

PCGC: Pressure Case Gamma
PCDC: Pressure Case Directional



1 : 600 / 1 : 240

Country : USA						
Field : Wattenberg						
Location : Lat: 40° 26' 2.65" North Long: 104° 31' 27.41" West						
Well : Cougar B02-69-1HN						
Company : Noble Energy						
Rig : H&P 315						
LOCATION		Company : Noble Energy				
		Rig : H&P 315				
		Well : Cougar B02-69-1HN				
		Field : Wattenberg				
		Country : USA				
		API Number : 05-123-36405				
Other Services Directional Drilling		Latitude : 40° 26' 2.65" North Longitude : 104° 31' 27.41" West				
		UTM Easting = 3,271,606.070 ft UTM Northing = 1,402,466.330 ft				
Permanent Datum : Ground Level		Elevation : 4641.00 ft			Elev. KB N/A	
Log Measured From : Drill Floor		24.00 ft Above Permanent Datum			DF 4665.00 ft GL 4641.00 ft WD N/A	
Drilling Measured From :		<div>MD LOG</div>				
Depth Logged : 124.00 ft To 10,282.00 ft		Unit No. : 11610113			Job No. : CA-XX-0900977249	
Date Logged : 26-Jan-14 To 31-Jan-14						
Total Depth MD : 10,282.00 ft TVD : 6,635.61 ft		Plot Type : Final				
Spud Date : 25-Jan-14		Plot Date : 01-Feb-14				
Run No.	Borehole Record (MD)				Borehole Record (MD)	
	Size	From	To	Run No.	Size	To
1	13.500 in	124.00 ft	2,006.00 ft			
2	8.750 in	2,006.00 ft	5,969.00 ft			
3	8.750 in	5,969.00 ft	6,991.00 ft			
4	6.125 in	6,991.00 ft	10,282.00 ft			
				Size	Casing Record (MD) Weight From To	
				7.000 in	26.00 lbpf SURFACE	6,983.00 ft

WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	25-Jan-14	27-Jan-14	29-Jan-14	01-Feb-14	
Rig Bit Number	1	2	3	4	
Bit Size (in)	13.500	8.750	8.750	6.125	
Tool Nominal OD (in)	8.000	6.750	6.750	4.750	
Log Start Depth (MD, ft)	124.00	2,006.00	5,969.00	6,991.00	
Log End Depth (MD, ft)	2,006.00	5,969.00	6,991.00	10,282.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	25-Jan-14 04:20	26-Jan-14 23:30	28-Jan-14 01:30	30-Jan-14 07:15	
Drill/Wipe End Date and Time	25-Jan-14 16:30	27-Jan-14 14:15	28-Jan-14 16:45	31-Jan-14 22:00	
Min Inc (deg) @ Depth (MD, ft)	0.37 @ 502.00	0.47 @ 4,682.00	1.27 @ 5,948.00	85.68 @ 7,030.00	
Max Inc (deg) @ Depth (MD, ft)	4.12 @ 1,711.00	10.52 @ 2,784.00	80.06 @ 6,937.00	92.47 @ 7,694.00	
Bit TFA(in2) / Bit Type	1.17 / PDC	.75 / PDC	0.86 / PDC	0.65 / PDC	
Flow Rate (gpm)	691.32	596.64	587.00	277.42	
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	Polymer	Polymer	Polymer	
Density (ppg) / Viscosity (spqt)	8.85 / 31.00	9.50 / 34.00	10.20 / 38.00	10.60 / 36.00	
Filtrate CL (ppm)	1,500.00	1,500.00	1,500.00	1,600.00	
pH / Fluid Loss (mptm)	9.10 / 0	9.70 / 10	9.00 / 8	9.50 / 8	
PV (cP) / YP (lbf2)	7 / 4.00	10 / 9.00	16 / 13.00	10 / 11.00	
% Solids / % Sand	3.8 / 0.35	2.25 / 0.30	11.1 / 0.35	10 / 0.50	
% 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 (in) Temp (degF)	122.00 / 120M	127.07 / 120M	127.07 / 120M	226.00 / 120M	

Max Tool Temp (degF) / Source	109.09 / PCM	167.97 / PCM	167.97 / PCM	230.30 / 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	Paul Kock	Paul Kock	Paul Kock	Paul Kock	
Customer Representative	Martin Suarez	Martin Suarez	Martin Suarez	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	11812718	11331933	11331933	11671371	
Insert Serial Number	11680783	11680783	11680783	11620309	
Date and Time Initialized	24-Jan-14 22:28	26-Jan-14 10:37	26-Jan-14 10:37	29-Jan-14 17:32	
Date and Time Read	25-Jan-14 20:04	29-Jan-14 02:38	29-Jan-14 02:52	01-Feb-14 11:44	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	56.38	54.27	52.35	58.85	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11812718	11331933	11331933	11671371	
Sonde Serial Number	12177532	12177532	12177532	11478014	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	106.02	320.91	38.42	43.20	

Gamma Ray Sensor Information

Tool Type		PCG	PCG	PCG	
Distance From Bit (ft)		49.27	47.35	53.87	
Recorded Sample Period (sec)		10	10	10	
Software Version		8.15	8.15	8.15	
Sub Serial Number		11331933	11331933	11671371	
Insert/Sonde Serial Number		11681002	11681002	11292593	

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/cement from 6944 ft. MD to 6991 ft. MD.

WARRANTY

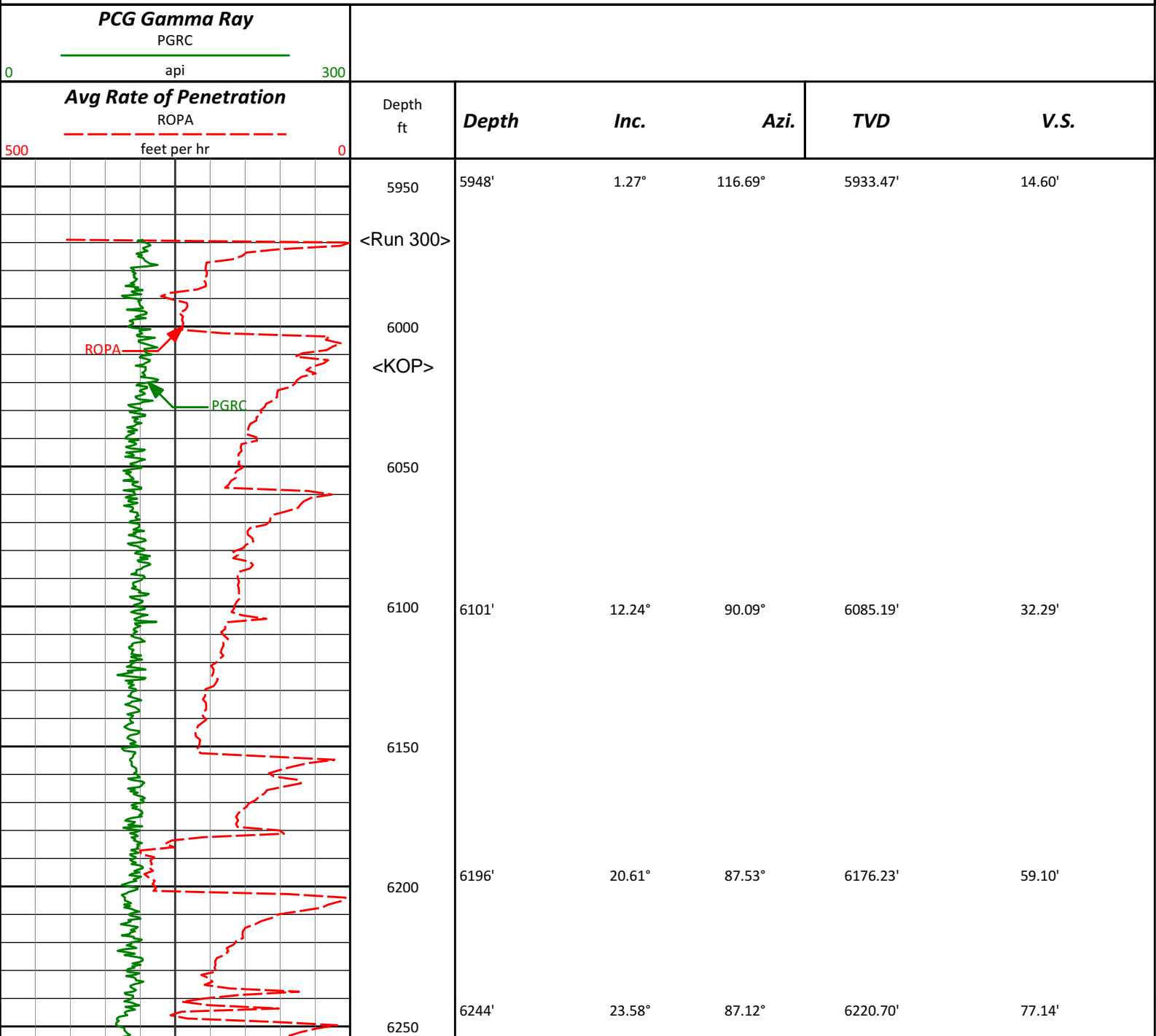
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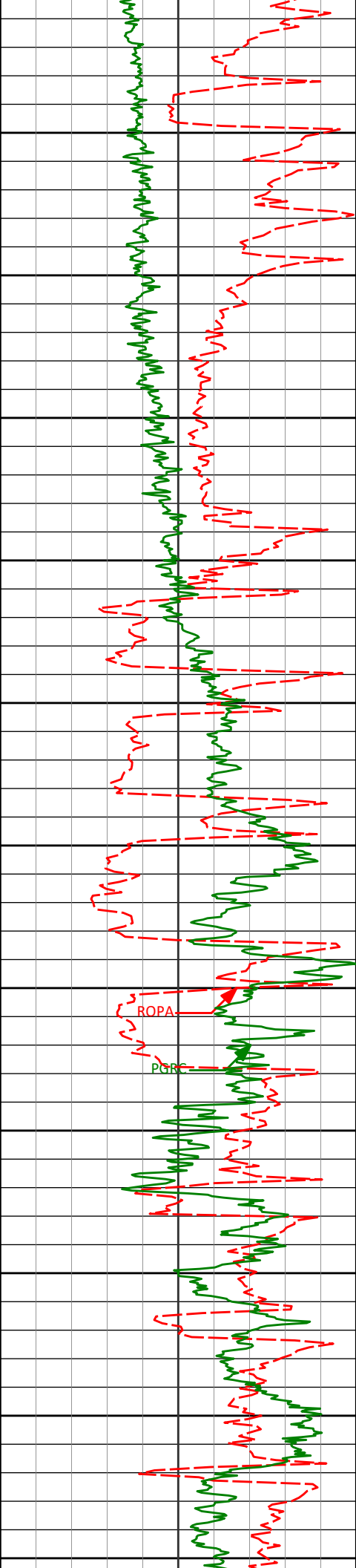
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HALLIBURTON
Sperry Drilling Services

