



Max Tool Temp (degF) / Source	158.60 / PCM	150.10 / PCM	150.10 / PCM	167.00 / PCM	221.80 / PCM
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Lead MWD Engineer	Robert Ley	Robert Ley	Robert Ley	Robert Ley	Robert Ley
Customer Representative	Charles Collver	Charles Collver	Charles Collver	Charles Collver	Charles Collver

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	PCM
Software Version	5.93	5.93	5.93	5.93	5.93
Sub Serial Number	11342274	11342274	11342274	11342274	12334786
Insert Serial Number	11145513	11145513	11145513	11145513	11145513
Date and Time Initialized	04-Aug-14 00:10	01-Jan-70 00:00	01-Jan-70 00:00	01-Jan-70 00:00	08-Aug-14 10:02
Date and Time Read	07-Aug-14 21:31	07-Aug-14 21:22	07-Aug-14 21:15	07-Aug-14 20:36	12-Aug-14 01:32
ECMB SW Version	N/A	N/A	N/A	N/A	N/A

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	PCDC
Distance From Bit (ft)	59.00	57.00	58.00	56.00	63.00
Software Version	6.21	6.21	6.21	6.21	6.21
Sub Serial Number	11342274	11342274	11342274	11342274	12334786
Sonde Serial Number	11638605	11638605	11638605	11638605	11638605
Sensor ID Number	N/A	N/A	N/A	N/A	N/A
Toolface Offset (deg)	352.60	251.73	153.99	266.43	82.56

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	PCG
Distance From Bit (ft)	51.60	50.19	50.58	49.39	55.90
Recorded Sample Period (sec)	10	10	10	10	10
Software Version	8.15	8.15	8.15	8.15	8.15
Sub Serial Number	11342274	11342274	11342274	11342274	12334786
Insert/Sonde Serial Number	11680902	11680902	11680902	11680902	11680902

## REMARKS

1. All depths are measured depths and are calibrated to the driller' pipe tally and are measured from the 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.
4. The Following smoothing parameters have been applied to the data"

**PGXR (Gamma Ray):**  
 Interval Resolution: 0.5 feet  
 Coercion Distance: 0.6 feet  
 Gap Fill: 3.0 feet

**ROPA (Rate of Penetration):**  
 Interval Resolution: 0.5 feet  
 Coercion Distance: 1.2 feet

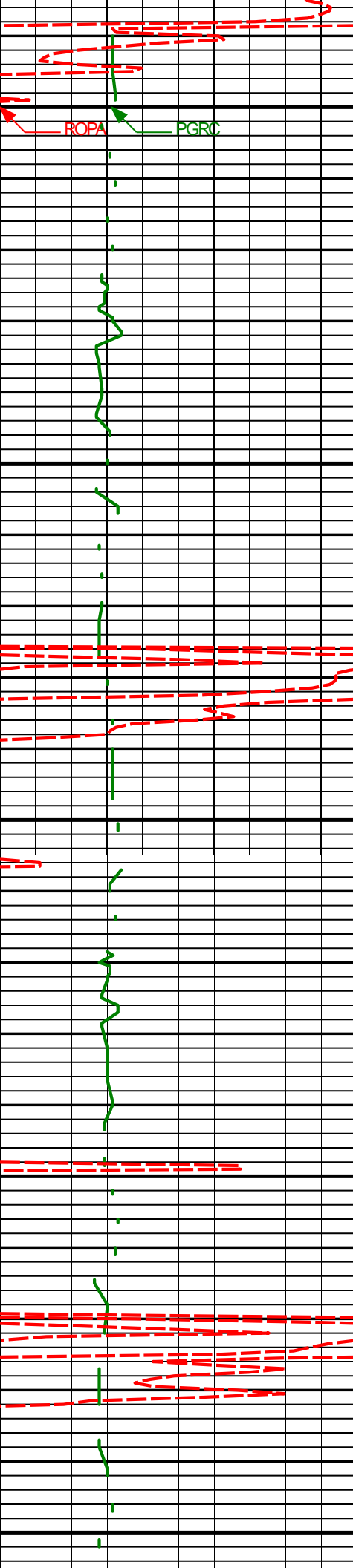
## WARRANTY

HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

# HALLIBURTON

## MD Detail Log 1:240

Gamma Ray (PGXC) (Api)						
0	300					
Avg Rate of Penetration feet per hr		Feet				
600	0		Depth	Inc	Azm	
					TVD	
					Vsec	
		900'				
			921'	0.27°	328.98°	920.99'
		950'				



1000'

1050'

1100'

1150'

1200'

1014'

0.11°

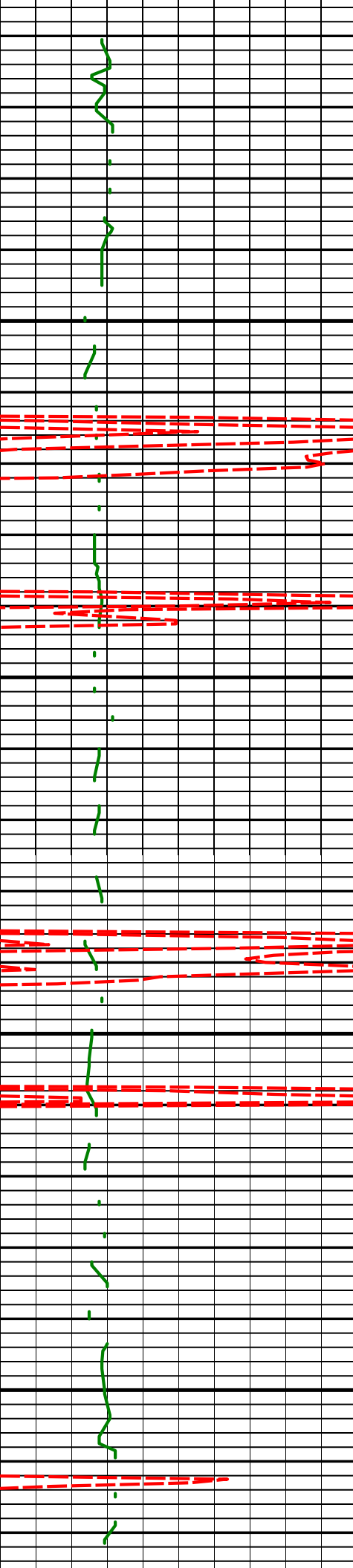
305.46°

1013.99'

1.77'

ROFA

PGRC



1250'

1293'

0.17°

313.60°

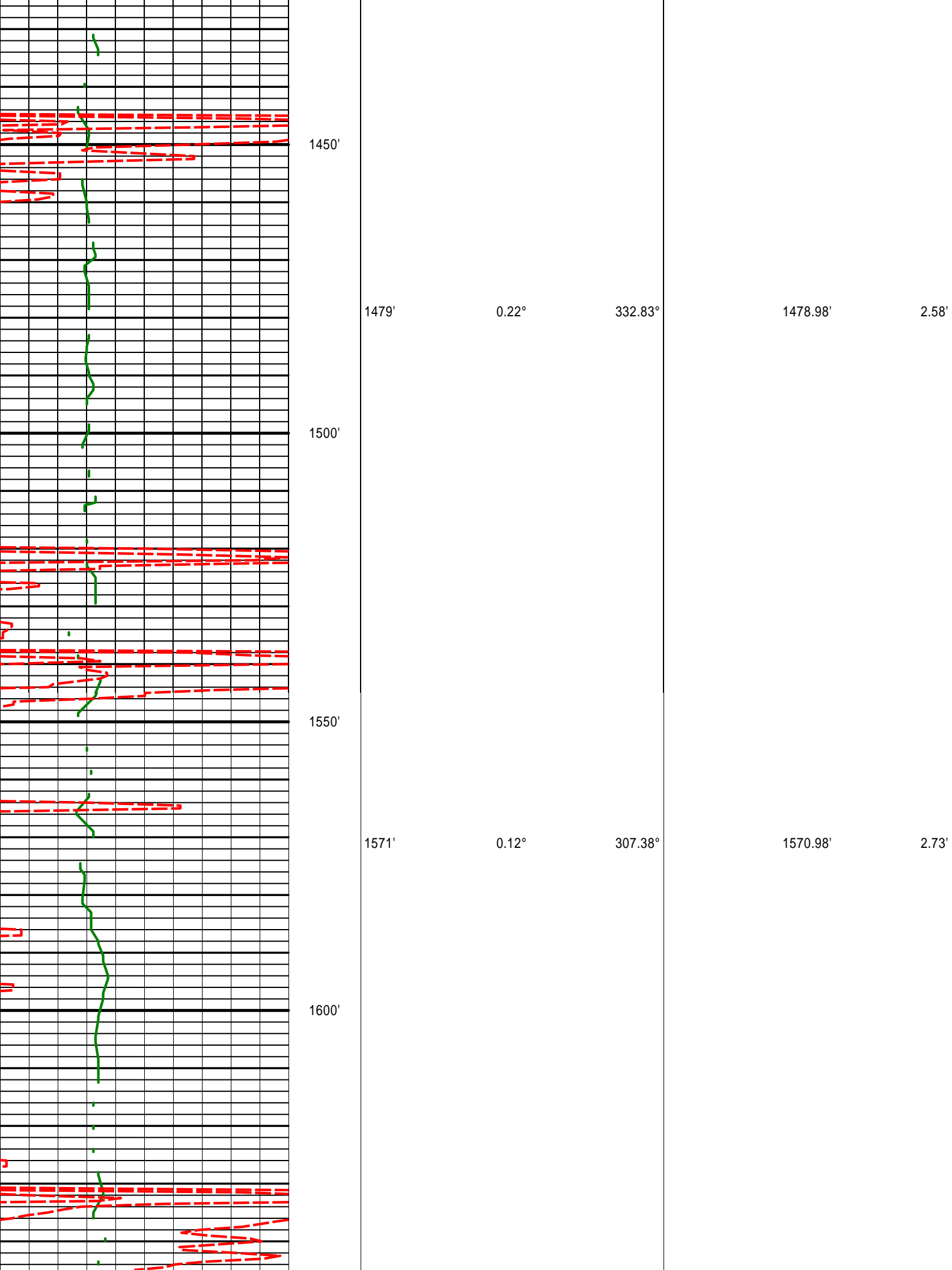
1292.98'

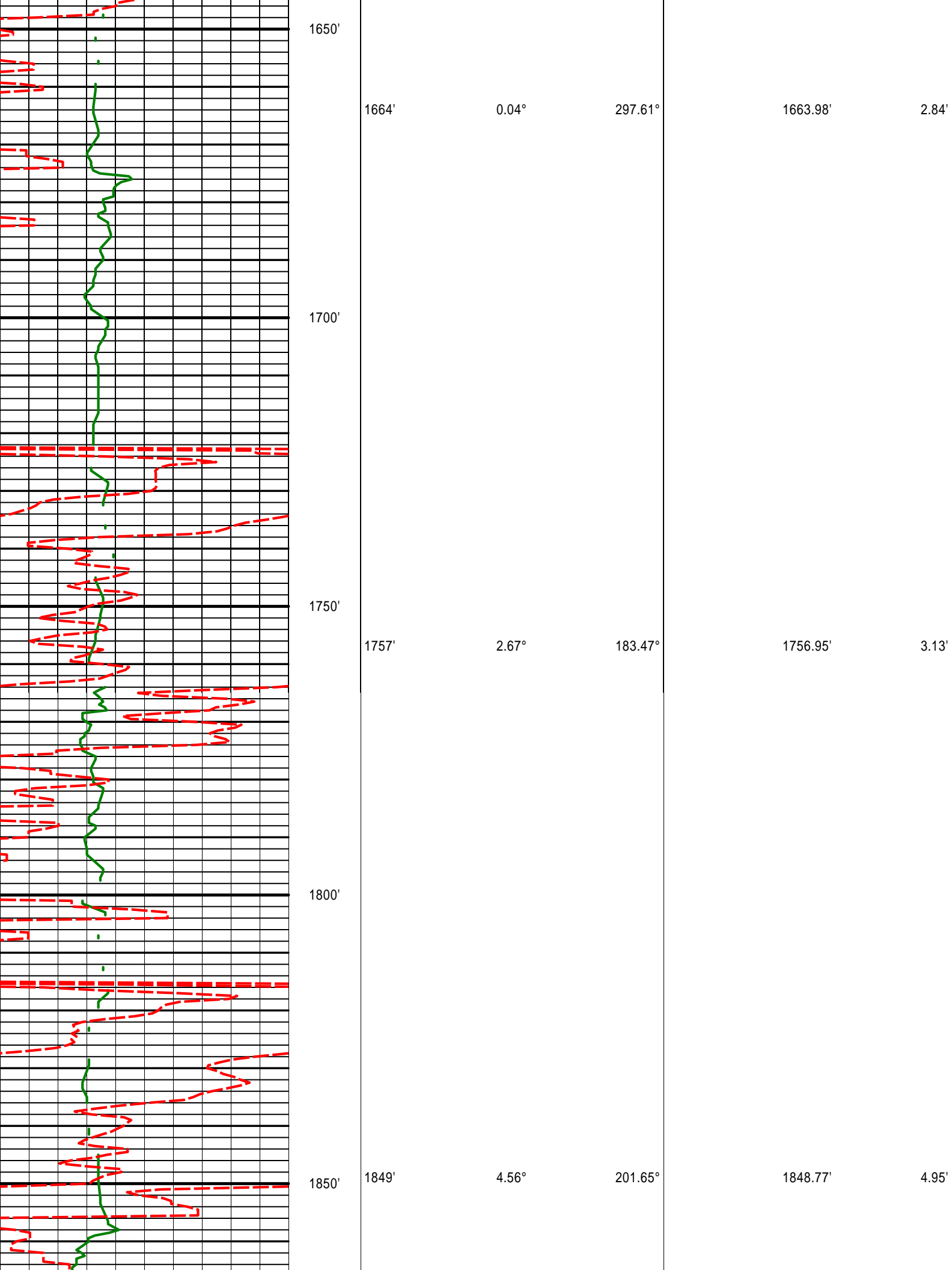
2.25'

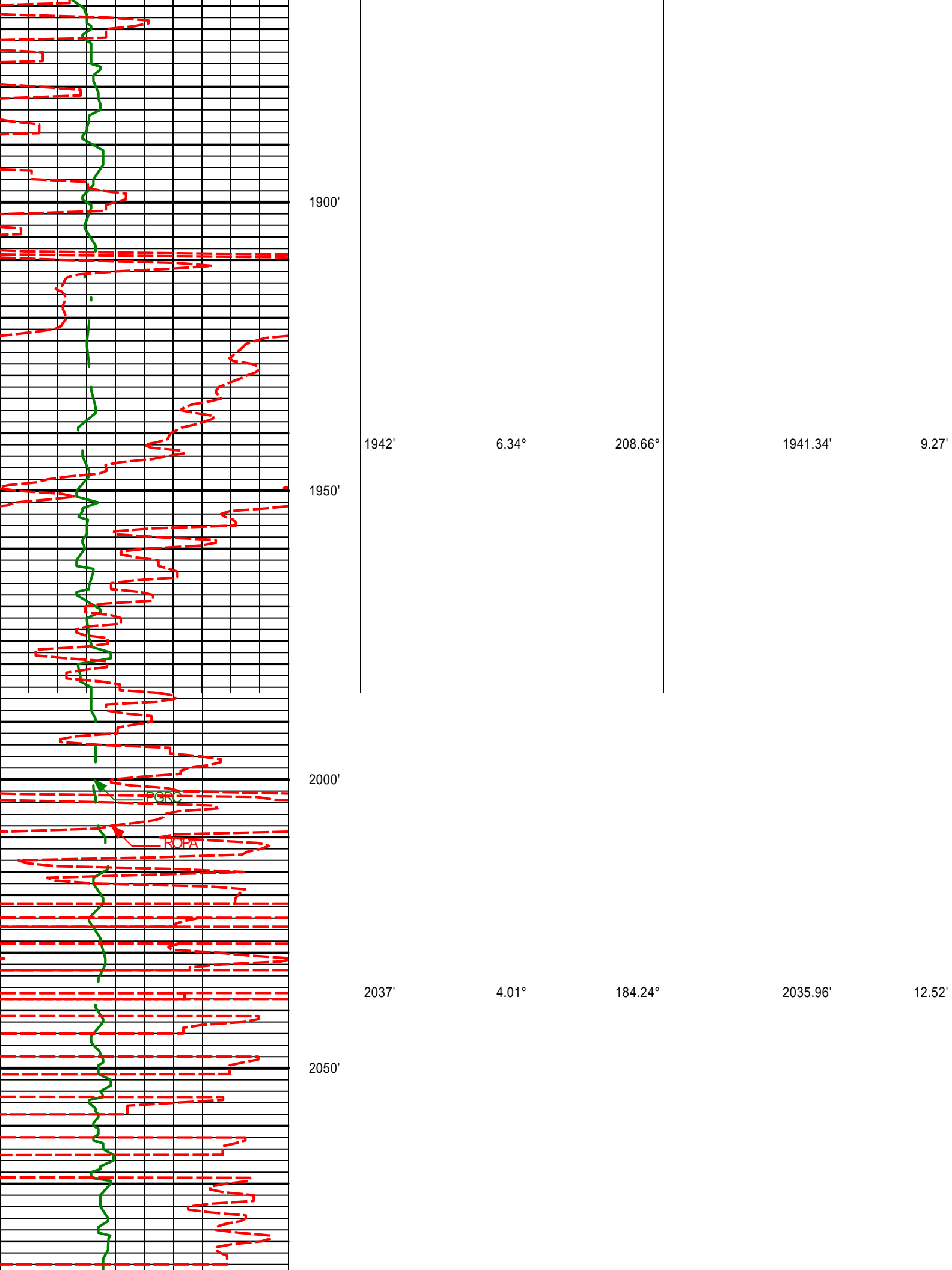
1300'

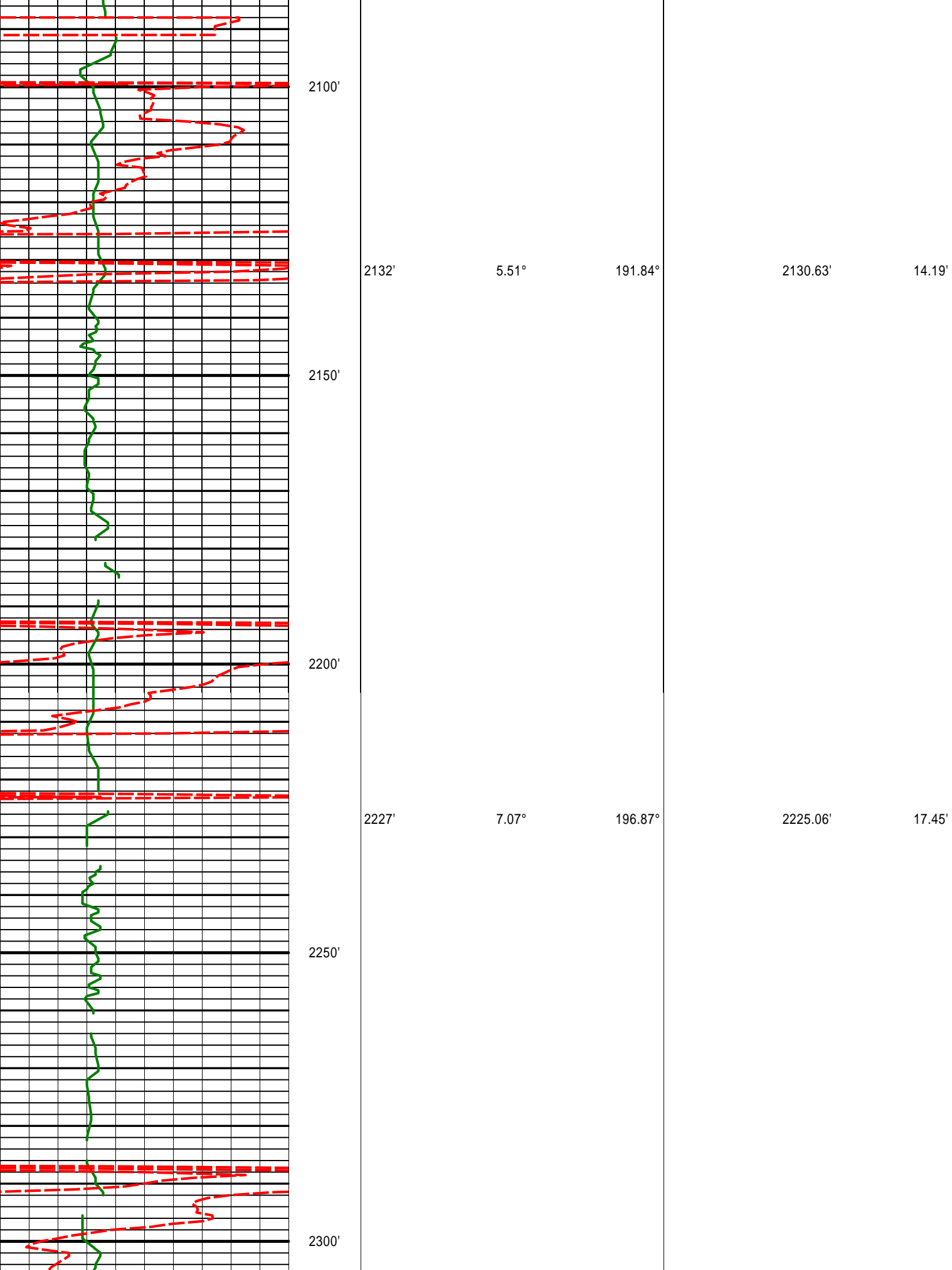
1350'

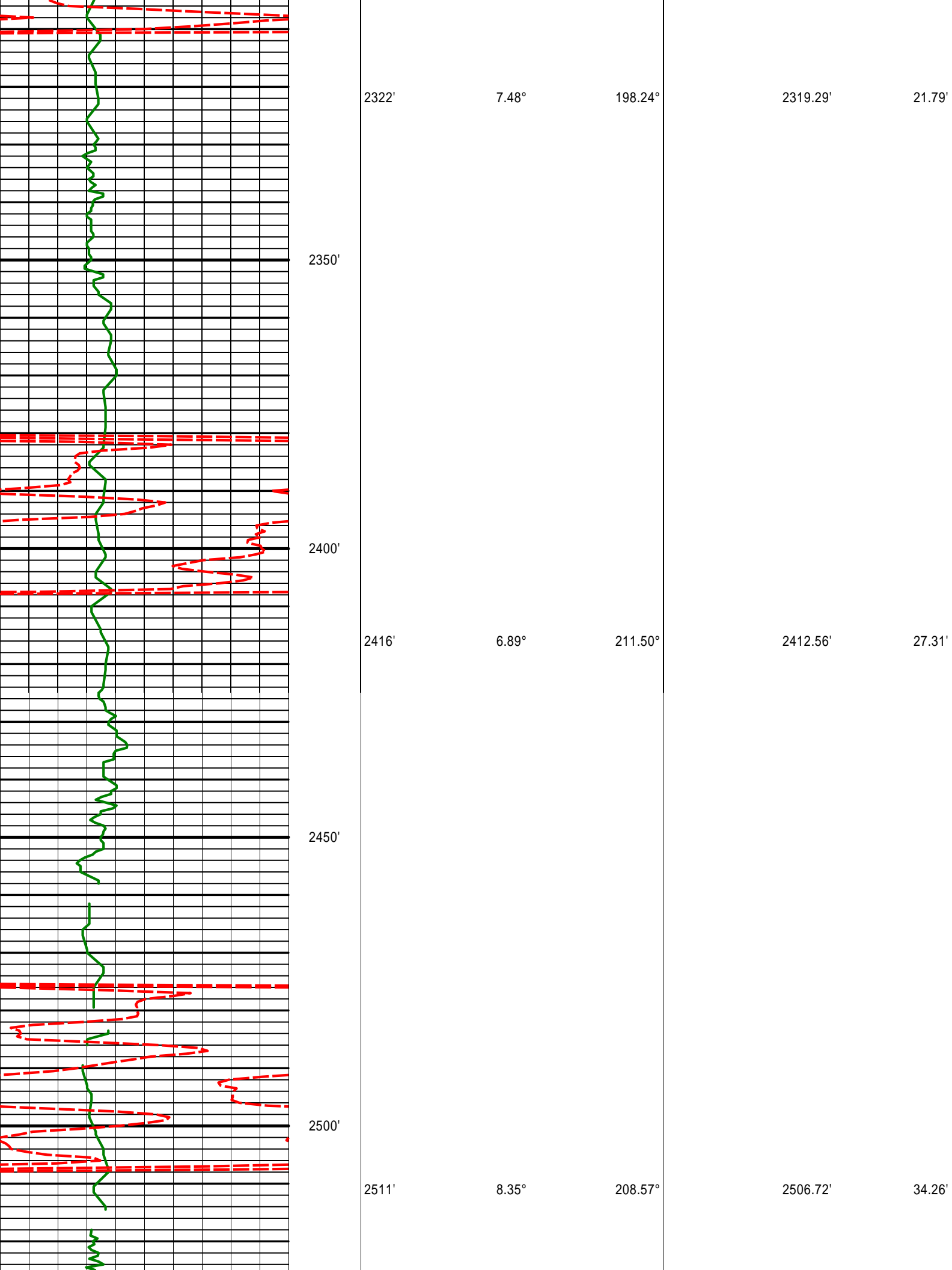
1400'

