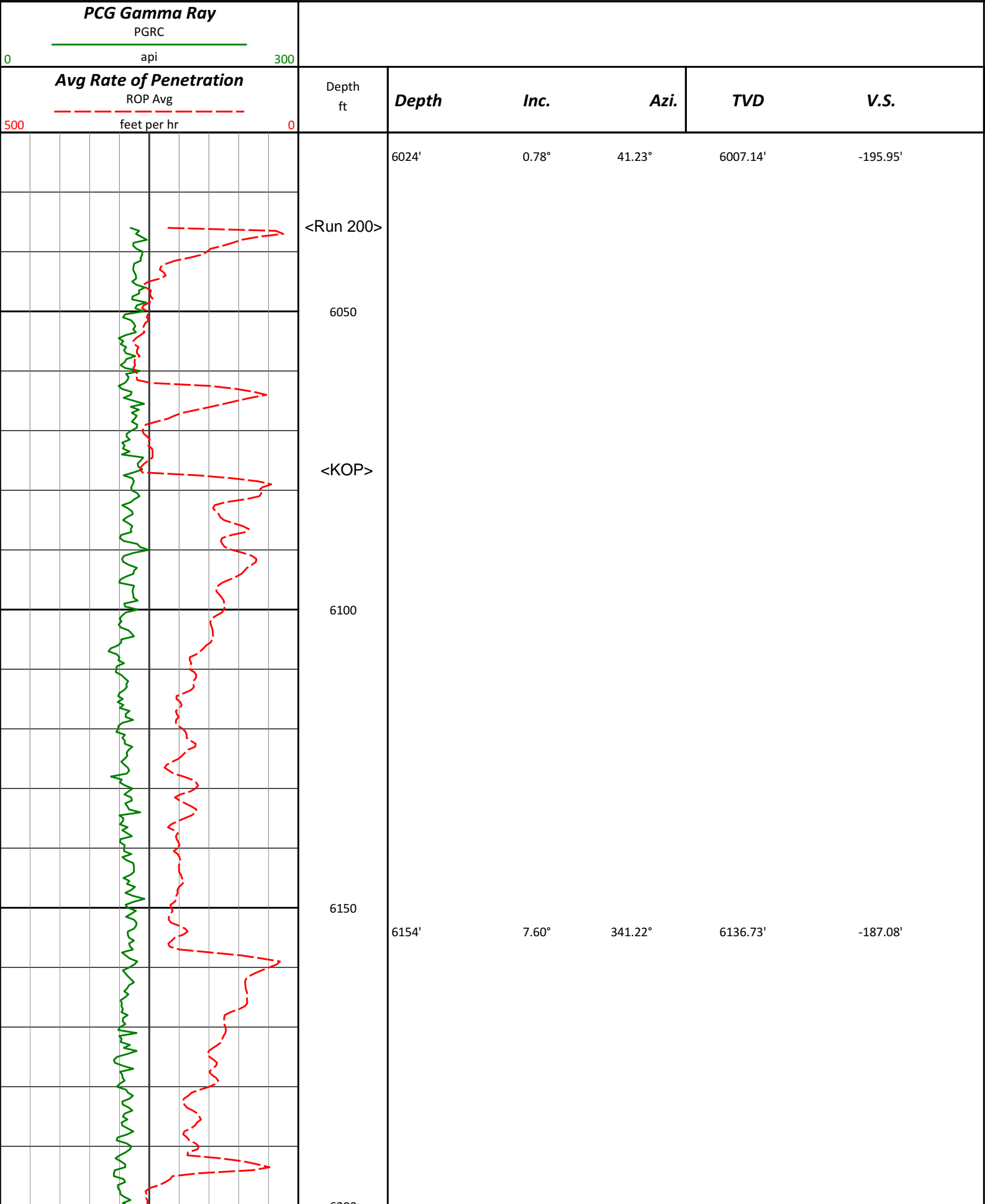


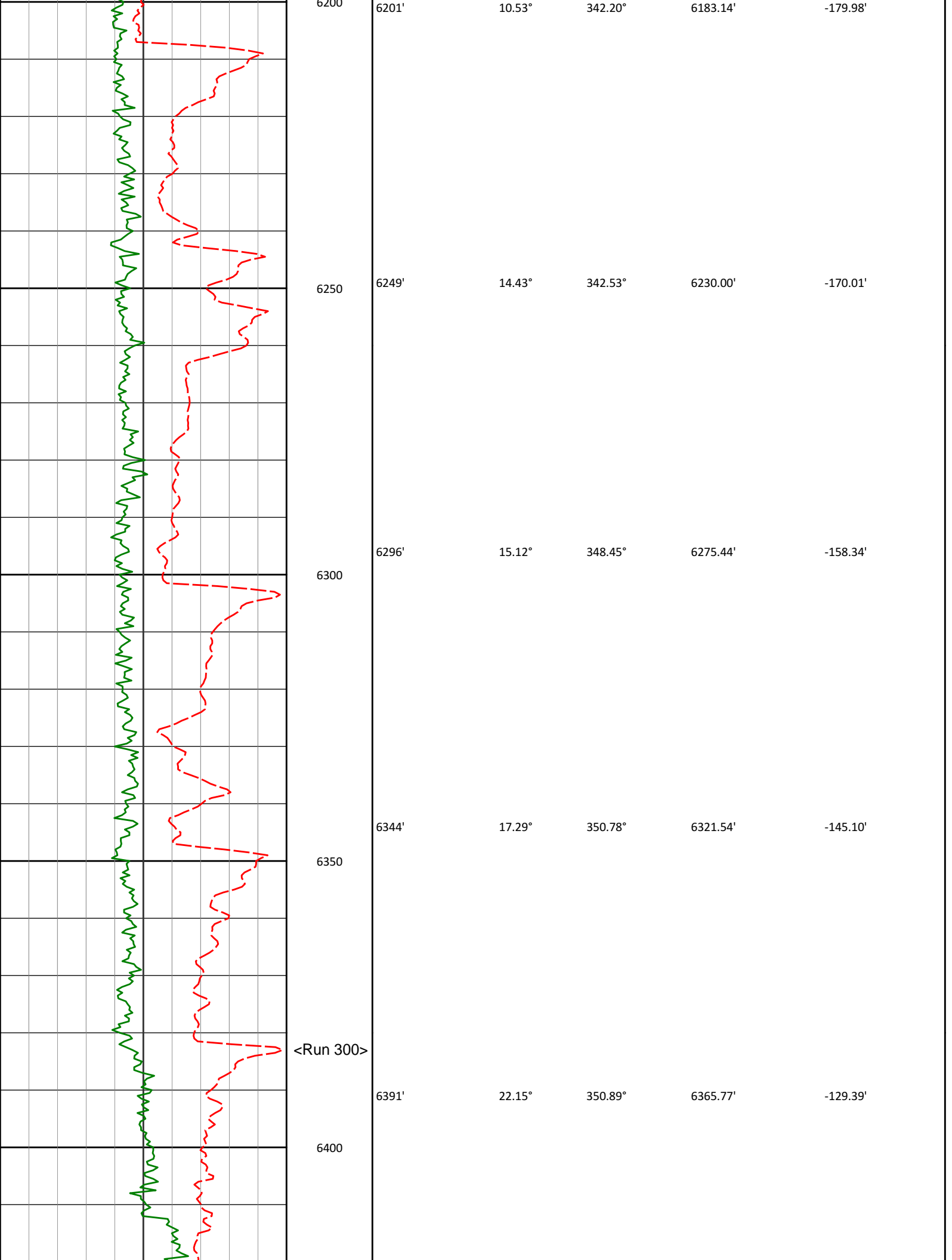


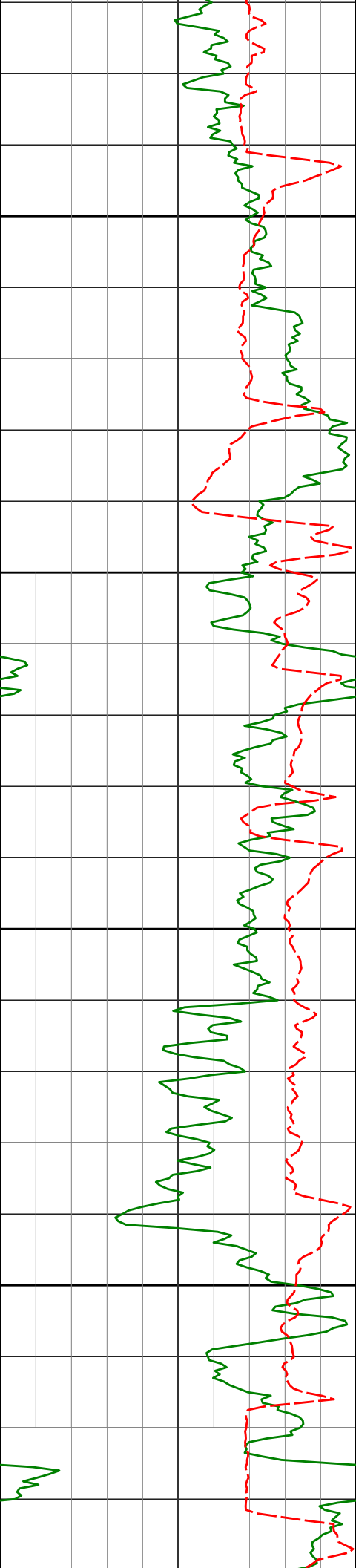
<div><div>Avg Rate of Penetration</div><div>ROP Avg</div><div>feet per hr</div><div>0</div></div>		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div><div>0</div><div>300</div></div>							

MWD Detail Log 1.240

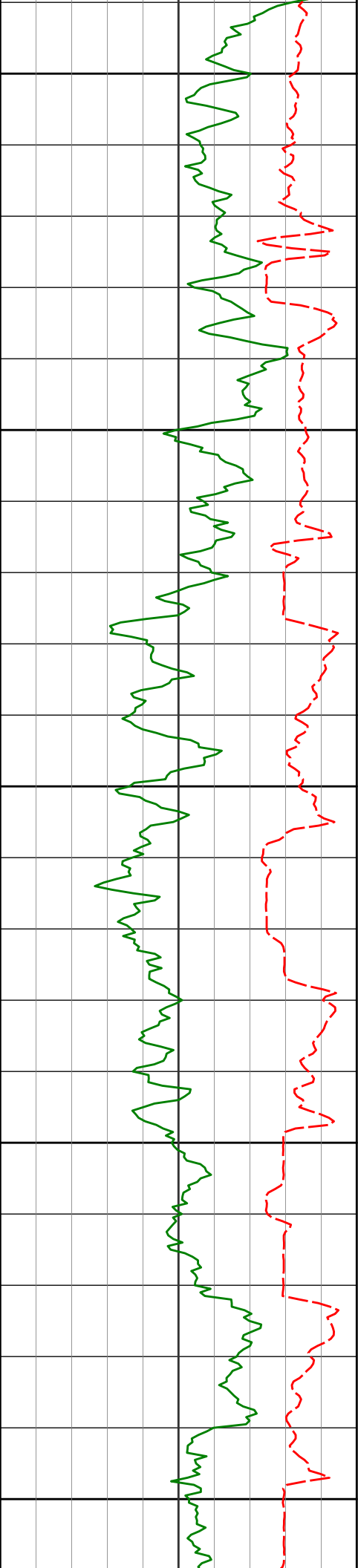
Noble Energy, Inc
Crow Creek State AC36-77-1HN
H&P 315
T7N R63W







