

PCDC - Pressure Case Directional
PCGK - Pressure Case Gamma

1 : 240

Country		: USA			
Field		: Wattenburg			
Location		: Lat: 40° 0' 29.29" North Long: 104° 55' 1.89" West			
Well		: Howard 3C-29HZ			
Company		: Anadarko Petroleum Corp			
Rig		: Xtreme 22			
LOCATION		Latitude : 40° 0' 29.29" North Longitude : 104° 55' 1.89" West		Other Services	
		UTM Easting = 3,163,255.193 ft UTM Northing = 1,246,347.096 ft		Directional Drilling	
Permanent Datum		: Ground Level		Elev. KB 5066.00 ft	
Log Measured From		: Drill Floor		DF 5065.00 ft	
Drilling Measured From		: Drill Floor		GL 5049.00 ft	
				WD N/A	
Depth Logged		: 996.00 ft To 15,438.00 ft		Unit No. : 11610117	
Date Logged		: 15-Aug-14 To 26-Aug-14		Job No. : CA-XX-0901445564	
Total Depth MD		: 15,438.00 ft TVD: 7,804.82 ft		Plot Type : Final	
Spud Date		: 15-Aug-14		Plot Date : 29-Aug-14	
Run No.	Borehole Record (MD)			Borehole Record (MD)	
	Size	From	To	Run No.	Size
0100	8.750 in	996.00 ft	8,294.00 ft		
0200	6.125 in	8,294.00 ft	11,073.00 ft		
0300	6.125 in	11,073.00 ft	15,428.00 ft		

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	18-Aug-14	21-Aug-14	26-Aug-14		
Rig Bit Number	0100	0200	0300		
Bit Size (in)	8.750	6.125	6.125		
Tool Nominal OD (in)	6.750	4.790	4.790		
Log Start Depth (MD, ft)	996.00	8,294.00	11,073.00		
Log End Depth (MD, ft)	8,294.00	11,073.00	15,438.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	15-Aug-14 07:45	20-Aug-14 05:00	22-Aug-14 13:00		
Drill/Wipe End Date and Time	18-Aug-14 01:20	21-Aug-14 15:15	25-Aug-14 15:35		
Min Inc (deg) @ Depth (MD, ft)	0.15 @ 2,679.00	89.54 @ 9,442.00	88.80 @ 15,241.00		
Max Inc (deg) @ Depth (MD, ft)	90.49 @ 8,248.00	91.36 @ 8,386.00	92.09 @ 11,323.00		
Bit TFA(in2) / Bit Type	0.97 / PDC	1.86 / PDC	1.48 / PDC		
Flow Rate (gpm)	615.12	309.08	312.00		
Max AV (fpm) / CV (fpm) @ MWD	481.2 / 350.0	NA / NA	NA / NA		
Fluid Type	Native/Spud Mud	Polymer	Polymer		
Density (ppg) / Viscosity (spqt)	9.90 / 40.00	9.80 / 44.00	9.97 / 36.00		
Filtrate CL (ppm)	1,100.00	1,500.00	1,600.00		
pH / Fluid Loss (mptm)	9.20 / 0	8.50 / 5	8.60 / 7		
PV (cP) / YP (Ihf2)	13 / 15.00	14 / 15.00	10 / 14.00		
% Solids / % Sand	9.00 / 0.30	8.00 / .2	10.50 / 0.50		
% Oil / Oil:Water Ratio	NA / NA	2.00 / NA	2.00 / NA		
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		

Max Tool Temp (degF) / Source	182.55 / PCM	210.31 / PCM	236.82 / PCM		
Rm @ Max Tool Temp (degF)	NA @ 182.55	NA @ 210.31	NA @ 236.82		
Lead MWD Engineer	Clay Wass	Clay Wass	Clay Wass		
Customer Representative					

SENSOR INFORMATION

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	43.99	45.65	45.62		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404286	12310752	12310752		
Sonde Serial Number	11833212	11833264	11833212		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	338.51	33.12	268.56		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	48.94	40.95	40.89		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404286	12310752	12310752		
Insert/Sonde Serial Number	11681007	11579777	11681007		

Pulser Controller Sensor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
PIC Software Version	1.40	1.40	1.40		
Sub/HOC Serial Number	11404286	12310752	12310752		
Insert/Probe/Module SN	11680783	11620295	11680783		
Battery Serial Number	N/A	N/A	N/A		
Valve Insert SN	N/A	N/A	N/A		
DC Insert Serial Number	N/A	N/A	N/A		
Choke Size (32nd)	N/A	N/A	N/A		
Driver Current (amps)	N/A	N/A	N/A		
Driver SMI Current (amps)	N/A	N/A	N/A		
Boot Strap Version	4,130.00	4,130.00	4,130.00		

REMARKS

1) All Depths are true vertical bit depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.

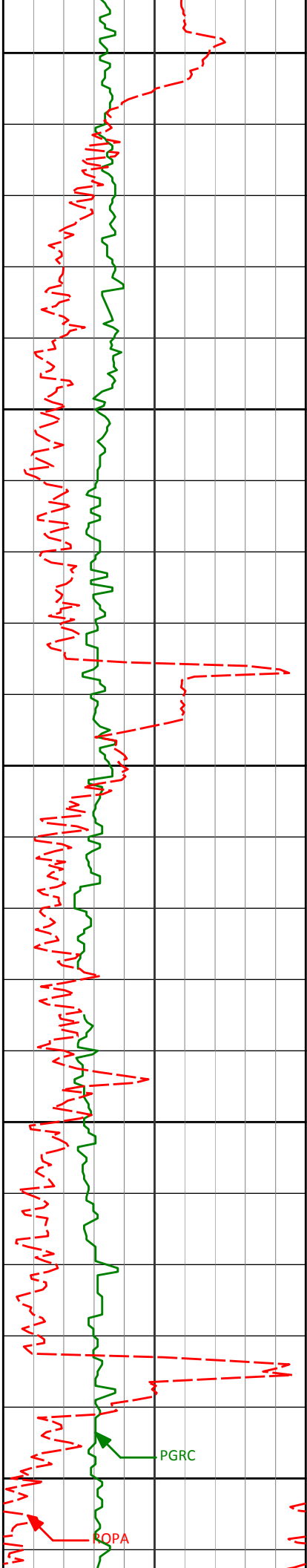
2) No depth corrections have been made for pipe stretch or compression.

3) The following smoothing parameters have been applied to data:

PGXC (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

4) Insite Version 8.0.20 Build 4



1050

1100

1150

1200

1250

1201'

0.48°

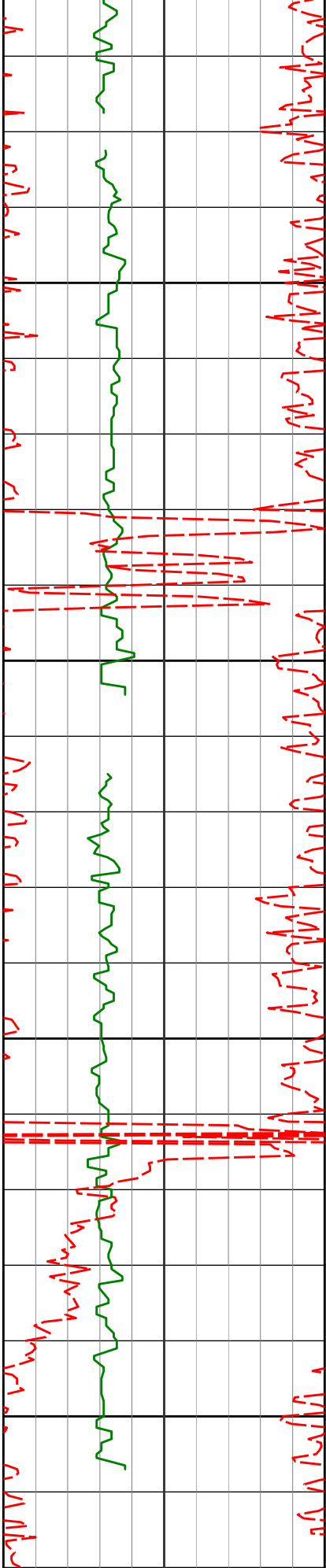
25.62°

1200.97'

7.18'

PGRC

ROPA



1300

1350

1400

1450

1391'

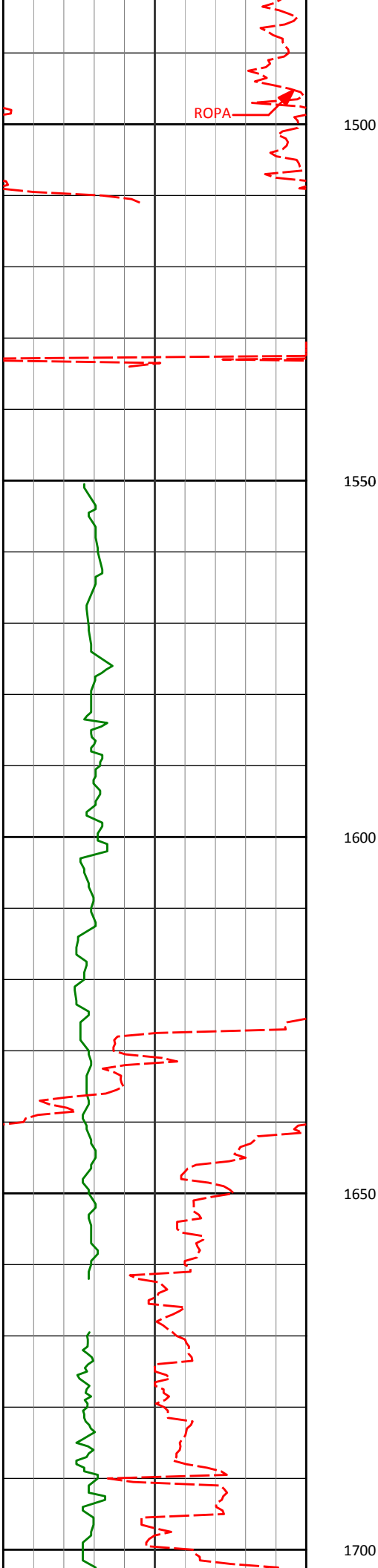
0.84°

34.72°

1390.96'

9.04'

Gamma missing due to poor detection



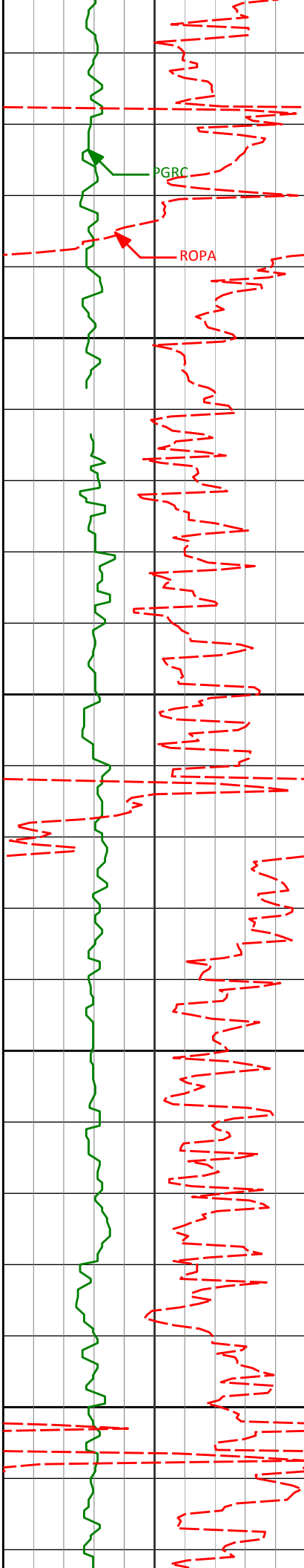
1580'

0.64°

344.70°

1579.94'

11.20'



1750

1763'

0.99°

193.58°

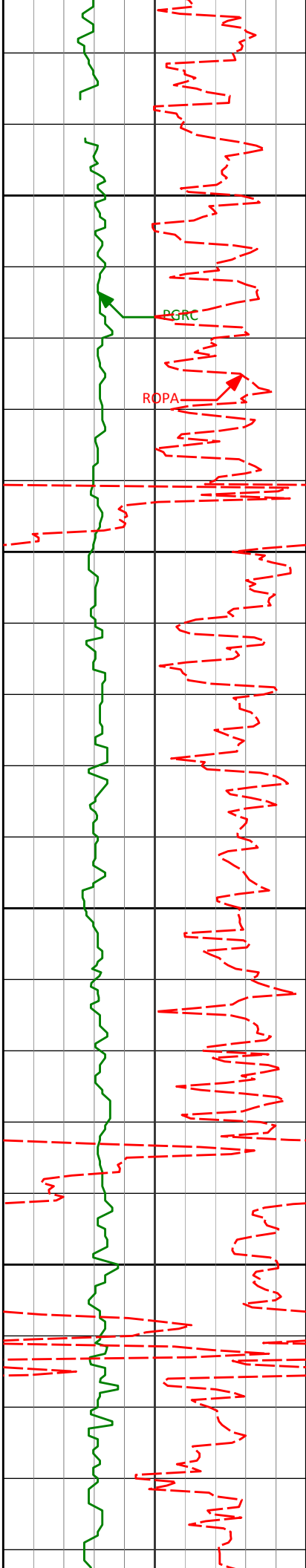
1762.93'

10.65'

1800

1850

1900



1950

2000

2050

2100

1947'

0.64°

189.58°

1946.92'

8.09'

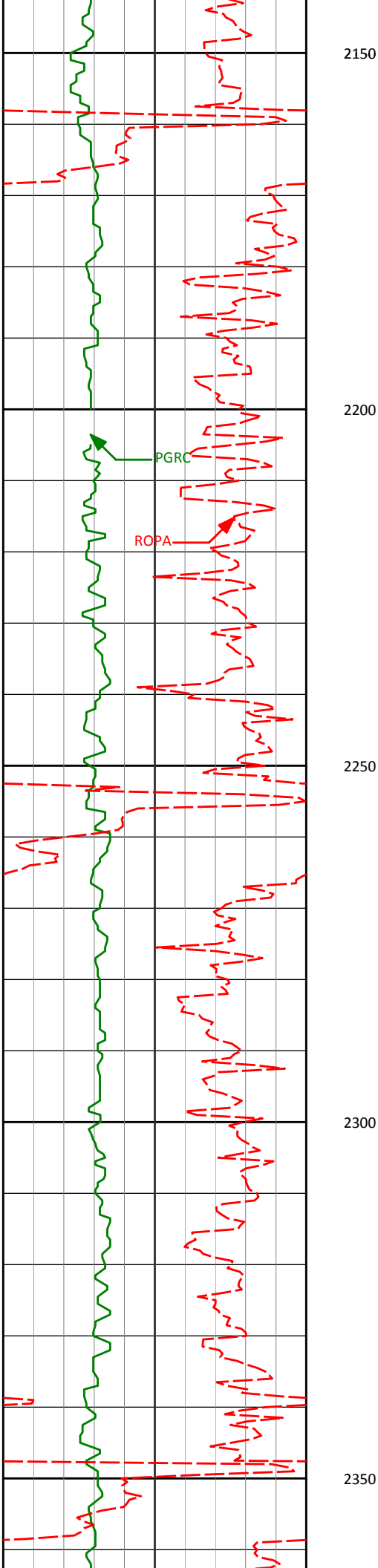
2129'

0.45°

229.19°

2128.91'

6.62'



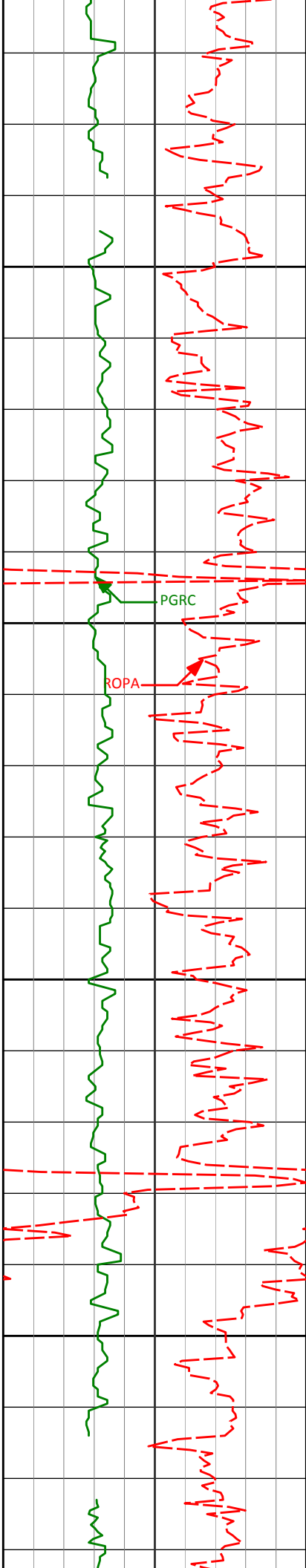
2312'