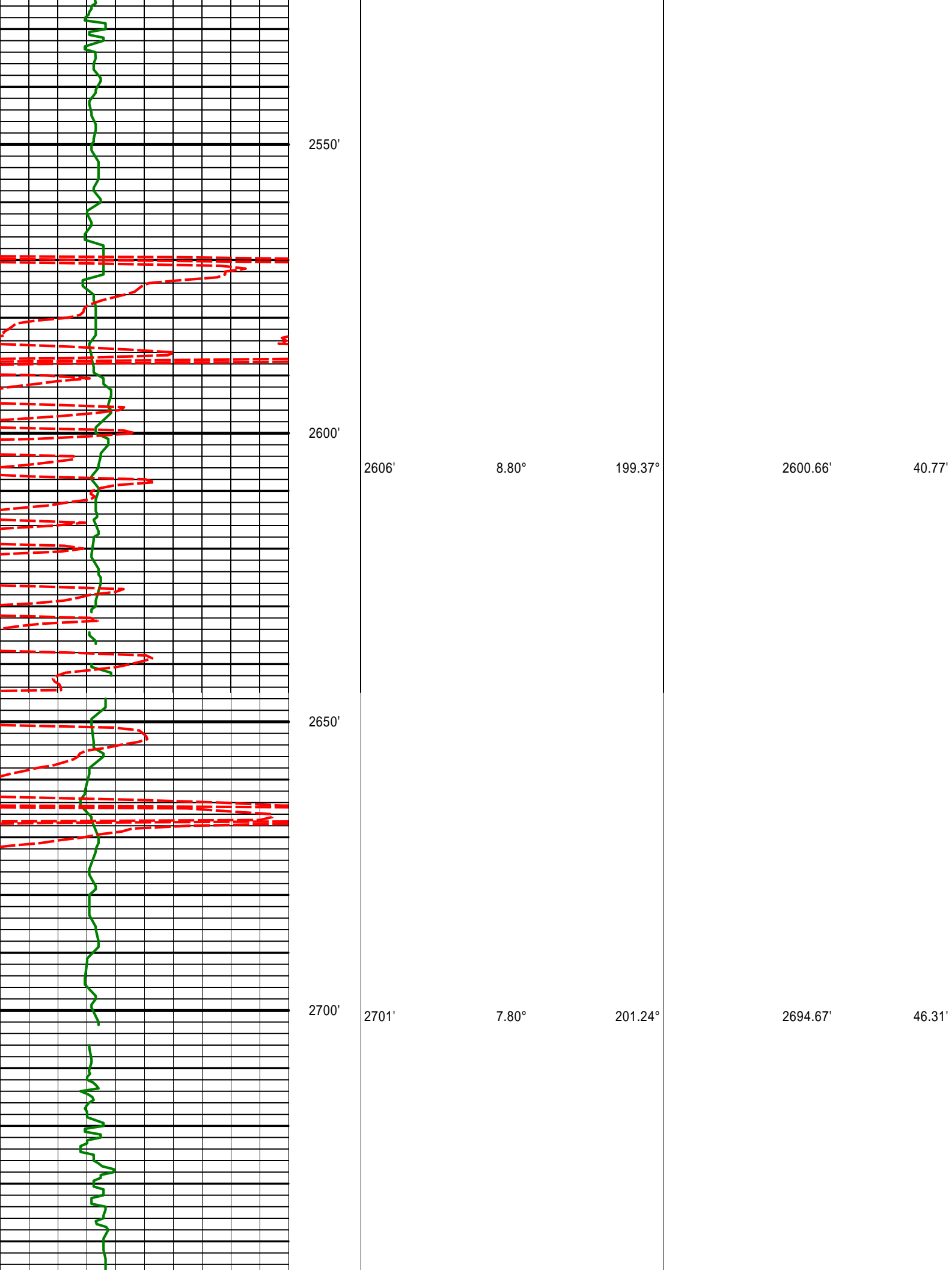


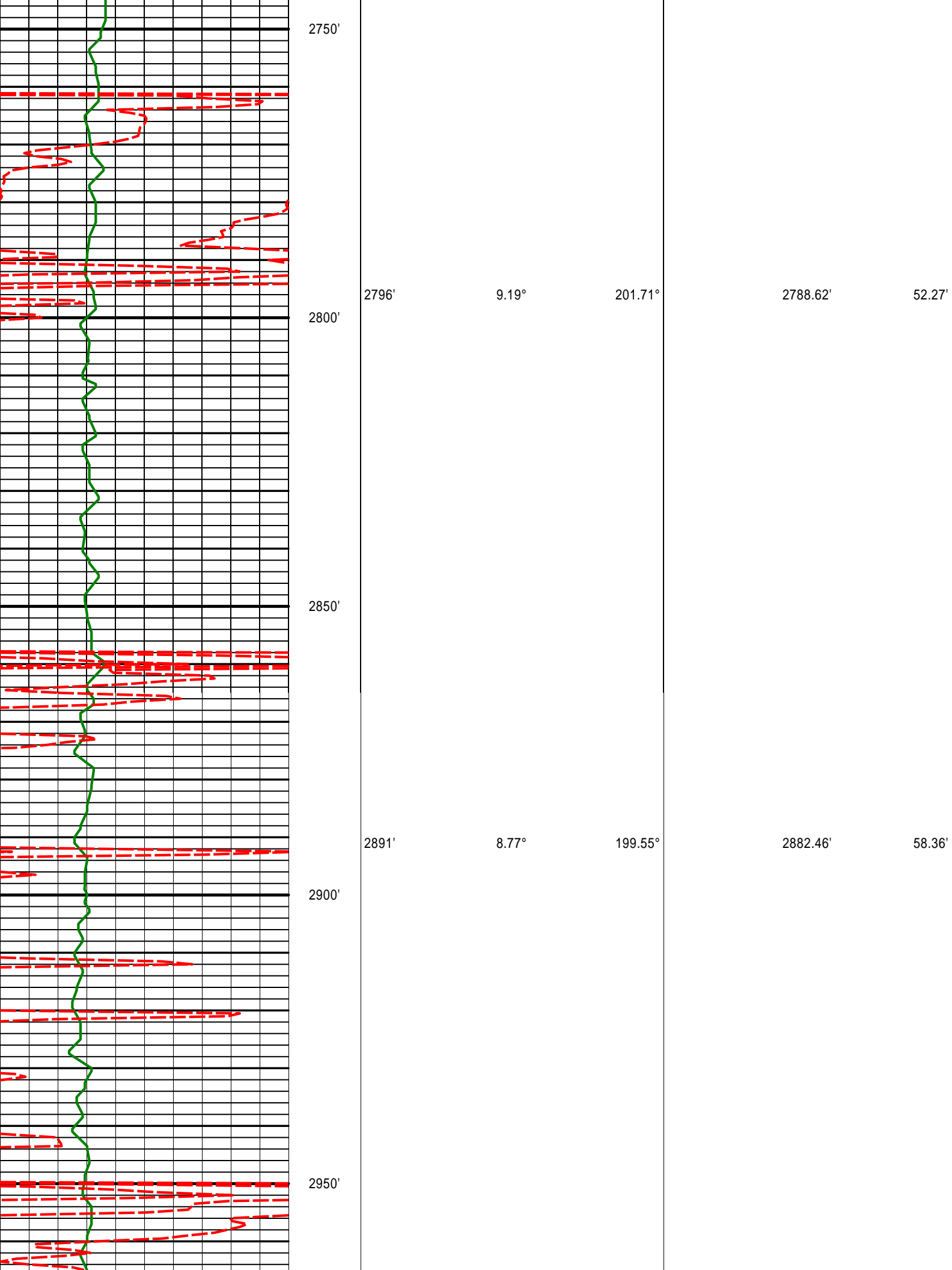


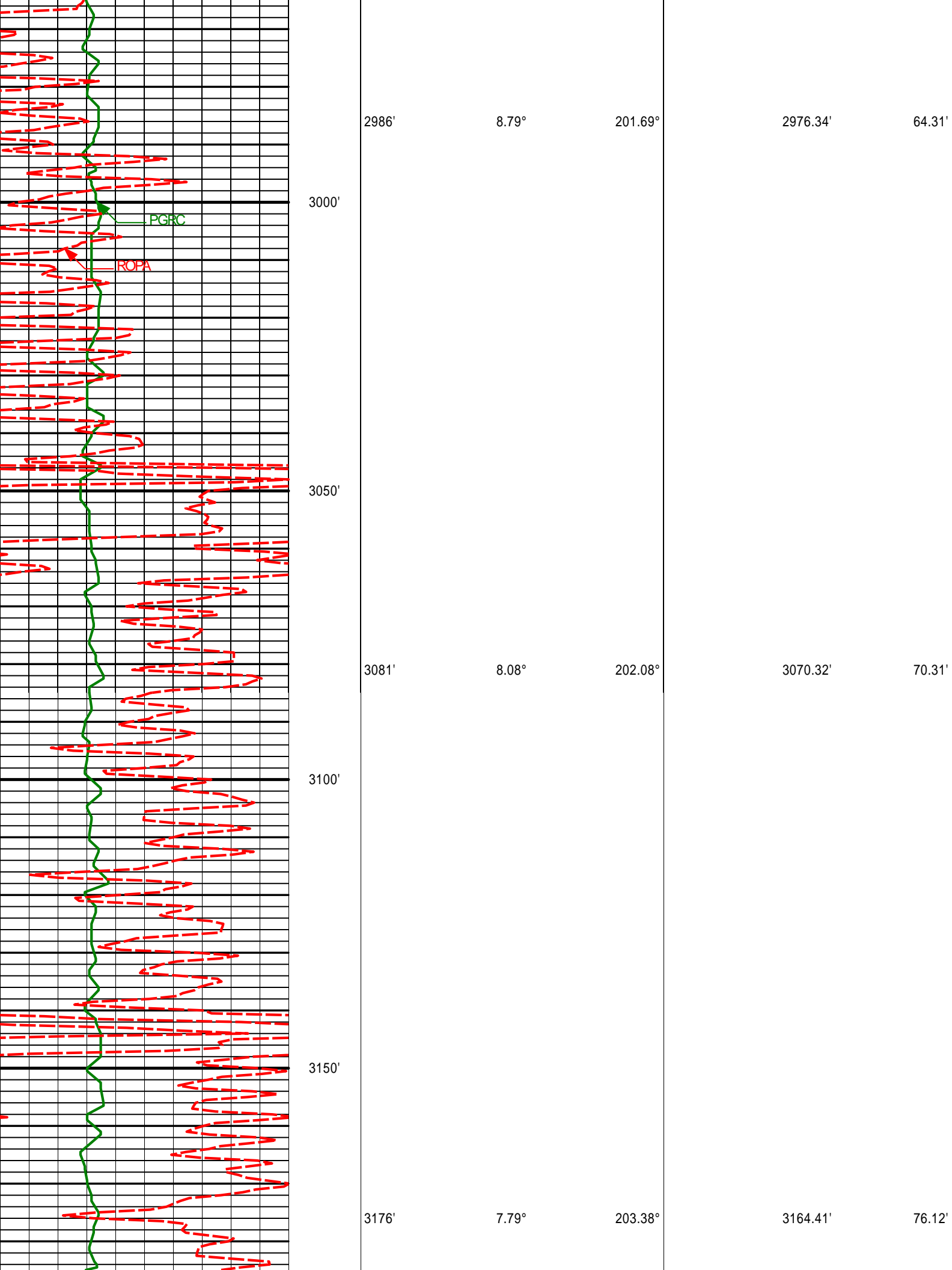


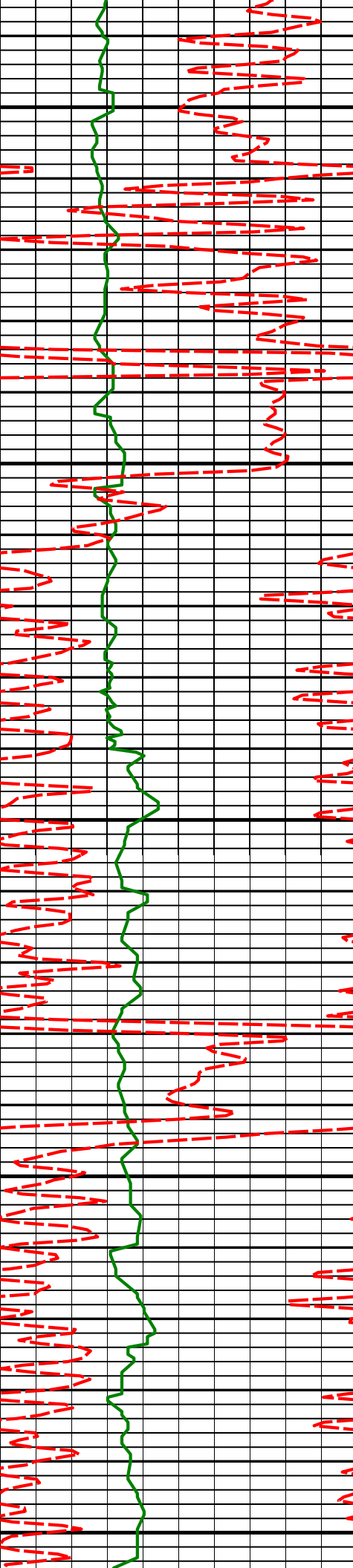












3200'

3250'

3300'

3350'

3400'

3271'

6.92°

203.83°

3258.62'

81.68'

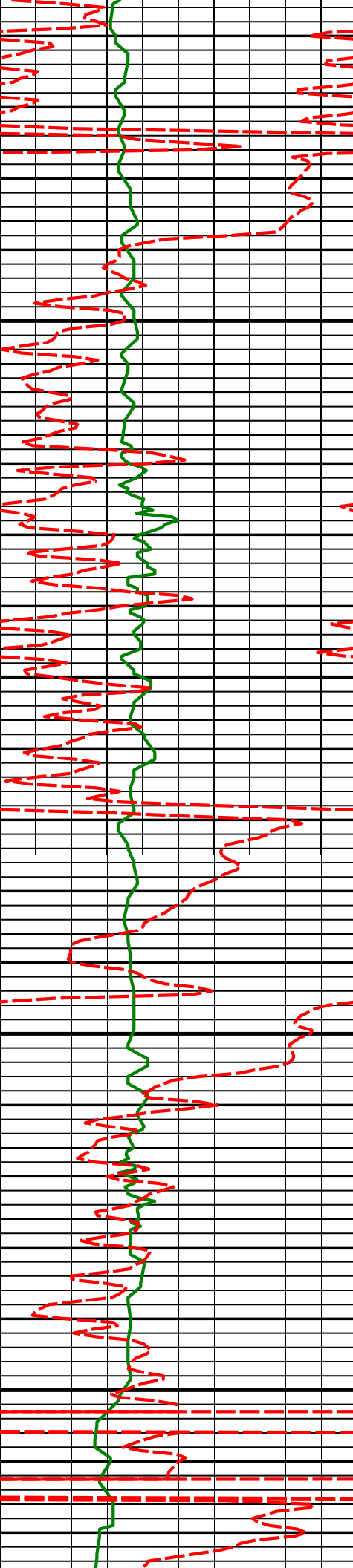
3365'

5.77°

215.20°

3352.05'

87.25'



3450'

3460'

4.17°

223.01°

3446.69'

92.75'

3500'

3550'

3556'

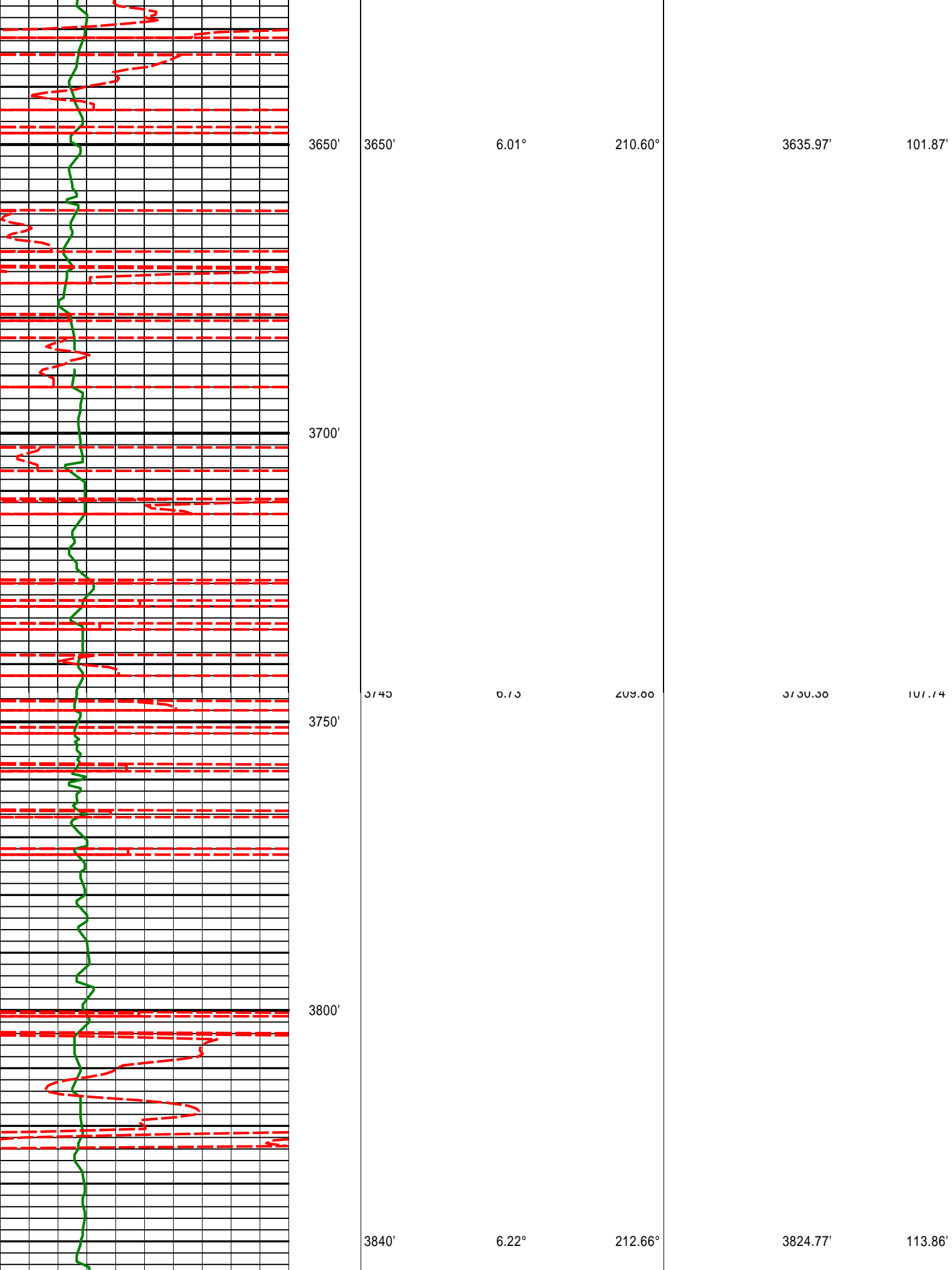
4.93°

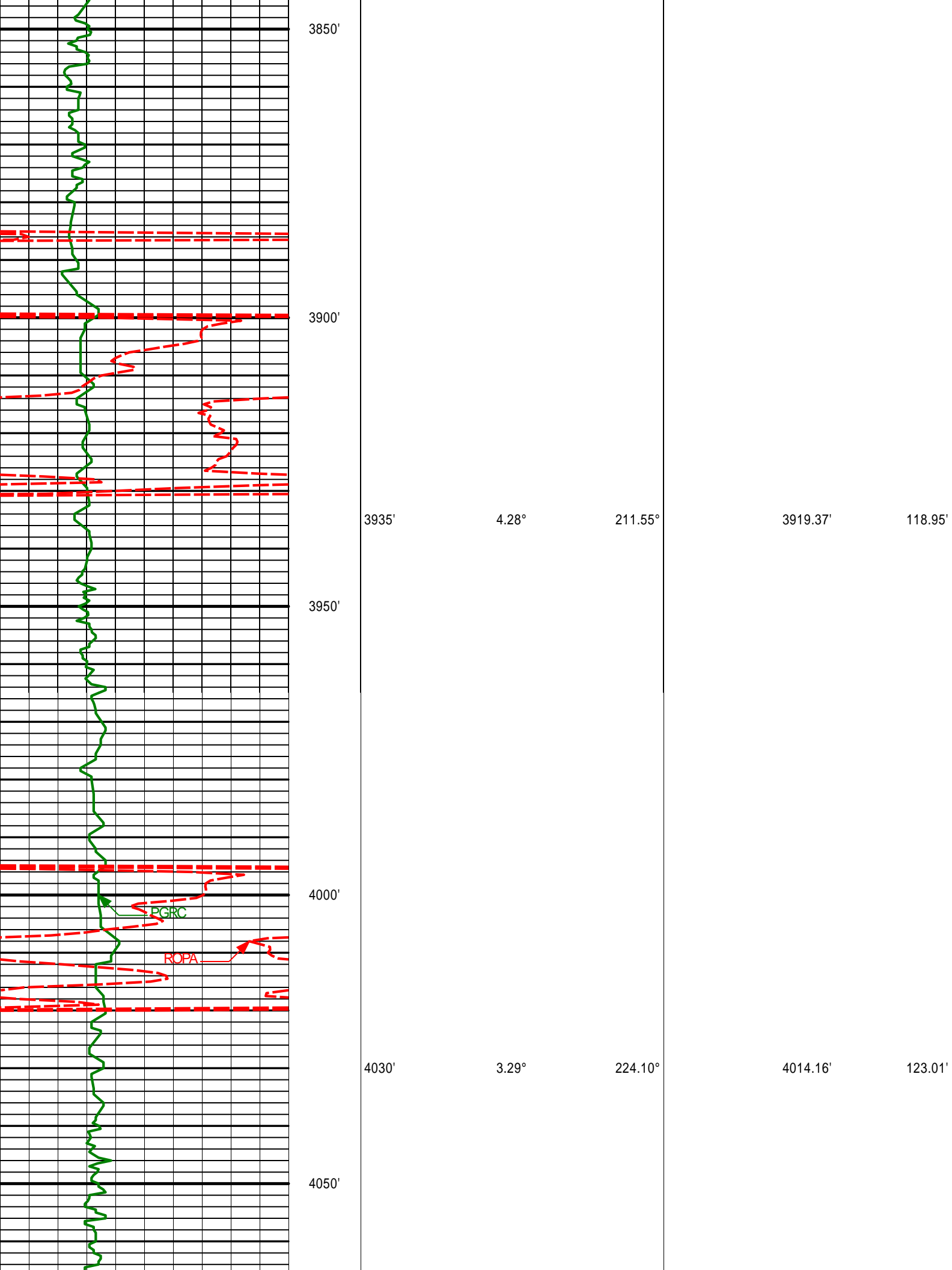
204.31°

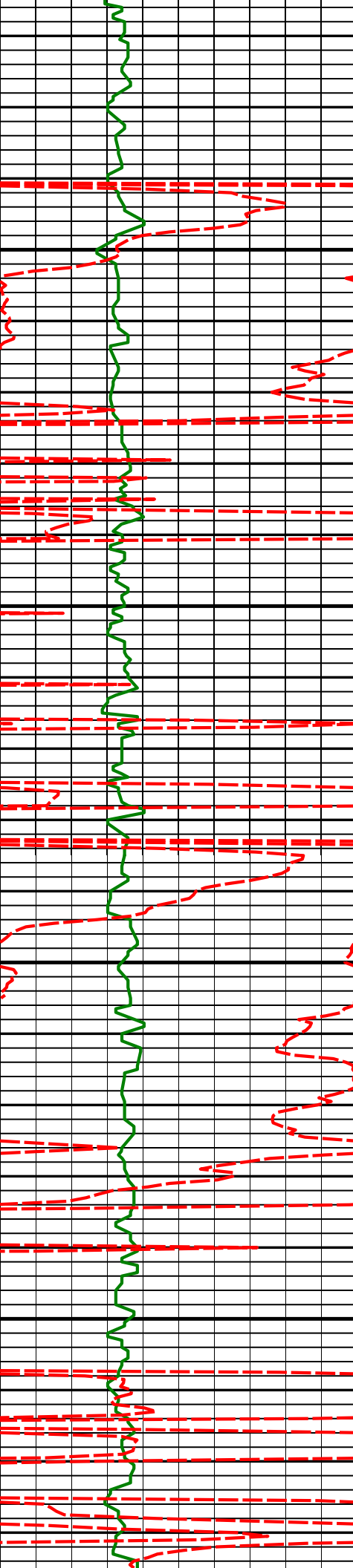
3542.39'

97.22'

3600'







4100'

4125'

2.38°

192.62°

4109.05'

125.58'

4150'

4200'

4220'