6439'	30.15°	353.94°	6408.82'	-108.36'
6486'	35.25°	355.35°	6448.36'	-83.03'
6534'	38.41°	357.72°	6486.77'	-54.28'
6581'	44.94°	359.26°	6521.86'	-23.05'
6629'	50.83°	0.39°	6554.04'	12.53'



6650

6676'

56.35°

1.57°

6581.92'

50.30'

6700

6724'

61.79°

1.57°

6606.58'

91.40'

6750

6771'

66.23°

0.85°

6627.17'

133.58'

6800

6819'

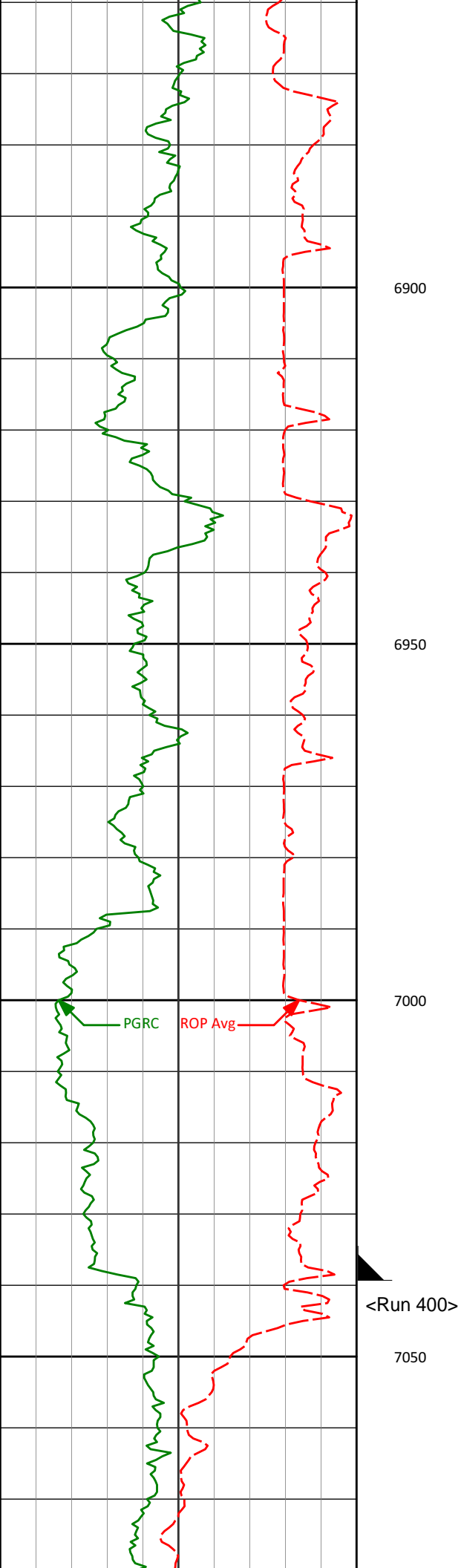
69.32°

0.33°

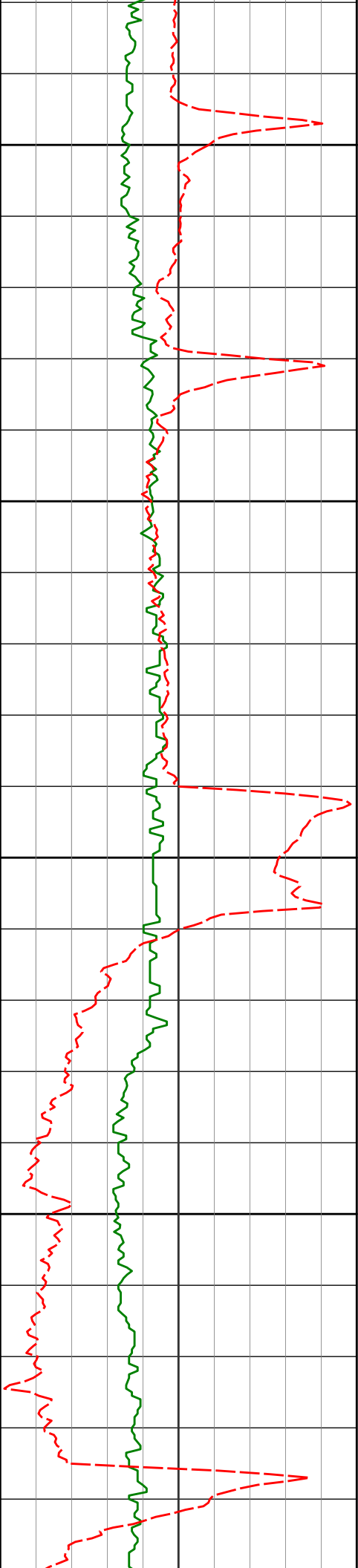
6645.33'

