

PCGK - Pressure Case Gamma

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	21-Oct-13	10-Nov-13	14-Nov-13		
Rig Bit Number	101	200	0300		
Bit Size (in)	8.750	6.125	6.125		
Tool Nominal OD (in)	6.750	4.750	4.750		
Log Start Depth (MD, ft)	1,027.00	7,691.00	12,215.00		
Log End Depth (MD, ft)	7,691.00	12,215.00	16,476.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	18-Oct-13 23:00	08-Nov-13 06:00	11-Nov-13 02:00		
Drill/Wipe End Date and Time	20-Oct-13 20:10	10-Nov-13 08:06	13-Nov-13 19:20		
Min Inc (deg) @ Depth (MD, ft)	0.00 @ 5,788.00	88.03 @ 11,591.00	87.81 @ 12,320.00		
Max Inc (deg) @ Depth (MD, ft)	87.53 @ 7,643.00	92.28 @ 11,044.00	91.67 @ 12,841.00		
Bit TFA(in2) / Bit Type	1.04 / PDC	1.24 / N/A	1.86 / N/A		
Flow Rate (gpm)	551.35	277.04	259.92		
Max AV (fpm) / CV (fpm) @ MWD	232.1 / N/A	N/A / N/A	265.4 / N/A		
Fluid Type	Native/Spud Mud	Mineral Oil Bas	Mineral Oil Bas		
Density (ppg) / Viscosity (spqt)	10.40 / 47.00	9.50 / 61.00	9.40 / 58.00		
Filtrate CL (ppm)	1,100.00	63,000.00	48,500.00		
pH / Fluid Loss (mptm)	8.80 / 4	N/A / N/A	N/A / N/A		
PV (cP) / YP (lbf2)	13 / 15.00	21 / 6.00	19 / 10.00		
% Solids / % Sand	9.30 / 0.10	10.50 / 0.03	10.80 / 0.03		
% Oil / Oil:Water Ratio	2.00 / N/A	60.00 / 67:33	65.80 / 74:26		
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 (deg F) @ 100 ft	170.05 / ROM	200.57 / ROM	245.00 / ROM		

Max Tool Temp (degF) / Source	170.37 / PCM	220.77 / PCM	245.03 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 170.37	N/A @ 220.77	N/A @ 245.03		
Lead MWD Engineer	Clay Wass	Clay Wass	Clay Wass		
Customer Representative	Dave Cornett	Scott Hancock	Scott Hancock		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.76	5.76		
Sub Serial Number	11404261	12134679	12134679		
Insert Serial Number	11400901	11145582	11680735		
Date and Time Initialized	17-Oct-13 15:19	07-Nov-13 12:42	10-Nov-13 12:00		
Date and Time Read	21-Oct-13 05:39	11-Nov-13 08:41	15-Nov-13 07:33		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	48.00	42.52	42.52		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404261	12134679	12134679		
Sonde Serial Number	11297555	11297555	11638628		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	92.42	83.54	5.17		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	51.18	47.43	47.43		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404261	12134679	12134679		
Insert/Sonde Serial Number	12035849	12035849	12037413		

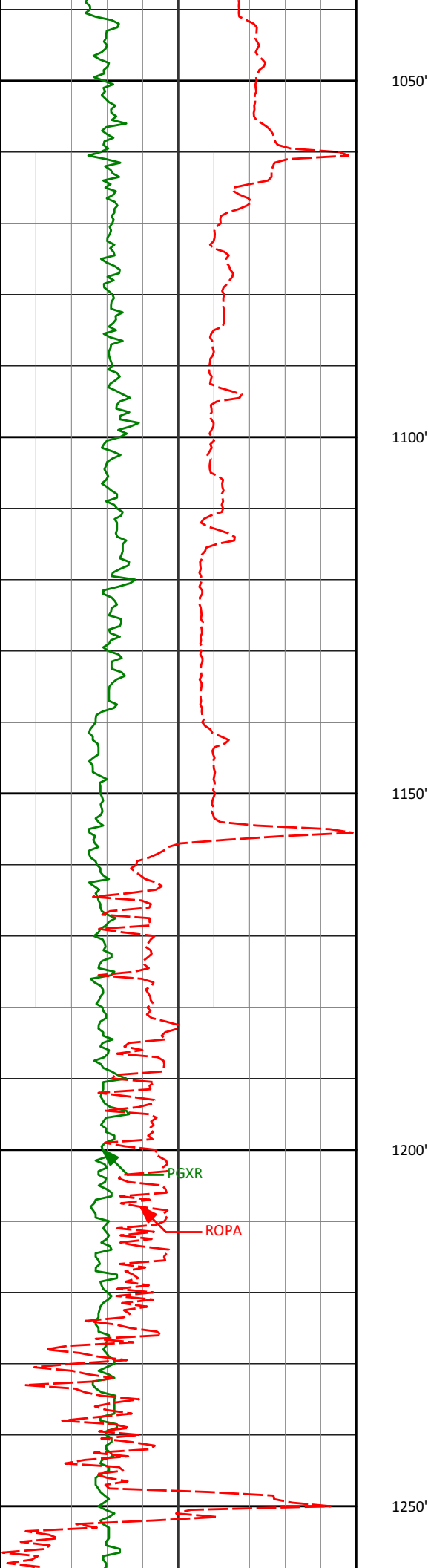
REMARKS

1. All depths are true vertical depths, referenced to the Driller's pipe tally and are measured from the Kelly Bushing, 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

Insite version: 8.0



1107'

0.46°

187.27°

1106.99'

-1.94'

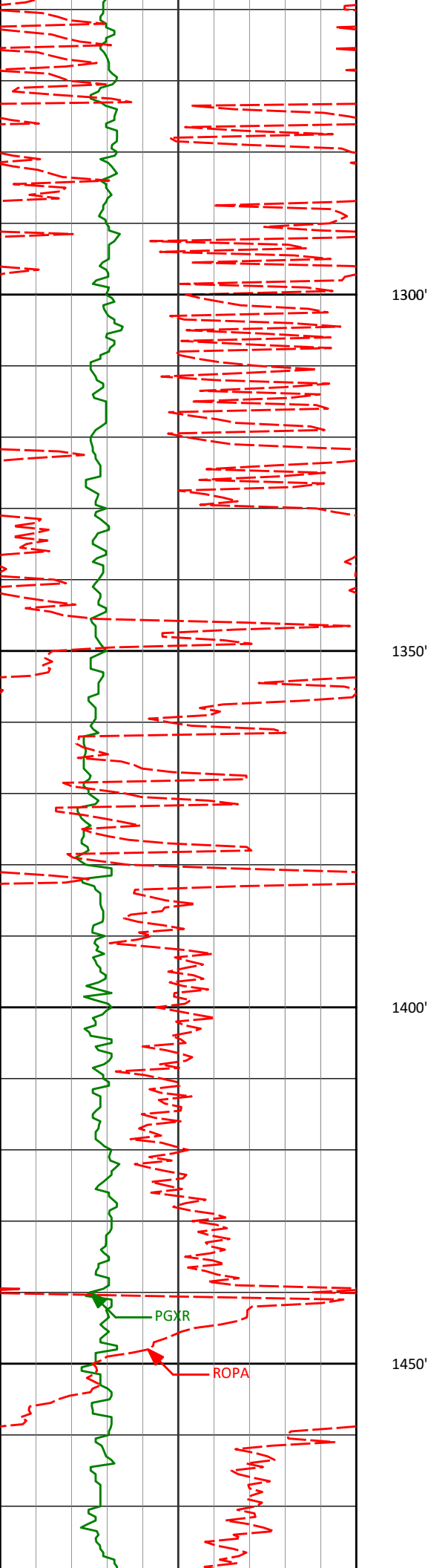
1202'

0.43°

196.53°

1201.99'

-1.22'



1300'

1350'

1400'

1450'

1297'

0.47°

205.81°

1296.98'

-0.53'

1392'

0.57°

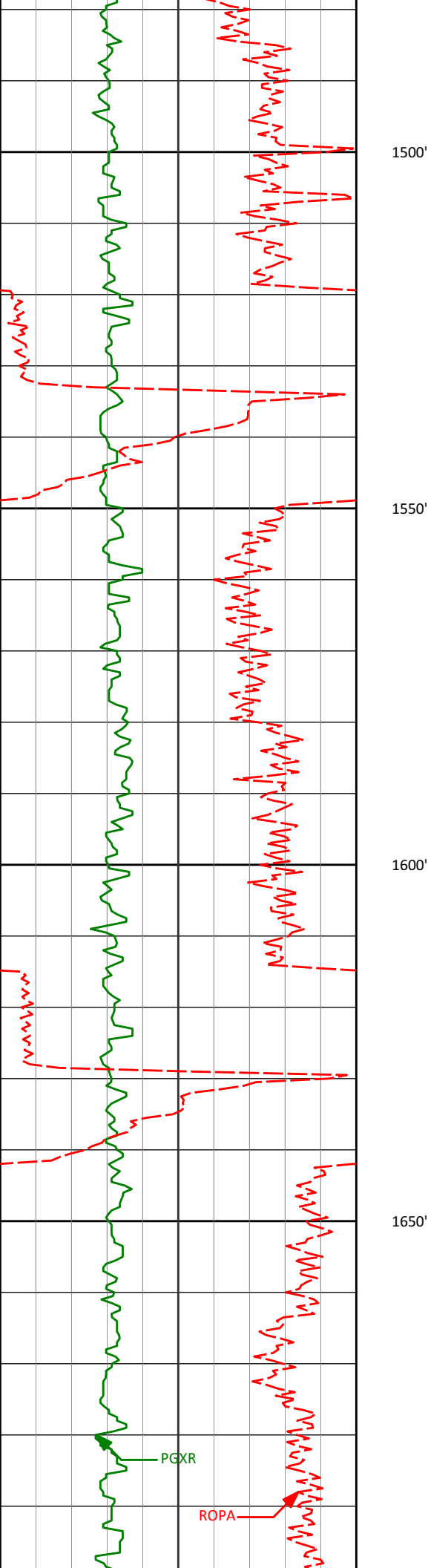
204.90°

1391.98'

0.25'

PGXR

ROPA



1487'

0.50°

228.52°

1486.97'

0.95'

1500'

1550'

1580'

0.68°

248.38°

1579.97'

1.42'

1600'

1650'

1676'

0.49°

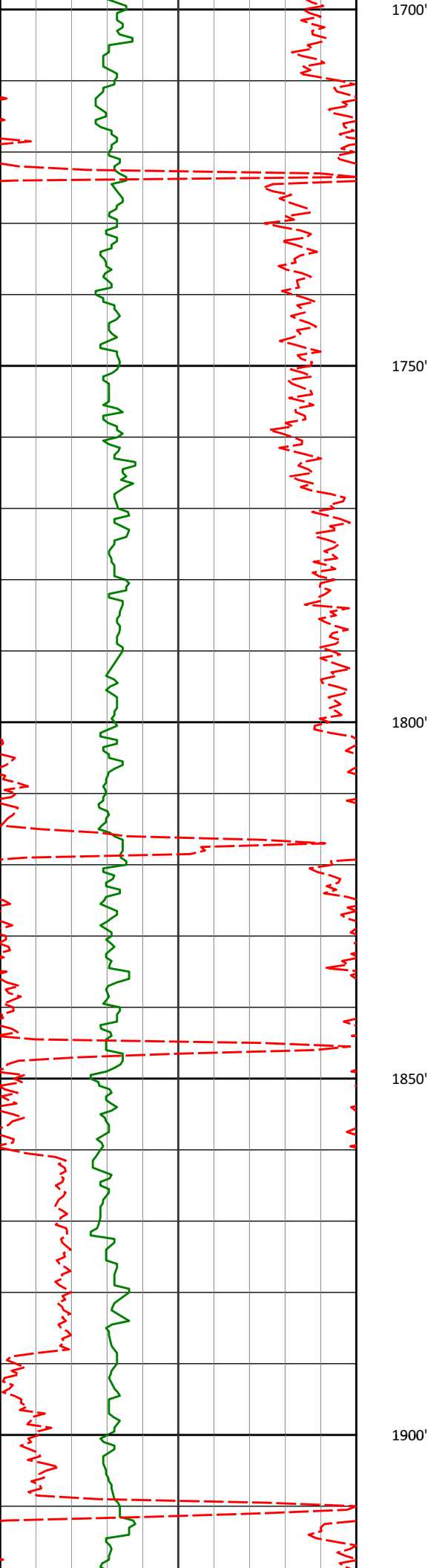
272.64°

1675.96'

1.60'

PGXR

ROPA



1767'

0.55°

275.51°

1766.96'

1.54'

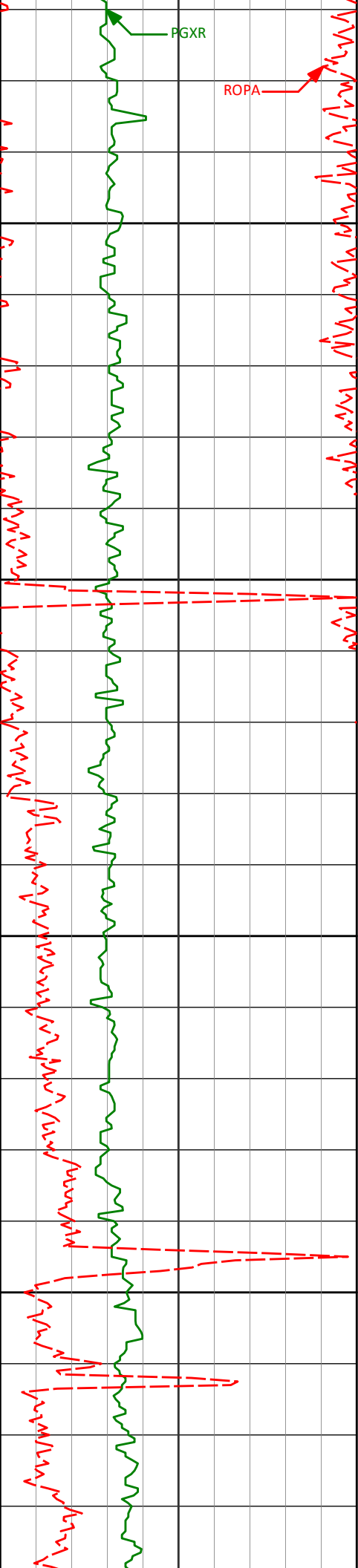
1860'

0.99°

280.88°

1859.95'

1.34'



PGXR

ROPA

1950'

1952'

1.00°

306.37°

1951.94'

0.71'

2000'

2044'

1.06°

290.28°

2043.92'

-0.07'

2050'

2100'

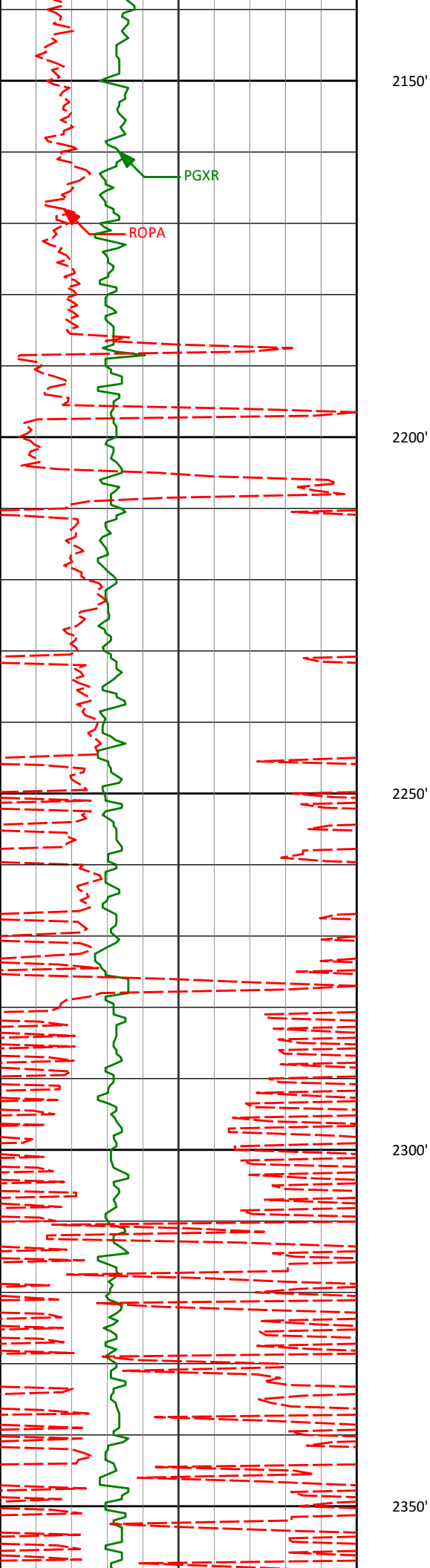
2137'

1.15°

301.18°

2136.91'

-0.86'



2228'

0.57°

235.89°

2227.90'

-1.08'

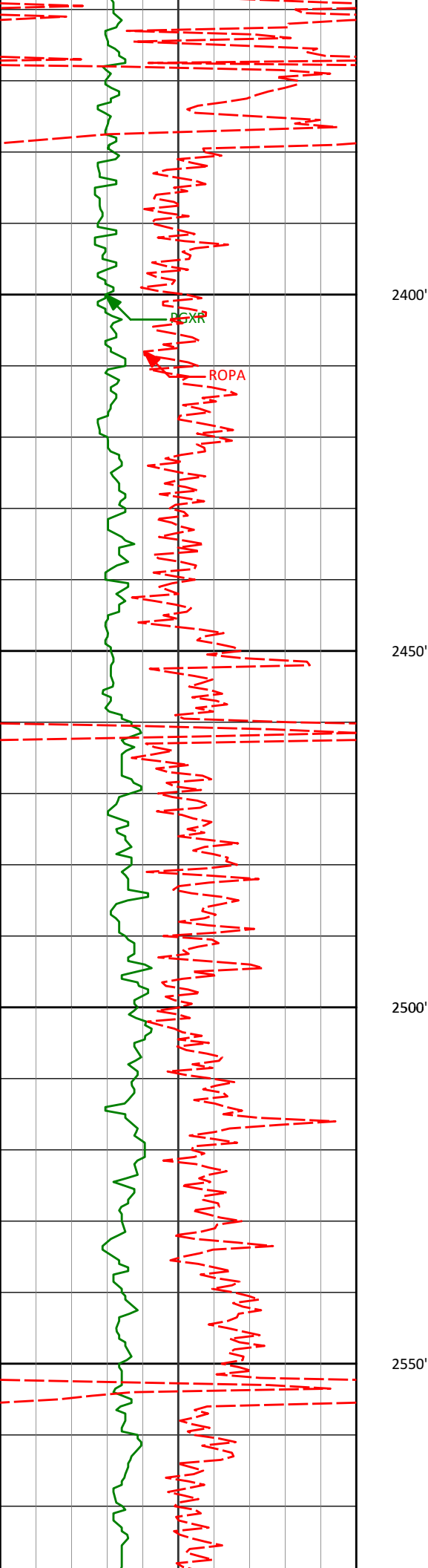
2320'

0.22°

129.60°

2319.90'

-0.71'



2400'

2413'

1.29°

81.12°

2412.89'

-0.76'

2450'

2500'

2505'