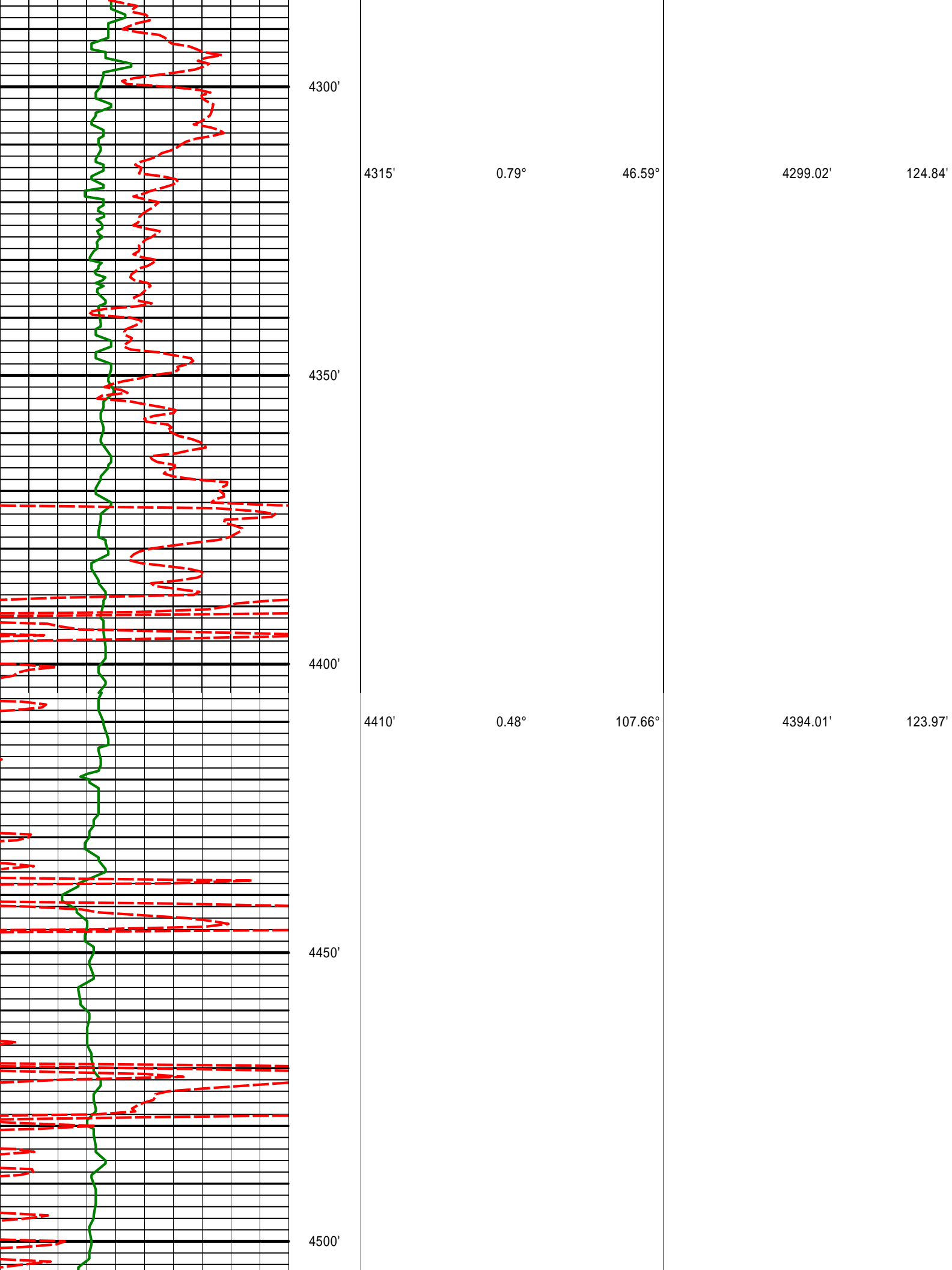
0.65°

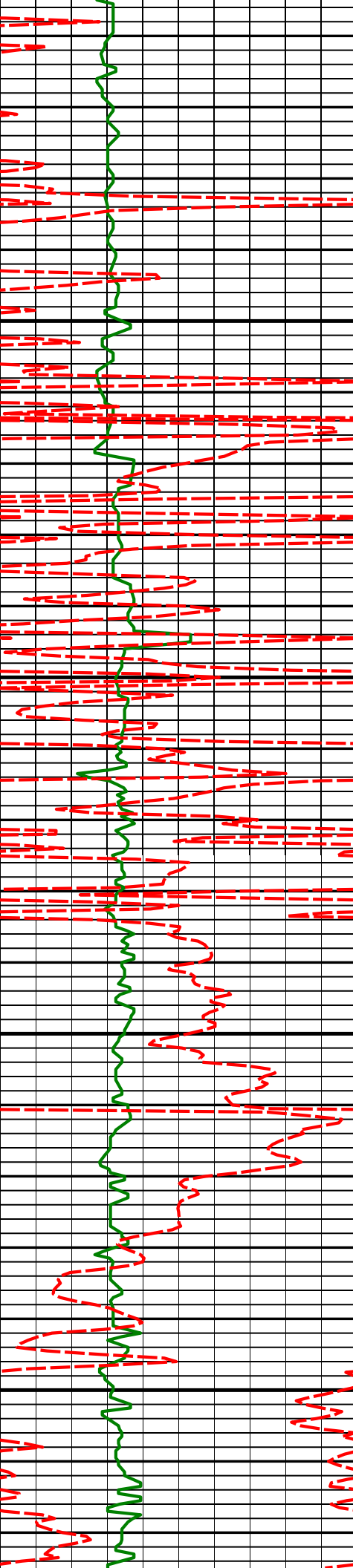
43.28°

4204.03'

125.74'

4250'





4550'

4600'

4650'

4700'

4505

0.76

31.25

4489.01

123.24

4599'

1.78°

0.58°

4582.99'

122.78'

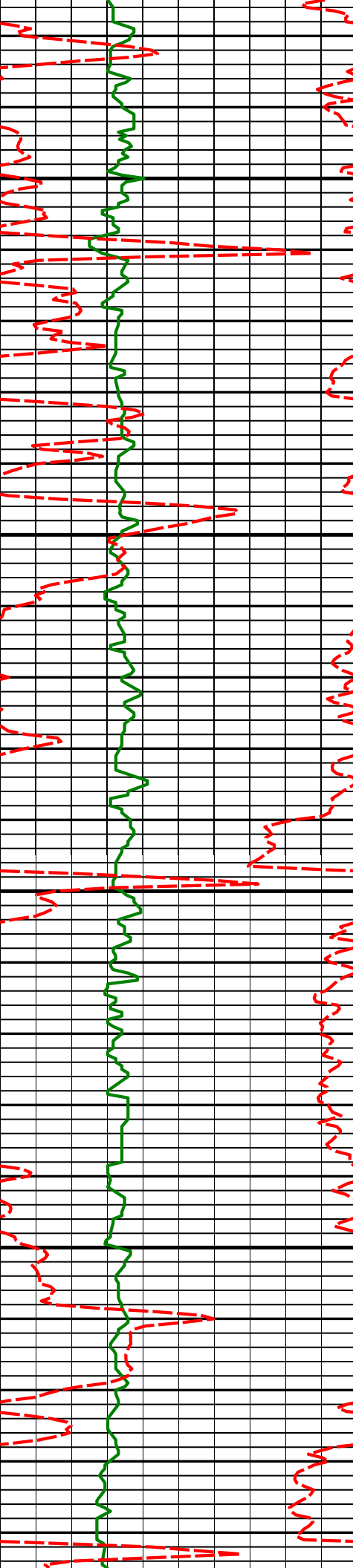
4694'

0.25°

345.42°

4677.97'

122.71'



4750'

4788'

0.21°

333.70°

4771.97'

122.81'

4800'

4850'

4883'

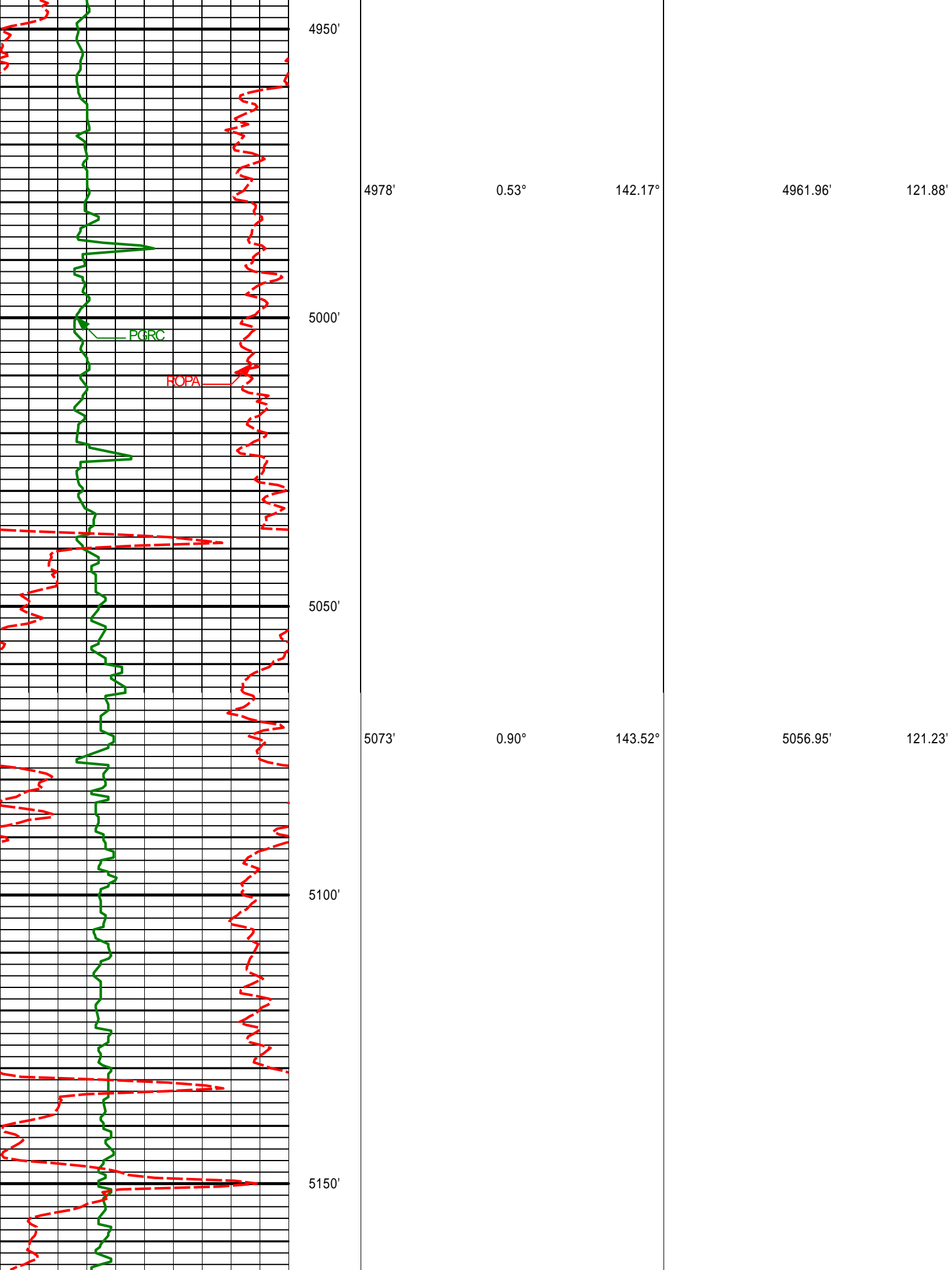
0.66°

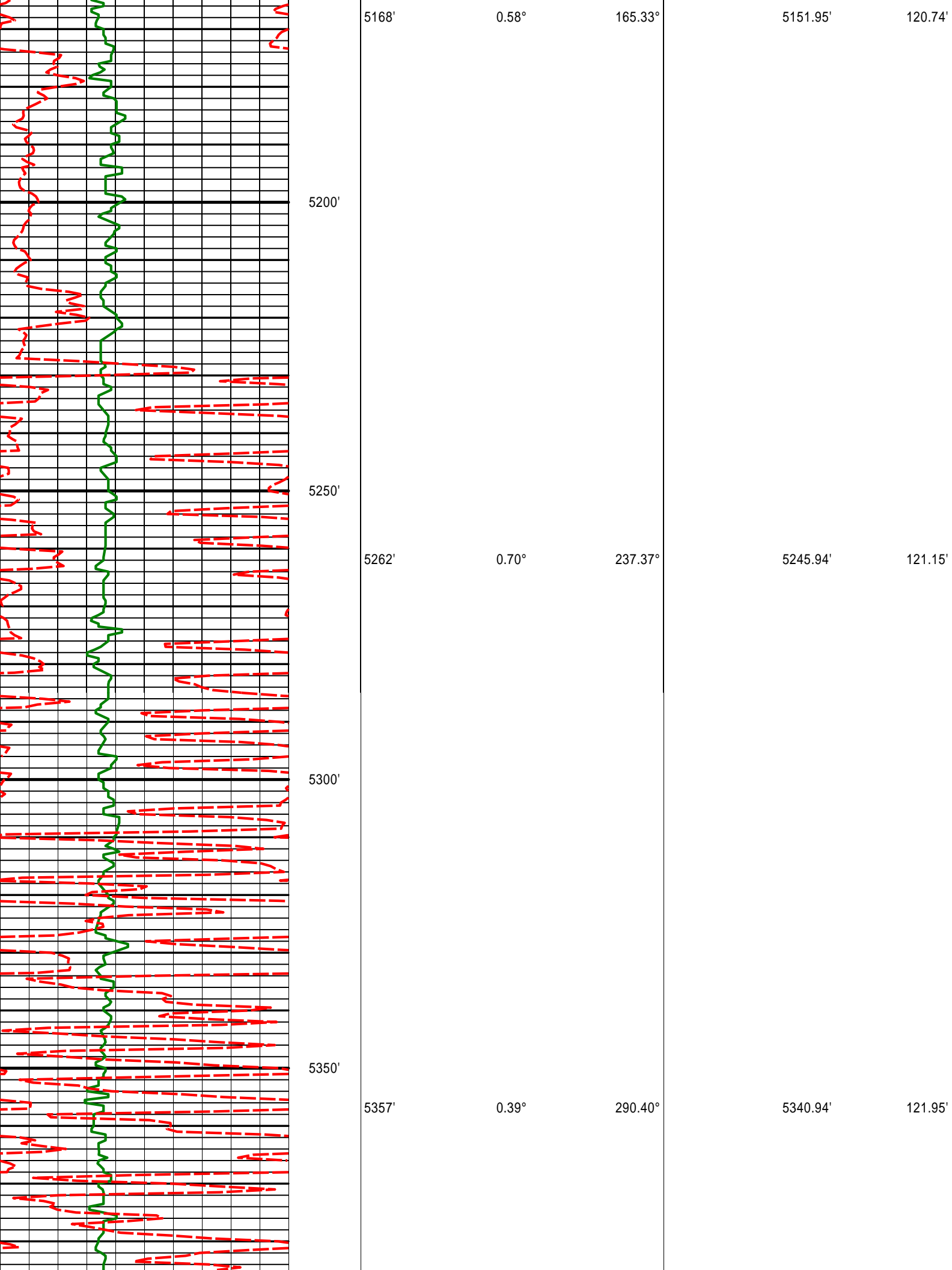
133.20°

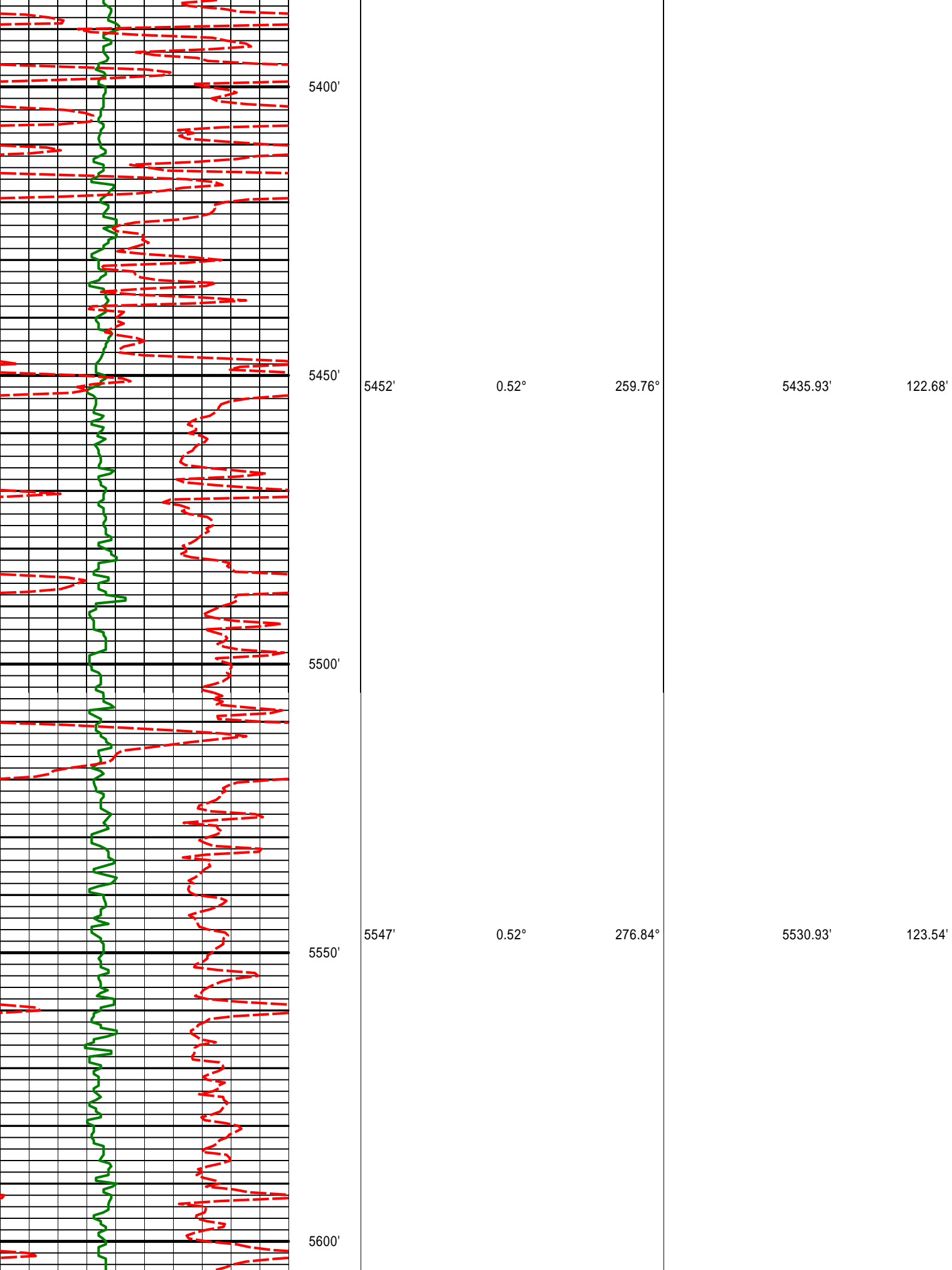
4866.97'

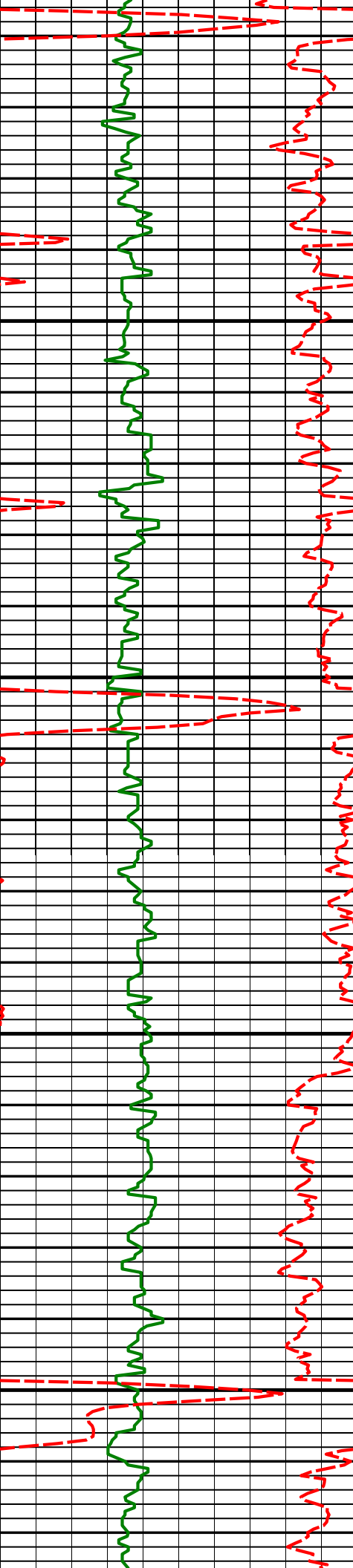
122.50'

4900'









5642'

0.99°

240.90°

5625.92'

124.71'

5650'

5700'

5737'

0.90°

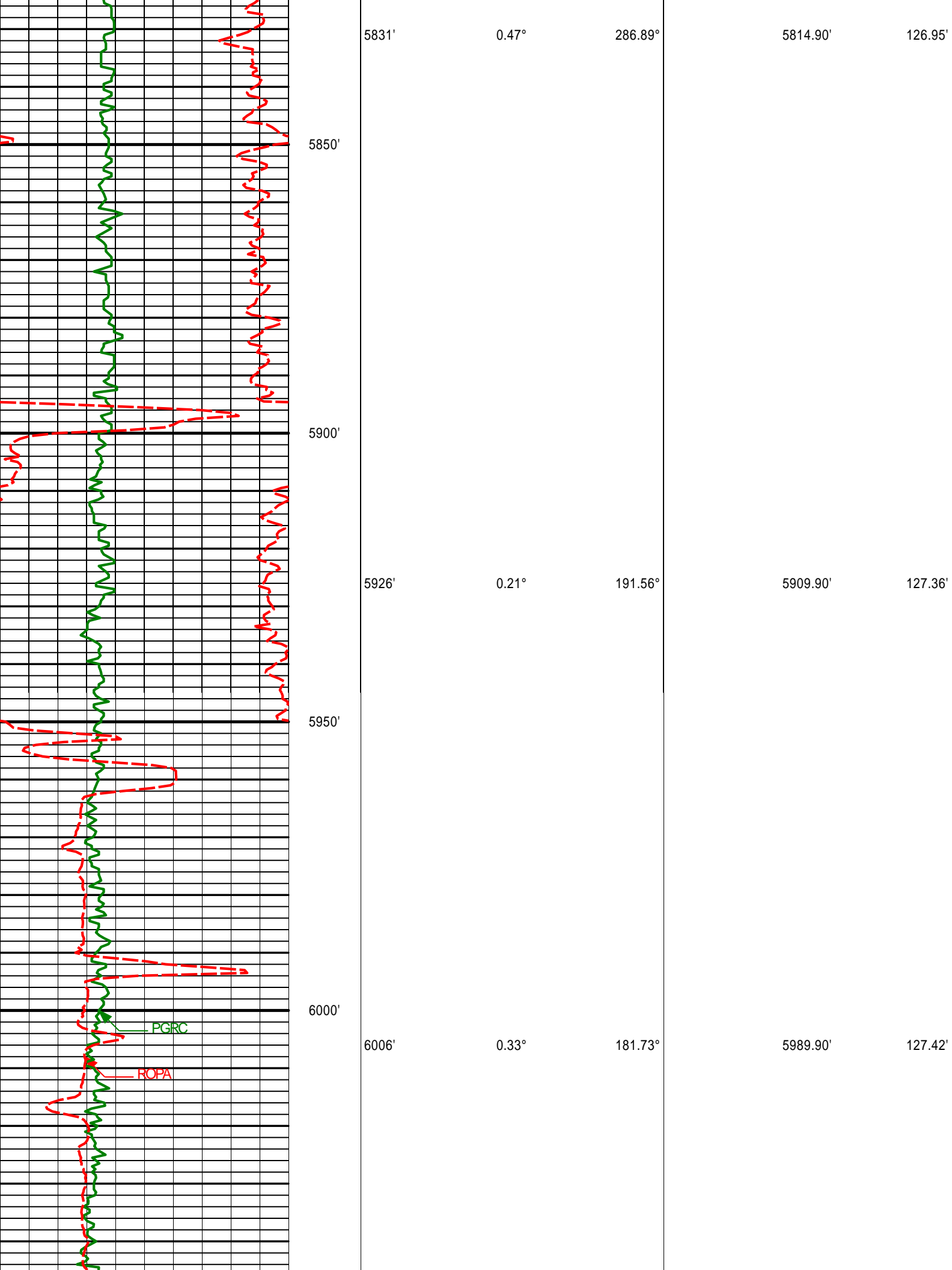
227.10°

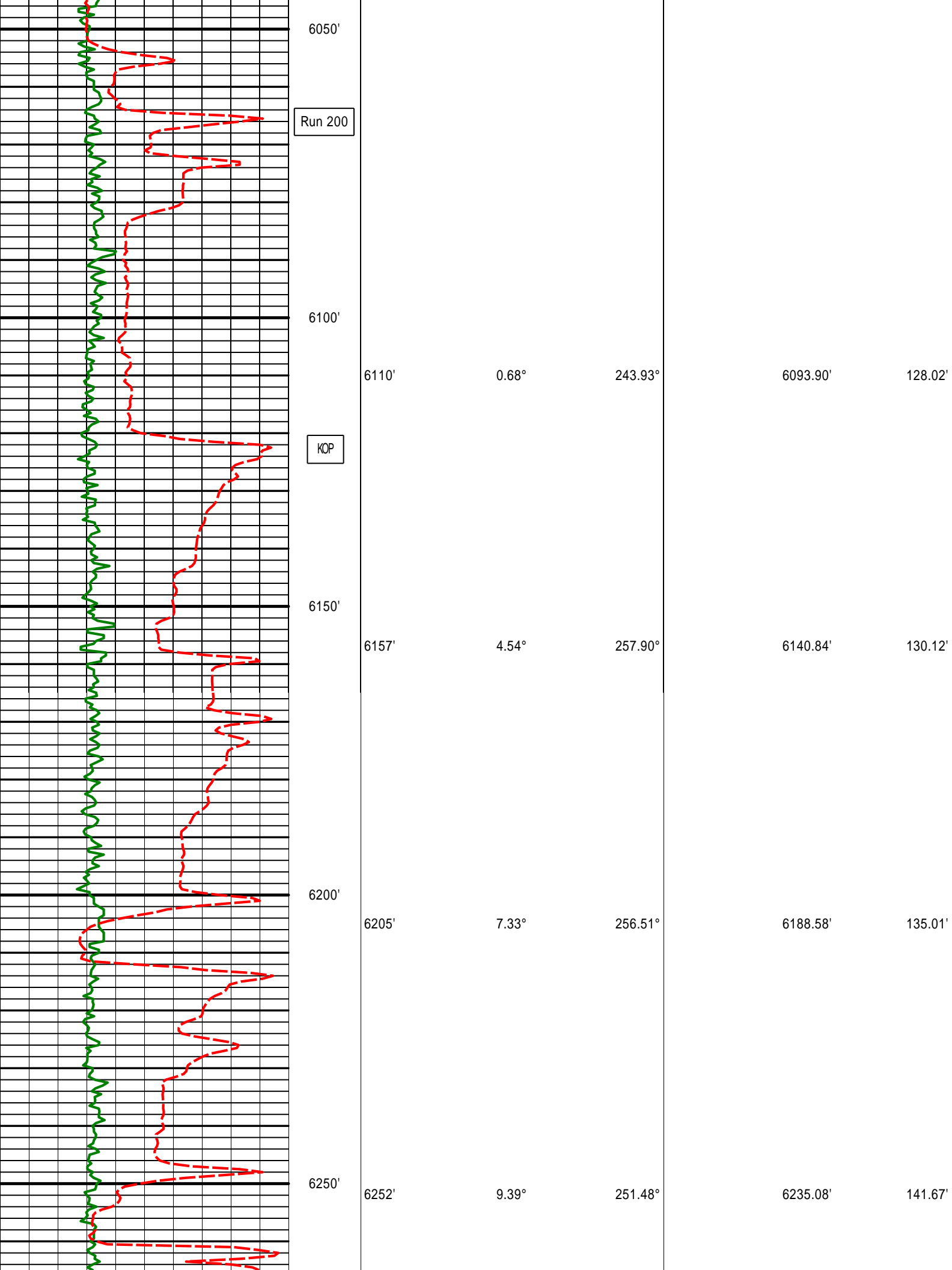
5720.91'

