

D-C Pressure Case Directional
PCG-K Pressure Case Gamma



1 : 240

Country		: USA			
Field		: Wattenburg			
Location		: Lat: 40° 8' 42.91" North Long: 104° 42' 5.24" West			
Well		: Crowder 15N-18HZ			
Company		: Anadarko Petroleum Corp			
Rig		: H&P 308			
LOCATION		Latitude : 40° 8' 42.91" North Longitude : 104° 42' 5.24" West UTM Easting = 3,223,235.74 ft UTM Northing = 1,296,764.29 ft		Other Services Directional Drilling	
Permanent Datum		: Ground Level		Elev. KB N/A	
Log Measured From		: Drill Floor		25.00 ft Above Permanent Datum DF 4983.00 ft GL 4958.00 ft WD N/A	
Drilling Measured From		: Drill Floor		MD LOG	
Depth Logged		: 1,082.00 ft To 11,538.00 ft		Unit No. : 11610114	
Date Logged		: 01-May-13 To 08-May-13		Job No. : CA-XX-0900217529	
Total Depth MD		: 11,538.00 ft TVD: 7,205.01 ft		Plot Type : Final	
Spud Date		: 30-Apr-13		Plot Date : 13-May-13	
Run No.		Borehole Record (MD)		Borehole Record (MD)	
		Size	From	To	Run No.
100		8.750 in	1,082.00 ft	7,691.00 ft	Size
0200		6.125 in	7,691.00 ft	8,555.00 ft	From
0300		6.125 in	8,555.00 ft	11,538.00 ft	To
					</

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	04-May-13	06-May-13	08-May-13		
Rig Bit Number	0100	0200	0300		
Bit Size (in)	8.750	6.125	6.125		
Tool Nominal OD (in)	6.75	4.750	4.750		
Log Start Depth (MD, ft)	1,082.00	7,691.00	8,555.00		
Log End Depth (MD, ft)	7,691.00	8,555.00	11,538.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	02-May-13 09:30	06-May-13 05:55	06-May-13 05:55		
Drill/Wipe End Date and Time	04-May-13 16:40	06-May-13 13:45	07-May-13 23:30		
Min Inc (deg) @ Depth (MD, ft)	.15 @ 1,469.00	89.57 @ 8,404.00	87.66 @ 11,538.00		
Max Inc (deg) @ Depth (MD, ft)	85.11 @ 7,641.00	91.08 @ 7,930.00	91.94 @ 9,543.00		
Bit TFA(in2) / Bit Type	.86 / PDC	.61 / PDC	.61 / PDC		
Flow Rate (gpm)	563.57	300.00	290.24		
Max AV (fpm) / CV (fpm) @ MWD	416.0 / N/A	416.0 / 236.0	586.0 / 284.0		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	9.40 / 50.00	9.50 / 40.00	9.30 / 35.00		
Filtrate CL (ppm)	1,400.00	1,400.00	1,500.00		
pH / Fluid Loss (mptm)	9.00 / 4	8.90 / 4	8.00 / 6		
PV (cP) / YP (lbf2)	21 / 13.00	11 / 8.00	9 / 7.00		
% Solids / % Sand	.5 / 7.9	6.42 / .5	4.94 / .5		
% Oil / Oil:Water Ratio	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		
Rmf @ Measured Temp (degF)	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		
Max Tool Temp (in) Temp (degF)	170.05 / 180M	200.00 / 180M	200.71 / 180M		

Max Tool Temp (degF) / Source	170.37 / PCM	202.60 / PCM	228.74 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 170.37	N/A @ 202.60	N/A @ 228.74		
Lead MWD Engineer	Ryan White	Ryan White	Ryan White		
Customer Representative	Travis Lourence	Travis Lourence	Travis Lourence		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.84	5.76		
Sub Serial Number	11404300	123	11706793		
Insert Serial Number	11680766	11680730	11680766		
Date and Time Initialized	29-Apr-13 11:35	04-May-13 17:40	06-May-13 14:18		
Date and Time Read	04-May-13 23:31	07-May-13 00:49	09-May-13 00:16		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	48.48	46.00	44.30		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404300	123	11706793		
Sonde Serial Number	11062040	11145703	11062040		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	244.74	295.76	41.68		

Gamma Ray Sensor Information

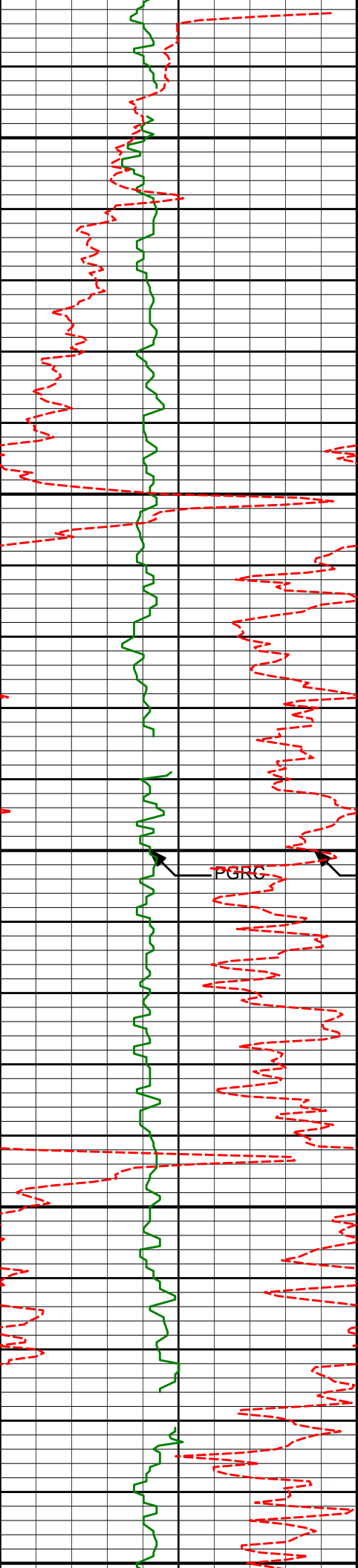
Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	53.43	48.70	49.25		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404300	123	11706793		
Insert/Sonde Serial Number	11681021	11121365	11681021		

REMARKS

1. All depths are measured bit depths, referenced to the driller's pipe tally and are measured from the drill floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.
4. All data presented is recorded data unless otherwise specified
5. The following smoothing parameters have been applied to the data:

PGRC (Corrected Gamma Ray):
 Interval Resolution: 0.5 ft
 Interval Distance: 0.6 ft
 Gap Fill: 3.0 ft

 ROPA (Average Rate of Penetration):
 Interval Resolution: 0.5 ft
 Interval Distance: 1.2 ft
 Gap Fill : 3.0 ft
6. INSITE version 7.4.10



1100

1101'

0.39°

200.94°

1100.97'

-6.16'

1150

1200

PGRC

ROPA

1250

1284'

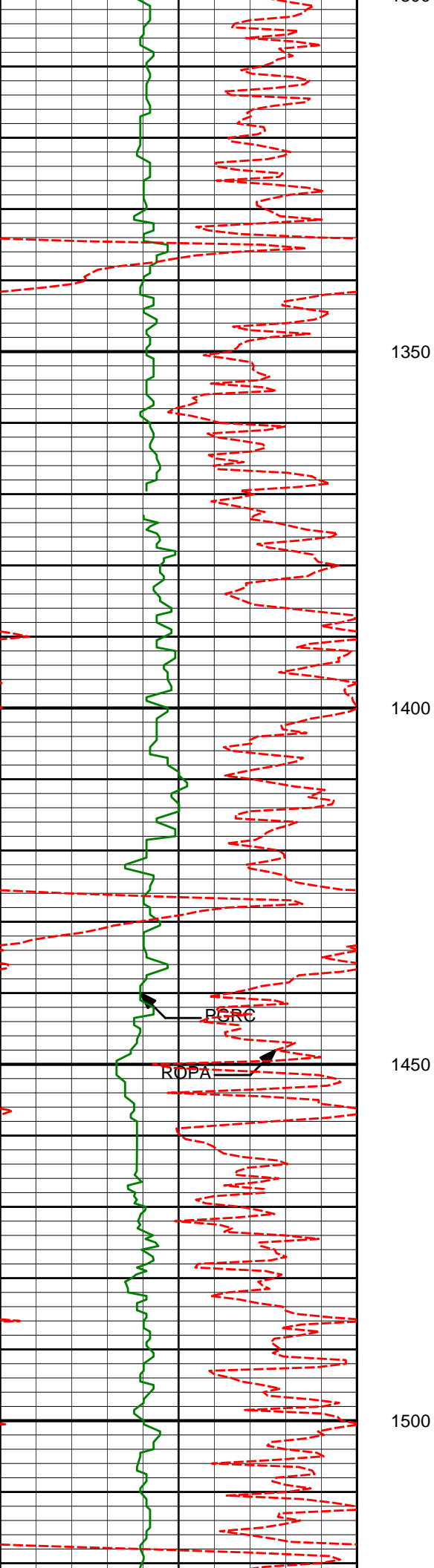
0.34°

129.87°

1283.97'

-5.22'

1300



1350

1400

1450

1500

PGRC

ROPA

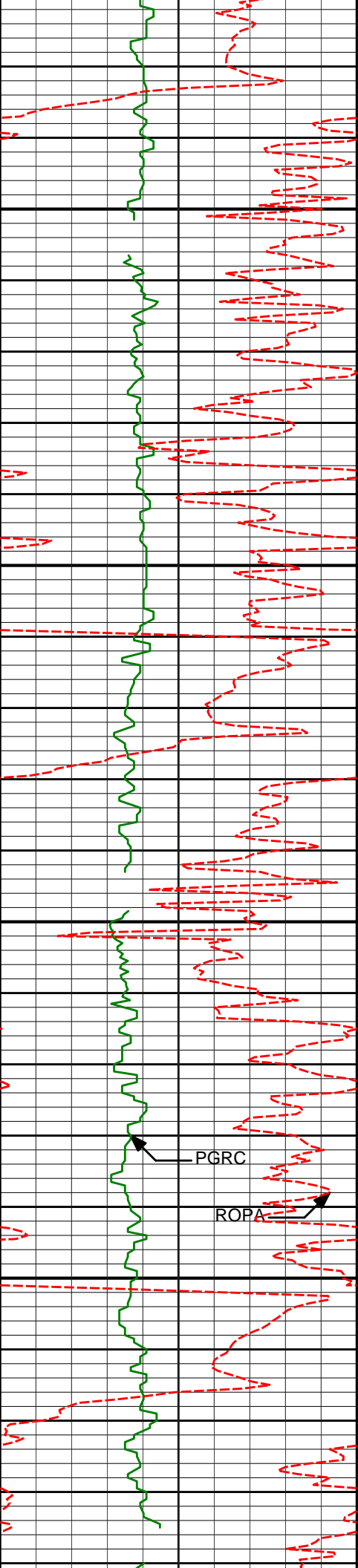
1469'

0.15°

140.01°

1468.96'

-4.69'



1550

1560'

1.96°

270.75°

1559.95'

-4.59'

1600

1650

1652'

3.97°

280.13°

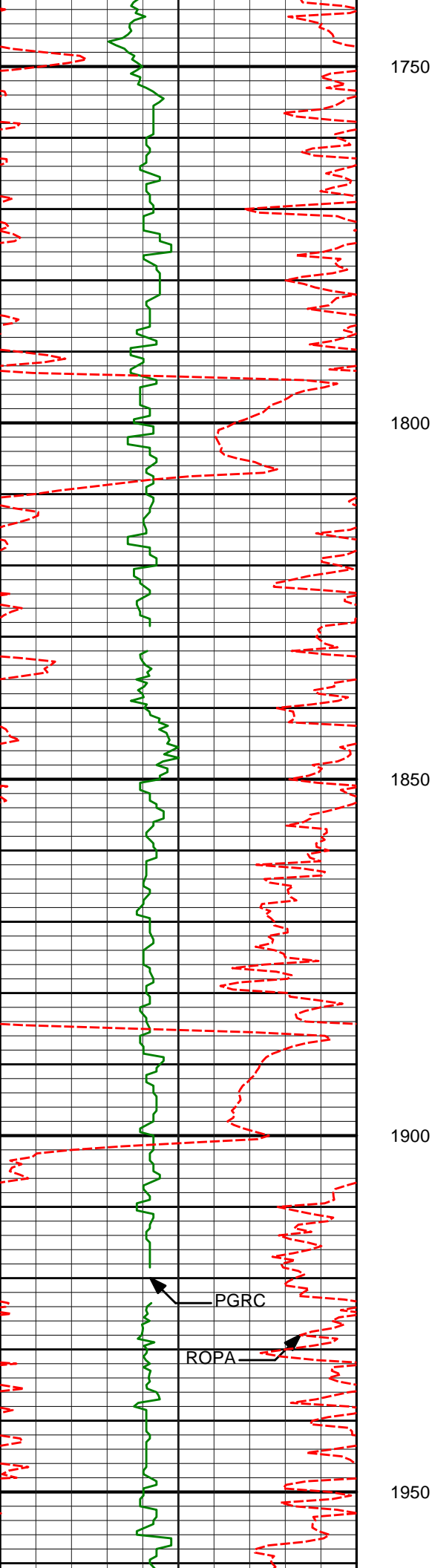
1651.82'

-5.10'

1700

PGRC

ROPA



1744'

5.91°

284.08°

1743.47'

-6.69'

1750

1800

1836'

7.80°

278.92°

1834.81'

-8.65'

1850

1900

PGRC

ROPA

1928'

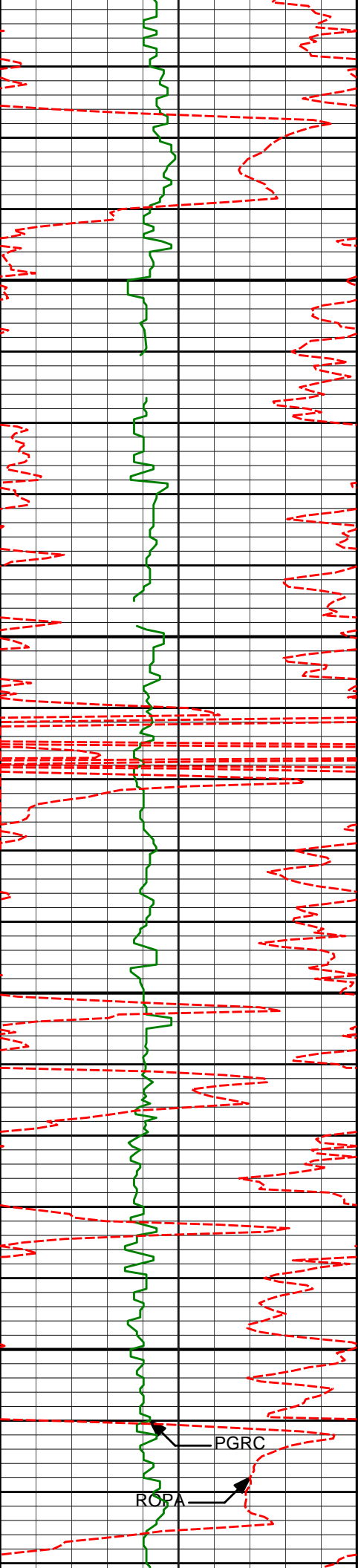
10.17°

276.53°

1925.68'

-10.32'

1950



2000

2020'

11.17°

272.20°

2016.09'

-11.32'

2050

2100

2111'

10.94°

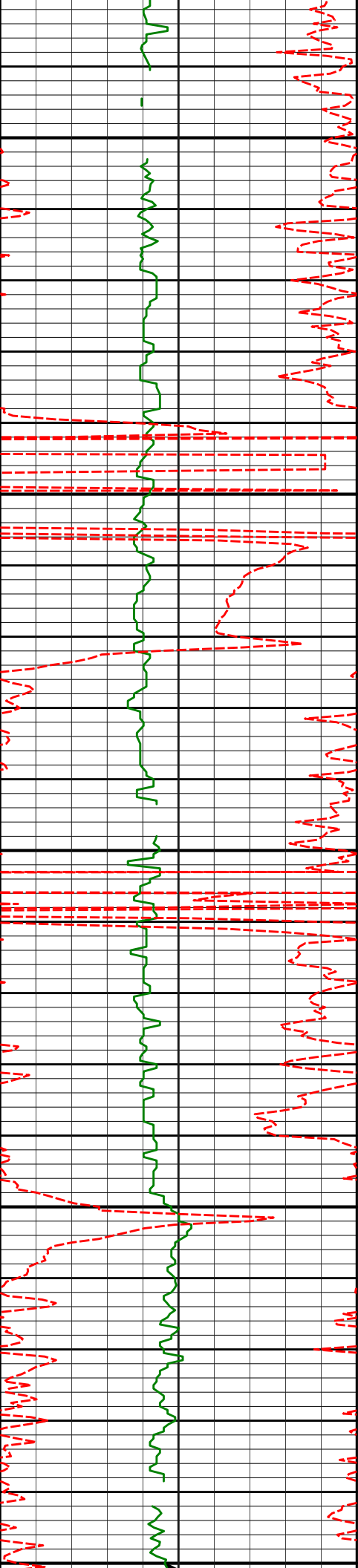
274.08°

2105.40'

