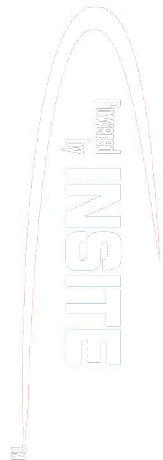


PCDC - Pressure Case Directional
PCGK - Pressure Case Gamma

1 : 240

Country		: USA		Company : Noble Energy			
Field		: Wattenberg		Rig : H&P 322			
Location		: Lat: 40° 28' 3.29" North Long: 104° 26' 2.87" West		Well : Wells Ranch AA21-63-1HN			
Well		: Wells Ranch AA21-63-1HN		Company : Noble Energy			
Company		: Noble Energy		Rig : H&P 322			
Rig		: H&P 322		Company : Noble Energy Rig : H&P 322 Well : Wells Ranch AA21-63-1HN Field : Wattenberg Country : USA API Number : 05-123-37597			
LOCATION							
Latitude : 40° 28' 3.29" North Longitude : 104° 26' 2.87" West		UTM Easting = 3296552.611 ft UTM Northing = 1414962.263 ft					
Permanent Datum		: Ground Level		Elevation : 4730.00 ft		Other Services	
Log Measured From		: Drill Floor		24.00 ft Above Permanent Datum		Directional Drilling	
Drilling Measured From		: Drill Floor		MD LOG		KB N/A DF 4754.00 ft GL 4730.00 ft WD N/A	
Depth Logged		: 958.00 ft To 10,983.00 ft		Unit No. : 11210425		Job No. :CA-XX-0900918609	
Date Logged		: 16-Jan-14 To 21-Jan-14		Plot Type : Final			
Total Depth MD		: 10,983.00 ft TVD : 6,713.39 ft		Plot Date : 21-Jan-14			
Spud Date		: 15-Jan-14					
Run No.		Borehole Record (MD)		Run No.		Borehole Record (MD)	
Size		From To		Size		From To	
100	8,750 in	958.00 ft	6,000.00 ft				
0200	8,750 in	6,000.00 ft	7,002.00 ft				
300	6,125 in	7,002.00 ft	10,983.00 ft				
				Casing Record (MD)			
				Size	Weight	From	To
				9,625 in	36.00 lbpf	SURFACE	948.00 ft
				7,000 in	26.00 lbpf	SURFACE	6,992.00 ft

Max Tool Temp (degF) / Source	158.47 / PCM	158.47 / PCM	213.40 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Robert Ley	Robert Ley	Robert Ley		
Customer Representative	Charles Collver	Charles Collver	Charles Collver		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11303511	11303511	11768604		
Insert Serial Number	11145509	11145509	11680738		
Date and Time Initialized	15-Jan-14 16:42	15-Jan-14 16:42	18-Jan-14 21:57		
Date and Time Read	18-Jan-14 15:29	18-Jan-14 15:18	21-Jan-14 09:35		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	59.00	57.00	66.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11303511	11303511	11768604		
Sonde Serial Number	11297588	11297588	11638621		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	70.89	245.06	93.78		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	52.28	50.72	58.85		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11303511	11303511	11768604		
Insert/Sonde Serial Number	11293266	11293266	11681001		

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 CG):

Interval Resolution: 0.5 feet

Coercion Distance: 0.6 feet

Gap Fill: 3.0 feet

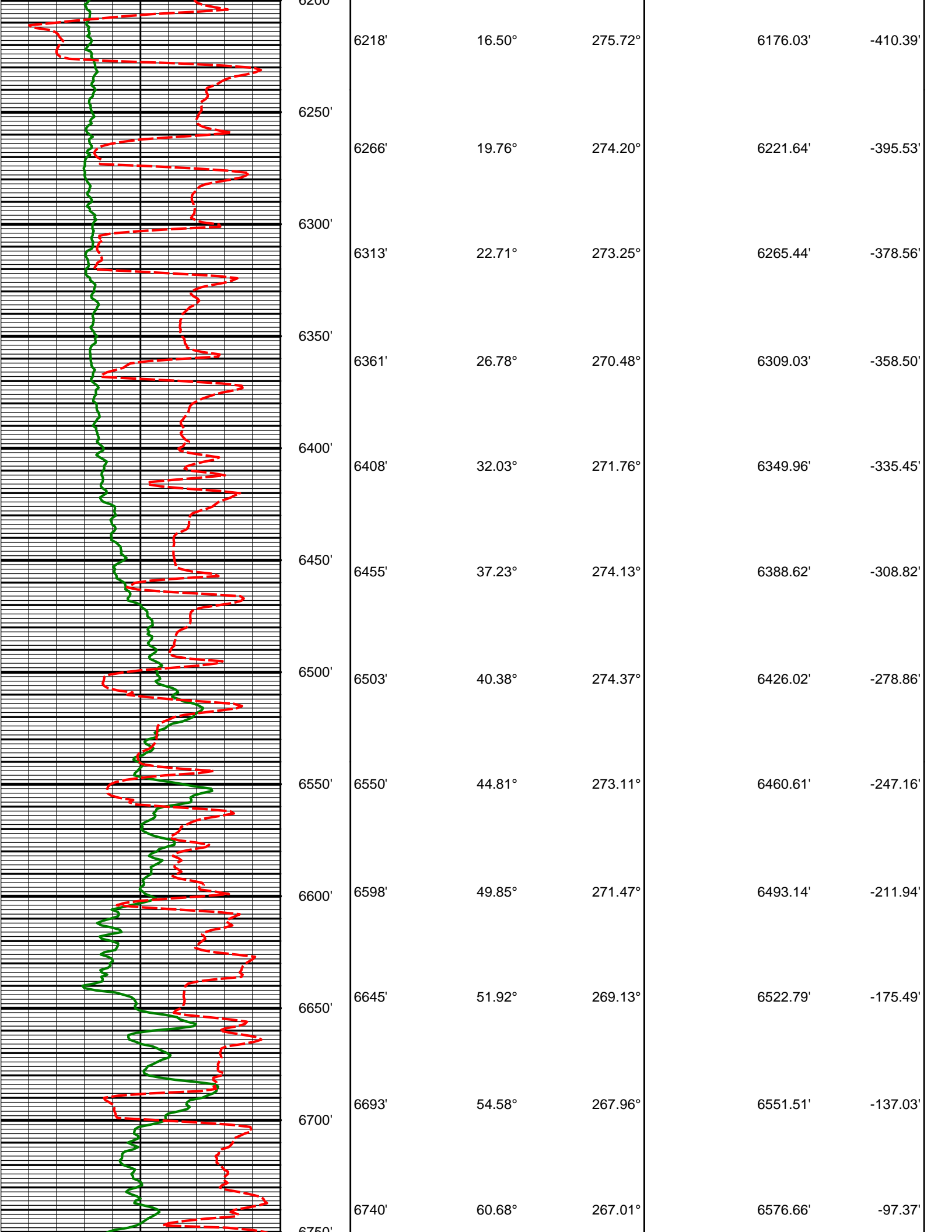
ROPA (Rate of Penetration):