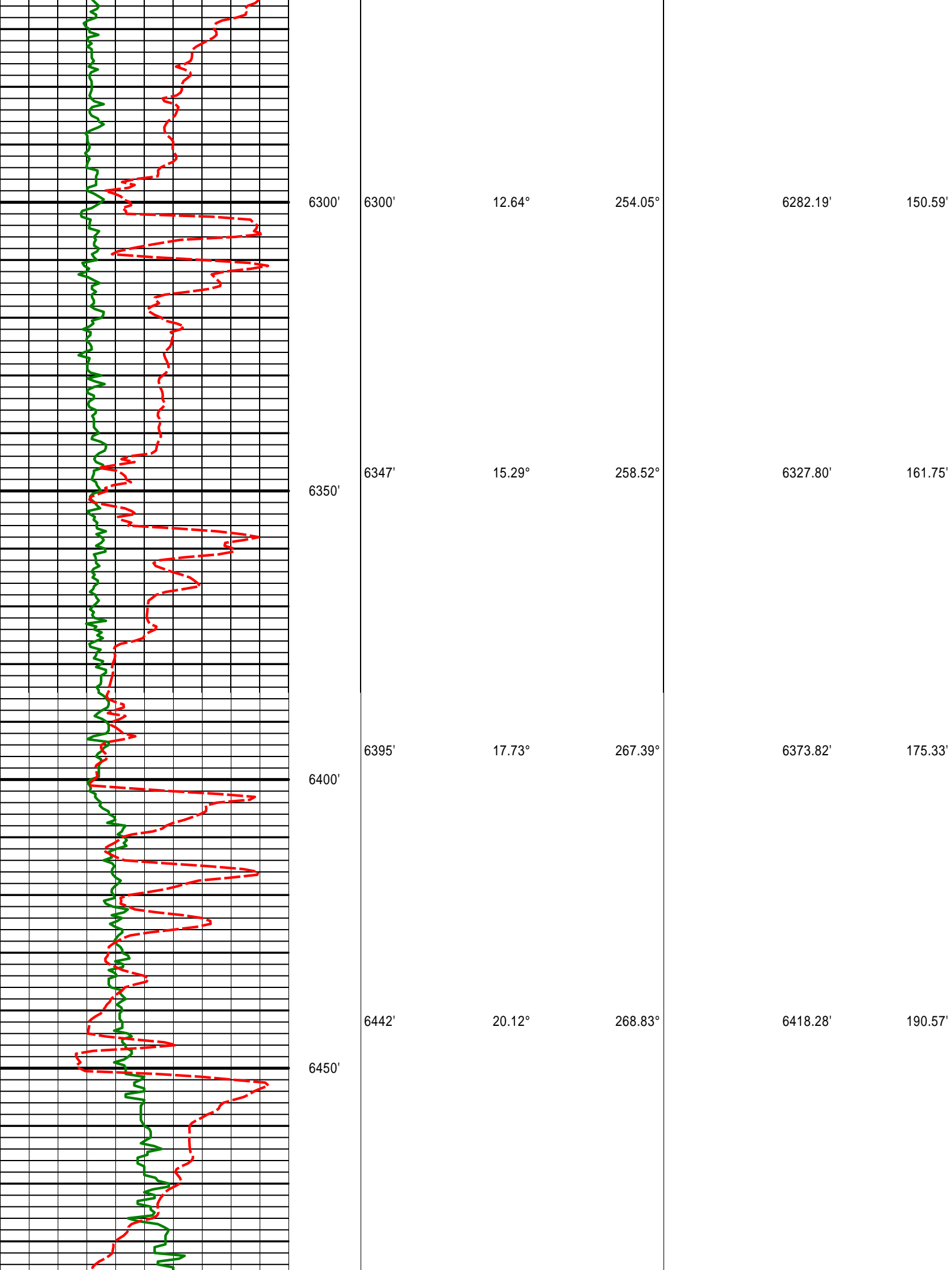
126.02'

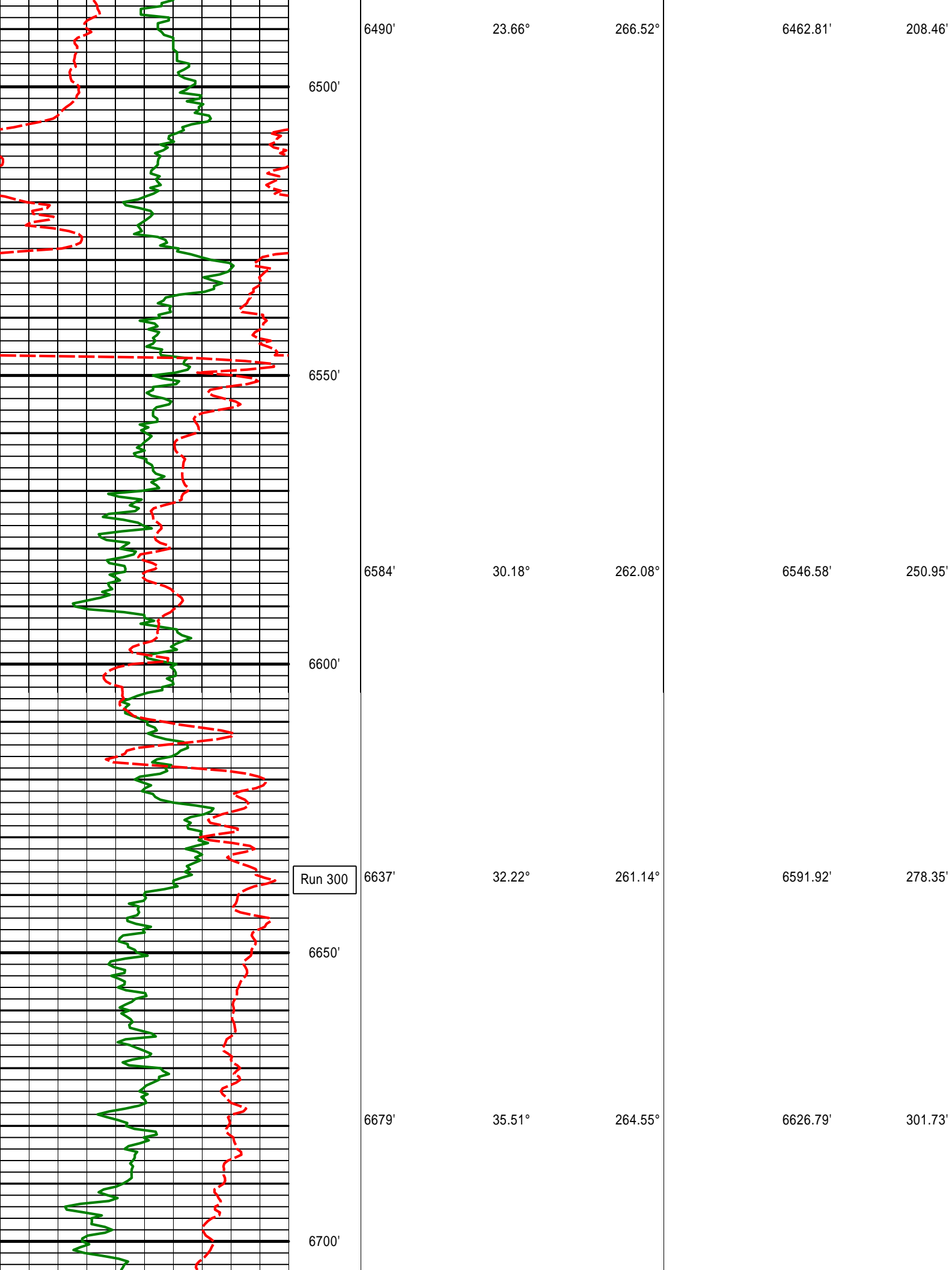
5750'

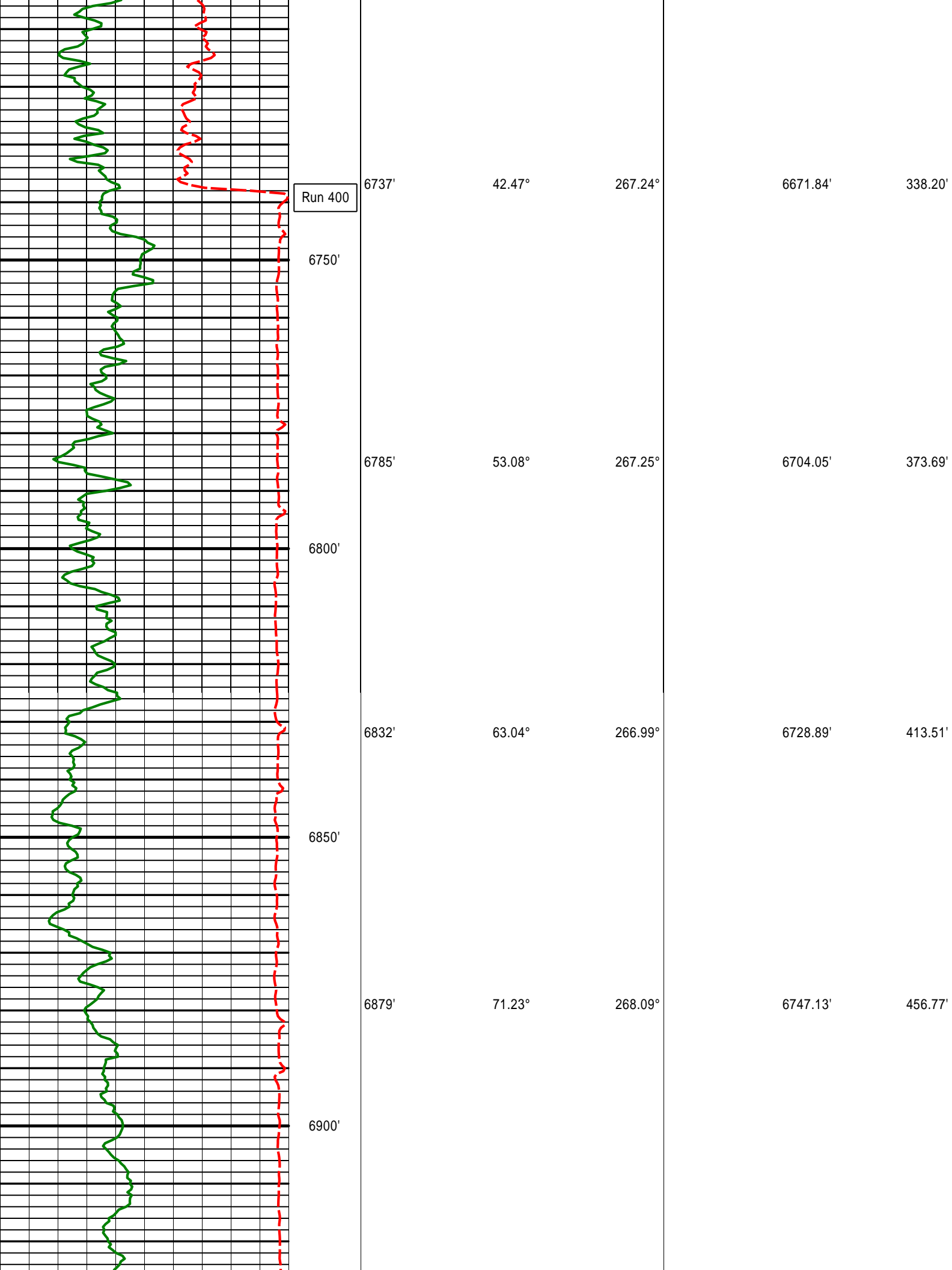
5800'

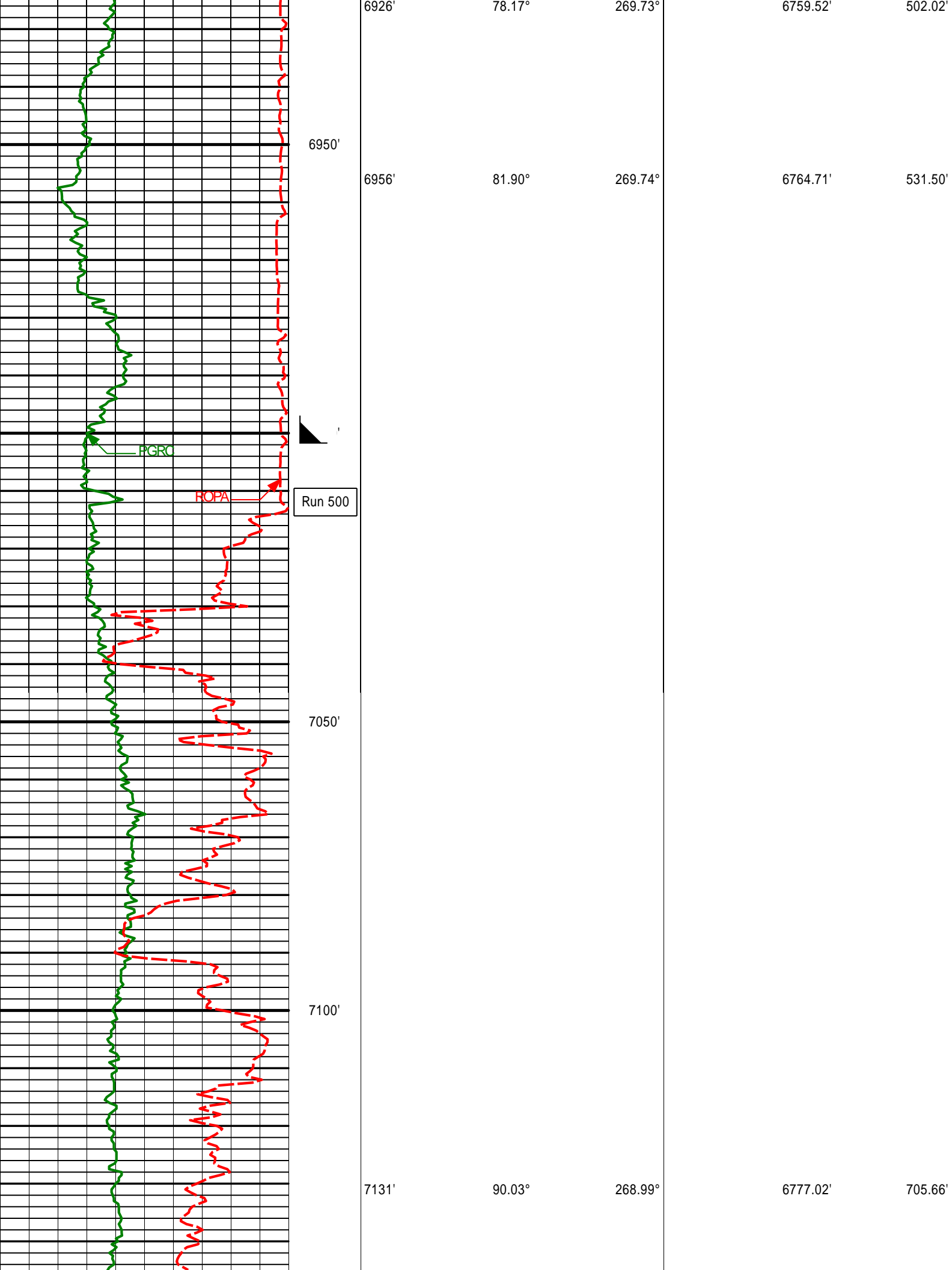


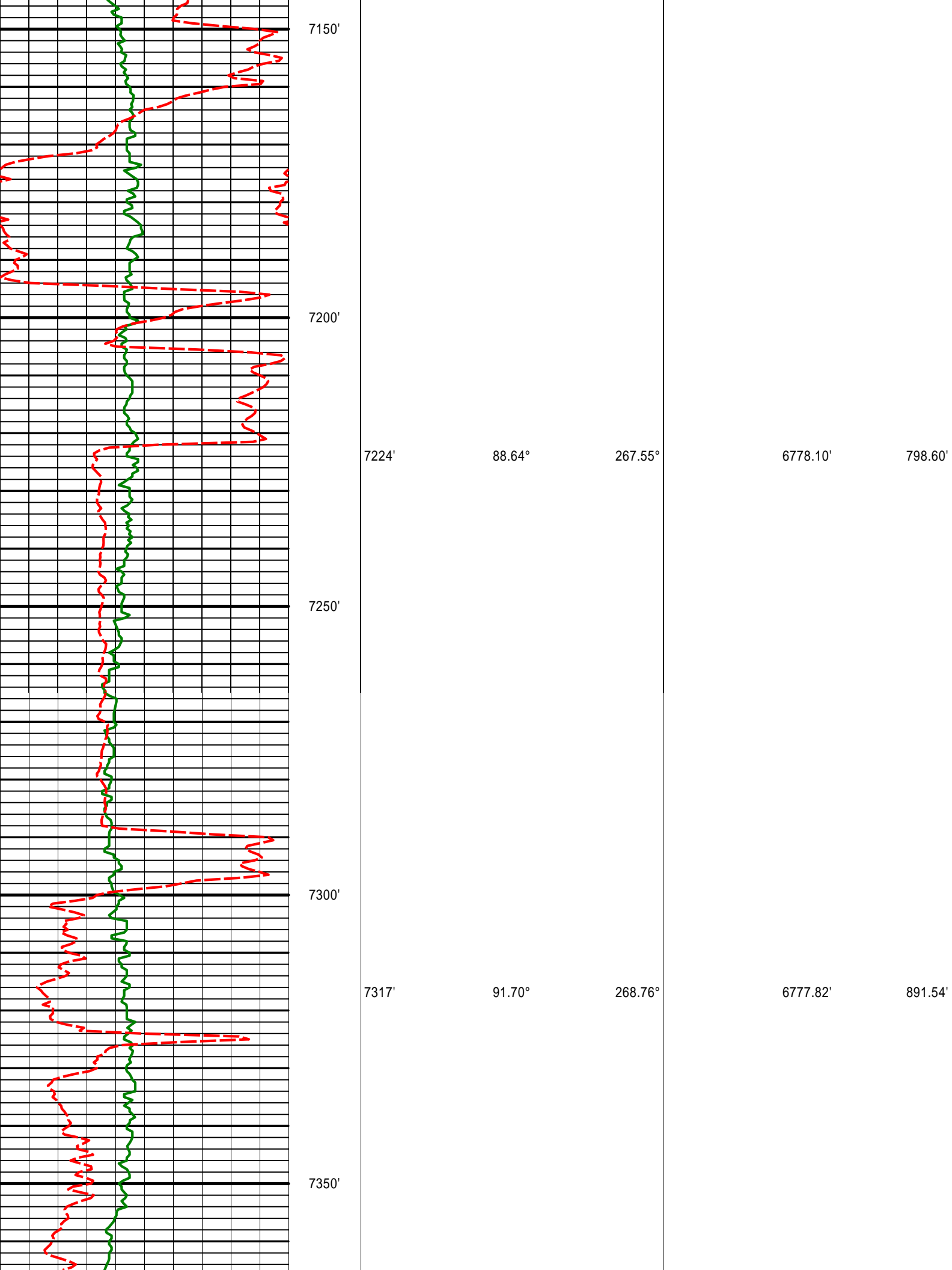


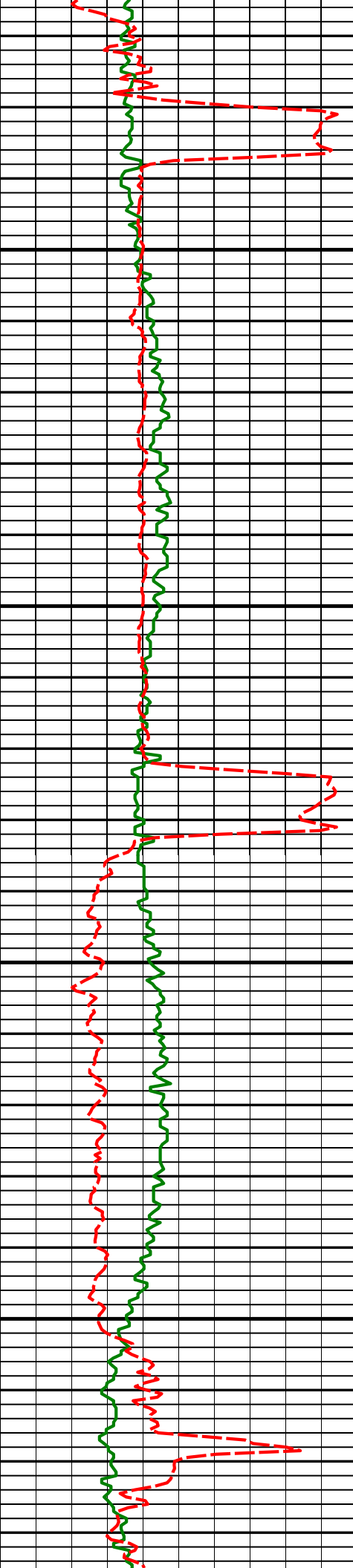












7400'

7410'

88.92°

266.30°

6777.32'

984.51'

7450'

7500'

7503'