-12.00'

2150

PGRC
ROPA



2200

2206'

12.50°

273.81°

2198.42'

-13.03'

2250

2300

2301'

14.12°

273.54°

2290.86'

-14.09'

2350

2396'

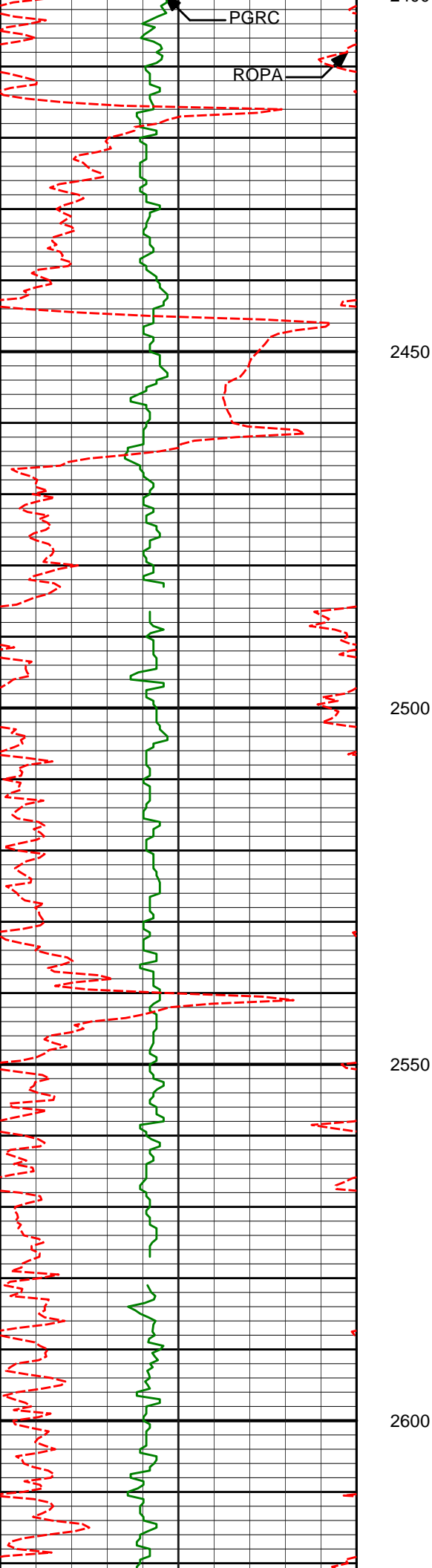
12.45°

272.17°

2383.32'

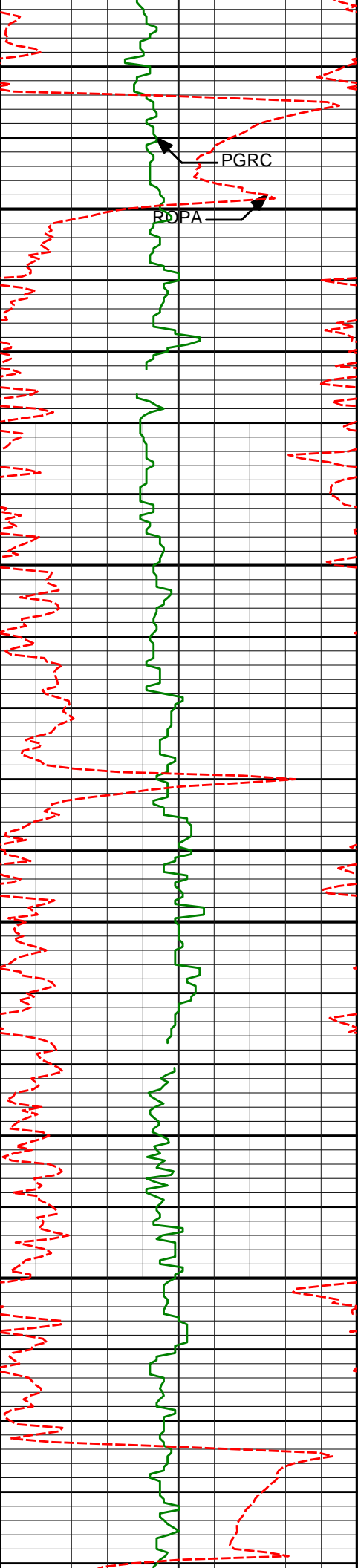
-14.85'

2400



2490'	15.19°	271.40°	2474.59'	-15.19'
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2585'	13.66°	272.75°	2566.59'	-15.66'
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PGRC

ROPA

2650

2700

2750

2800

2680'

14.49°

273.25°

2658.74'

-16.51'

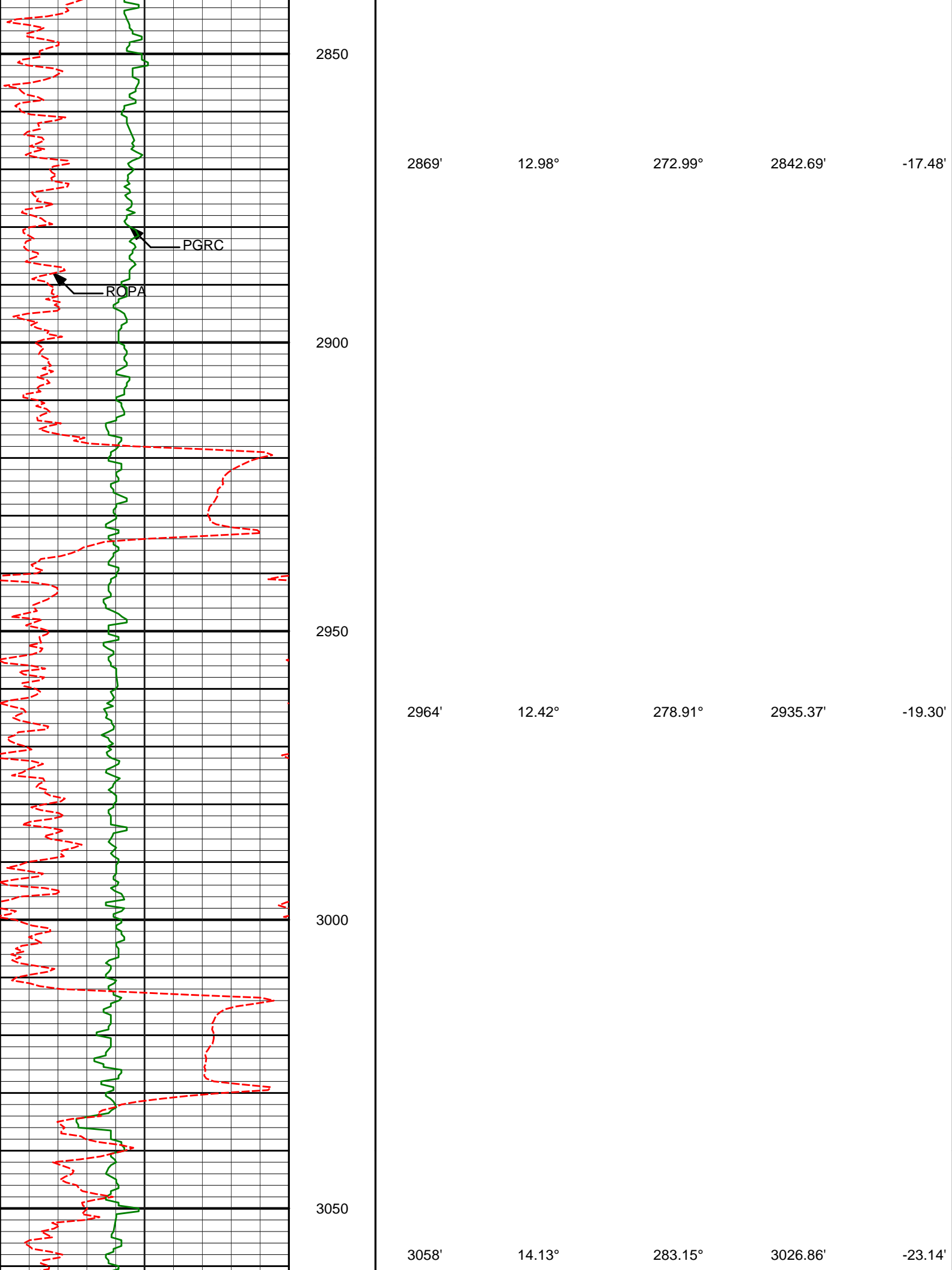
2774'

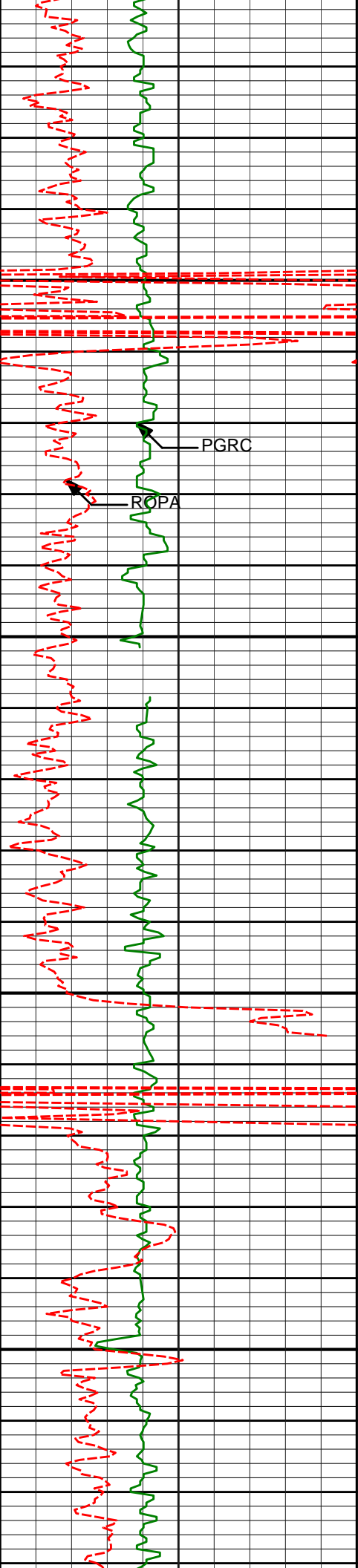
12.80°

271.14°

2750.08'

-17.04'





3100

PGRC

ROPA

3150

3153'

13.63°

283.52°

3119.08'

-28.05'

3200

3250

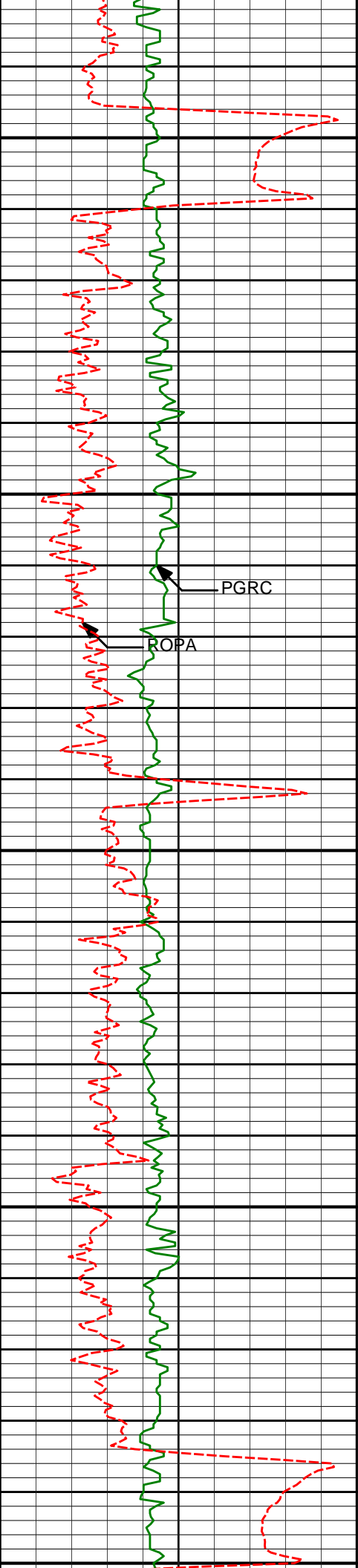
3248'

13.06°

282.93°

3211.52'

-32.74'



3300

3342'

13.74°

283.27°

3302.96'

-37.35'

3350

PGRC

ROPA

3400

3437'

13.00°

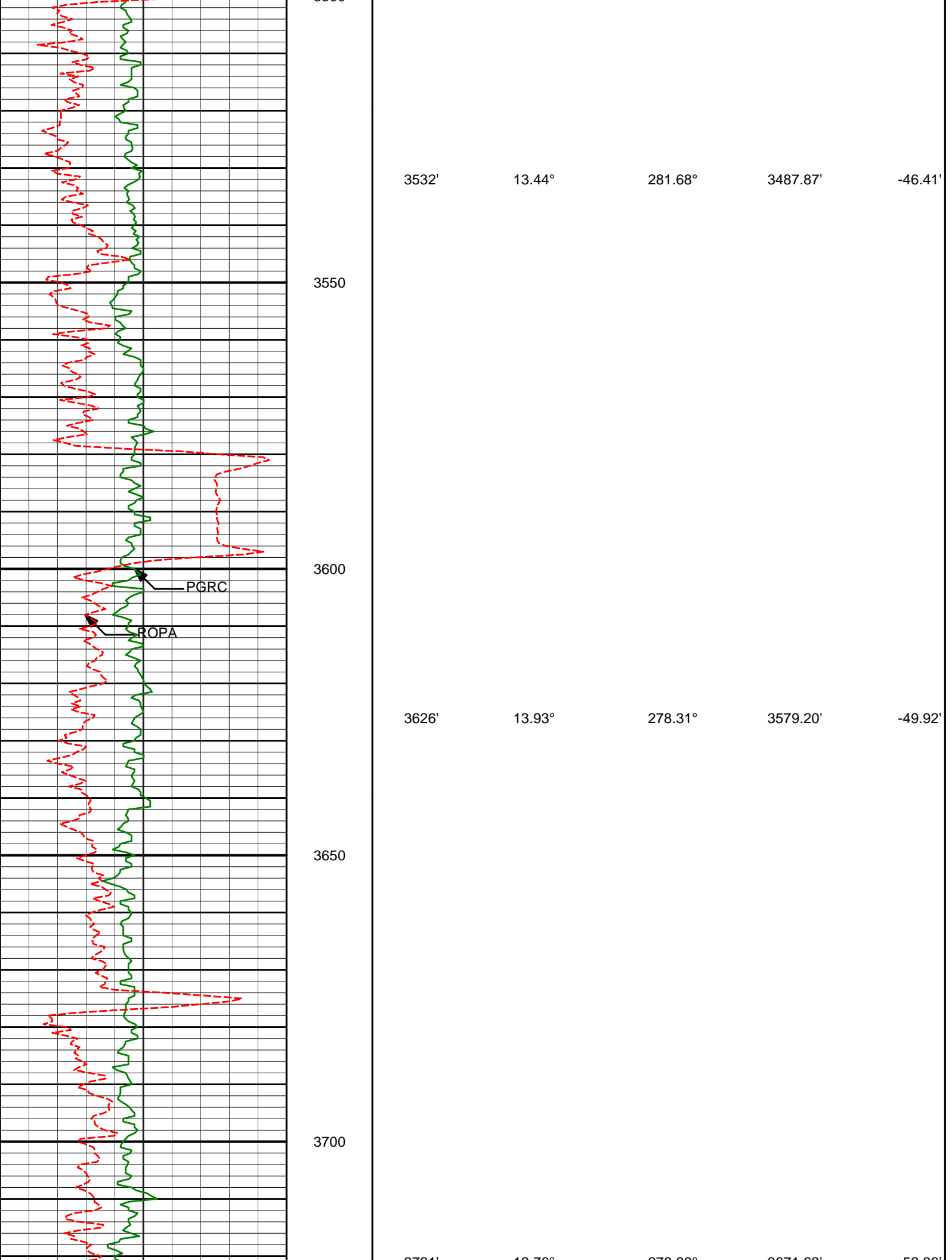
283.27°

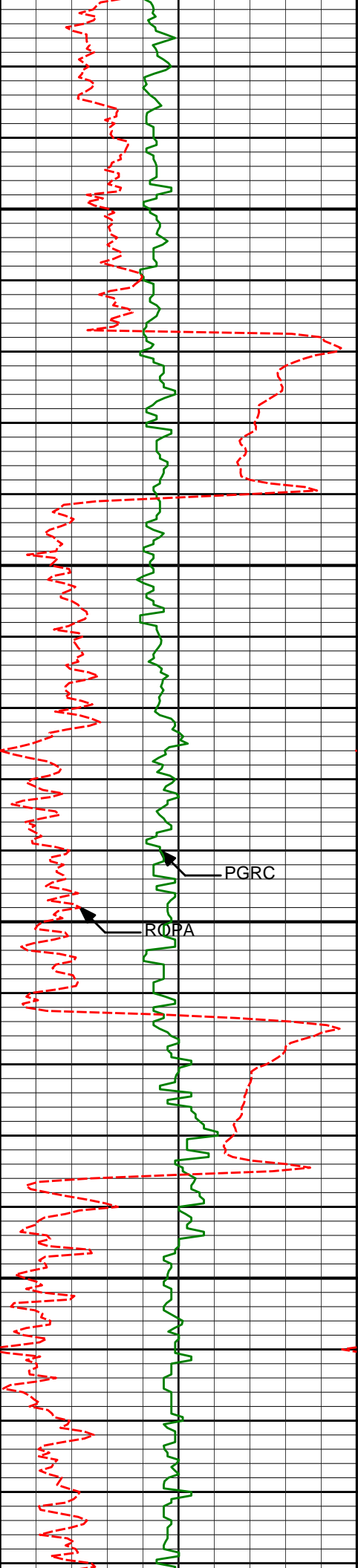
3395.38'