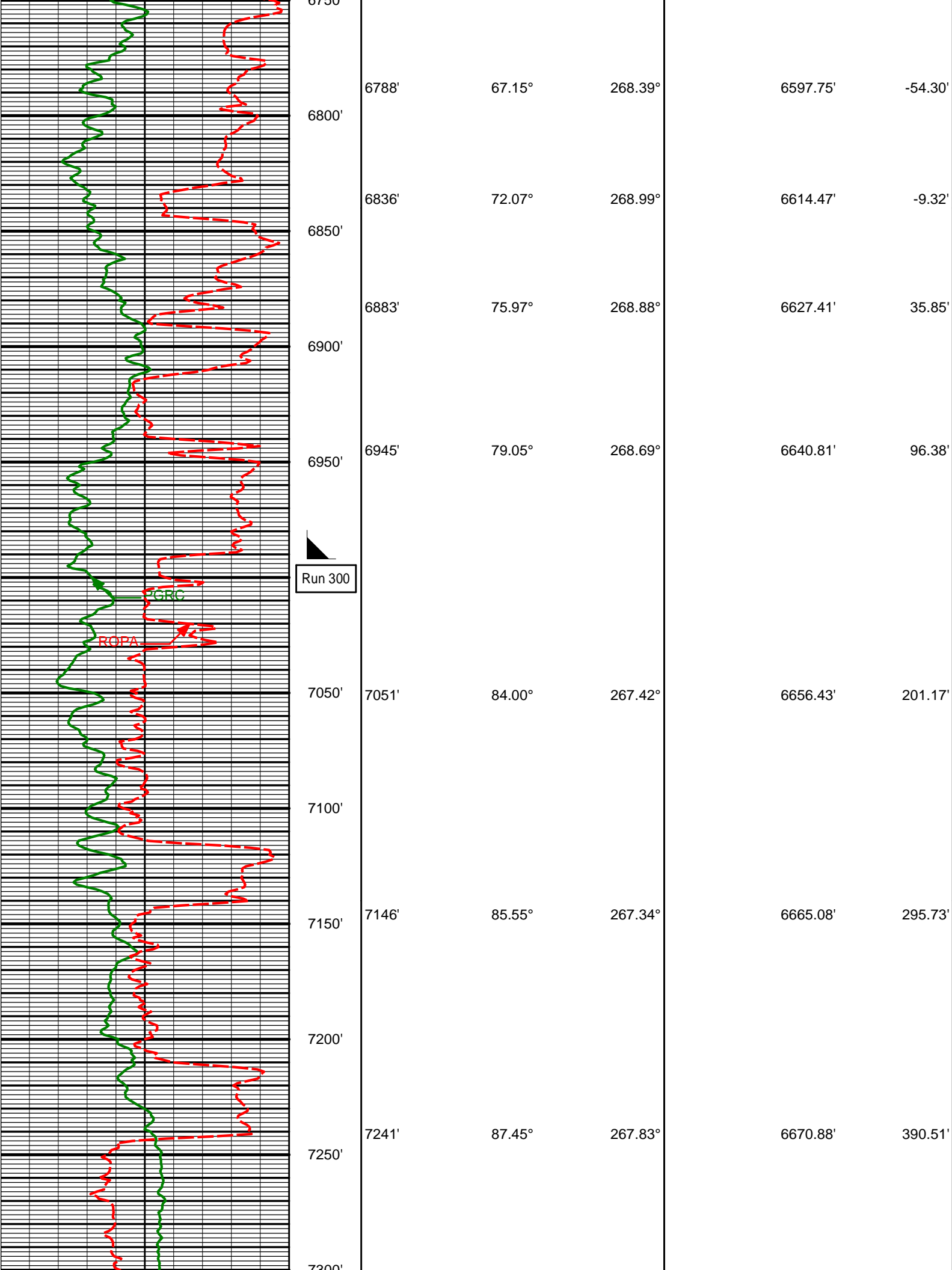
Interval Resolution: 0.5 feet

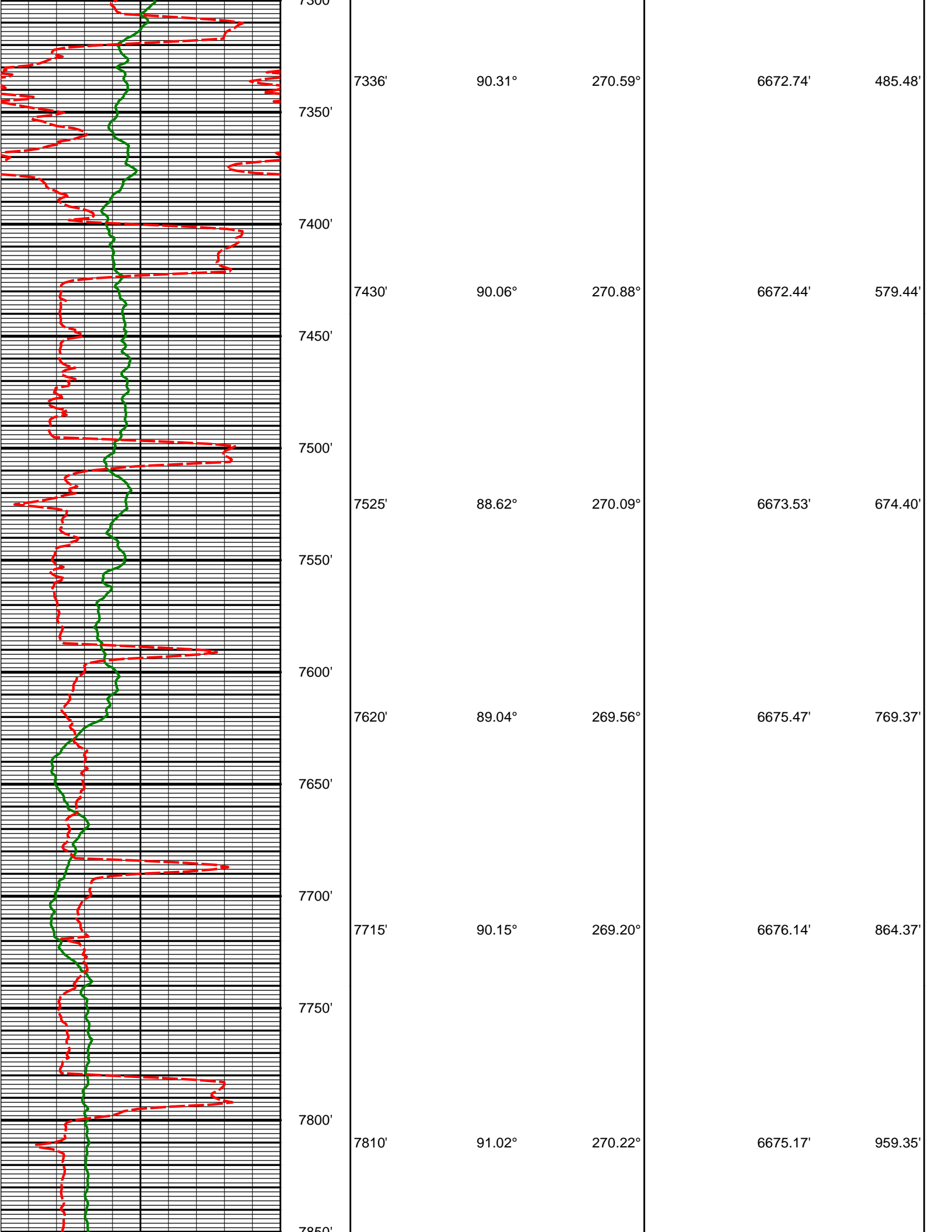
Coercion Distance: 1.2 feet

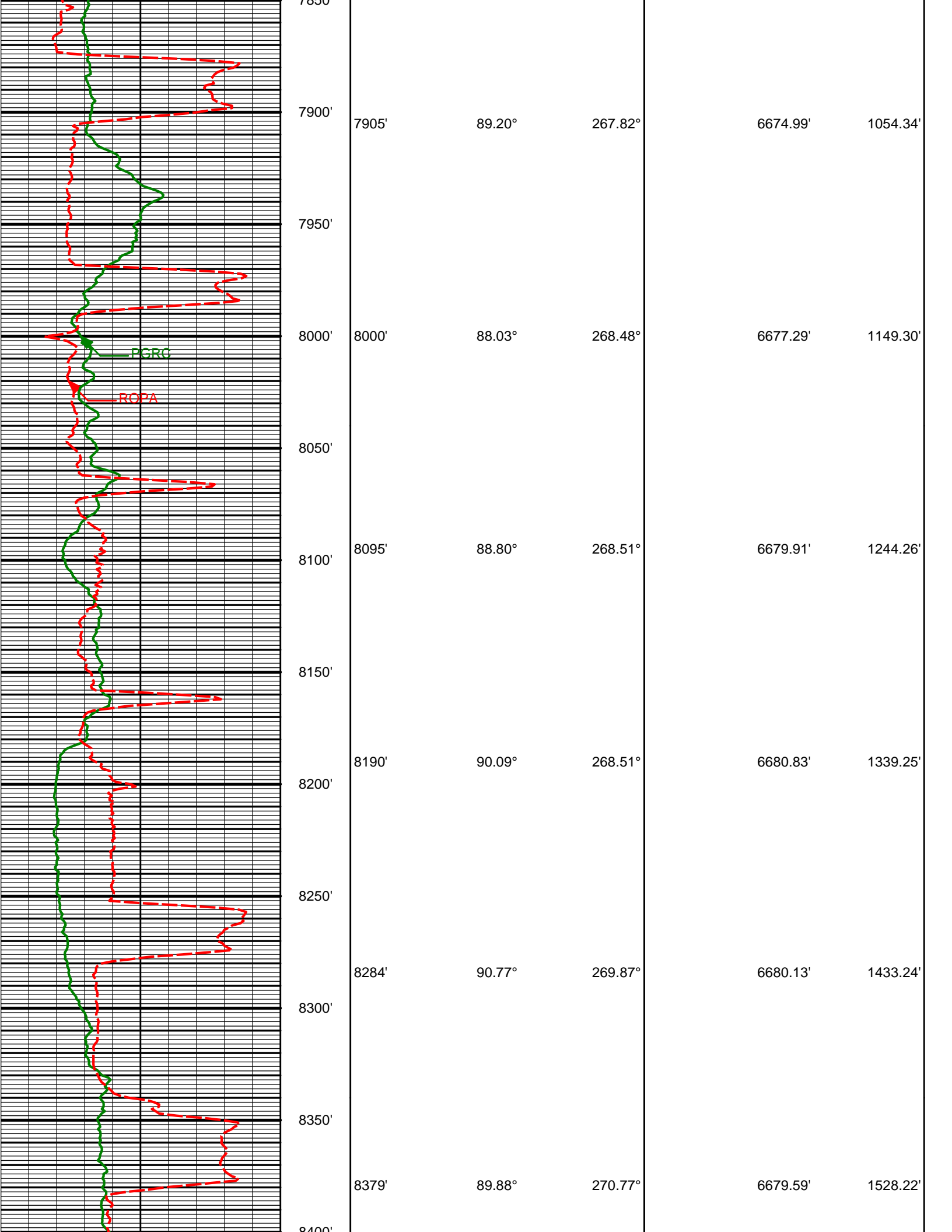
WARRANTY

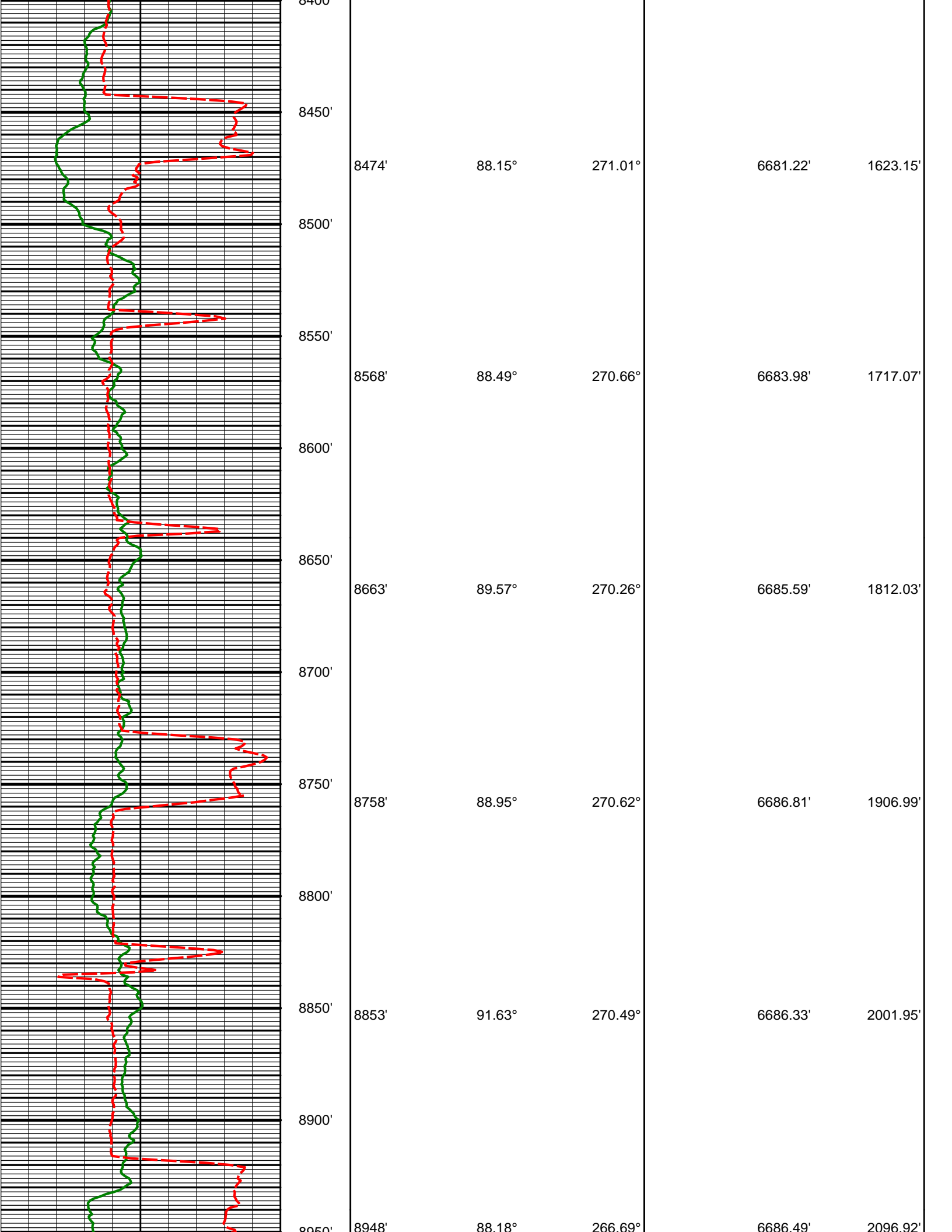
Gamma Ray (PGXC) (Api)							
0	300						
Avg Rate of Penetration feet per hr		Feet					
600	0		Depth	Inc	Azm	TVD	Vsec
		5950'	5941'	0.65°	268.07°	5902.21'	-441.16'
Run 200							
PGRC							
ROPA							
		6029'	6029'	0.40°	245.41°	5990.20'	-440.38'
		6050'					
KOP							
		6077'	6077'	4.28°	279.79°	6038.15'	-438.46'
		6100'					
		6123'	6123'	10.46°	276.52°	6083.75'	-432.63'
		6150'					
		6171'	6171'	13.85°	276.02°	6130.67'	-422.60'
		6200'					