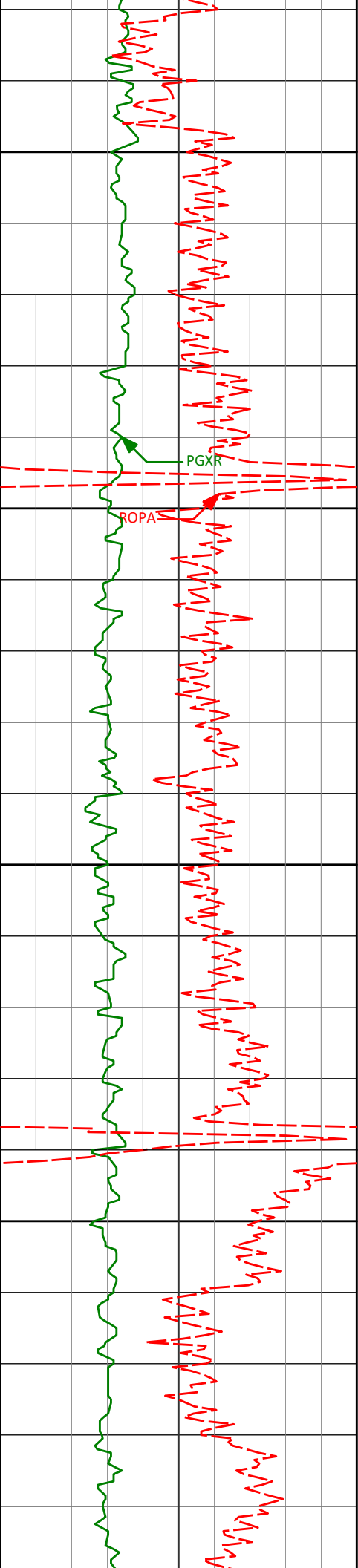
0.96°

76.81°

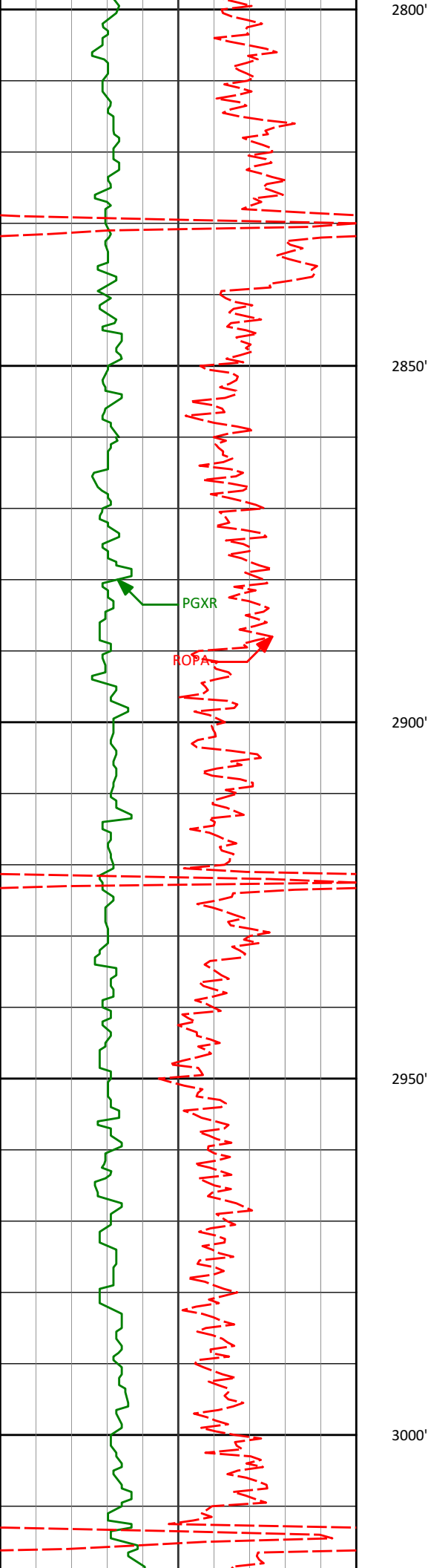
2504.87'

-1.08'

2550'



2600'	2597'	0.74°	76.85°	2596.86'	-1.39'
2650'					
	2689'	0.37°	57.12°	2688.86'	-1.68'
2700'					
2750'					
	2780'	0.28°	0.19°	2779.85'	-2.06'



2872'

0.26°

22.32°

2871.85'

-2.48'

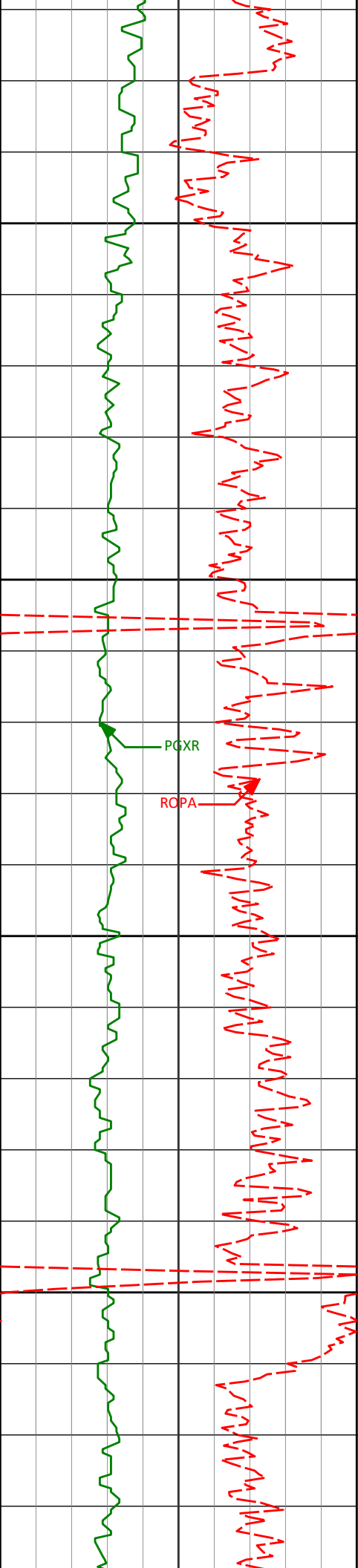
2963'

0.35°

331.90°

2962.85'

-2.92'



3050'

3053'

0.40°

322.12°

3052.85'

-3.41'

3100'

PGXR

ROPA

3150'

3145'

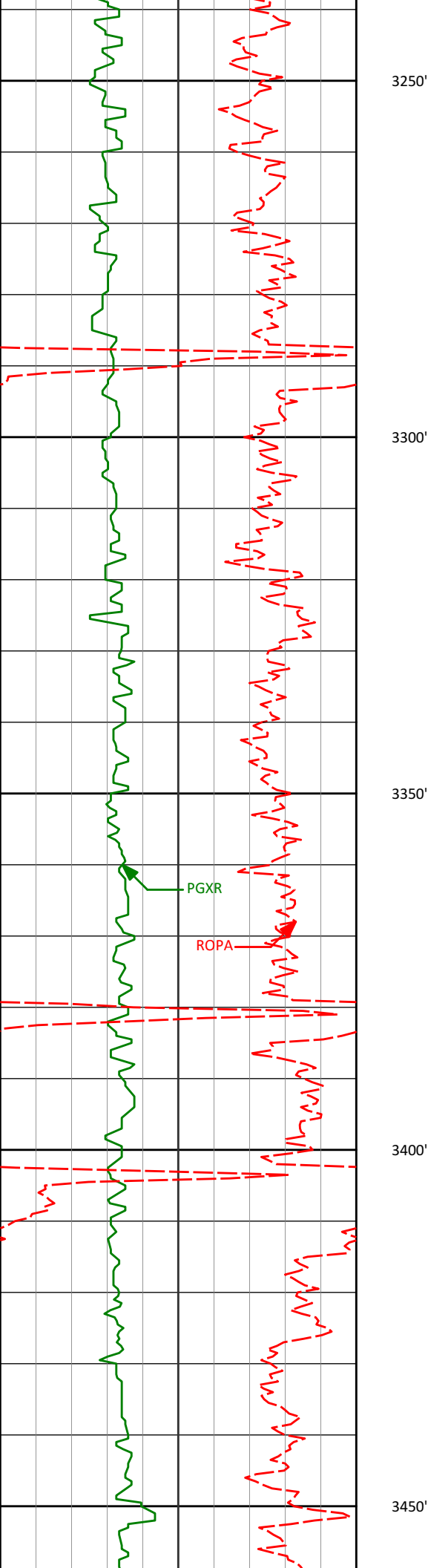
0.48°

291.30°

3144.85'

-3.81'

3200'



3250'

3300'

3350'

3400'

3450'

PGXR

ROPA

3327'

0.82°

306.46°

3326.84'

-4.86'

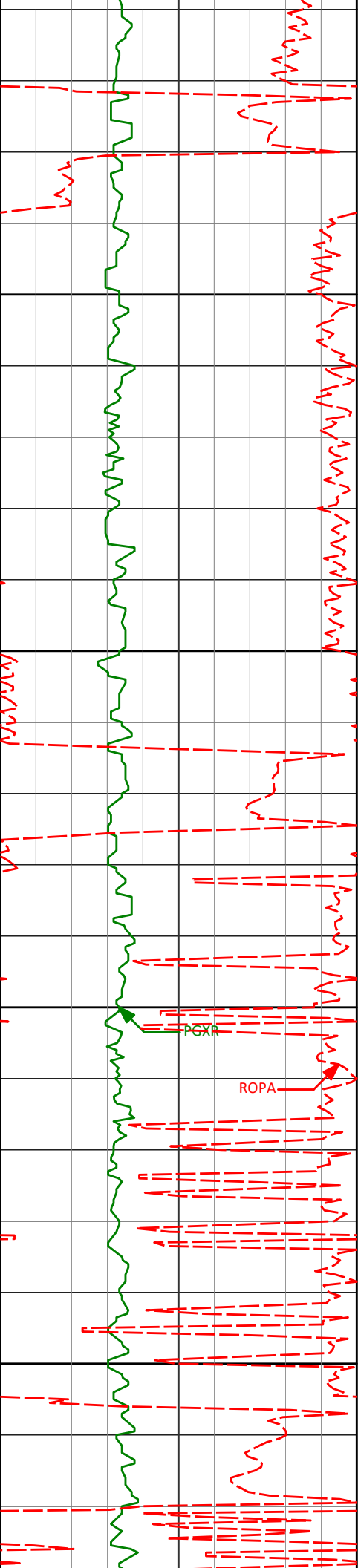
3418'

0.92°

316.88°

3417.82'

-5.79'



3500'

3510'

1.56°

271.04°

3509.80'

-6.36'

3550'

3600'

3601'

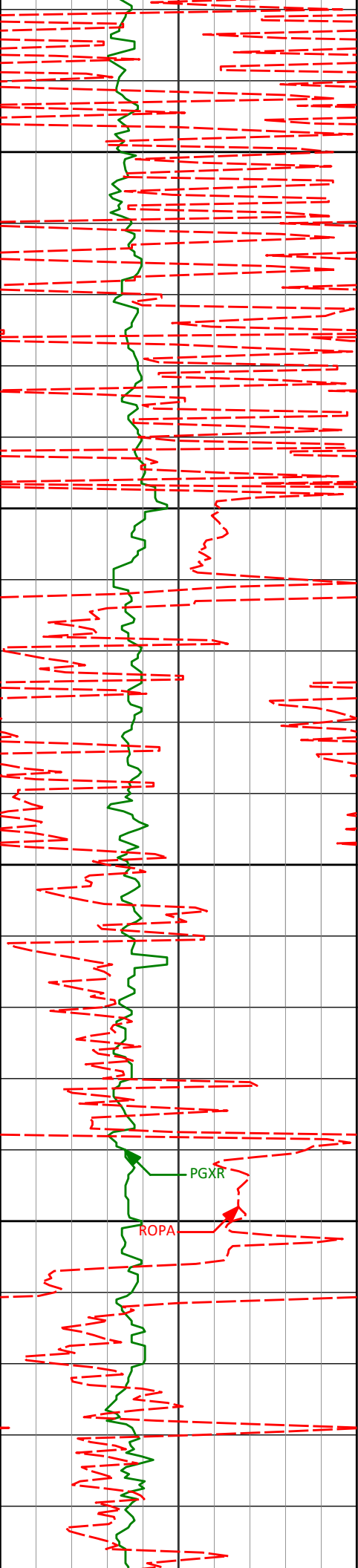
2.60°

263.63°

3600.74'

-6.16'

3650'



3693'

4.26°

276.74°

3692.58'

-6.36'

3700'

3750'

3784'

6.05°

271.24°

3783.21'

-6.89'

3800'

3850'

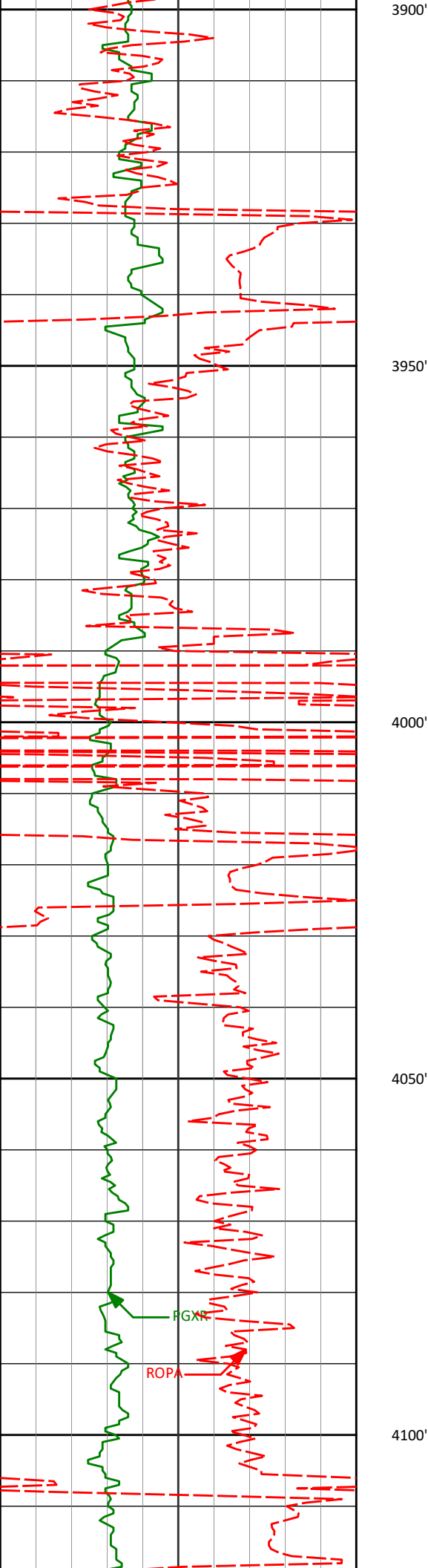
3875'

7.40°

277.89°

3873.58'

-7.84'



3900'

3950'

4000'

4050'

4100'

3966'

9.30°

281.38°

3963.61'

-10.15'

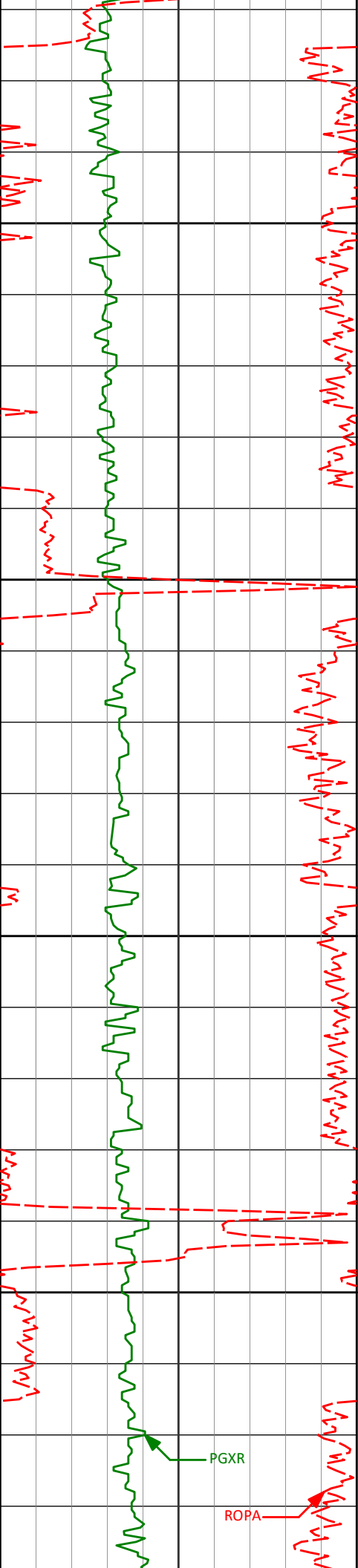
4057'

9.53°

283.86°

4053.39'

-13.47'



4150'

4148'

10.19°

279.89°

4143.04'

-16.72'

4200'

4240'

9.60°

278.13°

4233.67'

-19.27'

4250'

4300'

PGXR

ROPA

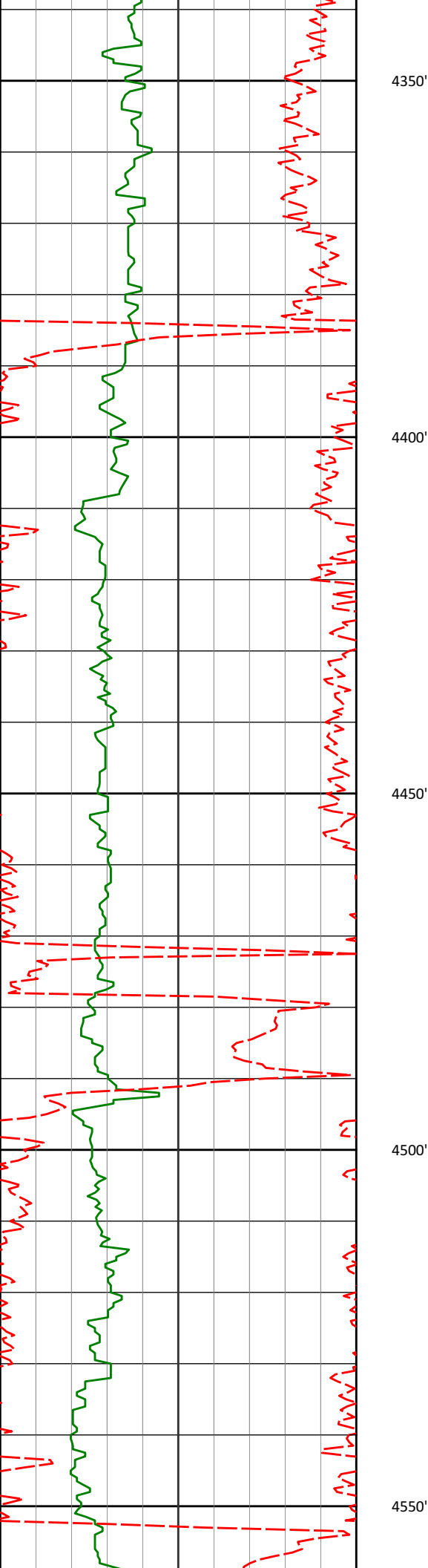
4332'

8.97°

275.93°

4324.47'

-21.16'



4418'

8.15°

278.28°

4409.51'

-22.78'

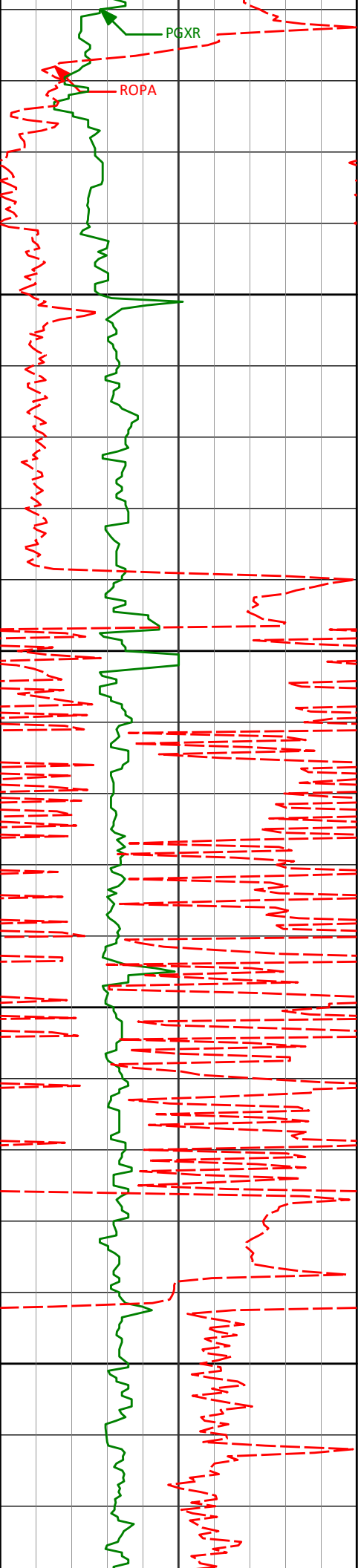
4504'

7.63°

272.46°

4494.70'

-23.95'



4589'

7.60°

261.15°

4578.95'

-23.38'

4674'

7.19°

255.61°

4663.25'

-21.24'

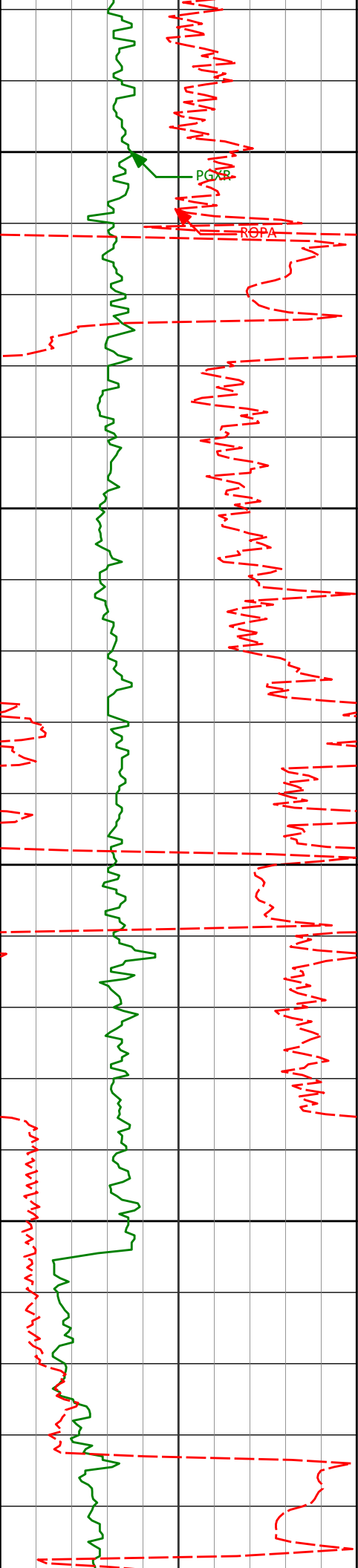
4760'