177.97'

6850



6866'	73.17°	359.98°	6660.44'	222.45'
6914'	76.86°	359.81°	6672.84'	268.79'
6946'	79.78°	0.67°	6679.32'	300.11'
6988'	83.47°	3.63°	6685.44'	341.56'
<7" casing set at 7039' MD>				
<Run 400>				



7100

7132'

89.78°

2.68°

6693.91'

484.73'

7150

7200

7227'

90.46°

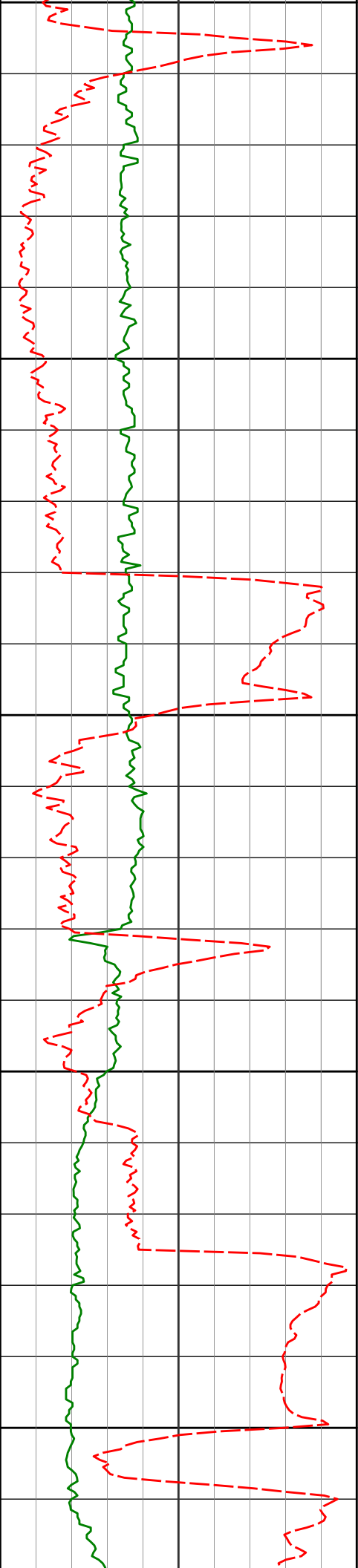
0.28°

6693.70'

579.58'

7250

7300



7322'

89.72°

2.93°

6693.55'

674.42'

7417'

91.91°

12.15°

6692.19'

768.09'

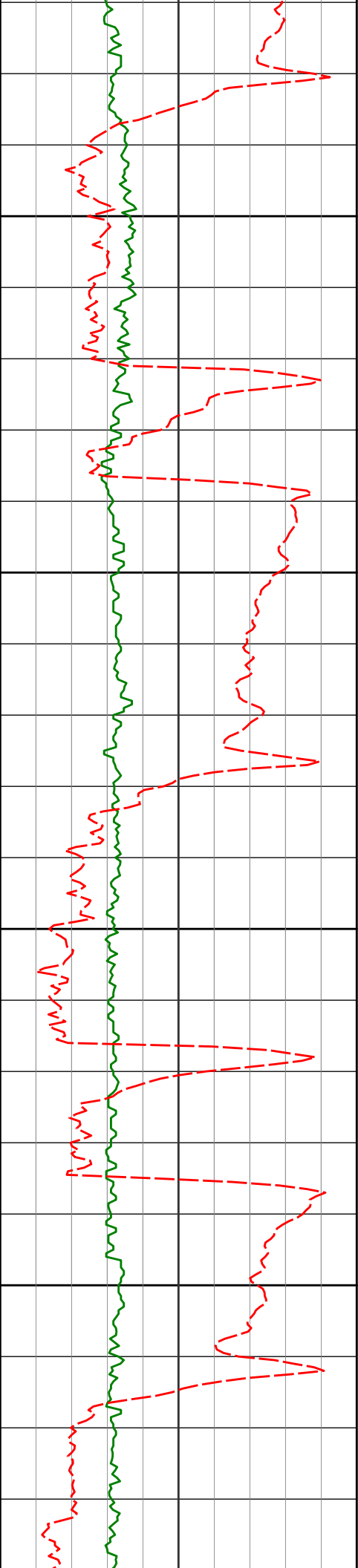
7511'

91.20°

8.44°

6689.64'

860.01'



7550

7600

7650

7700

7606'

89.91°

1.27°

6688.72'

954.33'

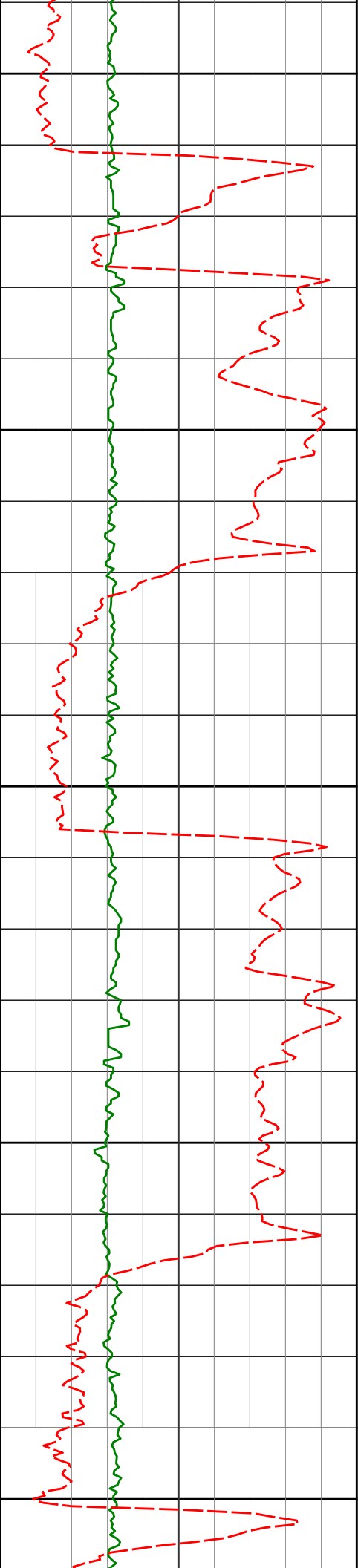
7701'

89.88°

1.67°

6688.90'

1049.19'



7750

7796'

89.97°

3.13°

6689.03'

1143.95'

7800

7850

7891'