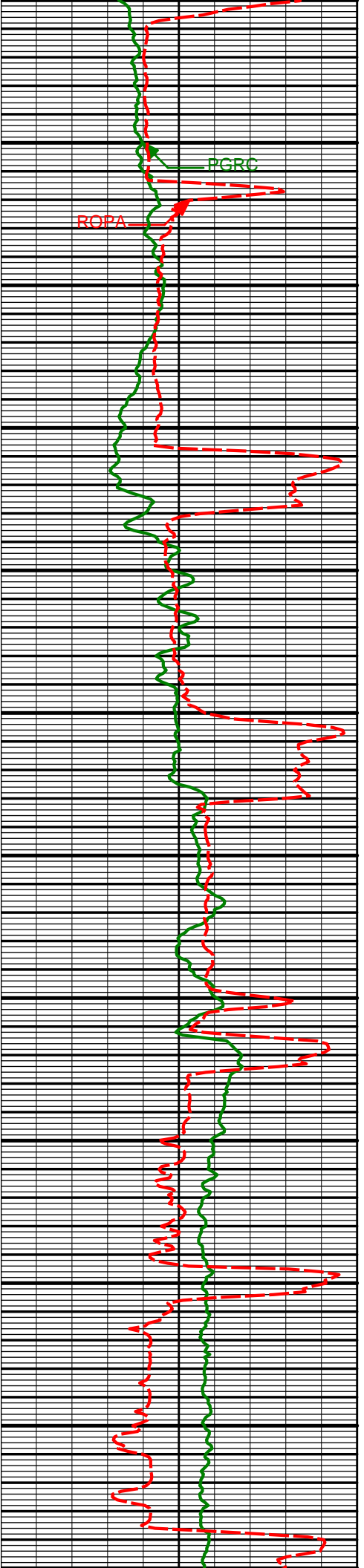




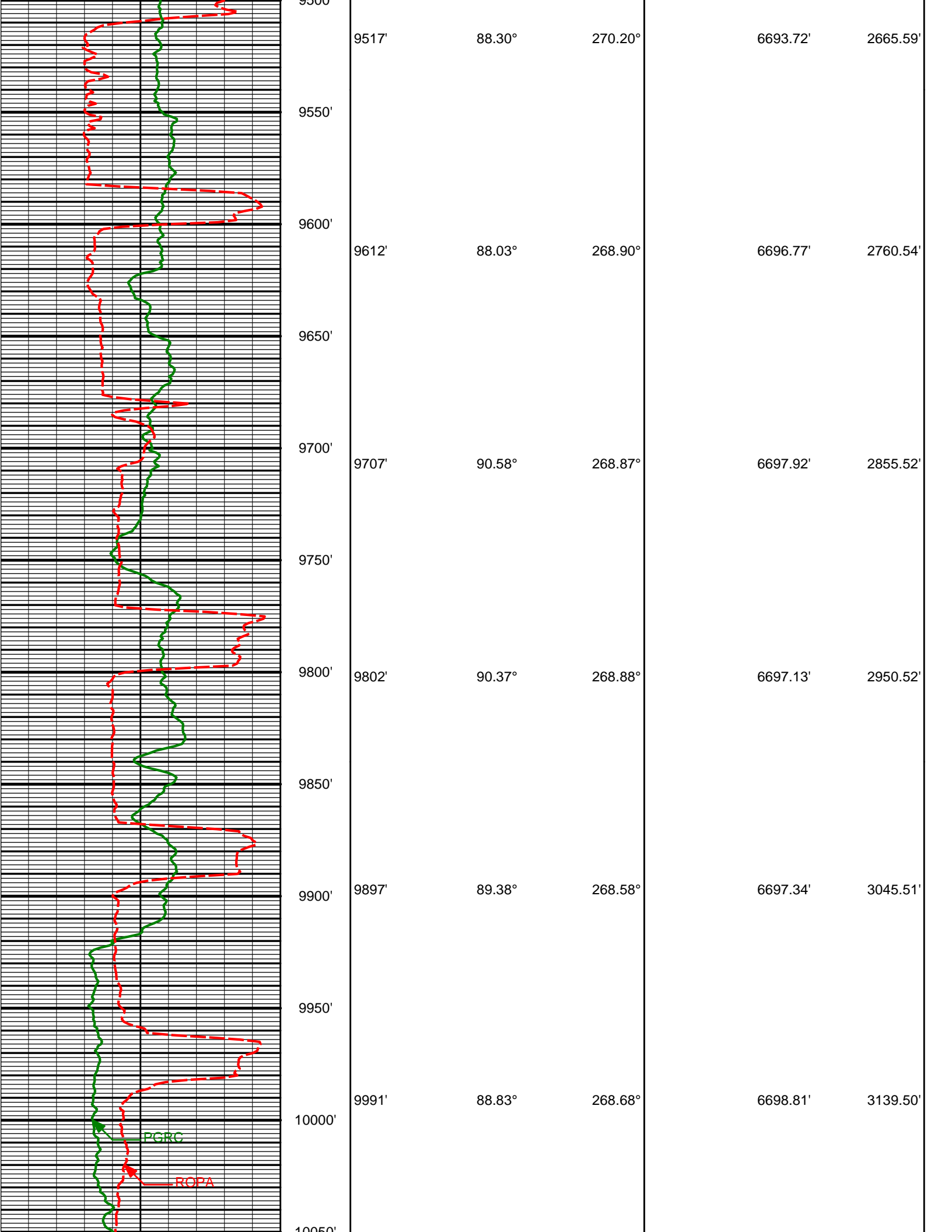


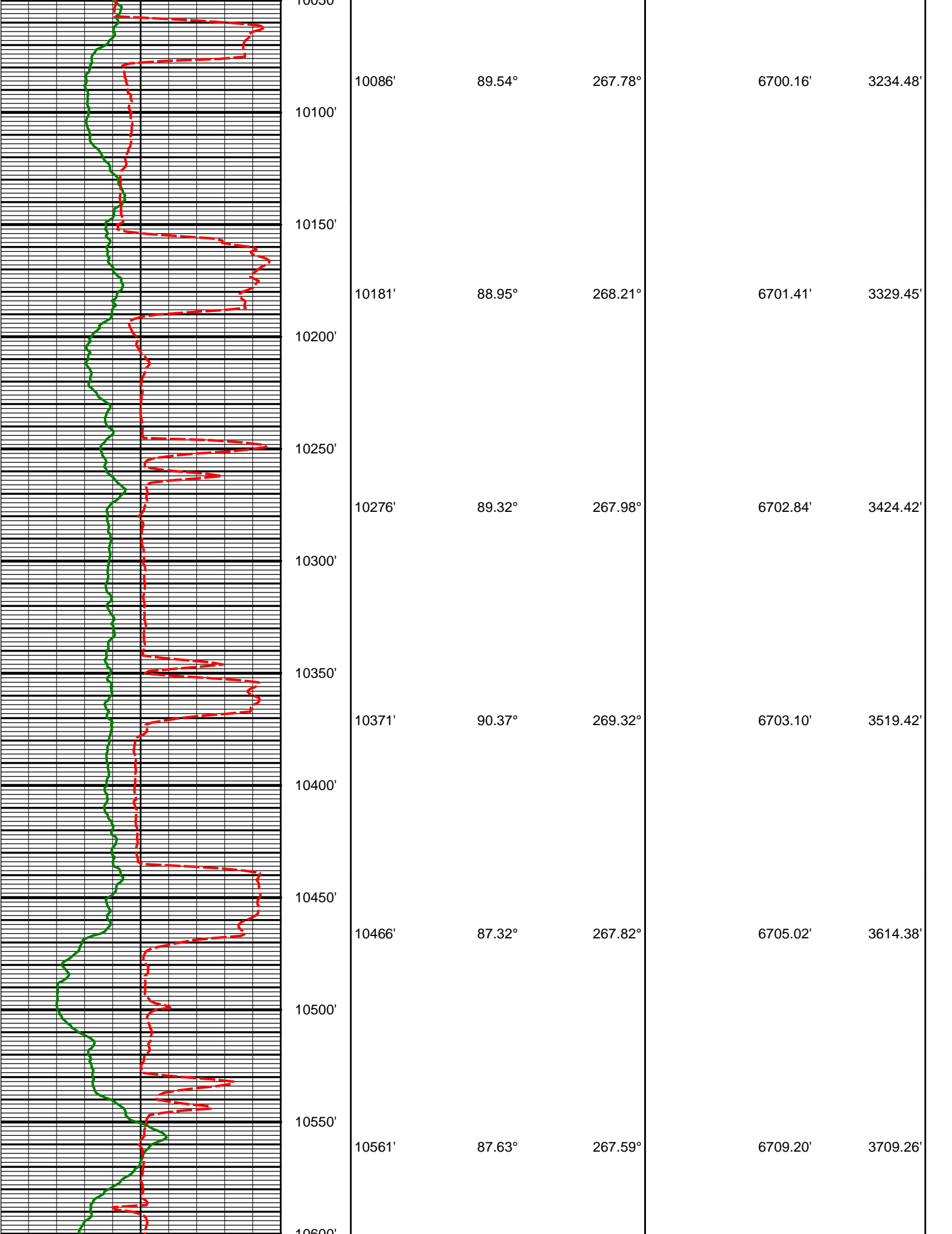


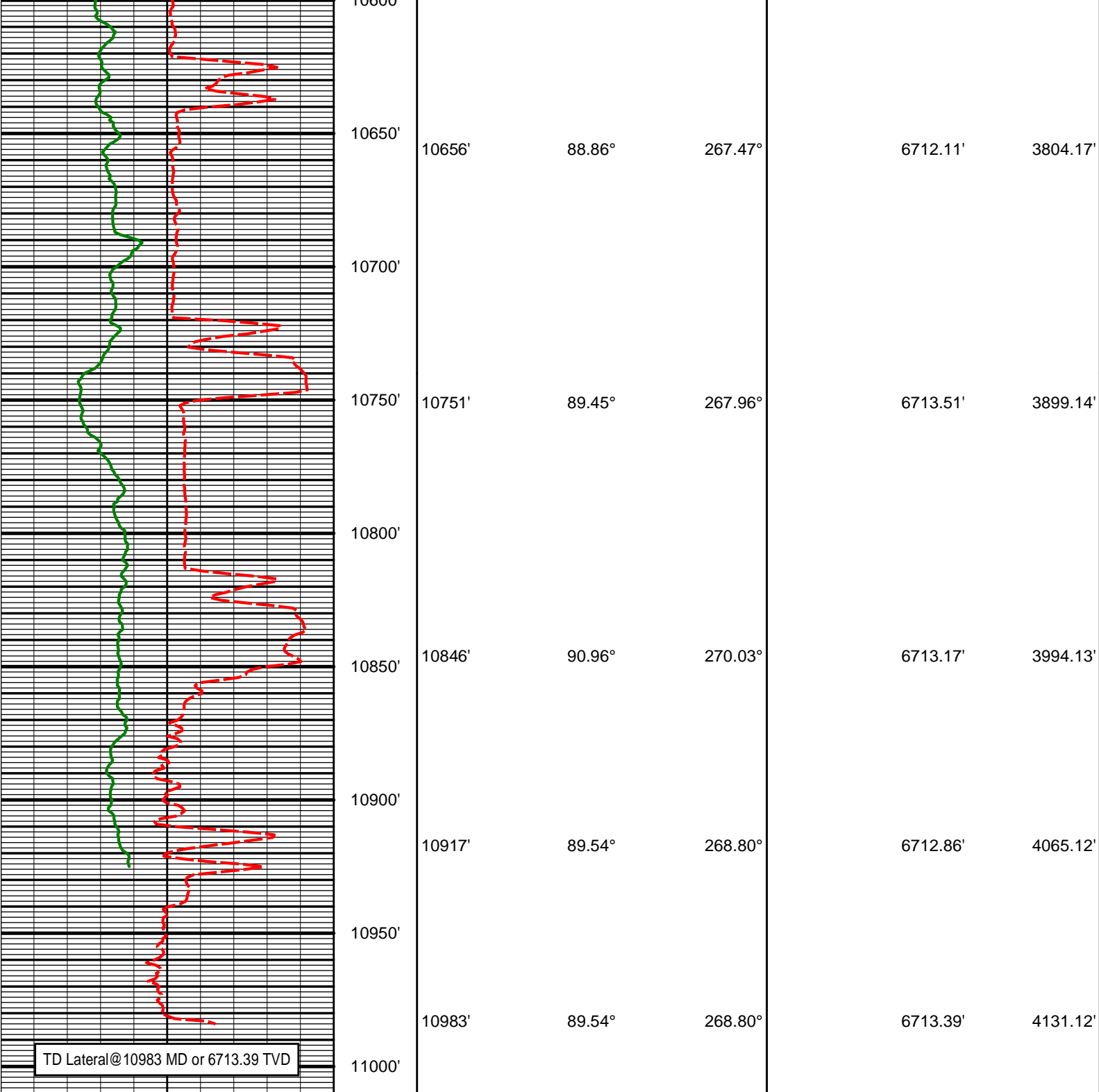




8950'				
9000'				
9043'	90.68°	267.72°	6687.44'	2191.85'
9050'				
9100'				
9138'	90.99°	269.46°	6686.05'	2286.83'
9150'				
9200'				
9233'	88.55°	271.34°	6686.43'	2381.80'
9250'				
9300'				
9327'	88.27°	270.94°	6689.04'	2475.70'
9350'				
9400'				
9422'	88.89°	270.34°	6691.40'	2570.64'
9450'				
9500'				