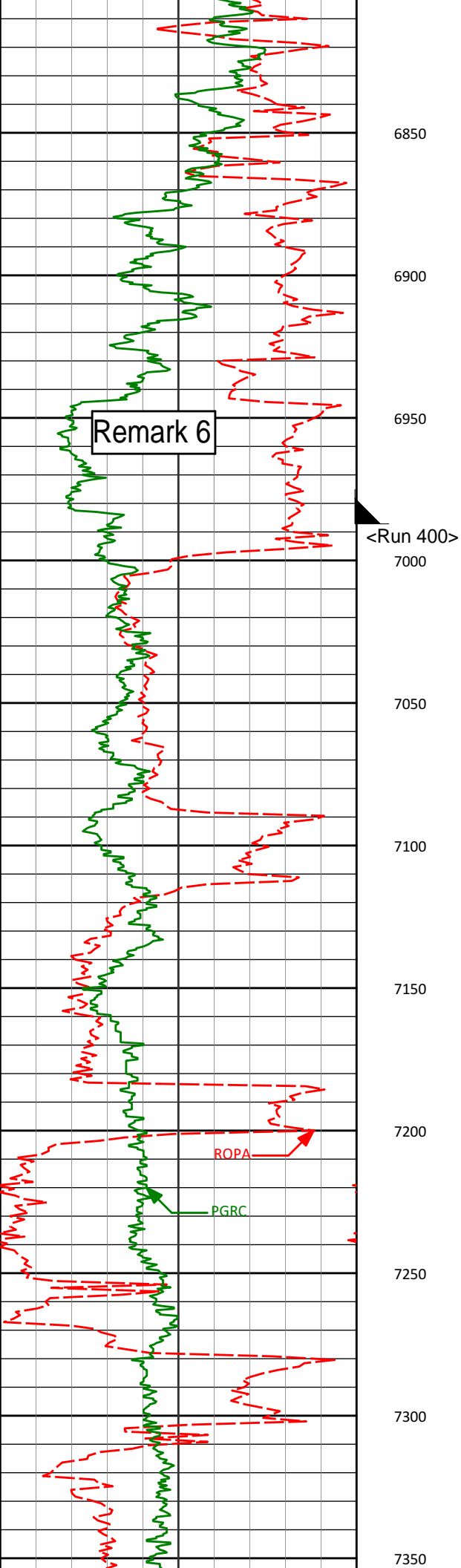
MD Main Log 1:600

Noble Energy, Inc
Cougar B02-69-1HN
H&P 315
T5N R64W

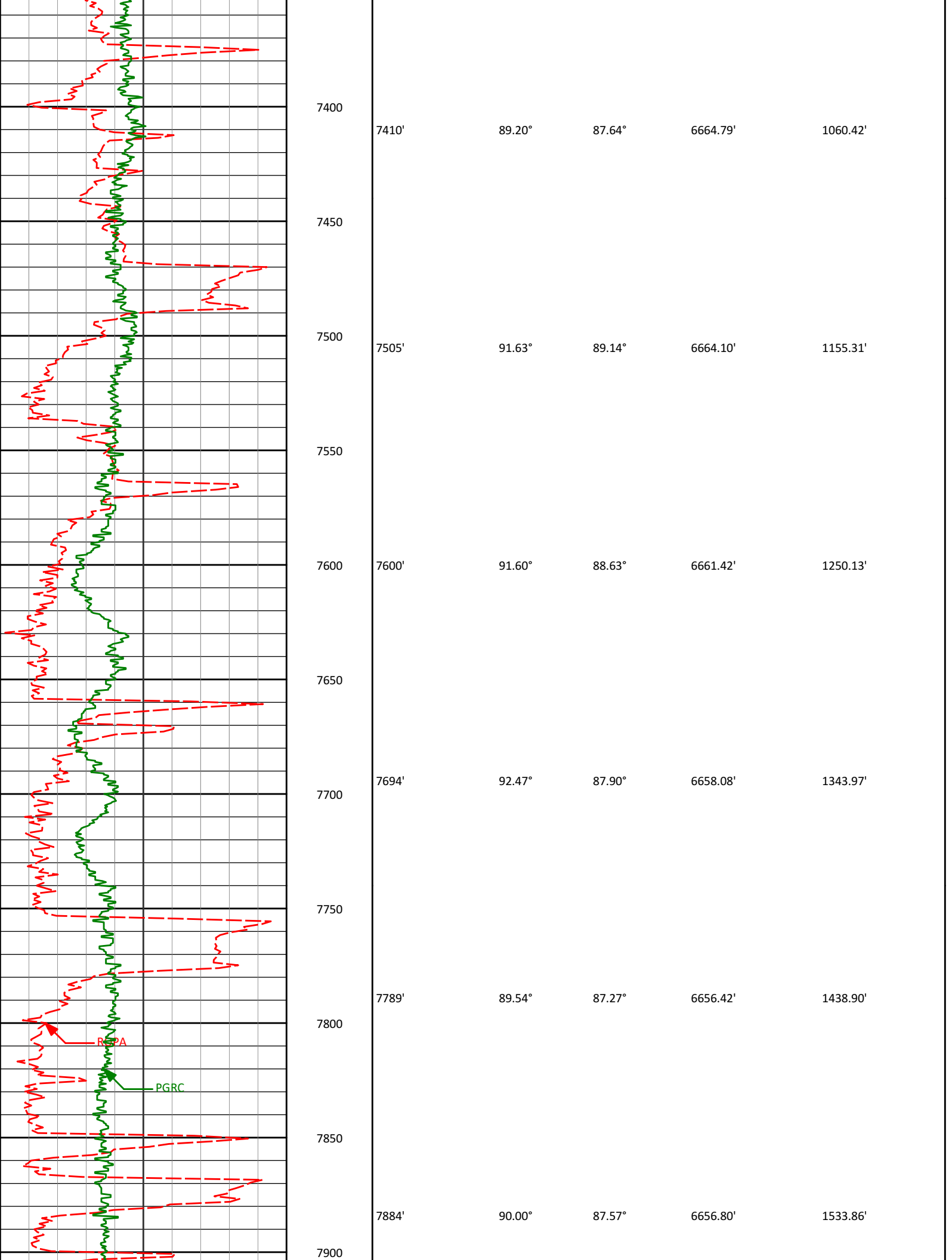


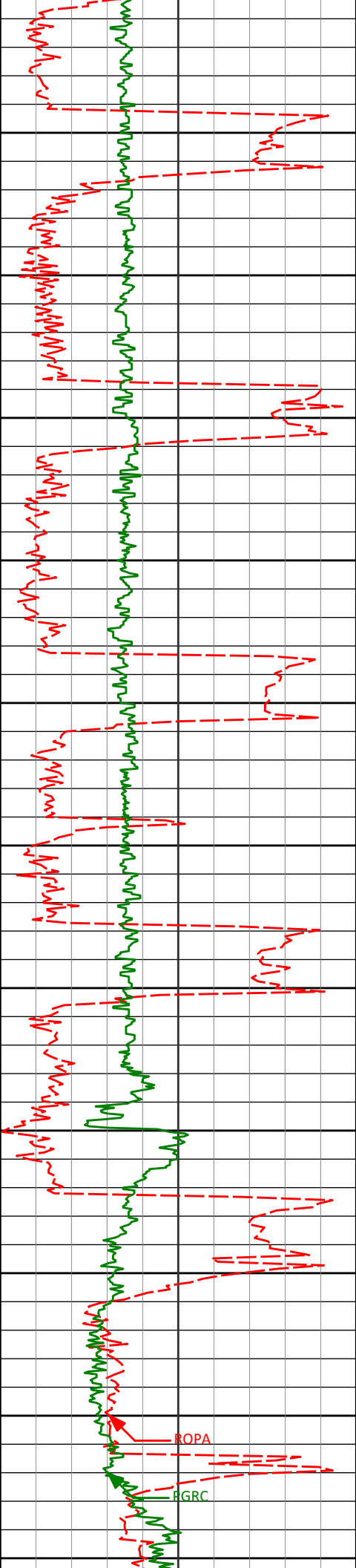


6300	6291'	25.47°	88.65°	6263.46'	96.64'
6350	6339'	29.55°	89.08°	6306.02'	118.77'
6400	6386'	34.64°	86.20°	6345.83'	143.71'
6450	6434'	42.71°	87.61°	6383.27'	173.68'
6500	6481'	45.78°	87.57°	6416.93'	206.45'
6550	6529'	47.65°	85.88°	6449.84'	241.38'
6600	6576'	47.88°	86.51°	6481.44'	276.18'
6650	6624'	47.88°	88.06°	6513.63'	311.77'
6700	6671'	52.05°	88.64°	6543.85'	347.71'
6750	6719'	57.25°	87.38°	6571.62'	386.82'
6800	6765'	63.58°	88.84°	6594.32'	426.76'



6813'	69.66°	89.72°	6613.35'	470.72'
6850				
6860'	73.13°	91.25°	6628.35'	515.10'
6900				
6937'	80.06°	91.89°	6646.19'	589.57'
6950				
<7" casing set at 6983' MD>				
<Run 400>				
7000				
7030'	85.68°	89.22°	6657.73'	681.48'
7050				
7100				
7125'	88.00°	89.95°	6662.97'	776.12'
7150				
7200				
7220'	88.89°	89.32°	6665.56'	870.86'
7250				
7300				
7315'	91.42°	90.56°	6665.30'	965.60'
7350				





7950

7979'

89.78°

88.25°

6656.98'

1628.79'

8000

8050

8074'

89.91°

87.41°

6657.24'

1723.73'

8100

8150

8169'

89.75°

89.45°

6657.52'

1818.62'

8200

8250

8263'

89.88°

89.79°

6657.82'

1912.40'

8300

8350

8358'

91.88°

90.68°

6656.37'

2007.10'