89.32°

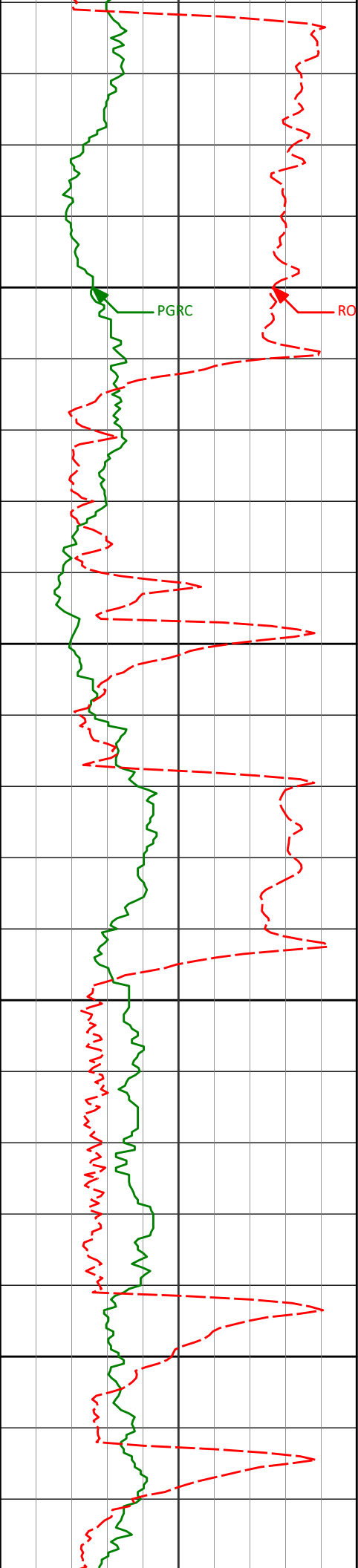
2.01°

6689.61'

1238.69'

7900

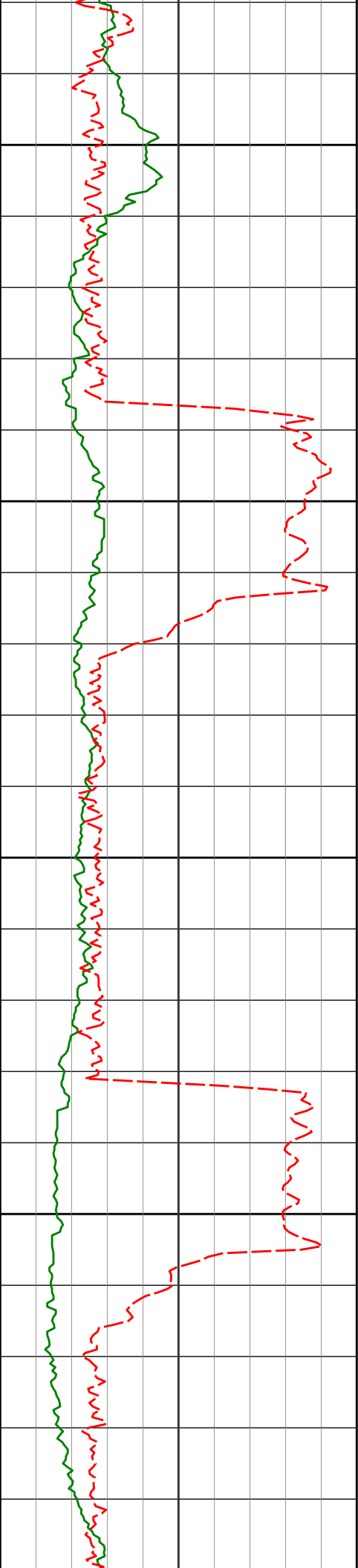
7950



7986'	87.72°	0.15°	6692.07'	1333.55'
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8081'	86.20°	355.68°	6697.11'	1428.38'
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8175'	85.03°	353.84°	6704.30'	1521.92'
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8200

8250

8270'

86.57°

353.75°

6711.25'

1616.36'

8300

8350

8365'

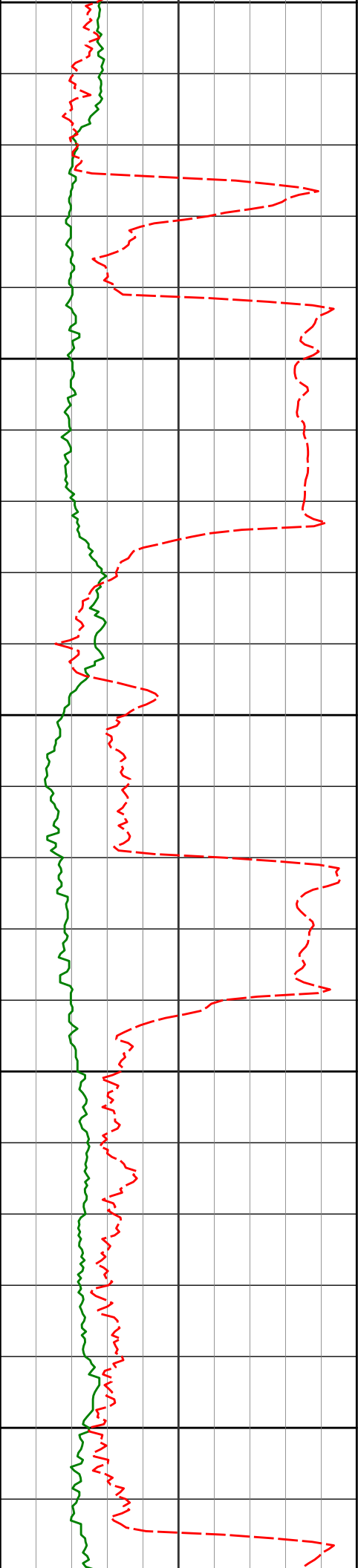
88.52°

354.88°

6715.31'

1711.03'

8400



8400

8450

8500

8550

8600

8460'

90.83°

354.09°

6715.85'

1805.80'

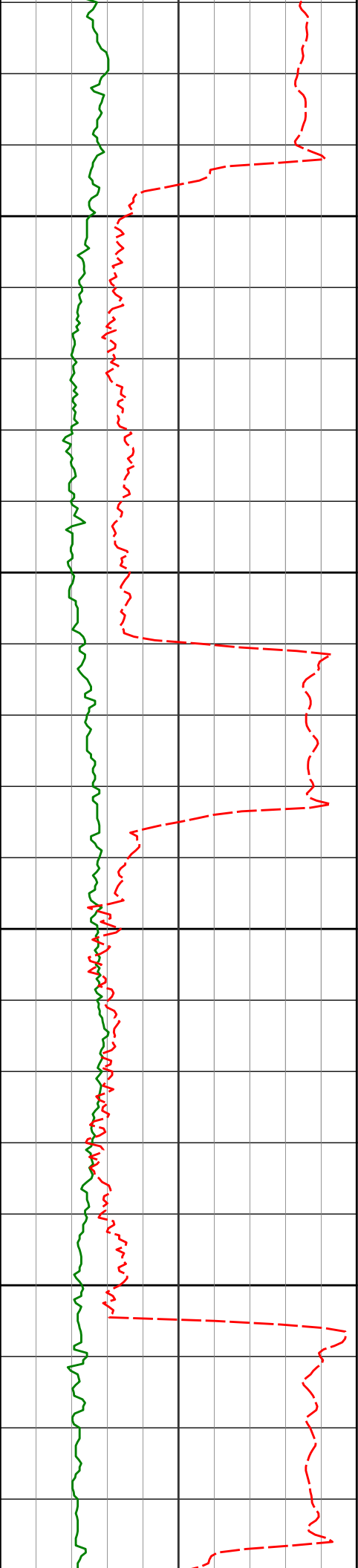
8555'

92.22°

354.67°

6713.32'

1900.54'



8650

8700

8750

8800

8650'

8745'

8840'

91.26°

88.37°

89.21°

356.90°

356.35°

352.86°

6710.43'