0.28°

153.62°

2311.91'

5.75'



2400

2450

2500

2550

PGRC

ROPA

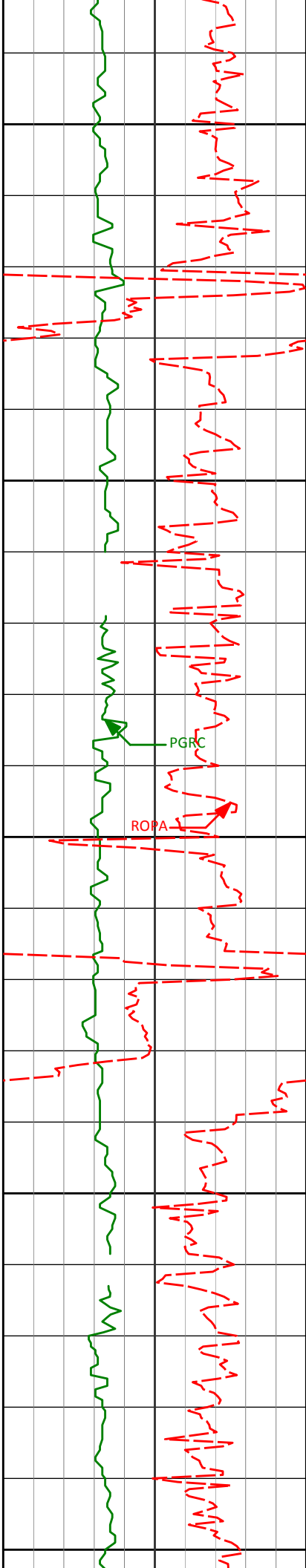
2495'

0.34°

109.75°

2494.90'

5.16'



2600

2650

2679'

0.15°

181.67°

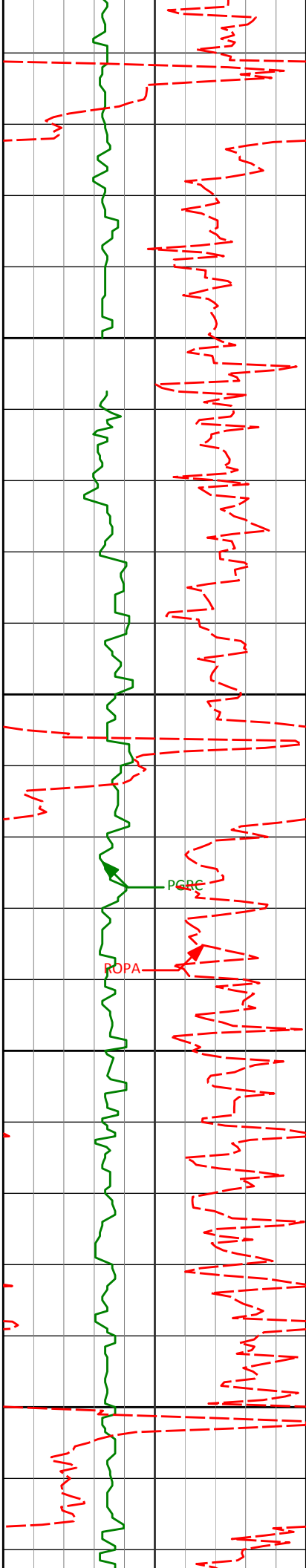
2678.90'

4.74'

2700

2750

2800



2850

2862'

0.54°

185.20°

2861.90'

3.64'

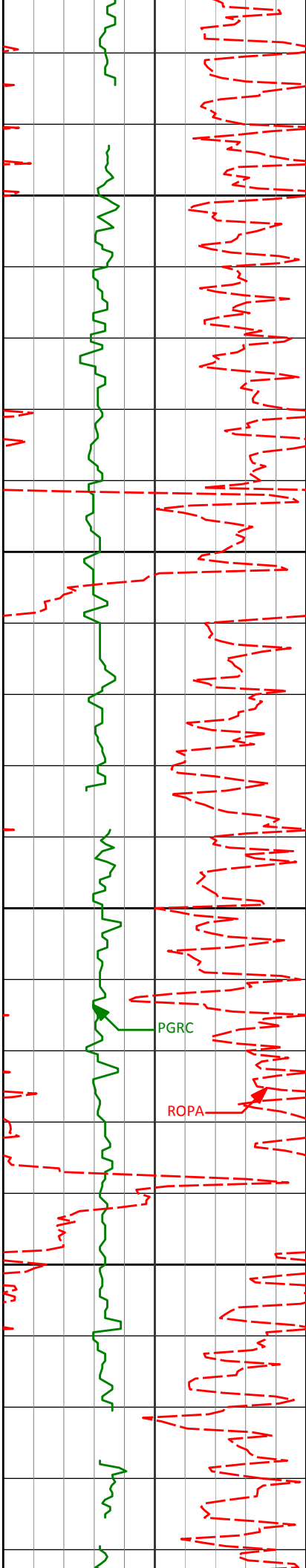
2900

POBC

POPA

2950

3000



3050

3100

3150

3200

3045'

1.14°

238.66°

3044.88'

1.84'

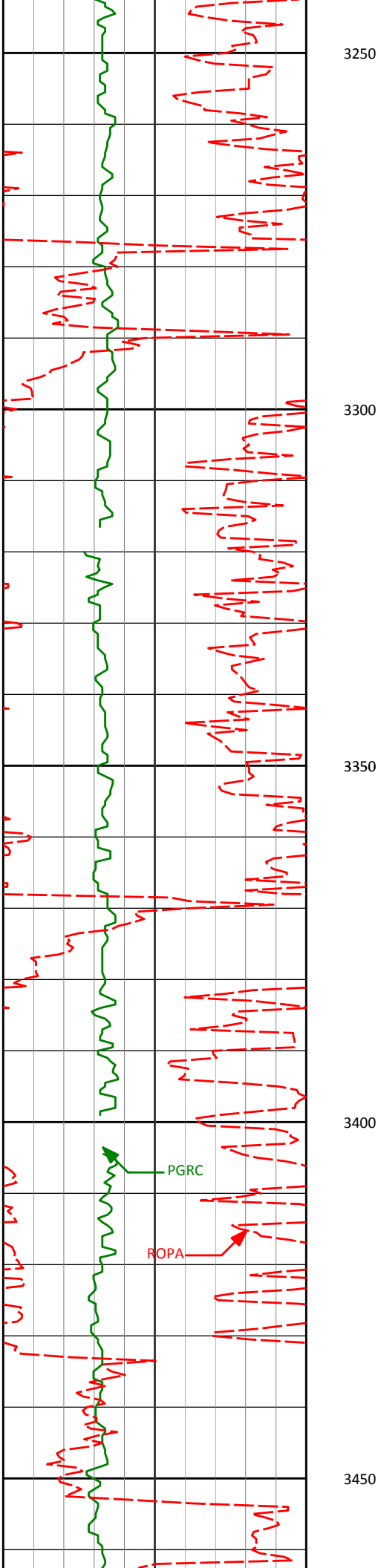
3228'

0.42°

82.32°

3227.87'

0.98'



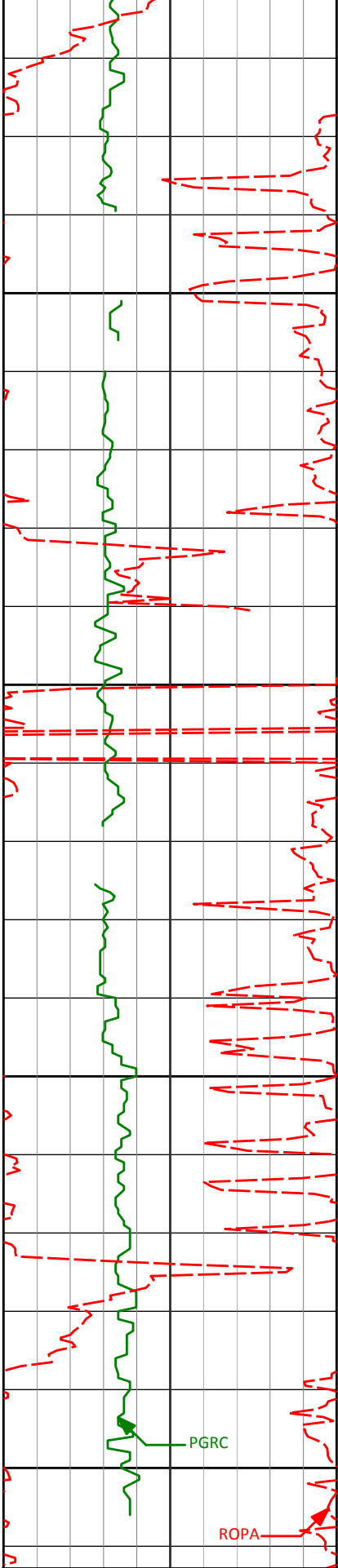
3405'

1.12°

39.46°

3404.85'

2.40'



3500

3550

3575'

0.19°

123.55°

3574.84'

3.53'

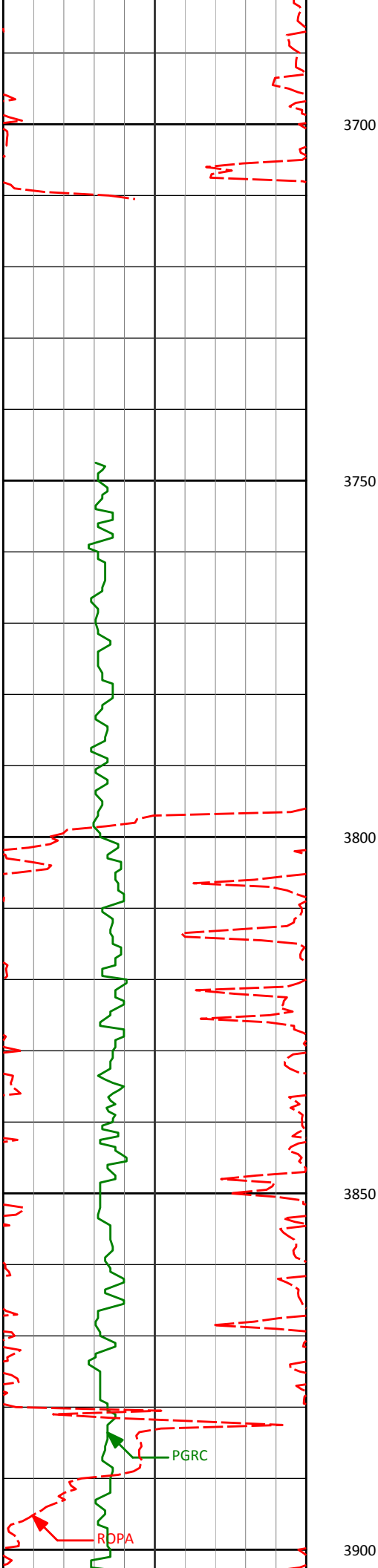
3600

3650

PGRC

ROPA

Gamma missing due to poor detection



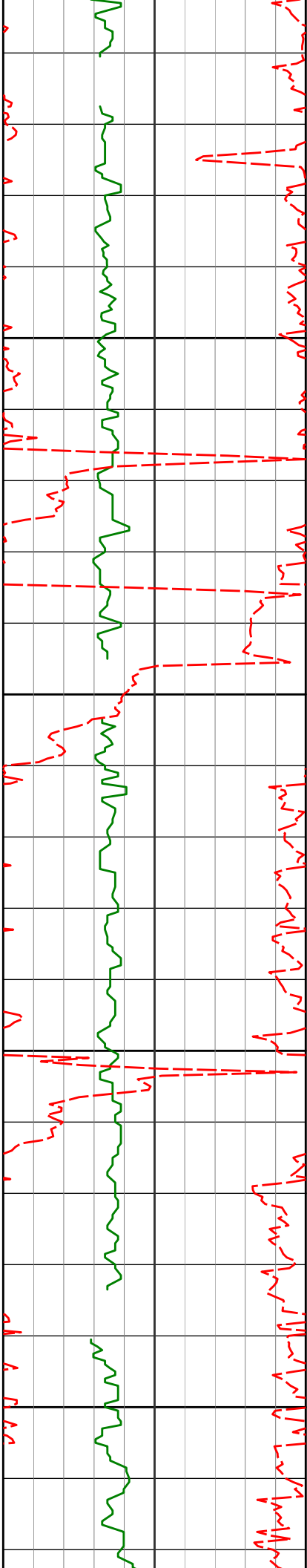
3747'

0.37°

35.59°

3746.84'

3.82'



3917'

1.60°

30.64°

3916.81'

6.31'

3950

4000

4050

4088'

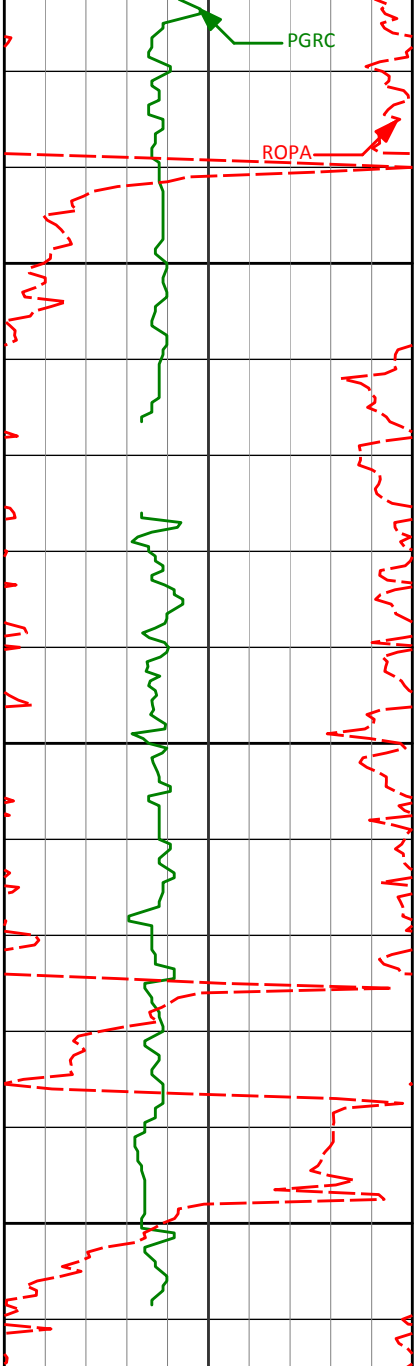
1.32°

31.29°

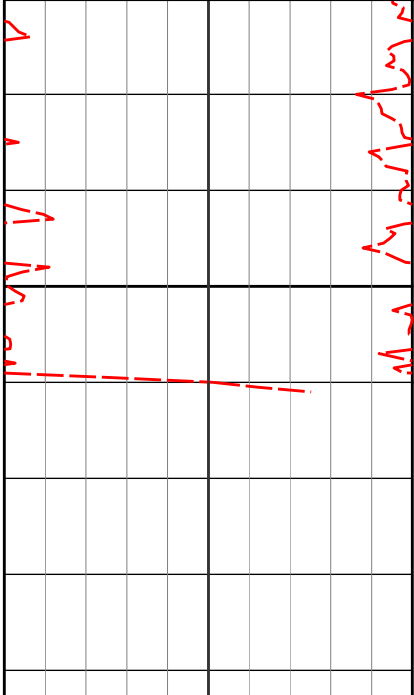
4087.76'

10.05'

4100



Gamma missing due to poor detection



4150

4200

4250

4259'