-42.06'

3450

3500





3750

3800

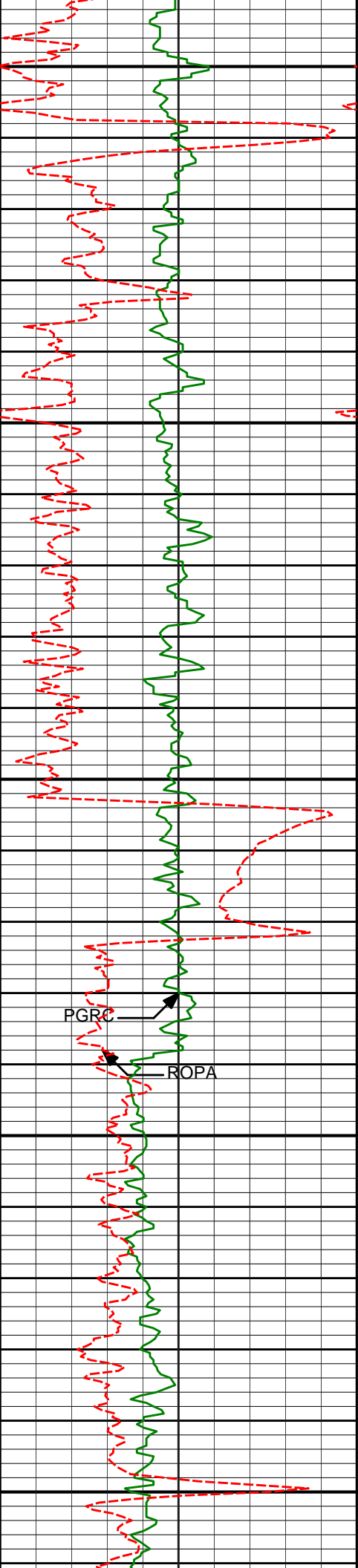
3850

3900

PGRC

ROPA

3721'	12.76°	278.89°	3671.63'	-52.86'
3816'	13.72°	275.58°	3764.11'	-55.24'
3910'	15.36°	275.73°	3855.09'	-57.20'



3950

4000

4050

4100

4150

4005'

13.59°

273.38°

3947.07'

-58.75'

PGRC

ROPA

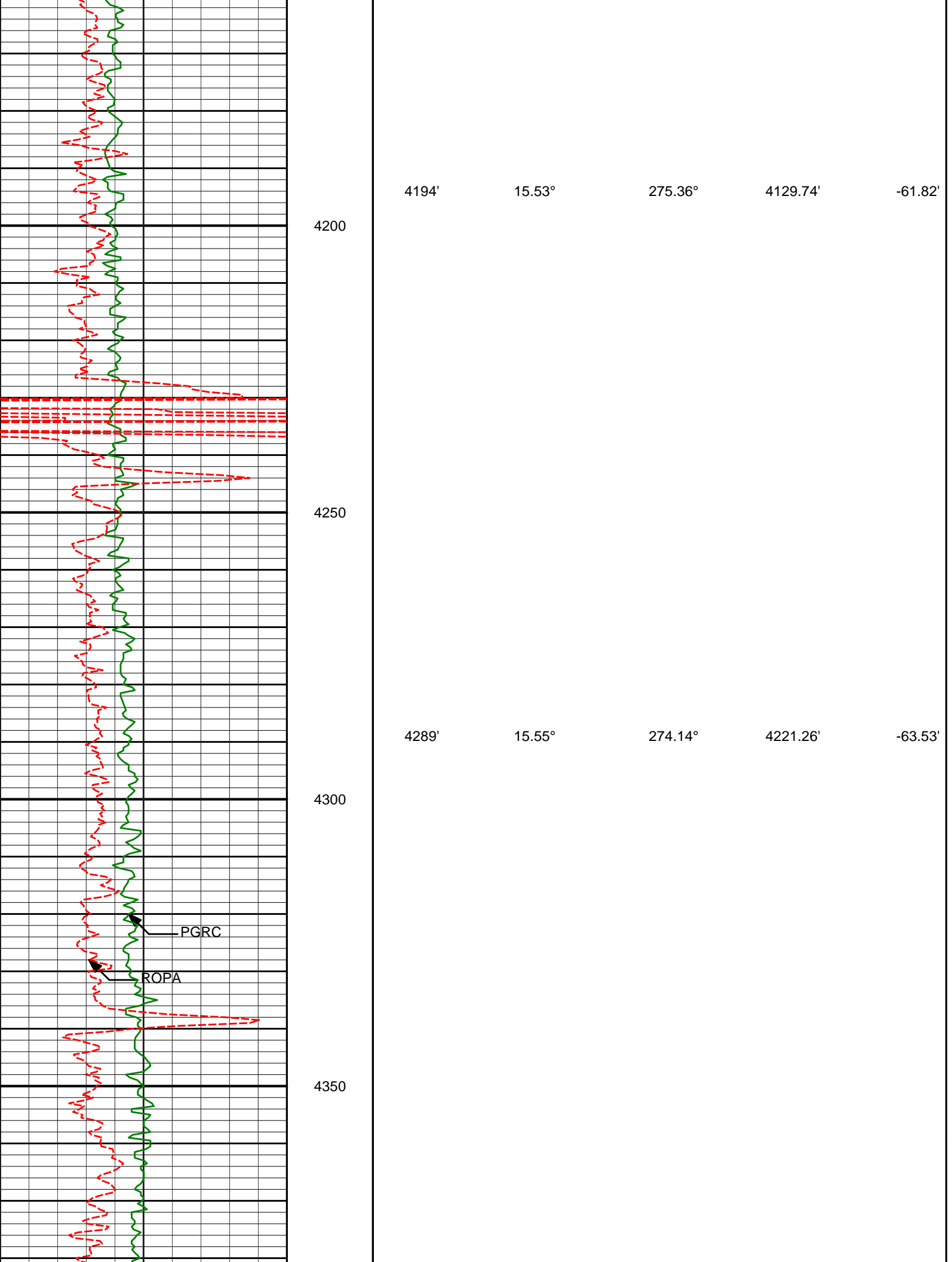
4100'

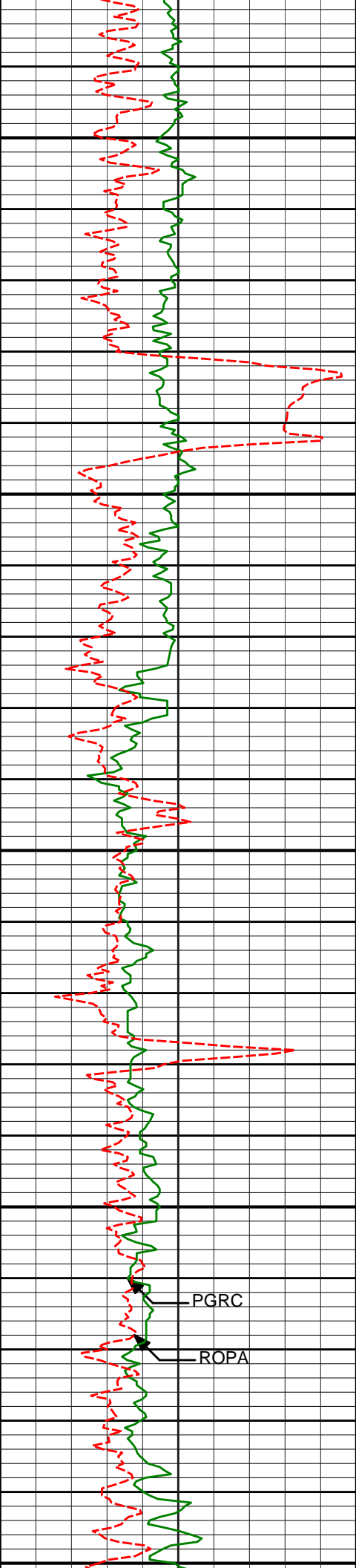
15.19°

274.61°

4039.09'

-60.04'





4400

4450

4500

4550

4600

PGRC

ROPA

4384'

15.12°

272.22°

4312.88'

-64.54'

4478'

14.46°

274.99°

4403.77'

-65.66'

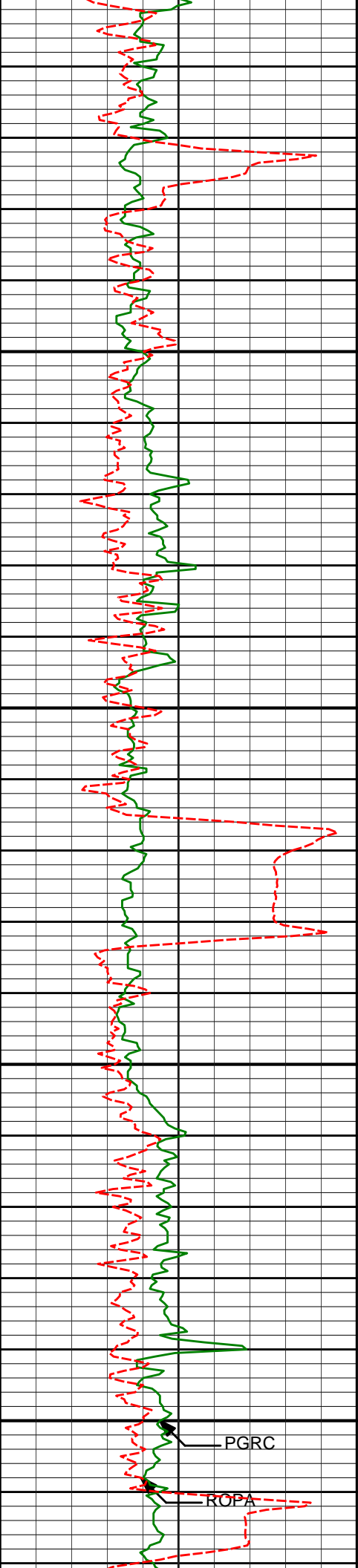
4573'

14.37°

275.47°

4495.78'

-67.46'



4650

4700

4750

4800

4667'

13.87°

272.29°

4586.94'

-68.66'

4762'

14.85°

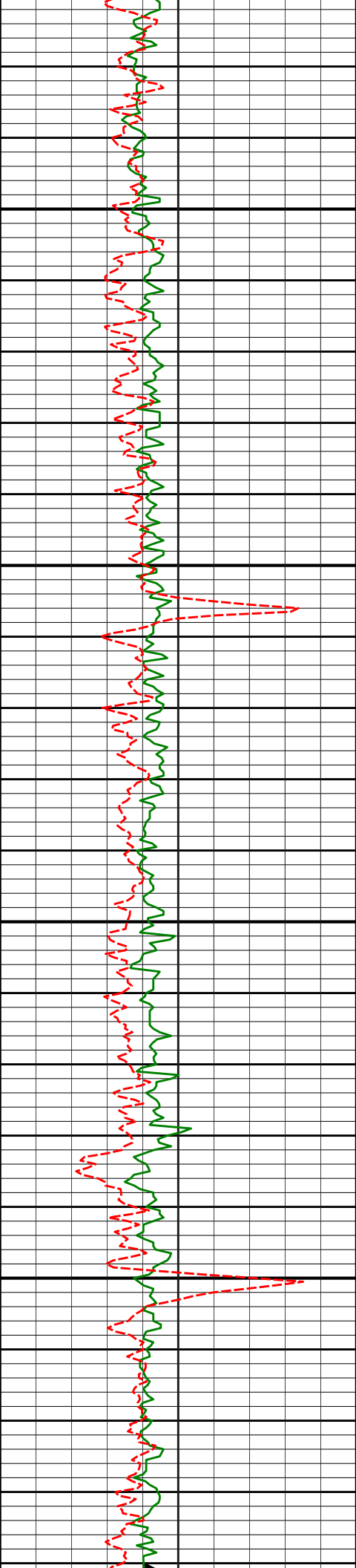
277.32°

4678.97'

-70.31'

PGRC

ROPA



4850

4857'

15.18°

278.54°

4770.73'

-73.32'

4900

4950

4951'

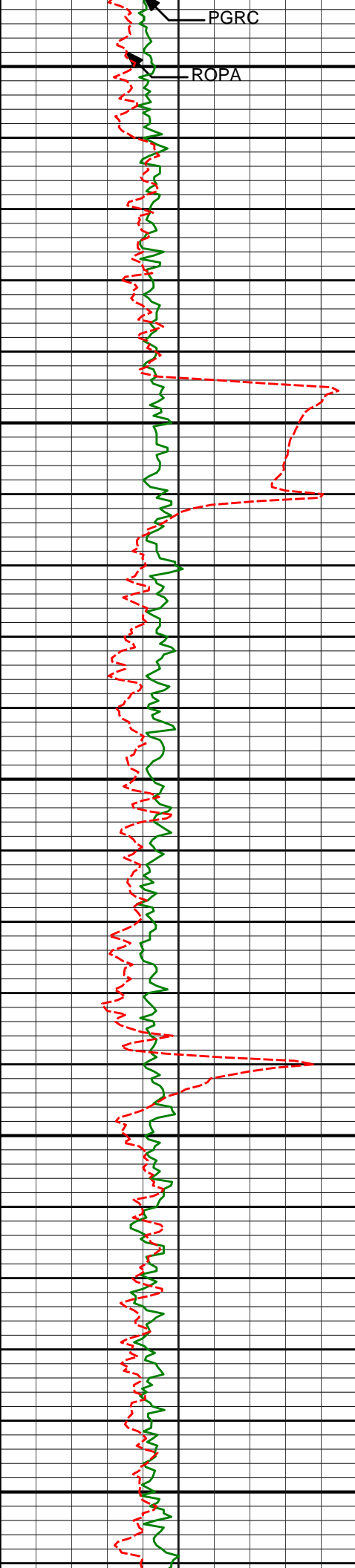
14.55°

275.19°

4861.58'

-75.85'

5000



5050

5100

5150

5200

5250

5046'

13.44°

272.98°

4953.76'

-77.14'

5141'

13.87°

278.82°

5046.08'

-79.12'