5.21°

257.65°

4748.74'

-19.10'



4800'

4850'

4900'

4950'

4846'

3.37°

261.55°

4834.49'

-17.92'

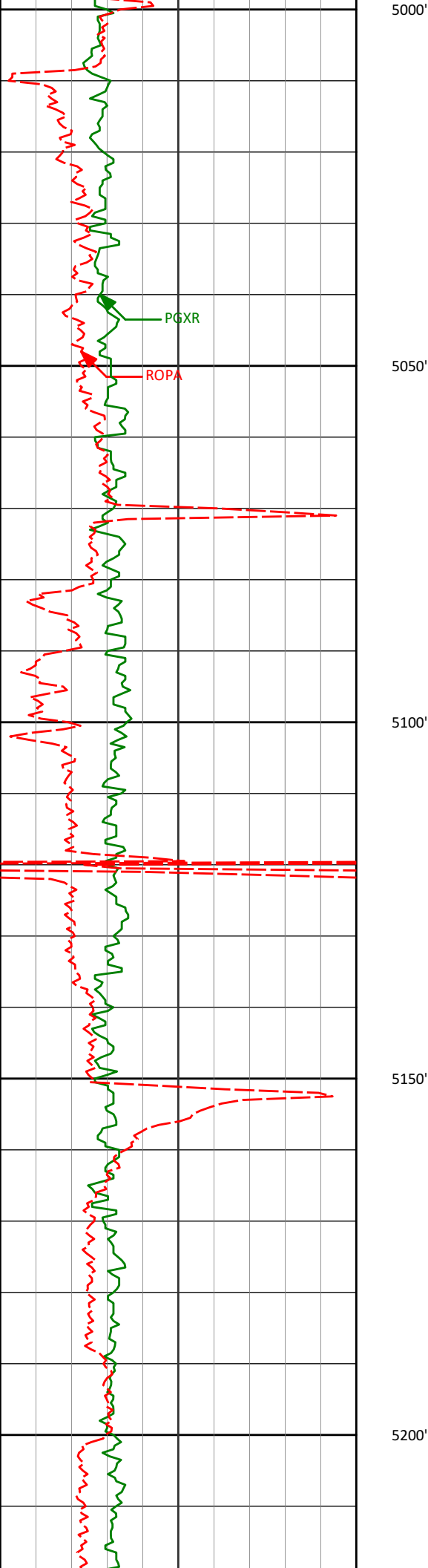
4931'

1.94°

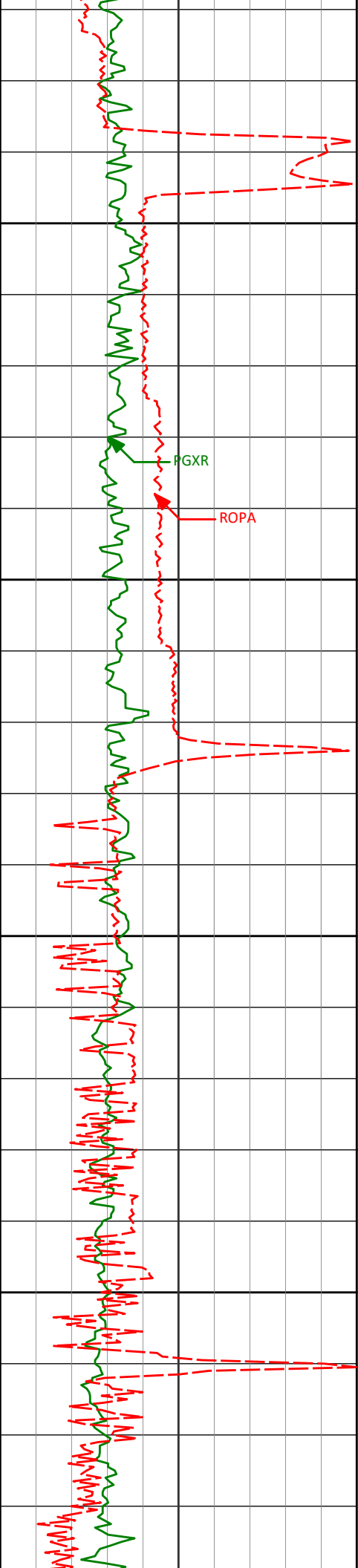
288.99°

4919.40'

-18.04'



5017'	0.37°	261.12°	5005.38'	-18.47'
5102'	0.46°	269.41°	5090.38'	-18.43'
5188'	0.37°	283.51°	5176.38'	-18.50'



5250'

5274'

0.41°

97.18°

5262.38'

-18.52'

5300'

PGXR

ROPA

5350'

5359'

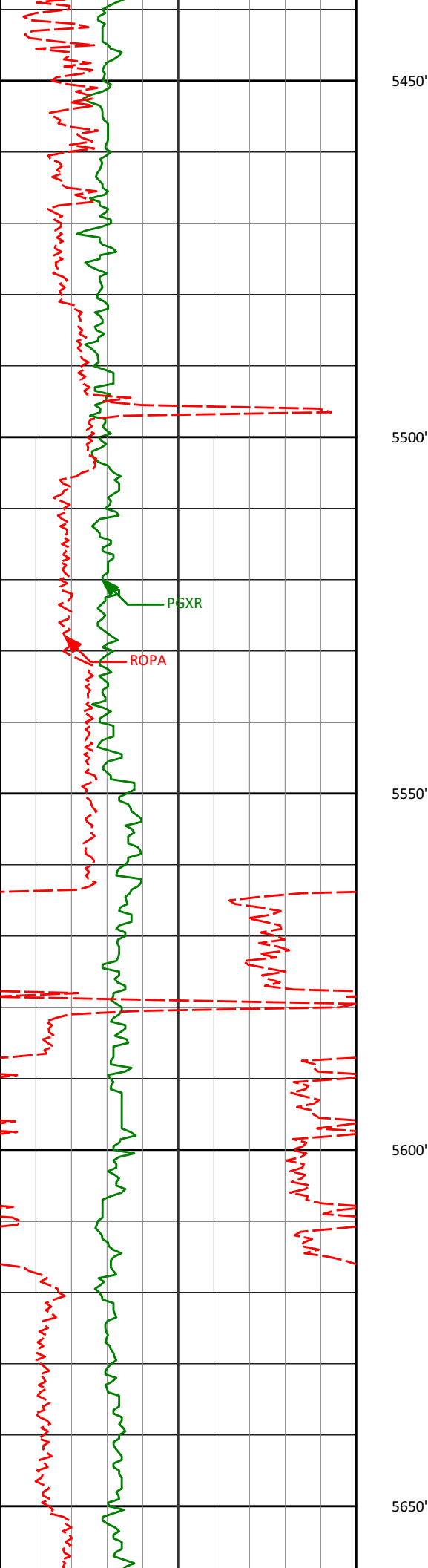
0.55°

83.85°

5347.38'

-18.52'

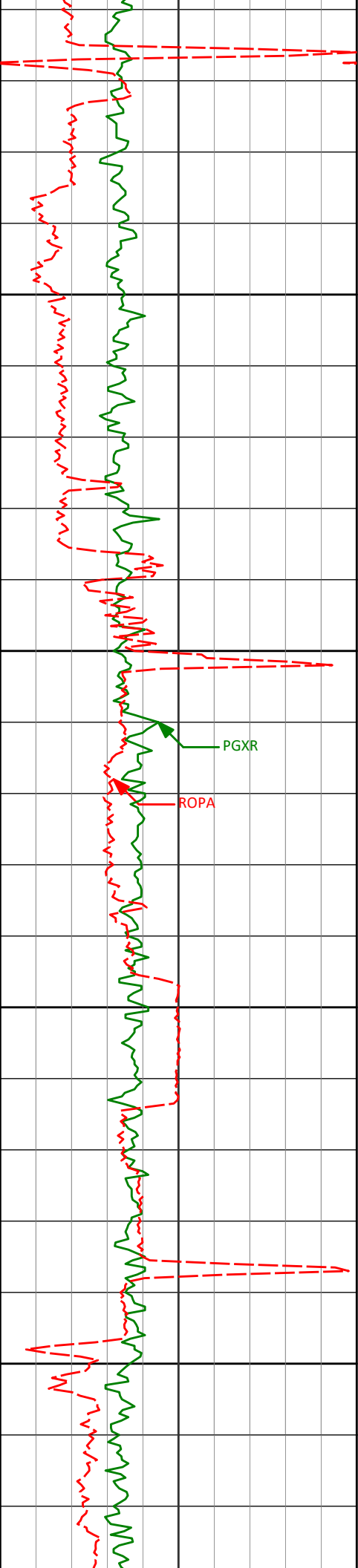
5400'



5445'	0.40°	92.05°	5433.37'	-18.56'
-------	-------	--------	----------	---------

5530'	0.47°	89.12°	5518.37'	-18.55'
-------	-------	--------	----------	---------

5616'	0.38°	71.55°	5604.37'	-18.64'
-------	-------	--------	----------	---------



5700'

5702'

0.20°

34.25°

5690.37'

-18.85'

5750'

PGXR

ROPA

5788'

0.00°

121.73°

5776.37'

-18.98'

5800'

5850'

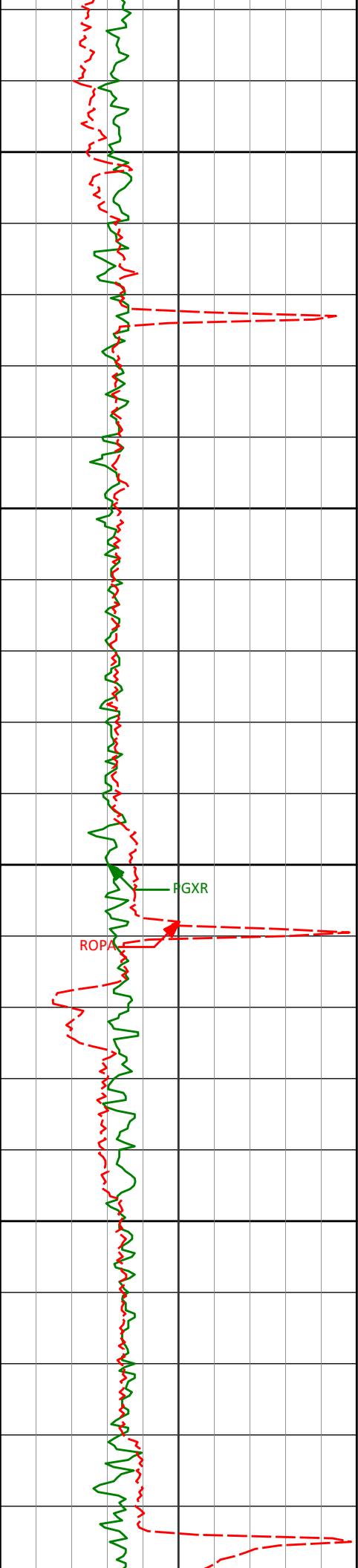
5873'

0.37°

195.12°

5861.37'

-18.71'



5900'

5950'

6000'

6050'

5959'

0.71°

151.25°

5947.36'

-17.98'

ROPA

FGXR

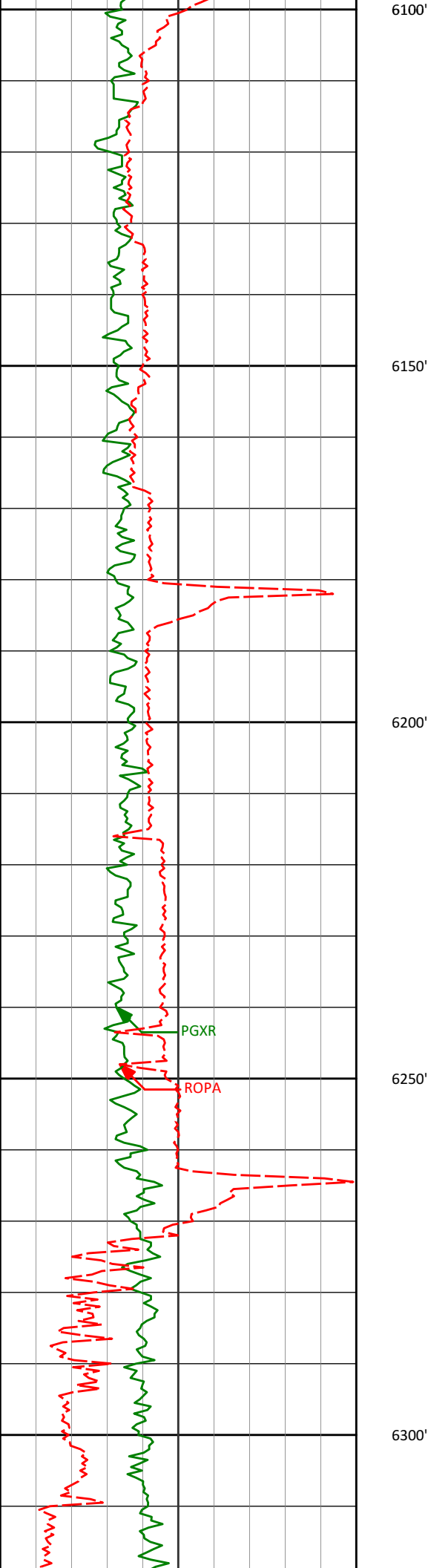
6045'

0.68°

137.38°

6033.36'

-17.13'



6100'

6130'

0.68°

155.01°

6118.35'

-16.30'

6150'

6200'

6216'

0.55°

173.70°

6204.35'

-15.43'

6250'

PGXR

ROPA

6300'

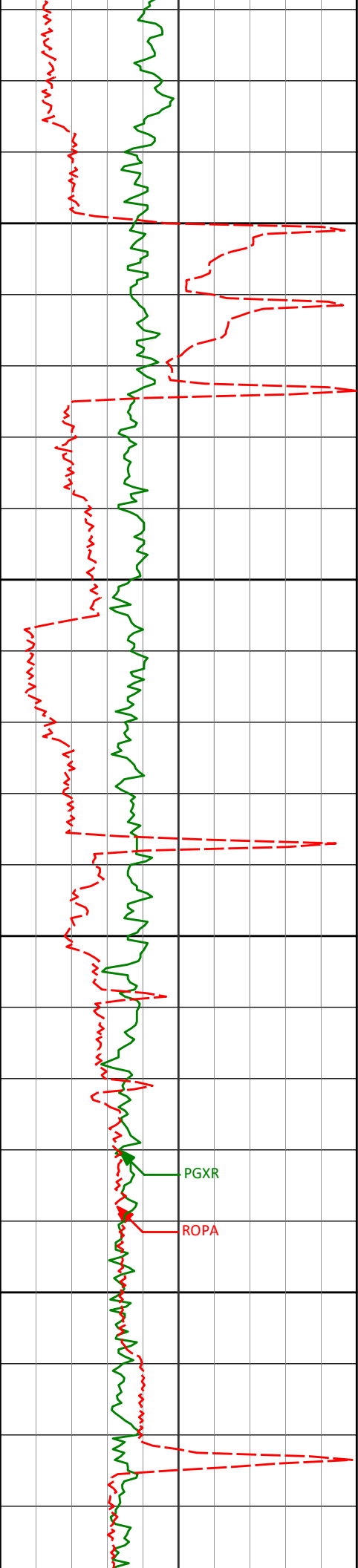
6302'

0.44°

169.23°

6290.34'

-14.69'



6350'

6387'

0.50°

184.83°

6375.34'

-14.00'

6400'

6450'

6473'

0.51°

186.53°

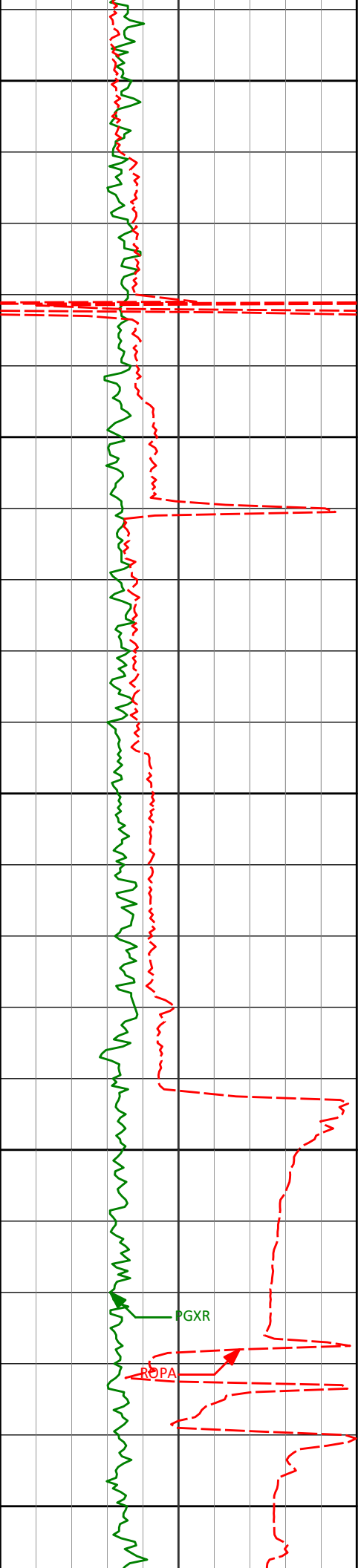
6461.34'

-13.25'

6500'

PGXR

ROPA



6550'

6559'

0.56°

197.23°

6547.33'

-12.47'

6600'

6650'

6645'

0.31°

203.24°

6633.33'

-11.85'

6700'

6688'

0.65°

188.52°

6676.33'

-11.50'

6750'

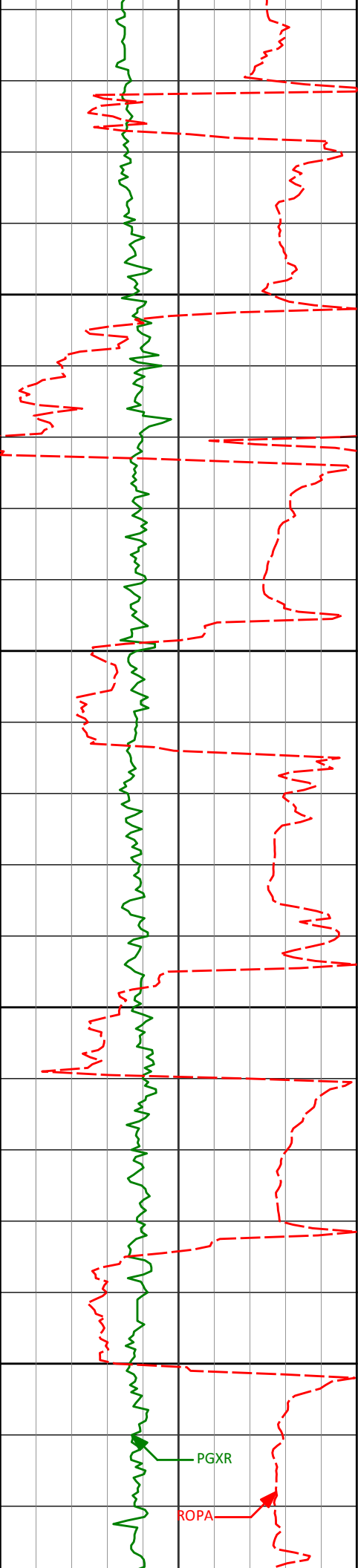
6730'

5.43°

193.06°

6718.26'

-9.33'



6800'

6850'

6900'

6950'

6773'

10.46°

192.38°

6760.83'

-3.54'

6816'

12.58°

191.05°

6802.96'

4.86'

6859'

15.91°

185.38°

6844.64'

15.32'

6902'

19.26°

181.17°

6885.62'

28.28'

6945'

22.78°

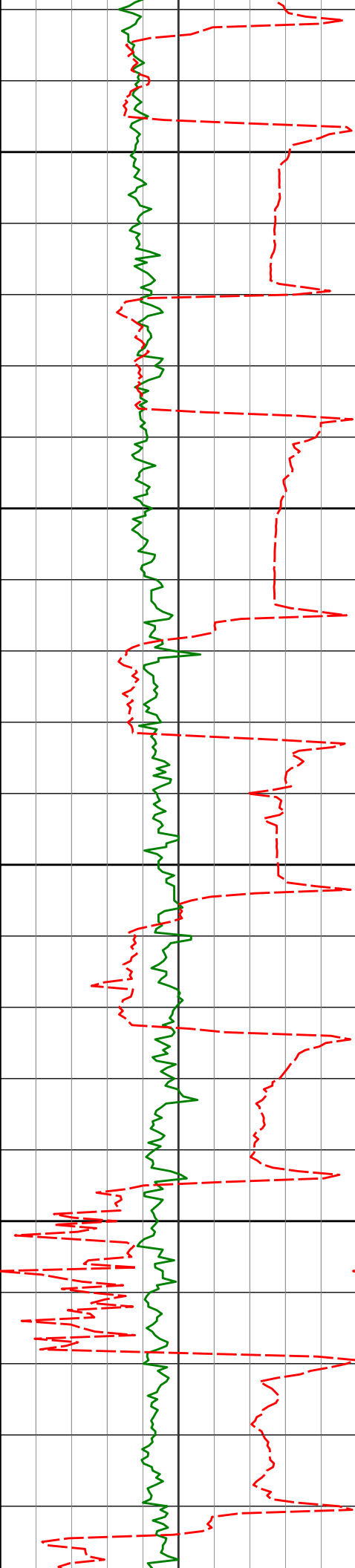
181.00°

6925.75'