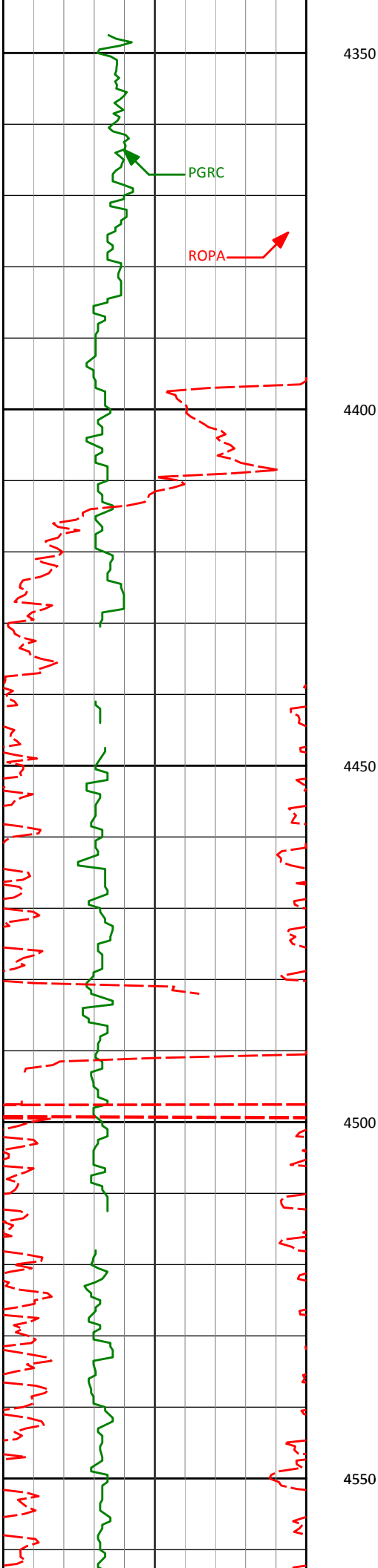
0.91°

221.03°

4258.75'

10.71'

4300



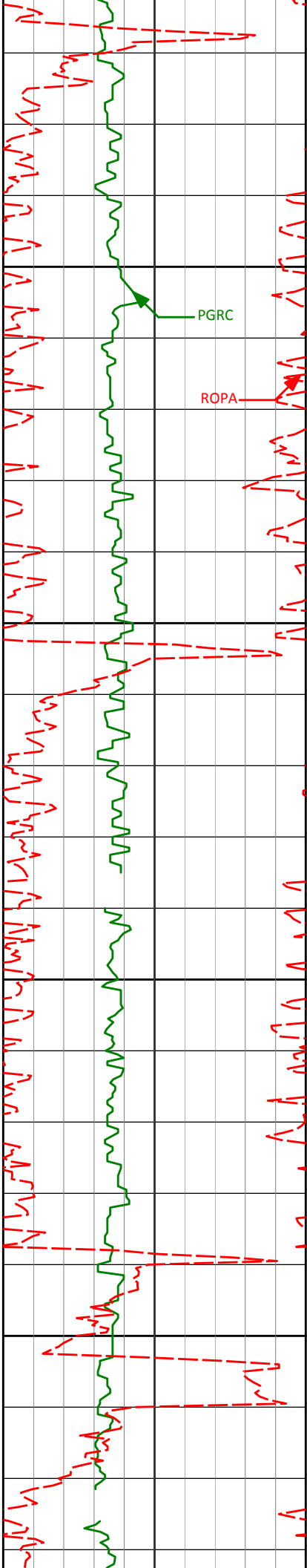
4430'

1.17°

241.56°

4429.72'

8.85'



4600

4602'

1.06°

278.60°

4601.69'

8.25'

PGRC

ROPA

4650

4700

4750

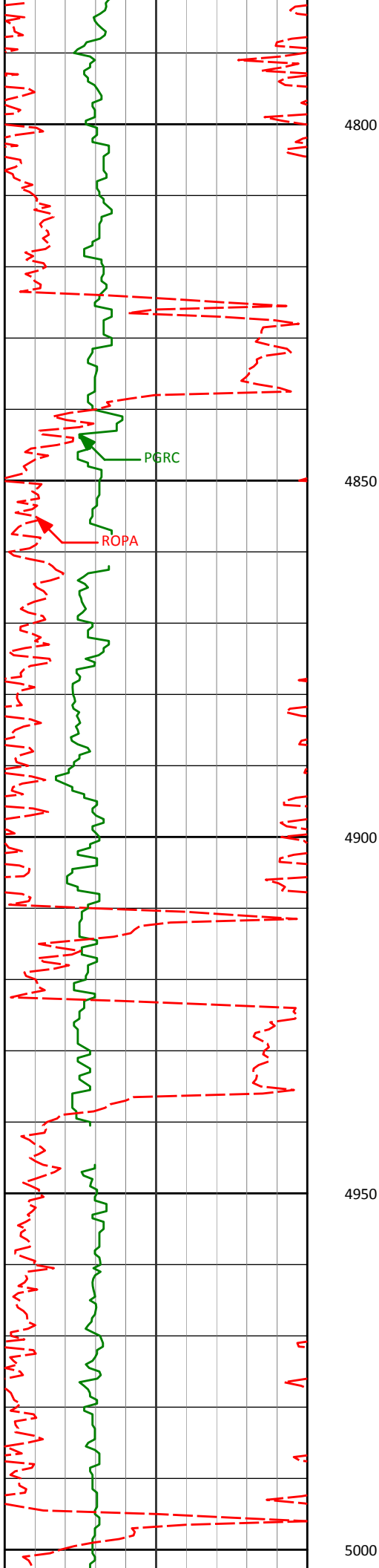
4772'

0.85°

306.52°

4771.66'

9.24'



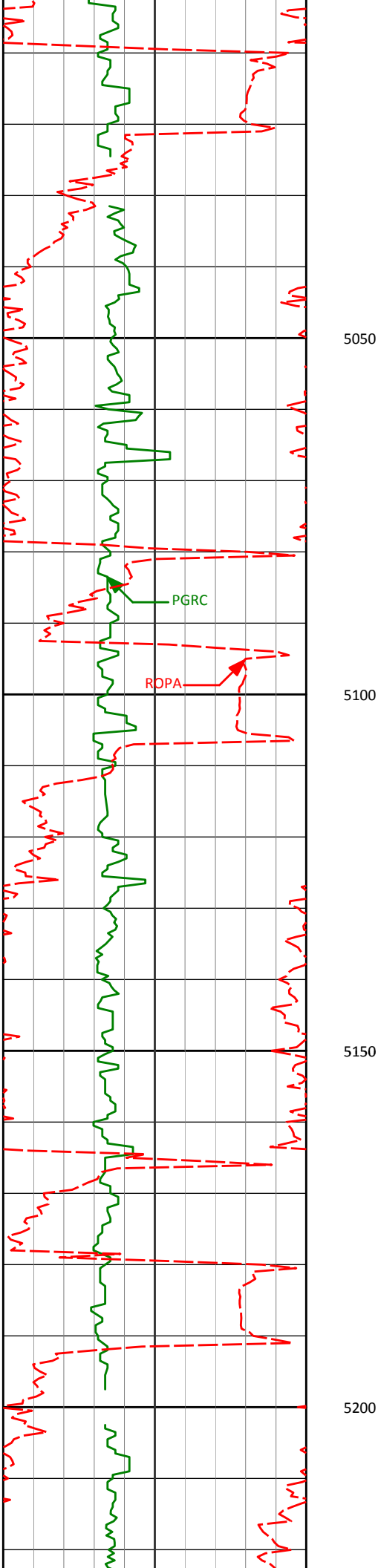
4943'

1.52°

116.02°

4942.65'

9.00'



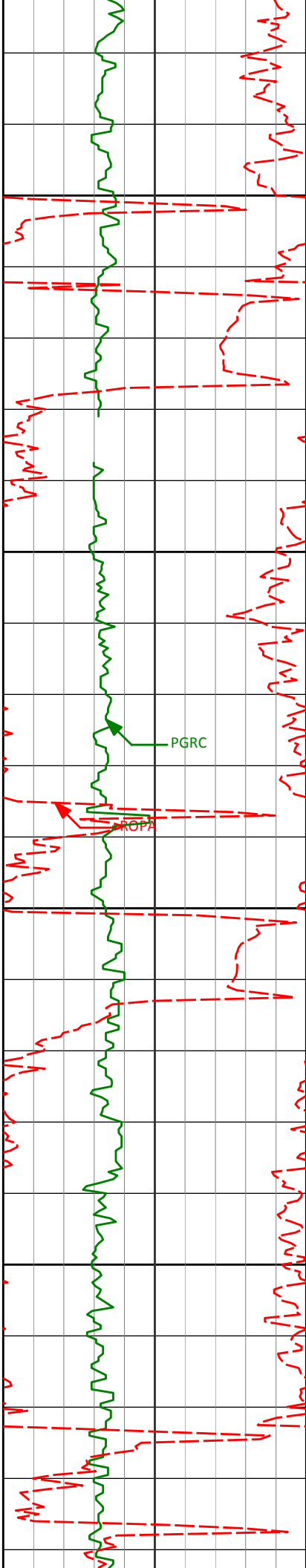
5113'

4.83°

136.08°

5112.37'

2.85'



5250

5284'

8.06°

129.48°

5282.27'

-9.96'

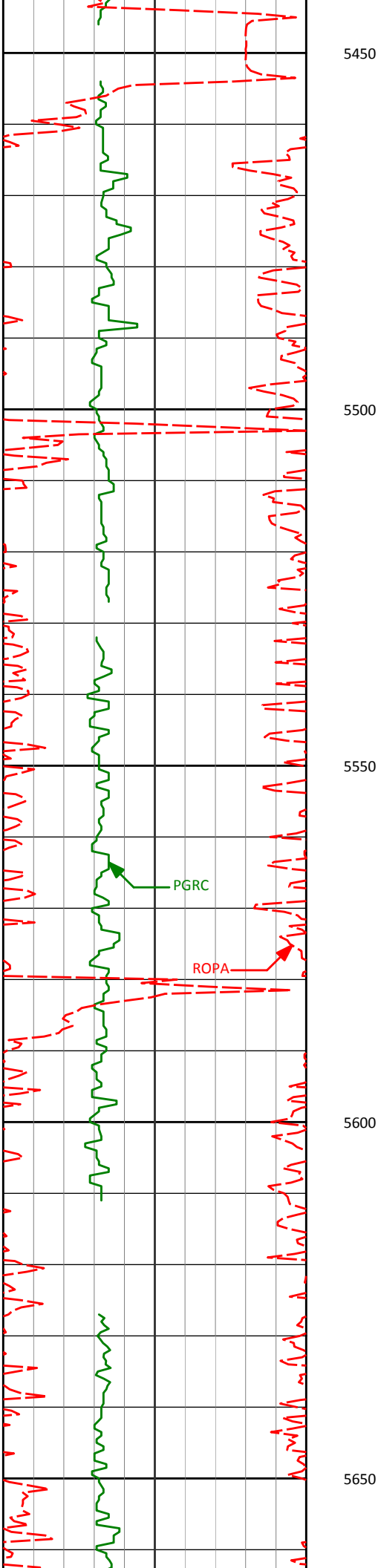
5300

PGRC

ROPA

5350

5400



5455'

10.25°

122.17°

5451.08'

-25.69'

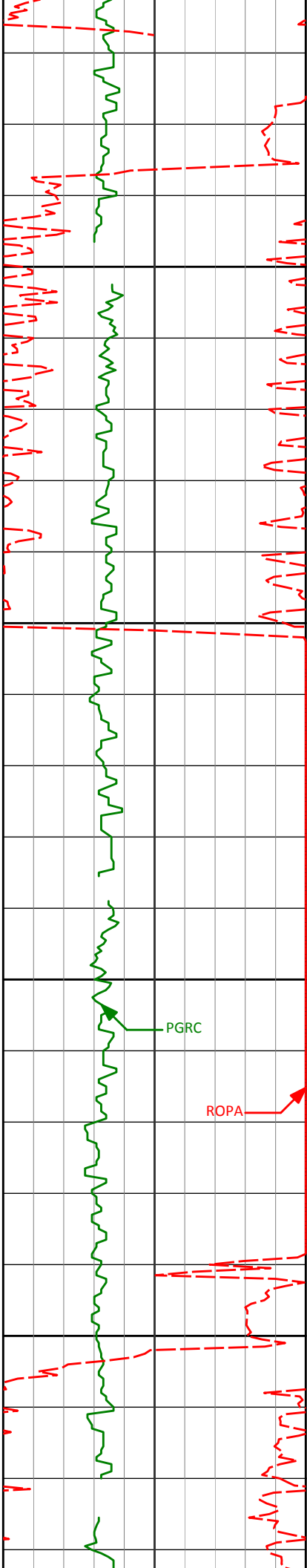
5627'

9.08°

123.87°

5620.64'

-41.40'



5700

5750

5800

5850

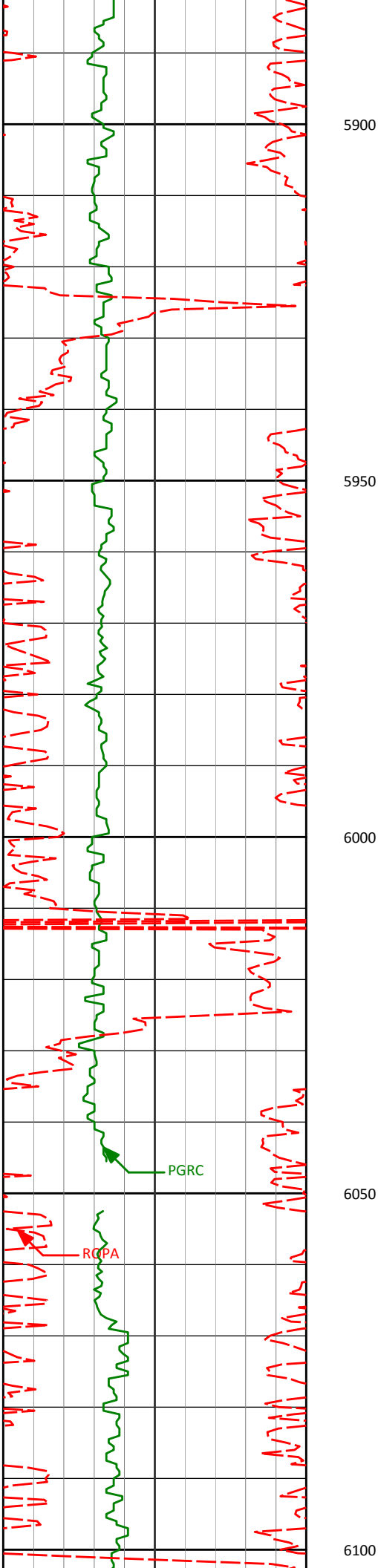
5798'

9.73°

120.38°

5789.34'

-56.23'



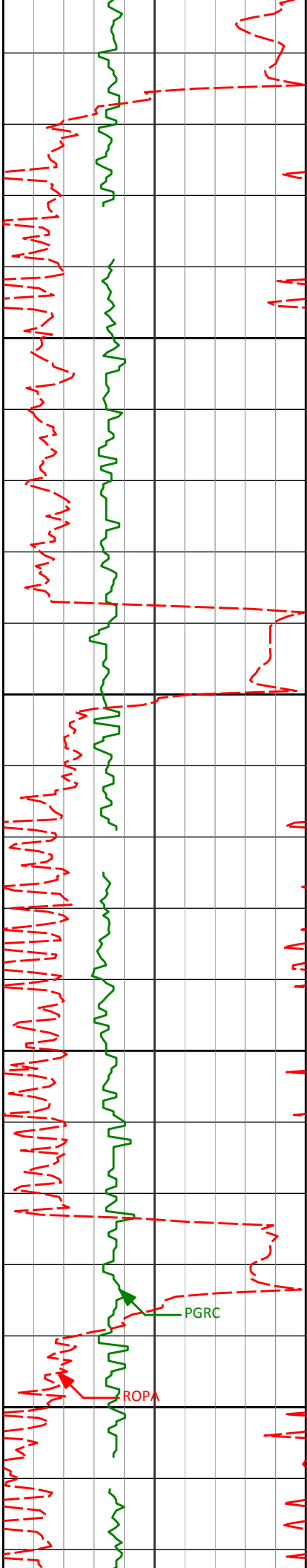
5969'

9.70°

119.51°

5957.89'

-70.63'



6140'

9.07°

120.26°

6126.60'

-84.52'