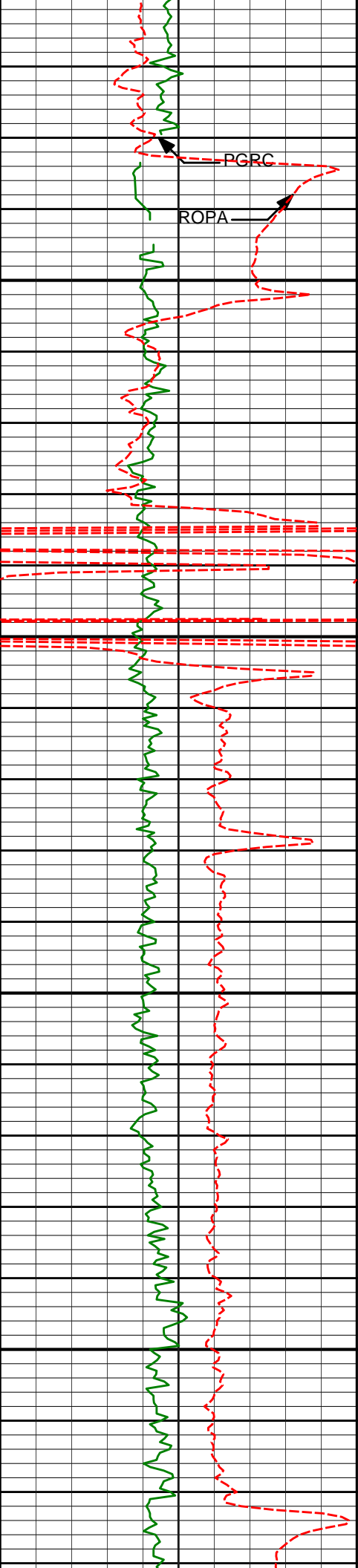
5235'

12.82°

275.72°

5137.54'

-81.55'



5300

5330'

14.11°

281.32°

5229.93'

-84.53'

5350

5400

5425'

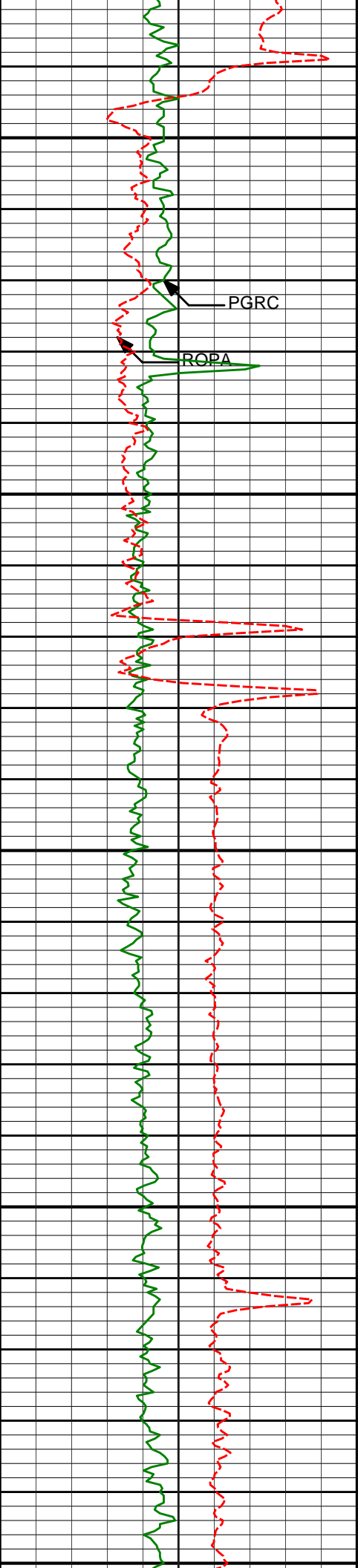
13.11°

280.99°

5322.27'

-88.52'

5450



5500

5519'

13.49°

282.44°

5413.74'

-92.58'

PGRC

ROPA

5550

5600

5614'

12.62°

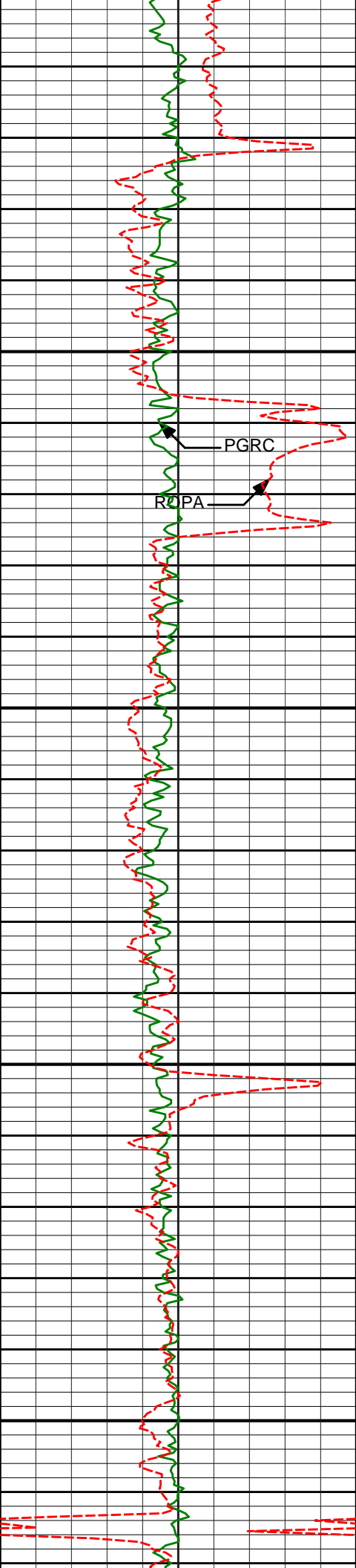
281.62°

5506.29'

-96.73'

5650

5700



5700
5750
5800
5850
5900

5709'

10.77°

280.70°

5599.31'

-100.18'

PGRC
RCPA

5803'

10.91°

277.43°

5691.64'

-102.69'

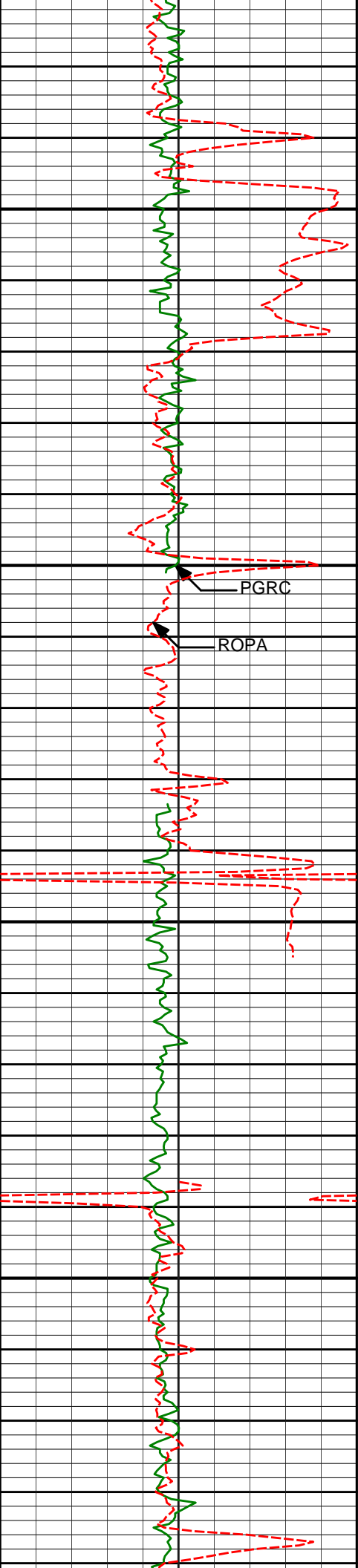
5898'

9.19°

276.57°

5785.17'

-104.46'



5950

5993'

9.30°

279.73°

5878.94'

-106.39'

6000

PGRC

ROPA

6050

6088'

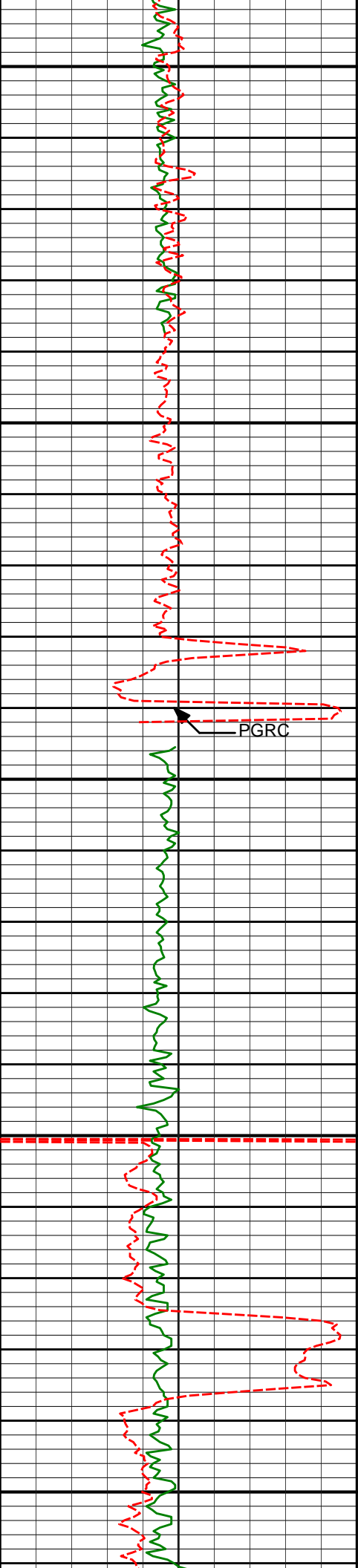
9.56°

281.16°

5972.66'

-108.98'

6100



6150

6200

6250

6300

6350

6182'

8.54°

282.14°

6065.48'

-111.73'

PGRC

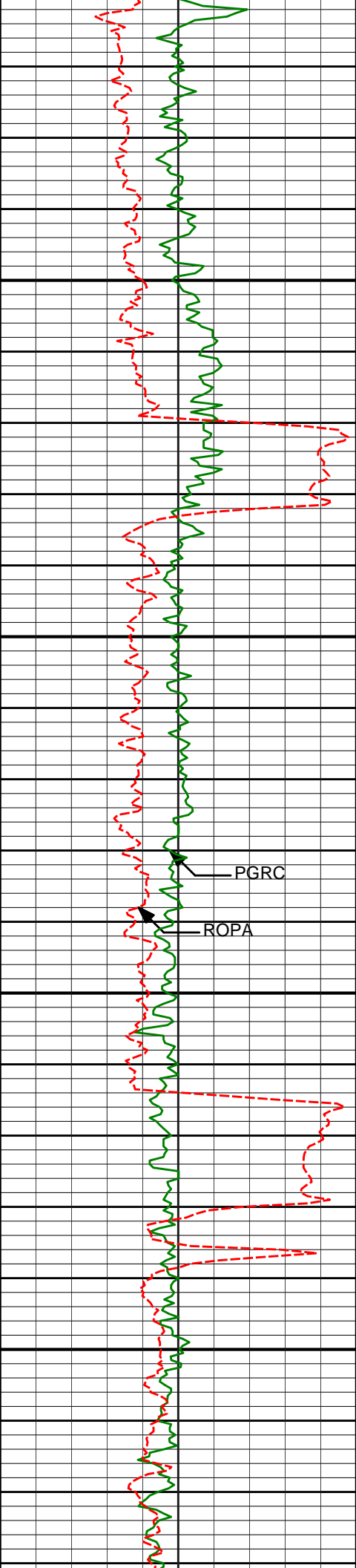
6277'

7.30°

279.65°

6159.58'

-114.03'



6372'

5.40°

273.72°

6253.99'

-115.17'

6400

6450

6467'

3.64°

272.64°

6348.69'

-115.48'

PGRC

ROPA

6500

6550

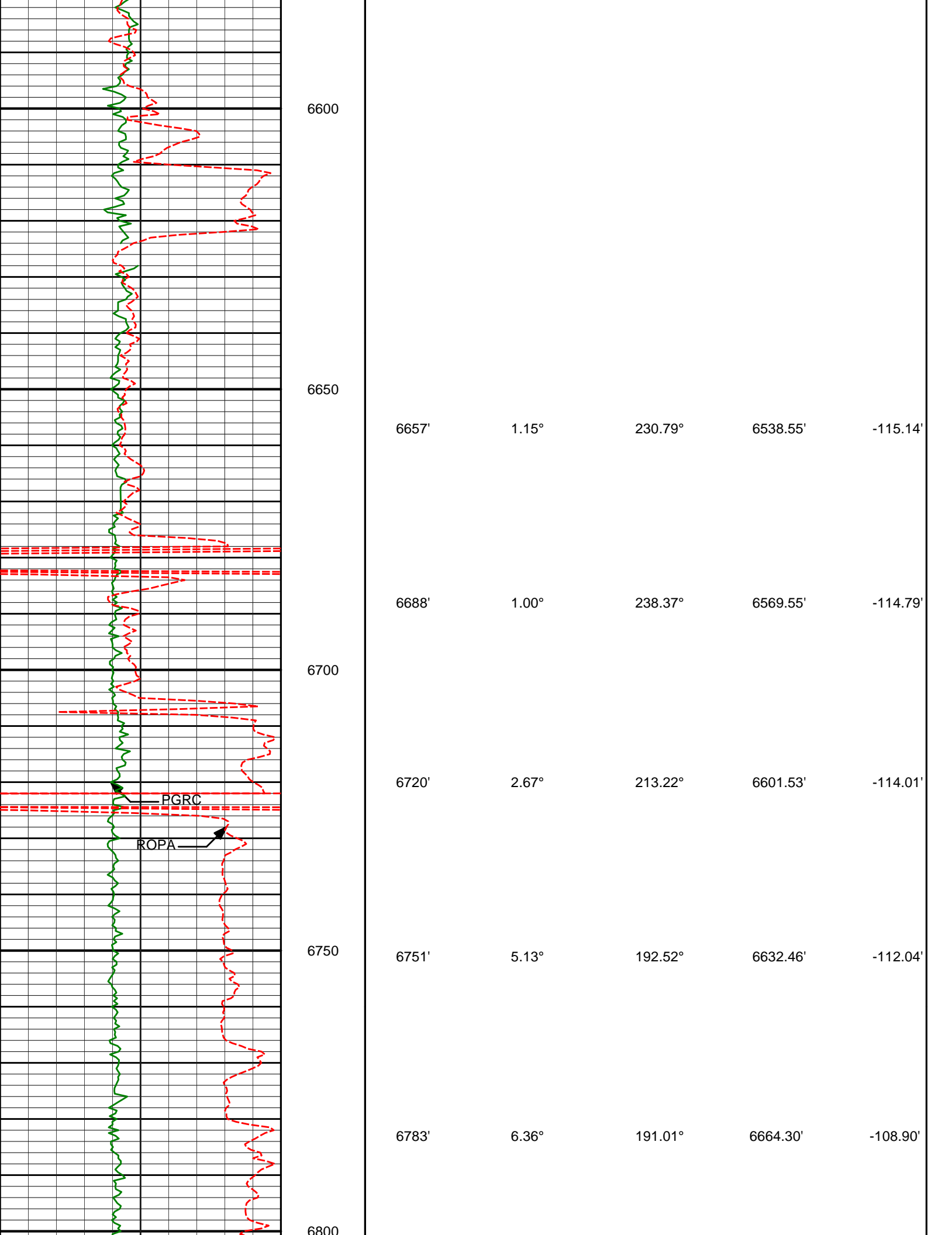
6562'