8400

8450

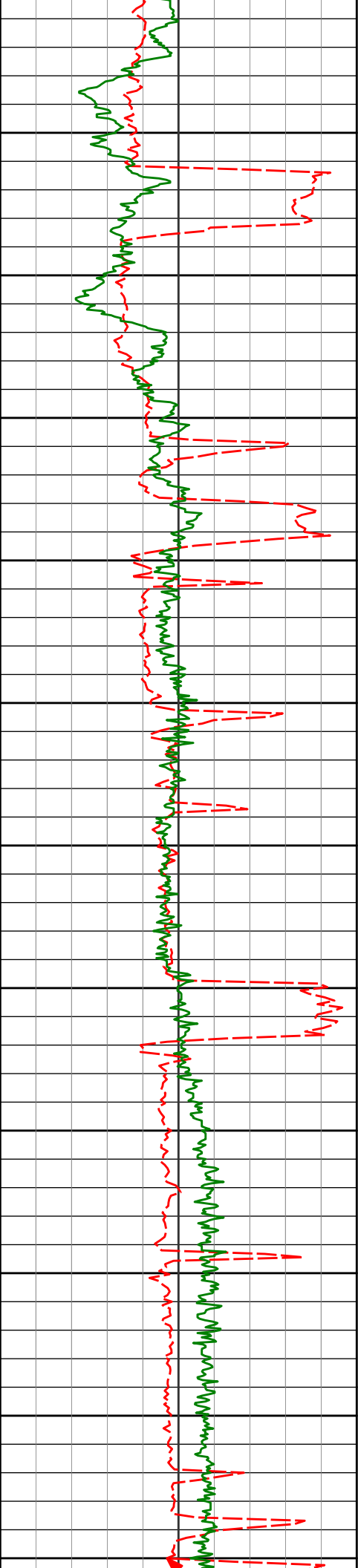
8453'

92.28°

89.68°

6652.92'

2101.75'



8500

8550

8600

8650

8700

8750

8800

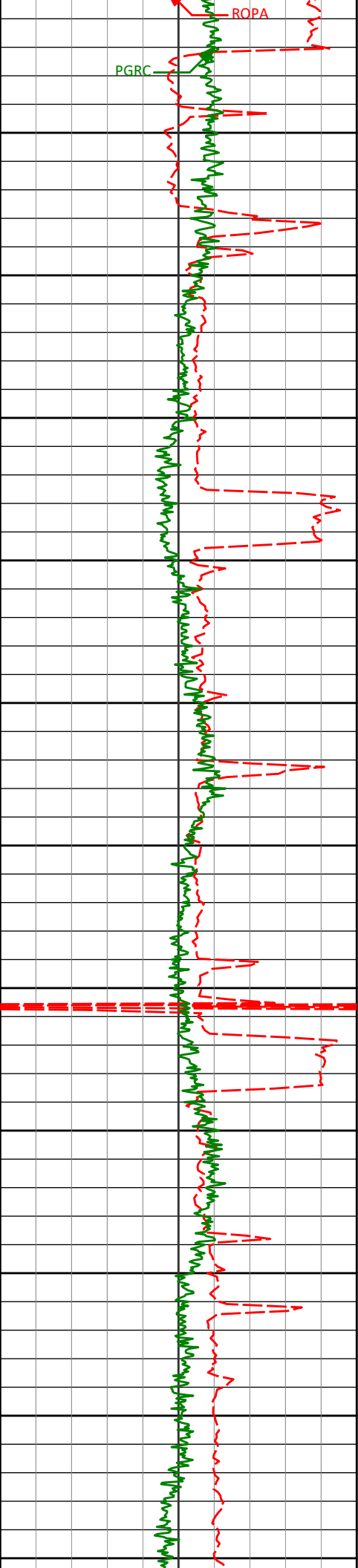
8850

8900

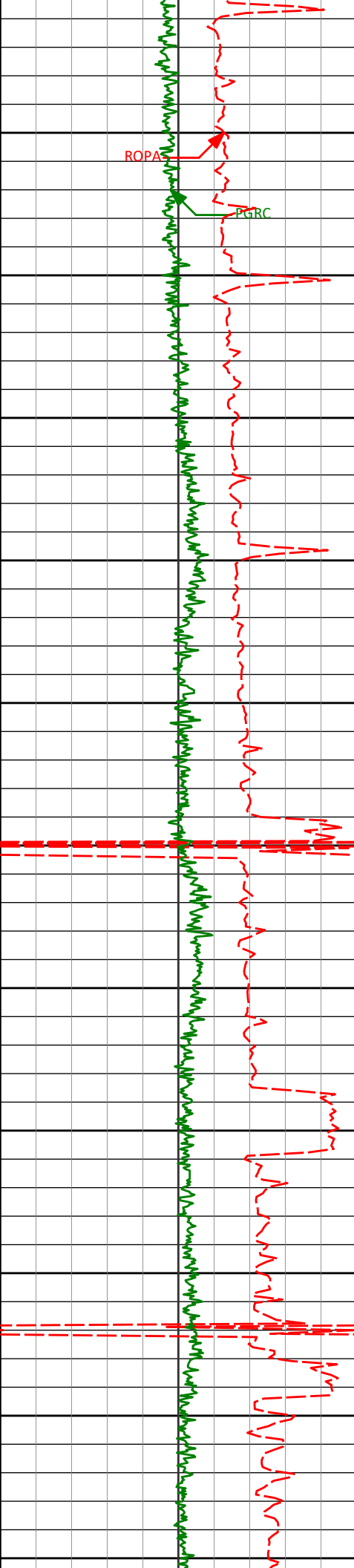
8950

9000

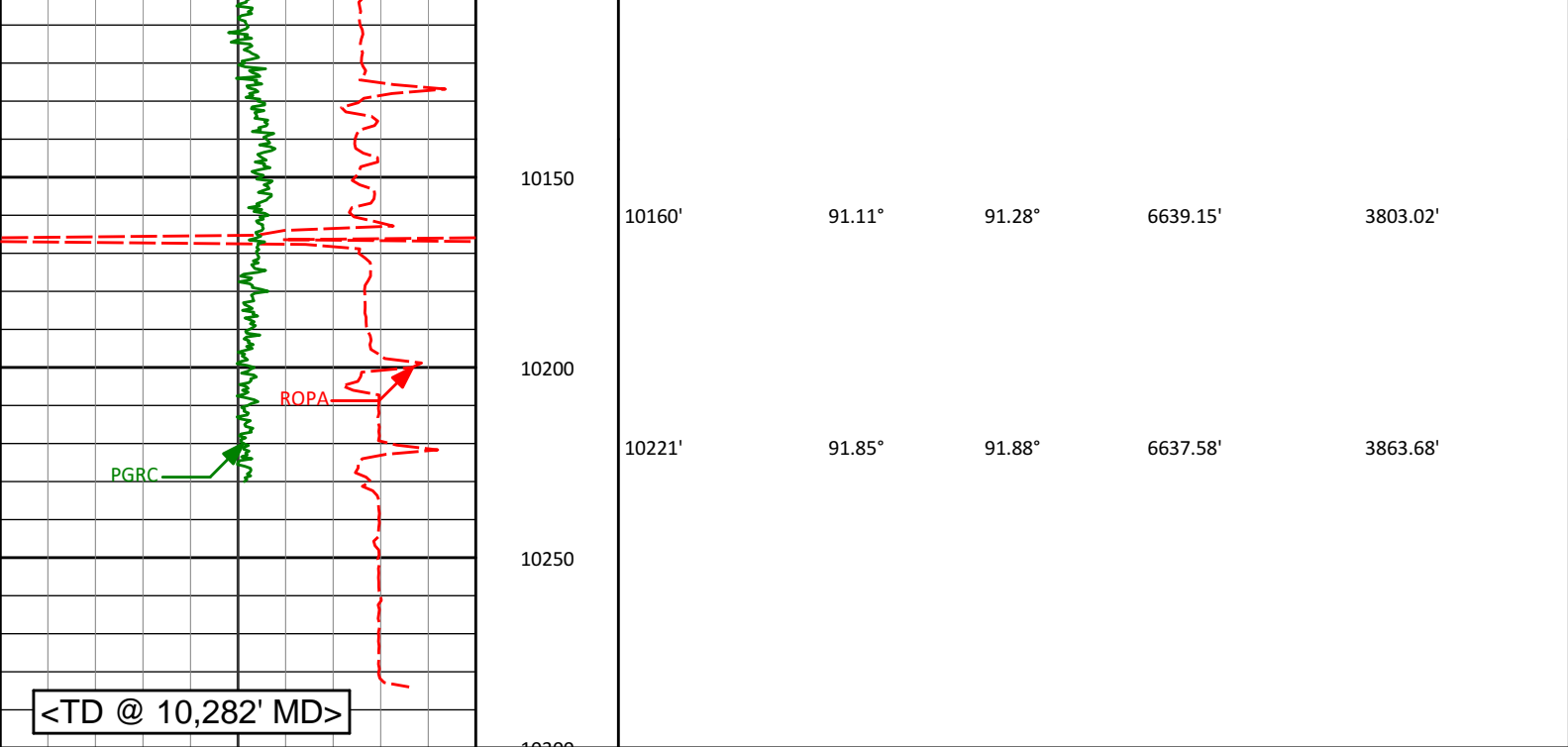
8453'	92.28°	89.08°	6652.92'	2101.73'
8548'	90.99°	89.77°	6650.21'	2196.48'
8643'	90.43°	89.92°	6649.03'	2291.23'
8738'	91.42°	89.76°	6647.50'	2385.97'
8832'	89.57°	89.06°	6646.69'	2479.77'
8927'	89.07°	87.72°	6647.82'	2574.66'



9022'	89.72°	90.88°	6648.81'	2669.46'
9050				
9100				
9117'	88.71°	90.66°	6650.12'	2764.09'
9150				
9200				
9212'	90.34°	90.03°	6650.91'	2858.78'
9250				
9300				
9307'	90.19°	89.33°	6650.48'	2953.55'
9350				
9400	9401'	90.89°	91.21°	6649.59'
9450				
9500	9496'	90.74°	91.21°	6648.23'
9550				



9591'	91.05°	90.96°	6646.75'	3236.39'
9600				
9650				
9686'	90.86°	91.20°	6645.17'	3330.96'
9700				
9750				
9781'	90.62°	91.09°	6643.94'	3425.53'
9800				
9850				
9876'	90.52°	91.53°	6643.00'	3520.08'
9900				
9950				
9971'	91.08°	90.03°	6641.67'	3614.70'
10000				
10050				
10065'	90.43°	90.43°	6640.43'	3708.40'
10100				