6150

6200

6250

6300

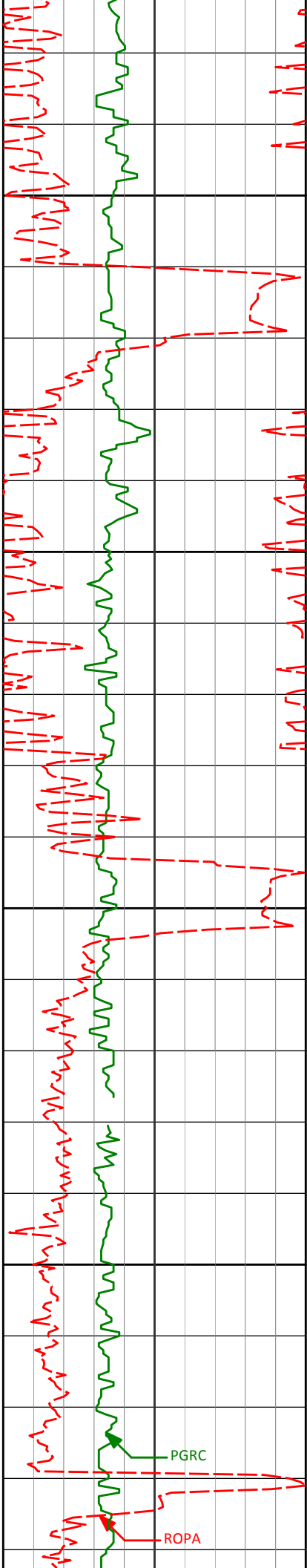
6312'

9.90°

122.42°

6296.25'

-99.28'



6350

6400

6450

6483'

10.82°

116.59°

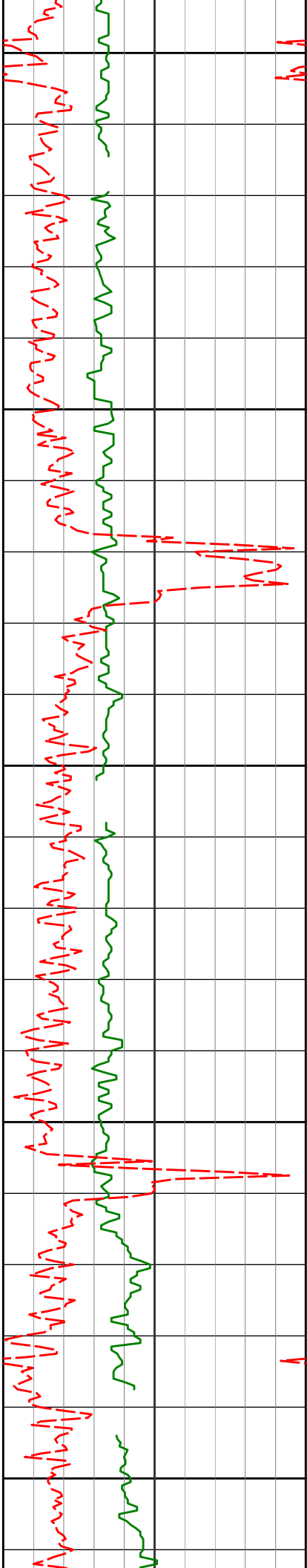
6464.46'

-114.34'

6500

PGRC

ROPA



6550

6600

6650

6700

6750

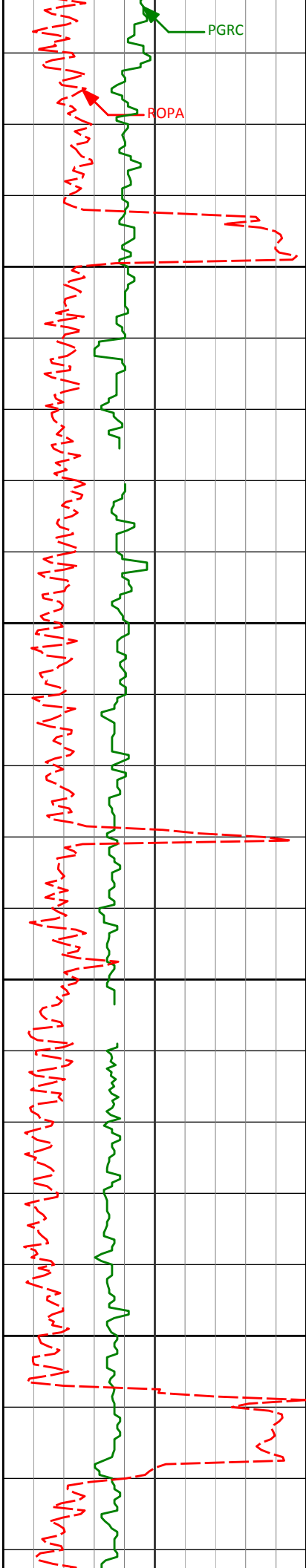
6654'

8.13°

113.72°

6633.12'

-126.39'



6800

6824'

5.10°

116.58°

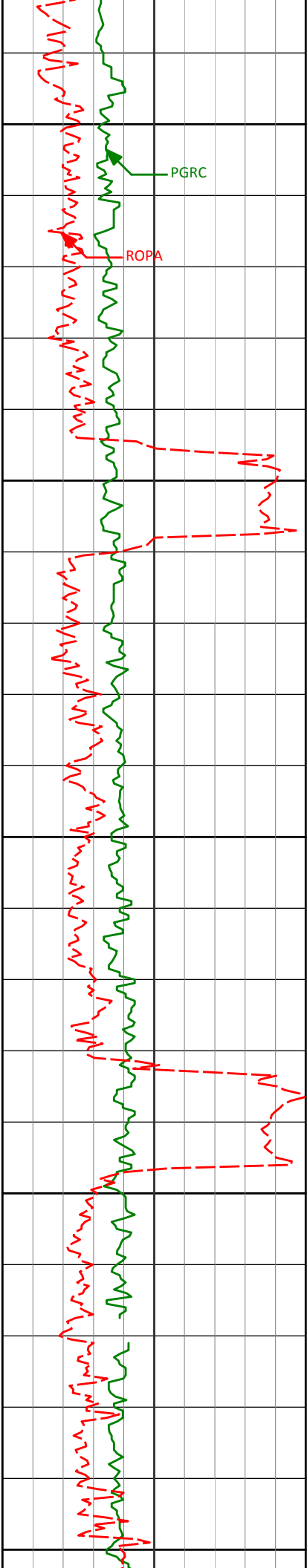
6801.96'

-134.61'

6850

6900

6950



7000

7050

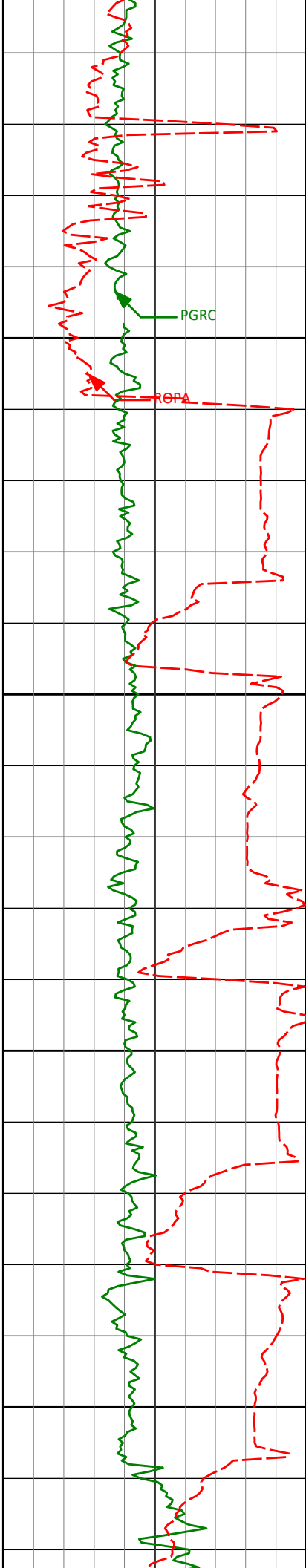
7100

7150

7200

6996' 3.25° 129.63° 6973.50' -141.14'

7167' 0.30° 193.69° 7144.41' -144.67'



7250

7253'	0.74°	278.64°	7230.41'	-144.81'
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7294'	4.98°	348.54°	7271.35'	-143.02'
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7300

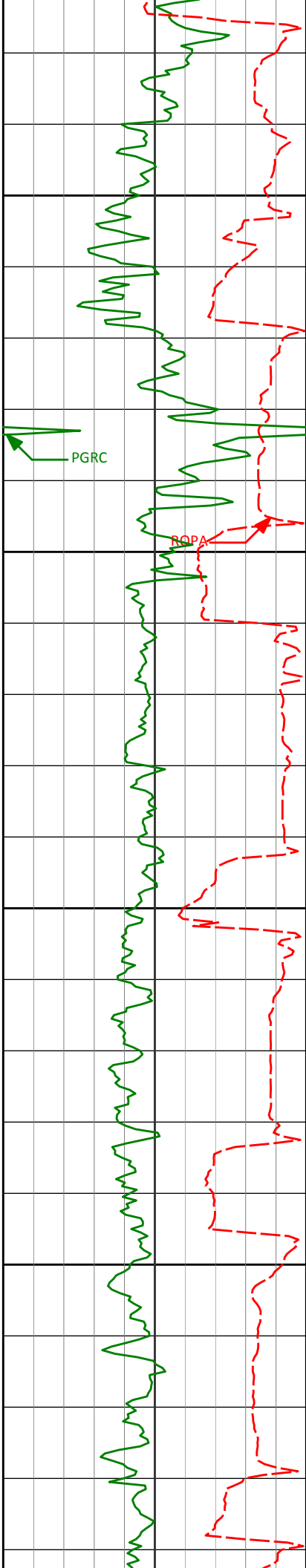
7335'	9.49°	354.14°	7312.01'	-137.91'
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7350

7378'	12.39°	349.95°	7354.23'	-129.84'
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7400

7421'	16.23°	350.93°	7395.89'	-119.36'
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7450

7464'

20.08°

351.04°

7436.74'

-106.13'

7500

7507'

24.18°

350.71°

7476.56'

-90.14'

7550

7550'

26.98°

354.91°

7515.35'

-71.73'

7600

7592'

30.57°

359.74°

7552.16'

-51.55'

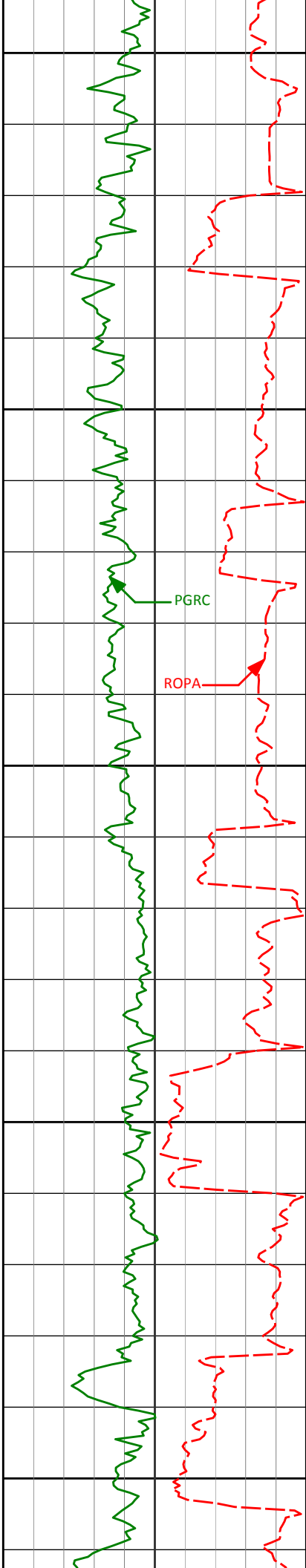
7635'

35.56°

359.03°

7588.18'

-28.10'



7650

7678'

38.97°

358.39°

7622.40'

-2.07'

7700

7721'

44.70°

0.56°

7654.43'

26.59'

7750

7763'

50.10°

3.57°

7682.85'

57.47'

7800

7806'

53.28°

2.72°

7709.50'

91.15'

7850

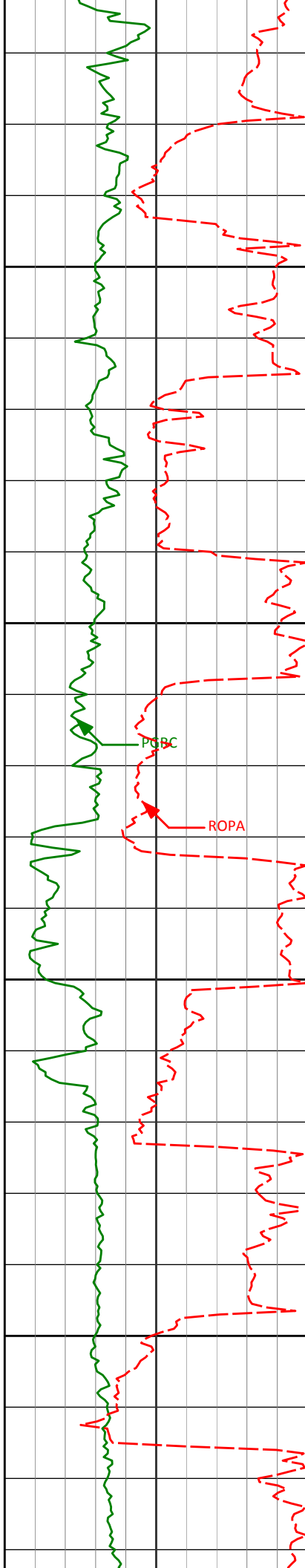
7849'

57.21°

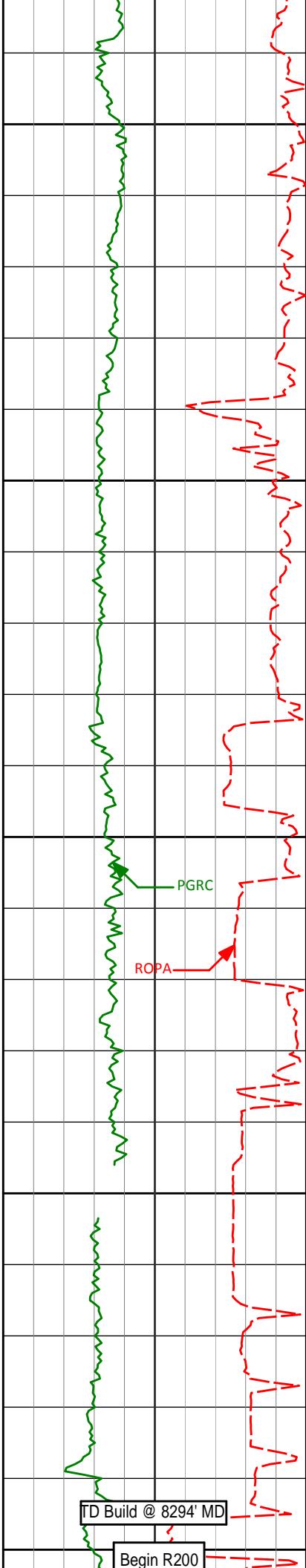
1.20°

7734.01'

126.45'



7900	7892'	62.47°	0.97°	7755.61'	163.61'
7950	7934'	65.15°	0.53°	7774.14'	201.29'
8000	7977'	66.93°	359.88°	7791.60'	240.59'
8050	8020'	69.80°	359.52°	7807.46'	280.55'
	8063'	72.84°	0.66°	7821.23'	321.28'



8100

8106'

77.55°

0.95°

7832.21'

362.84'

8150

8148'

83.51°

359.04°

7839.12'

404.24'

8200

8190'

88.21°

358.64°

7842.15'

446.11'

8250

8248'

90.49°

358.68°

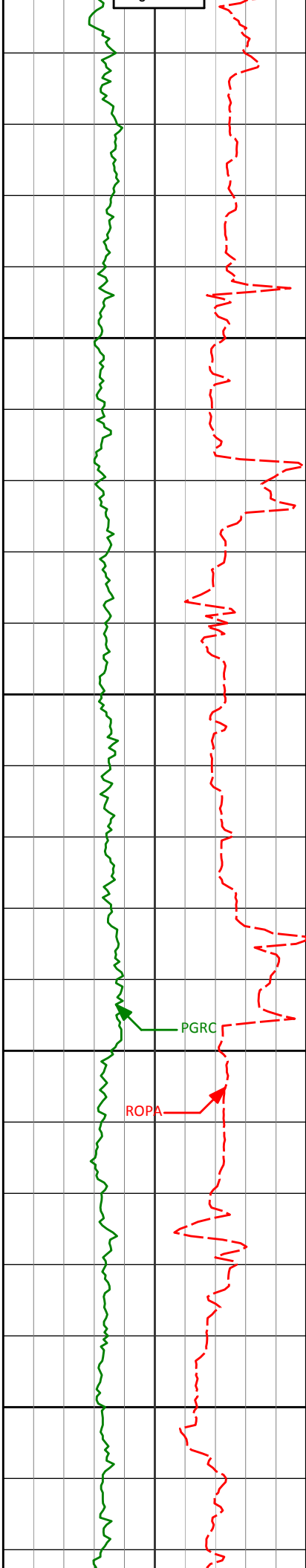
7842.81'