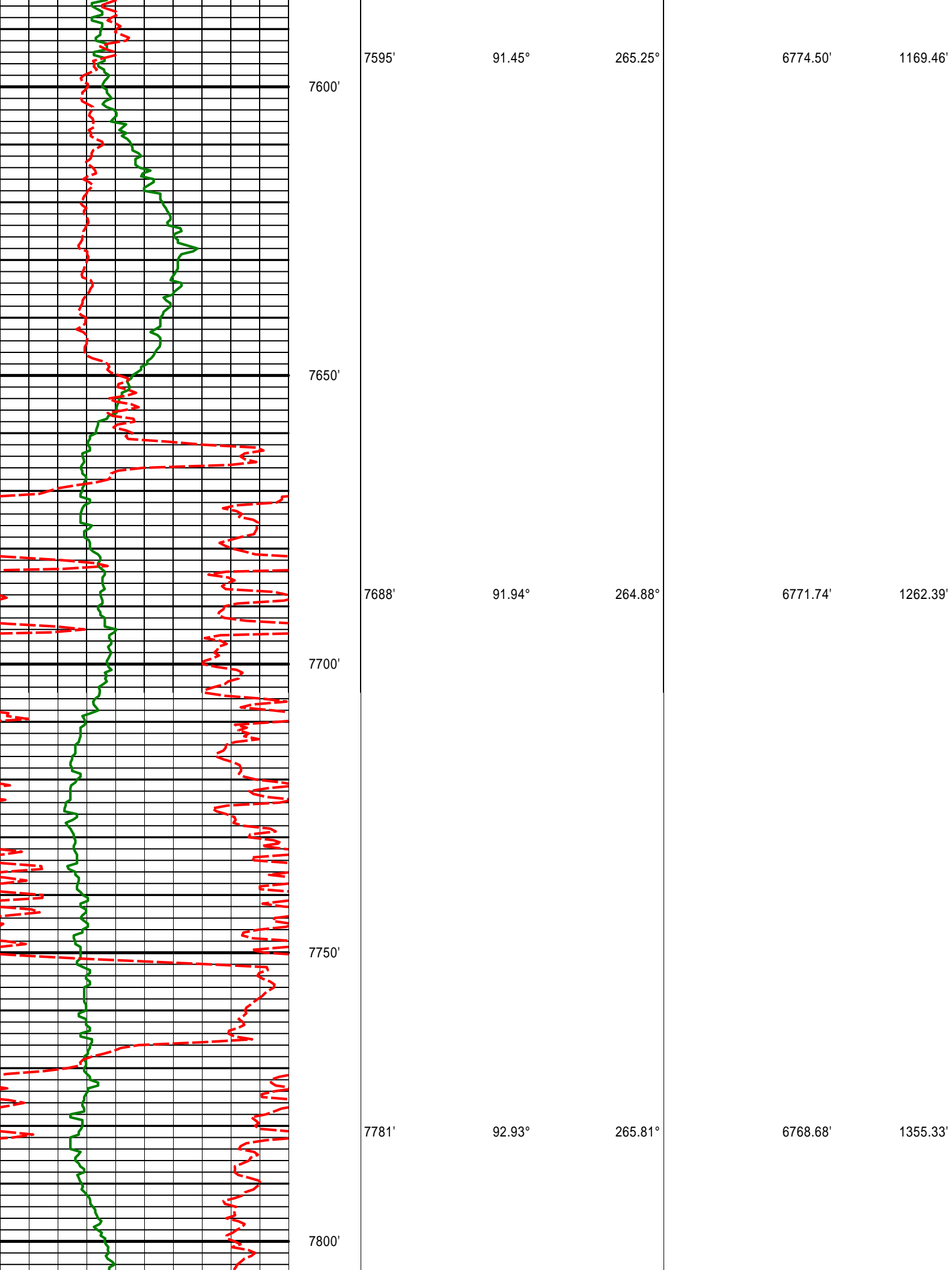
91.57°

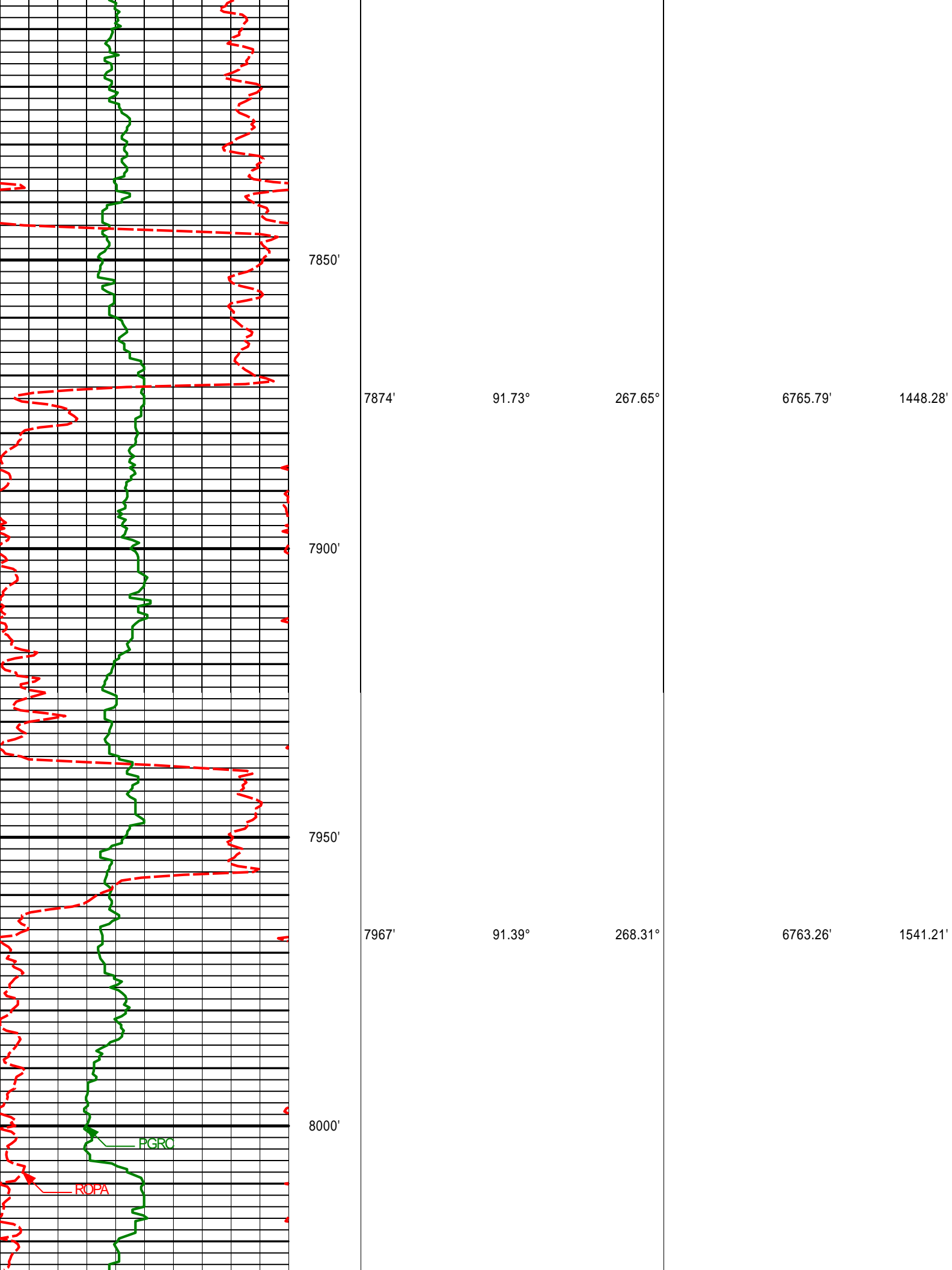
266.84°

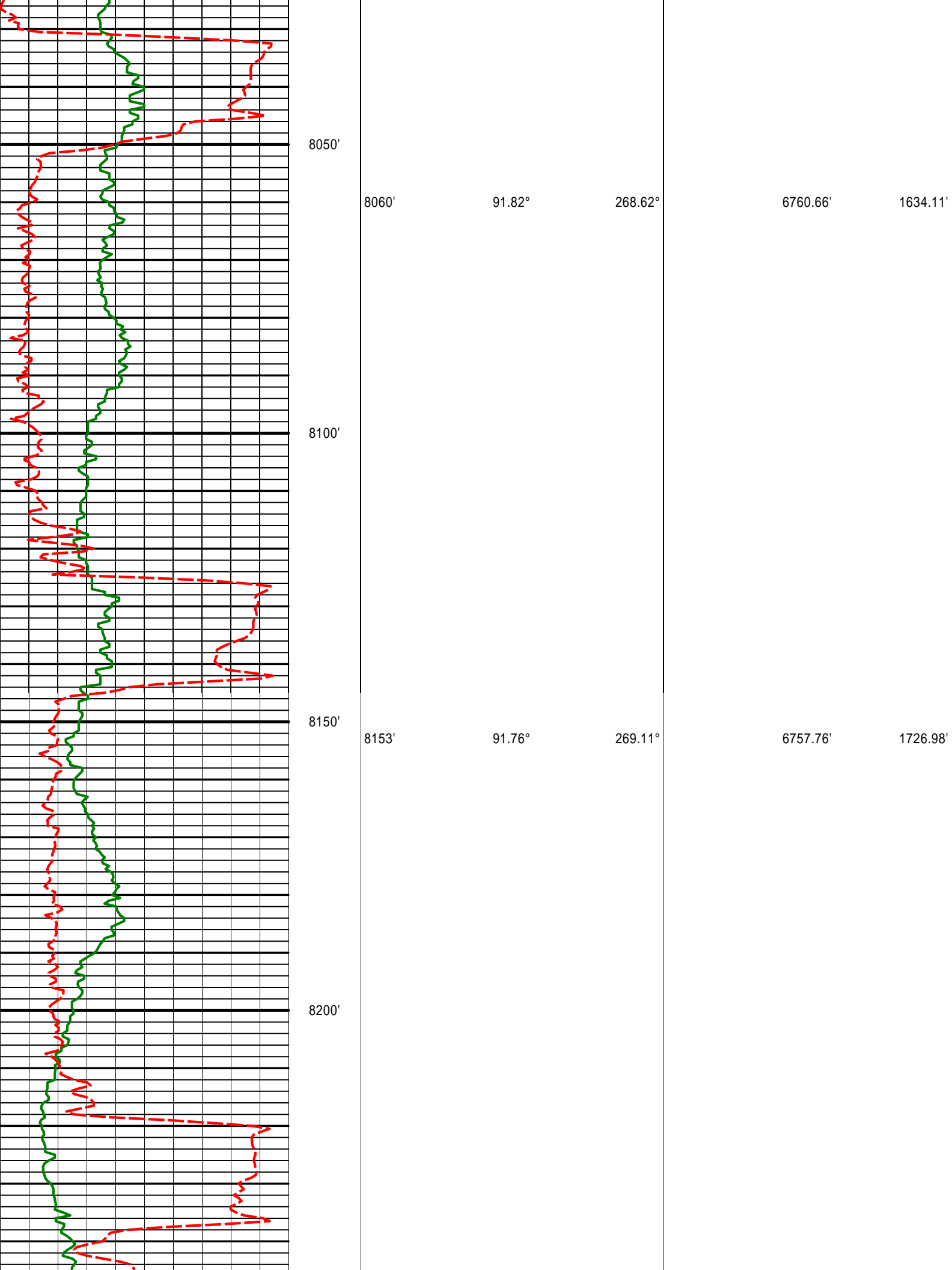
6776.92'

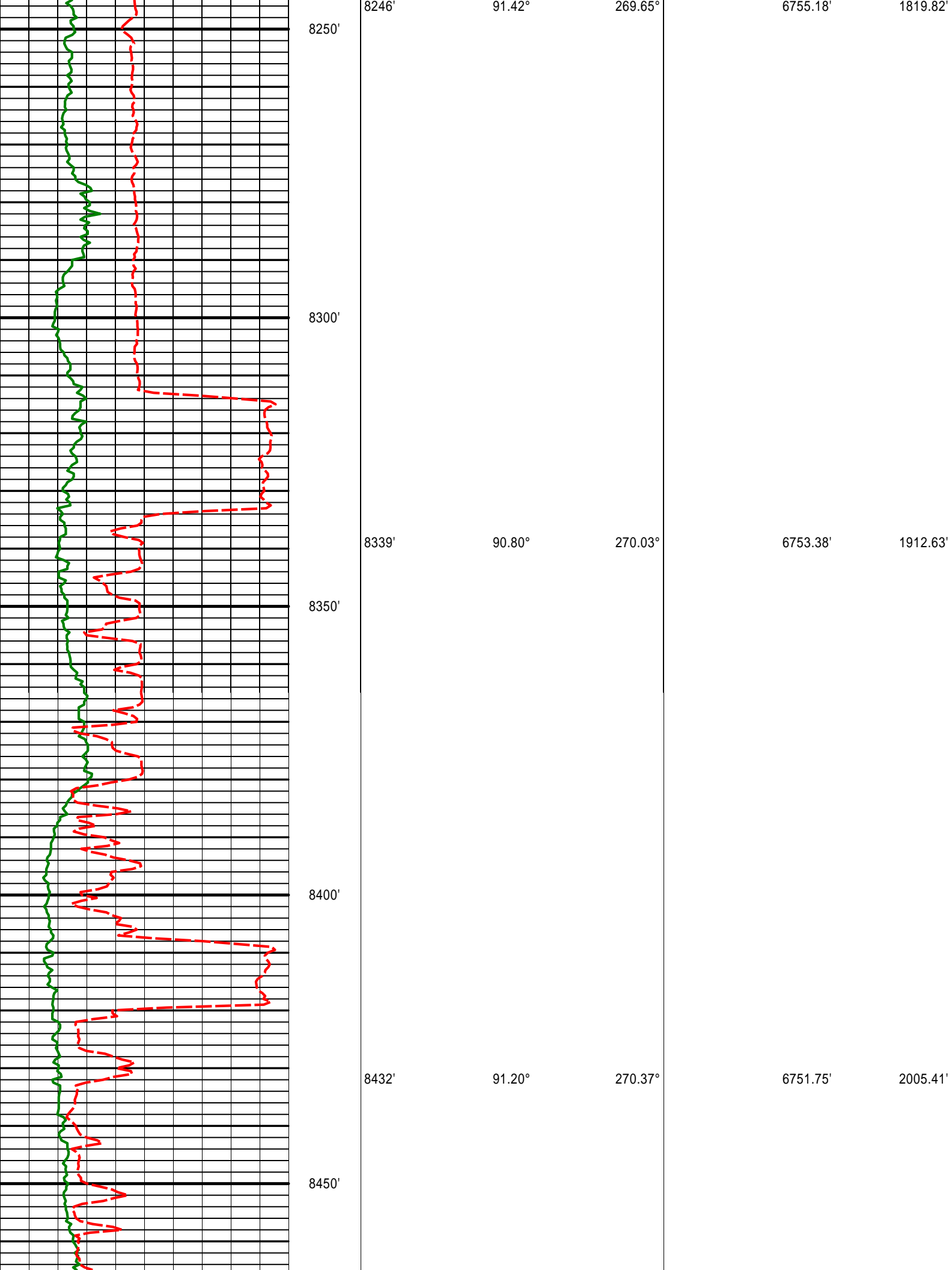
1077.50'

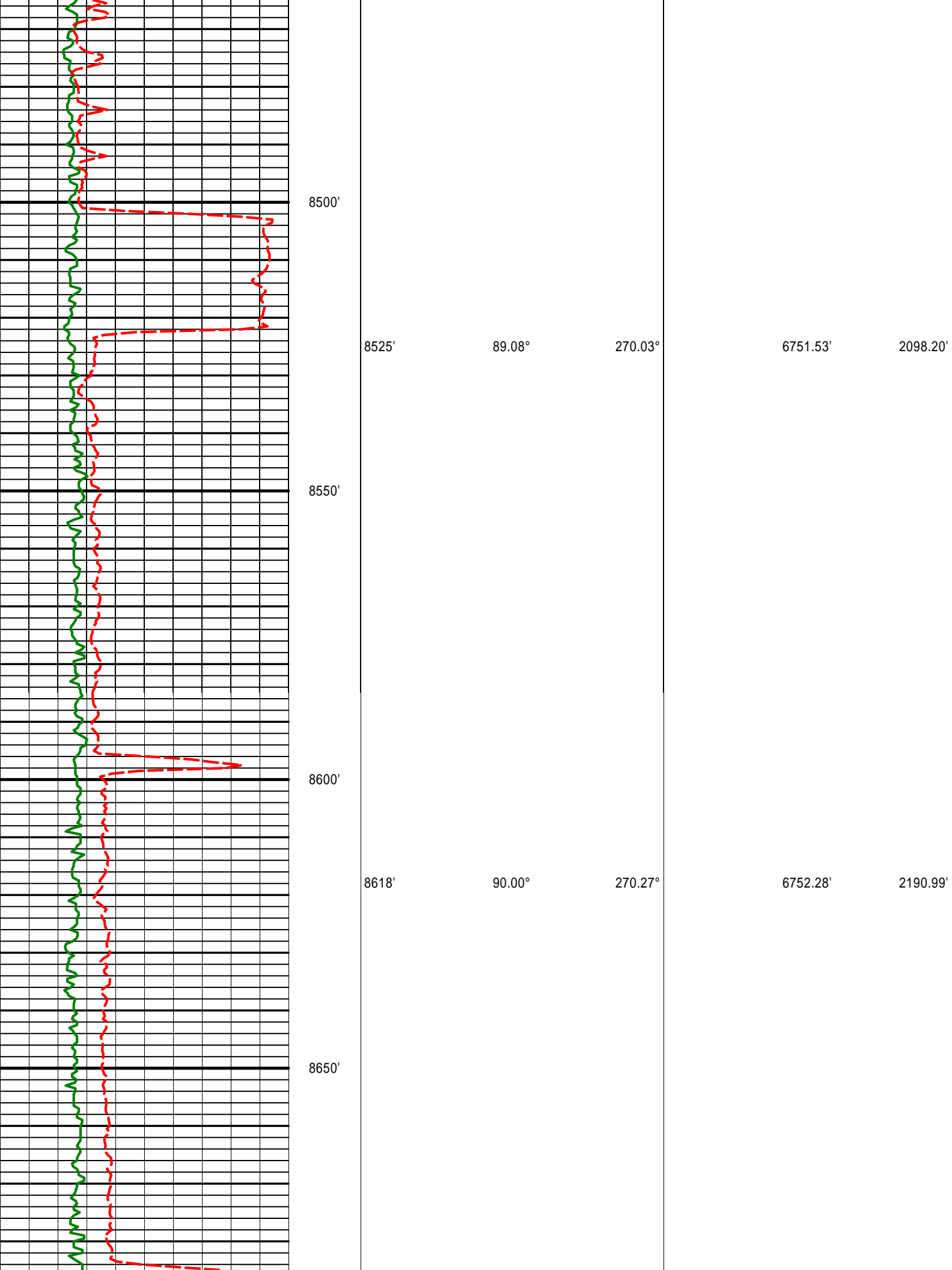
7550'

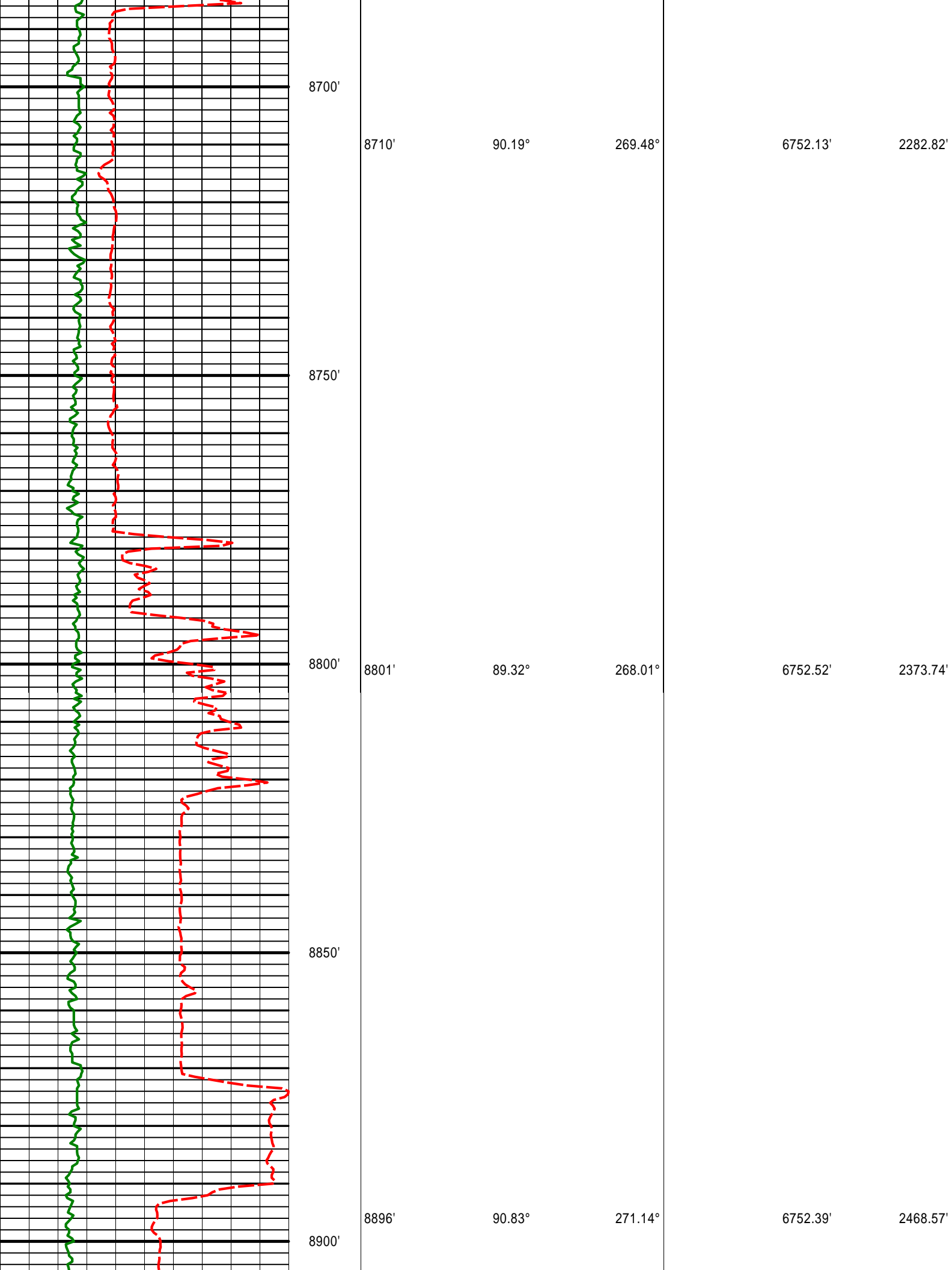


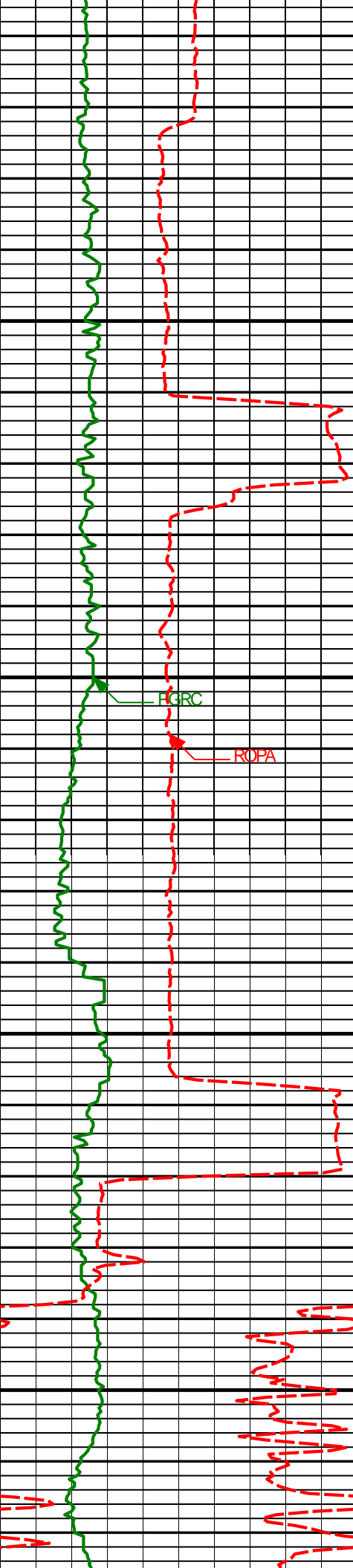












8950'

8990'

87.60°

270.82°

6753.68'

2562.25'

9000'

FGRC

ROPA

9050'

9085'