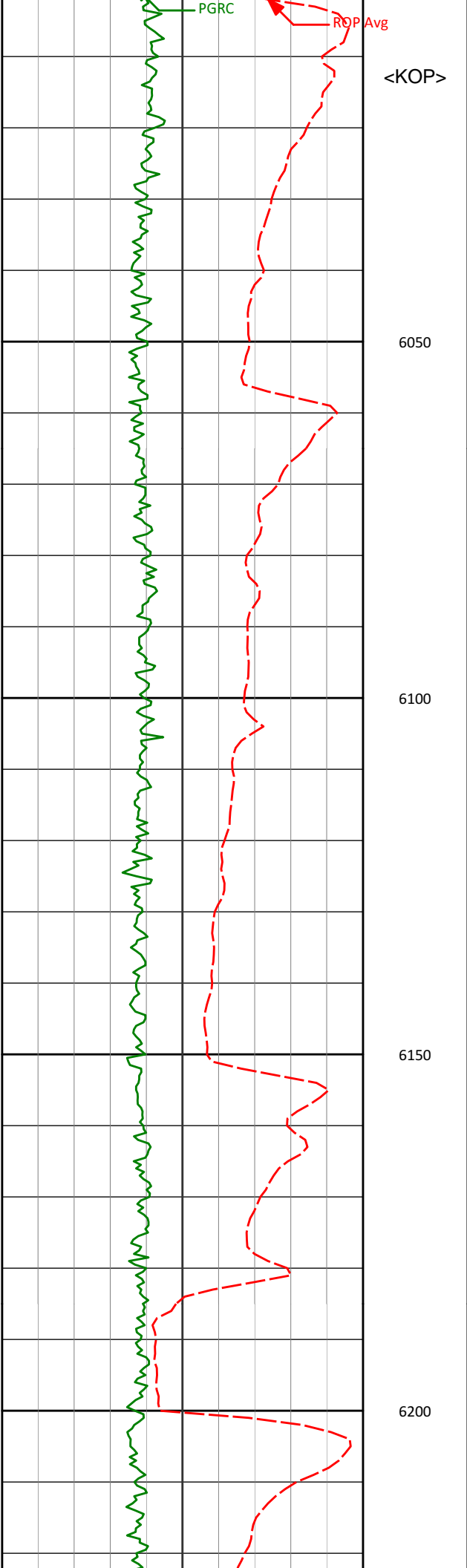


Avg Rate of Penetration ROPA feet per hr		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
500	0						
PCG Gamma Ray PGRC api							
0	300						

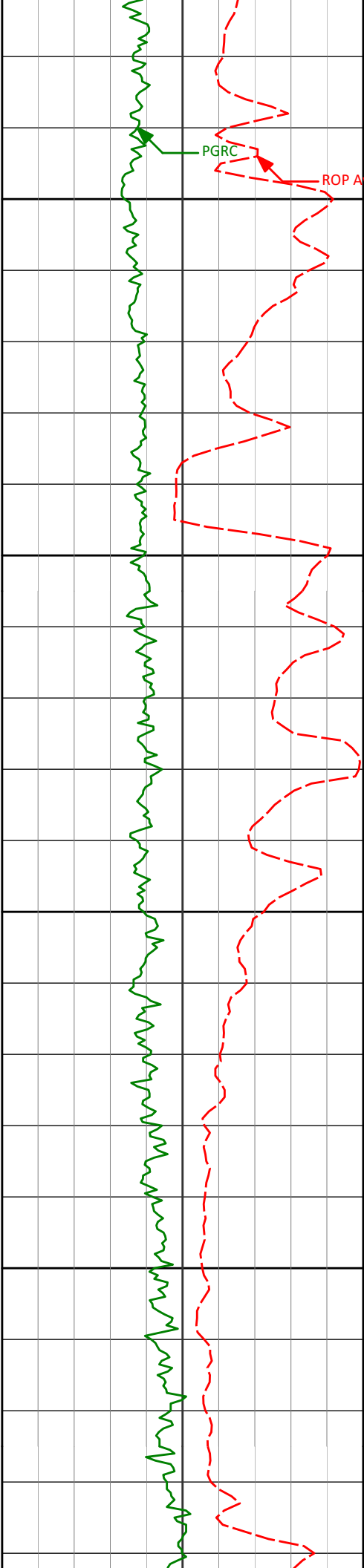
HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

Noble Energy, Inc
Cougar B02-69-1HN
H&P 315
T5N R64W

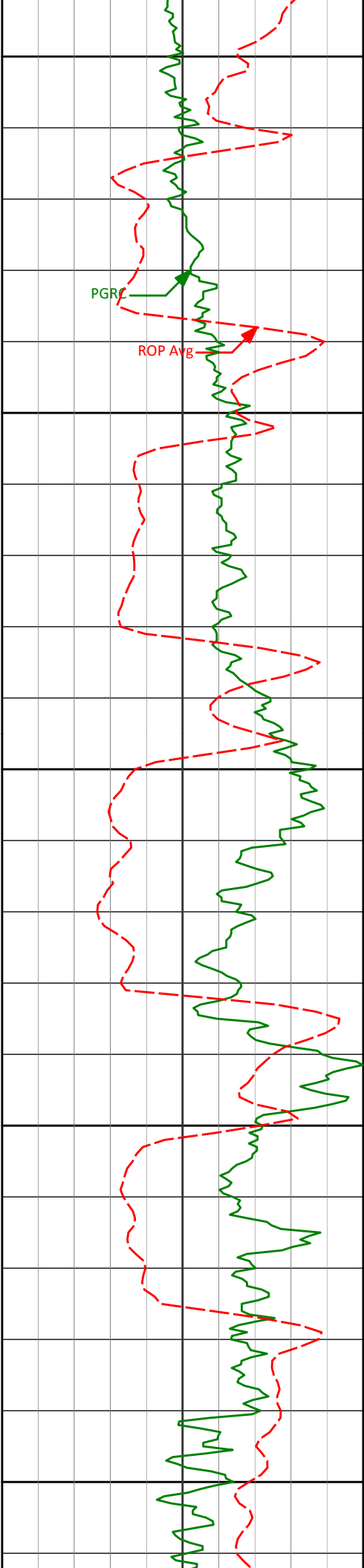
PCG Gamma Ray PGRC api							
0	300						
Avg Rate of Penetration ROP Avg feet per hr		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
500	0						
		5950	5948'	1.27°	116.69°	5933.47'	14.60'
		<Run 300>					
		6000					



6050				
6100	6101'	12.24°	90.09°	6085.19'
				32.29'
6150				
6200	6196'	20.61°	87.53°	6176.23'
				59.10'



6244'	23.58°	87.12°	6220.70'	77.14'
6291'	25.47°	88.65°	6263.46'	96.64'
6339'	29.55°	89.08°	6306.02'	118.77'
6386'	34.64°	86.20°	6345.83'	143.71'
6434'	42.71°	87.61°	6383.27'	173.68'



6450

6481'

45.78°

87.57°

6416.93'

206.45'

6500

6529'

47.65°

85.88°

6449.84'

241.38'

6550

6576'

47.88°

86.51°

6481.44'

276.18'

6600

6624'

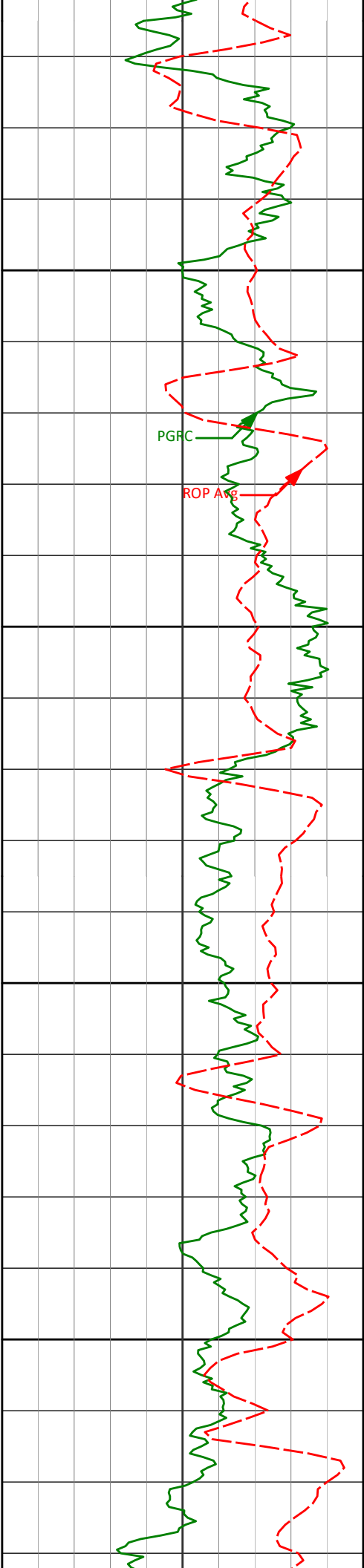
47.88°

88.06°

6513.63'

311.77'

6650



6671'

52.05°

88.64°

6543.85'

347.71'

6700

6719'

57.25°

87.38°

6571.62'

386.82'

PGFC

ROP Ang

6750

6765'

63.58°

88.84°

6594.32'

426.76'

6800

6813'

69.66°

89.72°

6613.35'

470.72'

6850

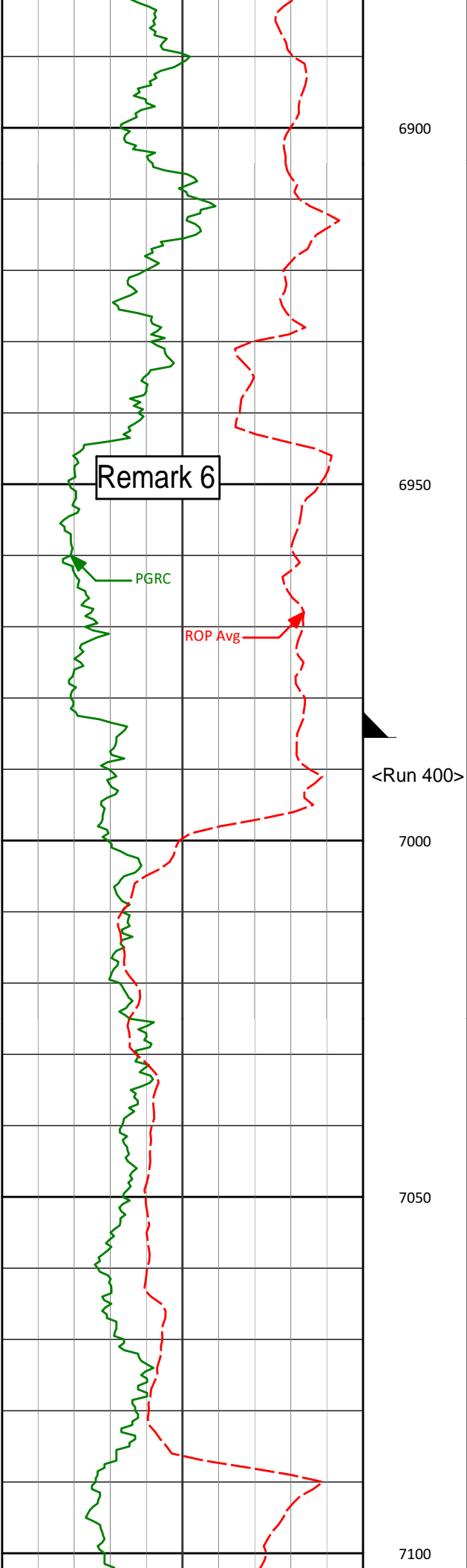
6860'