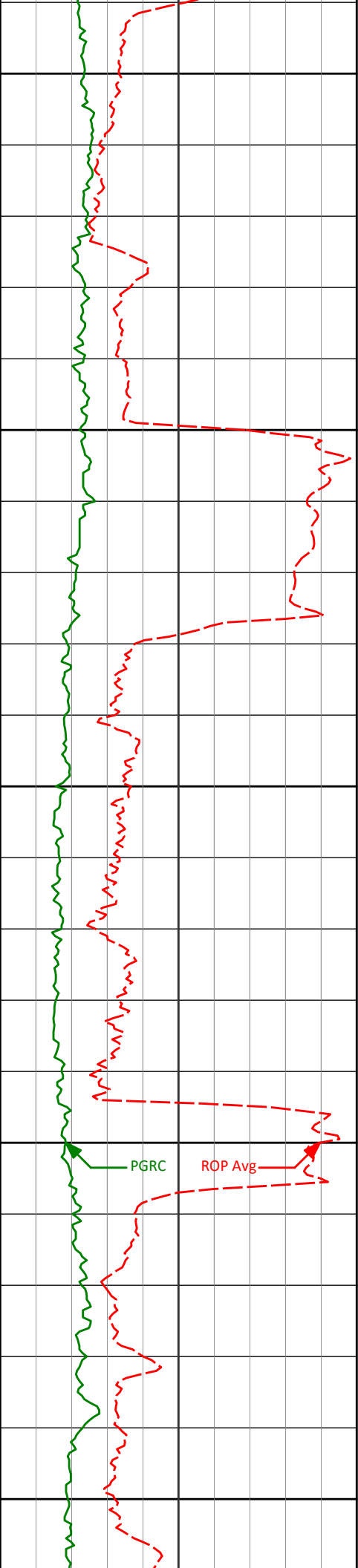
6710.74'

6712.21'

1995.39'

2090.34'

2125.22'



8850

8900

8950

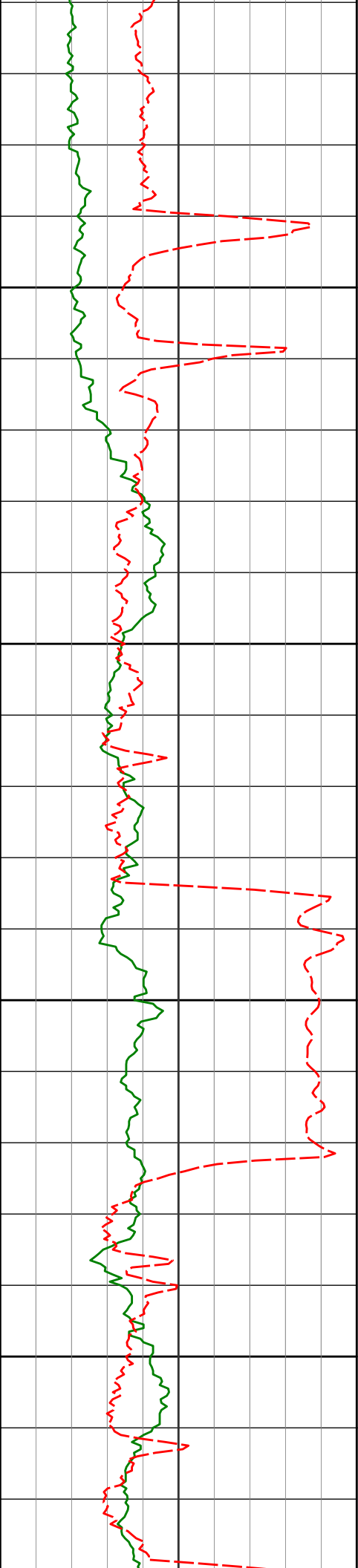
9000

9050

PGRC

ROP Avg

8840'	89.01°	358.96°	6712.91'	2185.30'
8935'	89.54°	1.23°	6714.11'	2280.24'
9030'	91.39°	2.21°	6713.35'	2375.07'



9100

9125'

93.24°

2.29°

6709.51'

2469.77'

9150

9200

9220'

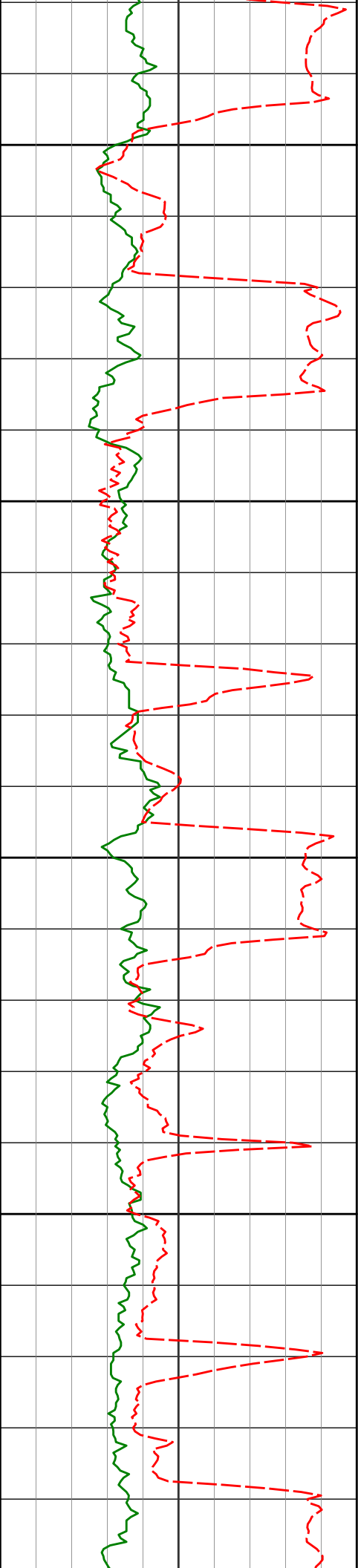
91.94°

2.18°

6705.21'

2564.45'

9250



9300

9314'

89.01°

0.88°

6704.43'

2658.29'

9350

9400

9410'

87.84°

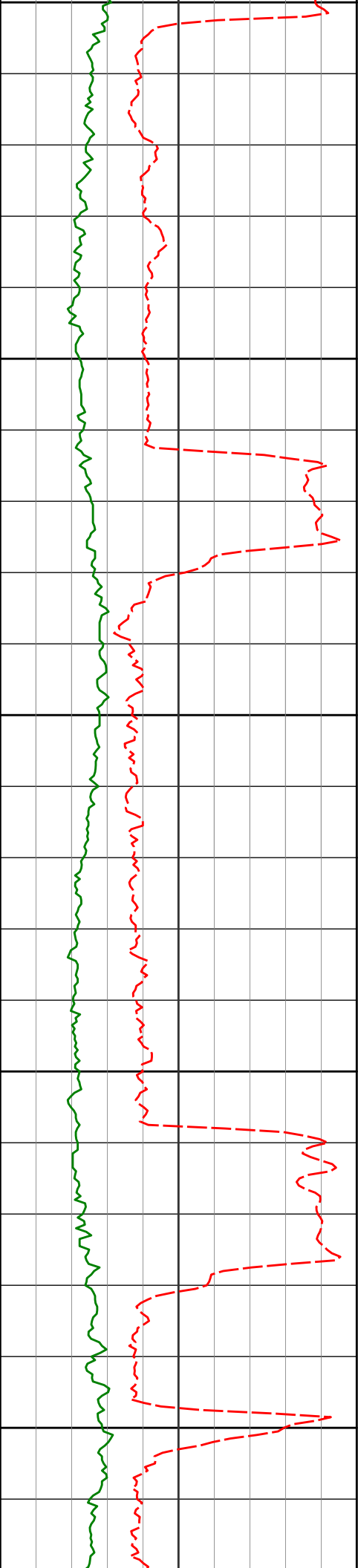
2.20°

6707.06'