504.09'

8300

TD Build @ 8294' MD

Begin R200



8350

8386'

91.36°

358.77°

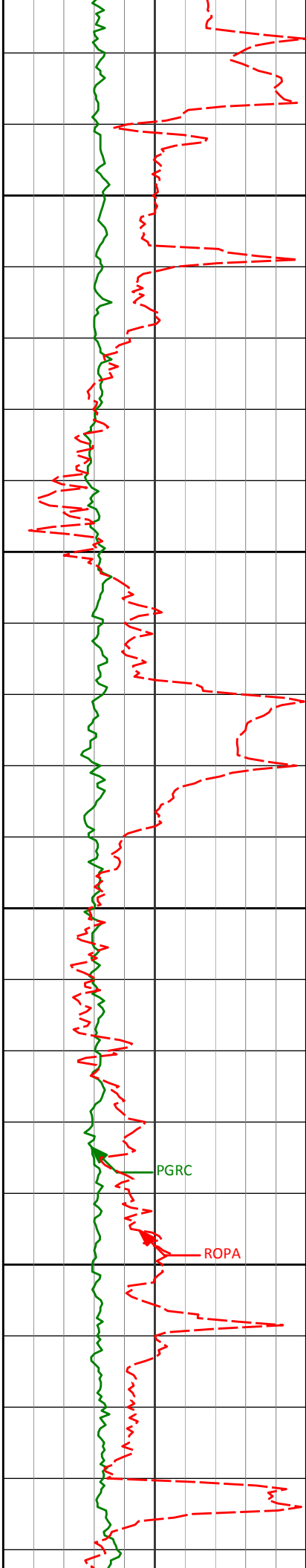
7840.58'

642.04'

8400

8450

8500



8550

8569'

91.11°

0.35°

7836.64'

824.98'

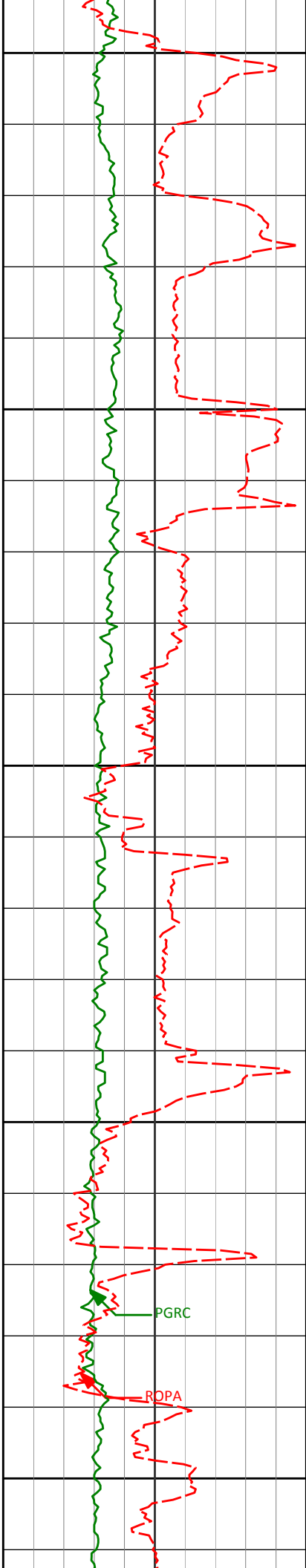
8600

8650

8700

PGRC

ROPA



8750

8752'

89.72°

359.67°

7835.31'

1007.97'

8800

8850

8900

8950

PGRC

ROPA

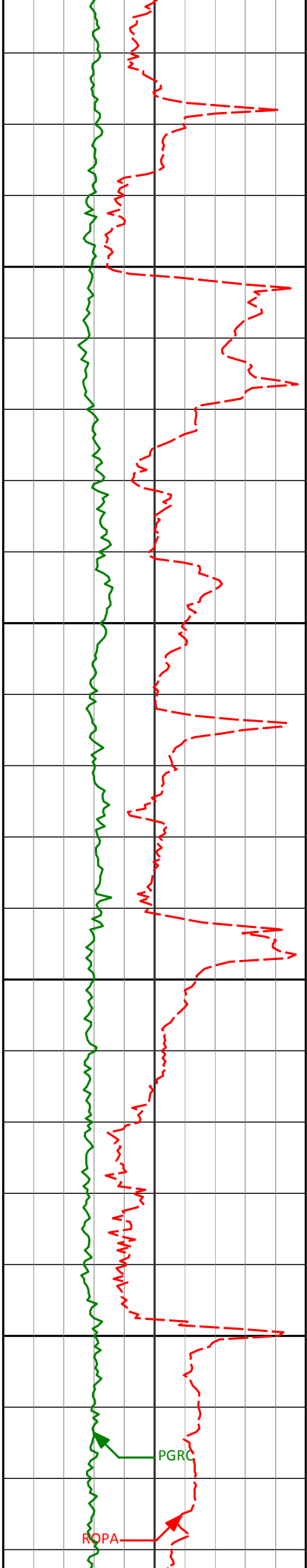
8930'

90.37°

0.31°

7835.17'

1185.97'



9000

9050

9100

9150

9100'

90.49°

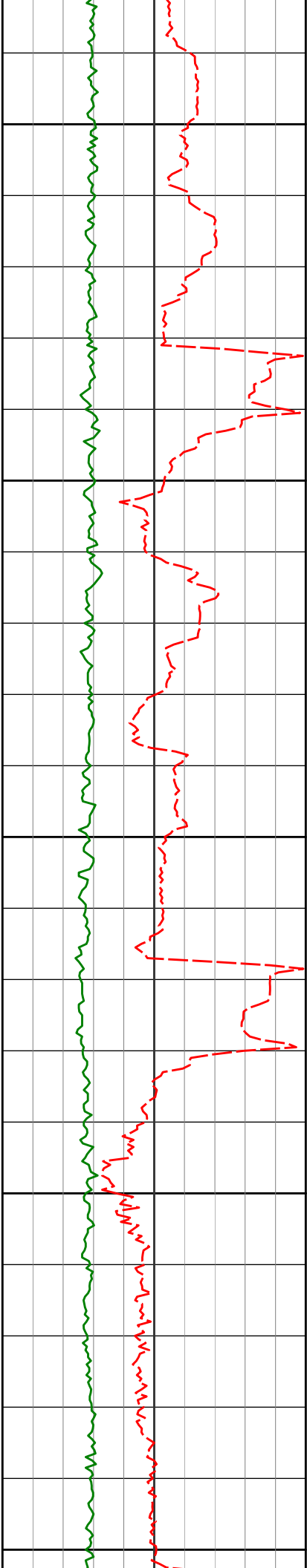
1.38°

7833.90'

1355.95'

PGRC

ROPA



9200

9250

9300

9350

9400

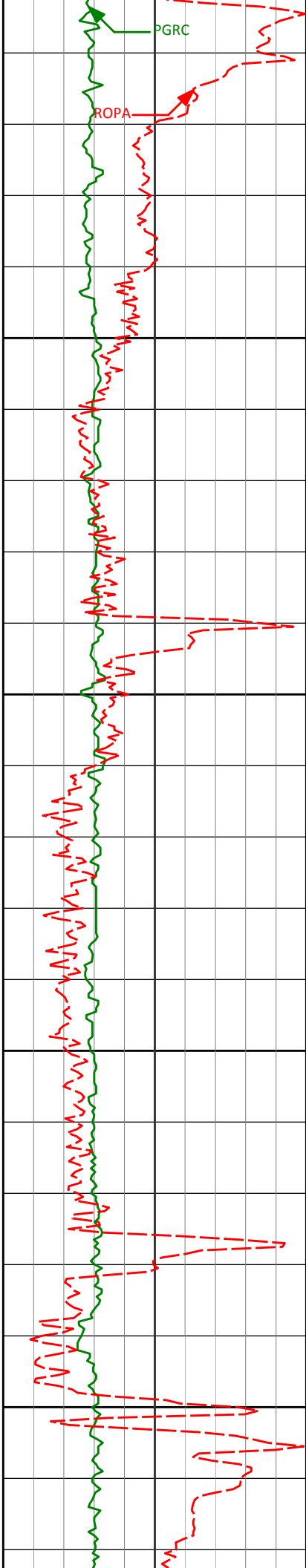
9271'

90.68°

0.97°

7832.15'

1526.90'



9442'

89.54°

0.47°

7831.82'

1697.88'

9450

9500

9550

9600

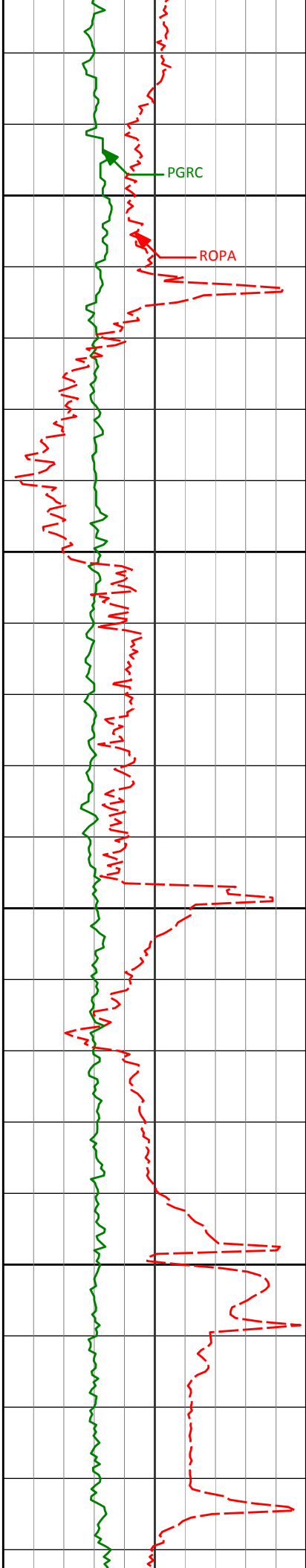
9614'

90.03°

0.53°

7832.47'

1869.88'



PGRC

ROPA

9650

9700

9750

9800

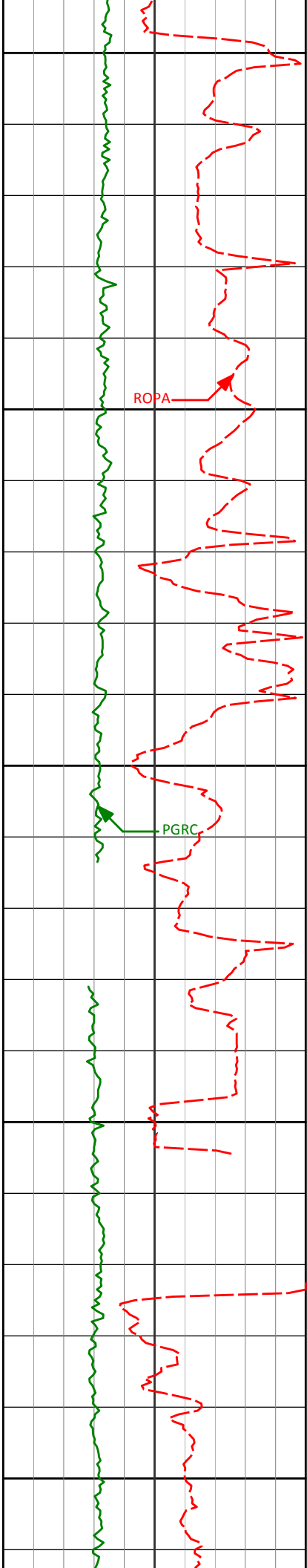
9784'

90.28°

0.15°

7832.01'

2039.87'



9850

9900

9950

9956'

90.25°

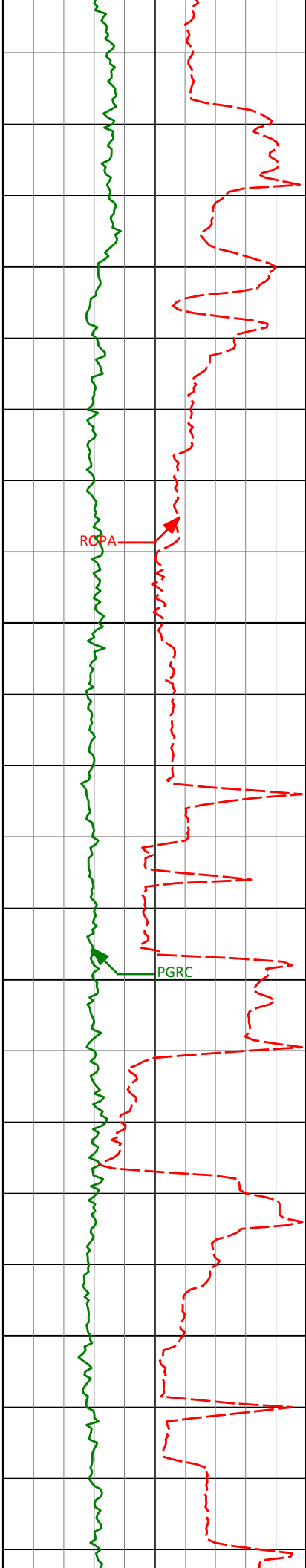
359.12°

7831.21'

2211.86'

10000

10050



10100

10126'

89.88°

359.03°

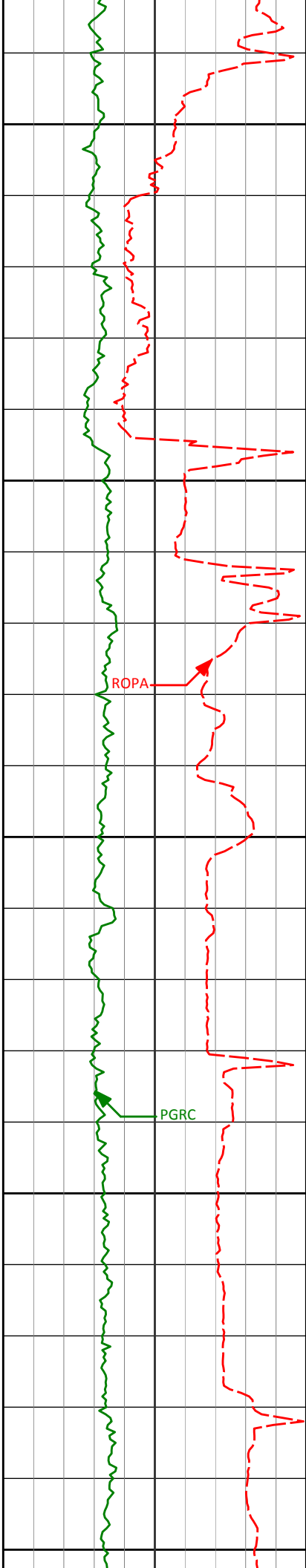
7831.02'

2381.84'

10150

10200

10250



10300

10350

10400

10450

10500

10297'

89.69°

0.28°

7831.66'

2552.83'

ROPA

PGRC

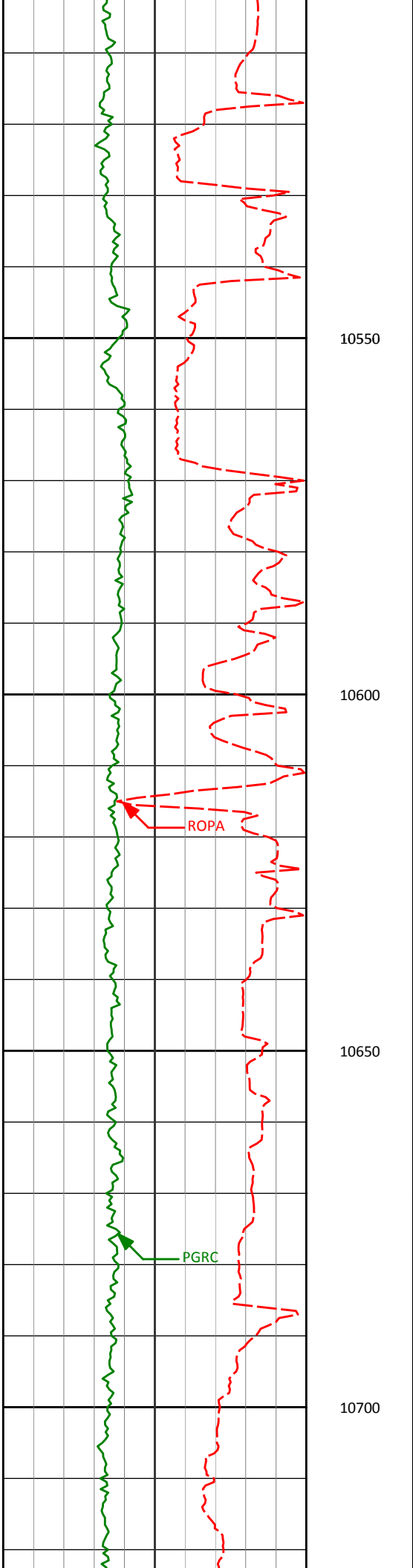
10468'