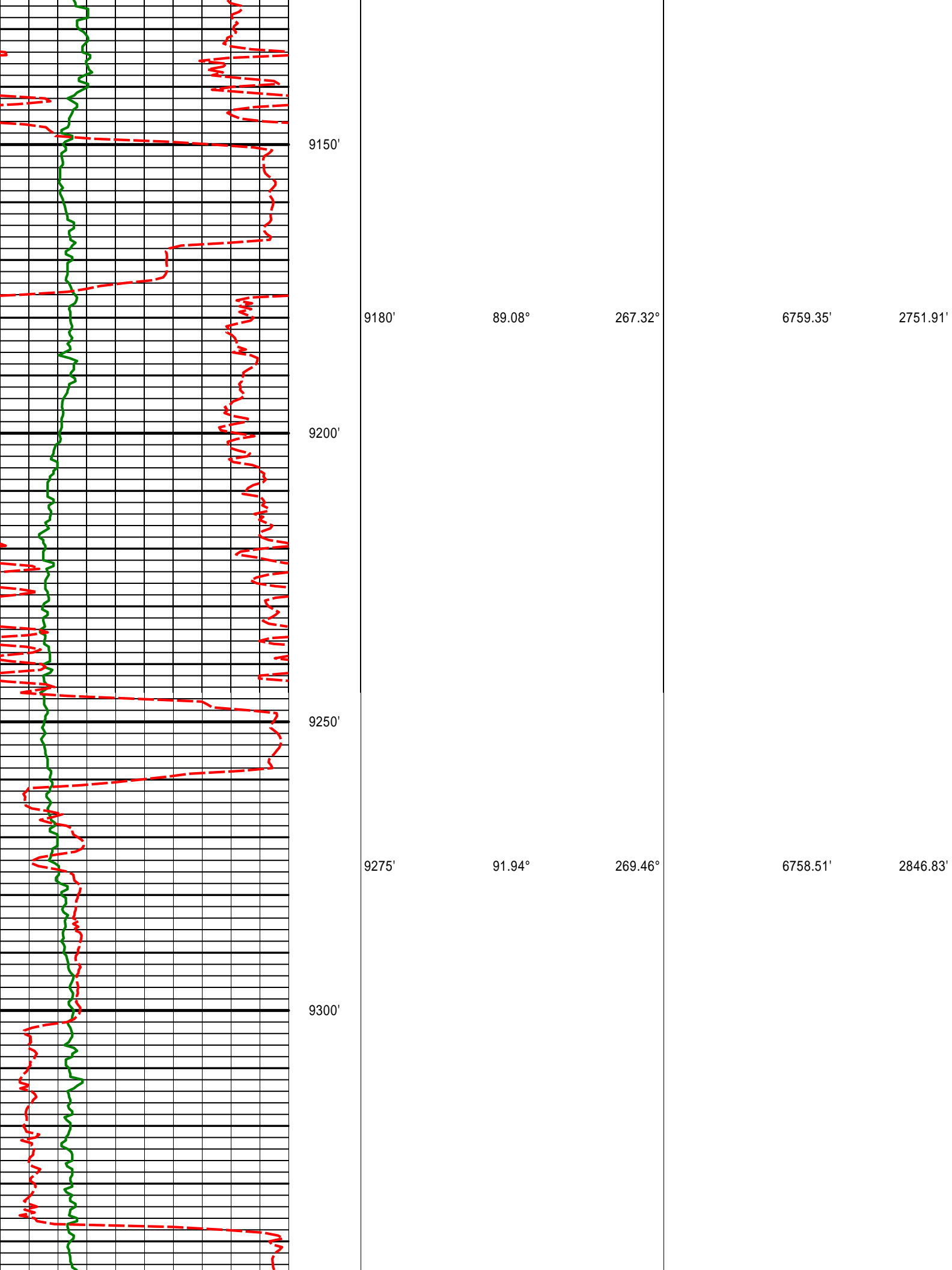
88.24°

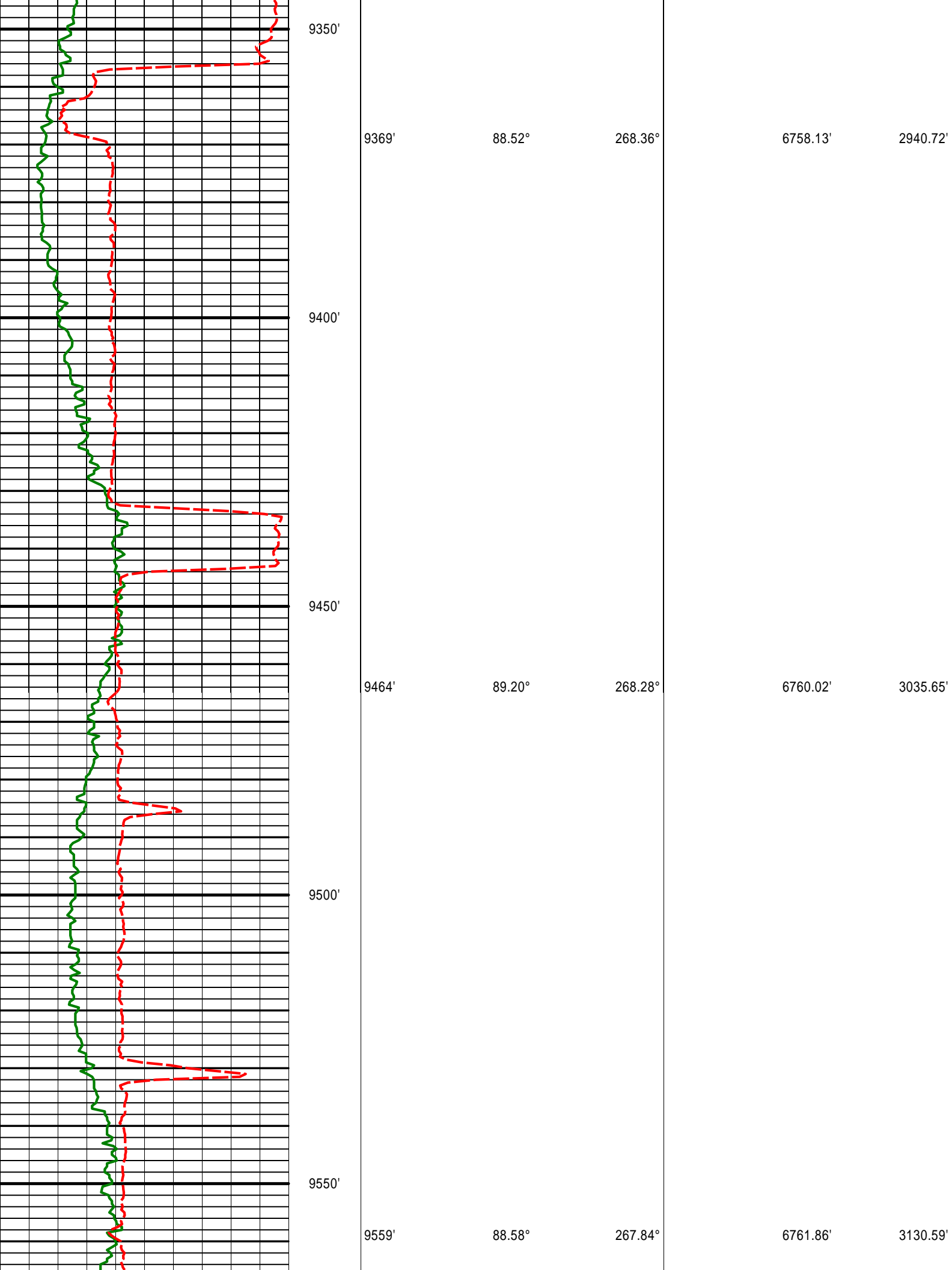
269.28°

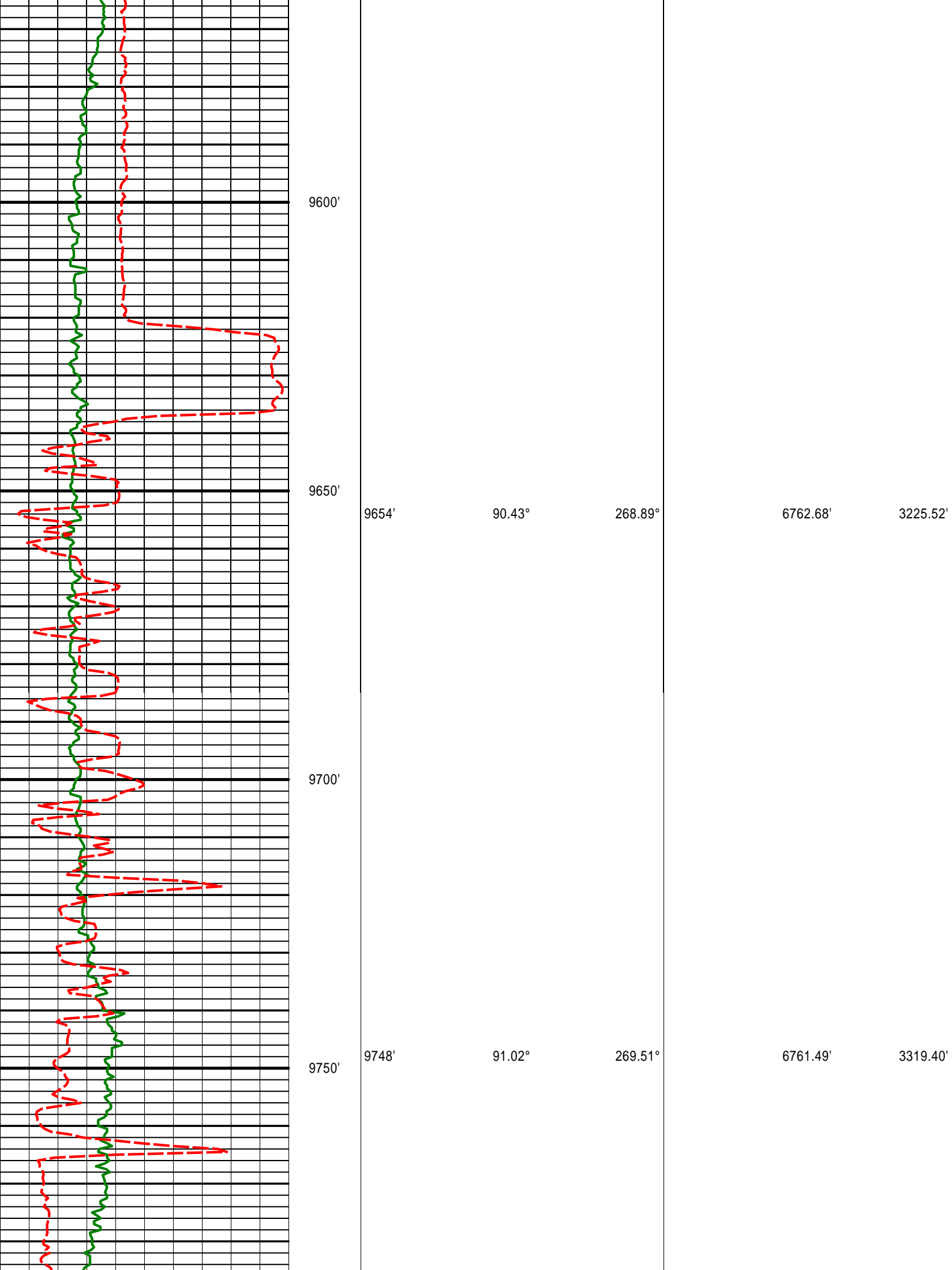
6757.13'

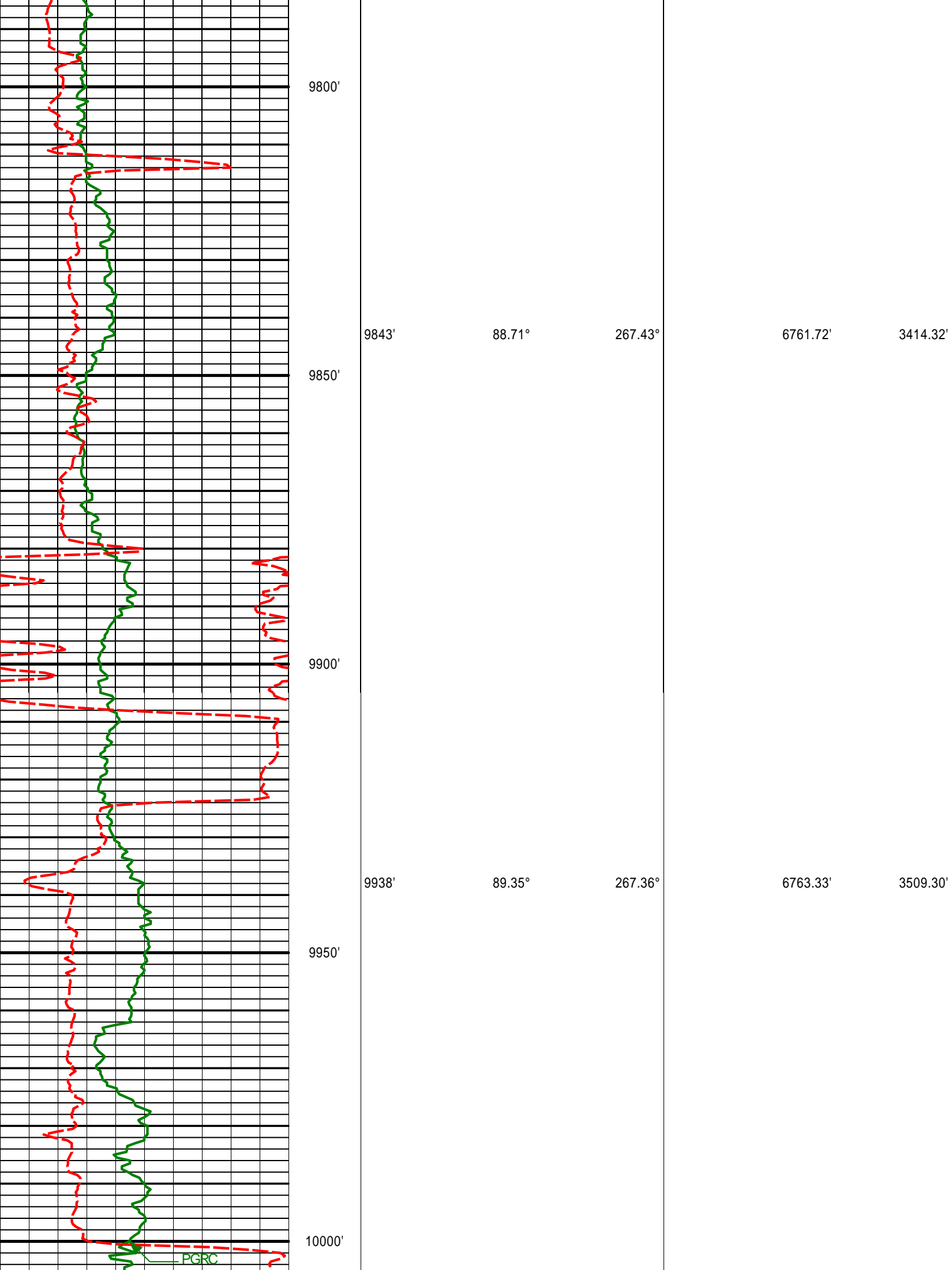
2656.99'

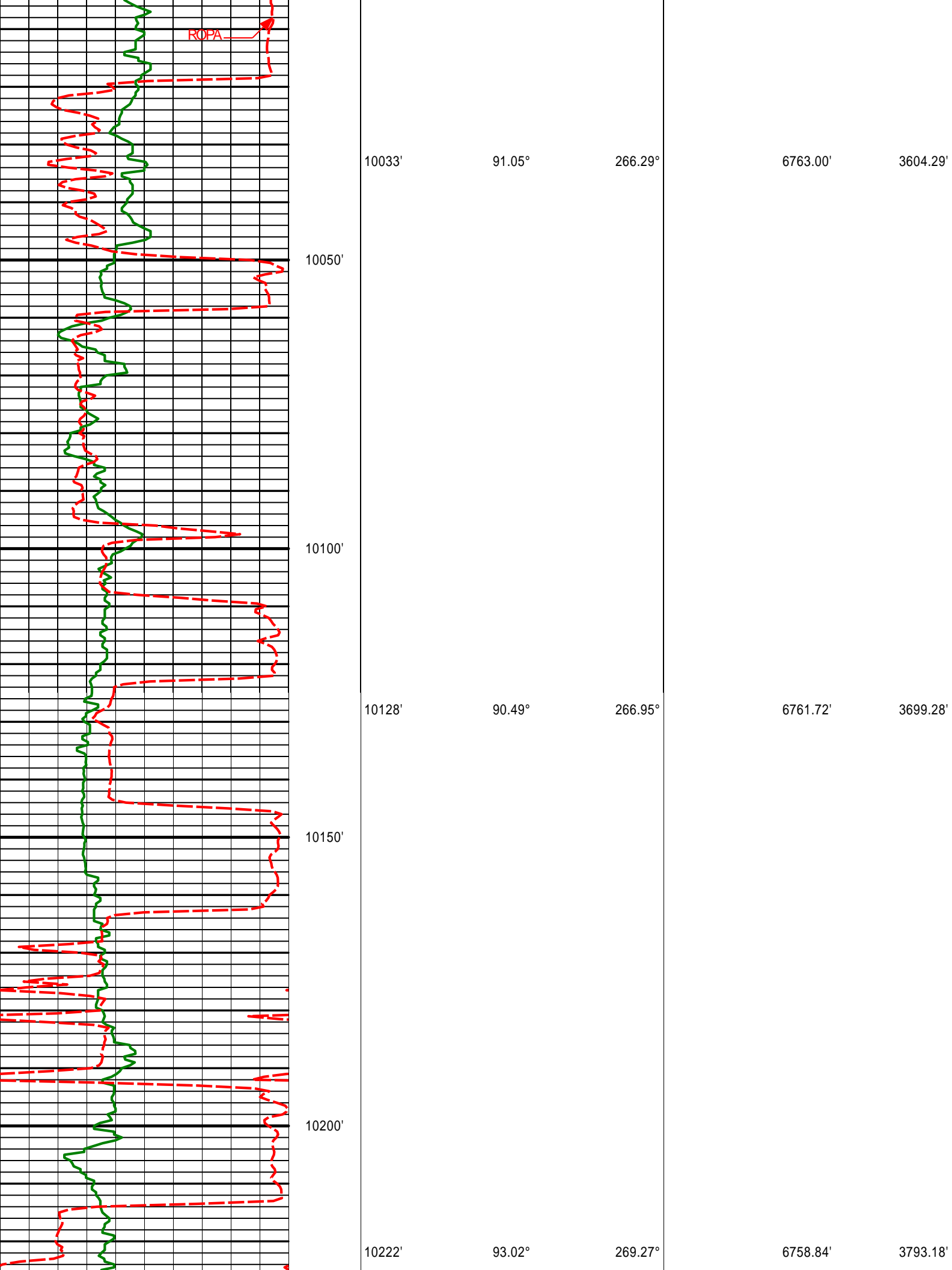
9100'

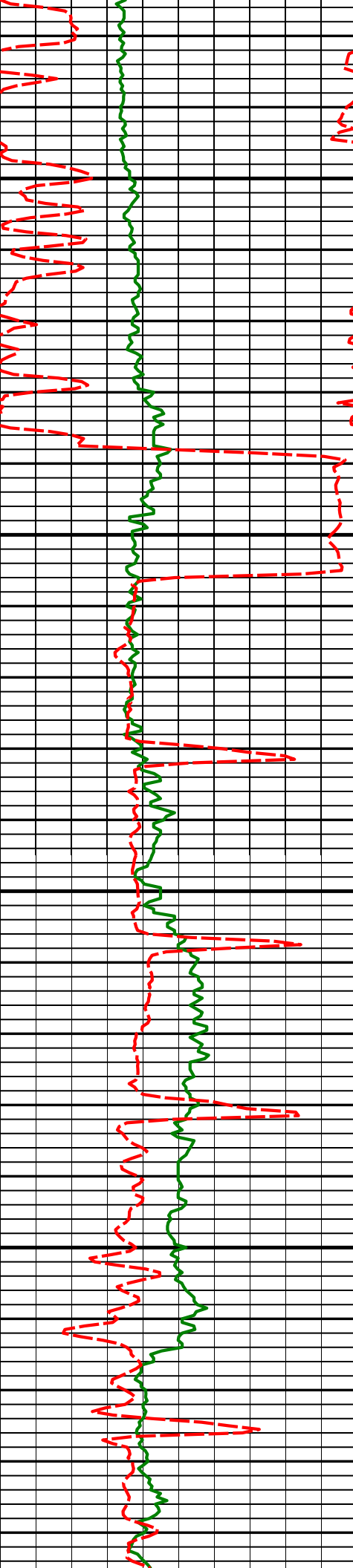












10250'

10300'

10350'

10400'

10317'

91.57°

270.38°

6755.03'

3887.92'

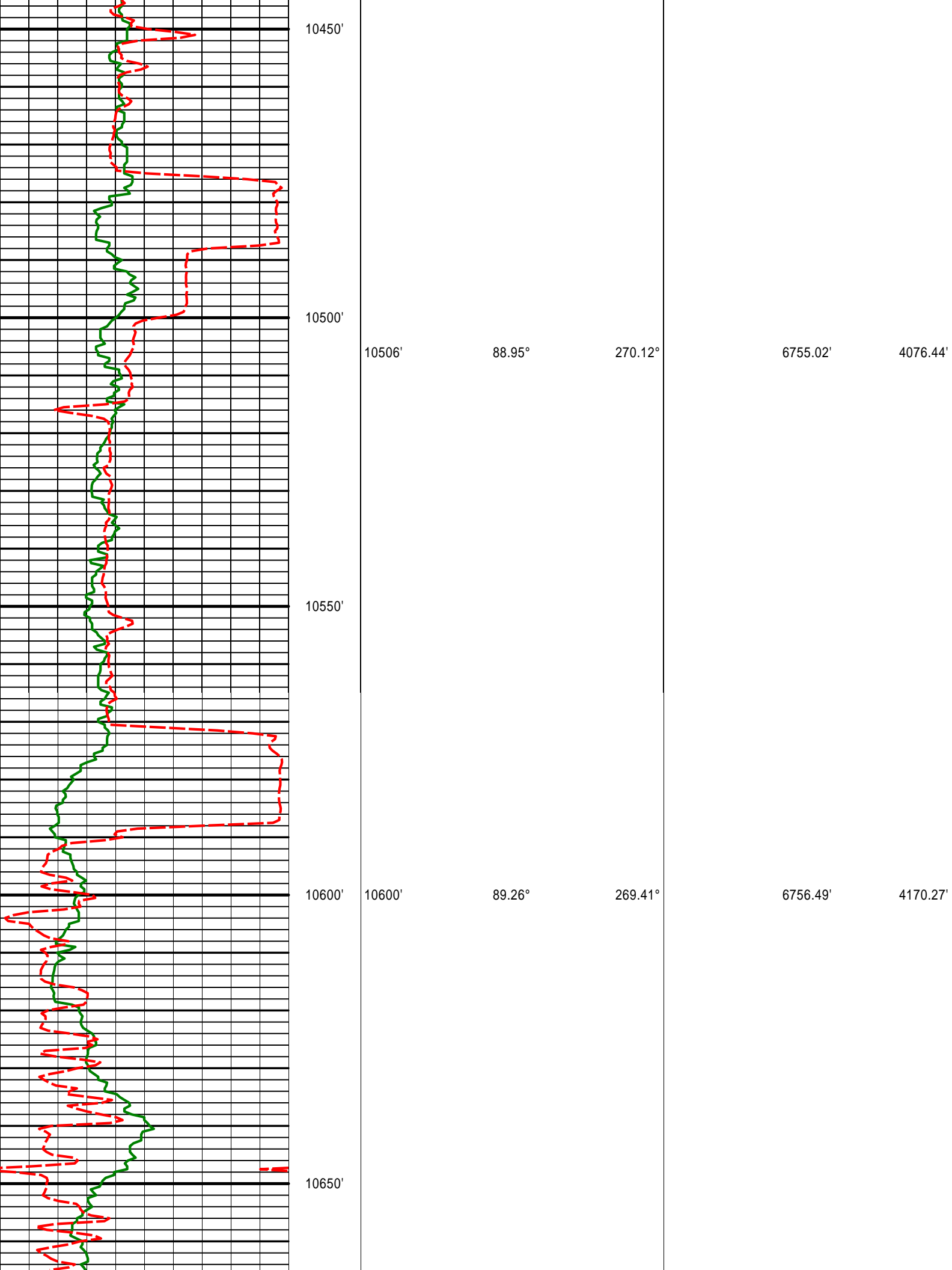
10411'

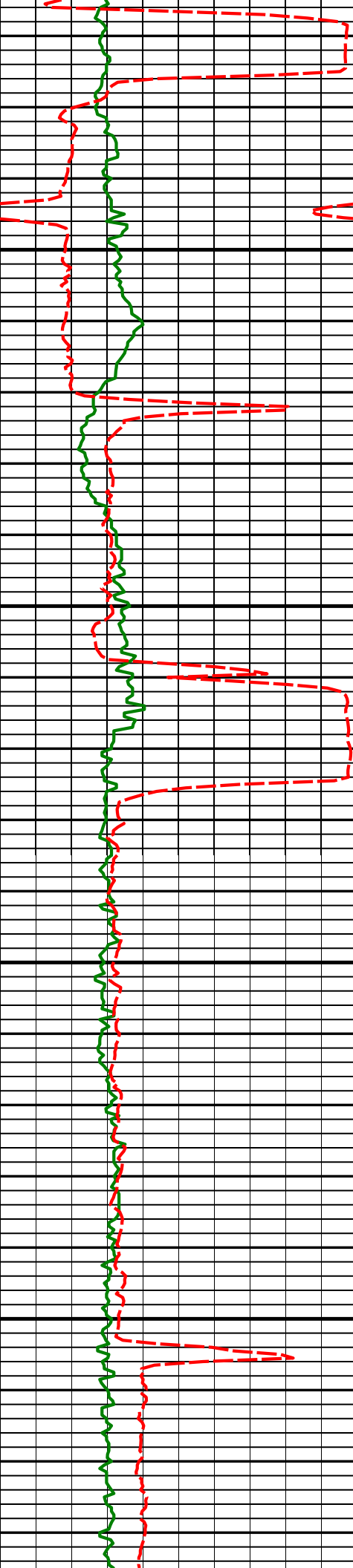
89.75°

270.52°

6753.95'

3981.68'





10695'

89.54°

268.83°

6757.48'

4265.15'

10700'

10750'

10790'