43.70'

PGXR

ROPA



7000'

7050'

7100'

7150'

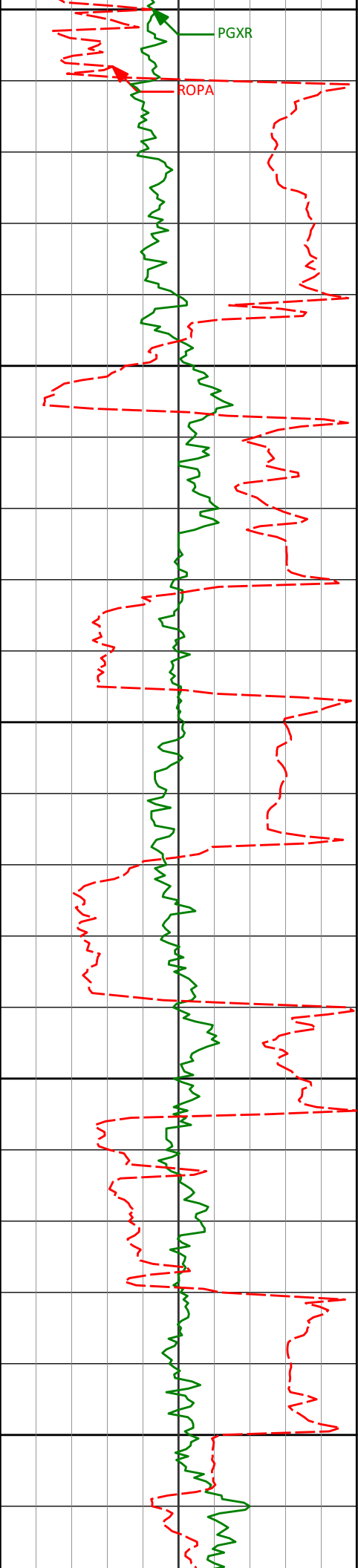
6987'	27.25°	176.35°	6963.81'	61.44'
-------	--------	---------	----------	--------

7030'	31.60°	177.09°	7001.25'	82.53'
-------	--------	---------	----------	--------

7073'	36.46°	177.09°	7036.88'	106.56'
-------	--------	---------	----------	---------

7116'	40.49°	177.45°	7070.54'	133.28'
-------	--------	---------	----------	---------

7159'	42.89°	177.40°	7102.64'	161.85'
-------	--------	---------	----------	---------



7200'

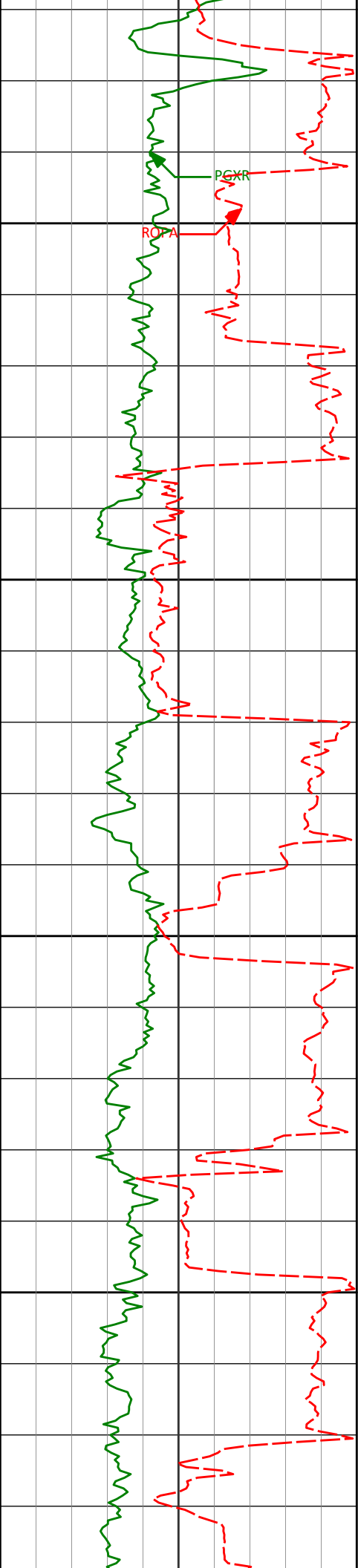
7250'

7300'

7350'

7400'

7202'	47.33°	178.98°	7132.98'	192.30'
7244'	52.94°	179.79°	7159.89'	224.52'
7287'	57.42°	179.81°	7184.44'	259.81'
7330'	61.10°	180.89°	7206.42'	296.76'
7373'	63.65°	181.13°	7226.35'	334.85'
7416'	67.08°	181.43°	7244.28'	373.91'



7450'

7459'

70.67°

180.80°

7259.77'

414.01'

7500'

7501'

72.60°

180.45°

7273.00'

453.86'

7550'

7544'

75.99°

180.79°

7284.64'

495.25'

7600'

7587'

81.02°

181.36°

7293.21'

537.36'

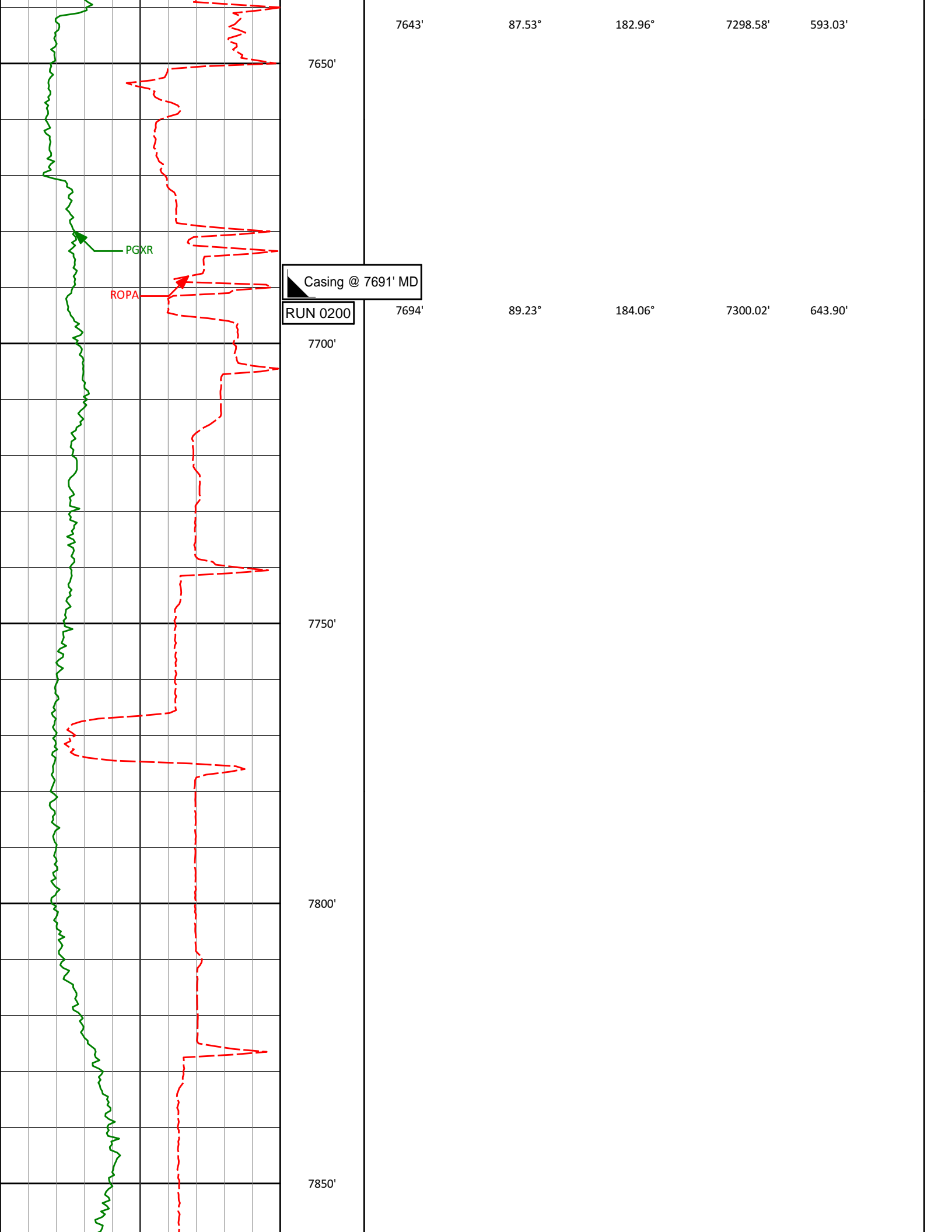
7630'

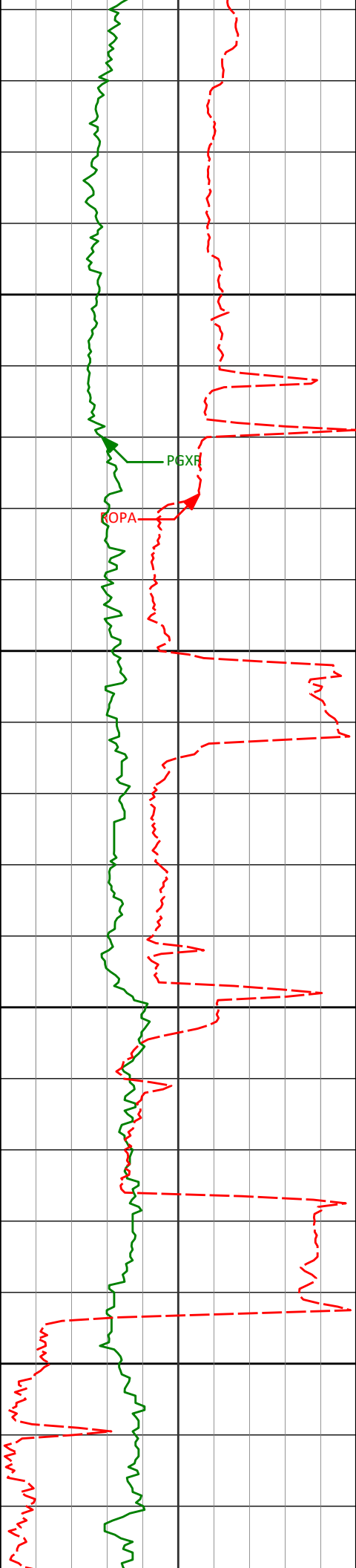
86.46°

181.84°

7297.89'

580.06'





7866'

88.49°

182.67°

7303.44'

815.52'

7900'

7950'

8000'

8037'

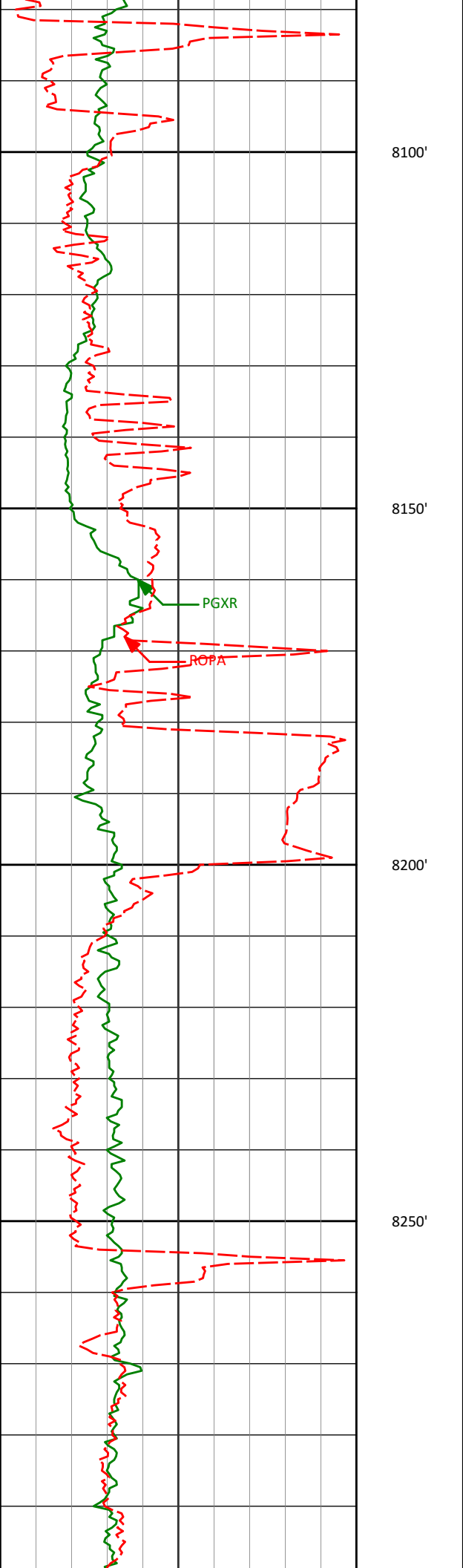
89.54°

181.56°

7306.38'

986.34'

8050'



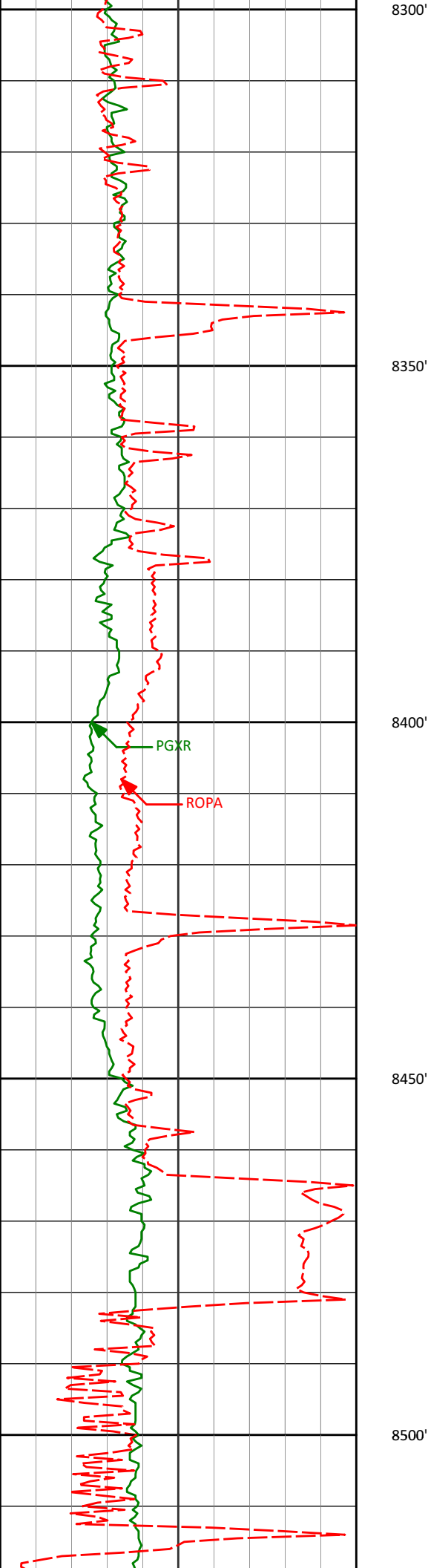
8208'

90.65°

181.66°

7306.10'

1157.25'



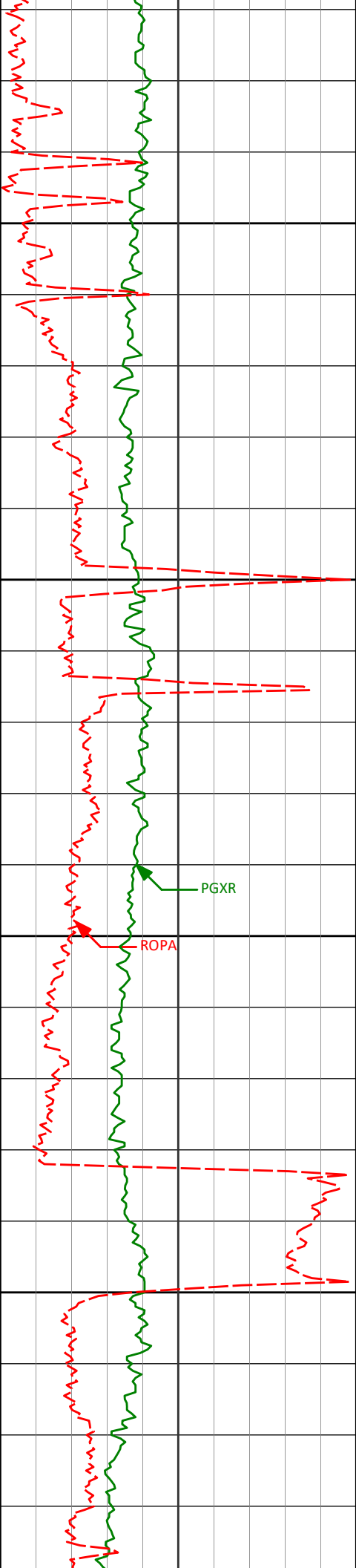
8379'

91.33°

180.05°

7303.14'

1328.19'



8550'

8551'

90.03°

180.38°

7301.10'

1500.17'

8600'

8650'

8700'

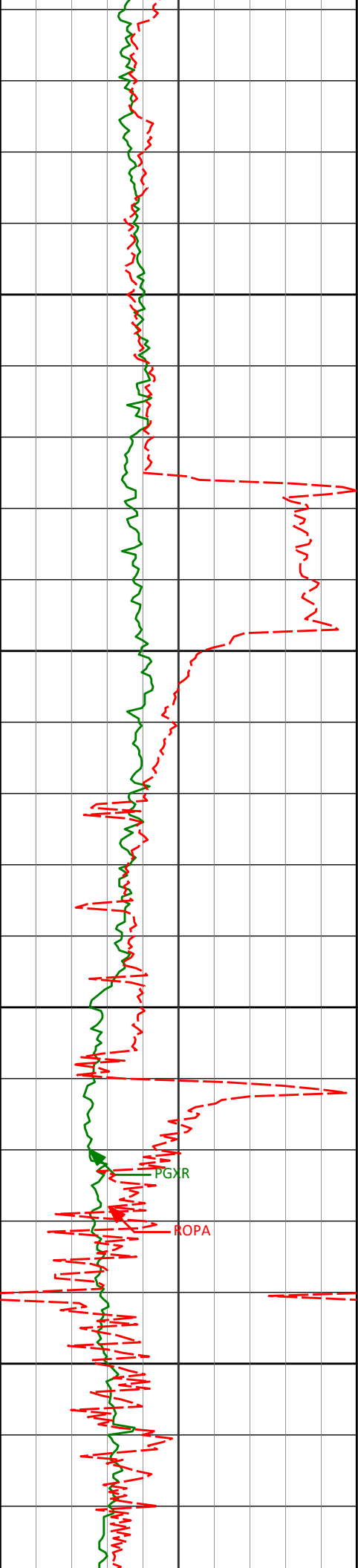
8722'

88.09°

182.32°

7303.91'

1671.06'



9000'

9050'

9100'

9150'

9065'

90.55°

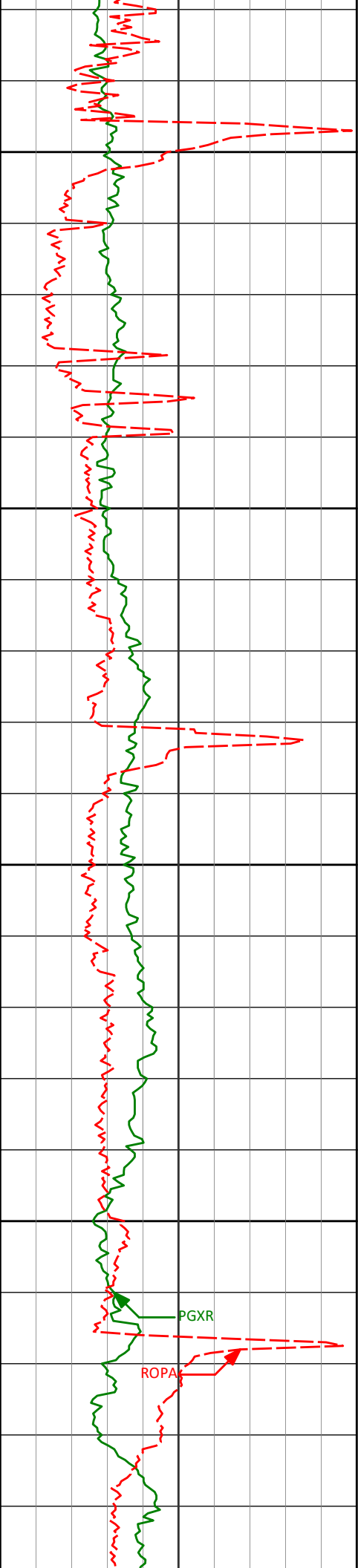
185.34°

7306.49'