73.13°

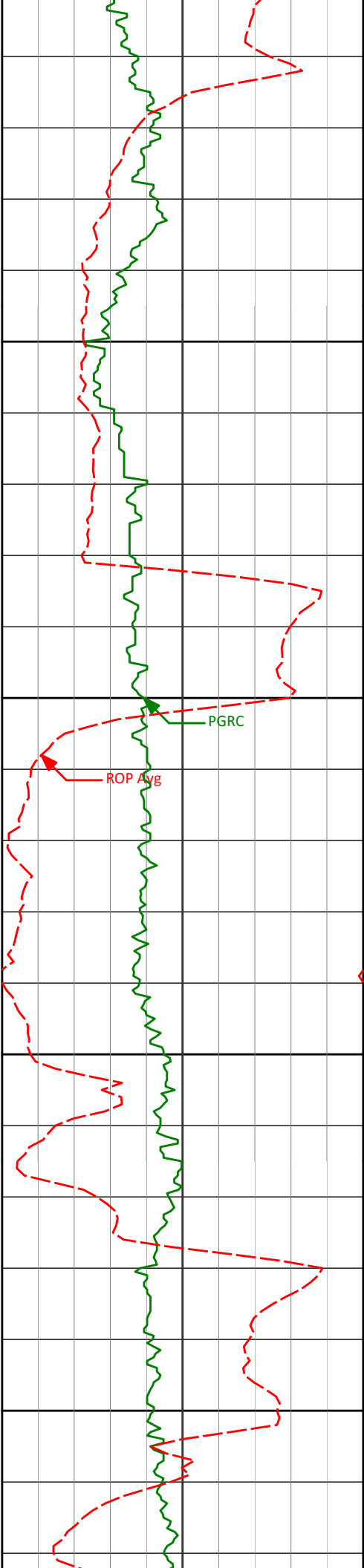
91.25°

6628.35'

515.10'



6937'	80.06°	91.89°	6646.19'	589.57'
<7" casing set at 6983' MD>				
<Run 400>				
7030'	85.68°	89.22°	6657.73'	681.48'



7125'

88.00°

89.95°

6662.97'

776.12'

7150

7200

7220'

88.89°

89.32°

6665.56'

870.86'

7250

7300

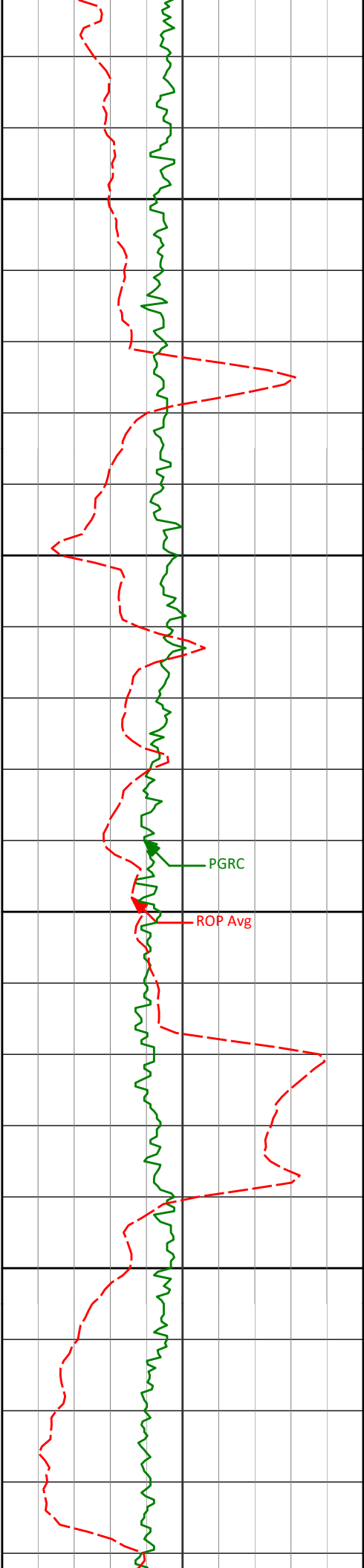
7315'

91.42°

90.56°

6665.30'

965.60'



7350

7400

7450

7500

7410'

89.20°

87.64°

6664.79'

1060.42'

7505'

91.63°

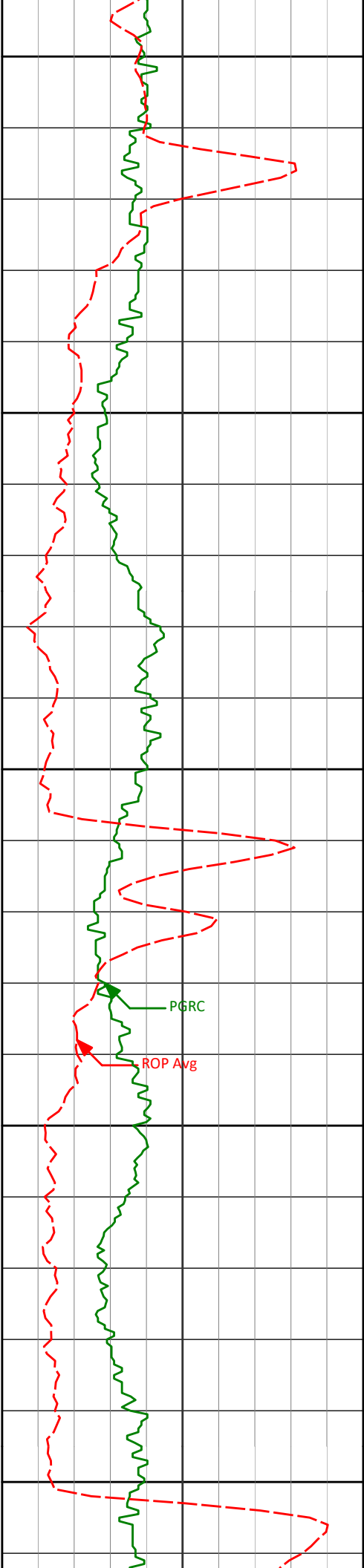
89.14°

6664.10'

1155.31'

PGRC

ROP Avg



7550

7600

7650

7700

7750

7600'

91.60°

88.63°

6661.42'

1250.13'

7694'

92.47°

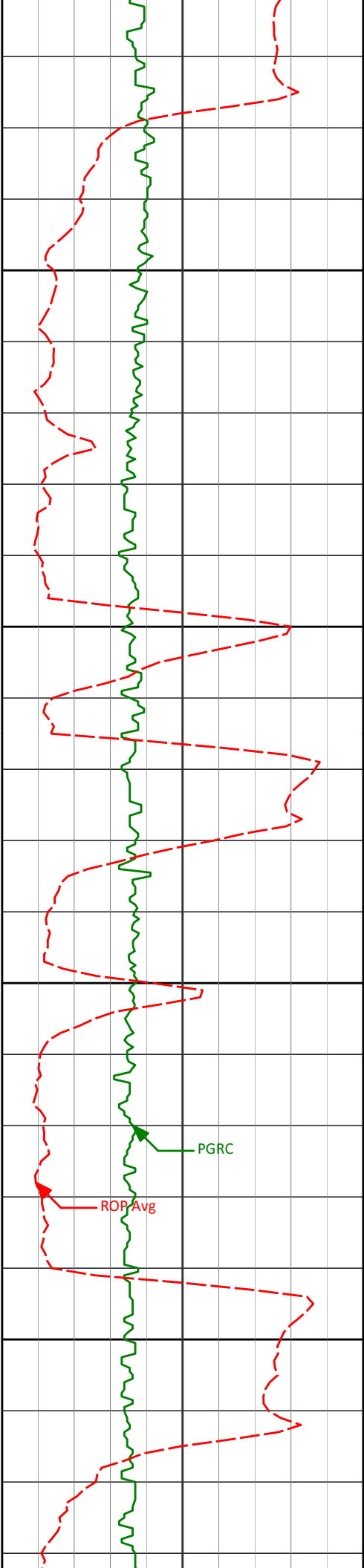
87.90°

6658.08'

1343.97'

PGRC

ROP Avg



7789'

89.54°

87.27°

6656.42'

1438.90'

7800

7850

7884'

90.00°

87.57°

6656.80'

1533.86'

7900

7950

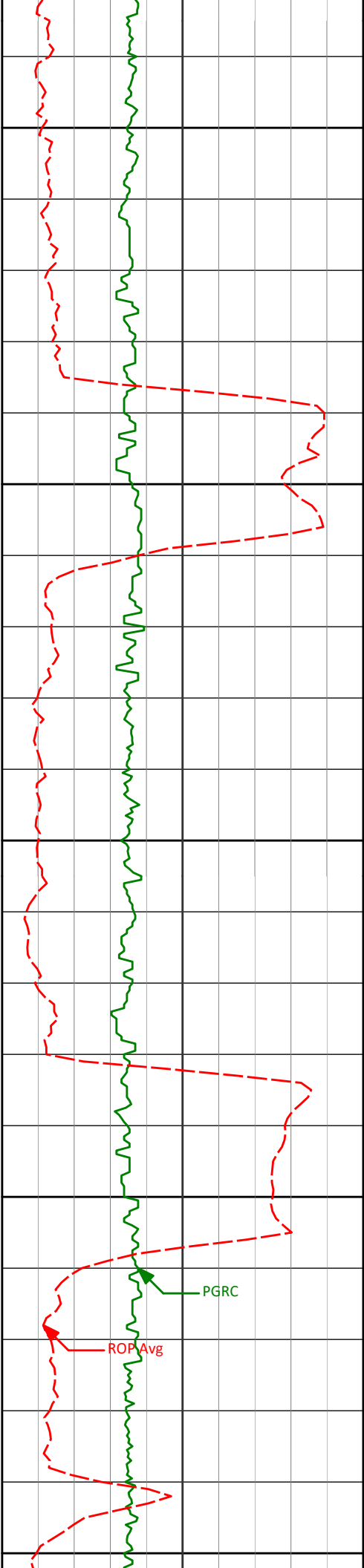
7979'