90.56°

359.86°

7831.29'

2723.83'



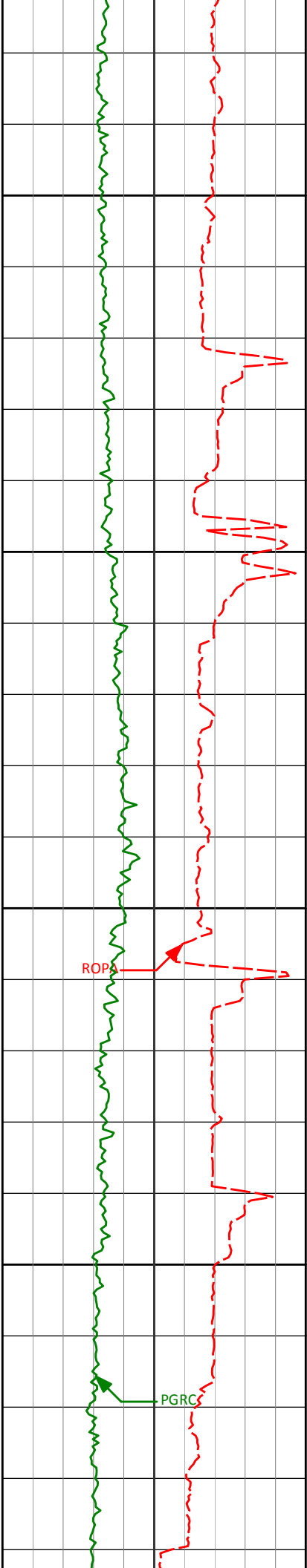
10637'

89.82°

359.98°

7830.73'

2892.83'



10750

10800

10850

10900

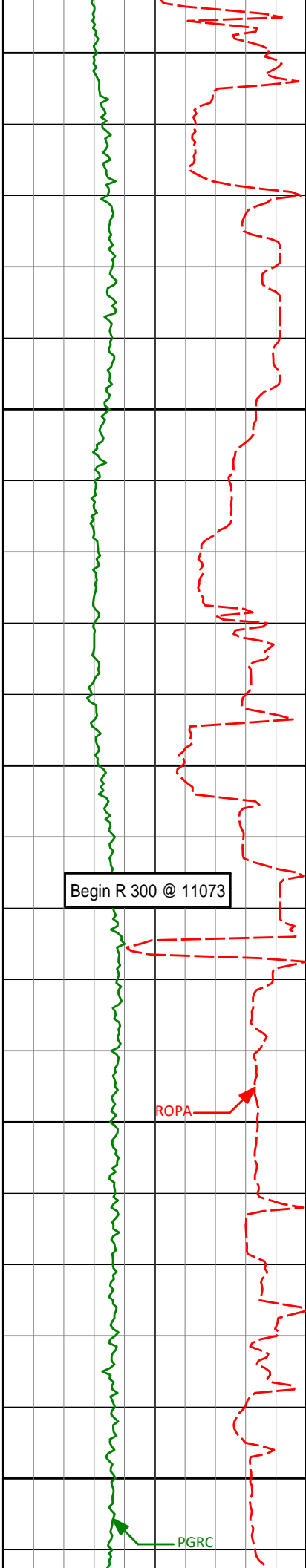
10809'

90.34°

359.74°

7830.49'

3064.83'



10950

10980'

91.14°

359.51°

7828.28'

3235.81'

11000

11050

Begin R 300 @ 11073

ROPA

11100

11150

11151'

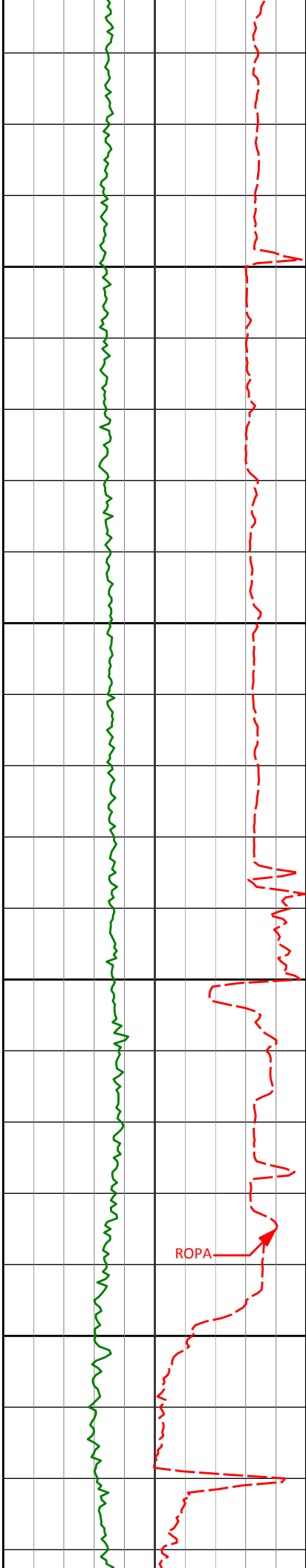
90.25°

359.03°

7826.20'

3406.78'

PGRC



11200

11250

11300

11350

11323'

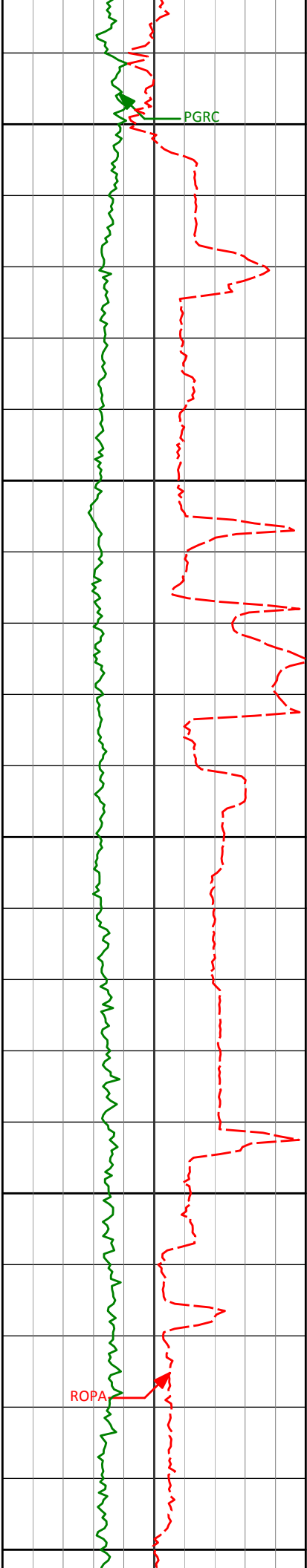
92.09°

359.70°

7822.69'

3578.72'

ROPA



11400

11450

11500

11550

11600

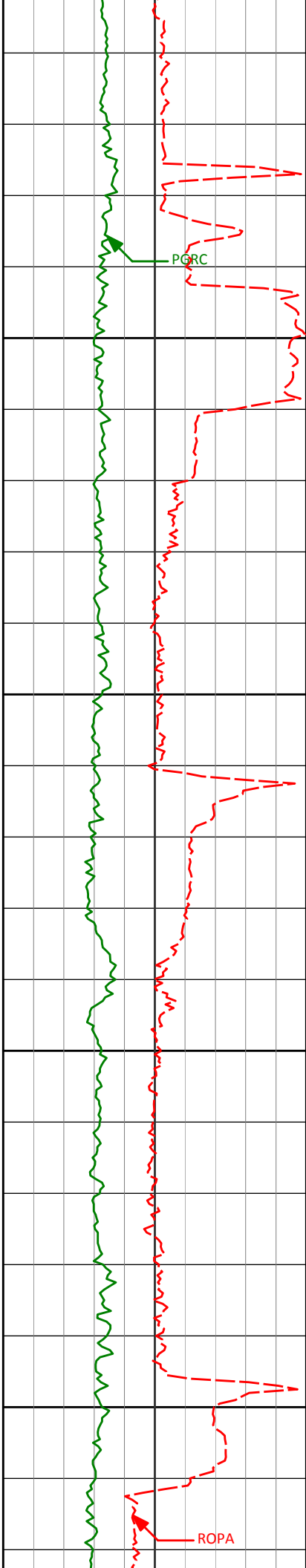
11494'

90.89°

358.95°

7818.25'

3749.65'



11650

11665'

90.09°

359.89°

7816.78'

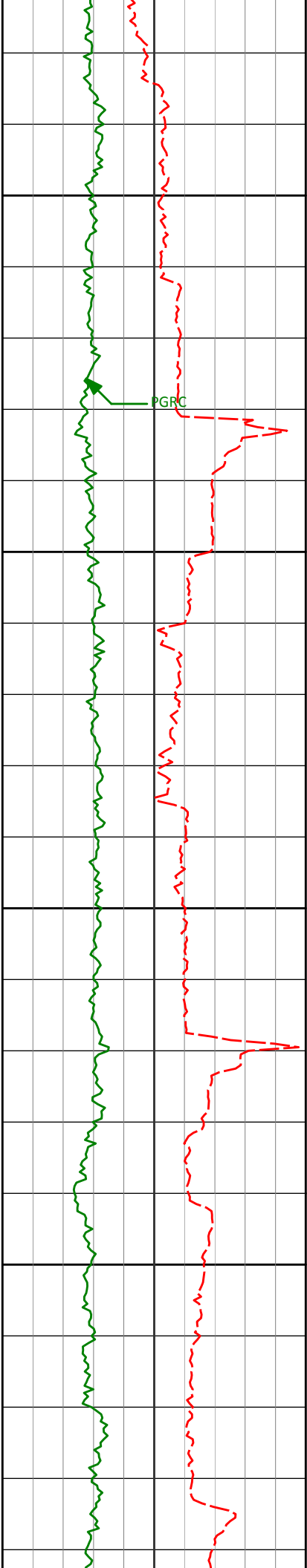
3920.63'

11700

11750

11800

ROPA



11850

11900

11950

12000

11835'

90.74°

359.76°

7815.55'

4090.63'

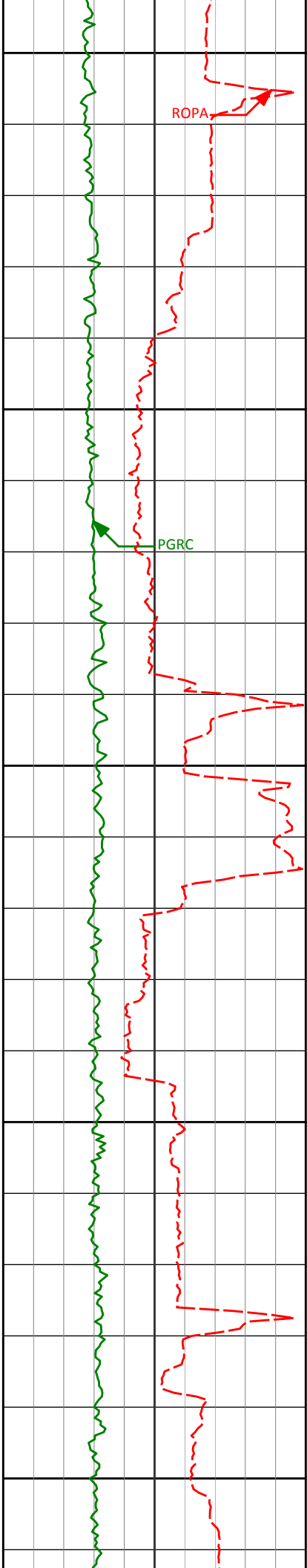
12006'

90.46°

359.01°

7813.76'

4261.60'



12050

12100

12150

12200

12250

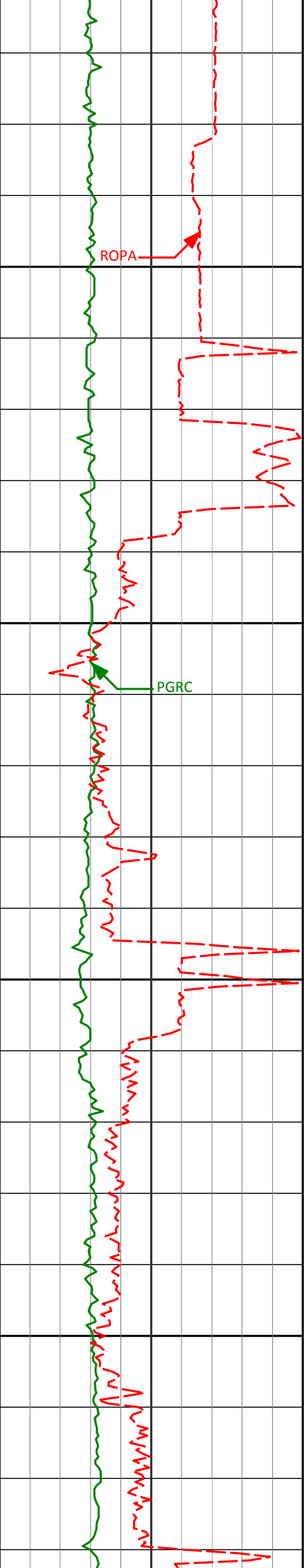
12176'

90.40°

359.38°

7812.49'

4431.58'



12300

12344'

12350

12400

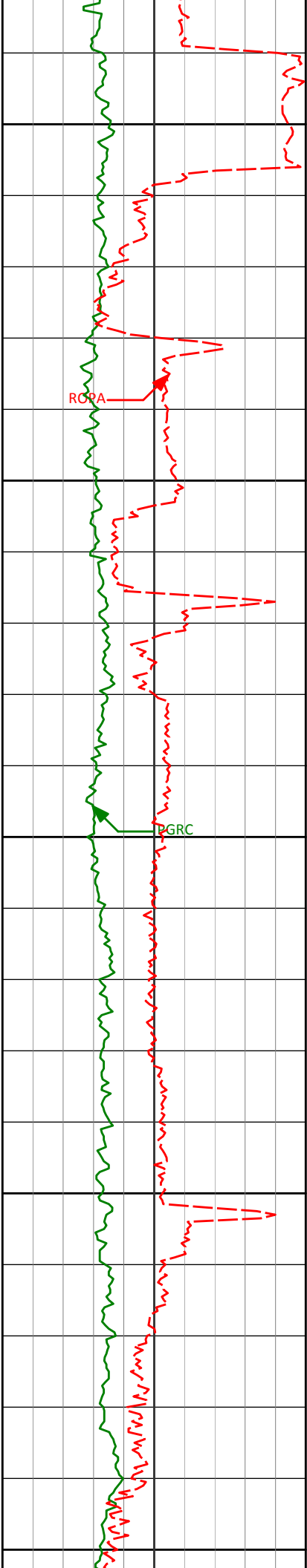
12450

89.63°

359.17°

7812.44'

4599.57'



12500

12515'

89.69°

359.91°

7813.46'

4770.56'

12550

12600

12650

12700

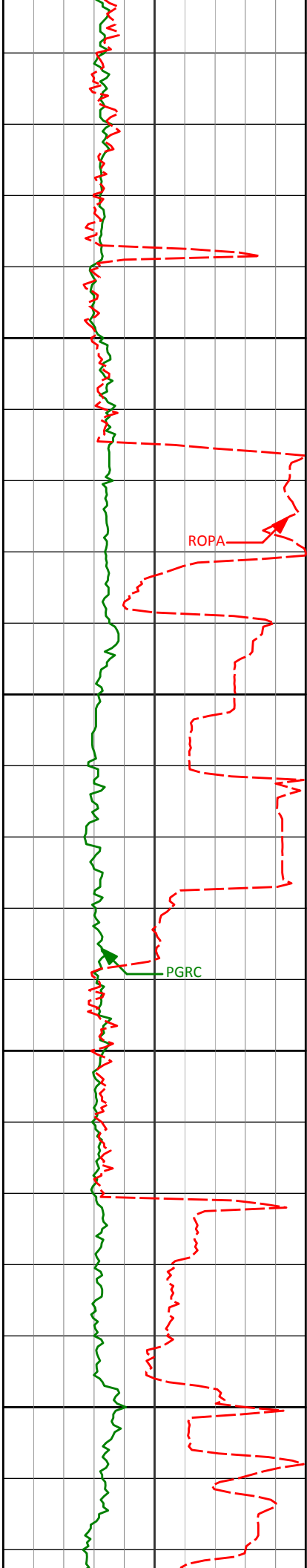
12686'