2013.14'

PGXR

ROPA



9200'

9237'

89.63°

182.73°

7306.22'

2184.64'

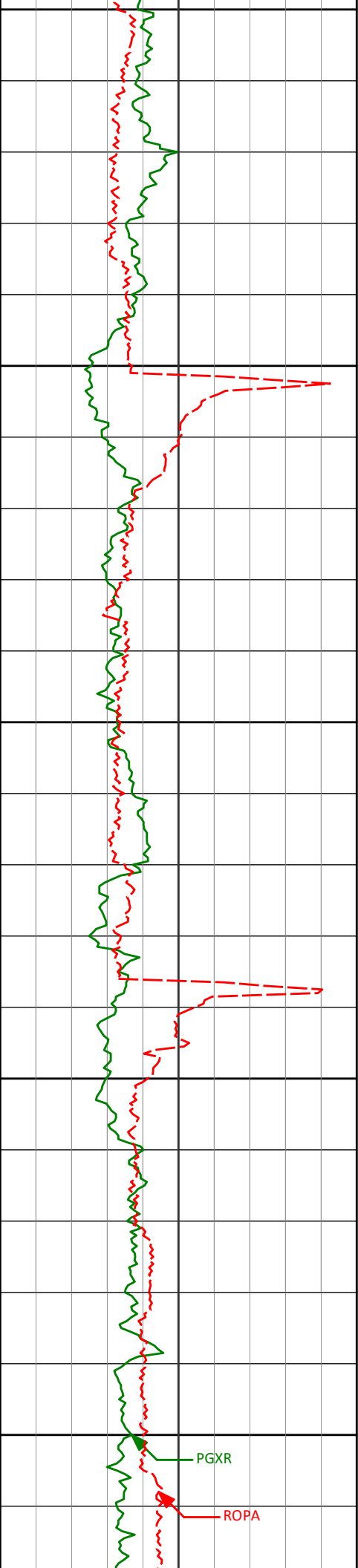
9250'

9300'

9350'

PGXR

ROPA



9400'

9408'

90.12°

181.47°

7306.59'

2355.50'

9450'

9500'

9550'

9579'

89.97°

180.72°

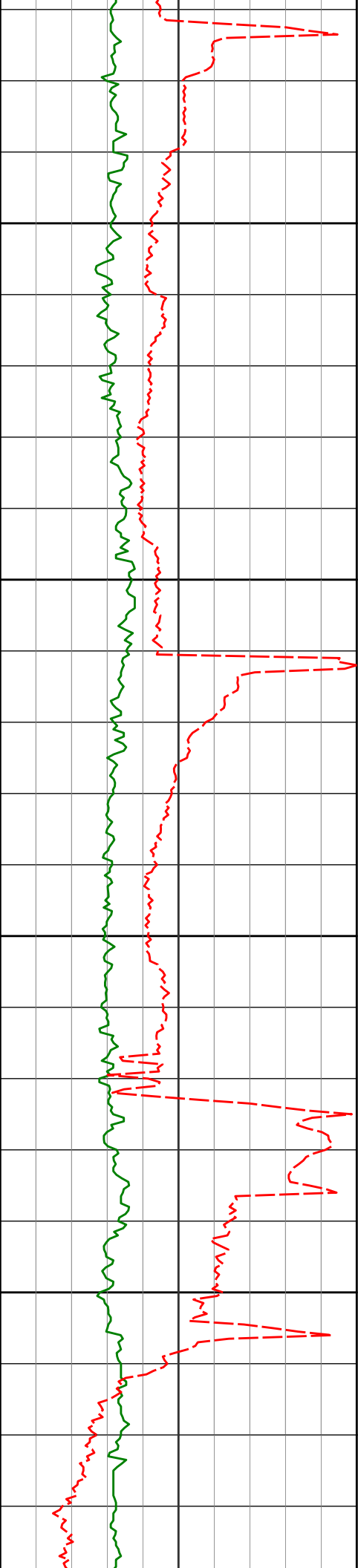
7306.46'

2526.45'

9600'

PGXR

ROPA



9650'

9700'

9750'

9757'

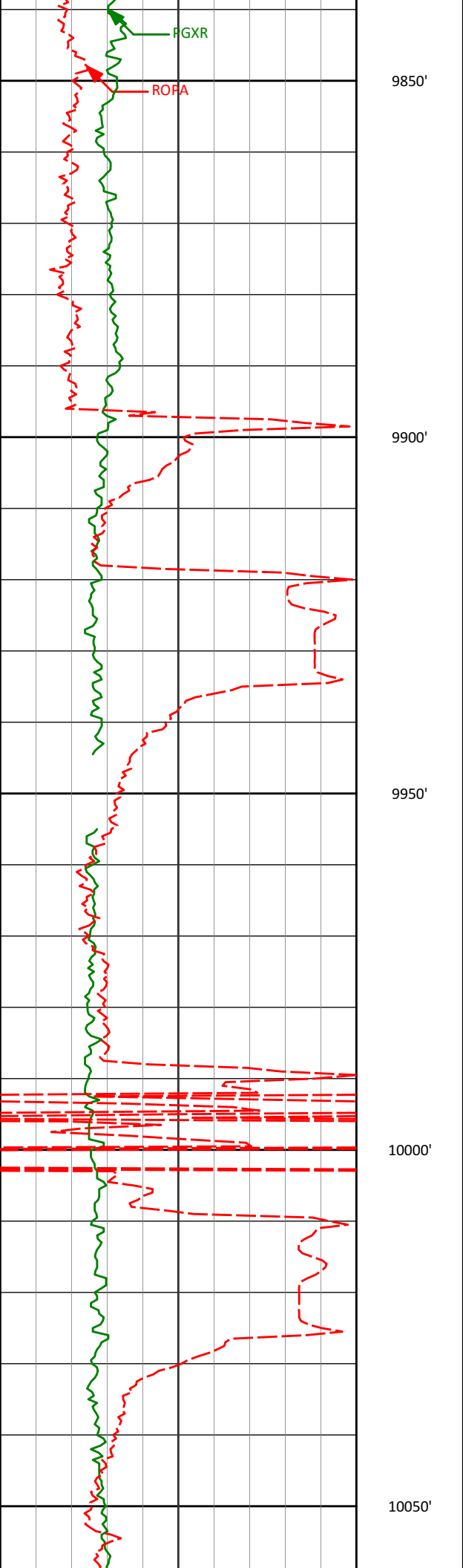
88.98°

178.53°

7308.09'

2704.43'

9800'



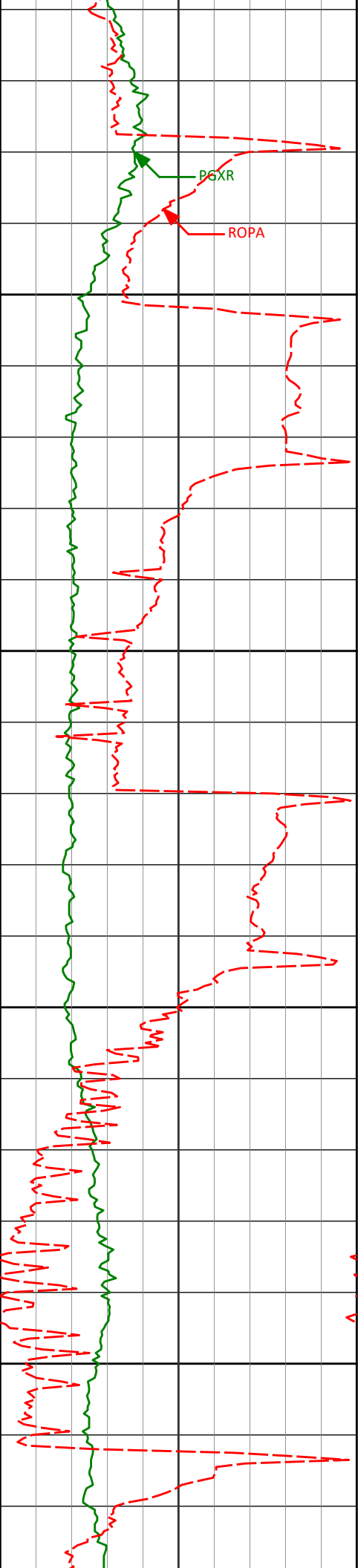
9941'

90.40°

180.05°

7309.09'

2888.41'



10100'

10125'

89.08°

182.12°

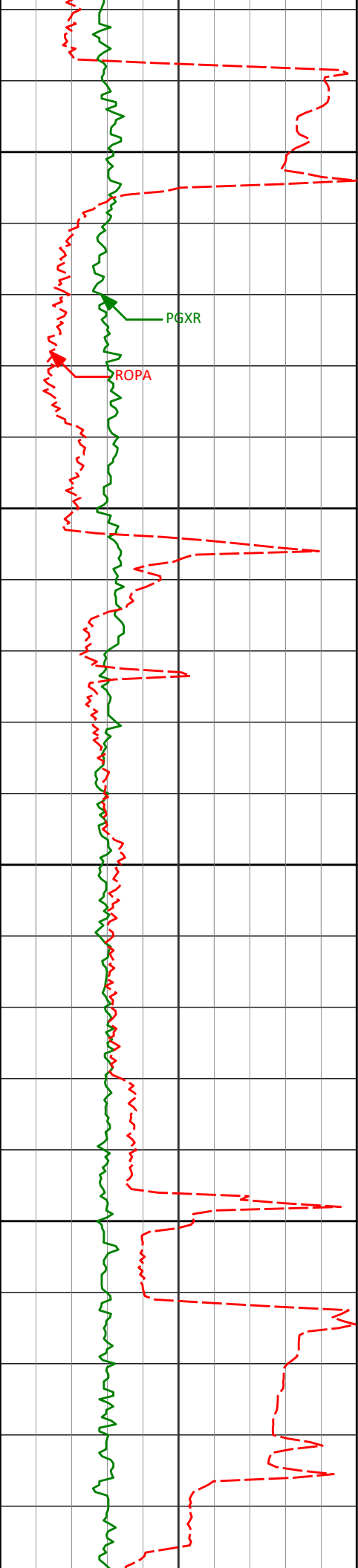
7309.92'

3072.34'

10150'

10200'

10250'



10300'

10309'

90.71°

184.57°

7310.26'

3255.96'

PGXR

ROPA

10350'

10400'

10450'

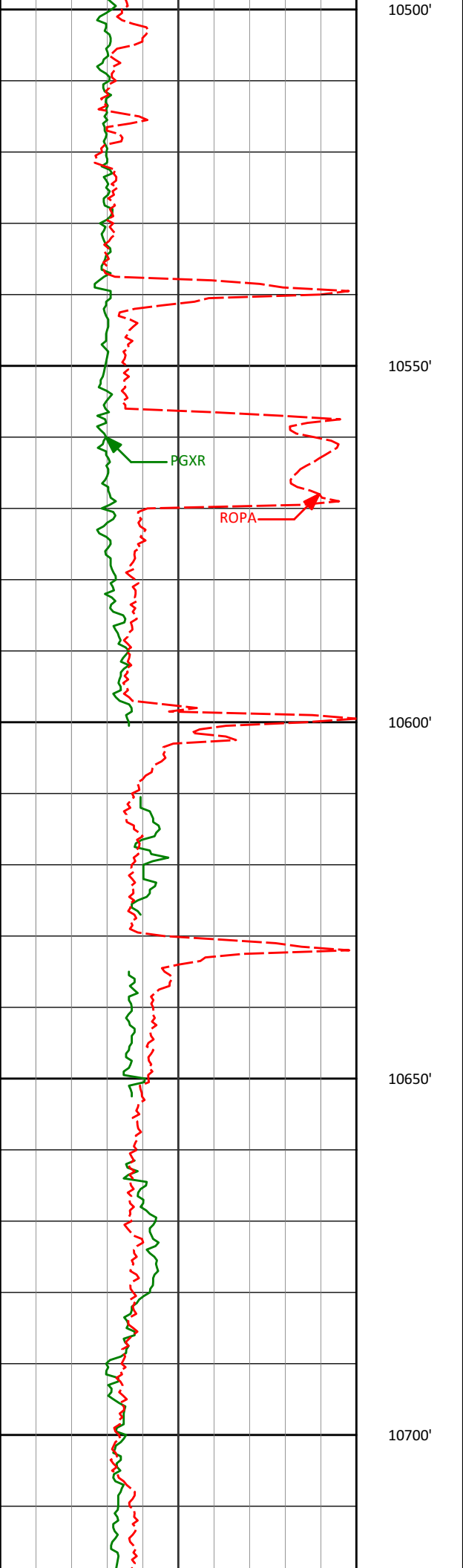
10494'

89.32°

184.97°

7310.21'

3440.25'



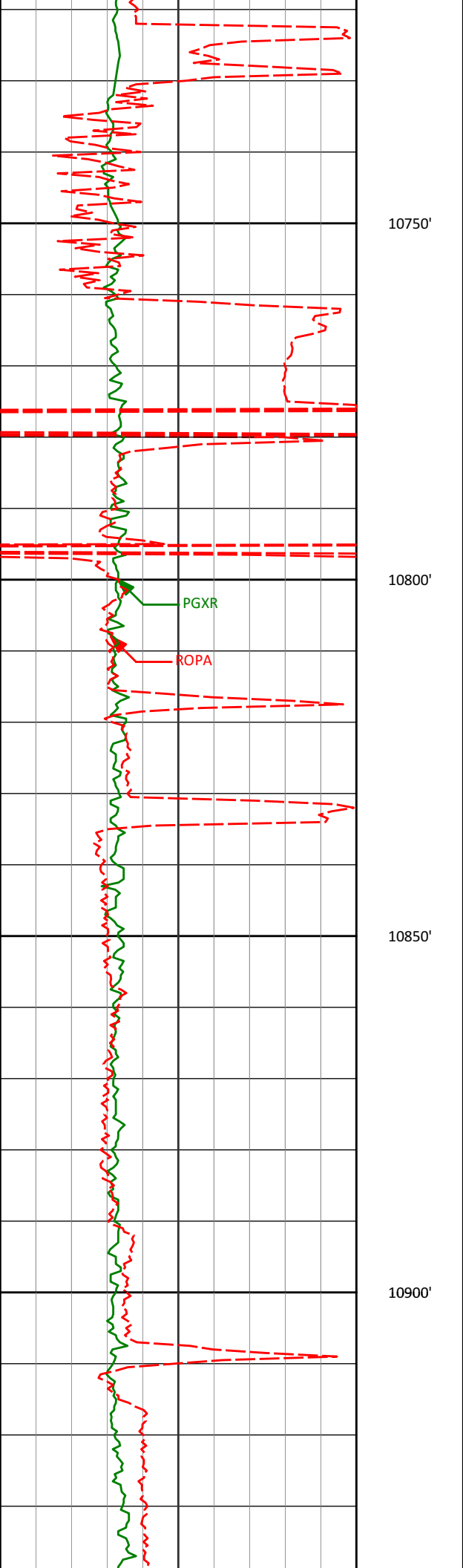
10678'

90.09°

182.49°

7311.16'

3623.79'



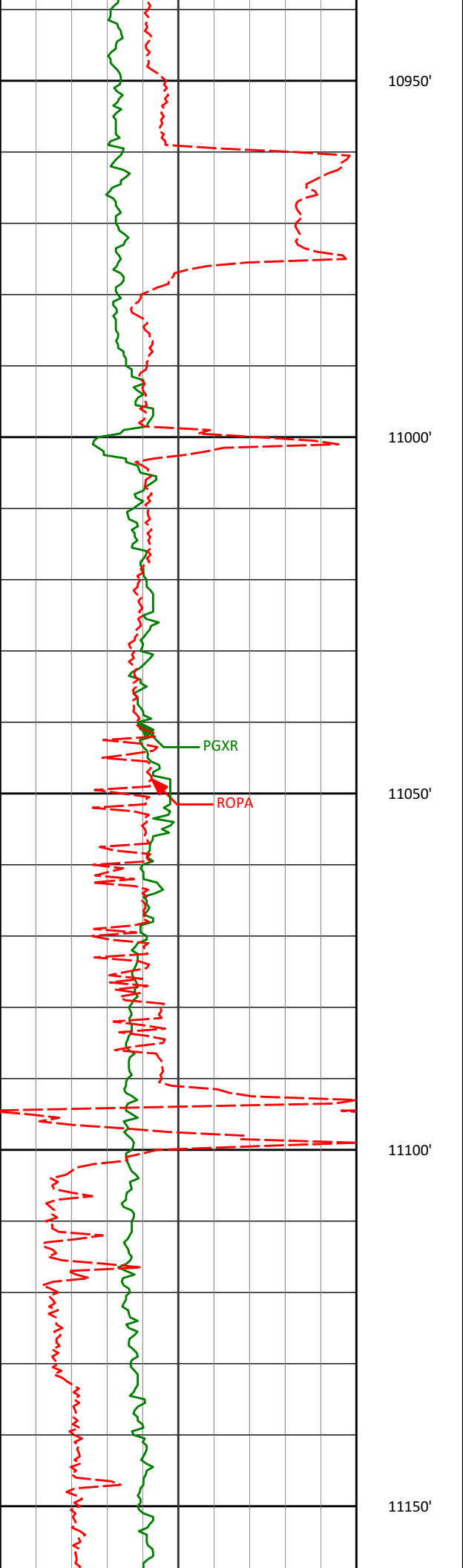
10861'

90.22°

183.13°

7310.66'

3806.53'



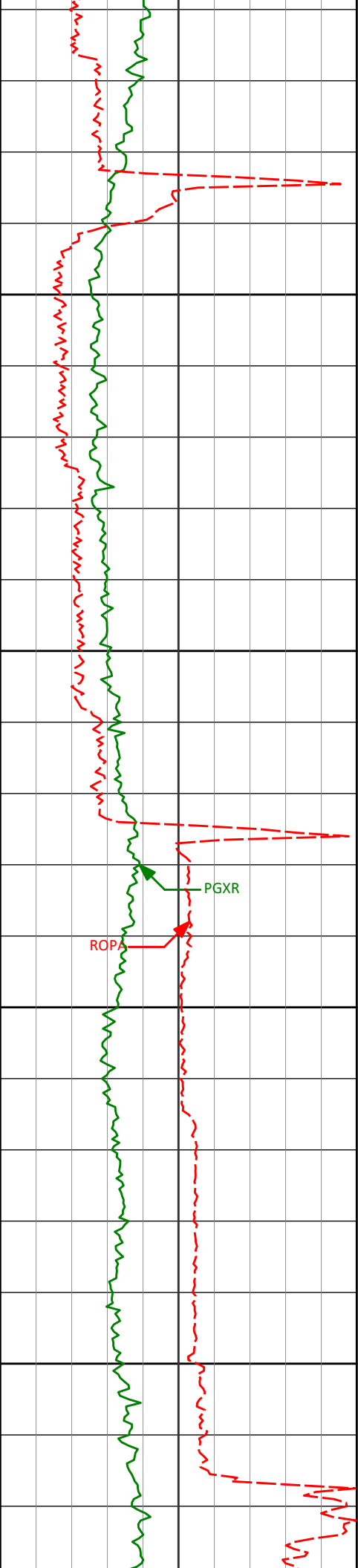
11044'

92.28°

183.95°

7306.67'

3989.08'



11200'

11226'

91.94°

181.46°

7299.97'

4170.70'

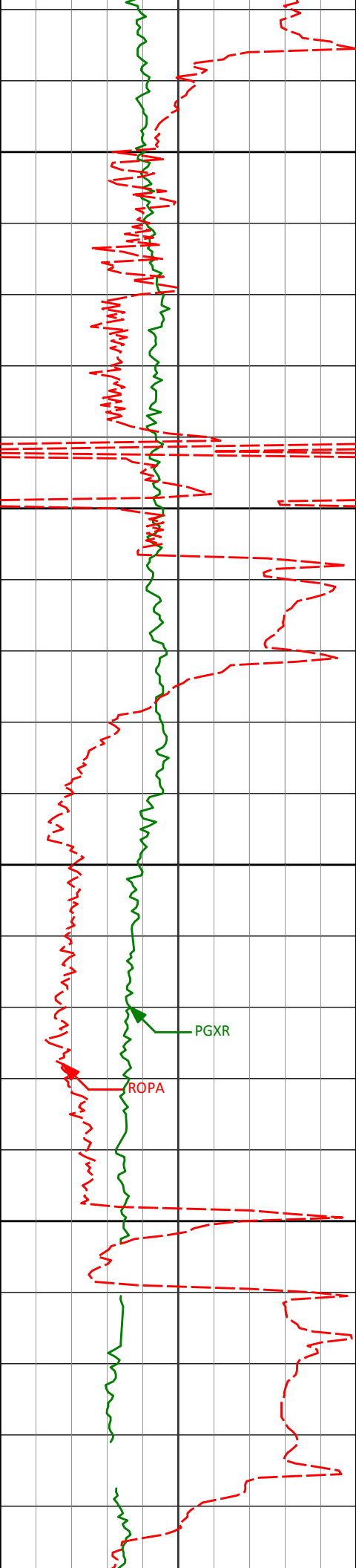
11250'