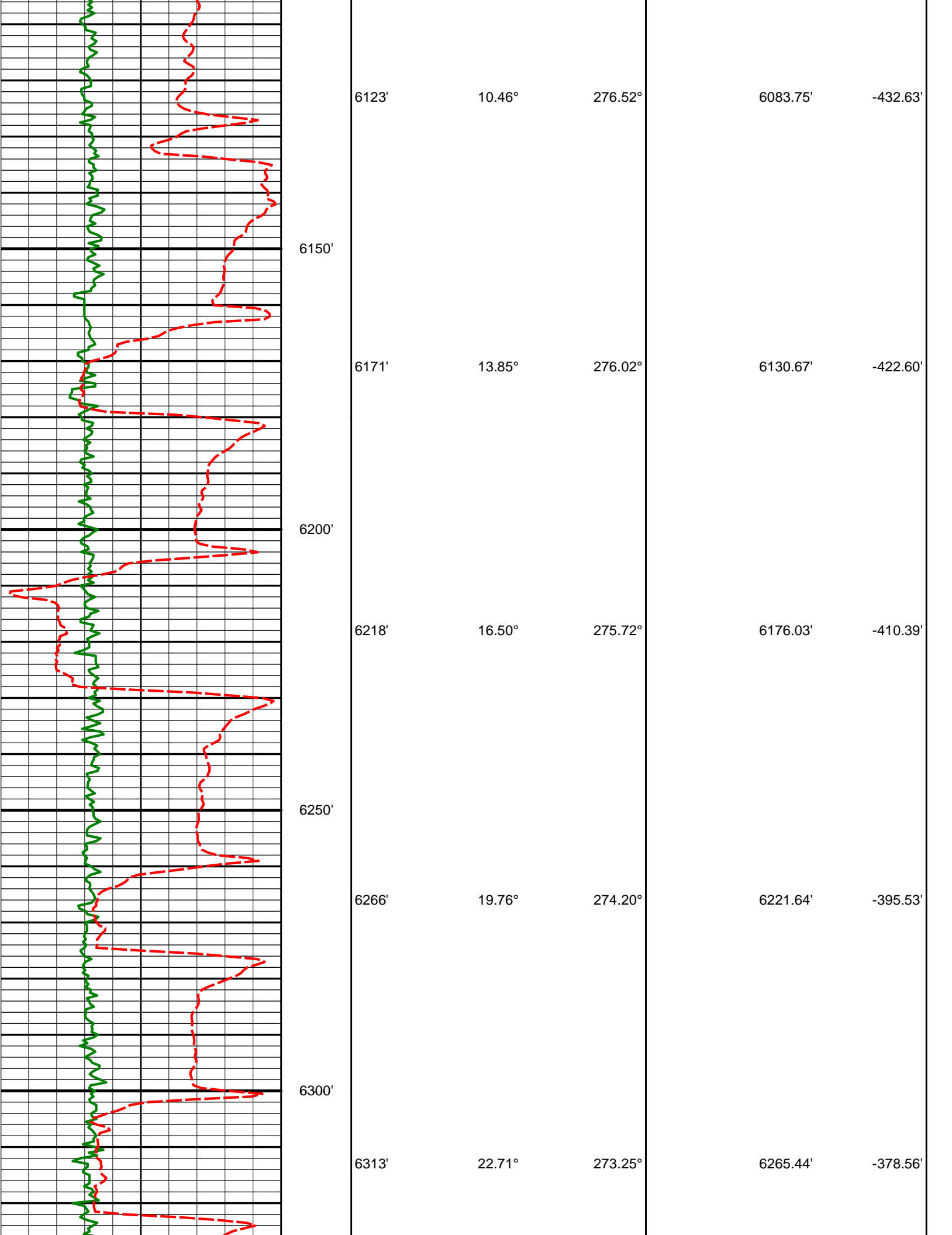


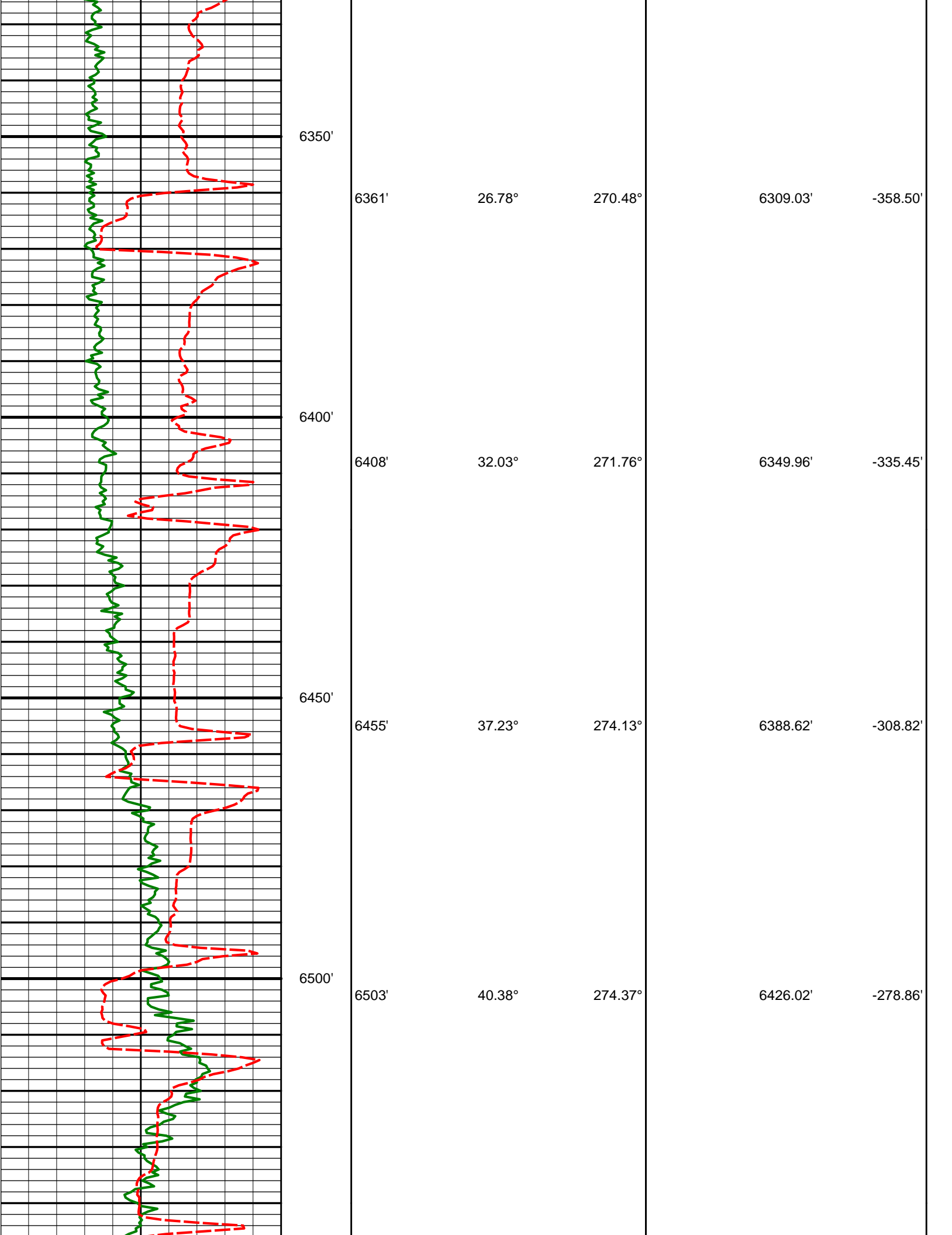


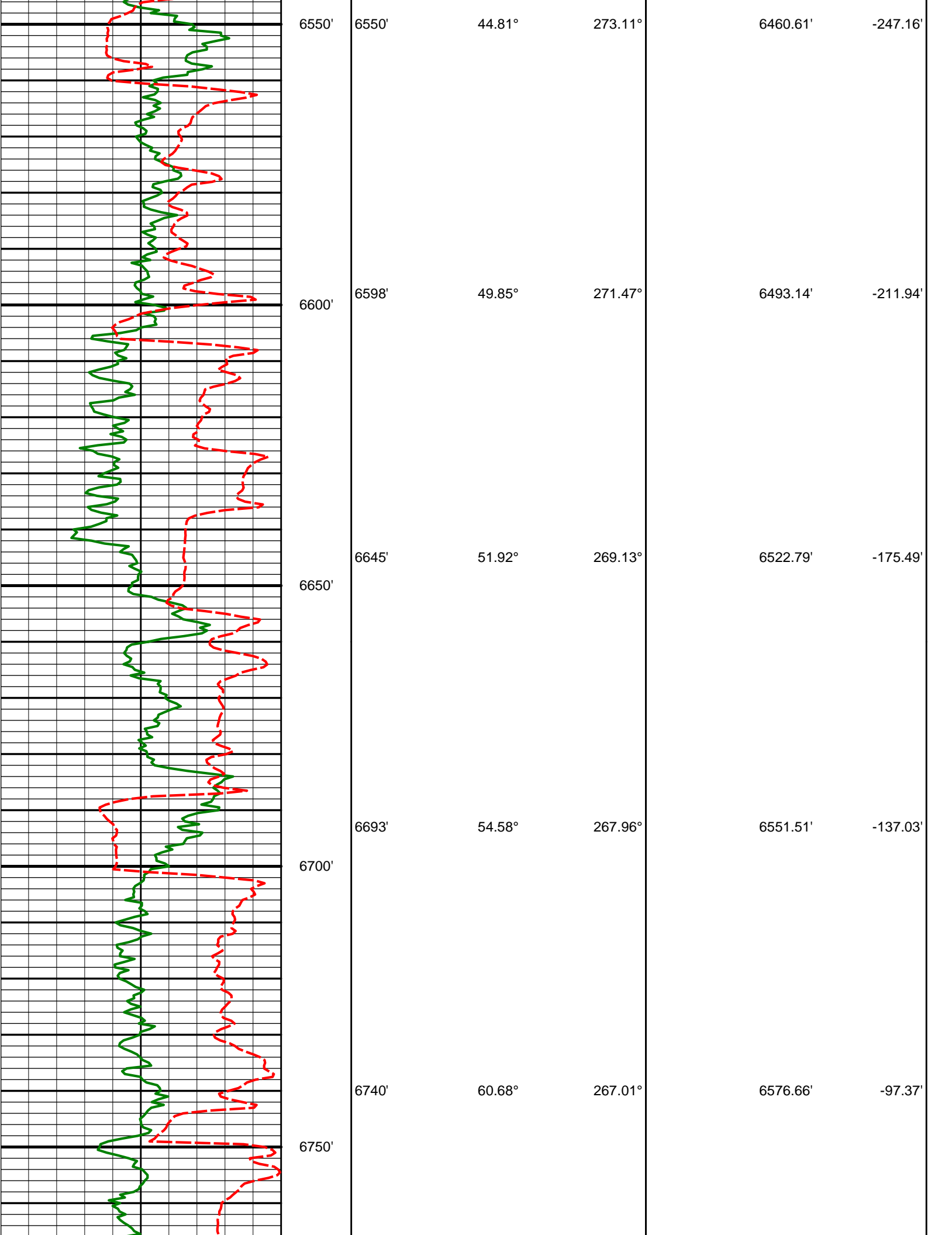
Avg Rate of Penetration feet per hr		Feet		
600				
		Depth	Inc	Azm
Gamma Ray (PGXC) (Api)				TVD
0				Vsec
300				

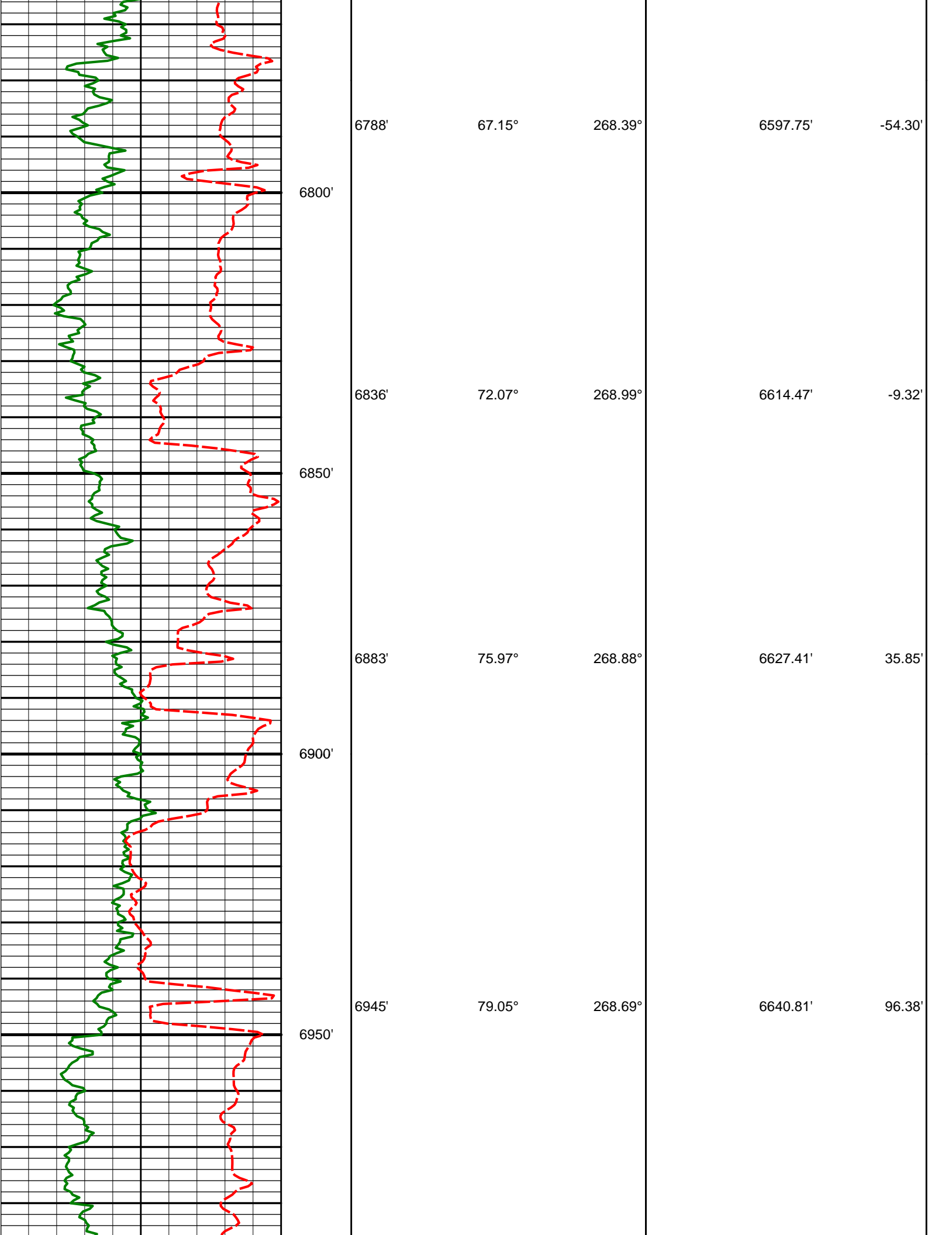
HALLIBURTON

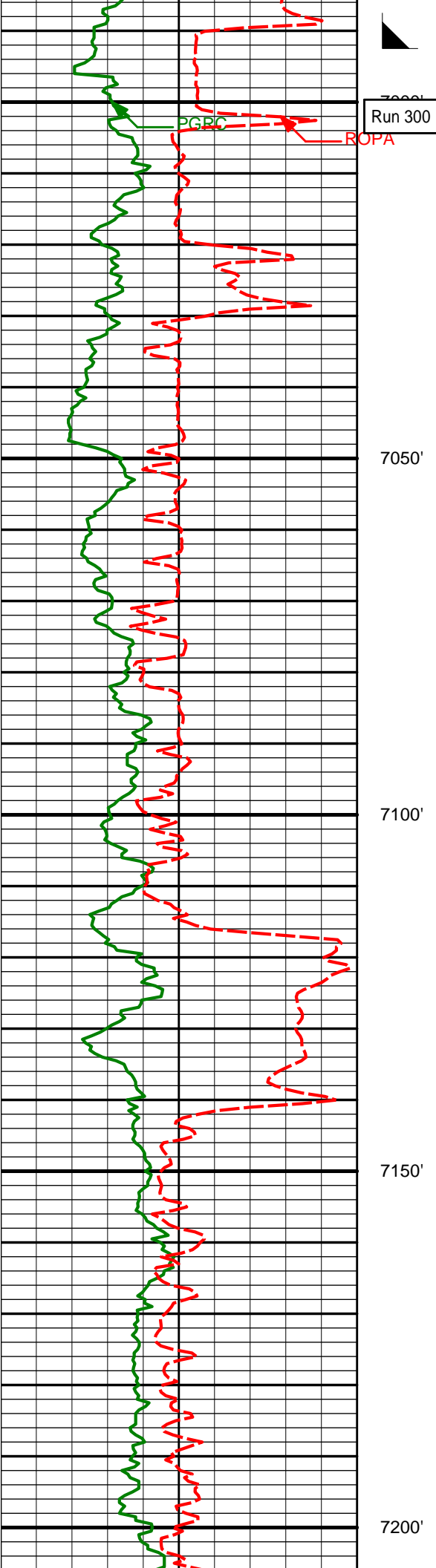
Gamma Ray (PGXC) (Api)							
Avg Rate of Penetration feet per hr		Feet	Depth	Inc	Azm	TVD	Vsec
0	300		5941'	0.65°	268.07°	5902.21'	-441.16'
600	0	5950'					
Run 200							
KOP							
		6029'		0.40°	245.41°	5990.20'	-440.38'
		6050'					
		6077'		4.28°	279.79°	6038.15'	-438.46'
		6100'					











Run 300

PGBC

ROPA

7050'

7051'

84.00°

267.42°

6656.43'

201.17'

7100'

7150'

7146'

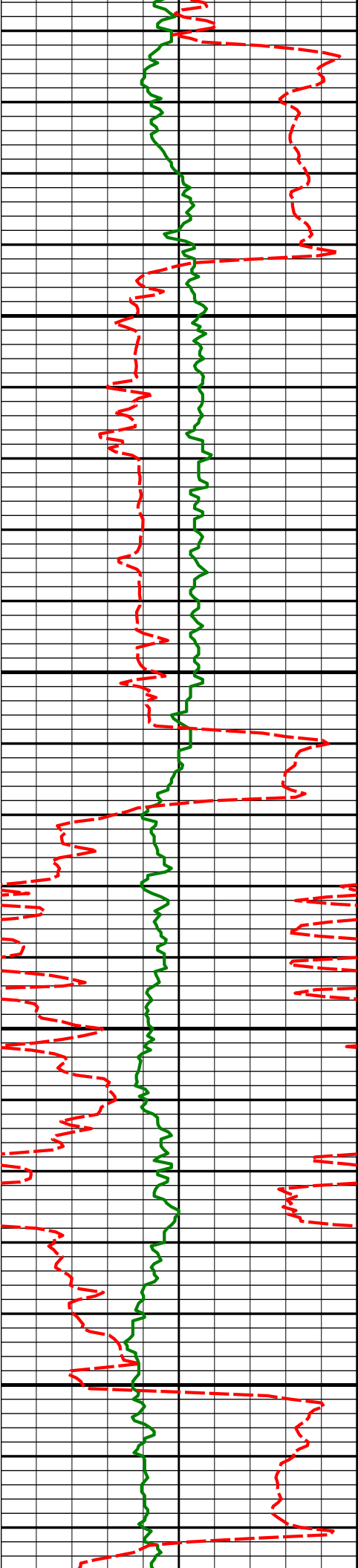
85.55°

267.34°

6665.08'

295.73'

7200'



7241'

87.45°

267.83°

6670.88'

390.51'

7250'

7300'

7336'