89.60°

359.20°

7814.52'

4941.55'



12750

ROPA

PGRC

12800

12850

12858'

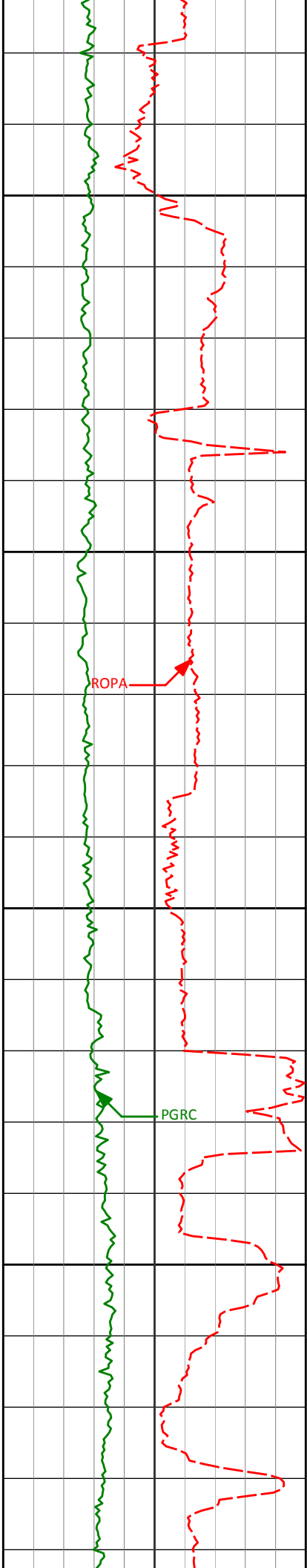
90.12°

1.37°

7814.94'

5113.54'

12900



12950

13000

ROPA

13029'

91.26°

1.10°

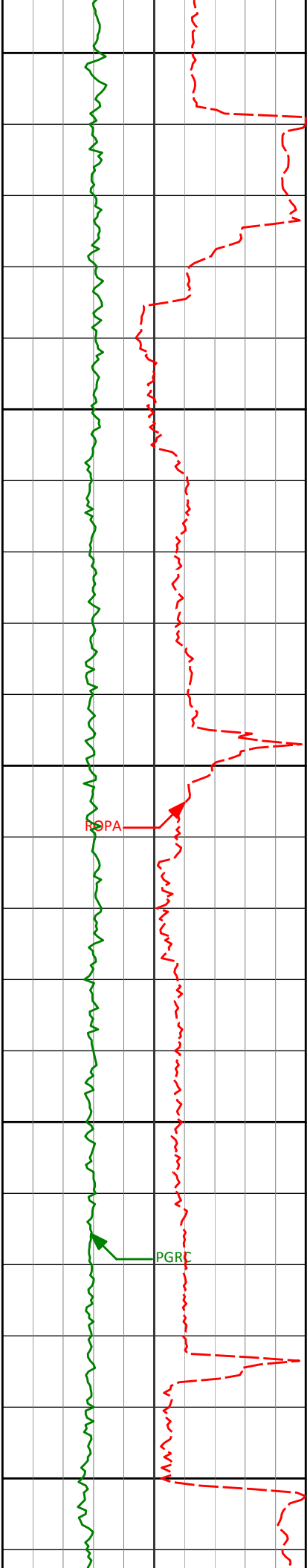
7812.88'

5284.48'

13050

PGRC

13100



13150

13200

13250

13300

13350

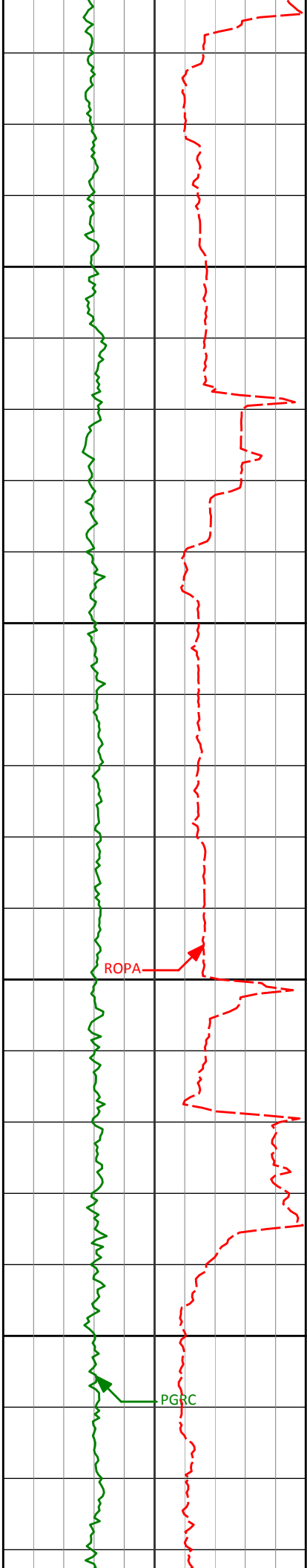
13200'

90.12°

1.24°

7810.82'

5455.43'



13370'

90.12°

0.46°

7810.46'

5625.41'

13400

13450

13500

13536'

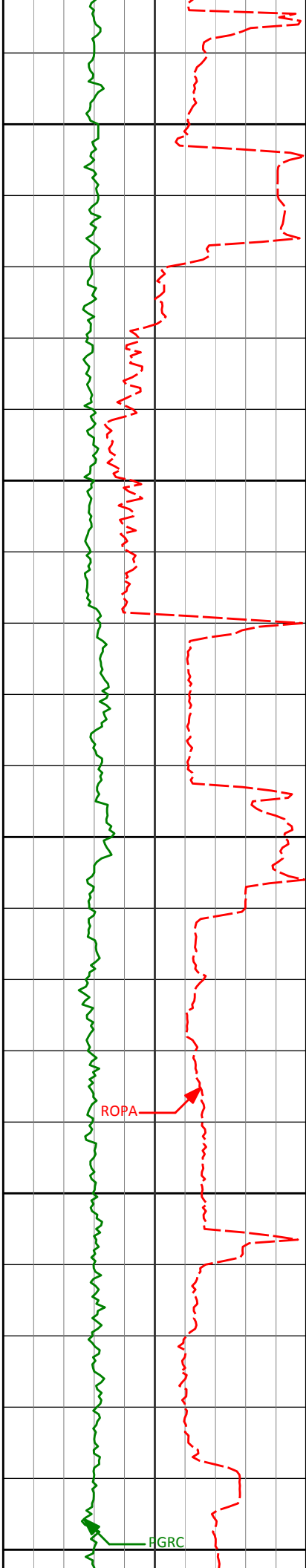
90.06°

359.61°

7810.20'

5791.41'

13550



13600

13650

13700

13750

13800

13707'

89.97°

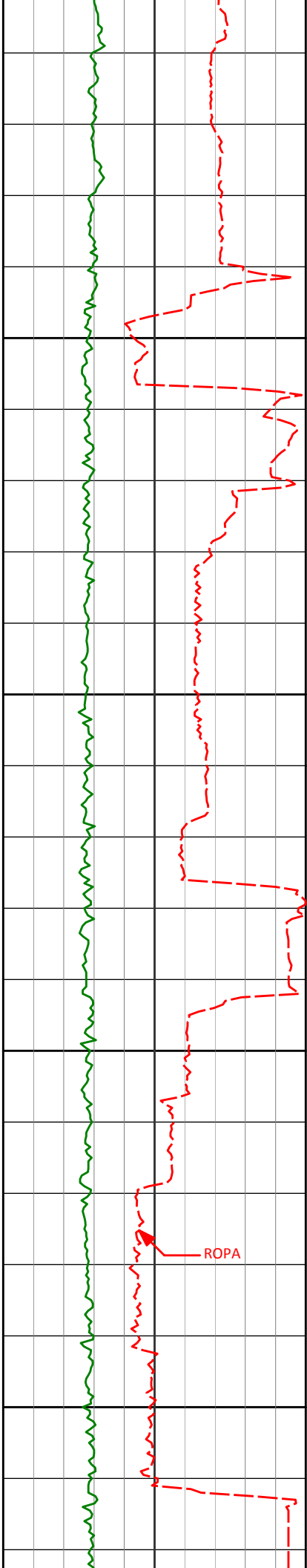
0.69°

7810.16'

5962.40'

ROPA

FGRC



13850

13878'

90.59°

1.00°

7809.32'

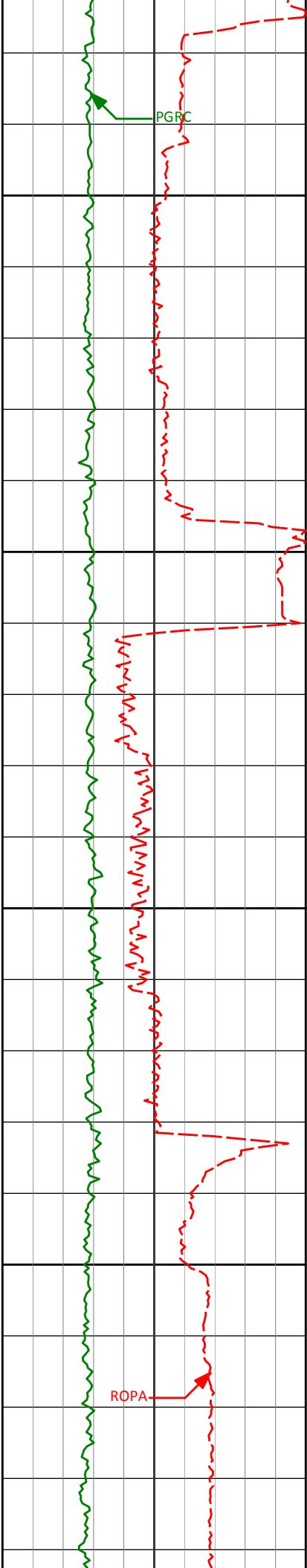
6133.38'

13900

13950

14000

ROPA



14050

14100

14150

14200

14049'

14219'

90.15°

90.37°

0.82°

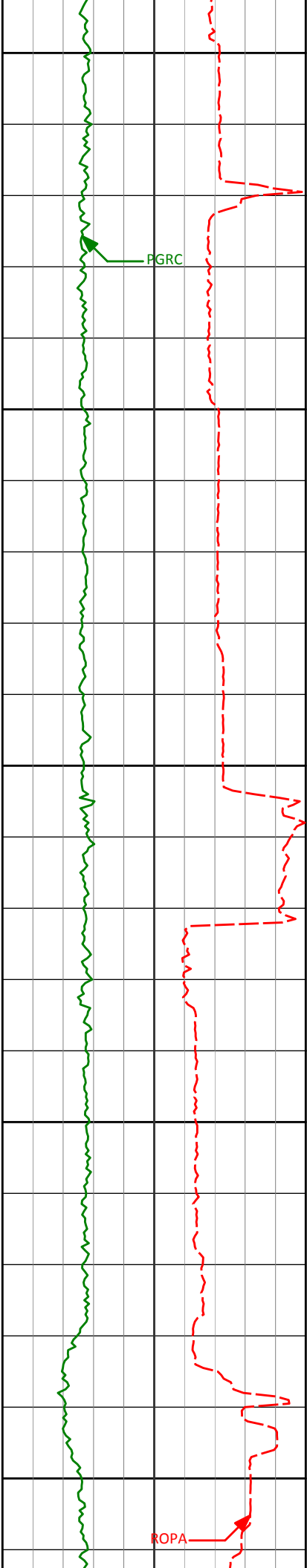
1.06°

7808.22'

7807.45'

6304.36'

6474.33'



14250

14300

14350

14390'

90.09°

359.84°

7806.76'

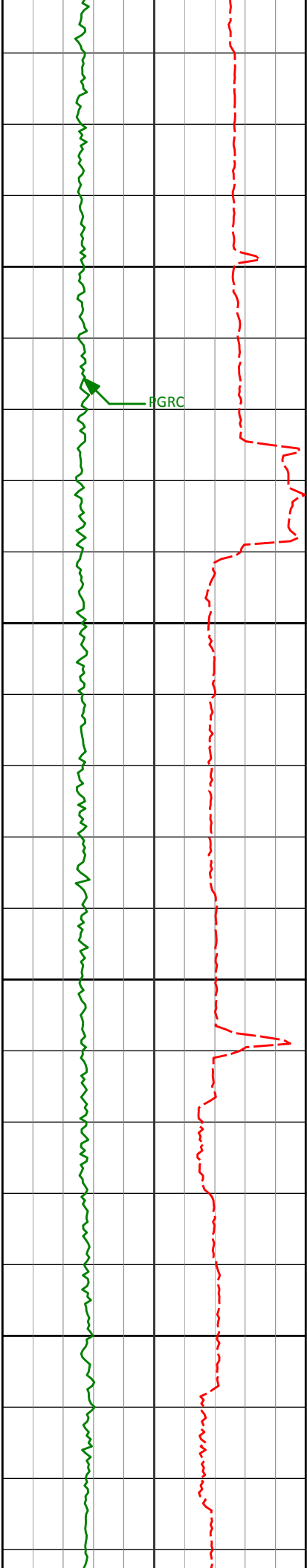
6645.32'

14400

14450

PGRC

ROPA



14500

14550

14600

14650

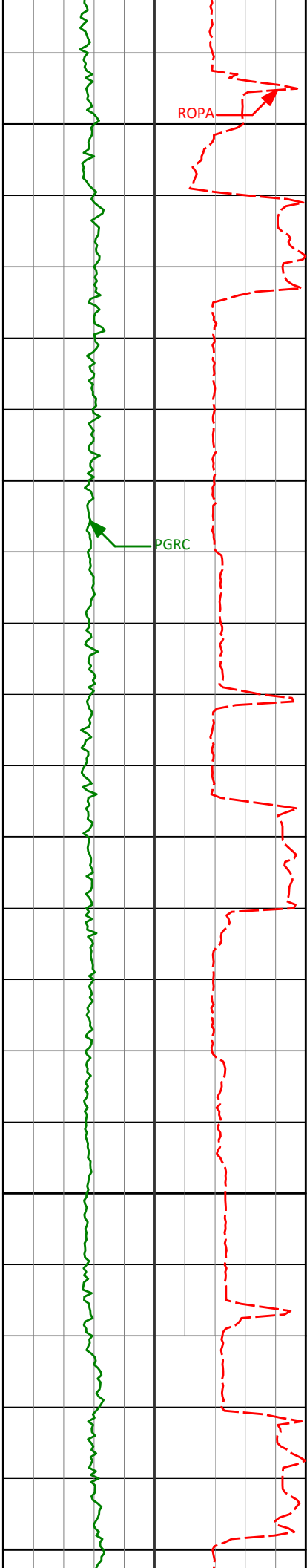
14557'

89.94°

359.24°

7806.72'

6812.32'



14700

14750

14800

14850

14900

14728'

90.77°

359.28°

7805.66'

6983.30'

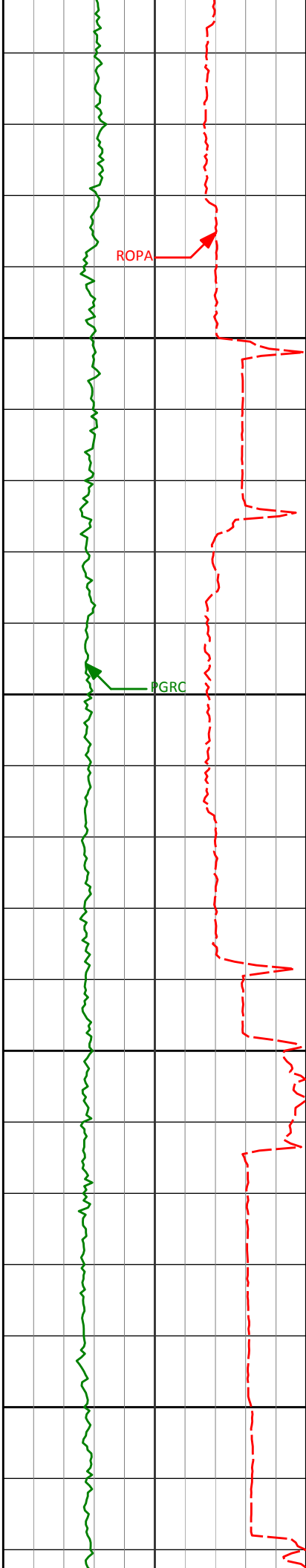
14898'