11300'

11350'

PGXR

ROPA



11400'

11408'

91.23°

179.35°

7294.93'

4352.61'

11450'

11500'

PGXR

ROPA

11550'

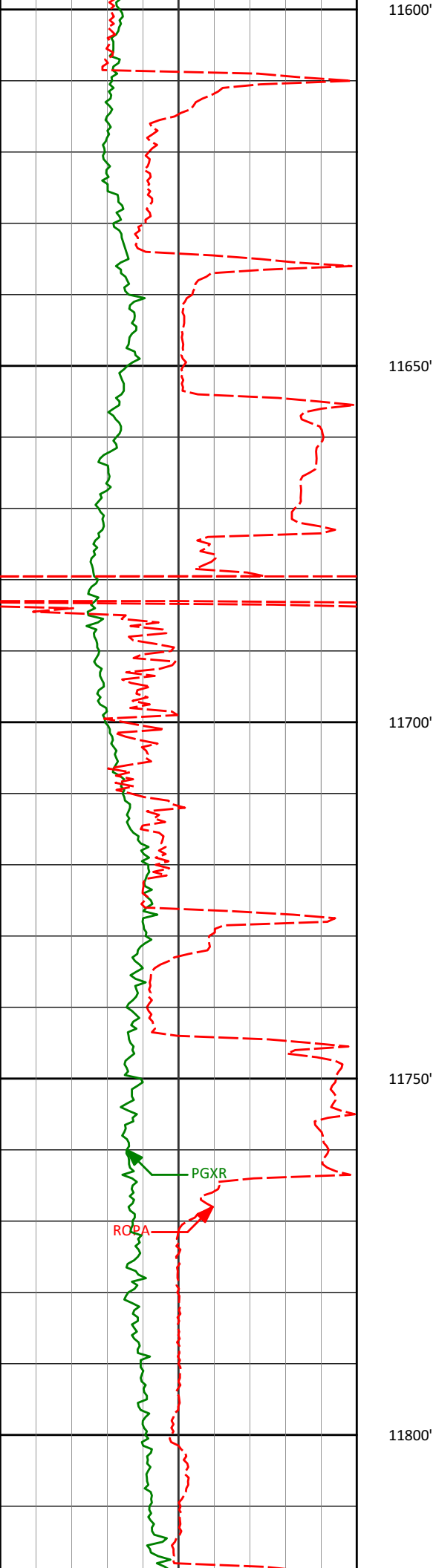
11591'

88.03°

180.03°

7296.12'

4535.58'



11600'

11650'

11700'

11750'

11800'

PGXR

ROBA

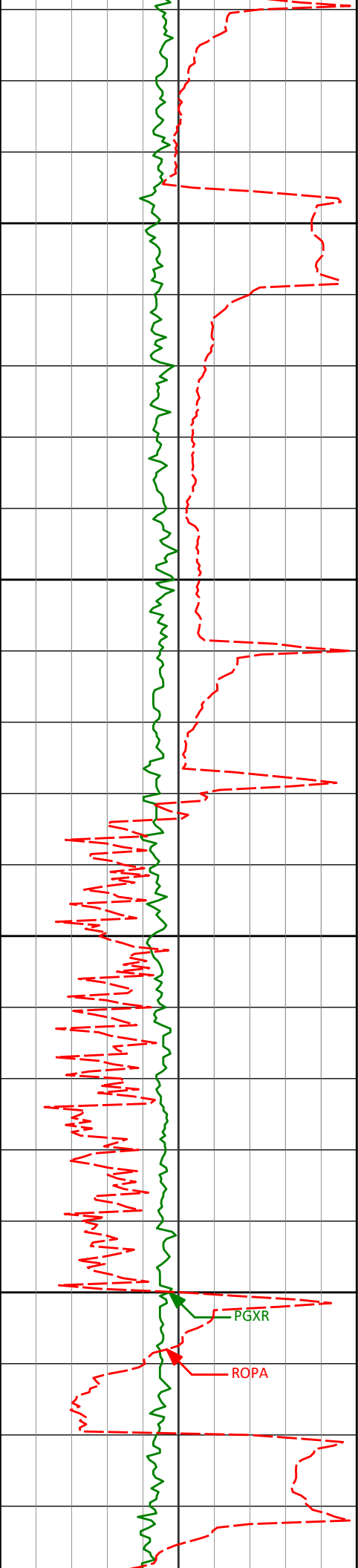
11774'

89.38°

184.32°

7300.25'

4718.32'



11850'

11900'

11950'

12000'

11956'

88.95°

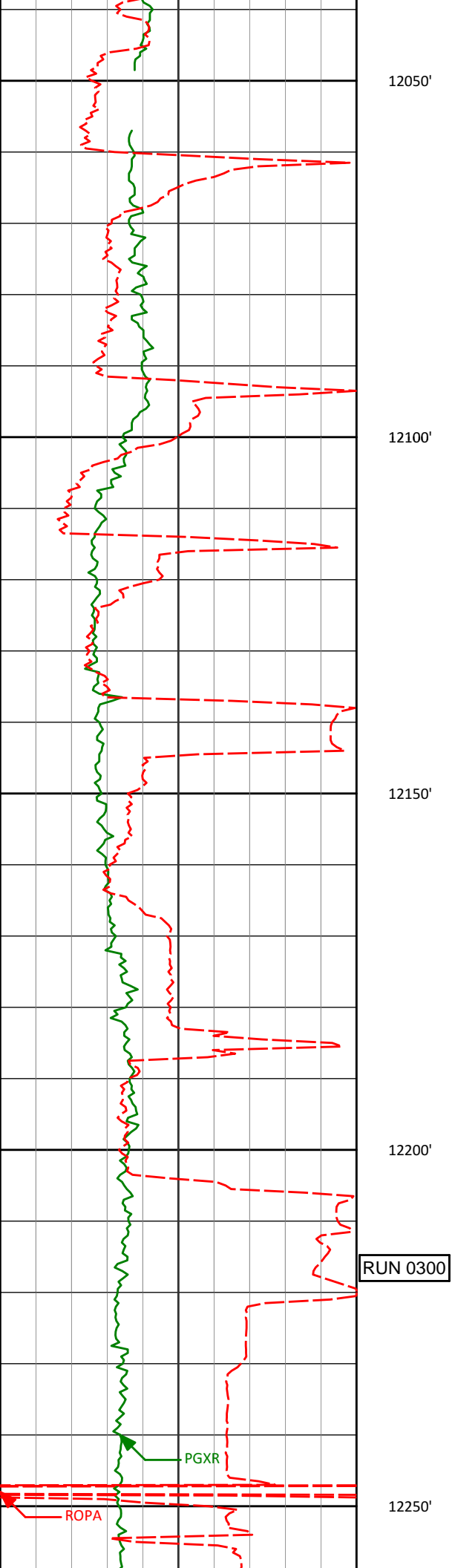
183.23°

7302.91'

4899.85'

PGXR

ROPA



12138'

90.12°

182.67°

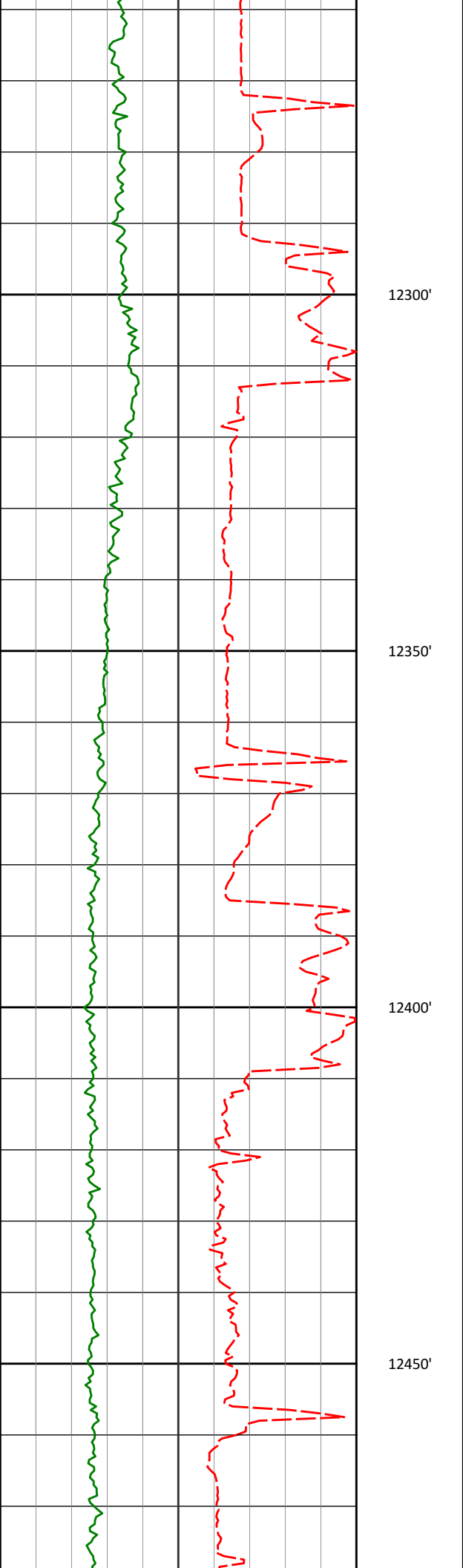
7304.38'

5081.56'

RUN 0300

PGXR

ROPA



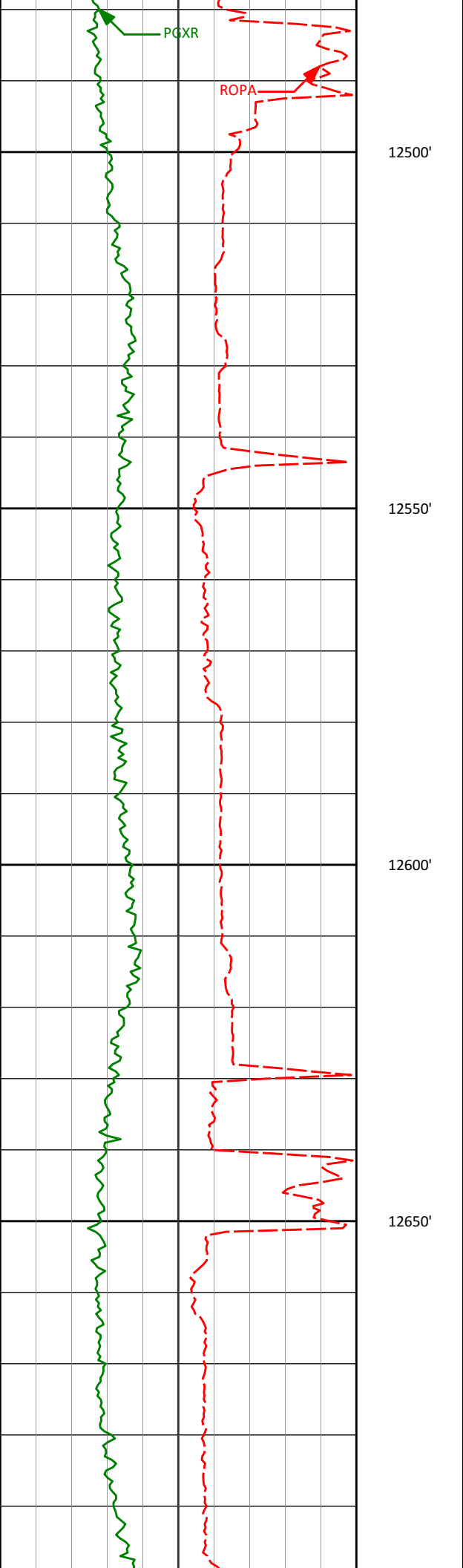
12320'

87.81°

177.03°

7307.67'

5263.44'



12498'

90.18°

173.72°

7310.79'

5440.86'

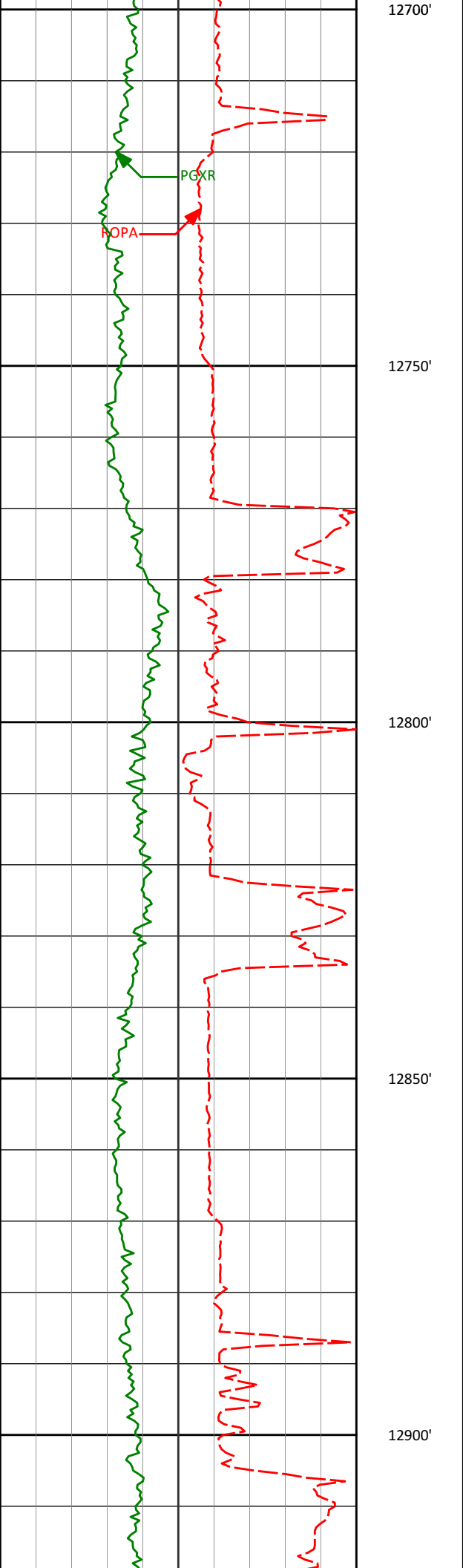
12669'

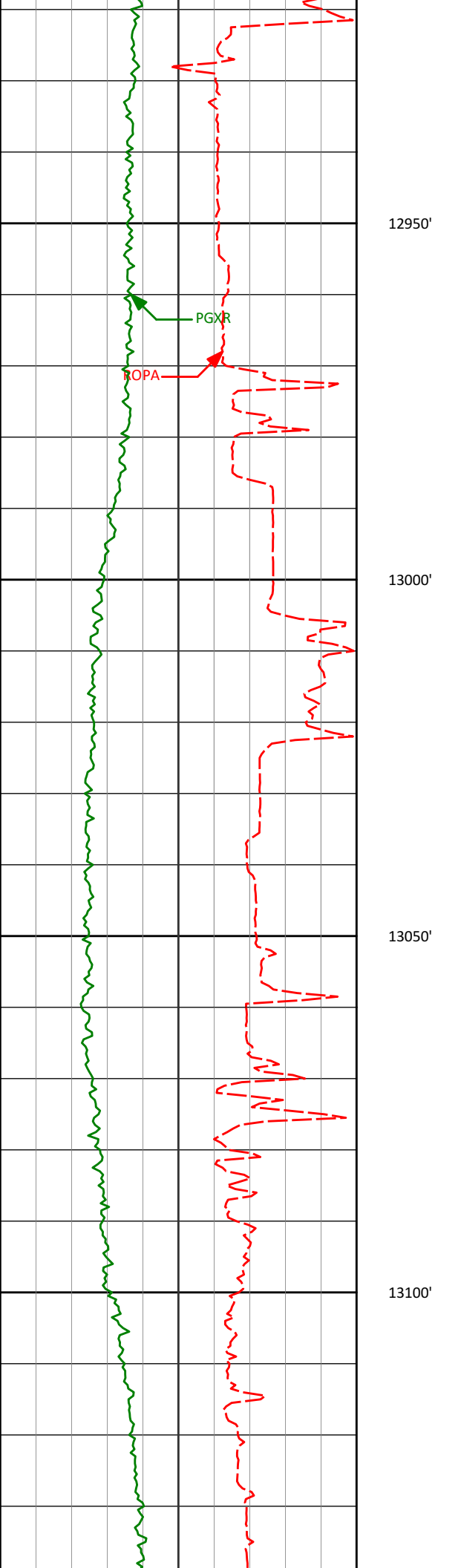
91.42°

173.14°

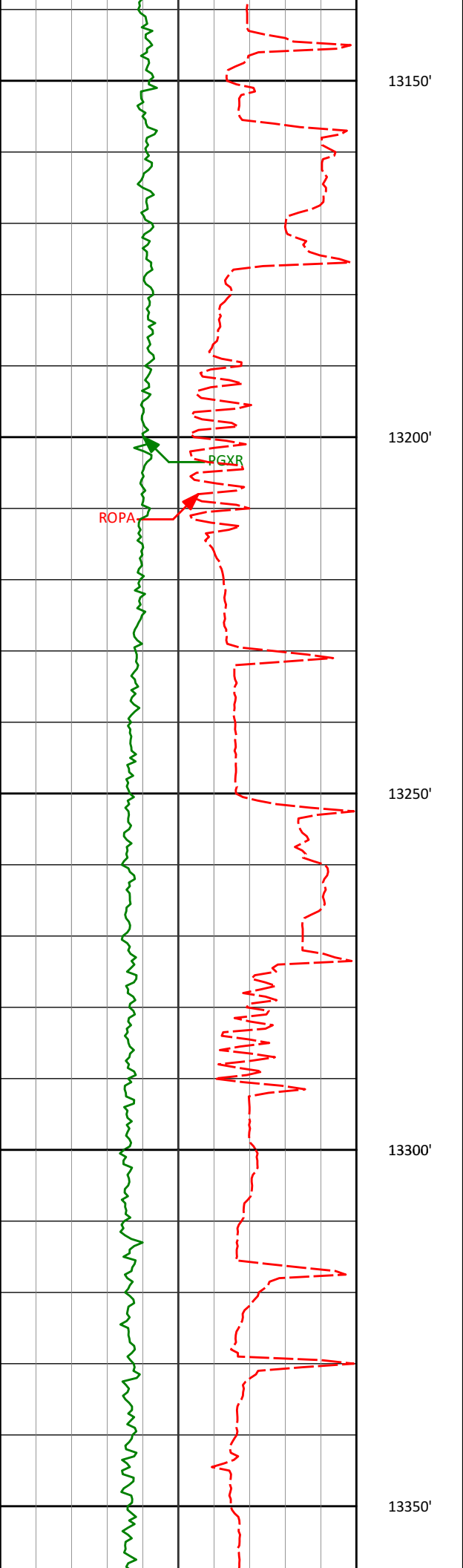
7308.41'

5610.80'





12950'					
13000'					
	13012'	90.49°	175.91°	7300.55'	5951.93'
13050'					
13100'					



13183'

90.37°

176.93°

7299.26'

6122.63'

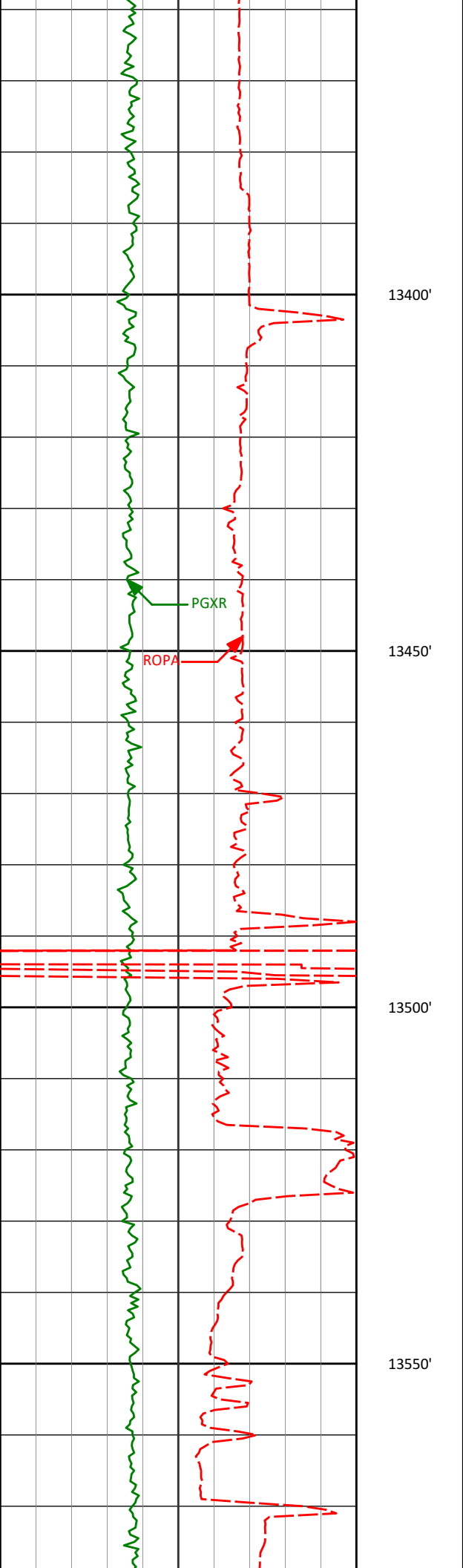
13354'