91.42°

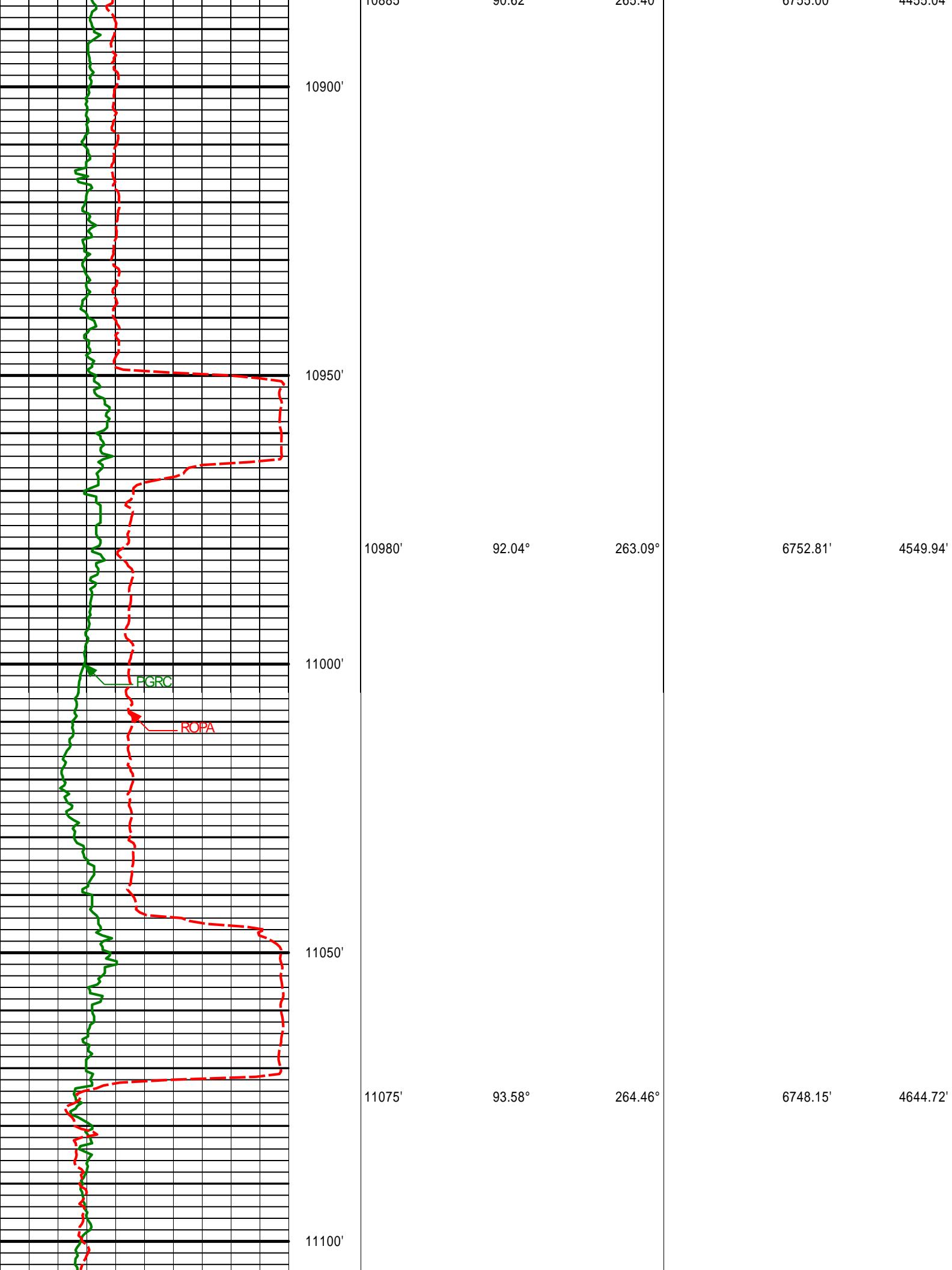
268.55°

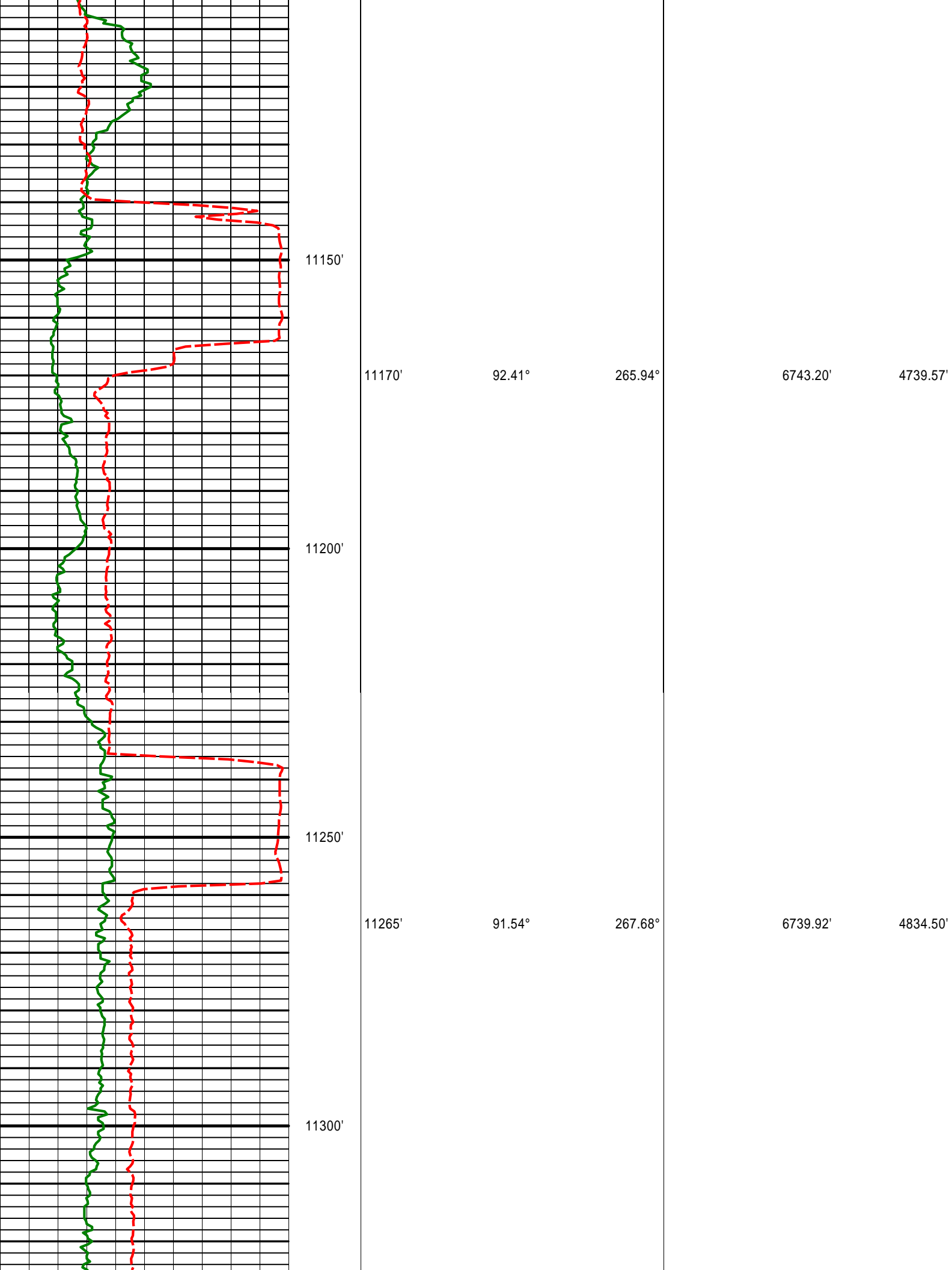
6756.69'

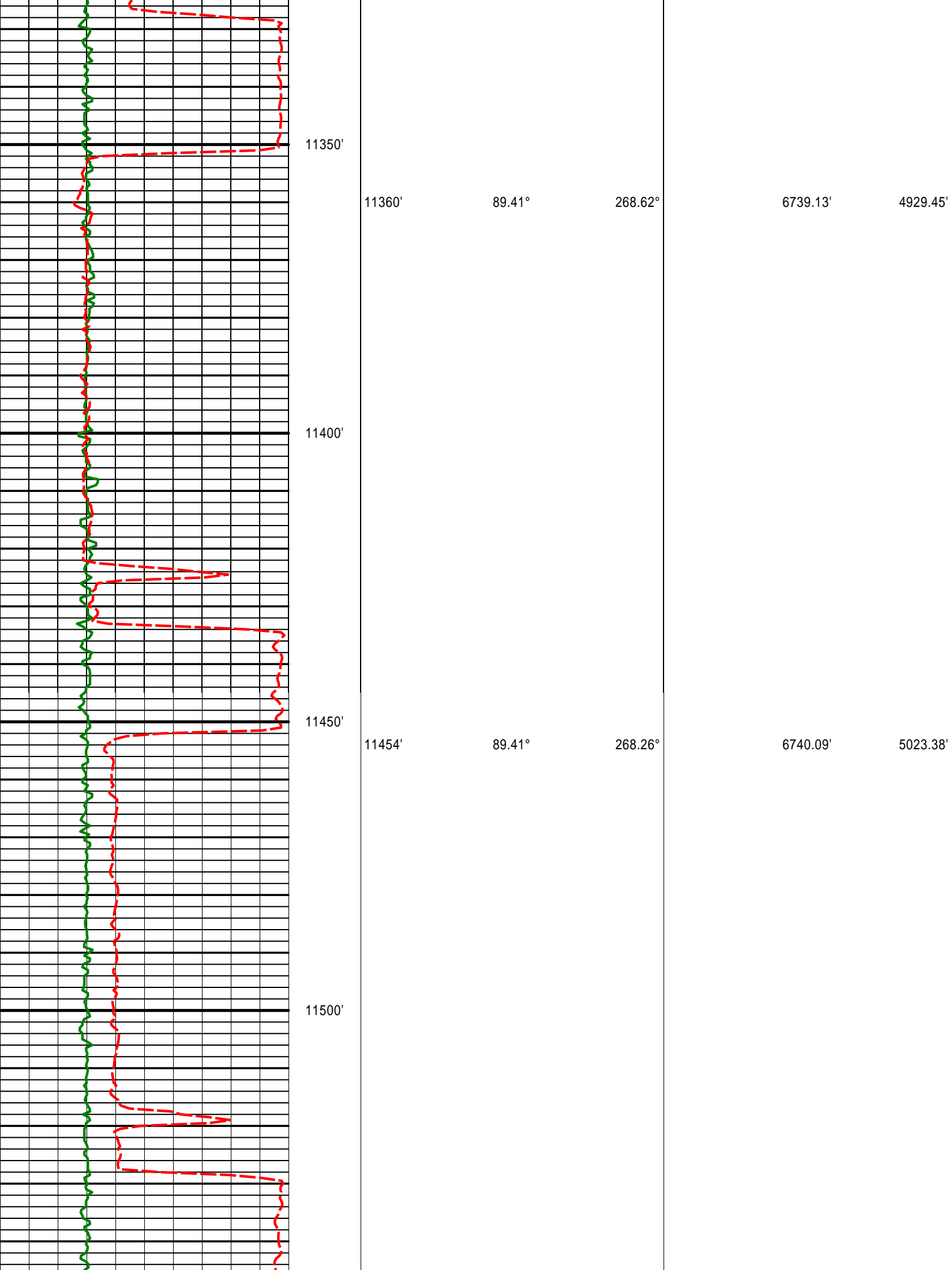
4360.07'

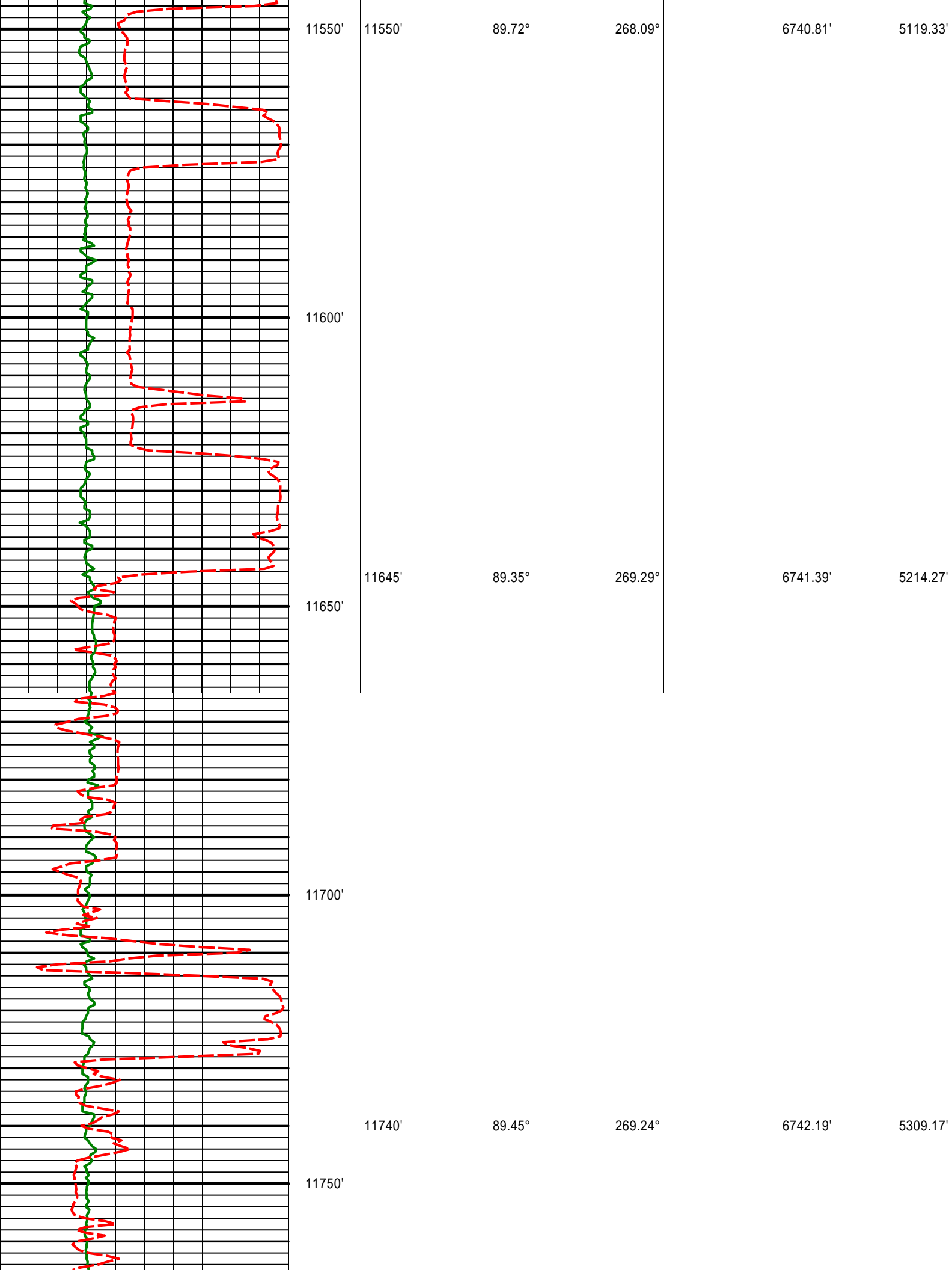
10800'

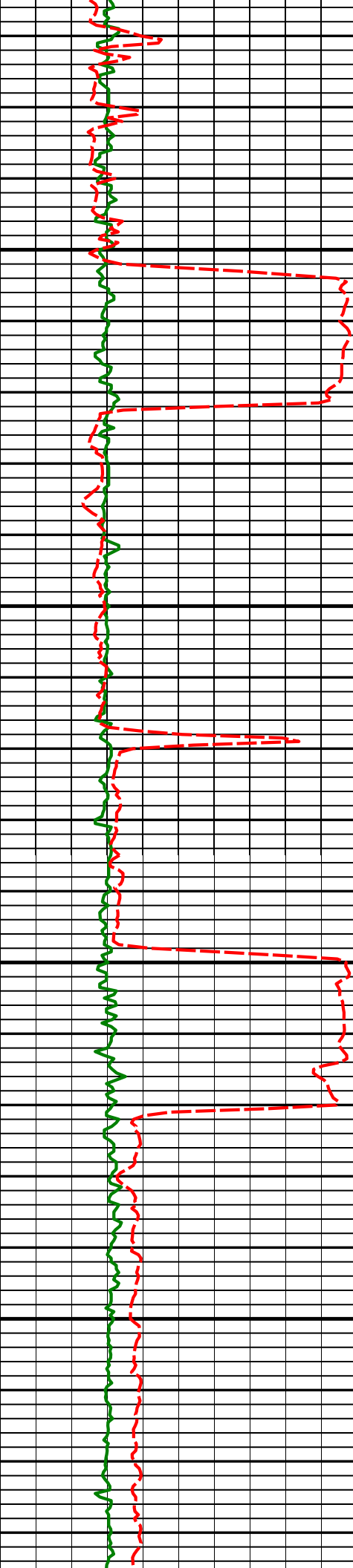
10850'











11800'

11835'

89.72°

268.83°

6742.88'

5404.07'

11850'

11900'

11930'

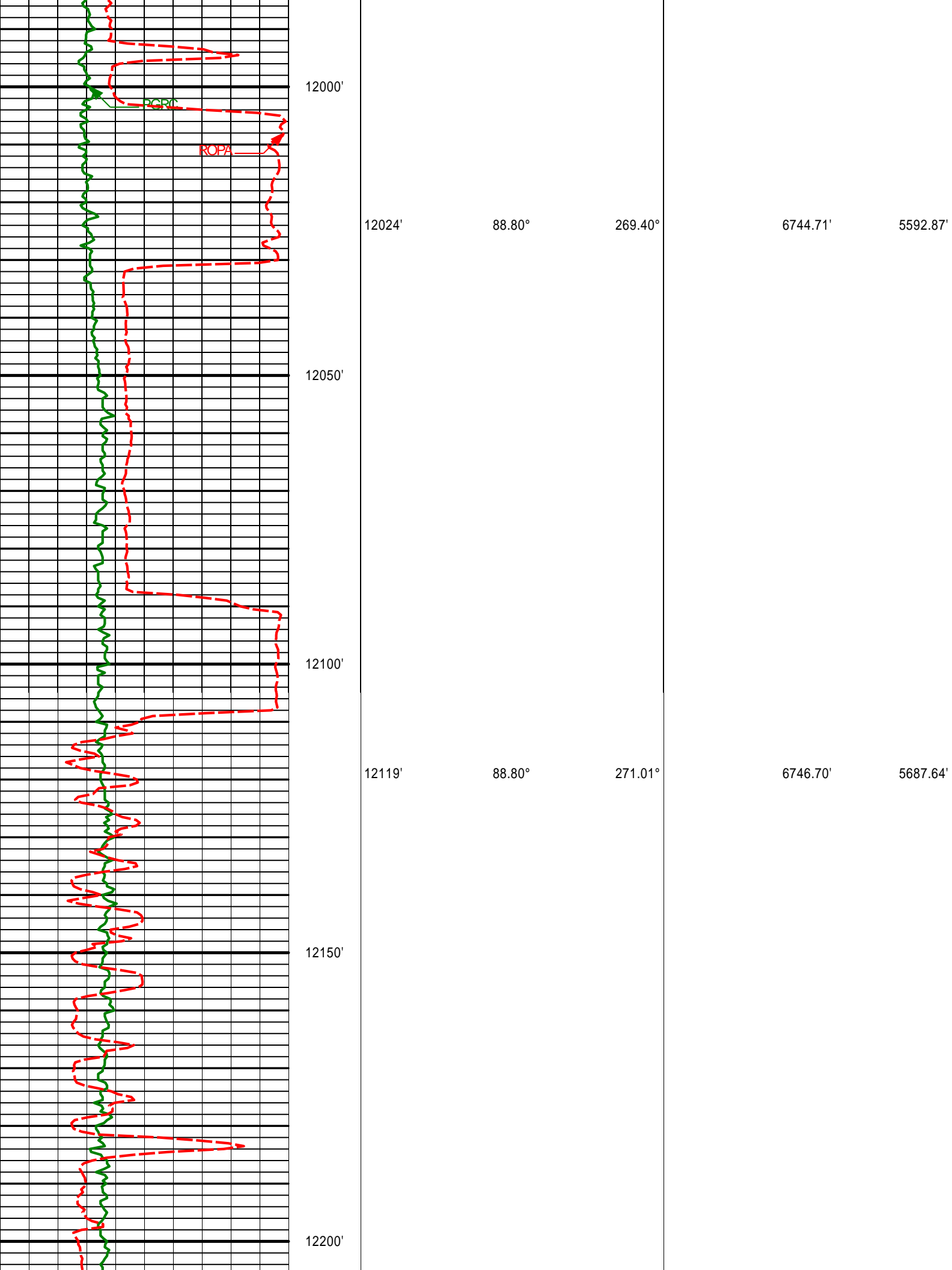
89.63°

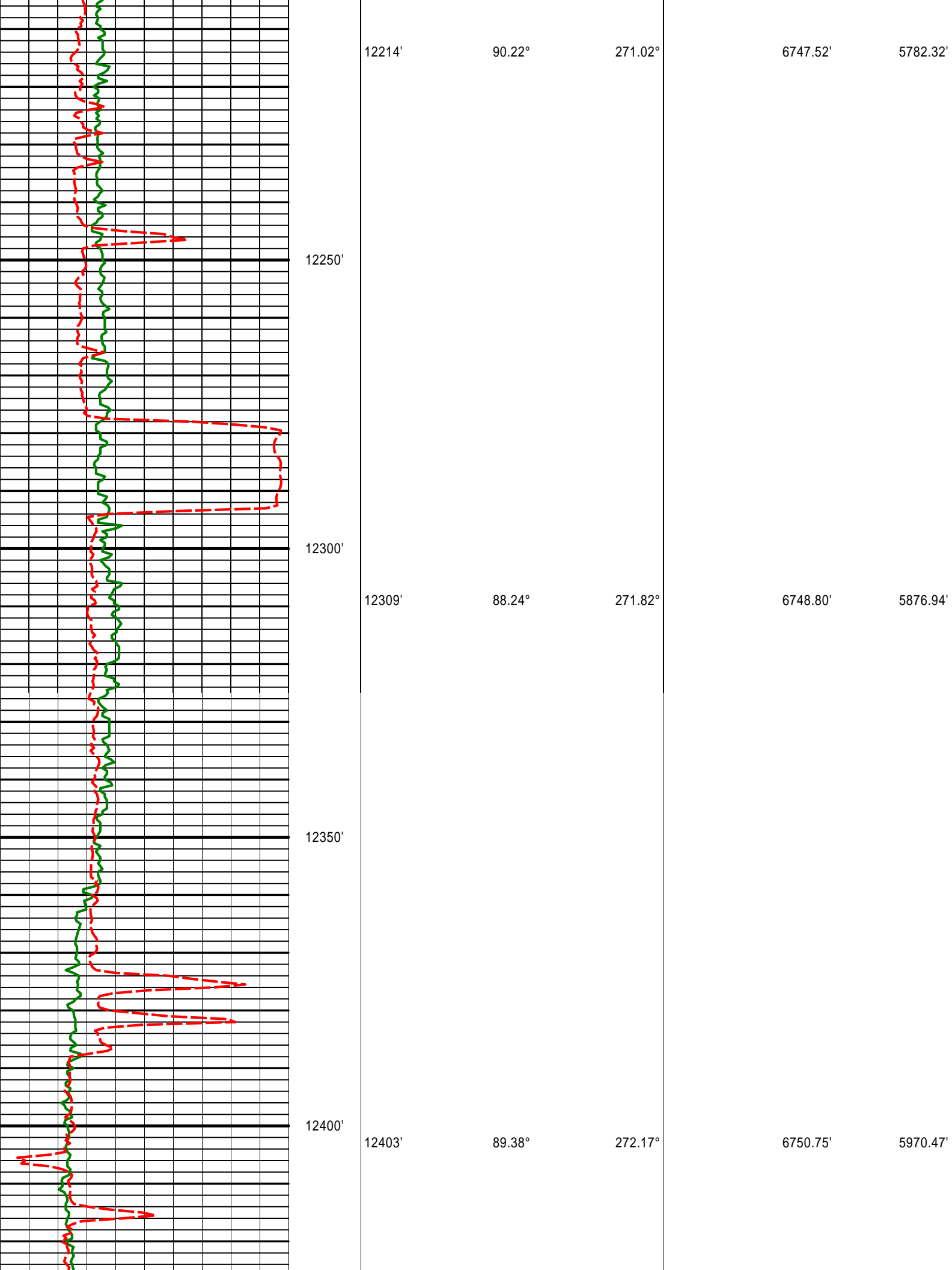
268.76°

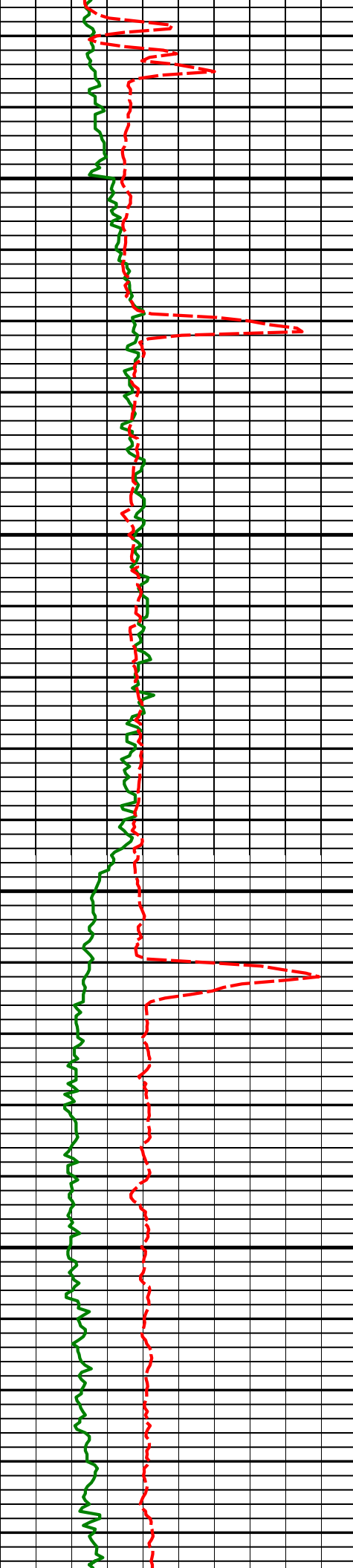
6743.42'

5498.98'

11950'







12450'

12500'

12550'

12600'

12498'

89.72°

272.44°

6751.49'

6064.96'