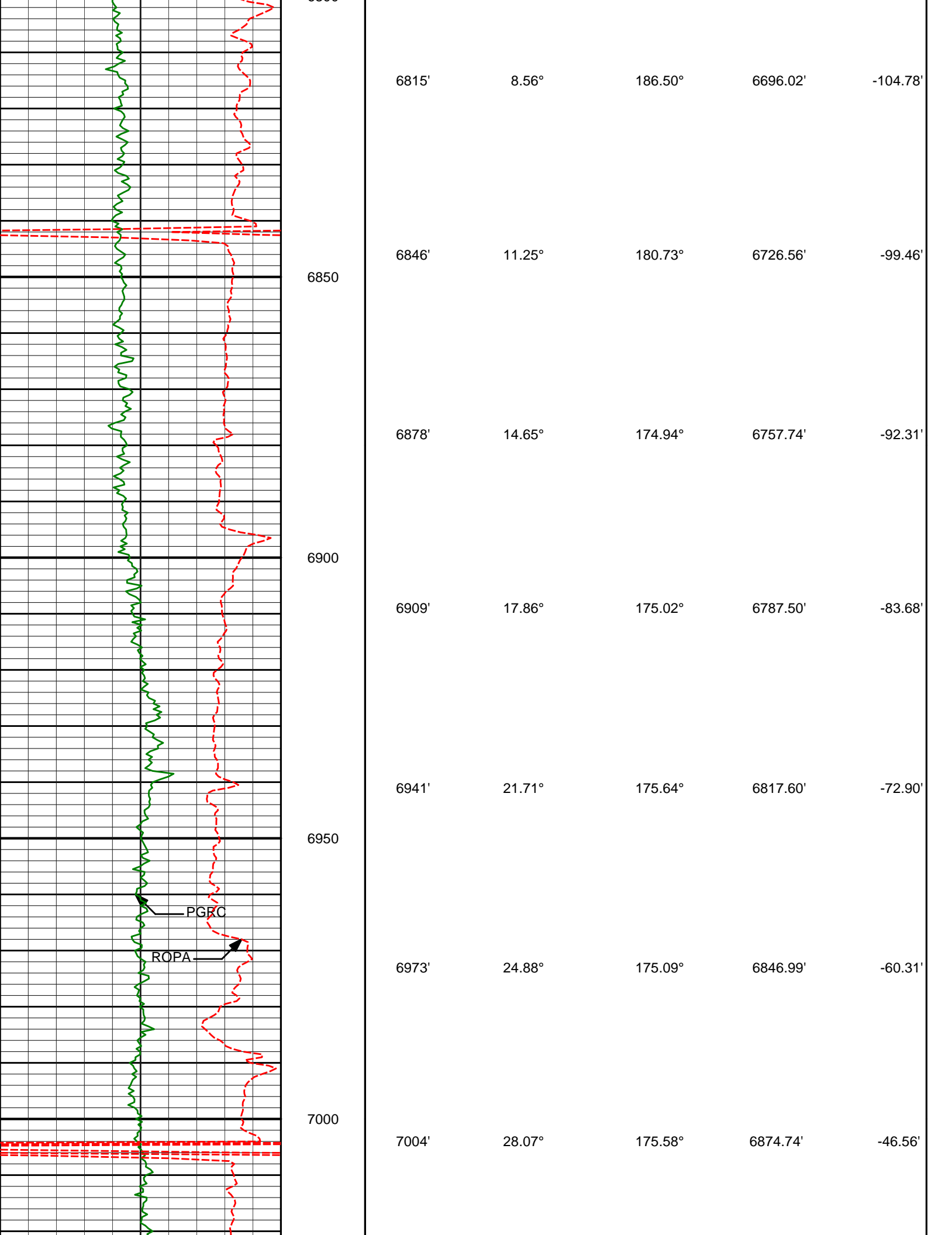
1.77°

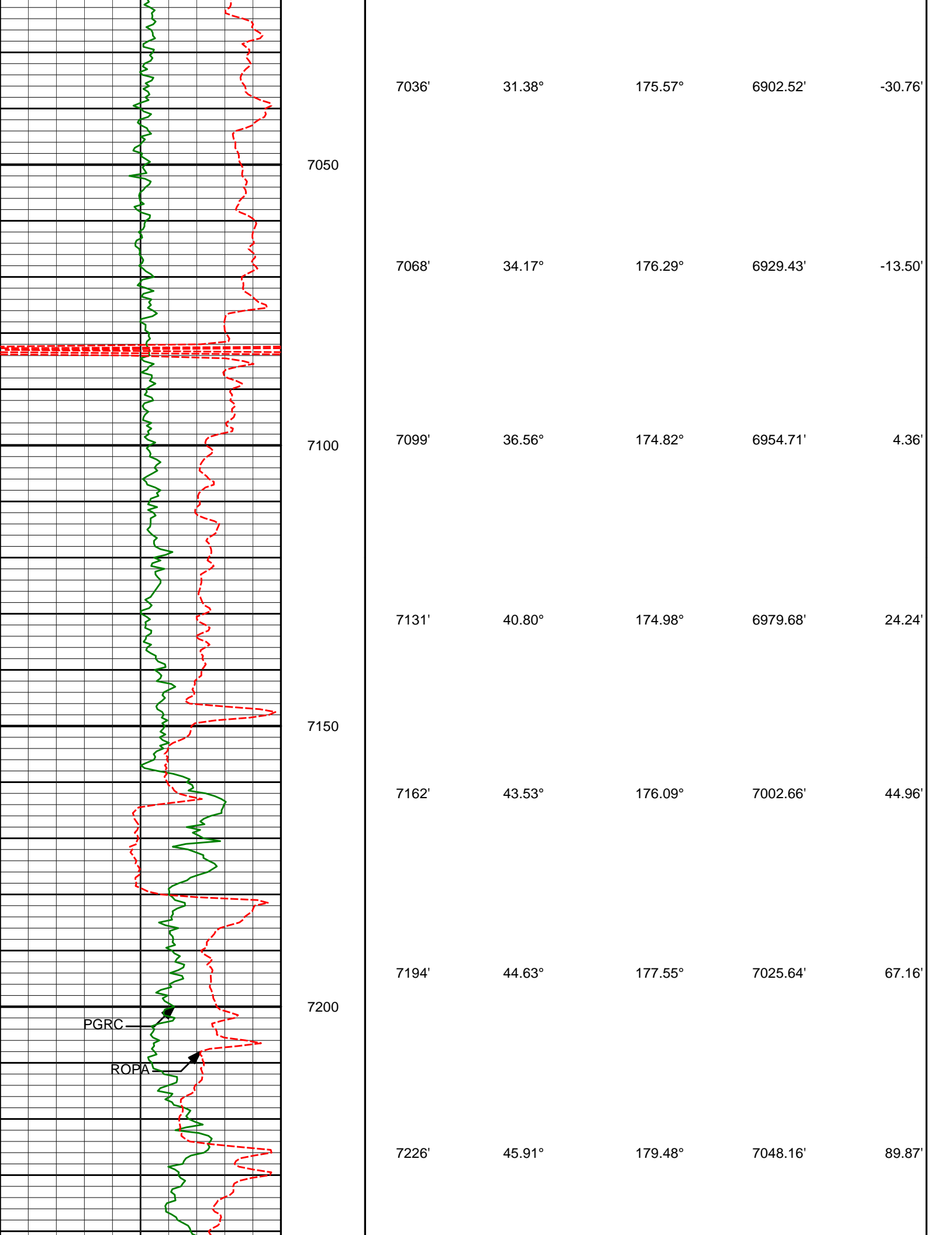
274.30°

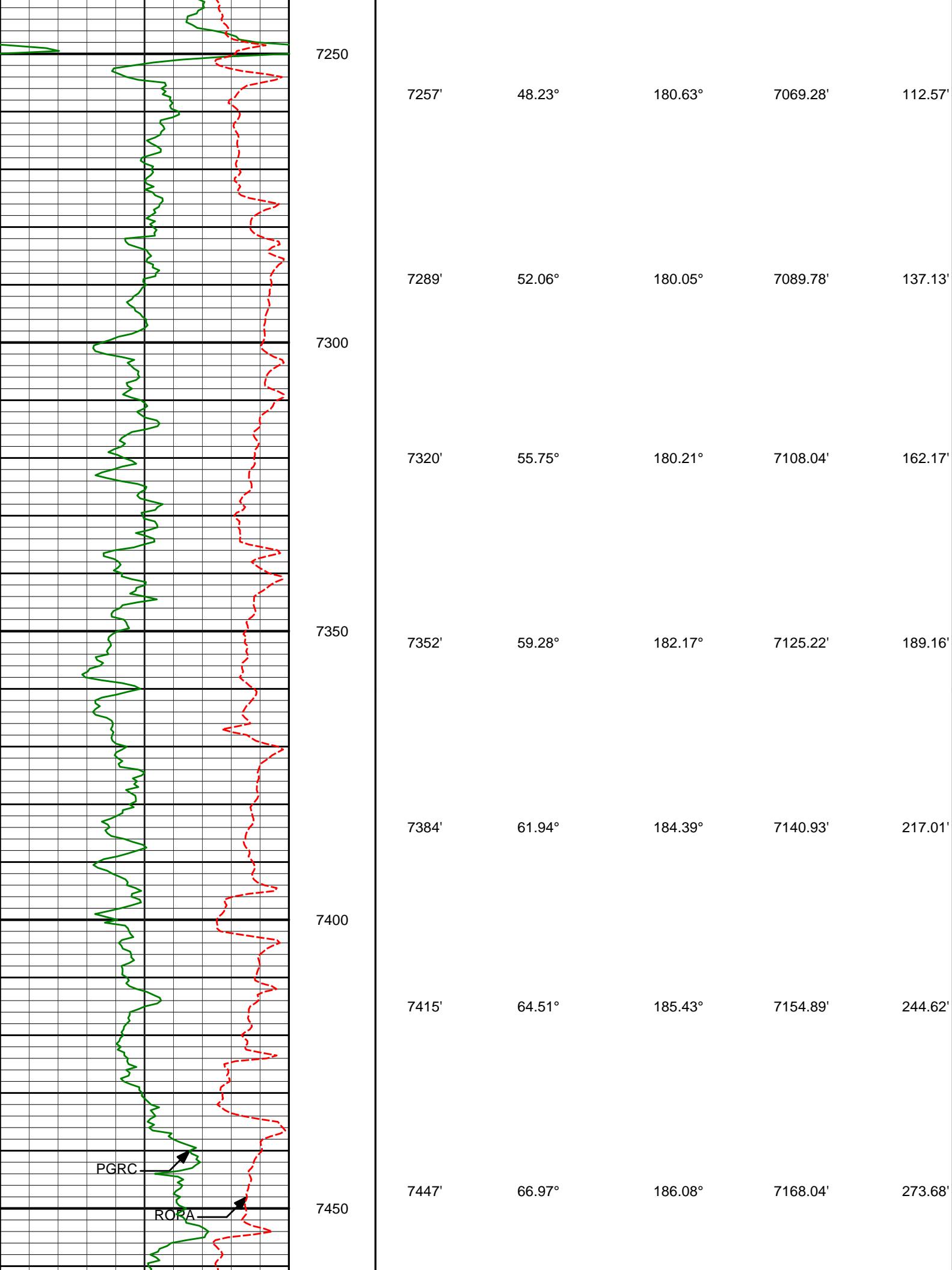
6443.58'

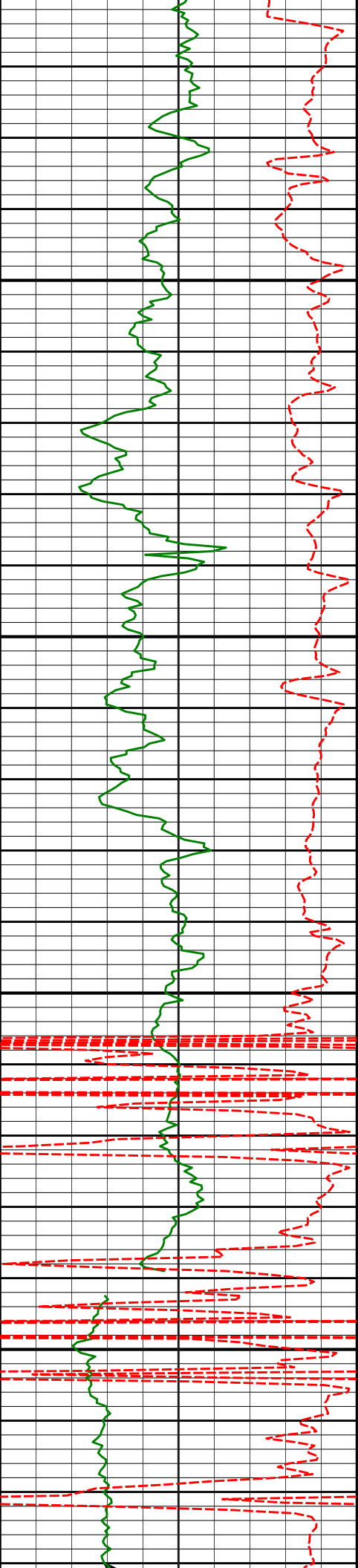
-115.66'











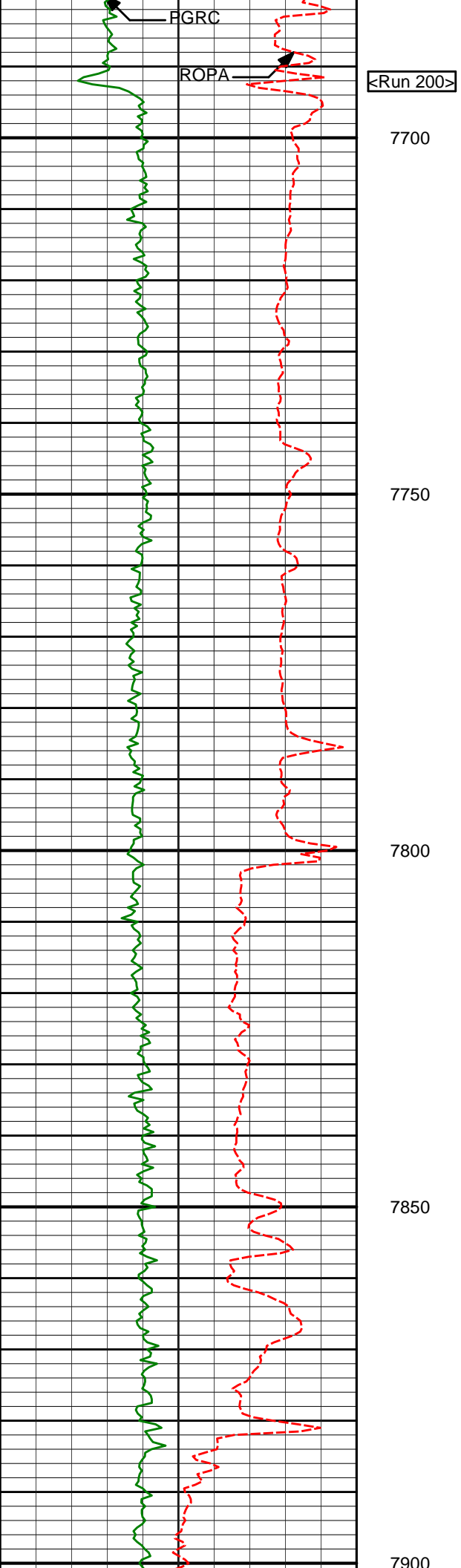
7500

7550

7600

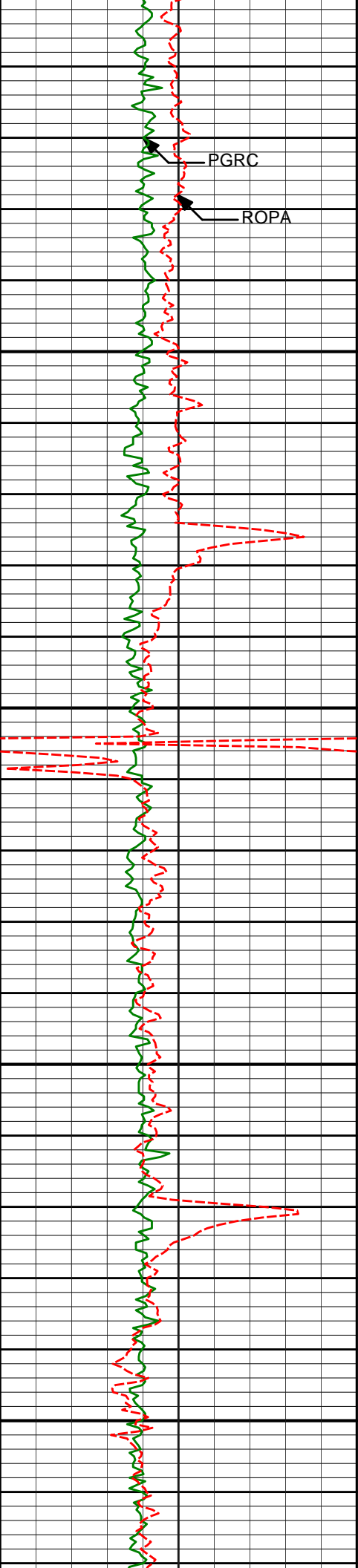
7650
Casing set @
7,657 MD'

7479'	69.66°	185.65°	7117.86'	303.30'
7510'	71.72°	184.92°	7190.11'	332.47'
7542'	74.20°	183.63°	7199.48'	363.01'
7574'	77.54°	182.48°	7207.30'	394.02'
7605'	81.57°	181.93°	7212.92'	424.49'
7641'	85.11°	181.95°	7217.09'	460.23'