89.57°

178.32°

7299.35'

6293.51'



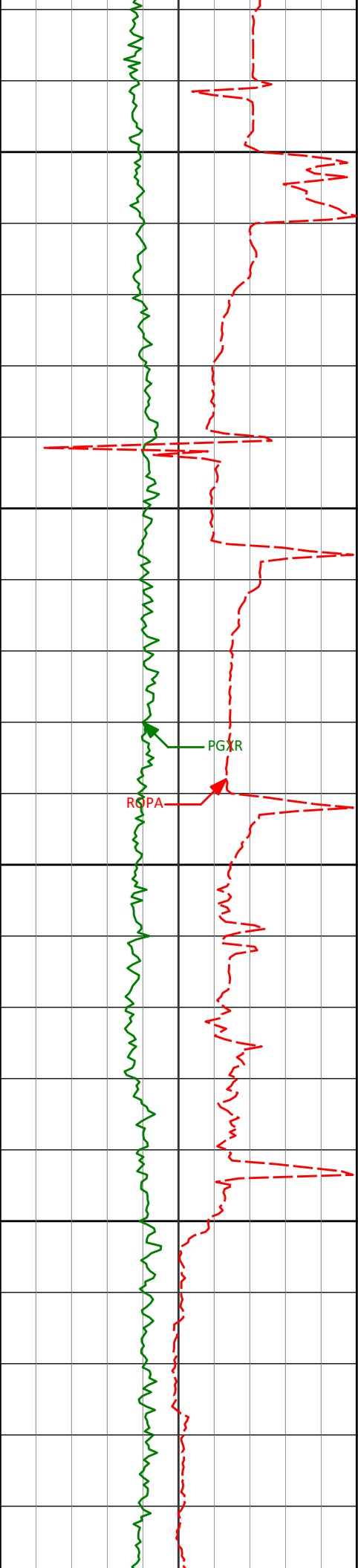
13525'

89.78°

178.52°

7300.32'

6464.46'



13600'

13650'

13700'

13750'

PGXR

RCPA

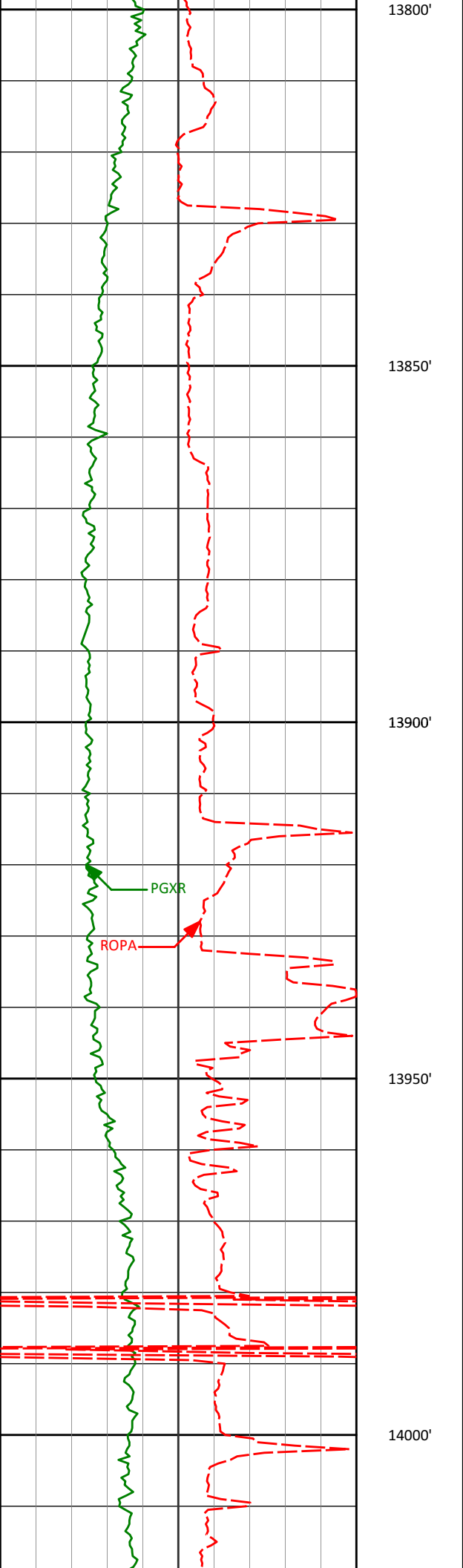
13696'

89.26°

179.13°

7301.76'

6635.43'



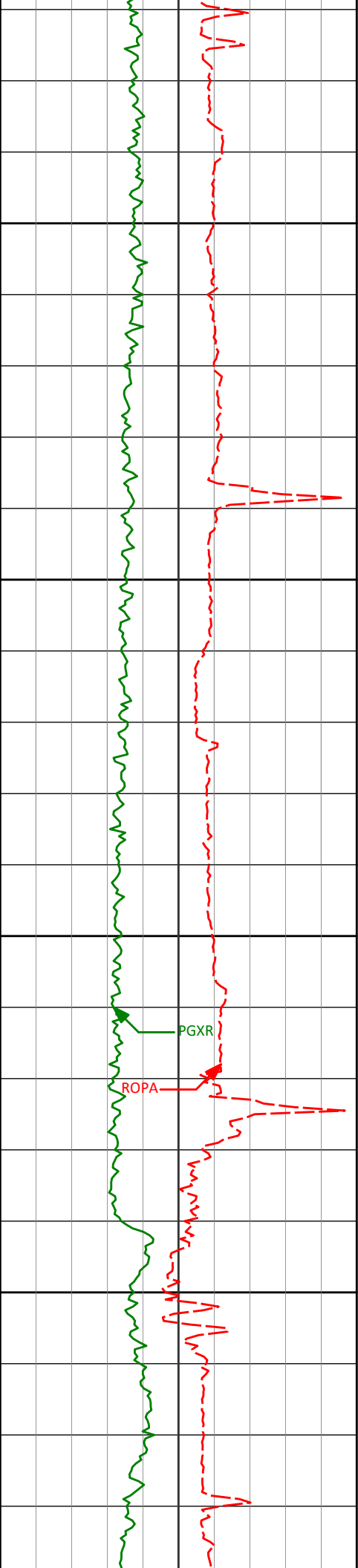
13868'

89.66°

178.49°

7303.38'

6807.40'



14039'

88.86°

177.20°

7305.58'

6978.28'

14050'

14100'

14150'

PGXR

ROPA

14200'

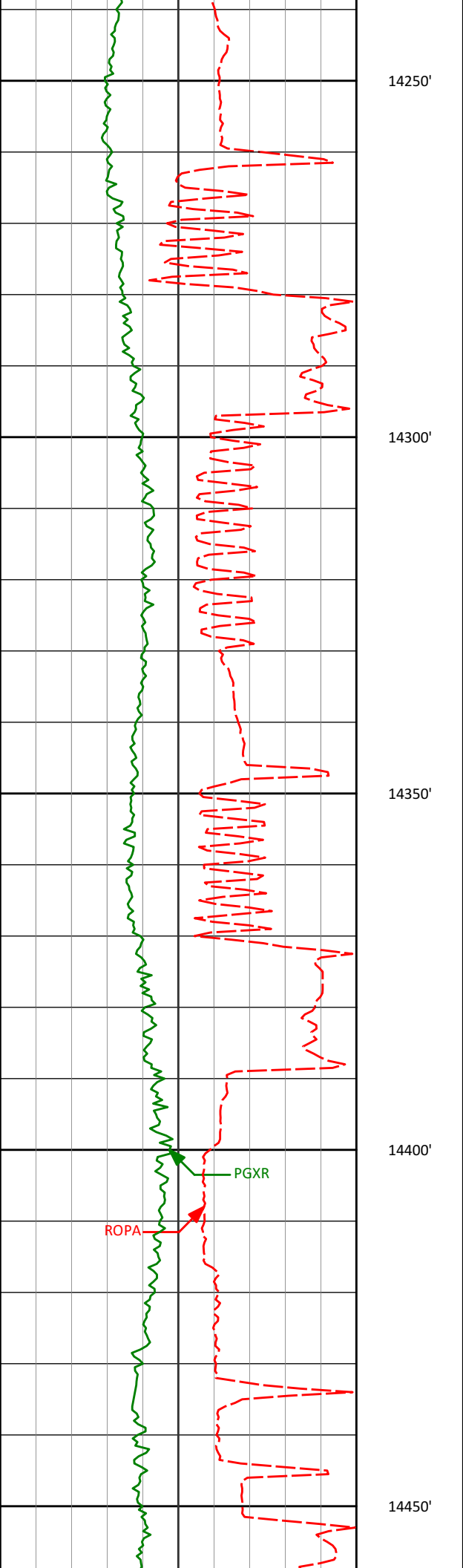
14211'

88.33°

174.62°

7309.80'

7149.83'



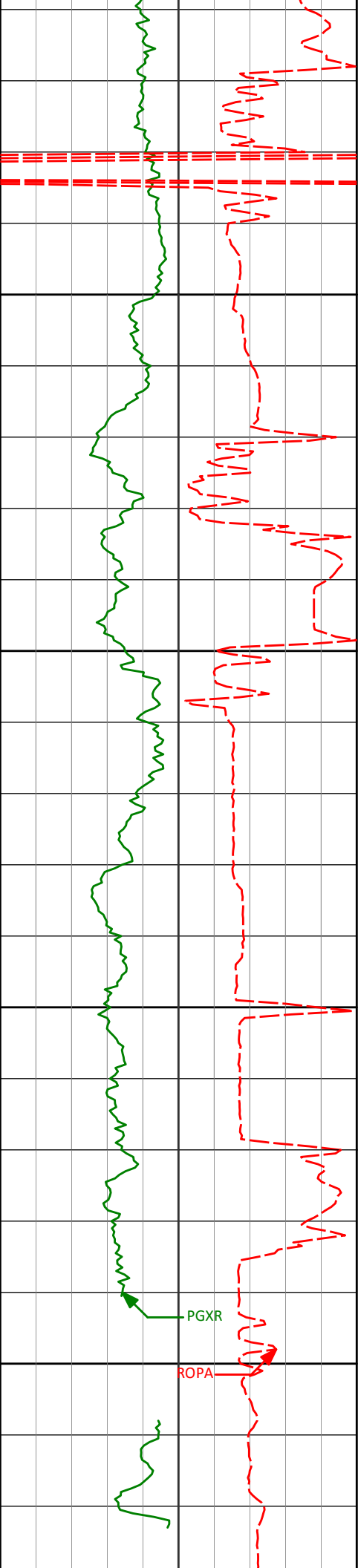
14382'

88.67°

176.84°

7314.28'

7320.33'



14500'

14550'

14600'

14650'

14554'

90.65°

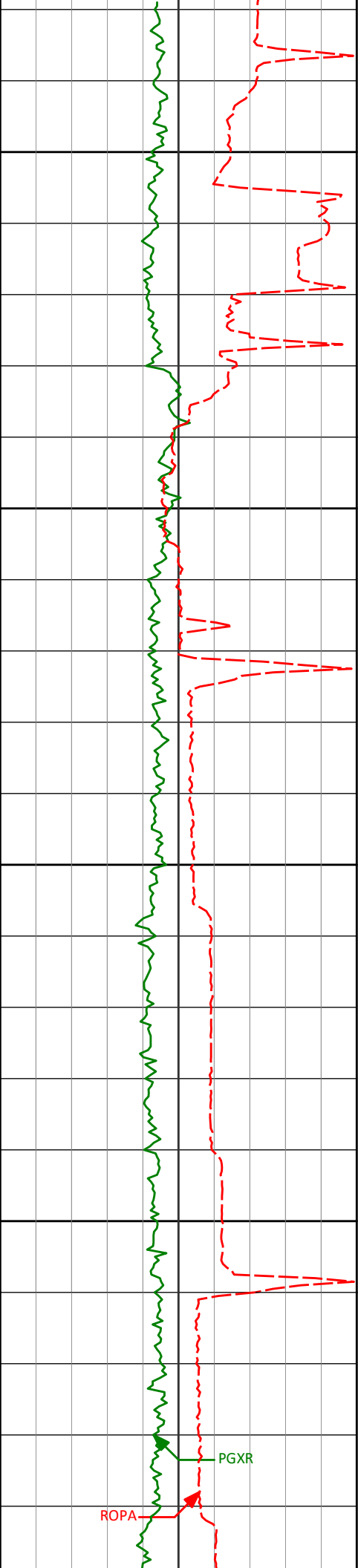
179.52°

7315.30'

7492.24'

PGXR

ROPA



14700'

14725'

88.83°

179.81°

7316.08'

7663.23'

14750'

14800'

14850'

PGXR

ROPA

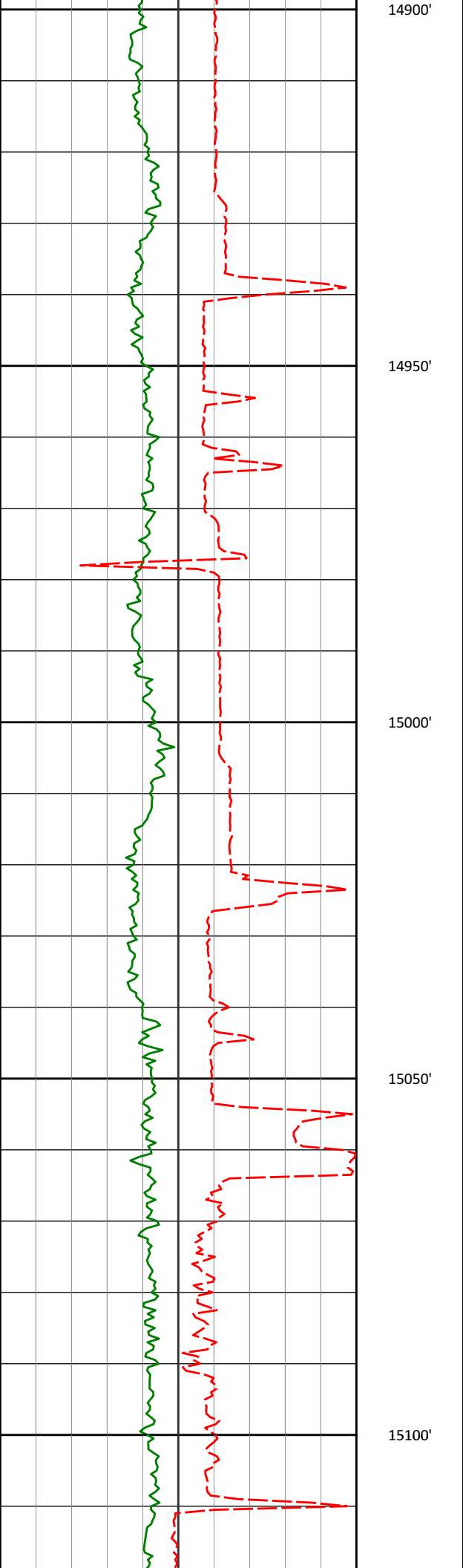
14896'

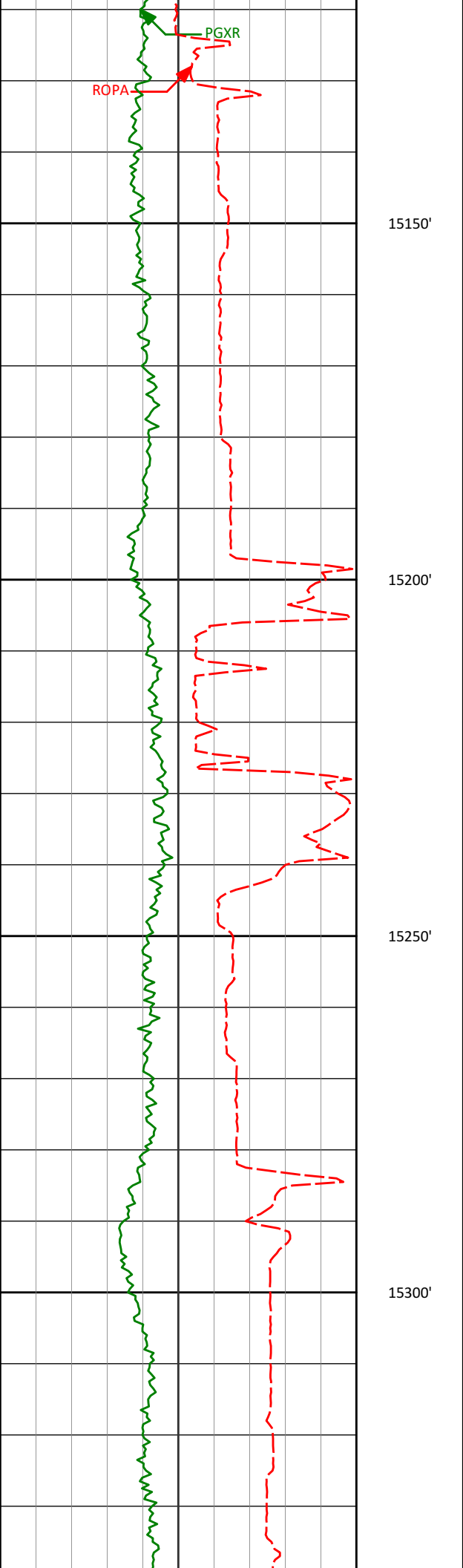
89.35°

180.18°

7318.79'

7834.21'





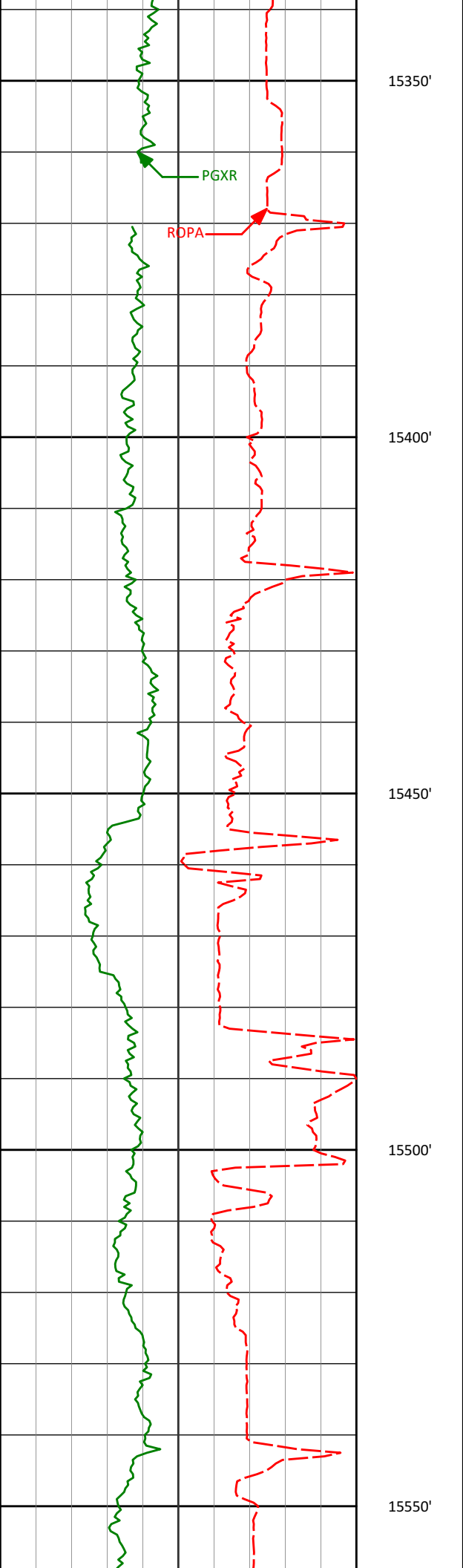
15239'

88.40°

179.62°

7323.80'

8177.16'



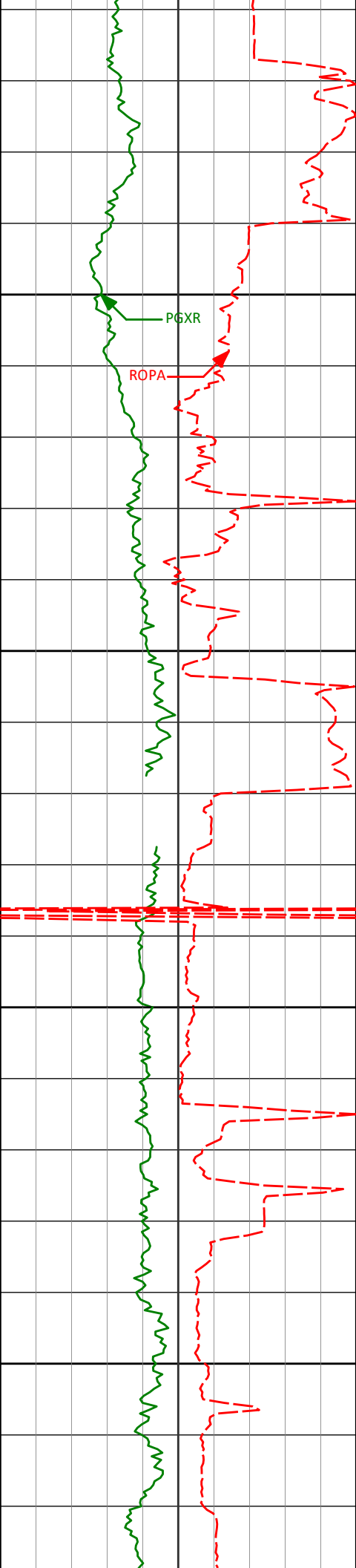
15410'