90.31°

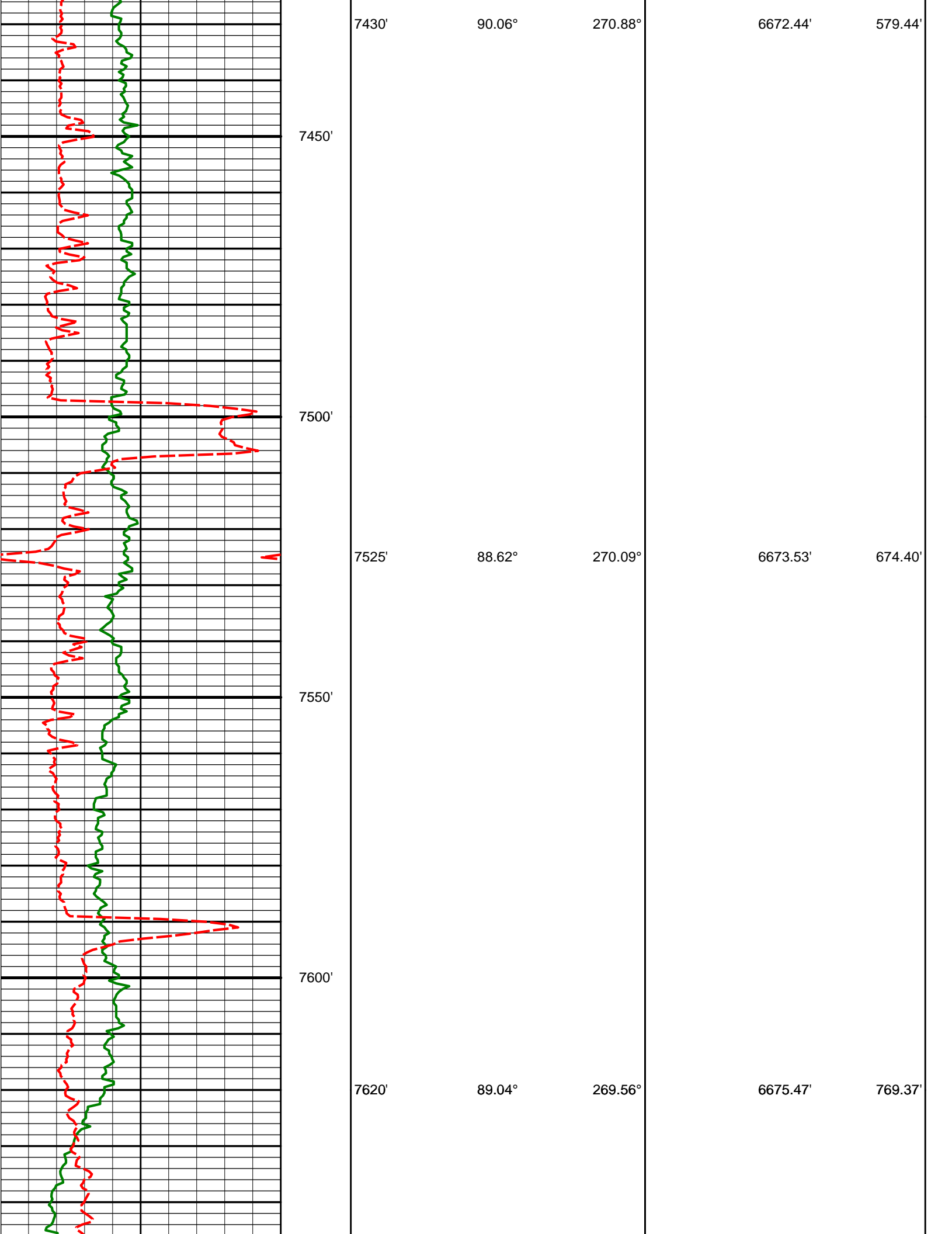
270.59°

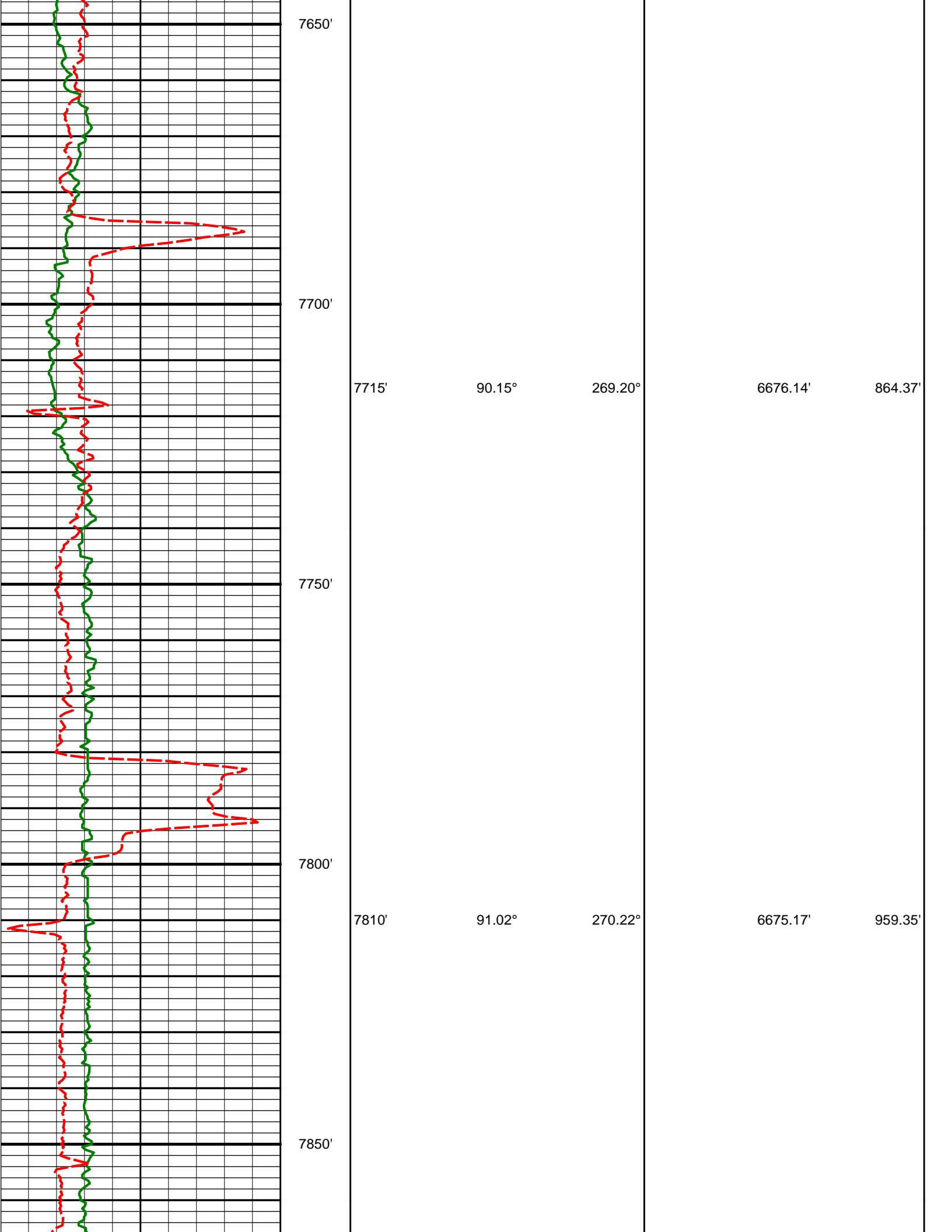
6672.74'

485.48'

7350'

7400'







7900'

7905'

89.20°

267.82°

6674.99'

1054.34'

7950'

8000'

8000'

88.03°

268.48°

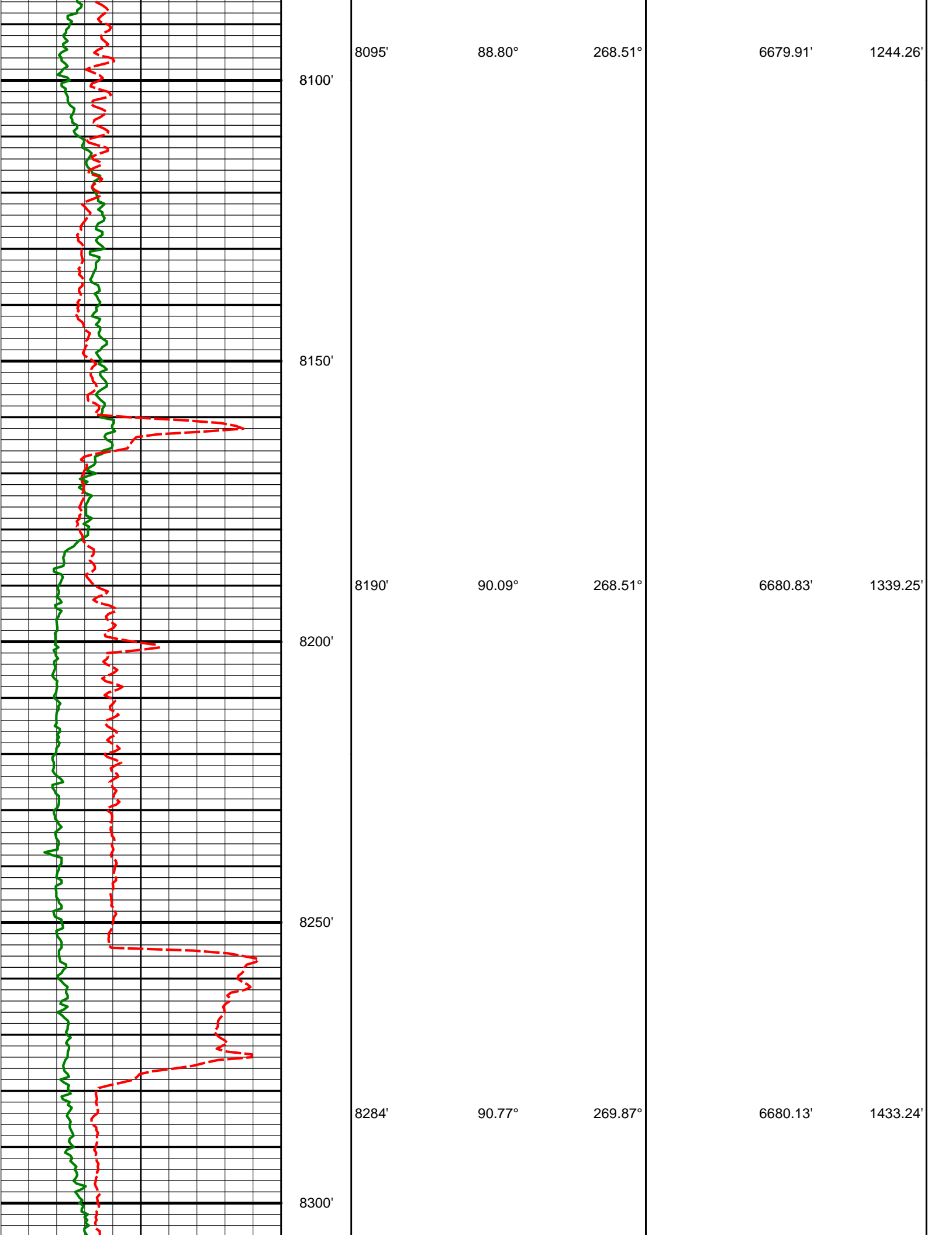
6677.29'

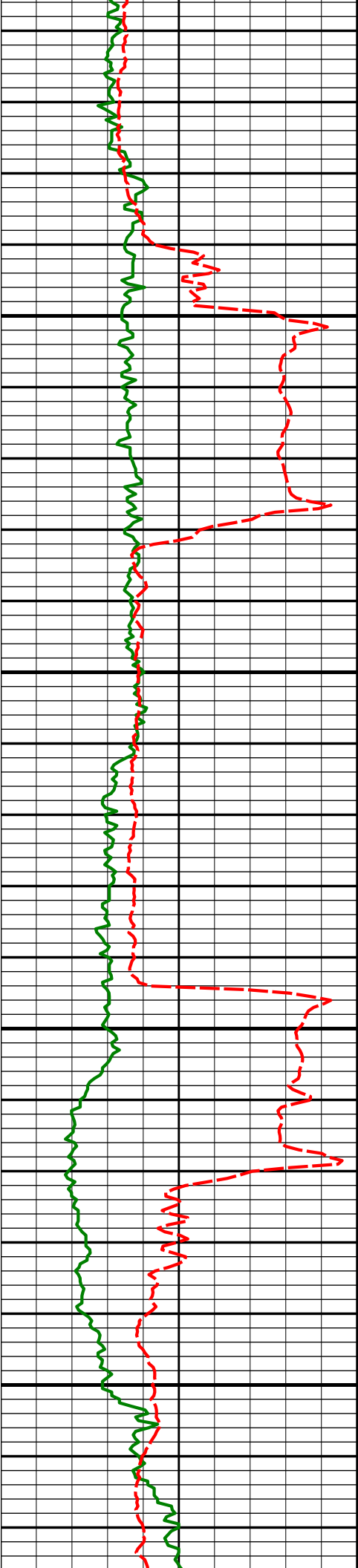
1149.30'

8050'

PGRC

ROPA





8350'

8379'

89.88°

270.77°

6679.59'

1528.22'

8400'

8450'

8474'