7740' 90.80° 182.43° 7220.62' 559.10'

7835' 90.12° 182.43° 7219.85' 654.07'



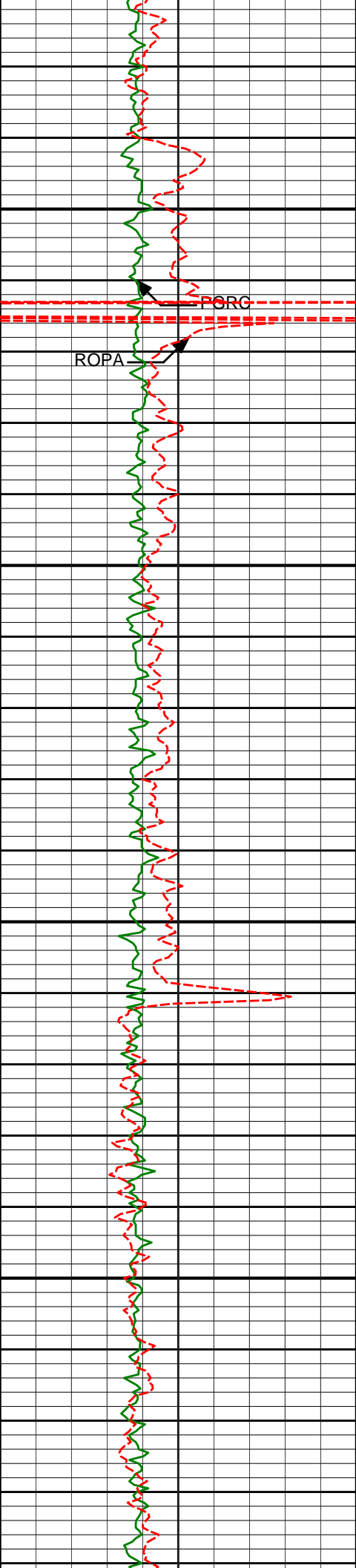
7950

8000

8050

8100

7930'	91.08°	182.76°	7218.85'	749.02'
8025'	90.00°	181.65°	7217.96'	843.99'
8120'	90.03°	181.73°	7217.93'	938.98'



8150

8200

8250

8300

ROPAC

PORC

8215'

90.34°

181.45°

7217.62'

1033.97'

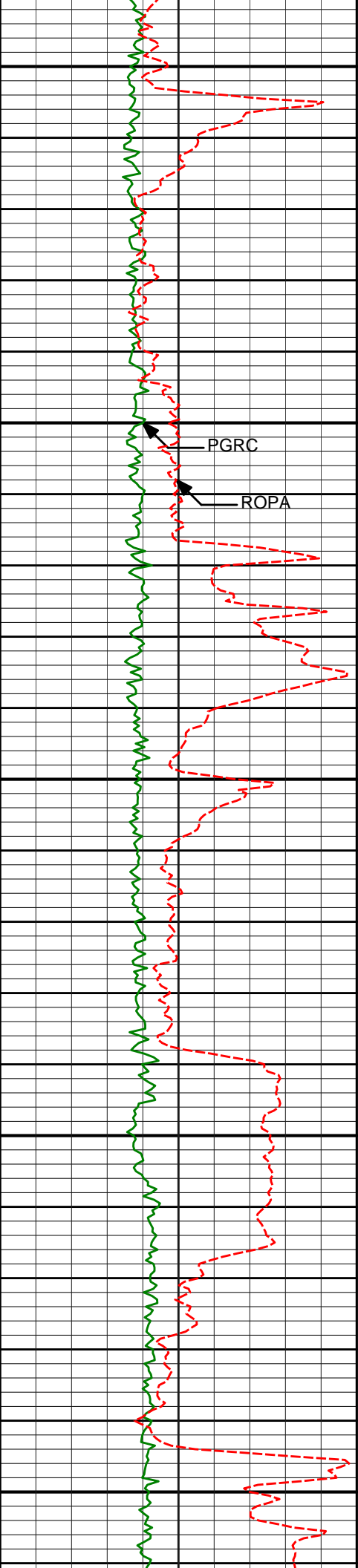
8310'

90.31°

180.55°

7217.09'

1128.97'



8350

8400

8450

8500

8550

PGRC

ROPA

8404'

89.57°

180.27°

7217.19'

1222.96'

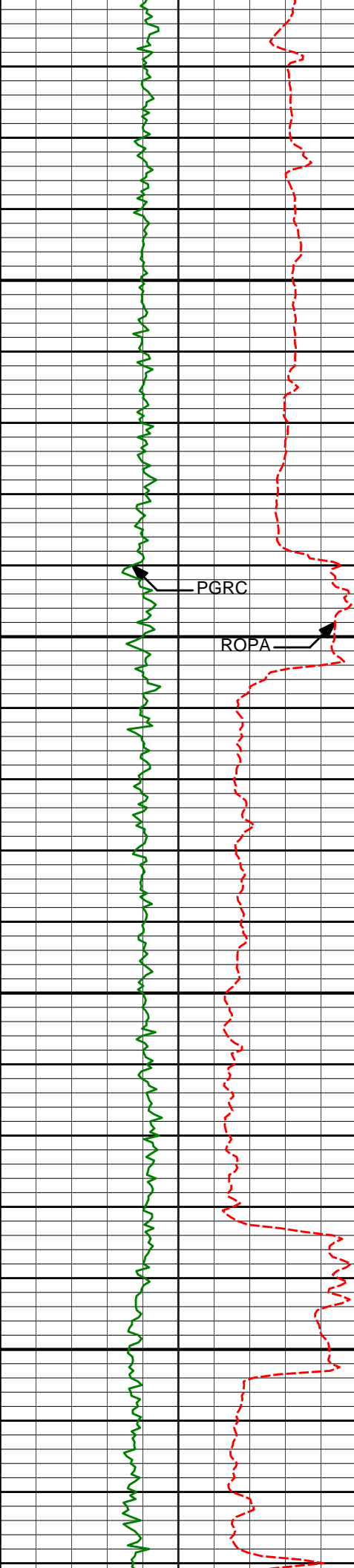
8499'

89.63°

179.95°

7217.85'

1317.95'



8600

8650

8700

8750

8594'

90.25°

179.10°

7217.95'

1412.92'

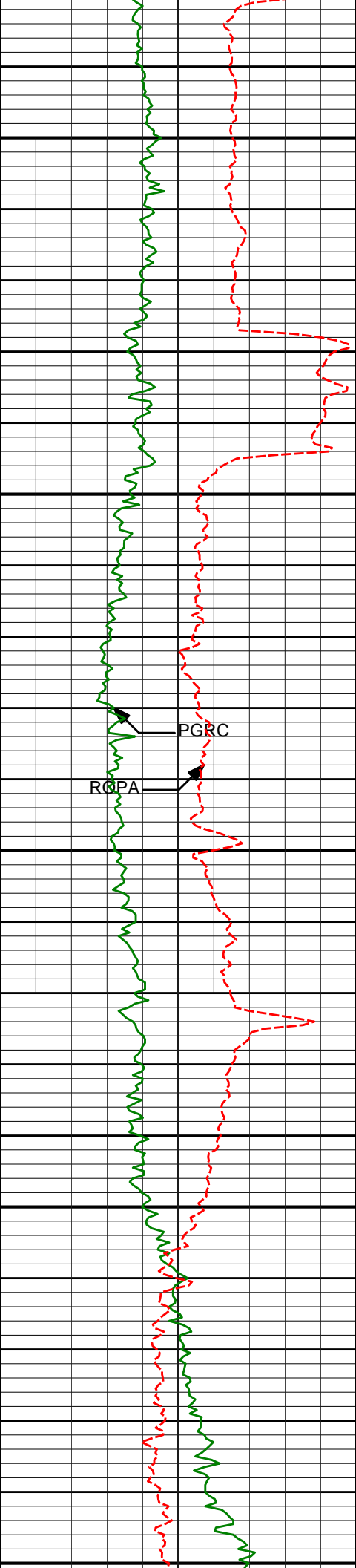
8689'

89.29°

177.75°

7218.33'

1507.83'



8800

8850

8900

8950

9000

8784'

89.88°

179.70°

7219.02'

1602.75'

8879'

89.91°

182.26°

7219.20'

1697.75'

8974'

89.97°

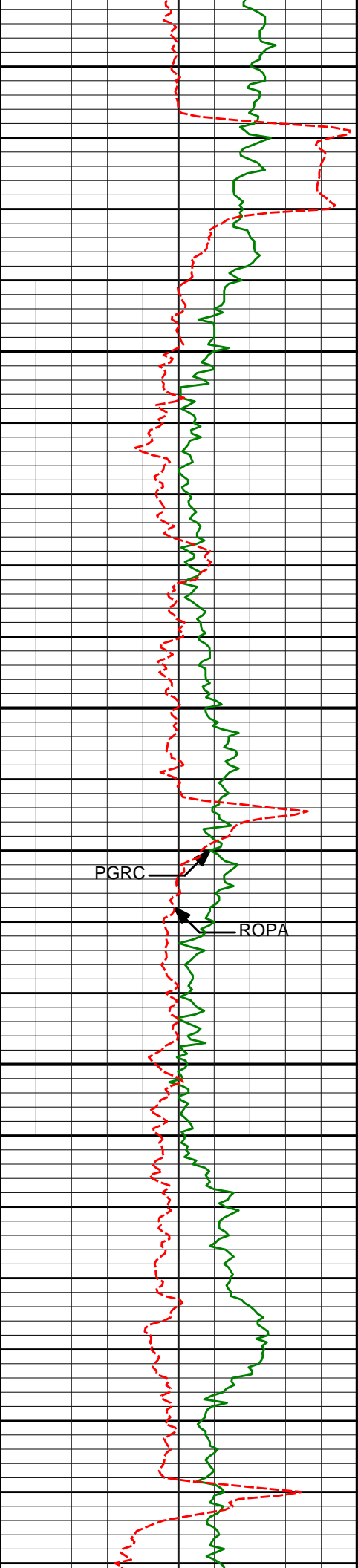
182.01°

7219.31'

1792.72'

PGRC

RCPA



9050

9100

9150

9200

PGRC

ROPA

9069'

90.37°

182.51°

7219.02'

1887.70'

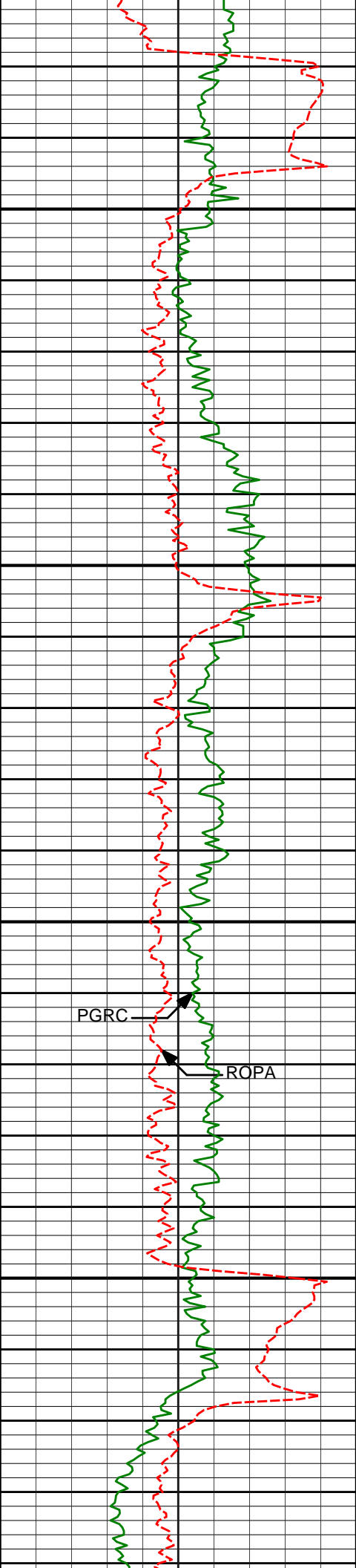
9164'

90.71°

181.34°

7218.13'

1982.67'



9250

9258'

90.40°

183.10°

7217.22'

2076.64'

9300

9350

9353'

88.34°

181.57°

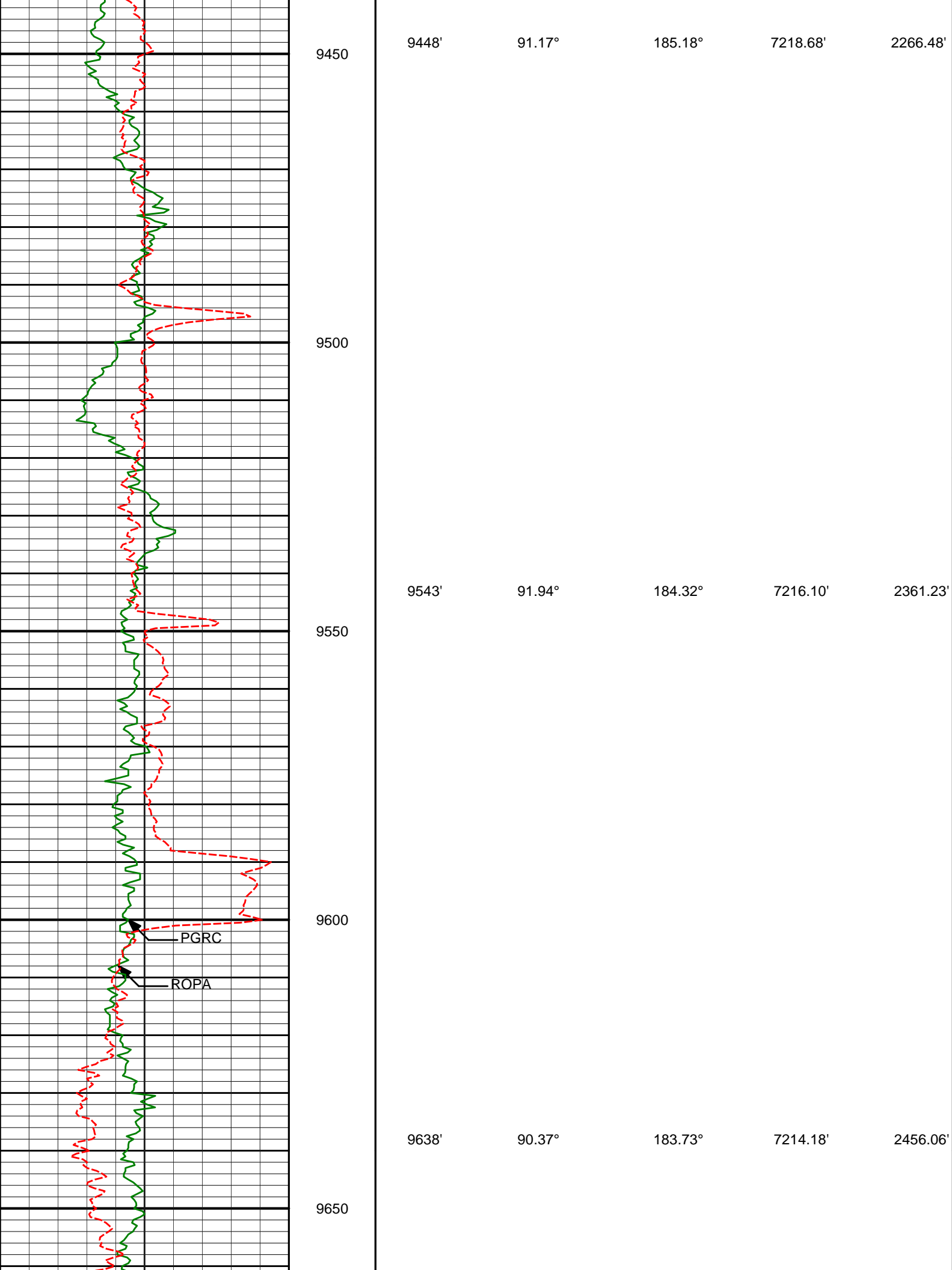
7218.27'