87.90°

178.67°

7329.32'

8348.06'



15582'

88.53°

175.84°

7334.68'

8519.80'

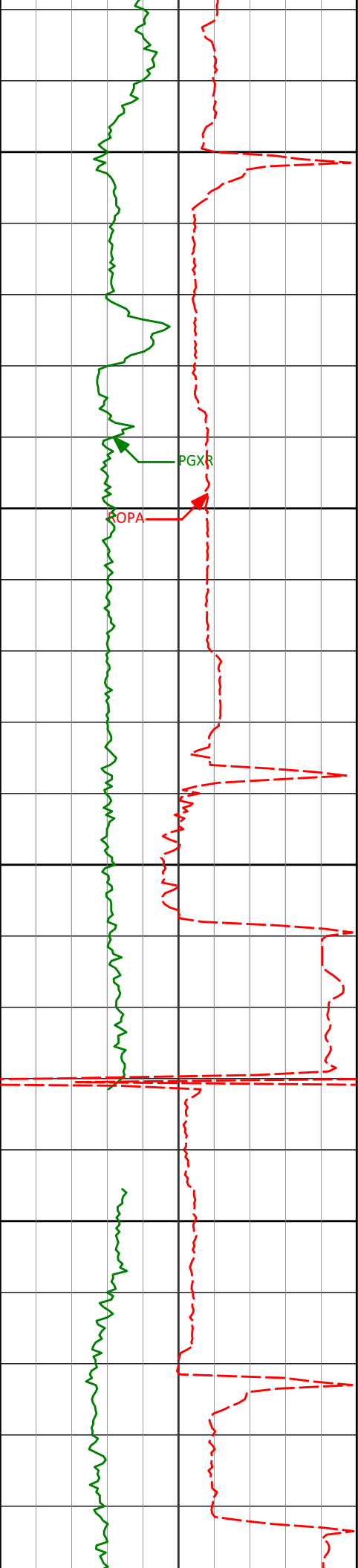
15754'

89.57°

173.89°

7337.53'

8691.13'



15800'

15850'

15900'

15950'

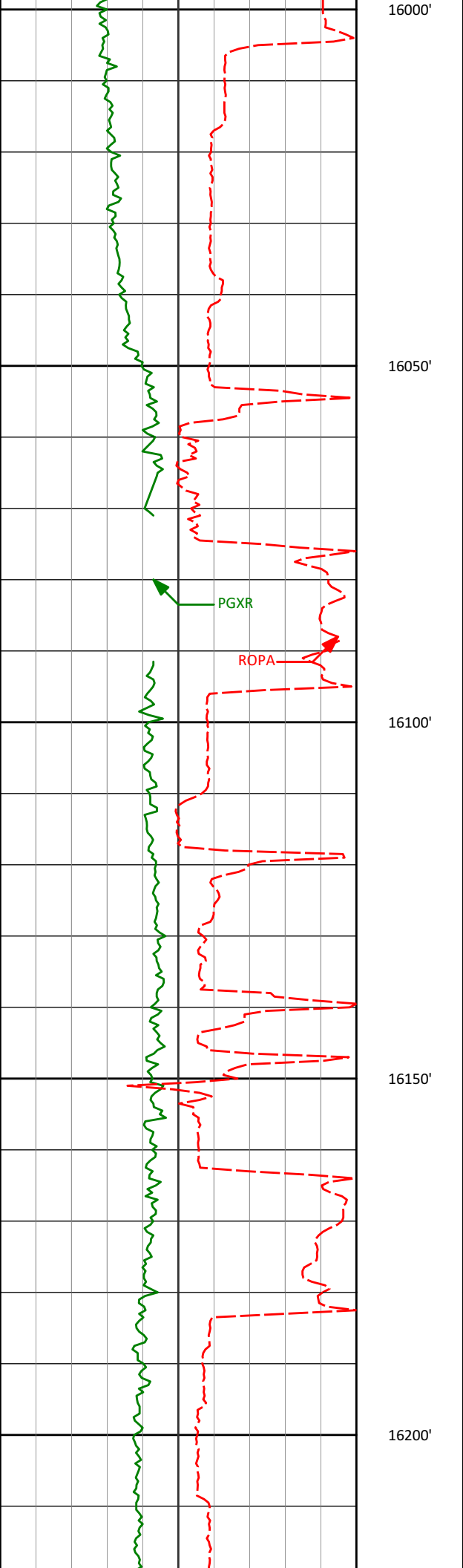
15925'

90.99°

174.64°

7336.70'

8861.34'



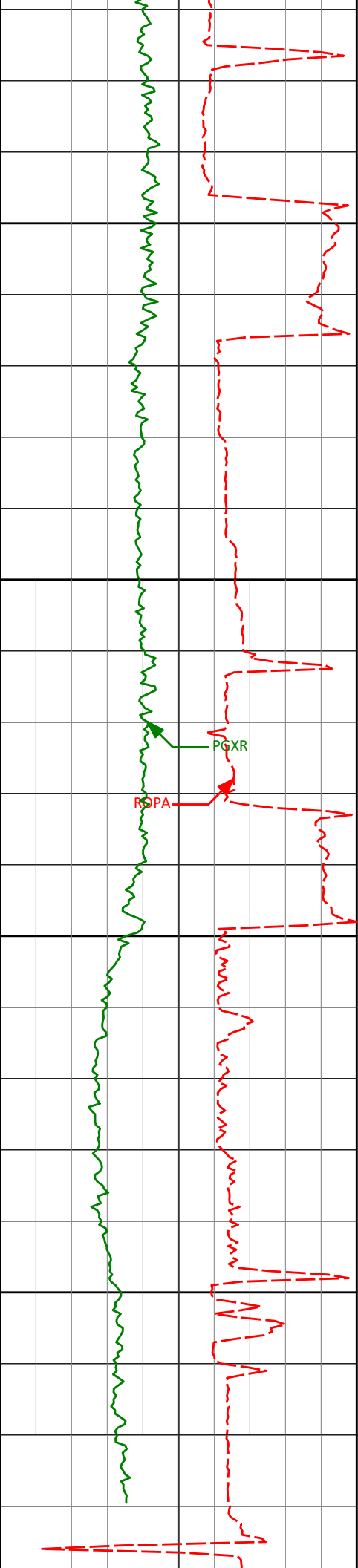
16097'

90.40°

177.35°

7334.61'

9032.94'



16268'

89.66°

179.22°

7334.52'

9203.87'

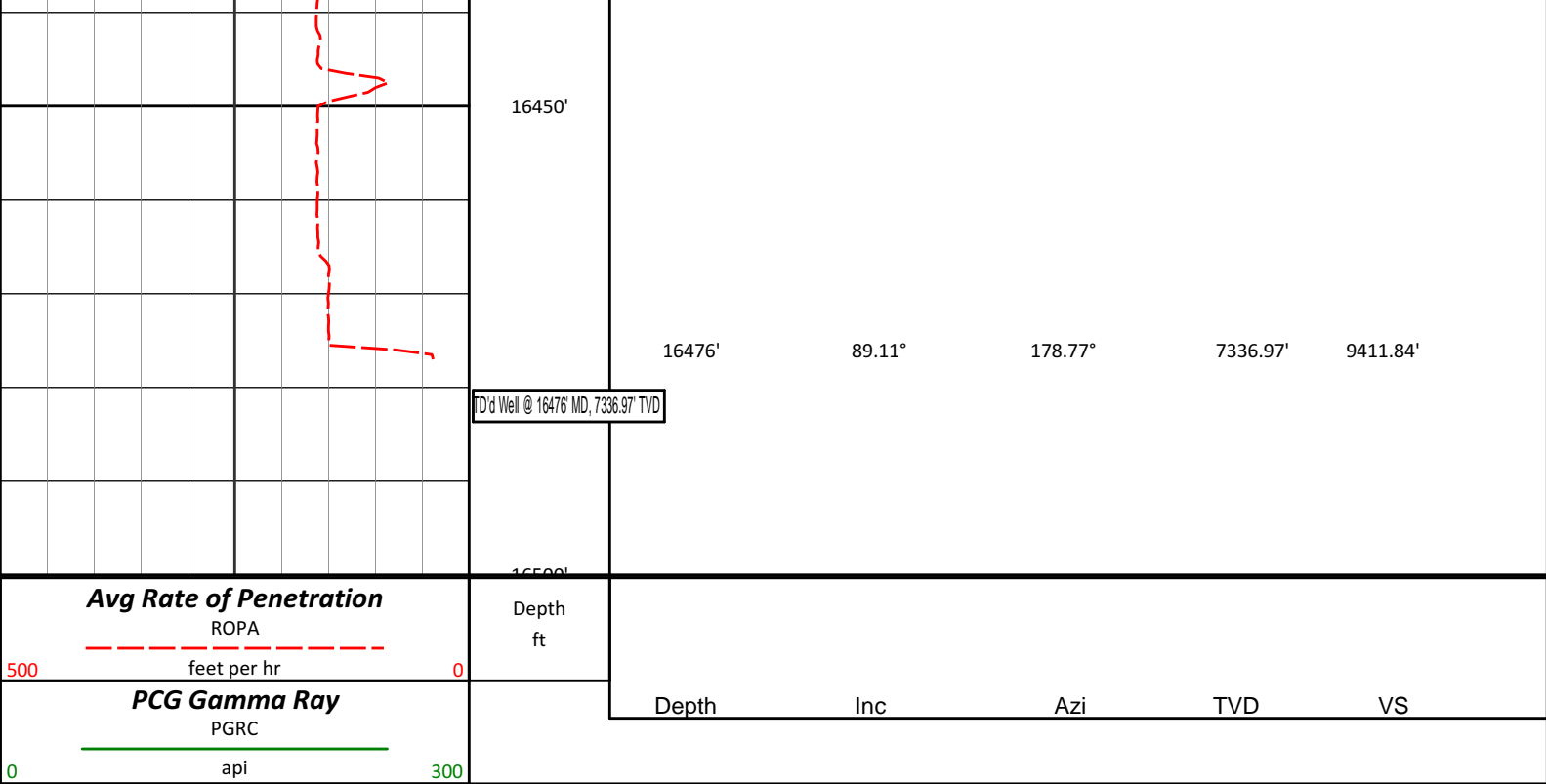
16431'

89.11°

178.77°

7336.27'

9366.85'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.
Batterball 3N-15HZ
Wattenberg
Weld Colorado
USA
CA-XX-0900752899

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
946.00	0.23	308.67	945.99	2.39 N	2.19 E	-2.38	TIE-IN
1107.00	0.46	187.27	1106.99	1.95 N	1.86 E	-1.94	0.38
1202.00	0.43	196.53	1201.99	1.23 N	1.71 E	-1.22	0.08
1297.00	0.47	205.81	1296.98	0.54 N	1.44 E	-0.53	0.09
1392.00	0.57	204.90	1391.98	0.24 S	1.07 E	0.25	0.11
1487.00	0.50	228.52	1486.97	0.94 S	0.56 E	0.95	0.24
1580.00	0.68	248.38	1579.97	1.42 S	0.26 W	1.42	0.29
1676.00	0.49	272.64	1675.96	1.61 S	1.20 W	1.60	0.32
1767.00	0.55	275.51	1766.96	1.55 S	2.02 W	1.54	0.07
1860.00	0.99	280.88	1859.95	1.35 S	3.26 W	1.34	0.48
1952.00	1.00	306.37	1951.94	0.73 S	4.68 W	0.71	0.48
2044.00	1.06	290.28	2043.92	0.04 N	6.13 W	-0.07	0.32
2137.00	1.15	301.18	2136.91	0.83 N	7.73 W	-0.86	0.25
2228.00	0.57	235.89	2227.90	1.04 N	8.89 W	-1.08	1.15
2320.00	0.22	129.60	2319.90	0.68 N	9.13 W	-0.71	0.72
2413.00	1.29	81.12	2412.89	0.72 N	7.96 W	-0.76	1.24
2505.00	0.96	76.81	2504.87	1.06 N	6.19 W	-1.08	0.37
2597.00	0.74	76.85	2596.86	1.37 N	4.86 W	-1.39	0.24
2689.00	0.37	57.12	2688.86	1.67 N	4.03 W	-1.68	0.45
2780.00	0.28	0.19	2779.85	2.05 N	3.78 W	-2.06	0.35
2872.00	0.26	22.32	2871.85	2.47 N	3.70 W	-2.48	0.11
2963.00	0.35	331.90	2962.85	2.90 N	3.75 W	-2.92	0.30
3053.00	0.40	322.12	3052.85	3.39 N	4.08 W	-3.41	0.09
3145.00	0.48	291.30	3144.85	3.79 N	4.63 W	-3.81	0.27
3327.00	0.82	306.46	3326.84	4.84 N	6.39 W	-4.86	0.21
3418.00	0.92	316.88	3417.82	5.76 N	7.41 W	-5.79	0.21
3510.00	1.50	271.04	3509.89	6.22 N	8.17 W	-6.22	1.22

3510.00	1.56	271.04	3509.80	6.32 N	9.17 W	-0.36	1.23
3601.00	2.60	263.63	3600.74	6.11 N	12.46 W	-6.16	1.18
3693.00	4.26	276.74	3692.58	6.28 N	17.93 W	-6.36	1.98
3784.00	6.05	271.24	3783.21	6.78 N	26.08 W	-6.89	2.04
3875.00	7.40	277.89	3873.58	7.69 N	36.68 W	-7.84	1.71
3966.00	9.30	281.38	3963.61	9.95 N	49.69 W	-10.15	2.16
4057.00	9.53	283.86	4053.39	13.20 N	64.22 W	-13.47	0.51
4148.00	10.19	279.89	4143.04	16.39 N	79.46 W	-16.72	1.04
4240.00	9.60	278.13	4233.67	18.87 N	95.07 W	-19.27	0.72
4332.00	8.97	275.93	4324.47	20.70 N	109.80 W	-21.16	0.79
4418.00	8.15	278.28	4409.51	22.27 N	122.50 W	-22.78	1.04
4504.00	7.63	272.46	4494.70	23.39 N	134.24 W	-23.95	1.11
4589.00	7.60	261.15	4578.95	22.77 N	145.43 W	-23.38	1.76
4674.00	7.19	255.61	4663.25	20.58 N	156.14 W	-21.24	0.97
4760.00	5.21	257.65	4748.74	18.41 N	165.17 W	-19.10	2.32
4846.00	3.37	261.55	4834.49	17.20 N	171.48 W	-17.92	2.17
4931.00	1.94	288.99	4919.40	17.30 N	175.31 W	-18.04	2.21
5017.00	0.37	261.12	5005.38	17.73 N	176.96 W	-18.47	1.89
5102.00	0.46	269.41	5090.38	17.69 N	177.58 W	-18.43	0.13
5188.00	0.37	283.51	5176.38	17.75 N	178.19 W	-18.50	0.16
5274.00	0.41	97.18	5262.38	17.78 N	178.16 W	-18.52	0.91
5359.00	0.55	83.85	5347.38	17.78 N	177.45 W	-18.52	0.21
5445.00	0.40	92.05	5433.37	17.81 N	176.74 W	-18.56	0.19
5530.00	0.47	89.12	5518.37	17.81 N	176.09 W	-18.55	0.09
5616.00	0.38	71.55	5604.37	17.91 N	175.47 W	-18.64	0.18
5702.00	0.20	34.25	5690.37	18.12 N	175.11 W	-18.85	0.29
5788.00	0.00	121.73	5776.37	18.24 N	175.03 W	-18.98	0.23
5873.00	0.37	195.12	5861.37	17.98 N	175.10 W	-18.71	0.44
5959.00	0.71	151.25	5947.36	17.24 N	174.92 W	-17.98	0.60
6045.00	0.68	137.38	6033.36	16.40 N	174.32 W	-17.13	0.20
6130.00	0.68	155.01	6118.35	15.57 N	173.76 W	-16.30	0.25
6216.00	0.55	173.70	6204.35	14.70 N	173.50 W	-15.43	0.28
6302.00	0.44	169.23	6290.34	13.96 N	173.39 W	-14.69	0.14
6387.00	0.50	184.83	6375.34	13.27 N	173.36 W	-14.00	0.17
6473.00	0.51	186.53	6461.34	12.52 N	173.44 W	-13.25	0.02
6559.00	0.56	197.23	6547.33	11.74 N	173.61 W	-12.47	0.13
6645.00	0.31	203.24	6633.33	11.12 N	173.82 W	-11.85	0.30
6688.00	0.65	188.52	6676.33	10.78 N	173.91 W	-11.50	0.83
6730.00	5.43	193.06	6718.26	8.60 N	174.39 W	-9.33	11.39
6773.00	10.46	192.38	6760.83	2.80 N	175.69 W	-3.54	11.70
6816.00	12.58	191.05	6802.96	5.60 S	177.42 W	4.86	4.97
6859.00	15.91	185.38	6844.64	16.07 S	178.87 W	15.32	8.39
6902.00	19.26	181.17	6885.62	29.03 S	179.57 W	28.28	8.33
6945.00	22.78	181.00	6925.75	44.45 S	179.86 W	43.70	8.19
6987.00	27.25	176.35	6963.81	62.19 S	179.39 W	61.44	11.62
7030.00	31.60	177.09	7001.25	83.27 S	178.19 W	82.53	10.15
7073.00	36.46	177.09	7036.88	107.30 S	176.97 W	106.56	11.30
7116.00	40.49	177.45	7070.54	134.02 S	175.70 W	133.28	9.39
7159.00	42.89	177.40	7102.64	162.59 S	174.41 W	161.85	5.58
7202.00	47.33	178.98	7132.98	193.03 S	173.47 W	192.30	10.65
7244.00	52.94	179.79	7159.89	225.25 S	173.13 W	224.52	13.44
7287.00	57.42	179.81	7184.44	260.54 S	173.01 W	259.81	10.42
7330.00	61.10	180.89	7206.42	297.49 S	173.24 W	296.76	8.83
7373.00	63.65	181.13	7226.35	335.58 S	173.91 W	334.85	5.95
7416.00	67.08	181.43	7244.28	374.65 S	174.79 W	373.91	8.00
7459.00	70.67	180.80	7259.77	414.75 S	175.57 W	414.01	8.46
7501.00	72.60	180.45	7273.00	454.60 S	176.00 W	453.86	4.66
7544.00	75.99	180.79	7284.64	495.99 S	176.45 W	495.25	7.92
7587.00	81.02	181.36	7293.21	538.11 S	177.24 W	537.36	11.77
7630.00	86.46	181.84	7297.89	580.82 S	178.43 W	580.06	12.70
7643.00	87.53	182.96	7298.58	593.79 S	178.98 W	593.03	11.91
7694.00	89.23	184.06	7300.02	644.67 S	182.10 W	643.90	3.97
7866.00	88.49	182.67	7303.44	816.33 S	192.19 W	815.52	0.92
8037.00	89.54	181.56	7306.38	987.18 S	198.50 W	986.34	0.89
8208.00	90.65	181.66	7306.10	1158.11 S	203.31 W	1157.25	0.65
8379.00	91.33	180.05	7303.14	1329.06 S	205.86 W	1328.19	1.02
8551.00	90.03	180.38	7301.10	1501.05 S	206.50 W	1500.17	0.78
8722.00	88.09	182.32	7303.91	1671.96 S	210.53 W	1671.06	1.60
8894.00	89.82	183.75	7307.04	1843.68 S	219.64 W	1842.74	1.30
9065.00	90.55	185.34	7306.49	2014.13 S	233.19 W	2013.14	1.02
9237.00	89.63	182.73	7306.22	2185.69 S	245.29 W	2184.64	1.61
9408.00	90.12	181.47	7306.59	2356.57 S	251.55 W	2355.50	0.79

9579.00	89.97	180.72	7306.46	2527.54 S	254.82 W	2526.45	0.45
9757.00	88.98	178.53	7308.09	2705.51 S	253.66 W	2704.43	1.35
9941.00	90.40	180.05	7309.09	2889.49 S	251.38 W	2888.41	1.13

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 179.76 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.62 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 9941.00 FEET
IS 2900.40 FEET ALONG 184.97 DEGREES (TRUE)**

Directional Surveys tied onto Gyro's @ 946'. Final survey is a straight line projection to bit.

Date Printed:18 November 2013