2754.10'

9450

9500



9500

9550

9600

9650

9700

9505'

9600'

9694'

88.09°

90.74°

87.56°

2.13°

1.96°

358.32°

6710.44'

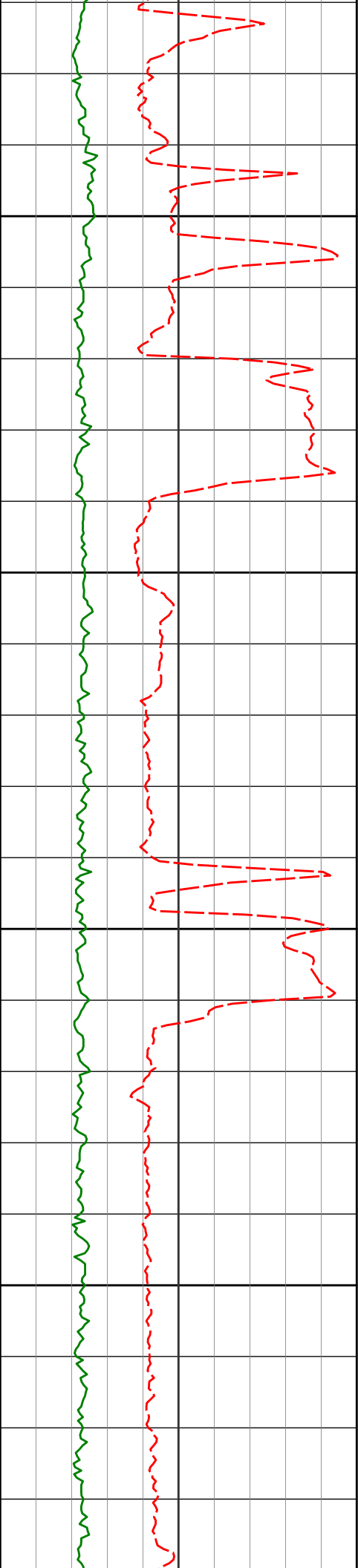
6711.41'

6712.80'

2848.83'

2943.62'

3037.54'



9750

9800

9850

9900

9789'

88.52°

358.74°

6716.05'

3132.48'

9884'

90.37°

359.37°

6716.97'

3227.47'



9950

9979'

89.75°

358.38°

6716.86'

3322.46'

10000

PGRD

ROP Avg

10050

10074'

89.66°

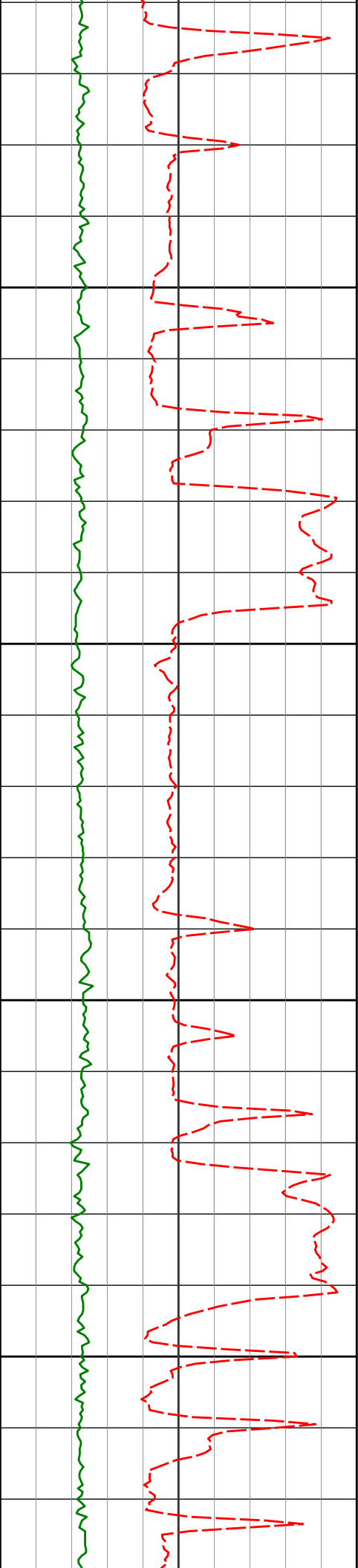
357.28°

6717.35'

3417.46'

10100

10150



10169'

89.91°

358.20°

6717.71'

3512.45'

10200

10250

10264'

89.35°

358.64°

6718.32'

3607.45'

10300

10350

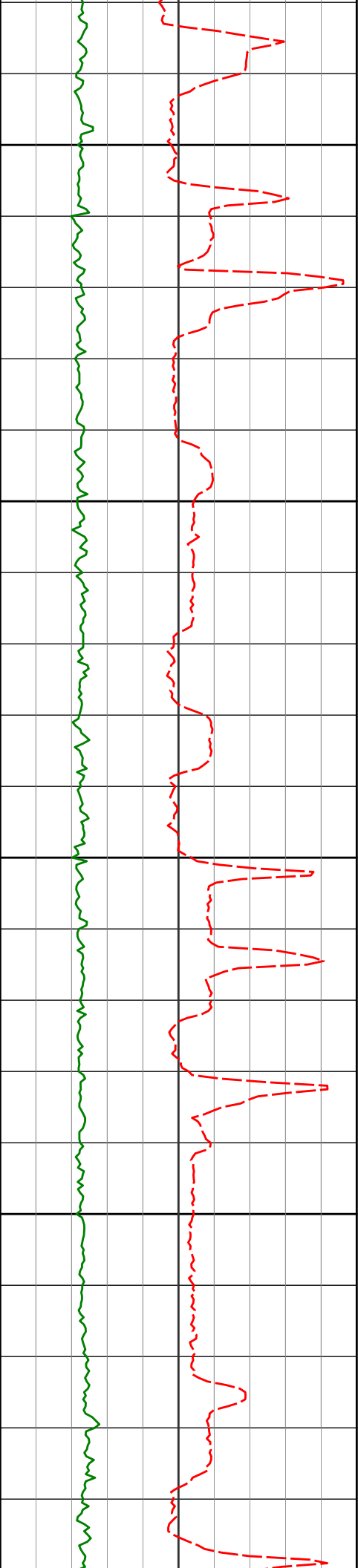
10359'

89.41°

359.92°

6719.34'

3702.43'



10400

10450

10500

10550

10600

10454'

89.54°

359.22°

6720.21'

3797.40'

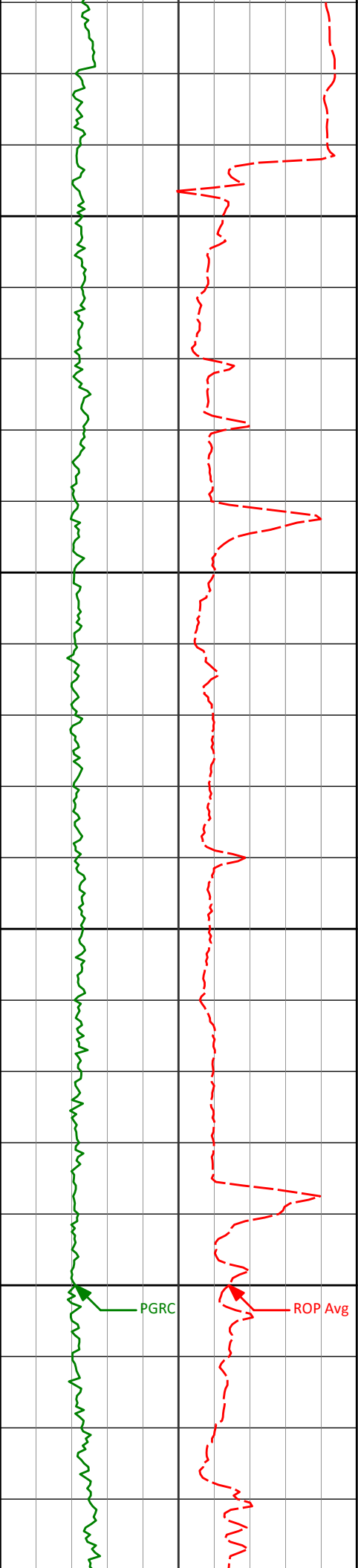
10549'