89.91°

358.88°

7804.65'

7153.27'



14950

15000

15050

15100

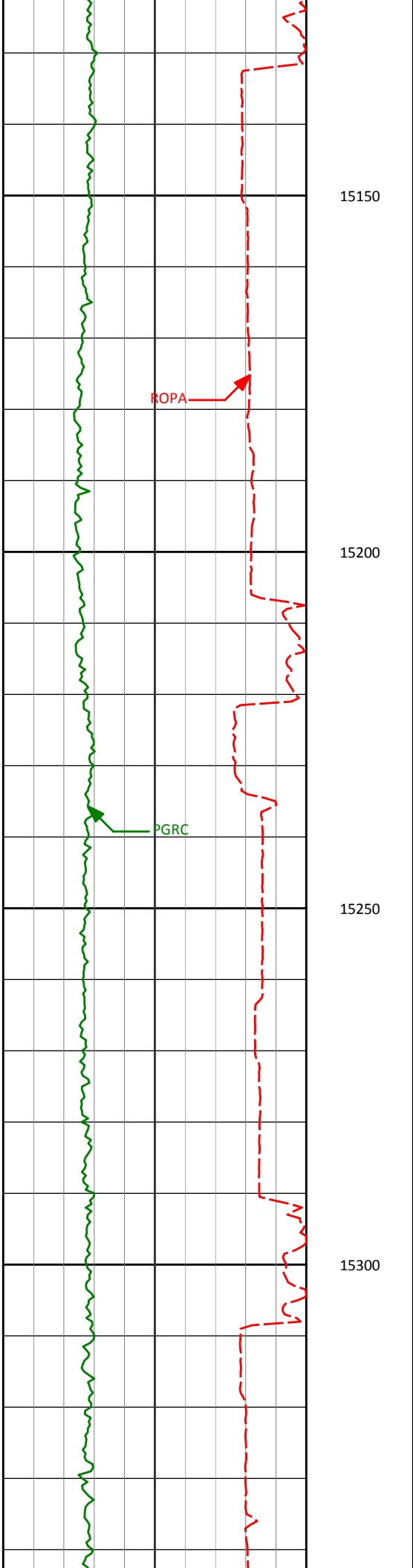
15070'

90.80°

359.40°

7803.58'

7325.24'



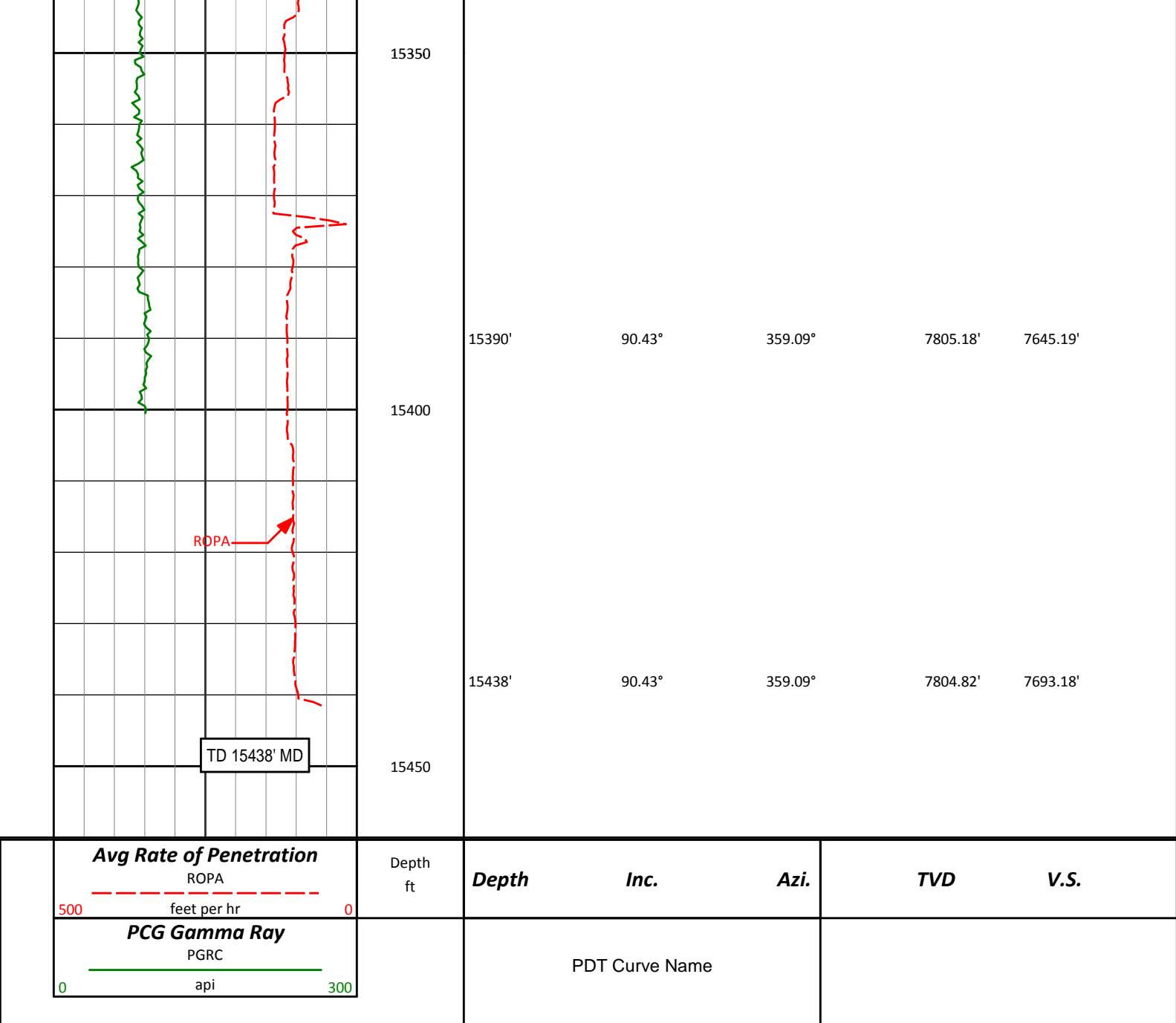
15241'

88.80°

358.95°

7804.18'

7496.22'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp
Howard 3C-29HZ
Wattenburg
Weld Colorado
USA
CA-XX-0901445564

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
902.00	0.21	322.35	901.98	5.41 N	2.23 E	5.41	TIE-IN
1012.00	0.62	56.41	1011.98	5.90 N	2.60 E	5.90	0.61
1201.00	0.48	25.62	1200.97	7.18 N	3.80 E	7.18	0.17
1391.00	0.84	34.72	1390.96	9.04 N	4.93 E	9.04	0.20
1580.00	0.64	344.70	1579.94	11.20 N	5.44 E	11.20	0.34
1763.00	0.99	193.58	1762.93	10.65 N	4.80 E	10.65	0.86
1947.00	0.64	189.58	1946.92	8.09 N	4.26 E	8.09	0.19

2129.00	0.45	229.19	2128.91	6.62 N	3.55 E	6.62	0.23
2312.00	0.28	153.62	2311.91	5.75 N	3.20 E	5.75	0.26
2495.00	0.34	109.75	2494.90	5.16 N	3.91 E	5.16	0.13
2679.00	0.15	181.67	2678.90	4.74 N	4.42 E	4.74	0.18
2862.00	0.54	185.20	2861.90	3.64 N	4.34 E	3.64	0.21
3045.00	1.14	238.66	3044.88	1.84 N	2.70 E	1.84	0.51
3228.00	0.42	82.32	3227.87	0.98 N	1.81 E	0.98	0.84
3405.00	1.12	39.46	3404.85	2.40 N	3.55 E	2.40	0.49
3575.00	0.19	123.55	3574.84	3.53 N	4.85 E	3.53	0.66
3747.00	0.37	35.59	3746.84	3.82 N	5.41 E	3.82	0.24
3917.00	1.60	30.64	3916.81	6.31 N	6.94 E	6.31	0.72
4088.00	1.32	31.29	4087.76	10.05 N	9.18 E	10.05	0.16
4259.00	0.91	221.03	4258.75	10.71 N	9.31 E	10.71	1.30
4430.00	1.17	241.56	4429.72	8.85 N	6.88 E	8.85	0.26
4602.00	1.06	278.60	4601.69	8.25 N	3.76 E	8.25	0.42
4772.00	0.85	306.52	4771.66	9.24 N	1.19 E	9.24	0.30
4943.00	1.52	116.02	4942.65	9.00 N	2.21 E	9.00	1.38
5113.00	4.83	136.08	5112.37	2.85 N	9.21 E	2.85	2.02
5284.00	8.06	129.48	5282.27	9.96 S	23.46 E	-9.96	1.93
5455.00	10.25	122.17	5451.08	25.69 S	45.59 E	-25.69	1.45
5627.00	9.08	123.87	5620.64	41.40 S	69.82 E	-41.40	0.70
5798.00	9.73	120.38	5789.34	56.23 S	93.48 E	-56.23	0.51
5969.00	9.70	119.51	5957.89	70.63 S	118.49 E	-70.63	0.09
6140.00	9.07	120.26	6126.60	84.52 S	142.67 E	-84.52	0.38
6312.00	9.90	122.42	6296.25	99.28 S	166.86 E	-99.28	0.52
6483.00	10.82	116.59	6464.46	114.34 S	193.62 E	-114.34	0.82
6654.00	8.13	113.72	6633.12	126.39 S	219.05 E	-126.39	1.60
6824.00	5.10	116.58	6801.96	134.61 S	236.82 E	-134.61	1.79
6996.00	3.25	129.63	6973.50	141.14 S	247.41 E	-141.14	1.20
7167.00	0.30	193.69	7144.41	144.67 S	251.04 E	-144.67	1.83
7253.00	0.74	278.64	7230.41	144.81 S	250.43 E	-144.81	0.90
7294.00	4.98	348.54	7271.35	143.02 S	249.82 E	-143.02	11.65
7335.00	9.49	354.14	7312.01	137.91 S	249.12 E	-137.91	11.12
7378.00	12.39	349.95	7354.23	129.84 S	247.95 E	-129.84	6.99
7421.00	16.23	350.93	7395.89	119.36 S	246.20 E	-119.36	8.95
7464.00	20.08	351.04	7436.74	106.13 S	244.10 E	-106.13	8.95
7507.00	24.18	350.71	7476.56	90.14 S	241.53 E	-90.14	9.54
7550.00	26.98	354.91	7515.35	71.73 S	239.24 E	-71.73	7.75
7592.00	30.57	359.74	7552.16	51.55 S	238.35 E	-51.55	10.18
7635.00	35.56	359.03	7588.18	28.10 S	238.09 E	-28.10	11.64
7678.00	38.97	358.39	7622.40	2.07 S	237.49 E	-2.07	7.98
7721.00	44.70	0.56	7654.43	26.59 N	237.26 E	26.59	13.74
7763.00	50.10	3.57	7682.85	57.47 N	238.41 E	57.47	13.89
7806.00	53.28	2.72	7709.50	91.15 N	240.26 E	91.15	7.56
7849.00	57.21	1.20	7734.01	126.45 N	241.45 E	126.45	9.59
7892.00	62.47	0.97	7755.61	163.61 N	242.15 E	163.61	12.24
7934.00	65.15	0.53	7774.14	201.29 N	242.65 E	201.29	6.45
7977.00	66.93	359.88	7791.60	240.59 N	242.79 E	240.59	4.36
8020.00	69.80	359.52	7807.46	280.55 N	242.57 E	280.55	6.72
8063.00	72.84	0.66	7821.23	321.28 N	242.64 E	321.28	7.50
8106.00	77.55	0.95	7832.21	362.84 N	243.23 E	362.84	10.97
8148.00	83.51	359.04	7839.12	404.24 N	243.22 E	404.24	14.88
8190.00	88.21	358.64	7842.15	446.11 N	242.37 E	446.11	11.23
8248.00	90.49	358.68	7842.81	504.09 N	241.01 E	504.09	3.93
8386.00	91.36	358.77	7840.58	642.04 N	237.94 E	642.04	0.63
8569.00	91.11	0.35	7836.64	824.98 N	236.54 E	824.98	0.87
8752.00	89.72	359.67	7835.31	1007.97 N	236.57 E	1007.97	0.85
8930.00	90.37	0.31	7835.17	1185.97 N	236.54 E	1185.97	0.51
9100.00	90.49	1.38	7833.90	1355.95 N	239.05 E	1355.95	0.63
9271.00	90.68	0.97	7832.15	1526.90 N	242.55 E	1526.90	0.26
9442.00	89.54	0.47	7831.82	1697.88 N	244.70 E	1697.88	0.73
9614.00	90.03	0.53	7832.47	1869.88 N	246.20 E	1869.88	0.29
9784.00	90.28	0.15	7832.01	2039.87 N	247.21 E	2039.87	0.27
9956.00	90.25	359.12	7831.21	2211.86 N	246.11 E	2211.86	0.60
10126.00	89.88	359.03	7831.02	2381.84 N	243.37 E	2381.84	0.22
10297.00	89.69	0.28	7831.66	2552.83 N	242.34 E	2552.83	0.74
10468.00	90.56	359.86	7831.29	2723.83 N	242.55 E	2723.83	0.56
10637.00	89.82	359.98	7830.73	2892.83 N	242.31 E	2892.83	0.44
10809.00	90.34	359.74	7830.49	3064.83 N	241.89 E	3064.83	0.33
10980.00	91.14	359.51	7828.28	3235.81 N	240.77 E	3235.81	0.49
11151.00	90.25	359.03	7826.20	3406.78 N	238.59 E	3406.78	0.59
11322.00	89.88	359.77	7822.89	3578.78 N	238.88 E	3578.78	1.11

11323.00	92.09	359.70	7822.69	3578.72 N	236.69 E	3578.72	1.14
11494.00	90.89	358.95	7818.25	3749.65 N	234.67 E	3749.65	0.83
11665.00	90.09	359.89	7816.78	3920.63 N	232.94 E	3920.63	0.72
11835.00	90.74	359.76	7815.55	4090.63 N	232.42 E	4090.63	0.39
12006.00	90.46	359.01	7813.76	4261.60 N	230.59 E	4261.60	0.47
12176.00	90.40	359.38	7812.49	4431.58 N	228.20 E	4431.58	0.22
12344.00	89.63	359.17	7812.44	4599.57 N	226.07 E	4599.57	0.48
12515.00	89.69	359.91	7813.46	4770.56 N	224.70 E	4770.56	0.43
12686.00	89.60	359.20	7814.52	4941.55 N	223.37 E	4941.55	0.42
12858.00	90.12	1.37	7814.94	5113.54 N	224.23 E	5113.54	1.30
13029.00	91.26	1.10	7812.88	5284.48 N	227.91 E	5284.48	0.69
13200.00	90.12	1.24	7810.82	5455.43 N	231.41 E	5455.43	0.67
13370.00	90.12	0.46	7810.46	5625.41 N	233.93 E	5625.41	0.46
13536.00	90.06	359.61	7810.20	5791.41 N	234.03 E	5791.41	0.51
13707.00	89.97	0.69	7810.16	5962.40 N	234.48 E	5962.40	0.63
13878.00	90.59	1.00	7809.32	6133.38 N	237.00 E	6133.38	0.41
14049.00	90.15	0.82	7808.22	6304.36 N	239.71 E	6304.36	0.28
14219.00	90.37	1.06	7807.45	6474.33 N	242.50 E	6474.33	0.19
14390.00	90.09	359.84	7806.76	6645.32 N	243.85 E	6645.32	0.73
14557.00	89.94	359.24	7806.72	6812.32 N	242.50 E	6812.32	0.37
14728.00	90.77	359.28	7805.66	6983.30 N	240.30 E	6983.30	0.49
14898.00	89.91	358.88	7804.65	7153.27 N	237.57 E	7153.27	0.56
15070.00	90.80	359.40	7803.58	7325.24 N	234.98 E	7325.24	0.60
15241.00	88.80	358.95	7804.18	7496.22 N	232.52 E	7496.22	1.20
15390.00	90.43	359.09	7805.18	7645.19 N	229.97 E	7645.19	1.10
15438.00	90.43	359.09	7804.82	7693.18 N	229.21 E	7693.18	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 0.00 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.46 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 15438.00 FEET
IS 7696.59 FEET ALONG 1.71 DEGREES (TRUE)**

Directional Surveys tied onto Gyro's @ 902' MD. Final Survey is a calculated projection to bit.