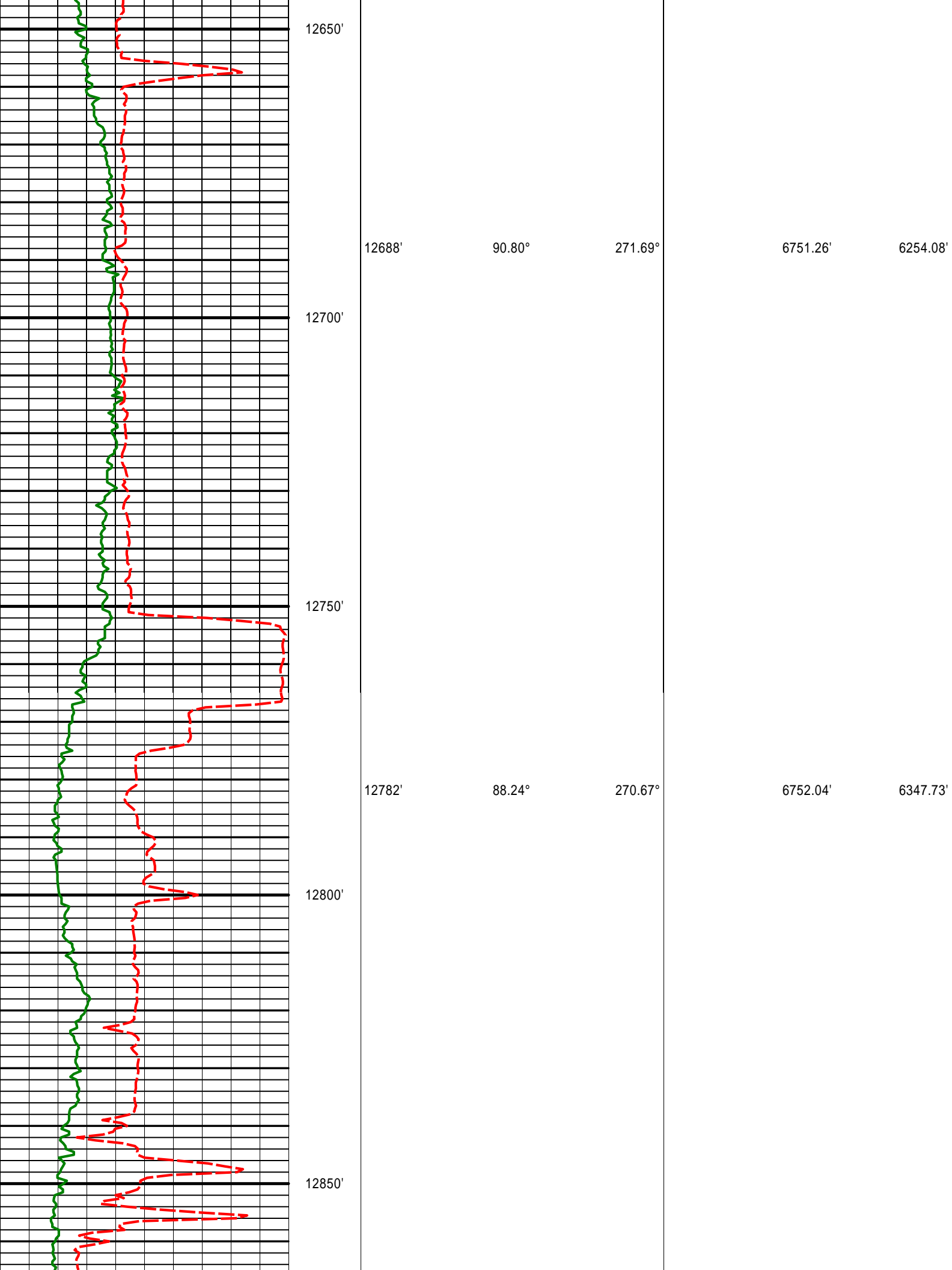
12593'

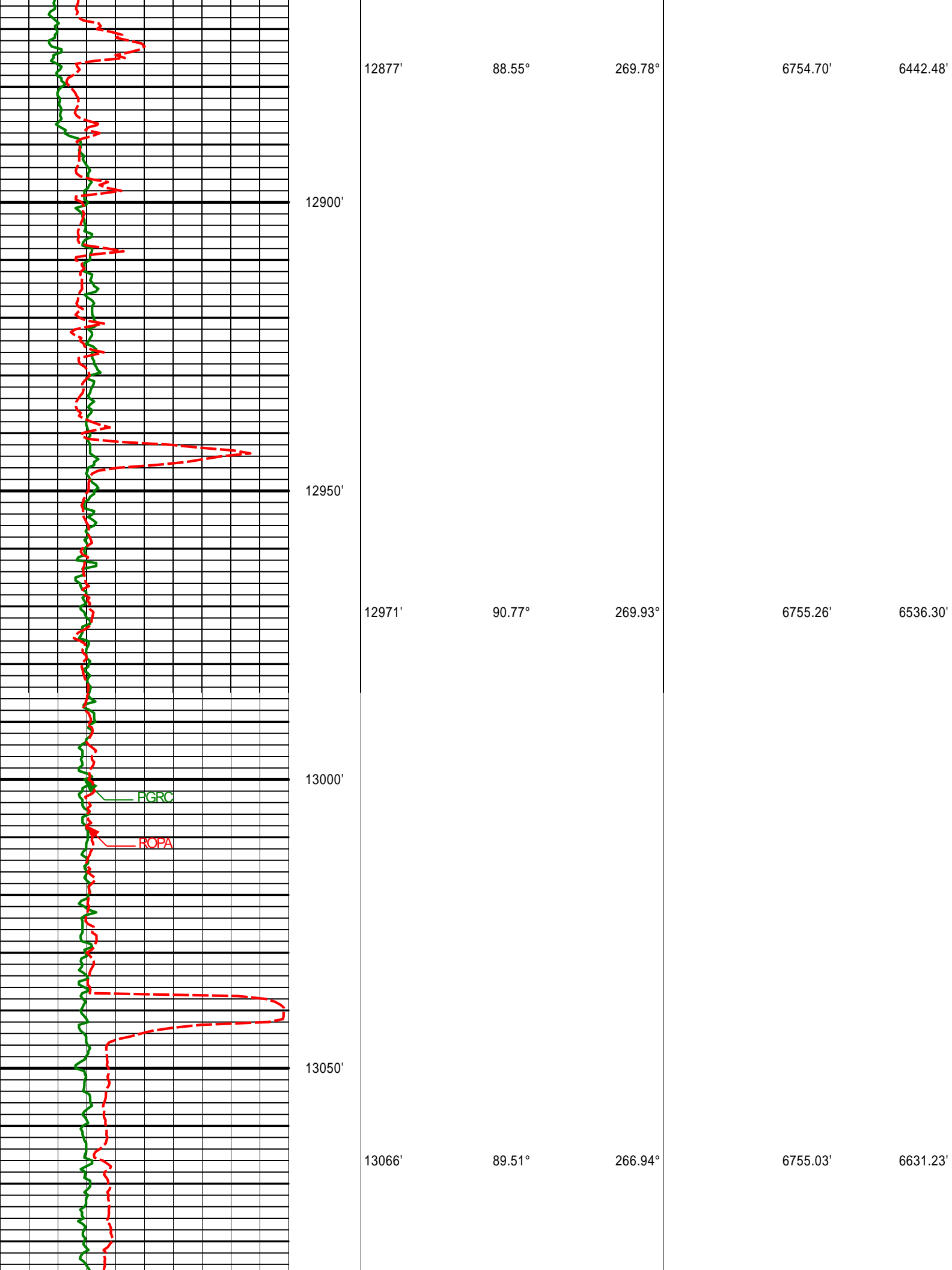
89.88°

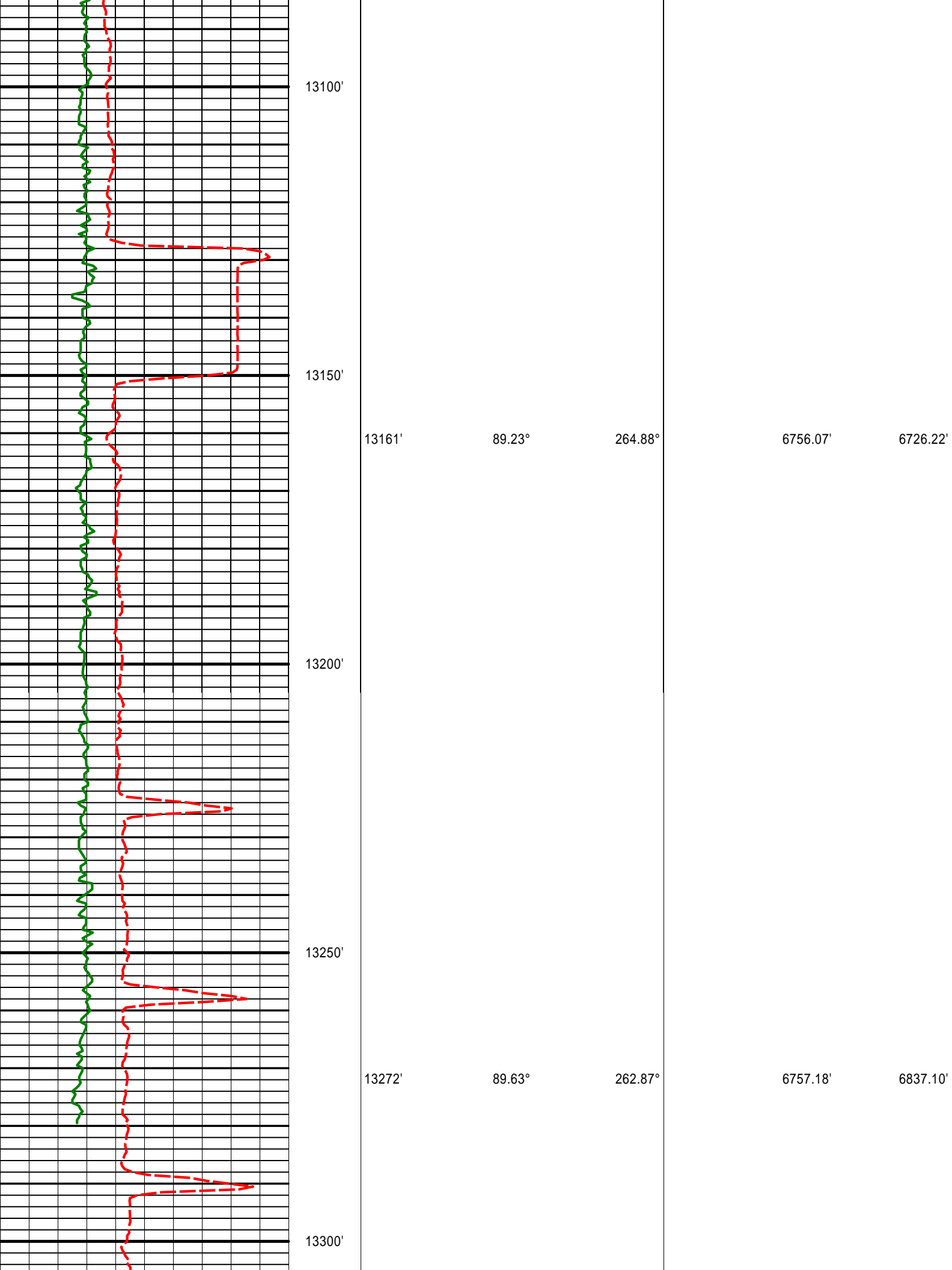
271.73°

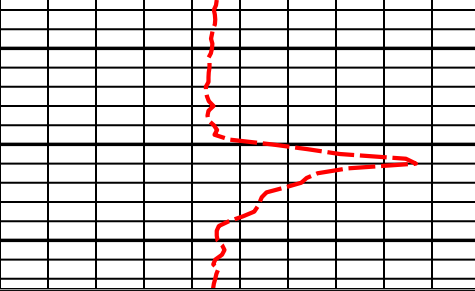
6751.82'

6159.49'









12225'      80.62°      262.87°      6757.46'      6800.04'

Avg Rate of Penetration feet per hr	Feet	Depth	Inc	Azm	TVD	Vsec
600	0					
Gamma Ray (PGXC) (Api)						
0	300					

## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
NCLP AA07-69-1AHNC  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901435867

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
311.00	0.60	304.86	310.99	0.93 N	1.34 W	1.28	0.19
594.00	0.30	82.56	593.99	1.87 N	1.82 W	1.70	0.30
870.00	0.40	326.46	869.99	2.77 N	1.63 W	1.46	0.22
921.00	0.27	328.98	920.99	3.02 N	1.79 W	1.60	0.26
1014.00	0.11	305.46	1013.99	3.26 N	1.98 W	1.77	0.19
1293.00	0.17	313.60	1292.98	3.70 N	2.50 W	2.26	0.02
1479.00	0.22	332.83	1478.98	4.21 N	2.86 W	2.59	0.04
1571.00	0.12	307.38	1570.98	4.43 N	3.02 W	2.74	0.13
1664.00	0.04	297.61	1663.98	4.50 N	3.12 W	2.84	0.09
1757.00	2.67	183.47	1756.95	2.35 N	3.28 W	3.13	2.89
1849.00	4.56	201.65	1848.77	3.19 S	4.76 W	4.95	2.38
1942.00	6.34	208.66	1941.34	11.13 S	8.59 W	9.27	2.04
2037.00	4.01	184.24	2035.96	19.05 S	11.35 W	12.52	3.32
2132.00	5.51	191.84	2130.63	26.82 S	12.53 W	14.18	1.71
2227.00	7.07	196.87	2225.06	36.88 S	15.17 W	17.43	1.74
2322.00	7.48	198.24	2319.29	48.35 S	18.80 W	21.77	0.47
2416.00	6.89	211.50	2412.56	58.97 S	23.66 W	27.28	1.87
2511.00	8.35	208.57	2506.72	69.89 S	29.94 W	34.23	1.59
2606.00	8.80	199.37	2600.66	82.80 S	35.64 W	40.73	1.52
2701.00	7.80	201.24	2694.66	95.67 S	40.39 W	46.27	1.09
2796.00	9.19	201.71	2788.62	108.72 S	45.53 W	52.21	1.46
2891.00	8.77	199.55	2882.46	122.60 S	50.76 W	58.30	0.57
2986.00	8.79	201.69	2976.34	136.17 S	55.87 W	64.24	0.34
3081.00	8.08	202.08	3070.31	149.10 S	61.06 W	70.23	0.75
3176.00	7.79	203.38	3164.40	161.19 S	66.13 W	76.03	0.36
3271.00	6.92	203.83	3258.62	172.34 S	70.99 W	81.59	0.92
3365.00	5.77	215.20	3352.05	181.38 S	76.00 W	87.15	1.81
3460.00	4.17	223.01	3446.69	187.81 S	81.11 W	92.65	1.82
3556.00	4.93	204.31	3542.39	194.12 S	85.19 W	97.12	1.73
3650.00	6.01	210.60	3635.96	202.04 S	89.36 W	101.77	1.31
3745.00	6.73	209.88	3730.38	211.14 S	94.67 W	107.63	0.76
3840.00	6.22	212.66	3824.77	220.30 S	100.22 W	113.74	0.63
3935.00	4.28	211.55	3919.37	227.66 S	104.85 W	118.82	2.04
4030.00	3.29	224.10	4014.16	232.64 S	108.60 W	122.88	1.35

4125.00	2.38	192.62	4109.05	236.52 S	110.93 W	125.44	1.86
4220.00	0.65	43.28	4204.02	238.05 S	110.99 W	125.60	3.11
4315.00	0.79	46.59	4299.02	237.21 S	110.15 W	124.70	0.15
4410.00	0.48	107.66	4394.01	236.88 S	109.29 W	123.83	0.74
4505.00	0.76	31.25	4489.01	236.46 S	108.58 W	123.10	0.84
4599.00	1.78	0.58	4582.98	234.47 S	108.25 W	122.64	1.27
4694.00	0.25	345.42	4677.97	232.79 S	108.28 W	122.57	1.62
4788.00	0.21	333.70	4771.97	232.44 S	108.41 W	122.67	0.07
4883.00	0.66	133.20	4866.96	232.66 S	108.09 W	122.37	0.91
4978.00	0.53	142.17	4961.96	233.38 S	107.42 W	121.75	0.17
5073.00	0.90	143.52	5056.95	234.33 S	106.71 W	121.09	0.39
5168.00	0.58	165.33	5151.94	235.39 S	106.14 W	120.59	0.44
5262.00	0.70	237.37	5245.94	236.16 S	106.51 W	121.00	0.81
5357.00	0.39	290.40	5340.94	236.36 S	107.30 W	121.81	0.59
5452.00	0.52	259.76	5435.93	236.33 S	108.02 W	122.53	0.29
5547.00	0.52	276.84	5530.93	236.35 S	108.88 W	123.38	0.16
5642.00	0.99	240.90	5625.92	236.70 S	110.02 W	124.55	0.68
5737.00	0.90	227.10	5720.91	237.61 S	111.29 W	125.87	0.26
5831.00	0.47	286.89	5814.90	238.00 S	112.20 W	126.80	0.83
5926.00	0.21	191.56	5909.90	238.06 S	112.60 W	127.21	0.56
6006.00	0.33	181.73	5989.90	238.43 S	112.64 W	127.27	0.16
6110.00	0.68	243.93	6093.90	239.00 S	113.20 W	127.87	0.58
6157.00	4.54	257.90	6140.84	239.51 S	115.27 W	129.96	8.26
6205.00	7.33	256.51	6188.58	240.63 S	120.11 W	134.86	5.82
6252.00	9.39	251.48	6235.08	242.54 S	126.66 W	141.52	4.65
6300.00	12.64	254.05	6282.19	245.23 S	135.43 W	150.43	6.85
6347.00	15.29	258.52	6327.79	247.88 S	146.45 W	161.60	6.08
6395.00	17.73	267.39	6373.82	249.47 S	159.95 W	175.18	7.30
6442.00	20.12	268.83	6418.27	249.96 S	175.19 W	190.41	5.18
6490.00	23.66	266.52	6462.81	250.72 S	193.06 W	208.30	7.59
6584.00	30.18	262.08	6546.58	255.12 S	235.34 W	250.77	7.25
6637.00	32.22	261.14	6591.92	259.13 S	262.50 W	278.12	3.96
6679.00	35.51	264.55	6626.79	262.02 S	285.71 W	301.47	9.04
6737.00	42.47	267.24	6671.85	264.56 S	322.09 W	337.94	12.35
6785.00	53.08	267.25	6704.06	266.27 S	357.54 W	373.43	22.10
6832.00	63.04	266.99	6728.89	268.28 S	397.32 W	413.26	21.20
6879.00	71.23	268.09	6747.14	270.12 S	440.55 W	456.52	17.56
6926.00	78.17	269.73	6759.53	270.97 S	485.85 W	501.78	15.14
6956.00	81.90	269.74	6764.72	271.11 S	515.39 W	531.27	12.43
7131.00	90.03	268.99	6777.03	273.05 S	689.80 W	705.46	4.67
7224.00	88.64	267.55	6778.11	275.85 S	782.75 W	798.40	2.15
7317.00	91.70	268.76	6777.83	278.85 S	875.68 W	891.35	3.54
7410.00	88.92	266.30	6777.33	282.86 S	968.58 W	984.31	3.99
7503.00	91.57	266.84	6776.93	288.42 S	1061.40 W	1077.30	2.91
7595.00	91.45	265.25	6774.51	294.76 S	1153.15 W	1169.27	1.73
7688.00	91.94	264.88	6771.76	302.76 S	1245.76 W	1262.20	0.66
7781.00	92.93	265.81	6767.81	310.30 S	1338.37 W	1355.10	1.46
7874.00	91.73	267.65	6764.02	315.60 S	1431.14 W	1448.01	2.36
7967.00	91.39	268.31	6761.49	318.88 S	1524.04 W	1540.94	0.80
8060.00	91.82	268.62	6758.89	321.37 S	1616.97 W	1633.85	0.57
8153.00	91.76	269.11	6755.98	323.21 S	1709.91 W	1726.72	0.53
8246.00	91.42	269.65	6753.40	324.21 S	1802.87 W	1819.56	0.69
8339.00	90.80	270.03	6751.60	324.47 S	1895.85 W	1912.38	0.78
8432.00	91.20	270.37	6749.98	324.15 S	1988.84 W	2005.16	0.56
8525.00	89.08	270.03	6749.75	323.83 S	2081.83 W	2097.95	2.31
8618.00	90.00	270.27	6750.50	323.58 S	2174.82 W	2190.75	1.02
8710.00	90.19	269.48	6750.34	323.78 S	2266.82 W	2282.59	0.88
8801.00	89.32	268.01	6750.73	325.78 S	2357.80 W	2373.51	1.88
8896.00	90.83	271.14	6750.61	326.48 S	2452.78 W	2468.35	3.66
8990.00	87.60	270.82	6751.90	324.87 S	2546.75 W	2562.03	3.45
9085.00	88.24	269.28	6755.34	324.79 S	2641.68 W	2656.78	1.75
9180.00	89.08	267.32	6757.57	327.61 S	2736.61 W	2751.69	2.24
9275.00	91.94	269.46	6756.72	330.28 S	2831.55 W	2846.62	3.76
9369.00	88.52	268.36	6756.34	332.07 S	2925.52 W	2940.52	3.82
9464.00	89.20	268.28	6758.23	334.85 S	3020.46 W	3035.45	0.72
9559.00	88.58	267.84	6760.07	338.07 S	3115.38 W	3130.39	0.80
9654.00	90.43	268.89	6760.90	340.78 S	3210.34 W	3225.32	2.24
9748.00	91.02	269.51	6759.71	342.09 S	3304.32 W	3319.21	0.91
9843.00	88.71	267.43	6759.93	344.62 S	3399.27 W	3414.13	3.27
9938.00	89.35	267.36	6761.54	348.94 S	3494.16 W	3509.11	0.68
10033.00	91.05	266.29	6761.21	354.20 S	3589.01 W	3604.10	2.11

10128.00	90.49	266.95	6759.93	359.80 S	3683.83 W	3699.09	0.91
10222.00	93.02	269.27	6757.05	362.90 S	3777.72 W	3792.99	3.65
10317.00	91.57	270.38	6753.25	363.19 S	3872.64 W	3887.74	1.92
10411.00	89.75	270.52	6752.16	362.45 S	3966.63 W	3981.50	1.94
10506.00	88.95	270.12	6753.24	361.92 S	4061.62 W	4076.28	0.94
10600.00	89.26	269.41	6754.71	362.31 S	4155.61 W	4170.10	0.82
10695.00	89.54	268.83	6755.70	363.77 S	4250.59 W	4264.99	0.68
10790.00	91.42	268.55	6754.91	365.94 S	4345.56 W	4359.91	2.00
10885.00	90.62	265.40	6753.22	370.95 S	4440.40 W	4454.88	3.42
10980.00	92.04	263.09	6751.01	380.47 S	4534.89 W	4549.78	2.85
11075.00	93.58	264.46	6746.35	390.76 S	4629.21 W	4644.56	2.17
11170.00	92.41	265.94	6741.39	398.70 S	4723.74 W	4739.40	1.98
11265.00	91.54	267.68	6738.12	403.98 S	4818.53 W	4834.34	2.05
11360.00	89.41	268.62	6737.33	407.05 S	4913.47 W	4929.28	2.45
11454.00	89.41	268.26	6738.30	409.61 S	5007.43 W	5023.22	0.38
11550.00	89.72	268.09	6739.03	412.67 S	5103.38 W	5119.17	0.37
11645.00	89.35	269.29	6739.80	414.84 S	5198.35 W	5214.10	1.32
11740.00	89.45	269.24	6740.79	416.06 S	5293.34 W	5308.97	0.12
11835.00	89.72	268.83	6741.48	417.66 S	5388.32 W	5403.87	0.52
11930.00	89.63	268.76	6742.02	419.65 S	5483.30 W	5498.79	0.12
12024.00	88.80	269.40	6743.31	421.16 S	5577.28 W	5592.68	1.11
12119.00	88.80	271.01	6745.30	420.82 S	5672.25 W	5687.45	1.69
12214.00	90.22	271.02	6746.11	419.14 S	5767.23 W	5782.14	1.49
12309.00	88.24	271.82	6747.39	416.79 S	5862.19 W	5876.77	2.25
12403.00	89.38	272.17	6749.34	413.52 S	5956.11 W	5970.30	1.27
12498.00	89.72	272.44	6750.08	409.70 S	6051.03 W	6064.80	0.46
12593.00	89.88	271.73	6750.42	406.24 S	6145.97 W	6159.34	0.77
12688.00	90.80	271.69	6749.85	403.40 S	6240.92 W	6253.93	0.97
12782.00	88.24	270.67	6750.64	401.47 S	6334.89 W	6347.59	2.93
12877.00	88.55	269.78	6753.30	401.10 S	6429.85 W	6442.35	0.99
12971.00	90.77	269.93	6753.86	401.33 S	6523.84 W	6536.17	2.37
13066.00	89.51	266.94	6753.63	403.93 S	6618.79 W	6631.10	3.42
13161.00	89.23	264.88	6754.67	410.70 S	6713.54 W	6726.09	2.19
13272.00	89.63	262.87	6755.77	422.55 S	6823.90 W	6836.96	1.85
13335.00	89.63	262.87	6756.18	430.37 S	6886.41 W	6899.84	0.00

**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 266.43 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.46 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 13335.00 FEET  
IS 6899.84 FEET ALONG 266.42 DEGREES (GRID)**

**Tie-In @ Surface**

**Surveys at 311 ft, 594 ft and 870 ft were taken and provided by HP 322 while they were drilling the surface hole and have been converted from magnetic north to grid north.**