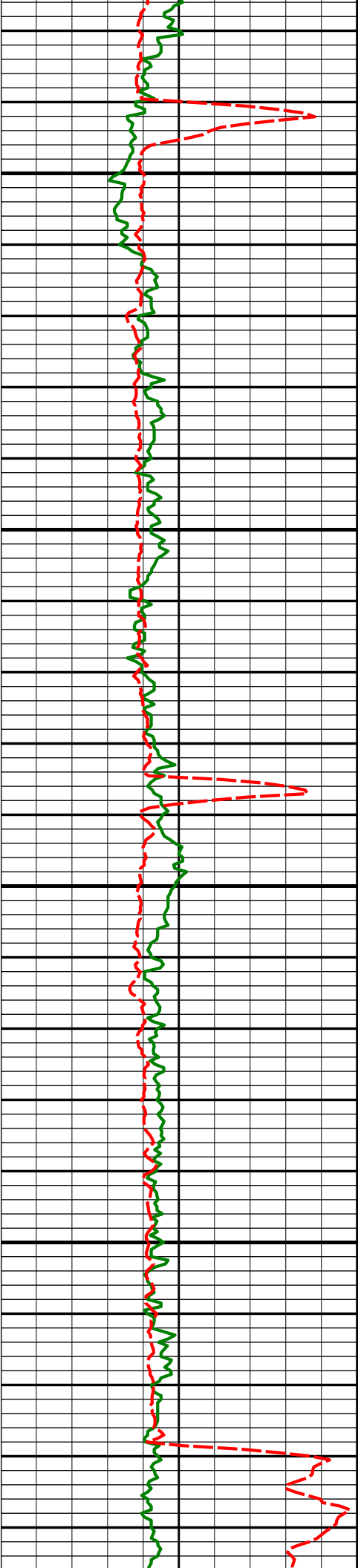
88.15°

271.01°

6681.22'

1623.15'

8500'



8550'

8568'

88.49°

270.66°

6683.98'

1717.07'

8600'

8650'

8663'

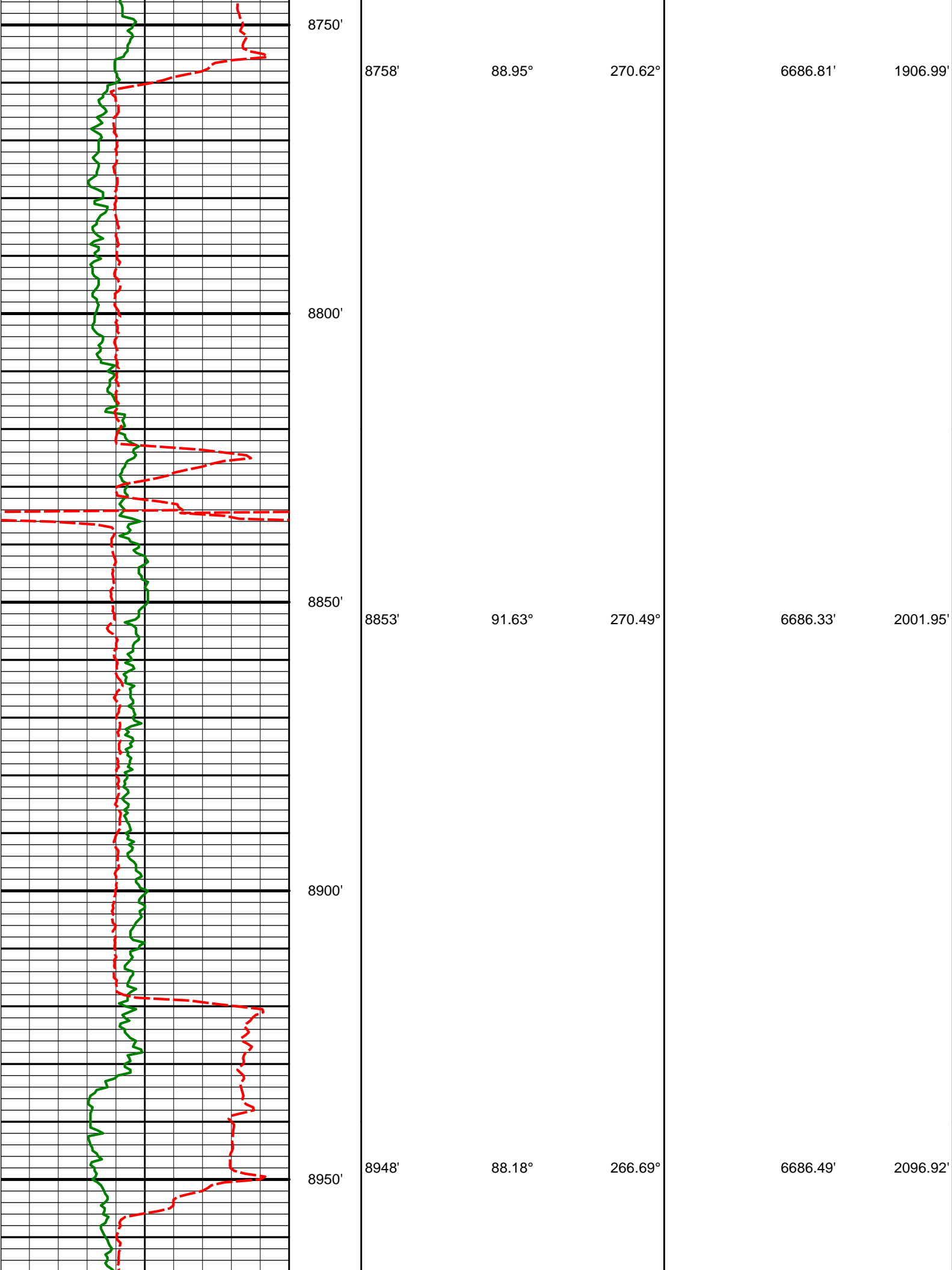
89.57°

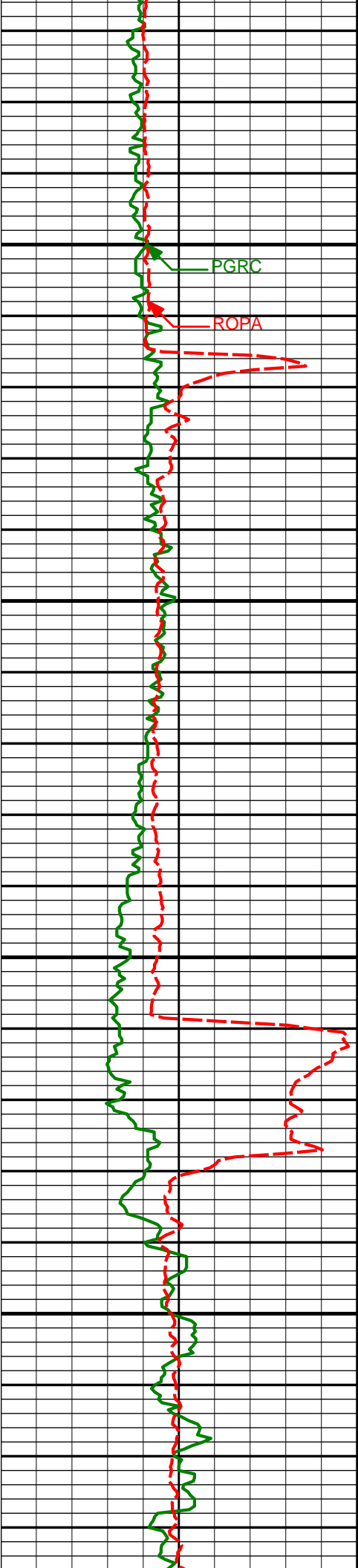
270.26°

6685.59'

1812.03'

8700'





PGRC

ROPA

9000'

9050'

9100'

9150'

9043'

90.68°

267.72°

6687.44'

2191.85'

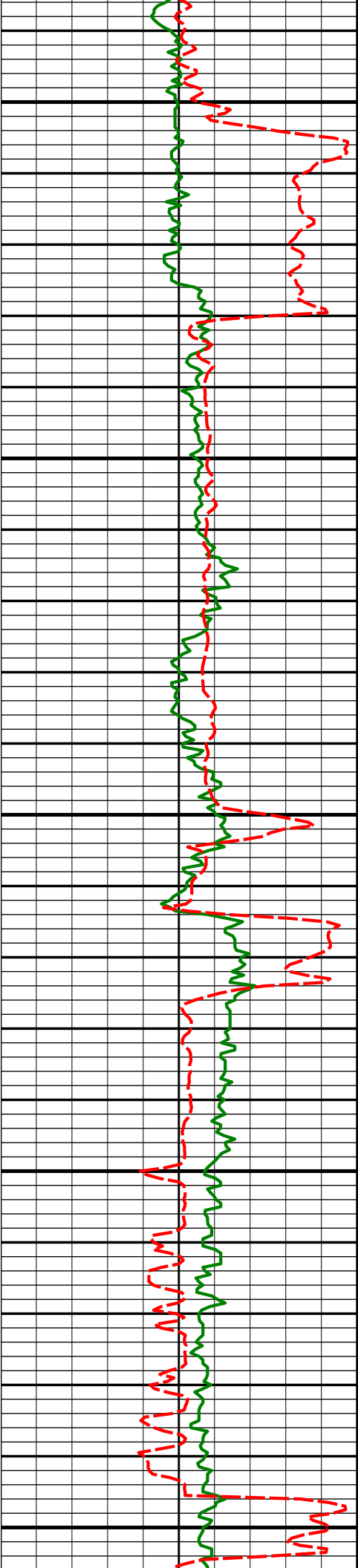
9138'

90.99°

269.46°

6686.05'

2286.83'



9200'

9233'

88.55°

271.34°

6686.43'

2381.80'

9250'

9300'

9327'

88.27°

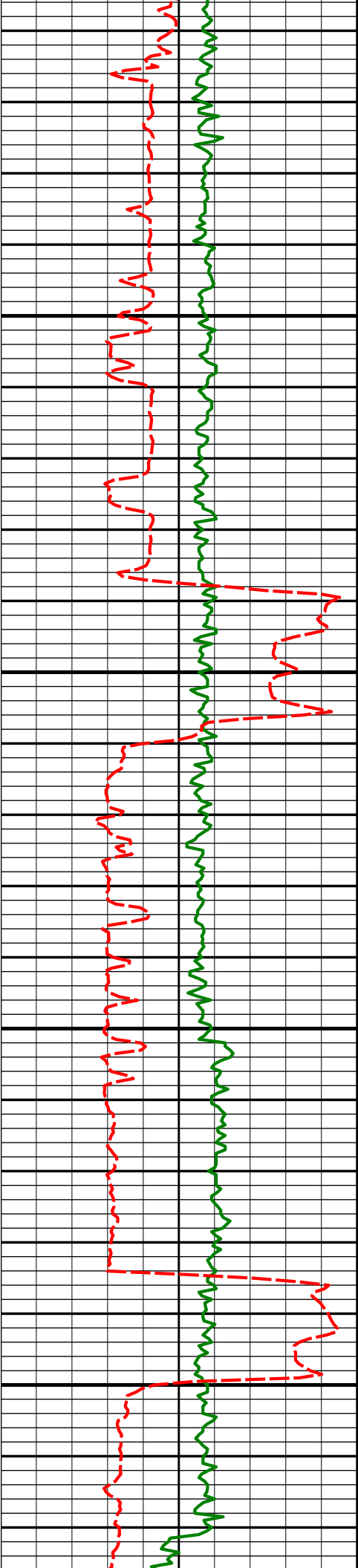
270.94°

6689.04'

2475.70'

9350'

9400'



9422'

88.89°

270.34°

6691.40'

2570.64'

9450'

9500'

9517'

88.30°

270.20°

6693.72'

2665.59'

9550'

9600'

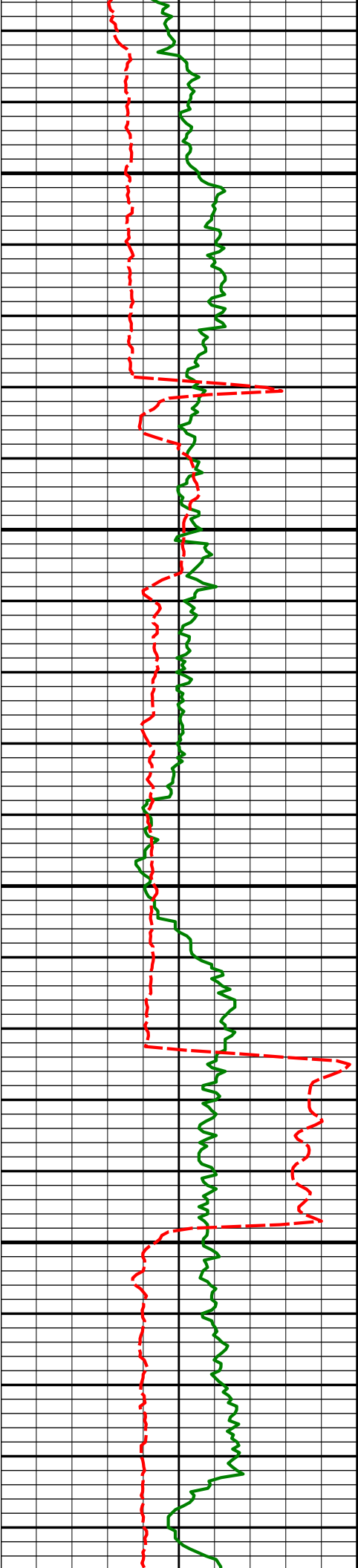
9612'

88.03°

268.90°

6696.77'

2760.54'



9650'

9700'

9750'

9800'

9707'

90.58°

268.87°

6697.92'

2855.52'