89.23°

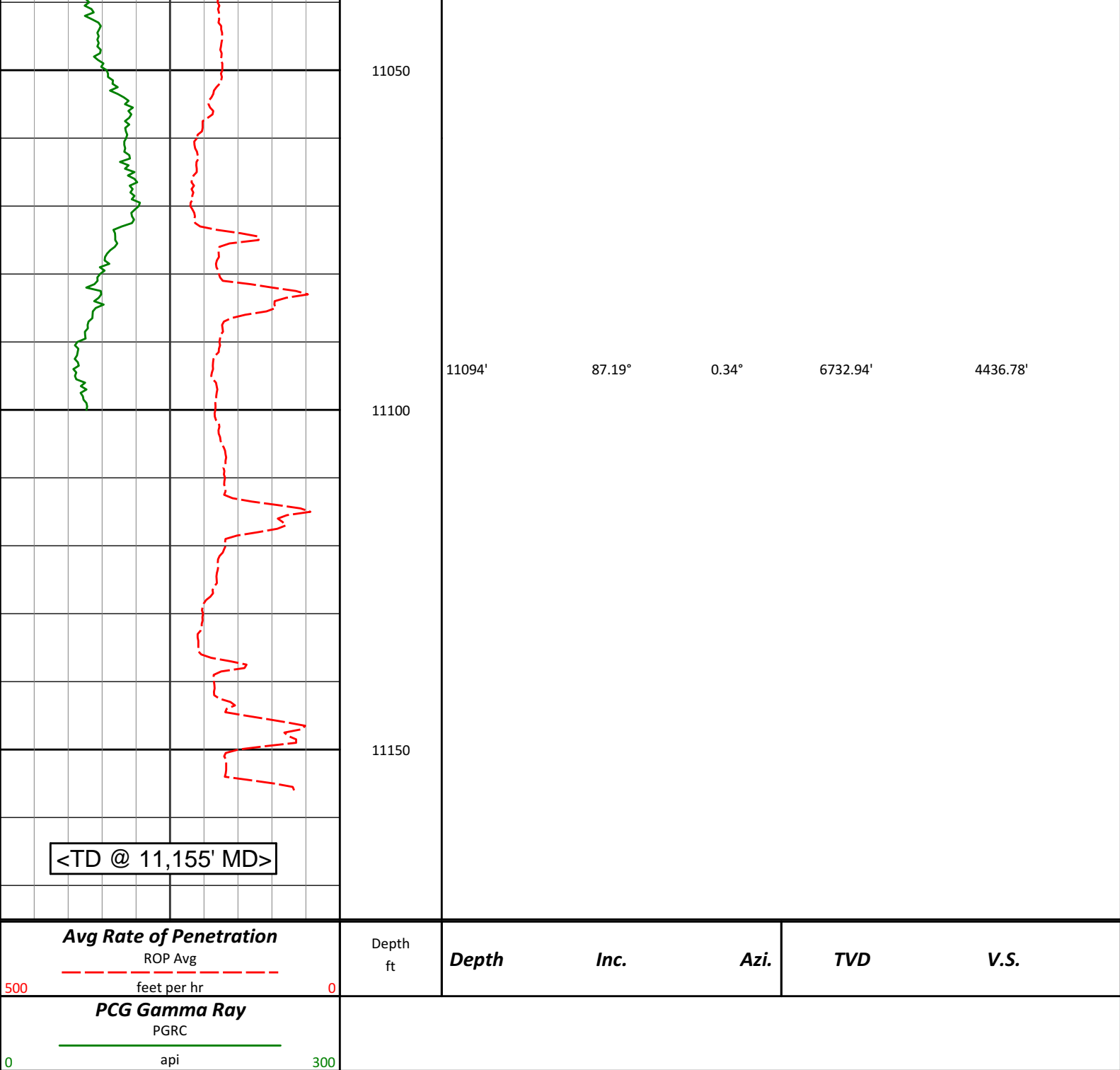
357.91°

6721.23'

3892.39'



10833'	90.03°	0.55°	6725.98'	4176.17'
10850				
10900				
10928'	88.61°	1.51°	6727.10'	4271.05'
10950				
11000				
11023'	87.96°	0.73°	6729.94'	4365.90'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Crow Creek State AC36-77-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0900775411

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
330.00	0.90	246.47	329.99	1.03 S	2.38 W	-0.97	0.27
616.00	0.40	214.47	615.97	2.75 S	5.00 W	-2.61	0.21