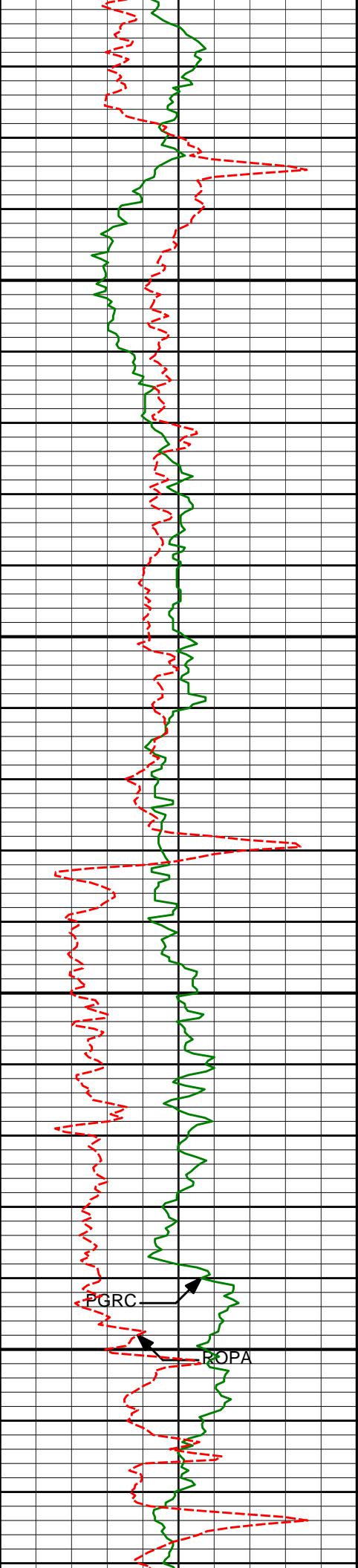
2171.60'

PGRC

ROPA

9400





9700

9732'

90.06°

183.42°

7213.83'

2549.96'

9750

9800

9827'

90.83°

181.53°

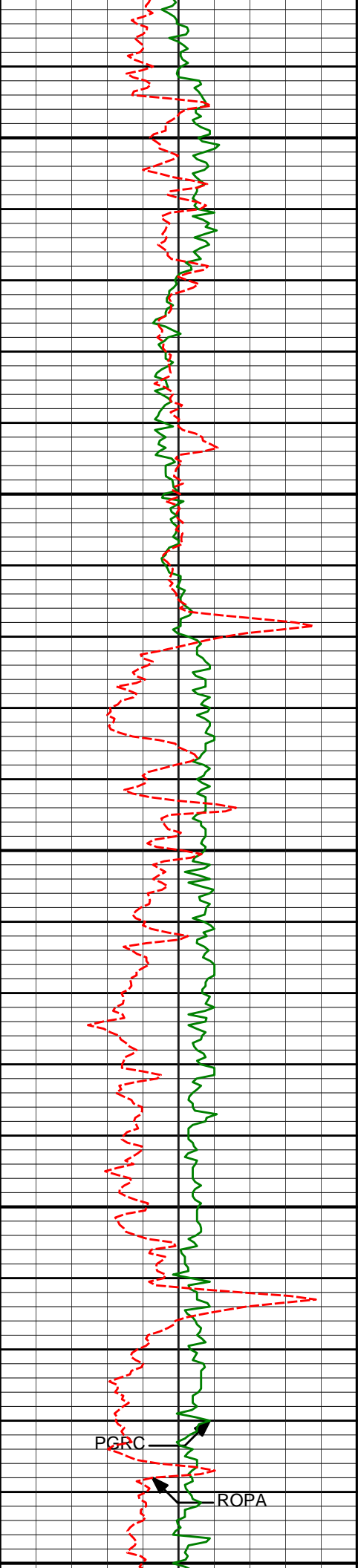
7213.09'

2644.92'

9850

PGRC

POPA



9900

9950

10000

10050

10100

9922'

91.27°

181.79°

7211.35'

2739.89'

10017'

91.54°

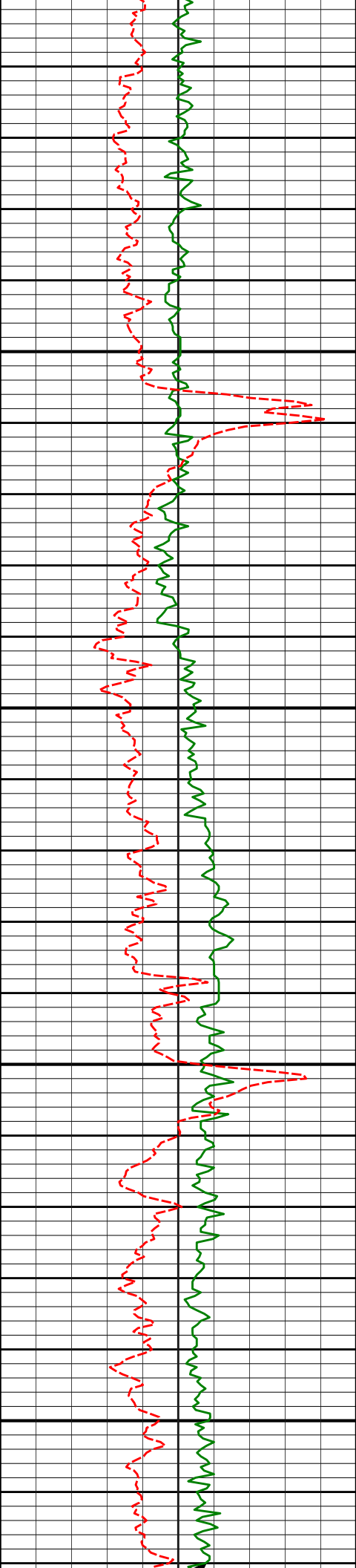
182.11°

7209.02'

2834.85'

PGRC

ROPA



10100
10150
10200
10250
10300

10111'

91.11°

181.64°

7206.85'

2928.81'

10206'

90.80°

182.13°

7205.27'

3023.78'

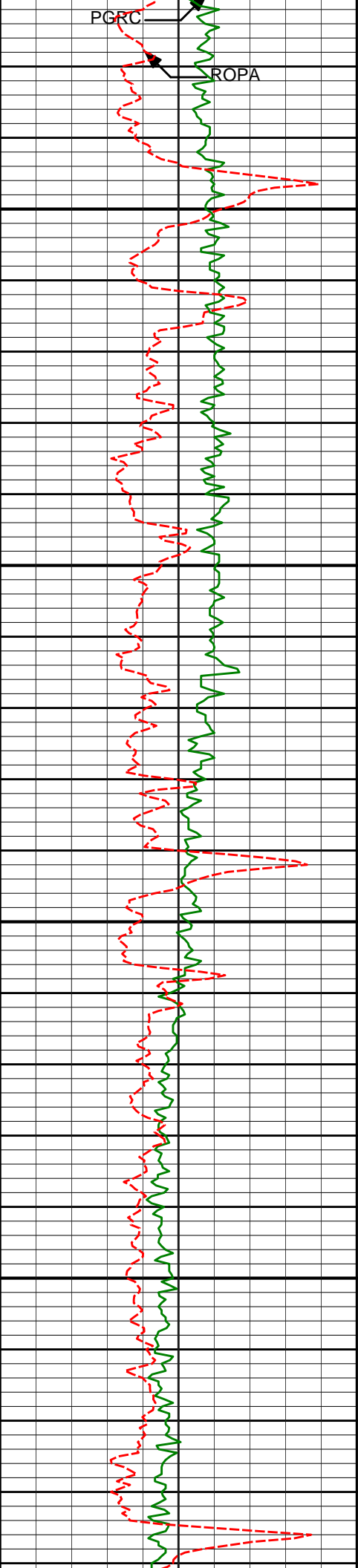
10301'

90.28°

181.08°

7204.37'

3118.77'



10396'

89.63°

180.32°

7204.45'

3213.76'

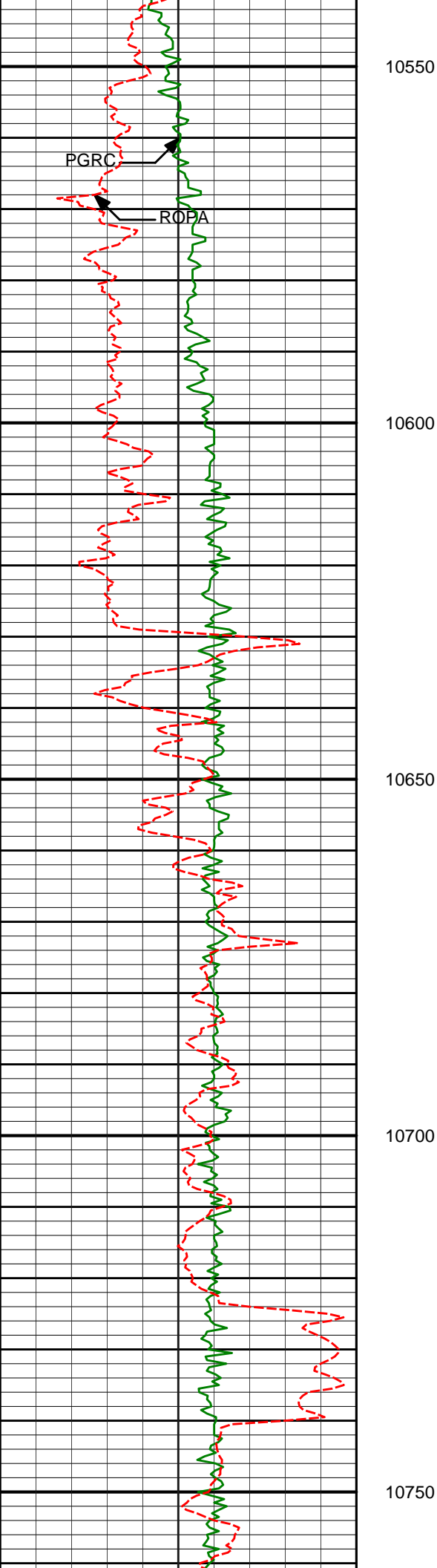
10490'

89.94°

180.54°

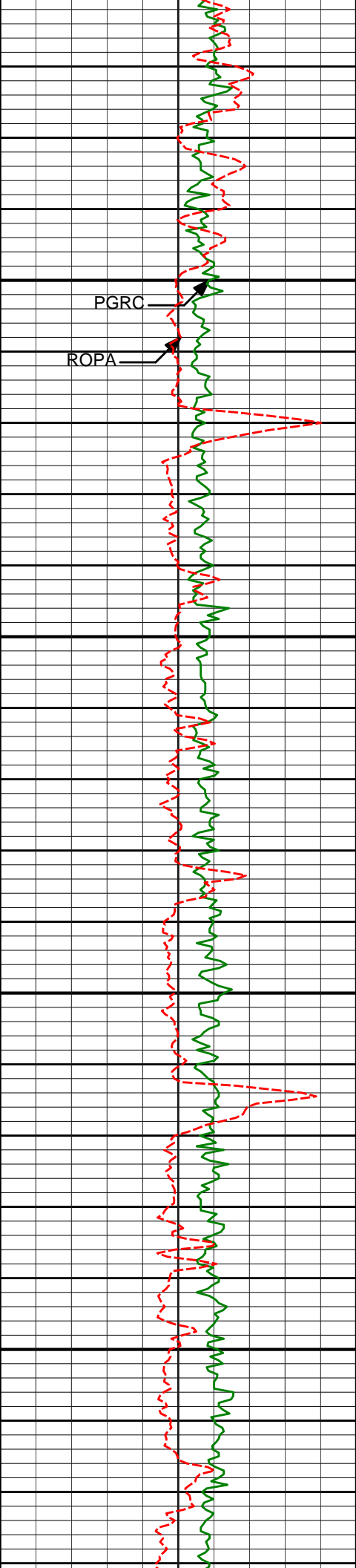
7204.80'

3307.76'



10585' 91.17° 181.20° 7203.88' 3402.75'

10680' 91.02° 182.32° 7202.07' 3497.72'



10800

10850

10900

10950

10774'

91.26°

180.49°

7200.20'

3591.70'

10869'

90.19°

178.20°

7199.00'

3686.65'

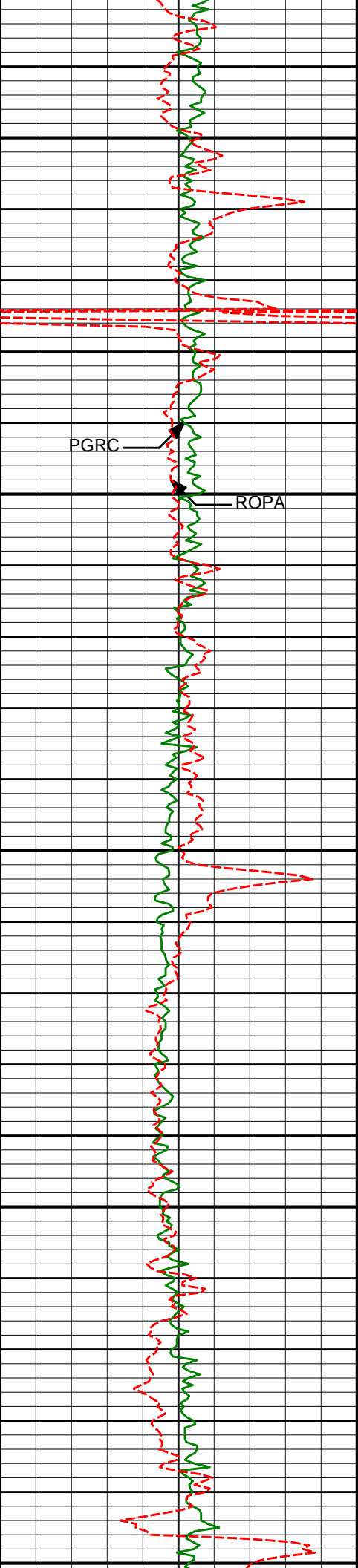
10964'

89.85°

178.53°

7198.97'

3781.55'



11000

PGRC

ROPA

11050

11059'

89.94°

178.16°

7199.15'

3876.46'

11100

11150

11154'

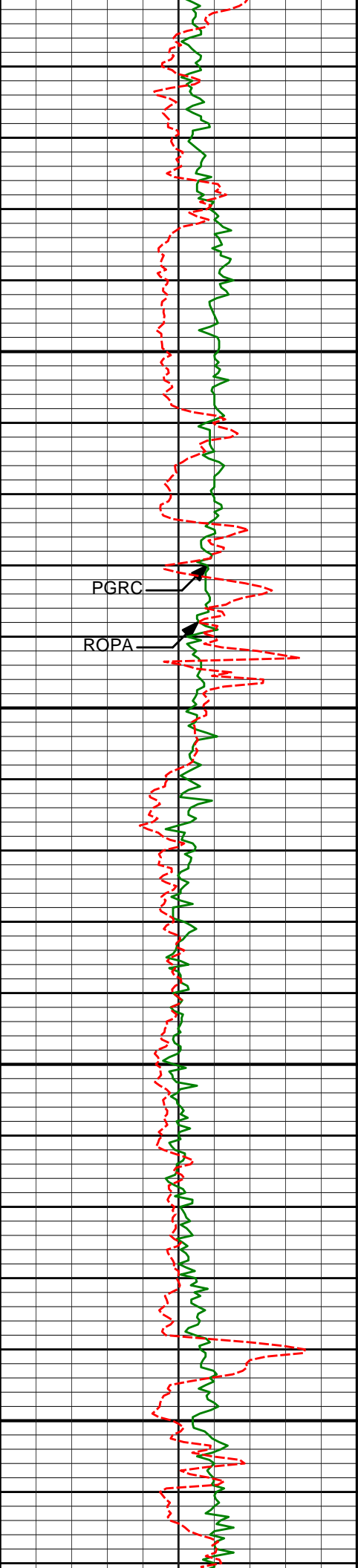
90.31°

178.35°

7198.95'

3971.36'

11200



11250

11249'

90.25°

177.79°

7198.49'

4066.24'

PGRC

ROPA

11300

11344'