89.78°

88.25°

6656.98'

1628.79'



8000

8050

8100

8150

8200

8074'

89.91°

87.41°

6657.24'

1723.73'

8169'

89.75°

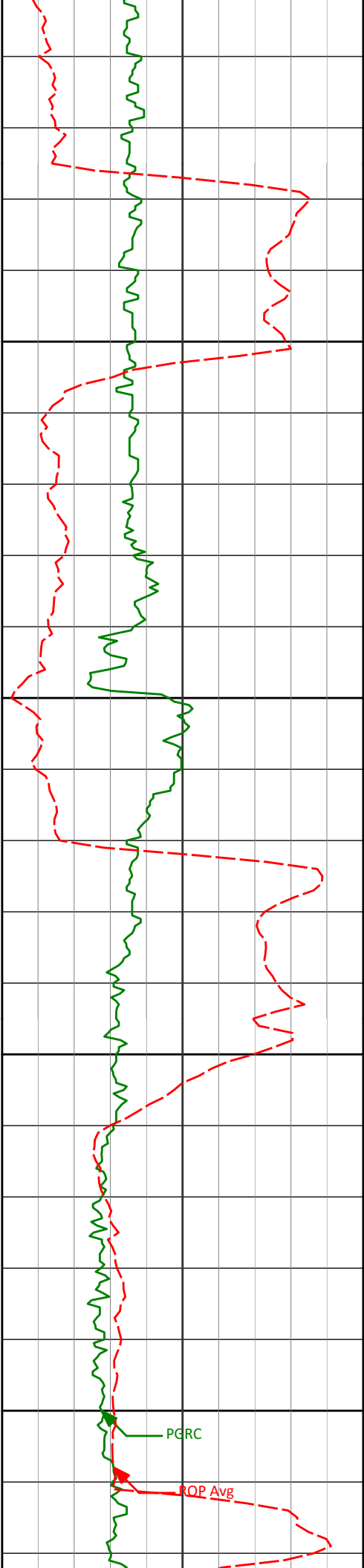
89.45°

6657.52'

1818.62'

PGRC

ROP Avg



8250

8263'

89.88°

89.79°

6657.82'

1912.40'

8300

8350

8358'

91.88°

90.68°

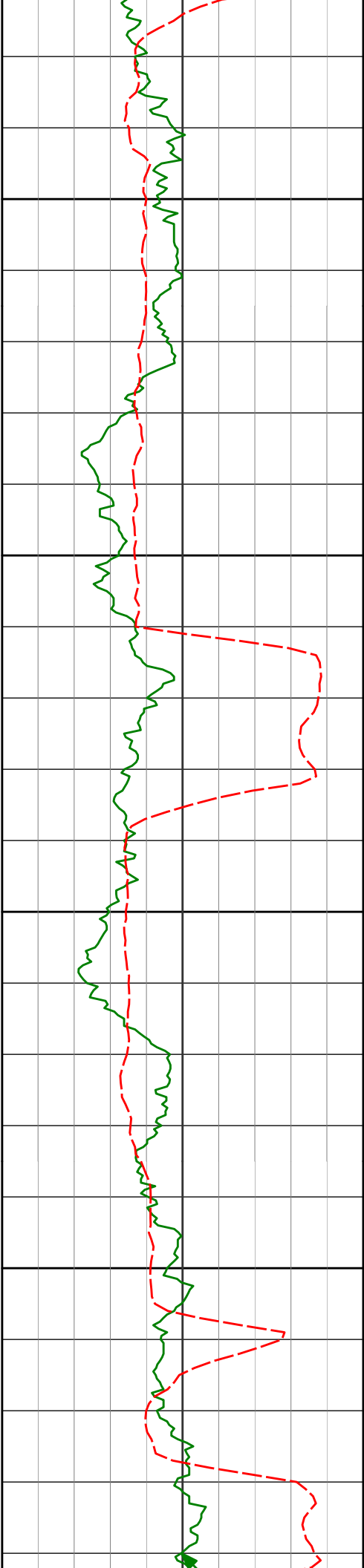
6656.37'

2007.10'

8400

PGRC

ROP Avg



8450

8453'

92.28°

89.68°

6652.92'

2101.75'

8500

8550

8548'

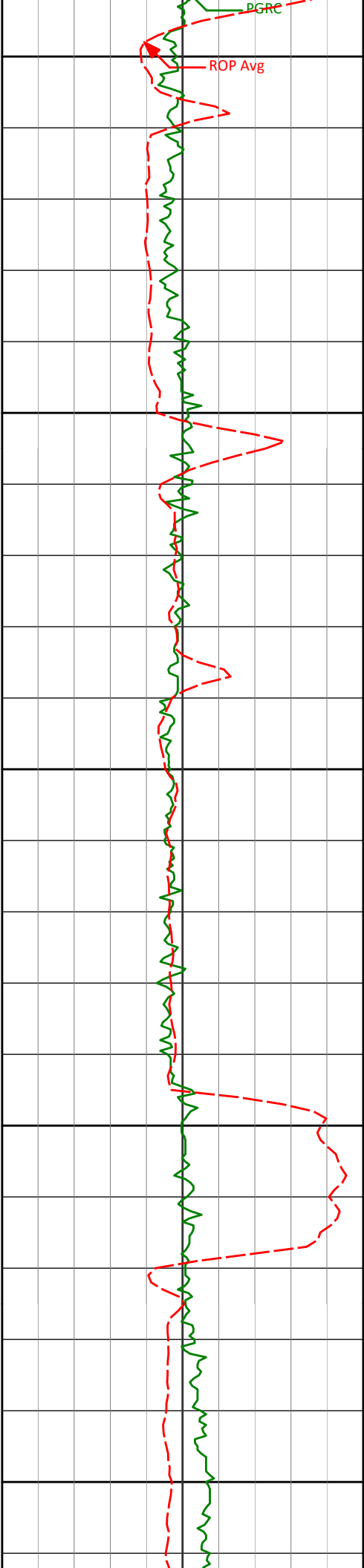
90.99°

89.77°

6650.21'

2196.48'

8600



8650

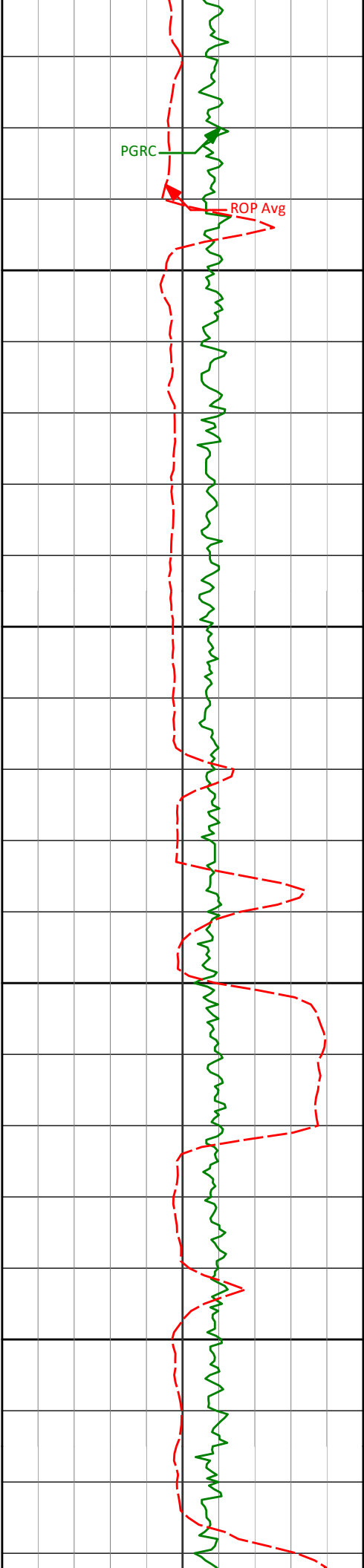
8700

8750

8800

8850

8643'	90.43°	89.92°	6649.03'	2291.23'
8738'	91.42°	89.76°	6647.50'	2385.97'
8832'	89.57°	89.06°	6646.69'	2479.77'



8900

8927'

89.07°

87.72°

6647.82'

2574.66'

8950

9000

9022'

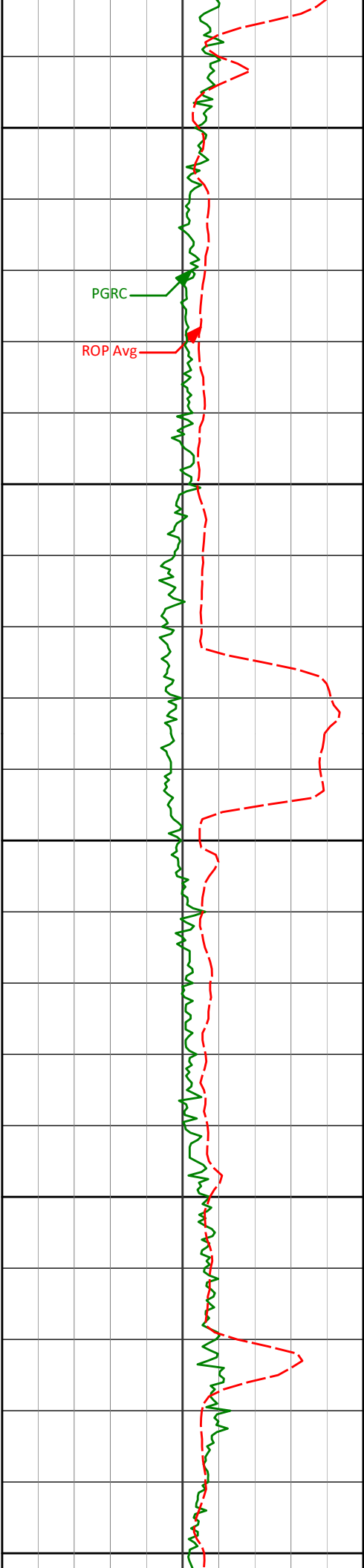
89.72°

90.88°

6648.81'

2669.46'

9050



9100

9117'

88.71°

90.66°

6650.12'

2764.09'

9150

9200

9212'