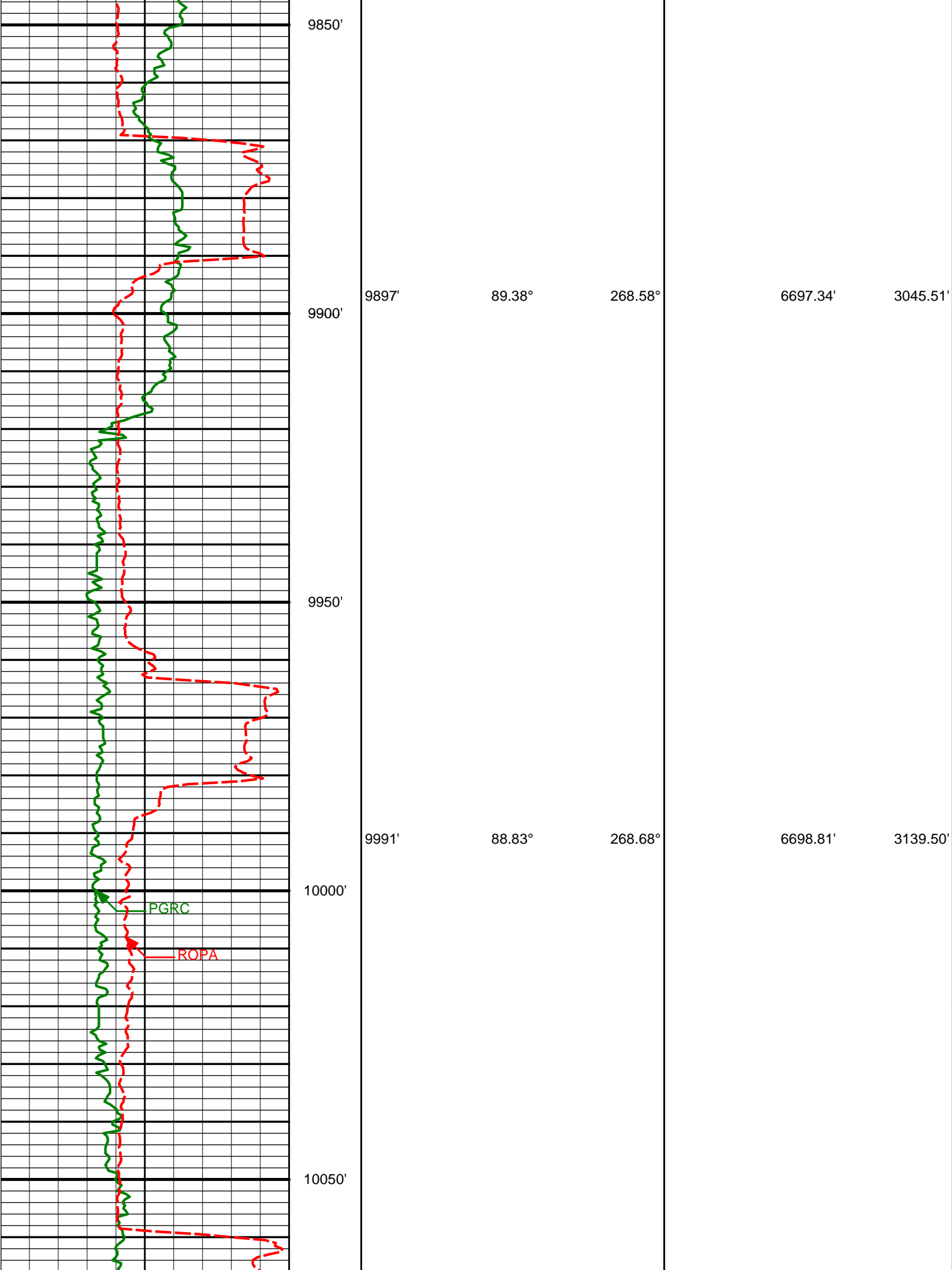
9802'

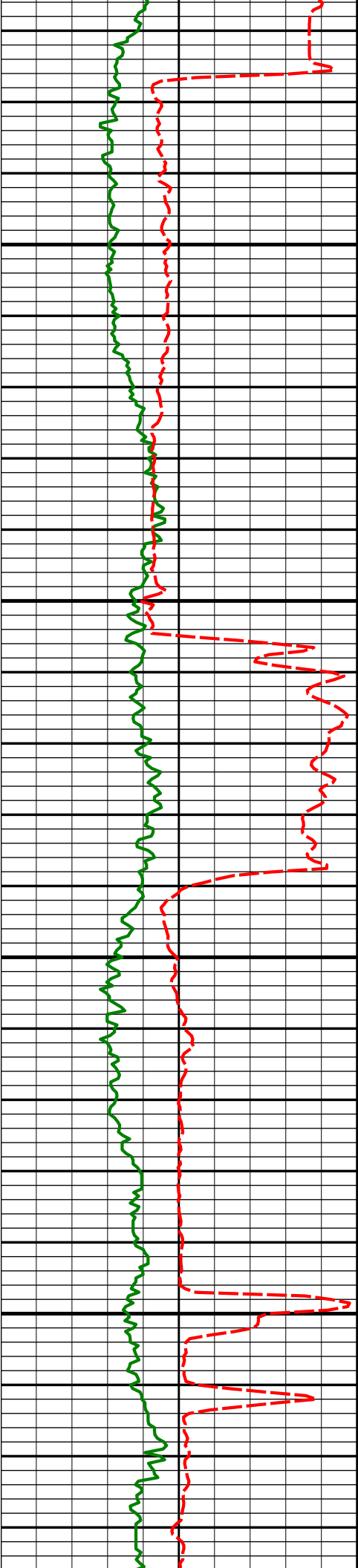
90.37°

268.88°

6697.13'

2950.52'





10086'

89.54°

267.78°

6700.16'

3234.48'

10100'

10150'

10181'

88.95°

268.21°

6701.41'

3329.45'

10200'

10250'

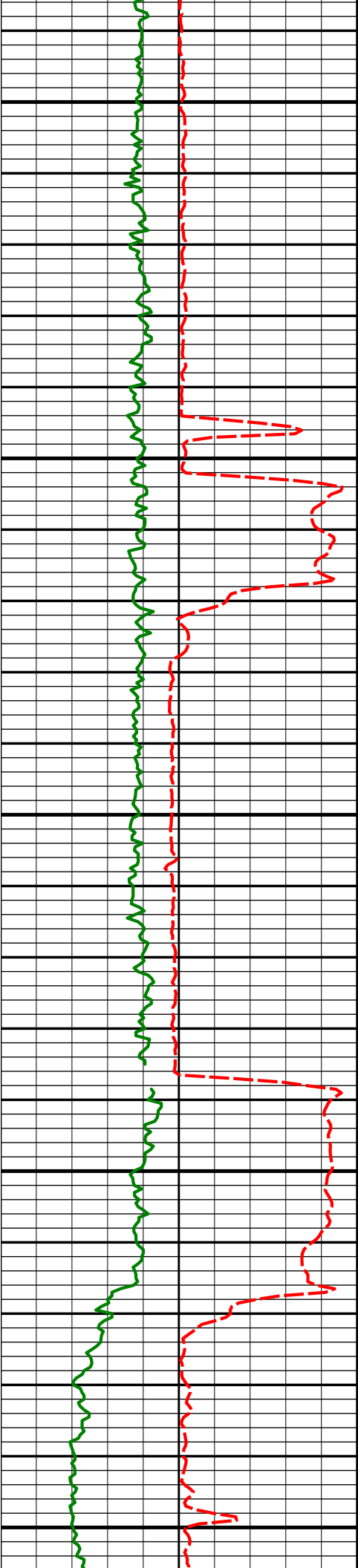
10276'

89.32°

267.98°

6702.84'

3424.42'



10300'

10350'

10400'

10450'

10500'

10371'

90.37°

269.32°

6703.10'

3519.42'

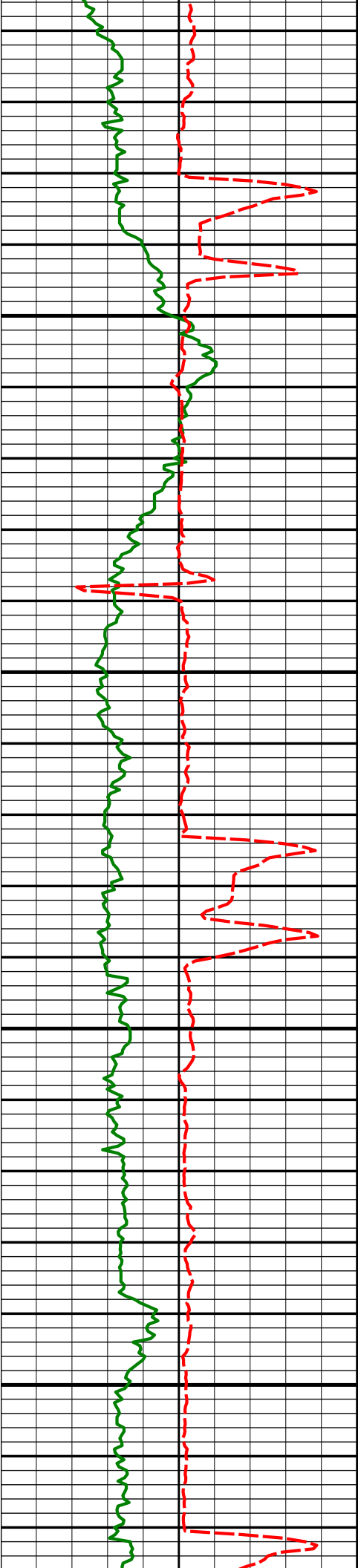
10466'

87.32°

267.82°

6705.02'

3614.38'



10550'

10561'

87.63°

267.59°

6709.20'

3709.26'

10600'

10650'

10656'