89.32°

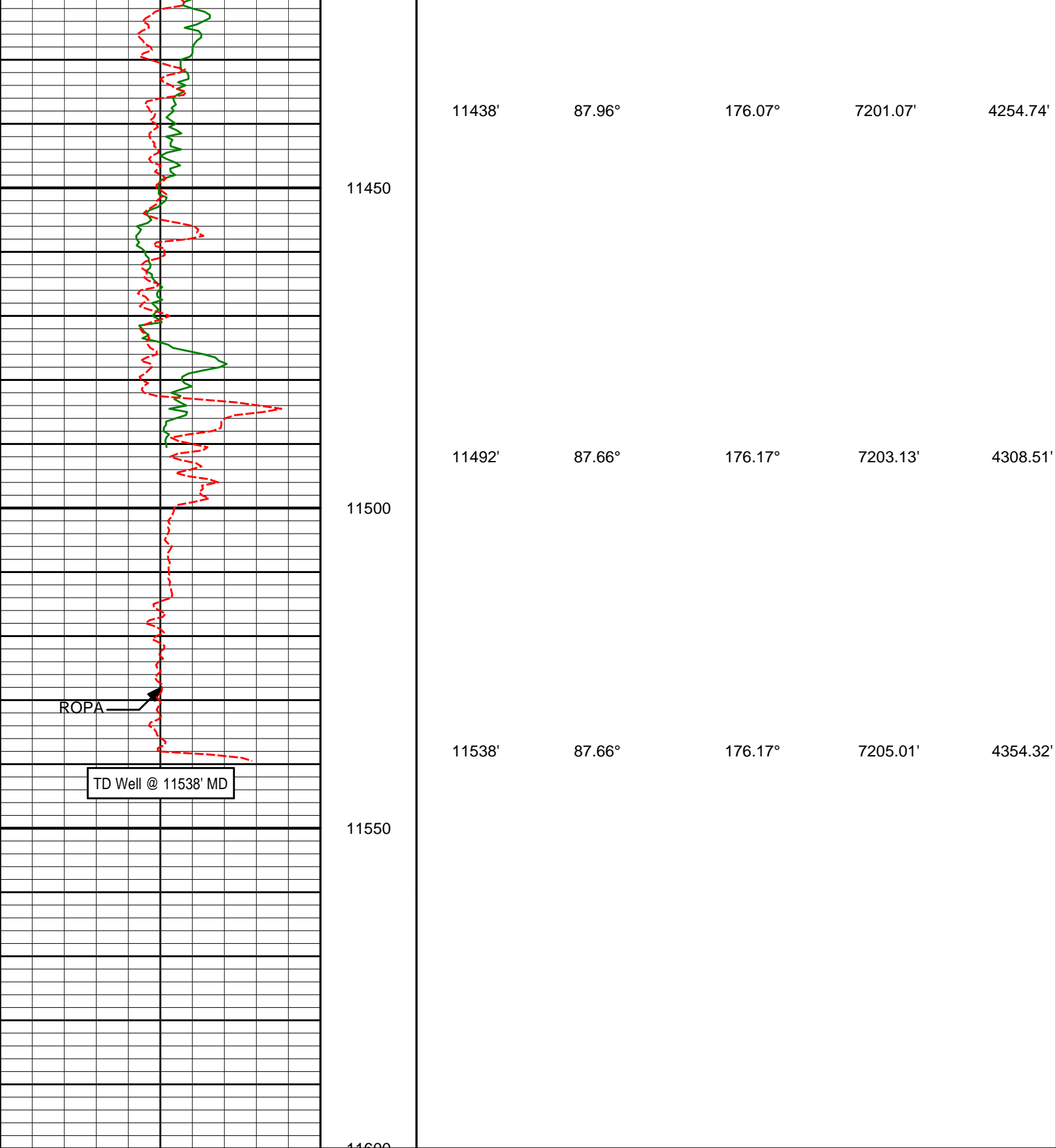
176.80°

7198.84'

4161.05'

11350

11400



Gamma Ray KclBh (PGRC) api		Depth ft 1 : 240	DEPTHINC					AZI					TVD					VS				
0250																						
Avg Rate of Penetration (ROPA) feet per hr																						
5000																						

HALLIBURTON

Sperry Drilling

MD 1:240 Detail Log



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp
Crowder 15N-18HZ
Wattenburg
Weld Colorado
USA
CA-XX-0900217529

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
990.00	0.29	339.43	989.97	6.23 N	1.28 E	-6.25	TIE-IN
1101.00	0.39	200.94	1100.97	6.14 N	1.05 E	-6.16	0.57
1284.00	0.34	129.87	1283.97	5.21 N	1.25 E	-5.22	0.23
1469.00	0.15	140.01	1468.96	4.66 N	1.83 E	-4.69	0.11
1560.00	1.96	270.75	1559.95	4.59 N	0.36 E	-4.59	2.26
1652.00	3.97	280.13	1651.82	5.17 N	4.35 W	-5.10	2.25
1744.00	5.91	284.08	1743.47	6.88 N	12.08 W	-6.69	2.13
1836.00	7.80	278.92	1834.81	9.00 N	22.85 W	-8.65	2.17
1928.00	10.17	276.53	1925.68	10.89 N	37.09 W	-10.32	2.60
2020.00	11.17	272.20	2016.09	12.16 N	54.06 W	-11.32	1.39
2111.00	10.94	274.08	2105.40	13.11 N	71.48 W	-12.00	0.47
2206.00	12.50	273.81	2198.42	14.44 N	90.73 W	-13.03	1.64
2301.00	14.12	273.54	2290.86	15.84 N	112.55 W	-14.09	1.71
2396.00	12.45	272.17	2383.32	16.94 N	134.35 W	-14.85	1.79
2490.00	15.19	271.40	2474.59	17.62 N	156.78 W	-15.19	2.92
2585.00	13.66	272.75	2566.59	18.47 N	180.43 W	-15.66	1.64
2680.00	14.49	273.25	2658.74	19.68 N	203.51 W	-16.51	0.88
2774.00	12.80	271.14	2750.08	20.55 N	225.66 W	-17.04	1.88
2869.00	12.98	272.99	2842.69	21.32 N	246.83 W	-17.48	0.47
2964.00	12.42	278.91	2935.37	23.45 N	267.58 W	-19.30	1.49
3058.00	14.13	283.15	3026.86	27.63 N	288.74 W	-23.14	2.09
3153.00	13.63	283.52	3119.08	32.88 N	310.92 W	-28.05	0.53
3248.00	13.06	282.93	3211.52	37.90 N	332.26 W	-32.74	0.62
3342.00	13.74	283.27	3302.96	42.84 N	353.47 W	-37.35	0.73
3437.00	13.00	283.27	3395.38	47.88 N	374.85 W	-42.06	0.78
3532.00	13.44	281.68	3487.87	52.57 N	396.06 W	-46.41	0.60
3626.00	13.93	278.31	3579.20	56.42 N	417.95 W	-49.92	0.99
3721.00	12.76	278.89	3671.63	59.69 N	439.63 W	-52.86	1.23
3816.00	13.72	275.58	3764.11	62.41 N	461.22 W	-55.24	1.28
3910.00	15.36	275.73	3855.09	64.74 N	484.70 W	-57.20	1.75
4005.00	13.59	273.38	3947.07	66.65 N	508.36 W	-58.75	1.97
4100.00	15.19	274.61	4039.09	68.31 N	531.91 W	-60.04	1.71
4194.00	15.53	275.36	4129.74	70.47 N	556.71 W	-61.82	0.42
4289.00	15.55	274.14	4221.26	72.58 N	582.07 W	-63.53	0.35
4384.00	15.12	272.22	4312.88	73.98 N	607.15 W	-64.54	0.70
4478.00	14.46	274.99	4403.77	75.48 N	631.10 W	-65.66	1.03
4573.00	14.37	275.47	4495.78	77.63 N	654.65 W	-67.46	0.16
4667.00	13.87	272.29	4586.94	79.20 N	677.52 W	-68.66	0.98
4762.00	14.85	277.32	4678.97	81.20 N	700.97 W	-70.31	1.66
4857.00	15.18	278.54	4770.73	84.60 N	725.35 W	-73.32	0.49
4951.00	14.55	275.10	4861.58	87.50 N	749.38 W	-75.85	1.13

4951.00	14.95	275.19	4861.58	87.50 N	749.28 W	-75.85	1.15
5046.00	13.44	272.98	4953.76	89.15 N	772.19 W	-77.14	1.31
5141.00	13.87	278.82	5046.08	91.47 N	794.47 W	-79.12	1.52
5235.00	12.82	275.72	5137.54	94.23 N	815.98 W	-81.55	1.36
5330.00	14.11	281.32	5229.93	97.56 N	837.82 W	-84.53	1.93
5425.00	13.11	280.99	5322.27	101.88 N	859.75 W	-88.52	1.06
5519.00	13.49	282.44	5413.74	106.28 N	880.93 W	-92.58	0.54
5614.00	12.62	281.62	5506.29	110.76 N	901.91 W	-96.73	0.94
5709.00	10.77	280.70	5599.31	114.49 N	920.80 W	-100.18	1.96
5803.00	10.91	277.43	5691.64	117.27 N	938.25 W	-102.69	0.67
5898.00	9.19	276.57	5785.17	119.31 N	954.70 W	-104.46	1.81
5993.00	9.30	279.73	5878.94	121.47 N	969.81 W	-106.39	0.55
6088.00	9.56	281.16	5972.66	124.30 N	985.12 W	-108.98	0.37
6182.00	8.54	282.14	6065.48	127.27 N	999.60 W	-111.73	1.10
6277.00	7.30	279.65	6159.58	129.77 N	1012.45 W	-114.03	1.35
6372.00	5.40	273.72	6253.99	131.07 N	1022.86 W	-115.17	2.12
6467.00	3.64	272.64	6348.69	131.50 N	1030.34 W	-115.48	1.85
6562.00	1.77	274.30	6443.58	131.75 N	1034.82 W	-115.66	1.97
6657.00	1.15	230.79	6538.55	131.26 N	1037.02 W	-115.14	1.29
6688.00	1.00	238.37	6569.55	130.92 N	1037.49 W	-114.79	0.66
6720.00	2.67	213.22	6601.53	130.15 N	1038.13 W	-114.01	5.67
6751.00	5.13	192.52	6632.46	128.20 N	1038.83 W	-112.04	9.04
6783.00	6.36	191.01	6664.30	125.06 N	1039.48 W	-108.90	3.86
6815.00	8.56	186.50	6696.02	120.95 N	1040.09 W	-104.78	7.12
6846.00	11.25	180.73	6726.56	115.63 N	1040.39 W	-99.46	9.23
6878.00	14.65	174.94	6757.74	108.48 N	1040.07 W	-92.31	11.36
6909.00	17.86	175.02	6787.50	99.84 N	1039.31 W	-83.68	10.36
6941.00	21.71	175.64	6817.60	89.04 N	1038.44 W	-72.90	12.06
6973.00	24.88	175.09	6846.99	76.43 N	1037.41 W	-60.31	9.91
7004.00	28.07	175.58	6874.74	62.66 N	1036.29 W	-46.56	10.33
7036.00	31.38	175.57	6902.52	46.84 N	1035.07 W	-30.76	10.35
7068.00	34.17	176.29	6929.43	29.57 N	1033.84 W	-13.50	8.79
7099.00	36.56	174.82	6954.71	11.68 N	1032.44 W	4.36	8.19
7131.00	40.80	174.98	6979.68	8.24 S	1030.67 W	24.24	13.26
7162.00	43.53	176.09	7002.66	28.98 S	1029.06 W	44.96	9.10
7194.00	44.63	177.55	7025.64	51.20 S	1027.82 W	67.16	4.68
7226.00	45.91	179.48	7048.16	73.93 S	1027.24 W	89.87	5.86
7257.00	48.23	180.63	7069.28	96.62 S	1027.26 W	112.57	7.95
7289.00	52.06	180.05	7089.78	121.18 S	1027.41 W	137.13	12.06
7320.00	55.75	180.21	7108.04	146.23 S	1027.46 W	162.17	11.92
7352.00	59.28	182.17	7125.22	173.21 S	1028.03 W	189.16	12.18
7384.00	61.94	184.39	7140.93	201.04 S	1029.63 W	217.01	10.27
7415.00	64.51	185.43	7154.89	228.62 S	1032.00 W	244.62	8.80
7447.00	66.97	186.08	7168.04	257.64 S	1034.93 W	273.68	7.91
7479.00	69.66	185.65	7179.86	287.22 S	1037.96 W	303.30	8.52
7510.00	71.72	184.92	7190.11	316.35 S	1040.66 W	332.47	7.00
7542.00	74.20	183.63	7199.48	346.85 S	1042.93 W	363.01	8.64
7574.00	77.54	182.48	7207.30	377.84 S	1044.58 W	394.02	11.00
7605.00	81.57	181.93	7212.92	408.29 S	1045.75 W	424.49	13.13
7641.00	85.11	181.95	7217.09	444.03 S	1046.97 W	460.23	9.84
7740.00	90.80	182.43	7220.62	542.85 S	1050.75 W	559.10	5.77
7835.00	90.12	182.43	7219.85	637.76 S	1054.78 W	654.07	0.71
7930.00	91.08	182.76	7218.85	732.66 S	1059.09 W	749.02	1.07
8025.00	90.00	181.65	7217.96	827.58 S	1062.74 W	843.99	1.63
8120.00	90.03	181.73	7217.93	922.54 S	1065.55 W	938.98	0.10
8215.00	90.34	181.45	7217.62	1017.50 S	1068.19 W	1033.97	0.44
8310.00	90.31	180.55	7217.09	1112.48 S	1069.85 W	1128.97	0.94
8404.00	89.57	180.27	7217.19	1206.48 S	1070.52 W	1222.96	0.84
8499.00	89.63	179.95	7217.85	1301.48 S	1070.69 W	1317.95	0.34
8594.00	90.25	179.10	7217.95	1396.47 S	1069.90 W	1412.92	1.10
8689.00	89.29	177.75	7218.33	1491.43 S	1067.29 W	1507.83	1.74
8784.00	89.88	179.70	7219.02	1586.40 S	1065.18 W	1602.75	2.15
8879.00	89.91	182.26	7219.20	1681.38 S	1066.80 W	1697.75	2.69
8974.00	89.97	182.01	7219.31	1776.31 S	1070.34 W	1792.72	0.27
9069.00	90.37	182.51	7219.02	1871.24 S	1074.09 W	1887.70	0.67
9164.00	90.71	181.34	7218.13	1966.18 S	1077.28 W	1982.67	1.29
9258.00	90.40	183.10	7217.22	2060.10 S	1080.92 W	2076.64	1.90
9353.00	88.34	181.57	7218.27	2155.01 S	1084.79 W	2171.60	2.70
9448.00	91.17	185.18	7218.68	2249.82 S	1090.38 W	2266.48	4.83
9543.00	91.94	184.32	7216.10	2344.45 S	1098.24 W	2361.23	1.21
9638.00	90.37	183.73	7214.18	2439.20 S	1104.91 W	2456.06	1.76
9732.00	90.06	183.42	7213.83	2533.01 S	1110.77 W	2549.96	0.47

9827.00	90.83	181.53	7213.09	2627.92 S	1114.86 W	2644.92	2.15
9922.00	91.27	181.79	7211.35	2722.86 S	1117.61 W	2739.89	0.53
10017.00	91.54	182.11	7209.02	2817.78 S	1120.84 W	2834.85	0.45
10111.00	91.11	181.64	7206.85	2911.70 S	1123.92 W	2928.81	0.68
10206.00	90.80	182.13	7205.27	3006.64 S	1127.05 W	3023.78	0.61
10301.00	90.28	181.08	7204.37	3101.59 S	1129.71 W	3118.77	1.24
10396.00	89.63	180.32	7204.45	3196.58 S	1130.86 W	3213.76	1.05
10490.00	89.94	180.54	7204.80	3290.58 S	1131.57 W	3307.76	0.41
10585.00	91.17	181.20	7203.88	3385.56 S	1133.01 W	3402.75	1.47
10680.00	91.02	182.32	7202.07	3480.50 S	1135.93 W	3497.72	1.19
10774.00	91.26	180.49	7200.20	3574.45 S	1138.23 W	3591.70	1.96
10869.00	90.19	178.20	7199.00	3669.43 S	1137.15 W	3686.65	2.67
10964.00	89.85	178.53	7198.97	3764.39 S	1134.43 W	3781.55	0.50
11059.00	89.94	178.16	7199.15	3859.35 S	1131.68 W	3876.46	0.40
11154.00	90.31	178.35	7198.95	3954.30 S	1128.79 W	3971.36	0.44
11249.00	90.25	177.79	7198.49	4049.25 S	1125.59 W	4066.24	0.60
11344.00	89.32	176.80	7198.84	4144.14 S	1121.10 W	4161.05	1.43
11438.00	87.96	176.07	7201.07	4237.93 S	1115.26 W	4254.74	1.64
11492.00	87.66	176.17	7203.13	4291.77 S	1111.61 W	4308.51	0.59
11538.00	87.66	176.17	7205.01	4337.62 S	1108.54 W	4354.32	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 180.89 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.61 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11538.00 FEET
IS 4477.04 FEET ALONG 194.34 DEGREES (TRUE)**

Final survey is a projection to bit.