90.34°

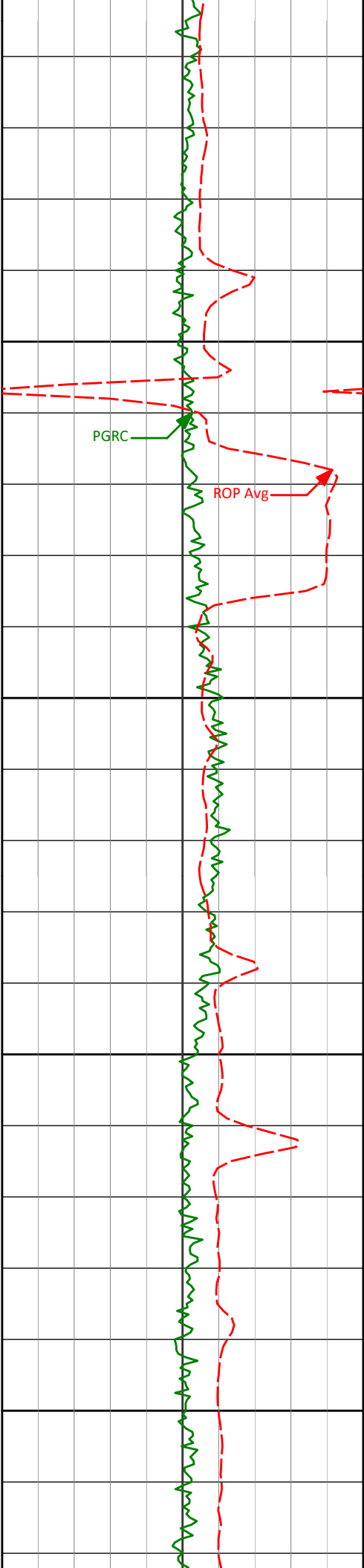
90.03°

6650.91'

2858.78'

9250

9300



9307'

90.19°

89.33°

6650.48'

2953.55'

9350

PGRC

ROP Avg

9400

9401'

90.89°

91.21°

6649.59'

3047.25'

9450

9500

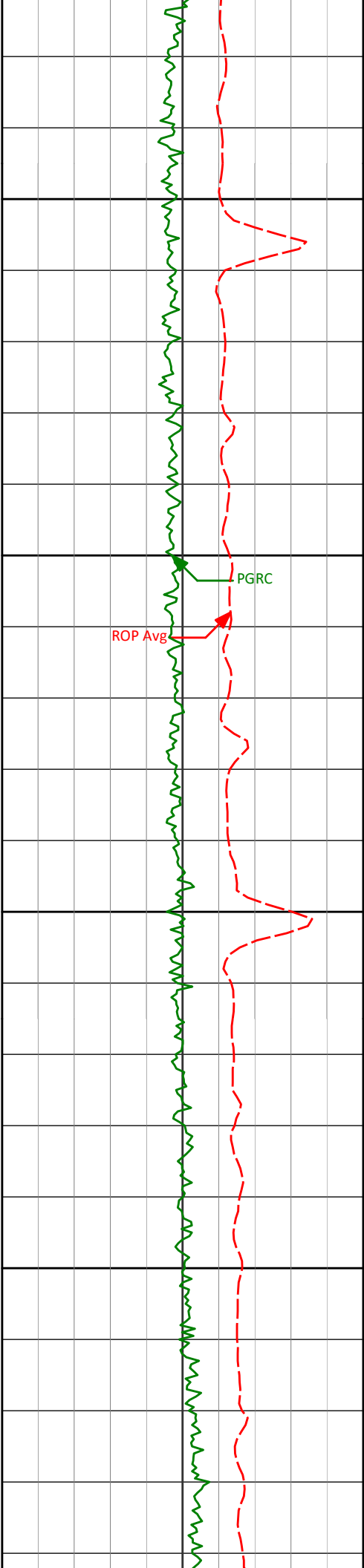
9496'

90.74°

91.21°

6648.23'

3141.81'



9550

9591'

91.05°

90.96°

6646.75'

3236.39'

9600

PGRC

ROP Avg

9650

9686'

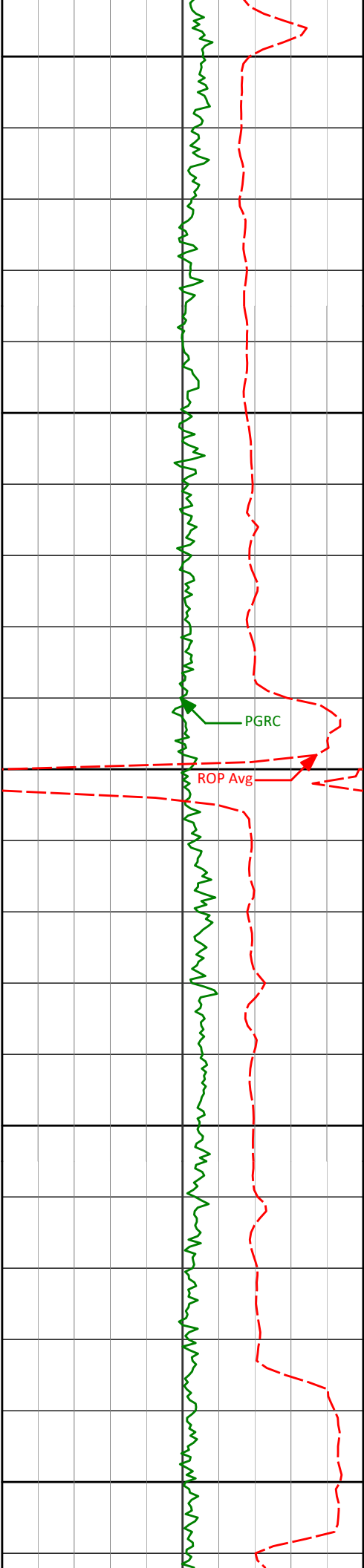
90.86°

91.20°

6645.17'

3330.96'

9700



9750

9781'

90.62°

91.09°

6643.94'

3425.53'

9800

9850

9876'

90.52°

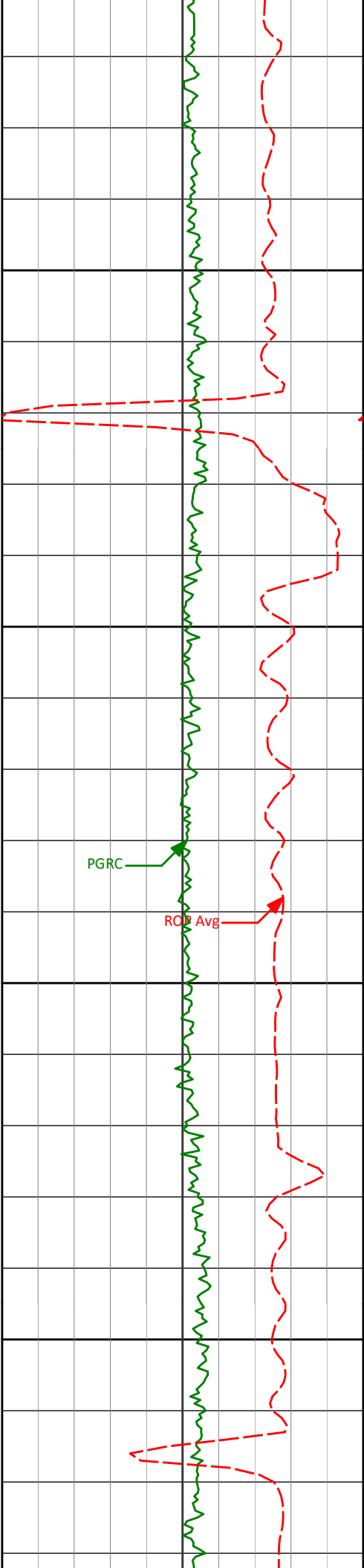
91.53°

6643.00'

3520.08'

9900

9950



9971'

91.08°

90.03°

6641.67'

3614.70'

10000

10050

10065'

90.43°

90.43°

6640.43'

3708.40'

PGRC

ROP Avg

10100

10150

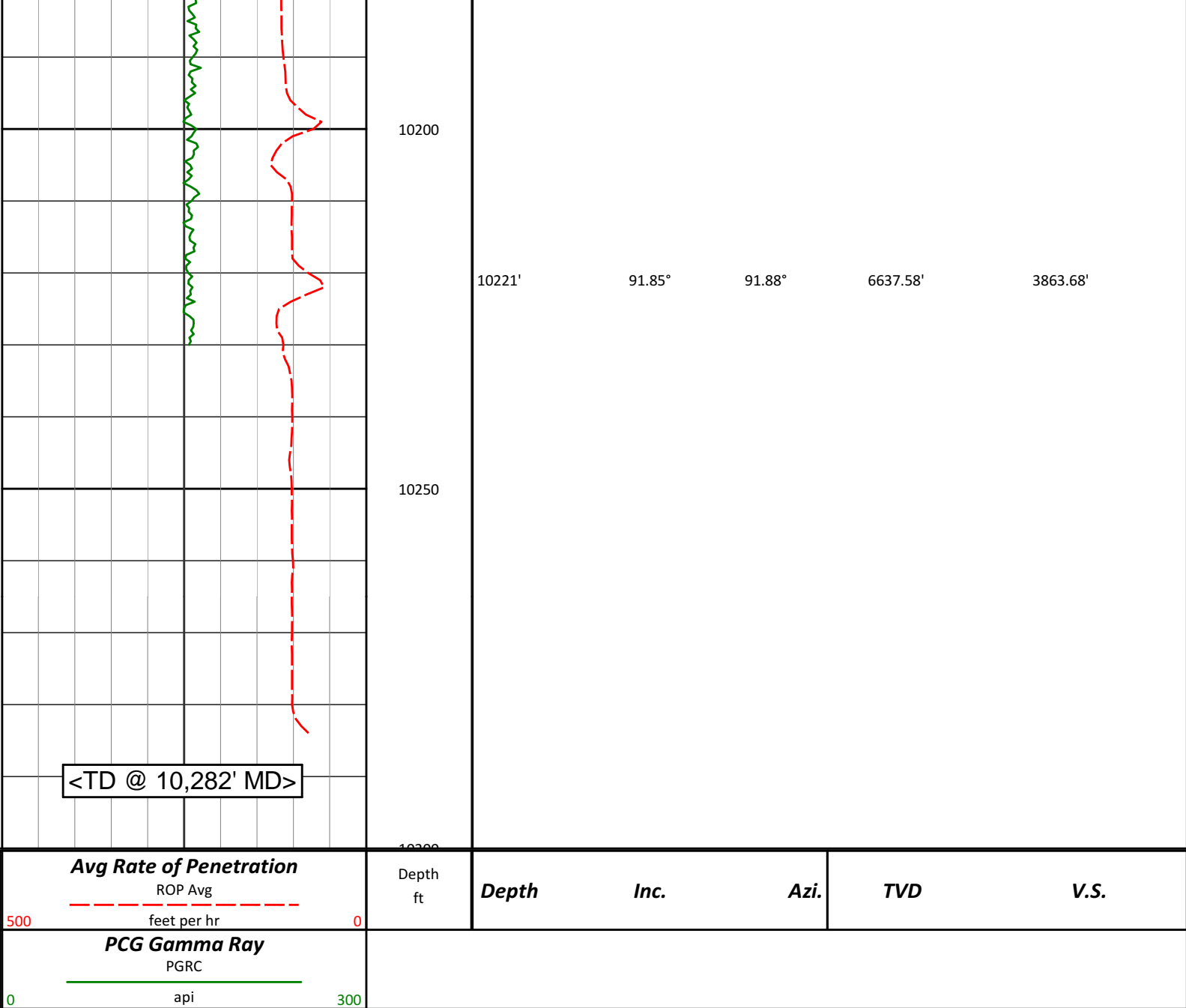
10160'