713.00	0.43	202.99	712.97	3.37 S	5.33 W	-3.21	0.09
804.00	0.65	228.89	803.96	4.02 S	5.85 W	-3.85	0.36
897.00	0.64	244.20	896.96	4.59 S	6.72 W	-4.40	0.19
989.00	0.60	264.22	988.95	4.86 S	7.67 W	-4.64	0.24
1082.00	2.13	188.00	1081.93	6.63 S	8.40 W	-6.39	2.23
1175.00	2.51	189.37	1174.85	10.36 S	8.97 W	-10.09	0.41
1269.00	0.93	190.88	1268.80	13.14 S	9.45 W	-12.87	1.68
1362.00	0.68	165.09	1361.79	14.42 S	9.45 W	-14.14	0.47
1454.00	1.05	202.05	1453.78	15.72 S	9.63 W	-15.44	0.71
1549.00	0.84	175.68	1548.77	17.22 S	9.90 W	-16.93	0.50
1644.00	1.03	183.39	1643.76	18.77 S	9.90 W	-18.48	0.24
1739.00	0.73	158.62	1738.75	20.18 S	9.73 W	-19.90	0.51
1834.00	0.80	182.76	1833.74	21.41 S	9.54 W	-21.13	0.35
1929.00	0.66	212.77	1928.73	22.54 S	9.87 W	-22.24	0.42
2024.00	0.77	201.99	2023.73	23.59 S	10.41 W	-23.29	0.18
2119.00	3.03	225.35	2118.67	25.95 S	12.44 W	-25.58	2.46
2214.00	3.75	231.51	2213.50	29.65 S	16.65 W	-29.16	0.85
2309.00	5.32	229.16	2308.20	34.46 S	22.42 W	-33.81	1.67
2404.00	6.09	215.72	2402.73	41.44 S	28.70 W	-40.60	1.62
2498.00	7.18	212.18	2496.10	50.46 S	34.74 W	-49.45	1.24
2593.00	10.31	207.97	2589.99	63.00 S	41.89 W	-61.78	3.36
2688.00	10.34	210.35	2683.45	77.86 S	50.18 W	-76.40	0.45
2783.00	10.99	212.96	2776.81	92.81 S	59.42 W	-91.07	0.85
2878.00	10.83	219.70	2870.10	107.28 S	70.04 W	-105.23	1.35
2973.00	11.02	219.29	2963.37	121.18 S	81.50 W	-118.80	0.21
3068.00	11.11	217.87	3056.61	135.43 S	92.87 W	-132.72	0.30
3162.00	9.38	218.22	3149.11	148.60 S	103.17 W	-145.59	1.84
3257.00	8.41	214.97	3242.96	160.37 S	111.94 W	-157.10	1.15
3352.00	7.81	214.44	3337.01	171.39 S	119.57 W	-167.90	0.63
3447.00	6.01	214.23	3431.32	180.83 S	126.02 W	-177.15	1.89
3542.00	5.12	215.96	3525.87	188.38 S	131.31 W	-184.55	0.95
3637.00	2.94	202.28	3620.63	194.07 S	134.73 W	-190.13	2.50
3732.00	1.35	178.03	3715.56	197.44 S	135.61 W	-193.48	1.89
3827.00	0.25	53.67	3810.55	198.44 S	135.41 W	-194.48	1.58
4112.00	0.22	135.08	4095.55	198.45 S	134.53 W	-194.52	0.11
4397.00	2.23	135.09	4380.47	202.77 S	130.23 W	-198.96	0.71
4492.00	0.26	40.80	4475.45	203.91 S	128.78 W	-200.14	2.39
4776.00	1.66	328.45	4759.40	199.91 S	130.50 W	-196.10	0.56
5061.00	1.34	347.04	5044.31	193.16 S	133.41 W	-189.26	0.20
5346.00	1.77	151.53	5329.27	193.78 S	132.06 W	-189.92	1.08
5631.00	1.27	130.69	5614.17	199.70 S	127.57 W	-195.97	0.26
5916.00	0.61	38.28	5899.14	200.57 S	124.23 W	-196.93	0.50
6024.00	0.78	41.23	6007.14	199.57 S	123.39 W	-195.95	0.16
6154.00	7.60	341.22	6136.73	190.75 S	125.58 W	-187.08	5.57
6201.00	10.53	342.20	6183.14	183.72 S	127.89 W	-179.98	6.23
6249.00	14.43	342.53	6230.00	173.83 S	131.03 W	-170.01	8.13
6296.00	15.12	348.45	6275.44	162.24 S	134.02 W	-158.34	3.53
6344.00	17.29	350.78	6321.54	149.07 S	136.41 W	-145.10	4.72
6391.00	22.15	350.89	6365.77	133.42 S	138.93 W	-129.39	10.33
6439.00	30.15	353.94	6408.82	112.46 S	141.64 W	-108.36	16.91
6486.00	35.25	355.35	6448.36	87.19 S	143.99 W	-83.03	10.98
6534.00	38.41	357.72	6486.77	58.47 S	145.71 W	-54.28	7.21
6581.00	44.94	359.26	6521.86	27.25 S	146.50 W	-23.05	14.07
6629.00	50.83	0.39	6554.04	8.34 N	146.59 W	12.53	12.39
6676.00	56.35	1.57	6581.92	46.14 N	145.93 W	50.30	11.92
6724.00	61.79	1.57	6606.58	87.29 N	144.80 W	91.40	11.33
6771.00	66.23	0.85	6627.17	129.51 N	143.92 W	133.58	9.55
6819.00	69.32	0.33	6645.33	173.94 N	143.46 W	177.97	6.50
6866.00	73.17	359.98	6660.44	218.44 N	143.34 W	222.45	8.24
6914.00	76.86	359.81	6672.84	264.80 N	143.42 W	268.79	7.69
6946.00	79.78	0.67	6679.32	296.13 N	143.29 W	300.11	9.47
6988.00	83.47	3.63	6685.44	337.64 N	141.72 W	341.56	11.23
7132.00	89.78	2.68	6693.91	481.10 N	133.82 W	484.73	4.43
7227.00	90.46	0.28	6693.70	576.06 N	131.37 W	579.58	2.62
7322.00	89.72	2.93	6693.55	671.01 N	128.72 W	674.42	2.90
7417.00	91.91	12.15	6692.19	765.08 N	116.27 W	768.09	9.97
7511.00	91.20	8.44	6689.64	857.51 N	99.49 W	860.01	4.02
7606.00	89.91	1.27	6688.72	952.10 N	91.46 W	954.33	7.67
7701.00	89.88	1.67	6688.90	1047.07 N	89.02 W	1049.19	0.42
7796.00	89.97	3.13	6689.03	1141.99 N	85.04 W	1143.95	1.54
7891.00	89.32	2.01	6689.61	1236.89 N	80.79 W	1238.69	1.36

7986.00	87.72	0.15	6692.07	1331.83 N	79.00 W	1333.55	2.59
8081.00	86.20	355.68	6697.11	1426.61 N	82.45 W	1428.38	4.96
8175.00	85.03	353.84	6704.30	1519.94 N	91.01 W	1521.92	2.31
8270.00	86.57	353.75	6711.25	1614.12 N	101.24 W	1616.36	1.62
8365.00	88.52	354.88	6715.31	1708.56 N	110.64 W	1711.03	2.37
8460.00	90.83	354.09	6715.85	1803.12 N	119.77 W	1805.80	2.57
8555.00	92.22	354.67	6713.32	1897.62 N	129.07 W	1900.54	1.58
8650.00	91.26	356.90	6710.43	1992.31 N	136.05 W	1995.39	2.55
8745.00	88.37	356.35	6710.74	2087.14 N	141.64 W	2090.34	3.10
8840.00	89.01	358.96	6712.91	2182.03 N	145.53 W	2185.30	2.82
8935.00	89.54	1.23	6714.11	2277.01 N	145.38 W	2280.24	2.45
9030.00	91.39	2.21	6713.35	2371.96 N	142.53 W	2375.07	2.21
9125.00	93.24	2.29	6709.51	2466.81 N	138.80 W	2469.77	1.95
9220.00	91.94	2.18	6705.21	2561.63 N	135.10 W	2564.45	1.37
9314.00	89.01	0.88	6704.43	2655.59 N	132.59 W	2658.29	3.41
9410.00	87.84	2.20	6707.06	2751.51 N	130.01 W	2754.10	1.84
9505.00	88.09	2.13	6710.44	2846.38 N	126.42 W	2848.83	0.27
9600.00	90.74	1.96	6711.41	2941.31 N	123.03 W	2943.62	2.80
9694.00	87.56	358.32	6712.80	3035.27 N	122.79 W	3037.54	5.14
9789.00	88.52	358.74	6716.05	3130.18 N	125.23 W	3132.48	1.10
9884.00	90.37	359.37	6716.97	3225.16 N	126.79 W	3227.47	2.06
9979.00	89.75	358.38	6716.86	3320.14 N	128.66 W	3322.46	1.23
10074.00	89.66	357.28	6717.35	3415.07 N	132.25 W	3417.46	1.16
10169.00	89.91	358.20	6717.71	3509.99 N	135.99 W	3512.45	1.00
10264.00	89.35	358.64	6718.32	3604.96 N	138.62 W	3607.45	0.75
10359.00	89.41	359.92	6719.34	3699.94 N	139.82 W	3702.43	1.35
10454.00	89.54	359.22	6720.21	3794.93 N	140.54 W	3797.40	0.75
10549.00	89.23	357.91	6721.23	3889.89 N	142.92 W	3892.39	1.42
10643.00	88.89	1.60	6722.78	3983.87 N	143.33 W	3986.34	3.94
10738.00	88.61	359.91	6724.85	4078.83 N	142.08 W	4081.23	1.80
10833.00	90.03	0.55	6725.98	4173.82 N	141.70 W	4176.17	1.64
10928.00	88.61	1.51	6727.10	4268.79 N	140.00 W	4271.05	1.80
11023.00	87.96	0.73	6729.94	4363.73 N	138.15 W	4365.90	1.07
11094.00	87.19	0.34	6732.94	4434.67 N	137.49 W	4436.78	1.21
11155.00	87.19	0.34	6735.93	4495.59 N	137.13 W	4497.68	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 358.36 DEGREES (GRID)
A TOTAL CORRECTION OF 7.67 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11155.00 FEET
IS 4497.68 FEET ALONG 358.25 DEGREES (GRID)**

Surface surveys at 330 ft and 616 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 11094 ft MD to TD at 11155 ft MD.