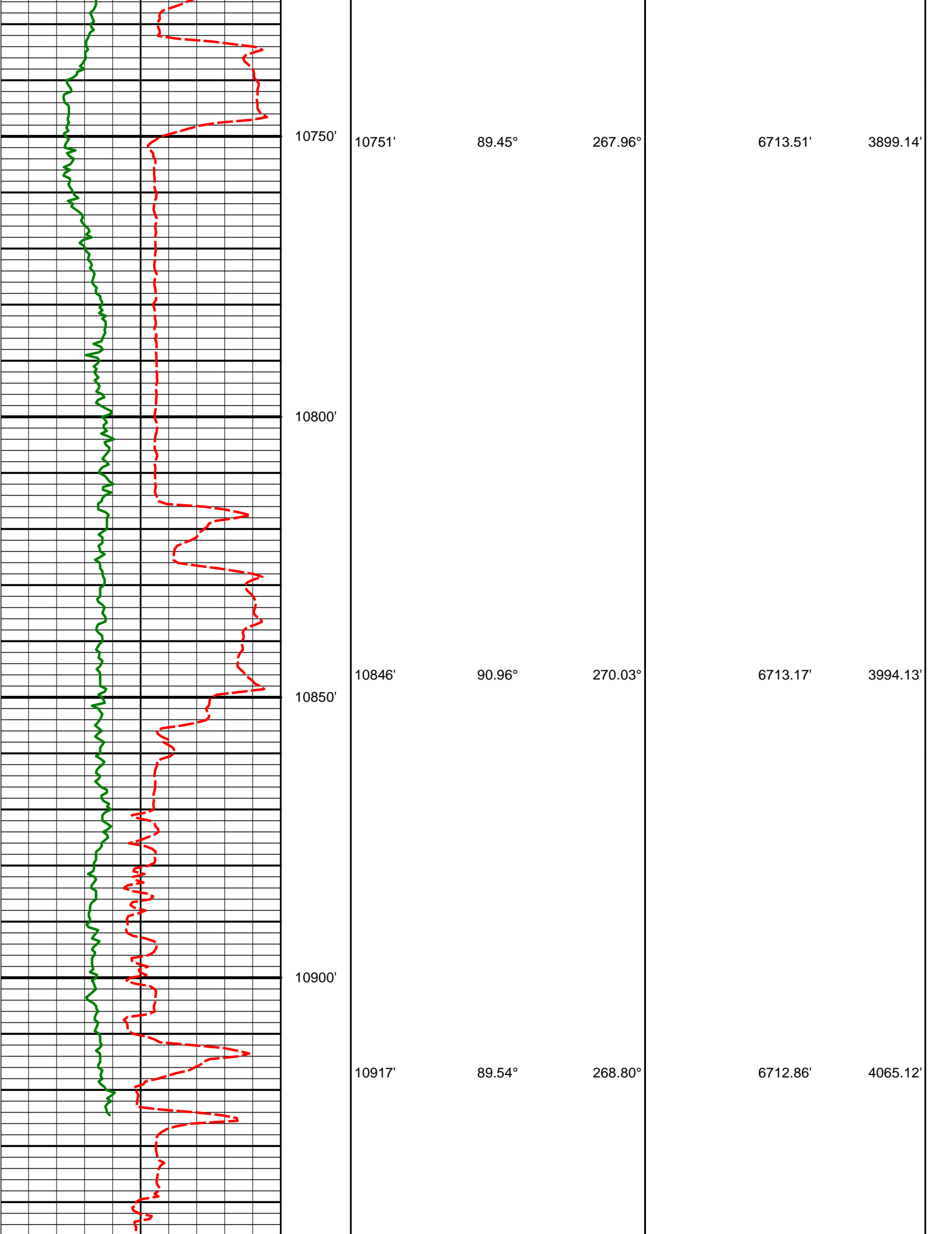
88.86°

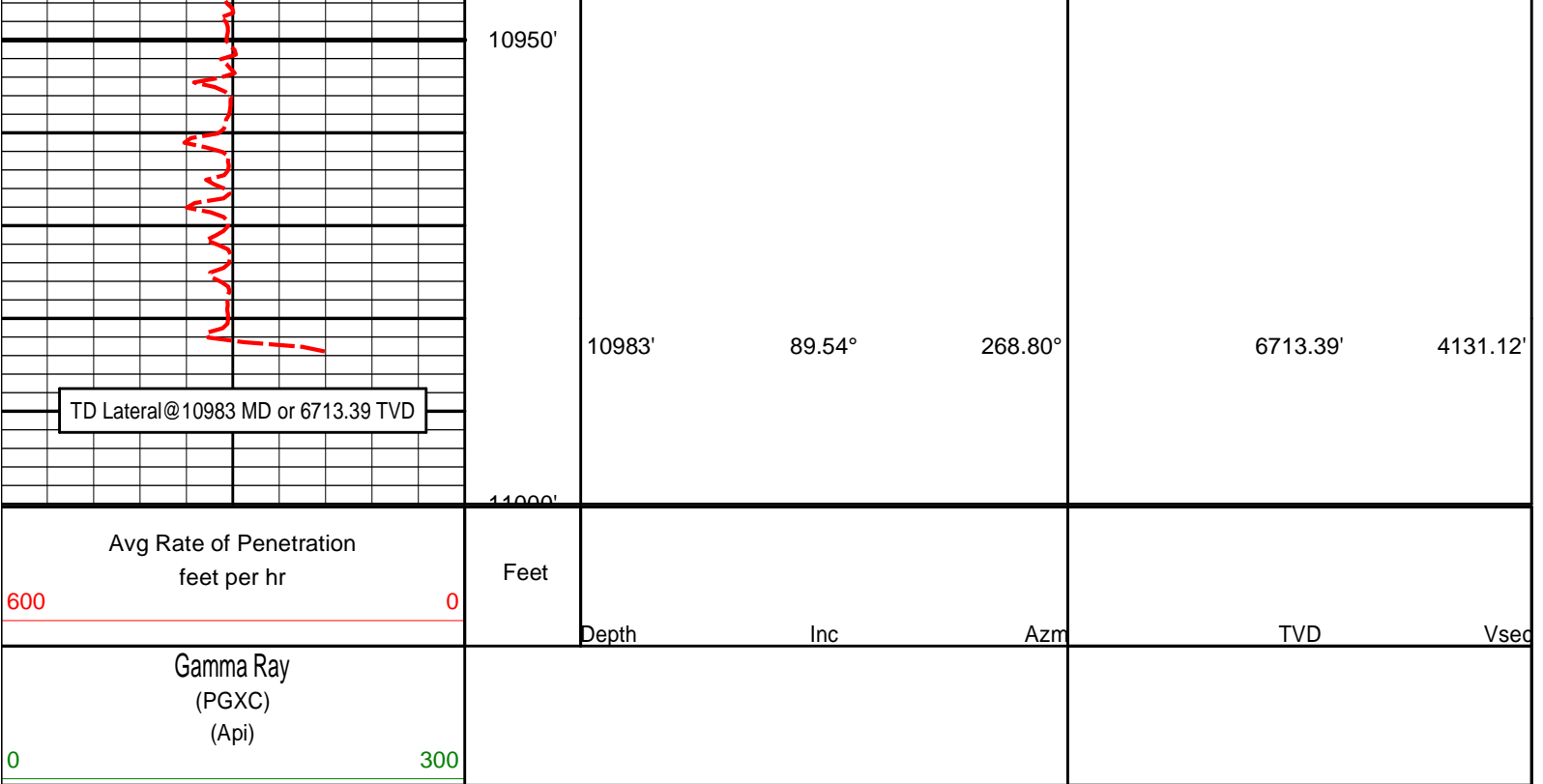
267.47°

6712.11'

3804.17'

10700'





DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA21-63-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0900918609

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
252.00	0.40	249.39	252.00	0.31 S	0.82 W	0.83	0.16
500.00	0.20	252.99	499.99	0.74 S	2.05 W	2.06	0.08
750.00	0.40	82.79	749.99	0.76 S	1.60 W	1.61	0.24
942.00	0.60	24.29	941.99	0.24 N	0.52 W	0.52	0.27
1017.00	0.82	8.73	1016.98	1.13 N	0.28 W	0.26	0.39
1203.00	1.00	20.84	1202.96	3.96 N	0.50 E	-0.56	0.14
1296.00	1.86	51.65	1295.93	5.66 N	1.97 E	-2.06	1.21
1389.00	2.27	70.74	1388.87	7.20 N	4.90 E	-5.01	0.86
1482.00	3.78	91.14	1481.74	7.75 N	9.70 E	-9.82	1.97
1576.00	5.59	93.41	1575.42	7.41 N	17.37 E	-17.48	1.94
1671.00	7.24	90.97	1669.82	7.04 N	27.97 E	-28.08	1.76
1766.00	8.82	93.07	1763.89	6.55 N	41.23 E	-41.33	1.69
1861.00	10.25	89.73	1857.58	6.20 N	56.96 E	-57.05	1.61
1956.00	9.77	85.67	1951.13	6.84 N	73.45 E	-73.55	0.90
2051.00	10.42	85.80	2044.66	8.08 N	90.05 E	-90.17	0.68
2146.00	9.96	85.70	2138.16	9.33 N	106.82 E	-106.95	0.48
2240.00	10.36	88.55	2230.69	10.15 N	123.37 E	-123.51	0.68
2335.00	9.23	86.81	2324.30	10.79 N	139.52 E	-139.67	1.23
2430.00	9.03	89.47	2418.10	11.28 N	154.58 E	-154.74	0.49
2525.00	10.60	88.97	2511.70	11.51 N	170.77 E	-170.93	1.66
2620.00	10.86	95.21	2605.05	10.85 N	188.42 E	-188.57	1.25
2715.00	9.88	91.16	2698.49	9.88 N	205.48 E	-205.61	1.29
2810.00	10.35	95.53	2792.02	8.89 N	222.13 E	-222.24	0.95
2905.00	10.76	93.91	2885.41	7.46 N	239.47 E	-239.56	0.53
3000.00	10.09	95.65	2978.84	6.04 N	256.60 E	-256.66	0.78
3095.00	10.15	94.78	3072.36	4.52 N	273.22 E	-273.26	0.17
3189.00	10.52	94.17	3164.84	3.21 N	290.03 E	-290.05	0.41
3284.00	8.87	94.69	3258.48	1.98 N	305.98 E	-305.98	1.74
3379.00	8.50	95.20	3352.39	0.74 N	320.27 E	-320.25	0.40

3379.00	8.56	95.26	3332.39	0.74 N	320.27 E	-320.25	0.46
3474.00	8.92	89.25	3446.30	0.20 N	334.63 E	-334.59	1.05
3569.00	9.72	88.52	3540.04	0.51 N	350.01 E	-349.98	0.85
3664.00	11.31	91.69	3633.44	0.44 N	367.34 E	-367.31	1.78
3759.00	11.90	90.64	3726.50	0.05 N	386.45 E	-386.40	0.66
3853.00	11.70	87.08	3818.52	0.43 N	405.66 E	-405.62	0.80
3948.00	10.76	83.29	3911.70	1.96 N	424.09 E	-424.07	1.26
4043.00	7.69	83.77	4005.46	3.68 N	439.22 E	-439.22	3.23
4137.00	5.53	84.73	4098.83	4.78 N	449.98 E	-450.00	2.30
4232.00	3.33	94.76	4193.54	4.97 N	457.29 E	-457.31	2.45
4327.00	1.25	105.59	4288.46	4.47 N	461.04 E	-461.05	2.23
4422.00	0.68	198.32	4383.45	3.65 N	461.86 E	-461.86	1.53
4517.00	1.45	220.82	4478.43	2.21 N	460.89 E	-460.87	0.91
4612.00	1.57	234.54	4573.40	0.54 N	459.05 E	-459.00	0.40
4707.00	0.88	239.13	4668.38	0.59 S	457.36 E	-457.30	0.73
4802.00	0.94	219.84	4763.37	1.56 S	456.24 E	-456.16	0.33
4897.00	1.11	218.99	4858.35	2.87 S	455.16 E	-455.06	0.18
4992.00	1.01	222.69	4953.33	4.20 S	454.01 E	-453.89	0.13
5086.00	1.18	216.62	5047.32	5.59 S	452.87 E	-452.73	0.22
5181.00	0.93	222.59	5142.30	6.94 S	451.77 E	-451.61	0.29
5276.00	0.82	257.39	5237.29	7.66 S	450.58 E	-450.41	0.56
5371.00	0.82	215.08	5332.28	8.36 S	449.53 E	-449.34	0.62
5466.00	1.03	220.21	5427.27	9.57 S	448.59 E	-448.38	0.24
5561.00	0.96	249.36	5522.26	10.50 S	447.29 E	-447.07	0.53
5656.00	1.27	278.22	5617.24	10.63 S	445.50 E	-445.28	0.66
5751.00	0.89	273.97	5712.22	10.43 S	443.73 E	-443.51	0.41
5846.00	0.65	268.42	5807.21	10.39 S	442.45 E	-442.24	0.26
5941.00	0.65	268.07	5902.21	10.43 S	441.37 E	-441.16	0.00
6029.00	0.40	245.41	5990.20	10.57 S	440.60 E	-440.38	0.36
6077.00	4.28	279.79	6038.15	10.34 S	438.68 E	-438.46	8.24
6123.00	10.46	276.52	6083.75	9.57 S	432.83 E	-432.63	13.46
6171.00	13.85	276.02	6130.67	8.47 S	422.79 E	-422.60	7.07
6218.00	16.50	275.72	6176.03	7.22 S	410.55 E	-410.39	5.64
6266.00	19.76	274.20	6221.64	5.94 S	395.67 E	-395.53	6.86
6313.00	22.71	273.25	6265.44	4.85 S	378.68 E	-378.56	6.32
6361.00	26.78	270.48	6309.03	4.23 S	358.61 E	-358.50	8.81
6408.00	32.03	271.76	6349.96	3.76 S	335.55 E	-335.45	11.25
6455.00	37.23	274.13	6388.62	2.35 S	308.89 E	-308.82	11.43
6503.00	40.38	274.37	6426.02	0.12 S	278.90 E	-278.86	6.57
6550.00	44.81	273.11	6460.61	1.94 N	247.16 E	-247.16	9.60
6598.00	49.85	271.47	6493.14	3.33 N	211.91 E	-211.94	10.80
6645.00	51.92	269.13	6522.79	3.51 N	175.45 E	-175.49	5.86
6693.00	54.58	267.96	6551.51	2.52 N	137.01 E	-137.03	5.88
6740.00	60.68	267.01	6576.66	0.77 N	97.37 E	-97.37	13.09
6788.00	67.15	268.39	6597.75	0.94 S	54.32 E	-54.30	13.72
6836.00	72.07	268.99	6614.47	1.97 S	9.35 E	-9.32	10.32
6883.00	75.97	268.88	6627.41	2.81 S	35.82 W	35.85	8.30
6945.00	79.05	268.69	6640.81	4.09 S	96.33 W	96.38	4.98
7051.00	84.00	267.42	6656.43	7.66 S	201.07 W	201.17	4.82
7146.00	85.55	267.34	6665.08	11.98 S	295.58 W	295.73	1.63
7241.00	87.45	267.83	6670.88	15.98 S	390.31 W	390.51	2.07
7336.00	90.31	270.59	6672.74	17.28 S	485.27 W	485.48	4.18
7430.00	90.06	270.88	6672.44	16.08 S	579.26 W	579.44	0.41
7525.00	88.62	270.09	6673.53	15.27 S	674.24 W	674.40	1.73
7620.00	89.04	269.56	6675.47	15.56 S	769.22 W	769.37	0.71
7715.00	90.15	269.20	6676.14	16.59 S	864.21 W	864.37	1.23
7810.00	91.02	270.22	6675.17	17.07 S	959.21 W	959.35	1.41
7905.00	89.20	267.82	6674.99	18.70 S	1054.18 W	1054.34	3.17
8000.00	88.03	268.48	6677.29	21.76 S	1149.10 W	1149.30	1.41
8095.00	88.80	268.51	6679.91	24.26 S	1244.03 W	1244.26	0.81
8190.00	90.09	268.51	6680.83	26.73 S	1338.99 W	1339.25	1.36
8284.00	90.77	269.87	6680.13	28.06 S	1432.98 W	1433.24	1.62
8379.00	89.88	270.77	6679.59	27.53 S	1527.97 W	1528.22	1.33
8474.00	88.15	271.01	6681.22	26.05 S	1622.94 W	1623.15	1.84
8568.00	88.49	270.66	6683.98	24.68 S	1716.89 W	1717.07	0.52
8663.00	89.57	270.26	6685.59	23.92 S	1811.87 W	1812.03	1.21
8758.00	88.95	270.62	6686.81	23.19 S	1906.86 W	1906.99	0.75
8853.00	91.63	270.49	6686.33	22.27 S	2001.85 W	2001.95	2.82
8948.00	88.18	266.69	6686.49	24.61 S	2096.79 W	2096.92	5.40
9043.00	90.68	267.72	6687.44	29.24 S	2191.66 W	2191.85	2.85
9138.00	90.99	269.46	6686.05	31.58 S	2286.62 W	2286.83	1.86

9233.00	88.55	271.34	6686.43	30.91 S	2381.60 W	2381.80	3.24
9327.00	88.27	270.94	6689.04	29.04 S	2475.55 W	2475.70	0.52
9422.00	88.89	270.34	6691.40	27.98 S	2570.51 W	2570.64	0.91
9517.00	88.30	270.20	6693.72	27.54 S	2665.48 W	2665.59	0.64
9612.00	88.03	268.90	6696.77	28.28 S	2760.43 W	2760.54	1.40
9707.00	90.58	268.87	6697.92	30.13 S	2855.40 W	2855.52	2.68
9802.00	90.37	268.88	6697.13	31.99 S	2950.38 W	2950.52	0.22
9897.00	89.38	268.58	6697.34	34.10 S	3045.35 W	3045.51	1.09
9991.00	88.83	268.68	6698.81	36.35 S	3139.31 W	3139.50	0.59
10086.00	89.54	267.78	6700.16	39.28 S	3234.26 W	3234.48	1.21
10181.00	88.95	268.21	6701.41	42.60 S	3329.19 W	3329.45	0.77
10276.00	89.32	267.98	6702.84	45.76 S	3424.12 W	3424.42	0.46
10371.00	90.37	269.32	6703.10	48.00 S	3519.09 W	3519.42	1.79
10466.00	87.32	267.82	6705.02	50.37 S	3614.03 W	3614.38	3.58
10561.00	87.63	267.59	6709.20	54.17 S	3708.86 W	3709.26	0.41
10656.00	88.86	267.47	6712.11	58.26 S	3803.73 W	3804.17	1.30
10751.00	89.45	267.96	6713.51	62.05 S	3898.64 W	3899.14	0.81
10846.00	90.96	270.03	6713.17	63.72 S	3993.62 W	3994.13	2.70
10917.00	89.54	268.80	6712.86	64.44 S	4064.61 W	4065.12	2.65
10983.00	89.54	268.80	6713.39	65.82 S	4130.59 W	4131.12	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 269.11 DEGREES (GRID)
A TOTAL CORRECTION OF 7.69 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10983.00 FEET
IS 4131.12 FEET ALONG 269.09 DEGREES (GRID)**

Tie-In @ Surface

Surveys at 252 ft, 500 ft, 750 ft, and 942 were taken and provided by HP 322 while they were drilling the surface hole and have been covered from magnetic north to grid north.