91.11°

91.28°

6639.15'

3803.02'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Cougar B02-69-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0900977249

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
225.00	0.91	134.97	224.99	1.26 S	1.26 E	1.17	0.40
317.00	0.98	137.00	316.98	2.35 S	2.32 E	2.14	0.09
410.00	0.93	163.42	409.97	3.66 S	3.08 E	2.80	0.47
502.00	0.37	143.85	501.96	4.62 S	3.46 E	3.11	0.65
594.00	0.37	332.01	593.96	4.60 S	3.50 E	3.15	0.80
687.00	0.84	2.02	686.95	3.65 S	3.38 E	3.10	0.59
779.00	1.09	8.04	778.94	2.11 S	3.53 E	3.36	0.30
872.00	1.64	232.89	871.92	2.04 S	3.27 E	3.28	1.22

872.00	1.04	333.80	871.92	0.04 S	3.07 E	3.08	1.03
965.00	1.87	345.78	964.87	2.62 N	2.11 E	2.30	0.46
1057.00	1.90	340.38	1056.82	5.52 N	1.23 E	1.63	0.20
1150.00	2.13	345.59	1149.76	8.64 N	0.28 E	0.92	0.31
1244.00	2.61	352.73	1243.68	12.45 N	0.43 W	0.50	0.60
1337.00	2.86	358.91	1336.58	16.87 N	0.74 W	0.51	0.42
1429.00	3.28	356.53	1428.45	21.79 N	0.94 W	0.68	0.48
1522.00	3.36	359.91	1521.29	27.17 N	1.11 W	0.91	0.22
1616.00	3.73	0.27	1615.11	32.98 N	1.10 W	1.35	0.40
1711.00	4.12	357.86	1709.89	39.47 N	1.21 W	1.72	0.44
1806.00	4.06	5.75	1804.65	46.23 N	1.00 W	2.43	0.59
1948.00	3.94	359.95	1946.30	56.10 N	0.50 W	3.66	0.30
2025.00	4.02	3.44	2023.12	61.44 N	0.34 W	4.21	0.33
2120.00	3.06	349.42	2117.94	67.26 N	0.61 W	4.38	1.35
2215.00	4.22	12.61	2212.75	73.16 N	0.31 W	5.11	1.95
2310.00	5.91	10.15	2307.37	81.39 N	1.32 E	7.35	1.79
2405.00	7.58	16.94	2401.71	92.20 N	4.01 E	10.83	1.94
2500.00	8.99	8.51	2495.72	105.54 N	6.93 E	14.73	1.96
2595.00	9.99	2.81	2589.42	121.11 N	8.43 E	17.39	1.44
2690.00	9.92	356.75	2682.99	137.52 N	8.37 E	18.54	1.11
2784.00	10.52	356.25	2775.50	154.17 N	7.35 E	18.76	0.64
2879.00	9.66	354.18	2869.03	170.76 N	5.98 E	18.62	0.98
2974.00	9.80	354.12	2962.66	186.73 N	4.34 E	18.17	0.15
3069.00	7.97	355.49	3056.52	201.34 N	2.99 E	17.91	1.95
3164.00	6.20	1.52	3150.79	213.03 N	2.61 E	18.39	2.01
3259.00	5.20	357.83	3245.32	222.46 N	2.58 E	19.06	1.12
3354.00	2.59	1.90	3340.10	228.91 N	2.49 E	19.45	2.76
3449.00	1.59	340.81	3435.03	232.30 N	2.13 E	19.34	1.31
3544.00	1.13	7.65	3530.01	234.47 N	1.82 E	19.19	0.82
3828.00	1.33	354.88	3813.94	240.52 N	1.90 E	19.72	0.12
4112.00	1.79	356.85	4097.84	248.22 N	1.36 E	19.76	0.16
4397.00	0.53	299.34	4382.78	253.30 N	0.02 W	18.75	0.55
4682.00	0.47	151.89	4667.77	252.91 N	0.62 W	18.13	0.34
4967.00	1.34	260.68	4952.75	251.34 N	3.35 W	15.28	0.55
5251.00	1.26	239.27	5236.68	249.21 N	9.31 W	9.18	0.17
5536.00	1.41	148.60	5521.63	244.62 N	10.17 W	7.99	0.67
5820.00	1.71	144.07	5805.52	238.21 N	5.87 W	11.80	0.11
5913.00	1.72	111.51	5898.48	236.58 N	3.75 W	13.79	1.03
5948.00	1.27	116.69	5933.47	236.21 N	2.92 W	14.60	1.34
6101.00	12.24	90.09	6085.19	235.42 N	14.88 E	32.29	7.27
6196.00	20.61	87.53	6176.23	236.12 N	41.71 E	59.10	8.84
6244.00	23.58	87.12	6220.70	236.97 N	59.75 E	77.14	6.18
6291.00	25.47	88.65	6263.46	237.68 N	79.24 E	96.64	4.24
6339.00	29.55	89.08	6306.02	238.11 N	101.40 E	118.77	8.51
6386.00	34.64	86.20	6345.83	239.18 N	126.34 E	143.71	11.32
6434.00	42.71	87.61	6383.27	240.77 N	156.26 E	173.68	16.90
6481.00	45.78	87.57	6416.93	242.14 N	189.03 E	206.45	6.54
6529.00	47.65	85.88	6449.84	244.15 N	223.91 E	241.38	4.67
6576.00	47.88	86.51	6481.44	246.46 N	258.63 E	276.18	1.11
6624.00	47.88	88.06	6513.63	248.15 N	294.19 E	311.77	2.39
6671.00	52.05	88.64	6543.85	249.18 N	330.15 E	347.71	8.93
6719.00	57.25	87.38	6571.62	250.55 N	369.26 E	386.82	11.03
6765.00	63.58	88.84	6594.32	251.85 N	409.22 E	426.76	14.05
6813.00	69.66	89.72	6613.35	252.40 N	453.26 E	470.72	12.77
6860.00	73.13	91.25	6628.35	252.02 N	497.79 E	515.10	8.00
6937.00	80.06	91.89	6646.19	249.96 N	572.62 E	589.57	9.04
7030.00	85.68	89.22	6657.73	249.08 N	664.85 E	681.48	6.68
7125.00	88.00	89.95	6662.97	249.77 N	759.70 E	776.12	2.56
7220.00	88.89	89.32	6665.56	250.37 N	854.66 E	870.86	1.15
7315.00	91.42	90.56	6665.30	250.47 N	949.65 E	965.60	2.96
7410.00	89.20	87.64	6664.79	251.97 N	1044.62 E	1060.42	3.86
7505.00	91.63	89.14	6664.10	254.63 N	1139.57 E	1155.31	3.01
7600.00	91.60	88.63	6661.42	256.48 N	1234.51 E	1250.13	0.54
7694.00	92.47	87.90	6658.08	259.32 N	1328.41 E	1343.97	1.21
7789.00	89.54	87.27	6656.42	263.33 N	1423.30 E	1438.90	3.16
7884.00	90.00	87.57	6656.80	267.61 N	1518.20 E	1533.86	0.58
7979.00	89.78	88.25	6656.98	271.08 N	1613.14 E	1628.79	0.75
8074.00	89.91	87.41	6657.24	274.68 N	1708.07 E	1723.73	0.89
8169.00	89.75	89.45	6657.52	277.28 N	1803.03 E	1818.62	2.15
8263.00	89.88	89.79	6657.82	277.91 N	1897.02 E	1912.40	0.39
8358.00	91.88	90.68	6656.37	277.52 N	1992.01 E	2007.10	2.31
8453.00	92.28	89.68	6652.92	277.23 N	2086.94 E	2101.75	1.13

8548.00	90.99	89.77	6650.21	277.68 N	2181.90 E	2196.48	1.37
8643.00	90.43	89.92	6649.03	277.94 N	2276.89 E	2291.23	0.60
8738.00	91.42	89.76	6647.50	278.20 N	2371.88 E	2385.97	1.05
8832.00	89.57	89.06	6646.69	279.17 N	2465.86 E	2479.77	2.10
8927.00	89.07	87.72	6647.82	281.84 N	2560.82 E	2574.66	1.50
9022.00	89.72	90.88	6648.81	283.00 N	2655.79 E	2669.46	3.39
9117.00	88.71	90.66	6650.12	281.72 N	2750.77 E	2764.09	1.10
9212.00	90.34	90.03	6650.91	281.14 N	2845.77 E	2858.78	1.84
9307.00	90.19	89.33	6650.48	281.67 N	2940.76 E	2953.55	0.76
9401.00	90.89	91.21	6649.59	281.23 N	3034.75 E	3047.25	2.14
9496.00	90.74	91.21	6648.23	279.22 N	3129.72 E	3141.81	0.16
9591.00	91.05	90.96	6646.75	277.42 N	3224.69 E	3236.39	0.42
9686.00	90.86	91.20	6645.17	275.63 N	3319.66 E	3330.96	0.32
9781.00	90.62	91.09	6643.94	273.73 N	3414.64 E	3425.53	0.28
9876.00	90.52	91.53	6643.00	271.56 N	3509.61 E	3520.08	0.48
9971.00	91.08	90.03	6641.67	270.26 N	3604.58 E	3614.70	1.68
10065.00	90.43	90.43	6640.43	269.88 N	3698.57 E	3708.40	0.81
10160.00	91.11	91.28	6639.15	268.46 N	3793.55 E	3803.02	1.14
10221.00	91.85	91.88	6637.58	266.78 N	3854.51 E	3863.68	1.56
10282.00	91.85	91.88	6635.61	264.78 N	3915.45 E	3924.30	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 85.75 DEGREES (GRID)
A TOTAL CORRECTION OF 7.79 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10282.00 FEET
IS 3924.39 FEET ALONG 86.13 DEGREES (GRID)**

Last survey is a projection from 10221 ft MD to TD at 10282 ft MD.